

Flat Earth/Flat Wrong

**An Historical, Biblical
& Scientific Analysis**

Flat Earth/ Flat Wrong: An Historical, Biblical and Scientific Analysis is authored by Robert A. Sungenis, Ph.D.

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NB: The Scripture portions of this book come mainly from the 1951 Revised Standard Version, but other translations are used when appropriate, and the author has also given his own translation at times. Greek and Hebrew font is taken from www.teknia.com and all Hebrew fonts are transcribed without Masoretic vowel pointing.

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NB: Much consideration has been given in this book to address as many flat-earther arguments as possible in the limited space available. If after reading the book you believe a significant argument has not been addressed, feel free to write to the author at www.flatEarthflatWrong.com and you will receive a reply.

10 9 8 7 6 5 4 3

Abbreviations for the Books of Scripture

New Testament

Mt	Matthew
Mk	Mark
Lk	Luke
Jn	John
Ac	Acts
Rm	Romans
1Co	1 Corinthians
2Co	2 Corinthians
Gl	Galatians
Ep	Ephesians
Ph	Philippians
Cl	Colossians
1Th	1 Thessalonians
2Th	2 Thessalonians
1Tm	1 Timothy
2Tm	2 Timothy
Ti	Titus
Pm	Philemon
Hb	Hebrews
Jm	James
1Pt	1 Peter
2Pt	2 Peter
1Jn	1 John
2Jn	2 John
3Jn	3 John
Jd	Jude
Ap	Apocalypse (Revelation)

Old Testament

Gn	Genesis
Ex	Exodus
Lv	Leviticus
Nm	Numbers
Dt	Deuteronomy

Js	Joshua
Jg	Judges
Rt	Ruth
1Sm	1 Samuel
2Sm	2 Samuel
1Kg	1 Kings
2Kg	2 Kings
1Ch	1 Chronicles
2Ch	2 Chronicles
Er	Ezra
Nh	Nehemiah
Tb	Tobit
Jt	Judith
Et	Esther
1Mc	1 Maccabees
2Mc	2 Maccabees
Jb	Job
Ps	Psalms
Pr	Proverbs
Ec	Ecclesiastes
Sg	Song of Solomon
Ws	Wisdom
Es	Ecclesiasticus
Is	Isaiah
Jr	Jeremiah
Lm	Lamentations
Br	Baruch
Ez	Ezekiel
Dn	Daniel
Hs	Hosea
Jl	Joel
Am	Amos
Ob	Obadiah
Jh	Jonah
Mc	Micah
Na	Nahum
Hk	Habakkuk
Zp	Zephaniah
Hg	Haggai
Zc	Zechariah
Ml	Malachi

Authoritative Sources

ACCS	Ancient Christian Commentary on Scripture
ACW	Ancient Christian Writers Series
AHL	Analytical Hebrew/Chaldee Lexicon, Davidson
ANF	Ante-Nicene Fathers
ASV	American Standard Bible (1901)
BAGD	Bauer, Arndt, Gingrich, Danker Greek Lexicon
BHS	Biblica Hebrica Stuttgartensia
CCL	Corpus christianorum latinorum
CE	Catholic Encyclopedia, 1911
CSEL	Corpus scriptorum ecclesiasticorum latinorum
DB	Darby Bible
DR	Douay-Rheims Bible
ESV	English Standard Version (2001)
HAY	Commentary on the Bible by Rev. Leo Haydock
ICC	International Critical Commentary: Driver, et al.
JB	Jerusalem Bible
JR	Faith of the Early Fathers by William A. Jurgens
KDL	Keil and Delitzsch Commentary
KJV	King James Version
KNX	Knox's Translation
LXX	The Greek Septuagint
MT	Masoretic Text
NAB	New American Bible (1970, 1981, 1987)
NABC	New American Bible Commentary
NAS	New American Standard Bible (1995)
NEB	New English Bible
NIV	New International Version (1984)
NJB	New Jerusalem Bible
NKJ	New King James Bible
NLT	New Living Translation
NPNF	Nicene and Post Nicene Fathers
NRSV	New Revised Standard Version
NT	New Testament
OAB	Oxford Annotated Bible
OT	Old Testament
PG	Patrologia graeca, J. Migne
PL	Patrologia latina, J. Migne
RSV	Revised Standard Version
V _g	Vulgate
YL	Young's Literal Translation

Textual Critical Sources Consulted

Greek, Hebrew and Latin manuscripts, as well as any other source information, are catalogued under the abbreviations listed below. The abbreviations for Greek codices and minuscules follow:

- The *Nestle-Aland Novum Testamentum Graece*, 27th edition.
- *The Greek New Testament*, eds. Aland, Black, Marcini, Metzger & Wikgren, 4th edition.
- The Latin abbreviations follow those found in Nestle's *Novum Testamentum Latine*, 1952.
- The Hebrew abbreviations are those corresponding to the *Biblia Hebraica Stuttgartensia* (Deutsche Bibelstiftung Stuttgart, 1977).

Greek and Hebrew Grammars Consulted

- T. Robertson: *A Grammar of the Greek New Testament in the Light of Historical Research*, 4th edition.
- James Hope Moulton and George Milligan: *The Vocabulary of the Greek New Testament, Illustrated from the Papyri and other Non-literary Sources*.
- Max Zerwick: *Biblical Greek*; Max Zerwick and Mary Grosvenor: *A Grammatical Analysis of the Greek New Testament*.
- Daniel B. Wallace: *Greek Grammar Beyond the Basics: An Exegetical Syntax of the New Testament*.
- Herbert Smyth, *Greek Grammar*.
- F. Blass, A. Debrunner, and R. Funk: *A Greek Grammar of the New Testament and Other Early Christian Literature*.
- W. Robertson Nicoll: *The Expositors Greek Testament*.
- Ernest De Witt Burton: *Syntax of the Moods and Tenses in New Testament Greek*.
- C. F. D. Moule: *An Idiom Book of New Testament Greek*.
- Stanley E. Porter: *Verbal Aspect in the Greek of the New Testament with Reference to Tense and Mood*.
- Barbara and Timothy Friberg: *Analytical Greek New Testament*.
- Bible Works *Hermeneutica* computer software, 8th edition.
- Alford Marwill: *The Revised Standard Greek-English Interlinear*.
- George Ricker Berry: *The King James Greek-English Interlinear*.
- Harry A. Sturz: *The Byzantine Text-Type and New Testament Textual Criticism*.
- Jakob van Bruggen: *The Ancient Text of the New Testament*.

- Wilbur N. Pickering: *The Identity of the New Testament Text*.
- Gesenius' *Hebrew Grammar*, ed. E. Kautzsch.

Greek and Hebrew Lexicons Consulted

The following Greek and Hebrew lexicons and dictionaries were consulted:

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- Louw, Johannes P. and Eugene A. Nida, *Greek-English Lexicon of the New Testament Based on Semantic Domains*.
- Kittel, Gerhard, and Gerhard Friedrich, eds. *Theological Dictionary of the New Testament*.
- Gesenius, William: *A Hebrew and English Lexicon of the Old Testament*.
- Harold K. Moulton: *Analytical Greek Lexicon*, revised edition.
- Benjamin Davidson: *The Analytical Hebrew and Chaldee Lexicon*.

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Other Books by Robert Sungenis

- *Galileo Was Wrong: The Church Was Right, Volume I, The Scientific Case for Geocentrism*, 12th ed., CAI Publishing, Inc. 2018, co-author: Robert Bennett, Ph.D.
- *Galileo Was Wrong: The Church Was Right, Volume II, The Scientific Case for Geocentrism*, 11th ed., CAI Publishing, 2015.
- *Galileo Was Wrong: The Church Was Right, Volume III, The Historical Case for Geocentrism*, 11th ed., CAI Publishing, 2015.
- *A Googolplex of Tiny Blackholes: A Theory of the Cause of Gravity, Inertia and the Speed of Light* (CAI Publishing, 2015)
- *Geocentrism 101*, 6th ed (CAI Publishing, 2015).
- *The Catholic Apologetics Study Bible, Volume I, The Gospel According to Matthew* (Queenship Publishing, 2003)
- *The Catholic Apologetics Study Bible, Volume II, The Apocalypse* (Queenship Publishing, 2003)
- *The Catholic Apologetics Study Bible, Volume III, The Epistles of Romans and James* (CAI Publishing, Inc. 2008)
- *The Catholic Apologetics Study Bible, Volume IV, The Book of Genesis: Ch. 1-11* (CAI Publishing, 2007)
- *The Catholic Apologetics Study Bible, Volume V, The Epistle to the Corinthians* (CAI Publishing, 2007)
- *The Catholic Apologetics Study Bible, Volume VI, The Gospel of John* (CAI Publishing, 2007)
- *Not By Faith Alone: The Biblical Evidence for the Catholic Doctrine of Justification* (Queenship Publishing, 1997)
- *Not By Scripture Alone: A Catholic Critique of the Protestant Doctrine of Sola Scriptura* (Queenship Publishing, 1997)
- *Not By Bread Alone: The Biblical and Historical Evidence for the Sacrifice of the Mass* (Queenship Publishing, 2000)
- *The Consecration of Russia* (Hometown Publications, 2013).
- *How Can I Get to Heaven: The Bible's Teaching on Salvation Made Easy to Understand* (Queenship Publishing, 1998)
- *The Immutable God Who Can Change His Mind: The Impassible God Who Can Show Emotion* (CAI Publishing, 2015)

- *Learning Greek through the Gospel of John* (CAI Publishing, 2016).
- *Speaking in Tongues: Sign of Blessing: Sign of Judgment* (CAI Publishing, 2010)
- *A Critical Analysis of Karl Keating and His Book 'The New Geocentrists'* (CAI Publishing, 2015)
- *Bob's Dictionary of Big Words* (CAI Publishing, 2014).
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- *Should Women Wear Head Coverings?* (CAI Publishing, 2015)
- *Shockwave 2000* (New Leaf Press, 1994)
- Contributions to: *Surprised By Truth* (Basilica, 1995); *Jesus, Peter and the Keys* (Queenship, 1997); *The Catholic Answer Book of Mary* (Our Sunday Visitor, 2000)
- Movie: *The Principle*, 2014 by Stellar Motion Pictures, LLC, creator, executive producer and actor.
- DVD: *Journey to the Center of the Universe*, 2015, CAI Publishing, Inc., executive producer, writer
- DVD: *The Church Versus Galileo*, 2015, *Introduction*, CAI Publishing, Inc.

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"Ignorant men raise questions that wise men answered a thousand years ago."

Johann Wolfgang von Goethe

"There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact."

Mark Twain

"Sometimes the first obligation of intelligent men is to restate the obvious."

George Orwell

"Many people believe they are thinking when they are only rearranging their pre-existing prejudices."

Martin Selbrede

"The fool on the hill sees the sun going down and the eyes in his head see the world spinning round."

Lennon and McCartney

"All knowledge is interpretation."

Karl Jaspers

"The trouble ain't that people are ignorant, it's just that they know so much that ain't so."

Josh Billings

"The question of all questions for humanity, the problem which lies behind all others and is more interesting than any of them, is that of the determination of man's place in Nature and his relation to the Cosmos."

Thomas H. Huxley

Questioner: *"Which is farther away, Florida or the sun?"*

A blonde in California: *"Florida, because I can see the sun."*

Anonymous

Historical Overview of the Flat Earth Movement

Chapter 1

Historical Overview of the Flat Earth Movement

Popular Personalities in the Movement

If you have been on the Internet in the past couple of years you have probably come across someone, somewhere, espousing the Earth is flat. Sophisticated and convincing videos on Youtube have flooded the public domain since about late 2014, although the modern flat-earth movement began in earnest in 2009, an offshoot of the movement that began in the late 1800s. Popular magazines have also been forced to address the debate, and even store shelves and web shopping sites include everything from flat Earth clocks to furniture. Whereas Cabbage Patch dolls, pet rocks, Beanie Babies, Rubik's Cube and cellphones are and were popular in their own right, the flat Earth question is not only worldwide in scope, it is both a unique mental challenge and a multi-tiered social phenomenon unlike we have never seen or heard in modern times. With thousands of websites and Youtube channels devoted to this single topic, it may not end soon.



Even some famous celebrities have embraced a flat Earth and made the issue even more popular, such as basketball star Kyrie Irving of the Boston Celtics (and now Brooklyn Nets). During a 2017 podcast, Irving stated:

This is not even a conspiracy theory. It's right in front of our faces. I'm telling you, it's right in front of our faces. They lie to us. If you really think about it from the landscape of the way we travel, the way we move, and the fact that – can you really think of us rotating around the sun and

¹ <https://www.youtube.com/watch?v=2TebGSZ2EQE>

all planets aligned, rotating in specific dates, being perpendicular with what's going on with these planets? The truth is right there. You've just got to go searching for it.²



Shaquille O'Neil, a popular sports announcer, and Draymond Green of the Golden State Warriors, stated more equivocal views of a flat earth, which then prompted NBA Commissioner, Adam Silver, to declare the Earth is

definitely round in case someone wants to know the NBA's official position.³ A few days later O'Neil explained the tongue-in-cheek to his colleagues, saying: "I was only kidding, you idiots."⁴



Social media personality, Tila Tequila, tweeted these statements in 2016:

- Why are all the buildings in NYC standing straight up? If earth was round then some of the buildings would have a slight tilt. #FlatEarth
- I will stop my #Flat Earth talk if someone can send me a \$#%& photo of the horizon with a curvature! Otherwise it is flat!
- If I get killed in 2016 you'll all know it's because I exposed the Earth as being flat. #Truthexposed.

Cricket player, Freddie Flintoff, added to the chorus:

If you're in a helicopter and you hover, why does the Earth not come to you if it's round? The middle is the North Pole; around the outside is the South Pole which is like a big wall



² Feb. 2017. He appeared on "The Jimmy Kimmel Show" using a basketball as his prop: <https://mail.google.com/mail/u/0/#inbox/1618fe641396ba67?projector=1>

³ ranker.com/list/celebrities-who-are-flat-earthers;
youtube.com/watch?v=RL5VVfQek6s

⁴ cbssports.com/nba/news/shaq-was-apparently-trolling-everyone-when-he-made-his-flat-earth-comments/

of ice. This is why all governments now have bases on the South Pole.⁵

The first-ever “Flat Earth International Conference” (FEIC) was held in Raleigh, North Carolina, on November 9-10, 2017. As reported by *LiveScience* it featured...

...some of the big names in round-Earth denial. Among the speakers were Darryle Marble, who once took a level on a plane to “prove” the Earth doesn’t curve; Mark Sargent, the creator of the “Flat Earth Clues” YouTube Series, who believes all life is enclosed in a “Truman Show” – like dome structure; and Jeran Campanella, a YouTube and online radio personality, who makes flat-Earth, 9/11 Truther and other conspiracy theory videos. The conference was hosted by Kryptoz Media, which produces DVDs and other media arguing that “scientism” is an agenda designed to keep people from God, and the Creation Cosmology Institute, an organization with little online footprint except a now-deleted YouTube channel. The conference featured talks such as “NASA and Other Space Lies,” “Flat Earth with the Scientific Method,” “Waking Up to Mainstream Science Lies” and “Testing the Globe.” The conference organizer, Kryptoz Media’s, Robbie Davidson, is a Christian creationist, and that philosophy emerged in sessions such as “Flat Earth & The Bible” and “Exposing Scientism,” the latter of which decried evolution and the Big Bang theory of the universe’s origin.⁶



⁵ indy100.com/article/6-famous-people-belief-earth-flat-theory-kyrie-irving-fleddie-flintoff-tila-tequila-shaq-8088161

⁶ livescience.com/60972-flat-earthers-first-conference.html, “What in the World? Flat-Earthers Gather at First Conference,” by Stephanie Pappas Nov. 17, 2017

⁷ <https://www.denverpost.com/2017/07/07/colorado-earth-flat-gravity-hoax/>

Daniel Shenton, current president as of 2004 of the *Flat Earth Society*,⁸ replacing Charles Johnson (d. 2001), says he was inspired to research the issue when in the late 1990s he heard the 1984 album of musician Thomas Dolby appropriately titled, “The Flat Earth.” Dolby followed up with a later release in 1992 titled, “She Blinded Me With Science.”



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It appears, however, that Daniel was probably more inspired by **Samuel Shenton** (d. 1971) who, although no relation to Daniel, was the president of the *International Flat Earth Society* established in 1956, who himself was inspired by Samuel Rowbotham (d. 1884), a biblical literalist and the author of the 430-page book, *Zetetic Astronomy: Earth Not a Globe*, published in 1881.¹¹

⁸ theflatearthsociety.org/home/index.php

⁹ A tweet of March 14, 2013 from Daniel Shenton to FlatEarthToday, recorded at <https://twitter.com/FlatEarthToday?lang=en>

¹⁰ twitter.com/danielshenton?lang=en&lang=en

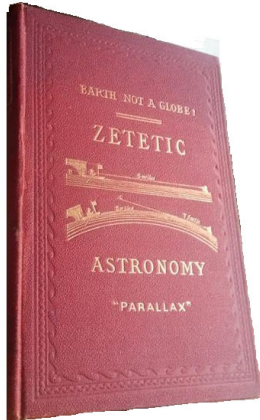
¹¹ theflatearthsociety.org/home/index.php/featured/Flat-Earth-Historical-Figures-People. Other people who have written for the Flat Earth Society, beginning from Rowbotham in 1867 to the present day, includes over 70 entries. It states: “This treasure trove of Journals and Pamphlets related to the Flat Earth was carefully assembled by our team. Dating from the 1800s and onwards our collection features writers such as Samuel Rowbotham, John Hampden, Albert Smith, Lady Blount, Samuel Shenton, Robert Schadowalde and the Universal Zetetic Society.” See theflatearthsociety.org/home/index.php/flat-earth-library/pamphlets-and-journals

Scholarly treatises espousing a flat Earth begin with Rowbotham's book since his immediate claim to fame was his meticulous measurements of long distances that apparently showed no curvature of the Earth. As C. Nothaft sums them up:

...the pioneering adventures of spin doctor **Samuel Birley Rowbotham** alias "Parallax" in Victorian England to the quixotic struggles of Charles Kenneth Johnson and his California-based International Flat Earth Research Society of America (IFERS), which continued to organize resistance against an international conspiracy of scientists and journalists, who had dedicated themselves to mislead people into believing that they lived on a curved surface, well into the 1990s.¹²



The word "zetetic" comes from the Greek word ζητέω, meaning "to seek," and encapsulates the flat-earther's resolve to depend only on experience and reason as opposed to scientific dogma. They prefer the "what you see is what you get" understanding of the world (*e.g.*, if it looks flat, it probably is flat),



but with the added spice that only personally acquired facts are permissible for study, which severely limits the amount of information they will consider. In many cases, the visual world of the flat-earthier takes precedence over either what cannot be seen (*e.g.*, the refraction of light causing it to bend downward so that we can see objects that are normally under the horizon) or what can be shown mathematically as evidence against a flat Earth (*e.g.*, using math to show why the horizon, as flat-earthiers claim, is not always at "eye level").

¹² "Augustine and the Shape of the Earth: A Critique of Leo Ferrari," C. P. E. Nothaft, 2011, *Augustinian Studies*, 42 (1): 34. See also, C. Garwood, *Flat Earth: The History of an Infamous Idea* (London: Macmillan, 2007).

Daniel Shelton's viewpoint is well expressed in his interview with *The Guardian*:

I haven't taken this position just to be difficult. To look around, the world does appear to be flat, so I think it is incumbent on others to prove decisively that it isn't. And I don't think that burden of proof has been met yet.¹³



Daniel Shenton @Danielshenton · 28 Jul 2016

If anyone ever tells you the earth isn't flat, just say "Kansas" and walk away.
#FlatEarth #horizoning



14

Flat Earth Today Retweeted



Daniel Shenton @Danielshenton · 26 May 2012

Just made some Flat Earth keychains and magnets to toss in as freebies with the t-shirts. I like making stuff.



15

¹³ theguardian.com/global/2010/feb/23/flat-earth-society

¹⁴ twitter.com/danielshenton?lang=en. It appears that Daniel Shenton has studiously avoided having his picture taken. No pictures of him seem to be available, except for one back shot with another individual during an interview with FlatEarthToday, <https://twitter.com/FlatEarthToday?lang=en>

¹⁵ One of many tweets from Daniel Shenton on May 26, 2012 to *FlatEarthToday* at <https://twitter.com/FlatEarthToday?lang=en>. Curiously, Shenton stopped tweeting in July 2016 and speculation is that he is deceased.

Although some critics might be tempted to classify Daniel Shenton as a crackpot, *The Guardian* says his other views of the world fit in with the status quo:

Shenton turns out to have resolutely mainstream views on most issues. The 33-year-old American, originally from Virginia but now living and working in London, is happy with the work of Charles Darwin. He thinks the evidence for man-made global warming is strong, and he dismisses suggestions that his own government was involved with the 9/11 terrorist attacks.¹⁶



John Davis, the present secretary of *The Flat Earth Society*,¹⁷ which presently has about 500 registered members (recouped from the 3500 members lost when president Charles Johnson died in 2001), also points to the apparent lack of curvature as his tipping point. In an interview with *The Tab* last year, Davis told his story:

I came to a point in my life that left me questioning what I had simply taken as fact over the years. This led me into some serious study on many of the world-views out there. When I examined the evidence critically and objectively, the flat earth argument rang both on an objective and subjective level. To me, these odd-balls and square pegs were far closer to the truth of the matter than orthodox and conventional attempts.

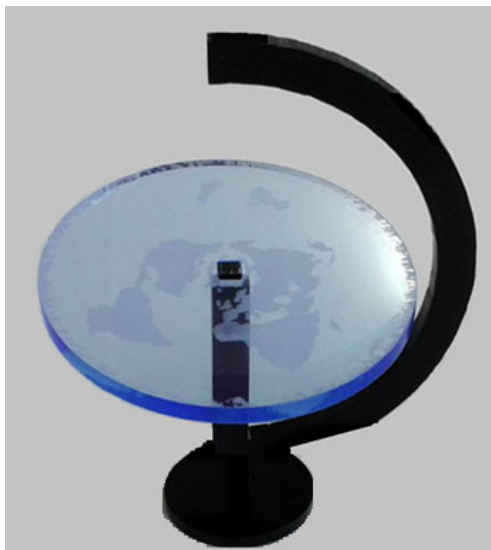
One of my favorite experiments is obvious and easy to perform. The interested student can at times see further than one would expect given a round earth. Many tourist traps like Rock City in Chattanooga, TN make

¹⁶ *Ibid.*

¹⁷ The society is also run by Michael Wilmore, current vice-president, giving updates to the website @FlatEarthToday.

big bucks off this by enticing visitors to “see seven states.” On a round earth, you would not be able to see this far as your view would be blocked by the curvature of Earth.

To add insult to injury, the horizon seems to rise to meet you at eye level, no matter what your altitude is. As Samuel Rowbotham once said, there is so much truth in our favour we can well afford to be dainty with our selection. I suggest anybody interested in additional evidence pick up a copy of *Earth: Not A Globe*.¹⁸

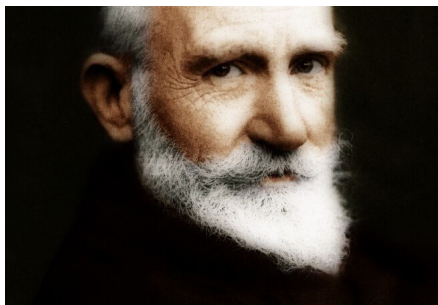


Flat-earthers seem to pop up out of nowhere. When one dies or is discredited, another rises to take his place. As Nothaft puts it:

Just when the Cold War space programs and the availability of photographs of the earth taken from outside made it increasingly difficult for flat earthers to plausibly uphold their position, a group of Canadian intellectuals, headed by the well-known Augustine scholar Leo C. Ferrari, breathed new life into the infamous idea by founding the Flat Earth Society of Canada (FESC) in 1970. Armed with both a serious philosophical purpose and a good dose of humor, Ferrari and his colleagues publicly championed the absurd doctrine of “planoterrestrialism” in order to subvert what they critically perceived as

¹⁸ <https://thetab.com/uk/sussex/2016/05/11/spoke-people-still-believe-earth-flat-9548>, article by Kyle Farrell.

a popular blind faith in science that allowed scientific authority to overrule even the most basic inclinations of common sense. While the FESC itself is now long defunct, the subject of the flat earth has found a second lease of life in Ferrari's own scholarship. In 1996, he published an extensive article on Augustine's Cosmography...¹⁹



We will take a much closer look at Ferrari's claims about Augustine in our chapter on the Church Fathers. Suffice it to say, the attempt to commandeer one of the greatest theologians in human history as a flat-earthier shows how deep this issue can go. Another prized

possession of flat-earthers is the famed **George Bernard Shaw** (d. 1950), an Oscar and Nobel Prize winner (1925) and one of the world's greatest playwrights. He is purported to have said:

We are more gullible and superstitious today than we were in the Middle Ages, and an example of modern credulity is the widespread belief that the Earth is round. The average man can advance not a single reason for thinking that the Earth is round. He merely swallows this theory because there is something about it that appeals to the twentieth century mentality.²⁰

An even more impressive prize is the testimony of physicist Auguste Piccard (1884 – 1962) who is known for his high-altitude balloon flights. As Wikipedia sums up his discovery:

Piccard also was the first to witness views of earth from 10 miles up, stating in a 1931 *Popular Science* magazine....” Through portholes, the observers saw the earth through copper-colored, then bluish, haze. It seemed a flat disk with upturned edge. At the ten-mile level the sky appeared a deep, dark blue.”²¹

¹⁹ “Augustine and the Shape of the Earth: A Critique of Leo Ferrari,” C. P. E. Nothaft, 2011, *Augustinian Studies*, 42 (1): 35.

²⁰ <http://www.whale.to/v/shaw1.html>

²¹ https://en.wikipedia.org/wiki/Auguste_Piccard, “Ten Miles High in an Air-Tight Ball,” *Popular Science*, Bonnier Corporation. August 1931, p. 23.



Others, however, report that Piccard and his partner were able to see the curvature of the Earth, not flatness. As David K. Lynch records it:²²

The first direct visual detection of the curvature of the horizon has been widely attributed to Auguste Piccard and Paul Kipfer on 27 May 1931.²³ They reported seeing it from a hydrogen-filled balloon at an elevation of 15,787 m (51,783 ft) over Germany and Austria. On 11 November 1935, Albert W. Stevens and Orville A. Anderson became the first people to photograph the curvature.²⁴ They were flying in the helium-filled Explorer II balloon during a record-breaking flight to an altitude of 22,066 m (72,395 ft) over South Dakota. Other claims have been made as to being the first to see the curvature of the Earth, but they seem to have come long after visual curvature had been established.²⁵

Lynch also reports the following:

²² "Visually discerning the curvature of the Earth," David K. Lynch, *Applied Optics*, Vol. 47, No. 34, December 1, 2008.

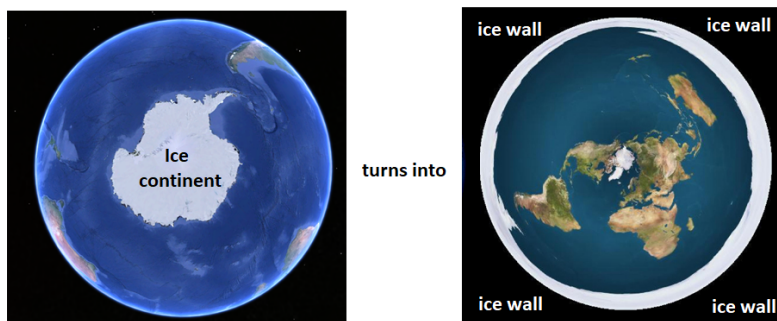
²³ Lynch notes: "Piccard is widely believed to be the first. There are many references to his achievement on the Internet, most of them certainly derivative. I contacted the Piccard family and they were aware of the claim but had no hard evidence or literature citation backing it up."

²⁴ S. W. Bilsing & O. W. Caldwell "Scientific events," *Science* 82, 586–87, 1935.

²⁵ Lynch notes: "A brass plaque placed at the Lamont Odett vista point in Palmdale, Calif., by E. Vitus Clampus claims that X-1A pilot Arthur 'Kitt' Murray was the first person to see the curvature of the Earth. The plaque does not cite the year or altitude, but, according to the NASA archives, it was probably on 26 August 1954 when Murray took the X-1A to a record-breaking altitude of 90,440 ft (27,566 meters or 17.2 miles).

Interviews with pilots and high-elevation travelers revealed that few if any could detect curvature below about 50,000 feet. High-altitude physicist and experienced sky observer David Gutierrez²⁶ reported that as his B-57 ascends, the curvature of the horizon does not become readily sensible until about 50,000 feet and that at 60,000 feet the curvature is obvious. Having talked to many other highfliers (SR-71, U2, *etc.*), Gutierrez confirms that his sense of the curvature is the same as theirs. Passengers on the Concorde (60,000 feet) routinely marveled at the curvature of the Earth. Gutierrez believes that if the field of view (FOV) is wide enough, it might be possible to detect curvature from lower altitudes. The author has also talked to many commercial pilots, and they report that from elevations around 35,000 feet, they cannot see the curvature.²⁷

One of the strangest claims of flat-earthers is that Antarctica is not a continent; rather, it is a 75,000-mile “ice wall” around the flat disc of Earth. The belief that Earth is flat necessarily forces the flat-earthers to adopt the “ice-wall” model regardless whether it works or not. If one were to cut a sphere into say, 24 slices, beginning the slicing from the North Pole and then flattening out all the slices so that the peels form a circumference at their ends, it forces the South Pole to become a huge circle of ice. Geometrically, there is no way around this eventuality.



²⁶ D. Gutierrez, djgutierrez1@verizon.net (personal communication, 2007).

²⁷ Lynch, *op. cit.*, p. H39.



provides tours for people to see the whole continent in as little as five hours.²⁸ Australia has its routine explorations to Antarctica displayed on its website.²⁹

Once this is done, flat-earththers are forced to explain how and why all the things that are purported to be occurring at a continent can be explained by a 75,000 mile ice wall, which is virtually impossible to do, especially since Qantas has 19 routes over Antarctica and

Flat-earththers realize the dilemma they are in. Hence one flat-earthther has totally rejected the ice wall as well as its azimuthal map version.³⁰ But others, instead of admitting it, doubled-down and tried to raise funds for their own jet cruise to Antarctica. As reported by *The Daily Sheeple*:

If you haven't heard of Flat Earth Theory, that headline may have confused you. A conspiracy gaining traction around the Internet claims that the earth is really a flat disc and we have all been lied to. The theory is actually a resurgence of old theories widely believed by ancient cultures about the nature of the planet before Pythagoras and Aristotle provided their scientific evidence the earth was actually a globe.

Others say the resurgence of Flat Earth is a conspiracy psyop to make all conspiracy theorists look like crazy tin foil hatters, and thus, discredit the entire alternative media and anyone who critically analyses the Establishment narrative on any front. Well now a group is officially planning an expedition to Antarctica for a series of scientific tests in a bid to prove their case that our planet is flat. It is known as "The Copernican Project." Their mission? "*To obtain visual footage to prove Flat Earth.*"³¹

²⁸ [youtube.com/watch?time_continue=247&v=UZVFan7jL80](https://www.youtube.com/watch?time_continue=247&v=UZVFan7jL80)

²⁹ antartica.gov.au/about-antarctica

³⁰ [youtube.com/watch?v=WIU9khdYTQ](https://www.youtube.com/watch?v=WIU9khdYTQ), published April 30, 2018 by Darren Nesbit, starting at 34:55, but replaces it with a Mercator-square model.

³¹ facebook.com/copernicusproject1



While it causes some people's brains to explode simply to mention Flat Earth, the theory has gained traction in modern times (or at least taken up a lot of people's time arguing in online chat threads about it)

with famous rapper B.o.B Tweeting about his beliefs that NASA is covering up the truth and saying things like, *"I'm going up against the greatest liars in history... you've been tremendously deceived."*³²

The funds for the cruise never materialized and thus, to date, no flat-earther has ever been to Antarctica to prove the ice wall exists and the Earth is flat. Still, other flat-earthers, knowing flat Earth theory stands or falls on whether Antarctica is a continent or an ice wall, seek to prove their claim by pointing out suspicious activity in Internet advertising of various Antarctica cruise lines, as well as the fact that Qantas trips have a discrepancy in their flight plans,³³ and that webcam footage at stations in Antarctica don't show the sun's full path for about five hours, which is interpreted as a deliberate attempt to hide the flat Earth model that says the sun should be seen during those five hours.³⁴

³² http://www.thedailysheep.com/team-plans-scientific-expedition-to-antarctica-to-prove-the-earth-is-flat_032016, "Team Plans Scientific Expedition to Antarctica to 'Prove' the Earth is Flat," March 8, 2016.

³³ [youtube.com/watch?v=YLkTm19aZGs](https://www.youtube.com/watch?v=YLkTm19aZGs), at 20:06, published by Jeran Campanella on April 16, 2018. He states that the flight plans from Australia to the south pole advertise that it takes 12 hours to reach the south pole and the distance from all three sites is 8,000 miles, which results in 666 mph, but Campanella says the top speed of a 747 jet is only 550 mph, which means the jet does not go to the south pole as advertised. First, Campanella fails to show what this discrepancy has to do with a flat Earth. Second, he did not research the Boeing 747 well enough, since it can cruise at 92% the speed of sound (741 mph). Hence the 747's top speed is 682 mph, but most jet liners will fly at Mach .80, which is 593 mph. Since the atmosphere is thinner at the poles, Qantas jets can fly much closer to a 682 mph than a 593 mph. (usatoday.com/story/travel/columnist/cox/2016/02/28/fastest-passenger-plane-boeing-747/80946366).

³⁴ *Ibid*, at 21:30. Campanella argues that because the north pole and south pole should receive the exact opposite from the sun, then sunlight at the north pole should mean there is no sunlight at the south pole. He points out, however, that when the

Other flat-earthers ignore the bigger problems in their model and concentrate on more mundane things that will at least give plausible evidence for their belief. For example, a consortium of South American scientists released a 90-minute video in March 2018 titled, *Convex Earth: The Documentary*.³⁵



The title is a bit confusing because the only thing “convex” in their model are the continents whose center points are higher than the surrounding land and water. The rest of the habitable portion of the model is quite flat, complete with what appears to be a wading pool for another continent.

The documentary itself seems to be quite scientific, especially as it focuses on attaining empirical evidence to support its thesis that the Earth is not spherical. The most astounding feature is not the science findings (which we will examine thoroughly toward the end of this book) but the fact that the scientists are on record stating they were moved to do the experiments due to their communication with an extraterrestrial named Bilu who informed them the Earth is not spherical and that the group needs to do many experiments to prove it. Although the communication with Bilu is not part of the documentary, it is part of a promotion piece done in 2011 when the project, called *Projecto Portal*, began. The separation of the promotion piece from the actual documentary led *Globebusters* (a flat Earth group) to feature the *Convex Earth* documentary on its website, but took it down a

north pole receives sunlight, there is also some sunlight at the south pole. We will cover this issue later in our book.

³⁵ [youtube.com/watch?v=McdMMmclGVc](https://www.youtube.com/watch?v=McdMMmclGVc)

day later (April 2, 2018) when the ‘Bilu connection’ was discovered by its patrons.



Although the group seems at first to fit the stereotype of typical scientists in white lab coats who are purely objective and only desire the scientific facts, we are left aghast when the leading scientist, Urandir Fernandes de Oliveira records a conversation he had with Bilu who spoke with him from a bush. The dialogue is as follows:

Bilu: About Earth, it's convex. It's not spherical, it's not flat. It's even more convex on its continents, especially in South America.

Urandir: What do you suggest we do, then, in fact to prove that it is neither spherical or round?

Bilu: Test...perform many tests. Bilu will give you a lot of tests, to all of you. Optical illusions by the atmospheric layers; electromagnetic fields; the water sphericity. The flatness of the waters leveled on the oceans. And also tests with ships; ship masts, hulls, as so many have talked about. But Bilu will better explain it. Bilu has many things to say.

Urandir: Ok, then. If Earth's whole border is the south pole, as well as with other theories you have given us, what are the other tests we can do to prove all of this?

³⁶ [youtube.com/watch?v=HZHVtxwvcMw](https://www.youtube.com/watch?v=HZHVtxwvcMw), at the 16:50 mark, courtesy of *Globebusters*, published April 2, 2018. One can hear the voice of the alien at the 10:43 mark.

Bilu: Many...perform all tests. Take the light test. Take the telescope test, specifically if you point it to the moon. The moon isn't spherical either. It's just an optical illusion according to Earth's atmospheric layers. And tests may also be made with the electromagnetic fields, in an airplane, on a cruiser, on the rivers. The most perfect form of energy is linked to a stone. Throwing a stone, square, rectangular, it does not matter, as all waves will be circular. The force of gravity is totally equivocated. They are actually several forces. And Bilu says that these forces Earth scientists cannot explain just yet.

Urandir: We are going to conduct Bilu's suggested tests. They are absurd ideas and absurd tests. But it's worth trying to verify if in fact all of this could be consistent in evidence with the reality that he is talking about. Do you think that the theory suggested by ET Bilu is possible?

Urandir is not alone. One of his chief assistants, Alessandro Draco Oliviera, with a degree in electronic engineering and one of the experimenters in the recent film, said this on the promotion video:

The ideas suggested by Bilu are viable and have fundament. We have in fact done some research and we even came up with some ideas based on Einstein's General Relativity Theory and so yes it is totally plausible due to the theory of light diversion in function of the gravitational field.³⁷

So here we have what appears to be a unique and puzzling mixture of science and the occult. It gets even more interesting when Urandir states:

Bilu has many revelations to give us. Later on he will tell us about the human origin, about Christ, about God. Also about many other subjects. So let's wait and stay tuned, together every step of the way watching all these documentaries as they come out, because they deal with extremely

³⁷ [youtube.com/watch?v=HZHVtxwvcMw](https://www.youtube.com/watch?v=HZHVtxwvcMw); other comments from the researchers include: Eduardo Della Santa from the Center of Technology Zigurates: "There are two very interesting things we need to understand about Earth on this new format given by Bilu. First is that all this edge around it is in fact entirely the South Pole"; Mauro Dias: "As a researcher I believe all new ideas need to be accepted for studies to break paradigms....This proposal of Bilu is one that produces a profound shock into our knowledge."

interesting issues, and it will definitely help to see the world in a different way, a new reality of our present situation.³⁸

As with any such popular topic there are, of course, opposing opinions from equally famous people. **Elon Musk**, CEO of the Tesla Corporation, puzzled why flat-earthers don't also believe Mars is flat:



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Louis Doré of *The Independent*, commenting on Musk's tweet, opined:

To be a flat Earth conspiracy theorist takes a special kind of ignorance and dedication. You have to ignore a fact that has been scientifically accepted as truth for hundreds of years, and debate around hundreds of counter arguments that prove the conspiracy to be demonstrably false. You also have to come up with your own explanations for, say, the extinction of the dinosaurs. You also have to decry Nasa's images of Earth as fake; and try to explain the Coriolis effect, the ice caps, or the rotations of the stars in different hemispheres.⁴⁰



Neil deGrasse Tyson, the popular cosmological commentator who has become the major spokesman for the modern science community, often jests with flat-earthers in his typical humorous style. Recently he tweeted a picture of

³⁸ *Ibid.*

³⁹ <https://www.indy100.com/article/elon-musk-flat-earth-conspiracy-theory-mars-spacex-rotation-of-globe-truthers-8081741>

⁴⁰ *Ibid.*

what a lunar eclipse (*i.e.*, when the Earth is between the sun and the moon) would look like if the Earth were flat. If there was ever an instance when “a picture is worth a thousand words,” this was it.⁴¹



The cause of a lunar eclipse has been known and accepted for centuries, even among those who believed that the Earth was fixed in space. The church Father, Basil of Caesarea (d. 379), stated this in the fourth century:

The eclipse of the moon, on the other hand, is due to the shadow the earth casts on it when it is a fifteen days' moon and the sun and moon happen to be at the opposite poles of the highest circle, the sun being under the earth and the moon above the earth. For the earth casts a shadow and the sun's light is prevented from illuminating the moon, and therefore it is then eclipsed.⁴²

Undaunted, flat-earthers are quick to return the favor to Tyson whenever possible, especially concerning Tyson's recent remark that the Earth is pear-shaped.⁴³ Taking his words in a crass literal sense in order to make him look silly, the image of the Earth in the exact shape of a pear soon appeared on the Internet. Of course, the flat-earthers left out the part that Tyson's pear analogy was merely a hyperbole to account for the fact that the Earth is

⁴¹ www.inverse.com/article/38783-neil-degrasse-tyson-flat-earthconspiracy

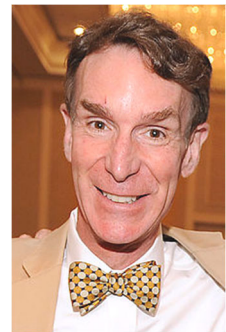
⁴² *Orthodox Faith*, Bk 2, Ch VII.

⁴³ <https://www.youtube.com/watch?v=nTOE4Ar0Dfo>, at 0:41, published by Tomas Jo on Feb. 6, 2016.

slightly larger below the equator. Although the Earth is slightly larger in its bottom half, the difference is miniscule. Pound for pound, billiard balls have less accuracy in spherical measurement than the Earth, since the polar circumference compared to the equatorial circumference is only 0.0036 different or 0.36% smaller.



Equally quipping and popular is **Bill Nye**, dubbed “the science guy,” who stated to the flat-earthers at large: “Hey, man on the internet, why don’t you drive to the edge of the Earth and take a picture? Then post it. Drive to the edge of the Earth. We’ll be here.”⁴⁴ Nye makes a good point. Despite all the bravado of flat-earthers, they have no photographs of their claims. There are no photos of a flat Earth. There are no photos of the edge of the Earth. There are no photos of a giant ice wall at their 75,000-mile earthly circumference. There are no photos of a dome over a flat Earth. Yet the thousands of photos of a spherical Earth taken by NASA, the European Space Agency (ESA), and the Russian (Roscosmos), Japanese (JAXA), Indian (ISRO), Chinese (CNSA) space probes, are rejected as “fake” by the flat-earthers. Hence the very thing flat-earthers require from their opponents is the very thing they themselves lack, in *toto*. Hence almost all arguments brought forth by flat-earthers are based



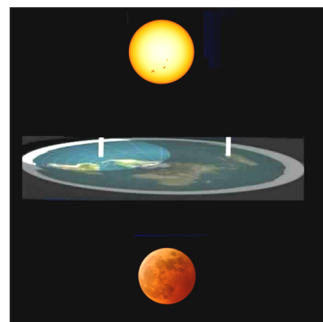
⁴⁴ *Ibid.*

on what can be seen from Earth (even though, ironically, a dome cannot be seen from Earth). As we will see, however, evidence from Earth is quite malleable and can easily be made to look like the Earth is flat, especially if one leaves out crucial details.

Interestingly enough, the flat-earththers, Tyson and Nye don't have much trouble agreeing on what causes a solar eclipse (*i.e.*, when the moon is between the sun and Earth) since they agree that the round moon blocks the light from the round sun (although some flat-earththers simply deny that the moon even showed up in the latest solar eclipse of August 2017, while some deny it is round and others say it produces its own light).

The difference is that the flat-earththers believe the sun is the same size as the moon and the Earth is flat, while their opponents believe the sun is about 3 million times larger but obviously much farther away, and the Earth is round. But as we shall see later, there are problems with the flat Earth solar eclipse, since the moon and sun are so close together.

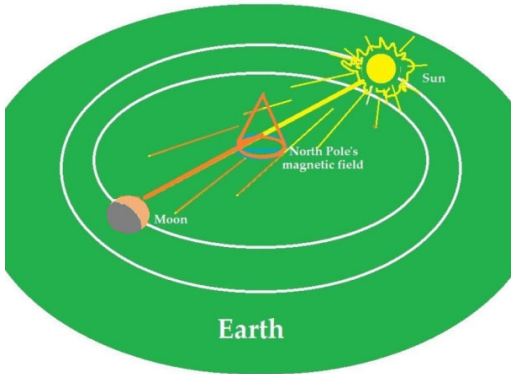
Perhaps if Tyson really wanted to spend time convincing the flat-earththers their model is wrong, it would have been better to show them an image of a darkened moon as it occurs during a lunar eclipse and then ask the flat-earththers what in their model accounts for this darkness and why it only occurs for a few hours. But perhaps Tyson couldn't resist the humor that his bar-shaped shadow could elicit. In any case, Tyson's bar-image should have been able to stymie the flat-earththers in a few seconds. Since flat-earththers believe the sun and moon are only about 30 miles in diameter and move in circular orbits near the top of a hemispherical dome which encases a much larger flat Earth of some 24,000 miles in diameter, the Earth would never be in a position to block the light of the sun from the moon, unless, of course, the moon departed from the upper hemisphere and suddenly went below the flat Earth, but the flat-earththers don't believe that is possible, of course.



While they accept, to a certain degree, the conventional explanation for solar eclipses, they have quite an unconventional but clever explanation for lunar

eclipses, and this is what often makes the debate rather interesting and why it is often difficult to convince flat-earthers otherwise. In their view, there really is no “eclipse” of the moon. As one flat-earth website put it:

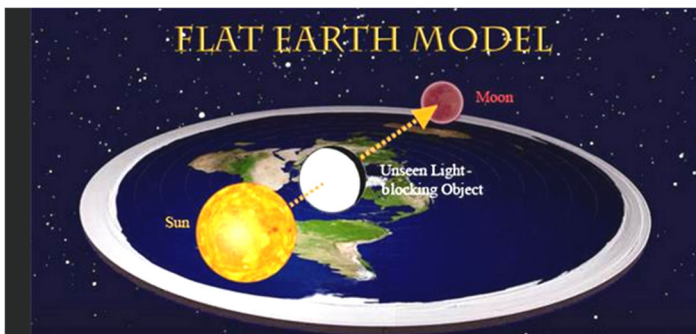
The Lunar ‘eclipse’ happens at night. When it happens, the moon turns orange in color. This is caused when the sun and moon line up with the center of the disk earth. The sunlight goes through the strong magnetic field of the north pole,



field of the north pole, and the sunlight turns orange. And that light then hits the moon. Since the sunlight is orange, it makes the moon appear orange as in this image.”

The moon must be at the same altitude as the sun in order for this to happen. That’s why it doesn’t happen very often, and is a rare event. Thus, as you can see, the phenomenon of the “orange moon” is not an eclipse at all, but is caused by the North Pole’s magnetic field.⁴⁵

Another popular interpretation of a lunar eclipse for the flat Earth model is to posit that there is some unknown object or light source that appears between the sun and the moon, such as the depiction below:



⁴⁵ <https://www.flat-earth-moon-phases.com/what-causes-a-lunar-eclipse>

⁴⁶ <http://www.blogtalkradio.com/deanodle/2017/02/01/the-dome-firmament-flat-earth-nasas-lies-pt-2>

Of course, this model just begs the question as to the identity of the “unseen light-blocking object.” It’s one thing to propose a model to explain a lunar eclipse, but it’s quite another to show proof of its existence. Inadvertently, this model actually demonstrates that the globe Earth, which serves as the middle object that blocks the light from the sun, can be the only reality, and that someone tried to make a cheap copy of this model for his flat Earth version.

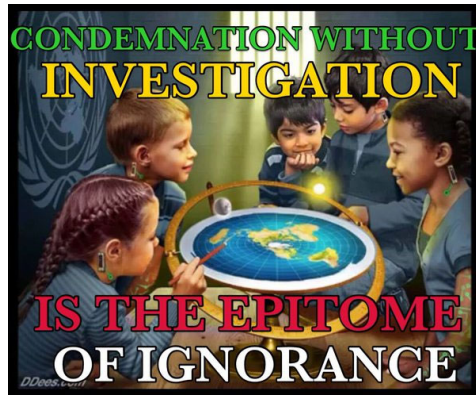
If anything, you have to admire them for their ingenuity. Like many issues in life, there are different ways to perceive various phenomena. By the mere fact that the first model is at least plausible, if you then choose to go down this rabbit hole in order to reserve yourself a place at the table to argue against it (that is, other than the typical knee-jerk reaction that a flat Earth is impossible), it will require you to do a study on what effect a magnetic field has on the sun’s light (the Aurora Borealis being one good example). You may next begin to reason that when white light goes through a prism it turns into the seven colors of the rainbow. You will then have to investigate whether a magnetic field works similar to a prism, and if the red and orange hues of a typical lunar eclipse can be separated out of the other five. If you



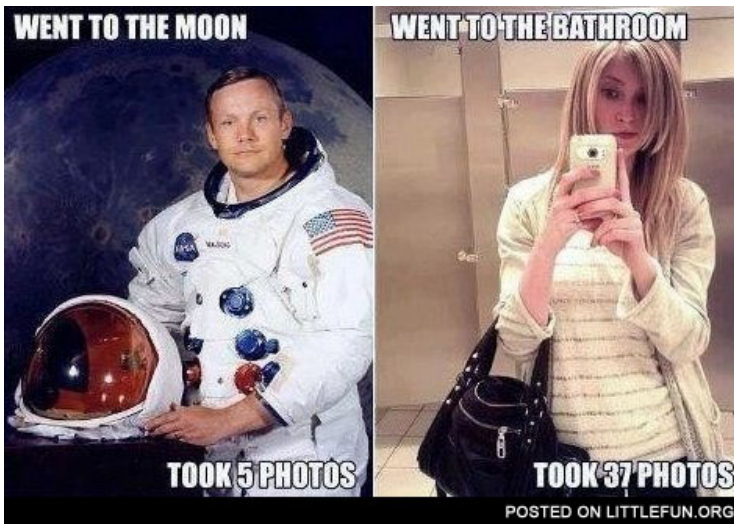
do your due diligence, you may then find yourself up at the wee hours of the night doing search after search on the Internet, which will then show you even more interesting challenges from the flat-earthers, and before

long you have officially joined one of the most popular and gnarly debates the world, round or flat, has ever seen, and you will never be the same. But don’t begrudge yourself for at least doing an investigation. As Aristotle once said: “It is the mark of an educated mind to entertain a thought without accepting it.”⁴⁷

⁴⁷ <https://www.youtube.com/channel/UCXIovaBdnA4UHdd-TZ-MqRg>, with “Bob,” “TJ” (possibly Jon Christopulos, aka “The Morgile”) and Jeran Campanella from “Jeranism.” Their following is not too shabby, which as of this date has near 30,000 subscribers. I was interviewed on *Jeranism* three years ago when he had just



As you can see, if you were to do the research on even this one issue, it would not only take you a long time to collect the data, but you would need at least some knowledge of physics and its protocols. My guess is that neither Kyrie Irving nor rapper B.o.B have the time or acumen to delve into the subject at this depth and are subsequently easy to convince from amateur Youtube videos.



started. At that time, our company, Stellar Motion Pictures had just released *The Principle* in US theaters. On the show I took the anti-flat-Earth side. See: <https://www.youtube.com/watch?v=8ycxm0tg1M8>

Why is the Flat Earth Movement so Popular?

In the midst of this tit-for-tat, one might ask why a deluge of flat-earth geography has resurfaced with such a vengeance. As one can surmise from the comments of the celebrities above, one of the main reasons is that there exists a whole generation of millennials, GenXers, GenYers, and even probably some left over hippies, yippies and Baby Boomers whose Vietnam and Watergate wounds have not yet healed, and thus have an axe to grind against modern society that, for all intents and purposes, seems to have abandoned them and come off the rails.



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As the rich still get richer and the poor get poorer, and these young people see gobs and gobs of money being taken from them and used to support the old and dying structures of society, many are looking for the proverbial silver bullet to bring down the whole edifice in one crashing boom. In order to do so, they need an issue in which they can accuse their progenitors of being totally inept buffoons who have consistently lied to their constituents, not only about basic things such as the shape of the Earth, but about all the political, military, business, scientific, religious and other such corruptions that have been covered up and subsequently used to control and deceive the populace.

⁴⁸ <https://www.youtube.com/watch?v=x6kryIHIOsM>, image used by flat-earther Kyle Thompson, with mask taken from the movie, “V for Vendetta,” 2005, an anarchist genre film: [https://en.wikipedia.org/wiki/V_for_Vendetta_\(film\)](https://en.wikipedia.org/wiki/V_for_Vendetta_(film))

IS THE GLOBE PART OF THE "STRONG DELUSION"?

Speed of Earth's orbit:
18.5 mps = 66,600 mph

Curvature math is 8 in. per mile squared:


- 1 mile = .666ft.
- 10 miles = 66.666ft.
- 100 miles = 6666.666 ft.

Earth's Tilt:
23.4 off of center
90 - 23.4 = 66.6

Speed of the globe's orbit:
66.600mph

Curvature in one mile squared:
.666ft

Axis tilt:
66.6°

 Masonic Science

testingtheglobe.com

**A QUEST FOR TRUTH BY
ROB SKIBA**

49

Suffice it to say, the Internet has drastically changed the climate of public opinion and turned it into one of almost total distrust of those in charge. The availability of information on past and current events has reached a point that far surpasses what we ever had in the past. Anyone with a computer and a server can simply press a few keys and become privy to information that was previously confined to television producers and newspaper publishers. In fact, much of the new information available to the public on the Internet goes much deeper than what we ever received from mainstream media.

Because of this new access to information, there is a growing distrust of mainstream news sources. Everything from the Kennedy assassination, the Gulf of Tonkin affair, 911, CIA covert operations, the Bohemian Grove, the Illuminati, the Jesuits, chemtrails, vaccines, the recent sexual exploits of dozens of popular figures, Pizzagate and Twittergate, the Florida school shooting, to the Catholic Church's pedophile scandal, to name just a few, have made the public quite aware that there is a lot going on behind the scenes that we never knew before the information age. They also know that mainstream media covers up much of what is actually occurring and has become as complicit as the actual perpetrators of these societal ills, at least until it is to their distinct advantage, financially or politically, to spill the

⁴⁹ <https://www.youtube.com/watch?v=dgGL-7H7vIw>, at 3:21, video by Ron Skiba, titled: "Occultist Isaac Newton: Father of Scientism Gravity Cult," published January 17, 2018.

beans. The “official storyline” (at least before it is finally exposed) has often become synonymous with lies and deceit in the minds of a much more educated public. The days in which the news media icon Walter Cronkite served as the final word of truth for the American audience are certainly over. There is probably not left a single media figure who enjoys impeccability or who is implicitly trusted to reveal the unadulterated truth. Today, everyone and everything is bought and sold for a price.

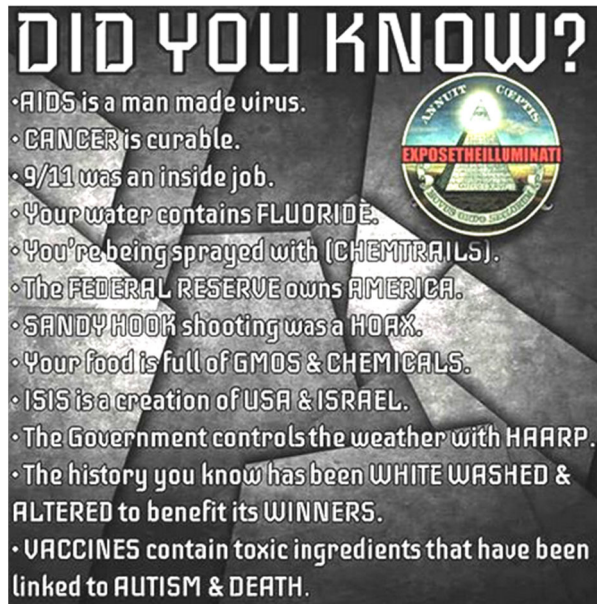
Consequently, hiding one’s mortal sins, and even one’s peccadilloes, from this raucous and bitter crowd is almost impossible to do for those today who live in the limelight. There is no longer anywhere to hide. But people still need answers. They need reasons why the society is going to hell in a hand-basket. This distrustful climate invariably gives rise to many conspiracy theories. In fact, it gives rise to hysteria, and when one is hysterical, there is only black and white and no shades of gray. To satisfy their frustration and calm their hysteria, they not only need an answer, they need a big answer, an “ah-hah” moment that uncovers the mother lode of conspiracies. In a word, the flat Earth conspiracy fills the bill better than any other. To them, it shows the underbelly of evil and deception as it has never been revealed before, or, at the least, it seems to hold a key to understanding all other conspiracies. And despite the fact that flat-earthers do not possess a monolithic consensus of belief in how to support their model, it certainly helps their cause when a novice tries to find the curvature of the Earth over various bodies of water and land masses and discovers that it is much harder than anyone thought it was, a topic we will address later in great detail.



By the same token, a fair number of conspiracy theories, though criticized at first, turn out to be true. For example, one can easily find on the Internet a partial list of 33 of these former “conspiracy theories” that were eventually proven true.⁵⁰ Or, take a look at this meme on the *Facebook* page of “**Flat Earth Christian Truthers,**” a veritable cornucopia of modern day conspiracy theories, some of which are believable or already proven as true. Even if

⁵⁰ <https://www.scribd.com/document/56684398/33-Conspiracy-Theories-That-Turned-Out-to-Be-True>.

you give credence to only one of these conspiracy theories and regard the rest as false, you are a doubter of the “official” story.



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After doubting one official story it's just a matter of degree as to how much more you will doubt based on information you receive from alternative news sources. In some cases, the name “Truthers” has been commandeered by those who have become either very suspicious or downright obstinate against the “official” version of events.

Why did the US government
invent and patent EBOLA
Patent number #CA2741523A1
SWINE FLU
Patent number #8124101
The AIDS cure
Patent number #5676977
The CANCER cure
Patent number #6630507
Seems like they are trying to
cause an epidemic, making us ill,
then keeping us sick...

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⁵¹facebook.com/FlatEarthChristianTruthers, posted April 9, 2018.

⁵² facebook.com/FlatEarthChristianTruthers, posted Aug. 25, 2016.

In the case of our present topic, The National Aeronautics and Space Administration (NASA) has been especially targeted by those espousing the Earth is flat. As one flat-earther put it: “NASA was created to HIDE the flat earth dome firmament from you.”⁵³ As **Eric Dubai**, one of the leading flat-earthers, puts it:



In NASA images, they claim to be hundreds and hundreds of miles up, and then you start to see curvature [of the Earth]. But if you notice, these images are often clearly CGI, computer graphic images, sometimes not so clearly....So they’ve used many different tricks throughout the years. But NASA is essentially Hollywood. And all the images that you think you’ve seen of a spinning ball Earth are faked.⁵⁴



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One of the leading flat-earthers today, **Mark Sargent**, reveals a typical story of how his interest began. A July 2017 article in the *Denver Post* (no friend of flat-earthers) describes it this way:

⁵³ www.youtube.com/playlist?list=PLt36ZcQGl6srt_-aQlEAaHQeizaxwnh3v

⁵⁴ <https://steemit.com/flathearth/@crypt0/best-video-on-the-flat-earth-theory-why-do-you-believe-the-earth-is-round-anarchast>, at 9:45 to 10:20. Dubai is also noted for producing a video that promotes the established doctrines of Jesus Christ as pure myth (<https://www.youtube.com/watch?v=Ng5sR1qPOkA>). Dubai and Sargent are at odds, the former calling the latter a “shill” because he produces bogus arguments for the flat Earth. Sargent has not returned the favor.

⁵⁵ youtube.com/watch?v=2TebGSZ2EQE, 22:32.

...research tends to fall on the shoulders of movement leaders, many of whom have backgrounds in related fields. Mark Sargent is the father of Flat Earth organizing in the United States. He worked as a software analyst in Boulder for 20 years before relocating to Seattle, where he sets up Flat Earth meet-ups through YouTube. His channel has amassed 7.7 million video views and almost 40,000 regular subscribers.

Like nearly every member of the movement, Sargent converted to Flat Earthism late in life. For most of his first five decades, he believed Earth to be a spinning globe. But something changed around the summer of 2014, when he stumbled upon a YouTube video contending that Earth is flat.



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“It was interesting, but I didn’t think it was real,” he says. “I started the same way as everyone else, saying, ‘Oh, I’ll just prove the earth is round.’ Nine months later, I was staring at my computer thinking, ‘I can’t prove the globe anymore.’”

He remembers the date, Feb. 10, 2015, when he took the plunge and started creating Flat Earth content of his own. To his surprise, the daily videos he had begun churning out ignited a firestorm online. The 49-year-old now devotes himself to Flat Earth propagation full time. He has made 600 YouTube videos and been interviewed more than 120 times.

⁵⁶ Photo from the *South Whidbey Record* published on August 17, 2017 (southwhidbeyrecord.com/news/flat-earth-from-skeptic-to-believer), written by Justin Burnett, who states: “Sargent has his own weekly radio show. He is a published author. His YouTube page, which includes over 20 ‘Clues’ videos, has nearly 40,000 subscribers and a whopping 8.4 million views.”

His conversion to the cult of globe-busting follows a common pattern among proselytes: latent anti-authoritarianism, which first found outlet in popular conspiracy theories of the mid-aughts, that by the mid-2010s transformed into full-blown contempt for the global model. In most cases, the catalyst was YouTube, with its highly popular flat-earth videos that began proliferating in late 2014.

Sargent acknowledges that he didn't found Flat Earthism, which has existed in some form since antiquity. But he and a handful of others combined communications technology with old-fashioned salesmanship to grow a shambolic rump of mostly silent believers into a fledgling movement that spans the country. "Before I did the first few videos back in 2015, if you typed 'flat earth' into YouTube you'd get 50,000 results," he says. "Now, you'll come in with 17.4 million. That's more than a 30,000 percent increase. And we're growing."

The Centennial State has been the cradle of the American flat earth renaissance since birth. The first Flat Earth International Conference, which will be in Raleigh, N.C., in November, features a number of Colorado-based Flat Earthers, including Sargent, Knodel and Matthew Procella, or ODD Reality, a Denver-based rapper and YouTuber with 75,000 subscribers and nearly 7 million video views.

The movement, though, is not a monolith. Differences of opinion divide the community on matters of scientific interpretation, cosmology, strategy and even the most fundamental questions of geology, such as: what shape is our planet?

Many subscribe to the "ice wall theory," or the belief that the world is circumscribed by giant ice barriers, like the walls of a bowl, that then extend infinitely along a flat plane. Sargent envisions Earth as "a giant circular disc covered by a dome." He likens the planet to a snow globe, similar to the one depicted in "The Truman Show," a fictitious 1998 existential drama about an insurance salesman unknowingly living in an artificially constructed dome. What then lies on the other side of the ice walls or beyond the glassy dome enclosing our world?

Flat Earthers don't claim to know with certainty, instead paying lip service to "common sense" evidence they claim can be proved. When skeptics demand proof, though, Flat Earthers wield reams of figures from so-called curvature tests and gyroscope calibrations that seem to buttress their views. Leaders want Flat Earthism to be an accessible creed for the

common man, an egalitarian movement that gives life meaning by punching back at scientific disenchantment.

“They want you to think you’re insignificant, a speck on the earth, a cosmic mistake,” Sargent says. “The flat earth says you are special, we are special, there is a creator, this isn’t some accident.”⁵⁷

Sargent has several entries into IMDb due to his flat Earth movies.⁵⁸ He likens the flat Earth movement to the popular 1998 movie, *The Truman Show*, in which **Truman Burbank**⁵⁹ (played by Jim Carrey) is born and



grows up in an enclosed town that has been built by a movie company who controls the whole structure with paid actors and artificial effects (moving sun, moon and clouds, rain, water ways, *etc.*), while monitoring Truman’s life with hidden cameras. Truman does not begin to question the reality of his

quarters until he reaches his thirties when, after a series of mistakes by the movie crew to keep him ignorant, he takes a dangerous boat ride to the edge of the structure and discovers that he has been living under a dome. Similarly, Sargent believes that God created man under a dome and that man, like Truman, discovered this heretofore unknown fact when **Admiral Richard Byrd** (1888 – 1957) landed in Antarctica and allegedly found it wasn’t a continent but a giant ice wall surrounding a flat Earth, popularly depicted today by an azimuthal map.



⁵⁷ denverpost.com/2017/07/07/colorado-earth-flat-gravity-hoax/

⁵⁸ imdb.com/name/nm7392551.

⁵⁹ Probably a symbolic name in which “Truman” refers to “True Man” and his true state of being discovered and displayed by “Burbank,” namely, Hollywood.



As Sargent says it in his movie:

The authority figured out in the 1950s all the borders of our enclosed world, and have done a great job hiding it over the decades....Admiral Byrd had laid the groundwork until his death in 1957. A year later, the United States and Russia found the upper edge....

The United States and Russia both sent up rockets, high enough to take decent pictures; and what they saw scared them a great deal. How do we know they were extremely concerned about the sky? Because the US and Russia immediately started firing nuclear weapons straight up, and they kept firing for the next four years....This was high kiloton to low megaton, and we couldn't get them up fast enough.

And the strangeness continued in other places. In 1959, only a year into the atmosphere bombardment, ten nations, including the United States, made Antarctica off limits to any colonization. The only thing they had to worry about was the space program, which is immediately militarized....And so the moon missions were created...you needed a moon mission event to stage a picture of the Earth from deep orbit.

⁶⁰ Flat-earthers consistently appeal to this picture from Antarctica as evidence of their 75,000-mile ice wall, but it is merely the Ross Ice Shelf formed near the Ross Sea, which is between 50 to 160 feet high, and 500 miles across, at the 6:30 position in the map below.



The short version of the discovery is this. By 1958 the military had discovered the very upper and solid edges of our world; and had to create a way to put up ‘do not enter’ signs without looking obvious....The sky part of the dome was much higher than commercial air traffic.

Then, of course, there is the decision, or deception, depending on how you looked at it. The authority made the call to actually hide the shape of where we live and sealed off the edge from prying eyes, and created the space program, not only to reinforce the globe model but to control it....And so the moon missions were created...you needed a moon mission event to stage a picture of the Earth from deep orbit.⁶¹

Sargent’s take on things would make an excellent science fiction movie. That the US and Russia saw the holy grail of biblical history—the actual dome of Genesis chapter 1—and then tried to blast through it with nuclear devices thousands of times more powerful than Hiroshima and, having failed to do so, were forced to hide the dome from the public by manufacturing fake pictures of a spherical Earth as if they were taken from the moon would, without doubt, be one of the highest grossing films of all time. But the operative word here is “fiction.” As we will see later, there simply isn’t an ounce of proof to what Sargent is saying. Suffice it to say for now, however, that the US and Russia were not trying to blast “straight

⁶¹ youtube.com/watch?v=4SIRsbQ3nfM&bpctr=1524229214, at 2:40 to 6:30 and 40:55 to 41:12; and 49:00f for specific reference to *The Truman Show*.

up” through a dome (especially since the flat-earth dome is supposed to be 3000+ miles high which no rocket in 1958 could reach) but were testing out their nuclear weapons in anticipation of using them against each other.

Since in cases like Sargent’s the flat-earthers are more interested in historiography than actual history, they subsequently marked NASA as an organization purposely designed and heavily funded to do one basic thing—hide the flat Earth from the public, just as the producers of *The Truman Show* tried to keep Truman Burbank from discovering his real world. As Sargent sees it, you will not become a “True Man” unless you expose NASA’s mistakes (*e.g.*, US flags waving in wind on the moon’s surface where there is supposed to be no wind; light projecting from several directions on the moon when the sun is the only light; astronaut boot footprints in soil that has no moisture to form prints) and discover the truth for yourself.



The “all or nothing” attack against NASA leads to doubting everything from the existence of satellites and planet probes (and thus all photos of a spherical Earth from space are said to be computer-generated images or CGI); the moon landings, courtesy of Stanley Kubrick’s movie, *The Shining*, as well as NASA’s Buzz Aldrin and Neil Armstrong who refused

⁶²[youtube.com/watch?v=2TebGSZ2EQE](https://www.youtube.com/watch?v=2TebGSZ2EQE), 29:17

to swear on the Bible that they walked on the moon,⁶³ NASA and the science environs at large face a backlash like never before.



Left to right: Frederick Ordway (in white), Deke Slayton, Arthur Clarke, unidentified man (behind Clarke), Stanley Kubrick, George Mueller.

Stanley Kubrick meeting with NASA Officials

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It is alleged that Kubrick was hired by NASA in the late 1960s to create moon landings in studio. Later, Kubrick is said to have had pangs of conscience and thus decided to produce *The Shining* in 1980 as an effort to reveal the moon landings were faked, spattering his movie with symbolic images and numbers relating to the Apollo missions. The title, *The Shining*, is most likely a symbolic reference to the fact that Kubrick's film was, up to that time, the quintessential 'shining light' upon one of the best kept secrets of mankind.

Consequently, if a devotee of the flat Earth has a firm belief that NASA lied to the public about going to the moon, or, perhaps, that the NIST study of the collapse of the Twin Towers is full of fabrications and missing details, it is not too far out of their realm of possibility that like-minded scientists are in collusion with the government and thus could be lying to us

⁶³[youtube.com/watch?v=o1S0oObHT0c](https://www.youtube.com/watch?v=o1S0oObHT0c), caution: expletives uttered by astronauts;[youtube.com/watch?v=xt9RfXCKYG4](https://www.youtube.com/watch?v=xt9RfXCKYG4);[youtube.com/watch?v=7UJiK5imnMw](https://www.youtube.com/watch?v=7UJiK5imnMw)

⁶⁴[mojvideo.com/uporabnik/rikisuave/slika/stanley-kubrick-meeting-with-nasa-officials/596014](https://www.mojvideo.com/uporabnik/rikisuave/slika/stanley-kubrick-meeting-with-nasa-officials/596014)

that the Earth is a sphere. The old adage is once again refreshed that, ‘if they can lie to us about one thing, they can lie to us about a lot of things,’ especially when money, power and prestige are recognized as the impetus for the alleged fabrications. The problem for the flat-earthers here, of course, is that even if it can be shown that NASA deliberately lied to the public about various things, it does not mean that everything is a lie and the Earth is flat. Convincing a flat-earther that one does not necessarily lead to the other is quite difficult.

Daniel Shenton, present secretary of *The Flat Earth Society*, adds to this negative image of NASA:

To most flat earthers, NASA played a major role in falsifying the moon landings. They soon after found out the reason they couldn’t travel to the moon: the Earth was flat. Stuck in their lie, they had to continue the round earth myth or risk a loss of legitimacy.



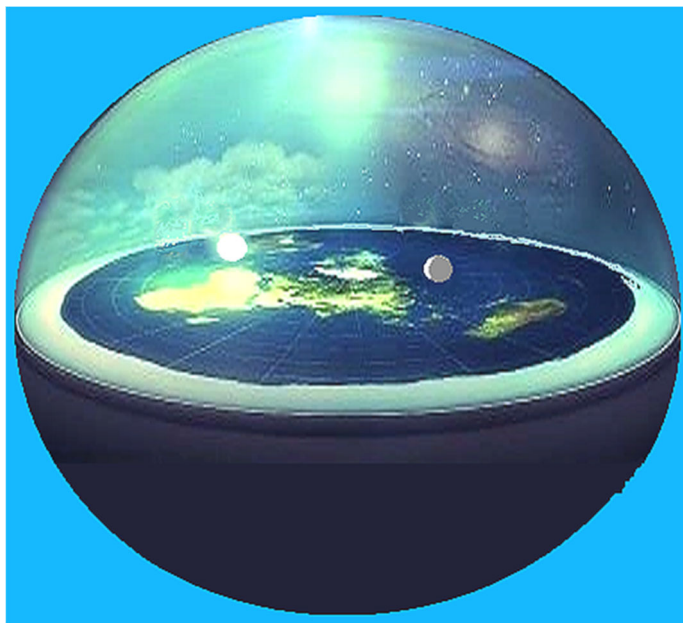
The amazing thing about NASA though is how incompetent they seem. They’re seldom able to report and account for their budget, they routinely claim to have discovered things they in reality haven’t for the sake of publicity, and they’ve been unable to produce a single non-altered image of the Earth since they supposedly

started going to space.

If they aren’t conspirators, they sure are doing a poor job at convincing the world they even went to space. No other development of man has

been met with so much skepticism, and to me the fault lies on NASA for this. If the Earth is round, the evidence should be plain to see.⁶⁵

There are many flat-earthers, however, who do not claim to be Christian. In fact, Eric Dubay seems to be totally against Christianity as much as he is NASA and the science community. The majority of flat-earthers today, however, appear to be Christian evangelicals. To a man, this group of flat-earthers believe the Bible teaches the Earth is flat and it is covered by a hard dome. The logical conclusion that many of them draw from this conviction is that if you don't believe the Earth is flat, at least after being shown the evidence, then you are, at best, either lazy, cognitively dissonant, willfully ignorant; or, at worst, following the devil and part of the cabal. It is the latter group that has drawn their line in the sand with memes typical of the above.



On the other side of the extreme, of course, are the scientists of the world who are, by and large, avowed atheists. In 1999, *Scientific American* carried an article of the research of James H. Leuba, a statistician who both in 1914 and 1933 surveyed the religious beliefs of American biological and physical

⁶⁵ <https://thetab.com/uk/sussex/2016/05/11/spoke-people-still-believe-earth-flat-9548>, article by Kyle Farrell.

scientists of their views on two fundamental beliefs in Christianity: (1) the worship of God and (2) the existence of an afterlife. Leuba believed his research was important because, as he said himself, “scientists enjoy great influence in the modern world, even in matters religious.”⁶⁶ At first glance, Leuba’s results seemed somewhat promising. Among a general cross section of scientists, he found that 40% believed in God. He then concentrated his study on the more elite scientists, those whose names are in the newspapers, who write the major books and articles, and who have the most influence on public opinion. He found that “80 percent of top natural scientists rejected the cardinal beliefs of traditional Christianity.” Some seventy years later, *Scientific American* did its own study and found very similar results. Using the 1,800 members of the 1998 *National Academy of Sciences* as its measure of who comprised the “elite scientists” of the day, the editors found that:

Disbelief [in God] among NAS members responding to our survey exceeded 90 percent....NAS biologists are the most skeptical, with 95 percent of our respondents evincing atheism and agnosticism. Mathematicians in the NAS are more accepting: one in every six of them [17%] expressed belief in a personal God.⁶⁷

Commenting further, the article reveals that atheism dominates academic institutions, and those who have any Christian beliefs are systematically suppressed:

University of Washington sociologist Rodney Stark...points out, “There’s been 200 years of marketing that if you want to be a scientific person you’ve got to keep your mind free of the fetters of religion.”...higher education on the whole winnows out the idea of God or people who hold it. In research universities, “the religious people keep their mouths shut,” Stark says. “And the irreligious people discriminate. There’s a reward system to being irreligious in the upper echelons.”⁶⁸

The reasons for this rampant atheism are then discovered:

⁶⁶ “Scientists and Religion in America,” Edward J. Larson and Larry Witham, *Scientific American*, Sept. 1999, p. 89.

⁶⁷ *Ibid.*, p. 90.

⁶⁸ *Ibid.*, p. 91.

Legendary evolutionary biologist Ernst Mayr, an NAS member since 1954, made a study of disbelief among his Harvard University colleagues in the academy. “It turned out we were all atheists,” he recalls. “I found that there were two sources.” One Mayr typified as, “Oh, I became an atheist very early. I just couldn’t believe all that supernatural stuff.” But others told him, “I just couldn’t believe that there could be a God with all this evil in the world.” Mayr adds, “Most atheists combine the two. This combination makes it impossible to believe in God.”⁶⁹

So, it is no wonder that NASA, with few exceptions,⁷⁰ is an emblem of the atheistic science establishment, at least to the flat-earthers. There couldn’t be a better example of the polarization between one group and another. With the Internet at their disposal, the flat-earthers have waged a no-holds-barred war on the scientific establishment. As Youtube has become their favorite media vehicle, memes are used as the stepping-stones. The following are some of the better examples of how these memes make it clear that one is put on one side or the other.

Despite the fact that NASA and its supporters insist that the United States put a man on the moon,⁷¹ in many cases NASA does, indeed, create theories

⁶⁹ *Ibid.*

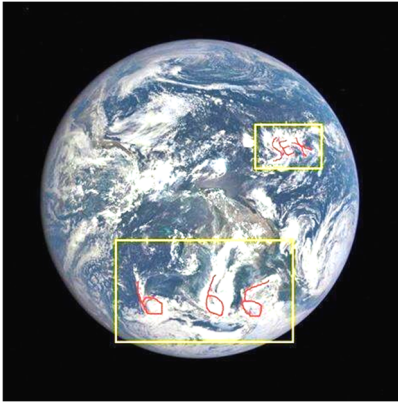
⁷⁰ Exceptions to this rule are Jeffrey N. Williams (Apollo 17) and Charles Duke (Apollo 16). Duke is reported to have stated to Danny Faulkner: “I was the lunar module pilot on the Apollo 16 mission to the moon. We launched from KSC (Kennedy Space Center) in Florida on April 16, 1972. We left earth orbit for our three day trip to the moon about three hours later. As we maneuvered our spacecraft to dock with our lunar module, the earth came into view about 20,000 miles away. It was an awesome sight. As you can see in the photo, it is obviously a sphere and not a flat circle. As we journeyed to the moon, we would look out our windows and see a smaller earth, and each time we would see different landmasses, so it was obviously rotating on its axis. Some people are questioning the fact that we landed on the moon, alleging that it is a big hoax. Well, we did land on the moon six times, and the evidences are overwhelming. If we faked the landing, why did we fake it 6 times? One needs only to look at the photos from the Lunar Reconnaissance Orbiter from my mission. The photos of our landing site show the descent stage, the lunar rover, the experiments package, and the tracks we left on the moon. Every landing site has similar evidence. There are many other proofs that conclusively show that Apollo actually landed on the moon six times.” (“Is the Earth Flat?” Danny R. Faulkner, May 24, 2016).

⁷¹ See <https://www.quora.com> for questions: “Why do people believe we landed on the moon? Why won’t the US admit that they did not go to the moon? Why do people deny the moon landing? I just don’t get it. What evidence is there that we

and interpret the scientific evidence to make it appear there is not even a Creator, much less a man named Jesus Christ who came to Earth to save mankind. For most of them, the Bible is merely a piece of ancient literature that is full of myths and fables for uneducated people. Of course, if the flat-earthers are wrong about the Earth being flat, once the atheistic and agnostic populace is convinced that flat Earth science is wrong, they will invariably blame it on the Bible for leading the flat-earthers astray. Hence one of our purposes in writing this book is to extract the Bible from being forced into a mold it doesn't fit and, at the same time, show the world that it remains the inspired word of God that many—some well-intentioned, some not so—abuse to create dubious interpretations to fit their own worldview.



didn't actually go to the moon in 1969? Did NASA fake the moon landing? If so, how can you tell using the images? Why did Neil Armstrong refuse to swear on the Bible that he actually did go to the moon? What motivates people to deny that we landed on the moon?"



SATAN'S BABYLON/NWO COUNTERFEITS:

1. "Do what thou wilt," Luciferian Theosophy
2. Worship whatever you want. You are a god.
3. Evolution: You evolved from nothing
4. The Big Bang Theory: Everything came from nothing
5. Sun worship/Pagan idolatry. The earth revolves around the sun.
6. The earth is a ball chaotically hurtling through the Universe.

GOD'S FLAT EARTH TRUTH AND REALITY:

1. "If you love Me keep my Commandments." John 14:15
2. "I am the Way, the Truth, and the Life." John 14:6
3. "For I am fearfully and wonderfully made." Psalm 139:14
4. "In the beginning God created the heavens and the earth." Genesis 1:1
5. "And God said, Let there be lights IN THE FIRMAMENT." Genesis 1:14
6. "The world also shall be stable, that it cannot be moved." 1 Chron. 16:30

When the teachings of men conflict with the Word of God, it would be wise to go with God.

-Henry M. Morris Ph.D.

THE BIBLE DESCRIBES A FLAT STATIONARY EARTH INSIDE A DOME. EARTH IS FLAT! RESEARCH IT!

THE GLOBE

THE FLAT EARTH

THE FOUNDATION FOR EVOLUTION, THE BIG BANG, ATHEISM, ALIEN SEEDING, PAGANISM, THE OCCULT, THE NEW WORLD ORDER, AND SATANIC WORLD CONTROL

DESCRIBED IN THE BIBLE, VALIDATES THE BIBLE, POINTS TO GOD ALONE AS CREATOR, AND BLOWS SATAN'S DECEPTIONS WIDE OPEN

Now do you see why they are lying?

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A typical example of how perhaps well-intentioned Christians may fall off the edge (pun unintended) is in the case of **Wilbur Voliva**. As Wikipedia regards his exploits,

From 1914, Voliva gained nationwide notoriety by his vigorous advocacy of the flat earth doctrine. He offered a widely publicized \$5000 challenge for anyone to disprove the flat earth theory. The church schools in Zion taught the flat earth doctrine. In 1923 Voliva became the first evangelical preacher in the world to own his own radio station, which could be heard as far away as Australia. His radio



⁷² <https://flatearthscienceandbible.com/tag/flat-earth/feed/>

station broadcast his diatribes against round earth astronomy, and the evils of evolution. He was quoted about the sun as follows:

The idea of a sun millions of miles in diameter and 91,000,000 miles away is silly. The sun is only 32 miles across and not more than 3,000 miles from the earth. It stands to reason it must be so. God made the sun to light the earth, and therefore must have placed it close to the task it was designed to do. What would you think of a man who built a house in Zion and put the lamp to light it in Kenosha, Wisconsin?



He became increasingly focused on destroying the “trinity of evils”: modern astronomy, evolution and higher criticism, insisting on a strict interpretation of 24-hour days for creation and travelling to Dayton, Tennessee, to appear as a witness at the Scopes trial (he wasn’t called). Voliva also frequently predicted the end of the world: his predictions that the end would come in 1923, 1927, 1930, 1934, and 1935 all proved incorrect.⁷³

The difficulty in dealing with the aberrations of both science and religion is sorting out the wheat from the chaff, whether it is from the atheists at NASA who believe we descended from monkeys and that the universe came from

⁷³ https://en.wikipedia.org/wiki/Wilbur_Glenn_Voliva

nothing yet is infinite, or the god-fearing Christians who predict dates for the end of the world and insist the Earth is flat.

"...the very moment when the universe came out of nothingness.... We expect surprises. There has to be surprises."

~ Rainer Weiss

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As eccentric as he was, Voliva understood well that the modern science/religious community consistently preaches a trifecta of evils, but the sincere Christians, divided as they are into thousands of churches and denominations, preach different doctrines and thus inadvertently confuse the truth they desire to uphold. Without a central authority to curb excesses and rein in religious vigilantes, one of the most dangerous things that can occur is when a Bible is put into the hands of someone who thinks God has personally spoken to him or that his personal interpretation, diverse as it is from everyone else's, is the only correct one. Sometimes the only difference between the false teachings between Christians and atheists is that the former introduce theirs with "Jesus wants you to believe..." while the latter say, "What's the matter with you, you stupid moron?"

In some cases, Christians make elaborate films that have enough good quality in them to appear in movie theaters, and the attempt is presently being made and more will come in the future. One pioneering example is the film from the *Biblical Flat Earth Series* titled: "The Global Lie: Flat Earth Revelation Documentary," starring Rob Skiba, Philip Stallings, Emmanuel Lokonga and three people which, strangely, appear under pseudonyms: "My Perspective," "Truth is Stranger than Fiction" and "Scrawny2brawny," with music by Coca De Fluffy.⁷⁵ All of these participants base their belief on the supposition that the Bible teaches a flat

⁷⁴ <https://www.youtube.com/watch?v=74zBvMvWILY>, at 4:29, in video titled: "Aether and Electric Universe v. Einstein LIGO and Gravity Waves," published Nov. 9, 2017 by "Globebusters." The narrator (Wallace Thornhill of the "Thunderbolts Project") says: "The real surprise is that a physicist can say that the universe came out of nothingness." Rainer Weiss is one of the top physicists in the world.

⁷⁵ Presented by PhilipStallings.com and produced by Robbie Davidson from "Flat Out Truth Productions" and part of "Celebrate Truth: Exposing the World's Lies," can be viewed at <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>

Earth, which is why a major portion of our book delves deeply into biblical exegesis to correct this false notion. We will also deal with the science claims of the movie, some of which are passable when dealing with Copernicanism and Darwinism, but are quite dubious when espousing a flat Earth (the denial that meteors strike the Earth; that it would be impossible for the Earth's celestial pole to point to the North Star continually; the denial of stellar parallax, *etc.*). In any case, one can easily surmise in viewing the movie and its attention to “the Copernican principle,” that a good portion of its conviction and material was inspired by our movies, *The Principle*⁷⁶ and *Journey to the Center of the Universe*,⁷⁷ as well as the books series, *Galileo Was Wrong*,⁷⁸ but went off the rails due to its conviction that a flat Earth is a product of divine revelation. Except for the flat Earth *faux pas*, the movie is very educational for those who wish to delve into the debate.

Currently, a movie in post-production titled, *Behind The Curve*, is a 96-minute documentary about flat-earthers, featuring Mark Sargent, Patricia Steere, Bob Knodel, Jeran Campanella, Nathan Thompson, and Chris Pontius, and the *Hot Docs International Film Festival* in late April 2018 in Toronto. It is described on its website as “A documentary about people who think the Earth is flat. Yes, really.”⁷⁹



Reviews of the screenings are listed and linked for reading, such as this one

⁷⁶ Produced by Stellar Motion Pictures, LLC in West Hollywood, CA, released in AMC and Regal Cinemas in October 2014, and available on DVD, download and streaming at www.theprinciplemovie.com.

⁷⁷ Produced by CAI Publishing, Inc., on DVD, July 2015, and available at www.gwwdvd.com

⁷⁸ Published by CAI Publishing, Inc., and available at www.robertsungenis.org.

⁷⁹ <https://www.behindthecurvefilm.com>. It is underwritten by Delta-V Productions and directed and produced by Daniel and Caroline Clark, respectively, and edited by Nick Andert. Andrew Herwitz, president of *The Film Sales Company*, has attained worldwide sales rights to *Behind The Curve*.

from *Hot Docs Review*, written on April 25, 2018 by Norman Wilner, who is critical and condescending:

It's a literal conspiracy theory, and one spun out over and over again by the likes of Mark Sargent and Patricia Steere, who've become superstars in the Flat Earth YouTube community over the last few years. They don't offer real answers, just innuendo and suspicion – Steere loves referring to “The Powers That Should Not Be” – but that's what keeps people coming back, of course.

Documentarian Daniel J. Clark interviews them, and a few other believers, and lets them tell their version of reality – but he also speaks to astrophysicists and psychologists who efficiently debunk their beliefs and explain how people might have come to hold them. (The Dunning-Kruger effect, in which people convince themselves they know everything about something while actually knowing very little, is brought up fairly early on, along with confirmation bias, which keeps people focused on evidence that supports their existing beliefs rather than evidence that challenges them.)

While there's entertainment value in watching the clown show of fringe weirdoes drawn to the movement – one especially enthusiastic dolt swerves from terrarium theory to anti-vaxxer and Young Earth talking points in a matter of seconds – Clark also offers a compassionate view, hoping that the brighter ones might be talked back to an acceptance of reality. I want to believe he's right.⁸⁰



Patricia Steere, one of the flat-earthers featured in the movie, and whose Facebook page describes her as “Flat Earther–Vegan,”⁸¹ replied: “Thank you for writing about *Behind the Curve*. We appreciate the media attention, good or bad, because like it or not, Flat Earth isn't going away.”

⁸⁰ <https://nowtoronto.com/movies/reviews/hot-docs-behind-the-curve/#.WuDIYp0MEmQ.twitter>

⁸¹ <https://www.facebook.com/misssteere>

Another reviewer was more polite but singled out Matt Boylan as the villain (whom we also cover in this book), as apparently does the movie according to an email to me from Mark Sargent. The article states:



Behind the Curve follows a variety of Flat Earthers, such as **Mark Sargent**, podcaster Patricia Steere, and others, who try to provide proof that their theories are the truth....I am going to say flat out that if you are a scientifically minded person, *Behind the Curve* is probably going to infuriate you, as these people use circumstantial evidence to “prove” that their beliefs that

the Earth is flat are true. On the other hand, *Behind the Curve* shows that this community is made up by relatively relatable people, who just share an unpopular belief. The only exception is the originator of the Flat Earth theory Matt Boylan, aka Math Powerland, who is pretty much a full-blown conspiracy theory nutjob. Believe what you will, but *Behind the Curve* is an interesting watch, no matter which way you stand.⁸²

Another reviewer said:

Then again, as *Behind the Curve* makes clear, the idea of a flat Earth is pretty much at the top of the conspiracy pyramid; you only get there once you’ve accepted everything else, from chemtrails to lizard people. And yet, shouting them down doesn’t seem particularly productive. The more we ostracize them, the more likely they are to dig in their heels and defy mainstream science. These aren’t stupid people, as the film makes clear. A lot of them are smart, inquisitive, and actually, want to test their theories—the problem is, they aren’t satisfied by the overwhelming amount of evidence that suggests that the Earth is round. They need more proof.⁸³

When the director, **Daniel Clark**, was asked what motivated him to do the film, he said it was for his brother “who is so against flat-earthers that he won’t even talk about it”:

⁸² <http://www.skonmovies.com/2018/04/hot-docs-2018-behind-curve.html>

⁸³ https://www.vice.com/en_us/article/qvxq3v/this-filmmaker-wants-us-to-take-flat-earthers-seriously

At first, there was the thought that we could make a movie that flat earthers or conspiracy theorists would watch and come to an understanding of themselves. That is still entirely possible, but as we were making it, I think we shifted our focus. I use my brother as an example. My brother is a super science person, loves sci-fi, loves everything about space, and he's one of the smartest people I've ever met. He has the most disdain for flat earthers. He doesn't have the patience to even talk about it. I think I ended up making the movie more for people like him, which are people who aren't willing to give them even a moment's thought or are aggressively against them. If you're trying to fix the flat earthers, that's honestly a much harder job than to try to get someone to see someone else as another human being. So the movie is kind of for my brother [laughs]. And he likes it.

Before we even went out, I actually sat and watched countless hours of their videos, trying to really get used to their claims and how they react to certain things because when I was first watching every point they make, I'd be like "What? Come on!" I think that's the natural reaction if you're watching a flat Earth video for the first time. They say that the sun and the moon are spotlights in the sky and Antarctica is an ice wall.



If I was ever with someone [and] they brought up a point that I couldn't immediately, in my head, say, This is why, I would actually go research it. Everybody who becomes a flat earther [first] tried to debunk it and couldn't, which is kind of like saying your keys are always in the last place you look. A lot of people do find the evidence that proves the theory of the Earth being flat wrong, and they stop exploring it. But those who don't, yes, they couldn't debunk it.

I noticed that everybody in the film who believes in a flat Earth kept on saying that they went in looking to debunk it. And I thought, am I just waiting for that moment? Am I going to watch this film, and that

moment's going to come? Am I going to stop believing that the Earth is what it is? That didn't happen [laughs].⁸⁴

Not surprisingly, flat-earththers must consistently deal with rabid opposition, but since some of the people involved are highly intelligent, they have come up with an apologetic that at least deals with some of the more high-profile and related issues. For example, as regards NASA, for those who think it



would be impossible for this illustrious multi-billion dollar institution to hide a fake moon landing from the general public, flat Earth advocate and popular evangelical **Rob Skiba**⁸⁵ reminds them that during the Manhattan Project, which created the atomic bomb and involved 130,000 people, “even the vice-president of the United States didn’t know what was going on,” much less the general public.⁸⁶

On the other hand, Skiba, quite unashamedly, says that before teaching about the flat Earth, he asks his listener if he believes that NASA landed a man on the moon or believes that 19 Muslims are responsible for bringing down the Twin Tower complex. If the person says that he believes the official version, Skiba says that he will just walk away and no longer talk to the person about whether the Earth is flat, since he obviously does not have the necessary pre-conditioned mind set.⁸⁷ But in this case, what’s good for the goose is also good for the gander. In a recent interview with MMA executive, Joe Rogan, in February 2017, **Neil Degrasse Tyson** said these words:

All I would do is say, what is your best single bit of evidence for what you’re calming and what would it take to show that you’re wrong?....And I’ve done this exercise and it doesn’t work. You know why? Because there was a guy who didn’t believe we went to the moon; rather, let me just say he is skeptical. So I said, what kind of evidence would convince you? He said, “image of the landing sites of the Apollo missions.” So I

⁸⁴ *Ibid.*

⁸⁵ Rob Skiba is an entrepreneur at heart, delving into many areas of business and is an avid filmmaker. He tells the heartbreaking story of himself in a 25-minute video at <https://www.youtube.com/watch?v=etiez4Cd6iw>

⁸⁶ [youtube.com/watch?v=DfBRyQxW90E](https://www.youtube.com/watch?v=DfBRyQxW90E), at the 21:50 mark.

⁸⁷ [youtube.com/watch?v=Ih1LPFqHSSM](https://www.youtube.com/watch?v=Ih1LPFqHSSM)

said, “Ok. Here’s a website—in fact it wasn’t us, I think it was the Chinese or Europeans—sent a probe, an orbiter, to the moon so that it was close enough.... photographed the entire surface of the moon and there were the landing sites, and you...

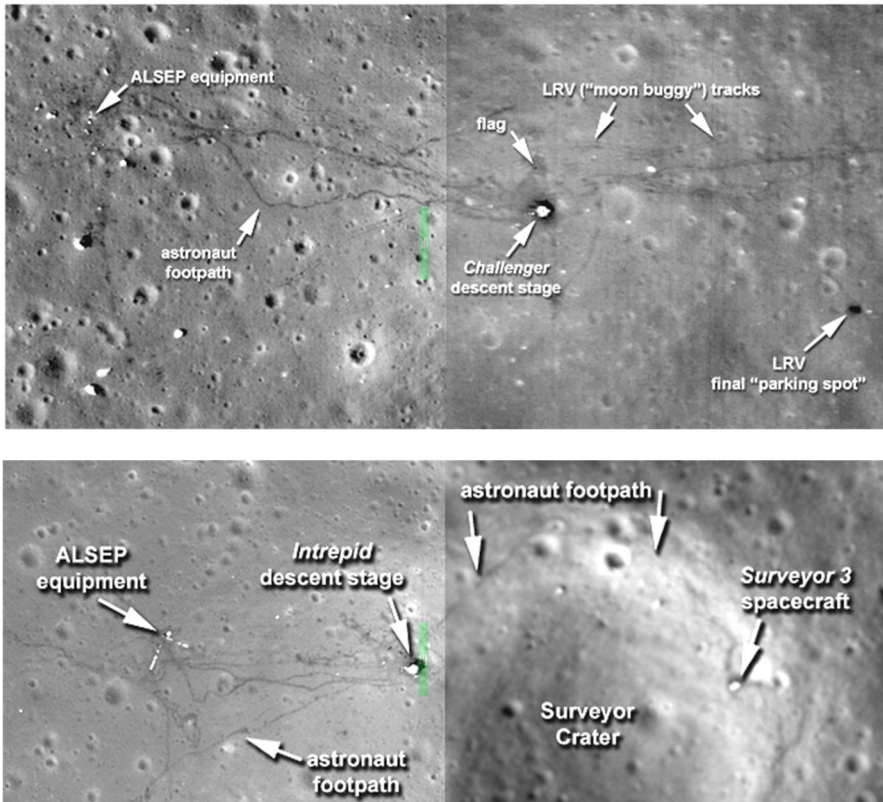


...saw the rover tracks, and the base for the lunar module...” And so that night he went home and found it. Then he came back and says, “Well, NASA could have faked that.” Well, I’m done with you. We have no more to talk about, because he’s not ready to be convinced.⁸⁸

As we can see, the NASA moon missions become the proverbial rag doll that each side uses as a litmus test as to whether they will listen to what the other side has to say. Nevertheless, it is interesting to see the so-called “proof” from the orbiter to which Tyson refers. Below are the photographs provided by NASA’s *Lunar Reconnaissance Orbiter Camera* (LROC).⁸⁹

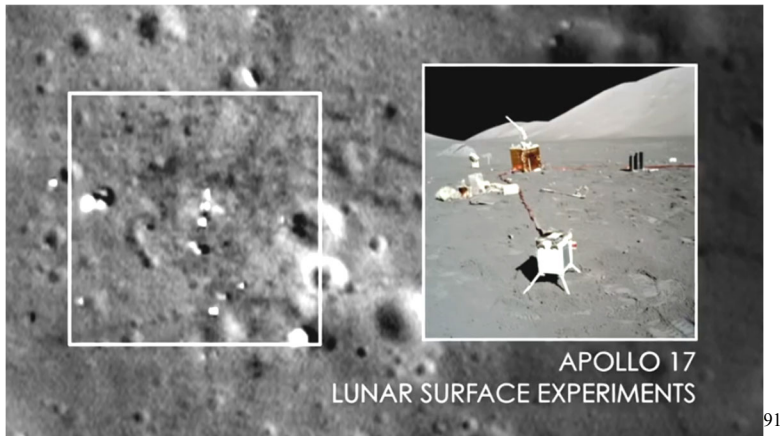
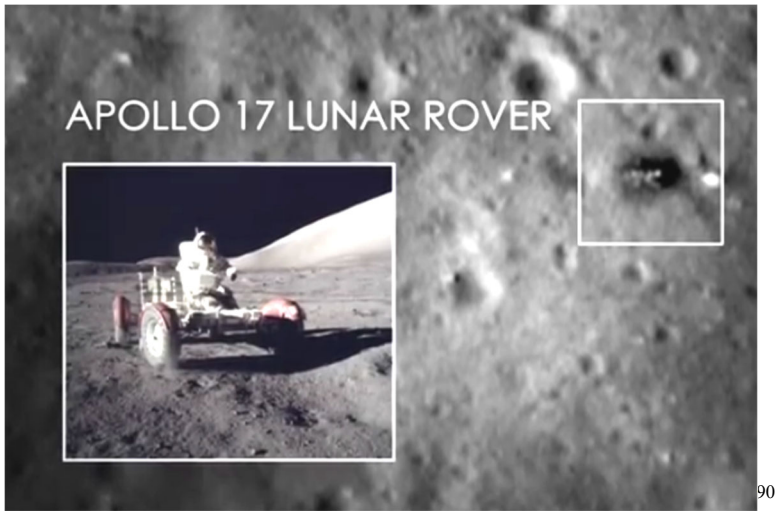
⁸⁸youtube.com/watch?v=Zni00B36f7E, at 1:00-2:35. In my inquiry to Mark Sargent, he believes Eric Dubay is the flat-earthier mentioned by Tyson.

⁸⁹ https://www.nasa.gov/mission_pages/LRO/news/apollo-sites.html, article titled: “NASA Spacecraft Images Offer Sharper Views of Apollo Landing Sites,” Published, Sept. 5, 2011.



Photos from NASA's Lunar Reconnaissance Orbiter Camera, 2011

Suffice it to say, it is precisely the poor quality of these photos (*e.g.*, nothing resembling the “lunar rover” appears at all discernible in the lower photo; all the “experimental equipment” appears only as white squares or circles in the next photo) that incite disbelievers in NASA to continue their disbelief. It is ironic that Google Earth can show a picture of your car in vivid detail parked in your driveway from hundreds of miles in space, but somehow a sophisticated NASA camera, meticulously designed to take pictures of the detail on the lunar surface, isn't capable of providing an image that remotely looks like what it is purported to be.



In light of NASA's poor photos, it should be no surprise that in the debate Skiba had with Zachary Bauer on February 28, 2016, he spent his opening remarks decrying NASA and their "fake photos."⁹² Although as the debate progressed Skiba then offered what he believed was evidence for a flat Earth, as we will see later, he offered no definitive proof but only circumstantial evidence upon which he continually cogitates. To his credit, on a scientific level, Skiba remains equivocal about the flat Earth even

⁹⁰ https://www.nasa.gov/mission_pages/LRO/news/apollo-sites.html, at 0:50.

⁹¹ *Ibid.*, at 1:06

⁹² [youtube.com/watch?v=DfBRyQxW90E](https://www.youtube.com/watch?v=DfBRyQxW90E)

though he vigorously defends it on many occasions. In the beginning of the aforementioned debate, Skiba stated quite matter-of-factly, “I’m not a flat-earther and I’m not fully convinced that it is flat,”⁹³ yet proceeded to defend it quite vigorously as if he did believe it. In part 3 of his “Questioning Everything Flat Earth,” published May 21, 2015, Skiba states in bold letters at the beginning, “As of today, I believe Earth is a sphere. Yes I really do *still* believe Earth is a sphere. Seriously. Earth = a *sphere*....at least for now I do anyway.”⁹⁴ Most of his verve comes from his sincere conviction that the Bible teaches a flat Earth, which often becomes his default position when the science is not definitive. In the same video, Skiba later says:

We are really going to have to do some serious thinking on this issue. And some of it may make you angry, because you are going to have to be confronted with some things...Because I’ll tell you what, the Bible...if you say you believe the Bible and you use it as your authority for truth, the Bible absolutely argues in favor of an enclosed system on a stationary Earth. It certainly does not, in any way, shape or form, advocate a globe.⁹⁵

As we can see, Skiba has thrown down the proverbial gauntlet regarding an “enclosed system” (*e.g.*, an Earth enclosed by a dome), not only against his critics, but against himself as well. It is an unfortunate ultimatum that, if and when he is honest with himself, will certainly bring him heartache and disbelief. It doesn’t seem to cross Skiba’s mind that he could be in error regarding his interpretation of the Bible, and this is especially puzzling since, by his own admission, Skiba does not know the original languages of the Bible.

Although later we will show the errors of Skiba’s biblical exegesis, as we can clearly see above, Skiba is a man struggling with what he believes the Bible “absolutely” teaches but what may or may not be supportable scientifically. This is a dangerous place to be. It is this precise position which spawned the liberal theological movements in Protestantism, Judaism and Catholicism in the last two or three hundred years. Laying aside a couple of smaller voices in the 13th and 14th centuries, it was Copernicus in the 16th

⁹³ *Ibid.*, at 1:14.

⁹⁴ [youtube.com/watch?v=feqnoVRRPQs](https://www.youtube.com/watch?v=feqnoVRRPQs)

⁹⁵ *Ibid.*, at 34:38 to 35:10.

century, and Galileo and Foscarini in the 17th century, who were the first to begin the path to liberal theology. Convinced from their own “science” that the Earth moved around the sun, they were more or less forced to take the position that the Bible’s insistence that the Earth was motionless did not need to be taken literally and that the Bible was not designed to be an authority on science or history, particularly regarding its teaching about the cosmos and its origin. Of course, this position only begged the question as to what else the Bible said that need not be taken literally, which then led to Graf-Wellhausen’s and Darwin’s claims in the 19th century that even the origins of life taught in Genesis were not literal accounts of history. Today in the 21st century, liberal theology reserves the right to dismiss practically anything the Bible has to say about history, and even its teaching about salvation is deemed to be little more than made-up stories. As a result, most of the mainline churches and denominations have lost the Christian faith, and the few conservative branches still fighting the good fight have severely diluted the Bible’s former authority. There really is no way around this dilemma once it is believed that “science has proven” the Earth moves.

Perhaps recognizing this dilemma, Skiba has what one might call a “thinking out loud” approach to the flat Earth theory. He does most of this cogitation on Youtube channels, and that is because he is an avid film maker who is quite adept at making videos of his favorite subjects. Interestingly enough, although Skiba is equivocal about the flat Earth theory, he is not equivocal about the Earth being motionless in the center of the universe. During the aforementioned debate, Skiba stated:

And in regard to the Copernican model, I would just say in closing, watch the movie, *The Principle*, go to theprinciplemovie.com. Watch that movie. It obliterates the idea we are in a heliocentric system. We are in a geocentric system. While I may not be certain about the flat Earth, I am certain about that. We are in a geocentric system.⁹⁶...if the evidence

⁹⁶ *Ibid.*, at 53:18 to 53:34. The 90-minute movie, *The Principle*, had its theatrical release in AMC and Regal Cinemas in Chicago in October 2014 and ran in various other cities until April 2015. I was the executive producer and an actor; Rick Delano (writer and producer); Ktee Thomas (director), and starring, Michio Kaku, Max Tegmark, Laurence Krauss, George F. R. Ellis and many other top scientists.

proves beyond all doubt that we are in fact on a spinning, heliocentric ball...I will never again be able to claim to take the Bible literally.⁹⁷



In light of Skiba's remarks about *The Principle*, as the creator, consultant and executive producer of the movie, it goes without saying that I appreciate his endorsement. It is the very opposite of his opponent in the debate, Zachary Bauer, who, viewing only half the movie (by his own admission), missed its most important parts, which then led him to accept, without question, the media hype against the movie, that is, that the scientists in the movie, such as Laurence Krauss, Max Tegmark and Michio Kaku, were "deceived" into participating. This accusation was thoroughly rebutted by myself and Rick Delano on ChurchMilitant.com in January 2015 as we showed the contracts signed by the participants, which stated that the movie would be covering alternative views to the mainstream science view of cosmology.⁹⁸ Tegmark is especially culpable since he signed an additional contract to be a consultant for the movie and was paid the appropriate fees for his high-level participation.

Additionally, the participants were interviewed for 3-4 hours and thus knew precisely the aim and theme of the movie; and at no time did any participant ask that his views be deleted nor state that he would not answer certain questions posed. All the participants were permitted to say whatever they wanted to say, even when the subject of geocentrism was made part of the questions asked of them. At no time were the participants—by what is known in the movie industry as "cutting and pasting"—made to appear as geocentrists or anything of the sort. Unfortunately, most of them, egged on and pressured by the biased press, criticized and denounced the movie long

⁹⁷ Said by Skiba on Feb. 4, 2016, quoted from Skiba's video by Douglas Hamp.

⁹⁸ http://www.theprinciplemovie.com/concise-overview-media-hoax-principle-documentary/#at_pco=smlwn-1.0&at_si=5a691124349bd268&at_ab=per-2&at_pos=0&at_tot=1

before they ever saw it,⁹⁹ since it was not released until October 2014, six months after the press organized their worldwide attack against the movie in April 2014, after contacting each of the participants. At one point, *The Principle* was the third highest trending story on the Internet and covered by over 150 news agencies throughout the world.

In addition to the secular attack against *The Principle*, there was another attack orchestrated by the more liberal and neo-orthodox factions of modern Catholicism who have made their bed with modern cosmology (e.g., the Big Bang, acentrism, evolution, historical criticism of the Bible) and repudiate the attempt by more tradition-minded members of Catholicism to exonerate the popes and cardinals of the 17th century who condemned Galileo and his heliocentric system. Since *The Principle* (and its sequel, the DVD, *Journey to the Center of the Universe*)¹⁰⁰ use the discoveries of modern science to show the Earth is, indeed, in the center of the universe, one ingenious way our enemies chose to fight our innovative use of science was to associate it with a movement which most consider a misuse of science, namely, those in the late 1880s who started the flat Earth movement based on various scientific anomalies regarding the Earth's curvature. Since it is rather obvious that satellite evidence not available in the late 1800s now makes moot the issue of whether the Earth is flat, still, the guilt by association tactic used by our opponents was more or less an attempt to derail the success of *The Principle* by making it appear as just another tin-foil hat operation. But the flat-earthers attempted to use *The Principle* as a sounding board for their own views, which is noted by the fact that over 500,000 illegal views of *The Principle* on Youtube have been reported between 2015 and 2017, most of the piracy being done by flat Earth advocates. There have also been many other attempts by flat-earthers to commandeer my books and films to support their cause, along with continual requests to join their movement. It

⁹⁹ The leading participant in the denunciation (before he ever saw the film or even remembered he had been interviewed for it), was Laurence Krauss, at least until his signed contract with Stellar Motion Pictures was shown on national television in Jan. 2015. Interestingly enough, in 2013 Krauss was involved with a movie titled, *The Unbelievers*, (a year before *The Principle*), and complains vociferously that his critics reviewed and criticized the movie months before it was actually released (<https://www.youtube.com/watch?v=VgxUTJmcWsM>).

¹⁰⁰ Available at www.journeytothecenteroftheuniverse.com or www.gwwdvd.com, released in 2015. It is a 4.5 hour-long detailed and comprehensive documentary.

may be no coincidence that the rebirth of the flat Earth movement in 2014 was during the same time that *The Principle* was being excoriated in the press (April 2014) and eventually released in nationwide theaters (October 2014), although many believe that the sheer number of excellently produced Youtube videos that appeared in just a couple months advocating a flat Earth could only be from a well-financed psyops phenomenon. As one site put it:

What's interesting to me is that the debate is between the geocentric flat earth vs. the heliocentric globe earth. But that may be a false dichotomy, as there is a third option that hardly anyone is talking about; the geocentric globe earth. It puts the Earth at the center of the universe, proving a Creator, and explaining why stars perfectly circle the Earth; while maintaining the global structure of earth, and the surrounding elaborate universe, which is a precision time-piece. What's really interesting is that interest in the flat earth spiked after the movie documentary '*The Principle*' was released in October, 2014. The enemy may have created the flat earth narrative, to cause people to mock anyone who believes in the geocentric earth. The focus of this website is not about whether the earth is geocentric or heliocentric; but about whether it's flat or a globe. Why would the enemy create the flat earth deception? Because most flat earthers are sharing truth in other areas, whether it's about coming out of churchianity, about the Illuminati and their agenda, etc.; so by getting them to believe in the flat earth, they cause family and friends to stop listening to all that they teach.¹⁰¹

As one astute flat Earth debunker put it:

How many times does this have to be debunked before people wake up to the psy-op? People, they are trying to make Truthers and Christians look stupid. Don't let them.¹⁰²

¹⁰¹ <http://flatearthdeception.com/> by David Nikao, one of the better scientifically-based sites debunking a flat Earth. Other more politically-minded sites blame the flat Earth movement on an array of conspiracies, such as the popular Henry Makow at <https://www.henrymakow.com/2016/02/Flat-Earth-Psyop.html>. See also "Christians Against Flat Earth" for other references to psy-ops campaigns at: <https://www.facebook.com/ChristiansAgainstFlatEarth/videos/103162700121668/> such as <https://www.youtube.com/watch?v=VSy9oKHLpiE&feature=youtu.be>, which warns against "throwing the baby out with the bath water" philosophy of the flat Earth mentality.

¹⁰² [youtube.com/watch?v=MIyz3B3g-ZE&feature=youtu.be](https://www.youtube.com/watch?v=MIyz3B3g-ZE&feature=youtu.be), 9:15.

Whether it is a psy-ops or not is difficult to tell. Psy-ops are masters at concealing their operations. On the other side, many flat-earthers believe that videos and chat rooms that espouse a globe earth are a “covert counterintelligence curriculum subcontracted by internal compartments within security agencies” and that “the entire debate online over the web has been infiltrated” by these agencies.¹⁰³ If its “the entire debate,” then it means the psy-ops operators are playing both sides of the fence for their own political purposes. Of course, we also cannot discount the huge amount of money that is being made on both sides of the aisle in this worldwide debate, including the ‘fifteen minutes of fame’ each producer of a Youtube video receives.



To be sure, *The Principle* has obviously started a worldwide movement to educate the public to alternative views of cosmology that compete directly

¹⁰³[youtube.com/watch?v=JI94gMVybX4](https://www.youtube.com/watch?v=JI94gMVybX4), in a video titled “The List of All Flat Earth Fakes Revealed: Confirmed by Canadian Intel Asset,” published on “TheNASACHannel” on Nov. 21, 2016, from flat-earther, Matthew Powerland (aka Math Boylan), a former NASA contracted artist who created painted images of celestial objects for NASA. A comment from a chatter at one of Powerland’s videos says: “This makes me realize the scriptures are real, God exists, and that we have been lied to our entire lives, but rest assured, the veil is lifting thanks to the good work of this man. God bless,” even though Powerland is not a Christian and discounts biblical revelation ([youtube.com/watch?v=TfoXSVlv8-E](https://www.youtube.com/watch?v=TfoXSVlv8-E)).

¹⁰⁴[youtube.com/watch?v=2TebGSZ2EQE](https://www.youtube.com/watch?v=2TebGSZ2EQE), 27:39.

against modern cosmology; but at the same time, due to what appears to be an orchestrated attempt to derail it by some well-funded political and academic institutions, finds itself in a quagmire because of the flat Earth attempt to ride on its coattails.

Not surprisingly, then, flat-earththers have used the same appeal to the public that appears in *The Principle*, namely, that flat Earth geocentric cosmology brings one in touch with one's Creator and shows that we are not a speck of dust moving aimlessly in the remote recesses of space but that we are, indeed, very special in the center of the universe. In using this appeal, the flat-earththers have incited the public to fall headlong into accepting a flat Earth since, as they claim, "flat-earththers also believe the Earth is special and in the center of the universe." This is a clever attempt to use the truth to deceive. As such, perhaps it could be said that the fixed-globe-Earth has been turned into a Frankenstein by the fixed-flat-Earth movement. This was no better said than a video recently posted by "The Entertainment Vault" titled, "I was wrong!!! The earth is NOT flat: 19 mile zoom on P900," who stated:

If you consider yourself to be intellectually or even spiritually honest you will give this video a chance and not judge it on the first few minutes. Hopefully you will see how and why I have come full circle on this topic of flat earth. When I initially heard of flat earth I found it slightly funny and strange, but was intrigued as to why so many people believe in it so strongly. I am also a sucker for a good conspiracy. So what were the claims and why, I asked, and I was told something that got me hooked almost right away, "...you have been lied to your whole life, indoctrinated and suppressed from birth to believe you are a chance creation...a fluke that happened because a giant rock hurtling through space that happened to be located in the perfect place for life to occur." This was all luck, as opposed to if you are on a flat earth with a dome and are pretty much the focal point...you are being watched by possibly a creator...you are special. I've done a lot of learning, was completely unbiased from the start and even found myself starting to believe some of the stuff I was watching, reading or hearing about. It's a lot easier to take on board if you have a general distrust for the government and the powers that rule (which I do) ...it's also very easy to get caught up with

a conspiracy, as information is often twisted or false and money is the main agenda...but I had to be honest with myself.¹⁰⁵

Even more to the point is flat-earthier Mark Sargent's commentary in his movie *Flat Earth Clues*, published in 2015. All of Sargent's flat Earth movies were made at least six months after the debut of *The Principle*.¹⁰⁶ I reached out to Sargent in early 2018 when I began this book and introduced myself as the creator and executive producer of *The Principle*. Here is the beginning of our email exchange. (NB: Mark gave me permission to publish any and all words we exchanged):

Robert: Greetings, Mark. This is Robert Sungenis. I got your name and email address from Brian xxxx, a long-time patron of mine. Since you may not know who I am, I am the creator and executive producer of *The Principle*, which was released in AMC and Regal theaters in October 2014, and the author of the *Galileo Was Wrong* series of books, as well as the 4.5 hour DVD, *Journey to the Center of the Universe*. From what I can gather, we share a conviction from the Bible and science that the Earth is motionless in the center of the universe, so at least we have some common ground to stand on and converse, if you wish to. But I have an equal conviction from the Bible and science that the flat Earth theory is wrong, as you might guess from the email exchange between yourself, Brian and Rick Delano, my producer. I have a couple of questions to ask you about your version of the flat earth, in particular, the issue of what can be seen in the night sky from the northern hemisphere as opposed to the southern hemisphere. Would you be willing to exchange a few emails on this in order to have a polite discussion? Please let me know at your earliest convenience.

Mark: You don't really need an introduction. Our community had been following your work since we came online in 2015. I know that we were an annoyance to you in some ways, but I can assure you, we share some

¹⁰⁵ <https://www.youtube.com/watch?v=dVER8BKBOpI>, posted Feb. 6, 2018.

¹⁰⁶ <https://www.imdb.com/name/nm7392551>: "Mark K. Sargent is a writer and producer, known for *Flat Earth Clues* (2015), *Flat Earth Shenanigans* (2016) and *Flat Earth & Other Hot Potatoes* (2015)." Sargent is also featured in the 96-minute upcoming documentary, *Behind the Curve*, which is described as "A documentary about people who think the Earth is flat. Yes, really." It is underwritten by Delta-V Productions and directed and produced by Daniel and Caroline Clark, respectively, <https://www.behindthecurvefilm.com>.

similar goals. Yes, from a biblical standpoint, I think we are using some of the same pages. I come from a strong born again Christian home, but I defer most of the chapter and verse to people on our side who specialize in it, like Rob Skiba, Zen Garcia, or Robbie Davidson. The one I like most is this. <http://testingtheglobe.com...>To be clear, YOU ARE RIGHT, the Earth is the center of the universe. The universe however, was just a stage backdrop, very well crafted, and only detectable when we were ready.¹⁰⁷

From the above exchange, I think it is safe to say that since Sargent, Skiba, Garcia and Davidson are representative of the leadership of the flat Earth movement, its spawning and present worldwide popularity is due in good measure to *The Principle*. But if someone were to pose the question to me, “Robert, what do you think would be the quickest and most effective way for modern society to have a reason to ignore or ridicule the astounding information contained in *The Principle* about the Earth’s centrality in the universe?”, my quickest and most effective answer would not be the Bible or modern science’s data; rather, “the flat Earth movement.” In other words, the quickest way to discredit the Bible-based and scientific-based movie called *The Principle* is to juxtapose it with an already discredited “Bible-based” and “scientific-based” belief. Whoever originally thought up this clever scheme is an evil genius.



Take the case **Jeran Campanella**. Although he has asked me twice to join the flat Earth movement, I began to suspect that the invitation harbors an ulterior motive when I came across this statement in April 2018. After being accused of being “stoopid” by a critic for believing that Antarctica is an ice wall, Campanella acted out his opposition’s viewpoint:

I just don’t get how dumb flat-earthers are. I mean, you have a simple choice. Either Earth is spinning a thousand miles per hour or it’s not. Either it travels 21 million miles a day, or zero. Stars are either trillions of miles away or they are lights in the sky. All that HD footage confirms

¹⁰⁷ An email from Mark Sargent on February 13, 2017, published by permission.

that NASA's in space doing great things, or they're just stealing our money. It's just so sad that these guys are so intellectually stupid that they believe their own eyes! I mean, their own senses! Not me. I know where truth lies. It lies in the textbooks, provided and written by Freemason Jesuits who want a better life for me and my family. They want me to give them a run for their money. To challenge them and beat them in this game of life. Thank non-God for science!¹⁰⁸

Notice that Campanella's stooge does not offer the audience a third alternative—the geocentric globe Earth—believed by everyone from Plato and Aristotle, through Ptolemy, Brahe and the *Jesuit* Robert Bellarmine, and allowed scientifically by even Newton, Einstein and Hawking (although they preferred heliocentrism for philosophical reasons).¹⁰⁹ For the flat-earththers it is an all or nothing game. You either believe in a flat Earth or all

¹⁰⁸ <https://www.youtube.com/watch?v=YLkTm19aZGs>, beginning at 18:10.

¹⁰⁹ Newton: "That the center of the system of the world is immovable: this is acknowledged by all, although some contend that the Earth, others that the sun, is fixed in that center" (*Principia Mathematica*, Book 3: *The System of the World*, Proposition X, Hypothesis I); "In order for the Earth to be at rest in the center of the system of the sun, planets, and comets, there is required both universal gravity and another force in addition that acts on all bodies equally....Since this force is equal and opposite to its gravity toward the sun, the Earth can truly remain in equilibrium between these two forces and be at rest. And thus celestial bodies can move around the Earth at rest, as in the Tychonic system" (*Principia Mathematica*, Proposition 43, discovered by George E. Smith (Tufts University) in essay is titled: "Newtonian Relativity: A Neglected Manuscript, an Understressed Corollary," cited by Steven Weinberg in *To Explain the World*, 2015, pp. 251-252); Einstein: "We need not necessarily trace the existence of these centrifugal forces back to an absolute movement of K' [Earth]; we can instead just as well trace them back to the rotational movement of the distant ponderable masses [stars] in relation to K' whereby we treat K' as 'at rest'" ("Die formale Grundlageder allgemeinen Relativitätstheorie," October 1914); "The struggle, so violent in the early days of science, between the views of Ptolemy and Copernicus would then be quite meaningless. Either coordinate system could be used with equal justification. The two sentences: 'the sun is at rest and the Earth moves,' or 'the sun moves and the Earth is at rest,' would simply mean two different conventions concerning two different coordinate systems" (*The Evolution of Physics: From Early Concepts to Relativity and Quanta*, Einstein/Infeld, 1938, p. 212); Hawking: "Although it is not uncommon for people to say that Copernicus proved Ptolemy wrong, that is not true. As in the case of our normal view versus that of the goldfish, one can use either picture as a model of the universe, for our observations of the heavens can be explained by assuming either the earth or the sun to be at rest" (*The Grand Design*, Hawking/Mlodinow, 2010, pp. 41-42).

of your science isn't worth a plug nickel. In fact, the last time Campanella asked me to join with him (April 2018), I told him: "How could I? The satellites you reject as fake are the very satellites I depended upon to reveal the Earth is in the center of the universe."

In Sargent's case, it seems the evil genius found the perfect guinea pig, since in Sargent's approach there is no need to go through much scientific rigor. We are told to just accept the Bible teaches a flat Earth and then do whatever necessary to demonstrate this to the public. Since it is rather difficult to prove a flat Earth scientifically, Sargent has decided to view the astronomical data as "a stage backdrop," similar to *The Truman Show*. As we will see later, Sargent believes that the objects we see in the sky, from the sun, moon and stars to anything in between, are merely light projections, or even holograms. This is his answer as to how they can all fit into the tiny world of a flat Earth with a dome comprising a universe that is only 3,000 miles high and 24,000 miles in diameter thus leaving less than a few hundred billion cubic miles of living space. Conversely, the producers of *The Principle* view raw data from astrophysics as real, defining real objects, large distances and definitive patterns, all of which, incidentally, put the Earth in the center of a vast universe, at least if the data is interpreted at face value and without an atheistic philosophical bias.

The irony here is that Sargent's holograms allow him to use the same appeal to the public that *The Principle* used, but without him having to engage in the same scientific rigor. Consequently, once Sargent's flat Earth and dome are scientifically discredited, the "genius" is betting that a motionless Earth in the center of the universe will also be discredited, and thus he kills two birds with one stone. The problem, of course, is the same one the "genius" wasn't able to conquer previously, which is the fact that the world's top scientists, as noted, have already admitted to the scientific viability of a geocentric universe (Newton, Einstein, Mach, Lorentz, Hawking, Born, Hoyle, Ellis, Russell, Barbour, Cohen, Krauss, *et al*), but admit they can't bring themselves to accept it due to their previous philosophical commitments. At the least, this makes the battle a scientific stalemate to be settled in the future. Still, not a one of them ever gave any scientific credence to a flat Earth.

In any case, Sargent makes a dramatic appeal to his audience. The basic theme is, how would the world react if they suddenly had proof that the Earth they were taught by science for the last 500 years was totally false.

We start with a press conference by, let's say, the United Nations, who have discovered that indeed the world is enclosed in a giant high-tech dome of unknown origin and age. The public reacts with wonder and awe trying to take in the sheer scope of this announcement. Facebook crashes. Twitter crashes. Entire mobile networks crash. It's like hitting a bee hive with a sledge hammer. News organizations send teams to the outer edge to confirm the finding, and the general public is glued to their media devices. That's the good news; the excitement; the revelation; the positive shock. Then the bad news starts coming in waves, some of which you might not expect.

The first is the immediate disbanding of NASA and all other world space programs for obvious reasons. Most governments will secretly pardon these groups and keep them immune from class action lawsuits—the lawsuits themselves coming from NASA investment groups claiming fraud. Regardless, everyone at NASA, despite their good intentions, is out of a job overnight. And this is where you would say “Good, they deserve it. It's about time they stopped lying to everyone.” Oh, but it doesn't stop there, because every contractor and subcontractor that are exclusively tied to NASA, they have to shut down as well. Fine, a few thousand jobs lost; no big deal. And the ripples continue to spread, some bigger than others. Observatories all over the world close their doors. And the reasoning is this: if you've been looking at the ceiling for decades and couldn't tell it was a ceiling, then what good are you? Every university in the world that has an astronomy or astrophysics program, well, they don't anymore. Stephen Hawking? His book writing days are over. Carl Sagan? No more NOVA in syndication. I guarantee it. Those professors are going to have to retool their skills and be prepared to answer one giant question: how did you not see it?! Aren't there clues? People start finger pointing, and it will continue for years. And still my fellow flat-earthers will say, ‘well, hell, that doesn't sound too bad.’ What if some nerds around the world lose their jobs? So what? Ah, you don't get off that easy, is ‘what.’

Finger pointing at NASA will then point to finger pointing at the government that directed the whole thing....The point is that all religions are seeking their leverage against science. You've heard of the division

between Church and State. Well, here it is. Advantage Church. The barrier becomes a giant religious symbol. And since it is backed by the big five [religions], it also becomes universal. The big five then go into their draw with the good silver and pull out this belief that was forgotten but not lost and say, “We knew it all along, and science lied to us.”Temporarily all religions unite against science, who has been only moderately weakened by the removal of their astronomy and astrophysics divisions. But the public won’t care, because they will listen to the group shouting the loudest, and no one yells louder than the Church....And the people will turn to science and hear nothing but crickets. And that’s where the world changes, because in times of great stress, the public will want words. And while religion has no shortage of them, science simply isn’t capable of taking leaps of faith....For everyone of you, there are hundreds, if not thousands, of mouth breathing troglodytes who will not walk but run to the nearest house of religion and say, “You were right about this. What else can you teach me.” THIS is what fills the current authority with pause....¹¹⁰

Such a futuristic scenario is why the book that is the bases of *The Principle*, is titled *Galileo Was Wrong: The Church Was Right*. The fear of the agnostic and atheistic nations is that there may come a time in which the Church will regain its leadership over mankind, the same held by the Church when everyone believed the Earth was the center of the universe and everything revolved around it. But if we insist that such an Earth must be flat, we will lose whatever ascendancy we gained when we showed the world its centrality in the universe. The “evil genius” has created a temporary fail safe for himself and his minions; a last desperate attempt to suppress the truth and confuse the public. But he will not win. Time is on our side, not his. It is my prediction that the flat Earth baggage will eventually be shown for its inept use of science and the Bible. This may take a few years. Meanwhile the true science and the legitimate conclusions made in *The Principle* will suffer accordingly.

I believe it is also important to point out that, from everything I can gather from the flat-earthers—their desires, their techniques, their language, their targets, their motivations, and their ultimate goals—a contingent portion seems to be bent on revolution, a revolution to turn over the basic structures

¹¹⁰ [youtube.com/watch?v=4SiRsbQ3nfM&bpctr=1524316152](https://www.youtube.com/watch?v=4SiRsbQ3nfM&bpctr=1524316152), 1:00:36 to 1:06:27.

of society and any form of authority, especially government. Although some flat-earthers are rational people who are honestly searching for answers amidst all the lies and mis-directions that various leaders in government, business, military and education have perpetrated on the uneducated public,¹¹¹ there are many others who are little more than anarchists.¹¹² Although everyone has the right to interpret the evidence to his own persuasions, when these persuasions are used as a springboard for anarchy we then have a whole different animal—an animal that needs to be caged rather than admired. Good, bad or indifferent at various times in history, the basic structures of society are vitally necessary for our survival, otherwise there is only chaos left in the vacuum wherein the medicine becomes worse than the disease.

Despite the flat-earther's desire to teach a biblical worldview, the constant droning against NASA spawns an “attack the source” methodology that attempts to make NASA into a complete boogeyman wherein nothing good can come from it. Instead of separating the good from the bad, the hope is that no one will listen to what NASA has to say about anything, following the adage: “If they can lie to us about one thing, they can lie to us about all things, including that the Earth is round.” Of course, the converse of the “all or nothing” methodology is another adage: “You can fool some of the people some of the time, but you can't fool all of the people all of the time.”



¹¹¹ See the first seven minutes of Rob Skiba's program appropriately titled, "RevolutionaryRadio" at <https://www.youtube.com/watch?v=feqnoVRRPQs>

¹¹² There are over 500 flat Earth sites, and growing. Some are violent, foul-mouthed, uneducated, and full of hate and animosity for mankind and God.

In other words, as influential and authoritative as it appears to be, NASA, if it is fabricating its evidence, can convince the public only for so long until the truth finally comes out. As one commentator put it: “NASA lies, but that doesn’t mean the Earth is flat.”¹¹³ Ironically, Skiba was forced to “debunk himself,” as he puts it, because of a failure he made in accusing NASA of producing a fake video of a satellite one million miles away that took a running film of the moon circling the Earth.¹¹⁴ Previous to finding his own mistake, Skiba excoriated NASA, as well as the Japanese, for “lying to the public.” Similarly, flat-earther Jeran Campanella stated that he didn’t believe in the GPS because:

...it’s owned by the US government; operated by the US Air Force. I mean, the US government, we can trust them, right? Unless you may have heard of the Gulf of Tonkin; the use of Napalm and Agent Orange...

Interrupting the long list of conspiracies, Soundly replies:

What in the bleep does any of that have to do with whether or not the GPS actually works? GPS could have come from Satan himself and it wouldn’t prevent it from working. GPS is used to drive tractors; to grade land; to automatically land airplanes and guide missiles...GPS works. It doesn’t matter who created it.¹¹⁵

While we are speaking about the GPS, this is a good time to tell a little more of the story in order to even the playing field and expose the double-standard used by the science community. Although the GPS certainly “works,” Soundly is probably oblivious to the fact that the GPS defies much of the modern science that Soundly uses against Campanella. That is because the GPS discredits the Special Theory of Relativity invented in 1905 by Albert Einstein—the very theory upon which all of modern science is built. Even more significant is the fact that Einstein invented the Special theory in order to counter the experiments by Arago (1820); Airy (1871) and Michelson-

¹¹³ [youtube.com/watch?v=M9-DMbGDsZ4](https://www.youtube.com/watch?v=M9-DMbGDsZ4), at 27:47, courtesy of “We’ll Do it Live: The Real Alternative Podcast.”

¹¹⁴ [youtube.com/watch?v=M9-DMbGDsZ4](https://www.youtube.com/watch?v=M9-DMbGDsZ4)

¹¹⁵ [youtube.com/watch?v=vP_wYRbWGSA](https://www.youtube.com/watch?v=vP_wYRbWGSA), titled, “Holy Flerspective,” published Feb. 4, 2018 by Soundly. A new video making more claims for Special Relativity and against Campanella is [youtube.com/watch?v=vwTvGyBRjQE](https://www.youtube.com/watch?v=vwTvGyBRjQE), Team Skeptic.

Morley (1887) that showed the Earth was motionless in space—one of the very planks of science held by flat-earthers. The GPS defies Einstein’s Special Relativity theory since it shows that electromagnetic signals travel faster east-to-west than west-to-east, all day, every day; whereas Einstein’s theory says the signals should always travel the same speed in any direction. In order to compensate for the difference in speed, the GPS computers must be pre-programmed with what is called a “Sagnac correction.” As noted by Neil Ashby, chief operator of the GPS:

...the Sagnac effect can produce discrepancies amounting to hundreds of nanoseconds. The Sagnac effect is particularly important when GPS signals are used to compare times of primary reference cesium clocks at national standards laboratories far from each other....A Sagnac correction is needed to account for the diurnal motion of each receiver during signal propagation. In fact, one can use the GPS to observe the Sagnac effect.¹¹⁶

As we can see, instead of admitting the GPS computers must be corrected for the anisotropy in the speed of light, they adjust the GPS by the Sagnac effect to make the capture of the light signals seem isotropic. They then tell the world that the GPS is proof of Special Relativity’s postulate that the speed of light never changes. Below are two examples from popular Relativity advocates of how this ruse is accomplished:

Relativistic coordinate time is deeply embedded in the GPS. Millions of receivers have software that applies relativistic corrections. Orbiting GPS clocks have been modified to more closely realize coordinate time. Ordinary users of the GPS, though they may not need to be aware of it, have thus become dependent on Einstein’s conception of space and time.¹¹⁷

GPS accounts for relativity by electronically adjusting the rates of the satellite clocks, and by building mathematical corrections [the Sagnac correction] into the computer chips which solve for the user’s location.

¹¹⁶ Neil Ashby, “Relativity and the Global Positioning System,” *Physics Today*, May 2002, pp. 5-6.

¹¹⁷ *Ibid.*, p. 10.

Without the proper application of relativity, GPS would fail in its navigational functions within about 2 minutes.¹¹⁸

Physicist Ron Hatch candidly reveals the scientific chicanery taking place. Hatch was an employee of *NavCom Technologies* who contracted with *John Deere Tractor Company* to use the GPS to guide the latter's tractors. Hatch saw that the GPS was pre-programmed with a Sagnac correction so that the speed of light between GPS satellites and stations would always remain constant. As he puts it:

The Sagnac effect is the result of a non-isotropic speed of light and arises any time an observer or measuring instrument moves with respect to the frame chosen as the isotropic light-speed frame. And it is here that the Sagnac effect runs into trouble with the special theory. The special theory by postulate and definition of time synchronization requires that the speed of light always be isotropic with respect to the observer. And this is where the special theory is in error—the Sagnac effect illustrates that error.¹¹⁹

So, Soundly's admonishment of Campanella is a two-edged sword. Campanella is certainly wrong in denying the GPS exists, but Soundly is ignorant of why the GPS he highly esteems can work so well in plowing fields and landing planes. Little does he know the GPS actually supports one of Campanella's major flat Earth doctrines—a motionless Earth in the center of the universe. The reality is that Special Relativity doesn't deal with reality; rather, it distorts reality (*e.g.*, it shortens the length and dilates the time of moving objects, while it forces light to be constant when the GPS shows it is not) in order to get the answer it desires for the waiting world (*e.g.*, a non-constant, moving Earth). As long as modern science distorts reality, it will never give a satisfying answer to the Campanellas of the world.

In the end, each so-called “conspiracy theory” must be judged on its own merits; and more than often that process takes a long time. Some are short-

¹¹⁸ Clifford M. Will, “Einstein's Relativity and Everyday Life,” <http://www.physicscentral.com/explore/writers/will.cfm>.

¹¹⁹ “Relativity and GPS,” Part I, *Galilean Electrodynamics*, 6, 3, 1995. Hatch continues: “Since relativists do not like to admit that non-isotropic light speed exists, they attempt to explain the effect by other mechanisms.”

lived, but some never die, and so it is with the flat Earth theory. It may never die. The reason, to be fair to the flat-earthers, is that there is some seemingly credible evidence that supports a flat Earth geography, especially the seeming lack of curvature to the Earth in various places.

Anyone who enters this controversy thinking that it is a simple slam dunk process to debunk the flat Earth really hasn't studied the issue very well. As noted by Lynch:

Detecting the curvature of the horizon directly is a complex issue, and it is further aggravated by psychological factors: much has been written about the evocative effects of seeing the curvature of the Earth from space. People hope and often expect to see it and so they do, whether they actually do or not.¹²⁰

When, for example, a news meteorologist looks across Lake Michigan and sees almost the whole skyline of Chicago above the horizon—which, from Grand Mere State Park, 60-miles away, should not be visible because of the curvature of the Earth—and concludes that it is merely “a superior mirage,”¹²¹ but which is countered by flat-earthers who say the Chicago skyline, with the right zoom lens, can be seen quite often and that atmospheric conditions prohibit us from seeing it on other occasions, we can readily see we have entered into an arena which requires more than knee-jerk reactions.

¹²⁰ “Visually discerning the curvature of the Earth,” David K. Lynch, *Applied Optics*, Vol. 47, No. 34, Dec. 1, 2008, p. H41.

¹²¹ Meteorologist Tom Coomes at: [youtube.com/watch?v=eJiYXSVNU0w&index=18&list=PLt36ZcQG16srt_-aQIEAaHQQeizaxwnh3v](https://www.youtube.com/watch?v=eJiYXSVNU0w&index=18&list=PLt36ZcQG16srt_-aQIEAaHQQeizaxwnh3v)

The Chicago skyline from Grand Mere State Park (on the other side of Lake Michigan)

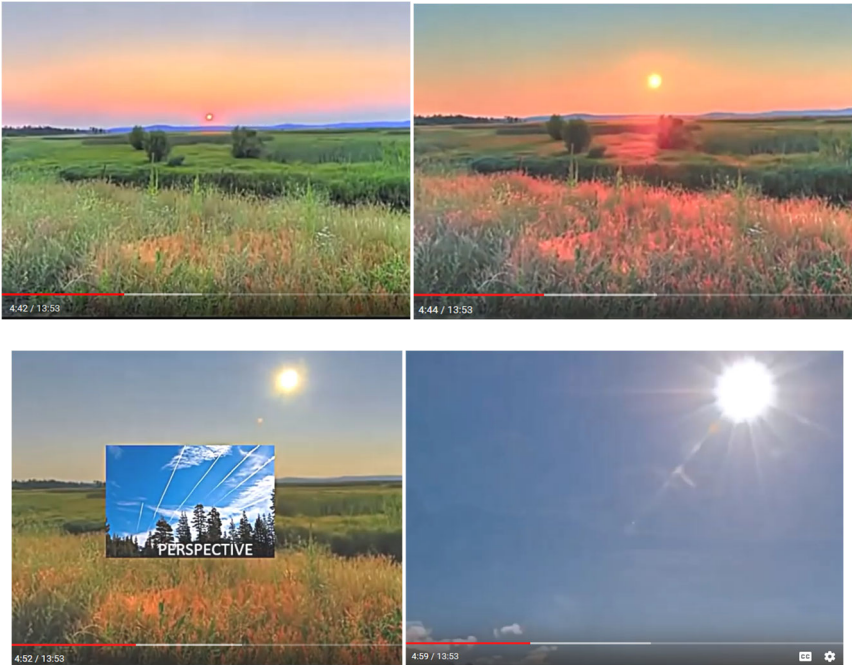
Here we have the impossible. The distance between Grand Mere State Park in Stevensville and Chicago is about 60 miles. At that distance, Chicago should be nearly a half-mile (2,400 ft) below the horizon - assuming we are on a ball with a curvature of 8" per mile! So, how do they explain it away? "Oh, that's just a mirage." Seriously? Give me a break!



BERRIEN COUNTY, Mich. - A picture of the Chicago skyline taken almost 60 miles away, is actually a mirage. Joshua Nowicki (@StartVisiting) snapped the pic Tuesday night from Grand Mere State Park in Stevensville. Under normal conditions, even when extremely clear, this should not be visible, due to the curvature of the earth. The Chicago skyline is physically below the horizon from that vantage point, but the image of the skyline can be seen above it.

Examples like this can be multiplied. Whole books have been written showing similar anomalies with finding a curved Earth. The difficulty in resolving these issues is compounded since many flat-earthers either pick and choose the established scientific means they will use to get to the truth, or refuse to use them at all since to them almost anything modern science says is suspect. As noted, this is especially the case for NASA's satellites and space probes. But even more mundane evidence is often ignored. One case involves the claim flat-earthers make about the sun. They show numerous videos of the sun descending into the horizon and remark that as it gets closer to the horizon it gets smaller and smaller, and vice-versa when it is ascending. Observe these snap shots in sequence from a time-lapse video starting just after sunrise.¹²²

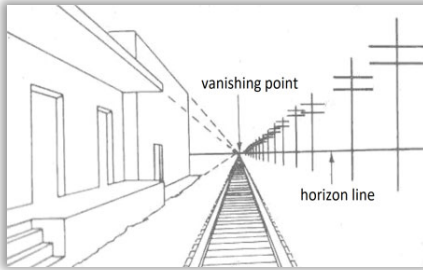
¹²² <https://www.youtube.com/watch?v=0KLd-W--ZjQ>, ending at 4:60, by Al Theeathoone, published Oct. 26, 2016.



Flat-earthers claim that since a very small sun, about 3000 miles above us, is revolving around a fixed flat Earth in 24 hours, from wherever one is standing on the Earth, the sun, for half the day, will come towards you, and for the other half, it will move away from you. They also claim that as it comes toward you, it gets larger and larger, as it appears to in the above time-lapse snap shots. This also means there is no “sunset” and “sunrise” in the flat Earth model—at least not with regard to the sun coming up from under the horizon or going down below it. For flat-earthers, the sun never goes below the horizon. It is *always* 3,000 or so miles above it. Hence the “sunset” for the flat-earther is merely the point at which the sun disappears from our view because, by the phenomenon of “perspective,” the sun is simply too small to be seen.¹²³ Perspective is the visual phenomenon in which an object appears to become smaller and smaller the farther away it

¹²³ https://www.youtube.com/watch?v=sa6Z_f06Je8; https://www.youtube.com/watch?v=sa6Z_f06Je8, at the 4:40 mark, with the title, “The BEST flat earth video| 100% Proof the Earth is Flat| Please Debunk This I Dare You!!!! 2018”

moves from our eyes (or larger and larger the closer it comes to our eyes), as is seen in the tracks or bridge below.¹²⁴



But the flat-earththers are either very tricky or very ignorant on this point. In claiming that “perspective” is what makes the sun so small it “disappears,” in reality, perspective is never powerful enough to make an object disappear, unless, of course, someone can prove that two parallel lines can meet so that there is no more space between the lines, which no one has been able to do since the days of Pythagoras. If the flat-earththers were correct, although the sun might “disappear” from the unaided eye due to distance, it should “reappear” if observed through a zoom lens. But the fact is, once the sun sets, its image cannot be retrieved by any zoom lens or telescope, no matter how powerful. That is an indisputable fact with which the flat-earththers have no answer. The reason is because at night the sun goes thousands of miles beneath the horizon on a spherical Earth.¹²⁵

Another way to use lenses to prove the point is what an astute Ausie did in an experiment on the sun. Using a filter, he found the sun was not increasing or decreasing in size, but only appears so due to solar flares. If one does not use a filter, he cannot remove the flares. In his first snap shot below, the sun is just above the horizon (as it is in photo #2 on previous page), but he

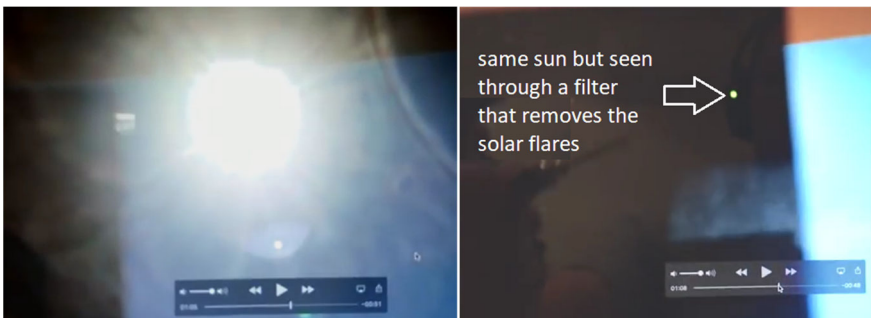
¹²⁴ Perspective can be measured by the inverse square law, *i.e.*, for every doubling of the distance (D) the intensity (I) will diminish by half, so that if $D = 1$ and $I = 1$, then $2D = .25I$; $3D = .11I$; $4D = .06I$; $5D = .04I$. Since I is measured by the square, the width of railroad tracks and bridges needs to be squared to determine the amount of perspective distortion that is occurring.

¹²⁵ It can be easily shown that flat-earth predictions of the time of sunset and sunrises are inaccurate. See <http://www.nccg.org/flaearth/26.jpg> which compares the sunset times of Boston to Santiago.

allowed his Nikon P900 to take in a full exposure, and thus he saw a much bigger sun.



In the next two snap shots, he first took a picture of the sun without a filter, and then a few seconds later, he used a filter. Notice the vast difference in the size of the sun. The one on the left is literally 20 times larger than the one on the right, not even counting the extended flares that make it 40 times larger.



He puts the final nail in the coffin by showing time-lapses of the sun, with proper filters, revealing the size of the sun does not change throughout the

day. The first photo is taken at 8:31 am; the second at 12:53 pm; the third at 16:22 (4:22); and all have the same size sun.



The same thing is true about the moon. It does not grow in size as it rises and traverses the sky, yet flat-earththers claim it follows the same path as the sun every day.¹²⁶



¹²⁶ See <http://flatearthdeception.com/flat-earth-sun-graphic-invalidates-flat-earth-theory>, for an animation of what the flat-earth's sun should look like during the day, but which we never see.

The point of all this analysis is to reveal the unfortunate but very real event that happened after this experiment. The author, Wolfie6020, explains:

If you are using a solar filter, you are going to see the true size of the sun....There are many videos on Youtube made by flat-earthers claiming that the sun is reducing in size as it sets. Unfortunately, these videos are made without using high-quality solar filters, and therefore they are quite invalid. They're not accurately depicting the truth of the size of the sun. In many cases I reached out to these flat-earthers and contacted them, and offered to send them, at my cost, high-quality solar filters to fit their cameras so they could repeat the experiment properly and therefore obtain accurate results. I was very disappointed that, in every case, the flat-earther back peddled, made an excuse not to accept the filter, and just outright refused to repeat the experiment properly. I find that very surprising because I'm often hearing from flat-earthers that they are truth seekers and they are researching the truth and yet when I offered to assist them in making a real observation, all I get is resistance....I no longer believe they are genuine researchers. A genuine researcher would have no hesitation to repeat the experiments properly using good quality equipment, especially when I'm sending it to them for free.¹²⁷

One person, going by the moniker “fiveredpears” who has published several videos on Youtube that seek to discredit the flat Earth theory with very sophisticated mathematical and geometrical analysis, became so thoroughly disgusted by the constant verbal abuse and elementary objections from flat-earthers (especially their denial of the above experiment that shows the sun is the same size throughout the day) that he wrote this conclusion on August 4, 2015:

This channel is effectively closed. I am bored of flat Earth and everyone involved in it. It is an utter joke, and I am sick of reading the same lies, day in day out, from flat Earthers. Flat Earthers should be treated with

¹²⁷ https://www.youtube.com/watch?v=XyiXxyO5_Hw, published February 17, 2018, up to the 5:00 minute mark. Another Youtube video by Wolfie6020 is: https://www.youtube.com/watch?time_continue=4&v=LFTWGdR8SiU. Incidentally, he chose the moniker Wolfie6020, because, “Wolfie is the nickname my wife gave me. On our first date in a restaurant when the meal arrived, I sniffed it. She laughed and said, ‘Just eat it Wolfie,’ and the name stuck from that point. The 6020 is the last four digits of my cell number (years ago)”; from <https://www.youtube.com/watch?v=avXJqA3w7qk>, comment section.


derision and contempt. The very act of entering into a discussion with them is to extend to them a level of respect that they do not deserve. They lie, they manipulate, they distort information, they invent pseudoscientific ideas. Everything that comes from the flat Earth community should be dismissed as white noise. They thrive on their notoriety, and the abuse they incur. I have never encountered a phenomenon even remotely similar. Flat Earthers are revolting excuses for human beings.¹²⁸



There are some flat-earthers who have taken a different course after starkly realizing that the most popular flat Earth model taught today simply doesn't work. One of the leading personalities in this enlightened group, himself a Christian who tries to be "faithful to the Bible," is **Darren Nesbit**. Although Nesbit is still a firm believer that almost everything NASA does is fake and that the world is run by lies and conspiracies, he realized quite recently that the azimuthal map projection of the flat Earth distorts reality to such a degree that it is basically useless. He now believes the azimuthal map was chosen by counter-intelligence agents to foil the flat Earth movement. His video gives a list of the 20 things he

¹²⁸ <https://www.youtube.com/watch?v=SbdIDfoDu-0>, authored by "fiveredpears," showing why buoyancy cannot serve as the only force that makes objects fall to Earth. See also <https://www.youtube.com/watch?v=uA9YLqteB9M>. To be fair to the flat-earthers, Globebusters attempted to answer the anomaly regarding the sun remaining the same size by: (1) claiming (per Jeran Campanella), that there is a vertical change but not a horizontal change, showing time-lapse of the sun flattening as it got close to the horizon. But this does not explain that even if the sun were to flatten slightly at sunset, this change is miniscule compared to the differences in the size of the sun when solar flares are present, and which flat-earthers are claiming shows a very great difference in the size of the sun throughout the day that their model requires. It also does not remark that the flattening of the sun at sunset is caused by both refraction and that its light must travel through more atmosphere at sunset than it does at noon, which is also why it turns orange-red at sunset; and (2) by referencing a "Dr. Zak" and his friend "Steve" who, they claimed, showed the sun increasing and decreasing in size, but again, instead of showing the purported evidence, they merely went on to the next topic of discussion, in addition to failing to reveal whether "Steve's" evidence was the same as Jeran's (<https://www.youtube.com/watch?v=pvuNdrV30Kc>, starting at 1:56:50, with evidence of sun flattening at 2:00:00 to 2:02:55).

believes discredits the azimuthal map,¹²⁹ most of which we cover in this book.

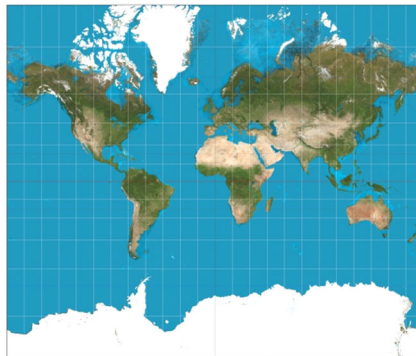


The AE Circle Model is Counter Intelligence.

1. Straight 90-270 path of the sun on the equinoxes
2. Daylight hours equal north and south of the equator
3. Flight times in the north same as those in the south
4. Southern continent completely out of proportion
5. Non-stop flights across the south in impossible times
6. 17-hour solstices in South America
7. No proof of 65,000 mile ice wall/dome edge
8. At least 15 Antarctica webcams show 24-hour daylight
9. Antarctic treaty does not prevent exploration
10. Travel companies, researchers and explorers prove it
11. Sunrise & sunset positions/times wrong
12. Cannot see Polaris much south of equator
13. Impossible to navigate by Polaris
14. Opposite spin of different stars in north & south
15. South sees same stars though facing different directions
16. Astronomical prediction discounts 'personal' skies
17. Near-constant speeds of the sun & moon
18. Impossible solar eclipse paths everywhere on earth
19. Sun does not circle; would remain level at the north pole
20. Never see retrograde sun; should see south of tropics

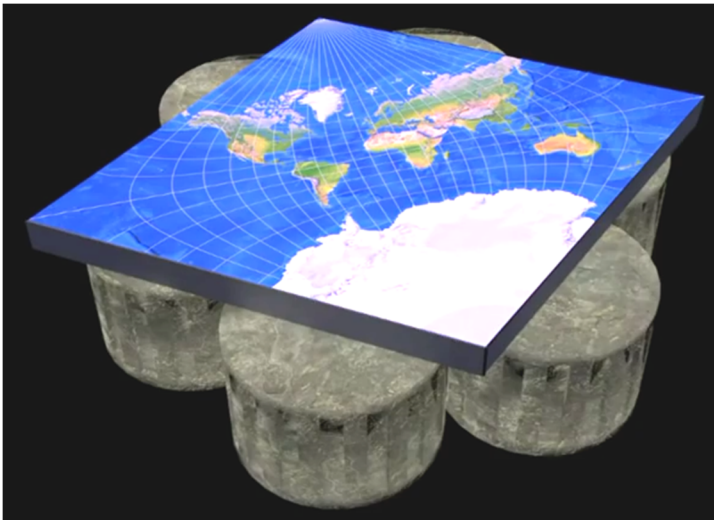
DO YOUR OWN RESEARCH, OR LET OTHERS DECIDE FOR YOU.

Since he is still dedicated to the “biblical” flat Earth model and firmly believes that because of certain “flat” or “square” language the Bible contains that he must therefore confine himself to finding a flat model that fits all its details, Nesbit feels confident to present another model to replace the azimuthal model. It is based on the Mercator map projection.



¹²⁹ <https://www.youtube.com/watch?v=WIU9khadYTQ>, published April 30, 2018.

It is a square with four corners to match the biblical phrase “the four corners of the Earth,” and it has seven pillars beneath it to match the biblical phrase, “the pillars of the Earth.” Nesbit arrives at “seven” pillars because it is the Bible’s “perfect” number, which, Nesbit adds, is also verified in the way the Egyptians built the great pyramids. We are also told that the model has a dome and that because the Bible refers to the “pillars of heaven,” Nesbit adds 12 pillars around the original 7 to hold up the firmament, although he does not say whether it is in the shape of a dome. He also does not tell us the structure upon which all the pillars are resting or how they can be considered as supports for the firmament and the Earth.



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In this model, Antarctica is obviously not a 75,000-mile ice wall, nevertheless, it is as big or bigger than the rest of the continents put together and therefore greatly distorts this region of the Earth. Likewise, the Arctic Circle and North pole are missing from this map. As we will see in the scientific section, all the attempts to fit the Earth into a flat model will be lacking. Moreover, in our biblical section we will see that phrases such as “four corners of the Earth,” “pillars of the Earth” or “the pillars of heaven” do, literally, refer to corners and pillars, but not the way flat-earthers force them to conform to a flat Earth.

¹³⁰ <https://www.youtube.com/watch?v=WIU9khadYTQ>, at 1:07:00

Of course, what is driving the flat-earthers in most cases is about 10% scientific evidence and about 90% conviction that the Bible teaches the Earth is flat (which is why, in this book, we treat their idiosyncratic claims on the Bible first, and only then the science issues). If a flat-earther believes the Bible teaches a flat Earth, it is just as if God himself told him directly that the Earth is flat, and no amount of gentle persuasion is going to convince him otherwise, since to relinquish “what God told me personally” will mean he himself will come under God’s judgment. As one opponent of the flat Earth experienced:

I am just an Aussie pilot with no strong political or religious beliefs. I post videos based on my own experiences and will answer any genuine question honestly to the best of my ability. In return people have come here calling me a Liar, a satanist, a sun worshiper, a freemason. They tell me to go to hell simply because I believe something different to them. You have to understand the Australian mentality. None of this bothers me at all. I find it quite funny to be honest. The fact that anyone in 2016 could actually be fooled into believing the Earth is flat truly fascinates me.¹³¹

As good and perfect a book as the Bible is, in the wrong hands it can be transformed into an equivocal or deceptive piece of literature. Literally thousands of Christian denominations, all claiming to be following the Bible, have very different beliefs about the Bible, not just about science issues like the flat v. globe Earth, but on almost any topic in the religious, political, scientific or cultural sphere. It is truly an amazing phenomenon to watch various people claiming to speak for God all saying different things about God. Just the fact that both Jesus and Satan are depicted in Scripture as using Scripture to prove their respective points means that we must be very careful of anyone saying “Thus saith the Lord...” unless they have the authority, expertise and credentials to do so.

¹³¹ <https://www.youtube.com/watch?v=avXJqA3w7qk>., Wolfie6020’s comment to Vladimir Novakovic, published Sept. 22, 2016.



Modern Science and Genesis 1

Of course, to be fair, we must interject that the ignorance or dishonesty we see among various flat-earthers is not a disease inflicting only them. Many of them are mild compared to the chicanery that occurs in the halls of modern academia yet passing itself off as being a united group of unprejudiced researchers who only want the truth. There are reams of articles showing that, in a broad number of cases, the modern scientist is akin to the proverbial used car salesman, especially with regards to how he makes conclusions on the data he collects. Financial rewards and ideological agendas are often the real motive behind the modern consensus.¹³² It is

¹³² “Global Warming” is the most current example, which makes the bogus claim that higher CO₂ levels in recent years are causing the Earth’s temperature to rise. Other relevant issues are covered in the following books: *Betrayers of the Truth*, William Broad and Nicholas Wade, 1982, pp. 8-9. Broad and Wade point out the problems with “peer review” (pp. 18-21, 89-102), faulty data collection (pp. 107-125), desire for advancement and continuation of government funding (pp. 88-106), non replication of experiments (pp. 60-87), *status-quo* obstacles (pp. 126-160), protecting popular scientists and pet projects from scrutiny (pp. 161-180), personal

precisely the dishonesty the flat-earthers see in modern academia, especially in the area of cosmology and cosmogony, that drives them with an almost insatiable resolve to discredit it. In point of fact, it is often the case that modern science's ideologues engage in exactly the same kind of irrational

agendas (pp. 181-211). Broad and Wade uncover many discrepancies and problems with Galileo, Newton, Einstein, Darwin, and many other scientists involved with cosmological issues; Horace F. Judson, *The Great Betrayal: Fraud in Science*, 2004, p. 463; "Stamping Out Dissent," *Newsweek*, April 26, 1993, pp. 49-50, international edition; Derek Hodson, "Science fiction: the continuing misrepresentation of science in the school curriculum," 1998, in *Pedagogy, Culture and Society*, 6:2, pp. 205-206, Routledge, 2006. Hodson's references include: A. Roe, (1961) "The Psychology of the Scientist," *Science*, 134, pp. 456-459; P. J. Gaskell, (1992) "Authentic Science and School Science," *International Journal of Science Education*, 14, pp. 265-272; M. J. Mahoney, (1979) "Psychology of the Scientist," *Social Studies of Science*, 9, pp. 349-375; I. Mitroff and R. Mason, "On evaluating the scientific contribution of the Apollo missions via information theory: a study of the scientist-scientist relationship," *Management Science: Applications*, 20, pp. 1501-1513; E. Cawthron and J. Rowell, (1978) Epistemology and science education," *Studies in Science Education*, 5, pp. 31-59; R. M. Santilli, *Il Grande Grido: Ethical Probe on Einstein's Followers in the U. S. A. : An Insider's View*, 1984, p. 7; Philip Sherrard, *The Rape of Man and Nature: An Enquiry into the Origins and Consequences of Modern Science*, 1987, p. 74; Robert Bell, *Impure Science: Fraud, Compromise and Political Influence in Scientific Research*, 1992; Simon Garfinkel, "When Fraud Taints Science," *Christian Science Monitor*, July 1992; Robert G. Jahn, "20th and 21st Century Science: Reflections and Projections," *Journal of Scientific Exploration* 15, 1, 2001, p. 21; Richard Milton, *Forbidden Science: Exposing the Secrets of Suppressed Research*, 1994; Anthony Standen, *Science is a Sacred Cow*, 1952, 2000; "Con Men in Lab Coats" *Scientific American*, March 2006, p. 10; Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, 1963, 1965, pp. 229, 192, 151; "Scientists and Religion in America," Edward J. Larson and Larry Witham, *Scientific American*, Sept. 1999, p. 89; John Horgan, *The End of Science*, 1996, p. 74; Robert Matthews, *New Scientist*, Jan. 30, 1999, p. 24; James Gleick, *Genius: The Life and Science of Richard Feynman*, 1992, p. 378; Carl Sagan, *U.S. News and World Report*, December 23, 1991, p. 61; Stephen Gould, *Wonderful Life*, 1989, p. 318; Alan Rauch, *Useful Knowledge: The Victorians, Morality And The March of Intellect*, 2001, p. 12; Paul Davies, *God and the New Physics*, 1983, p. viii; Andrei Linde, "The Self-Producing Inflationary Universe," *Scientific American*, Magnificent Cosmos, 1998, p. 99; Alan Guth and Paul Steinhardt, "The Inflationary Universe," *Scientific American*, May 1984, p. 128; Philip and Phylis Morrison, "The Big Bang: Wit or Wisdom?" *Scientific American*, February 2001, p. 93; *Scientific American*, "Profile: Fred Hoyle: The Return of the Maverick," by John Horgan, March 1995, p. 47.

fanaticism and personal prejudice that “fiveredpears” complains about with flat-earthers.

Thus it is no surprise that another obstacle in finding the truth is what modern science has done with the first chapter of Genesis. For many flat-earthers—especially conservative Christians—anyone who rejects the face value interpretation of Genesis and opts for what they regard as the utterly fantastic and mind-bending theories of modern science as to how things began and proceed (evolution, relativity, copernicanism, singularities, expansion, multiverses, dark matter, dark energy, alien life, *etc.*), it is almost a given that anything science says afterward will be taken with a grain of salt, and perhaps the whole salt cellar. This is especially true after flat-earthers have easily surmised that modern scientists develop these theories for the sole purpose of maintaining their atheism. One does not have to look far to see this agenda rather clearly. As Big Bang evolutionist **Richard Lewontin** has put it rather candidly:

We take the side of science in spite of the patent absurdity of some of its constructs, in spite of its failure to fulfill many of its extravagant promises of health and life, in spite of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a prior commitment, a commitment to materialism.



It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our a-priori adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counterintuitive, no matter how mystifying to the uninitiated.¹³³

¹³³ “Billions and Billions of Demons,” *The New York Review of Books*, January 9, 1997, pp. 28, 31.



It is the thesis of this book that the reason for these controversies is that both sides of the aisle—the flat-earthers and the science community—are at opposite (and false) extremes due to their preconceived and biased notions, and that the truth lies somewhere in the middle. It will be shown, for example, that the interpretation that almost all flat-earthers give not only to Genesis 1 but to many other passages of Scripture, is seriously flawed. Although they are to be applauded for their desire to take the divinely inspired word of God at face value, it is often the case that even in applying a literal interpretation they often eisegete the passages in question instead of exegeting them. For example, much is made over the fact that Genesis 1:6-9 and 1:14-19 speaks of a firmament over the Earth, and that because the Hebrew word for firmament (רָקִיעַ: pronounced *raqiya*) refers to something hard, this means there must be a hard hemispherical dome above the Earth that houses the atmosphere and celestial space and through which nothing man-made can penetrate (*ergo*, no satellites, rockets or space probes are possible).

The flat-earthers are not fully to blame for this eisegesis of Scripture, however. They are encouraged by many English translations of Genesis 1 which either use the word “dome” or imply it is a dome (*e.g.*, NAB, NJB, NRS, TNIV) but do so with preconceived notions. We will find that if we investigate this matter more deeply, the Hebrew word *raqiya*, while certainly denoting the firmament is hard, does not necessarily imply it is a

dome or any other kind of shape. Rather, it can be shown that *raqiya* refers only to a material substance, not a shape. So, once this misnomer is corrected, the firmament of Genesis 1 can be understood to allow much more than a dome above a flat Earth. In fact, it will be seen that the firmament of Genesis accords well with some of the discoveries of modern science as well as the foundations of metaphysics.

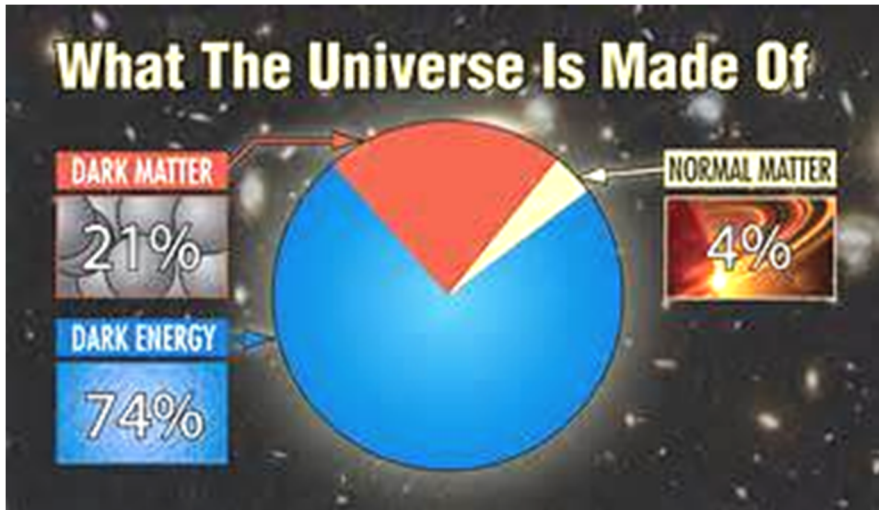
The same sorts of misguided interpretations will be seen when we examine the other biblical passages that are used to conclude the Earth is flat. For example, Isaiah 40:22 says:

It is he who sits above the *circle* of the earth, and its inhabitants are like grasshoppers; who stretches out the heavens like a curtain, and spreads them like a tent to dwell in.

Flat-earthers claim that the word “circle,” from the Hebrew word כִּוּי (pronounced: *kug*) cannot refer to a sphere, for a sphere is obviously more than a circle, especially since Isaiah 22:18 uses the Hebrew word כְּדֹר (pronounced: *ka-door*) when referring to a spherical object like a ball (“and I whirl you round and round, and throw you like a *ball* into a wide land”). We will find, however, that Isaiah 22:18 does not refer to a sphere or a ball but to anything that rolls; nor does Isaiah 40:22 refer to a disc or a flat Earth since a “circle” is a two-dimensional shape used only in the geometrical abstract, not a three-dimensional shape of either a disc or a sphere. This information will become especially relevant after we also learn that Hebrew, being only an 8000-word language, did not, strange as it may seem, have a specific word for a “sphere” or a “disc.” That doesn’t mean, of course, that the Hebrews had no concept of these shapes or that God did not make celestial objects or earthly things in spheres. It only means that the description of a sphere or disc will be a little more involved and a little more obscure in the Hebrew language.

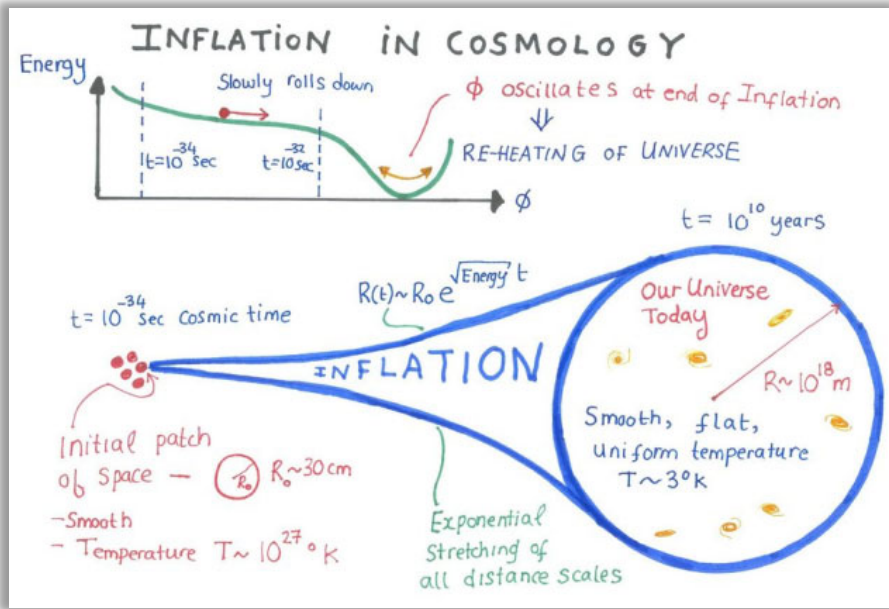
By the same token, as much as flat-earthers have taken a wrong direction in their exegesis of Scripture, modern science has taken a wrong direction in its own exegesis, so to speak, of the universe at large. Since they totally ignore Genesis and stigmatize it as the fantasies of primitive men, they have gone to the other extreme and have ended up creating a universe that, pound

for pound, is much more fanciful and fantastic than the flat-earthers' solid dome on a flat disc.



They tell us, for example, that 96% of the universe is composed of substances called “dark matter” and “dark energy,” both of which they haven’t discovered experimentally, yet they foist this made-up universe upon the public only so that they can have what they need to allow their Big Bang to expand for the last 14 billion years in order to accommodate the long periods required by the equally *ad hoc*, theory of evolution. But this expansion doesn’t occur until after they have added a convenient manufactured hiccup they call “inflation,” which spring loads the universe to expand so fast so that all the other *ad hoc* theories that modern cosmology had previously manufactured can fit into the Big Bang theory. For example, the alleged “inflation” allows the “singularity” to explode 10^{35} times in size in 10^{-35} seconds so that they can get around Einstein’s universal speed limit of c for light and gravity, yet in a total about-face, they also claim the universe is expanding way beyond Einstein’s speed limit, which expansion is said to be occurring by the power they made-up in inventing “dark energy.” On top of this, they give no explanation for the physical cause of the “inflation”; rather, they theorize it because without it their Big Bang universe would fall apart in a fraction of a second. We also discover they need, but can’t prove, a slower expansion after the inflation only so they can have some plausible mechanism to explain the redshift of galaxies so that,

according to Edwin Hubble, the father of modern cosmology, mankind is not consigned to an Earth in the center of the universe—the very kind of universe that Hubble actually saw in his telescope and which flat-earthers believe is the gospel truth.¹³⁴



¹³⁴ In his 1937 book, *The Observational Approach to Cosmology*, after viewing the redshift of galaxies coming from each quadrant of the universe, which necessarily puts the Earth in the center, Hubble exclaimed: “Such a condition would imply that we occupy a unique position in the universe, analogous, in a sense, to the ancient conception of a central Earth....This hypothesis cannot be disproved, but it is unwelcome and would only be accepted as a last resort in order to save the phenomena. Therefore we disregard this possibility...the unwelcome position of a favored location must be avoided at all costs...such a favored position is intolerable... Therefore, in order to restore homogeneity, and to escape the horror of a unique position [the apparent centrality of the Earth]...must be compensated by spatial curvature. There seems to be no other escape” (pp. 50, 51, 58, 59).



If anyone tries to challenge the Big Bang, he is summarily dismissed as a “crackpot,” as was the case with the popular astronomer, **Halton Arp**, who found through his study of quasars and galaxies that the expansion of the universe was nothing but a pipe dream.¹³⁵

If, after we see this rather biased and convenient rearranging of the cosmological data, we then ask a modern scientist what the “singularity” of the Big Bang is or where it came from, he suddenly gets that glassy look in his eye and either tells us “not to ask such stupid questions” or defaults to a belief in an infinite birth of universes (*e.g.*, the Multiverse) in which matter creates itself, and in this way the modern scientist can have something produced from nothing and dispense with a Creator.¹³⁶ Hence they can sin as much as they want in this universe and have no God to answer to in whatever is next.

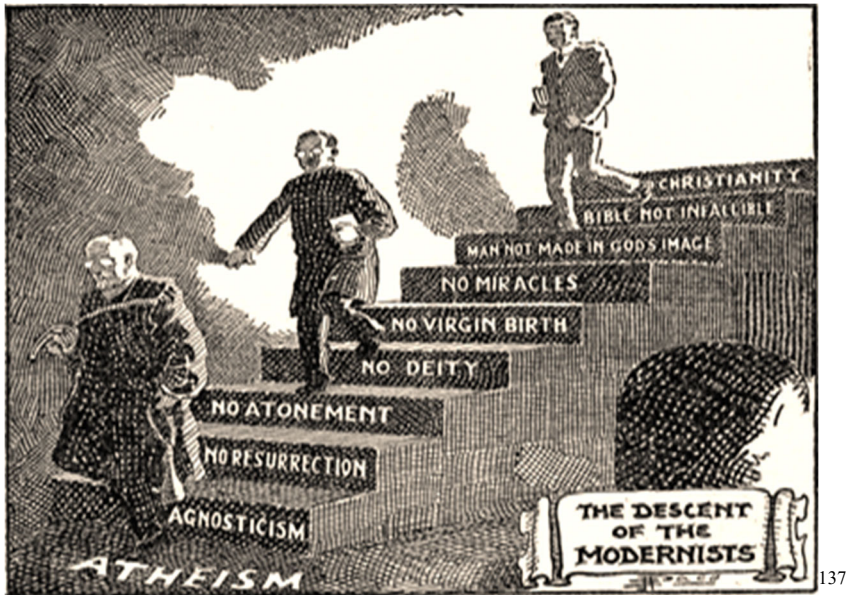
We can easily see that modern science is eisegeting the universe and twisting Scripture to suit their own agenda just as the flat-earthers are eisegeting Scripture and twisting science to create a flat Earth. For the former, we are forced to conclude that mainstream scientists either have an atheistic agenda or they have gone insane, or more likely both. Their basic problem is that when one forcibly takes God out of the picture, logically explaining the universe becomes a certified impossibility. As long as they engage in this sophistry, they will never convince the God-believing flat-earthers that the Earth is not flat. They have poisoned the well much too often for a skeptic to believe much of what they say.

¹³⁵ See, *Seeing Red: Redshifts, Cosmology and Academic Science*, Halton Arp, Apeiron, 1998. See also Eric Lerner’s *The Big Bang Never Happened*, and his numerous colleagues who have all been banned from mainstream science for doubting the Big Bang theory.

¹³⁶ See, *A Universe From Nothing*, Lawrence Krauss, Atria, 2012.

Modern Theology and Genesis 1

Modern scientists are not the only ones at fault for misleading and disillusioning the flat-earthers and prohibiting them from seeing the truth. Liberal theologians, and many “neo-conservative” theologians, from Catholic, Protestant, Orthodox, Jewish and Muslim ranks, have egged on the secular scientists to engage in these fanciful cosmological theories due to their collective effort to empty Scripture of any historical value. So without a sure guide, they go off into a myriad of far-fetched theories. The typical modern biblical commentary, for example, claims that Genesis, especially its first eleven chapters, is not an accurate portrayal of history since, whatever one’s view of divine inspiration, it isn’t applicable to any historical narrative of the Bible.



In other words, these new theologians espouse the idea that the authors of Scripture merely made up, out of their own minds, much of what they wrote, which, the new theologians add, was invariably influenced by their “primitive cultures.” Hence Genesis becomes no more accurate than the historical accounts of the god Marduk from *Enumu Elish* or Homer’s *Iliad*

¹³⁷ Drawn by E. J. Pace, *Christian Cartoons*, 1922.

and the Odyssey. Moreover, we are told that since the victors always distort the written history to make themselves appear noble, biblical narratives suffer from the same human frailty and thus can't be trusted to give us the real truth. As liberal Catholic theologian Raymond Brown once opined, when we read Genesis 1 to a child we should always tell him that none of what we read there actually happened; rather, Genesis is just a nice way of saying God created the world, period, full stop. They, of course, then wonder why their children grow up rejecting the veracity of Scripture and the God behind it.

Incidentally, it is these very theologians who started the idea back in the 1800s that the firmament of Genesis was a dome above a flat earth. They did this to make it appear that Genesis 1's description of the origin of the world is no more accurate and believable than a caveman's drawings. The whole scheme was designed to discredit the six days of Genesis as accurate history so as to make room for a vast universe of time and chance that evolved over billions of years. No sooner had this mutilation of Scripture been propounded by the predecessors and purveyors of the Graf-Wellhausen "Documentary Hypothesis," Charles Darwin came with his evolutionary theory in *Origin of Species* in 1859. Essentially, the liberal theologians of that day paved the way for Darwin by relegating Genesis to the realm of Aesop's Fables. Obviously, if these scholars are successful in depicting the authors of Genesis as primitive people who were not directly inspired by God to record actual historical detail, then these ancient authors are left to their own devices in transmitting a record of how the world began, and as such it is not worth the paper it is written on. Unfortunately, not being privy to the schemes of these liberal theologians, the flat-earthers have taken their historical-critical bait and appealed to the very dome theory invented by the liberals as the original way Jewish authors led men to understand the structure of the universe. This is a classic case of the blind leading the blind.

In turn, their biased translation of Scripture allows these modern scholars to disregard the literal teachings of Genesis 1 and make the text appear as the imaginary and unscientific ruminations of ancient peoples who were unversed in the real science of how the universe came into being.

And here's the rub. Instead of a supernatural creation in six days spoken into existence by God, these scholars believe in the fanciful Big Bang and the

equally incredible evolution as the only way the material world could come into being. Not surprisingly, they have the same cavalier disregard for the miraculous events in the remaining narratives in the Pentateuch (e.g., the great Flood of Noah's day; the Tower of Babel, Exodus).

Since Genesis 1 teaches, for example, that the Earth was created *before* the sun, moon and stars, then obviously a face value or literal reading of its text cannot accommodate modern scientific theories like the Big Bang and evolution, which hold the Earth came billions of years *after* the sun and stars. Their ingenious solution is to dismiss the details of the Genesis account as mere story-filler that has no factual basis, except, perhaps, to reveal the general truth that God, as the First Cause, set in motion the things that would bring about the Big Bang universe. Accordingly, foisting on these ancient peoples the idea that heaven is merely a dome above a flat earth is the perfect tactic for these scholars to portray the author of Genesis and his readers as unsophisticated hunter-gatherers who hadn't the slightest clue how the real world originated or operates.

To be sure, these liberal-minded scholars regard themselves as those "in the know" since they hold firm to the idea that universe came into being by the theories of Einstein, Copernicus and Darwin. Essentially, they think they know better than the Bible how the universe could and should be built. What does this blatant historiography in modern biblical scholarship mean for the flat-earthers? It means they have collectively fallen into the trap set by the modern hermeneutic. These aberrant scholars have convinced the world, and especially the flat-earthers, that the original, and thus correct way that Genesis was written, was to depict a flat Earth covered by a dome. Even "conservative" scholars have succumbed. The late and popular scientist Fr. Stanley Jaki, former professor at Seton Hall University, totally disregards Genesis 1 as accurate history, citing a purported "conflation" between Day 1, when the "Light" was made, and Day 4 when the sun and stars were made, as evidence that Genesis cannot be historically accurate since, in his view, the two days are redundant.¹³⁸ This conclusion has spawned a whole cadre of Catholic "scholars" who, following Jaki, have sided with modern sciences' wild and unproven theories about the origins of the universe

¹³⁸ *Genesis 1 Through the Ages*, Stanley L. Jaki, Thomas More Press, 1992. See my book, *Genesis 1-11*, for a thorough critique of Jaki's hermenutical theories.

instead of honestly trying to figure out why the inspired author of Genesis insists on two light sources divided by three Days. A recent example of the effect of the ‘Jaki cult’ is the book written by Fr. Paul Robinson, a priest of the embattled Society of St. Pius X (SSPX), titled: *A Realist Guide to Religion and Science*. The ploy in this work, like many other modern works, is to convince the audience that Genesis 1’s “intent” was not to transcribe accurate history. He does so by making it appear that Genesis 1 teaches the dubious concept of a firmament as a dome over the Earth, which means that the Earth must necessarily be flat. Robinson’s intent, if you will, is to make the Genesis account look silly. With this presupposition, he concludes that hardly anything in Genesis 1 can be true (except, as Ray Brown taught, that God created the world) and that to be a “realist” we must use our “reason” and come to the conclusion that modern science’s advocating of the Big Bang theory must then be true, along with all its accouterments (*e.g.*, long-ages or evolution, relativity, copernicanism).

Here’s the second rub. Since the flat-earththers believe that Genesis 1 was written by Moses under the inspiration of God, they are then led to believe that God inspired Genesis to teach a flat earth covered by a dome. “If God said it, then it must be true,” is the flat-earthther’s mantra. In actuality, they have been deceived by the Wellhausen¹³⁹ and other historical-critical schools and have become the very unsophisticated and clueless ‘Bible-thumpers’ that these scholars want them to be.

In the end, NASA (as representative of modern science at large); the liberal theologians of Catholicism, Protestantism and Judaism; as well as the theologically conservative flat-earththers, have misinterpreted both the Bible and science, and the public suffers accordingly. All three groups

¹³⁹ The Graf-Wellhausen theory, as popular as it was in the later 1800s and early 1900s, was, more or less, discredited by the discovery of the Dead Sea scrolls in 1947. As one scholar notes: “Since 1947...it has been increasingly difficult to maintain anything remotely resembling the classical Wellhausenian documents. The three main types of text (proto-Masoretic, proto-Samaritan, and proto-Septuagintal) found among the Dead Sea scrolls—especially the 4Q fragments—have seriously undermined detailed literary criticism of the Pentateuch. Furthermore...no tangible manuscript evidence of the separate existence of the posited documents has ever been discovered through archeological means” (William H. Green, *The Higher Criticism of the Pentateuch*, Baker, 1978, p. xv).

misunderstand and misrepresent the universe they view and the biblical words they read, respectively; and all are subsequently victims of their own perceptions and personal biases. In order to expose these facts, we will take a painstaking look at the claims and counterclaims of each group and draw the appropriate conclusions.

For now, each side engages in a number of logical fallacies, and most of these go unnoticed in the heat of the battle. But since flat-earthers dominate the dialogue and engage few if any representatives from NASA or other space agencies, they also dominate the commissions of the logical fallacies, among them are the following:¹⁴⁰

- **Fallacy of composition:** assuming that something true of part of a whole must also be true of the whole.
- **False equivalence:** describing a situation of logical and apparent equivalence, when in fact there is none.
- **Fallacy of the single cause** (causal oversimplification): it is assumed that there is one, simple cause of an outcome when in reality it may have been caused by a number of only jointly sufficient causes.
- **Historian's fallacy:** occurs when one assumes that decision makers of the past viewed events from the same perspective and having the same information as those subsequently analyzing the decision.
- **Inflation of conflict:** The experts of a field of knowledge disagree on a certain point, so the scholars must know nothing, and therefore the legitimacy of their entire field is put to question.
- **Inconsistent comparison:** different methods of comparison are used, leaving one with a false impression of the whole comparison.
- **Kafka-trapping:** A sophistical and unfalsifiable form of argument that attempts to overcome an opponent by inducing a sense of guilt and using the opponent's denial of guilt as further evidence of guilt.
- **Mind projection fallacy:** one's subjective judgments are "projected" to be inherent properties of an object, rather than being related to personal perception of that object.

¹⁴⁰ https://en.wikipedia.org/wiki/List_of_fallacies

- **Onus probandi:** from Latin *onus probandi incumbit ei qui dicit, non ei qui negat* the burden of proof is on the person who makes the claim, not on the person who denies (or questions the claim). It is a particular case of the argumentum *ad ignorantiam* fallacy, here the burden is shifted on the person defending against the assertion. Also known as shifting the burden of proof.
- **Post hoc ergo propter hoc:** Latin for “after this, therefore because of this” (faulty cause/effect, coincidental correlation, correlation without causation) – X happened, then Y happened; therefore X caused Y. The Loch Ness Monster has been seen in this loch. Something tipped our boat over; it’s obviously the Loch Ness Monster.
- **Psychologist’s fallacy:** an observer presupposes the objectivity of his own perspective when analyzing a behavioral event.
- **Regression fallacy:** ascribes cause where none exists. The flaw is failing to account for natural fluctuations. It is frequently a special kind of post hoc fallacy.
- **Retrospective determinism:** the argument that because an event has occurred under some circumstance, the circumstance must have made its occurrence inevitable.
- **Accident:** an exception to a generalization is ignored.
- **Cherry picking:** (suppressed evidence, incomplete evidence) – act of pointing at individual cases or data that seem to confirm a particular position, while ignoring a significant portion of related cases or data that may contradict that position.
- **Hasty generalization:** (fallacy of insufficient statistics, fallacy of insufficient sample, fallacy of the lonely fact, hasty induction, *secundum quid*, converse accident, jumping to conclusions) – basing a broad conclusion on a small sample or the making of a determination without all of the information required to do so.
- **Misleading vividness:** involves describing an occurrence in vivid detail, even if it is an exceptional occurrence, to convince someone that it is a problem.
- **Bare assertion fallacy:** also known as *ipse dixit* – a claim that is presented as true without support, as self-evidently true, or as

dogmatically true. This fallacy relies on the implied expertise of the speaker or on an unstated truism.

- **Bulverism** (psychogenetic fallacy): inferring why an argument is being used, associating it to some psychological reason, then assuming it is invalid as a result. It is wrong to assume that if the origin of an idea comes from a biased mind, then the idea itself must also be a falsehood.
- **Chronological snobbery**: a thesis is deemed incorrect because it was commonly held when something else, clearly false, was also commonly held.
- **Judgmental language**: insulting or pejorative language to influence the recipient's judgment.
- **Pooh-pooh**: dismissing an argument perceived unworthy of serious consideration.
- **Tu quoque**: in which the arguer states that a certain position is false or wrong or should be disregarded because its proponent fails to act consistently in accordance with that position.
- **Straw man fallacy**: an argument based on misrepresentation of an opponent's position.
- **Texas sharpshooter fallacy**: improperly asserting a cause to explain a cluster of data.
- **Definist fallacy**: involves the confusion between two notions by defining one in terms of the other.
- **Slippery slope**: (thin edge of the wedge, camel's nose) – asserting that a relatively small first step inevitably leads to a chain of related events culminating in some significant impact/event that should not happen, thus the first step should not happen. It is, in its essence, an appeal to probability fallacy.

Biblical Analysis of Flat Earth Exegesis



*For it is He who gave me unerring knowledge
of what exists, to know the structure of the
world*

*and the activity of the elements;
the beginning and end and middle of times,
the alternations of the solstices
and the changes of the seasons,
the cycles of the year
and the constellations of the stars...*

*I learned both what is secret and what is manifest,
for wisdom, the fashioner of all things, taught me.*

Wisdom 7:17-19, 21

Chapter 2

Biblical Analysis of Flat Earth Exegesis

Does Scripture Teach a Flat or Spherical Earth?

The Bible never uses the phrase “flat Earth” or refers to the Earth as flat in any way, shape or form. There is one place, however, that the phrase “flat Earth” does appear in an English translation of the Bible. The 1537 *Matthew’s Bible* renders 2Samuel 11:11 as:

and my Lorde Ioab and the seruauntes of
my Lorde lye in tentes vpon the flatt erthe:&

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Matthew’s Bible was then copied directly three years later by *The Great Bible* of 1540:

and my Lorde Ioab and the
seruauntes of my Lorde lye vpon the flatt
erthe:and thall I then go into myne house,

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As infrequent as it is, flat-earthers treasure this citation, even though everyone knows that the old English “flatt erthe” was a way of referring to a flat open field;¹⁴³ besides the fact that no other English translation contains the words “flat earth” nor has the words “flat” and “Earth” in the same sentence.

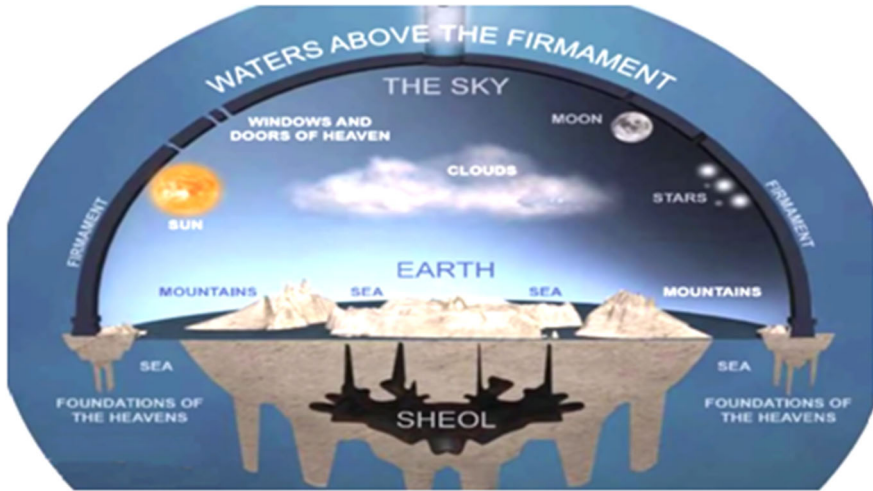
¹⁴¹ <https://www.originalbibles.com/matthew-bible-1537-pdf-thomas-matthew-a-k-a-john-rogers, p. 141>

¹⁴² <https://www.originalbibles.com/the-great-bible-1540-original-pdf/, p. 67b>

¹⁴³ The 1599 Geneva Bible has: “...and my lord Ioab and the seruants of my lord abide in the open fields,” with something similar in the 1951 RSV: “and my lord Joab and the servants of my lord are camping in the open field.”

In examining what the Bible has to say about whether the Earth is flat or spherical, we will investigate two main areas:

1. What the Bible says about the shape of the Earth,
2. What the Bible says about the Firmament.



The Popular Flat Earth Model Ascribed to the Bible

First, a word about biblical hermeneutics. For those who believe the Old and New Testaments were inspired by the Holy Spirit and thus are inerrant in what they teach as propositional truth, there are basically two ways to interpret its authoritative words, namely, literally or figuratively. This dual method of interpretation is taught by Scripture itself, since some statements are obviously figurative (e.g., “I am the potter and you are the clay,” “the sun rose”),¹⁴⁴ and others are quite literal (“In the beginning, God created the

¹⁴⁴ We include “the sun rose” (Mt 5:45; Ec 1:5) as a good example of how Scripture can use figurative or “as seen by the observer looking towards the horizon” language about a celestial phenomenon yet also insist, on a scientific basis, that of the two bodies, it is the sun that causes the appearance of “rising” since it revolves around the Earth while the Earth is motionless in space, even equating God’s immutability to the Earth’s immobility (cf. Js 10:10-14; Ps 19:1-6; Ps 93:1-2; Ecclesiasticus (Sirach) 46:3-5; Habakkuk 3:11; 2Kings 20:9-12; 2Chronicles 32:31;

heavens and the earth,” “Jesus Christ, born of Mary”). It is unfortunately the case, however, that when modern science’s conclusions concerning the origin and operation of the cosmos differ from a literal interpretation of Scripture (*e.g.*, evolution, Copernicanism, relativity), those who seek to maintain a devotion to Scripture’s inspiration and inerrancy, but also wish to maintain an adherence to modern science’s popular dictates which they assume to be correct, will find themselves being forced to interpret Scripture’s descriptions of the cosmos as figurative in order to allow both Scripture and science to maintain their respective authorities.

There has been a growing consensus in science and culture, however, that as good as science may be in certain areas, there is very little knowledge that science has actually proven as fact, and often finds itself merely stumbling onto some beneficial result without even knowing how or why it arrived there.¹⁴⁵ There is much that science has not only assumed to be true and yet must discard every century or so when a theory is found to be false; and not only are there many cases in which several differing scientific interpretations can be made to fit the data but only the most culturally popular or financially driven is chosen as authentic, but science often pretends to come to its “scientific truth” with a keen eye toward contradicting Scripture’s statements on the cosmos in order to remove it altogether from the discussion table. Suffice it to say, none of those ill-fated presumptions of modern science will be used in this book. Scripture is science’s authority, not vice-versa. Human interpretation of the raw data is so often fraught with personal biases and ideologies that the so-called ‘impeccably objective scientist’ becomes more a myth than a reality. But Scripture never changes and is never biased. It always teaches the same thing and never changes with the next wave of scientific theory, even though some theologians attempt to change what Scripture says by the same cultural and religious prejudices that scientists use to conform the scientific data to their own philosophical whims.

Isaiah 38:7-8; Psalm 8:3-6; 1Chronicles 16:30; Psalm 96:9-11; Psalm 75:2-4; Psalm 104:5, 19; Psalm 119:89-91; Ecclesiastes 1:4-7; Ecclesiasticus (Sirach) 43:1-10; Job 9:6-10; Job 22:13-14; Job 26:7-9; Job 26:10-11; Proverbs 8:27-30; Wisdom 7:15-22; 1Esdras 4:34).

¹⁴⁵ See the writings of Arthur Koestler, Bertrand Russell, Thomas Kuhn, Ludwig Wittgenstein, *et al.*

Lastly, even though Scripture is not, *per se*, a “science textbook” and thus speaks mainly about spiritual issues, the fact remains that if and when Scripture touches upon an issue of science, history, chronology, cartography, geography, mathematics, names, numbers or nomenclature, *etc.*, it is just as inerrant as it is about spiritual things. If not, then there is no use depending on Scripture for either salvation or science, since if it is erroneous in one area it will inevitably be erroneous in other areas. Although some try to patch up this problem by holding the dichotomous view that Scripture is inerrant in salvation but errant in history, this is nothing but a convenient cop out, not to mention a view that is never countenanced by either Scripture or traditional Church teaching. It is either all God’s word, or it is not. There is no middle ground.

With that foundation we will investigate what Scripture says, one way or the other, about whether the Earth is flat and has a solid dome over it. Rest assured, we will have no battle whether to interpret a certain passage literally or figuratively, since all that Scripture says on this topic will be assumed to be literally stated and is to be literally interpreted, unless there is some crystal-clear indication in Scripture itself (not scientific theories) that a figurative interpretation is intended and a literal interpretation is forbidden. Let us begin.

Although there are no passages that contain the phrases “flat Earth” or “flat disc,” by the same token, there are no passages that have the phrase “round Earth” or “spherical Earth.”¹⁴⁶ Everything that Scripture says about the shape of the Earth is either inferred or deduced from the available information therein. Similarly, there are no passages that say the sun, moon or stars are spheres, but it is strongly implied in Scripture that they are, and it appears we are expected to deduce their shape by seeing their figures in the sky, and perhaps by our scientific knowledge of the economy of mass, surface tension and gravity that leads to a sphere.¹⁴⁷

¹⁴⁶ The Greek word for “sphere” is σφαῖρα, but it does not appear in either the LXX or the New Testament, nor any corresponding words in the Hebrew of the Old Testament.

¹⁴⁷ For example, drops that fall from a faucet form into a sphere and drop as spheres mainly due to the surface tension of water. Similarly, water droplets in a non-gravity vacuum will come to rest or reach equilibrium as spheres. In general, massive

Practically speaking, perhaps there is a good reason why Scripture does not explicitly say the Earth is a sphere. Since the volume of a sphere is mathematically defined as $4\pi r^3$, if the actual measurement of the Earth deviated slightly from this equation, yet Scripture, by divine inspiration and inerrancy, called it a “sphere,” one could accuse Scripture of telling a falsehood. This is especially true if, because of inertial forces, the Earth has a bulge at the equator compared to its polar circumference, which science is credited with measuring to be a ratio of 231:230. The difference of 1/231 would prohibit the Earth from being a perfect sphere. Yet when viewed from above the North Pole, the Earth could still be technically described as a “circle,” as it is in Isaiah 40:22, since a bulge at the equator, due to inertial equivalence, would still be in the shape of a perfect circle.

For the same practical reasons, it may be the case that Scripture does not say the Earth is the exact center of the universe but only says it is motionless. Being fixed in space implies the Earth would necessarily be at, or very near, the center, yet not the precise geometric center, even if the universe were a perfect sphere. This allows the Earth to be the mass center or center of gravity of the universe even though it may not be the exact geometric center. In this way, the entire universe could rotate around a motionless center of mass, the Earth—a view that modern science is forced to countenance due to the general relativity principle in physics.

In other cases, Scripture could be leaving itself room for mathematical approximations for instances in which the mathematics is much more precise than the hand and foot measurements common in ancient societies, such as when 1Kg 7:23 appears to give the ratio of the diameter of a circle to its circumference with the approximate ratio of 3:1 instead of the more precise 3.14:1 or $22/7$.¹⁴⁸ Yet even in this case, Scripture may be implying the accepted value of π since the measurement of the bowl in 1Kg 7:23

bodies will form into spheres since it is the most economical shape for them to remain stable due to gravity, especially if the body contains a large amount of liquid or gas. The only time nature will allow a non-spherical shape is if the body is completely solid.

¹⁴⁸ “Then he made the molten sea; it was round, ten cubits from brim to brim, and five cubits high, and a line of thirty cubits measured its circumference” (1Ki 7:23 RSV).

[illegible]

Now, since the Earth may not be a perfect sphere due to its slight bulge; and thus this may preclude Scripture from referring to it as a “sphere,” nevertheless, there are various passages that refer to the Earth as a “circle,” and from this description Scripture implies that although it may not be a perfect sphere, it is in a shape that is best understood as a sphere. One of those passages is Isaiah 40:22:

¹⁴⁹ Since we must assume that the rim of the bowl has a certain thickness, then the bowl will have an inner and outer circumference. If there are 18 inches to a cubit, an outer diameter of 10 cubits is 180" and the radius of 5 cubits is 90", and the inner circumference of 30 cubits is 540". Since the thickness of the bowl is one handsbreadth of about 4 inches, then the inner radius must be 90" minus 4" equals 86". The circumference of a circle is $2\pi r$. An inner radius of 86" and inner circumference of 540" is the equation $540" = 2 \pi \times 86 = 172 \pi$, so $\pi = 540/172 = 3.1395348837$, which is mathematically equivalent to 3.14.

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Conversely, flat-earthers will argue that the word “circle” is best understood as a flat disc as opposed to a sphere. At first glance, this interpretation sounds plausible. After all, Isaiah uses the word “circle” and not “sphere.” A circle implies flatness. If we were to describe the shape of a dish, for example, we would say it is circular, not spherical.

Upon closer inspection we see a number of things that go against the flat-earth interpretation. First, the verse depicts God sitting “above” the Earth. From that vantage point, the Earth would look like a circle, whether it was a flat circular disc or a sphere, especially since Scripture depicts God’s view as being very far above the Earth.¹⁵¹ Some argue that God would know if it was a disc or a sphere, so His vantage point really doesn’t add anything to the issue. The fact remains, however, that not only does Is 40:22 compare the size of humans to grasshoppers, it also includes God’s “stretching out of the heavens.” One possible connection between grasshoppers and the heavens is that if we compare the size of a human to that of a grasshopper, a human is about 16,000 times as big.¹⁵² In the cosmological realm, an Earth of 25,000 miles in circumference multiplied by 16,000, equals 400 million miles, give or take, as God’s local “distance” from Earth, if, indeed, we want to complete the analogy of Is 40:22 literally. From this distance, the Earth would certainly look like a circle. We are not saying here that Isaiah is thinking of an exact astronomical figure; rather, he is saying that God’s view of Earth is from very far away (keeping in mind that Scripture both localizes God’s presence and maintains His omnipresence (*cf.* Ex 33:19-23; Jr 23:24).

¹⁵¹ Ps 113:4-6: “The Lord is high above all nations, and his glory above the heavens! Who is like the Lord our God, who is seated on high, who looks far down upon the heavens and the earth?” Jr 31:37: “Thus says the Lord: ‘If the heavens above can be measured, and the foundations of the earth below can be explored, then I will cast off all the descendants of Israel for all that they have done, says the Lord’”; Is 55:9: “For as the heavens are higher than the earth, so are my ways higher than your ways and my thoughts than your thoughts”; Ps 103:11: “For as the heavens are high above the earth, so great is his steadfast love toward those who fear him.”

¹⁵² Calculated on the basis that an average grasshopper is 2 inches long, and 0.5 inches high and 0.5 inches in width, which equals 0.5 cubic inches. Let’s say the average human is 60 inches (5 feet) in height; 15 inches in width; and 9 inches in depth, which amounts to 8100 cubic inches, which is 16,200 times the 0.5 cubic inches of the grasshopper.

In any case, we will go deeper into the analysis. We find that the word “circle” is the Hebrew word כִּוּג (pronounced *kug* or *koog*). To acquire a better range of its definition, it also appears in Job 22:14 and is often translated as “vault”:

¹² Is not God high in the heavens? See the highest stars, how lofty they are! ¹³ Therefore you say, ‘What does God know? Can he judge through the deep darkness? ¹⁴ Thick clouds enwrap him, so that he does not see, and he walks on the vault of heaven.’ (RSV)

In this case, “vault” seems to refer to the arch of the heavens as it is seen from Earth, or even the hemisphere of the heavens since it would necessarily be in three dimensions. Ironically, it appears identical to what flat-earthers envision as a dome. Irrespective of that similarity, since “vault” is the Hebrew word *kug*, the verse could also be translated, “He walks on the circle of heaven” in order to match the definition that flat-earthers give to *kug* in Isaiah 40:22 (“he who sits above the circle of the Earth”). This presents an immediate difficulty for flat-earthers since they have already insisted that *kug* in Isaiah 40:22 means the Earth is a flat disc. This begs the question as to how *kug* can refer to the flat-disc of Earth in one passage (Is 40:22), yet a dome of heaven in another passage (Jb 22:14).

Perhaps this discrepancy was not noticed by the translators of the *International Standard Version* (© 2011), which is the only Bible on the market that renders Isaiah 40:22 with the word “disk” (“He’s the one who sits above the disk of the earth”). Whether this particular translation was chosen because the ISV wanted to put three dimensions into *kug* or actually teach the Earth is a disk, is not known. Although the ISV’s specialty purports it to be a translation that makes “departures from the base text...with respect to the book of Isaiah...from Qumran Cave 1’s Great Isaiah Scroll (1QIsa)...along with certain Dead Sea Scroll manuscripts,” the endnotes show no evidence from these external sources for the ISV’s unique translation of Isaiah 40:22 as “disk.”¹⁵³ Interestingly enough, the ISV

¹⁵³ The ISV states: “The following principles of translation were followed in producing the ISV. For the *Tanakh*, or Old Testament, the Masoretic text as published in the latest editions of *Biblia Hebraica Stuttgartensia* and *Quinta* is used as the base text, in consultation with other ancient Hebrew texts such as the Dead Sea Scrolls, the Samaritan Pentateuch, and a select number of ancient versions (the

translates Jb 22:14's use of *kug* as "horizon," which obviously is not a "disk," even though it is the same Hebrew word.

Despite the confusion caused by the ISV, the difference between Isaiah 40:22 and Job 22:14 is resolved when we realize that *kug* does not refer either to a flat disc or a dome, but only to something that has a curved shape, which could be true for both a flat disc that is curved on its edge, or a dome, or even a sphere. Hence the only thing that can be gleaned from Isaiah 40:22 is that the Earth has a curved shape instead of a square or straight-edged shape. There simply isn't enough information in the verse to determine anything more specific. What we need to discover, however, is whether the curvature of the Earth is limited to two salient dimensions (as in a flat disc) or involves three dimensions (as in a sphere).



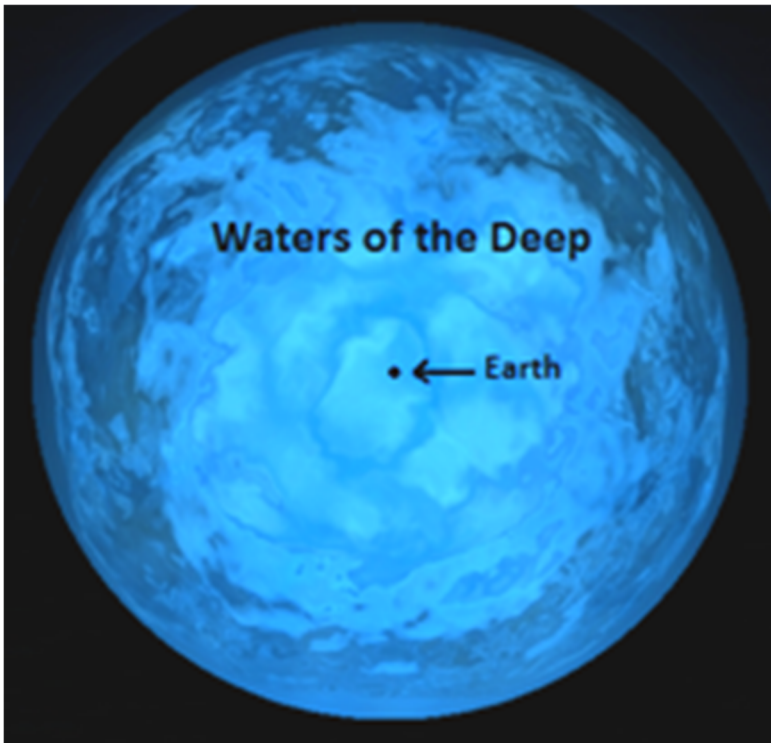
Flat-earthers have the same problem with the Hebrew *kug* in other passages, such as Proverbs 8:27 and Job 26:10. The former says,

²⁷ When he established the heavens, I was there, when he *drew a circle* on the face of the deep, ²⁸ when he made firm the skies above, when he established the fountains of the deep. (RSV)

Septuagint, the Vulgate, the Syriac Peshitta, and the Targums.” But neither the *Biblia Hebraica Stuttgartensia* nor any other external source shows any variations with Isaiah 40:22, and no indication that *kug* (כּוּג) refers specifically to a “disk.” The ISV gives no indications in its endnotes that there exist any textual discrepancies or even questions regarding the text. Hence, its translation of *kug* as “disk” is completely arbitrary.

Flat-earthers claim that the flat disc of the Earth rests on the waters of “the Great Deep,” which “Deep” is a hemispherical container underneath the flat Earth (see figure above). God is said to draw a circle on the top (or face) of the Great Deep and this circle becomes the flat disc called Earth.

But since *kug* also refers to the curved shape of a sphere, Proverbs 8:27 can simply mean that God drew or encompassed a sphere of water whose resulting curved surface is the face of the sphere.



Still, some flat-earthers attempt to shade the meaning of *kug* to be exclusively a flat circle by comparing it to the word for “ball” used in Isaiah 22:18:

“...and I whirl you round and round and throw you like a *ball* into a wide land.”

The flat-earthers claim that since Hebrew had a special word for a “ball,” this word would have been used for the Earth if the Earth were indeed a sphere. Rob Skiba, for example, argues:

Isaiah is the only guy who used the word “ball.” The problem is he didn’t use it Isaiah 40:22. He used it in chapter 22:18. He says, “I’ll throw you like a ball.” And if you look up the Hebrew word for that it’s *door*. The Hebrew word for “ball” is *door*. The Hebrew word he used for circle is *kug*. So he knew the difference in Hebrew and we should know the difference in English....Textually speaking, no question! The ancient record—not just the Hebrew biblical or even extra-biblical—no question. The Hebrew text was very flat earth.¹⁵⁴

Suffice it to say, Skiba’s analysis is faulty. Although he is correct in saying that the Hebrew noun for “ball” is דֹּר (pronounced: *door*), this obscures the fact that the prefix כ was added to make the word כְּדֹר (pronounced: *ka-door*) in order to denote a comparison, thus it is translated “*like* a ball.” In other words, the verse does not specify a “ball,” but something that is “like a ball.” The importance of this fact will be shown momentarily. For now, this particular masculine noun and its prefix appears three times in the Hebrew Bible:

- Is 22:18: “and throw you *like a ball* (כְּדֹר) into a wide land.”
- Is 29:3: “And I will encamp against you *round about* (כְּדֹר).” (NB: Since this verse used the same comparative word כְּדֹר, a more accurate translation would be “And I will camp *as a circle* around you”).
- Ez 24:5: “*Pile* (דֹּר) the logs under it; boil its pieces.”

The oddity here, of course, is Ez 24:5’s “pile,” but perhaps “pile” refers to a heap or mound of logs that is wider at the base than the peak, or to the fact the logs are cylindrical. In any case, we see that *kadoor* (כְּדֹר) does not refer to a “ball,” *per se*, but is closer to something that is not straight or not square. As such, this would mean that Is 22:18 refers to anything that rolls, including a ball, a disc, a hoop, or a cylinder.

¹⁵⁴ <https://www.youtube.com/watch?v=a3k27x0fUV4> starting at 23:00 and again at 26:00. See also: <https://www.youtube.com/watch?v=xNyeHzO1oEc>.

By the same token, Is 29:3 would not refer to a “ball” as much as it would a circle or an encircling, since a ball would mean that God is encamping above, below, and laterally, which would then mean that God is below the ground of the camp. Although a spherical encamping of God is certainly possible since God can occupy any space, the more logical meaning is that God is encamping against them on every part of the ground-level circumference in which they dwell, especially since the people do not rise above the ground or go beneath it.

As it stands, then, *kadoor* would not be the best Hebrew word for a sphere; rather, it is the best word for something that is circular and can thus roll. As we noted earlier, however, that is also the function of the Hebrew word *kug*. It is circular in shape. Whether that circular shape refers to a flat disc or a sphere can only be determined by other factors.

We must further note that whereas *kadoor* refers to something that can roll, *kug* is not used of something that rolls, but of something that is circular in shape. Hence, this difference is another reason that *kadoor* would not be used of the Earth, since according to Scripture, the Earth does not move. It neither rotates, revolves, rolls nor does any other kind of movement, except shake internally from time to time (*e.g.*, earthquakes).¹⁵⁵

We should also note that as *kug* can refer to a circle, technically speaking, a circle is a two-dimensional entity and is thus not a real object at all. Only objects in three dimensions actually exist. If one draws a circle on a piece of paper, that circle is basically a two-dimensional object.¹⁵⁶ Unless we want to include the thickness of the graphite that is on the paper, the circle we drew has no thickness and thus is only a *representation* of something that has a circular shape. As such, flat-earthers cannot, even if the Earth were flat, say that the Earth is a circle. For in their view, the Earth is a disc. A

¹⁵⁵ Joshua 10:10-14; *cf.* Ecclesiasticus (Sirach) 46:3-5; Habakkuk 3:11; 2Kings 20:9-12; 2Chronicles 32:31; Isaiah 38:7-8; Psalm 8:3-6; Psalm 19:1-6; 1Chronicles 16:30; Psalm 93:1-2; Psalm 96:9-11; Psalm 75:2-4; Psalm 104:5, 19; Psalm 119:89-91; Ecclesiastes 1:4-7; Ecclesiasticus (Sirach) 43:1-10; Job 9:6-10; Job 22:13-14; Job 26:7-9; Job 26:10-11; Proverbs 8:27-30; Wisdom 7:15-22; 1Esdras 4:34.

¹⁵⁶ In fact, the OT uses the word *וַיַּבְחֶרְוֶהָ* (pronounced: *vu-bah-me-KUG-ah*) once in Is 44:13 for a compass that draws a circle, although the word “circle” is not directly included in meaning, only implied.

disc has thickness and therefore has three dimensions. Flat-earththers can only say that the Earth has a *circular shape*, or they can say that the preponderant dimension of a flat Earth is in the shape of a circle, but technically they cannot say the Earth is a circle – a Hebrew *kug* – since a circle, in itself, has no dimension of thickness. A disc is in the shape of a circle, but it is not a circle, *per se*, since circles are only two-dimensional representations of something that has a three-dimensional circular shape.

This distinction is precisely why *kug*, since it is understood as a circle in the abstract, can be used to refer to a disc or a sphere in reality, since both a disc and a sphere have a circular *shape*. It would be the same if we were looking at a cube and called it “square-shaped.” If either a flat disc or a sphere were viewed from above (as Is 40:22 depicts God looking at the Earth), both would appear as a circle since the depth or thickness of the Earth would not be seen, which is the same reason we cannot see the depth of the sun, the moon or the planets through a telescope and only see round outlines.

The upshot of this analysis is that if a Hebrew person wanted to describe the Earth, whether it was a disc or a sphere, he could not say it is a “circle” since circles, in themselves, don’t exist in reality. All he can say is that the Earth is *circular-shaped*. Hence it is futile for flat-earththers to argue that because Isaiah 40:22 uses *kug* to represent the Earth, this must mean the Earth is a disc as opposed to a sphere. In the final analysis, *kug* refers to a circular-shape, no more, no less. But since a sphere has a circular shape, then *kug* would be the natural, and perhaps only, word to use for the Earth as a sphere. This is especially true since, as we noted earlier, if the flat-earththers insist that *kug* in Isaiah 40:22 is a flat disc, then they must also say that heaven is a flat disc since *kug* is used to describe the shape of the hemispherical heaven in Job 22:14. But if both the Earth and heaven are spherical, then there is no contradiction between Isaiah 40:22 and Job 22:14.

Another important detail to consider is that the Hebrews, although they had plenty of words to depict a circular or round shape, do not seem to have a precise and exclusive word for a sphere, but this is not unusual for Hebrew. It is a language of only 8000 words, if that. In many instances Hebrew does not have a specific word for very common items. For example, Hebrew had no word for “uncle.” Instead, a Hebrew person would say “your father’s brother.” Likewise, there was no word for grandfather, grandmother, aunt

or cousin. There was no word for triangle or oval or rectangle. Their vocabulary was limited to circle and square, and variations were made by adding words or by context. This doesn't mean that the Hebrews had no concept of such shapes but only that their descriptions of such shapes were much more laborious and contextual than our modern words. Our language is based on Greek, which, as the saying goes, "had a word for everything," having probably ten times as many words as Hebrew.¹⁵⁷ Being so limited in their vocabulary, the Hebrews would use their word "circle" (*kug*) for both a disc, a cylinder, a sphere, and the context and intent would determine the difference. As noted, the larger context of Isaiah 40:22 includes Job 22:14, and thus the best meaning for the Hebrew *kug* in each verse is that of a sphere. Perhaps this is why the Douay-Rheims version has for Is 40:22: "It is he that sitteth upon the globe of the earth."

To be sure, Hebrew had other words to describe something round. The word כּוּב (pronounced: *sa-bib*) is used for something that turns, or something that surrounds an object, either partially or completely, with the context determining the extent of the surrounding:

- "And they shouted to the Danites, who *turned round (sabib)* and said to Micah" (Jg 18:23)
- "Our God comes, he does not keep silence, before him is a devouring fire, *round about (sabib)* him a mighty tempest" (Ps 50:3)
- "Clouds and thick darkness are *round about (sabib)* him; righteousness and justice are the foundation of his throne" (Ps 97:2)
- "The wind blows to the south, and goes round to the north; *round and round (sabib)* goes the wind, and on its circuits the wind returns" (Ec 1:6)
- "For, lo, I am calling all the tribes of the kingdoms of the north, says the Lord; and they shall come and every one shall set his throne at the entrance of the gates of Jerusalem, against all its walls *round about, (sabib)* and against all the cities of Judah" (Jr 1:15)
- "For thou didst cast me into the deep, into the heart of the seas, and the flood was *round about (sabib)* me; all thy waves and thy billows passed over me" (Jh 2:3)
- "The waters closed in over me, the deep was *round about (sabib)* me; weeds were wrapped about my head" (Jh 2:5)

¹⁵⁷ The Greek noun for sphere is σφαῖρα, which stands for sphere, globe or orb.

The word עגל (pronounced: *ak-gol*) is also used of something round, and in the case of 1Kg 7:23 it is something hemispherical.

- “Then he made the molten sea; it was *round (akgol)* ten cubits from brim to brim, and five cubits high, and a line of thirty cubits measured its circumference.”

The word מטבב (pronounced: *met-si-bah*), is used of circular motion or of an object that is completely surrounded by something.

- “He loads the thick cloud with moisture; the clouds scatter his lightning. They *turn round (metsibah)* and round by his guidance, to accomplish all that he commands them on the face of the habitable world” (Jb 37:11-12)
- “So he poured upon him the heat of his anger and the might of battle; it set him on fire *round about (metsibah)* but he did not understand; it burned him, but he did not take it to heart” (Is 42:25)

The word נקף (pronounced: *na-qaf*) is used of cutting off, usually into a circle, by using the Hiphil form of the verb.

- “For a cry has gone round (*naqaf*) the land” (Is 15:8)
- “you shall march around (*naqaf*) the city once” (Js 6:3)
- “You shall not round off (*naqaf*) the hair of your temples” (Lv 19:27)

The word סהר (pronounced: *sa-har*) for a cavity that is semi-spherical or hemispherical.

- “The navel is like a round (*sahar*) goblet” (Sg 7:2)

The point in this word analysis is to show that the Hebrews used spherical concept words, but did not have a specific word for a sphere, globe, or even a disc. As such, the argument cannot be advanced that if the Hebrew language uses “circle” or “round” it can only refer to a disc of a flat Earth. It can refer to any circular shape. But we must insist, however, that the use of *kug* in Is 40:22 for the Earth and Job 22:14 for the heavens, *kug* necessarily must refer to a sphere, not a flat disc.

There are people on the other side of this debate, the heliocentric globers, who go to the other extreme. They argue¹⁵⁸ that *kug* is from a more primitive Hebrew word קָגַג (pronounced: *ka-gag*) which, although preponderantly used of “keeping a feast” (e.g., Ex 12:14; Dt 16:15; Zc 14:16), has two verses which speak of movement within the feast (e.g., Ps 107:27 and 1Sm 30:16).

- Ps 107:27: “they *reeled* and staggered like drunken men and were at their wits’ end.”

In Ps 107:27, the word “reeled” is *kagag* in the Hebrew qal imperfect tense, while the word “staggered” is the Hebrew נָאָק (pronounced: *nu-ak*).

- 1Sm 30:16: “eating and drinking and *dancing*.”

Here the word “dancing” is *kagag* in the qal participle form.

From these two verses, a heliocentric glober, Douglas Hamp, argues that since the people had to go *up to* Jerusalem to do the feast and then turn around and go home after the feast, this was a “circle” of movement, thus *kagag* refers to a “revolving” kind of movement. He then expands this argument to claim that since *kagag* is a root of *kug*, then *kug*’s reference to “circle” must be referring to a revolution of the Earth around the sun and not to the shape of the Earth itself.¹⁵⁹

This kind of argumentation is itself circuitous. Close examination of the two usages of *kagag*, Ps 107:27 and 1Sm 30:16, reveal that the word does not refer to a steady revolution (e.g., a planet going around the sun) but to an unsteady and unpredictable movement, since both verses are in a context of

¹⁵⁸ <https://www.youtube.com/watch?v=xNyeHzO1oEc>, an opponent of Ron Skiba at, at the 25:00 mark.

¹⁵⁹ See Skiba’s opponent at <https://www.youtube.com/watch?v=xNyeHzO1oEc>, at the 26:00-minute mark. He is referring to Douglas Hamp at douglashamp.com. Hamp studied at the Hebrew University at Jerusalem, refers to himself as a “bible literalist,” and wrote a book titled, *The First Six Days*.

drunken people moving haphazardly due to their intoxication, whether in a precarious situation or at a feast where intoxication is common place.¹⁶⁰

Hamp attempts to back up his view by appealing to the idea that the Earth makes a circuit around the sun, which then leads him to translate Ps 104:5 as, “He founded the Earth *on its paths*; it will never be dislodged,”¹⁶¹ wherein he changes the Hebrew construct form **עַל-מִכּוֹנֶיהָ**, which literally is “on its foundations,”¹⁶² and replaces it with “on its paths” to allow himself to teach that the Earth orbits the sun instead of an Earth that is at rest and whose foundations are within its own structure. Suffice it to say, this is a self-serving imposition on Scripture rather than a faithful effort to remain with the face value meaning of the text, especially from one who calls himself a “biblical literalist” and who knows that the Bible never says the Earth moves, but consistently says the sun moves. Although Hamp later allows for the normal understanding of **מִכּוֹן** as representing the Earth’s internal structure, he insists that his translation, “on its path,” is better. He

¹⁶⁰ Another example is at 26:30 of the video (but starting at 47:17 in Hamp’s video at [youtube.com/watch?time_continue=24&v=4HrIHuFP74k](https://www.youtube.com/watch?time_continue=24&v=4HrIHuFP74k)), in which Hamp says: “*The original is chaga (חגא) and it means ‘to revolve.’ This is from Brown, Driver, Briggs: a terror, a reeling in terror. Its origin is from an unused root meaning to revolve.... This is not a stagnant circle.*” First, so that there is no confusion, Hamp is using the transliteration *chaga*, but I have used *kagag* above for simplification. But more importantly, the Hebrew lexicon by “Brown, Driver and Briggs” (Clarendon Press, Oxford, 1980) mentions nothing about *chaga* referring to “revolving.” It also mentions nothing about either *chaga* (חגג) or *chag* (חג) referring to a “revolving” or anything close to such movement. For *chaga*, Brown, *et al*, say: “reeling, Is 19:17 ‘and the land of Judah shall become to Egypt a reeling,’ i.e., Egypt shall reel in terror at the sight of it...this meaning may either be from an original sense of חגג, or = ‘be excited as at a חגג, cf. חגג 3.” On point “3” of חגג, Brown, *et al*, says: “reel, in giddiness on the sea, Ps 107:27 cf. חגג Is 19:17; this ether points to an earlier meaning of √ or better, the Psalm 107 being late, means reel as from festival excesses.” Suffice it to say, the speaker in the Youtube video made a total misrepresentation of the Hebrew words.

¹⁶¹ [youtube.com/watch?time_continue=24&v=4HrIHuFP74k](https://www.youtube.com/watch?time_continue=24&v=4HrIHuFP74k), at cue 54:45.

¹⁶² From the Hebrew: **מִכּוֹן** (pronounced *ma-kon*), which appears 17 times in the OT and always refers to an established or settled place, and never to something that moves (cf. Ex 15:17; 1Kg 8:13; 39, 43, 49; 2Ch 6:2, 30, 33, 39; Er 2:68; Ps 33:14; 89:15; 97:2; 104:5; Is 4:5; 18:4; Dn 8:11. A derivative is **מִכּוֹנֶה**, which appears 20 times, and always means “base” or “bases,” which don’t move but serve as foundations for other objects (e.g., Er 3:3: “they set the altar upon his bases.”).

attempts to back up this decision by appealing to how the atom is similar to the conventional solar system because, as the Earth orbits the sun, it is similar to an electron orbiting its hydrogen nucleus (a proton), and thus for Hamp nature is consistent. Apparently, the thought didn't cross his mind that if the stars rotate around a fixed Earth, this model is akin to the dozens of electrons that orbit the nucleus of a uranium atom. This is assuming, of course, that either analogy can be sustained in light of the fact that modern physics is leaning against the Bohr model of the atom of rotating electrons and going towards electrons in a stationary wave, courtesy of quantum mechanics.

Last but not least, there are some who go to other extremes in order to empty any literal meaning from the Hebrew *kug* in either Isaiah 40:22 or Job 22:14, ostensibly to refute the exegesis of flat-earththers. As one Jewish/Evangelical site sees it:

Understanding the Earth Circle Metaphor: I mention all of this so that you are not surprised by the way this Targum or paraphrase renders the key "flat-earth" Scripture in Isaiah 40:22 in such a way that nobody can be in any doubt that the passage is a poetic rendition or a metaphor Yahweh's glory! The Aramaic has been rendered into King James-type English:

"Have ye not known? have ye not heard? hath not the work in the creation been declared unto you in its order from the beginning? Have ye not understood that ye ought to fear Him, who hath created the foundations of the earth? Who maketh the Shekinah of His glory to dwell in exalted strength, and all the inhabitants of the earth are in His estimation as locusts; He that stretched out the heavens as a little thing, and spreadeth them out as the tent of the house of the Shekinah"

Yahweh's Exalted Strength: So here is the big question - why does this read so differently from our English translations of the (known-to-be doctored) Masoretic Text? Why is, "It is He (Yahweh) who sits above the circle of the earth" rendered, "Who maketh the Shekinah of His glory to dwell in exalted strength" in the Targum? The answer is simple: "the circle of the earth" was a known metaphor for "in exalted strength" since the circle encompassed 'everything' that the viewer could observe from that part of the planet's surface he stood on. This is not a proof-text for Astronomy or Cosmology - it isn't describing the actual shape of the

earth in its totality so it is wrong to use it as such. Nevertheless, as the description of an earth-bound observer it is perfectly accurate.¹⁶³

This is a case in which someone who wants to prove a point against an opponent goes to the opposite extreme that is just as wrong. The claim here is that since one targum¹⁶⁴ of Isaiah has, “Who maketh the Shekinah of his glory to dwell in exalted strength” in Is 40:22 instead of the literal Hebrew: “It is he who sits above the circle of the earth,” this means that the latter is nothing more than a metaphor for the former. But this is certainly false. First, in the canonical books, the phrase “circle of the Earth”¹⁶⁵ is a hapaxlegomena (*i.e.*, never appearing in the Bible again). So how could it be “a known metaphor for ‘in exalted strength’”? Likewise, since when is the phrase, “He who sits over,” a metaphor for, or even resemble, “Who maketh the Shekinah of his glory to dwell”? What proof, from other usages, does the author provide to back up his thesis? What authority, beside the targum itself (which has no authority), does the author cite for verification? The only other time “circle of the earth” appears is in the non-canonical 4Esdras 6:1-2:

And he said to me, “At the beginning of *the circle of the earth*, before the portals of the world were in place, and before the assembled winds blew, and before the rumblings of thunder sounded, and before the flashes of lightning shone, and before the foundations of paradise were laid...” (RSV).

But identical to Is 40:22, we see that the surrounding phrases of “circle of the earth” are all tailored to the very beginning of the creation week. It would certainly be out of place if Esdras had said, “At the beginning of the exalted strength...” instead of, “At the beginning of the circle of the Earth,” especially in light of the fact that Genesis 1:1-2 tells us that the Earth was,

¹⁶³ <http://www.nccg.org/lev20161215.html>

¹⁶⁴ A targum is an Aramaic translation or paraphrase of an Old Testament book, much like translations today that are based on “dynamic equivalence” as opposed to literal translation. As with freer translation methods, sometimes the targums were accurate, and more than often inaccurate.

¹⁶⁵ חוּג הָאָרֶץ (“the circle of the earth”) or in construct form עַל־חוּג הָאָרֶץ (“over the circle of the earth”).

indeed, created first and existed before the portal, the wind, the thunder, the lightening, and paradise itself.

ISAIAH XL. 135
hath not the work¹⁴ in the creation been declared
unto you in its order from the beginning? Have
 ye not understood that ye ought to fear Him, who
 hath created the foundations of the earth?
 22 Who maketh the Shekinah of His glory to
 dwell in exalted strength, and all the inhabitants
 of the earth are in His estimation as locusts; He
 that stretched out the heavens as a little thing,
 and spreadeth them out as the tent of the glory of
 the house of the Shekinah.
 23 Who gives princes over to weakness; the
 judges of the earth He bringeth to naught.
 24 Although they multiply, although they
 increase, although their children become great in
 the earth, yet, nevertheless, He will send His
 wrath among them, and they shall be confounded:
 and His Work shall scatter¹⁵ them, as the whirl-
 wind the chaff.
 25 To whom, then, will ye liken me? and to
 whom will ye equal me? saith the Holy One.
 26 Lift up your eyes on high, and behold, that
 ye may fear Him, who hath created these things,

136 ISAIAH XL.
 who bringeth forth the host of the heavens
by number: He calleth them all by their name:
on account of the combination of forces and might
of power, not one is hindered in its orb.¹⁶
 27 Why sayest thou, O Jacob, and speakest, O
 Israel, My way is hid from the Lord, and my cause
 is removed from my God?
 28 Hast thou not known? yea, hast thou not
 heard that the everlasting God, the Lord who hath
created the foundations of the earth, is not fatigued,
neither is weary?¹⁷ there is no end to His wisdom.
 29 Who giveth wisdom to the righteous that
 long¹⁸ for the words of the law; and to those who
 have no strength, he multiplieth strength.¹⁹
 30 And the wicked youths shall be fatigued and
 shall be weary; and the impious young men shall
 utterly fall.

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As for Is 40:22, not only are there no textual variants in the verse or in the phrase “circle of the Earth,”¹⁶⁷ the surrounding verses of the Isaiah targum likewise describe the creation (see the above verses underlined in red). Looking more closely, why would the author begin with the creation in Is 40:21 and say, “who hath created the foundations of the earth” and then mangle the next verse which shows another example of the creation (“He who sits above the circle of the Earth”) and then render it, “Who makes the Shekinah of his glory to dwell in exalted strength,” and then immediately go back to the creation in the same verse and say, “that stretched out the heavens as a little thing”?

The answer is that the unknown Aramaic author has taken liberties with the Hebrew text that simply have no basis in fact, much less can it be shown that “circle of the Earth” is a “known metaphor.” Even if it was a metaphor, it wouldn’t mean that “circle of the Earth” does not have literal meaning in itself, namely, the Earth is in the shape of a circle, not a square or triangle. If the author wanted to add a footnote that, “He sits above” may be an oblique reference to God’s “Shekinah glory” and that “the stretching out of

¹⁶⁶ Taken from C. W. H. Pauli’s *The Chaldee Paraphrase of The Prophet Isaiah*, London, 1871, pp. 135-136.

¹⁶⁷ The *Biblia Hebraica Stuttgartensia*, 1977, p. 736, lists no variants for Is 40:22.

the heavens” could possibly be akin to “the tent of the glory of the house of Shekinah,” this would be acceptable. But changing the actual meaning of the text is a gross violation of biblical translation, even for targums that are known for using paraphrases. For some reason the author is bent on associating God’s “sitting” and the firmament with the Shekinah glory, which was common in the targums and other rabbinic literature and thus explains its origin. They had a penchant to sprinkle the “Shekinah glory” in many places.¹⁶⁸ But Is 40:22 is not the place for that excess, especially since the author was very faithful to the original Hebrew in all the verses surrounding Is 40:22. The Hebrew שֹׁכֵן (*sha-ken*) is the normal word for “dwelling” or “inhabiting” used over 100 times in the Old Testament. There is no mystery to it, except that God sometimes comes to “dwell” on Earth in a cloud for the Israelites.¹⁶⁹

Lastly, another interpretation of Is 40:22 claims that the “circle of the Earth” refers to the zodiac of constellations (aka: “Mazzoroth”) and thus not to the Earth itself. As this exegete puts it:

He is declaring that the works of man are nothing as compared to His creativity and power. Then He points out His Mazzoroth, the twelve signs in the circle of the Mazzoroth, which have proclaimed His plan of redemption from the beginning.

Did you not know? Have you not heard? Has it not been declared to you from the beginning? Have you not understood from the foundations of the earth? Isaiah 40:21

Do you bring out the constellations (Mazzoroth) in its season? Or do you lead the Bear with its sons. Job 38:32

¹⁶⁸ Especially in the Isaiah targum, *cf.* Is 2:3: “to the house of Shekinah of the God of Jacob”; Is 4:5: “of the house of his Shekinah a cloud of glory”; “the Shekinah shall be protecting it”; Is 5:5: “I will cause my Shekinah to remove from them”; Is 6:3: “Holy in the highest and exalted heavens is the house of his Shekinah”; Is 6:5: “For my eyes have seen the glory of the Shekinah,” *et al.* As noted by Wikipedia, “In the Targum the addition of the noun term Shekhinah paraphrases Hebrew verb phrases” (<https://en.wikipedia.org/wiki/Shekhinah>).

¹⁶⁹ Ex 24:16: “...the Lord settled upon Mount Sinai. The cloud covered it for six days, and on the seventh day he called to Moses from the midst of the cloud.”

The CIRCLE in Isaiah 40:22 is the Mazzoroth in the sky above, that has 12 constellations in a circle on the ecliptic, which declare the Gospel. It is like a curtain which covers the earth, and in which the stars dwell. It's a tabernacle (tent) in which the Father dwells.¹⁷⁰

Although this author's purpose is to discredit the flat Earth theory, this is the wrong way to go about it since it conflates references to the constellations, which are *in a circle*, with the Earth which *is a circle*. Is 40:21, which introduces the context of Is 40:22, makes a specific reference to the Earth as the focus of the passage ("Has it not been told you from the beginning? Have you not understood from the foundations of *the earth*?"). Is 40:22 then follows immediately with, "It is he who sits above the *circle of the earth*, and its inhabitants are like grasshoppers." Moreover, Isaiah's reference in verse 22 to the "heavens" immediately after ("who stretches out the heavens like a curtain, and spreads them like a tent to dwell in") is not talking about the twelve constellations of Mazzoroth, but the whole heavens that includes all the stars which, in its hemispherical or spherical shape, is like a circular tent covering. Hence Mazzoroth is not even part of the discussion in Isaiah 40:21-22.

Before we leave Isaiah 40:22 ("circle of the Earth"), in addition to what we have said already, we are obliged to make some additional comments on the remarks that Rob Skiba, one of the leading Protestants espousing the flat-earth view, makes of the Catholic Douay-Rheims translation of the passage, which is "globe of the Earth." In his video he says the following:

The Douay-Rheims bible, 'the globe of the earth,' oh, that is interesting, Douay-Rheims, that would be following on the heels of the Copernican revolution so that doesn't really surprise me, especially since this is a Catholic bible.

Obviously, then, we have the typical Protestant bias against Catholicism at work in Skiba's mind. Since Skiba wants *kug* to refer to a flat disc, he prejudices his audience against the Douay-Rheim's "globe" by playing an audio from another Protestant titled: *Flat Earth: Jesuits and the Global Conspiracy*, who claims the following:

¹⁷⁰ <http://flatearthdeception.com/biblical-proofs-of-the-globe-earth/>



Copernicus' theory of a heliocentric universe was well known at the upper strata of the Catholic Church in his lifetime. While he preferred his theories after his death, he ultimately agreed to publish his manuscripts on the persistent appeals of high-church officials. Catholics were not first to reject Copernicus' views for they themselves admit "Opposition was first raised against the Copernican system by Protestant theologians for biblical reasons."¹⁷²

The Catholic Church advanced Copernicus' heliocentric model, constantly urging him to spread it abroad, together with other theories that opposed the sacred Scriptures.

The necessity to change public conception from an accurate belief in a flat enclosed earth to a false belief grew slowly. With sapiens baby steps, the whole world would become amenable to the final delusion of an alien invasion under the first woe.

The Catholic hierarchy had the perfect opportunity to lay the groundwork for a global deception that would culminate in this Earth's final generation. This deception required a globe Earth spinning throughout the vast reaches of space, space inhabited by aliens and other sanctioned life forms. These contrivances created doubt in the Bible putting science ahead of Scripture, which advised mankind the Earth is enclosed and unmoving. They also place the Creator far away from his creation by presenting a universe unimaginably vast.

To engineer this transformation in belief, the newly created Society of Jesus, commonly known as The Jesuits, became the agents of change. The Roman Catholic Church was waging war on the new Protestantism

¹⁷¹ <https://www.youtube.com/watch?v=1WHlr-IFqAo&feature=share>

¹⁷² Citing the website: "<http://www.newadvent.org/cathen/04352b.htm>"

believers having come from their own system while Copernicus was resisting appeals to publish theory of a heliocentric solar system. Under the approval of Pope Paul III, the Jesuit order was established in 1540 and Copernicus dedicated his book, *Revolutions of the Heavenly Bodies*, to this very same pope.

This newly formed order, the perfect instrument to implement this clandestine operation for the pope of Rome, began changing the public perception of the authority of the Scriptures, the Earth and the Creator through the Copernican revolution. Following Copernicus' publications, it is probably the Jesuit order produced more astronomers than any other demographic in Europe. That, ostensibly a religious order should produce so many scientists should cause surprise. However, as these scientists have focused almost exclusively in but one area, this gives us reason to question.

Upon rejection of the sacred Scriptures, which teaches us that Earth is a fixed immovable object under a protective covering, a nefarious foundation was laid. Atop this were built perversions designed to doubt the very word of our Father, Yahuah. With the biblical geocentric model rejected, a new explanation was required. A globe Earth, its orbit for millions of miles every year, illimitable realms of space with billions of galaxies, each composed of billions of stars with worlds innumerable. All this became necessary to explain the new heliocentric model of the universe. And mankind, over a short time, lost his divine significance. Thereafter was created an environment within which the writings of Charles Darwin found a receptive audience. Once science showed the Bible wrong, the disparaging then diverged from a religious guise altogether. Anything suddenly became possible. There was nothing above question, including how the Earth seemed to appear in the vastness of space with all else, and the existence of extraterrestrials.

The Big Bang theory is today the leading explanation as to how the universe began. At its simplest, it talks about the universe as we know it starting with a small singularity, then inflating over the next 13.8 billion years to the cosmos that we know today.

Priest Andrew Pinsent holds advanced degrees in theology from the Pontifical Gregorian University in Rome as well as a doctorate in particle physics from Oxford. In January 2015 he wrote, 'Being both a priest and a former particle physicist at CERN, I am often asked to give talks on

faith and science. Quite often young people ask me the following question: how can you be a priest and believe in the Big Bang? To which I am delighted to respond. We invented it. Or more precisely, priest George Lemaitre invented the theory which is today called the Big Bang and everyone should know about him. The creator of the Big Bang theory was none other than the Jesuit-trained priest George Lemaitre.

Follow from cause to effect:

1 Without a globe earth circling the sun through the far reaches of space, we do not have the Big Bang.

2 Without the Big Bang we do not have evolution.

3 Without evolution, we are more likely to accept creation as an act of an intelligent design by a divine creator.

The Roman Catholic Church does, in fact, accept evolution.

The problems with this derisive exposé are manifold. Not only does it fail to address the discrepancy between Isaiah 40:22 and Job 22:14 if he insists on viewing the Earth as a flat disc, it fails miserably in its understanding of the historical details.

First, it is obvious that its main purpose is to put a black mark on the Catholic Church. Although the Catholic Church certainly does have its problems and has a variety of renegade theologians (as also all Protestant denominations have, and often in greater proportions), criticisms that neither make the proper distinctions nor separate the good from the bad are hardly objective. As in Protestant denominations, there is a grave and crucial distinction to be made between those who seek to be faithful to the Scripture and those who do not. Accordingly, it was the liberal Catholics of the 1800s who began to turn away from traditional Catholic doctrine, not the whole Catholic Church.

Second, although there are many liberals in the Catholic Church who “accept” evolution, as well as Copernicanism and Relativity, none of these are the official teaching of the Catholic Church, and never have been. Officially, the Church holds the same doctrine that it held when it condemned Galileo in 1616 and 1633, namely, geocentrism, even though many members of the Church shout it down with impunity.

Third, Skiba's exposé fails to recognize that it was liberal Protestants, who began as early as the late 1600s and 1700s, that actually initiated the deleterious concepts that Skiba decries, and long before the Catholics did.



After Luther and Calvin, it was the Protestants who were largely responsible for the world's present acceptance of Copernicanism, Darwinism and Relativism. Soon after the Catholic Church had rejected the ideas of Galileo, the secularists waged a vicious war against the Church. For example, **Baruch de Spinoza** (1632 – 1677), a Jewish pantheistic and rationalistic philosopher, started the ball rolling

by proposing an alternative view of Scripture's authorship. He began by rejecting the divine miracles of the Bible. If divine miracles are denied, then the divine inspiration of Scripture would be the next logical thing to set aside, thus leading Spinoza to reject divinely inspired Mosaic authorship of the Old Testament.



By 1878, the German Protestant scholars, **Karl Graf** and **Julius Wellhausen**, crafted these novel views of Scripture and created what is now known as the "Documentary Hypothesis." It taught that there were four basic authors of the Pentateuch, from widely diverse epochs, but Moses was not one of them. The authorship of Genesis 1 was attributed to a Jewish

scribe coming from the Babylonian captivity around 515 BC. His goal, it is claimed, was merely to invigorate the Jewish people during their return to Jerusalem, with no intention of giving a factual rendering of cosmological history, much less was he under “divine inspiration.”

Fourth, as Skiba’s exposé speaks only of “Luther and Calvin” among the Protestants it wishes to elevate as the defenders of Scripture and avoid all of Protestantism’s liberal theologians, the fact remains that Luther and Calvin did not teach the Earth was flat. As such, Protestantism, even the “best” of Protestantism, has no pedigree for the very thesis that Protestant Rob Skiba wishes to promote. Flat-earthism is largely an aberrant secular offshoot of traditional geocentric doctrine. Its only religious ties come from two rather ignored figures, Lactantius (d. 325 AD) and Cosmos the Monk (d. *circa* 550 AD). Besides that, it is only Skiba and his colleagues who have now made flat-earthism into a religious movement.

Fifth, this exposé has also given a distorted history of what occurred in the Catholic Church when Copernicus published his heliocentric book, *De revolutionibus*, in 1543. The exposé makes it appear as if the Catholic Church of the 1500s and 1600s totally accepted Copernicus’ theory, but this thesis is totally false. Although there were a couple of cardinals backing Copernicus, the fact is that most were against him, including the Jesuits. Cardinal Bellarmine (1542-1621) himself was a Jesuit and he led the Catholic Church in condemning both the Copernican system and those like Galileo who were trying to promote it. In the 1540s, soon after the Lutheran, Andreas Osiander, published Copernicus’ book, the Catholic Bartolomeo Spina, the Master of the Sacred Palace until his death in 1547 and the only man responsible for censoring heretical books for the Catholic Church, immediately sought to have Copernicus’ book banned, which was eventually carried out by his Dominican colleague Giovanimaria Tolosani, who died two years later in 1549. Similar to Copernicus’ effort to persuade Paul III of heliocentrism, Tolosani wrote a detailed geocentric treatise in 1546, which he dedicated to Paul III and which included an endorsement from Spina. In it Tolosani vehemently rejected Copernicus’ universe and

declared it an extreme danger to the faith precisely because of its attempt to deliteralize sacred Scripture.¹⁷³

As the 16th century reached the midway point, the staunchest anti-Copernican of the day was another Jesuit, Christoph Clavius (d. 1612). He writes in his highly esteemed work:

We conclude, then, in accordance with the common doctrine of the astronomers and the philosophers, that the earth lacks any local motion, either rectilinear or circular, and that the heavens themselves revolve continually round it.... Holy Scripture is also in favor of this doctrine, stating in a great number of places that the earth is stationary. It also bears witness to the fact that the sun and the other heavenly bodies are in motion.¹⁷⁴

One of the clearest official and authoritative statements from the Catholic Church defending the doctrine of geocentrism comes from the catechism issued under a decree of Pope Pius V, known as *The Catechism of the Council of Trent*. In light of its date, 1566, the Catechism comes as more or less the capstone to the Church's position, since it had already rejected both Rheticus' and Copernicus' books on heliocentrism in the 1540s and put them both on the Index in 1559. The Catechism comes just seven years after the Index. Copernicus' book remained on the Index for almost 300 years until a series of falsehoods told to the then reigning pope, Pius VII, by liberal and Copernican Catholics in 1820 through 1835, had it removed under false grounds.

¹⁷³ The work's title is: *On the Highest Immobile Heaven and the Lowest Stable Earth, and All Other Movable Heavens and Intermediate Elements*. Tolosani insisted Copernicus' teaching "could easily provoke discord between Catholic commentators on Holy Scripture and those who have resolutely decided to follow this false opinion. It is in order to avoid such scandal that we have written this short work" (English translation of the French translation *Aux origins*, p. 708, cited in *The Church and Galileo*, pp. 15-16).

¹⁷⁴ *In Sphaeram Ioannis de Sacro Bosco Commentarius*, Rome 1570, pp. 247-248, cited in *The Church and Galileo*, p. 18, 31. Clavius uses Psalms 19:5-6; 104:5 and Ecclesiastes 1:4-6 for his main support. See also: James Lattis' *Between Copernicus and Galileo: Christoph Clavius and the Collapse of Ptolemaic Cosmology*, University of Chicago Press, 1994.

Up to the publishing of the Roman Catechism, we see the following in the Church's teaching on the universe:

- The Church assumed and promoted a spherical Earth, following the view of the universe espoused by Claudius Ptolemy as early as the second century AD.
- The Church held that the sun and stars move, and never said the earth moves and, in fact, said the earth "stands still."
- The Church held that the sun and stars move in continual revolution. The only "revolution" of which science and the Church knew was the stars and sun revolving around the earth.
- The Church rejected the teaching of Oresme who suggested the earth might be rotating, specifically stating in its decrees of 1616 and 1633 against Galileo that the Earth has no diurnal motion.
- The Church rejected Nicholas Cusa's teaching that the earth could be moving but not necessarily by rotating or revolution.
- The Church's Tridentine catechism of 1566 entertained no alternate scientific theory (*i.e.*, heliocentrism) when it supported geocentrism. It made no statement accepting heliocentrism and no mention of acentrism, or any other view. It gave no credence to the Greek astronomers Pythagoras or Aristarchus, or any view that said the earth moved, but condemned them all, specifically naming Pythagoras in its condemnation of Galileo.
- the Tridentine catechism knew that the Catholic tradition believed the earth did not move and it makes no statement that indicates a break with the Church's tradition, including no break against the consensus of the Church Fathers on geocentrism.

Lastly, Skiba's exposé ends with the statement, "The Roman Catholic Church accepts evolution," but this is a misinterpretation of the facts. Not only does the Roman Catholic Church have no official position endorsing the theory of evolution, the unanimous teaching of the Fathers and Doctors of the Church and all of the authoritative teaching of the Magisterium on the origins of man and the universe upholds special creation and the literal historical truth of the sacred history of Genesis. In fact it can be more easily ascertained that the Protestant Church accepts evolution, since most of evolution's major promoters stemming from the 1700s through the 1900s were Protestant in origin, including those who developed the "Documentary Hypothesis" to allow Genesis to be interpreted in line with evolution, as well

as the Protestant forerunners of Darwin's evolutionary theory.¹⁷⁵ Except for a few early Catholic dissidents (e.g., Teilhard de Chardin, Ernest Messenger, J. Paquier) it was only in the 1940s that Catholics began a major shift away from creationism to evolution.

All in all, Skiba's attempt to smear the Catholic Church and its translation of Isaiah 40:22 ("globe of the Earth") in the 1609 Douay-Rheims version is nothing but a distortion of the facts. It shows that Skiba is just as biased as those he criticizes for being biased.

Job 26:10

Regarding Earth as a sphere, another relevant passage is Job 26:10

He has *described a circle* upon the face of the waters at the boundary between light and darkness.

Here again is the Hebrew word *kug* ("described a circle"),¹⁷⁶ but this time it is in the qal preterite for the past tense and thus it is pronounced *kag* (קָג). As before, *kag* could refer to the circular shape of a disc or a sphere, but the preference goes again to a sphere. The reason is that *kag* must fit into the rest of the verse, which specifies that the geometric shape it has in view divides light from darkness.

This division of light from darkness is easily portrayed on a sphere. For example, during a total eclipse the moon is between the Earth and the sun and thus the side of the moon facing us is in darkness, while the side facing the sun is in total light. Thus, light and darkness have a mutual boundary, wherein half the sphere is light and the other half is darkness.

¹⁷⁵ E.g., Alfred Russell Wallace, Asa Gray, Charles Kingsley, Charles Babbage.

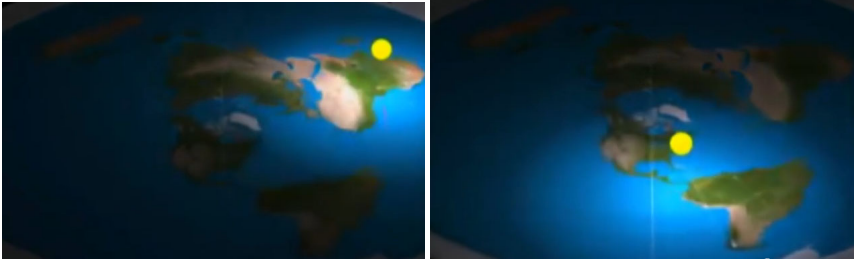
¹⁷⁶ Other translations have: "marked a circle" (NAB); "marks out the horizon" (NIV); "he hath compassed" (KJV); "hath set bounds" (DR); "described a circle" (NRSV); "inscribed a circle" (NAS).



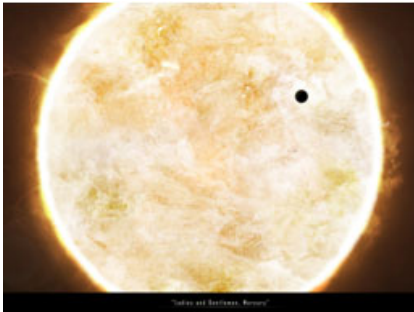
Second, even if one insists on using “circle” as the meaning of *kag*, it also supports a spherical Earth. If God inscribed a circle at the place where light on the sphere was divided from darkness on the sphere, He would draw the circle connecting the North Pole to the South pole. In other words, it would be a circle inscribed on a sphere. Incidentally, this circle, as all abstract circles, would have no thickness, since there is only a conceptual line between light and darkness on a globe.



But it is not so easy for flat-earthers to accommodate Job 26:10. In fact, they use misrepresented animations to answer this problem. On most flat-earther videos, the sun is depicted as revolving along the inner radii of a flat circular disc and the sun’s light is deliberately limited so that it only hits a portion of the flat Earth. See the following figures:



The flat-earthers say the sun's light is limited because, they believe, the sun is the same size as the moon. But if the sun is the same size as the moon it means that the intensity of the sun's light will be much less than if it were the 864,000-mile diameter we commonly have believed the diameter to be. Additionally, the flat-earthers believe that the sun's light is further limited because the sun is only 3000 miles above the flat Earth. As such, the sun for the flat-earthers is more like a spotlight instead of an equilaterally radiating body. But this raises a problem. How would the moon and the planets radiate light? The very close and very small flat-earth sun would not be powerful enough to give light to the moon and the planets. As we can see in the above pictorial, the sun can't even give light to the whole flat Earth due to its small

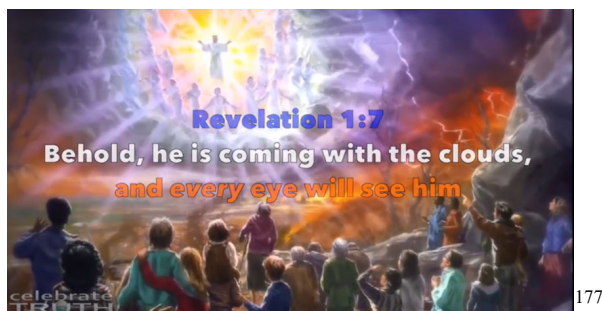


size and low height above the Earth. It only has a cone of light, as would be the case for a spotlight or a flashlight. As such, the moon and planets would have to create their own light, and this is precisely what many flat-earthers believe. Unfortunately, there is no scientific

evidence that planets and moons create their own light, much less light that we could see in our telescopes. If planets could create their own light, we would not see darkness in Mercury and Venus as they traverse the sun.

Apocalypse 1:7

Behold, he is coming with the clouds, and every eye will see him, everyone who pierced him; and all tribes of the earth will wail on account of him. Even so. Amen. (RSV)



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Christian flat-earthers claim that if the Earth were round, it would be impossible for everyone on Earth to see Christ coming back on the clouds. Even if Christ were as big as conventional theory says the sun is, half of the world would not see him. The problem with this reasoning is that it assumes that when Christ returns the people will remain on the surface of the Earth. But this is not the picture necessarily indicated in Scripture. For example, 1 Th 4:16-17 says that the people on Earth will be raised into the sky when Christ returns:



16

For the Lord himself will descend from heaven with a cry of command, with the archangel's call, and with the sound of the trumpet of God. And the dead in Christ will rise first; ¹⁷ then we who are alive, who are left, shall be caught up together with them in the clouds to meet the Lord in the air; and so we shall always be with the Lord.

¹⁷⁷ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 50:25, produced by the film, "The Global Lie Flat Earth Revelation Documentary."

Scripture is also clear in John 5:28-29 that the unsaved dead will be raised at the same time:

²⁸ Do not marvel at this; for the hour is coming when all who are in the tombs will hear his voice ²⁹ and come forth, those who have done good, to the resurrection of life, and those who have done evil, to the resurrection of judgment.”

Effectively, everyone in the world will be taken from the surface of the Earth, since at Christ’s return the Earth will be destroyed (*cf.* 2 Pt 3:10-13; Jn 5:29; 1Co 15:50-55). Christ will judge the good and the bad, in the air, and they will be sent to their respective destinations.

Even if it were the case that Jesus comes back to a flat Earth, this doesn’t mean he could be seen by everyone, just as those in New York cannot see the sky over Philadelphia, much less see the sky over Jerusalem, which is thousands of miles away.

Amos 9:6

Another passage of interest regarding the shape of the Earth is Amos 9:6:

...who builds his upper chambers in the heavens, and founds his *vault* upon the earth; who calls for the waters of the sea, and pours them out upon the surface of the earth - the Lord is his name.

The word “vault” here is the Hebrew אגודָה (pronounced: *a-gu-dah*). It is used four times in the Bible

- Exodus 12:22: “Take a *bunch* of hyssop and dip it in the blood which is in the basin”

This is a feminine noun in the singular, perhaps better translated as “take a band of hyssop and dip it.”

- 2Sm 2:25 “And the Benjaminites gathered themselves together behind Abner, and became one *band* (*agudah*)”

This is another feminine noun in the singular.

- Is 58:6: “Is not this the fast that I choose: to loose the bonds of wickedness, to undo the *thongs* (*agudah*) of the yoke”

This is a feminine noun in the plural.

- Am 9:6 “founds his *vault* (*agudah*) upon the earth”

This is a feminine noun in the singular.

The common thread running through these verses is that an *agudah* is some kind of entity that connects one thing to another. Since the *agudah* is in the genitive with “Earth,” it is connected with the Earth in some fashion. But translating it as “vault” (as the RSV does) appears more of an interpretation than a definition, since a *vault* is usually understood as a dome or some kind of pocket of space.

As it stands, if we were to consider the *agudah* as a spherical atmosphere and a spherical heavens, both around a spherical earth, then the definition of *agudah* would be satisfied, since a spherical space would rest upon or be connected to the whole spherical earth. The connection may be solid, liquid or gaseous. The verse simply does not supply any more information than a connection. We could easily replace “firmament” for *agudah* in Amos 9:6 and the meaning would be the same.

We might venture to say, however, that since the first part of the verse says God “builds his chambers in the heavens, and founds his *agudah* on the earth,” and we know that Hebrew poetry often repeats the meaning of the first phrase in the second phrase but with different words, that the “heavens” and the *agudah* are one in the same, as is the case in Genesis 1:8 between the firmament and the heavens (*i.e.*, “the firmament of the heavens”).

Additionally, it would be especially appropriate to say that God “founded” the heavens on the Earth since, as Scripture clearly indicates, the Earth is the center of the whole heavens and does not move.

The “Corners” of the Earth

The Bible speaks about the “corners (רָאשֵׁי, pronounced: *pa-at*) of the Earth,” and “ends of the Earth.”

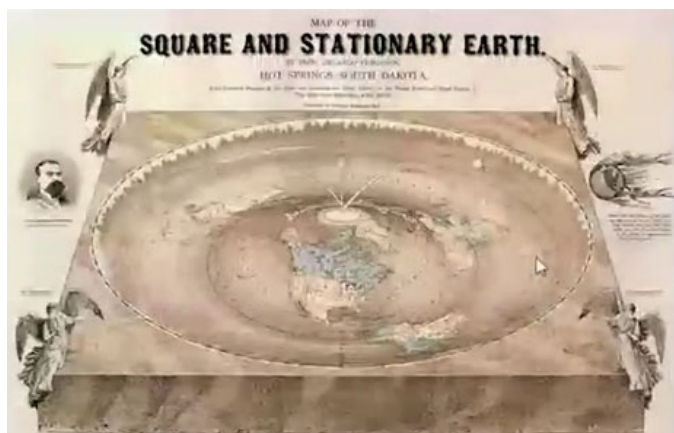
- “Under the whole heaven he lets it go, and his lightning to the corners of the earth” (Job 37:3)
- “...and gather the dispersed of Judah from the four corners of the earth” (Is 11:12)
- “...you whom I took from the ends of the earth, and called from its farthest corners” (Is 41:9)
- “The end has come upon the four corners of the land” (Ez 7:2)
- “After this I saw four angels standing at the four corners of the earth, holding back the four winds of the earth” (Ap 7:1)
- “...and will come out to deceive the nations which are at the four corners of the earth” (Ap 20:8)

The relevance of these passages for our topic is that many flat-earththers will seize on them and conclude the Earth is flat because only a flat surface can have “corners,” and spheres obviously don’t have corners. But this is a case in which the evidence proves too much for the protestor. Since few flat-earththers have ever depicted the Earth as a flat square, cube or rectangle, but only as a flat circular disc, then in the literal sense of “four corners,” their understanding of the shape of the Earth does not fit the biblical language.

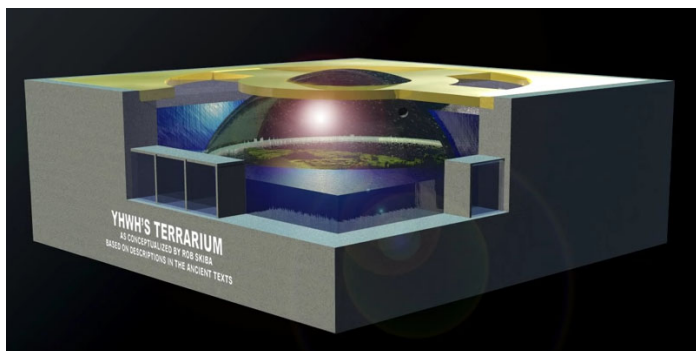
Rob Skiba, using the non-canonical Book of Enoch that speaks about “four angels at the four corners of the Earth,” tries to get around this problem for the flat Earth view with the below argument:

...it occurred to me that we can consider the atmosphere, clouds, oceans and land collectively as “Earth,” meaning the whole “Earth system,” as in the global model above. I suppose we could apply the same logic to the entire system depicted in my 3D model. In other words, the entire compartment depicted there could be the “Earth system.” Thus, if true, then the four corners don’t necessarily have to be part of the “circle of the Earth” below, but rather they could be part of the “roof” above the system, while the Heavenly realm, surrounding the Throne, which looks down on the Earth land below. If true, then this causes a departure from views such as this one.... To me it’s not rocket science that a circle can

be inscribed into something that is square or rectangular. Someone else back in the 1800s had a very similar idea and drew this depiction here.



Although he admits that his alternative view is “pure speculation,” Skiba presents his own “four corners” model as follows:



Skiba then refers to this as the “heaven-Earth system.” As such, all the water, even the water above the heavens (*cf.* Gn 1:6-9; Ps 148:4), is contained in Skiba’s square-shaped box called “Yahuah’s Terrarium,” which, because a box has four corners, suffices for the biblical phrase, “four corners of the Earth.” The problems with this depiction are manifest. First, the Book of Enoch is non-canonical and thus it is not giving us a divine description of the heavens and the Earth (assuming that Skiba is even providing us with a correct version of what Enoch described). There was a good reason the early Christian Church rejected Enoch as an inspired book, and that is usually because the internal contents do not agree with what is

known from the inspired books. Even though a reference is made to Enoch in the New Testament book of Jude (1:14-15), this does not necessarily refer to the “book” of Enoch but may simply be a prophecy, inspired by God, that the Enoch of the Old Testament uttered when he was on Earth (*cf.* Gn 5:21-24; Hb 11:5; Sr 44:16; 49:14). Many such prophets in the Old Testament were likewise inspired by God to utter prophecies, but without having a book attached to their name. In fact, Enoch’s prophecy recorded in Jd 1:14-15 is corroborated by such passages as 1Th 3:13 and 4:14.¹⁷⁸ Yet even though this same prophecy is quoted in the Book of Enoch (1:9), it only means that someone commandeered the quote and put it in a book and then called it the “Book of Enoch,” but it does not mean that either that sentence, or anything else in the Book of Enoch, was inspired by God at the time the book was written. It only means that Enoch’s inspired prophecy was already part of the tradition, which was subsequently appropriated by an uninspired author who used it in the Book of Enoch and then proceeded to add all his non-canonical fantasies, which is precisely the way apocryphal and pseudepigraphal books were constructed, that is, by mixing a little truth with a lot of fiction. The bottom line is that no one can cherry-pick from the Book of Enoch to support views that are not corroborated in the canonical books.¹⁷⁹

Second, Skiba has no basis for inventing a “Terrarium,” much less one that must necessarily include the heavens and the Earth into a “heaven-Earth system” so that he can then explain the meaning of the biblical phrase, “the four corners of the Earth.” There simply is no indication in canonical

¹⁷⁸ “...at the coming of our Lord Jesus with all his saints”; “For since we believe that Jesus died and rose again, even so, through Jesus, God will bring with him those who have fallen asleep,” *cf.* 1Co 6:1-2.

¹⁷⁹ For example, the Book of Enoch claims that wicked angels copulated with human females and produced the Nephilim. This is an uncorroborated thesis when compared to the canonical books. Angels are spirits and thus they cannot copulate with humans. Wicked angels can certainly possess humans, but they themselves do not copulate with humans and produce a super-race of humans. The “sons of God” in Genesis 6 simply refers to godly men who were deceived into taking ungodly women as their wives, otherwise known as “mixed marriages.” See, for example, how flat-earthers attempt to use the Book of Enoch to support their views at <https://www.youtube.com/watch?v=xUQaKOWPZEE> for all the other fantasies in the Book of Enoch. Skiba also has his own video on the Nephilim.

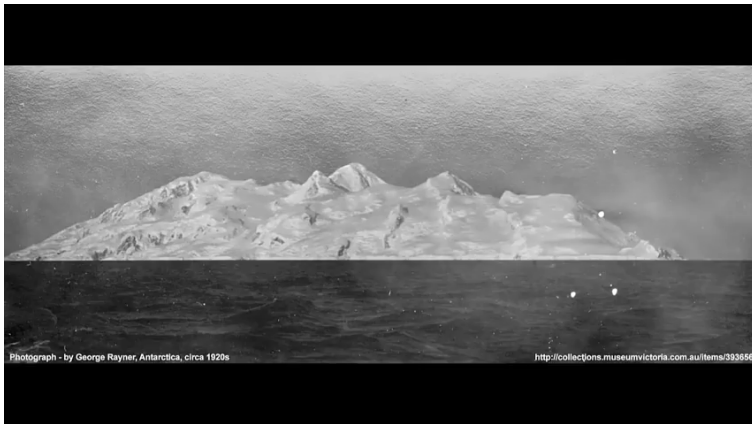
Scripture that the “four corners” include the heavens; rather, the phrase always refers to the Earth, or the land, alone.

Third, as much as Skiba promotes a “dome” over the Earth as the identity of the “firmament,” he never tells us where, precisely, the dome is, or how high it is above the Earth. At one point he suggests the dome might be “plasma 7,200 miles above the Earth,”¹⁸⁰ but never explains how this could be nor makes any other attempts at defining it. In any case, Skiba is forced to make his dome part of the “heaven-Earth system” so that he can use it in his four-sided “Terrarium” so that he can then claim to have literally interpreted the “four corners of the Earth,” even though, literally speaking, Scripture does not refer either to “four corners of the heavens” or “four corners of the heavens-Earth.” Skiba is right about one thing. His interpretation is “pure speculation,” because there is no evidence in the Bible that a Terrarium exists or that it can be referred to as “four corners.” Additionally, it would seem that if the dome of the flat Earth model fits snugly against the so-called 75,000-mile “ice wall” around the disc of the Earth, then it should easily be seen or detected at the outer rim of the ice wall since it would be so close to our viewing depth. Looking for the dome at its peak, according to flat-earththers, is at least 3000 miles above the Earth, but looking for the dome at its extremity – the rim – it could not be more than a few hundred miles from the land, and zero to a few hundred miles on the ice wall itself.



¹⁸⁰ At <https://www.youtube.com/watch?v=rtL0GA-pdC8>, Skiba suggests that the firmament could be something like the plasma modern science has discovered 7200 hundred miles to protect the Earth from electron radiation at the rim of the Van Allen Belts, although Skiba does not explain why the sun, moon and stars are outside this 7200 mile barrier.

If one were to walk or drive on the ice wall away from the land and toward the dome, he would actually bump into the dome at some point. This would seem the easiest way to prove the case for the flat-earthers, but instead of organizing such an expedition, flat-earthers will claim that the world's governments don't want us to see the ice wall and thus prohibit anyone from visiting it. This seems to be a rather convenient way to avoid the problem. Instead, flat-earthers cite a photo taken by George Rayner around 1920 of something that looks like a wall of water behind a huge iceberg as possible evidence of a dome.



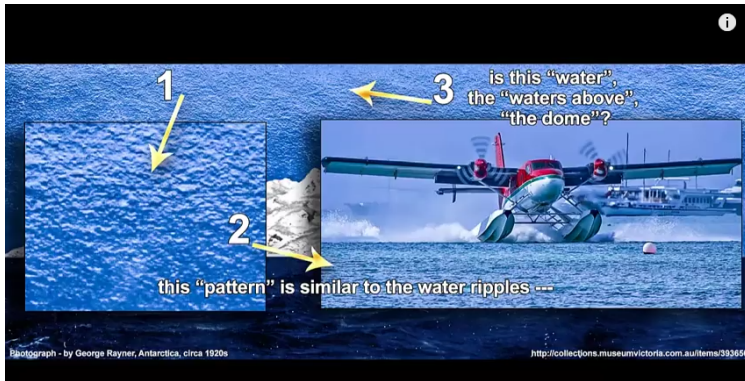
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¹⁸¹ <https://www.youtube.com/watch?v=SUMhvvzIWX6E>, a picture allegedly taken by George Rayner circa 1920 that some flat-earthers suggest is the “dome.”

¹⁸² *Ibid.*, <https://www.youtube.com/watch?v=SUMhvvzIWX6E>, same picture but enhanced with blue dye.



Of course, the minute flat-earthers present evidence for their theory, they take the risk of being scrutinized and falsified, and these pictures are no exceptions to that rule, such as: Why does the alleged dome only rise a few hundred feet above the ice berg and suddenly stop? Why is the ice berg not part of the 75,000-mile ice wall that is claimed to hold in the water of the world's oceans? What atmospheric conditions were taking place that would have produced or contributed to such an image? And most important, if flat-earthers claim that the stars are within the dome, why are there no stars in this photo when there should be thousands of them, especially since the flat-earth model must bring up all the southern constellations and place them on the lower extremity of their dome?

¹⁸³ *Ibid.*, <https://www.youtube.com/watch?v=SUMhvzIWX6E>, allegedly the ship of George Rayner.

In any case, from an analysis of the biblical usage of the phrase “four corners” we can understand why its authors used such language even though at certain times there were no literal corners in view. On the one hand, four corners is literally applicable in instances when a four-sided figure is in view. For example, the ark of the covenant was a rectangular box which obviously had four corners at its base. At each of the four corners a ring of gold was mounted so that poles could be run through the rings and was thus able to be carried by four men (Ex 37:1-5).



At other times, “corners” (*paat*, פֶּאֶת) referred to the side of a structure. For example, Ex 26:18 says: “You shall make the frames for the tabernacle: twenty frames for the south *side*.”¹⁸⁴ The same understanding is seen throughout Ezekiel 45-48.¹⁸⁵ In other cases, *paat* is a place on the human head between the side and the top, but it is obviously not a literal corner but a curved sharp, as in Lv 13:41: “And if a man’s hair has fallen from his *forehead and temples*, he has baldness of the forehead but he is clean.” The word *paat* is also applied to things that are irregular in shape, such as a man’s beard, as in Lv 19:27: “You shall not round off the hair on your temples or mar the *edges* of your beard.” In another case, *paat* is used for either an irregularly shaped region or a quarter slice of land as if the land were cut into four pie slices, and is distinguished from the actual border or side, as in Nm 34:3: “your *south quarter* shall be from the wilderness of Zin along the side of Edom, and your southern boundary shall be from the end

¹⁸⁴ See also Ex 26:20; 27:9, 11, 12, 13; 36:23; 38:9-13.

¹⁸⁵ Cf. Ez 45:7; 47:15-20; 48:1-33.

of the Salt Sea on the east,” or Js 15:5: “And the boundary on the north *quarter* runs from the bay of the sea at the mouth of the Jordan.”

The conclusion of these uses of the Hebrew *paat* is that it can mean various things in various contexts. Often it refers to literal corners, but in other cases it refers to the intersection of two irregularly shaped regions or to the general region going towards one of the four compass points (e.g., north, east, south or west). In other words, it does not always refer to a literal 90-degree angle intersection.

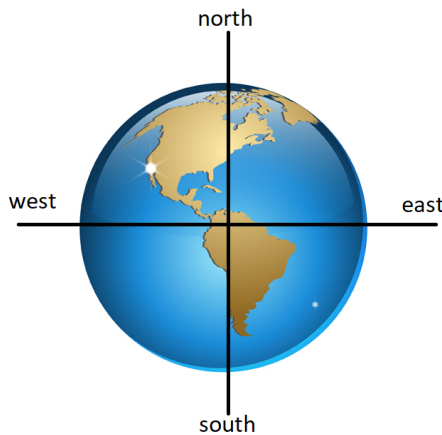
The variance of meaning in the word is also accentuated by the instances in which it refers to the corners of the “land” rather than corners of the “Earth.” For example, Ez 7:2 says, “The end has come upon the four corners of the land” (RSV).¹⁸⁶ The reason this happens is that the word “land” and “Earth” are the same Hebrew word, אֶרֶץ (pronounced: *er-ets*). The reason is that Hebrew did not have a separate word for “Earth” as a body in space. This means that the context will determine whether the Earth as a globe, or the land as a parcel of its geography, is in view. Accordingly, the reason we translate Is 40:22 as “circle of the earth” instead of “circle of the land” is because the context tells us that God is looking from overhead, and since the Earth is a globe, God sees it as a circular shape, as opposed to designated portions of land on Earth that are invariably irregular in shape. Still, when Scripture wants to bring into view the whole “land” of a particular region, even when the region is irregular in shape, it will refer to it as “the four corners” since that is the easiest geometric way to include the whole region in view. This method coincides with the way Scripture uses the four compass points, north, east, south and west.¹⁸⁷ It is the most accurate and convenient way to designate the center, since if lines are drawn from one corner to the opposite corner, all four lines will converge only at the center

¹⁸⁶ The same translation appears in: ASV, KJV, DR, NAB, NAS, NIV, NRS, *et al.*

¹⁸⁷ E.g., Gn 28:14: “and your offspring shall be like the dust of the earth, and you shall spread abroad to the west and to the east and to the north and to the south”; Dt 3:27: “Go up to the top of Pisgah and look around you to the west, to the north, to the south, and to the east”; Ps 107:3: “and gathered in from the lands, from the east and from the west, from the north and from the south”; Lk 13:29: “Then people will come from east and west, from north and south, and will eat in the kingdom of God.”

of the land mass in consideration, whether that land mass is irregular in shape, is a square, rectangle or a circle.

On a sphere, if a line is drawn to form its diameter, another line can be drawn orthogonally through the center of the diameter to connect the points on the sphere that are 90 degrees apart. In other words, these two lines would point toward the north and the south, and the east and the west, respectively. Since as we noted earlier that Hebrew had no word for “sphere,” then referring to the “four corners of the Earth” would be the closest means it had to envisioning a sphere, just as the “four corners” of an irregularly shaped piece of land would intend to encompass the whole land. It is no surprise that “four corners of the Earth” has become the colloquial means of referring to the whole globe of the Earth even in today’s modern languages.



There are also biblical passages that speak of the “ends of the Earth”:

- “And the Lord will scatter you among all peoples, from *one end of the earth* to the other” (Dt 28:64)
- “he shall push the peoples, all of them, to the *ends of the earth*; such are the ten thousands of Ephraim” (Dt 33:17)
- “The Lord will judge the *ends of the earth*” (1Sm 2:10)
- “For he looks to the *ends of the earth*, and sees everything under the heavens” (Jb 28:24)
- “...that it might take hold of the *skirts of the earth*, and the wicked be shaken out of it” (Jb 38:13)

- “yet their voice goes out through all the earth, and their words to the *end of the world*. In them he has set a tent for the sun, which comes forth like a bridegroom leaving his chamber, and like a strong man runs its course with joy. Its rising is from the end of the heavens, and its circuit to the end of them; and there is nothing hid from its heat” (Ps 19:4-6)
- “All the *ends of the earth* shall remember and turn to the Lord” (Ps 22:27)
- “He makes wars cease to the *end of the earth*” (Ps 46:9)
- “As thy name, O God, so thy praise reaches to the *ends of the earth*” (Ps 48:10)
- “...that men may know that God rules over Jacob to the *ends of the earth*” (Ps 59:13)
- “from the *end of the earth* I call to thee” (Ps 61:2)
- “O God of our salvation, who art the hope of all the *ends of the earth*, and of the farthest seas” (Ps 65:5)
- “let all the *ends of the earth* fear him!” (Ps 67:7)
- “...and from the River to the *ends of the earth*!” (Ps 72:8)
- “she came from the *ends of the earth* to hear the wisdom of Solomon” (Mt 12:42)
- “Their voice has gone out to all the earth, and their words to the *ends of the world*.” (Rom 10:18)

Once again, since there is no convenient way to refer to the extremities of a sphere except to refer in general to its circumference, Scripture will do what common sense and colloquial language will allow, which is to segment a sphere into portions by drawing lines within it. Since lines have ends, the Scripture will use those ends as its reference points. As the diameter of a sphere has two end points and those end points would be the extent of the circumference of the sphere, Scripture will use those end points to refer to the extremities of the sphere. As we noted previously, however, it is also possible that “ends of the Earth” is referring to “ends of the land,” which, in the case of many of the biblical lands in view, it would be referring to the designated boundaries given to that land by its human possessors.

The Foundations of the Earth

The Bible also speaks of the “the foundation of the earth,”¹⁸⁸ and the “pillars of the earth.”¹⁸⁹

Job 38:4 shows that the foundation of the Earth is a complicated structure with precise measurements that are unfathomable to Job.

⁴ Where were you when I *laid the foundation* of the earth? Tell me, if you have understanding. ⁵Who determined its measurements, surely you know! Or who stretched the line upon it? ⁶On what were its *bases* sunk, or who laid its cornerstone.

The words “laid the foundation” in Jb 38:4 is a Hebrew verb for “I founded” or “I established” (בִּסְדֵּי) in the qal infinitive construct with “earth,” and thus does not refer to the material of a “foundation.” The word “bases” is the Hebrew plural אֲדָנִיָּה (*eh-da-ney-ha*) from the singular noun אֶדֶן (*eh-den*) referring to a foundation or base, but God’s remark implies that even the base should have something to rest upon. These are terms that would be familiar to anyone adept at building a large structure.

The root of בִּסְדֵּי is סָדַד, appearing in connection with the Earth:

- Ps 24:2: “for he has founded it [the Earth] upon the seas, and established it upon the rivers.”
- Ps 78:69: “He built his sanctuary like the high heavens, like the earth, which he has founded for ever.”
- Ps 89:11: “The heavens are thine, the earth also is thine; the world and all that is in it, thou hast founded them.”
- Ps 102:25: “Of old thou didst lay the foundation of the earth, and the heavens are the work of thy hands.”
- Ps 104:5: “Thou didst set the earth on its foundations, so that it should never be shaken.”¹⁹⁰

¹⁸⁸ E.g., 2Sm 22:16; Ps 18:15; 102:25; Pr 8:27-29; Is 48:13; Jn 17:24.

¹⁸⁹ E.g., 1Sm 2:8; Jb 9:6; 38:4-6.

¹⁹⁰ The rest of the context is also important: “⁶ Thou didst cover it with the deep as with a garment; the waters stood above the mountains. ⁷ At thy rebuke they fled; at the sound of thy thunder they took to flight. ⁸ The mountains rose, the valleys sank down to the place which thou didst appoint for them. ⁹ Thou didst set a bound which

- Pr 3:19: “The Lord by wisdom founded the earth; by understanding he established the heavens”
- Is 48:13: “My hand laid the foundation of the earth, and my right hand spread out the heavens; when I call to them, they stand forth together.”
- Is 51:16: “stretching out the heavens and laying the foundations of the earth, and saying to Zion, ‘You are my people.’”
- Am 9:6: “who builds his upper chambers in the heavens, and founds his vault upon the earth; who calls for the waters of the sea, and pours them out upon the surface of the earth – the Lord is his name.”
- Zc 12:1: “Thus says the Lord, who stretched out the heavens and founded the earth and formed the spirit of man within him”

In 2Sm 22:16, “Then the channels of the sea were seen, the *foundations of the world* were laid bare, at the rebuke of the Lord, at the blast of the breath of his nostrils,” the phrase “foundations of the world” is the Hebrew תבֿל מוֹסְדִית (*mo-se-dot te-bel*), and similar to מוֹסְדִיה (*mo-sa-dah*).

The Hebrew מוֹסְדִית (*mo-se-dot*) appears 13 times:

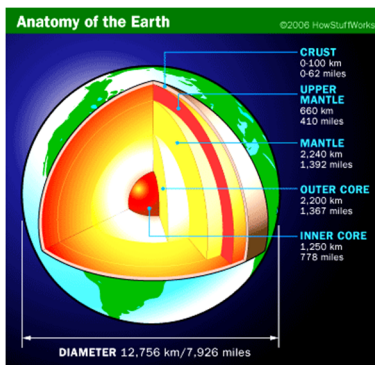
- Dt 32:22: “the foundations of the mountains”
- 2Sm 22:8: “the foundations of the heavens moved”
- 2Sm 22:16: “the foundations of the world were laid bare”
- Ps 18:7: “the foundations of the mountains trembled”
- Ps 18:16: “the foundations of the world were laid bare”
- Ps 82:5: “all the foundations of the earth are shaken”
- Pro 8:29: “when he marked out the foundations of the earth”
- Is 24:18: “the foundations of the earth tremble”
- Is 40:21: “from the foundations of the earth”
- Is 58:12: “raise up the foundations of many generations”
- Jr 31:37: “and if the foundations of the earth can be explored”
- Jr 51:26: “no stone for a foundation”
- Mi 6:2: “you enduring foundations of the earth”

The Hebrew מוֹסְדִיה (*mo-sa-dah*) appears twice:

- Is 30:32: “stroke [ordaining, appointed] of the staff”
- Ez 41:8: “the foundations of the side chambers”

they should not pass, so that they might not again cover the earth. ¹⁰ Thou makest springs gush forth in the valleys; they flow between the hills...”

A few of these passages give us clues as to the nature of the Earth's foundations. The largest material objects that are specified to have foundations are the mountains, the heavens, and the Earth. The interesting feature of all these passages is that the Hebrew is always in the plural ("foundations") rather than the singular, strongly suggesting that there are multiple layers to what undergirds these massive structures. Whereas there is normally one foundation for the typical building, it appears there are multiple foundations for the heavens and the Earth, each being laid on top of the other. This is precisely what modern science has discovered about the Earth. It has an inner and outer core, as well as a mantle and a crust, upon which the continents and the oceans rest. There appear to be five layers, one built upon the other, each serving a different purpose.



Layers of the Earth

- **Crust**—Oceanic—Basalt—Very Dense
Continental—Granite—Less Dense
- **Mantle**—Thick slowly flowing rock. Has the property of plasticity (solid that flows like a liquid).
- **Outer Core**—Liquid metal
- **Inner Core**—Solid Iron & Nickel due to intense pressure.

Much of the crust is made up of rock, much of it granite rock, which is one of the hardest structures known, while the mantle is composed of various elements, preponderantly iron and magnesium. This five-layered foundation seems to fit the description in 2Sm 22:16's words: "Then the channels of the sea were seen, the *foundations of the world* were laid bare, at the rebuke of the Lord, at the blast of the breath of his nostrils," since the "channels" of the sea would refer to water currents that are most likely formed by channels carved into the sea bed at its base level, the fifth layer or crust of the Earth.¹⁹¹ Since the passage says the crust could be seen because the

¹⁹¹ Psalm 8:9 has similar language: "whatever passes along the paths of the sea." "Paths" is from the Hebrew **דָּרָג**, used over 60 times in the OT (cf. Ps 1611; 17:4; 25:4; Is 2:3; Jl 2:7; Mi 4:2). Matthew Maury, head of the Depot of Charts and Instruments at the Hydrographic office of the US Navy from 1841-1861, appealed

water was brushed back, this corresponds to the “foundations” being laid bare. When this event occurred we do not know for certain, but it was certainly cataclysmic.

In any case, these layers are hard substances of extreme strength, as Ps 104:5 indicates, “Thou didst set the earth on its foundations, so that it should never be shaken.” The Hebrew word for “foundations” here is the plural **מְכוּיֵנָה** (*me-ko-ney-hah*) from **מִכּוֹן** (*ma-kon*), which refers to an established or long-time settled place.¹⁹²

Scripture also maintains the earth rests motionless in space and is not supported by any material thing, for it “hangs upon nothing” (Job 26:7). This means the “pillars” would apply only to the interior of the Earth, since there is nothing surrounding the Earth that supports it. The “pillars” are found in the following passages:

- “...who shakes the earth out of its place, and its *pillars* tremble” (Job 9:6)
- “When the earth totters, and all its inhabitants, it is I who keep steady its *pillars*” (Ps 75:3).

In these passages, “pillars” is the Hebrew **עֲמֹוד** (*ak-mood*), which appears over 100 times in the Old Testament. It refers to any cylindrical object, which can be composed of either gas, liquid or solid (*e.g.*, fire, mist, smoke, cedar, marble, brass, iron), so that the gas or liquid usages are for display and not for the purposes of support, while the others composed of solids are strictly for support.

As regards the Earth, either the above two passages are using “pillar” as a general term for support, or it is also possible that even as 2Sm 22:16 indicates there are channels in the Earth’s crust which form currents in the ocean, so Jb 9:6 and Ps 75:3 refer to actual pillar-like or cylindrical structures in the Earth’s subterranean layers that hold the Earth together and stabilize it, much like spokes on a wheel support the rim.

to Ps 8:9 as the reason he discovered various ocean currents (*e.g.*, the Gulf stream, which is 40 miles wide and 2000 feet deep).

¹⁹² Appearing 17 times in the Old Testament, *e.g.*, Ex 15:17; 1Kg 8:13, 39, 43, 49; Er 2:68; Ps 33:14; Ps 97:2.

Two other passages that refer to “pillars” are:

- 1Sm 2:8: “For the *pillars* of the earth are the Lords, and on them he has set the world.”
- 1Sm 14:5: “The one crag *rose* on the north in front of Michmash, and the other on the south in front of Geba.”

These two passages use the Hebrew word *מַצֹּק* (*mats-uk*), the only times it is used in the Old Testament. The first passage again confirms the Earth is held together by pillar-shaped structures at subterranean levels. The second passage is more obscure in Hebrew. The RSV’s “crag” refers to a rocky extension from a mountain or other large rocky location. It could be a cliff or ridge that juts out from the main rock. The verse might better be understood as “...one crag jutted out or ‘pillared’ toward the north,” since the crag would be in somewhat of a cylindrical form.

The reason pillars are the best support for the Earth is the same reason that concrete is more stable with interspersed metal rods. In times of stress, the pressure can be circulated within and around the cylindrical rods and allow them to maintain their strength to support the structure. If the stress had to be distributed in a single solid structure, it would crack in order to relieve the pressure and thereby destabilize the whole structure.

In reference to Job 9:6’s remark that the Earth “trembles,” since Scripture insists the Earth does not rotate on an axis or revolve around the sun but rests in the center of the universe, occasions in which a verse speaks of the earth “shaking” or “tottering” refer to the natural occurrences of earthquakes, which originate below the Earth’s surface and break up the land mass to varying degrees. The cylindrical pillars would remain stable while the looser mass around them crumbles and reforms.

The shaking of the Earth refers to its land mass, since the Hebrew word is *עֵרֶץ* (*erets*), which can refer to “land” or “Earth.” This is confirmed by the fact that it is the “pillars” of the Earth that are specifically stated as “trembling.” But if one were to insist that *erets* refers to the whole Earth, this would only strengthen the geocentric argument, since in order for the whole Earth to be shaken out of its place it must have had a place in which it was previously at rest. If the Earth were in orbit and the orbit were disturbed, the appropriate language would be “shaken out of its path” or

“shaken out of its course” not “out of its place.” That biblical “pillars” does not refer to cylindrical mounts outside the Earth (as is often depicted in flat-earth renditions of the Earth’s pillars),¹⁹³ is apparent from the fact that it uses the same Hebrew for “pillars of the heavens,” as in Jb 26:11:

- “The pillars of heavens tremble, and are astounded at his rebuke.”

Although it is possible that the “pillars of heavens” refer to angels since Scripture uses the same Hebrew word for “pillars” in places it is talking about personages who are the leaders of a particular group,¹⁹⁴ this, if true, is secondary to the fact that “pillars” are referring to physical supports for the heavens. Since this verse is the only place in Scripture in which “pillars of the heavens” appears, we are not in a position to be definitive on its exact meaning, but it would seem that the firmament, which is considered a hard substance, would be the likely candidate for this celestial role. The firmness and ubiquity of the firmament acts as its own “pillars” for the entire heavens.

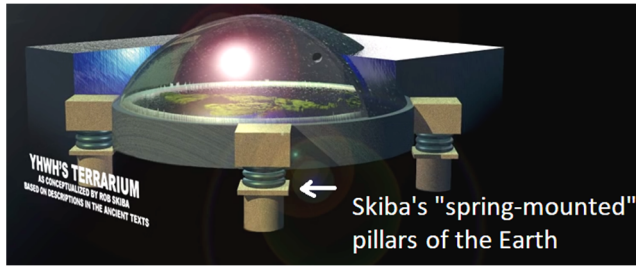
Also important to note is that in such passages as Psalm 75:3 in which the Earth is said to “totter,” this again refers to the Earth’s land mass, not the Earth’s position in space. Although the land mass may totter, ultimately the pillars are held in position and the Earth’s surface remains firm. The Hebrew word for “totters” is מוֹג (moog), which refers mostly to “melting” or some kind of structural weakening.¹⁹⁵ If, for example, the pillars of the Earth were made of granite, they can withstand heat up to 2300 degrees Fahrenheit, which is higher than that of iron, brass, aluminum or lava.

Flat-earth Rob Skiba takes quite a different view of the pillars. The mock-up version he advertises on his Youtube videos is a giant terrarium that rests on four pillars, complete with springs, at the four corners of a square foundation, with a dome over a flat earth resting on the pillars.

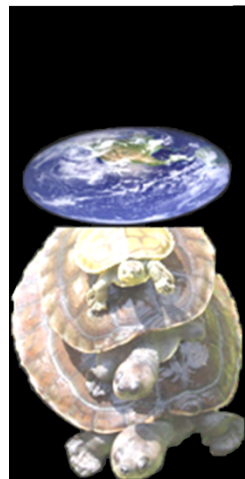
¹⁹³ E.g., Ron Skiba’s has four pillars on springs in his depiction of what supports the flat-earth, calling the whole image, “God’s Terrarium.”

¹⁹⁴ E.g., Is 19:10; Ez 26:11; Gl 2:9.

¹⁹⁵ Hebrew מוֹג (moog), appears 17 times in the Old Testament, mostly as “melt” (e.g., Ex 15:15; Ps 46:6; Am 9:5), sometimes “faint” (e.g., Js 2:9; Jr 49:23). Ps 75:3, a Niphal participle (“when the Earth and its inhabitants are melting...”).



As it stands, since Skiba has the flat earth and firmament resting on four spring-mounted pillars, which then rest on a square-shaped encasement, this begs the question as to what supports the encasement? What is keeping the encasement stable and non-moving? If the earth and firmament are putting weight on the spring pillars, and the pillars are putting weight on the foundation, the foundation must then put weight on something else so that the whole system remains stable and non-moving. Ancient pagan cultures answered this conundrum by appealing to successive turtles holding up the Earth. Of course, the obvious question is: what holds up the bottom turtle? As such, appealing to “pillars that hold up the Earth” is superfluous, since pillars require a foundation.



Skiba might consider Job 26:7's statement: “he hangs the Earth upon nothing,” as supporting evidence for a stable terrarium, but as we will see below, this verse refers only to the Earth, not an edifice that encloses the Earth. It is the Earth, by itself, that hangs upon nothing.

At this point we will take a closer look at the passage in **Job 26:6-10**:

⁶ Sheol is naked before God, and Abaddon has no covering. ⁷ He stretches out the north over the void, and hangs the earth upon nothing. ⁸ He binds up the waters in his thick clouds, and the cloud is not rent under them. ⁹ He covers the face of the moon, and spreads over it his cloud. ¹⁰ He has described a circle upon the face of the waters at the boundary between light and darkness.

These verses are part of the answer that Job gives to Bildad the Shuhite who has accused Job of being unjust and therefore deserving of the calamities that God has allowed to come upon him. Bildad's ending words in Jb 25:4-6 are quite stinging:

⁴ How then can man be righteous before God? How can he who is born of woman be clean? ⁵ Behold, even the moon is not bright and the stars are not clean in his sight; ⁶ how much less man, who is a maggot, and the son of man, who is a worm!

In his opening response, Job affirms God's greatness by remarking on his creative actions. Similar to the Psalms, Job speaks of environmental phenomena in a scientific sense, yet in simple language (*e.g.*, *vr.* 8: water accumulates in clouds and yet the cloud does not tear itself apart or drop from the sky because of its weight). The unique dimension that Scripture gives to these events is that God is behind them all and thus they are not mere brute forces of nature. Where the dividing line between God's action and natural events actually exists is not discussed, however.¹⁹⁶ It is just assumed by both the writer and reader that ultimately God is the cause of all we see in nature.

Verse 7 begins the listing of God's astounding feats by stating that he "stretched out the north over the void." The verb "stretched" is a *qal* participle נָטָה (*natah*) referring to a past action that was in progress at one

¹⁹⁶ See, for example, God's use of the "east wind" in Ex 10:13: "And Moses stretched forth his rod over the land of Egypt, and the Lord brought an east wind upon the land all that day, and all that night; and when it was morning, the east wind brought the locusts" and Ex 14:21: "And Moses stretched out his hand over the sea; and the Lord caused the sea to go back by a strong east wind all that night, and made the sea dry land, and the waters were divided."

time, namely the beginning days of creation in Genesis 1:1-2. The word “north” is the normal Hebrew word appearing 38 times in the Old Testament for צפון (*tsapon*), but it has no article, thus it can serve both as the north direction and as a synecdoche for the heavens, the latter being used here in Job 26:7.¹⁹⁷ It is the firmament that Scripture refers to as being “stretched out,”¹⁹⁸ and thus “the heavens” on Day One (in Gn 1:1: “God created the heavens...”) would be considered a “void” that is filled by the “firmament” on Day Two (Gn 1:6: “Let there be a firmament”) so that the firmament becomes synonymous with the heavens (Gn 1:8: “And God called the firmament, heaven”). As such, the Earth is understood as separate from the north or heavens. While the heavens are stretched out, the Earth is held motionless. Moreover, the Earth is not said to hang in the heavens, rather, it hangs on “nothing.” In fact, Scripture never says that the Earth is in the heavens or is part of the heavens. It is suspended in a neutral position that is not part of the cosmos. This unique position is also immovable, since the word “hangs”¹⁹⁹ denotes that once the Earth is placed in its special position

¹⁹⁷ The Hebrew sentence is: נָטָה (he stretched) צפון (north) עַל־הַדָּוָה (over the void). The coupling of “north” and heavens is in Is 14:13: “I will ascend to heaven...in the recesses of the north.” NRSV sees צפון as obscure and transliterates as “Zaphon”; NIV has “the northern skies”; REB has “canopy of the skies”

¹⁹⁸ Jb 9:8: “who alone stretched out the heavens”; Ps 104:2: “he stretched out the heavens like a tent”; Is 42:5: “who created the heavens and stretched them out”; Is 45:12: “it was my hands that stretched out the heavens” (see also Is 40:22; 51:13; Jr 10:12; 51:15; Zc 12:1).

¹⁹⁹ “hangs”: Hebrew: תָּלָה (*talah*) qal participle representing a continuing action. It is commonly used when something is hung on an anchor or peg (*cf.* Is 44:23-24; Ez 15:3). It seems the grammatical form of Jb 26:7 shows God continually working to keep the Earth immobile, but not on a peg, but on “nothing,” which is the common Hebrew word בִּלְיָ (*beli*) meaning “without,” combined in construct form with the indefinite pronoun מָה (*mah*), meaning “anything” or “aught,” that is “without anything” holding it. Some object that the Hebrews did not have a concept of “empty space” and that it would be wrong to understand “nothing” as such, but this assumes that God inspired Scripture without once going beyond what the Hebrews conceived, which is certainly not true. “Nothing” in Jb 26:7 simply means that the Earth has no visible or physical supports as do other things that hang on something physical. Since gravitational and inertial forces are not visible or physical in common parlance, they serve well to portray what Jb 26:7 is describing, regardless whether the Hebrews understood them.

it remains there by God's constant vigilance. Something in orbit does not "hang"; rather, it moves from place to place.

Other Biblical Verses Flat-Earthers Use

Matthew 4:8: Again, the devil took him to a very high mountain, and showed him all the kingdoms of the world and the glory of them.

Luke 4:5: And the devil took him up, and showed him all the kingdoms of the world in a moment of time.



Flat-earthers argue that it would be impossible to show Jesus all the kingdoms of the world if the Earth were spherical. But the same logic would be true for a flat Earth, since with the unaided eye, even on a very high mountain, Jesus would only be able to see for a few hundred miles, not the whole 24,000 mile diameter of a flat Earth. This is because the low visibility factor due to the density of the Earth's atmosphere will severely limit how far a human can see, not to mention that, compared to birds such as eagles, hawks and falcons who have eyes that can see much farther, the human eye is on the lower end of the scale.²⁰¹ Of course, a flat-earther might claim that

²⁰⁰ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 49:39, produced by the film, "The Global Lie Flat Earth Revelation Documentary."

²⁰¹ The eagle eye is among the strongest in the animal kingdom, with an eyesight estimated at 4 to 8 times stronger than that of the average human. An eagle is said to be able to spot a rabbit 3.2 km away. Although an eagle may only weigh 10 pounds (4.5 kg), its eyes are roughly the same size as those of a human. As the eagle

Jesus used His divine power to increase his vision, but if such was the case, He could also use it to see around a round Earth. Likewise, if the devil was using some preternatural power to bring all the kingdoms of the Earth into view, he could do the same thing on a globe Earth. Once one enters into the area of supernatural capabilities, both the flat Earth and the globe Earth can be made to fit into the phenomena.

Hence, if we remain with the text's implied circumstance of natural human ability and natural eyesight, we find that while Matthew's version uses the Greek *πάσας τὰς βασιλείας τοῦ κόσμου* ("all the kingdoms of the world"), Luke uses *πάσας τὰς βασιλείας τῆς οἰκουμένης* ("all the kingdoms of habitation") thus neither evangelist refers to the Earth (γῆ) specifically.

Since *κόσμος* can refer either to the Earth, the earthly system²⁰² or the whole creation, including the universe,²⁰³ Jesus could be viewing something as large as the whole starry universe or to something as small as the world of Jewry surrounding Jerusalem and its environs. Since Luke uses *οἰκουμένης* (a combination of *οἶκος* = house, dwelling; and *μένω* = abide) it refers specifically to the inhabited portion of whatever location is in view.²⁰⁴

As such, Luke's meaning is "all the kingdoms inhabited in his line of sight at that point in time,"²⁰⁵ and thus not the whole Earth, and thus neither the flat Earth nor the curved Earth model are contradicted. The region Jesus sees, of course, would be as far as Jesus could see towards the four compass points. If the mountain were 10,000 feet high and a mountain in the next kingdom were also 10,000 feet high, Jesus could only see about 225 miles, without the aid of refraction, before the curvature of the Earth would begin to obscure the mountain.

descends from the sky to attack its prey, the muscles in the eyes continuously adjust the curvature of the eyeballs to maintain sharp focus and accurate perception throughout the approach and attack (Grambo, Rebecca L., December 14, 2003), *Eagles*, Voyageur Press. p. 11, taken from Wikipedia).

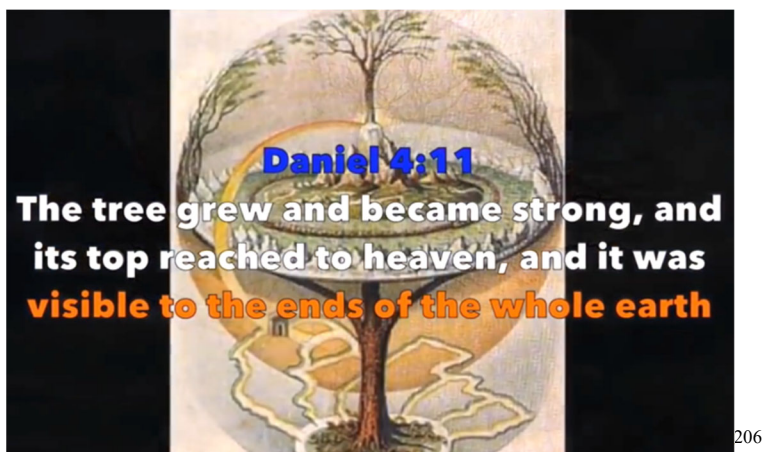
²⁰² Jn 17:12; Rm 1:8.

²⁰³ Ac 17:24; Ep 1:4; Rm 1:20.

²⁰⁴ Lk 2:1; Ac 11:28

²⁰⁵ Thus interpreting *ἐν στιγμῇ χρόνου* as "at that point in time" instead of "in a moment of time."

Daniel 4:10: The visions of my head as I lay in bed were these: I saw, and behold, a tree in the midst of the earth; and its height was great...



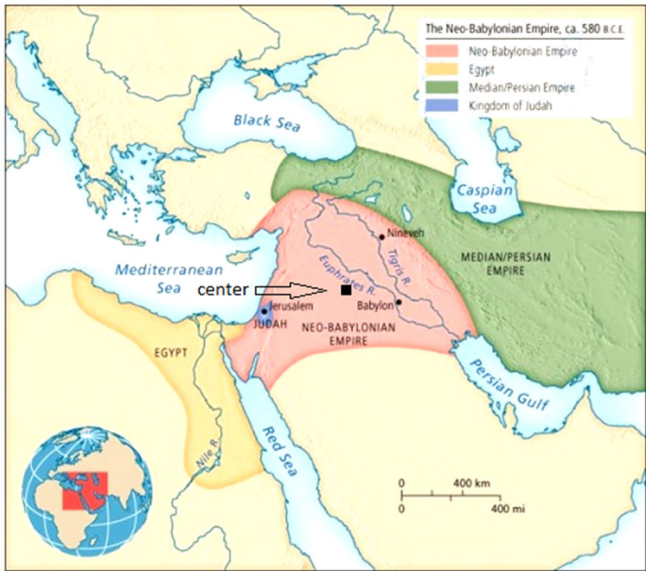
Flat-earthers appeal to Daniel 4:10 since it appears the only way to see the whole Earth from a very high tree is if the Earth is flat. Let's see if that is the case. First, although some translations ascribe this statement to verse 10 (KJV, RSV, NAS, NIV), it is actually in verse 7 (DR, NAB, NJB) of the Hebrew text: **שָׁנִיָּא** (great) **וְרֹמְמָהּ** (height) **אֶרֶצָא** (earth) **בְּגֹוֹא** (middle) **אֵילָן** (tree). The fact that this scene is a dream Daniel is having, shows that it is symbolic, not literal. The meaning of the symbolism is given in *vrs.* 20-22:

²⁰ The tree you saw, which grew and became strong, so that its top reached to heaven, and it was visible to the end of the whole earth; ²¹ whose leaves were fair and its fruit abundant, and in which was food for all; under which beasts of the field found shade, and in whose branches the birds of the air dwelt – ²² it is you, O king, who have grown and become strong. Your greatness has grown and reaches to heaven, and your dominion to the ends of the earth.

But even if we were to literalize Daniel's dream, it fits within a spherical Earth model. The approximate radius of the Babylonian empire in 580 BC

²⁰⁶ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 49:58, produced by the film, "The Global Lie Flat Earth Revelation Documentary."

was 500 miles from its center point. The map of Babylon below shows its approximate center.



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If, from the center of Babylon, the top of the tree reached to the stratosphere (40 miles high), the observer on the top of the tree could easily see the whole kingdom of Babylon, as noted by our distance calculator.

Calculator of Earth's curvature and horizon

РусскийEnglishMetricImperial

Distance between observer and the target [miles]

550

Observer height [ft]

211200

Target height [ft]

6

Earth radius [miles]

3958.76

Changing unit system does NOT convert your input numbers, but Earth radius. I.e. if you input 15 meters and you change unit system, it will be 15 feet.

Common Info

Central angle between observer and target, COZ [radian / degree]

0.13893239/7.96023975

Depth to chord, GP [ft]

50412.0807

Chord length, CZ [miles]

549.55776420

Visible horizon drop [degree]

8.110882

Horizon drop height, FB/DB [ft]

211907.9756/423107.9756

Target drop height, NZ/KZ [ft]

201405.154522/412605.154522

*Polar refraction can not be predicted or calculated properly. Thus, its calculation is just an example. You can't get a real result. If we have a severe polar refraction, the target can be lifted above true horizon and can be observed from hundreds kilometers.

Red values in the top table depend on observer's height

Refraction is in the lower table and has a caption like: "Weak 1.07, Standart 7/6..."

Calculate

Title	No refraction	Weak 1.07	Standart 7/6	Intense 4/3	Severe 1.5	Polar 70/20*
Visible horizon, AB [miles]	564.1821	583.4985	609.1675	651.0519	690.4000	1053.5915
Target max visible distance [miles]	567.1816	586.6013	612.4073	654.5155	694.0737	1059.2031
Hidden part, ZW [ft]	-	-	-	-	-	-
Visible part, HW [ft]	-	-	-	-	-	-
Additional info	No hidden part	No hidden part	No hidden part	No hidden part	No hidden part	No hidden part

Since Daniel's phrases must refer to the whole land of Babylon ("and it was visible to the end of the whole earth [land]...Your greatness has grown and

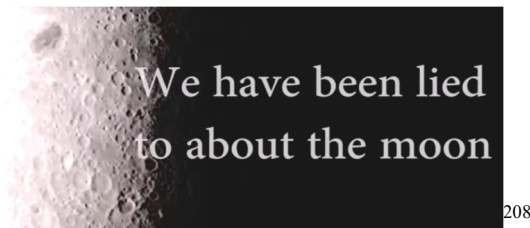
²⁰⁷ <https://www.tumblr.com/search/babylonian%20map>

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reaches to heaven [stratosphere], and your dominion to the ends of the earth [land]”), then Daniel’s vision fits in precisely with what would be seen on a spherical Earth, upon which Nebuchadnezzar’s kingdom rested.

Isaiah 13:10: For the stars of the heavens and their constellations will not give their light; the sun will be dark at its rising and the moon will not shed its light.

Irrespective of any symbolic meaning attached to this verse, the fact remains that at the end of the world, all the celestial bodies will be destroyed. The phrase in question is “the moon will not shed its light,” which implies the moon has its own light. The flat-earthers need a self-lit moon because their sun is very small and it acts like a spotlight so that it only sheds light downward upon a specific part of the Earth so that the rest of the Earth will be either in twilight or darkness. As such, the moon, far away from the Sun at times, would not be in the light cone of the sun, and therefore it would need its own light so that we could see it on Earth at night. Of course, if the moon had its own light, then from where are the shadows on the lunar surface originating (as we see below), if, as they claim, “we have been lied to about the moon”?

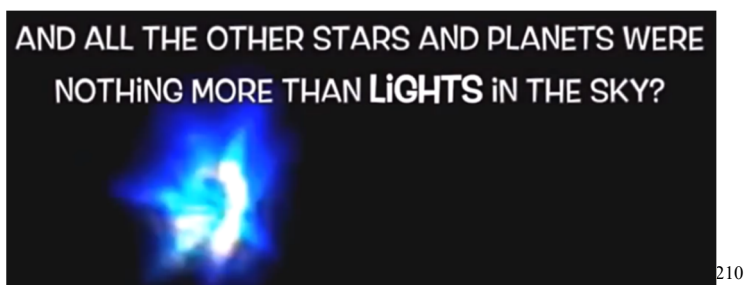


Rob Skiba and a commentator see it this way:

Skiba: Now we’re all told that the moon is a reflector of the sun. How does that work! – if the moon is literally giving off cold light that’s warmer in the shadows cast by the moon light. I don’t know. I’m still asking questions. What if there was a circular light inside the moon, and the moon is hollow and the moon has somewhat of a semitransparent, opaque, exterior? A light from the sun is very different than the light from the moon.

²⁰⁸ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 1:14:29

Commentator: The moon gives off her own light. You’ve heard me correctly. The moon gives off her own light and does not reflect the light of the sun, as ‘science falsely so called’²⁰⁹ claims, as NASA claims, and as most people claim. The Lord Jesus Christ, in the Gospel of Matthew, makes this very clear. Matthew 24:29: “Immediately after the tribulation of those days shall the sun shall be darkened and the moon shall not give her light and the stars shall fall from heaven, and the powers of the heavens shall be shaken.”



The problem is, however, that the Hebrew does not state or imply that the moon has its own light. The Hebrew of Isaiah 13:10 (right to left), is:

וְיָרָח (the moon) לֹא־יִגִּיד (not be caused; not reflect) אֹרֶךְ (its light).

²⁰⁹ A phrase taken from the King James Bible at 1Tm 6:20: “O Timothy, keep that which is committed to thy trust, avoiding profane and vain babblings, and oppositions of science falsely so called.”

²¹⁰ [youtube.com/watch?v=sEH2jz8PKfQ](https://www.youtube.com/watch?v=sEH2jz8PKfQ)?autoplay=true, at 1:09:36. Following his own logic, this “commentator” then says at 1:16:11: “We have been lied to about the moon, that it is something physical, something we can land on, when the Bible says it is a light.”

The operative word here is לֹא־יִגִּיחַ, and it is translated “not be caused” (*i.e.*, “not reflect”) because it is in the Hiphil verb form, which refers to a passive cause, not an active event. The same Hiphil form appears two other times for this verb, and the wording is very similar.

Ps 18:29: “Yea, thou dost light my lamp; the Lord my God lightens my darkness.”

2Sm 22:29: “Yea, thou art my lamp, O Lord, and my God lightens my darkness.”

We will translate the second clause (right to left):

יְהוָה (Yahovah) אֱלֹהֵי (Elohim) יִגִּיחַ (will make light) הַשְּׁעִי (my darkness)

We see that the object is already “dark” (as the moon is on the side that does not capture the sun’s light) and then “light” is cast upon it to make it radiate light (as the moon does on the side facing the sun). In other words, the light from Yahovah is causing the light to be reflected to the person who was formerly without light. We know this since the Hebrew verb, נָגַח, is used in the Hiphil verb form above, יִגִּיחַ, which means a source *causes* light to be given to an object.

Matthew 24:29: Immediately after the tribulation of those days the sun will be darkened, and the moon will not give its light, and the stars will fall from heaven, and the powers of the heavens will be shaken.

Mark 13:24-25: But in those days, after that tribulation, the sun will be darkened, and the moon will not give its light, and the stars will be falling from heaven, and the powers in the heavens will be shaken.

Since we have already exegeted Isaiah 13:10 and found that the moon does not have its own light, we should not expect to find anything different in these two Synoptic passages. Regarding the moon, the Greek of both passages is identical and contains the following:

ἡ	σελήνη	σὺ	δώσει	τὸ	φέγγος	αὐτῆς.
the	moon	not	will give	the	light	of her.

The outstanding feature of these two passages is that both use a word for “light” that is not normal in Greek. The word is *φέγγος* (pronounced: *fengos*). It only appears three times in the New Testament, the third being Luke 11:33 in the sentence: “No one after lighting a lamp puts it in a cellar or under a bushel, but on a stand, that those who enter may see the light (*φέγγος*).” The more normal word in Greek for “light” is *φῶς*, appearing 64 times, in addition to its derivatives (*φωστήρ*, *φωτισμός*, *φωτίζω*, *φωτεινός*). Since *φέγγος* does not include the root *φῶς*, it denotes an additional nuance. *Φέγγος* was used in contexts depicting the splendor or radiance that comes from light rather than light as an independent source of energy, following closely with its verbal form, *φέγω*: “to make bright, shine, gleam, be bright.”²¹¹ As one would polish a silver spoon or a chrome bumper so that the light would reflect more brilliantly, such is the idea behind the choice of *φέγγος* rather than *φῶς* for these two apocalyptic verses, which make them in perfect accord with Isaiah 13:10.

Four Angels Standing on the Four Corners of the Earth

Apocalypse 7:1: After this I saw four angels standing at the four corners of the earth, holding back the four winds of the earth, that no wind might blow on earth or sea or against any tree.

A good portion of the biblical verses that flat-earthers use to support a flat Earth come from the Apocalypse (Revelation) of St. John. The reason is that much of John’s phraseology uses one particular number that seems to fit the flat Earth model. For example, they often commandeer John’s frequent use of the number “four” since in many flat Earth models the flat disc of the Earth is circumscribed by a square-shaped structure that has four literal corners, such as the one below. This model allows them to accommodate the language of Ap 7:1 on a literal level since John speaks of “four corners,” with “four angels” upon the corners, and “four winds” that come from the direction of the “four corners.” But the problems with this model are numerous.

²¹¹ Liddell and Scott, *Greek-English Lexicon*, Oxford University Press, 1977, p. 753, adding that *φέγγος* as a noun means: “light, splendor, lustre.”



First, the Apocalypse is a highly symbolic book. When forced into a literal mold it distorts the book into all kinds of fanciful and even bizarre events.²¹² Since the Apocalypse is mainly in the prophetic genre, most of its language is symbolic, not literal, and this follows the biblical pattern wherein most of its detailed prophetic passages are symbolic. After the first three historical chapters of the Apocalypse (which themselves contain a certain degree of symbolism, especially with regard to the number 7), the book is almost entirely symbolic in its language. The reason is, like parts of Isaiah, Daniel, Ezekiel, Joel, Zechariah, and a few other Old and New Testament books, the material is futuristic, terminating at either the First or Second Coming of Christ. As such, these prophetic books give details of the future that are safe with believers who know how to interpret, teach and protect the information they contain, but would be abused by unbelievers who would use the information for their own gain. This use of symbolism is similar to the reason Jesus said he spoke in parables, that is, to hide information from unbelievers but reveal it to believers.²¹³ In other words, the text is written in symbols to purposely mislead the unbeliever down a proverbial rabbit hole but to give believers the key to understanding history and the future. Hence when the interpreter attempts to force literal events onto symbolic texts (e.g.,

²¹² See my book, *The Apocalypse of St. John*, Queenship Publishing, 2007, 544 pages, ISBN: 1-57918329-8.

²¹³ cf. Mt 13:13-15; Mk 4:34.

the *Council on Foreign Relations* is the 666 of Ap 13:18) he will invariably depart from the intended meaning.

Such is the case when Apocalypse 7:1 speaks of “four” corners, angels and winds. They are all symbolic, especially since these items were things John saw in a vision, as if he were in a dream (see Ap 1:9-20). As our dreams are almost all symbolic images of the realities of life, so are John’s visions, and the use of the first twelve cardinal numbers is one of the more frequent symbols used in the Apocalypse. They appear 230 times, which is remarkably high for even a symbolic text, much more one that is only 22 chapters long. The breakdown is as follows:

Number	Frequency
1	36
2	14
3	32
4	33
5	7
6	8
7	60
8	2
9	1
10	12
11	1
12	24
Total	230

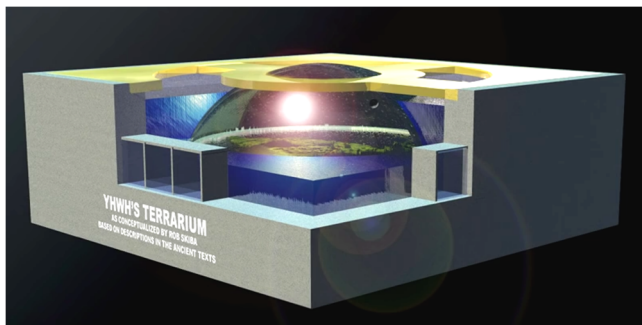
As we can see, the number “four” appears 33 times. It is applied to such things as elders, beasts, angels, winds, people, quarters, corners, cubits, seals, parts, and gems. The sheer diversity implies that symbolism is highly involved, while the contexts of each passage confirms this fact. In most instances, “four” is used for universality, similar to a synecdoche in which the part stands for the whole. As noted previously, “four corners” refers to all the land in view. Likewise, “four angels” refers to the entire work of the angels for a particular event, and “four winds” refers to all of land which will be involved.

In Ap 7:1, John sees four angels standing at the four corners of the earth. The “four corners” refer to the compass points north, south, east and west. These four angels are holding back four winds, which we assume come from each of the four compass points. We know from Ap 7:2-3 that these four winds are designed to harm the earth (and the sea and the trees) in some manner. But another angel comes up from the east and shouts to the four angels to stand down. These symbols convey to us that God’s judgments are comprehensive (which is denoted by the thrice use of the number “four” (e.g., “four angels,” “four corners,” “four winds”). When they strike, the “four” agents will be directed against the smallest of man’s dwellings and sustenance (e.g., the trees) and to the large places (e.g., earth and sea). In other words, nothing escapes God’s judgment. Not surprisingly, the pinpoint accuracy of God’s judgments against the wicked denotes the same type of divine accuracy in the protection of his elect. If something as small as a “tree” (at least when compared to the earth and sea) is added to the list of things that are in the scope of God’s determinations, the elect can rest assured that nothing in heaven or earth can somehow escape God’s concern. Not even a slight wind rustling the leaves of a tree is hidden from God’s notice. Everything, to the last detail, has been ordered and calculated, and nothing or no one will escape God’s determined plan.²¹⁴

Second, viewing the Earth as a square that contains a circle may help the literalist to suggest a literal interpretation of Ap 7:1-2, but it does a complete injustice to what the same literalist had interpreted regarding “the circle of Earth” in Isaiah 40:22. The verse states: “It is he who sits above the circle of the earth, and its inhabitants are like grasshoppers.” Since God is viewing the Earth as a “circle,” then the Earth cannot be both a square and a circle. It is one or the other, otherwise we have a contradiction. If the Earth is a circle, yet is encased in a square, then God would not be telling the whole truth about the figure he is viewing if he said it was merely a circle. Moreover, phrases such as “the four corners of the Earth” would also be misleading, since if the Earth is defined as a circle in Is 40:22, then it cannot have four literal corners, and thus it could not be square. It could only be

²¹⁴ *The Apocalypse of St. John*, Queenship Publishing, 2007, 544 pages, ISBN: 1-57918329-8, pp. 125-126.

true if the phrase said “the four corners of the Earth’s encasement,” or some similar phraseology.



Rob Skiba attempts to defend the square encasement of a flat circular Earth as a fitting description of Isaiah 40:22 by citing Job 26:10, “He has *described a circle* upon the face of the waters at the boundary between light and darkness” (RSV), or with Proverbs 8:27: “When he established the heavens, I was there, when he *drew a circle* on the face of the deep.” As for Job 26:10, as noted earlier, the entire phrase, “described a circle,” is the single Hebrew word *kag* (כָּגַ), the qal preterite of the more common *kug* (כָּוַ). Since the literal translation of *kag* would be, “He circled upon the face of the waters...” some translations add the word “described” (RSV, NRSV) or “inscribed” (NAS) or “marked” (NAB) to *kag* in order to make it easier to read in English.²¹⁵ Unfortunately, since Skiba does not know Hebrew, he makes the mistake of assuming that the addition of “inscribed” to *kag* in English translations means that God more or less chiseled out a circular Earth inside a square encasement, which then means that Is 40:22 is referring to a squared circle and not a mere circle. As such, Skiba can have his hermeneutical cake and eat it, too, since the goal was to satisfy passages such as Ap 7:1 with a literal interpretation of four angels standing on four corners and at the same time allowing himself to refer to the Earth as a flat circular disc. Suffice it to say, this dichotomous and self-serving exegesis of Scripture is precisely what has caused many to misinterpret Scripture and fall for the flat Earth theory.

²¹⁵ Other translations have: “marked a circle” (NAB); “marks out the horizon” (NIV); “he hath compassed” (KJV); “hath set bounds” (DR).

Proverbs 8:27

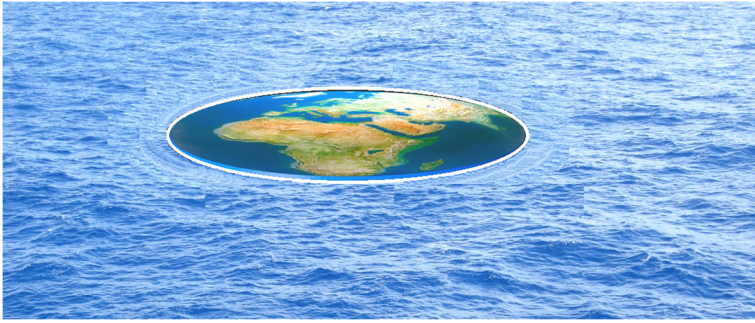
Regarding Pr 8:27, the phrase “drew a circle” is from the Hebrew words כָּוַן בְּחֶקֶל (*bhe-keh-qo kug*). The first word, כָּוַן, is the qal infinitive of חָקַק, prefixed by בּ, which can mean “by” or “in.” The word חָקַק appears 19 times in the verbal form²¹⁶ and twice in the noun form in the Old Testament.²¹⁷

The same form appears two verses later in Pr 8:29 as “when he assigned to the sea its limit, so that the waters might not transgress his command, when *he marked out* the foundations of the earth.” As we can see from its other usages in the Hebrew, it refers, in the main, to an authoritative inscription or something that was designed/decreed in the mind and then portrayed in physical form. As such, this passage will not work for Skiba’s purposes, since what is decreed and inscribed is not on a solid surface but on “the face of the deep.” The “deep” refers to water, not land.

Hence both verses, Pr 8:27 (“when he *drew a circle* on the face of the deep”) and Jb 26:10 (“*described a circle* upon the face of the waters at the boundary between light and darkness”), speak only of putting a circle on “the face” of the water, not by carving out a circle from a square land mass. In the flat Earth model, if the water were inscribed with a circle, it would appear as something like the following:

²¹⁶ In the qal preterite (Is 49:16: “I have *graven* you on the palms of my hands”; Ez 4:1: “take a brick and lay it before you, and *portray* upon it a city, even Jerusalem”); the qal infinitive (Pr 8:29: “when he *marked out* the foundations of the earth”); qal imperative (Is 30:8: “and *inscribe* it in a book”); qal participle poel (Jg 5:9: “My heart *goes out* to the commanders of Israel”; Is 10:1: “Woe to those *who decree*”; 22:16: “and *carve* a habitation for yourself in the rock”); qal participle paul (Ez 23:14: “the Chaldeans *portrayed* in vermilion”); poel future (Pr 8:15: “rulers *decree* what is just”); poel participle (Gn 49:10: “nor the *ruler’s* staff from between his feet”; Nm 21:18: “the *scepter* and with their staves”; Dt 33:21: “for there a *commander’s portion* was reserved”; Jg 5:14: “from Machir marched down the *commanders*”; Ps 60:7: “Judah is my *scepter*”; 108:8: “Judah is my *scepter*”; Is 33:22: “the Lord is our *ruler*”); pual participle (Pr 31:5: “what has *been decreed*”; Jb 19:23: “Oh that they were *inscribed* in a book!”).

²¹⁷ Jg 5:15: “there were great *searchings* of heart”; Is 10:1: “who decree iniquitous *decrees*.”



As opposed to having a circle inscribed on land...



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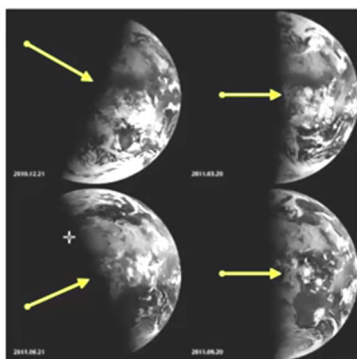
Moreover, since Jb 26:10 says, “He has circled upon the face of the waters at the boundary between light and darkness,” the flat Earth model cannot fulfill this passage since there is no such circle boundary of the Earth between light and darkness. But, as we noted earlier, if God inscribed a circle at the place where light was divided from darkness on the sphere, yet also ran across the face of the waters, He would draw the circle connecting the North Pole to the South pole. In other words, it would be a circle on a sphere. Incidentally, this circle, as all abstract circles, would have no thickness, since there is only a conceptual line between light and darkness.

²¹⁸ <https://www.youtube.com/watch?v=dpY0nscsHzY>, courtesy of Mark Sargent.

The circle would also continue to move and complete its travel in 24 hours. See picture below.

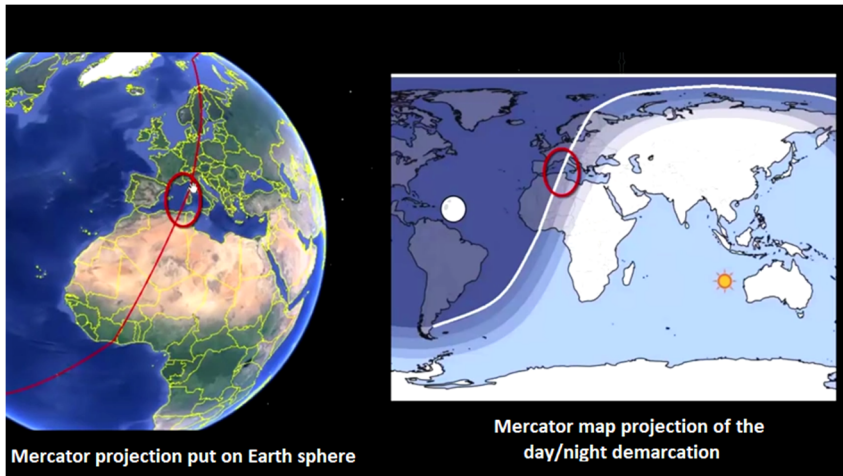


We should pause to mention here that one flat-earther claims the day/night demarcation line of the Earth is not a straight line, although satellite photos depict it as such. Using the demarcation line from a Mercator map and plotting that line on a spherical Earth, he concludes that since the line of the latter is not straight, then the sun cannot be 93 million miles away and must be revolving above a flat Earth at only 3,000 miles high.²¹⁹



Terminator Lines From Satellites ALWAYS shows a 100% STRAIGHT EDGE Between Sunrise and Sunset.

²¹⁹ <https://www.youtube.com/watch?v=2lX-ZslGYrk>, posted Dec. 27, 2015 by MrThriveandSurvive.



The problem, however, is the distortion level of the Mercator. As one source put it:

Although the linear scale is equal in all directions around any point...the Mercator projection distorts the size of objects *as the latitude increases from the Equator to the poles*, where the scale becomes infinite. So, for example, landmasses such as Greenland and Antarctica appear much larger than they actually are relative to land masses near the equator, such as Central Africa.²²⁰

Consequently the Mercator map will cause the day/night line from Africa to South American to bend to the left compared to the straight line going across the Equator in Africa; and also make the line from north Africa through Europe and Scandinavia bend slightly to the right.

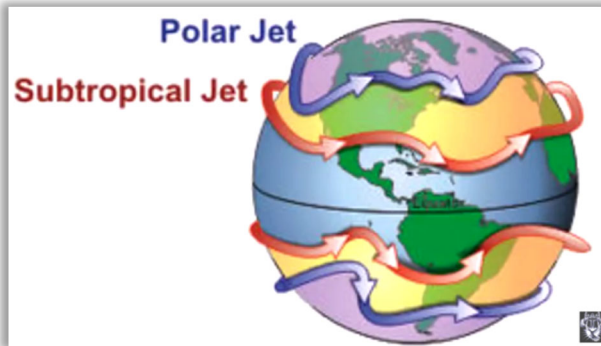
Regarding the “four corners,” another Christian evangelical not only ascribes them to the squared-circle idea, he also tries to literalize the “four winds” of Ap 7:1, as he transcribes the words of the verse on his model. He claims the four winds refers to the four jet streams, citing from Wikipedia that both “the northern and the southern hemisphere have a polar jet and a subtropical jet.”²²¹ He then gives us a picture of what these four winds would

²²⁰ https://en.wikipedia.org/wiki/Mercator_projection

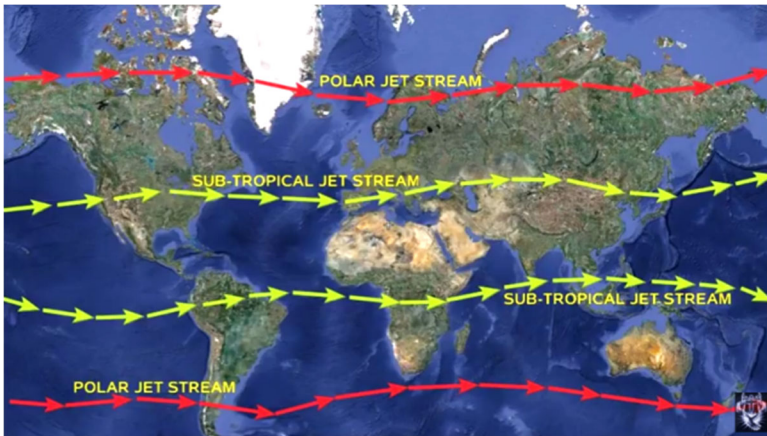
²²¹ <https://www.youtube.com/watch?v=tuqqPS5z3uw>, titled “Jesus Truth,” at 18:57.

appear to be on a globe Earth and compares it to what it would appear to be on a flat Earth, with these words:

This is what it says straight from Wikipedia...that comes to a total of four winds of the Earth just like the Bible states. Here's a picture of what that would look like on the faith globe Earth given to us by science...

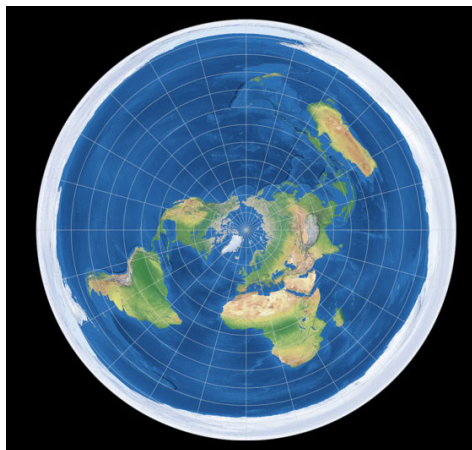


And here is a picture of what it really looks like on a flat Earth given to us by God Almighty.



First, we see the cherry-picking mentality of the typical flat-earthier. For him, it is perfectly acceptable to consult and accept a NASA-backed information site such as Wikipedia when Wikipedia says something that he can mold into his own views. But when Wikipedia speaks about satellites or space probes taking pictures of the Earth that are globes and not anywhere near a flat Earth, he rejects them as pure fabrications.

Second, since he constricts himself to showing a numerical equivalent on Earth of the four winds stipulated in Ap 7:1, he doesn't even consider that he is discounting all the other dozens of wind currents on Earth. Simply because he found the number "four" in the jet stream, this becomes for him the definitive interpretation of how to interpret Ap 7:1.



Third, although he shows diagrams of how the jet streams would appear on either a flat or globe Earth, what value is this information if it shows that, in his view, both models are possible? Along these lines, notice that he doesn't give us either a true or complete map of the flat Earth. Rather, he gives us an Equirectangular version of a globe Earth.²²² But flat-earththers

believe in an azimuthal map, above.

Since that is the case, then his jet streams would need to make a similar circular path around the Earth as he depicts in the globe Earth model, and thus there really is no significant difference. Obviously, there are no literal "corners" on an azimuthal map and thus he not only defeated the whole purpose of his presentation, but he did not give us a map from "God Almighty." The most unfortunate fact is the "Jesus Truth" (who is apparently fearful of giving us his real name and prefers to speak anonymously) may be sincere about his presentation, but the reality is he is sincerely wrong. He ends his video with these fateful words:

That just shows you how powerful brainwashing can be. So, if you are a Christian, then I expect you to believe 100% that we live on a flat Earth. Why? Because the Bible says so.

And so it will be when the flat Earth deception is finally exposed for the falsity it is, many of these Christians will be disillusioned with the Bible that

²²² See Equirectangular at en.wikipedia.org/wiki/List_of_map_projections.

supposedly mislead them, and they will be in a worse situation than they were before, victims of a clever ruse in the art of twisting the truth perpetrated upon them from the principalities and powers of the air.

Another Christian appeals to the same verse (Revelation 7:1) and focuses on the “four corners” and says “...four corners on a spinning globe?”



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Here we will only refer to our previous discussion of the Bible’s use of “four corners.” We will be reminded that a flat circular disc itself does not have four corners, and that efforts to circumscribe a flat disc and dome with a square foundation containing pillars that are outside of the inner structure are presumptuous at best and unbiblical at worst.

²²³ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 49:06, produced by the film, “The Global Lie Flat Earth Revelation Documentary.”

The Bottomless Pit

Apocalypse (Revelation) 20:1

Then I saw an angel coming down from heaven, holding in his hand the key of the bottomless pit and a great chain.



As we noted earlier in regards to Apocalypse 7:1, the same kind of symbolic language appears in Apocalypse 20:1. The mere fact that the RSV put “bottomless” and “pit” in the same sentence tells us immediately that the translators understood the phrase symbolically, since a “pit,” in colloquial parlance, is not bottomless. The phrase “bottomless pit” is a common, although somewhat graphic, translation of the Greek ἄβυσσος, more commonly understood as “abyss.” It appears nine times in the New Testament, but seven of them are in the Apocalypse of John.²²⁵ The other two passages refer only to something that is deep. Luke 8:31, for example, uses ἄβυσσος in reference to a lake into which the demon-possessed pigs were cast by Jesus. Romans 10:7 uses ἄβυσσος in reference to the place in which bodies are buried. Hence these two passages throw a dim light on translating ἄβυσσος as “bottomless pit,” much less will it allow a flat-earthier to use this symbolic passage to teach the Earth is flat. This is why most English translations render ἄβυσσος as “abyss,” while the KJV and

²²⁴ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 48:57, produced by the film, “The Global Lie Flat Earth Revelation Documentary.”

²²⁵ Lk 8:31; Rm 10:7; Ap 9:1, 2, 11; 11:7; 17:8; 20:1-2.

RSV are the only popular translations that render it “bottomless pit.” The reason the majority of Bibles simply transliterate ἄβυσσος to “abyss” is that the exact meaning of the word is ambiguous. In general, it refers to a remote and unseen location that disallows movement and activity (*e.g.*, as in Ap 20:1 in which Satan is chained so that he cannot move about; or as in Rm 10:17 in which a place of burial is one in which the dead are inactive). In the end, it does not refer to a “bottomless pit,” *per se*, and thus there is no recourse for the flat-earthier to claim that the Apostle John is contradicting a globe Earth.

The Skirts of the Earth

Job 38:12-14: Have you commanded the morning since your days began, and caused the dawn to know its place, that it might take hold of the skirts of the earth, and the wicked be shaken out of it? It is changed like clay under the seal, and it is dyed like a garment.

This passage is used to give the impression that, like a seal which is flat and has demarcations on its surface, so the Earth is flat and contains distinguishing features on its land. Suffice it to say, that is not the meaning of the passage. The original Hebrew does not say “It is like clay under the seal,” but “It is changed like clay under the seal” from the following:

תהיה (‘‘it is changed’’) כחמר (‘‘like clay’’) חותם (‘‘a seal’’).



²²⁶ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 47:58, produced by the film, “The Global Lie Flat Earth Revelation Documentary.”

In other words, the clay is changed because a metal casting is pressed into the clay to make an impression. The כ (“like”) before חמר (“clay”) shows that the passage is giving an analogy, while the verb תתהך (“it is changed”) shows that the clay goes from one formation to another. Likewise, the phrase following: לבוש (“a garment”) כמו (“like”) ויתיצבו (“they appear”)²²⁷ is also an analogy since the garment is changed from one color to another. The purpose of the analogy, in line with the context established by verses 12-13, is that as God shakes the wicked from the Earth from day to day, the result is that the Earth is changed as a seal is reformed by its press and a garment is given a new color from a dye. As such, there is nothing in these verses which either explicitly or implicitly regards the Earth as a flat disc. Both analogies refer only to change, not shape.



²²⁷ The word ויתיצבו is a hithpael, third person, masculine, plural, and thus the RVS's “it is dyed” should be pluralized to “they are dyed.” The root is יצב, which means “to stand” in the qal form, but is reflexive in the hithpael, thus leading to the translation “dyed” as the result, but “appear” in the literal sense. See also Ex 19:17; Dt 31:14; Js 24:1; 1Ch 11:14 for other instances of ויתיצבו.

Chapter 3

Patristic Analysis of Spherical v. Flat Earth

Overview of the Church Fathers



The Fathers of the Church, almost to a man, believed and taught the Earth was a sphere.²²⁸ The only person who appears to have explicitly believed and taught a flat Earth as if it were doctrine was **Cosmas Indicopleustes** (c. 550), a Greek merchant who was not considered a Church Father and held no office in the Catholic Church. The only other possibility is **Lactantius** (aka: Lucius Caecilius Firmianus Lactantius), an early Latin Father writing in the early fourth century. Although Lactantius certainly questions the viability of a spherical Earth, this is due only to the issue of the Antipodes and not to any scientific proof or exegetical demonstrations from Scripture that he reveals in his argumentation. Irrespective of his doubts about a spherical Earth, in the end Lactantius never explicitly says that he believes

²²⁸ “Myth 3: That Medieval Christians Taught that the Earth was Flat,” by Lesley Cormack, cited from Ronald Numbers’ *Galileo Goes to Jail and Other Myths About Science and Religion*, Harvard University Press, 2009, pp. 30–31.

the Earth is flat; and never explicitly offers an alternative to compensate for the antipode problem.

Other Fathers who are often cited by flat-earththers as believing and teaching a flat Earth are **Methodius** and **Theophilus**, but the reality is that both these two Fathers never actually say they disagree with a spherical Earth, nor do they ever say they believe and teach a flat Earth. Rather, both Fathers question the Greeks' use of the sphericity of the universe and the Earth due to the Greek penchant to turn them into astrological charts in order to preach fatalism.

In another vein, **John Chrysostom** and **Clement of Alexandria** are sometimes commandeered by flat-earththers due to these Fathers envisioning heaven as a "tabernacle" with a "tent stretched above it," rather than a universal sphere. As we will see, however, neither of these Fathers ever say the Earth is flat; rather, Chrysostom says only that the third heaven is not spherical, while Clement not only says the Earth is spherical but, like many other Fathers, he specifies that the Earth is "in the middle of the universe."

Another case is **Basil of Caesarea** who is also cited by flat-earththers as evidence for their view, but the reality is that in one passage Basil says that he doesn't know the shape of the Earth for certain, and in another passage says the Earth is made of "two hemispheres." In any case, he never says he believes or teaches the Earth is flat.

Jerome is also cited by flat-earththers. In this case, merely because Jerome questions, in his *Commentary on Isaiah*, how a spherical Earth could accommodate the lowering of the waters in Genesis 1, the flat-earththers turn his question into a full-blown support for a flat Earth, in spite of the fact that elsewhere Jerome clearly says the Earth is a sphere. Flat-earththers do a similar bait-and-switch with **Eusebius**.

Although **Serverian** and **Isidore** are sometimes cited as flat-earththers, the evidence is not clear cut, as we shall see later.

Lastly, even the great **Augustine** is sometimes cited by flat-earththers, as is the case with the Augustinian scholar, Leo Ferrari, who in 1970 formed the

Flat Earth Society of Canada (FESC); but even Ferrari admits that Augustine's clear evidence shows he accepted the Earth as a sphere, which forces Ferrari to appeal to a couple of Augustine's more obscure figurative phrases in an attempt to turn the scholarly tide. Suffice it to say, he fails.

The Fathers who taught the Earth is a globe, a sphere, two hemispheres, or a round object (not a disc), some doing so more explicitly than others, are:

- Ambrose
- Arnobius
- Archelaus
- Athanasius
- Augustine
- Basil
- Clement of Alexandria
- Cyril of Jerusalem
- Eusebius
- Gregory of Nyssa
- Gregory Nanzianzus
- Gregory Thaumaturgus
- Irenaeus
- Jerome
- John Damascene
- Venerable Bede

Various Fathers claim that the heavens are not spherical (*i.e.*, the heavens do not go under the Earth), but none of these Fathers ever concede that the Earth is flat, although a flat Earth has been implied by various scholars due to these Fathers' view that the heavens are hemispherical:

- Chrysostom
- Methodius
- Severian of Gabala

Some Fathers question how the Earth could be spherical considering other assumed facts that must be applied first:

- Lactantius
- Theopholis of Antioch

The rest of the prominent Fathers are silent on the issue.

With that summary, we will now begin a more detailed survey of the Church Fathers.

The Consensus of the Fathers: Earth is a Sphere

Ambrose: “They ask us to concede to them that heaven turns on its axis with a swift motion, *while the sphere of the earth remains motionless*, so as to conclude that waters cannot stay above the heavens, because the axis of heaven as it revolved would cause these to flow off. They wish, in fact, that we grant them their premise and that our reply be based on their beliefs. In this way they would avoid the question of the existence of length and breadth in that height and depth, a fact which no one can comprehend except Him who is filled with the fullness of the Godhead, as the Apostle says. For who can easily set himself up to be a judge of God’s work? There exists, therefore, breadth in the very heights of heaven. ...What prevents us, then, from admitting that water is suspended above the heavens? How can they say that the earth, although it is certainly heavier than water, stays suspended and immobile in the middle? Following the same principle, they can admit the water which is above the heavens does not descend because of the rotation of that celestial sphere. Just as the earth is suspended in the void and stays immobile in position, its weight being balanced on every side, in like manner the water, too, is balanced by weights either equal to or greater than that of the earth. For the same reason, the sea does not tend to inundate the land without a special command to do so.”²²⁹

Archelaus: But just as those Orientals have the light rising on them earlier than the people who live in the west, so they have it also more quickly obscured, and they only who are settled in the *middle of the globe see always an equality of light*.²³⁰

Arnobius: For *whatever is round, and bounded on every side by the circumference of a solid sphere*, has no beginning, no end; where there is no end and beginning, no part can have its own name and form the beginning. Therefore, when we say, This is the right, and that the left side, we do not refer to anything in the world, which is everywhere very much the same, but to our own place and position, we being so formed that we speak of some things as on our right hand, of others as on our left; and yet these very things which we name left, and the others which

²²⁹ *Hexaemeron*, Book II, Third Homily, Ch. 3, 9, translated by John J. Savage in *The Fathers of the Church*, ed. Roy Deferrari, 1961, pp. 52-53, available at <https://archive.org/details/fathersofthechur027571mbp>

²³⁰ *Acts of the Disputation with Manes*, 22.

we name right, have in us no continuance, no fixedness, but take their forms from our sides, just as chance, and the accident of the moment, may have placed us. If I look towards the rising sun, the north pole and the north are on my left hand; and if I turn my face there, the west will be on my left, for it will be regarded as behind the sun's back. But, again, if I turn my eyes to the region of the west, the wind and country of the south are now said to be on my left.²³¹

Athanasius: "And again, if what is said of God hold true, namely, that He is almighty, and that while nothing has power over Him, He has power and rule over all, how can they who deify creation fail to see that it does not satisfy this definition of God? *For when the sun is under the earth, the earth's shadow makes his light invisible*, while by day the sun hides the moon by the brilliancy of his light."²³²

Although Athanasius' remark here is subtle, we include it as evidence of his belief in a spherical Earth since what he describes can only occur with a spherical Earth blocking the sun's light. In the flat Earth model, the sun is always over the flat disc and never descends below the flat disc.

Athenagoras: "For if the world, *being made spherical*, is confined within the circles of heaven, and the Creator of the world is above the things created, managing that by His providential care of these, what place is there for the second god, or for the other gods?"²³³

Athenagoras: "Beautiful without doubt is the world, excelling, as well in its magnitude as in the arrangement of its parts, both those in the oblique circle and those about the north, *and also in its spherical form*."²³⁴

Basil: "And God called the light Day and the darkness he called Night." Genesis 1:5 Since the birth of the sun, the light that it diffuses in the air, *when shining on our hemisphere, is day; and the shadow produced by its disappearance is night*. But at that time it was not after the movement of the sun, but following this primitive light spread abroad in the air or

²³¹ Arnobius, *Against the Heathen*, Book 4, para 5.

²³² Athanasius, *Against the Heathen*, Book 1, Part 1, 29.

²³³ *A Plea for the Christians*, Ch. 8: "The Absurdities of Polytheism."

²³⁴ *Ibid.*, Ch. 16: "The Christians Do Not Worship the Universe."

withdrawn in a measure determined by God, that day came and was followed by night.²³⁵

Basil: How does the sun rule by day? Because carrying everywhere light with it, it is no sooner risen above the horizon than it drives away darkness and brings us day. Thus we might, without self deception, *define day as air lighted by the sun, or as the space of time that the sun passes in our hemisphere.*²³⁶

Basil: Those who have written about the nature of the universe have discussed at length *the shape of the earth. If it be spherical or cylindrical, if it resemble a disc and is equally rounded in all parts, or if it has the form of a winnowing basket and is hollow in the middle; all these conjectures have been suggested by cosmographers, each one upsetting that of his predecessor.* It will not lead me to give less importance to the creation of the universe, that the servant of God, Moses, is silent as to shapes; he has not said that the earth is a hundred and eighty thousand furlongs in circumference; he has not measured into what extent of air its shadow projects itself while the sun revolves around it, nor stated how this shadow, casting itself upon the moon, produces eclipses. He has passed over in silence, as useless, all that is unimportant for us.²³⁷

Basil, of course, has a mental lapse when he says that Moses...“has passed over in silence, as useless...” the shape of the Earth or how eclipses are caused, since in the same book Basil elaborates on how eclipses and shadows of the moon are caused by its interaction with the sun (e.g., Book 6). Likewise, since in Books 6 & 9 he refers to the upper half of the Earth that receives daylight as a “hemisphere” (Greek: ἡμισφῆριον), this means he is aware of the other hemisphere that is not receiving light. Since the Greek here is ἡμισφῆριον, (pronounced: *hemis-phrio*) Basil cannot be referring to a disc or a flat Earth.

Cyril of Jerusalem: For according to the extent of universal space, must we reckon the number of its inhabitants. *The whole earth is but as a point in the midst of the one heaven,* and yet contains so great a multitude;

²³⁵ *Hexaemeron*, Homily 2, 8.

²³⁶ *Hexaemeron*, Homily 6, 8.

²³⁷ *Hexaemeron*, Homily 9, 1.

what a multitude must the heaven which encircles it contain? And must not the heaven of heavens contain unimaginable numbers?²³⁸

As such, Cyril's understanding is not an Earth that is flat and wider than a dome above it, but a circular point in the middle of a vast heaven which is a sphere around it.

Gregory Thaumaturgus: "Today is *the whole circle of the earth filled with joy*, since the sojourn of the Holy Spirit has been realized to men. Today the grace of God and the hope of the unseen shine through all wonders transcending imagination, and make the mystery that was kept hidden from eternity plainly discernible to us."²³⁹

Gregory Nanzianzus: And what is it which ever moves him in his circuit, though in his nature stable and immovable, truly unwearied, and the giver and sustainer of life, and all the rest of the titles which the poets justly sing of him, and never resting in his course or his benefits? *How comes he to be the creator of day when above the earth, and of night when below it?* Or whatever may be the right expression when one contemplates the sun? What are the mutual aggressions and concessions of day and night, and their regular irregularities — to use a somewhat strange expression? How comes he to be the maker and divider of the seasons, that come and depart in regular order, and as in a dance interweave with each other, or stand apart by a law of love on the one hand, and of order on the other, and mingle little by little, and steal on their neighbour, just as nights and days do, so as not to give us pain by their suddenness. This will be enough about the sun.²⁴⁰

Gregory of Nyssa: "As, when the sun shines above the earth, the shadow is spread over its lower part, *because its spherical shape makes it impossible for it to be clasped all round at one and the same time by the rays*, and necessarily, on whatever side the sun's rays may fall on some particular point *of the globe*, if we follow a straight diameter, we shall find shadow upon the opposite point, and so, continuously, at the opposite end of the direct line of the rays shadow moves round that globe,

²³⁸ *Catechetical Lectures*, 15, 24.

²³⁹ Four Homilies, First Homily.

²⁴⁰ *Oration* 28, XXX.

keeping pace with the sun, so that equally in their turn both the upper half and the under half of the earth are in light and darkness.²⁴¹

Gregory of Nyssa: “For just as those skilled in astronomy tell us that the whole universe is full of light, and darkness is made to cast its shadow by the interposition of the body formed by the earth; and that this darkness is shut off from the rays of the sun, in the shape of a cone, *according to the figure of the sphere-shaped body*, and behind it; while the sun, exceeding the earth by a size many times as great as its own, enfolding it round about on all sides with its rays, unites at the limit of cone the concurrent streams of light; so that if (to suppose the case) any one had the power of passing beyond the measure to which the shadow extends, he would certainly find himself in light unbroken by darkness.”²⁴²

Gregory of Nyssa: “This is the book of the generation of heaven and earth,” says the Scripture, when all that is seen was finished, and each of the things that are betook itself to its own separate place, when the body of heaven compassed all things round, and those bodies which are heavy and of *downward tendency, the earth and the water, holding each other in, took the middle place of the universe*; while, as a sort of bond and stability for the things that were made, the Divine power and skill was implanted in the growth of things, guiding all things with the reins of a double operation (for it was by rest and motion that it devised the genesis of the things that were not, and the continuance of the things that are), driving around, about the heavy and changeless element contributed by the creation that does not move, as about some fixed path, *the exceedingly rapid motion of the sphere, like a wheel, and preserving the indissolubility of both by their mutual action, as the circling substance by its rapid motion compresses the compact body of the earth round about*, while that which is firm and unyielding, by reason of its unchanging fixedness, continually augments the whirling motion of those things *which revolve round it*, and intensity is produced in equal measure in each of the natures which thus differ in their operation, in the stationary nature, I mean, and in the mobile revolution; *for neither is the*

²⁴¹ *On the Soul and the Resurrection.*

²⁴² *On the Making of Man*, XXI, 3.

earth shifted from its own base, nor does the heaven ever relax in its vehemence, or slacken its motion."²⁴³

Gregory of Nyssa: Our course, then, will once more lie in what is good, by reason of the fact that the nature of evil is bounded by necessary limits. For just as those skilled in astronomy tell us that the whole universe is full of light, and that darkness is made to cast its shadow by the interposition of the body formed by the earth; and that this darkness is shut off from the rays of the sun, in the shape of a cone, according to the figure of the sphere-shaped body, and behind it; while the sun, exceeding the earth by a size many times as great as its own, enfolding it round about on all sides with its rays, unites at the limit of the cone the concurrent streams of light; so that if (to suppose the case) any one had the power of passing beyond the measure to which the shadow extends, he would certainly find himself in light unbroken by darkness.²⁴⁴

Gregory of Nyssa: Well, replied the Teacher, our doctrine will be in no ways injured by such a supposition. For if it is true, what you say, and also *that the vault of heaven prolongs itself so uninterruptedly that it encircles all things with itself, and that the earth and its surroundings are poised in the middle, and that the motion of all the revolving bodies is round this fixed and solid centre*, then, I say, there is an absolute necessity that, whatever may happen to each one of the atoms on the upper side of the earth, the same will happen on the opposite side, seeing that one single substance encompasses its entire bulk. As, when the sun shines above the earth, the shadow is spread over its lower part, because its spherical shape makes it impossible for it to be clasped all round at one and the same time by the rays, and necessarily, *on whatever side the sun's rays may fall on some particular point of the globe*, if we follow a straight diameter, we shall find shadow upon the opposite point, and so, continuously, at the opposite end of the direct line of the rays *shadow moves round that globe, keeping pace with the sun*, so that equally in their turn both the upper half and the under half of the earth are in light and darkness; so, by this analogy, we have reason to be certain that, whatever in our hemisphere is observed to befall the atoms, the same will befall them in that other.²⁴⁵

²⁴³ *On the Making of Man*, 1, 1.

²⁴⁴ *On the Making of Man*, 21, 3.

²⁴⁵ *On the Soul and Resurrection*.

Irenaeus: affirming that He, who has made His angels spirits, and is clothed with light as with a garment, and holds the circle of the earth, as it were, in His hand, in whose sight its inhabitants are counted as grasshoppers, and who is the Creator and Lord of all spiritual substance...²⁴⁶

As a whole, the Fathers do not dismiss the knowledge gained by “those skilled in astronomy” and with them understand that the circular-shaped eclipses we see between the Earth and the moon must be made by “spherical-shaped bodies.” Not one of the Fathers contemplated a flat disc for the Earth’s shape, much less attempted to explain what kind of shadow a flat disc would put on the moon in a lunar eclipse. For a solar eclipse, they all understood that the blocking of the sun’s light by the moon would produce a cone of darkness on the Earth at varying places.

John Damascene: Since, therefore, the Scripture speaks of heaven, and heaven of heaven, and heavens of heavens, and the blessed Paul says that he was snatched away to the third heaven 2 Corinthians 12:2, we say that in the cosmogony of the universe *we accept the creation of a heaven which the foreign philosophers, appropriating the views of Moses, call a starless sphere.* But further, God called the firmament also heaven Genesis 1:8, which He commanded to be in the midst of the waters, setting it to divide the waters that are above the firmament from the waters that are below the firmament. And its nature, according to the divine Basilus, who is versed in the mysteries of divine Scripture, is delicate as smoke. Others, however, hold that it is watery in nature, since it is set in the midst of the waters: others say it is composed of the four elements: and lastly, others speak of it as a fifth body, distinct from the four elements.

Further, some have thought that the heaven encircles the universe and has the form of a sphere, and that everywhere it is the highest point, and that the centre of the space enclosed by it is the lowest part: and, further, that those bodies that are light and airy are allotted by the Creator the upper region: while those that are heavy and tend to descend occupy the lower region, which is the middle. The element, then, that is lightest and most inclined to soar upwards is fire, and hence they hold that its position is immediately after the heaven, and they call it ether, and after it comes

²⁴⁶ *Against Heresies*, Bk II, Ch 30.

the lower air. But earth and water, which are heavier and have more of a downward tendency, are suspended in the centre. Therefore, taking them in the reverse order, we have in the lowest situation earth and water: but water is lighter than earth, and hence is more easily set in motion: above these on all hands, like a covering, is the circle of air, and all round the air is the circle of ether, and outside air is the circle of the heaven. Further, they say that the heaven moves in a circle and so compresses all that is within it, that they remain firm and not liable to fall asunder.

All, therefore, who hold that the heaven is in the form of a sphere, say that it is equally removed and distant from the earth at all points, whether above, or sideways, or below. And by 'below' and 'sideways' I mean all that comes within the range of our senses. For it follows from what has been said, that the heaven occupies the whole of the upper region and the earth the whole of the lower. They say, besides, that the heaven encircles the earth in the manner of a sphere, and bears along with it in its most rapid revolutions sun, moon and stars, and that when the sun is over the earth it becomes day there, and when it is under the earth it is night. And, again, when the sun goes under the earth it is night here, but day yonder.

Others have pictured the heaven as a hemisphere. This idea is suggested by these words of David, the singer of God, Who stretches out the heavens like a curtain, by which word he clearly means a tent: and by these from the blessed Isaiah, Who has established the heavens like a vault Isaiah 40:22: and also because when the sun, moon, and stars set they make a circuit round the earth from west to north, and so reach once more the east. Still, whether it is this way or that, all things have been made and established by the divine command, and have the divine will and counsel for a foundation that cannot be moved. For He Himself spoke and they were made: He Himself commanded and they were created. He has also established them for ever and ever: He has made a decree which will not pass.²⁴⁷

John Damascene: Further, some hold that the earth is in the form of a sphere, others that it is in that of a cone. At all events it is much smaller than the heaven, and suspended almost like a point in its midst. And it

²⁴⁷ *Orthodox Faith*, Book 2, Ch. 6.

will pass away and be changed. But blessed is the man who inherits the earth promised to the meek Matthew 5:5.²⁴⁸

We see in the case of John Damascene that though he sides with the “foreign philosophers” and their view of a spherical and rotating universe with a spherical and non-rotating Earth, he still leaves room for picturing the heavens as a hemisphere. But one thing he never allows is that the Earth is flat.

John Damascene: “Further, some hold that the Earth is in the form of a sphere, others that it is in that of a cone. *At all events it is much smaller than the heaven, and suspended almost like a point in its midst.* And it will pass away and be changed. But blessed is the man who inherits the Earth promised to the meek.”²⁴⁹

John Damascene: “These are lakes, and there is only one sea, as those affirm who have traveled *round the Earth.*”²⁵⁰

Clement of Alexandria: Lord of the good, Father, of all the Maker, Who heaven and heaven’s adornment, by Your word Divine fitly disposed, alone make; Who brought forth the sunshine and the day; Who appointed their courses to the stars, And how the earth and sea their place should keep; And when the seasons, in their circling course, Winter and summer, spring and autumn, each Should come, according to well-ordered plan; Out of a confused heap who created *This ordered sphere, and from the shapeless mass* Of matter did the universe adorn.²⁵¹

Here Clement refers to the first day of creation in which God made the Earth. For Clement, God created the Earth into a sphere from its shapeless mass.

Clement of Alexandria: And those golden figures, each of them with six wings, signify either the two bears, as some will have it, or rather the *two hemispheres.* And the name cherubim meant “much knowledge.” But both together have twelve wings, and by the zodiac and time, which moves on it, point out the world of sense.²⁵²

²⁴⁸ *Orthodox Faith*, Book 2, Ch. 10.

²⁴⁹ *Orthodox Faith*, Book 2, Ch 10.

²⁵⁰ *Hexameron*, Homily IV, 4.

²⁵¹ *The Instructor*, Book III, Ch. 12, “To the Paedagogus.”

²⁵² *The Stromata*, Book V, Ch 6.

In some passages, Clement points out that even the Greek philosophers regarded certain Christian beliefs, one of them being that the Earth was a “fixed sphere” and that the seven planets moved:

Clement of Alexandria: And the Lord’s day Plato prophetically speaks of in the tenth book of the Republic, in these words: “And when seven days have passed to each of them in the meadow, on the eighth they are to set out and arrive in four days.” *By the meadow is to be understood the fixed sphere, as being a mild and genial spot, and the locality of the pious; and by the seven days each motion of the seven planets, and the whole practical art which speeds to the end of rest.* But after the wandering orbs the journey leads to heaven, that is, to the eighth motion and day. And he says that souls are gone on the fourth day, pointing out the passage through the four elements. But the seventh day is recognized as sacred, not by the Hebrews only, but also by the Greeks; according to which the whole world of all animals and plants revolve. Hesiod says of it: “The first, and fourth, and seventh day were held sacred.” And again: “And on the seventh the sun’s resplendent orb.” And Homer: “And on the seventh then came the sacred day.”²⁵³

In this next passage, Clement quotes from a “Chaldean” who says that the universe, as a sphere, rotates on its axis around the Earth:

Clement of Alexandria: And again, respecting God, saying that He was invisible, and that He was known to but one, a Chaldean by race—meaning either by this Abraham or his son—he speaks as follows: “But one a scion of Chaldean race; For he the sun’s path knew right well, And how the *motion of the sphere about The earth proceeds, in circle moving equally around its axis, how the winds Their chariot guide o’er air and sea.*” Then, as if paraphrasing the expression, “Heaven is my throne, and earth is my footstool,” Isaiah 66:1 he adds: “But in great heaven, He is seated firm Upon a throne of gold, and ‘neath His feet The earth. His right hand round the ocean’s bound He stretches; and the hills’ foundations shake To the centre at His wrath, nor can endure His mighty strength. He all celestial is, *And all things finishes upon the earth.*”²⁵⁴

Clement of Alexandria: Let him who wishes, then, approaching to the true instruction, learn from Parmenides the Eleatic, who promises:

²⁵³ *The Stromata*, Book V, Ch 9.

²⁵⁴ *Ibid.*

“Ethereal nature, then, and all the signs In Ether you shall know, and the effects, All viewless, of the sacred sun’s clear torch And whence produced. The round-eyed moon’s Revolving influences and nature you shall learn; *and the ensphering heaven shall know*; Whence sprung; and how Necessity took it And chained so as to keep the starry bounds.”²⁵⁵

This next passage from Clement of Alexandria is very important because it shows that although the Fathers often pictured heaven as a tabernacle with a tent stretched over it (*e.g.*, Chrysostom), this did not mean they understood the Earth as flat.

Clement of Alexandria: Now concealment is evinced in the reference of the seven circuits around the temple, which are made mention of among the Hebrews; and the equipment on the robe, indicating by the various symbols, which had reference to visible objects, the agreement which from heaven reaches down to earth. And the covering and the veil were variegated with blue, and purple, and scarlet, and linen. And so it was suggested that the nature of the elements contained the revelation of God. For purple is from water, linen from the earth; blue, being dark, is like the air, as scarlet is like fire.

In the midst of the covering and veil, where the priests were allowed to enter, was situated the altar of incense, the symbol of the earth placed in the middle of this universe; and from it came the fumes of incense. And that place intermediate between the inner veil, where the high priest alone, on prescribed days, was permitted to enter, and the external court which surrounded it — free to all the Hebrews — was, they say, the middlemost point of heaven and earth.

Obviously, for the Earth to be “two hemispheres” in shape and be positioned “in the middle of this universe,” it cannot be flat at the ground level, but, as Job 26:7 reveals, “He stretches out the north over the void, and hangs the earth upon nothing.” For anyone who might be thinking that Job’s words might allow for a flat Earth to be suspended in space with a dome over it, not only is it impossible to then say the Earth “is in the middle of the universe” (since in the flat Earth model the Earth stretches from one end of heaven to the other and thus is not “in the middle”), but even the Fathers

²⁵⁵ *Ibid.*

who entertained the notion of a non-spherical Earth never considered a flat Earth hanging in the middle of a much larger universe.

On that note, we have a string of Fathers who explicitly declare the Earth is in the “center of the universe.” By their context they imply the Earth is a tiny speck in a vast universe. This depiction implicitly shows they did not believe in a flat Earth covered by a dome, since an Earth that was housed by a dome that encompassed all of the heavens would mean that the Earth was not a center point; rather, the Earth would reach from one side of the universe’s circumference to the other. The center of the flat disc could only be the north pole, but the north pole is not the whole Earth. The Fathers indicate that the *whole* Earth is in the center of the universe, as follows:

Athanasius: “For the sun is carried round along with, and is contained in, the whole heaven, and can never go beyond his own orbit, while the moon and other stars testify to the assistance given them by the sun... And wells, again, and rivers will never exist without the earth; but the earth is not supported upon itself, but is set upon the realm of the waters, while this again is kept in its place, *being bound fast at the center of the universe*. And the sea, and the great ocean that flows outside round the whole earth, is moved and borne by winds wherever the force of the winds dashes it.”²⁵⁶

Athenagoras: To Him is for us to know who stretched out and vaulted the heavens, *and fixed the earth in its place like a center*.²⁵⁷

Augustine: Let not the philosophers, then, think to upset our faith with arguments from the weight of bodies; for I don’t care to inquire why they cannot believe an earthly body can be in heaven, while *the whole earth is suspended on nothing. For perhaps the world keeps its central place by the same law that attracts to its center all heavy bodies*.²⁵⁸

Basil: In the midst of the covering and veil, where the priests were allowed to enter, was situated the altar of incense, *the symbol of the earth*

²⁵⁶ *Against the Heathen*, First Book, Part 1, 27.

²⁵⁷ *Why the Christians do not Offer Sacrifices*, Ch XIII.

²⁵⁸ *City of God*, Bk XIII, Ch 18.

*placed in the middle of this universe; and from it came the fumes of incense.*²⁵⁹

Clement of Rome: the Creator, long-suffering, merciful, the sustainer, the benefactor, ordaining love of men, counseling purity, immortal and making immortal, incomparable, dwelling in the souls of the good, that cannot be contained and yet is contained, *who has fixed the great world as a centre in space, who has spread out the heavens and solidified the earth.*²⁶⁰

Cyril of Jerusalem: *The earth, which bears the same proportion to the heaven as the center to the whole circumference of a wheel, for the earth is no more than this in comparison with the heaven: consider then that this first heaven which is seen is less than the second, and the second than the third, for so far Scripture has named them...*²⁶¹

Eusebius: Again, having created the lofty and profound expanse of air, and caused the world in its length and breadth to feel its cooling influence, he decreed that the air itself should be graced with birds of every kind, and left open this vast ocean of space to be traversed by every creature, visible or invisible, whose course is through the tracts of heaven. *In the midst of this atmosphere he poised the earth, as it were its center, and encompassed it with the ocean as with a beautiful azure vesture.*²⁶²

Gregory of Nyssa: "...the earth and the water, holding each other in, *took the middle place of the universe.*"²⁶³

Gregory of Nyssa: "...the vault of heaven prolongs itself so uninterruptedly that it encircles all things with itself, *and that the earth and its surroundings are poised in the middle,* and that the motion of all the revolving bodies is round this fixed and solid center..."²⁶⁴

²⁵⁹ *The Mystic Meaning of the Tabernacle*, Bk V, Ch VI; Clement of Rome, *Stromata*, Bk V.

²⁶⁰ *Homily II*, Ch XLV.

²⁶¹ *Catechetical Lectures*, VI, 3.

²⁶² *Oration in Praise of Constantine*, 6, 6.

²⁶³ *On the Making of Man*, 30, 1, 1.

²⁶⁴ *On the Soul and Resurrection*.

Hippolytus: [Refuting the view of the Greek Ecphantus]: “And that the earth in the middle of the cosmical system is moved round its own center towards the east.”²⁶⁵

There are also a number of Fathers who consider the universe vast, which is not the size inherent in a dome over the small Earth of 24,000 miles in diameter.

Eusebius: “To all these he appoints with perfect equity their limits, places, laws, and inheritance, allotting to each their suited portion according to his sovereign will. To some he assigns *the super-terrestrial regions*, to others heaven itself as their habitation: *others he places in ethereal space*, others in air, and others still on earth.”²⁶⁶

Eusebius: “So also the Supreme Word of God, pervading all things, everywhere existent, everywhere present in heaven and earth, governs and directs the visible and invisible creation, the sun, *the heaven, and the universe itself*, with an energy inexplicable in its nature, irresistible in its effects. From him, as from an everlasting fountain, the sun, the moon, and stars receive their light: and he forever rules that heaven which he has framed as the fitting emblem of his own greatness. The angelic and spiritual powers, the incorporeal and intelligent beings which exist beyond the sphere of heaven and earth, are filled by him with light and life...”²⁶⁷

Gregory of Nyssa: We see all this with the piercing eyes of mind, nor can we fail to be taught by means of such a spectacle that a Divine power, working with skill and method, is manifesting itself in this actual world, and, penetrating each portion, combines those portions with the whole and completes the whole by the portions, *and encompasses the universe with a single all-controlling force, self-centred and self-contained, never ceasing from its motion, yet never altering the position which it holds.*²⁶⁸

John Cassian: “who even when He was on earth in the flesh, yet was present in the hearts of all the saints, and filled the heaven, the earth, the sea, aye and the whole universe with His infinite power and majesty; and

²⁶⁵ *The Prooemium*, Ch XIII.

²⁶⁶ *Oration in Praise of Constantine*, 12, 5.

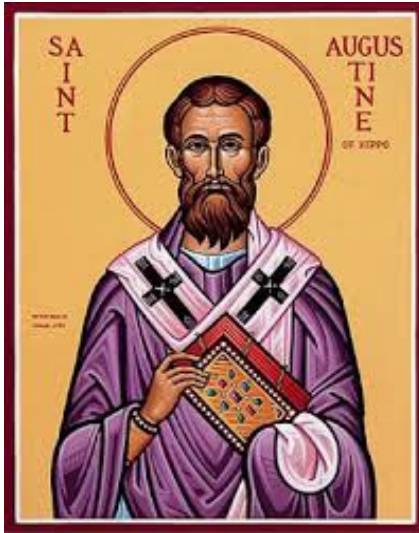
²⁶⁷ *Ibid.*, 12, 16.

²⁶⁸ *On the Soul and Resurrection*.

yet was so complete in Himself that the whole world could not contain Him.”²⁶⁹

A Detailed Analysis of Augustine’s View

Augustine: “But as to the fable that there are Antipodes, that is to say, men on the opposite side of the earth, where the sun rises when it sets to



us, men who walk with their feet opposite ours, that is on no ground credible. And, indeed, it is not affirmed that this has been learned by historical knowledge, but by scientific conjecture, on the ground that the earth is suspended within the concavity of the sky, and that it has as much room on the one side of it as on the other: hence they say that the part which is beneath must also be inhabited. But they do not remark that, *although it be*

supposed or scientifically demonstrated that the world is of a round and spherical form, yet it does not follow that the other side of the earth is bare of water; nor even, though it be bare, does it immediately follow that it is peopled. ...”²⁷⁰

Here Augustine tells us that even though he is opposed to the idea of “antipodes” (*i.e.*, men living on the opposite part of the Earth), still, he has recognized that it can be scientifically demonstrated the Earth is a round or spherical form. Patristic scholar C. P. E. Nothaft cites this passage in opposition to Ferrari’s idea that Augustine believed in a “vertical” universe because Augustine sometimes speaks of the Earth at the “bottom,” which, to Ferrari, implies he also believed in a hemispherical sky.²⁷¹ Nothaft retorts that,

²⁶⁹ *On the Incarnation*, Book V, Ch. 4.

²⁷⁰ *City of God*, Bk XVI, Ch 9.

²⁷¹ Ferrari, “Augustine’s Cosmography,” pp. 138-139.

As Augustine himself indicates in *The City of God*, the spherical model simply implies that the bottom and the center of the universe are one and the same (*eundemque locum mundus habeat et infimum et medium*). Since the earth is located at the center of the universe and everything that falls “down” describes a motion towards the center, there remains a (figurative) sense in which it is still true that the earth [is] located at the “bottom.” In the absence of any additional evidence of Augustine’s belief in a flat Earth, it is thus hardly advisable to deduce from his use of expressions such as a *duo corpora maxima* and *fundas* a “vertical universe” in the sense that Leo Ferrari makes of it.²⁷²

We move on with Augustine:

Augustine: “You have heard in the Psalm, ‘I have seen the end of all perfection.’ He has said, I have seen the end of all perfection: what had he seen? Think we, had he ascended to the peak of some very high and pointed mountain, and looked out thence and seen the compass of the earth, and *the circles of the round world*, and therefore said, ‘I have seen the end of all perfection’? If this be a thing to be praised, let us ask of the Lord eyes of the flesh so sharp-sighted, that we shall but require some exceeding high mountain on earth, that from its summit we may see the end of all perfection..²⁷³

Although in the rest of this homily Augustine answers the question by appealing to a metaphorical mountain, namely, Christ, to which we can ascend and see the real and ultimate perfection of God; still, Augustine recognizes in the physical sense that if one were to go to a high mountain on Earth, he would see the Earth as a “round world” and not a flat disc. Moreover, nowhere does Augustine say he believes in a flat Earth.

Augustine: “...this Christ’s one Church, this the Unity which we are, is crying from the ends of the earth....But wherefore have I cried this thing? ‘While my heart was being vexed.’ He showeth himself to be throughout all nations in the *whole round world*, in great glory, but in great tribulation.”²⁷⁴

²⁷² Nothaft, “Augustine and the Shape of the Earth,” p. 42.

²⁷³ *Homilies on First John*, Homily X, 5

²⁷⁴ *Homily on Psalm 61*, 2.

Augustine: "...the earth more abundantly hath given her fruit, and that crop now hath filled *the round world*."²⁷⁵

Augustine: "...*the whole round world* repopled by the three sons of Noe: for from East and West and North and South shall come they that shall sit down with the Patriarchs."²⁷⁶

Augustine: "Which thing signified, that, being as it were on a floor in the midst of *the whole round world*, the dry fleece was the former people Israel."²⁷⁷

Augustine: "Let not the philosophers, then, think to upset our faith with arguments from the weight of bodies; for I don't care to inquire why they cannot believe an earthly body can be in heaven, while the whole earth is suspended on nothing. For perhaps the world keeps its central place by the same law that attracts to its center all heavy bodies."²⁷⁸

Augustine: "But if I say that, I am afraid I will be laughed at by those who know for certain, and by those who can easily work out, that during the time when it is night with us the presence of light is illuminating those parts of the world past which the sun is returning from its setting to its rising, *and that thus during the entire twenty-four hours, while it circles through its whole round*, there is always day-time somewhere, night-time somewhere else."²⁷⁹

Nothaft's treatment of this last passages, in light of Ferrari's attempt to make Ausutine a flat-earther, is excellent. Ferrari seeks to fit it into the typical

²⁷⁵ *Homily on Psalm 67*, 8.

²⁷⁶ *Homily on Psalm 69*, 1

²⁷⁷ *Homily on Psalm 72*, 9.

²⁷⁸ *City of God*, Book 13, Chapter 18. Even Leo Ferrari, a well-known Augustinian scholar partial to a flat Earth, admits that Augustine's words presuppose the Earth to be "global in shape, with the spherical heavens surrounding it," yet he tries to counter its clarity by adding, "it was useful to Augustine for purposes of rhetorical rebuttal, but which, to the best of my knowledge, is not demonstrably his own. Otherwise it would be incompatible with his oft-repeated phrase *duae maximae partes mundi* ["two largest parts of the world"] for the earth and sky" (Ferrari, p. 140, n. 6). Nothaft responds: "We have already seen [we will see below] that Augustine's use of this phrase can hardly qualify as a decisive hint for his acceptance of any cosmology, be it 'flat' or 'spherical'" (Nothaft, p. 44).

²⁷⁹ *The Literal Interpretation of Genesis*, Book I, 10, 21, translated by Edmund Hill, O. P., p. 176.

“spotlight” sun of the flat Earth model that continually circles about 3,000 miles above the disc:

Taken by itself, this statement strongly evokes a spherical, geostatic picture of heaven and earth. Ferrari tries to undercut this line of reasoning by claiming that “for Augustine the sun kept traveling around in very large horizontal circles or ellipses above the disk-shaped earth.”²⁸⁰ It remains questionable, however, whether the notion of the sun constantly “traveling” above the earth, sending down its beams like a flashlight over a large plate, can be reasonably taken to account for the simultaneity of day and night. Ferrari’s explanation that “the disk-shaped earth was one of the two greatest bodies in the universe, so that there were plenty of distant lands for the sun to visit after it went behind the nearest horizon” is question-begging in this respect and seems to owe more to the kind of arguments developed by modern-day flat earthers than to anything Augustine recognizably committed himself to in writing.²⁸¹ It may be worth adding that Cosmas Indicopleustes, in order to account for the sun’s nightly disappearance, felt compelled to posit enormous mountain ranges that blocked the sun from sight once it reached the northwestern parts of the world.²⁸² Needless to say, Augustine never makes any such claim, but simply asserts that the sun describes a circular path (*circuitum gyri*) about the earth, which is fully consistent with the spherical model. Augustine’s aim, in the passage cited above, was not to discuss rival cosmological conceptions, but to appeal to a well-known fact (namely the simultaneity of day and night) in order to shed light on a difficult exegetical question. In doing so, he appealed to the common cosmological knowledge of his readers, which was anchored in the spherical model. He continued his discussion of the creation of day and night in another passage, which is completely ignored by Ferrari even though it can be read as an unequivocal endorsement of the spherical model:

Although water still covered the whole earth, there was nothing to stop this watery and globular mass from causing day on one

²⁸⁰ Ferrari, “Augustine’s Cosmography,” 167 (see n. 6).

²⁸¹ *Ibid.*, pp. 166-167.

²⁸² Cosmas Indicopleustes, *Topographie* (2.34), 1:339-41 (see n. 18). See the criticism in John Philoponus, *De opificio mundi* (3.10), 138-139 (see n. 15), for whom the phenomenon of sunrise and sunset was clear proof of the earth’s sphericity.

side from the presence of light, and night on the other from the absence of light, which would follow round to the first side at the time of evening, while the light sank down to the other side.²⁸³

Once again we have a clear depiction of the simultaneity of day and night that is most straightforwardly associated with the spherical model. More importantly, however, this passage includes an unambiguous description of the earth (covered by water) as a globular mass (*globosa moles*).²⁸⁴ This creates a considerable obstacle to any attempt to impute to Augustine a flat-earth cosmology. Rather than reinterpreting in Ferrari's fashion all traces of the spherical model in Augustine's work as being really based on a "flat" cosmology, it would seem far more economical to assume that Augustine was ready to accept the spherical concept of heaven and earth that was doubtlessly common in his age.²⁸⁵

We move on with Augustine:

Augustine: 21. "But, says, somebody, how are these people, who attribute to the sky the shape of a sphere or globe, not contradicted by what is written in our literature: "who stretched out the sky like a skin" [Ps 104:2]? Certainly let it be contradicted by that, if what they say is false; this after all, is true which has divine authority behind it, rather than that which is the guesswork of human weakness. But if it should happen that they can prove their case with evidence and arguments beyond any possibility of doubt, then it has to be demonstrated that what is said here among us about a skin is not contrary to those explanations of theirs. Otherwise, in any case (if you are going to be crassly literal-minded) it will also be contrary to another place in these very scriptures of ours where they sky is said to be like a suspended dome. What, I ask you, could be so different and opposed to each other as a skin stretched

²⁸³ *The Literal Interpretation of Genesis*, Book I, 12, 25, translated by Edmund Hill, O. P., pp. 178-179.

²⁸⁴ Nothaft further notes: "This passage is also discussed in Krüger, *Das Überleben*, 250-254 (see n. 3), who takes it as explicit proof that Augustine accepted the spherical model. Ferrari claims to have conducted a search "of all of his works for the key words which could possibly be used in maintaining a global theory of the earth's shape. With two merely speculative exceptions already encountered, no passages were found in which Augustine was promoting the idea of a global or spherical earth." Ferrari, "Augustine's Cosmography," 142 (see n. 6). Gn. litt. 1, 12, 25 is not cited among those 'speculative exceptions.'"

²⁸⁵ Nothaft, "Augustine and the Shape of the Earth," pp. 45-46.

out flat, and the hollow curve of a dome? But if we are obliged, as indeed we are, to understand these two expressions in such a way that they are found to agree with each other and not to be in the least contradictory, *then we are also and equally obliged to demonstrate that neither of them is opposed to those explanations, should they happen to be shown by rational arguments to be true, which inform us that the sky has the shape of a hollow globe all round us—provided, once again, it can be proved.*

22. *And even if that comparison on our side with a dome is taken literally, it will make no difficulty for those who say the sky is a globe; it is reasonable to assume that Scripture wished to talk about the shape of the sky with reference to that part of it which is above us. So if the sky is not a globe, it is in one part—the part which covers the Earth—a dome, while if it is a globe, then it is a dome all round. But as for the text about a skin, that is rather more serious, because it may seem to be opposed, not to the globe, which may just be a human fabrication, but to our own dome. My treatment of this in terms of allegory may be found in the thirteenth book of my *Confessions*. So whether the sky being stretched out like a skin is to be understood allegorically in the way I suggested there, or in some other way, still to satisfy the tiresome people who persist in demanding a literal explanation I will say what in my opinion should be obvious to anyone of sense. Each term, no doubt, that is both “skin” and “dome” can be understood figuratively; but what we have to see is how each can be explained literally. Well, if it is not only curved but also a flat ceiling that can be called a dome, then assuredly a skin for its part can be stretched out round a curve as well as on a flat plane, After all, both wine containers and footballs are skins.*²⁸⁶

Augustine: Since water, you see, was still covering the whole earth, there was nothing to stop the mass of this watery globe from causing day on one side from the presence of light, and night on the other from the absence of light, which would follow round to the first side at the time of evening, while the light sank down to the other side.²⁸⁷

As noted earlier, a controversy regarding Augustine’s views on the spherical v. flat Earth came to light in the writings of Augustinian scholar, Leo C. Ferrari who, as a member of the Flat Earth Society of Canada, in 1996,

²⁸⁶ *The Literal Interpretation of Genesis*, Book II, 9, 21-22, translated by Edmund Hill, O. P., p. 202.

²⁸⁷ *Ibid.*, Book I, 12, 25.

published an extensive article titled *Augustine's Cosmography*, which contains the following conclusion:

Surprisingly, he believed that the two greatest bodies in the universe were the sky and the earth, with the former dome-shaped and covering the latter. The earth was essentially flat and surrounded by the mighty oceanus. The sun and moon were the two greatest bodies in the sky, but each was much smaller than the earth.²⁸⁸

The article gained an entry in the standard encyclopedia for Augustinian studies, which makes it citable for flat-earth articles (e.g., Wikipedia). But as Nothaft notes, this single entry is in the face of “other recent writers on the subject [who] treat Augustine’s acceptance of the earth’s spherical shape as a well-established fact.”²⁸⁹ Nothaft’s article on Ferrari’s use of Augustine for the flat Earth view concludes with:

I believe that the Augustinian flat world which Leo Ferrari has skillfully distilled out of the bishop of Hippo’s writings rests on too shaky grounds to be maintained in its present form. For these reasons, the present article aims at a reassessment of “Augustine’s cosmography” by arguing that his views on the earth’s shape bore a stronger continuity to the spherical model of Greek natural philosophy than Ferrari is prepared to admit.²⁹⁰

I would add that Ferrari’s reluctance to admit the case is common to a flat Earth mentality, that is, they search into every nook and cranny looking for just the slightest possible nuance toward a flat Earth view in the person under investigation and then jump to hasty and specious conclusions. We will see another example of this with the “Flat Earth Trads” below.

Nothaft puts things in proper perspective when he argues...

A glance at the works of the great Roman encyclopedists, from Pliny the Elder (c. 79) to Macrobius (c. 400) and Martianus Capella (c. 420), strongly suggests that the dominant picture of the universe in

²⁸⁸ Ferrari, “Augustine’s Cosmography,” *Augustinian Studies* 27 (1996), p. 129.

²⁸⁹ Nothaft, *op. cit.*, p. 35, citing J. B. Russell, *Inventing the Flat Earth: Columbus and Modern Historians*, New York: Praeger, 1991, pp. 22–23, fn. 2; and C. Garwood, *Flat Earth: The History of an Infamous Idea*, London: Macmillan, 2007, pp. 24–25, fn. 4.

²⁹⁰ *Ibid.*, p. 36.

Augustine's day was essentially still that propagated in Plato's *Timaeus* and Aristotle's *On the Heavens*. According to this picture, the universe is composed of two main parts, a celestial and an earthly (or sub-lunar) realm, both of which are structured by concentric spheres. In the case of the sub-lunar realm, these spheres are made up by the four elements, which are ordered according to their heaviness or density. Earth, as the heaviest element, is massed together in the form of a solid globe at the center of the universe, surrounded by concentric spheres of water, air and fire. Since Augustine received a classical "pagan" education, which included some engagement with Platonic philosophy, there is no reason to doubt that he was familiar with this picture.²⁹¹ In order for Ferrari to be right, however, he [Augustine] must have largely abandoned it in his later years as a consequence of his conversion to Christianity..."²⁹²

Although Nothaft is right about the overwhelming climate of the Earth's sphericity before and during the time of Augustine, his concluding remark of why Ferrari is wrong about Augustine is not so cogent. Nothaft states:

... because the cosmology contained in the Hebrew Scriptures precluded an acceptance of what I will hereafter call the 'spherical model.'²⁹³

Here Nothaft follows the liberal scholarly line that the Old Testament taught a flat Earth. But we have already seen (and will see in more detail in Chapter 4) that this biased conclusion is based on the presupposition that Mesopotamian culture held exclusively to a flat Earth model and that this culture pre-dated the Hebrew culture and highly influenced its writings,

²⁹¹ Nothaft's footnote has: See Aristotle, *On the Heavens*, trans. W. K. C. Guthrie (London: Heinemann, 1960); F. M. Cornford, *Plato's Cosmology* (London: Routledge & Kegan Paul, 1937). On the encyclopedists see Krüger, *Das Überleben*, 120–150, 189–192, 278–350 (see n. 3); F. S. Betten, "The Knowledge of the Sphericity of the Earth during the Earlier Middle Ages," *Catholic Historical Review* 9 (1923): 74–90, at 76–83. On Augustine's knowledge of the *Timaeus* and other Platonic teachings see F. van Fleteren, s.v. "Plato, Platonism," in *Augustine through the Ages*, 651–654 (see n. 7).

²⁹² Nothaft, *op. cit.*, p. 37.

²⁹³ Nothaft's footnote has: on the cosmology of the bible see now L. Montagnini, "La questione della forma della terra: Dalle origini alla tarda antichità," *Studi sull'Oriente Cristiano* 13, no. 2 (2009): 31–68, at 34–35; Garwood, *Flat Earth*, 363–369 (see n. 4).

according to the Wellhausen documentary hypothesis, both of which are dubious.

In any case, Nothaft offers a devastating critique of Ferrari's attempt to commandeer Augustine for the flat Earth theory:

There are essentially two passages in Augustine's works which Ferrari cites as positive proof for his claim that the bishop of Hippo believed the earth to be flat. The first of these can be found among his *Letters* (no. 199, written in 419), where Augustine refers to the *orbis terrarum*, the "circle of the lands," which is surrounded by the great oceanus.

'He will have dominion from sea to sea and from the river to the ends of the earth' (Ps 72:8)—from the river, that is, where he was baptized because he began to preach the gospel from there, but from sea to sea there is *spread out the whole world* with all the nations, because the world is girded by the sea called Ocean.... 'He will have dominion from sea to sea,' the sea by which each island is girt. It is the same way in the whole world (*universo orbe terrarum*), which in a sense is like the largest island of all because Ocean girds it. And we know that the Church has arrived in the east at its shores, and to whatever shores of it she has not come, she will come as she bears fruit and increases.²⁹⁴

To this statement can be added his exposition of Psalm 76:19 ("the voice of thy thunder in a wheel"), which he interprets as an allusion to the *orbis terrarum*, shaped like a wheel (rota).

²⁹⁴ Augustine's *Letter* 199, 12, 47, translated by John E. Rottele of the Augustine Heritage Institute, Vol. 3, nd. The context concerns how the gospel will be spread to the whole world before Christ returns. The CSEL Latin is: "*Dominabitur a mari usque ad mare et a flumine usque ad terminos orbis terrae* [Ps 71.8], 'a flumine' scilicet, ubi baptizatus est, quia inde coepit evangelium praedicare, 'a mari' autem 'usque ad mare' totus est orbis cum omnibus, quoniam mari oceano cingitur universes....*Dominabitur a mari usque ad mare*, quo uaqueque insula cingitur, sicut in universo orbe terrarum, quae tamquam omnium quodam modo maxima est insula, quia et ipsam cingit oceanus, ad cuius littora in occidentalibus partibus ecclesiam pervenisse iam novimus et, quocumque litorum eius nondum pervenit, perventura est utique fructificando atque crescendo" (Ep. 199, 12, 47, CSEL 57, 285–286). Another sentence prior to the ellipsis is: "Some of the are located in Ocean, and we have learned that some of them have already received the gospel. And so in each individual island there are being fulfilled the words, 'He will have dominion from sea to sea.'"

Nothafft's reference to Ps 76:19 in *CSEL* is Ps 77:18 in Schaft's English versions, of which the following is what Ferrari extracts:

The round world is a wheel. For the circuit of the round world is with reason called also an "orb": whence also a small wheel is called an "orbiculus." *The voice of Thy thunder is in the wheel: Thy lightnings have appeared to the round world.* Those clouds in a wheel have gone about the round world, have gone about with thundering and with lightning, they have shaken the abyss, with commandments they have thundered, with miracles they have lightened. *Unto every land hath gone forth the sound of them, and unto the ends of the orb the words of them.*²⁹⁵

Nothafft continues:

At first glance, Augustine's vocabulary might seem to commit him to a non-spherical, disk- or wheel-shaped picture of the earth. Yet to draw this conclusion would mean to commit what I would like to call the "T-O-fallacy." The nature of this fallacy is most easily grasped from the role medieval T-O-maps have played in past debates over the state of geographical knowledge in the Middle Ages. These maps usually depict the *orbis terrarum* as a circular land-mass, made up of the three continents (Europa, Africa, Asia), with the ocean forming a large "O" at its periphery. Scholars working in the field of medieval geography have long understood that these maps aimed at a schematic depiction of the *oikoumene*, the habitable landmass of the world, which, contrary to what has often been assumed, in no way presupposes a flat earth.²⁹⁶ The picture of a wheel-shaped *orbis terrarum* is perfectly compatible with

²⁹⁵ Augustine, *On the Psalms*, p. 365. Nothafft's Latin taken from *CSEL* is: "...orbis terrarum est rota; nam circuitus orbis terrarum, merito et orbis dicitur; unde brevis etiam rotella, orbiculus appellatur. *Vox tonitrui tui in rota; apparuerunt fulgura tua orbi terrarum.* Nubes illae in rota circumierunt orbem terrarum; circumierunt tonando et coruscando, abyssum commoverunt, praeceptis tonuerunt, miraculis coruscaverunt, in omnem enim terram exiit sonus eorum, et in fines orbis terrae verba eorum." En. Ps 76,20 (*CSEL* 39, 1064). See also en. Ps 59,12; 71,11; ciu [City of God]. 16,17.

²⁹⁶ Nothafft cites: Stevens, "The Figure" (n. 9); Woodward, "Medieval Mappaemundi," 318–321, 342 (n. 9); R. Simek, *Erde und Kosmos im Mittelalter: Das Weltbild vor Kolumbus* (Munich: C. H. Beck, 1992), 37–54; A.-D. von den Brincken, *Fines Terrae: Die Enden der Erde und der vierte Kontinent auf mittelalterlichen Weltkarten* (Hannover: Hahn, 1992); E. Edson, *Mapping Time and Space: How Medieval Mapmakers Viewed Their World* (London: British Library, 1997).

the spherical model, because it can be taken (and was usually meant) to represent just a small part of the total surface of the globe, the rest of which was thought to be either completely covered with water or containing unknown further continents.²⁹⁷ Hence, it is no surprise that Augustine's contemporary and fellow North African Martianus Capella could talk of the *rotunditas* of the landmass, engirded by the *Oceanus*, even though he is a clear representative of the spherical model.²⁹⁸ In the same vein, Augustine's reference to the *orbis terrarum* as round or wheel-shaped no more commits him to a flat-earth cosmology than two-dimensional depictions or verbal descriptions of the shape of Australia would commit anyone to an assumption that the "whole world" is in some way shaped like this particular continent.²⁹⁹

²⁹⁷ Nothaft cites: See the various ancient views discussed in Vogel, *Sphaera terrae*, 34–69 (see n. 10).

²⁹⁸ Nothaft quotes Martianus Cappella: "Rotunditatis autem ipsius extima circumfusus ambit oceanus, sicut navigatus undique comprobatur; nam a Gadibus per Hispaniae Galliarumque flexum occidentalis plaga omnis hodieque navigatur." Martianus Capella, *De nuptiis Philologiae et Mercurii* (617–618), ed. J. Willis (Leipzig: Teubner, 1983), 216. English online translation: "It is encompassed by the outermost elements of the same curved shape as surrounded with the Ocean, and is approved of as to sail on all sides: for Cadiz in Spain and Gaul bent western every day we navigated."

²⁹⁹ Nothaft, pp. 42–43.

Various Issues Concerning Other Fathers

Eusebius: “The sun and the moon have their settled course. The stars move in no uncertain orbits round *this terrestrial globe*. The revolution of the seasons recurs according to unerring laws. The solid fabric of the earth was established by the word: the winds receive their impulse at appointed times; and the course of the waters continues with ceaseless flow, the ocean is circumscribed by an immovable barrier, and whatever is comprehended within the compass of earth and sea, is all contrived for wondrous and important ends.”³⁰⁰

We see that Eusebius’ concept is the traditional geocentric universe of the Fathers, specified with a “terrestrial globe” as the center point around which everything else in the universe revolves. There are some, however, who seek to make Eusebius a flat-earthier,³⁰¹ following the historian Andrew White’s assessment of Eusebius in his famous 1896 book, *A History of the Warfare of Science with Theology in Christendom*, in which White’s thesis is, “the great majority of the early fathers of the Church, and especially Lactantius, had sought to crush it [*i.e.*, science] beneath the utterances attributed to Isaiah, David, and St. Paul.” Of Eusebius, in particular, White writes:

Among the legacies the thought left by the ancient world to the modern, were certain ideas of the rotundity of the earth. These ideas were vague; they were mixed with absurdities, but they were germ ideas, and, after the barbarian storm which ushered in the modern world had begun to clear away, these germ ideas began to bud and bloom in the minds of a few thinking men, and these men hazarded the suggestion that the earth is round — is a globe.³⁰²

The greatest and most earnest men of the time took fright at once. To them, the idea of the earth’s rotundity seemed fraught with dangers to Scripture: by which, of course, they meant their interpretation of Scripture.

Among the first who took up arms against the new thinkers was **Eusebius**. He endeavored to turn off these ideas by bringing science into contempt. He endeavored to make the innovators understand that he and

³⁰⁰ *Life of Constantine*, Bk 2, Ch LVII.

³⁰¹ Flat-Earth Trads, comment section under Elaine C., as of March 21, 2018.

³⁰² Here White is referring to Plato in the *Timaeus*, as well as Cicero’s works.

the fathers of the Church despised all such inquiries. Speaking of the innovations in physical science, he said: "It is not through ignorance of the things admired by them, but through contempt of their useless labor, that we think little of these matters, turning our souls to better things."³⁰³

White's goal, of course, is to belittle the Fathers and make them appear as ignorant partisans that neither know science nor wish to know it. But nothing could be further from the truth. If Eusebius is read in context, he is merely ridiculing the inordinate amount of "scientific" theories with which the Greeks bombarded the world of their day, most of which were utter nonsense. As Roger Pearse notes:

...the *Praeparatio Evangelica*. This is a large and scholarly work, stuffed to the gills with word-for-word extracts of Greek philosophy. Book 15 may be found here. The book consists of listing the opinions of a whole range of Greek philosophers on a wide range of subjects, and thereby showing that they cannot be used as an authority, since they disagree violently among themselves on all of them. The quotations run to some 50 chapters and are too long to reproduce here.³⁰⁴

We will here quote just one of Eusebius' statements about the Greek philosophers to give a flavor of the rest of his contempt for their wild speculations:

But as to those who professed to give physiological explanations about the whole world, and things celestial and ethereal, and the conception of the universe, how little they knew even of their own nature, you may learn from their discordant utterances on these points also, as follows.

Do you not think therefore that with judgment and reason we have justly kept aloof from the unprofitable and erroneous and vain labour of them all, and do not busy ourselves at all about the said subjects (for we do not see the utility of them, nor any tendency to benefit and gain good for mankind), but cling solely to piety towards God the creator of all things,

³⁰³ *A History of the Warfare of Science with Theology in Christendom*. Pp. 386-387. White is quoting from Eusebius' *Praeparatio Evangelica* xv, 61.

³⁰⁴ "Did Eusebius Attack Science," by Roger Pearse, posted April 15, 2011 at <http://www.roger-pearse.com/weblog/2011/04/15/did-eusebius-attack-science/comment-page-1/#comment-1823676>

and by a life of temperance, and all godly behaviour according to virtue, strive to live in a manner pleasing to Him who is God over all?³⁰⁵

We now move on with our survey to Jerome:

Jerome: "...so all substance shall be refined into its most perfect form and rarified into aether which is a pure and uncompounded essence; *or else the sphere which I have called motionless* and all that it contains will be dissolved into nothing, and the sphere in which the antizone itself is contained shall be called 'good ground,' and *that other sphere which in its revolution surrounds the earth and goes by the name of heaven* shall be reserved for the abode of the saints."³⁰⁶

Here Jerome speaks of both the sphere of the Earth and the sphere of heaven. Since he agrees that the "sphere" of heaven "surrounds the Earth" and has a "revolution" around the same, then that "which he calls motionless" is referring to the Earth, and he specifies the Earth is a "sphere." Once again, we see the Fathers all believed the Earth was a sphere that is motionless in the center of the heavens, and none of them deviated from this fact.

A Catholic website by the name of "Flat Earth Trads," claims that the Church Fathers denied a spherical Earth, but their citations are severely wanting.³⁰⁷ For example, the host of the website who had claimed Jerome believed in a flat Earth never bothered to cite Jerome's *Letter to Avitus*. When this issue was brought to his attention, he tried to distort Jerome's words by claiming:

In St. Jerome's letter to Avitus, in the sentence you refer to, there are two things to note; it is not clear at all that he refers to the earth. He could be referring to the sphere of creation. Secondly, even if it was in relation to the earth, if he uses the word *orbis*, then it can mean circle and not necessarily sphere.³⁰⁸

³⁰⁵ Eusebius in *Praeparatio Evangelica* xv, 61.

³⁰⁶ Letters, 124, *To Avitus*.

³⁰⁷ flatearthtrads.forumga.net. The website of "Flat Earth Trads," which states it is "A forum for traditional Catholics who follow the apostolic line of Bishop Richard Williamson," <http://flatearthtrads.forumga.net/t60-pertinent-quotes-from-fathers-and-tradition> and at https://www.youtube.com/watch?v=qS_Gyllqr-w.

³⁰⁸ In comment section of: https://www.youtube.com/watch?v=qS_Gyllqr-w

The problem with this explanation is that Jerome envisions three spheres:

1. The sphere that is “motionless” (*e.g.*, earth)
2. The sphere of the “anti-zone”
3. The sphere of the “heavens” (in “revolution” around “earth”)

As such, there is nothing flat in Jerome’s view of the world. Everything he sees and knows is spherical.

Regarding the quote from **Jerome’s** *Commentary on Isaiah*, the Flat-Earth Trads provide this English translation:

God established the great mass of the land and had gathered it together above the seas and rivers, so that the heaviest element [earth] hangs over the lighter weight waters by the will of God, who like a king sits above the circle of the earth.³⁰⁹

Jerome then adds this comment:

There are some who assert that this mass is like a point and globe. What, then, will the land be over?³¹⁰

In using this passage, the Flat Earth Trads totally ignore Jerome’s stipulation above in his *Letter to Avitus* that he regards the Earth as “*the sphere which I have called motionless*,” and instead rush to judgment from his comment in his Isaiah commentary and declare that Jerome did not believe in a spherical Earth, and that he consequently had to believe the Earth was flat. But no such admission is made from Jerome, neither here nor in any of this other works. In the Isaiah commentary, he is simply asking a question that if God, as Genesis 1:9 says, “Let the waters under the heavens be gathered

³⁰⁹ The Flat-Earth Trads provide no citation nor the original Latin, but it comes from *S. Hieronymi Presbyteri Commentariorum In Esaiam Libri*, XI, ed. M. Adriaen. Corpus Christianorum, 73 (Turnholt, Belgium: Brepols, 1963), 2:463, from Jerome’s Latin as follows: “Deus, qui tantam molem terrae fundas [set] et super maria et super flumina collocasset eam, ut elementum grauissimum super tenues aquas Dei penderet arbitrio, qui instar regis sedet super gyrum terrae.” Cited from “Does the Bible Teach a Spherical Earth?” by Robert J. Schneider at <http://www.asa3.org/ASA/PSCF/2001/PSCF9-01Schneider.html>

³¹⁰ “Ex quo nonnulli quasi punctum et globum eam [molem terrae] esse contendunt. Quid igitur superbit terra?”

together into one place, and let the dry land appear,” yet the “mass of land” is the whole globe of the Earth, then how can the mass of land be above the water? Obviously, there is no water in space below the globe of the Earth, and therefore Jerome’s question is legitimate. It does not mean, however, that he is rejecting a globe Earth and opting for a flat Earth. It only means that if one considers the “mass of land” as the whole globe Earth, then there is no place for the water on the globe. It is a rhetorical challenge, not a rejection of a spherical Earth.

Jerome does not say who was asserting the whole globe was a great land mass, but the fact is they were wrong in asserting so, since the globe is *both* land mass *and* water, not just land mass. Prior to the second day of creation, the Earth was covered with water (“*The earth was without form and void, and darkness was upon the face of the deep; and the Spirit of God was moving over the face of the waters*”). On the second day, God raised the land masses above the water on the globe Earth such that mountains would be higher than the seas and their valleys higher than lakes and rivers. All of the separation of land from water was taking place on the globe Earth. It is similar to what the Psalmist says in 104:6-9 about the Great Flood, since the passage can apply to both the creation waters and the flood waters:

⁶ Thou didst cover it with the deep as with a garment; the waters stood above the mountains. ⁷ At thy rebuke they fled; at the sound of thy thunder they took to flight. ⁸ The mountains rose, the valleys sank down to the place which thou didst appoint for them. ⁹ Thou didst set a bound which they should not pass, so that they might not again cover the earth.

Hence Jerome’s question, “What then will the land be over?” can be considered a rhetorical remark against those those who mistakenly believed the Earth was only a land mass with no water. It is quite obvious that Genesis 1:9 is telling us that the land mass rose above the water *on the globe Earth* and remains over it to this very day.

In any case, there is no indication here that Jerome rejected a globe Earth. There is merely a question as to how a globe Earth accommodates land being “over” the water. That very question was already answered by the other Church Fathers who addressed this subject wherein they held that the land

on the globe was raised over the water *on the globe* on the second day of creation.

Finally, as was the case with Chrysostom, there is no place in his writings that Jerome explicitly teaches or holds to a flat Earth. Since the Flat-Trads can only find one or two Fathers who had reservations against a spherical Earth and can find no Fathers who actually espoused a flat Earth, they consistently exaggerate the evidence. Instead of admitting their lack of a sufficient and convincing patristic witness, they and their followers make grandiose blanket conclusions, such as, “the Fathers believed in a flat Earth,” or, as one individual who sent me an email after seeing the Flat-Trad website said, “They [the Fathers] almost unanimously accepted it to be flat. This video shows a selection of quotations.”³¹¹ In fact, many of their patristic citations for a flat Earth point out merely those Fathers who believed the sun and stars move around the Earth. But this is not a fact in contention among those who recognize that the Fathers had an absolute consensus on geocentrism. But the geocentrism of the Fathers has nothing to do with flat-earth geography.

The Flat-Earth Trads also commandeer quotes from the magisterium’s condemnation of Galileo in order to support a flat Earth. But those documents cannot be used as proof texts for a flat Earth, since although all the Fathers were geocentrists and the Church supported geocentrism and denied heliocentrism, neither group defended flat-earth geocentrism, much less addressed it. When the Flat-Trads web host was confronted with his attempt to conflate the two issues, he retorted:

We will continue to “conflate” Galileo and geo-centrism with flat earth. It was you geo-centrists who created this artificial division, which only came about in the 1500’s. It can be seen as an attempt to accept false modern science, and reconcile it with the Catholic Faith, in particular the literal interpretation of Genesis. The lack of motion of the earth and it’s centrality is an important stepping stone for many in coming to the flat earth. Everything that is true is ours. God created the earth flat. AMDG.³¹²

³¹¹ From my friend Jason F. in an email sent March 16, 2018.

³¹² In comment section of: https://www.youtube.com/watch?v=qS_GyIlqr-w

As we can see, for these particular flat-earththers, the ends justify the means, even if the means is a blatant falsehood. In other words, they believe it is legal and moral to make it appear the Catholic magisterium officially endorsed and indoctrinated a flat Earth, even when the Catholic magisterium, neither in Galileo's time nor at any time, has ever said a word about a flat Earth. In their minds, it is perfectly acceptable to assume that if the Church supported a motionless Earth against Galileo, then the Church also supported a flat Earth. This is little more than dishonest scholarship.

In another video, the Flat Earth Trads state: "In an earlier video, we gave clear citations from the Fathers of the Church which show their opposition to the idea of a round earth." Besides consistently conflating flat-earth geocentrism with the globe-earth geocentrism of the Fathers, the site references only three Fathers that it proposes held to a flat Earth, Lactantius, Chrysostom and Jerome.

As for Chrysostom, the quote cited by the Flat Earth Trads is noted below:

Chrysostom: "See how he raised up the minds of the believing Jews. For as they would be apt to imagine that we have no such tabernacle [as they had], see here (he says) is the Priest, Great, yea, much greater than the other, and who has offered a more wonderful sacrifice. But is not all this mere talk? Is it not a boast, and merely said to win over our minds? On this account he established it first from the oath, and afterwards also from 'the tabernacle.' For this difference too was manifest: but the Apostle thinks of another also, 'which' (he says) the Lord pitched and not man. *Where are they who say that the heaven whirls around? Where are they who declare that it is spherical? For both of these notions are overthrown here.*"³¹³

The problem here for the Flat-Trads is that Chrysostom is not talking about the Earth, but about heaven where Christ is serving as the eternal priest. Further, Chrysostom is not talking about the first or second heaven, which comprise the atmosphere and the celestial heavens, but about the third heaven where God dwells.³¹⁴ Apparently, there were some in Chrysostom's day who were saying that the third heaven from which Christ serves is

³¹³ *Homily on Hebrews*, Ch. 8, v. 1

³¹⁴ See St. Paul's reference to the "third heaven" in 2 Cor 12:2.

spherical and whirls around, the same as the first and second heaven are spherical and whirl around the Earth. But the understanding among the Fathers was that the unmoving third heaven is where God's throne is established and the unmoving Earth is his footstool (see Is 66:1: "Heaven is my throne and the earth is my footstool"). This arrangement necessitates that God's throne is immovable and not whirling around in circles. In any case, nowhere in his writings does Chrysostom explicitly teach the Earth is flat. Our best interpretation of his words is that the Earth is spherical, as is strongly suggested in this passage:

But where the king of all is concerned, *he who holds not a portion of the earth but the whole circuit of it*, or rather who comprehends it all in the hollow of his hand, and measures the Heavens with a span, who upholds all things by the word of His power, by whom all the nations are counted as nought, and as a drop of spittle...³¹⁵

As for Lactantius (245-325), the quotation in question is the following:

Lactantius: What course of argument, therefore, led them to the idea of the antipodes? They saw the courses of the stars travelling towards the west; they saw that the sun and the moon always set towards the same quarter, and rise from the same. But since they did not perceive what contrivance regulated their courses, nor how they returned from the west to the east, but supposed that the heaven itself sloped downwards in every direction, which appearance it must present on account of its immense breadth, they thought that the world is round like a ball, and they fancied that the heaven revolves in accordance with the motion of the heavenly bodies; and thus that the stars and sun, when they have set, by the very rapidity of the motion of the world are borne back to the east. Therefore they both constructed brazen orbs, as though after the figure of the world, and engraved upon them certain monstrous images, which they said were constellations. It followed, therefore, from this rotundity of the heaven, that the earth was enclosed in the midst of its curved surface. But if this were so, the earth also itself must be like a globe; for that could not possibly be anything but round, which was held enclosed by that which was round. But if the earth also were round, it must necessarily happen that it should present the same appearance to all parts of the heaven; that is, that it should raise aloft mountains, extend plains,

³¹⁵ *Two Exhortations to Theodore*, 12

and have level seas. And if this were so, that last consequence also followed, that there would be no part of the earth uninhabited by men and the other animals. Thus the rotundity of the earth leads, in addition, to the invention of those suspended antipodes.

But if you inquire from those who defend these marvelous fictions, why all things do not fall into that lower part of the heaven, they reply that such is the nature of things, that heavy bodies are borne to the middle, and that they are all joined together towards the middle, as we see spokes in a wheel; but that the bodies which are light, as mist, smoke, and fire, are borne away from the middle, so as to seek the heaven. I am at a loss what to say respecting those who, when they have once erred, consistently persevere in their folly, and defend one vain thing by another; but that I sometimes imagine that they either discuss philosophy for the sake of a jest, or purposely and knowingly undertake to defend falsehoods, as if to exercise or display their talents on false subjects. But I should be able to prove by many arguments that it is impossible for the heaven to be lower than the earth, were it not that this book must now be concluded, and that some things still remain, which are more necessary for the present work. And since it is not the work of a single book to run over the errors of each individually, let it be sufficient to have enumerated a few, from which the nature of the others may be understood.”³¹⁶

Although in none of his writing does Lactantius say he believes the shape of the Earth is a flat disc, the above passage certainly implies that he believes the globe concept came from those who were promoting the “antipodes,” namely, the idea that men on opposite sides of the world would be standing with their head and feet (“podes”) opposite (“anti”) each other. In Lactantius’ view, God made man upright and he is to remain upright, looking to the heavens, which are always above him, never below him. Whatever Lactantius’ motive for criticizing a spherical Earth, the fact remains, he does not give an alternative shape for the Earth, and he certainly does not say the Earth is flat. He may have believed that the proper alternative is a flat Earth, but he doesn’t say it explicitly. In fact, on such questions Lactantius desires to leave them unsettled:

³¹⁶ *Divine Institutes*, Book III, Ch. 24.

For to investigate or wish to know the causes of natural things — whether the sun is as great as it appears to be, or is many times greater than the whole of this earth; also whether the moon be spherical or concave; and whether the stars are fixed to the heaven, or are borne with free course through the air; of what magnitude the heaven itself is, of what material it is composed; whether it is at rest and immoveable, or is turned round with incredible swiftness; *how great is the thickness of the earth, or on what foundations it is poised and suspended* — to wish to comprehend these things, I say, by disputation and conjectures, is as though we should wish to discuss what we may suppose to be the character of a city in some very remote country, which we have never seen, and of which we have heard nothing more than the name. If we should claim to ourselves knowledge in a matter of this kind, which cannot be known, should we not appear to be mad, in venturing to affirm that in which we may be refuted? *How much more are they to be judged mad and senseless, who imagine that they know natural things, which cannot be known by man!*³¹⁷

And at one point, Lactantius may be implying he believes the Earth is a globe, even while he is denouncing the Greeks who use the globe and the heavens for astrology:

Xenophanes most foolishly believed mathematicians who said that the orb of the moon was eighteen times larger than the earth; and, as was consistent with this folly, he said that within the concave surface of the moon there was another earth, and that there another race of men live in a similar manner to that in which we live on this earth. Therefore these lunatics have another moon, to hold forth to them a light by night, as this does to us. *And perhaps this globe of ours* may be a moon to another earth below this.³¹⁸

Some also attempt to commandeer **Augustine** to a flat Earth view due to the antipode issue. Leo Ferrari, for example, says that due to Augustine's reluctance to accept antipodes, he concludes that it represents an "antipathy of Augustine for the global shape of the earth."³¹⁹ But it is certainly not axiomatic that Augustine's antipathy for antipodes means he had an

³¹⁷ *Divine Institutes*, Bk III, Ch. 3.

³¹⁸ *Divine Institutes*, Bk III, Ch. 23

³¹⁹ Ferrari, "Augustine's Cosmography," p. 148, n. 6.

antipathy for a spherical Earth. It is simply a logical fallacy to assume so, but when it comes to collecting adherents to a flat Earth view, most flat-earthers become quite irrational by latching on to the flimsiest of evidence since obviously the Fathers and medievals who can even remotely be elevated to support their view can be counted on less than one hand. As Nothaft notes about Ferrari's attempt:

What seems clear is that the prime target of his (Lactantius') criticism was not so much the shape of the earth as the existence of Antipodes, an idea which Augustine likewise denied. In *The City of God*, he introduces the Antipodes as "men on the other side of the earth, where the sun rises when it sets for us, who plant their footsteps opposite ours," immediately adding that "there is no rational ground to believe this." His rejection of the idea was grounded in his belief in the unity of mankind as descendants from Adam, which would have been seriously challenged by the existence of another race of humans in far away and unreachable regions of the world. That there had to be such regions was sometimes inferred from the spherical shape of the earth: since all parts of the earth's surface were at the same distance from the center of the universe, they had to be all alike in being inhabited by humans.³²⁰

The Flat-Trads have produced another video with numerous errors and false statements. The author first states:

It is important to state clearly that the Church was flat Earth for the first fifteen hundred years of its existence. In fact, there have always been Catholics who have been flat Earth up to the present day, albeit, keeping quiet about it. The reason is simple – because it is the truth and God has made man for the truth.³²¹

It is one thing for this group to find a few Church Fathers who have questioned whether the Earth is a sphere; it is quite another for them to claim that, "the Church was flat Earth for the first 1500 years of its existence." The fact is, the "Church" has never made an official statement that the Earth is either flat or spherical. If, rather, the intent of the Flat Trads is to use the word "Church" for the Fathers and medievals that populated the Church for 1500 years, they are still no closer to the truth. As we have seen in our

³²⁰ Nothaft, *op. cit.*, p. 47.

³²¹ https://www.youtube.com/channel/UC5PWV08iRyvVnhLMvi_faew

comprehensive survey of the Church Fathers, not one of them wrote explicitly that he believed in a flat Earth. Moreover, the Church promoted the geocentric Ptolemaic model since it kept the Earth motionless and central, in accord with how the Church understood the Bible's declarations about the Earth's position in the universe. The Ptolemaic view understood the Earth to be a sphere in the center of the universe. Ptolemy's model didn't change to any degree until hundreds of years later when certain scientists, among them Galileo, realized that Ptolemy's model could not account for the phases of Venus. This fact led them to adopt the Tychonian model that put Venus in the right position and kept Earth in the center, which model was invented in secular circles in the early 1600s by the famous Danish astronomer Tycho Brahe, but had already been taught by St. Hildegard of Bingen in the 1100s.³²² In any case, there was no Catholic of any import who was espousing a flat Earth.

Theophilus of Antioch: And the writers, not knowing these things, are forward to maintain that the world is shaped like a sphere, and to compare it to a cube. But how can they say what is true regarding these things, when they do not know about the creation of the world and its population? Men gradually increasing in number and multiplying on the earth, as we have already said, the islands also of the sea and the rest of the countries were inhabited.³²³

As we saw with Lactantius, Chrysostom and Jerome, Theophilus does not state that he believes in a flat Earth. It is one thing for exegetes like Lactantius or Theophilus to question a spherical Earth, but it is quite another for anyone to claim these Fathers explicitly taught and believed the Earth is flat. As we can readily see, a few of them question the Greek affirmation that the Earth is spherical, but (1) they do not state the Earth is flat, and (2) they form their doubts based on peripheral issues (e.g., antipodes, astrology), as Theophilus does above by questioning how the Greeks could

³²² See my book, *The Geocentric Universe According to St. Hildegard*, CAI Publishing, Inc., 2014. Some flat-earthers falsely claim that Copernicus was the first to introduce the spherical Earth; at the same time claiming that all major religions prior to Copernicus believed in a flat Earth model (e.g., Mark Sargent at <https://www.youtube.com/watch?v=4SIRsbQ3nfM&bpctr=1524251001> in "Flat Earth Clues" at 56:51f).

³²³ *Theophilus to Autolycus*, Bk 2, 32.

arrive at a spherical Earth if they don't know (*i.e.*, don't have divine revelation) about how God created the world; and also about how the human population spread about the Earth. It certainly would not be out of the realm of educated guesses that once Theophilus received an answer to his questions, he could be persuaded that a spherical Earth *is precisely* how God created the world since it is the most physically economical and scientifically sound form for a large body to have in order to exist stably. In either case, it cannot be said that Theophilus espoused a flat Earth, for he simply doesn't say so.

Methodius is the last Church father on the list to investigate. His reference to the Earth being a globe is mentioned in chapter 14 of his *Banquet of the Ten Virgins*, but in a rather oblique manner. He states that “imposters” believe the Earth and the universe are spherical, but when read carefully, he is not discounting this particular view of the universe, but only what these “imposters,” following the Chaldeans and Egyptians, ascribe to the circular shape, namely, a fatalism for humankind that is based on the placement of the stars, much like how people of the modern age believe in horoscopes based on the signs of the Zodiac. As such, the spherical shape of the Earth and universe appears to be accepted by Methodius, but he rejects how these “imposters” turn the circular shape into a horoscope.

Methodius: Chapter 14. The Doctrine of Mathematicians Not Wholly to Be Despised, When They are Concerned About the Knowledge of the Stars; The Twelve Signs of the Zodiac Mythical Names.

Thekla. Resuming then, let us first lay bare, in speaking of those things according to our power, the imposture of those who boast as though they alone had comprehended from what forms the heaven is arranged, in accordance with the hypothesis of the Chaldeans and Egyptians. *For they say that the circumference of the world is likened to the turnings of a well-rounded globe, the earth having a central point.* For its outline being spherical, it is necessary, they say, since there are the same distances of the parts, that the earth should be the centre of the universe, around which, as being older, the heaven is whirling. For if a circumference is described from the central point, which seems to be a circle — for it is impossible for a circle to be described without a point, and it is impossible for a circle to be without a point — surely the earth consisted before all, they say, in a state of chaos and disorganization.

Now certainly the wretched ones were overwhelmed in the chaos of error, “because that, when they knew God, they glorified Him not as God, neither were thankful; but became vain in their imaginations, and their foolish heart was darkened” (Romans 1:21) and their wise men said that nothing earth-born was more honourable or more ancient than the Olympians. Whence they are not mere children who know Christ, like the Greeks, who, burying the truth in fairies and fictions, rather than in artistic words, ascribing human calamities to the heavens, are not ashamed to describe the circumference of the world by geometrical theorems and figures, and explain that the heaven is adorned with the images of birds and of animals that live in water and on dry land, and that the qualities of the stars were made from the calamities of the men of old, so that the movements of the planets, in their opinion, depended upon the same kind of bodies. And they say that the stars revolve around the nature of the twelve signs of the Zodiac, being drawn along by the passage of the circle of the Zodiac, so that through their intermingling they see the things which happen to many, according to their conjunctions and departures, their rising and setting.

For the whole heaven being spherical, and having the earth for its central point, as they think, because all the straight lines from the circumference falling upon the earth are equal to one another, holds back from the circles which surround it, of which the meridian is the greatest; and the second, which divides it into two equal parts, is the horizon; and the third, which separates these, the equinoctial; and on each side of this the two tropics, the summer and the winter — the one on the north, and the other on the south. Beyond is that which is called the axis, around which are the greater and lesser Bears, and beyond them is the tropic. And the Bears, turning about themselves, and weighing upon the axis, which passes through the poles, produce the motion of the whole world, having their heads against each other’s loins, and being untouched by our horizon.

Then they say that the Zodiac touches all the circles, making its movements diagonally, and that there are in it a number of signs, which are called the twelve signs of the Zodiac, beginning with the Ram, and going on to the Fishes, which, they say, were so determined from mythical causes; saying that it was the Ram that conveyed Helle, the daughter of Athamas, and her brother Phryxos into Scythia; and that the head of the Ox is in honour of Zeus, who, in the form of a Bull, carried over Europe into Crete; and they say the circle called the Galaxy, or

milky way, which reaches from the Fishes to the Ram, was poured forth for Herakles from the breasts of Hera, by the commands of Zeus. And thus, according to them, there was no natal destiny before Europe or Phryxos, and the Dioscuroi, and the other signs of the Zodiac, which were placed among the constellations, from men and beasts. But our ancestors lived without destiny. Let us endeavour now to crush falsehood, like physicians, taking its edge off, and quenching it with the healing medicine of words, here considering the truth.³²⁴

Chapter 15. Arguments from the Novelty of Fate and Generation; That Golden Age, Early Men; Solid Arguments Against the Mathematicians.

If it were better, O wretched ones, that man should be subject to the star of his birth, than that he should not, why was not his generation and birth from the very time when the race of man began to be? And if it was, what is the need of those which had lately been placed among the stars, of the Lion, the Crab, the Twins, the Virgin, the Bull, the Balance, the Scorpion, the Ram, the Archer, the Fishes, the Goat, the Watercarrier, Perseus, Cassiopeia, Cepheus, Pegasus, Hydra, the Raven, the Cup, the Lyre, the Dragon, and others, from which you introduce, by your instructions, many to the knowledge of mathematics, or, rather, to a knowledge which is anathema? Well, then, either there was generation among those before, and the removal of these creatures above was absurd; or else there was not, and God changed human life into a better state and government than that of those who before that lived an inferior life. But the ancients were better than those of the present time; whence theirs was called the golden age. There was then no natal destiny.

If the sun, driving through the circles and passing along the signs of the Zodiac in his annual periods, accomplishes the changes and turnings of the seasons, how did those who were born before the signs of the Zodiac were placed among the stars, and the heaven was adorned with them, continue to exist, when summer, autumn, winter, and spring, were not as yet separated from each other, by means of which the body is increased and strengthened? But they did exist, and were longer lived and stronger than those who live now, since God then disposed the seasons in the same manner. The heaven was not then diversified by such shapes.

³²⁴ *Banquet of the Ten Virgins*, Discourse 8, Ch. 14.

*If the sun and the moon and the other stars were made for the division and protection of the members of the time, and for the adornment of the heaven, and the changes of the seasons, they are divine, and better than men; for these must needs pass a better life, and a blessed and peaceful one, and one which far exceeds our own life in righteousness and virtue, observing a motion which is well-ordered and happy. But if they are the causes of the calamities and mischief of mortals, and busy themselves in working the lasciviousness, and the changes and vicissitudes of life, then they are more miserable than men, looking upon the earth, and their weak and lawless actions, and doing nothing better than men, if at least our life depends upon their revolutions and movements.*³²⁵

Agreeing with our thesis that Methodius is not rejecting a spherical Earth but is rejecting the astrology and fatalism the ancient cultures were attaching to it, Nothaft argues a similar case:

...the notion of the earth's sphericity came under attack from certain Christian quarters during late antiquity. The center of dissent can be located in the exegetical school of Antioch, whose members professed a literal reading of Genesis, tied to a strong skepticism towards the explanations of the structure of the cosmos offered by pagan philosophers. An important witness to the roots of this tradition is Photius of Constantinople, who informs us about the lost tract *Against Fate* by Diodore, who became bishop of Tarsus in 378. It appears that Diodore saw an intrinsic connection between deterministic astrology, which he—like most Christian writers—rejected, and the pagan doctrine of a spherical universe. In order to back up his conviction that the heaven was shaped like a tent rather than a sphere, he produced “testimonies drawn from Scripture, not just concerning the form of the heaven, but also on the rising and setting of the sun.” Photius was markedly critical of Diodore, noting that he was undoubtedly “a true believer,” but that his scriptural proofs were lacking in cogency.³²⁶

³²⁵ *Banquet of the Ten Virgins*, Discourse 8, Ch. 15.

³²⁶ Photius' comments about Diodore in his original Greek are: Μὴ σφαῖραν δὲ τὸν οὐρανὸν ἔναι, ἀλλὰ σκηνῆς καὶ καμάρας διασῶζειν. Καὶ ταύτης τῆς ὑπολήψεως γραφικὰς, προβάλλει μαρτυρίας, οὐ μόνον περὶ τοῦ σχήματος, ἀλλὰ καὶ περὶ δύσεως καὶ περὶ ἀνατολῆς ἡλίου ... Ἐξ οὗ εὐσεβοῦντα μὲν τὸν ἄνδρα, οἷς κέχρηται, θεῖν ἂν τις. ἀκριβεῖα δὲ λογισμῶν τὴν τῶν γραφικῶν μαρτυρίαν προτείνειν οὐκέτι ὁμοίως φήσει. My translation: [Diodore believes]

So here we see that just like today, there are a minority of Christians who question whether the Earth is a sphere. This divergence is to be expected since in some cases the scriptural evidence is more implicit than explicit. But the fact remains that those who questioned its sphericity were in the very small minority. According to Nothaft,

There is some evidence that Diodore of Tarsus passed on his cosmological views to his students, which included Theodore of Mopsuestia (c. 350–428/29) and John Chrysostom (c. 345–407). In his tract *On the Creation of the World* (546/60), John Philoponus repeatedly criticizes Theodore [of Mopsuestia]³²⁷ and his school for their use of biblical citations in an effort to contradict the spherical cosmology of the philosophers.³²⁸

That Chrysostom held similar views to Diodore and Theodore concerning the earth's flatness becomes apparent from his references to the world as a cosmic tabernacle.³²⁹ An even clearer picture is provided by one of Chrysostom's contemporaries (and personal rivals), Severianus of Gabala (d. after 408), whose *Homilies on Genesis* depict a tabernacle-shaped universe with a flat earth at the bottom.³³⁰

Nothaft mistakenly cites Homily 34 of the *Epistle to the Hebrews*, but it is actually Homily 14. In any case, Nothaft makes the same mistake that the "Flat Earth Trads" did above with Chrysostom. To reiterate, Chrysostom states:

"the heavens are not spherical, but a tent and an arch for safety, and that this is what is left to us in Scripture, to put forth a testimony, not only about the form, but about the setting and rising of the sun....From which the pious man, who having struggled whether he is accurately interpreting the Scripture evidence, it does not appear to be correct."

³²⁷ Theodore of Mopsuestia is also known as Theodore the Interpreter. He was of the Antiochian school of literal exegesis. Few of his commentaries have survived, but Philoponus was most likely referring to Theodore's commentary on the first chapters of Genesis, which remains untranslated.

³²⁸ Nothaft citing, Johannes Philoponos, *De opificio mundi* (3.10), ed. W. Reichhardt (Leipzig: Teubner, 1897), 131–141.

³²⁹ Nothaft citing, John Chrysostom, *Homiliae XXXIV in Epistolam ad Hebraeos*, *Patrologia Graeca* 63, 109–111.

³³⁰ Nothaft citing, Severian of Gabala, *In mundi creationem orationes*, *Patrologia Graeca* 56, 441–443, 452–454.

On this account he established it first from the oath, and afterwards also from ‘the tabernacle.’ For this difference too was manifest: but the Apostle thinks of another also, ‘which’ (he says) the Lord pitched and not man. *Where are they who say that the heaven whirls around? Where are they who declare that it is spherical? For both of these notions are overthrown here.*”³³¹

Once again, Chrysostom is not talking about the Earth at all, but about heaven where Christ is serving as the eternal priest. Further, Chrysostom is not talking about the first or second heaven, which comprise the atmosphere and the celestial heavens, but about the third heaven where God dwells. Chrysostom’s arrangement necessitates that God’s throne is immovable and not whirling around in circles. Moreover, as we saw with Clement of Alexandria, to picture the heavens as a tabernacle does not preclude a spherical Earth and does not necessarily suggest a flat Earth. This fact was made evident when Clement stated the Earth was “in the middle of the universe,” yet it could not be if the universe was a dome placed over a flat disc.

As for Nothaf’s comment that Severian “depicted a tabernacle-shaped universe with a flat earth at the bottom,” we first note from *New Advent Catholic Encyclopedia*,

It is unfortunate that his name [Severian] is associated indelibly with the Flat Earth. He owes this to the uncritical enthusiasm of Cosmas Indicopleustes, whose *Christian Topography* has attracted derision since its composition. But Severian undoubtedly was not thus committed to his own idea.³³²

Whereas *New Advent* is equivocal on Severian, Wikipedia, not so careful in this instance, states that Severian believed in a flat Earth:

Severian belonged to the Antiochene school of exegesis, and his interpretations can be very literal. He is notorious for his six sermons on

³³¹ *Homily on Hebrews*, Ch. 8, v. 1

³³² http://www.tertullian.org/fathers/severian_of_gabala_genesis_01.htm, fn #1.

the Creation, in which he expresses “absurdly literal” views including support for the Flat Earth.³³³

Wikipedia’s proof cites J. L. E. Dreyer’s, *A History of Planetary Systems* (1906) in which Dreyer says:

Severianus, Bishop of Gabala, speaks out even more strongly and in more detail in his *Six Orations on the Creation of the World*....The heaven is not a sphere, but a tent or tabernacle; “it is He...that stretcheth out the heavens as a curtain and spreadeth them out as a tent to dwell in [Is 40:22]; the Scripture says that it has a top, which a sphere has not, and it is also written: “The sun was risen upon the earth when Lot came into Zoar [Gn 19:23].” The earth is flat and the sun does not pass under it in the night, but travels through the northern parts “as if hidden by a wall,” and he quotes: “The sun goeth down and hasteth to his place where he ariseth [Ec 1:5].” When the sun goes more to the south, the days are shorter and we have winter, as the sun takes all the longer to perform his nightly journey [Servian, III, 5].³³⁴

The following are Severian’s actual words:

He did not create heaven as a sphere, as the idle talkers claim; he did not make it as a sphere moving on its axle. Rather, as the prophet asks, what course does the sun follow? ‘He arches the heaven like a curved roof and extends it like a tent.’ None of us is so impious as to be convinced by idle talkers. The biblical author says that heaven has a beginning and an end; hence the sun does not climb—it travels. Scripture says, ‘The sun had emerged upon the earth when Lot entered Zoar’; so it is obvious that the sun emerged, as Scripture says, and did not climb. And again, ‘from the furthest point of heaven was its emergence,’ not its ascent: if it were a sphere, it would not have a furthest point; what is the furthest point of something completely circular? Surely it is not only David who says this, therefore, or even the Savior? Listen to his words: ‘When the Son of man comes in his glory, he will send his angels with a loud trumpet call, and they will gather his elect from one end of heaven to the next.

Now, let us inquire where the sun sets and where it travels at night. According to the pagans, under the earth; according to us, since we claim

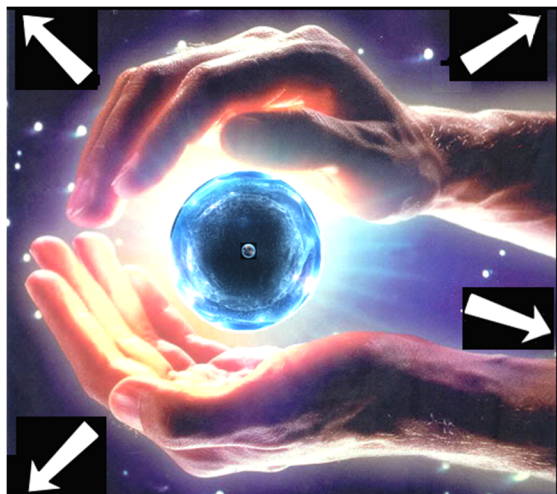
³³³ https://en.wikipedia.org/wiki/Severian_of_Gabala

³³⁴ J. L. E. Dreyer, *A History of Astronomy from Thales to Kepler*, Dover Pub. 1953, pp. 211-212.

heaven is a tent, where? Pay attention, I beg you, as to whether that view is false...Think of it in terms of a curved roof superimposed: east is in one direction, as the pattern requires, north another, south another, west another. When the sun rises and is destined to set, instead of setting under the earth it proceeds to the ends of heaven, travels to the northern regions, concealed as it were by a wall since the water prevent its course being visible, traverses the northern regions and reaches the east. How is this known to us? Blessed Solomon says in Ecclesiastes, a text that is authentic, not spurious, ‘The sun rises, and the sun sets; on rising, it travels to its setting, and goes around to the north. It goes round and round, and rises in its place.’ (Ec 1:1-5).....On setting at the furthest point of setting, conversely, it has to cover all the west and all the north in its circle through the night to reach the furthest point of the south, the inevitable result being a long night....The pagan savants did not teach us this, nor is that their view; rather, they claim that the stars and the sun travel under the earth.³³⁵

First, we see that the sentence, “The earth is flat and the sun does not pass under it in the night...” is not Severian’s but Dreyer’s interpretation of the scriptural passages that Severian cites. Severian and many other Fathers acknowledge Scripture’s stipulation that God stretched the heavens out as a tent but this does not necessarily mean they believed the Earth was the ground so that the tent’s pegs, as it were, were placed at the extremities of a flat Earth. Rather, the focus of Is 40:22 is the *stretching* of the heavens, as if one were to stretch a flexible skin or expand a tent canvas. Whether the Earth in this analogy is the ground or is an object hanging in the middle of the space created by the tent (as is suggested in Job 26:7: “He stretches out the north over the void, and hangs the earth upon nothing”) is not the point of the passage. But if it were the point, since the heavens are spherical, then they were most likely stretched from a much smaller sphere.

³³⁵ *Commentary on Genesis*, Book 1, Homily 3, taken from *Ancient Christian Texts, Commentaries on Genesis 1-3*, ed. Michael Glerup, translated by Robert C. Hill, IVP Academic, Illinois, 2010, p. 44.



Second, all the passages that Severian quotes from Scripture can easily be interpreted from a globe model. For example, as Dryer interpolates Severian to mean “the earth is flat and the sun does not pass under it in the night but travels... ‘as if hidden by a wall,’ thus implying that “hidden by a wall” necessarily means

that only a flat Earth could act as the “wall,” is simply not so. Obviously, a sun on the opposite side of a spherical Earth from where the viewer is located is also going to act like a “wall” when it is night.

Lastly, *New Advent*’s comment that “Severian undoubtedly was not committed to his own idea [of a flat earth]” is presumptuous. The fact is that Severian never mentions the Earth as being flat. Neither the words “flat Earth” or anything similar appear in Severian’s whole commentary on Genesis 1-3. Being a devout follower of Chrysostom (to the point that some of their writings are mistakenly interchanged) we must assume that Severian, in the following description of the heavens, could have regarded the relationship of the heavens and Earth in the same way as Chrysostom (which Nothaft equally misrepresented):

For example, he made the heavens that previously did not exist, not the current heavens, but the heavens which are above it; the other he made on the second day. He made the upper heavens about which David sang: “The heaven of the heavens is the Lord’s.” This heaven forms in a certain way the upper stage of the firmament. As in any two-story house, there is an intermediate stage; well in this building which is the world, the Creator has prepared the sky as an intermediate level, and he has put it over the waters; from where this passage of David: “It is you who covered with water its upper part.” So God made the sky which did not exist before, the earth which did not exist before, as well as the depths of

the sea, the winds, air, fire and water. On the first day, the material of everything which appeared afterwards was created.

The best that can be concluded about Severian's view is that he is silent about the shape of the Earth but that he understood the heavens as hemispherical. There simply is no evidence to prove otherwise.

Venerable Bede: We call the earth a globe, not as if the shape of a sphere were expressed in the diversity of plains and mountains, but because, if all things are included in the outline, the earth's circumference will represent the figure of a perfect globe... For truly it is an orb placed in the centre of the universe; in its width it is like a circle, and not circular like a shield but rather like a ball, and it extends from its centre with perfect roundness on all sides.³³⁶

Venerable Bede: "...let them remember that on the upper part of the same earth, which even now the daily light of the sun illumines, the very first light shone forth."³³⁷

Venerable Bede: "It is true that he did not dispel all the darkness of the world as the light increased—for it is appointed for the celestial world to enjoy thoroughly the eternal light—but illuminating it in one part, he left another dark, and directly it is added, 'And God separated the light from the darkness.' He separated them not only on the basis of their nature but also according to place, that is, by diffusing the light on regions in the upper part of the world where humans were going to live and by allowing the lower regions to remain in their former darkness."³³⁸

Venerable Bede: "Evening was made as the light gradually set after it had completed its daily course and entered the lower parts of the world, which now is done at night because of the customary circuit of the sun. Morning is made as the same light gradually returns over the lands and begins another day. At this point one day is completed, namely, twenty-four hours. But its careful choice of words the Scripture encourages us to understand that the light that has been created crossed the lower regions of the earth by its own setting, for it did not do this, but rather, when the evening came, little by little it disappeared totally and little by

³³⁶ Jeffrey Russell, *Inventing the Flat Earth*, New York: Praeger, 1991. p. 87.

³³⁷ *Ibid.*, p. 117.

³³⁸ *Ibid.*, p. 118.

little reappeared again in the morning, Scripture no longer could say that one day had been completed in the morning of the following day, but rather it was completed in the evening of the first.”³³⁹

Odd as it may seem, Bede appears to believe that only on the upper half of the spherical Earth did humans live. In any case, he shows that as the sun moved from one hemisphere to the other during a 24-hour period, the day and night rhythm was sustained.

Bede also wrote in *De temporum ratione* (“The Reckoning of Time”) that the Earth was round...

...not merely circular like a shield [or] spread out like a wheel, but resembl[ing] more a ball” “the roundness of the Earth, for not without reason is it called ‘the orb of the world’ on the pages of Holy Scripture and of ordinary literature. It is, in fact, set like a sphere in the middle of the whole universe.”³⁴⁰

As Wikipedia notes:

The large number of surviving manuscripts of *The Reckoning of Time*, copied to meet the Carolingian requirement that all priests should study the computus, indicates that many, if not most, priests were exposed to the idea of the sphericity of the Earth.³⁴¹

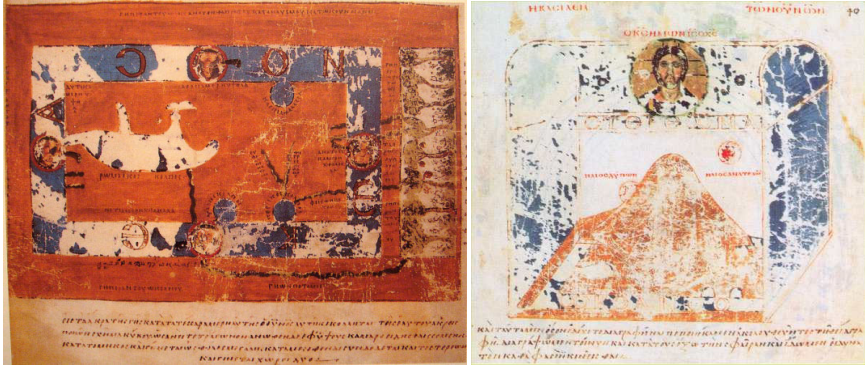
³³⁹ *Ibid.*, p. 118.

³⁴⁰ *De temporum ratione*, 32.

³⁴¹ *Bede: The Reckoning of Time*, translated by Faith Wallis, Liverpool: Liverpool University Press, 2004, pp. lxxxv–lxxxix. Wikipedia also notes: “Ælfric of Eynsham paraphrased Bede into Old English, saying, “Now the Earth’s roundness and the sun’s orbit constitute the obstacle to the day’s being equally long in every land,” (Ælfric of Eynsham, *On the Seasons of the Year*, translated by Peter Baker, nd).

Cosmas Indicopleustes

Cosmas Indicopleustes (c. 550) seems to be the only Christian who explicitly espoused a flat earth, although he held no office in the Church. He is an eastern Greek Christian whose name translates as “Cosmas the Indian Voyager,” but is also known as “Cosmas the Monk.” He wrote the *Christian Topography*, which contained some of the earliest maps known of the world, most of which were based on his travels as a merchant.



Cosmas' Map of the World

As noted by Wikipedia:

A major feature of his *Topographia* is Cosmas' worldview that the world is flat, and that the heavens form the shape of a box with a curved lid. He was scornful of Ptolemy and others who held that the world was spherical. Cosmas aimed to prove that pre-Christian geographers had been wrong in asserting that the earth was spherical and that it was in fact modeled on the tabernacle, the house of worship described to Moses by God during the Jewish Exodus from Egypt. However, his idea that the earth is flat had been a minority view among educated Western opinion since the 3rd century BC.³⁴² Cosmas' view was never influential even in religious circles; a near-contemporary Christian, John Philoponus, disagreed with him as did many Christian philosophers of the era.³⁴³ David C. Lindberg asserts: 'Cosmas was not particularly influential in Byzantium, but he is important for us because he has been

³⁴² Jeffrey Russell, *The Myth of the Flat Earth*, American Scientific Affiliation

³⁴³ *Encyclopædia Britannica*, 2008, O.Ed, Cosmas Indicopleustes.

commonly used to buttress the claim that all (or most) medieval people believed they lived on a flat earth. This claim...is totally false. Cosmas is, in fact, the only medieval European known to have defended a flat earth cosmology, whereas it is safe to assume that all educated Western Europeans (and almost one hundred percent of educated Byzantines), as well as sailors and travelers, believed in the earth's sphericity.³⁴⁴

Nothaft adds:

...the views of Diodore and Cosmas can hardly be taken as representative. Cosmas in particular was obviously well-acquainted with the spherical model, which he sometimes describes in great detail in order to refute it, and the polemical tone of his *Topography* suggests that it [the spherical model] remained the dominant view in his own time, that is, even among Christians. His resistance to this picture is hence best viewed as an attack from the intellectual periphery, maybe not too dissimilar to the efforts of nineteenth-century flat earthers to challenge conventional wisdom.³⁴⁵

Andrew Dickson White assessed Cosmas' view with his usual secular turpitude:

According to Cosmas, the earth is a parallelogram, flat, and surrounded by four seas. It is four hundred days' journey long and two hundred broad. At the outer edges of these four seas arise massive walls closing in the whole structure and supporting the firmament or vault of the heavens, whose edges are cemented to the walls. These walls enclose the earth and all the heavenly bodies....Nothing can be more touching in its simplicity than Cosmas' summing up of his great argument, He declares, "We say therefore with Isaiah that the heaven embracing the universe is a vault, with Job that it is joined to the earth, and with Moses that the length of the earth is greater than its breadth." The treatise closes with rapturous assertions that not only Moses and the prophets, but also angels and apostles, agree to the truth of his doctrine, and that at the last day God will condemn all who do not accept it.

³⁴⁴ Lindberg, *The Beginnings of Western Science, 600 B.C. to A.D. 1450*, p. 161

³⁴⁵ Nothaft, *op. cit.*, p. 39, with citation from Cosmas', *Topographie* (1.3), 1:275-277 (n. 18).

Other secular writers went a step further and tried to make Cosmas' view of a flat-earth as if it were the standard followed by the medieval church so as to make the church look primitive, yet all the while knowing the church had followed Ptolemy's view of the universe, complete with his spherical Earth. As noted by Ian Taylor:

One of the most successful books published in America in the past two decades is *The Discoverers*, by Daniel Boorstin, former head of the U.S. Library of Congress. He makes the following statement concerning the history of human perception of the geography of the world: "A Europe-wide phenomenon of scholarly amnesia...affected the continent from AD 300 to at least 1300. During those centuries Christian faith and dogma suppressed the useful image of the world that had been so slowly, so painfully, and so scrupulously drawn by ancient geographers." Boorstin points out that the Greeks had known the world was a sphere and had even worked out its circumference reasonably accurately. He calls the time of "scholarly amnesia" the "Great Interruption" and adds that during this dark period the old idea that the world was flat was reintroduced and justified by verses of Scripture. He quotes as the Church authority Cosmas Indicopleustes. Boorstin's notion of history is typical of many, yet the facts have been available for many years and have even found their way into some textbooks.

Following these fourth and sixth-century writers nothing more is heard about the flat earth until 1828, when a struggling American writer named Washington Irving published his book on Christopher Columbus. Irving (1783-1859) was born in New York City and spent the first 32 years of his life there. He was a fiction writer, probably best known as the author of *Rip Van Winkle* and the *Legend of Sleepy Hollow*, which appeared as part of his *Sketch Book* in 1820. He left New York for Europe in 1815 and did not return to America until 1832. He spent several years in Paris and three years in Spain. While in Spain Irving was invited to translate a valuable collection of manuscripts relating to the voyage of Columbus. He made good use of his time and in 21 months had cobbled together a fine piece of fiction entitled *The Life and Voyages of Christopher Columbus*. It was published in 1828. Irving admitted that he was "apt to indulge in the imagination," and he had done so handsomely. The problem was the reader would have no idea which parts of the account were truth and which were Irving's imagination. The theme of the narrative was the victory of rationalism over ignorance and superstition.

The scene was set early in the book at the Council of Salamanca, with Columbus confronting the ecclesiastical authorities. Columbus did have to make a good case for his project in order to get funding. However, the issue was never, as Irving had projected, between a lone believer in a spherical earth and a phalanx of Bible-quoting hardheads convinced that the earth was flat. Columbus had fudged his figures more than just a bit to give the impression that the sailing distance between Europe and Japan was far less than was actually the case. Of course, at the time no one knew that the continent of America stood halfway between. The argument at the Council of Salamanca was over the figures Columbus had presented; it had nothing to do with the shape of the earth. Irving, however, “invented” an entirely different argument, concluding his story with the returning hero confounding the authorities by not having fallen off the edge of the world. This was the account of the Columbus expedition of 1492 as received by the popular press. As a fiction writer, Irving had written it so that it would sell. However, something more scholarly was required for the academic. Six years after Irving had published his work on Columbus, the Parisian scholar Antoine-Jean Letronne produced a work that later scholars could feel comfortable quoting.

Letronne (1787-1848) had studied at the Institute de Paris under Edmé Mentelle shortly after the Revolution in 1789. The Institute taught progressivism and the skeptical teachings of Voltaire, while Mentelle attracted a great deal of attention in 1798 with a book claiming that Jesus Christ was an imposter. Young Letronne had studied Latin, Greek and mathematics and became a scholar in his own right; he eventually obtained the chair of history at the Collège de France. In 1834 he published a 32-page article in the prestigious *Revue des Deux Mondes* on the Cosmographical Opinions of the Church Fathers. Of course, he had access to the writings of Lactantius and Cosmas Indicopleustes, which had been made available in Latin the previous century. In his article, Letronne made the flat earth of Lactantius the majority view among the Church Fathers, including Augustine, Ambrose and Basil. He claimed that under such an alleged reign of folly, astronomers were “forced” to believe that the earth was flat. All this was patently untrue, yet because he was a reputable scholar, no one checked his sources and the lie was repeated by scholar after scholar for the next two centuries. Between Irving and Letronne, the flat earth myth was cast and eagerly picked up by layman and scholar alike. Subsequent writers copied those before them and so reinforced the myth until it became a “well-known fact.”

We now come to John Draper and Andrew White writing in the latter part of the same century, again promoting the flat earth myth. Born in England, John William Draper (1811-1882) was the son of a Methodist preacher, but at an early age he rejected his Methodist background, moved to America and became head of the medical school at New York University. He convinced himself that with the downfall of the Roman Empire, the “affairs of men fell into the hands of ignorant and infuriated ecclesiastics, parasites, eunuchs and slaves.” These were the “Dark Ages,” and if the priest declared the earth to be flat, then flat it had to be or there was the Inquisition, which would remove all doubt! Draper’s diatribe was written when he was 63 and was directed particularly against the Roman Church. Entitled *History of the Conflict Between Religion and Science*, it was published in 1874 and became a best seller. In the United States 50 printings were produced during the next 50 years, and translations were made worldwide. This was a single-volume work for popular consumption; the work for scholars was produced by White in two volumes some 22 years later.

Andrew Dickson White (1832-1918) was brought up in a high church Episcopalian family in New York; as is often the case, he came to hate the Christianity he knew. In 1865 he founded Cornell University as the first explicitly secular university in the United States and became its first president when he was only 33. He spent an active life as educator, historian and diplomat, with an antipathy toward the Church. In 1897 he wrote a two-volume scholarly work, *History of the Warfare of Science with Theology in Christendom*. As did Draper, White assumed that there had been a continuing battle throughout the Christian era between the defenders of ignorance and the enlightened rationalists. His own bias against Christianity caused him to select his information, part of which was the myth of the flat earth.

While many will have lost their faith through the writings of such men as Irving, Draper and White, it is gratifying to know that the following encyclopedias now present the correct account of the Columbus affair: *The New Encyclopedia Britannica* (1985), *Colliers Encyclopedia* (1984), *The Encyclopedia Americana* (1987) and *The World Book for Children* (1989). But there is still a long way to go before the average student will know from his modern history textbooks that Christianity has been central to virtually all Western human activity, and thus an understanding of the Christian doctrine and the doctrines that oppose it is necessary for the understanding of history. The doctrine of the flat

earth is indeed a myth, invented not by the Church but by those wishing to discredit Christianity.³⁴⁶

A few more details on the Columbus affair are important. During Columbus' day, those in the know were not arguing over the Earth's shape; rather, its size. Since the Islamic nations had closed the trade routes to the Far East, the only way to Asia was to travel west over the perilous Atlantic ocean, which at that time everyone understood was about 9,000 miles away from Spain, not realizing, of course, that 3,000 of those miles contained the two undiscovered American continents. The prevailing view was that it would be a much shorter and safer journey to sail to Asia around Africa. Moreover, the small ships common during that day needed to sail close to the land to escape the dangerous waters of the oceans. But Columbus decided to risk the odds and sail over the uncharted Atlantic Ocean. To sell the idea, Columbus purposely increased the eastward distance to Asia and decreased Eratosthenes' figures for the Earth's circumference, thus presenting a shorter distance to Asia if one traveled west instead of east. Columbus prevailed, of course, and the rest is history.

Before we continue on our survey of the Church Fathers, we have one more issue to deal with concerning **John Chrysostom**. In his *Homilies on the Statues*, it appears Chrysostom says the Earth rests upon water. This question does not affect whether the Earth is flat or spherical since either shape could rest upon water, but it does call for explanation since the Wikipedia site that cites Chrysostom makes it appear he believed there is water beneath the whole Earth ;and the Earth is floating in this water but will not sink because of divine power. The Wikipedia author states:

Chrysostom, one of the four Great Church Fathers of the Eastern Church and Archbishop of Constantinople, explicitly espoused the idea, based

³⁴⁶ Ian Taylor at <http://www.creationmoments.com/content/inventing-flat-earth>. Taylor's sources include: Boorstin, Daniel. 1983. *The Discoverers*, New York: Random House; Draper, John W. 1874. *History of the Conflict Between Religion and Science*, New York: Appleton; Irving, Washington, 1829, *The Life and Voyages of Christopher Columbus*, New York: J. J. Harper; Morrison, Samuel Eliot, 1942, *Admiral of the Ocean Sea*, Boston: Little Brown, 2 vols; Russell, Jeffrey Burton, 1991, *Inventing the Flat Earth*, New York: Praeger, Greenwood Publishing; White, Andrew Dickson, 1896, *A History of the Warfare of Science with Theology in Christendom*, 2 vols. Reprint, 1978, Cloucester, MA: Peter Smith.

on scripture, that the Earth floats miraculously on the water beneath the firmament.³⁴⁷

The passage in question is recorded below:

7. ...All men, then, must admit that it is the course of nature for water to be supported on the earth, and not the earth on the waters. For the earth being a certain dense, hard, unyielding, and solid substance, is easily able to support the nature of water; but the water, which is fluid, and rare, and soft, and diffusive, and giving way to all it meets with, must be unable to support any solid body, though it were of the lightest kind. Often indeed when a small pebble falls upon it, it yields, and makes way, and sends it down to the bottom. When therefore you behold not a small pebble, *but the whole earth borne upon the waters, and not submerged, admire the power of Him who wrought these marvellous things in a supernatural manner! And whence does this appear, that the earth is borne upon the waters? The prophet declares this when he says, "He has founded it upon the seas, and prepared it upon the floods." And again: "To him who has founded the earth upon the waters."*

The passages to which Chrysostom refers are Psalm 24:1-2 ("The earth is the Lord's...for he has founded it upon the seas, and established it upon the rivers") and Psalm 136:6 ("to him who spread out the earth upon the waters").³⁴⁸ The Hebrew, which Chrysostom did not have, is more distinct:

For Psalm 24:2:

עַל־יַמִּים (upon the seas) יָסְדָהּ (founded) וְעַל־נְהַרֹת (upon the rivers) יָכֻנְנָהּ (established).

³⁴⁷ St. John Chrysostom, *Homilies Concerning the Statues*, Homily IX, paras. 7–8, in A Select Library of the Nicene and Post-Nicene Fathers of the Christian Church, Series I, Vol IX, ed. Philip Schaff, D.D., LL.D., American reprint of the Edinburgh edition (1978), W. B. Eerdmans Publishing Co., pp. 403–404.

³⁴⁸ As taken from the Revised Standard Version, 1951. Similar passages are: 4Esdras 16:58-59: "who has enclosed the sea in the midst of the waters, and by his word has suspended the earth over the water; who has spread out the heaven like an arch, and founded it upon the waters," although this passage is apocryphal; Is 51:13: "And thou hast forgotten the Lord thy maker, who stretched out the heavens, and founded the earth"; Psalm 104:5: "Thou didst set the earth on its foundations, so that it should never be shaken."

For Psalm 136:6

עַל־הַיָּם (upon the seas, waters) יָרַדְתָּ (the earth) לְרֹקַע (to him who spread)

The Septuagint is almost identical:

Psalm 23(24):2:

αὐτὸς ἐπὶ θαλασσῶν ἐθεμελίωσεν αὐτήν
He upon the seas established it

καὶ ἐπὶ ποταμῶν ἡτοίμασεν αὐτήν
and upon the rivers he founded it

Psalm 135(136):6:

τῷ στερεώσαντι τὴν γῆν ἐπὶ τῶν ὑδάτων
to him who made firm the Earth upon the waters

From these two verses, as well as the many others that speak of the foundation of the Earth, we are to understand that Scripture is not speaking of a distinct and vast body of water upon which the whole Earth rests. In fact, it would be impossible for the Earth to rest upon the water and not somehow be submerged in it, for as soon as one part of the Earth hit the water, it would be submerged up to that point. It would then just be a matter of how much the Earth is submerged. But the part that is submerged would necessarily be continually flooded. The only remedy to this flooding is if the Earth is suspended above the water, but then what purpose would the water have insofar as being a “foundation” for the Earth? Hence in either case the picture does not work.

We get a hint of what Scripture is actually teaching by noting that the literal translation from both the Hebrew and the Greek is not “waters” but “seas” and “rivers” in Psalm 24. As for Psalm 136, the Hebrew uses the same word as in Psalm 24, which is יָם, and thus should be translated “sea,” or “waters” that refer to the sea. The Greek, in turn, uses ὑδάτων (“waters”) in Psalm 136 to stand for both the “seas” and the “rivers” in Psalm 24.

What this combination of words means is that there is no separate body of water in which the Earth is either floating partially or is suspended above;

rather, that the land masses of the Earth are distributed between seas and rivers (as it was on the third day of creation) in such a way that the land masses do not sink beneath the water, whether the water is the sea or a river. The land masses will absorb only some water but not enough that would make them sink beneath the surrounding water. Additionally, the air that also resides inside the land masses will suffice to make all the land masses buoyant above the water. This is most likely what Chrysostom means, and if so, then his analysis is quite scientific.

Athanasius also says something similar to Chrysostom about the Earth being supported by water:

And wells, again, and rivers will never exist without the earth; but the earth is not supported upon itself, but is set upon the realm of the waters, while this again is kept in its place, being bound fast at the centre of the universe. And the sea, and the great ocean that flows outside round the whole earth, is moved and borne by winds wherever the force of the winds dashes it.³⁴⁹

Or who that sees the earth, heaviest of all things by nature, fixed upon the waters, and remaining unmoved upon what is by nature mobile, will fail to understand that there is One that has made and ordered it, even God? For water is by nature heavy, and tends to flow downwards, while the clouds are light and belong to the class of things which tend to soar and mount upwards. And yet we see water, heavy as it is, borne aloft in the clouds. And again, earth is very heavy, while water on the other hand is relatively light; and yet the heavier is supported upon the lighter, and the earth does not sink, but remains immoveable.³⁵⁰

The first thing we should notice, of course, is that Athanasius understands both that the Earth is spherical (“the great ocean that flows outside round the whole earth”) and that it is motionless in the center of universe (“kept in its place, being bound fast at the centre of the universe”). The second thing is that Athanasius refers only to “rivers” and “oceans,” which are precisely the two bodies of water mentioned in Psalm 24 and Psalm 136. There is not a third body of water anywhere mentioned in Athanasius’ context. These facts agree precisely with our above analysis that the land masses of the

³⁴⁹ Athanasius, *Against the Heathen*, Book 1, Part 1, 27.

³⁵⁰ Athanasius, *Against the Heathen*, Book 1, Part 3, 36.

Earth do not sink below the rivers and oceans by which it is surrounded due to the buoyancy the land has according to its constitution.

There are a few other Fathers who also spoke of the Earth being either surrounded by water or buoyed up by water. The consensus is that the water refers to oceans, lakes and rivers, not to a separate body of water under the Earth:

Eusebius: “Who has commanded the liquid water to sustain the heavy element of earth? Who has turned back the waters from their downward course, and carried them aloft in clouds?”³⁵¹

Gregory Nanzianzus: “How is it that the earth stands solid and unswerving? On what is it supported? What is it that props it up, and on what does that rest? For indeed even reason has nothing to lean upon, but only the Will of God.”³⁵²

Gregory Nanzianzus: And with respect to the Sea even if I did not marvel at its greatness, yet I should have marvelled at its gentleness, in that although loose it stands within its boundaries; and if not at its gentleness, yet surely at its greatness; but since I marvel at both, I will praise the Power that is in both. What collected it? What bounded it? How is it raised and lulled to rest, as though respecting its neighbour earth? How, moreover, does it receive all the rivers, and yet remain the same, through the very superabundance of its immensity, if that term be permissible? How is the boundary of it, though it be an element of such magnitude, only sand? Have your natural philosophers with their knowledge of useless details anything to tell us...”³⁵³

Gregory Thaumaturgus: “How can I stretch out the right hand upon You, who stretched out the heavens like a curtain, and set the earth above the waters?”³⁵⁴

Jerome: Tell me, sharpest of disputants, which is greater, to hang the vast weight of the earth on nothing, and to balance it on the changing surface of the waves; or that God should pass through a closed door, and the creature yield to the Creator? You allow the greater; you object to the

³⁵¹ Eusebius, *Oration in Praise of Constantine*, 11, 13

³⁵² *Oration 28*, XXVI.

³⁵³ *Oration 28*, XXVII.

³⁵⁴ *Four Homilies*, Fourth Homily.

less. Peter Matthew 14:28 walked upon the waters with his heavy and solid body. The soft water does not yield.³⁵⁵

Lactantius: “How much better, therefore, is it, leaving vain and insensible objects, to turn our eyes in that direction where is the seat and dwelling-place of the true God; who suspended the earth on a firm foundation, who bespangled the heaven with shining stars; who lighted up the sun, the most bright and matchless light for the affairs of men, in proof of His own single majesty; who girded the earth with seas, and ordered the rivers to flow with perpetual course!”³⁵⁶

Lactantius: “Then He founded the earth, and placed it under the heaven, as a dwelling-place for man, with the other races of animals. He willed that it should be surrounded and held together by water.”³⁵⁷

Venerable Bede: “...but the earth circumscribed on all sides by those same boundaries as it is now, was in the past completely submerged but now remains only partly under the deepest depths of the sea.”³⁵⁸

Related Celestial Issues Concerning the Church Fathers

- The Fathers knew that the moon reflected light and traveled in a circle around the Earth.

Gregory of Nyssa: “Do you not confidently maintain that it is so, because you have arrived by reasoning through phenomena at the conception of such and such a movement, of such distances of time and space, of such causes of eclipse? *And when you look at the waning and waxing moon you are taught other truths by the visible figure of that heavenly body, viz. that it is in itself devoid of light, and that it revolves in the circle nearest to the earth, and that it is lit by light from the sun;* just as is the case with mirrors, which, receiving the sun upon them, do not reflect rays of their own, but those of the sun, whose light is given

³⁵⁵ *To Pammachius Against John of Jerusalem*, 35.

³⁵⁶ *Divine Institutes*, Bk II, Ch. 5.

³⁵⁷ *Divine Institutes*, Bk II, Ch. 10.

³⁵⁸ *In Genesim*, Book 1, taken from *Ancient Christian Texts, Commentaries on Genesis 1-3*, ed. Michael Glerup, translated by Carmen S. Hardin, IVP Academic, Illinois, 2010, p. 116. Bede (672 – 735) is a doctor of the Church (1899) and fashioned his commentary on Genesis by sorting out the views of Ambrose, Augustine, Basil, Clement, Filiastrus, Gregory, Isidore and Jerome.

back from their smooth flashing surface. Those who see this, but do not examine it, think that the light comes from the moon herself. But that this is not the case is proved by this; that when she is diametrically facing the sun she has the whole of the disc that looks our way illuminated; but, as she traverses her own circle of revolution quicker from moving in a narrower space, she herself has completed this more than twelve times before the sun has once traveled round his; whence it happens that her substance is not always covered with light.”³⁵⁹

John Chrysostom: “Perhaps each of you might wish to be such as to able to command the sun and moon. At this point what would they say who assert that the heaven is a sphere? For why did he not [merely] say, “Let the sun stand still,” but added “Let the sun stand still at the valley of Elom,” that is he will make the day longer? This was done also in the time of Hezekiah. The sun went back. This again is more wonderful than the other, to go the contrary way, not having yet gone round his course.”³⁶⁰

Cyril of Jerusalem: “...and the whole earth to the heaven in which it is embosomed; *the earth, which bears the same proportion to the heaven as the center to the whole circumference of a wheel*, for the earth is no more than this in comparison with the heaven.”³⁶¹

- The Fathers of the Church knew of eclipses, how they were formed, and the implications for the shapes of the heavenly bodies, and that the moon does not have its own light.

John Damascene: “The eclipse of the moon, on the other hand, is due to the shadow the earth casts on it when it is a fifteen days’ moon and the sun and moon happen to be at the opposite poles of the highest circle, the sun being under the earth and the moon above the earth. For the *earth casts a shadow and the sun’s light is prevented from illuminating the moon, and therefore it is then eclipsed*.”³⁶²

³⁵⁹ *On the Soul and the Resurrection*.

³⁶⁰ *Homily on Hebrews*, Homily 8, 7.

³⁶¹ *Catechetical Lectures*, Lec 6, 3.

³⁶² *Orthodox Faith*, Bk 2, Ch VII.

Damascene's description of an eclipse thus assumes the Earth is spherical just as the moon and sun are spherical, otherwise the Earth could not "prevent the sun from illuminating the moon."

John Damascene: Else, if you will not allow this to be true, you must tell me why, when you look at the sun, as you have been trained by your instructor to look at him, you assert that he is not in the breadth of his disc of the size he appears to the many, but that he exceeds by many times the measure of the entire earth. Do you not confidently maintain that it is so, because you have arrived by reasoning through phenomena at the conception of such and such a movement, of such distances of time and space, of such causes of eclipse? And when you look at the waning and waxing moon you are taught other truths by the visible figure of that heavenly body, viz. that it is in itself devoid of light, and that it revolves in the circle nearest to the earth, and that it is lit by light from the sun; just as is the case with mirrors, which, receiving the sun upon them, do not reflect rays of their own, but those of the sun, whose light is given back from their smooth flashing surface. Those who see this, but do not examine it, think that the light comes from the moon herself. But that this is not the case is proved by this; that when she is diametrically facing the sun she has the whole of the disc that looks our way illuminated; but, as she traverses her own circle of revolution quicker from moving in a narrower space, she herself has completed this more than twelve times before the sun has once travelled round his; whence it happens that her substance is not always covered with light. For her position facing him is not maintained in the frequency of her revolutions; but, while this position causes the whole side of the moon which looks to us to be illumined, directly she moves sideways her hemisphere which is turned to us necessarily becomes partially shadowed, and only that which is turned to him meets his embracing rays; the brightness, in fact, keeps on retiring from that which can no longer see the sun to that which still sees him, until she passes right across the sun's disc and receives his rays upon her hinder part; *and then the fact of her being in herself totally devoid of light and splendour causes the side turned to us to be invisible while the further hemisphere is all in light; and this is called the completion of her waning.* But when again, in her own revolution, she has passed the sun and she is transverse to his rays, the side which was dark just before begins to shine a little, for the rays move from the illumined part to that so lately invisible. You see what the eye does teach; and yet it would never of itself have afforded this insight, without

something that looks through the eyes and uses the data of the senses as mere guides to penetrate from the apparent to the unseen. It is needless to add the methods of geometry that lead us step by step through visible delineations to truths that lie out of sight, and countless other instances which all prove that apprehension is the work of an intellectual essence deeply seated in our nature, acting through the operation of our bodily senses.³⁶³

Archelaus: Hence in Genesis, where Moses gives an account of the construction of the world, he makes no mention of the darkness either as made or as not made. But he keeps silence on that subject, and leaves the explanation of it to be discovered by those who may be able to give proper attention to it. Neither, indeed, is that a very arduous and difficult task. For to whom may it not be made plain that this sun of ours is visible, when it has risen in the east, and taken its course toward the west, but that when it has gone beneath the earth, and been carried farther within that formation which among the Greeks is called the sphere, it then ceases to appear, being overshadowed in darkness in consequence of the interposition of the bodies? When it is thus covered, and when the body of the earth stands opposite it, a shadow is superinduced, which produces from itself the darkness; and it continues so until again, after the course of the inferior space has been traversed in the night, it rolls towards the east, and is seen to rise once more in its wonted seats. Thus, then, the cause of the shadow and the night is discovered in the solidity of the body of the earth — a thing, indeed, which a man may understand from the fact of the shadow cast by his own body. For before the heaven and the earth and all those corporeal creatures appeared, the light remained always constant, without waning or eclipse, as there existed no body which might produce shadow by its opposition or intervention; and consequently one must say that nowhere was there darkness then, and nowhere night. For if, to take an illustration, it should please Him who has the power of all things to do away with the quarter which lies to the west, then, as the sun would not direct its course toward that region, there would nowhere emerge either evening or darkness, but the sun would be on its course always, and would never set, but would almost always hold the centre tract of heaven, and would never cease to appear; and by this the whole world would be illumined with the clearest light, in virtue of which no part of it would suffer obscuration, but the equal power of one light would remain everywhere. But on the other hand, while the western

³⁶³ Gregory of Nyssa, *On the Soul and Resurrection*.

quarter keeps its position, and the sun executes its course in three parts of the world, then those who are under the sun will be seen to be illuminated more brightly; so that I might almost say, that while the people who belong to the diverse tract are still asleep, those former are in possession of the day's beginning. But just as those Orientals have the light rising on them earlier than the people who live in the west, so they have it also more quickly obscured, and they only who are settled in the *middle of the globe see always an equality of light*. For when the sun occupies the middle of the heavens, there is no place that can appear to be either brighter or darker (than another), but all parts of the world are illuminated equally and impartially by the sun's effulgence. If, then, as we have said above, that portion of the western tract were done away with, the part which is adjacent to it would now no more suffer obscuration. And these things I could indeed set forth somewhat more simply, as I might also describe the zodiacal circle; but I have not thought of looking into these matters at present. I shall therefore say nothing of these, but shall revert to that capital objection urged by my adversary, in his affirming so strenuously that the darkness is ungenerated; which position, however, has also been confuted already, as far as that could have been done by us.³⁶⁴

Basil: The sun and moon thus received the command to divide the day from the night. God had already separated light from darkness; then He placed their natures in opposition, so that they could not mingle, and that there could never be anything in common between darkness and light. You see what a shadow is during the day; that is precisely the nature of darkness during the night. If, at the appearance of a light, the shadow always falls on the opposite side; if in the morning it extends towards the setting sun; if in the evening it inclines towards the rising sun, and at mid-day turns towards the north; night retires into the regions opposed to the rays of the sun, since it is by nature only the shadow of the earth. Because, in the same way that, during the day, shadow is produced by a body which intercepts the light, night comes naturally when the air which surrounds the earth is in shadow.³⁶⁵

- The Fathers understood the heavens were wrapped around the entire Earth, calibrating it in increments of a sphere of 360 degrees.

³⁶⁴ *Acts of the Disputation with Manes*, 22.

³⁶⁵ *Hexaemeron*, 6, 3.

John Damascene: “The circle of the zodiac has an oblique motion and is divided into twelve sections called zodia, or signs: each sign has three divisions of ten each, *i.e.*, thirty divisions, and each division has sixty very minute subdivisions. The heaven, therefore, has three hundred and sixty-five [sic] degrees: *the hemisphere above the earth and that below the earth each having one hundred and eighty degrees.*”³⁶⁶

Here Damascene indicates the “heaven” is structured with two “hemispheres,” one above and one below the Earth, each hemisphere having “three hundred and sixty-five degrees” (now understood as 360 degrees). Hence for Damascene the heavens are in a spherical shape. This would mean that the lower hemisphere is not “sheol” (which is the label that flat-earthers assign to it) but the heavens themselves. Only a sphere could accommodate such a description.

- The Fathers were aware of how the Greeks understood the solar system.

Anatolious of Alexandria: “And Thales discovered the eclipse of the sun and its period in the tropics in its constant inequality. And Anaximander discovered that the earth is poised in space, and moves round the axis of the universe. And Anaximenes discovered that the moon has her light from the sun, and found out also the way in which she suffers eclipse. And the rest of the mathematicians have also made additions to these discoveries. We may instance the facts – that the fixed stars move round the axis passing through the poles, while the planets remove from each other round the perpendicular axis of the zodiac; and that the axis of the fixed stars and the planets is the side of a pentedecagon with four-and-twenty parts.”³⁶⁷

Hippolytus: “For among them there are from the monad three double (numbers), *viz.*, 2, 4, 8, and three triple ones, *viz.*, 3, 9, 27. But the diameter of Earth is 80, 108 stadii, and the perimeter of Earth 250,543 stadii; and the distance also from the surface of the Earth to the lunar circle, Aristarchus computes at 8,000,178 stadii, but Apollonius 5,000,000, whereas Archimedes computes it at 5,544,1300. And from the lunar to solar circle, (according to the last authority), are 50,262,065 stadii; and from this to the circle of Venus, 20,272,065 stadii, and from

³⁶⁶ *Orthodox Faith*, Bk 2, Ch VII.

³⁶⁷ *The Paschal Canon*, Chapter XVII.

this to the circle of Mercury, 50,817,165 stadii; and from this to the circle of Mars, 40,541,108 stadii; and from this to the circle of Jupiter, 20,275,065 stadii; and from this to the circle of Saturn, 40,372,065 stadii; and from this to the Zodiac and the furthest periphery, 20,082,005 stadii.”³⁶⁸

- The Fathers agreed with most of the geometry of the Greek geocentrists but condemned their belief in astrology.

Methodius: “Resuming then, let us first lay bare, in speaking of those things according to our power, the imposture of those who boast as though they alone had comprehended from what forms the heaven is arranged, in accordance with the hypothesis of the Chaldeans and Egyptians. For they say that the circumference of the world is likened to the turnings of a well-rounded globe, the earth having a central point. For its outline being spherical, it is necessary, they say, since there are the same distances of the parts, that the earth should be the center of the universe, around which as being older, the heaven is whirling. For if a circumference is described from the central point, which seems to be a circle, for it is impossible for a circle to be described without a point, and it is impossible for a circle to be without a point, surely the earth consisted before all, they say, in a state of chaos and disorganization. Now certainly the wretched ones were overwhelmed in the chaos of error, “because that, when they knew God, they glorified Him not as God, neither were thankful; but became vain in their imaginations, and their foolish heart was darkened.”³⁶⁹

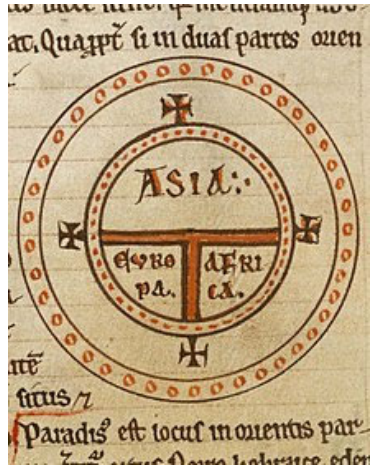


³⁶⁸ *Refutation of All Heresies*, Bk 4, Ch 8

³⁶⁹ *Discourse On the Virgins*, Discourse VIII, Thekla, Ch XIV.

The Medieval Period's View of the Earth

Wikipedia has one of the best summaries of early and late medieval treatments of the spherical v. the flat Earth issue. The major players in this time are Macrobius, Boethius, Isidore of Seville, Hildegard of Bingen, and Thomas Aquinas. We will further summarize and paraphrase Wikipedia's findings below. With few exceptions, the whole of the medieval period understood the Earth as spherical. Many textbooks of the Early Middle Ages supported the sphericity of the Earth. For example: some early medieval manuscripts of Macrobius include maps of the Earth, including the antipodes, zonal maps showing the Ptolemaic climates derived from the concept of a spherical Earth and a diagram showing the Earth (labeled as *globus terrae*, the sphere of the Earth) at the center of the hierarchically ordered planetary spheres.³⁷⁰



Further examples of such medieval diagrams can be found in medieval manuscripts of *The Dream of Scipio*. In the Carolingian era, scholars discussed Macrobius's view of the antipodes. One of them, the Irish monk Dungal, asserted the tropical gap between our habitable region and the other habitable region to the south was smaller than Macrobius had believed.³⁷¹ Boethius (c. 480–524), who also wrote a theological treatise *On the Trinity*, repeated the Macrobian model of the Earth in the center of a spherical cosmos in his influential, and widely translated, *Consolation of Philosophy*.³⁷²

³⁷⁰ B. Eastwood and G. Graßhoff, *Planetary Diagrams for Roman Astronomy in Medieval Europe, ca. 800–1500*, *Transactions of the American Philosophical Society*, 94, 3 (Philadelphia, 2004), pp. 49–50.

³⁷¹ Bruce S. Eastwood, *Ordering the Heavens: Roman Astronomy and Cosmology in the Carolingian Renaissance*, (Leiden: Brill, 2007), pp. 62–63.

³⁷² S. C. McCluskey, *Astronomies and Cultures in Early Medieval Europe*, (Cambridge Univ. Press, 1998), pp. 114, 123.

Bishop Isidore of Seville (560–636) taught in his widely read encyclopedia, *The Etymologies*, diverse views such as that the Earth “resembles a wheel.”^{373,374} Since this resembled Anaximander’s map, Isidore’s was widely interpreted as referring to a disc-shaped Earth.³⁷⁵ Isidore did not admit the possibility of antipodes, which he took to mean people dwelling on the opposite side of the Earth, considering them legendary,³⁷⁶ and noting that there was no evidence for their existence.³⁷⁷ Isidore’s T & O map, which was seen as representing a small part of a spherical Earth, continued to be used by authors through the Middle Ages, e.g., the 9th-century bishop Rabanus Maurus who compared the habitable part of the northern hemisphere with a wheel. At the same time, Isidore’s works also gave views of sphericity. For example, in chapter 28 of *De Natura Rerum*, Isidore claims the sun orbits the Earth and illuminates the other side when it is night on this side.³⁷⁸ In *Etymologies* there are also affirmations the sphere of the sky has Earth in its center and the sky being equally distant on all sides.³⁷⁹ Other researchers have argued these points as well.³⁸⁰ As one stated:

The work remained unsurpassed until the thirteenth century and was regarded as the summit of all knowledge. It became an essential part of

³⁷³ Stephen A. Barney, W. J. Lewis, J. A. Beach, Oliver Berghof (translators) (2010), “XIV ii 1,” *The Etymologies of Isidore of Seville*, Cambridge Univ. Press

³⁷⁴ 12th-century T and O map representing the inhabited world as described by Isidore of Seville in his *Etymologiae* (chapter 14, de terra et partibus)

³⁷⁵ “In other passages of the *Etymologies*, he writes of *anorbis*” W. G. Randles, 2000, *Geography, Cartography and Nautical Science in the Renaissance*, UK, Ashgate Variorum. p. 15. Also in Wolfgang Haase; Meyer Reinhold, eds., 1994; *The Classical Tradition and the Americas*, vol 1. p. 15; Lyons, Jonathan, 2009, *The House of Wisdom*, Bloomsbury, pp. 34–35.

³⁷⁶ *Etymologiae*, XIV, v. 17 [3].

³⁷⁷ *Etymologiae*, IX, ii. 133 [4].

³⁷⁸ See French translation of *De Natura Rerum*. Fontaine, Jacques, *Isidore de Seville: Traité de la Nature*. Bordeaux, 1960.

³⁷⁹ *Etymologiae*, III, XXXII [5]; XIV, I [6].

³⁸⁰ Russell, Jeffrey Burton (1991). *Inventing the Flat Earth: Columbus and Modern Historians*, Praeger, pp. 86–87; Wesley M. Stevens, “The Figure of the Earth in Isidore’s *De natura rerum*,” *Isis*, 71 (1980): 268–77; Stevens, Wesley M., 1980; “The Figure of the Earth in Isidore’s ‘*De natura rerum*,’” *Isis*, 71 (2): 268–77, doi:10.1086/352464. JSTOR 230175, p. 274; Grant, Edward, *A Sourcebook in Medieval Science* (Source Books in the History of the Sciences), Harvard University Press, 1974.

European medieval culture. Soon after the invention of typography it appeared many times in print.³⁸¹

The Scholastics – later medieval philosophers, theologians, and scientists – were helped by the Arabic translators and commentaries, but they hardly needed to struggle against a flat-earth legacy from the early middle ages (500–1050). Early medieval writers often had fuzzy and imprecise impressions of both Ptolemy and Aristotle and relied more on Pliny, but they felt (with one exception), little urge to assume flatness.³⁸²

A possible non-literary but graphic indication that people in the Middle Ages believed that the Earth (or perhaps the world) was a sphere is the use of the orb (*globus cruciger*) in the regalia of many kingdoms and of the Holy Roman Empire. It is attested from the time of the Christian late-Roman emperor Theodosius II (423) throughout the Middle Ages; the Reichsapfel was used in 1191 at the coronation of emperor Henry VI. However, “orbis” means “circle” and there is no record of a globe as a representation of the Earth like that of Martin Behaim in 1492. Additionally, it could well be a representation of the entire “world” or cosmos. A recent study of medieval concepts of the sphericity of the Earth noted that, “since the eighth century, no cosmographer worthy of note has called into question the sphericity of the Earth.”³⁸³ St. Hildegard, widely known for her science, especially cosmology, always held the universe and the Earth as spherical. See below.



³⁸¹ Thomas Glick; Stephen John Livesley; Faith Wallis, *Medieval Science Technology and Medicine, an Encyclopedia*, 2005, NY: Taylor & Francis.

³⁸² Russell, Jeffrey Burton, *Inventing the Flat Earth: Columbus and Modern Historians*, Praeger, 1991, pp. 86–87.

³⁸³ Vogel, Klaus Anselm, *Sphaera terrae – das mittelalterliche Bild der Erde und die kosmographische Revolution*, 1995, Ph.D. dissertation Georg-August-Universität Göttingen. p. 19.



Fourth Day: "Lights are placed in the firmament of heaven." (Mosaic 12. J.H., Monreale)



Seventh Day: On the seventh Day God rested from all His works that He had made. (Mosaic 12. J.H., Monreale)

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³⁸⁴ Hildegard of Bingen's depiction of a spherical Earth with the four seasons, from the 12th century book, *Liber Divinorum Operum*.



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Hermannus Contractus (1013–1054) was among the earliest Christian scholars to estimate the circumference of Earth with Eratosthenes' method. St. Thomas Aquinas (1225–1274) believed in a spherical Earth; and he even took for granted his readers also knew the Earth is round. In *Summa Theologiae* he wrote:

The physicist proves the earth to be round by one means, the astronomer by another: for the latter proves this by means of mathematics, *e.g.*, by the shapes of eclipses, or something of the sort; while the former proves it by means of physics, *e. g.* by the movement of heavy bodies towards the center, and so forth.³⁸⁷

St. Albert the Great said much the same around 1280:

Since these sciences have some common ground, so their demonstrations are sometimes mixed, *e.g.*, both prove the earth is a sphere. Thus sometimes the physicist proves this geometrically, and argues that if the earth were not round, the rising and setting of the stars would not be variable in different parts of the earth.³⁸⁸

³⁸⁵ Spherical Earth in 14th-century copy of *L'Image du monde* (circa 1246).

³⁸⁶ Picture from a 1550 edition of *On the Sphere of the World*, the most influential astronomy textbook of 13th-century Europe.

³⁸⁷ *Summa Theologiae* IIa Iae, Q. 54, A. 2.

³⁸⁸ *Physica II*, tr. 1, c.8 (Borget 3: 109b-110a).

Lectures in the medieval universities commonly advanced evidence in favor of the idea that the Earth was a sphere.³⁸⁹ The shape of the Earth was not only discussed in scholarly works written in Latin; it was also treated in works written in vernacular languages or dialects and intended for wider audiences. The Norwegian book *Konungs Skuggsjá*, circa 1250, states clearly that the Earth is spherical – and there is night on the opposite side of the Earth when there is daytime in Norway. The author also discusses the existence of antipodes – and he notes that (if they exist) they see the sun in the north of the middle of the day, and they experience seasons opposite those of people in the Northern Hemisphere. However, Tattersall shows that in many vernacular works in 12th and 13th century French texts show the Earth was considered “round like a table” rather than “round like an apple.” “In virtually all the examples quoted ... from epics and from non-‘historical’ romances (works of a less learned character) the actual form of words used suggests strongly a circle rather than a sphere,” though he notes the language is ambiguous.³⁹⁰

Catholic Popes on a Spherical Earth

Pope St. Gregory the Great: “He is removed from the globe when, at the coming of the heavenly judge, he is taken away from this world wherein he now prides himself in his wickedness.”³⁹¹

Pope Alexander VII: “On the chair of the Prince of the Apostles, by the mysterious inscrutable Divine Providence, assembled, by our judgment on the edge through all parts of the Christian globe [Latin: *per universas christiani orbis partes*]...”³⁹²

³⁸⁹ Grant, Edward, *Planets, Stars, & Orbs: The Medieval Cosmos, 1200–1687*, Cambridge: Cambridge University Press, 1994, pp. 626–30.

³⁹⁰ Jill Tattersall, “The Earth, Sphere or Disc?” *Modern Language Review*. 76: 31–46, 1981, doi:10.2307/3727009. JSTOR 3727009.

³⁹¹ *Moralia in Job*, on Job 18:18, c. 650.

³⁹² *Super Cathedram Principis Apostolorum*, September 9, 1659.

Pope Innocent XI: “The pastoral solicitude of office, by which We preside over the governing of the catholic Church spread throughout the whole globe by divine disposition...”³⁹³

Benedict XIV: “From all regions of the Christian globe...”³⁹⁴

Pope Pius IX: “...Indeed that nation has persevered in professing the Catholic religion in all distressful times, and the Irish clergy has worked industriously to spread the Catholic religion in the farthest parts of the globe.”³⁹⁵

Pope Leo XIII: “Further, who will deny that the Church has done away with the curse of slavery and restored men to the original dignity of their noble nature; and — by uplifting the standard of redemption in all quarters of the globe...”³⁹⁶

Pope St. Pius X: “All the world knows the feelings with which through the globe of all the earth, the faithful received this proclamation and the manifestations of public satisfaction and joy which greeted it...”³⁹⁷

Pope Benedict XV: “[St. Jerome’s]....by his life and example in his solitude than if he had passed his life at Rome, the capital of the globe of the earth [Latin: orbis terrarum].”³⁹⁸

Pope Pius XI: “...when several hundred bishops from all sections of the globe were reunited with Us before the tomb of the Holy Apostles.”³⁹⁹

Pope Pius XII: “2. Thus, when the globe [Latin: orbis] was rocked by a terrible war...”⁴⁰⁰

³⁹³ *Sollicitudo Pastoralis*, November 20, 1679.

³⁹⁴ *Ex omnibus Christiani orbis regionibus*, on Oct. 16, 1756.

³⁹⁵ *Praedecessores Nostros*, 1847.

³⁹⁶ *Inscrutabili Dei Consilio*, 1878.

³⁹⁷ *Ad Diem Illum Laetissimum*, 1904.

³⁹⁸ *Spiritus Paraclitus*, 1920.

³⁹⁹ *Ubi Arcano Dei Consilio*, 1922, par. 50.

⁴⁰⁰ *Meminisse Iuvat*, 1958.

Chapter 4

The Biblical Firmament

The Dubious Origin of the Dome Concept

The vast majority of flat-earthlers stake their claims on the supposition that Genesis 1:6-9 and 1:14-19 teach the firmament is a dome structure that fits over a flat Earth much like a cake covering fits over a cake dish. This is invariably the case with “Christian” flat-earthlers, whereas secular flat-earthlers only speak of a flat Earth but only occasionally refer to a dome over the Earth.

For the Christian flat-earthlers, various Bible translations encourage the dome interpretation. These translations and similar ones have been prompted by historical-critical scholarship that regards Genesis as merely a recapitulation of ancient Mesopotamian depictions of the world. In other words, modern hermeneutics, which had its beginnings in Protestant seminaries and universities in Europe in the 1700s and has spread abroad since then, holds that the Jewish depiction of the world in Genesis was neither divinely inspired nor historically accurate but was copied from cultures that arose centuries earlier in the so-called “cradle of human civilization.” These cultures, not knowing any differently, invented their creation stories to suit their pagan beliefs and thus their narratives had no factual basis. The Jews, wishing to follow suit with their own creation story, merely modified these Mesopotamian artifacts and invented their own particular story to fit their own culture and needs at the time.

In particular, modern historical-critical scholarship holds that Genesis 1 was written by an unidentified Jewish scribe who came out of the Babylonian captivity in 515 BC, about a thousand years after Moses. The reason the scribe is said to have written Genesis 1 was not to give an actual account of creation but only to invigorate the Jews, theologically and psychologically, for their journey back to Jerusalem. This rejuvenation was best accomplished by reintroducing their Jewish deity to them in order to replace the Babylonian god, Marduk, under whom they had been serving for seventy

years.⁴⁰¹ We are then told by the same historical critics that the details of Genesis 1 (e.g., God created the earth, the firmament, the plants, the celestial bodies, animals and man) was mere story-filler to make the Jewish deity, Yahweh, appear more powerful than Marduk (who seems to have spent most of his time in destroying other gods or using them for his own selfish purposes). Once the Jews were revitalized by this made-up yet seemingly real story of Yahweh, they could march back to Jerusalem with their heads held high, so to speak, knowing that Yahweh had conquered Marduk, who was then forced to release the Jews from Babylon.

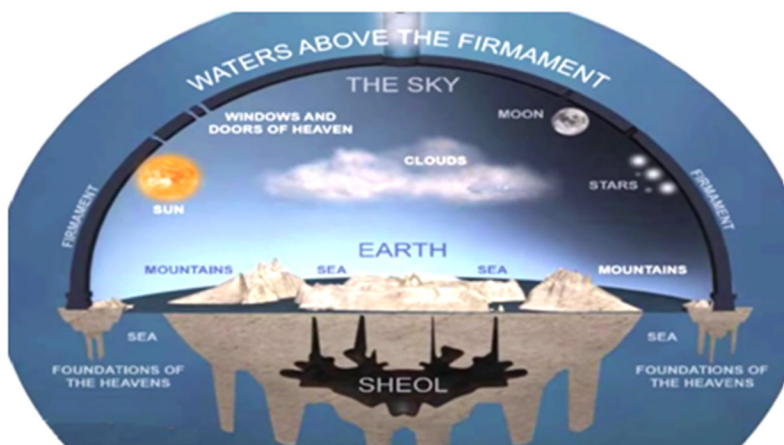
There is, of course, not an ounce of truth to this modern imposition on Scripture. Their rendition of history is nothing more than an attempt to empty Scripture of its divine inspiration since few, if any, historical critics believe that the God of the universe would actually dictate, word-for-word, the narratives of Holy Writ. But since these narratives still exist and are quite popular as the Bible continues to be the best-selling book of all time, the scholars must create at least some plausible but natural explanation of how they originated; *ergo*, they make up their own story of how Genesis 1 came to be, which, ironically, is not much unlike the attempt they foist upon the Jews of the 6th century to create their own anti-Marduk narrative. To be rather blunt, these modern biblical scholars try to convince us that Scripture's history is little more than fabricated stories; and in order to do so, they fabricate their own stories as to how Genesis originated.

One of the products of the fabrications of the historical-critical scholars is that the ancient cultures of Mesopotamia understood the Earth to be a flat disc covered by a hard dome. Let's see a few scholarly references to confirm this assumed fact. The *Theological Dictionary of the Old Testament* states:

The 'classic' cosmology [of the Hebrews], originating in its fundamentals in Mesopotamia...took on quasi-canonical authority through the influence of Gen 1. In it, heaven is a solid vault (Ps 19:2), which keeps the waters of chaos above and beside it from invading the cosmos (Gen 1:6-8; Ps 148:4). To it are attached as lights the sun, moon, and stars (Gen 1:14-17). It has openings through which the waters of

⁴⁰¹ We read of Marduk in 1Kg 17:30: "Thus the Babylonians made Marduk" (NAB); and Jr 50:2 – "Babylon has been captured, Bel has been put to shame, Marduk has been shattered" (NASB).

chaos can once more invade the world during the deluge (Gen 7:11; 8:2). According to 2 Sam 22:8 and Job 26:11, this enormous bell-shaped firmament rests on a foundation (pillars, analogous to the *išid šame* of the Babylonians), as do the earth (Ps 75:4; 104:5; Job 9:6) and the mountains (Ps 18:8).⁴⁰²



Similarly, Richard Clifford, S. J., in the *New Jerome Biblical Commentary*, states:

In Mesopotamian culture, evidently the model for most of the stories in Genesis 1-11, scribes explored beginnings through stories and cosmogonies, not through abstract reasoning.... Genesis 1-11 then is a single story, an unusually sustained ‘philosophical’ and ‘theological’ explanation of the human race....The biblical writers have produced a version of a common Mesopotamian story of the origins of the populated world, exploring major questions about God and humanity through narrative.⁴⁰³

Another author says:

The description given in Genesis 1:6-7 of the creation of the heaven indicates clearly that the Hebrew cosmologist conceived the sky to be a *rāqiaʿ*, a solid material stretched out, which contained within its upper

⁴⁰² G. Bartelmus, “רָקִיעַ,” *Theological Dictionary of the Old Testament*, 15:211, cited from <http://www.hebrewcosmology.com/introduction-to-the-raquia-problem>).

⁴⁰³ pp. 8-9.

surface ‘the waters above.’ Old Testament man saw ‘that inverted bowl we call the sky’ as a solid, crystalline material, above which ‘the waters which are above the firmament’ were contained, and within whose solid, transparent mass the heavenly luminaries performed the mechanical function assigned to them by the Creator...⁴⁰⁴

Suffice it to say that these sources well represent modern historical-critical scholarship, and we can surmise from their teaching that the whole basis for the view of a dome above a flat earth is not based on what the text of Genesis 1 actually says. The word “dome” does not appear in Genesis 1 nor any other Hebrew text.⁴⁰⁵ As noted, the “dome” concept has been imposed on Genesis 1 by modern scholars who believe the Jews obtained their view of the world from the primitive Mesopotamian cultures that are said to exist prior to the Hebrews.

Much of the blame for the popular concept that a domed Earth was the accepted view of cosmology not only of the Hebrews but also of the Christian medieval, most likely goes to the Flammarion engraving – a wood engraving by an unknown artist, given its title since its first documented appearance is found in Camille Flammarion’s book *L’atmosphère: météorologie populaire* (“The Atmosphere: Popular Meteorology”), published in 1888. At the height of the historical-critical hermeneutics—of which Genesis was the prime target of Wellhausen scholars—the

⁴⁰⁴ David Neiman, “The Supercaelian Sea,” JNES 28:4 (1969): 243, cited at <http://www.hebrewcosmology.com/introduction-to-the-raqiya-problem>

⁴⁰⁵ Hebrew apparently had no concept of a “hard dome,” much less a celestial one, since it had no word for it. The closest Hebrew came to a “dome” concept was a flexible tent covering, canopy, roof or pavilion, for example, the word שֹׁפָרָוּר in Jr 43:10 (“and he will spread his royal canopy over him”); or סֹהַר in Ps 18:11 (“he made darkness his covering around him”); סֹכָה in 2Sm 22:12 (“he made darkness around him his canopy”); מִיֶּסֶד in 2Kg 16:18 (“the covered way for the sabbath”); חֹפֶה in Is 4:5 (“over all the glory there will be a canopy”). There are about a dozen other words in Hebrew for the concept of a “covering” but none are used of a dome or canopy over the Earth. The word in Hebrew for a hard entity around the Earth is רָקִיעַ (*raqiya*), the word normally translated “firmament” or “expanse,” but it does not refer to a shape, only a substance. The only other time the Earth is “covered” appears in Ps 104:6 (“Thou didst cover it with the deep as with a garment; the waters stood above the mountains”) from the Hebrew כֶּסֶה, and is referring either to the original state of the Earth in Genesis 1:1 that is covered by water, or the flood waters that covered the Earth in Genesis 6-9.

Flammarion engraving was commonly used to represent Christian medieval and Hebrew cosmology, that is, a flat earth bounded by a solid dome firmament.



The engraving shows a man (lower left-hand corner), clothed in a long red robe, carrying a staff, kneeling down and passing his head and right hand through a hole between the firmament and the earth, who then sees more clouds and suns outside the firmament. Flammarion added the following description to the engraving: “A missionary of the Middle Ages tells that he had found the point where the sky and the Earth touch...”⁴⁰⁶ Since the Flammarion engraving is the only such flat Earth depiction available, the conclusion that it represents the early Christian



⁴⁰⁶ <http://gallica.bnf.fr/ark:/12148/bpt6k408619m/f4.item.zoom>

and medieval view of cosmology is certainly suspect.

As such, the Flammarion engraving begs the question as to what the Mesopotamian culture really believed about the cosmos, since neither the Pythagorean heliocentric system; the Aristotelian geocentric system nor the Ptolemaic geocentric system, ever depicted the Earth as flat with a dome over it. To this very question we find that Wayne Horowitz, in his published book from his Ph.D. dissertation, *Mesopotamian Cosmic Geography*, reveals that not only were the Mesopotamian accounts quite diverse, the idea of a dome over the Earth “has no direct evidence.” He writes:

...despite the continuity of tradition between the earliest and latest documents, one does find disagreement between texts from different periods, of different genres, and even among texts from the same period and genre.

...the available evidence leaves a number of problems completely unsolved. For example, no surviving text presents clear evidence for the bounds of the physical universe or explains what might be found beyond the limits of the universe. Such problems are endemic to this study, since no single surviving ancient Mesopotamian source or set of sources presents a comprehensive view of the physical universe.⁴⁰⁷

As for the idea of a dome, Horowitz reveals that the evidence is only indirect and that no direct evidence exists:

The image of the starry sky as a cattle-pen may provide indirect evidence that the sky was perceived as a dome. The original pictograph of the TIJR (cattle-pen) sign includes a dome-shaped element (see Labat 87a), suggesting that some cattle-pens had dome-shaped roofs that might have been compared with the apparent dome of the sky.⁴⁰⁸

Although the clear sky seems to us to be shaped like a dome, rather than flat circle, there is no direct evidence that ancient Mesopotamians thought the visible heavens to be a dome. Akkadian kippatu are always

⁴⁰⁷ *Mesopotamian Cosmic Geography*, Eisenbrauns, 1998, xiii.

⁴⁰⁸ *Mesopotamian Cosmic Geography*, pp. 255-256.

flat, circular objects such as geometric circles or hoops, rather than three dimensional domes.⁴⁰⁹

Horowitz adds that contrary evidence is only implied, and certainly not proven:

Nonetheless, evidence for dome-shaped, or curved, heavens may be found in the ziqpu-star text BM 38693+, the blessing formula STT 340:12, and AO 6478, where the Path of Enlil is 364° long. All three imply that the Path of Enlil, at least, is a curved band that encircles the earth's surface...However this does not prove that the surface of heaven is curved, since stars need not have necessarily traveled along the surface of the sky. There is also no direct evidence for the shape of the high unseen heavens, although it is likely that these levels too were thought to be circles.⁴¹⁰

As for the earlier Sumerians, Horowitz says the Earth seems to be cast into a block instead of a flat plane with a hemisphere:

In Sumerian mythology, the earth is a solid block of matter that is separated from heaven in early times. Heaven and earth are made distant from one another, thereby exposing the dry land on the upper surface of the earth, where mankind is later settled. The underworld below the earth's surface also apparently belongs to this solid block of matter.⁴¹¹

As Horowitz gives us a completely different view than what has been concluded by others, there is another matter in which modern scholars have presumed facts that are not in evidence. It concerns the dating of Mesopotamian literature as compared with the oral and written tradition of the Hebrew culture. In short, modern scholars have based their conclusions on the idea that the Mesopotamian culture and its writings pre-date the Hebrews and their writings. The simple fact is, there exists no proof for such an argument. For example, the oldest extant copies of the Babylonian *Enumu Elish* story come from the 11th century BC, four hundred years after

⁴⁰⁹ *Ibid.*, p. 264.

⁴¹⁰ *Ibid.*, pp. 264-265

⁴¹¹ *Ibid.*, p. 318.

Moses who is traditionally understood to have written Genesis.⁴¹² As one encyclopedia notes:

W. G. Lambert, for instance, has shown evidence that Marduk was still a relatively minor god in the Babylonian pantheon until about the 13th century b.c. and that he rose to officially sanctioned preeminence only in the late 12th century under Nebuchadnezzar I, on the occasion of a great religious revival in Babylonia. T. Jacobsen, adducing parallels between the Ugaritic epics and *Enuma Elish* and noting that the sea-storm motif would be much more at home in Syria, has contended that the Babylonian epic—or at least prominent elements of its theomachy—derived from the West Semitic world; he also views *Enuma Elish* as essentially a cosmogony (with Enlil originally as hero) and only secondarily (after the insertion of Marduk) revised into an apologia for Marduk.⁴¹³

The likelihood, then, is that the Hebrew tradition influenced the surrounding pagan cultures rather than vice-versa. But modern scholars, bent as they are on dismissing Hebrew accounts as uninspired man-made recapitulations, refuse to admit this possibility. As noted by John McCarthy,

The copies of *Enuma Elish* that are extant today do not antedate the year 1000 BC, which is long after the time of Moses. The exploits of the false god Marduk, which figure so prominently in Vawter’s comparison with Genesis 1, were added to the poem in a later phase that seems to date from the twelfth century BC, which was well after the time of Moses. What Herbst calls “a background of common Semitic folklore” could just as well have been an original revelation by the one true God that came down to Moses intact, but which was corrupted by pagan poets into their respective myths. Modern Scripture scholars are reluctant to admit the influence of Hebrew tradition upon the surrounding pagan cultures, judging almost always that the influence was in the opposite direction, but in doing this they are simply manifesting a common prejudice that

⁴¹² Dt 31:24-26: “When Moses had finished writing the words of this law in a book, to the very end, Moses commanded the Levites who carried the ark of the covenant of the Lord, ‘Take this book of the law, and put it by the side of the ark of the covenant of the Lord your God...’” (cf. Ex 17:34; 34:27; Nm 33:1-2; Dt 31:9; Rm 10:5; 2Co 3:15; Jn 5:45-47).

⁴¹³ <https://www.encyclopedia.com/religion/encyclopedias-almanacs-transcripts-and-maps/enuma-elish>

comes to light in the framework of a valid scientific theology. A revelation regarding the origin of the universe, given by God to the Hebrews, or preserved intact by them, would tend to provide the point of departure for pagan myths about the origin of the world, since human fantasy is quite limited in its own originality. If we succeed in rising above every unscientific and unhistorical prejudice against possible revelations by God to men, we shall be in a better position to make an objective analysis of the inspired word of Genesis.⁴¹⁴

The same kinds of presumptions from liberal scholars are made from the famed Gilgamesh Epic. It is claimed that the Bible obtained its Flood account from either the Gilgamesh Epic or some older Sumerian text. For example, rabbinic scholar Robert Wexler states: “The most likely assumption we can make is that both Genesis and Gilgamesh drew their material from a common tradition about the flood that existed in Mesopotamia. These stories then diverged in the retelling.”⁴¹⁵ The operative word here is “assumption,” since as O’Brien puts it: “A popular theory, proposed by liberal scholars, said that the Hebrews borrowed from the Babylonians, but no conclusive proof has ever been offered.”⁴¹⁶ Since the genealogies of Genesis show the Flood occurred in the early third millennium,⁴¹⁷ Noah is either before or contemporaneous with the earliest extant proof, provided by written documents of civilization, even those of Sumerian origin. As Wikipedia says regarding the earliest written documents:

It is generally agreed that true writing of language (not only numbers) was independently conceived and developed in at least two ancient civilizations and possibly more. The two places where it is most certain that the concept of writing was both conceived and developed independently are in ancient Sumer (in Mesopotamian), around 3100 BC, and in Mesoamerica by 300 BC,

⁴¹⁴ <http://www.rtforum.org/lt/lt45.html>

⁴¹⁵ <http://www.historyofinformation.com/expanded.php?id=1762>, in the article: “The Epic of Gilgamesh, Probable Source of Aspects of Biblical and Homeric Literature (Circa 1,300 BCE – 1,000 BCE).”

⁴¹⁶ J. R. O’Brien, “Flood Stories of the Ancient Near East,” p. 64.

⁴¹⁷ E.g., Masoretic text: 2529 BC; LXX: 3044 BC; Samaritan Pentateuch: 2954 BC. See my book, *The Book of Genesis, Chapters 1-11*, 2009, pp. 388-401.

because no precursors have been found to either of these in their respective regions.⁴¹⁸

Obviously then, any claims to a Sumerian culture prior to 3,100 BC are pure speculation, a result of the liberal scholars' need to make the Flood post-date Sumerian culture so they can upstage the Bible and its pre-Flood tradition. In any case, the Gilgamesh Epic, since it is a written document, must postdate 3100 BC. Hence, since Noah lived in the early third millennium, he predates the Gilgamesh Epic, and so does the tradition of the Flood that was passed down by his progeny listed in Genesis 10-11.

In the end, historical-critical scholarship cannot claim Sumerian culture predated Noah; and thus they cannot claim the Sumerians were the ones who passed down a tradition of a Flood prior to 3100 BC. Not only is their attempt pure speculation (which is why the critical literature trying to find an exact date for the Sumerian culture is quite diverse), more importantly, in basing their claim on the idea that the Sumerians passed down an unwritten tradition about a Flood, they leave the door wide open for Noah and his progeny to do the same, in their own tradition, and are thus hoist by their own petard.

Modern liberal scholars are not the only ones prone to an eisegesis of Genesis. Even those who have a reputation for conservative scholarship are heavily influenced by the historical-critical school. For example, Wheaton College's Old Testament scholar, John Walton, claims that we must read the text of Genesis 1 "as a Hebrew reader would," adding that the Hebrew understanding "comes largely from the cultures surrounding the Hebrews," and then concludes that this premise becomes the "authority" for how we should understand the Genesis text.⁴¹⁹ Let's examine the problems with this view.

⁴¹⁸ https://en.wikipedia.org/wiki/History_of_writing

⁴¹⁹ As stated by Old Testament scholar John Walton: "If we are going to enter that world of communication, we have to understand some of these things about what they thought about the world. They are not addressing the world the way everybody everywhere would understand it. They are talking about the world as they understand it. And God's communicating through that understanding. When we think about how they thought about the world, we have information from Egypt from texts, in reliefs, in tomb paintings, where they display how they think about

First, the mere fact that Walton's view assumes something it cannot prove is a fundamental problem. Walton cannot either assume or prove what the Hebrew view actually was, much less claim to rely on it as an authoritative interpretation of the text. This is especially the case when he later tells us that the answer to how the Hebrews interpreted the text is only discovered by examining the views of the surrounding cultures. The Hebrews did not give us an official interpretation of the text; and even if they did in certain cases, their interpretation was no more infallible than anyone else's, since only the text of Genesis was divinely inspired.

Second, there were many verses of Scripture the Hebrews did not understand, as even the Bible says in general to everyone in various places.⁴²⁰ It is quite presumptuous, then, to assume the Hebrews either understood every passage or had to be capable of applying it in the most rigorous and exacting way. Even if we were to agree the text of Genesis is simple, still, whether the total depth of the descriptions it gives was actually grasped by the Hebrews is another question altogether.

Third, for Walton to presume what the Hebrew author wrote in Genesis does not refer to the actual materials or means by which the universe was constructed but merely what the primitive mind of the typical Hebrew

the world. And it's a world heavily peopled with deities...now of course for the Israelites, they don't have gods populating every aspect of the cosmos. They have one God who rules it all, is in charge of it all...but they are not thinking of a picture of the cosmos they way we do. They still have the idea of a solid sky, the pillars of the earth that hold it up...waters below, waters above....If we are going to get the authority of the text, we have to see the world the way they are thinking about it. We can't impose our view of the world on the text because they we are changing it....The authority is in the human communicator to his initial audience....Likewise we cannot expect that God is going to embed in that message some private future cosmic geography to be seen when later audiences like us get there....We have to see the text the way the Israelites saw the text...So how did they view the text? When we look at any passage of Scripture, we have to ask the question, 'how would the Israelite author and audience understand this text with what they knew?' (<https://biologos.org/resources/audio-visual/origins-today-genesis-through-ancient-eyes>)

⁴²⁰ 2Pt 3:16: "There are some things in them hard to understand, which the ignorant and unstable twist to their own destruction, as they do the other scriptures," *cf.* 1Co 2:14; Jn 14:26; 2Tm 2:15; Ps 119:72; Is 55:8-9; Mt 13:10; Dn 12:4; 2Co 3:14; Gl 3:16.

understood from his surrounding cultures, is essentially to relegate Genesis to fiction and call the God who claims to inspire it a fabricator.⁴²¹ If biblical inspiration is true and given its full weight in the discussion, we have little choice in understanding Genesis but to accept it as the actual reality of how God created the cosmos, wherein each word and each phrase is a truth unto itself about the cosmos; as well as being intricately connected to the other detailed truths. Afterward, whether it is a Hebrew or an Einstein that interprets the passage, each of us seek to discover what God actually meant. Although God certainly used language with which both Hebrew, Egyptian and modern man are familiar, coming to the correct interpretation of those passages is not something that anyone, barring a prophet who is given divine understanding, can safely claim to have. As James Holding has opined: “Perhaps the ancient readers of this text did envision a solid dome with an ocean above it, but if so, they read things into the inspired and equivocal language of the text every bit as much as Seely or I have.”⁴²² Hence we must realize that, inspired Scripture, although it speaks in common words, often uses those very words in combinations that transcend the culture, since, not

⁴²¹ In fact, Walton does precisely this when later in his lecture (14:00 to 19:00) he states that because Genesis 1 is concerned with what he calls “function” and not process or materials (or what he colloquially describes as “the home story, not the house story”), then the addition of the sun and stars on Day 4 is merely a recapitulation of the light on Day 1, not a separate creation. This shows once again that the two lights of Day 1 and Day 4, respectively, remain the biggest stumbling block for historical-critical scholars to grasp and accept from Genesis 1. They simply refuse to believe that the text’s painstaking effort to describe two different lights on two different Days is actually what occurred. In other words, the text is not telling us the true history; and the reason it does so is because the author decided, based on idiosyncratic reasons, that function supersedes process. As long as scholars do this, they will never understand Genesis or be faithful to the text. Ironically, Walton claims that to see process or materials in Genesis 1 is what we ‘read into’ the text when it is precisely Walton’s ‘reading into’ the text that conflates Day 1 and Day 4, since the text knows of no such coincidence. On the Catholic side of this debate, historical-critical scholars do much the same.

⁴²² “Is the *raqiya*’ (firmament) a solid dome?” James Holding versus Paul Seely, first published in *Technical Journal* 13(2):44-51, 1999, now at: answeringgenesis.org/docs/4169.asp. Holding also adds the words of J. H. Sailhamer: “...we must be careful to let neither our own view of the structure of the universe nor what we think to have been the view of ancient people to control our understanding of the biblical author’s description’ (*The Pentateuch as Narrative*, Zondervan, Grand Rapids, MI, p. 89, 1992).

only does it tell the exact truth of history, it is written from God's omniscience and omnipotence, for all men of all time.

Most of all, Scripture is clear that, in whatever way God says it, He cannot lie.⁴²³ Hence no passage of Scripture is incidental or accidental but must always give the exact truth. This fact especially applies to the apparent discrepancy between the Light of Day 1 and the sun and stars of Day 4 that so many modern critical scholars use as a foundation to deny the historical and chronological accuracy of Genesis 1, of which Walton is representative on the Protestant side. On the Catholic side, Rev. Stanley Jaki, former professor of science at Seton Hall University, is the most representative. In his book, *Genesis 1 Through the Ages*,⁴²⁴ after telling his reader that Genesis 1 is "post-exilic" and thus unhistorical (e.g., "...accepting higher criticism about the three or more different sources of Genesis that almost force one to date Genesis 1 as post-exilic,"⁴²⁵ and: "since Genesis 1 is, on stylistic grounds alone, a patently post-exilic document,"⁴²⁶), Jaki continually rants against "concordism" (applying proven scientific facts to the Bible) by claiming that Genesis 1's separation of the Light of Gn 1:3 and the sun and stars of Gn 1:14-17 is a scientific "contradiction" and thus precludes understanding Genesis 1 as either an historical or chronological text, concluding with, "...that fourth day, perennially troublesome for those fond of waving their Bibles."⁴²⁷ The truth is that Jaki simply didn't trust the Bible to provide accurate history, and this is also true of most modern Catholics today. Obviously, the biblical writer knew that a separate Light that eventually disappears at the end of Day 3 would seem like a contradiction to the generations following, since all of them, including Adam, saw only the sun and stars. Hence all of them would have to trust the sacred text that there was, indeed, an essential and separate Light manifested for the first three days of creation. In all practicality, none of them could raise an objection since no one was present during Creation but God Himself; and it is His testimony, to Moses, the writer of Genesis 1, that there was indeed a

⁴²³ Ti 1:2: "in hope of eternal life which God, who never lies, promised ages ago."

⁴²⁴ Thomas More Press, 1992.

⁴²⁵ *Genesis 1 Through the Ages*, pp. 25-26, 62.

⁴²⁶ *Bible and Science*, p. 45.

⁴²⁷ *Genesis 1 Through the Ages*, p. 168.

first Light that was then replaced by the sun and stars three days later.⁴²⁸ Questioning this fact in our modern day by claiming it is a “scientific contradiction” is akin to the same hubris that spawned the insidious question two chapters later, saying, “Did God say, ‘You shall not eat of any tree of the garden’?You will not die. For God knows that when you eat of it your eyes will be opened, and you will be like God, knowing good and evil.”



Fourth, most, if not all, of the Mesopotamian literature concerning cosmology is a fantastical, often bizarre, array of invented stories that are not even close to the biblical account of creation. The faithful Hebrew would not be persuaded by them or even consider them worthy, much less reiterate them in the Pentateuch. The Babylonian god Marduk, for example, is said to have cut in half a female dragon named Tiamat and used one half as a dome over the Earth so that the waters would be held up, while he used the other half to serve as land that was flat (*i.e.*, a flat Earth).⁴²⁹

⁴²⁸ Cf., Dt 31:29; 2Tm 3:16.

⁴²⁹ Wayne Horowitz, *Mesopotamian Cosmic Geography*, 1998. Perhaps it is no coincidence Tiamat is a chief figure in the cultic game, *Dungeons and Dragons*.

The Egyptian cosmology is even more bizarre. The god Atum, who suddenly appears from primordial waters called Nu, is said to have masturbated in order to create other gods. Land then rose out of the waters, called Ben-Ben, and Atum stands on the land. He then spits out Shu, the god of the air, and Tefnut, the goddess of water, both of which had two children, Geb, the god of earth, and Nut, the goddess of the sky, the former holding up the latter, creating a dome structure over the land. These two then had four children, Osiris, Isis, Seth and Nephthys, and the fantastic story goes on from there.

To claim that the Hebrews would even be slightly interested in these Mesopotamian pagan cosmologies is insulting to them. But, of course, if a modern scholar who doesn't believe in divine inspiration of Scripture and thus is so inclined to convince himself that Hebrew cosmology was not written by Moses but was invented by some unknown Jewish scribe in 515 BC coming out from under these pornographic renditions of creation, we can understand why he would then conclude that the Hebrews obtained a "dome" cosmology from either the Babylonians or the Egyptians. It makes perfect sense to him, but in reality, it is nothing but a fabrication. We are forced to conclude that, similar to the Babylonians and Egyptians, modern scholars engage in inventing fantastic stories about the Bible to suit their own agenda.

In regard to the dome, R. H. Seely, a scholar from my alma mater, Westminster Theological Seminary (a traditionally conservative institution) says the idea of the sky being "solid" is all pervasive in the literature. From Mesopotamia to the American Indians to the time of the Renaissance, there seems to be one voice. He writes:

The basic historical fact that defines the meaning of *raqiya*—the Hebrew word in Genesis 1 which the King James Bible reads as 'firmament,' but many modern translations render 'expanse'—is simply this: all peoples in the ancient world thought of the sky as solid....(T)he language of Genesis 1 suggests solidity...and no usage of *raqiya* anywhere states or even implies that it was not a solid object...The

historical-grammatical meaning of *raqiya'* in Genesis 1:6-8 is very clearly a literally solid firmament.⁴³⁰

It would be futile to argue against Seely's massive research. The etymology of the Hebrew word *raqiya* and its precise usage down through the centuries precludes understanding the firmament as anything but a solid substance. But the question for us is not so much whether the firmament is solid. What cannot be conceded from its solidity is that the firmament is a dome above the Earth, since neither Genesis 1 nor any other mention of the firmament in Scripture specifies a particular *shape* to the firmament, much less a dome. This is important, since if the firmament were a hemispherical dome, it would necessarily mean the Earth would be flat. It would also necessarily mean that Scripture was not accurate in its historical or scientific details and that, indeed, the Hebrews wrote and understood only very primitive and necessarily inaccurate portrayals of the cosmos.

So, much is at stake here. Can we uphold the veracity of Scripture in the midst of this confusion? In other words, can we have a solid firmament and thereby preserve the etymological definitions and history of Scripture and at the same time dispense with the "dome" concept of the sky and flat disc concept of the Earth? The answer is emphatically yes, as we will see.

In the final analysis, we have gone through this preliminary history of the exegesis of Genesis 1 to show flat-earth advocates that although the firmament is to be understood as a solid substance, the idea that the Earth is flat with a dome is neither the proper nor even the original meaning of the text. Rather, it is a theory of Genesis promoted by progressive scholars who had long ago abandoned the idea that the Genesis writer was divinely, and thus infallibly, inspired to write the text and do so accurately and truthfully, whether in function or in chronology. With these dubious origins, in adopting the dome as the firmament, the flat-earthier is not being faithful to the text.

⁴³⁰ P. H. Seely, "The firmament and the water above. Part I: The meaning of *raqiya*" in Gen 1:6-8, *Westminster Theological Journal* 53:227-240, 1991.

What is the Firmament?

Since Genesis does not say the firmament is a dome above a flat earth, then what is it? This is actually easier to answer than it has been purported to be. We read in Genesis 1:6-9 that:

1. the firmament is synonymous with the heavens (Gn 1:8: “and God called the firmament heaven”);
2. that the sun, moon and stars are placed “in” the firmament; and
3. that birds fly “in” the firmament.



The only way for these three criteria to be fulfilled is to understand the firmament is simply the constitution of space. We look up and see that the heavens are filled with a lot of space. We see the celestial bodies reside in that space. Lower, towards the earth, we see the birds flying in the same space. There is nothing but space. As it stands, we do not see birds flying “in” a dome and we do not see celestial bodies “in” a dome. If one wants to use “dome” as the translation for the Hebrew *raqiya*, he can only say that birds and stars exist *underneath* a dome, but they are not, as the text of Genesis 1 specifies, “in” the *raqiya* (a very important point we will address later).

⁴³¹ <https://www.youtube.com/watch?v=3x3APUxiSd4>, published April 8, 2018, titled: “Finally we have a view of the Dome!”

If one then argues that the *raqiya* also includes all the spatial area from the surface of the Earth to the outside layer of a dome a few thousand miles above the Earth, he has created two opposing definitions for the *raqiya*: (1) the *raqiya* is a hard and thin semispherical dome a few thousand miles above the Earth, yet (2) the *raqiya* is also the few thousand miles of space between Earth and the dome. This is a contradiction, and when there is a contradiction then at least one of the two premises are wrong. Either the *raqiya* is space or it is a dome, but it cannot be both.

We should also point out that scriptural language concerning the extent of the heavens does not lend itself to the belief of flat-earthers that a 3000-mile high dome exists that houses all the celestial bodies. The following passages strongly suggest the extent of the heavens is exponentially more distant than a few thousand miles:

Isaiah 55:9: For as the heavens are higher than the earth, so are my ways higher than your ways and my thoughts than your thoughts.

Comparing this passage to others in the same genre, such as **Rm 11:33-34:**

O the depth of the riches and wisdom and knowledge of God! How unsearchable are his judgments and how inscrutable his ways! ‘For who has known the mind of the Lord, or who has been his counselor?’

...it would certainly be anticlimactic, if not disillusioning, if in using such analogies the heaven in view was only 3,000 miles high. The distance from Jerusalem to Babylon itself is over 600 miles; and the distance from Spain to the Persian Gulf is over 3,000 miles. Even on a flat Earth, the distance from the end of one radius must be at least 12,000 miles. As such, how would a verse of Scripture depicting the heaven only 3,000 miles high at its highest height even begin to fulfill the vastness of space between heaven and Earth in Is 55:9? Other passages of Scripture make such a notion even more difficult:

Job 22:12-14: Is not God high in the heavens? See the highest stars, how lofty they are! Therefore you say, ‘What does God know? Can he judge through the deep darkness? Thick clouds enwrap him, so that he does not see, and he walks on the vault of heaven.’

This passage implies we are to discern how high the heavens are by looking at the stars. That is, since we see only pinpoints of light when we look at the stars—which means we cannot see their actual shapes and sizes by the naked eye—we are thus to deduce that the reason these massive objects, which should be as big or bigger than the sun, only appear as points of light because they are so far away.

Psalms 103:11-12: For as the heavens are high above the earth, so great is his steadfast love toward those who fear him; as far as the east is from the west, so far does he remove our transgressions from us.

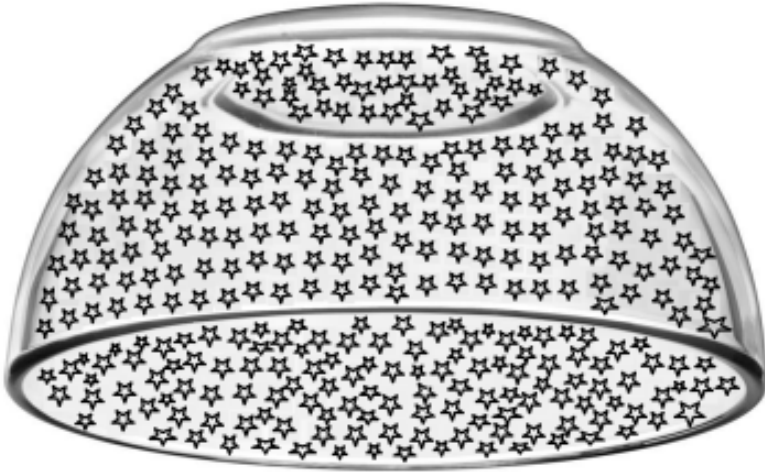
In this passage the imagery of a vast distance between the height of the heavens above the Earth is compared to the distance between east and west. On a flat Earth, the distance between east and west is at least 12,000 miles, which is four times higher than what the flat-earthers assign to their 3,000-mile high dome. Not only does the disparity between the two distances makes the verse confusing, the small numbers of both suggest a limitation on God's love rather than it being limitless. On a spherical Earth, the distance between east and west is incalculable, since as one moves eastward on a sphere, west is always 12,000 more miles ahead of him, which, in turn, depicts God's love as infinite. Likewise, a distance of the heavens above the Earth in the multi-millions of miles portrays a divine love that is beyond our comprehension.

Genesis 13:15; 22:17: And he brought him outside and said, 'Look toward heaven, and number the stars, if you are able to number them.'.... 'and I will multiply your descendants as the stars of heaven and as the sand which is on the seashore.'⁴³²

The imagery depicted in these passages is of a vast number of stars, so many they are hardly calculable, even from the limited view that Abraham had with his naked eyes. This vast number is hardly what would be allowable by a dome that had less than a few hundred billion cubic miles of spaced between heaven and Earth, especially since the stars could only occupy the

⁴³² Cf., Gn 26:4; Ex 32:13; Dt 10:22; 28:62; 1Ch 27:23; Nh 9:23; Ps 147:4.

underside of the dome, which would leave only 226 million square miles of surface area to occupy.⁴³³



In practical terms, if there existed only one million stars, each would require at least 226 miles of space per star on the inner surface of a dome. If two million, then 113 miles; if four million, then 56 miles, and so on. But in that case the stars would be so close together that it would be impossible for them to form the spacious constellations we see throughout the heavens. In fact, there would be so many stars crammed into such a small space that the night sky would be as bright as the sun, another version of Obler's paradox.

Jeremiah 31:37: Thus says the Lord: "If the heavens above can be measured, and the foundations of the earth below can be explored, then I will cast off all the descendants of Israel for all that they have done," says the Lord.

So, when the flat-earthlers tell us the stars only extend 3,000 miles high, and the foundations of the Earth have the small depth of a flat disc, this truncated world is hardly the one the Lord depicts in the above verse. In effect, the very God the flat-earthlers wish to respect by their so-called "literal" interpretation of Genesis 1, is the same God they disservice by their ignoring

⁴³³ The surface area of a hemisphere (dome) is $2\pi rh$. Since the radius of the flat Earth is 12,000 miles and the height of the dome is 3,000 miles, this leaves only 226 million square miles for the stars to populate.

of the above verse. In fact, so wrong are the flat-earthers in depicting the Earth as flat and the heavens as small, the Lord stakes the very future of Israel's descendants on it.

There are other biblical passages we could use to enhance the point. Suffice it to say, there is nothing in Scripture that even implies there is a dome, much less one that is only 3,000 miles above the Earth. Further, when we look into the sky or send probes into outer space, we do not see a dome. We only see space extending in all directions whose boundaries, from our vantage point on the surface of the Earth, appear to be hemispherical, but from outer space are spherical. Thus, as the text of Genesis 1 specifies, we see birds flying "in" and we see the sun, moon and stars revolving "in" the *raqiya*. Logically, this should tell us the primary definition for *raqiya* is space. This is confluent with the context of the first two Days of Genesis since:

- (1) matter (the Earth/water),⁴³⁴
- (2) energy (the Light),⁴³⁵
- (3) space (the *raqiya*, firmament)
- (4) time (evening and morning)⁴³⁶

⁴³⁴ See also 2Pt 3:5: "...that by the word of God heavens existed long ago, and an earth formed out of water and by means of water."

⁴³⁵ As noted earlier, the "Light" of Gn 1:3 is not the sun and stars, but a separate light and energy, and this is confirmed in Scripture. Psalm 74:16: "Yours is the day, Yours also is the night; You have prepared the light and the sun." Ec 12:1-2 prohibits one from concluding that the "light" of Ps 74:16 refers to the stars since it separates it from the sun: "Remember also your Creator in the days of your youth...before the sun and the light, and the moon and the stars are darkened." Notice how the writer mentions all the known luminous bodies that emanate light, but insists there is still an additional independent source of light. As in Ps 74:16, these four sources are specifically put in sequence by Hebrew *waw*-conjunctions so that it does not say "sun's light" but "the sun and the light and the moon and the stars." In sequence, the Hebrew reads: לֹא־תִחְשַׁךְ (are not darkened) הַשֶּׁמֶשׁ (the sun) וְהָאֵשׁ (and the light) וְהַיָּרֵחַ (and the moon) וְהַכּוֹכָבִים (and the stars), cf. Ez 32:6-8; Ps 104:2; Is 45: 7; 60:19; Br 3:33; Zc 14:6-7; 2Co 4:6; Ap 22:5; Gn 19:11; Ac 26:13. Some raise the objection that Gn 1:14-16's assigns the moon as one of the "two lights," even though the moon merely reflects light from the sun. This can be answered by pointing out that "light" in Genesis 1:14-16 is the Hebrew *meor*, (לְמִאֲוֶרֶת) which can refer to a emanating body or reflecting body (cf. Ps 74:16; Pr 15:30).

⁴³⁶ That the days of Genesis 1 are to be interpreted literally as a 24-hour period is confirmed by the consistent use of the phrase "and there was evening and morning,"

These are the four main ingredients to physical existence, which is why they are immediately put in place. The only other feature of the *raqiya* that must be incorporated into this formula is its hardness, but that will be relatively easy once we understand, metaphysically and physically, what “space” must necessarily consist of.

Prior to our explanation, we can easily see the traditional Bible translations of *raqiya* struggle with the two concepts Scripture provides of its characteristics and composition:

- (1) It is flexible, ethereal, stretchy and frictionless,
- (2) It is hard, firm, solid, and unbreakable.

Translations that choose “dome” or “solid arch” as the meaning of *raqiya* seek to emphasize the hardness and firmness concepts but fail to include the flexible and ethereal characteristics that allow the birds and celestial bodies to move freely *in* the *raqiya*. They are then forced to modify “*in* the firmament” to “*inside* the firmament” so that the firmament becomes a hard boundary that encases an ethereal firmament inside the boundary, thus

which appears at the end of each of the days of Creation (*cf.* Gn 1:5, 8, 13, 19, 23, 31). The use of “evening and morning” in Scripture shows that it always refers to the sequence of darkness and light comprising a single period of a day, a 24 hour period. Outside of Genesis, there are only eight appearances of “evening and morning” (*cf.* Ex 16:8-13; 27:21; 29:39; Lv 24:3; Nm 9:21; Dn 8:26). There are some cases in which the words “morning” or “evening” appear separately with the word “day,” some of which refer to a literal solar day and some which are indefinite of time. But in Genesis, and the other aforementioned passages “evening and morning” are coupled together and are specified as one unit of time. If the writer of Genesis intended to teach that *yom* meant an indefinite period of time, such that he desired to convey long ages of process and change, he had numerous ways to convey such an idea. He could have used the plural *yomim*, as it appears in Nm 20:15, or as Moses does in Gn 1:14 (“let them be for days and for years”) or Gn 3:14 (“dust shall you eat all the days of your life”). But even then we must interject that, of the 702 uses of the plural *yomim* in the Old Testament, literal days are always in view. As an alternative, the writer could have connected *yom* with other Hebrew words of indefiniteness, such as *dor*, *olam*, *netsach*, *tamid*, or any of a dozen similar words and concepts in Hebrew. But the writer of Genesis 1 chose none of these possibilities; rather, he chose the most specific phrase for a 24-hour day that one can find in the Hebrew Scriptures.

making *raqiya* into two separate entities, one a hard dome and the other ethereal space. But *raqiya* is only one entity.

As we can see, the reason there are so many different meanings of *raqiya* rendered in various Bible translations is that each translator will emphasize the characteristic of the *raqiya* with which he feels most confident, but he will invariably fail to include *both* characteristics of the *raqiya*. In fact, one translation below apparently refused to find a word for the dual nature of the *raqiya* and thus translated it as merely “something”! Let’s view the various translations.

Various translations of Genesis 1:6’s Hebrew *Raqiya*

- 1) **AMERICAN STANDARD VERSION (ASV):** And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 2) **THE BIBLE IN BASIC ENGLISH (BBE):** And God said, Let there be a solid arch stretching over the waters, parting the waters from the waters.
- 3) **COMMON ENGLISH BIBLE (CEB):** God said, Let there be a dome in the middle of the waters to separate the waters from each other.
- 4) **COMPLETE JEWISH BIBLE (CJB):** God said, Let there be a dome in the middle of the water; let it divide the water from the water.
- 5) **(HOLMAN) CHRISTIAN STANDARD BIBLE (CSB):** Then God said, Let there be an expanse between the waters, separating water from water.
- 6) **THE DARBY TRANSLATION (DBY):** And God said, Let there be an expanse in the midst of the waters, and let it be a division between waters and waters.
- 7) **DOUAY-RHEIMS AMERICAN ED (DRA):** And God said: Let there be a firmament made amidst the waters: and let it divide the waters from the waters.
- 8) **ENGLISH REVISED VERSION (ERV):** And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 9) **ENGLISH STANDARD VERSION (ESV):** And God said, Let there be an expanse in the midst of the waters, and let it separate the waters from the waters.
- 10) **GOD’S WORD TRANSLATION (GW):** Then God said, Let there be a horizon in the middle of the water in order to separate the water.

- 11) **GOOD NEWS TRANSLATION (GNT)**: Then God commanded, Let there be a dome to divide the water and to keep it in two separate places.
- 12) **GOODSPEED SHORT BIBLE (GSB)**: Then God said, Let there be a firmament in the middle of the waters to divide the waters in two.
- 13) **HEBREW NAMES VERSION (HNV)**: God said, Let there be an expanse in the midst of the waters, and let it divide the waters from the waters.
- 14) **INTERNATIONAL STANDARD VERSION (ISV)**: Then God said, Let there be a canopy [endnote: “or an expanse”] between the bodies of water, separating bodies of water from bodies of water.
- 15) **JERUSALEM BIBLE (JB)**: God said, Let there be a vault in the waters to divide the waters in two.
- 16) **JUBILEE BIBLE 2000 (JUB)**: And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 17) **KING JAMES VERSION (KJV)**: And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 18) **KING JAMES II VERSION (KJVII)**: And God said, Let there be an expanse in the middle of the waters, and let it divide the waters from the waters.
- 19) **KING JAMES 2000**: And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 20) **KNOX TRANSLATION (KT)**: God said, too, Let a solid vault by which God would separate the waters which were beneath it from the waters above it.
- 21) **LATIN VULGATE (LV)**: dixit quoque Deus fiat firmamentum in medio aquarum et dividat aquas ab aquis
- 22) **LEXHAM ENGLISH BIBLE (LEB)**: And God said, Let there be a vaulted dome in the midst of the waters, and let it cause a separation between the waters.
- 23) **THE MESSAGE BIBLE (MSG)**: God spoke: Sky! In the middle of the waters; separate water from water!
- 24) **NEW AMERICAN BIBLE (NAB)**: Then God said, Let there be a dome in the middle of the waters, to separate one body of water from the other.
- 25) **NEW AMERICAN STANDARD BIBLE (NAS)**: Then God said, Let there be an expanse in the midst of the waters, and let it separate the waters from the waters.
- 26) **NEW ENGLISH BIBLE (NEB)**: God said, Let there be a vault between the waters, to separate water from water.
- 27) **NEW CENTURY VERSION (NCV)**: Then God said, Let there be something to divide the water in two.

- 28) **NEW HEART ENGLISH BIBLE:** And God said, “Let there be an expanse in the midst of the waters, and let it divide the waters from the waters.”
- 29) **NEW INTERNATIONAL READER’S VERSION (NIRV):** God said, Let there be a huge space between the waters. Let it separate water from water.
- 30) **NEW INTERNATIONAL VERSION (NIV):** And God said, Let there be a vault between the waters to separate water from water.
- 31) **NEW JERUSALEM BIBLE (NJB):** God said, Let there be a vault through the middle of the waters to divide the waters in two.
- 32) **NEW KING JAMES VERSION (NKJV):** Then God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 33) **NEW LIVING TRANSLATION (NLT):** Then God said, Let there be a space between the waters, to separate the waters of the heavens from the waters of the earth.
- 34) **NEW REVISED STANDARD (NRS):** And God said, Let there be a dome in the midst of the waters, and let it separate the waters from the waters.
- 35) **ORTHODOX JEWISH BIBLE (OJB):** And Elohim said, Let there be a *raki’a* (expanse, dome, firmament) in the midst of the mayim (waters), and let it divide the mayim from the mayim.
- 36) **REVISED STANDARD VERSION (RSV):** And God said, Let there be a firmament in the midst of the waters, and let it separate the waters from the waters.
- 37) **SEPTUAGINT (LXX):** καὶ εἶπεν ὁ θεός γενηθήτω στερέωμα ἐν μέσῳ τοῦ ὕδατος καὶ ἔστω διαχωρίζον ἀνὰ μέσον ὕδατος καὶ ὕδατος καὶ ἐγένετο οὕτως.
- 38) **THE SCRIPTURES (ISR):** And Elohim said, “Let an expanse come to be in the midst of the waters, and let it separate the waters from the waters.”
- 39) **THIRD MILLENNIUM BIBLE (TMB):** And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 40) **TODAY’S NEW INTERNATIONAL VERSION (TNIV):** And God said, Let there be a vault between the waters to separate water from water.
- 41) **THE WEBSTER BIBLE (WBT):** And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters.
- 42) **WORLD ENGLISH BIBLE (WEB):** God said, Let there be an expanse in the midst of the waters, and let it divide the waters from the waters.

- 43) **YOUNG’S LITERAL TRANSLATION (YLT):** And God saith, Let an expanse be in the midst of the waters, and let it be separating between waters and waters.

The tabulation of English translations is as follows:

<u>Translation</u>	<u>Frequency</u>	<u>Hardness</u>	<u>Spacious</u>
Canopy	1	■	
Dome	5	■	
Expanse	10		■
Firmament	11	■	
Horizon	1		■
Sky	1		■
Solid vault	1	■	
Something	1	?	?
Space	2		■
Vault	6	■	
Vaulted dome	1	■	
firm. dome, exp.	1	?	?

As we can see, although the challenge is to make the translation accommodate both characteristics of *raqiya*, this task is rather difficult since most of these translators are not familiar with a substance that can be both hard and ethereal. The *International Standard Version* (© 2011), for example, translates *raqiya* as “canopy” in the text, but includes three endnotes saying, “or an expanse,” which is opposite in meaning.

Physics, Metaphysics and the Firmament

To begin to understand what the *raqiya* really is, we need to use both the biblical descriptions and our ability to reason them out. In this process, the sciences of physics and metaphysics will be essential.

To begin, Scripture reveals the *raqiya* is something hard that is also spatial or something spatial that is also hard. This is an issue with which the Greeks struggled deeply, but we would also expect it of any deep-thinking Hebrew familiar with the Torah and its intricacies. The Greeks understood there had to be a “smallest” substance, something that was no longer divisible. They called this the “atom.” In their view, everything was composed of “atoms.”

These atoms would collect by the millions and form visible substances like air, water, fire, or earth as different atoms would form different substances. Let's take air, for example. The Greeks knew that when they breathed inward, air would fill their lungs. They knew that if they rode in a chariot, the wind would brush against their body. Hence they understood air was made of a very discrete and invisible substance. We've progressed a little from then, since we can actually identify the various "atoms" that constitute the air, namely, nitrogen (78%), oxygen (21%) and 1% carbon dioxide, rare gases or pollutants. The Greeks knew that although air was invisible it had substance, and sometimes that substance could cause damage, as a powerful wind could knock down a building, or do something more constructive, such as sail a ship. Whatever the case, air had substance.

Of course, it is easy to talk about the "substance" of air, but what about outer space where the celestial bodies reside and move? We don't find any nitrogen or oxygen in outer space. But we do find space, and lots of it. Suppose someone ventured to say that because outer space does not have any elemental gases in its constitution then we can conclude outer space is empty or has nothing. Would this be correct? The answer would be emphatically negative. The simple reason is due to the metaphysical fact that "nothing" cannot exist. There must be "something" in outer space similar to how there is a "something" in Earth's atmosphere. Just because we can't sense it doesn't mean something cannot exist there. Simply put, if there was nothing that composed outer space, then outer space would not exist, since, in principle, "nothing" cannot exist. If there were "nothing" between the sun and the planets, for example, they would be next to each other or, even more likely, they would coalesce into one another.

Even the Church Fathers knew the heavens were composed of a substance, although they were at a loss to tell us exactly what it is. In such cases, they described it by using analogies. For example, **Basil the Great** said the heavens were like "smoke":

Upon the essence of the heavens we are contented with what Isaiah says, for, in simple language, he gives us sufficient idea of their nature, "The heaven was made like smoke," that is to say, He created a subtle substance, without solidity or density, from which to form the heavens. As to the form of them we also content ourselves with the language of



the same prophet, when praising God “that stretches out the heavens as a curtain and spreads them out as a tent to dwell in.”⁴³⁷

Basil also says that he cannot go any further in his description lest we...

...torment ourselves by trying to find out its essence, not to tire our reason by seeking for the substance which it conceals. Do not let us seek for any nature devoid of qualities by the conditions of its existence, but let us know that all the phenomena with which we see it clothed

regard the conditions of its existence and complete its essence.⁴³⁸

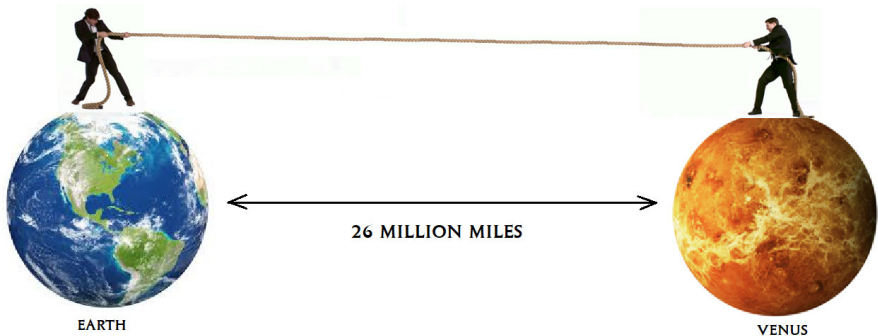
Despite his scientific limitations, Basil at least understood from the metaphysics of the issue that the heavens could not be “nothing,” but must be a “something” that had substance, although a very discrete substance, to be sure. Since we are 17 centuries removed from Basil in scientific discipline, perhaps we can go a few steps farther and at least hypothesize what this “substance” could be. We can surmise that the “something” of outer space is very different and vastly rarified compared to the air of Earth, since by all accounts its “substance” acts as a vacuum, at least compared to the density of Earth’s air. We realize this fact when we travel in a jet plane and the instruments sense that the higher we climb the thinner the air becomes. But what is replacing the space the air occupies as the air gets thinner (*i.e.*, there are less atoms per cubic volume)? It has to be something since “nothing” cannot exist. Obviously, it is ‘outer space’ replacing the air. But what is outer space? Again, metaphysically speaking, it must also be a substance of something, since it cannot be nothing. If there were nothing, then the universe would collapse in on itself, since “nothing” would be between its boundaries.

⁴³⁷ *The Hexaemeron*, Homily 1, 8. Basil is most likely referring to Isaiah 51:6: “Lift up your eyes to the heavens, and look at the earth beneath; for the heavens will vanish like smoke...”

⁴³⁸ *Ibid.*

Let's stop and remark here that viewing space as a "something" is not some highfalutin or imaginary concept. It is only common sense to understand that "nothing" cannot exist and thus a simple concept that space must consist of a physical substance.

Moreover, as the Greeks surmised with their "atom," it is also common sense that the substance of outer space must be composed of the smallest divisible entity. For example, whether he was Hebrew, Mesopotamian, Greek or Anglo-Saxon, many men have contemplated the nature of 'substance' during their lifetimes and realized that as he cut a garlic clove, what would happen if he kept cutting the clove and made it smaller and smaller? Where would the cutting end? His reason tells him that theoretically he should be able to cut the clove in half *ad infinitum*. But he also sees a paradox, as Zeno once did, since he also realizes there should come a point in which he can't cut any more garlic because the matter, at some critical point, will become indivisible. Since he realizes that matter cannot be infinite, either in largeness or smallness, there must be a "smallest" dimension of matter that is no longer divisible.



In a similar but opposite vein, modern science has theorized about a "perfectly rigid body." Let's say, for example, two men are having a tug-of-war, but one man is on Earth and the other man is on Venus. Let's say there was at least enough tension on the rope to have it taut (straight). At the word "Go," each man pulls his end of the rope. What would happen? All other things being equal and accounted for, the pull from each man would send a vibration down the rope, as each atom, in turn, would pull or push the other

atom. But since the atoms have “space” between them,⁴³⁹ and that space must be accounted for in order to calculate the time the vibration from one end of the rope would reach to the other end of the rope, the men might have to wait several minutes for the tug of one to be noticed by the other. But what if the rope were a “perfectly rigid body” with no “space” between its constituent parts? Theoretically, there should be an instantaneous or near instantaneous reaction, that is, a pull from the man on Earth should be nearly instantly felt by the man on Venus, and vice-versa. Because the constituent parts of the rope are so close together, the transfer of the vibration would be very fast, indeed. In fact, it can easily be calculated. It would not be infinite, but it would certainly be faster than the speed of light and it would be an ideal “medium for information” far superior to light, which is limited to 300,000 kilometers/second.⁴⁴⁰ So far we see that the closeness of the

⁴³⁹ In 1911, physicist Ernest Rutherford bombarded very thin sheets of gold with alpha particles. He found that, even though alpha particles are 8,000 times larger than the electron, and the metal foil was 400-atoms-thick, nevertheless, most of the particles penetrated the foil with little problem. Only a few, perhaps 1 in 1,000, were scattered, some deflecting 90 degrees. This means, of course, that the alpha particles move through the atom as if it were almost completely empty. The few alpha particles that were deflected had done so because they apparently hit the small nucleus of the atom, which means that most of the mass and electric charge of the atom is concentrated at that central point. As it turns out, only a quadrillionth of the atom has mass. The rest is “space.” If only 0.000,000,000,01% of the typical atom is occupied by particles, what constitutes the other 99.999,999,999,99%? It cannot be “nothing” since nothing cannot exist. It must be “something.”

⁴⁴⁰ The terrestrial speed of light has been accurately measured to be about 300,000 kilometers per second. Einstein’s Special theory of 1905, which was limited to non-inertial frames (*e.g.*, no gravity or inertial forces), claimed that light could not exceed what it was measured to be on Earth, which was given the symbol *c*. Ten years later in 1915, in his General theory, Einstein learned and admitted that light can exceed *c* by many orders of magnitude in inertial frames. As Einstein himself put it: “In the second place our result shows that, according to the general theory of relativity, the law of the constancy of the velocity of light in vacuo, which constitutes one of the two fundamental assumptions in the special theory of relativity and to which we have already frequently referred, cannot claim any unlimited validity” (Albert Einstein, *Relativity: The Special and General Theory*, 1920, p. 76; Methuen, London. Albert Einstein, *Relativity: The Special and the General Theory*, authorized translation by Robert W. Lawson, 1961, p. 85). Noted physicist, William Rosser, explained this more succinctly: “If gravitational fields are present, the velocities of either material bodies or of light can assume any numerical value depending on the strength of the gravitational field. If one considers the rotating roundabout [earth] as being at rest, the centrifugal gravitational field

constituent parts of the substance will determine how fast it can send a vibration.

What other quality would we expect from an ideal substance? We would expect that the constituent parts are the smallest they could possibly be and still be understood as matter—remembering that particles cannot be infinitely small. There must be a limit to their smallness. In essence, then, we have at least two characteristics that must be true of the ideal substance:

- (1) Its constituent parts must be so close together that there is no space, no gaps, between them. For all intents and purposes, they *are* “space,” since there is nothing else that can be between them;
- (2) The constituent parts must be the smallest possible parts that nature will allow to serve as a material part.

Whereas (#1) gives us the rigidity of the substance, (#2) gives us the flexibility to the substance. In other words, on the one hand, if we want to make the substance rigid so there is no space between its parts, we put the parts as close together as possible. On the other hand, if we want to make the substance as flexible as possible, we make its parts as small as possible. Theoretically, all we need to know is that a substance can exist that fulfills both criteria, that is, it is both hard and flexible due to both its particular material composition and its extreme granularity.

These theoretical facts beg the question: Would it be possible for God to create a substance to fill the heavens that was both the hardest substance in creation yet the most flexible, and thus fulfill the biblical definition of the *raqiya*, the firmament, to be both hard like gold and yet flexible like a gold leaf? In other words, would it be possible for God to create a substance that was so hard it could hold the whole universe together yet flexible enough that no planet moving around its sun would ever feel the slightest friction? As this “something” would fill all of “space,” or more correctly, *be the*

assumes enormous values at large distances, and it is consistent with the theory of General Relativity for the velocities of distant bodies to exceed 3×10^8 m/sec [*c*] under these conditions” (*An Introduction to the Theory of Relativity*, William G. V. Rosser, 1964, p. 460). This is one reason why modern science allows itself to claim the universe is expanding beyond the speed of light, since light, in General Relativity, can travel at any speed.

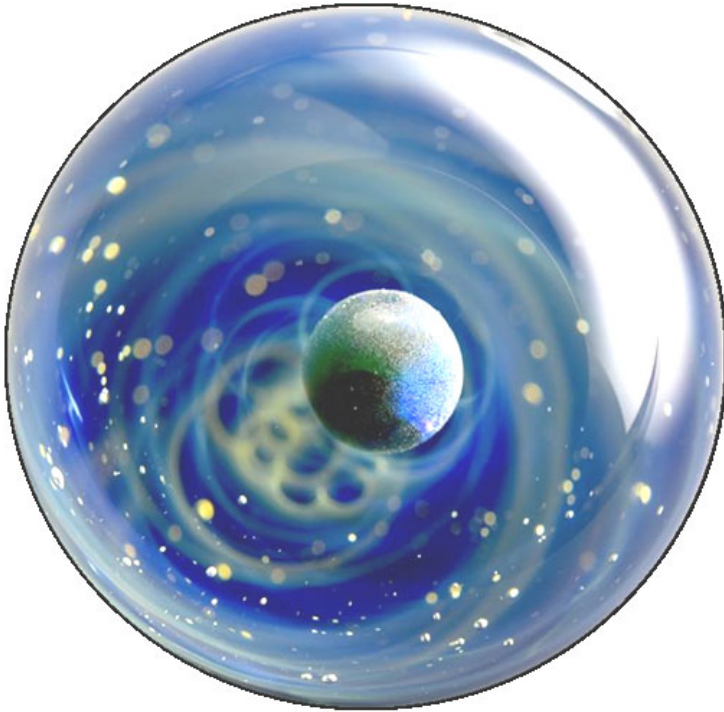
space, between the sun and the Earth or between all the stars, would it not also *be the space* between the atom's nucleus and its electrons since science has discovered that the atom itself is 99% "space"?

The answer to that question, of course, is a dramatic yes, since that is precisely what Genesis 1 tells us God did, and that is why he spent the whole of the Second Day telling us about it. The firmament must then be one of the most important substances in the creation. This highly rarified form of matter constitutes all of space, including the inner space between the mass particles inside the Earth, through the air particles of the Earth's atmosphere, and beyond to the farthest reaches of the "vacuum" of space at the edge of the universe. It is *the* material substance of our concept of "space," the most unique and discrete substance God created, that contains all things and in which all things move. Since it *is* space, then space can be quantified, perhaps similar to what Descartes sought in his "Cartesian coordinates" or Newton sought in his "absolute space" or what Einstein sought in his "bending of space." This is the "something" that cannot be "nothing," and it has nothing to do with domes or flat earths and has everything to do with the constitution of the universe.

In this light, perhaps modern science is catching up with what the Bible has taught about the firmament over three millennia ago when it stated in Proverbs 8:28 that God "made *firm* the skies above" or when it stated in Psalm 89:2: "...thy faithfulness is as *firm* as the heavens," or in Exodus 24:10, "and they saw the God of Israel; and there was under his feet as it were a pavement of sapphire stone, like the very heaven for clearness." One Nobel laureate in physics who has spent his life studying what constitutes space put it this way:

It turns out that such matter exists. About the time relativity was becoming accepted, studies of radioactivity began showing that the empty vacuum of space had spectroscopic structure similar to that of ordinary quantum solids and fluids. Subsequent studies with large

particle accelerators have now led us to understand that *space is more like a piece of window glass* than ideal Newtonian emptiness.⁴⁴¹



Of course, the “window glass” is just an analogy, since space must be far finer and discrete than glass. Modern physics is giving us a scientific clue and a logical conclusion that space cannot be a “nothing”; and that the “something” it is acts like a solid, a liquid, a gas, or a plasma when various sophisticated instruments are used to test its composition. For example, modern science has theorized the existence of an indivisible and invisible substance with extreme granularity, which exists in what are called the “Planck dimensions.” Here the smallest particle is an extremely “flexible” 10^{-35} meters in dimension (*i.e.*, 20 orders of magnitude smaller than the electron at 10^{-15} meters) but also a “hard” substance of 10^{94} g/cm³ (*i.e.*, so hard that a teaspoonful would weigh more than thousands of universes). These numbers are derived by using other known constants such as gravity,

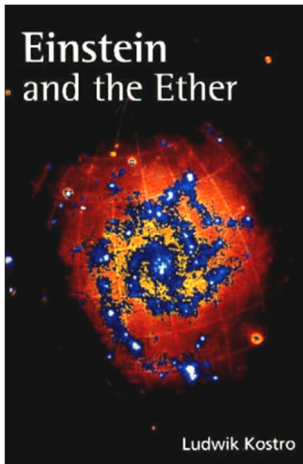
⁴⁴¹ Robert B. Laughlin, *A Different Universe: Reinventing Physics from the Bottom Down*, 2005, pp. 120-121; see also Paul Davies, “Liquid Space,” *New Scientist*, Nov. 3, 2001.

the speed of light, *etc.* As Craig Hogan of Fermilab put it, “The planck scale is not just small—it is the smallest.”⁴⁴² Many other scientists have reasoned to the same conclusion. George Musser writes:

The point is just that the space we observe could be a product of some underlying structure. When we walk across a room, we are not gliding passively through a preexisting expanse. Something is happening. There is machinery at work, a grinding of gears deep within nature, to produce the experience of being “here” and being “there.”⁴⁴³

From his book, *Einstein and the Ether*, Ludwik Kostro also comments on Albert Einstein’s final recognition in 1920 that space is made of a fine and discrete substance, which he called “ether”:

Modern science has its roots in ancient Greek philosophy. This philosophy, as we know, used the word “ether” to designate the particular kind of matter that filled the universe. This term was used throughout the history of philosophy and science, and it was also current at the beginning of this century. A resumption of its use at the dawn of this new century is now a fact. Since, according to the General Theory of Relativity and other modern branches of physics, the space and time of the universe do not constitute a vacuum, but a structured material plenum characterized by different physical quantities, the historical and traditional word “ether” is the most appropriate to express these features of the universe.⁴⁴⁴



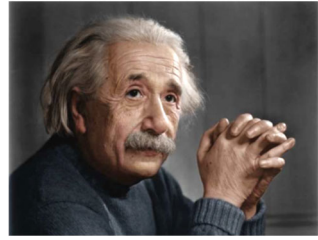
Accordingly, Einstein reintroduced the ether he had abandoned in 1905. He realized in 1920 that physics cannot function without ether, the “something” that is not “nothing”:

⁴⁴² See *Scientific American*, Feb. 2012, pp. 32-6; arXiv:1002.4880v27, Feb 2012.

⁴⁴³ *Spooky Action at a Distance*, George Musser, 2015, pp. 160-170.

⁴⁴⁴ Ludwik Kostro, *Einstein and the Ether*, 2000, pp. 186-187.

In 1905 I was of the opinion that it was no longer allowed to speak about the ether in physics. This opinion, however, was too radical, as we will see later when we discuss the general theory of relativity. It does remain allowed, as always, to introduce a medium filling all space and to assume that the electromagnetic fields (and matter as well) are its states. Once again “empty” space appears as endowed with physical properties, *i.e.*, no longer as physically empty, as seemed to be the case according to special relativity. One can thus say that the ether is resurrected in the general theory of relativity. Since in the new theory, metric facts can no longer be separated from “true” physical facts, the concepts of “space” and “ether” merge together.⁴⁴⁵



It would have been more correct if I had limited myself, in my earlier publications, to emphasizing only the non-existence of an ether velocity, instead of arguing the total non-existence of the ether, for I can see that with the word *ether* we say nothing else than that space has to be viewed as a carrier of physical qualities.⁴⁴⁶

Even Isaac Newton believed in the ether. Although in his famous book *Principia Mathematica* he said, “I design only to give mathematical notions of these forces, without consideration of their physical causes and seats,” which led to his concept of “action-at-a-distance” whereby gravity was mysteriously transported over vast distances by some mysterious yet

⁴⁴⁵ Albert Einstein, “Grundgedanken und Methoden der Relativitätstheorie in ihrer Entwicklung dargestellt,” *Morgan Manuscript*, EA 2070, as cited in Ludwik Kostro, *Einstein and the Ether*, Apeiron, 2000, p. 2. For a good summation of Einstein’s reasoning in regard to reviving the ether concept, see Galina Granek’s “Einstein’s Ether: Why Did Einstein Come Back to the Ether?” *Apeiron*, vol. 8, no. 3, July 2001; “Einstein’s Ether: Rotational Motion of the Earth,” *Apeiron*, vol. 8, no. 2, April 2001; Ludwik Kostro, “Einstein and the Ether,” *Electronics and Wireless World*, 94:238-239 (1988). Kostro writes: “the notion of ether was not destroyed by Einstein, as the general public believes” (*ibid.*, p. 239); “Lorentz wrote a letter to Einstein in which he maintained that the general theory of relativity admits of a stationary ether hypothesis. In reply, Einstein introduced his new non-stationary ether hypothesis” (*ibid.*, p. 238).

⁴⁴⁶ Albert Einstein, “Letter to H. A. Lorentz, November 15, 1919,” EA 16, 494, as cited in Ludwik Kostro, *Einstein and the Ether*, Apeiron, 2000, p. 2.

unexplained means, nevertheless, he believed that space was filled with something. He writes:



May not planets and comets, and all gross bodies, perform their motions more freely, and with less resistance in this aethereal medium than in any fluid, which fills all space adequately without leaving any pores, and by consequence is much denser than quick-silver and gold? And may not its resistance be so small, as to be inconsiderable? For instance; if this aether (for so I will call it) should be supposed 700,000 times more elastick than our air, and above 700,000 times more rare; its resistance would be above 600,000,000 times less than that of water. And so small a resistance would scarce make any sensible alteration in the motions of the planets in ten thousand years.⁴⁴⁷

Others after him held closely to this conviction, since it explained so many other phenomena in nature. As Robert Hooke understood it:

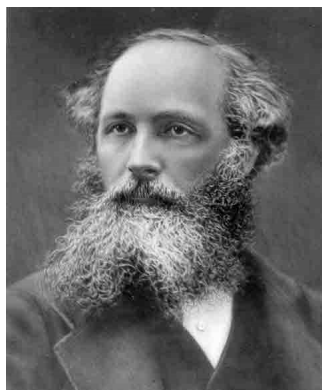
The mass of æther is all æther, but the mass of gold, which we conceive, is not all gold; but there is an intermixture, and that vastly more than is commonly supposed, of æther with it; so that vacuity, as it is commonly thought, or erroneously supposed, is a more dense body than the gold as gold. But if we consider the whole content of the one with that of the other, within the same or equal quantity of expaniation, then they are both equally containing the material or body.⁴⁴⁸

James Clerk Maxwell's entire electromagnetic theory was built on the foundation of ether, and he held the same idea as Newton regarding the constitution of interplanetary space. He writes:

⁴⁴⁷ Isaac Newton, *Opticks*, Fourth edition, 1730, Question 22. Newton addresses the issue of ether from Questions 18-31, mostly in reference to the travel of light through ether.

⁴⁴⁸ *From the Posthumous Works of Robert Hooke*, 1705, pp. 171-172, cited in O. Lodge, *The Ether of Space*, p. 98.

Ether or Æther (αἰθήρ probably from αἶθω, “I burn”) a material substance of a more subtle kind than visible bodies, supposed to exist in those parts of space which are apparently empty.... Whatever difficulties we may have in forming a consistent idea of the constitution of the æther, there can be no doubt that the interplanetary and interstellar spaces are not empty, but are occupied by a material substance



or body, which is certainly the largest, and probably the most uniform body of which we have any knowledge. Whether this vast homogeneous expanse of isotropic matter is fitted not only to be a medium of physical interaction between distant bodies, and to fulfill other physical functions of which, perhaps, we have as yet no conception, but also...to constitute the material organism of beings exercising functions of life and mind as high or higher than ours are at present – is a question far transcending the limits of physical speculation.⁴⁴⁹

The vast interplanetary and interstellar regions will no longer be regarded as waste places in the universe, which the Creator has not seen fit to fill with the symbols of the manifold order of His kingdom. We shall find them to be already full of this wonderful medium; so full, that no human power can remove it from the smallest portion of space, or produce the slightest flaw in its infinite continuity. It extends unbroken from star to star; and when a molecule of hydrogen vibrates in the dog-star, the medium receives the impulses of these vibrations, and after

⁴⁴⁹ *Encyclopedia Britannica*, 9th edition, Edinburgh: Adam and Charles Black, 1875, under the title “Ether,” republished by Cambridge University Press, 1890. Expanding on Maxwell’s Greek, the word αἰθήρ commonly referred to the upper, purer air, as opposed to αἶψα, the lower air or atmosphere. This distinction would make the ether the rarified interplanetary medium in distinction to the air near the Earth. Although αἶψα may be the closest derivative, it was a separate word found only in the present and imperfect tense, ἡθον, meaning “to light or kindle,” and rarely “to burn or blaze.” Another significant derivative is αἶθων, the participle of αἶθω, which either means “fiery burning” or “flashing or glittering metal” (Liddell and Scott, *Greek-English Lexicon*, Oxford University Press, 1871, 1977, pp. 18-19). The “metal” aspect of ether has some representation in the Hebrew word רָקִיעַ translated as “firmament” in Genesis 1:6-9, since the Hebrew refers, among other meanings, to a beaten down metal, denoting firmness.

carrying them in its immense bosom for several years, delivers them, in due course, regular order, and full tale, into the spectroscope of Mr. Huggins, at Tulse Hill.⁴⁵⁰

Robert Moon tells us that space even contains electrical resistance:

According to accepted theory, free space is a vacuum. If this is so, how can it exhibit impedance? But it does. The answer, of course, is that there is no such thing as a vacuum, and what we call free space has structure. The impedance equals 376+ ohms.”⁴⁵¹

Steven Weinberg notes in a 1989 paper that the energy density of space is upwards and probably beyond 10^{71} GeV, which is close to the Planck density. Alan Kostelecký adds:

Whatever the eventual form of the ultimate theory, quantum physics and gravity are expected to become inextricably intertwined at a fundamental length scale of about 10^{-35} meters, which is called the Planck length, after the 19th century German physicist Max Planck.⁴⁵²

As we see, modern science is well on its way to confirming the fact that space is not only not a “nothing,” but a functioning and formidable “something,” and a something that far exceeds our imagination and expectations, which is precisely what we would expect from God who also makes things as intricate as the human cell, which is a veritable city confined within a hundredth of a centimeter, and He creates things as microscopic but as complex as deoxyribonucleic acid (DNA). No wonder Psalm 150:1 calls this “something,” “God’s mighty firmament.”⁴⁵³

Of course, most of the flat-earthers will probably think our use of logic, reason and etymology (e.g., that “nothing” cannot exist; the firmament is not a shape but a substance; that a hard substance does not necessitate that

⁴⁵⁰ *Encyclopedia Britannica*, 9th edition, Edinburgh: Adam and Charles Black, 1875, under the title “Ether,” republished by Cambridge University Press, 1890, as cited in Sir Oliver Lodge, *The Ether of Space*, 1909, p. 114.

⁴⁵¹ “Space Must Be Quantized,” *21st Century*, May-June, 1988, p. 26ff.

⁴⁵² *Ibid.*

⁴⁵³ See my book, *A Googolplex of Tiny Blackholes: A Theory of Gravity, Inertia and the Speed of Light*, 2017, CAI Publishing, Inc, for more information on the firmament and the structure of space. Available at www.academia.edu/

the firmament is a dome); and our use of science (*e.g.*, that science is aware of and has accepted the existence of a discrete, hard and flexible substance) goes against their own reading of the Bible. Unfortunately, it is their own reading of the Bible that is the problem, since it is saturated with “private interpretation” borrowed from progressive theologians who themselves are saturated with false notions of biblical revelation.

Flat-earthier, Rob Skiba, at the same time he misses the problem he poses for himself in not seeing that his model defines the firmament both as a dome and the space underneath it, chides those who see the firmament as space by saying,

...*raqiya* is a solid structure...extended surface, solid expanse...firmament of heaven supporting the waters above...it is solid. It is not just simply an expanse, as in an expanse of air or the vacuum of space or gases. It comes from a root word *raqa*, which means to beat down, like to beat down metal to make it flat like a mirror, like the laver in the tabernacle. How do you beat out air? How do you beat out gas? How do you beat out the vacuum of space? It is a hard structure, solidity.”⁴⁵⁴

The problem here is that Skiba is confusing the result with the cause. Although it is certainly true that *raqiya* (רָקִיעַ) and its root *raqa* (רָקַע) refer to a solid substance and something beaten down and spread out, respectively,⁴⁵⁵ Skiba neglects to see that the firmament is the *result* of a solid substance being beaten down and spread out, which *result* allows the firmament to retain a solid quality but also obtain another quality, one, perhaps, that it didn’t have before it was beaten out. Scripture insists that this second quality is its flexibility and ethereal form (*e.g.*, Basil’s “smoke”), since the birds must be able to fly in it and the sun, moon, and stars to move in it. Hence Skiba’s questions, “how do you beat out air?” and “how do you beat out the vacuum of space” are misplaced, since space, both inner and

⁴⁵⁴ <https://www.youtube.com/watch?v=xNyeHzO1oEc> at 5:48 to 6:41.

⁴⁵⁵ The root *raqa* (רָקַע) is used 11 times: Ez 25:6: qal infinitive, “stamped”; Ez 6:11: qal imperative, “stamp”; 2Sm 22:43, qal imperfect, “did spread them”; Ps 136:6: qal poel participle, “that stretched out”; Is 42:5, “he that spread forth”; Is 44:24, “spread abroad”; Ex 39:3, piel imperfect, “they beat (the gold)”; Nm 16:39, “made broad”; Is 40:19, “spread it over (with gold)”; Jr 10:9, pual participle, “(silver) spread into (plates)”; Jb 37:18, hiphil imperfect, “spread out the sky.”

outer, is the *result* of God beating out the firmament so that the celestial bodies could be placed in it on the Fourth Day. Hence one can't beat down the vacuum of space because it has already been beaten down to its finest and most discrete level that nature will allow.

Perhaps Skiba is confused by the fact that *raqa* is sometimes used in other Old Testament passages in reference to beating out gold or silver, which substances he then infers must be the same or a similar substance of which the firmament is composed. But the inference is incorrect. First is the fact that *raqa* does not refer to gold or silver, but only to the "spreading out" of a substance, any substance. Second, the firmament is not metal since obviously birds can't fly in metal (which relates to the basic problem Skiba created for himself earlier by conflating a hard dome firmament with a spatial firmament in which the birds fly).⁴⁵⁶

Along with the book of Enoch, Skiba also attempts to commandeer the writings of Josephus to his aid. He quotes a passage in which Josephus refers to a "crystalline firmament" covering over the Earth:

After this, on the second day, he placed the heaven over the whole world, and separated it from the other parts, and he determined it should stand by itself. He also placed a *crystalline [firmament]* round it, and put it together in a manner agreeable to the earth, and fitted it for giving moisture and rain, and for affording the advantage of dews.⁴⁵⁷

Although Josephus has no particular authority on the interpretation of Genesis 1, he represents the abiding consensus among his contemporaries as to its meaning. This is enough for us to consider what he has to say. One of the first things we notice is that Josephus does not say the firmament is a dome above the Earth, and he gives no indication the Earth is flat. As such, he cannot really be of help to the flat-earthers and it appears Skiba is 'reading into' Josephus what he wants to see and thus titles his video,

⁴⁵⁶ At other times (<https://www.youtube.com/watch?v=rtL0GA-pdC8>), Skiba suggests that the firmament could be something like the plasma modern science has discovered 7,200 hundred miles to protect the Earth from electron radiation at the rim of the Van Allen Belts, although Skiba does not explain why the sun, moon and stars are outside this 7,200 mile barrier.

⁴⁵⁷ <https://www.biblestudytools.com/history/flavius-josephus/antiquities-jews/book-1/chapter-1.html>

“Enoch’s Domed World.”⁴⁵⁸ Nevertheless, we shall analyze his word choice in describing the firmament. Here is Josephus’ original Greek script, with my English translation for each Greek word:

Μετὰ δὲ τοῦτο τῇ δευτέρᾳ τῶν ἡμερῶν τὸν οὐρανὸν
After --- this the second --- day the heavens

τοῖς ὅλοις ἐπιτίθουσιν, ὅτ’ αὐτὸν ἀπὸ τῶν ἄλλων
--- whole he placed, so that it from the other parts

διακρίνας κατ’ αὐτὸν ἡξίωσε τετάχθαι,
he separated by itself he determined to have (it) stand,

κρύσταλλον τε περιπῆξας αὐτῷ καὶ νότιον αὐτὸν
a crystalline also he placed around it and moist it

καὶ ὑετώδη πρὸς τὴν ἀπὸ τῶν δρόσων ὠφέλειαν
and rainy to that from the dews an aid

ἀρμοδίως τῇ γῇ μηχανησάμενος.⁴⁵⁹
fitted to the Earth he was constructing.

We see that Josephus is concentrating on the atmospheric part of the firmament (as opposed to the celestial firmament) in which clouds form rain and keep the Earth moist, and also by causing dews on the ground. But the operative phrase for our purposes is κρύσταλλον τε περιπῆξας αὐτῷ (“a crystalline (κρύσταλλον) also he placed around it (περιπῆξας αὐτῷ)”), since it tells us the consensus was not only about the substance of the firmament (crystalline) but also its shape (round). The word κρύσταλλον refers in the main to a crystal.⁴⁶⁰ Perhaps Josephus is borrowing from the

⁴⁵⁸ <https://www.youtube.com/watch?v=R-Jpr3kGQXM>, beginning at 2:39.

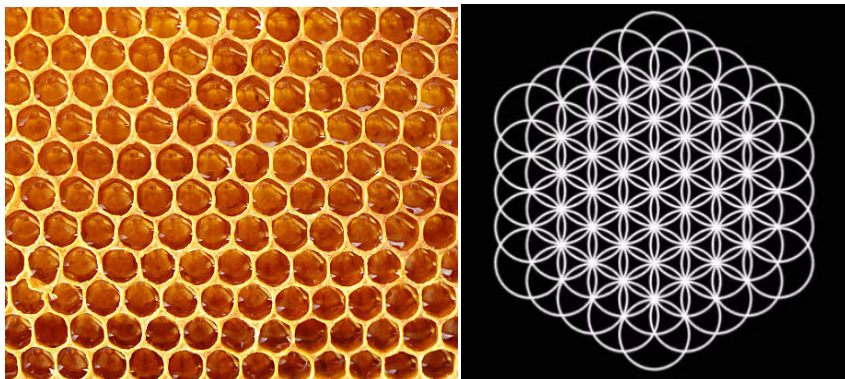
⁴⁵⁹ From the book of Flavius Josephus, *Antiquitates Judaicae*, ed. B. Niese at: <http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0145%3Abook%3D1%3Awhiston+chapter%3D1%3Awhiston+section%3D1>

⁴⁶⁰ So Liddell and Scott, wherein the verb κρυσταλλίζω means “to be like a crystal,” and κρυστάλλινος means “of crystal,” and κρυσταλλος means either “clear ice” or

idea proposed by Aristotle that space is composed of crystalline tubes in which the planets revolve around the Earth. In this case, perhaps the hardness or solidity of a crystalline substance is what Josephus has in mind, and thus matches at least one of the aspects of the Hebrew word רַקִּיעַ (*raqiya*). But since Josephus is speaking only about what surrounds the Earth—since the Earth was, at this point of time in the creation story, the only body in existence—then the solid crystal he has in view must be the ubiquitous substance composing both the atmospheric and celestial firmament, not planetary tubes.

At the risk of reading into Josephus' word choice, a crystalline substance would be the closest modern scientific description of what we had stated earlier regarding the composition of the firmament. In modern science, a crystal is a repeating pattern of atomic structure. For example, salt (NaCl) forms in a single cubic structure and then multiples into many cubic repetitions, which is the reason that if we look at a grain of salt under a microscope it is in the shape of a cube. A diamond does much the same with carbon atoms, but the crystal shape is a tetrahedron, which makes it very hard, as opposed to graphite, which is also pure carbon but in a square-shaped crystal, which is why it can break off rather easily and thus allows us to write with a graphite pencil. In any case, crystals are noted for how they form into a compact structure, which is measured by their "packing efficiency." Although crystals composed of spherical atoms would necessarily have a packing efficiency of less than 1.00, other shapes, such as the hexagonal (six-sided), can form crystals with no gaps and thus have a 1.00 (100%) packing efficiency.

"extreme cold, torpor" or "crystal, rock crystal" (*Greek-English Lexicon*, abridged, Oxford University Press, 1977, p. 395). Bauer has "rock crystal" as found in Diodorus Siculus 2, 52, 2; Strabo 15, 1, 67; Dio Chrysostom 12[13], 34; et al. (*Greek-English Lexicon of the New Testament and Other Early Christian Literature*, 2nd ed, Univ. of Chicago Press, 1979, p. 454).



This is why bees make their honeycombs into hexagonal shapes so as to economize on the space needed to make their hives. Since both inner and outer space can have nothing between their constituent parts, a hexagonal shape to its crystal structure would make it nature's strongest (hardest) and most economical structure, throughout the universe. Even a hexagonal pattern within a sphere is said to be the perfect repeating (*i.e.*, crystalline) shape. Perhaps this is why Ezekiel refers to a "firmament" as a "crystal" structure, as he says in Ek 1:22: "Over the heads of the living creatures there was the likeness of a firmament, shining like crystal."

We are not saying, of course, that either Josephus or Ezekiel had any notion of such high-level physics, but only that there is more to the fact that a κρύσταλλον can describe the firmament of Day 2 of creation week and that space is not a "nothing" but a "something" that appears to be very intricate and complex.⁴⁶¹

These insights are even more significant as Josephus uses the word περιπήξας⁴⁶² to describe the shape and position of the firmament. It refers

⁴⁶¹ Some may be puzzled as to how we can move through space if it is considered "hard," such that it has physical substance. We do so just as we would move through air or water, as we displace, by wave motion, what surrounds us. Moreover, not only has modern science found that matter may move with a pilot wave (Louis deBroglie), it has also shown that if space is as super-granular as they believe it to be (*e.g.*, 20 orders of magnitude smaller in granular size than an electron), then it will behave as a super-fluid that exhibits no friction against a moving object.

⁴⁶² From περιπήγνυμι, a combination of περί + πήγνυμι. Since this verb is followed by the dative αὐτῷ, then περί here is used for "around," "round about," and πήγνυμι = "to stick or fix in, make firm or fast in, to set or plant, to make solid, stiff" (Liddell

to a covering that goes around the Earth. Hence implied in Josephus' description is that the Earth is a sphere and the firmament extends all the way around it. Although it is possible that "around" in Josephus' mind could refer to the circumference of the bottom part of a dome, if he had intended such a concept he could have used the word ἡμικύκλιο (pronounced *hemi-kuklio*), which refers to a hemisphere or dome. Since in no place in his writing does Josephus say the Earth is flat or that it is covered by a dome or that the firmament is in the shape of a hemisphere, we can conclude that Skiba's attempted use of the *Antiquitates Judaicae* to support his flat Earth theory is neutralized.

The Church v. Fr. Foscarini on the Firmament

The question of the constitution of the firmament came up about 400 years ago when the Catholic Church was confronting the heliocentric cosmology of Fr. Paolo Antonio Foscarini in 1615, one year before the Galileo affair. One particular passage initiated the confrontation. It was Job 37:18 in the Latin Vulgate:

*Tu forsitan cum eo fabricatus es caelos qui solidissimi
quasi aere fusi sunt*

(Together with this you have created the heavens which are
most solid and spread out like the air).⁴⁶³

and Scott, *op. cit.*, pp. 551, 558). Here περιπήξας is either an aorist participle or a second aorist verb. Liddell and Scott have "to fix round, to put as a fence round, to make to congeal round." Bauer has no reference.

⁴⁶³ The operative Latin word, *fusi*, can be understood also as "melted," "fluid," "outpoured," "effused," "molded," or "flowing," depending on the declension. The Douay-Rheims has: "Thou perhaps hast made the heavens with him, which are most strong, as if they were of molten brass." Rahlfs' LXX has: στερεώσεις μετ' αὐτοῦ εἰς παλαιώματα ἰσχυραὶ ὥς ὄρασις ἐπιχύσεως ("Will you establish with him foundations for the ancient heavens? They are as strong as a molten mirror"). The RSV has: "Can you, like him, spread out the skies, hard as a molten mirror?" Of interest here is ὄρασις ἐπιχύσεως which is literally, "vision of a pouring over," or "vision of an overflow or flood" (per Liddell and Scott for ἐπιχύσεως), from the Hebrew כִּרְאִי מִצֶּקֶק.

Foscarini claimed the heavens were “very thin and tenuous” and he was censored for this view based on the Church’s plain reading of Job 37:18 that the sky was hard. Among other things, the censor stated:

On page 45 he says that the heavens are very thin and tenuous, not solid and dense. This is clearly contrary to Job 37* ‘Together with this you have created the heavens which are most solid and spread out like the air.’ This cannot be explained as an appearance (as the author indicates) because the solidity of the heavens is not apparent to us.⁴⁶⁴

Obviously, the Catholic censor was taking Job 37:18 at face value and considered it factual truth. Even the particulate constitution of the space was not considered a trivial and obscure point, since Scripture cannot lie on any point of fact. The censor regarded Job 37:18 as if it was based on the utmost divine authority and this became the sole reason for rejecting Foscarini’s approach to Scripture. The question at issue is: can Scripture be trusted to give us factual information about the cosmos in addition to its already accepted infallible authority on faith and morals? The answer of the Catholic Church of the 17th century was an unequivocal ‘affirmative,’ as it was for the sixteen centuries prior in its long-standing tradition. This view of Scripture and tradition was the whole basis for her condemnation of both Foscarini and Galileo, not to mention Copernicus.

Considering how the Holy Spirit led the Church into this rather obscure area of Scripture, let’s look a little deeper into what they may have seen. We notice that Job 37:18 has some very interesting features that support the censor’s contention against Foscarini, as well as supporting the fact that space is a discrete material substance that makes it hard. The RSV translation is:

Can you, like him, spread out the skies, hard as a molten mirror?

The original Hebrew reads as follows:

⁴⁶⁴ The censor’s document is titled: *Judicium de spistola F. Pauli Foscarini de mobilitate terrae* (see *The Church and Galileo*, p. 24) and the text is provided by Richard J. Blackwell in *Galileo, Bellarmine and the Bible*, pp. 253-254. We have changed “Tobit 37” to Job 37 since Blackwell, or from whomever he copied it, apparently misread the original Latin.

לִשְׁהָקִים עִמּוֹ (“with him”) תִּרְקִיעַ (“can you beat out or spread out”) מִיֶּצֶק כְּרָאִי (“like a mirror”) חֲזָקִים (“the sky, the heavens”) (“cast”).

- The word, תִּרְקִיעַ, (pronounced: *ta-ree-kee-ya*) is a verb appearing twelve times in the Hebrew bible and normally means “to spread or stretch out.”⁴⁶⁵ It is very similar to the noun רָקִיעַ (*raqiya*) which is translated as “firmament” in Genesis and the Psalms.⁴⁶⁶
- The word לִשְׁהָקִים (*la-sha-hiy-kim*) translated as “the sky, the heavens,” is from the root שָׁהַק and appears twenty-one times as either “sky”;⁴⁶⁷ “clouds”⁴⁶⁸ “heavens,”⁴⁶⁹ or even “dust,”⁴⁷⁰ with a notable difference between “sky” and “clouds.”⁴⁷¹ All in all, it carries the idea of a finely-grained hard substance that fills the sky, and by extension, the rest of the heavens.
- The word חֲזָקִים (*cha-zeek-eem*), translated as “hard,” appears over forty times in the Hebrew bible and is translated as “strong” (Ex 13:9); “mighty” (Ex 32:11); “hard” (Ez 3:9).
- The word מִיֶּצֶק (*miy-tsaq*), translated “cast,” is from the root יָצַק and is translated variously as “cast” (Ex 25:12); “pour” (Lv 2:1); “forms” (Jb 38:38); “firm” (Jb 41:23-24); “attached to” (Ps 41:8); “molten” (1Kg 7:16).

It is rather obvious, then, that the words used in Job 38:7 depict a first and second heavens that is very hard, solid and dense. Although it is obviously also flexible and ethereal, Foscarini failed to acknowledge the hard and dense aspect and thus was censored.

⁴⁶⁵ Ex 39:3; Nm 16:39; 17:4; 2Sm 22:43; Jb 37:18; Ps 136:6; Is 40:19; 42:5; 44:24; Jr 10:9; Ez 6:11; 25:6.

⁴⁶⁶ Gn 1:6-8, 14-17, 20; Ps 19:1.

⁴⁶⁷ Dt 33:26; 2Sm 22:12; Jb 37:18; Ps 18:11; 77:17; 108:4; Is 45:8; Jr 51:9.

⁴⁶⁸ Jb 35:5; 36:28; 37:21; 38:37; Ps 36:5; 57:10; 78:23; Pr 3:20; 8:28.

⁴⁶⁹ Ps 68:34; 89:6, 37, with the last in a context that specifies the space in which the sun and moon reside.

⁴⁷⁰ Is 40:15.

⁴⁷¹ 2Sm 22:12; Ps 18:11.

Since this is Scripture's divinely inspired description of space, who are we to argue with it? Instead, we should promptly take this information and see if both metaphysics and physics has evidence to support this description, and indeed it does, as we have seen.

Proverbs 8:28

When he established the heavens, I was there, when he drew a circle on the face of the deep, ²⁸ when he *made firm the skies* above, when he established the fountains of the deep. (RSV)

The word “skies” is the Hebrew שָׁמַיִם (pronounced: *sha-kaq*). Some translations render it as “clouds,” but that choice does not fit with the verb “made firm” which is from the Hebrew verb אָמַץ (pronounced *a-mats*), a piel infinitive, the intensive form of the qal. It is normally understood as “harden” (Deut 15:7) or “make strong” (2Ch 11:17). Clouds cannot be made strong or firm, since they are nothing but water vapor, unless the author is referring to the cloud's making of ice crystals.

Other passages that use *raqiya* (רָקִיעַ) are Psalms 19:1; Ps 150:1 and Ezekiel 1:22-26, all of which are sparse on detail. The Psalms use the word in praise to God while Ezekiel is a symbolic vision whose only distinguishing feature is that in all its verses God, in symbolism, is said to be above the firmament. This stipulation makes sense, since God, being spirit, cannot be the firmament even though the firmament is ubiquitous.

The remaining usages of *raqiya* appear in Daniel 12:3: (“those who are wise shall shine like the brightness of the firmament; and those who turn many to righteousness, like the stars for ever and ever”); and Ecclesiasticus (Sirach) 43:1 (“The pride of the heavenly heights is the clear firmament”) showing that the firmament is “clear” and thus invisible; and 43:8 (“the moon, increasing marvelously in its phases, an instrument of the hosts on high shining forth in the firmament of heaven”) in which we again see the celestial bodies are “in” the firmament and their light is also “in” the firmament.⁴⁷²

⁴⁷² The only other appearances of *raqiya* are in the non-canonical books: Prayer of Azariah 1:34: “Blessed art thou in the firmament of heaven”; and 4 Esdras 4:7:

All in all, the literal meaning is that the sky, heavens, or firmament, is not a tenuous, vaporous entity. Although ostensibly it is transparent and pliable, on another level (implied is the subatomic level), Job 37:18 indicates the heavens are composed of an extremely dense material substance.

So, on the First Day, God created the heavens (Gn 1:1: “In the beginning, God created the heavens...”), and on the Second Day he created the firmament to fill the heavens, which would then explain why Gn 1:8 concludes, “and God called the firmament, heaven,” since they would then be one in the same once the firmament fills the heaven. (The other possibility is that the phrase “God created the heavens” on Day 1 is merely in introductory remark and that “Let there be a firmament” on Day 2 is when God actually created the heavens). Additionally, the reference to “heavens” would necessarily refer only to the first and second heavens (*i.e.*, the Earth’s atmosphere and interstellar space) and not the third heaven where God dwells, since Scripture indicates God is above the firmament and, as noted, cannot *be* the firmament (*cf.* Ps 2:4; 11:4; 139:8; Ez 1:22-26; 10:1; 4Esdras 4:21; Ep 4:10; Hb 4:14; 7:26).

In either case, the firmament, *raqiya* (רָקִיעַ), constitutes all of space, the entire space between the Earth’s atoms to the edge of the universe. This concept is in distinction to other Hebrew words, such as רֵיחַ (*reyach*), which refers to “space” (e.g., Gn 32:16: “Pass on before me, and put a *space* between drove and drove”),⁴⁷³ or רָחוֹק (*rachok*), which refers to spatial distance (Js 3:4: “Yet there shall be a *space* between you and it, a distance of about two thousand cubits),⁴⁷⁴ words that the Hebrew writer obviously

“how many streams are above the firmament, or which are the exits of hell, or which are the entrances of paradise?”; 6:20: “the books shall be opened before the firmament, and all shall see it together”; 6:41: “Again, on the second day, thou didst create the spirit of the firmament, and didst command him to divide and separate the waters.” Additionally, the LXX translation of *raqiya* in Gn 1:6 is στερέωμα, which also appears once in the NT at Cl 2:5 in “καὶ τὸ στερέωμα τῆς εἰς Χριστὸν πίστεως ὑμῶν” (“and the *firmness* of your faith in Christ”).

⁴⁷³ רֵיחַ (*reyach*) not to be confused with רֵיחַ (*ruach*) = spirit, Gn 1:2; Ex 13:10.

⁴⁷⁴ Also Ps 22:1: “Why art thou *so far* from helping me, from the words of my groaning?”

did not want to use to describe the heavens since its space is a *substance*, not merely a spatial distance.

Essentially, Scripture tells us the heavens are both flexible and rigid. Apparently, Foscarini's censor, by little more than a simple deduction from Holy Writ, accepted the dual nature of the firmament, one nature observable and the other unobservable, with the latter nature being one in which he concludes, "the solidity of the heavens is not apparent to us." Conversely, a solid-shell model of the firmament ignores these atmospheric and celestial dimensions, seeking, rather, to confine the hardness to a dome structure that is over and separate from the atmosphere and the celestial realms. Consequently, it does not do proper justice to the Scriptural language.⁴⁷⁵

Hence if we take all these descriptions of the firmament of the heavens together, and apply them both to the firmament in which the birds fly and the firmament in which the stars reside, it obviously cannot refer to a dome since a dome would not fulfill the specific criteria. In order to fulfill the biblical criteria, the firmament of the heavens must be:

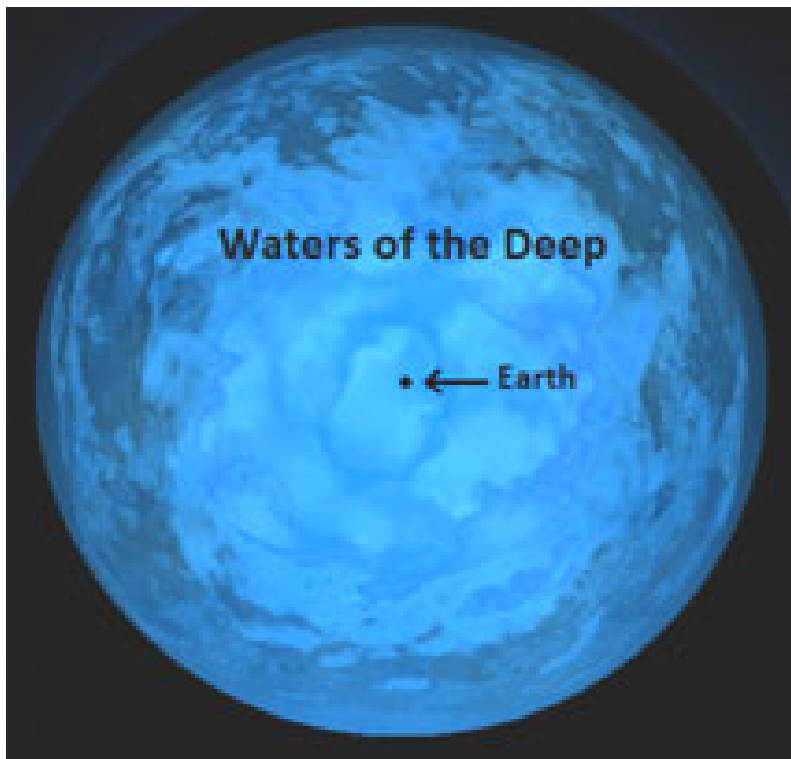
- hard and dense
- acts like a solid, liquid and gas.
- transparent, clear
- easily penetrable so that birds can fly in it
- flexible so that it can be stretched
- fills the whole universe so that stars may be contained in it
- combined with or be a substrate of Earth's atmosphere, filling all of the space between the molecules of Earth's air
- combined with or a substrate of the vacuum of outer space

Stretching of the Firmament

Another feature of the firmament is that Scripture says it was "stretched" or "expanded." This is already implied in Genesis 1:6: "And God said, 'Let there be a firmament in the midst of the waters, and let it separate the waters

⁴⁷⁵ See also "Is the *raqiya*' (firmament) a solid dome?" at answersingenesis.org/docs/4169.asp, James Holding versus Paul Seely, first published in *Technical Journal* 13(2):44-51, 1999.

from the waters.’” This means that at the beginning the Earth was covered with water. And since there was no heat, the water would be ice.



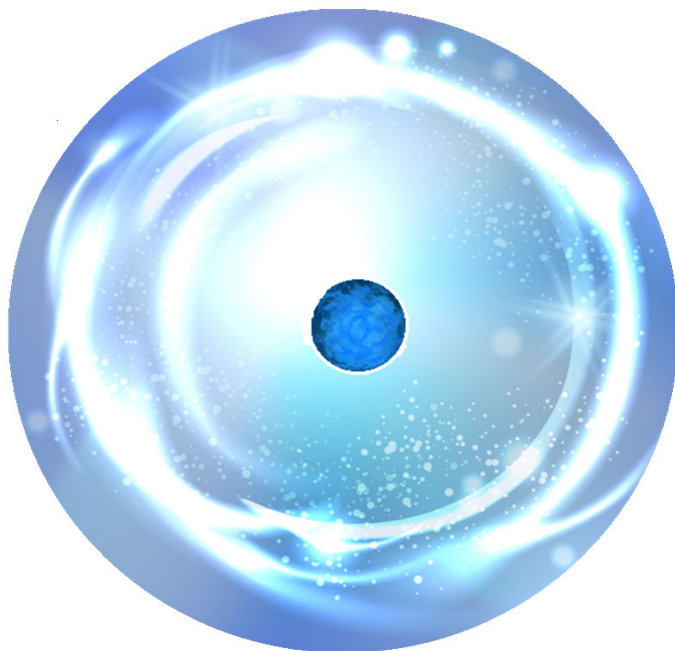
As Job 38: 29-30 states:

From whose womb did the ice come forth, and who has given birth to the hoarfrost of heaven?⁴⁷⁶ The waters become hard like stone, and the face of the deep⁴⁷⁷ is frozen.

In this frozen and dark environment, the Light is then created to give light for the day/night rhythm...

⁴⁷⁶ The phrase “hoarfrost of heaven” is from: **שָׁנִים וְכַפּוֹר**, referring to ice crystals which we normally see as frost on the surface of Earth, but here is associated with the first and/or second heavens. **כַּפּוֹר** also appears in Ex 16:14; Ps 147:16.

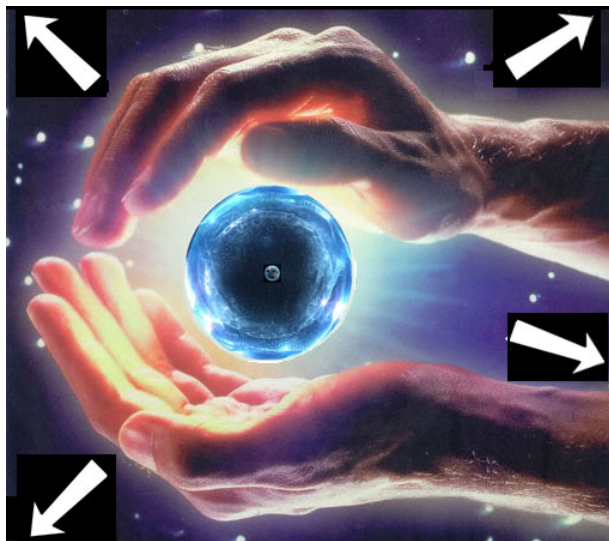
⁴⁷⁷ The phrase “face of the deep” is **פְּנֵי תְהוֹם**, the exact same phrase appearing in Gn 1:2 as “face of the deep,” which thus explains that the “water” of Gn 1:2 was in the form of ice. The “face” of the deep refers to the surface of the water.



...and to give heat to the Earth, which then melted the ice into liquid water.



This water may have been billions of miles deep, with the Earth being like a tiny seed in the middle. After God created the firmament on the Second Day (which would necessarily be in the water and outside the water), he stretched out the firmament so that it would take the greater portion of water far away from Earth.



As Genesis 1:7 puts it:

And God made the firmament and separated the waters which were under the firmament *from the waters which were above the firmament*. And it was so.

Even though there was water above the heavens, water in a much lesser percentage could have been diffused in the firmament and actually be part of its composite structure, seeping out in places where the temperatures will allow ice crystals to form *en masse*. Previously we noted that the smallest physical structure allowed in modern science is the Planck particle, which makes it the most likely candidate to be the actual composition of space itself, the firmament. Interestingly enough, out of all its dimensions (*i.e.*, length of 10^{-35} meters; density of 10^{-94} gm/cm³; temperature of 10^{32} K), the mass of the Planck particle is 2.1×10^{-5} gm, which is rather large compared to its size. As such, it may be no coincidence that the mass of a water ice crystal is between 1×10^{-5} gm and 5×10^{-5} gm. Thus it could be the case

that a Plank particle is an extremely compressed ice crystal that, on occasion, through a process known as “tunneling” in physics, could escape the compression and reform as detectable ice crystals in cold temperature or liquid water or steam in higher temperatures.

Prior to our present era, water existing in outer space was not detectable. Modern science, however, has discovered vast amounts of water in the recesses of space. As West Marrin writes:

Water is certainly not limited by the confines of this planet and is, in fact, one of the most common molecules in the universe. The more that science looks for water in the cosmos, the more places they seem to find it.⁴⁷⁸

As soon as telescopes were sensitive enough to detect water, the reports came in quite frequently. One of the first was from the University of California that reported in *Science*:

Radio spectral line radiation of water molecules at a wavelength of 1.35 centimeters has been measured from eight sources in the galaxy. The sources are less than 7 arcminutes in diameter, have extremely high brightness, temperatures, and show many spectral features...Seven of the eight H₂O line emission sources which have been observed agree in position with known hydroxide emission sources within the accuracy of measurement.⁴⁷⁹

⁴⁷⁸ West Marrin, *Universal Water: The Ancient Wisdom and Scientific Theory of Water*, Hawaii, Interocean Publishing, 2002, p. 67. Water has also been found on the surface of the sun. It survives the high temperatures of the sun’s photosphere since the water is confined to the dark, cool regions of sunspots whose temperature is less than 3,500 Kelvin. Marrin adds: “The water discovered in the Sun and in various stars is understandably known as hot water, but it is unmistakably water, based on the wavelengths of infrared radiation that are absorbed...water is believed to filter out certain frequencies of EM radiation that are given off by stars....When these stars die, they appear to go out in a flood of water as this element plays out its less glamorous role of mediating the destruction or recycling of the universe’s stuff” (*ibid.*, pp. 78-79).

⁴⁷⁹ S. H. Knowles, *et al.*, “Spectra, Variability, Size, and Polarization of H₂O Microwave Emission Sources in the Galaxy,” *Science*, March 7, 1969, pp. 1055, 1057.

The article goes on to say that the sizes of the water clouds range in length to about 80 billion miles, a distance which is 27 times the distance between the sun and Pluto. A newspaper report concurred with this evidence:

Astronomers have detected water at the most distant point from Earth so far, a discovery that adds to the growing belief this essential ingredient of life may be present throughout the universe. The water was found 200 million light years away by radio telescope in Markarian 1...said James A. Braatz, an astronomer at the University of Maryland.⁴⁸⁰

Often water is found in the strangest places:

Recently, two of the brightest supergiants in the galaxy, Betelgeuse (in the Orion constellation) and Antares (in the Scorpio constellation), were discovered to actually have water in their photospheres, as well as in the circumstellar material surrounding their photospheres....The structure of photospheres in cool stars is due primarily to the opacity of water, which is one of the most abundant molecules in such stars. The presence of photospheric water in these red supergiants confirms that it is located within the star itself and is not just a component of the dust and gas clouds surrounding stars. Aging supergiants have been observed to release massive amounts of water as they die.⁴⁸¹

Regarding the water surrounding Orion, Marrin adds:

Recent data indicate that this cloud complex contains an extremely high concentration of water vapor, which has been estimated on the order of 1 part in 2,000 or about 500 parts per million. This is about twenty times

⁴⁸⁰ "Water found on distant galaxy," *Associated Press*, Minneapolis, 1994. Braatz continues to find water in space. As of 2005, Braatz's most recent abstract reveals a "Search for Extragalactic Water Maser Emission with the GBT: Independent Measurement of the Hubble Constant: Consequently, we propose to conduct a search for extragalactic water maser emission in edge-on Seyfert 2 and LINER systems. Considering the detection rates of our recent GBT surveys among edge-on active systems, we expect to detect ~20 new sources, thereby increasing the number of known water maser sources by nearly 50%" (Conducted by the National Radio Astronomy Observatory).

⁴⁸¹ *Universal Water*, pp. 76-77.

greater than the water concentration in other interstellar gas clouds and represents enough water to fill the Earth's oceans ten million times!⁴⁸²

In addition to water's ubiquity, modern science is continually amazed at the makeup and function of the water molecule. The simple combination of two hydrogen atoms and one oxygen atom has, as it turns out, a dizzying array of combinations and actions that is highly unique among nature's compounds. As Marrin tells it:

Water is not simply H₂O, but rather is a complex network of interconnected water molecules, especially in its solid and liquid states. Moreover, this network is constantly shifting its connections (known as hydrogen bonds) among neighbors so that the resulting geometries are exchanged as many as a trillion times per second....Many of water's most puzzling properties, as well as its ability to solvate or "include" an amazing variety of substances within its network, are a direct result of these molecular gymnastics...⁴⁸³

Based on the percentage of water versus carbon-containing compounds in biological organisms, there is little doubt that the biosphere is water-based rather than carbon-based. Not only does water constitute most of our mass, it is required in essentially every biological structure and process. It was formerly understood that water simply acted as the solvent or matrix within which the carbon-containing compounds (*e.g.*, DNA, proteins) orchestrated the drama that creates and sustains biological life. It now appears as though water participates in directing the processes to an extent that was previously unimagined.⁴⁸⁴

The purpose of detailing the above facts is to point out that, as modern science has confirmed the presence of water in outer space, it is certainly no stretch of the imagination to accept that there is water in the firmament and "water above the firmament," as both Genesis 1:6-9 and Psalm 148:4 indicate. Considering the complexity and versatility of the water molecule, it no doubt plays a vital role both on Earth and in the cosmos, the latter being

⁴⁸² *Universal Water*, p. 78. See also, *New Scientist*, "H₂O! Water is actually two liquids disguised as one," May 30, 2018.

⁴⁸³ *Universal Water*, p. 93.

⁴⁸⁴ *Universal Water*, p. 125.

a dimension of water's existence that science is just now beginning to discover and confirm.

2 Peter 3:5 confirms Genesis 1:2's stipulation that the Earth was originally created inside a spherical mass of water:

...that by the word of God the heavens existed long ago, and an Earth formed out of water and by means of water, through which the world that then existed was deluged with water and perished. But by the same word the heavens and Earth that now exist have been stored up for fire, being kept until the day of judgment and destruction of ungodly men.

The clause “Earth formed out of and by means of water” is the Greek γῆ ἐξ ὕδατος καὶ δι' ὕδατος, wherein ἐξ means the Earth came from water, while the Greek δι, though normally “through,” here is closer to “between,” revealing the Earth was surrounded by water (*i.e.*, water covered the entire sphere). The original mass of water surrounding the Earth was huge, probably measuring multi-millions of miles in diameter, since later it would be stretched out into the firmament and then cap the firmament in the distant cosmos.

Other passages in Scripture give the same picture. Psalm 148:4 says:

Praise him, you highest heavens, and you *waters above the heavens!*⁴⁸⁵

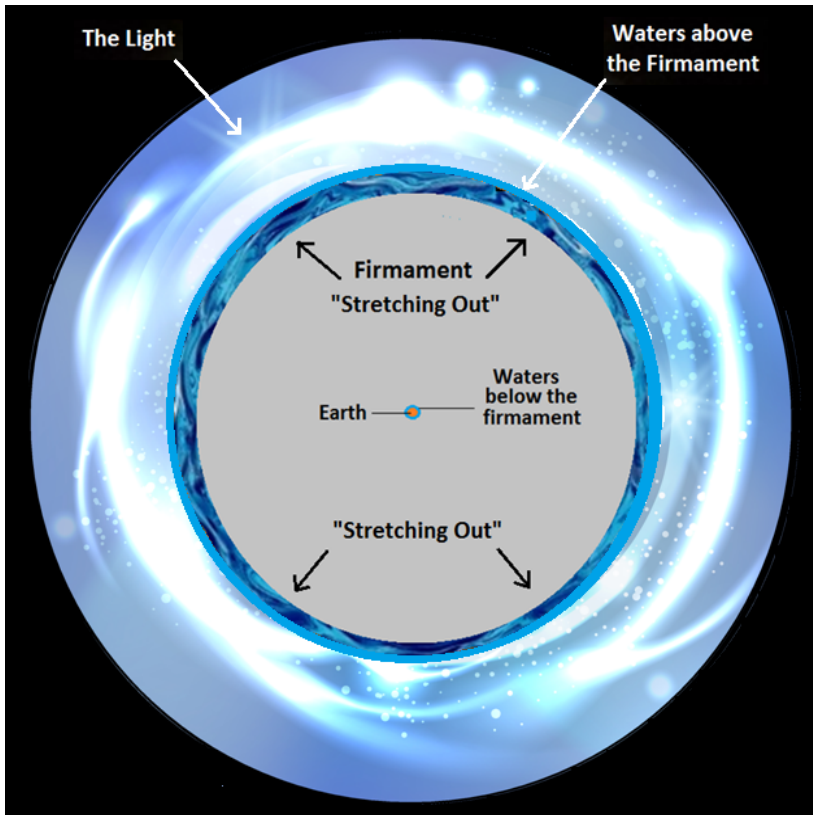
Accordingly, Job 9:8 says:

God...who alone *stretched out* the heavens, and trampled the waves of the sea; ⁹ who made the Bear and Orion, the Pleiades and the chambers of the south.

The phrase “stretched out” is a Hebrew qal participle נָתַח (pronounced: *na-tsa-ha*). The implication is that the firmament of the heavens was stretched

⁴⁸⁵ “waters above the heavens.” “Waters” and “heaven” form a paronomasia, *hamayim...hashamayim*, showing that it is a deliberate phrase. The preceding phrase, “you highest heavens” is literally, “heaven of heavens” (הַשָּׁמַיִם הַשְּׁמַיִם), showing that water is above the highest or farthest part of the second heaven (*cf.* 1Kg 8:27: “The heaven, even the highest heavens...”). The non-canonical book, *The Prayer of Azariah* 1:38 says: “Bless the Lord, all waters above the heaven, sing praise to him and highly exalt him for ever.”

in Genesis 1:6 to make celestial space. Then the stars, identified here as the constellations, *The Bear*, *Orion* and *The Pleiades*, were placed in the firmament, as Genesis 1:17 also says, “and God made the stars.”



This shows that the chronology of Genesis 1 is scientifically constructed, since the firmament must be built on the Second Day before the stars can have a place to reside and thus were made afterwards, on the Fourth Day. Likewise, if the universe is to have a cornerstone, it would be proper to put the Earth in a special place on the First Day and then build everything else around it.⁴⁸⁶ In this way the firmament is built around the universe’s cornerstone, the Earth, and stretched out as a sphere around it.

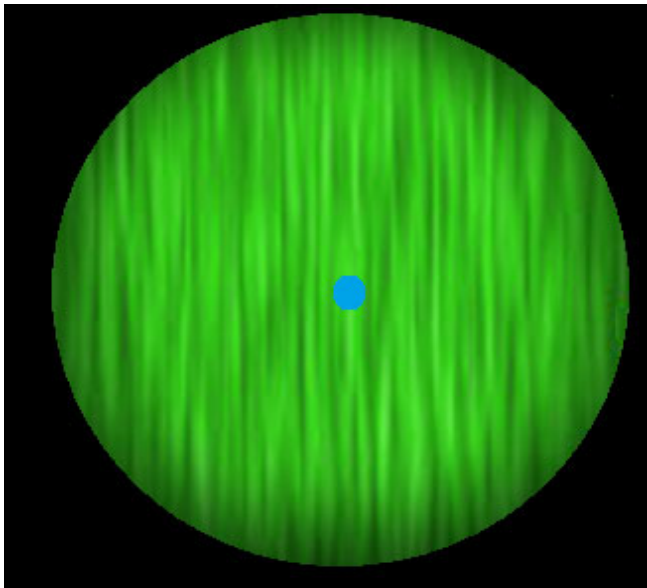
⁴⁸⁶ Hb 1:10: “‘Thou, Lord, didst found the earth in the beginning’”; Jb 38:4,6: “Where were you when I laid the foundation of the earth...or who laid its cornerstone?”

Additionally, the Hebrew qal participle referring to stretching appears in Psalm 104:2:

The Lord, who coverest thyself with light as with a garment, who has *stretched out* the heavens like a tent.

And again in Isaiah 42:5 and 44:24:

Thus says God, the Lord, who created the heavens and *stretched them out*, who spread forth the earth and what comes from it, I am the Lord, who made all things, who stretched out the heavens alone, who spread out the earth – Who was with me?



Stretching out like a curtain or flexible skin

The imagery here is, when God first made the firmament of the heavens, it was like a closed drapery surrounding the Earth and then God pulled open the drapery in order to undo its folds. This, of course, means that the constitution of the firmament has to be something that can be stretched very far yet not rip apart. This is certainly a mysterious and highly versatile substance. No wonder God refers to the stretching out of the firmament over a dozen times in Scripture as one of his mightiest acts. Its importance is also noted in that it takes up the whole Second Day.

Day 1: (Heavens), Earth and Light
Day 2: The Firmament
Day 3: Vegetation
Day 4: Celestial bodies
Day 5: Birds and Fish
Day 6: Animals and Man

A similar picture appears in Isaiah 45:12, using the Hebrew *qal* perfect tense. God stretches out the firmament and then commands the stars to be placed in it:

I made the earth and created man upon it; it was my hands that *stretched out* the heavens, and I commanded all their host.

A similar picture appears in Isaiah 51:13 with a Hebrew *qal* participle, this time showing the stretching out of the firmament occurred during the time the Earth was founded, which points to the sequence of creation Days in Genesis 1 with the Earth as the universe's cornerstone:

You have forgotten the Lord, your Maker, who *stretched out* the heavens and laid the foundations of the earth.

Lastly is Zechariah 12:1, using another Hebrew *qal* participle, pinpointing the stretching of the firmament to the original Days of Creation:

Thus says the Lord, who *stretched out* the heavens and founded the earth and formed the spirit of man within him.

So now we know the firmament of the heavens is hard, dense and transparent, but has qualities of a solid, liquid and a gas. We know it is penetrable and flexible so birds can fly in it. We know it can be stretched to unfathomable dimensions. We know it fills the whole universe so that the stars may be contained in it. We know it must be the substrate of Earth's atmosphere, as well as the substrate of the vacuum of celestial space.

Not to be forgotten in this analysis is that Scripture insists the Earth is motionless and the firmament rotates around it on a daily basis.⁴⁸⁷ There is no passage that says the Earth moves and there is no passage that says the

⁴⁸⁷ Joshua 10:10-14; Psalm 19:1-6.

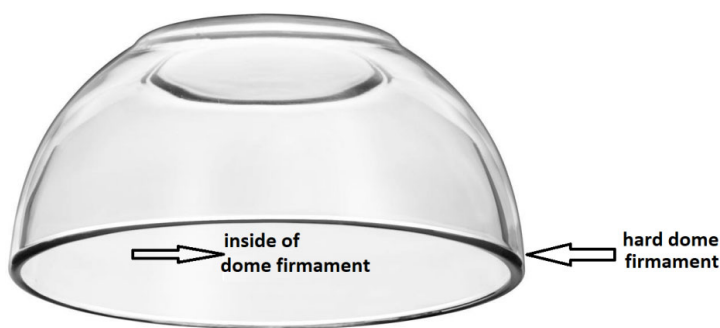
sun does not move. All scriptural passages that speak of the sun and Earth together insist the sun revolves around the Earth, and never vice-versa. Scientifically, then, it only makes sense the firmament can perform as a solid, since if it has to rotate at such great speed to complete the sidereal day, a firmament that was merely tenuous and ethereal would quickly fall apart. Additionally, the “waters above the firmament” (see Gn 1:7), most likely in the form of ice, would suit well to both keep the firmament bound and to help the universe rotate at the same sidereal speed *ad infinitum* due to its tremendous inertial energy or angular momentum.

A rotating firmament is also much safer and more stable than a rotating Earth. Since a rotating Earth would be bombarded daily by internal and external inertial and gravitational forces that would easily slow its rotation (e.g., earthquakes (1 million per year), tsunamis, volcanoes, planetary gravitational perturbations, asteroid collisions, meteor showers, twice daily tides of enormous oceans, solar winds, cosmic rays, internal movement of the liquid iron core), it wouldn’t last more than a few months at the present sidereal rate of 23 hours, 56 minutes and 4.1 seconds. Of course, here is where the conservative Protestants of *Answers in Genesis* or *Creation Research Ministries* do the same thing they accuse Paul Seely or the flat-earthers of doing, that is, departing from a literal interpretation of Scripture so that they can foist Copernicanism and Relativity upon Scripture, even though Scripture knows of neither.⁴⁸⁸

⁴⁸⁸ For example, after thoroughly excoriating Paul Seely due to Seely’s penchant to both ignore the literal meaning of the Bible and to dilute the verbal inspiration of Scripture, Holding then says: “By the same token, when Genesis speaks of ‘waters’ above the *raqiya*’, we are hardly to suppose that it was a substance universally composed of two parts hydrogen, one part oxygen. Nor for that matter can we suppose the distribution of these ‘waters’ was uniform above the *raqiya*’, although we do not doubt that some ancient peoples, including the Hebrews, reached that conclusion of their own accord” (See Holding’s “Waters above the heavens” section at (<http://answersingenesis.org/astronomy/cosmology/is-the-raqiya-firmament-a-solid-dome>). As we can see, taking Scripture at face value is limited in practice to when it becomes convenient for one’s specific view of how the Creation should fit together. Rather, as St. Augustine told us of the “waters above the firmament”: “But whatever the nature of that water and whatever the manner of its being there, we must not doubt that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity” (*The Literal Meaning of Genesis*, Bk 2, Ch. 5, No 9).

“In” or “Inside” the Firmament?

Regarding the precise nature of the firmament, although flat-earthers pride themselves on adhering to a literal interpretation of Genesis, we find that such is not the case in their actual exegesis. For example, Evangelical flat-earther, Rob Skiba, since he believes the firmament is a dome, must then say the birds fly “inside” the dome, as well as say the sun, moon and stars were placed “inside” the dome. He is required to conclude this state of affairs since it would be impossible for the birds to fly “in” a dome or for the celestial bodies to move “in” a dome, since Skiba believes the dome is a hard and inflexible structure.



Yet if we are going to be honest with the literal interpretation of Scripture (as Skiba says he wants to do), then Genesis insists the birds and celestial bodies move “in” the firmament, not “inside” or underneath the firmament. That is, the birds and celestial bodies are part and parcel with the firmament, not outside the boundaries of the firmament. In his Youtube video, however, Skiba makes the argument that because the literal text of Genesis 1:6-9 and 1:14-19 says God placed the stars and sun “in” the firmament, (Skiba even specifying that when the Hebrew letter *bet* (ב) is placed before “firmament,” as it is in Genesis 1:14-19, he concludes “it means ‘in’”).⁴⁸⁹ Yet earlier in his video, Skiba placed great emphasis on the fact that the Hebrew word for “firmament” refers to something hard and inflexible, like gold, from which he develops the idea that the firmament in Genesis refers to a hard

⁴⁸⁹ <https://www.youtube.com/watch?v=xNyeHzO1oEc> at 56:00f.

hemispherical dome whose extremities rest on the Earth and whose peak is a few thousand miles above the Earth.

Consequently, Skiba simply brushes off the difficulty he faces, that is, how the moon, the sun and the stars can be placed “in” the firmament if it is a hard dome. To place something “in” a hard dome would mean that it is actually encased in the substance of the hard dome, which would essentially make it part of the hard dome. If so, then the moon, sun and stars could not move in the firmament since a dome would be inflexible. The celestial bodies can only move “in” the firmament if the firmament itself is so flexible that it doesn’t cause any friction or curtail in any way their independent movement. Similarly, Genesis 1 says that the birds fly “in” the firmament. They could not do so if the firmament was a hard, inflexible substance. It is obvious, then, the firmament cannot refer to a hard dome.

Flat-earthers try to get around this problem by claiming that “in the firmament” really means *inside* or *underneath* the firmament. In this sense, the firmament is like a wall with objects placed next to its wall, but not “in” the wall. Although such an interplay between “in” and “inside” is linguistically possible, it does not do justice to the distinction when “in” does not mean “inside.” If we use “in,” it always refers to a smaller object being put into or being surrounded by a bigger object, whether we say “John is in the house” or “peppermint is in the candy.” Although we can also say “John is inside the house” which includes John and the house as one collective unit, all other cases show that “inside” separates the smaller object from the larger object. Such is the case when a flat-earthier says, “the stars are inside the firmament.” He means the stars are separate from the firmament and are not in the substance of the firmament. But is this the meaning and intent of Genesis 1? Hardly.

First, the Hebrew language, although it didn’t have the most comprehensive vocabulary, did, indeed, have different words for “in” and “inside.” As noted by Skiba himself, “in” is usually denoted by putting the letter *bet* (ב) before the noun. We find this formation, for example, in the first phrase of Genesis 1:1, “In the beginning...” (בְּרֵאשִׁית), or the phrase “in the firmament” (בִּרְקִיעַ) in which ב begins the word (reading right to left in Hebrew).

But when Hebrew wants to say “inside,” it does not use a כ before the noun; rather, it uses a different letter, the letter *mem* (מ). For example, in Gn 6:14 it says, “and cover it *inside* and out with pitch,” from the word *mabit* (מִבִּית). The same occurs in Lv 14:41: “and he shall cause the *inside* (מִבִּית) of the house to be scraped round about,” or 1Kg 6:15: “He lined the walls of the house on the *inside* (מִבִּיתָה) with boards of cedar,” or 2Ch 3:4: “He overlaid it on the *inside* (מִפְּנִימָה) with pure gold.”

The purpose of using the Hebrew prefix *mem* (מ) for “inside” (as opposed to כ for “in”) is that whatever item is put on the “inside” is separate from the overarching structure that lies next to it. On the ark, the pitch was put on the surface of the wood, but the pitch was not put in the wood itself. Likewise, cedar was put on the walls of the temple, but cedar was not mixed with the wall; and the temple was not made of gold; rather, gold was put on the temple walls, on the inside of the wall, not in the wall itself.

This grammatical issue becomes quite relevant for our discussion since in Genesis 1 there is no appearance of the Hebrew word “inside” when it speaks of the firmament. While the Hebrew prefix for “inside” (מ) is never used, the prefix for “in” (כ) is always used. For example, Gn 1:14,15,17 says, “*in the firmament* (בְּרָקִיעַ: pronounced: *bir-ee-kee-yah*) of the heavens.” If the text said, “Let there be lights *inside* the firmament of the heavens,” with the intent of saying the lights were underneath the firmament, the phrase would be בְּרָקִיעַ (pronounced: *mir-ee-kee-yah*).

The only exception to the use of “*in the firmament* (בְּרָקִיעַ) of the heavens” appears in Gn 1:20 regarding the realm of the birds. Here the translation is: “let birds fly above the earth *across the firmament* of the heavens” (RSV). The phrase “across the firmament” is עַל־פְּנֵי רָקִיעַ, which literally means “on the face of the firmament.” The “face” is the front of the firmament (as our face is the front of our head), which means the portion of the firmament in which the birds cannot fly is the “back” of the firmament, that is, outer space. The “face” of the firmament is that portion which, for lack of a better term, “faces” the Earth, or is closest to the Earth, which is just above the Earth’s surface. Hence the birds fly in the front part of the firmament as opposed to the back of the firmament where the moon, sun and stars move.

Skiba's view is also questionable as he speaks of a passage in Enoch 89:2-5 that is describing the Great Flood. Enoch speaks of "a lofty roof" and a "great enclosure." It is Skiba's view that the "roof" and the "enclosure" are speaking about a dome. But this interpretation is forced. Since the "roof" must open in order for the water to pour from it (or the water must spill over an unmoved roof), it means the substance of the roof (or dome) cannot be penetrated by the water. The water must move around the roof in some way in order for the water to be poured from it. Yet Skiba acknowledges that both the birds and the celestial bodies can move freely through his firmament. But how can the firmament be penetrated by birds and not penetrated by water?

Will the Stars Fall into the Earth?

Skiba then tries to back up his view by claiming that because Scripture says the "stars fall to earth"⁴⁹⁰ it would be impossible for this to happen under the dictates of modern cosmology which holds the stars are thousands of times bigger than the Earth and thousands of light years away.⁴⁹¹ The problem for Skiba is two-fold. First, passages such as Is 34:4 do not say the stars fall into or on the Earth. The passage merely says the stars will fade, droop, or wither, as a leaf droops from a vine or as a fig droops from a fig tree.⁴⁹² Although some translations depict the apocalyptic scene as leaves or figs actually falling, this is not the literal meaning of the Hebrew word, although it may be implied.⁴⁹³ But even if it is implied, neither the Hebrew nor the translations say the leaves or figs fall *to the Earth*, only that they will fall. Likewise, Mk 13:25 does not say the stars will fall to or into the Earth, but that "the stars of the heaven shall be falling."⁴⁹⁴

⁴⁹⁰ cf. Is 34:4; Mk 13:25; Ap 6:13.

⁴⁹¹ <https://www.youtube.com/v/sEH2jz8PKfQ?autoplay=true>, at 1:15:04

⁴⁹² From the Hebrew נָבֹל (*nabol*), here in the qal imperfect, יִבֹּל, (*yibol*), appears 24 times in the OT with the meaning of "fading away," "rotting" "drooping," *etc.*, cf. Ex 18:18; Ps 18:45; Is 1:30; 28:1, 4; Nh 3:6; Mi 7:6. NAB: "and all their host shall wither away, As the leaf wilts on the vine, or as the fig withers on the tree."

⁴⁹³ RSV: "All their host shall fall, as leaves fall from the vine, like leaves falling from the fig tree." NIV: "all the starry host will fall like withered leaves from the vine, like shriveled figs from the fig tree"; KJV: "and all their host shall fall down, as the leaf falleth off from the vine, and as a falling fig from the fig tree."

⁴⁹⁴ οἱ ἀστέρες ἔσονται ἐκ τοῦ οὐρανοῦ πίπτοντες.

Finally, Ap 6:13 says, “and the stars of heaven fell to the Earth as a fig tree casts its untimely figs.” Hence this passage seems to be taking part of its imagery from Is 34:4, yet very frequently in his Apocalypse St. John is noted for adding his own elements when he alludes to Old Testament passages. The difference here is that St. John says the stars fall “to” the Earth, with the operative word here being the Greek εἰς, translated as “to.”⁴⁹⁵ But stars that fall “to” the Earth does not necessarily mean the stars are tiny entities that will hit the Earth like meteorites, a scene which is implied in Skiba’s depiction of the event. All the Greek needs to mean is that the stars, since they are in concentric spheres around the Earth, will begin to move toward the center of the universe where Earth is located. Even if they all converged at the center and exploded as they came together (thus also destroying the Earth in the process), the fact is that in this process they would be falling “to” or “towards” the Earth and Ap 6:13 is satisfied. Since 2 Peter 3:10-13 assures us that not only the stars but the Earth itself will be burned up and destroyed, there actually is no better way for this to happen than for the millions of stars in the universe to suddenly move toward the center of the universe and converge at the very place the Earth is located.

⁴⁹⁵ καὶ οἱ ἀστέρες τοῦ οὐρανοῦ ἔπεσαν εἰς τὴν γῆν...

The Church Fathers on the Firmament

The Fathers and Middle Age theologians also contemplated the nature of the firmament. Suffice it to say, however, barring possibly Lactantius, no one promoted the “flat disc” concept. Augustine, for example, seeking a scientific answer to the firmament and the waters above, agrees with our interpretation. He writes:



Augustine: Now we are seeking to know whether the Creator, who has ordered all things in measure, and number, and weight, has assigned to the waters not just one proper place around the earth, but another also above the heavens, a region which has been spread around and established beyond the limits of air.

What is the firmament? Is it that heaven which extends beyond the entire realm of air

and above the air's farthest heights, where the lights and the stars are set on the fourth day? Or is the air itself called the firmament? This is the question that must concern us here.⁴⁹⁶

After offering his suggestions as to the nature of the firmament, he resolutely concludes:

With this reasoning some of our scholars attack the position of those who refuse to believe that there are waters above the heavens while maintaining that the star whose path is in the height of the heavens is cold. Thus they would compel the disbeliever to admit that water is there not in a vaporous state but in the form of ice. But whatever the nature of that water and whatever the manner of its being there, we must not doubt

⁴⁹⁶ *Confessions*, Bk 2, Ch 1-2.

that it does exist in that place. The authority of Scripture in this matter is greater than all human ingenuity.⁴⁹⁷

Apparently, Augustine did not hold to the “water canopy” theory, since he says the water above the heavens “does exist,” not “did exist,” showing he believed they still occupied the same location in space in the fifth century AD when he was writing the above paragraph. Augustine is more detailed in the following quotation:

...for on it the firmament was made between the waters above and beneath, and was called “Heaven,” in which firmament the stars were made on the fourth day.⁴⁹⁸

For very wonderful is this corporeal heaven, of which firmament, between water and water, the second day after the creation of light, you said, Let it be made, and it was made. Which firmament you called heaven, that is, the heaven of this earth and sea, which Thou made on the third day, by giving a visible shape to the formless matter which you made before all days.⁴⁹⁹

Thomas Aquinas, agreeing with Augustine that the present existence of the firmament could not be doubted due to the authority of Scripture, uses a similar argument in one of his *Replies to Objections*, citing Basil as the source of the idea. He writes:

Reply to Objection 2: The solution is clear from what has been said, according to the last two opinions. But according to the first opinion, Basil gives two replies (Hom. 3 in *Hexaemeron*). He answers first that a body seen as concave beneath need not necessarily be rounded, or convex, above. Secondly, that the waters above the firmament are not fluid, but exist outside it in a solid state, as a mass of ice, and that this is the crystalline heaven of some writers.

Reply Objection 3: According to the third opinion given, the waters above the firmament have been raised in the form of vapors, and serve to give rain to the earth. But according to the second opinion, they are above the heaven that is wholly transparent and starless. This, according

⁴⁹⁷ *The Literal Meaning of Genesis*, Bk 2, Ch. 5, No 9.

⁴⁹⁸ *City of God*, Bk XI, Ch 9.

⁴⁹⁹ *Confessions*, Bk XII, Ch 8.

to some, is the primary mobile, the cause of the daily revolution of the entire heaven, whereby the continuance of generation is secured. In the same way the starry heaven, by the zodiacal movement, is the cause whereby different bodies are generated or corrupted, through the rising and setting of the stars, and their various influences. But according to the first opinion these waters are set there to temper the heat of the celestial bodies, as Basil supposes (Hom. 3 in *Hexaemeron*). And Augustine says (*De Genesi ad litteram* ii, 5) that some have considered this to be proved by the extreme cold of Saturn owing to its nearness to the waters that are above the firmament.⁵⁰⁰

Various Fathers and medieval theologians offered similar opinions on the firmament.

Ambrose: “These are the heavens which declare the glory of God, these are His handiwork which the firmament proclaims. For not worldly enticements, but the grace of the divine working, raised them to the firmament of the most sacred Passion, and long before by the testimony of their character and virtues bore witness of them, that they continued steadfast against the dangers of this world.”⁵⁰¹

Aphrahat: From these things be thou persuaded that this earth, in which the children of Adam are sown, and the firmament that is over men, (even) *that firmament which is set to divide the upper heavens from the earth and this life*, shall pass away, and wear out, and be destroyed. And God will make a new thing for the children of Adam, and they shall inherit inheritances in the Kingdom of Heaven.⁵⁰²

Archelaus: “Then the living Spirit created the world; and bearing in himself three other powers, he came down and brought off the princes, and settled them *in the firmament, which is their body, (though it is called) the sphere*. Then, again, the living Spirit created the luminaries, which are fragments of the soul, and *he made them thus to move round and round the firmament...*”⁵⁰³

⁵⁰⁰ *Summa Theologica*, Bk 1, Ques. 68. Art 2.

⁵⁰¹ Letter XXII. Ambrose held that the firmament was solid, sustained by God’s power. See *Saint Ambrose: Hexameron, Paradise, and Cain and Abel*, trans. J. J. Savage (Wash, DC: Catholic University, 1961), pp. 11-16.

⁵⁰² *The Demonstrations*, 24.

⁵⁰³ *Disputation with the Heresiarch Manes*, 6.

Athanasius: “And all the visible creation was made in six days: in the first, the light which He called day; in the second the firmament; in the third, gathering together the waters....And God set them in the firmament of the heaven, to give light upon the earth, and to rule over the day and over the night...*And the firmament is to divide between waters and waters, and to be a place to set the stars in.*”⁵⁰⁴

Basil: ““And God called the firmament heaven.’ The nature of light belongs to another, and the firmament only shares it on account of its resemblance to heaven. We often find the visible region called heaven, on account of the density and continuity of the air within our ken, and



deriving its name ‘heaven’ from the word which means to see. It is of it that Scripture says, ‘The fowl of the air,’ ‘Fowl that may fly...in the open firmament of heaven’”⁵⁰⁵

Basil: “Upon the essence of the heavens we are contented with what Isaiah says, for, in simple language, he gives us sufficient idea of their nature, ‘The heaven was made like smoke,’ that is to say, He created a subtle substance, without solidity or density, from which to form the heavens. As to

the form of them we also content ourselves with the language of the same prophet, when praising God ‘that stretches out the heavens as a curtain and spreads them out as a tent to dwell in.’”⁵⁰⁶

Basil: “Now we must say something about the nature of the firmament, and why it received the order to hold the middle place between the waters. *Scripture constantly makes use of the word ‘firmament’ to express extraordinary strength.* ‘The Lord in firmament and refuge’; ‘I have strengthened the pillars of it’; ‘Praise him in the firmament of his power.’ The heathen writers thus call a strong body one which is compact

⁵⁰⁴ *Discourse Against the Arians*, No. 2, Ch 16; 17.

⁵⁰⁵ *Homilies*, 3. Cited also by Aquinas.

⁵⁰⁶ *The Hexaemeron*, Homily 1, 8. Basil is most likely referring to Isaiah 51:6: “Lift up your eyes to the heavens, and look at the earth beneath; for the heavens will vanish like smoke...”

and full, to distinguish it from the mathematical body. A mathematical body is a body which exists only in the three dimensions, breadths depth, and height. *A firm body, on the contrary, adds resistance to the dimensions. It is the custom of Scripture to call firmament all that is strong and unyielding. It even uses the word to denote the condensation of the air:* He, it says, who strengthens the thunder. Scripture means by the strengthening of the thunder, the strength and resistance of the wind, which, enclosed in the hollows of the clouds, produces the noise of thunder when it breaks through with violence. Here then, according to me, is a firm substance, capable of retaining the fluid and unstable element water; and as, according to the common acceptation, it appears that the firmament owes its origin to water, we must not believe that it resembles frozen water or any other matter produced by the filtration of water; as, for example, rock crystal, which is said to owe its metamorphosis to excessive congelation, or the transparent stone which forms in mines. This pellucid stone, if one finds it in its natural perfection, without cracks inside, or the least spot of corruption, almost rivals the air in clearness. We cannot compare the firmament to one of these substances. To hold such an opinion about celestial bodies would be childish and foolish; and although everything may be in everything, fire in earth, air in water, and of the other elements the one in the other; although none of those which come under our senses are pure and without mixture, either with the element which serves as a medium for it, or with that which is contrary to it; *I, nevertheless, dare not affirm that the firmament was formed of one of these simple substances, or of a mixture of them, for I am taught by Scripture not to allow my imagination to wander too far a field.* But do not let us forget to remark that, after these divine words ‘let there be a firmament,’ it is not said ‘and the firmament was reader’ but, ‘and God made the firmament, and divided the waters.’ Hear, O ye deaf! See, O ye blind! Who, then, is deaf? He who does not hear this startling voice of the Holy Spirit. Who is blind? He who does not see such clear proofs of the Only begotten. ‘Let there be a firmament.’ It is the voice of the primary and principal Cause. ‘And God made the firmament.’ Here is a witness to the active and creative power of God.⁵⁰⁷

Basil: “‘In the firmament of heaven,’ that is to say, as we have said before, in that part of the air called *ouranos* [Greek] heaven, from the word *oran*, which means to see; called firmament, because the air which

⁵⁰⁷ *Ibid.*

extends over our heads, compared to the aether, has greater density, and is thickened by the vapors which exhale from the earth.”⁵⁰⁸

Basil: “Therefore we read: ‘Let there be a firmament in the midst of the waters, and let it divide life waters from the waters.’ I have said what the word firmament in Scripture means. It is not in reality a firm and solid substance which has weight and resistance; this name would otherwise have better suited the earth. *But, as the substance of superincumbent bodies is light, without consistency, and cannot be grasped by any one of our senses, it is in comparison with these pure and imperceptible substances that the firmament has received its name.*”⁵⁰⁹

Basil: “For although, as Moses teaches, each act of creation had its proper order; the making the firmament solid, the laying bare of the dry land, the gathering together of the sea, the ordering of the stars...”⁵¹⁰

Clement of Rome: “as also He decked the visible firmament with stars, to which also He assigned their paths and arranged their courses.”⁵¹¹

“And now the water which was within the world, in the middle space of that first heaven and earth, *congealed as if with frost, and solid as crystal, is distended, and the middle spaces of the heaven and earth are separated as by a firmament of this sort;* and that firmament the Creator called heaven, so called by the name of that previously made: and so *He divided into two portions that fabric of the universe, although it was but one house.*”⁵¹²

Cyril of Jerusalem: “For God said, Let there be a firmament in the midst of the water. God spake once for all, and it stands fast, and falls not. The heaven is water, and the orbs therein, sun, moon, and stars are of fire: and how do the orbs of fire run their course in the water? But if any one disputes this because of the opposite natures of fire and water, let him remember the fire which in the time of Moses in Egypt flamed amid the hail, and observe the all-wise workmanship of God.”⁵¹³

⁵⁰⁸ *Homilies*, 8.

⁵⁰⁹ *Homilies*, 7.

⁵¹⁰ *On the Trinity*, Bk XII.

⁵¹¹ *Homilies*, III, Ch XXXIII.

⁵¹² *Recognitions of Clement*, Bk 1, Ch XXVII.

⁵¹³ *Catechetical Lectures*, 9, 5.

Ephraim the Syrian: “Let the second day, sing praise to the Birth of the second Son, and His voice which first commanded the firmament and it was made, divided the waters that were above, and gathered the seas that were under.”⁵¹⁴

Gregory of Nyssa: “So likewise, in the case of heaven and the firmament, though one nature is signified by each of these words, *their difference represents one or other of its peculiar characteristics, in looking at which we learn one thing by the appellation “heaven,” and another by ‘firmament.’* For when speech would define the limit of sensible creation, beyond which *it is succeeded by the transmundane void apprehended by the mind alone, in contrast with the intangible and incorporeal and invisible, the beginning and the end of all material subsistences is called the firmament.* And when we survey the environment of terrestrial things, we call that which encompasses all material nature, and which forms the boundary of all things visible, by the name of heaven.”⁵¹⁵

Hilary of Poitiers: “For although, as Moses teaches, each act of creation had its proper order; *the making the firmament solid.*”⁵¹⁶

Hippolytus: “For there has been a separation made between water and water; and there is water, that below the firmament of the wicked creation, in which earthly and animal men are washed; and there is life-giving water, (that) above the firmament, of the Good One, in which spiritual (and) living men are washed; and in this Elohim washed Himself.”⁵¹⁷

Hippolytus: “But that the circle of the sun is twenty-seven times larger than the moon, and that the sun is situated in the highest (quarter of the firmament); whereas the orbs of the fixed stars in the lowest.”⁵¹⁸

Hippolytus: “...and that the stars, coursing (the firmament) as shooting sparks, arise out of the motion of the pole.”⁵¹⁹

⁵¹⁴ *Hymns*, 19.

⁵¹⁵ *Answer to Eunomius’ Second Book*.

⁵¹⁶ *On the Trinity*, Bk XII.

⁵¹⁷ *Refutation of All Heresies*, Bk V, Ch 22.

⁵¹⁸ *Ibid.*

⁵¹⁹ *Ibid.*, Ch. VII.

Hippolytus: “The first and only (one God), both Creator and Lord of all, had nothing coequal with Himself; not infinite chaos, nor measureless water, nor solid earth, nor dense air, not warm fire, nor refined spirit, nor the azure canopy of the stupendous firmament.”⁵²⁰

Irenaeus: “For as the heaven which is above us, the firmament, the sun, the moon, the rest of the stars, and all their grandeur, although they had no previous existence, were called into being.”⁵²¹

Jerome: “Must not every one reject and despise such special pleading as that by which Origen says of the waters that are above the firmament that they are not waters, but heroic beings of angelic power, and again of the waters that are over the earth—that is, below the firmament that they are potencies of the contrary sort, that is, demons?”⁵²²

Jerome: “‘...the righteous shall shine as the stars; and the wise, that is the learned, as the firmament.’ You can see, therefore, how great is the difference between righteous ignorance and instructed righteousness. Those who have the first are compared with the stars, those who have the second with the heavens. Yet, according to the exact sense of the Hebrew, both statements may be understood of the learned, for it is to be read in this way: “They that be wise shall shine as the brightness of the firmament; and they that turn many to righteousness as the stars forever and ever.”⁵²³

Jerome: “A firmament is constructed between heaven and earth, and to this is allotted the name heaven, in the Hebrew *shamayim* or ‘what comes out of the waters,’ and the waters which are above the heavens are parted from the others to the praise of God. Wherefore also in the vision of the prophet Ezekiel there is *seen above the cherubim a crystal stretched forth, that is, the compressed and denser waters*. The first living beings come out of the waters; and believers soar out of the layer with wings to heaven. Man is formed out of clay and God holds the mystic waters in the hollow of his hand.”⁵²⁴

⁵²⁰ *Ibid.*, Ch XXVIII.

⁵²¹ *Against Heresies*, Bk II, Ch XXXIV.

⁵²² Letter LI, from Epiphanius.

⁵²³ Letter LIII to Paulinus.

⁵²⁴ Letter LXIX to Oceanus.

Jerome: “The sun has its own splendor, the moon tempers the darkness of the night; and the five heavenly bodies which are called planets traverse the sky in different tracks and with different degrees of luminousness. *There are countless other stars whose movements we trace in the firmament. Each has its own brightness.*”⁵²⁵

John Damascene: “But further, God called the firmament also heaven, which He commanded to be in the midst of the waters, setting it to divide the waters that are above the firmament from the waters that are below the firmament. And its nature, according to the divine Basilios [Basil] who is versed in the mysteries of divine Scripture, *is delicate as smoke.* Others, however, hold that it is watery in nature, since it is set in the midst of the waters: others say it is composed of the four elements: and lastly, *others speak of it as a fifth body, distinct from the four elements.*”⁵²⁶

John Damascene: “The heaven of heaven, then, is the first heaven which is above the firmament. So here we have two heavens, for God called the firmament also Heaven. *And it is customary in the divine Scripture to speak of the air also as heavens, because we see it above us.*”⁵²⁷

John Damascene: “For the deep is nothing else than a huge quantity of water whose limit man cannot comprehend. In the beginning, indeed, *the water lay all over the surface of the earth.* And first God created the firmament to divide the water above the firmament from the water below the firmament. For in the midst of the sea of waters the firmament was established at the Master’s decree. And out of it God bade the firmament arise, and it arose. Now for what reason was it that God placed *water above the firmament?* It was because of the intense burning heat of the sun and ether. For immediately under *the firmament is spread out the ether, and the sun and moon and stars are in the firmament,* and so if water had not been put above it the firmament would have been consumed by the heat.”^{528 529}

⁵²⁵ *Against the Pelagians*, Bk 1, 16.

⁵²⁶ *Exposition of the Orthodox Faith*, Bk II, Ch 6.

⁵²⁷ *Ibid.*, Bk II, Ch. 6.

⁵²⁸ *Exposition of the Orthodox Faith*, Bk 2, Ch 9.

⁵²⁹ From previous edition.

Justin Martyr: “And so also, of the heaven which was created, he thought that the heaven which was created and which he also called the firmament.”⁵³⁰

Lactantius: “In that place he looked up to heaven, by which name we now call it, and that which was above the world which was called the firmament.”⁵³¹

Novation: “Although it may be reared with immense piles of stones, the mountain crests are loftier; and although the fretted roofs glitter with gold, they will be surpassed by the brightness of the starry firmament.”⁵³²

Novation: “Nevertheless also, in higher regions; *that is, above even the firmament itself, regions which are not now discernible by our eyes*, He previously ordained angels, he arranged spiritual powers, He put in command thrones and powers, and founded many other infinite spaces of heavens, and unbounded works of His mysteries...a crystal covering being thrown over all things; that is, *the heaven covering all things, which at the command of God had been consolidated into a firmament.*”⁵³³

Origen: “The star that was seen in the east we consider to have been a new star, unlike any of the other well-known planetary bodies, either those in the firmament above or those among the lower orbs.”⁵³⁴

Origen: “Thus, for instance, there is the true light, and another heaven beyond the firmament, and a Sun of righteousness other than the sun we see.”⁵³⁵

Origen: “Now, when it is said that all things were made by Him, and that in Him were all things created, both things in heaven and things on earth, there can be no doubt that also those things which are in the firmament, *which is called heaven, and in which those luminaries are*

⁵³⁰ *To the Greeks*, Ch XXX.

⁵³¹ *Divine Institutes*, Bk I, Ch XI.

⁵³² *On the Public Shows*, 9.

⁵³³ *On the Trinity*, Ch I; VIII

⁵³⁴ *Against Celsus*, Preface, Ch LVIII.

⁵³⁵ *Against Celsus*, Bk VII, Ch XXXI.

said to be placed, are included amongst the number of heavenly things.”⁵³⁶

Rufinus: “I would first, with your leave, draw your attention to this firmament which our eyes behold, and ask you to explain, if you can, the nature of this visible luminary, how that celestial fire generates from itself the brightness of light.”⁵³⁷

Tertullian: “In like manner with respect to the heaven, it informs us first of its creation – ‘In the beginning God made the heaven:’ it then goes on to introduce its arrangement; how that God both separated ‘the water which was below the firmament from that which was above the firmament,’ and called the firmament heaven, – the very thing He had created in the beginning.”⁵³⁸

⁵³⁶ *De Principiis*, Bk I, Ch VII.

⁵³⁷ *Commentary on the Apostles’ Creed*, 4.

⁵³⁸ *Against Hermogenes*, Ch XXVI. Others, such as Rabanus Maurus, agreed with Basil that the water above the firmament could be in the form of ice and thus be a transparent crystalline substance (*Commentariorum in Genesis*, PL 107, 449). The great Jewish scholar, Moses Maimonides, held that the firmament referred to the sphere of the fixed stars, and that the sun rested within this sphere, adding that “there is no vacuum in the universe” (*The Guide for the Perplexed*, trans. M. Friedländer, NY: Dover, 1956, p. 214).

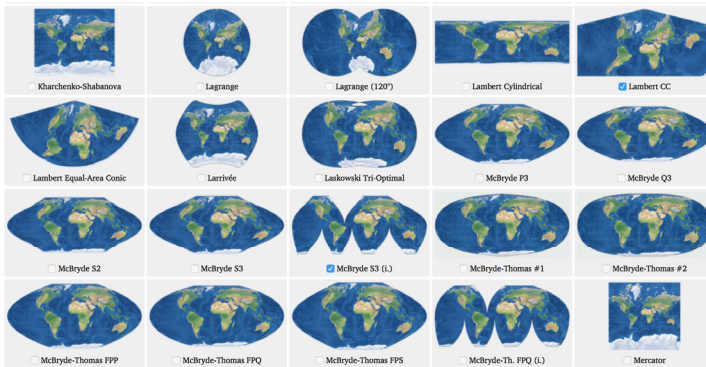
Scientific Analysis of Flat Earth Theory

Chapter 5

Scientific Analysis of Flat Earth Theory

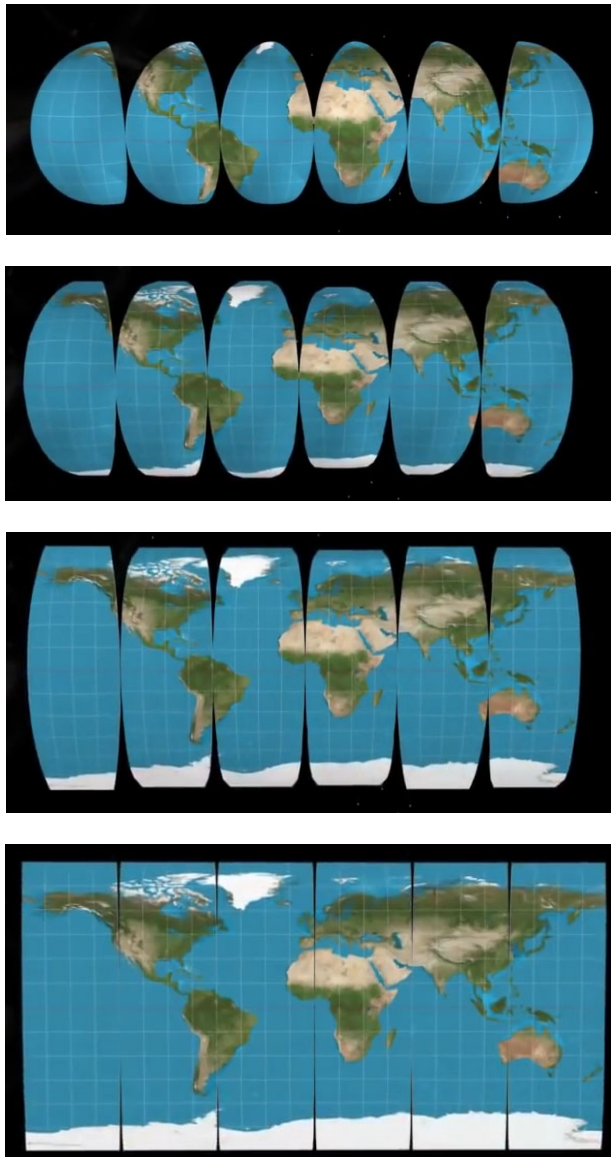
The Difficult Task of Making a Flat Earth

As the Bible contains no explicit teaching for a flat Earth, science shows there is no physical proof for a flat Earth. Yet we make this conclusion with a *caveat emptor*. The task of proving the Earth is not flat, at least from ground level, is not always as easy as one might think, and in some instances the evidence is equivocal. In reality, just as cartographers can make many kinds of maps of the Earth,⁵³⁹ so one can make a flat Earth model fit into many of the things we see on Earth. This doesn't mean, however, the Earth is flat. It only means that sometimes the evidence is pliable and/or missing certain crucial ingredients. For starters, a three-dimensional spherical map is hard to duplicate in a two-dimensional map.



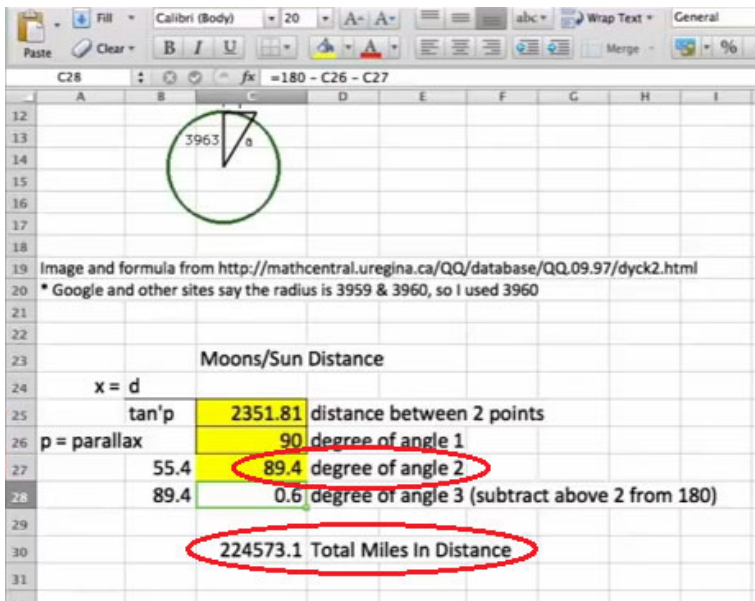
⁵³⁹ en.wikipedia.org/wiki/List_of_map_projections, Equirectangular, Cassini, Mercator, Gauss–Krüger, Gall stereographic, Miller, Lambert, Behrmann, Hobo–Dyer, Gall–Peters, Central cylindrical, Sinusoidal, Mollweide, Eckert II, Ortelius oval, Goode homolosine, Kavrayskiy VII, Robinson, Natural Earth, Tobler hyperelliptical, Wagner VI, Collignon, HEALPix, Boggs eumorphic, Loximuthal, Aitoff, Hammer, Winkel tripel, Van der Grinten, Equidistant conic, Lambert conformal conic, Albers conic, Werner, Bonne, Bottomley, American polyconic, Rectangular polyconic, Azimuthal equidistant, Gnomonic, Lambert azimuthal equal-area, Stereographic, Orthographic, Vertical perspective, Two-point equidistant, Peirce quincuncial, Guyou hemisphere-in-a-square projection, Adams hemisphere-in-a-square projection, Lee conformal world on a tetrahedron, Authagraph projection, Octant projection, Littrow, Armadillo, GS50, et al.

Consequently, many of the cartographer's map options sometimes look similar to the flat Earth that flat-earthers are promoting. In the end, however, all two-dimensional maps will distort the Earth to some extent. Observe the progression of how we get from a sphere to a flat, two-dimensional Mercator projection map:



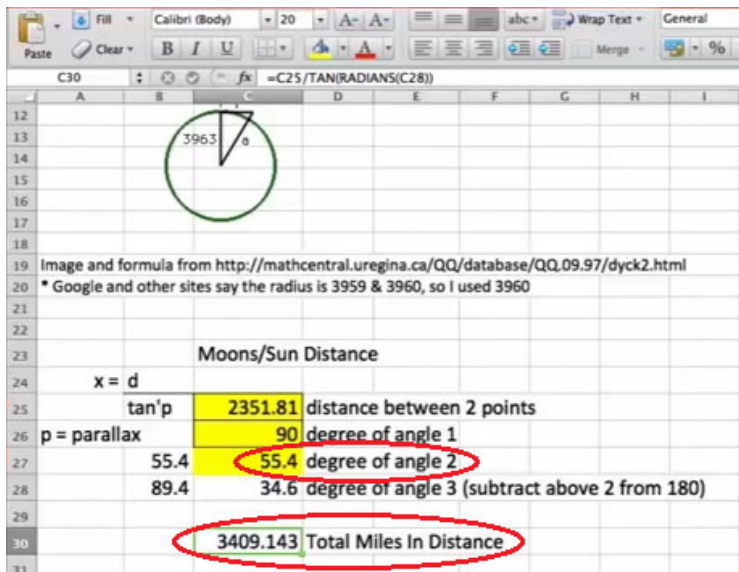
Whether or not there is similarity with a spherical Earth is not the criterion by which we should judge a map, since there is really only one correct model of a sphere, and that is a sphere. Analogously, we can get to the number 4 by many means: $2 + 2$; $3 + 1$; $1000 - 996$; $\sqrt{16}$; $\log_3 64$; $-8 + 12$, *etc.*, but there is only one set of addends that will fit a specific problem.

Let's look at an example of how the “addends” and “sum” of the flat Earth model can mimic the spherical model and thus appear legitimate. An anti-flat Earth group called “Cool Hard Logic” (CHL) has a Youtube video teaching how we can derive the distance from the Earth to the moon. CHL uses trigonometric parallax based on the Pythagorean theorem and neatly arrives at 224,573.1 miles (see formula and calculation below).⁵⁴⁰

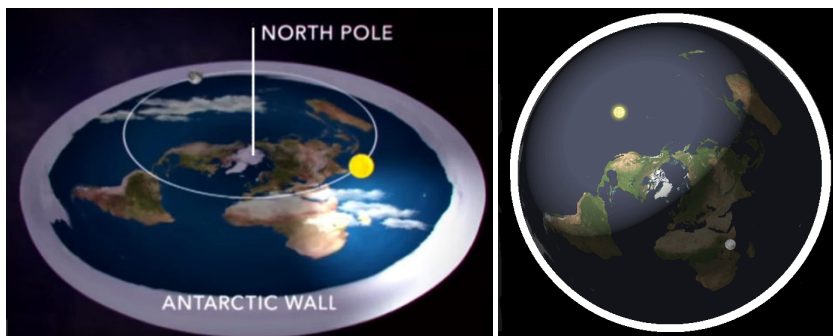


The flat-earthers, some of them quite intelligent, took the same formula and figures and showed how it would produce a distance between the Earth and moon of only 3,409 miles—the same distance flat-earthers claim is the height the moon revolves with the sun above the Earth! (see formula and figures below).

⁵⁴⁰ <https://www.youtube.com/watch?v=8h0XJ3JLb-o>, starting at 8:10 to 14:52, presented by Globebusters, published March 27, 2018.



The only thing the flat-earthers had to do in order to arrive at 3,409 miles was to change the degree of one of the angles from what would be required by assuming that the Earth is a sphere (an angle of 89.4) to assuming what angle would be required if the Earth were flat (an angle of 55.4), which is perfectly legitimate since one cannot assume the kind of Earth one wants in order to arrive at the desired figure for the distance to the moon.



Flat Earth Model

So the \$64,000 question is, whose “addends” (*i.e.*, angles) are true? Both can fit into the math, but one of them is completely false in regard to the reality. This means it will take much more evidence to prove the Earth is a

sphere than merely determining the distance between the Earth and the moon. As we will see later, though the flat-earththers are able to do the trigonometry based on flat Earth parameters, they are not able to do so based on the results of both stellar parallax and stellar aberration.

Interestingly enough, most flat-earththers play the double-agent role when discussing various flat Earth models. On the one hand, they excoriate institutions such as the United Nations, the World Health Organization and other such entities for being part of a worldwide deception to hide the truth from its citizens about the flat Earth. On the other hand, flat-earththers point out that the world maps displayed in these institutions' monikers and emblems are always flat.



They then ask leading questions, such as this one:

Why are all of these international world government agencies using a flat earth map in their symbols? Whatever reason they give they are all using it. When we begin comparing the flat earth map to our surroundings, the flat earth map makes more sense and the globe model of earth makes no sense. Perhaps the reason they use the flat earth map in their logos is because it is the map they use when they navigate the world which is not the same as the world map of the globe.⁵⁴¹

⁵⁴¹ http://geocentricworks.com/Flat_Earth_Map_Basics.html

So, even though the flat-earther preaches daily that these worldly institutions want to deceive us into subjection, at the same time they admit the same institutions are secretly teaching its citizens the Earth is flat by displaying a flat Earth map in their emblems, which then leads them to make presumptuous conclusions, and all without asking the United Nations whether its members believe the Earth is flat.

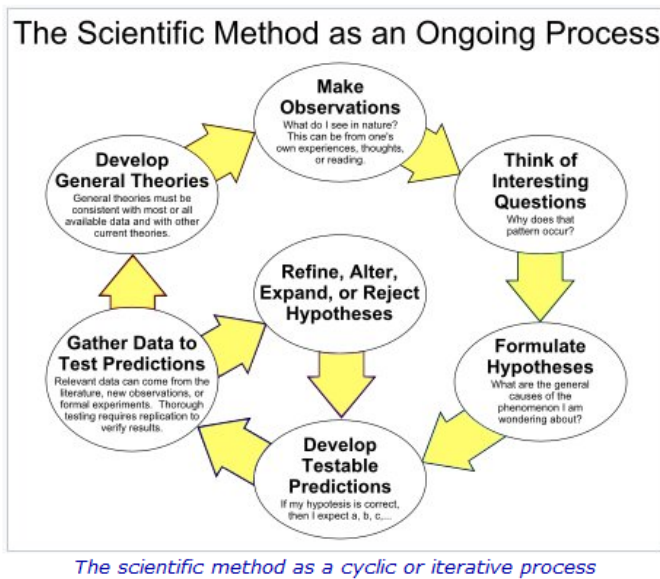


Apparently, it hasn't crossed the flat-earther's mind that these institutions use flat models of the Earth because convention has already accepted such maps as representative of a globe, and that it is more convenient to put a two-dimensional representation on a two-dimensional piece of paper as opposed to a spherical image, although we must add that the United Nations uses both a flat and spherical model in its emblems, such as:



⁵⁴² <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 26:41

We should also mention here that flat-earthers often can't agree amongst themselves how a flat Earth should be depicted. The problem here, of course, is like any other religion (which flat Earthism really is)⁵⁴³ the adherents will have different interpretations of what is observed or contemplated, and they will begin to divide into various camps, each criticizing the other as being unenlightened or even false prophets. The reason is, most of them do not use a consistent scientific method and thus they produce an inordinate amount of logical fallacies, as does the modern science community.



Be that as it may, there may be a number of instances in which flat-earthers can make their model duplicate what happens on a curved Earth, but this does not prove the Earth is flat. It only proves that in some instances a flat

⁵⁴³ https://www.youtube.com/watch?v=POzPJOC_FBg. This Youtube video includes this song in its presentation: "I can feel a change in everything, and as the surface breaks reflections fade; Lord in some ways they remain the same, and as my mind begins to spread its wings, there's no stopping curiosity. I want to turn the whole thing upside down, I find the things they say just can't be found; I'll share this love I've found with everyone; we'll sing and dance to mother nature's song; I don't want this feeling to go away."

Earth model can be made to fit a curved Earth model, at least to a certain extent.

Nevertheless, although geometrically speaking various models may be able to depict many of the things we actually see in the sky and on Earth, since we know intuitively that only one model can be true and the other must be false, we can reason that there should be one or more situations in which the model that is false will not be able to fit what we actually see in the sky and on Earth while the true model will be able to fit all that we see. We shall see examples of this fact throughout this section.

By the same token, modern science is also confronted with various anomalies to its present reigning theory, the Big Bang. For example, Newton's theory is based on $F = ma$ (force = mass \times acceleration), but recently science has found that the spin rate of spiral galaxies does not obey this law. In fact, spiral galaxies rotate ten times too fast to fit into $F = ma$. Likewise, Einstein's analog to Newton, $G = 8\pi T$, would also be ten times too slow for spiral galaxies. But since Newton and Einstein are the basic foundation for modern science, and have been for the last 400 years, modern society prefers to preserve the foundation and propose alternate explanations for why the galaxies spin at ten times the rate Newton's laws will allow. The reigning theory is that space is composed of an unseen type of matter, currently dubbed "dark matter," to make up for the missing gravitational force. Consequently, one can save the appearances by plugging in various *ad hoc* factors to make the phenomenon match the current theory, but it doesn't prove the theory. It only proves theories can be mathematically manipulated to get to the desired result. Incidentally, although the science community, worldwide, has been looking for "dark matter," no one has found even an iota of its existence. So much for empiricism leading the way.

The reason for these anomalies and manipulations is that science is often not a perfect science. Not only is our data sometimes faulty or misleading, the conclusion we reach from any data always rests upon fallible human beings who, for one reason or another, may not be able, or even want, to arrive at the correct interpretation. This fact is true for both sides of the argument. NASA scientists and flat-earth scientists often exaggerate or obfuscate certain facts in order to come to preconceived conclusions about the world they want to live in.

Astronomical-Based Evidence

In order to simplify the massive evidence available on both sides of the fence, we will divide our analysis into two categories:

(1) Astronomical-based evidence.

(2) Earth-based evidence.

NASA and the Use of Computer Graphic Images (CGI)

A good example of the “conspiracy” label being used as part of the argument against the other is the case when flat-earthers contend the whole space program of NASA is one big deception, beginning with the Apollo moon missions⁵⁴⁴ and progressing to the Hubble Space Telescope, down to every single satellite claimed to be in orbit around the Earth. The flat-earthers begin by claiming *all* the images NASA has produced of either the Earth or of man-made objects in space are *computer graphic images* (CGI for short) that are manufactured on Earth so as to appear as if they come from outer space.



⁵⁴⁴ One of the main arguments against the Apollo missions, whether it be from flat-earthers or non flat-earthers, is that given the extremes of pressure, temperature, radiation, the vacuum of space and biological necessities, it would be highly improbable if not impossible for a man to survive in space, since a small aluminum-alloy hull could not protect him.

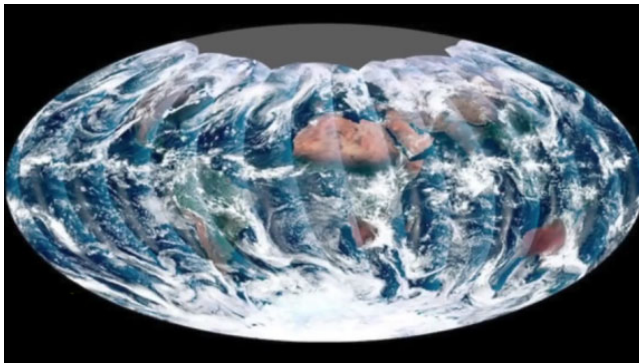


Hence any photos of the Earth that NASA claims to be from space are categorically denied by flat-earthers. To the critics of flat-earthers, this is a classic case of throwing the baby out with the bath water; or going to an extreme to counter another extreme. For the flat-

earthers, it is part-and-parcel with the “zetetic” philosophy to which most of them subscribe. As we noted earlier, “zetetic” comes from the Greek word ζητέω, meaning “to seek,” and encapsulates the flat-earth’s resolve to depend only on experience and reason as opposed to scientific dogma. They prefer the “what you see is what you get” understanding of the world (*e.g.*, if it looks flat, it probably is flat), but with the added spice that only personally acquired facts are permissible for study, which severely limits the amount of information most of them will consider.

For flat-earthers, this out-of-the gate premise denying satellite photos of Earth is simply a black and white issue, an all-or-nothing game, and there can be no compromise. Obviously, if flat-earthers were to admit that satellites are genuine and they fly over us daily from thousands of miles in space, such that even one of NASA’s photos of a spherical Earth is real, the whole enterprise of flat-earthism would come to a screeching halt, never to rise again. Consequently, flat-earthers must keep the debate at ground level, as it were, and base all their arguments on what we see on Earth and not what can be seen from the heavens. This, unfortunately, is what makes proving the case against a flat Earth difficult at times. The reason is, both a flat Earth and a spherical Earth can, at times, be used to explain the same phenomenon if one is viewing the phenomenon from the surface of the Earth. Simple elements such as magnification, atmospheric distortion, perspective, lines of sight, temperature, pressure and sun light, can be used by both sides in varying ways to make it appear that one or the other view is correct or not correct, as the case may be.

As staunch as the flat-earthers are in their resolve against satellite photos, in the realm of celestial-based evidence it would seem that NASA has the upper hand since few, if any, flat-earthers have the financial resources to send rockets and satellites into space. Consequently, the only way flat-earthers can fight the battle for the heavens is to deny not only that NASA has produced any reliable evidence from space, but even deeper, that satellites themselves are fiction. But convincing their audiences all NASA satellite photos are fake is quite a hard task. It requires a conspiratorial view of NASA that is of monstrous, if not devilish, proportions, but that is precisely the image flat-earthers seek to instill in their pupils. No compromises, no excuses, no alternatives can or will be accepted. Feeding off the popular doubt about events such as 911 and the Apollo moon landings, the flat-earthers are quick to conclude that if NASA, and the US government who runs them, can lie about one or two events, they can lie about all events, and thus a blanket condemnation against them is the *modus operandi*. Moreover, since even NASA admits to using CGI images, at least on occasion, instead of exonerating NASA, this admission is even more damning in the mind of the flat-earther. Unfortunately, it is the “at least on occasion” part of this admission the flat-earther has decided to ignore and thus uses to inflame his followers.⁵⁴⁵

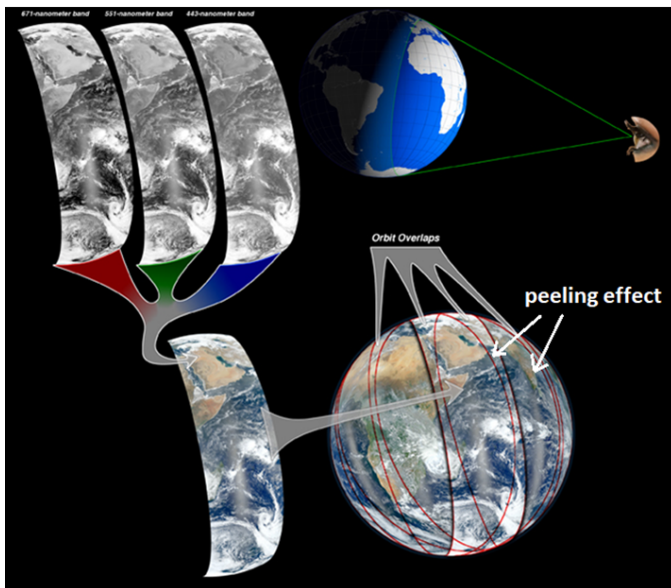


Above: Computer graphics used in making a spherical Earth

⁵⁴⁵ <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 1:14:45.

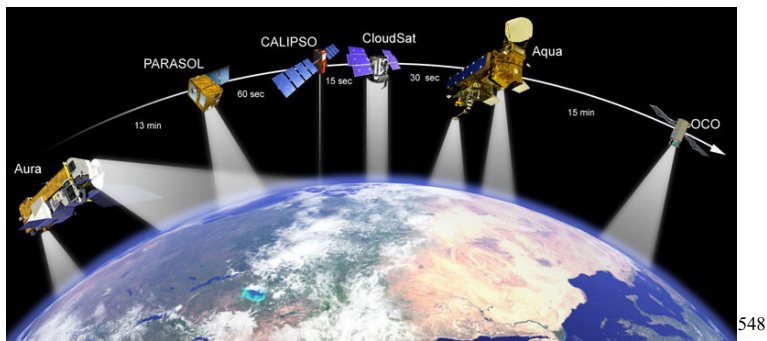
⁵⁴⁶ https://www.youtube.com/watch?v=YPrD_SFOfsU&list=PLt36ZcQG16srt_-aQIEAaHQeizaxwnh3v&index=1, image attributed to Rob Simmons, former NASA employee.

In its defense, NASA says its CGI images are made discriminately, and certainly not to deceive the public but to help envision what the actual and final image is supposed to look like. Since satellites are small objects and their cameras even smaller, even a wide-angle lens that takes pictures from a few hundred miles high is not capable of capturing the whole Earth at one time. Hence as the satellite makes numerous revolutions around the Earth, it will take snapshots of as much of the Earth as it can see in one passing. Later when the images are processed in the lab, they will often need to be pieced together as one were piecing together a puzzle, since many of the images overlap due to the fact that the camera will photograph some of the same portions of the Earth on a second or third pass. The distortion is especially evident since, in being a sphere, pictures of sections of the Earth will produce peels wherein the middle portion of the peel is much wider than the two ends of the peel. One can perform his own experiment to see this effect. If one were to cut an orange by beginning the cut at the orange's navel and cutting along the surface until the knife reached the bottom, and then repeating this procedure so that it would produce about a dozen peels, one can see that if the orange is then pressed flat so the navel is in the center, the peels will spread out and leave huge gaps between the peels at the lower extremity of the peels.



NASA describes the tedious process as follows:

NASA scientists created the two new ‘Blue Marble’ images from data acquired by a new instrument that’s aboard the Earth-observing satellite Suomi NPP, the Visible Infrared Imaging Radiometer Suite (VIIRS). The Suomi NPP satellite is in a polar orbit around Earth at an altitude of 512 miles, but the perspective of the new Eastern hemisphere ‘Blue Marble’ is from 7,918 miles. NASA scientist Norman Kuring managed to ‘step back’ from Earth to get the big picture by combining data from six different orbits of the Suomi NPP satellite. Or putting it a different way, the satellite flew above this area of Earth six times over an eight hour time period. Norman took those six sets of data and combined them into one image.⁵⁴⁷



Additionally, since the Earth is spherical it cannot easily accommodate the non-spherical exposure plates of a camera. The images must be cropped or enhanced, as the case may be, in order to produce a natural looking image of the Earth, as you see in the below final composite version made from several different instruments in 2002 by NASA’s Robert Simmon. As Simmon put it: “It is primarily taking data and making pictures out of it.” As a result of the overlap, cloud formations of adjacent regions on Earth will invariably be either identical or similar in various NASA photos. Some of these overlaps are, of course, due to editing from NASA. As Simmon says, “So we actually had to take clouds out....there being a slight gap between each orbit,” adding that colors in the final ocean segments are determined by the amount of phytoplankton in the water, which will determine whether

⁵⁴⁷ <http://www.nasa.gov/topics/earth/features/viirs-globe-east.html>

⁵⁴⁸ <https://www.nasa.gov/centers/jpl/news/mls-20080527.html>

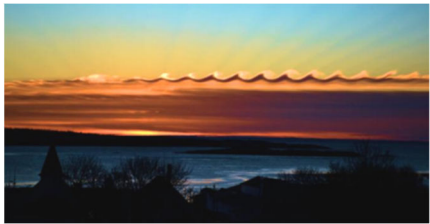
the water is darker, lighter, bluer or greener. Thus Simmon admits, “It is photo-shopped, but it has to be.”



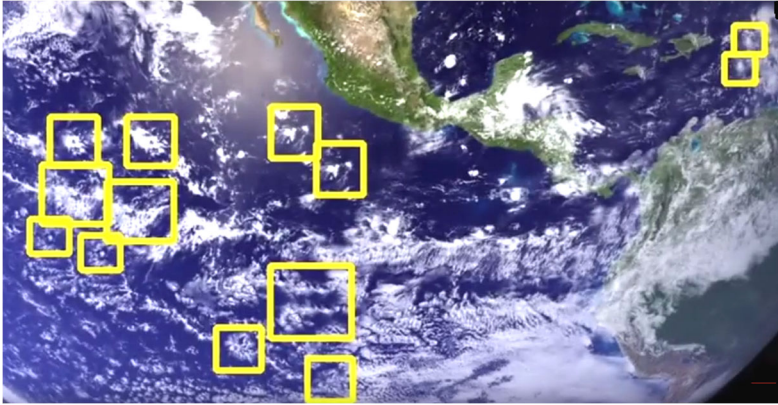
It is also true, however, that very similar cloud formations can stand right next to each other due to the fact that the same wind and pressure conditions that made the first cloud formation will also make the second cloud formation adjacent to it. Sometimes almost identical cloud formations can appear over and over again in the same photo, and most of these are caused by normal and natural occurrences. We have all seen cloud formations that repeat themselves many times. Each single formation appears almost

⁵⁴⁹ <https://www.theguardian.com/science/gallery/2012/feb/16/supernova-blast-wave-dunes-mars>. In another caption, NASA states: “Responding to public demand, NASA scientists created a companion image to the wildly popular ‘Blue Marble’ released last week (January 25, 2012)...The new image is a composite of six separate orbits taken on Jan. 23, 2012 by the Suomi National Polar-orbiting Partnership satellite. Both of these new ‘Blue Marble’ images are images taken by a new instrument flying aboard Suomi NPP, the Visible Infrared Imaging Radiometer Suite (VIIRS).”

identical to the cloud next to it, and the repetition can stretch a long way across the horizon.



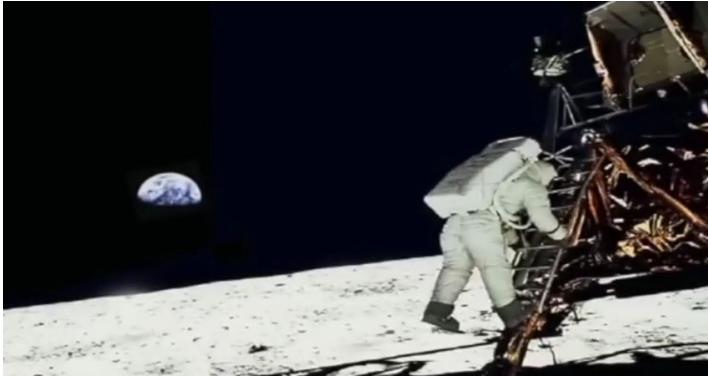
Hence whatever pressure, wind, moisture and temperature made the first wave can also made the second, and so on. It is obvious, then, that similar cloud formations cannot prove whether an image is CGI or not. In fact, some of the very photos that flat-earthers claim are CGI because the cloud formations are repeated are, upon closer examination, not identical repetitions, and thus cannot be CGI images but rather proof that very similar cloud formations often conglomerate in certain areas of the Earth's atmosphere, all conditions permitting.



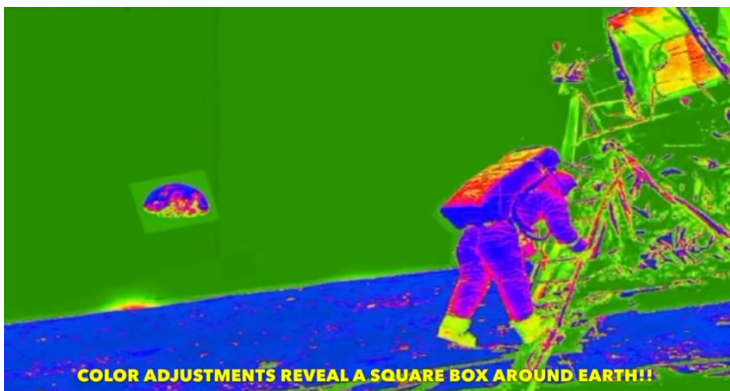
In any case, it is reported NASA says future photos of Earth will not have any photo-shopped cloud formations, since their technology has improved. As a result, flat-earthers lose this argument, not only because they fail to see that similarity in cloud formations does not mean the formations are identical and thus are not CGI images, but also because, in this case, NASA has a good reason for using some CGI images in order to provide something close to what Earth actually is instead of something distorted by the inadequacies of cameras and the altitude from which the pictures are shot.

But the story is not over. Despite what may be NASA's legitimate use of computer graphic imagery, there is also what appears to be the darker side of NASA that can use CGI for deceptive purposes. In fact, it is precisely in this area that the flat-earthers have caught NASA red-handed, as the saying goes. If the photos are genuine and the flat-earth analysis of them is correct, then there is hardly a doubt that NASA fabricated this next image, and did it boldly. The situation occurred on one of the Apollo flights. As NASA convinced its audience that the Apollo craft was a hundred or so

thousand miles from Earth, one of the astronauts took a photo of Earth in almost half phase. It was beautiful, to say the least. If there was ever a dramatic moment that rivaled Neil Armstrong's first foot on the moon, this was it. Centuries of humankind that had come and gone were never able to see the Earth as it really is, but we were the first – a blue marble, tethered in white circling streams against the total blackness of space, all by its lonesome. Below is the popular picture NASA released many years ago.⁵⁵⁰



But the flat-earthers recently discovered how NASA doctored its image to make it appear that the Apollo astronauts took the shot from the moon.



⁵⁵⁰ Courtesy of *NPR News* who invites photographer Flora Lickman to appear on “ScienceFriday.com.” In this particular show, Lickman is showing photos of Earth from NASA and is explaining how they are made. She obtained the photos and the explanation from Robert Simmon, an employee of NASA.

As flat-earthier Rob Skiba sees it:

Why is there a square box around the Earth allegedly taken from the scientists on the moon in Apollo 17? Then people wonder why I don't trust NASA. That's why I don't trust NASA! They are always out there saying, "Rob, everybody is trying to show you stuff from space and you keep rejecting it." This is why I reject it! These guys are liars!⁵⁵¹

As fellow flat-earthier, Jeran of "Jeranism" says:

We don't have a picture of Earth except for the nice composites faked images NASA gives you to make sure you keep believing you're in a ball and keep arguing on their behalf and keep fighting for them; keep telling people we went to the moon, simply because you can't let your mind think of the possibility that someone lied to you. The government lied to you. They can't. They're my government. Believe me, it's hard for all of us.⁵⁵²

Suffice it to say, NASA's photo-shopped image of the Earth generates enough doubt and skepticism among those already predisposed to reject NASA's claims of landing a man on the moon, that NASA loses the battle before it starts. It is quite an understatement to say this particular photo of the Earth gives NASA a credibility problem, not only with flat-earthiers but with many others. It is one thing to photo-shop clouds when making a composite of the Earth from hundreds of satellite photos, but it is quite another to make the world believe the Earth was photographed from 230,000 miles away by pasting in a picture of the Earth.

The only thing that saves NASA's tarnished credibility is the fact that this particular debate is not about the reputation of NASA, since we are not here to prove whether NASA landed a man on the moon but whether the Earth is flat, especially since the generation that produced the photo-shopped Earth was in a wholly different time and political situation in the 1960s than we are today in the 2020s. This caveat is not for the purpose of condoning what may have prompted NASA to make the fake photo, but only to say NASA's foibles do not prove the Earth is flat. Unfortunately, one does not get that

⁵⁵¹https://www.youtube.com/watch?v=YPrD_SFOfsU&index=1&list=PLt36ZcQG16srt_-aQIEAaHQeizaxwnh3v, beginning at 6:58.

⁵⁵² *Ibid.*, beginning at 7:30.

impression from the flat-earthier who put his own comments on the screen as the video is playing for the Youtube audience. For example, in the “Earth as seen from the moon” video that is narrated by Flora Lickman for NPR’s *ScienceFriday.com*, it is obvious the flat-earthier wants to brainwash the audience into accepting a flat earth, even though it is obvious Lickman is giving a rational explanation why NASA sometimes uses composites. The flat-earthier’s biased comments, in order of appearance, are:

- 1:20: “Once it is pointed out to you...it becomes easier to spot how phony *all* of NASA’s pictures are.”

Notice the deliberate exaggeration by his use of “all.” He wants the viewer to assume that even if some of NASA’s photos are composites but he finds one that is definitely a photo-shopped image of the Earth as seen from the moon, then we must conclude that *all* of NASA’s photos are bogus. The objective is to discredit anything NASA does and give no room for the fact that NASA might do some things correctly and others incorrectly; and no room is given for the fact that some employees of NASA may have evil intent while others do not. It is always the “all or nothing” game with the flat-earthiers. Unfortunately his conclusion is as deceptive as he is trying to make NASA appear.

- 1:48: “The Earth is Flat!!!”

This is the comment from the flat-earthier who is viewing NASA’s image of the “Earth as seen from the moon,” which appeared seamless at the time, but years later was revealed to be a square painting that was merely pasted on a black background. If the flat-earthier had merely stated this kind of photo-shopping serves to put doubt on whether NASA really sent a man to the Moon, it would be logical and cogent. But it is obvious he has another agenda. He wants to use NASA’s *faux pas* as clear, decisive and indisputable proof the Earth is flat. But the only thing flat is the argumentation of the flat-earthier. In fact, it shows he is just as devious as he purports NASA to be.

- 2:10: “The square boxes revealed on official NASA pictures that they are hiding the Earth’s true image.”

Again, NASA's photo-shopping does not mean they are trying to hide anything. NASA may be trying to hide the fact that they didn't have a man on the moon to take the picture, but it doesn't mean NASA is trying to hide the Earth's true shape with a false shape. The only thing truly evident here is the flat-earthier wants us to think NASA's true motive is to hide the shape of the Earth rather than pretending that a man went to the moon.

- 2:46: "NASA shapes data like this into a globe Earth!!"

Notice how the flat-earthier is using a truism, namely, that NASA makes composites into a globe, yet makes it appear there is something sinister about this procedure. There is nothing sinister about it at all, especially since NASA explained why it is sometimes required to use composites in order to display what the Earth really looks like from space.

- 3:15: "The clouds are photo-shopped duplicates."
- 3:40: "Next...let's listen to NASA themselves explain to us how they FAKE globe earth pictures!!"

Again, the flat-earthier distorts the truth since NASA never claimed the final globe Earth they produced is a fake representation of what the Earth really looks like. The flat-earthier obviously does not want the audience to think for themselves and thus induces all kinds of sinister motives as the only explanation for the composites, regardless of any rational explanation NASA may have.

- 4:56: "All official NASA pictures of the Earth are FAKES!!!"

Again, we see the "all or nothing" game of the flat-earthier. Nothing NASA produces has any truth to it whatsoever. The flat-earthier is forced to this extreme position since if there is even one photo that is not a fake globe Earth, everything the flat-earthers have said for the last one hundred and fifty years since Rowbotham's 1881 book claiming the Earth is flat, falls like the proverbial house of cards with no recovery possible.

- 5:13: "Rare audio of NASA admitting to faking pictures of the Earth!!"

As we see, within five minutes of the 21-minute video, the flat-earthier has already made eight biased, extreme, or exaggerated comments to sway his

audience against NASA. For them, NASA must be the great Satan and can have no good in them, at all; otherwise the flat-earththers lose.

- 6:24: ““It is photo-shopped. It has to be – NASA””

The flat-earthther is determined to have this truthful comment from NASA’s Robert Simmon resonate in the mind of the audience since he replays it about a half-dozen times in succession. The ploy, of course, is to make it appear the admission “it has to be” means NASA is always and without exception, out to deceive everyone, and thus Simmon’s comment means the Earth is flat and Simmon is determined to hide this fact from the public. For the flat-earthther it can never be the case that Simmon photo-shopped the Earth because without it he can’t get a reasonable facsimile of what the Earth looks like due to the limitations of current space photography.

Interestingly enough, the irony of this whole analysis is flat-earththers are the most guilty of making fake images, since every single image they have ever produced of a flat-earth is either an artist’s conception or a computer generated graphic; and obviously the flat-earththers have never shown a photograph of a flat earth from space. Of course, flat-earththers try to answer this lacuna by asserting that all satellites and space probes are fake. But this remains a far-fetched argument, especially since we can even see some of these satellites with the naked eye (even though some flat-earththers claim we are seeing only a holograph or that we have been hypnotized to believe it’s there).

The International Space Station (ISS) has daily live-streaming of its satellite taking continuous film of the Earth. Since the satellite is moving very fast, it can sweep past much of the Earth in virtually minutes.⁵⁵³ Notice the very similar cloud formations.

⁵⁵³ <http://www.ustream.tv/channel/live-iss-stream>. Notice there are clouds the could be mistaken for “composites,” yet these are said to be live pictures. Notice also the curvature of the Earth at center lens. A flat-earthther expert in vacuum technology, however, states that the ISS is not equipped to withstand the vacuum of space, citing the “floppy door” of the ISS capsule and the fact that its 14 O-ring seals need to be replaced every three weeks but the ISS has been in space for 20 years. He was asked if the ISS was possible, and said: “No, no way!” <https://www.youtube.com/watch?v=2TebGSZ2EQE>, starting from 29:15.

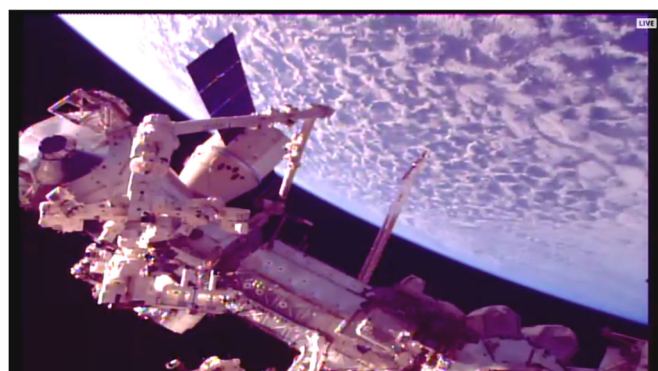
Daily predictions for brighter satellites

Month Day ☐ Morning ☒ Evening

Minimum brightness: ☒ 3.0 ☐ 3.5 ☐ 4.0 ☐ 4.5 ☐ 5.0

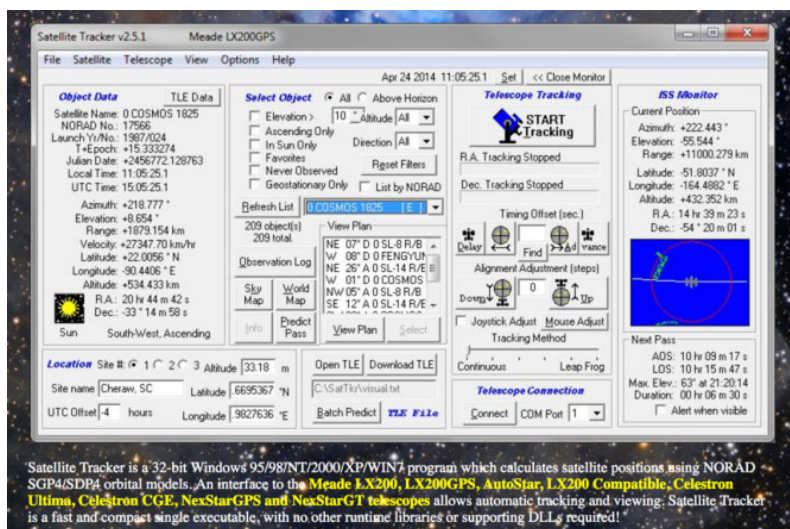
Satellite	Brightness (mag)	Start		Highest point			End			
		Time	Altitude	Azimuth	Time	Altitude	Azimuth	Time	Altitude	Azimuth
TITAN 4B R/B	2.4	20:54:22	10°	NNW	20:58:45	38°	NE	21:02:55	10°	ESE
APEX	3.0	20:56:47	10°	SSW	20:59:28	62°	WNW	21:02:20	10°	NNE
Cosmos 2219 Rocket	3.0	20:59:06	10°	SSW	21:04:36	59°	WNW	21:10:10	10°	N
Meteosat 1 Rocket2	2.6	21:10:02	10°	W	21:14:09	87°	S	21:17:45	10°	E
Atlas Centaur 2	2.6	21:11:20	10°	W	21:18:33	74°	N	21:24:08	10°	E
GOES 2 Rocket	2.9	21:12:18	10°	W	21:16:35	88°	N	21:20:49	10°	E
SL-8 R/B	2.7	21:24:56	13°	SSE	21:27:38	65°	ENE	21:30:43	10°	N
Cosmos 1484 Rocket	2.6	21:29:29	12°	SSE	21:32:54	72°	ENE	21:36:39	10°	N
Yohkoh Rocket	2.6	21:40:46	10°	WNW	21:44:02	86°	NNE	21:45:25	32°	ESE
Cosmos 1340 Rocket	2.9	21:42:36	10°	N	21:46:39	59°	E	21:48:55	25°	SSE
Cosmos 1726	2.3	21:51:36	10°	N	21:55:21	52°	E	21:56:30	37°	SE
Cosmos 1271 Rocket	2.7	22:00:30	18°	S	22:03:18	86°	W	22:07:10	10°	N
DASH	2.3	22:10:42	7°	E	22:10:42	7°	E	22:07:16	16°	E

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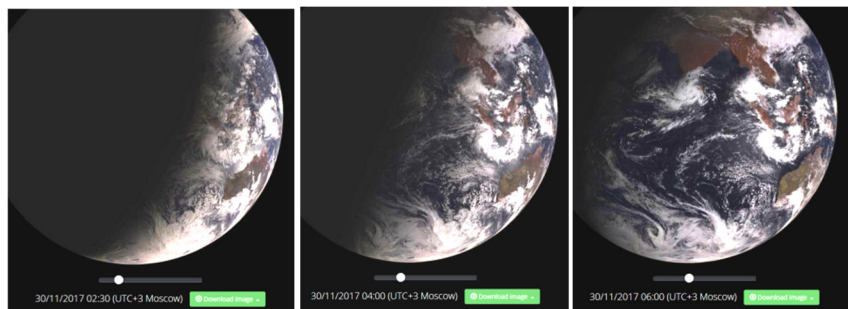
Other Satellite Trackers:

⁵⁵⁴ <https://www.universetoday.com/103382/how-to-spot-and-track-satellites/>



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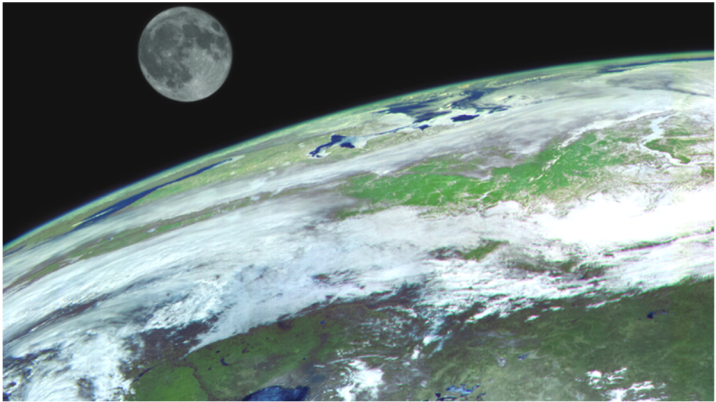
In regard to satellite pictures of Earth, NASA is not the only organization who produces them. The following pictures of Earth were taken recently from the geostationary weather satellite, Elektro-L, from 22,242 miles high, courtesy of the Russian Federal Space Agency.⁵⁵⁶ From close to 20 million snap shots taken by the satellite over a two day period, they are laid out side-by-side, from hour to hour, in a slide presentation. One can see the sun's light go across the Earth as it follows the day/night line.



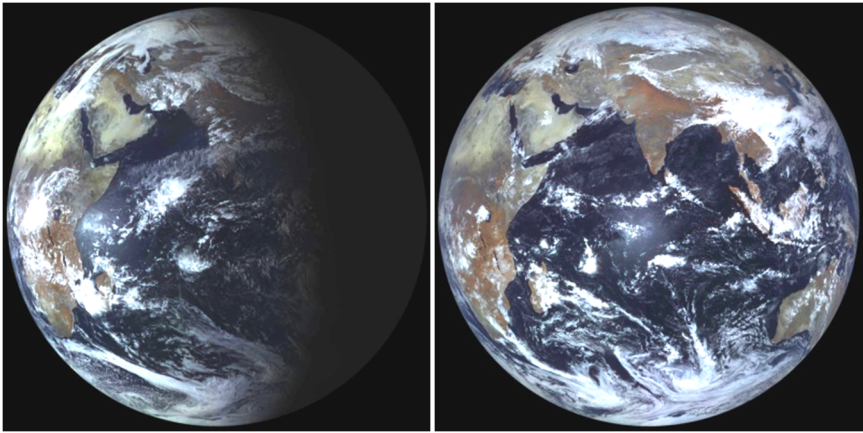
⁵⁵⁵ At <http://www.heavenscape.com>

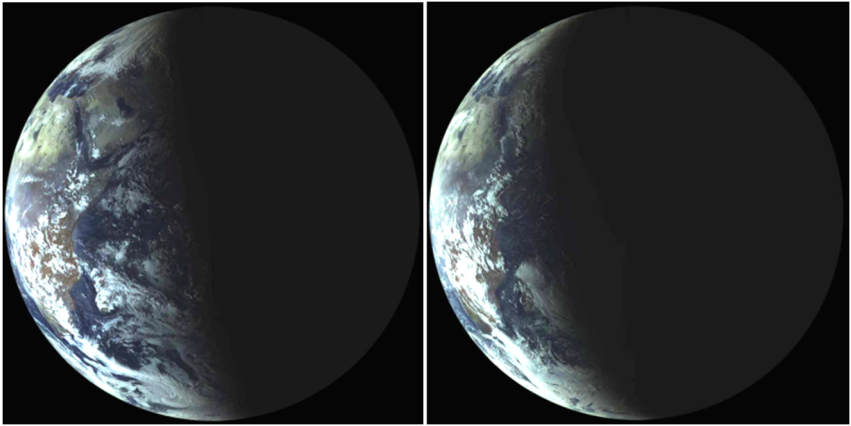
⁵⁵⁶ <http://electro.ntsomz.ru/en/>. It is recommended that you also visit the gallery to see the moving slides: <http://electro.ntsomz.ru/en/electro/gallery>. There are no composite images in these photos and thus they cannot be discredited by flat-earthers. See also: <https://www.youtube.com/watch?v=Ybh1lDhfM>.

Below are stills from Russia's Elektro-L

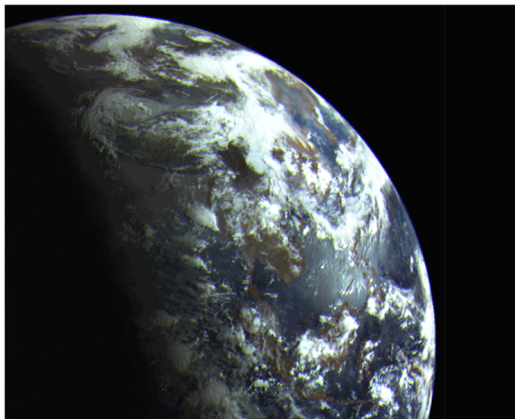
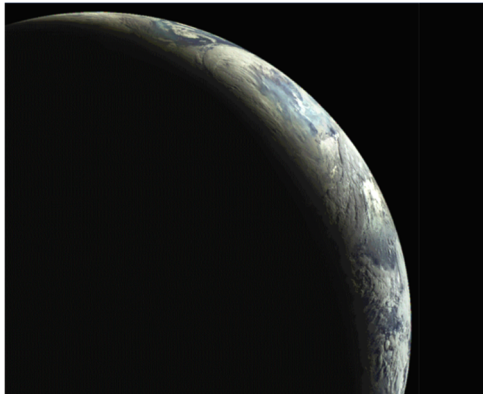


Below are more stills and moving images from Russia's Elektro-L.

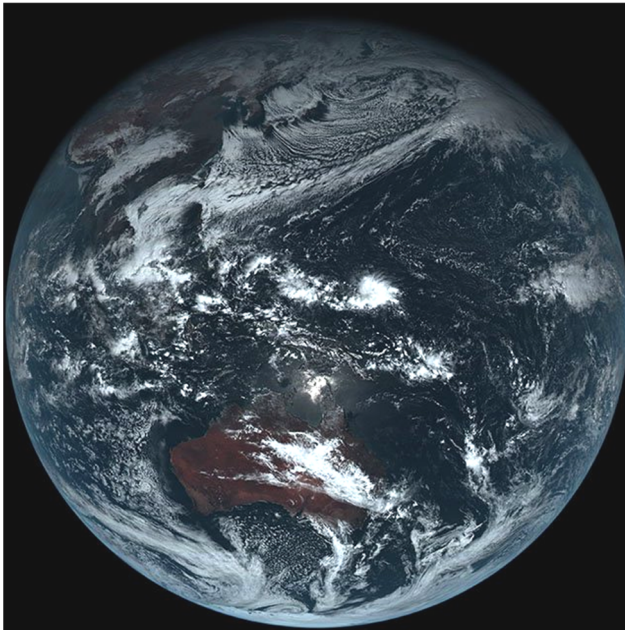




These two pictures of Earth taken a few hours apart. Notice the sun's light traveling east to west.



The Japan Meteorological Agency launched its latest weather satellite called the *Himawari 8* in October 2014. Below is a 11000×11000 pixel version of the photograph of Earth. Notice in many places the cloud formations are similar, side-by-side, but not identical.



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Flat Earth researcher, Rob Skiba, comments on these photos and time-lapses:

This video shows the Earth from May 15th to May 19th, 2011. It was created from images produced by the geostationary Elektro-L weather satellite. Now this is supposedly real, authentic, time-lapse of the Earth. Do you believe it? Do you believe this is actual time-lapse photography

⁵⁵⁷ <http://petapixel.com/2014/12/21/heres-first-true-color-photo-earth-snapped-japans-new-himawari-8-weather-satellite/>, and at http://www.jma.go.jp/jma/jma-eng/satellite/news/himawari89/20141218_himawari8_first_images.html. The flat-earthers claim that such photos are from a fish-eye lenses, which makes a circle out of the horizon. But this objection has been discredited as can be seen in this video: <https://www.youtube.com/watch?v=MIyz3B3g-ZE&feature=youtu.be>, at 2:15. Although a fish eye lens will certainly curve a straight line that is above or below the exact center of the lens, it cannot curve a line that is at the exact center. If a line is curved at the center focus of a wide-angle lens, it means it is curved in reality.

from a weather satellite looking down on our Earth? Me personally, ah, no. I don't believe it. I'm impressed by their ability to morph the clouds [change their shape or move]. That's a whole lot better than what the Galileo space probe did when it shot video of the Earth rotating in time-lapse...But I'm not buying this is legitimate because I can create a really believable Earth myself that looks very, very similar to this, might even look better than this using a software that cost about \$300 called View.⁵⁵⁸

Whereas most flat-earthers, out of the gate, would not even consider the time-lapses of the Elektro-L, Skiba does not necessarily put himself in that class since he has hinted he accepts the existence of satellites in this and other videos he has produced.⁵⁵⁹ Hence his critique about the Elektro-L is limited to the fact that he can create a rotating Earth with moving clouds with his own software. As such, he ends up with the same conclusion as other flat-earthers, although he gets there in a different way. Even though he has no evidence or proof the Elektro-L did not take the time-lapses, he insists they are fake, nonetheless. Instead of reserving his opinion—as most scientists would do when confronted with such hard evidence—Skiba sticks his head in the sand. Of course, if he were to admit the Elektro-L time-lapses were authentic, then the whole quest to support a flat Earth would be over, immediately. Since Skiba believes the Bible teaches a flat Earth, his belief is the final arbiter of whether he will accept the scientific evidence as real or manufactured. As for now, the fact that he can create his own videos serves as the buffer between his interpretation of the Bible and the scientific evidence.

Photos of the Earth's Curvature?

One might think that if we could simply get the flat-earthers to accept even one photo or time-lapse of the Earth it would be convincing evidence and the debate would be over. But similar to the CGI issue, there is also the problem of how one takes the photo of the Earth. If it isn't taken correctly and with the right camera, the results can be very deceiving. For example,

⁵⁵⁸ <https://www.youtube.com/watch?v=feqnoVRRPQs>, at 1:12:32 to 1:19:55.

⁵⁵⁹ *Ibid.*, at 1:40:35: "Some of the flat-earthers say there are no satellites at all. If the sun and moon are orbiting within the canopy, within the dome, in that model, then I don't have any problem believing that the ISS could be up there or that there could be satellites up there."

below are four pictures of the Earth extracted from a time-lapse taken by an amateur photographer who sent a balloon thousands of feet above the Earth with a camera attached. Notice below the two pictures show the Earth curved.



This third picture, however, shows the Earth relatively flat.



The fourth picture shows the Earth in a slightly concave shape.



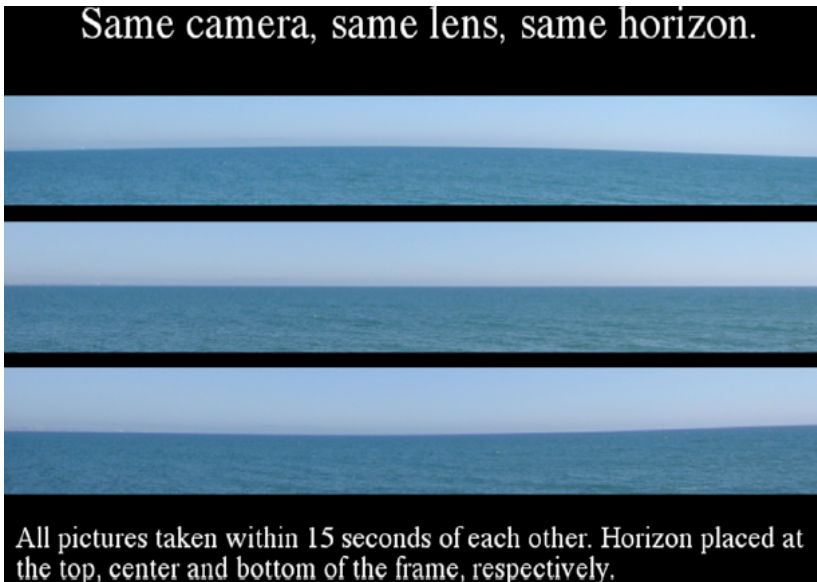
Why is this the case? Because when photos or films are taken of objects, especially with a wide-angle lens, the image will be distorted unless the edge of the object cuts right across the center of the lens. As such, a flat-earther could argue that photo #3, which shows the Earth flat, is the most accurate of these four photos because the edge of the Earth is precisely at the center of the lens. This shows that photographic evidence can be very tricky at times. No conclusions should be drawn from them unless every detail about the camera is known and calculated; and what effect these details will have on the photo.

But the most important thing this set of four photos tells us in regard to the flat Earth issue is, if the Earth is curved, a wide-angle lens will inevitably make the Earth look flat if the edge of the Earth is at the center of the lens. It cannot be avoided. Since the wide-angle lens that was set above the center showed a curved Earth, but then showed a flat Earth at the center of the lens, it follows that if the camera is then made to move below the edge, it will make the Earth appear concave, which is precisely what we see in photo #4.

⁵⁶⁰ <https://vimeo.com/15091562>

The lesson in this process is not to use a wide-angle lenses in taking pictures of the Earth, whether one is a flat-earther or a globe-earther. As David Lynch notes:

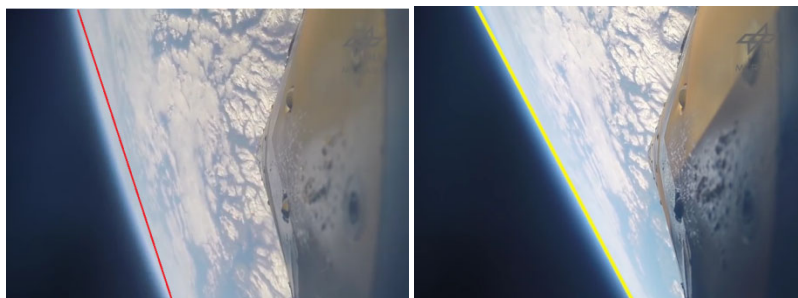
Most photographers place the horizon near the top of the frame in order to capture the scene of interest below the horizon. The resulting barrel-distortion produces a pronounced upward (anticlinal) curvature of the horizon that most people incorrectly interpret as the curvature of the Earth.



Barrel distortion occurs when the pupil is placed away from the lens, a common technique used in camera lens manufacturing to produce a flat field. In view of the ability to make the horizon curved both upward and downward, and with the tendency of casual photographers to place the horizon near the top of the image, where it appears curved upward like it would appear from very high elevation, we can dismiss most of the purported photographs of the curvature of the Earth as barrel distortion.⁵⁶¹

⁵⁶¹ “Visually discerning the curvature of the Earth,” David K. Lynch, endnote 5, p. H41.

The Mapheus-5 Rocket



6:23 minute mark

6:28 minute mark⁵⁶²

The above clips are taken from the Mapheus-5 rocket on June 30, 2015, launched from Sweden. One can view the Mapheus-5 rocket's takeoff, orbit, and landing on Youtube. It rose to 161.1 miles above the Earth. Rob Skiba (the flat Earth researcher) uses the 6:28 mark of the clip to claim the Earth appears as a straight edge and is thus flat. But Skiba ignores several important things here. First, the clips are very limited in their FoV (field of vision) since they only show a small portion of the Earth. The percentage of the Earth's horizon that is shown is miniscule compared to the size of the Earth, and thus very little if any curvature is going to appear. There is also a lack of perspective, which is caused by the acute angle between the camera and the Earth.

Second, the clip at 6:28 is taken after the whole Earth makes a sharp turn to the lower left, which is due to the rocket's rotational movement as it attempts reentry. This rotation creates a different camera angle as opposed to the 6:23 clip. Skiba ignores this change and claims the Earth's edge appears straighter because "when the horizon came across the center of the lens, at 73 miles high [NB: Skiba forgets it is 161.6 miles high]...[it is] flat."

⁵⁶² <https://www.youtube.com/watch?v=JakicLZgN-o>

Third, Skiba doesn't know the 6:28 clip is at the "center of the lens." He neither knows the depth of field the camera is capturing, nor does the camera provide crosshairs on the lens to determine its center.⁵⁶³

Fourth, even the 6:28 clip shows a slight curve of the Earth, since we see a darker blue atmosphere on the top right side of Skiba's yellow line. Obviously, if the field had been extended beyond the boundaries of the clip, the curve would have extenuated. Since the camera angle has changed at 6:28 due to reentry preparation, it is thus focusing on a narrower field, which then yields a more concentrated and thus darker blue.

The Sentinel-1A Satellite

There are other such rocket-based films of Earth that are more definitive of curvature. For example, the onboard camera of the Soyuz Sentinel-1A satellite of the European Space Agency launched March 4, 2014, at an altitude of over 400 miles (2.5 times higher than Mapheus-5), showed this image of the Earth.⁵⁶⁴



⁵⁶³ <https://www.youtube.com/watch?v=5ncfVU9Tf5U>. At 6:23, the Earth appears curved, although slightly. At 6:27, the Earth suddenly begins to turn toward the lower left of the screen, which then turns the curve of the Earth into a straighter line. At 6:28, Skiba then draws his yellow line.

⁵⁶⁴ <https://www.youtube.com/watch?v=vHWDNrrfhnl> at the 4:09 and 4:23 marks. The Sentinel has since had four more launches up to 2018. See the website: <http://spaceflight101.com/copernicus/photo-rockot-blasts-off-from-russia-with-sentinel-5p-atmospheric-monitoring-satellite/>



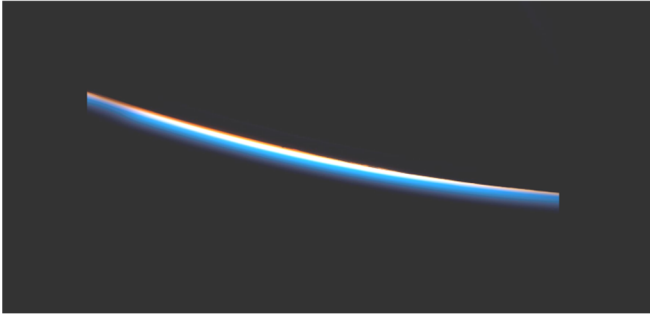
We notice the curvature of the Earth crosses what Skiba would call “the center of the lens” for most of its outline, both at the 4:09 and the 4:23 marks. The difference between the slight curvature seen from the Mapheus-5 as compared to the Sentinel-1A is the latter is much farther from Earth and has a better aspect of perspective and much less of an angle between the camera and Earth. In fact, it is not until the Earth gets a little beyond the lens’ center at the 4:26 mark that the Earth appears less-curved. See below.



The way most flat-earthers would answer the Sentinel-1A evidence is to reject the clip as a CGI, but since Skiba has already committed himself to using satellite and rocket footage, the Sentinel-1A completely dismisses his objections. Once Skiba accepts rocket and satellite photographs and films of the Earth, if even one of them shows a curved Earth, Skiba’s whole campaign falls like a house of cards, and this is precisely what the Sentinel-1A has done.

The Atlantis Space Shuttle Photo

We also have an example of the Earth's curvature in a photo taken by the Atlantis space shuttle from an altitude of 140 miles (226 km) in 2008. And we will notice in the photo that the snapshot of the horizon is taken precisely at the lens' center.⁵⁶⁵



Picture of Earth's Edge from Atlantis Shuttle

Other photos from NASA are very similar:



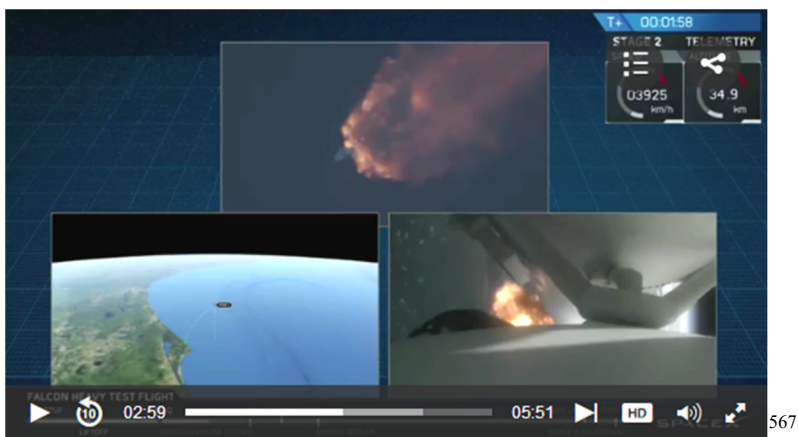
566

⁵⁶⁵https://commons.wikimedia.org/wiki/File:A_colorful_view_of_airglow_layers_at_Earth%27s_horizon.jpg

⁵⁶⁶ <https://www.aol.com/article/news/2017/08/23/nasa-releases-stunning-image-of-the-total-solar-eclipse-from-space/23159276/>

We are seeing precisely the curvature we would be able to see at this specific height and the FoV of the camera.

The latest rocket to take pictures of the Earth, the Falcon Heavy created by *SpaceX*, lifted off this year, 2018, on February 6. Billed as the world's most powerful booster since NASA's Saturn V, it lifted off from Launch Pad 39A at Kennedy Space Center, at 3:45 p.m. EST, and went 110 miles in altitude before sending a part of the rocket to Mars, with the booster portion descending safely to Earth. It shows the beginnings of a globe.

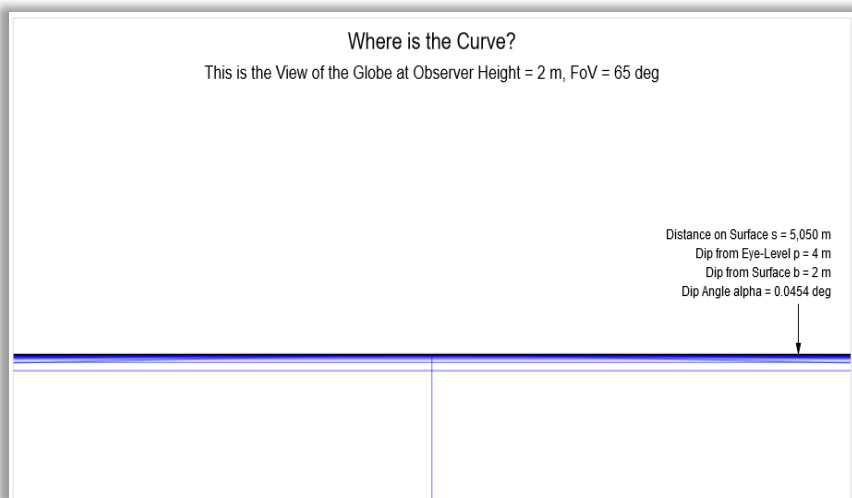


⁵⁶⁷ https://www.livescience.com/61678-spacex-falcon-heavy-launch.html?utm_source=notification

We could cover many more satellite and space probe events that have occurred and are planned to occur, but it would be redundant. For now, one can see those that are planned in 2018 through 2038.⁵⁶⁸

Computer Analysis of Earth's Curvature

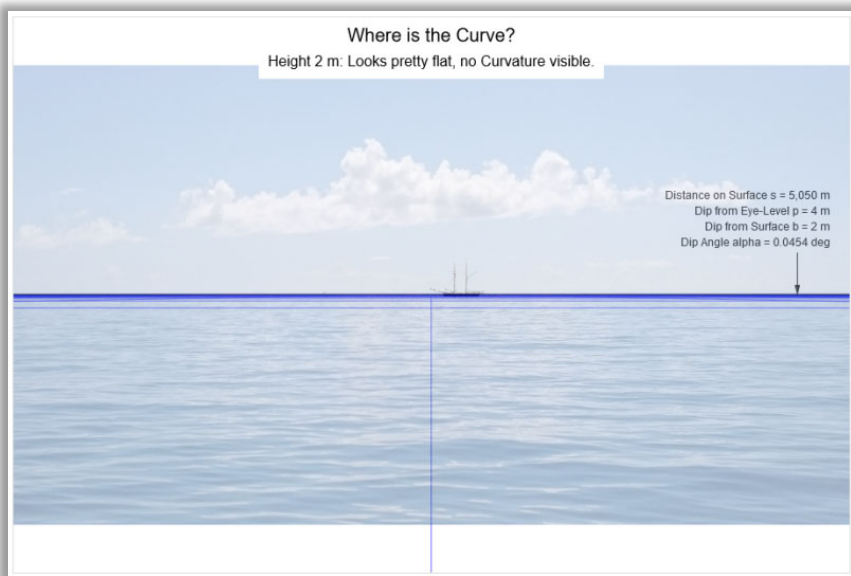
One of the best ways to demonstrate what degree of the Earth's curvature we can expect to see is by plugging all the data into a computer and allowing it to produce the corresponding animations. One of the best, if not *the* best, such device was created by Walter Bislins from Germany.⁵⁶⁹ We will look at a series of snap shots of his animations on the Earth's curvature.



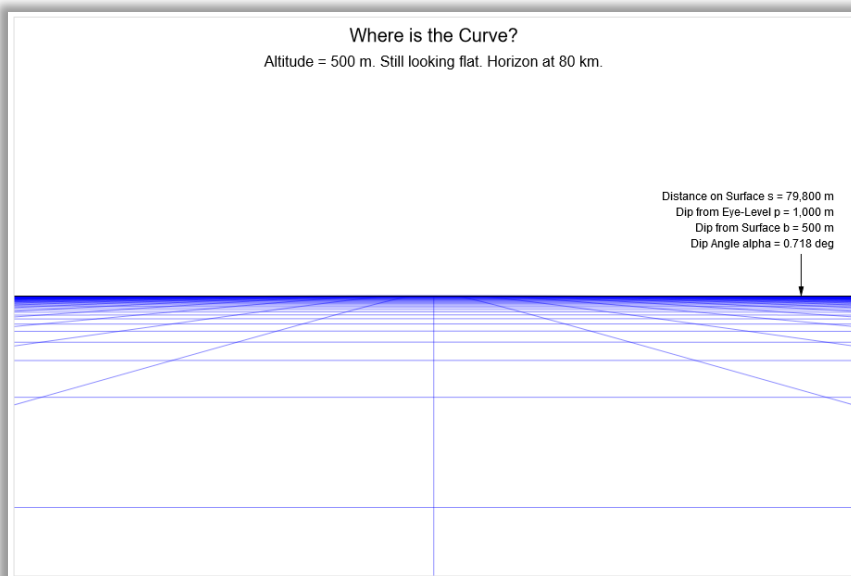
Above: the observer's height is 6.5 feet; the field of view (FoV) is 65 degrees wide; the distance across (from one end of the blue line to the other end) is 3.13 miles; distance from observer to blue line is 82 feet.

⁵⁶⁸ <http://www.iflscience.com/space/heres-a-list-of-every-upcoming-space-mission-for-the-next-twenty-years-and-some-of-them-are-unbelievably-awesome/>. One can check on these projects at www.space.com.

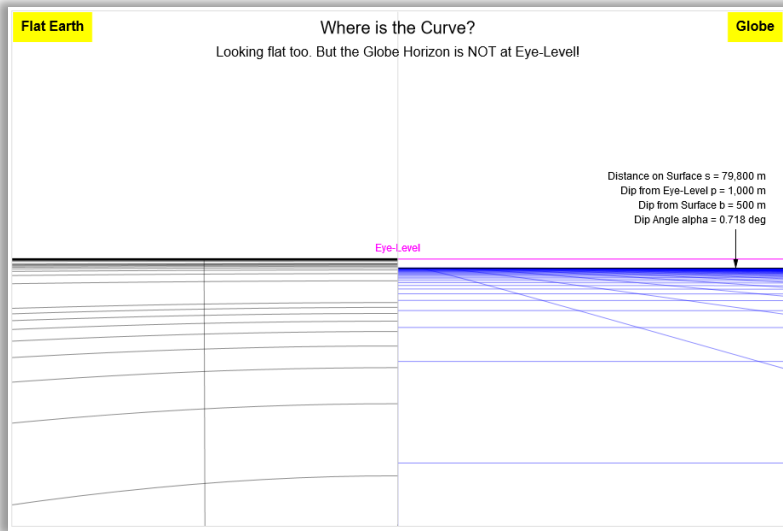
⁵⁶⁹ <http://walter.bislins.ch/bloge/index.asp?page=Flat-Earth%3A+Finding+the+curvature+of+the+Earth>



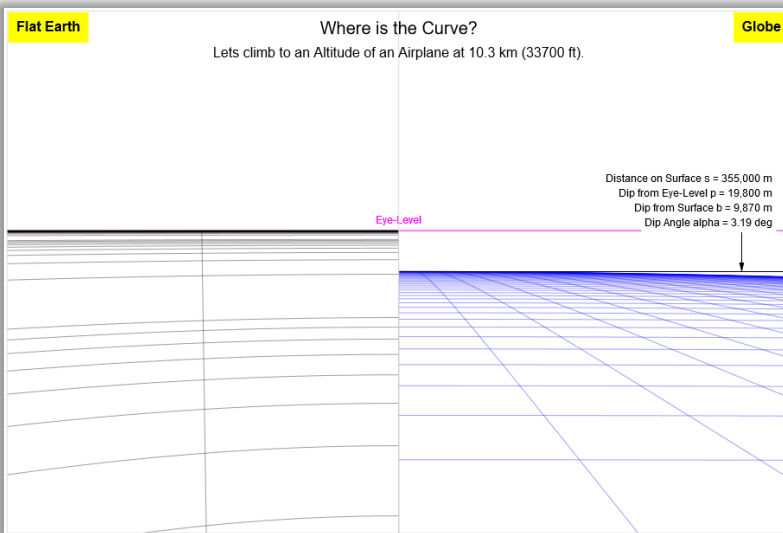
Above: a picture of the waterscape is superimposed on the scene. It does not show any apparent curvature of the water.



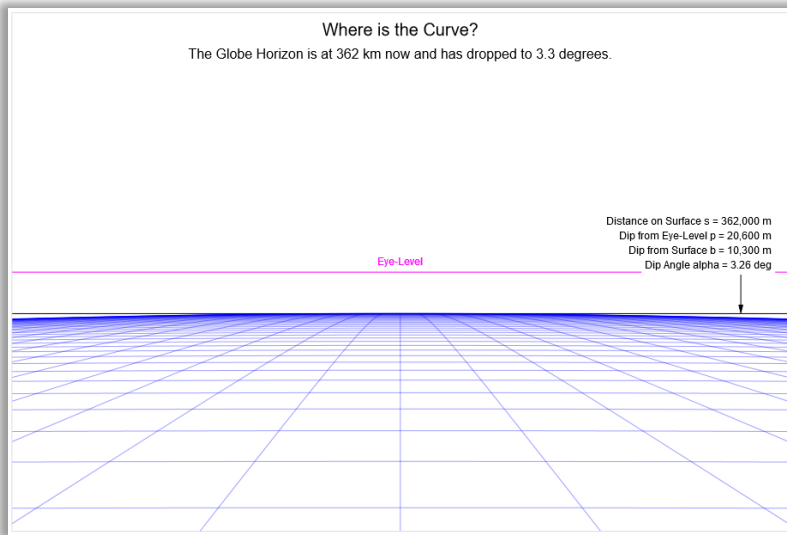
Above: the height of the observer has been increased from 6.5 feet to 1,640 feet, but curvature on horizontal line is still not noticeable.



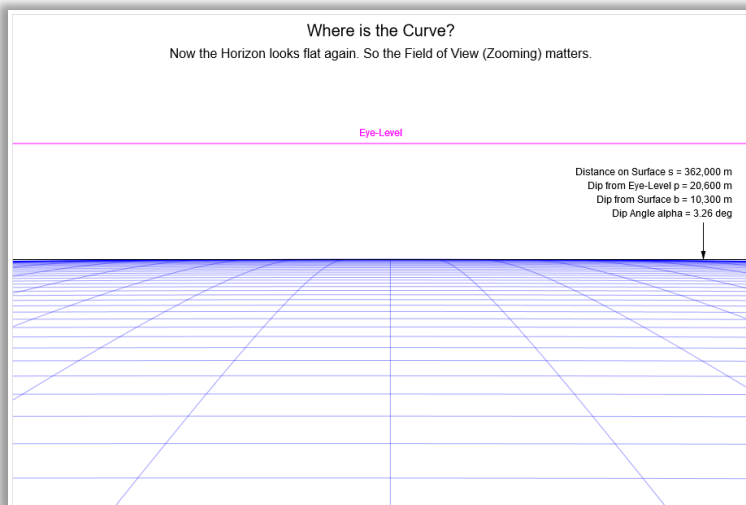
Above: at the same height, 1,640 feet, we split the screen with a flat Earth view. Notice the horizon of the globe model is below eye level.



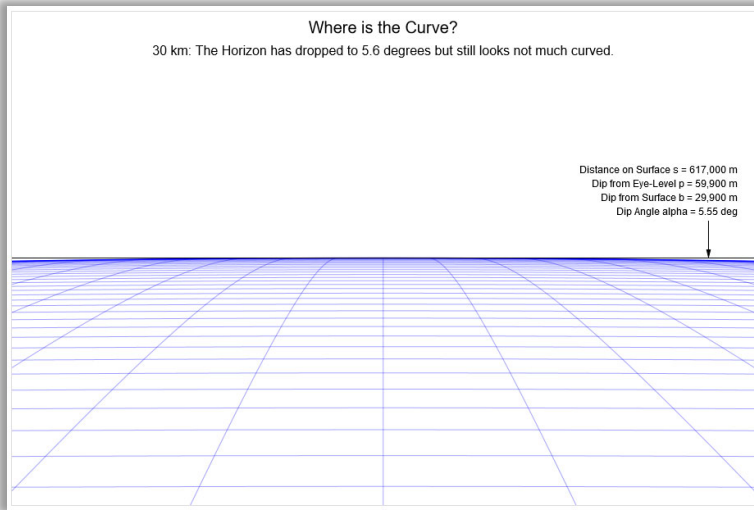
Above: we ascend to height of 33,700 feet, the altitude of a commercial jet liner. We see the globe horizon has separated from eye level by a greater margin. We see the start of Earth's curvature at the far right since the blue line is now below the black line.



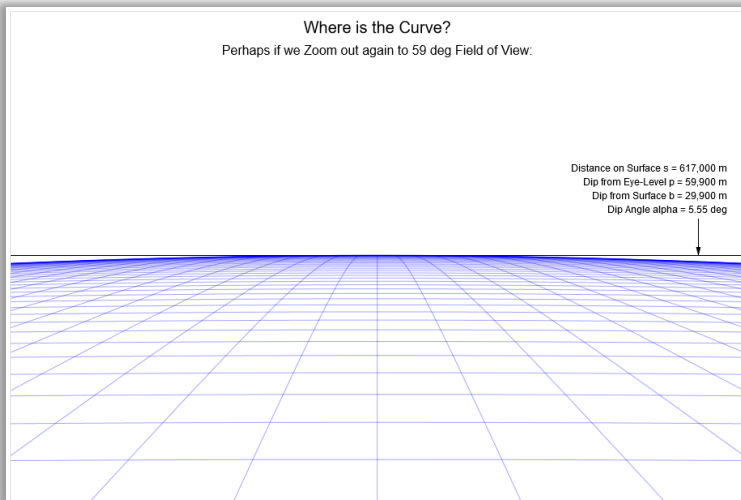
Above: We see the same small curvature on the left as we do the right (the white space between the black line and the blue line).



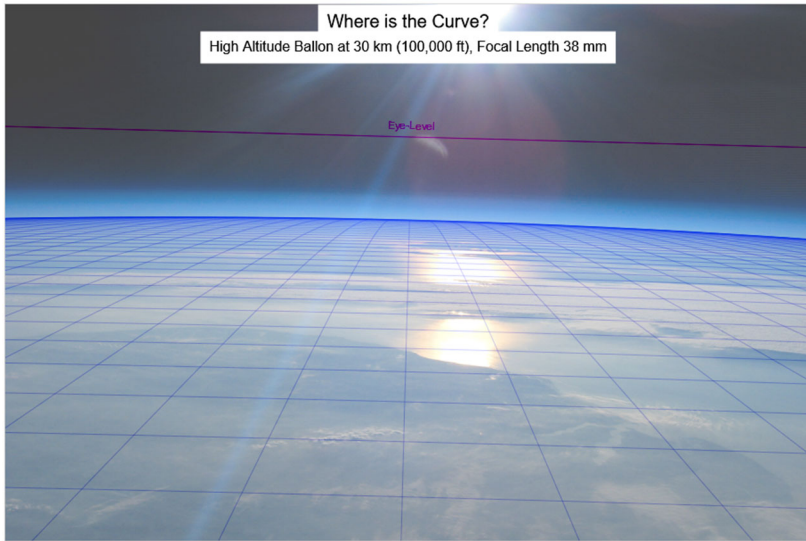
Above: Same picture, but we zoomed in by $f = 100$ mm on our camera, which will shrink the FoV (field of view). Notice the space between the black line and blue is no longer visible. The only curvature that can be detected is that going outward to the horizon since the blue graduated lines seem to curve downward.



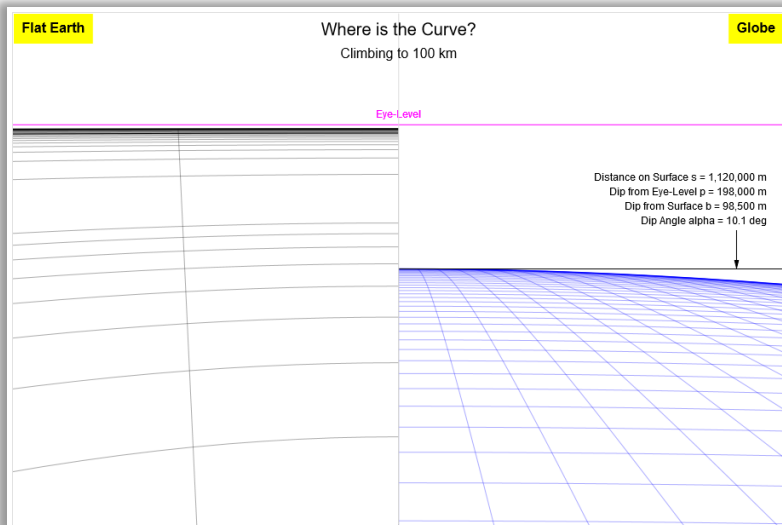
Above: We are now taking a balloon ride to 100,000 feet. We can detect only a slight separation between the black and blue lines at the far left and right, so the curvature we see is minimal.



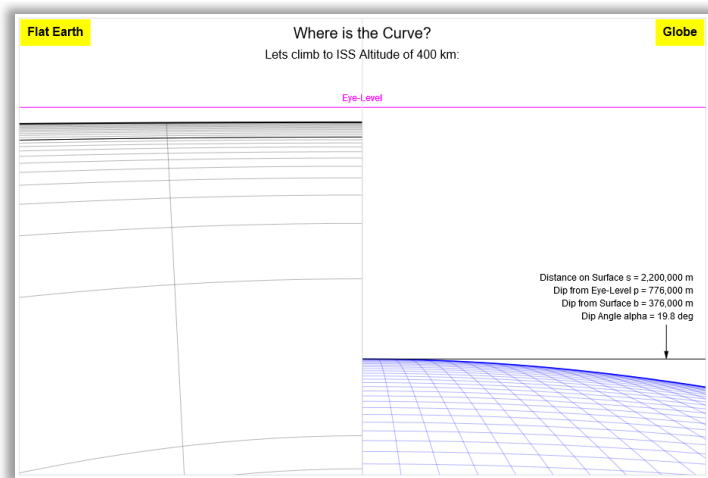
Above: Same picture, but now we have zoomed out to an FoV of 59 degrees. The white space between the black line and the blue line (at the far left and far right) is now larger and more distinct, thus showing a definite curvature to the Earth.



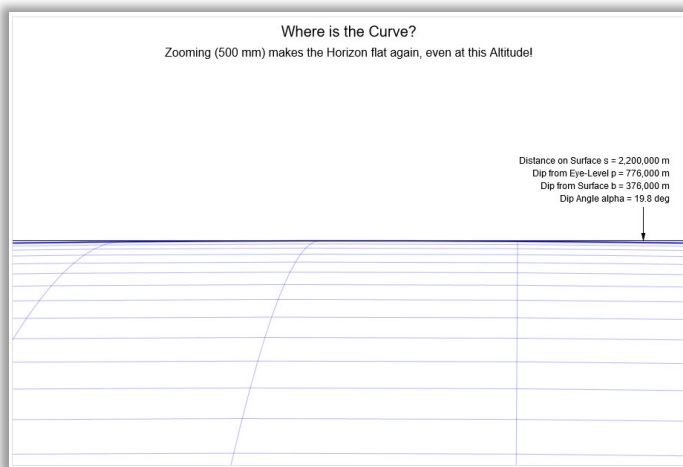
Above: Picture from a balloon at 100,000 ft, focal length of 38 mm, is superimposed over our findings. We see the blue line (the horizon) is curving downward at the left & right extremities of the snap shot.



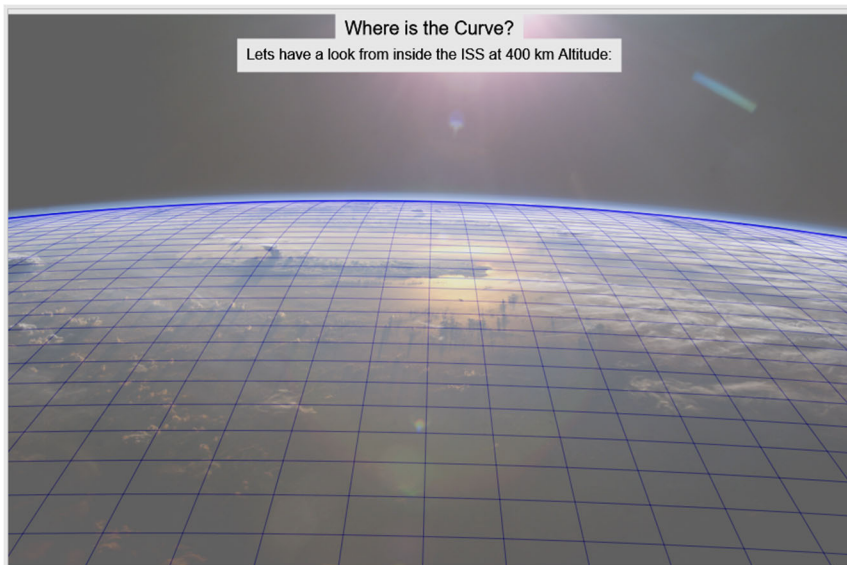
Above: Same picture, but at a height of 62 miles above the Earth. We see that the separation between the black line and blue line is pronounced, and that the horizon (blue line) is well below eye level.



Above: We are now 249 miles above the Earth, the altitude of the International Space Station. We see the globe has dropped even farther below eye level, and even the flat Earth model has dropped a little below eye level. The separation between the black line and the blue line is even more pronounced.



Above: Same scene viewed from 249 miles high, but zoomed in to 500 mm, which vastly shrinks our FoV (field of view). This all but eliminates the white space between the black and blue lines, although the curvature from the observer to the horizon (the graduated lines) is more pronounced.



Above: still at 249 miles high, we now zoom out to 50 mm and superimpose an actual image from the ISS onto our graph, and the two match up perfectly!

As stupendous as the images from space are, and as precisely as the mathematical calculations fit the images, a complete denial of such astronomical evidence is the only apologetic flat-earthers have offered. Likewise, Samuel Shenton's answer to the satellite age was predictable:

When he discovered Parallax's *Zetetic Astronomy* he was an instant convert. "What the authorities were concealing, Shenton decided, was the 'fact' that the earth was flat." Shenton soon constructed a cosmology, based partly on his interpretation of Genesis, that the earth was a flat disk centered on the North Pole with the zetetic notion of the South Pole being an impenetrable wall of ice, that marked the edge of the pit that is the earth in the endless flat plane forming the universe. The sun cast a narrow beam like a flashlight moving over a table as it traced flat circles that varied over the 365-day cycles. The sun was 32 miles (51 km) in diameter 3,000 miles (4,800 km) above the earth and the moon also 32 miles in diameter but only 2,550 miles (4,100 km) above the earth.

Despite the launch in October 1957 of Sputnik, the world's first artificial satellite, Shenton proved a popular speaker to small groups, enjoying particularly talking to children, never declining an invitation. He claimed

that satellites simply circled over a flat disc-world: “Would sailing round the Isle of Wight prove that it were spherical?,” he demanded. As manned space flight started in 1961, Shenton began to attract international media attention with his denials, telling the Coshocton Tribune on 10 May that the astronauts could never travel into orbit.

When John Glenn orbited the world, he was sent an IFERS [*International Flat Earth Society*] membership with the message “Ok Wise Guy” added to it. Shenton continued to lecture largely at his own expense but he suffered two strokes in 1963 probably as a result of his exertions. In January 1964 the *New York Times* carried a piece about the IFERS. During a parliamentary debate, Enoch Powell likened his opponents to “flat-earthers” and Harold Wilson reportedly slung back the insult in turn. Shenton was outraged and wrote letters of complaint.

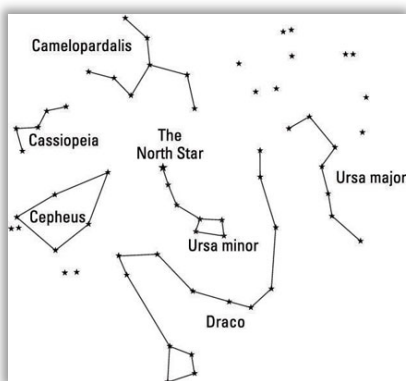
The Gemini 4 mission marked a change of pace for his campaign and he was to receive letters from across the world for the next few years. In 1966 he produced a pamphlet, *The Plane Truth*, which included a circular informing members “that modern astronomy and space flight were insults to God and divine punishment for humankind’s arrogance was a mere matter of time.” But the Lunar Orbiter program led to a sharp decline in membership. “Visual images, whether they were globes, photographs or television pictures, were clearly critical to how people perceived the earth’s shape...and pre-school children could know that it was round even if they had no grasp of the words ‘mathematics’, ‘geography’, ‘astronomy’ and ‘science.’”

By 1968, his [Shenton’s] health had deteriorated further and his signwriting business had collapsed although the media attention continued. But he stuck to his principles of ‘zetetic enquiry’ in which only personally acquired facts were permissible. In 1969, he found the successor he had been looking for: Ellis Hillman, a lecturer and member of the Greater London Council, agreed to be president of the IFERS, with the encouragement of Patrick Moore. Lillian Shenton was suspicious of his motives (he was developing a post-graduate course on the development of ideas about the shape of the earth) and in the event he did little for the society. Eighteen months later, Shenton had died.⁵⁷⁰

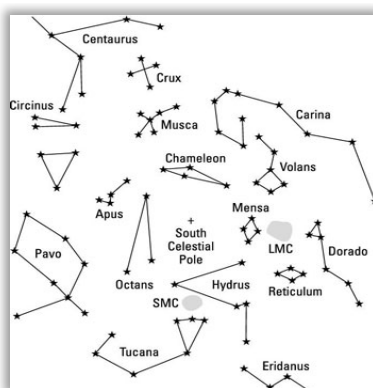
⁵⁷⁰ https://en.wikipedia.org/wiki/Samuel_Shenton

Constellations as Seen from a Globe and Flat Earth

One of the more obvious objections to a flat Earth is that the globe model has a wholly different set of constellations that can be seen in the northern hemisphere but not the southern hemisphere. For example, a person in the northern hemisphere, whether at the North Pole or near the equator, cannot see the constellations that go around the south pole, such as Chameleon, Mensa, Hydrus, Octans, or Apus. Likewise, a person in the lower southern hemisphere cannot see the constellations that go around the north pole, such as the Little Dipper, the Big Dipper, Cepheus, Cassiopeia, Camelopardalis or Draco.



Top of the Globe Earth



Bottom of the Globe Earth

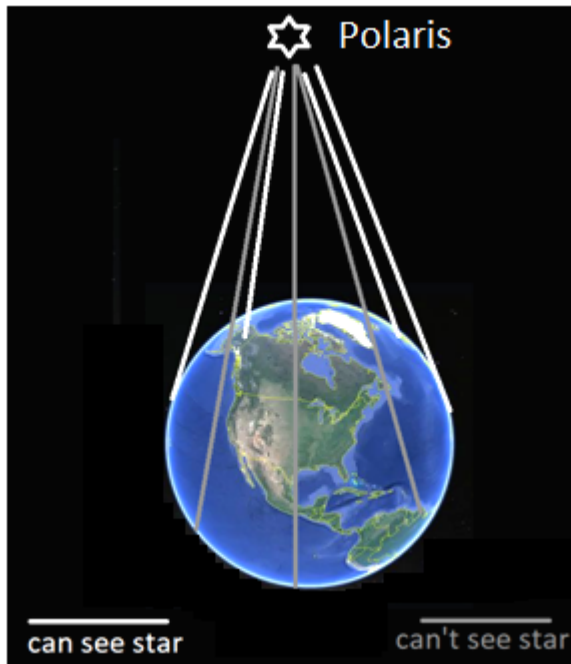


Globe stars streams circling the south celestial pole as observed from Australia



Star streaming observed from Reunion Island, South Africa (left) and Santiago, Chile (right)

The reason these polar constellations cannot be seen by someone in the opposite hemisphere is that the Earth's curvature blocks their line of sight.



As Aristotle once said:

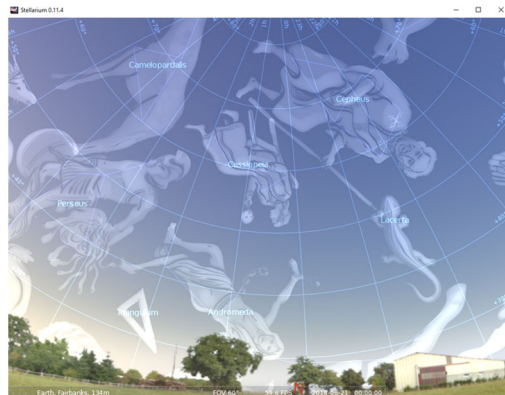
Observation of the stars also shows not only that the Earth is spherical but that it is of no great size, since a small change of position on our part southward or northward visibly alters the circle of the horizon, so that the stars overhead change their position considerably, and we do not see

the same stars as we move to the North or to the South. Certain stars are seen in Egypt and the neighborhood of Cyprus, which are invisible in more northerly lands, and stars which are continuously visible in the northern countries are observed to set in the others. This proves that both the Earth is spherical and that its periphery is not large, for otherwise such a small change of position could not have had such an immediate effect.⁵⁷¹

For example, below is the limit someone living in Fairbanks, Alaska would be able to see of the constellations south of him on June 21, the day the ecliptic is at its highest point in the northern hemisphere. All the constellations below these, he would not be able to see.



If he were looking north on the same day, he would see all the constellations surrounding Polaris:

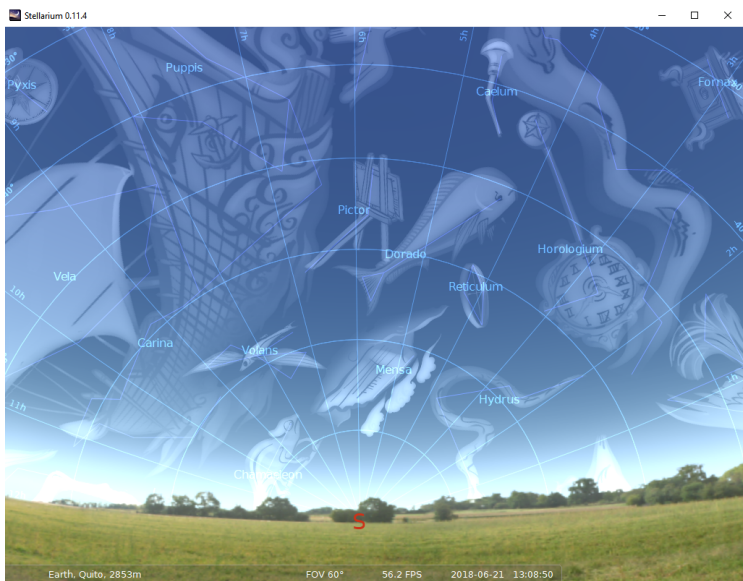


⁵⁷¹ *On the Heavens* II, 14.

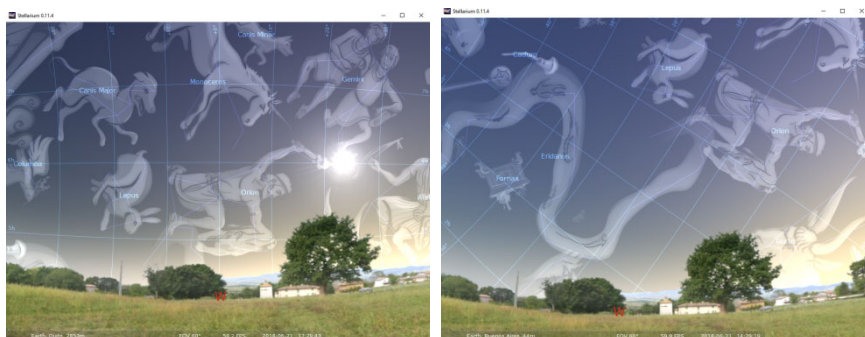
On the same day, a person from Quito, Ecuador, which is on the equator, will just barely be able to see Polaris and its surrounding constellations:



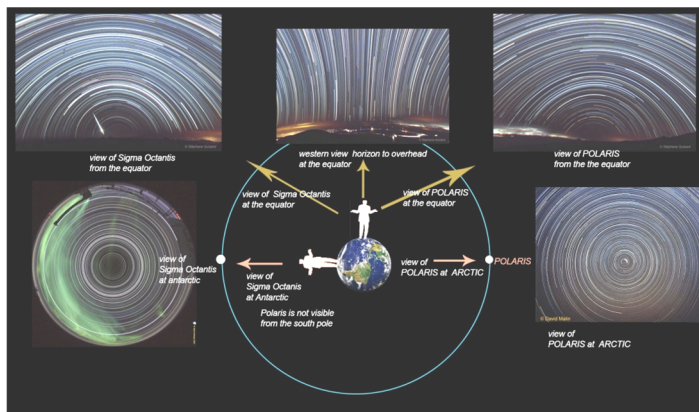
The same person from Quito, looking toward the south, will just barely be able to see the south pole star and its surrounding constellations:



Various constellations that are near the celestial/Earth equator can be seen by both people in the northern and southern hemisphere since there is little blockage from the Earth. The popular constellation Orion is one such cluster, although it is sideways when looking from Quito and partially upside down when looking from Buenos Aires.

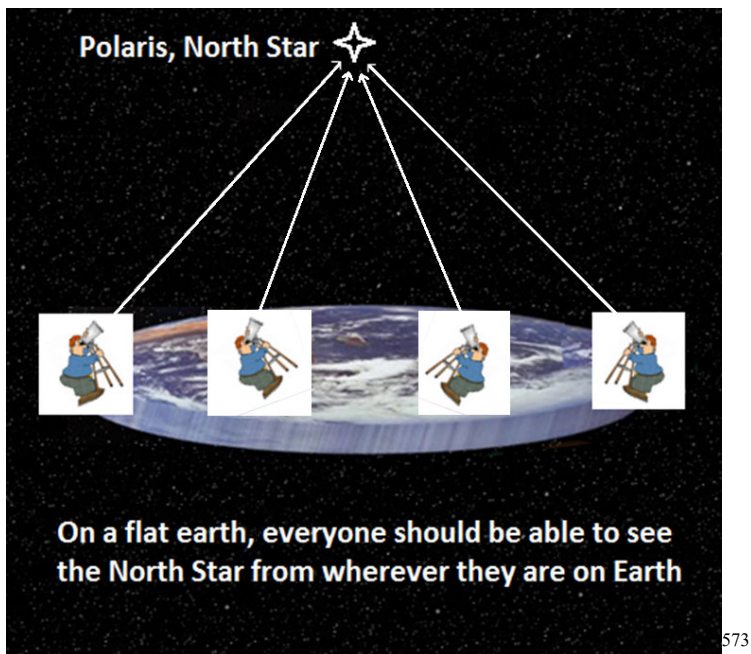


As the seasons change, the ecliptic will go up and down by 47 degrees every six months. As such, the sun and the constellations will move up to a height of 23.5 degrees above the equator for six months, and then down to a depth of 23.5 degrees below the equator for six months.⁵⁷²



⁵⁷² In a geocentric system, the celestial/Earth pole is vertical (not tilted 23.5 deg. as in the heliocentric system), which also means the ecliptic is horizontal, not tilted 23.5 deg. As a lateral plane, it moves down 47 deg. from June 21 to December 21, and up 47 deg. from December 21 to June 21. But it is not the ecliptic itself that is moving up and down, but the whole star field, which moves the ecliptic with it.

For our purposes, however, we are only interested in those northern constellations that are never seen by people in the south, and vice-versa. The reason for this interest is that on a flat Earth model everyone should be able to see the North Star, Polaris. Since everyone is on a flat plane under a single hemisphere, and Polaris is almost at top-dead-center of the “dome,” there is nothing to block the view, especially since flat-earththers believe the stars are at most only 3,000 miles above the flat Earth. The Pythagorean theorem shows that the farthest someone on the flat Earth would be from Polaris is 12,300 miles, if he were looking from the edge of the disc, say, from the southern tip of South America. Surely a powerful telescope should be able to see 12,300 miles into the night sky. But the indisputable fact is that a telescope cannot see Polaris from the tip of South America. To prove this, contact someone who lives in the southern tip of South America and ask them if they have ever seen Polaris or its surrounding constellations. The answer will be negative. But if we lived on a flat Earth, the answer would most assuredly be positive.



⁵⁷³ See https://www.youtube.com/watch?time_continue=36&v=a4CPL4mcpDc for more information on this phenomenon.

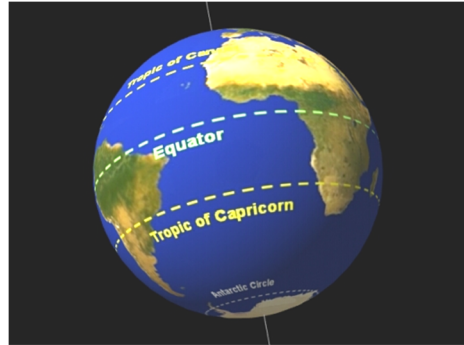
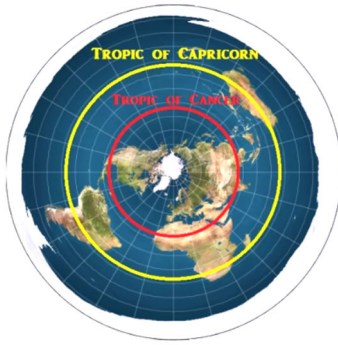
Now, you would think this fact is indisputable proof that we live on a globe, but the flat Earthers have desperately tried to answer this anomaly. Obviously, if they didn't have an answer (or perhaps convince themselves that they have an answer) then this little game would be over in a heartbeat. One amateur flat-earth-er has tried to explain at least some of the problem:

Our Earth planetarium however is so vast that perspective doesn't allow you to see all the stars from any one vantage point. You can however see Polaris, Ursa Major and Minor and other northern constellations from every point on Earth, all the way to the southern Tropic of Capricorn.⁵⁷⁴

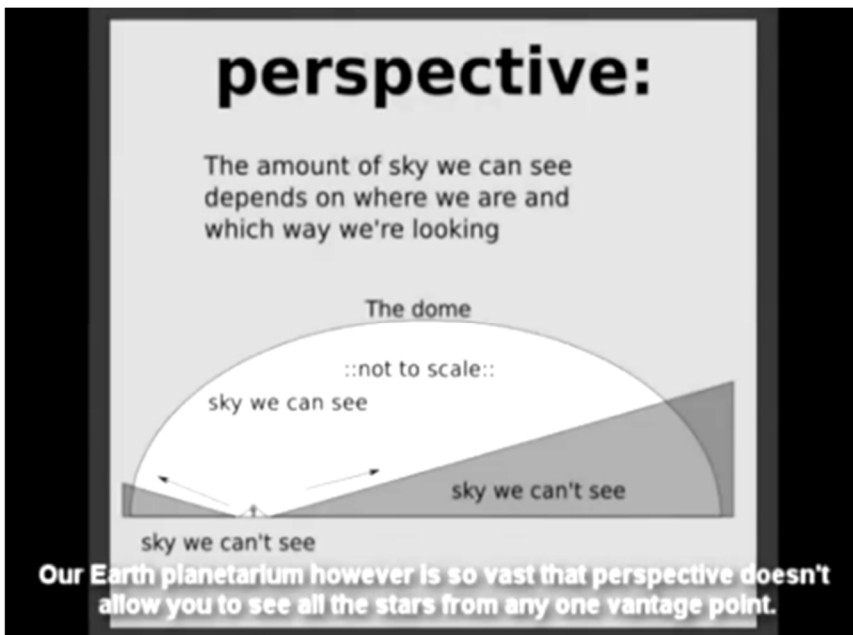


So the logical question to pose to this flat-earth-er is: why couldn't one see Polaris from beyond the Tropic of Capricorn? From a comparison of the flat Earth model with the globe model below, we see that the Tropic of Capricorn cuts across South America, Africa and Australia. It is only logical to assume we wouldn't be able to see Polaris on the globe model since the Earth's curvature would block our vision northward. But there is no reason why we wouldn't be able to see Polaris from the flat Earth model. It is a straight shot from anywhere on the yellow circle to Polaris, which flat-earth-ers claim is only 3,000 miles above the flat Earth.

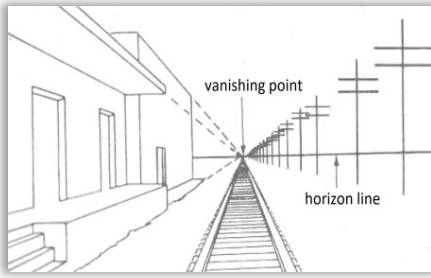
⁵⁷⁴ <https://www.youtube.com/watch?v=kpaFizGUJg8>, titled "Flat Earth Talk," up to the 1:40 mark.



Unfortunately, the flat-earther who made this video does not give an explanation, except to say that “perspective” will limit what stars we can see by giving this diagram:



Although perspective certainly is involved in what we can see at long distances, the diagram he offers is of no help in explaining his case, not only for Polaris but the other stars also. Perspective does not block us from seeing into the distance; rather, it merely converges objects that are in our line of vision.

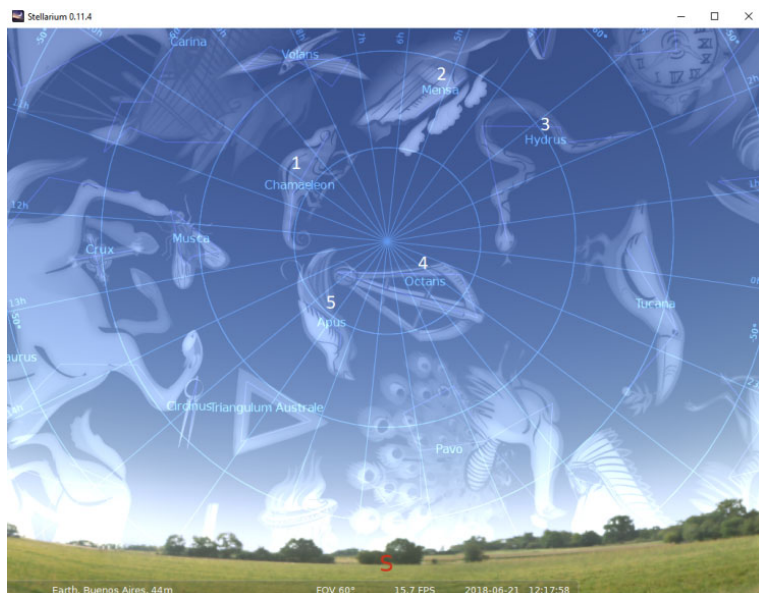


Examples of “Perspective”

If we were to point a powerful telescope at the vanishing point, we could easily see the same railroad tracks and walkway fence spaced apart as they were at the origin of our line of sight. In fact, that is precisely why we use telescopes – to counter the effect of perspective. In the same way, with the unaided eye one might see stars converge at the vanishing point, yet if we look through a telescope the stars will be separated, which is often the case with binary stars. The point is, on a flat Earth with a dome only 3,000 miles high and a land surface perhaps 24,000 miles in diameter, one should be able to see all the stars of the night sky from anywhere on the Earth, whether they converge or not, since there would be nothing blocking the view. Unmoved, the narrator of the video continues:

The supposed south pole star, Sigma Octantis, the Southern Crux, and other outer constellations, conversely, cannot be seen simultaneously from every point in the southern hemisphere the way Polaris can from every point in the north.

Again, the question to this flat-earthier would be: why can't they be seen? Since they can easily be seen on a globe Earth, why not a flat Earth, since it's merely a mathematical inversion of a globe Earth? In effect, this flat-earthier is just making statements to advance his theory but refuses to show how he arrives at his answer. Falsifying his theory is rather easy. All one need do is contact people who live in the southern hemisphere, or even go there ourselves, and see the constellations of: (1) Chamaeleon, (2) Mensa, (3) Hydrus, (4) Octans and (5) Apus, *etc.*, all revolve around the southern pole once every day. It is an undeniable fact. Below is a snap shot of what is seen on June 21 from Buenos Aires.



Since that is the case, yet the flat-earther says they cannot be seen, we have a major contradiction. Oblivious to it, he continues:

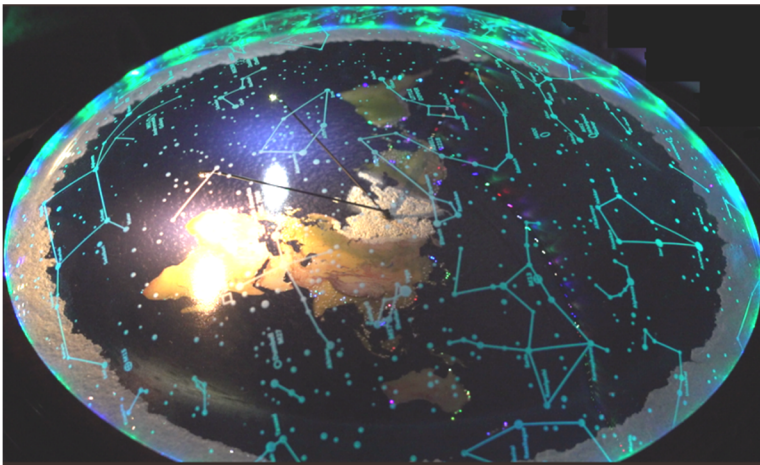
Nor do the southern constellations circle around it west to east as claimed by modern astronomy. No matter where you are on Earth, all stars rise, more or less, in the east and set in the west, with angle and inclination being based on where exactly you are on Earth and what direction you're facing. Modern astronomy claims the stars rotate one way in the south, but this is a drastic oversimplification used to bolster their ball model.

So, even though observers in the southern hemisphere actually see the southern constellations rotate west-to-east, he, being trapped by the constraints of his flat Earth model, must find a way to explain why the stars are only appearing to be rotating west-to-east. This turns out to be a very long road for flat-earthers. They really don't have a cogent explanation and literally end up using smoke and mirrors, as we shall see momentarily.

Before they even attempt to explain the above anomaly, the flat-earthers must first establish that all the stars of the heavens (*i.e.*, all the stars in both the northern and southern hemispheres of a globe Earth) are: (a) in one hemisphere or dome above a flat Earth, and (b) all these stars rotate in the same direction, counter-clockwise, so they rise in the east and set in the

west. These two features are demanded by their model, but they are virtually impossible to achieve, at least by normal and logical means. The one thing they accept from the globe model is that Polaris is at the peak of the dome. Since that is the case, *all* the other stars must fit between Polaris and the edge of their flat disc. But since the globe Earth has two hemispheres each containing X number of stars, this fact will require the flat Earth model to have 2X stars in a single hemisphere. As you can imagine, the star population is going to be quite crowded. In reality, it will be so crowded that the model will not be feasible since the distances from one constellation to the other will be disproportionate compared to a globe model. To compensate for this distortion, the only thing a flat Earth model can do is shrink the size of the constellations to half of what they normally are so that they can fit twice as many in their single hemisphere. But this would make the constellations much smaller than they are in reality. In effect, they would solve one distortion by creating another.

Below is a flat Earth model that is sold in stores. Notice it has constellations painted on the face of a glass dome. Notice how spaced-out they are. This would not be the case on a drawn-to-scale flat Earth.

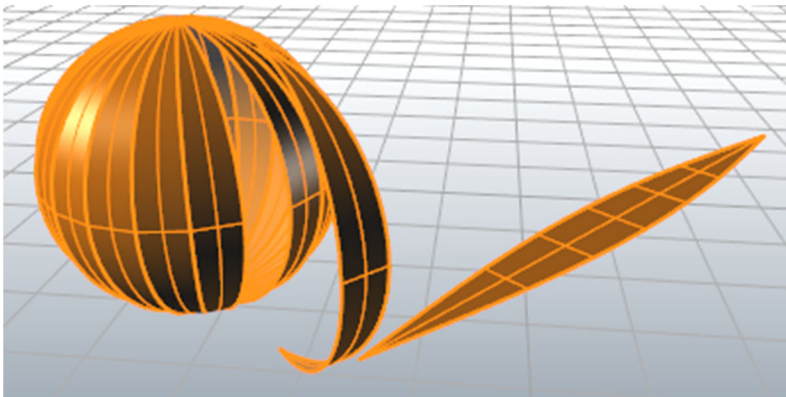


The southern constellations are going to be crammed into a little space just above the perimeter of the dome, and they will be so crowded one will not be able to distinguish one constellation from the other. They will literally be running into each other, if it is possible to place them at all.

Let's show this problem for the flat-earthers more graphically. Below is a sphere, representing a globe Earth, that has been cut so that the peels that are cut from top to bottom can lay flat.

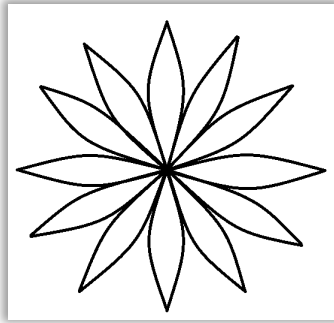


Now imagine that the entire sphere is laid out in a circle. The peels are laid side-by-side but with the top point of each peel touching the top points of the other peels. As such, there will be spaces between the peels because a sphere cannot be made flat without at least some distortion.

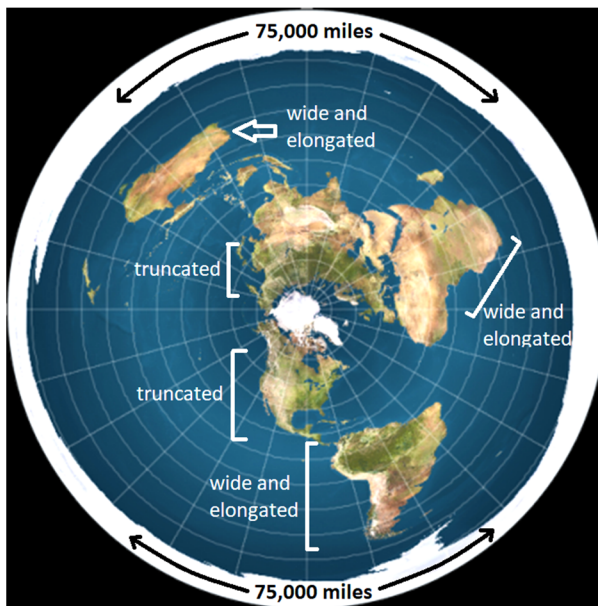


Of the 72 different flat Earth maps that cartographers create, all of them have some type of space distortion. These distortions are fixed 'on paper' by adjusting the extra space with more or less ocean, or larger or smaller

land surfaces. This is so because when one takes away the extra space inherent on a curved surface as opposed to a flat surface, the flat surface must, somehow, fit everything the curved surface contained, and also try to keep the former sizes and distances reasonably close.

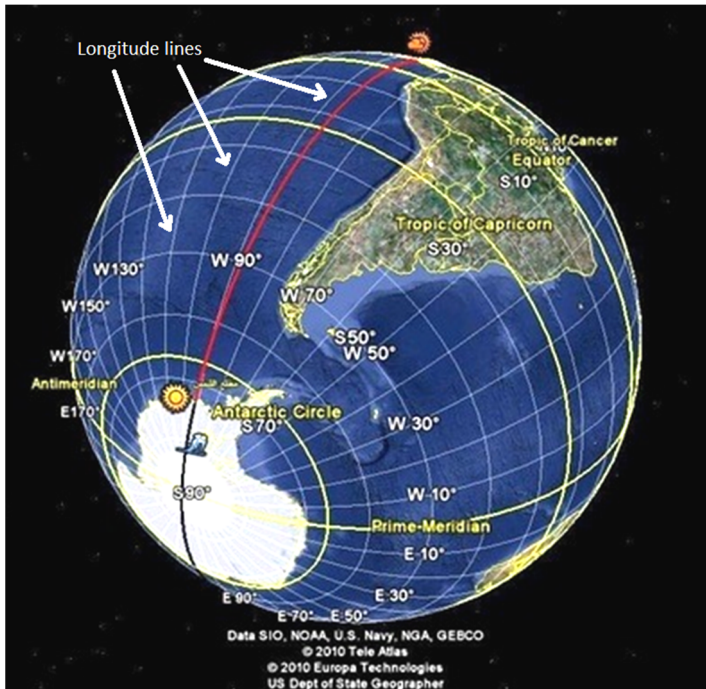


But since this is impossible to do without at least some distortion, one will end up with truncated continents and water bodies at one point, but wider and elongated at another point, as in the diagram below.



The most important and astounding result of cutting the Earth into equal flat peels and putting them into a circle is what it will do to Antarctica. It will

simply cease to exist. Below, we see the size, shape and location of the globe model of Antarctica at the bottom of the Earth.

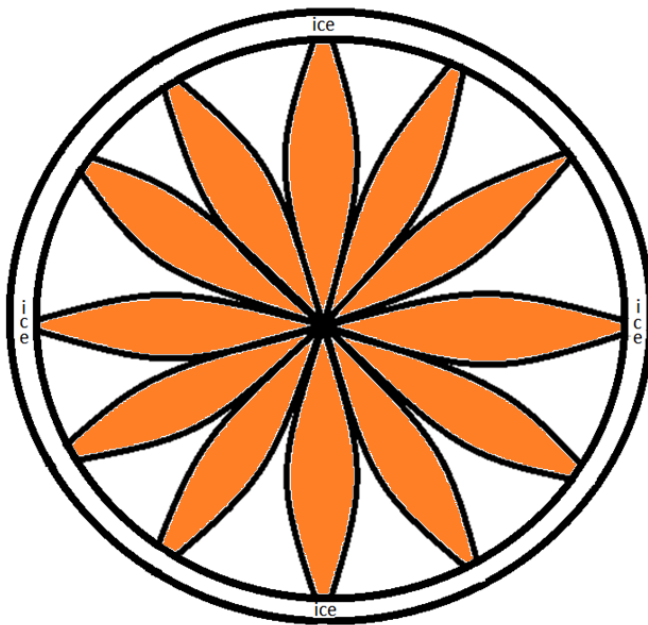


In order to make the globe Earth into a flat circular Earth, each of the peels (demarcated by the dark blue area between two light blue longitudinal lines) would be cut, from the north pole to the south pole, along each longitudinal line, and then peeled up using the center point of the Arctic as the pivot point. If the longitude lines are 15 degrees apart, it will create 24 peels. Once one starts the peeling process, Antarctica can no longer be a continent at the bottom of the Earth; rather, it will be at the tip of each of the peels. If we enhance the diagram above (see diagram on next page), Antarctica will be between the two black circles around the tips of all the peels. Since the tips of the peels are spaced far apart, the black lines must fill in the gaps.

The math shows that since there is a ratio in length of about 3.25:1 between the Earth's equator and the circumference of the new Antarctica, the perimeter of the flat Earth ice wall must be approximately 75,000 miles long, which means the radius of the flat Earth needs to be 11,942 miles, and the diameter 23,884 miles. In other words, for all practical purposes, the flat

Earth model must be about three times the size of the surface of a globe Earth.

The continent Antarctica turned into an ice circle



Hence, we can imagine how much the continents of the southern hemisphere must be widened and elongated to fill in the extra space; and conversely, how the continents of the northern hemisphere must be severely truncated so they can fit around the north celestial pole. The distortion speaks for itself. Naturally, these differences will affect flight paths of planes all over the world – a topic we will cover in chapter 6.

As for the stars, the story is just beginning. The next difficulty for the flat-earthers concerns how they are going to put the southern celestial hemisphere of stars into the single hemisphere over their flat Earth. They must also explain why a person in Buenos Aires who is looking toward the nearest star to the southern pole, Sigma Octantis, sees the star field rotating clockwise, but when he looks toward the north he sees the star field rotating counter-clockwise; and why a person in Fairbanks, Alaska, looking north, sees the star field rotating counter-clockwise, but, looking south, sees the star field rotating clockwise; and why a person in Quito, Ecuador, looking

north sees the star field rotating counter-clockwise around Polaris, while looking south sees the star field around Sigma Octantis rotating clockwise.

To date, there has been no credible explanation from flat-earththers on these anomalies. In fact, one of the leading flat-earththers, Jeran Campanella, said the following in regard to the impossibility of incorporating the southern stars into the flat Earth model:

For all the people who say we don't have evidence... 'how are you going to deal with the southern stars?' ...how are you going to deal with the fact that there is no curvature? Which one is more important when we are talking about the place that we live?...Does it matter what's in the sky, at all? It makes no difference.⁵⁷⁵

The truth is, it *does* make a difference, because the flat-earththers have not proven the Earth is flat. Every single piece of evidence they have produced has been explained by a globe Earth model, but a credible explanation of the southern stars has not been produced by the flat-earththers. That is because it can only be explained on a spherical model.

Flat-Earther Admits Dome Model is Very Difficult

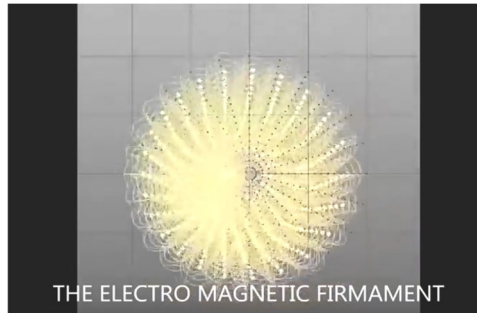
To demonstrate the extreme difficulty flat-earththers have in getting their model to work, the following was a piece posted on August 29, 2017 on the Youtube channel of Steve Torrence promoting the model of Mike Cavanaugh.⁵⁷⁶ Cavanaugh, although a devoted flat-earthther, has some stinging words for his colleagues: none of their models work. He honestly admits it has been virtually impossible for flat-earththers to account for the movements of the sun and stars. Normally flat-earththers can pass a dissident off as one who is simply confused, but Cavanaugh is no slouch who is hanging on someone's coattails. His sophisticated analysis shows no

⁵⁷⁵ <https://www.youtube.com/watch?v=pvuNDRV30Kc>, a "Globebusters" video ending at 17:35. His colleague on the same show retorts: "We have dealt with the southern stars, and we are going to deal with them again today." Apparently, there is a disagreement as to whether the flat-earththers have correctly answered the anomaly of the southern stars.

⁵⁷⁶ https://www.youtube.com/watch?v=nPINcJ_IC5w, the video is titled, "The Electro Magnetic Firmament" and runs for 21:56 minutes. The video is written and directed by Mike Cavanaugh.

mechanical model is up to the task and thus he proposes a new “electro magnetic” model in which the sun...

...is not a real object,” [but a] “local and personal projection....a source projection....a source coming from outside the so-called firmament which probably uses light polarization that is projected into the magnetic field and rendered through the atmosphere.”⁵⁷⁷



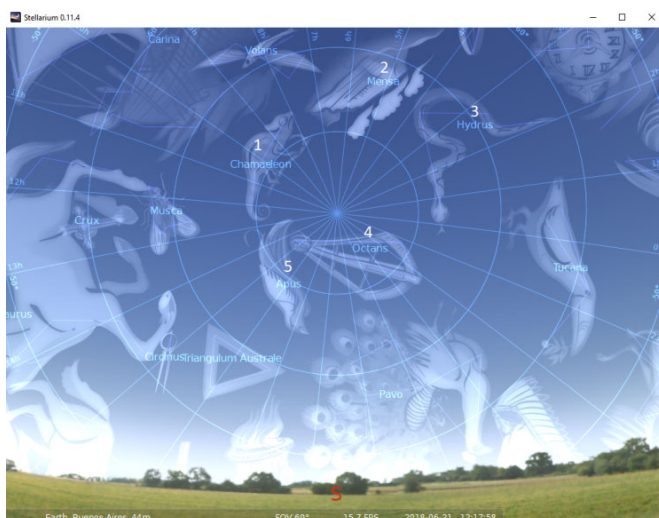
Flat-earthers will probably not like his model since most of them take to heart the words in Genesis 1:16-17: “And God made the two great lights, the greater light to rule the day, and the lesser light to rule the night; he made the stars also. And God set them in the firmament of the heavens to give light upon the earth.” Whether or not Cavanaugh has any religious convictions, he nevertheless tells them that if they don’t accept his model, they have no place to go. Regardless of his somewhat novel solution, I highly recommend viewing his video, since it is a rather revealing composite of flat Earth errors. He enumerates them as follows:

Since the beginning of the flat earth awakening there have been many attempts to model the motions of the heavens on top of flat projections. It gave us the circular model the square model and other projections like diamond. All have failed so far to make an accurate and verifiable model that shows what is actually going on up there. It is our research, modeling and experiments that have made it very clear to us that all current models are wrong. The main reason for that is because they all start with the wrong premise that the tropics form the actual paths of the physical objects like the sun or moon. Most flat earthers also have very little hands on experience in astronomy and proper experiments which led to an

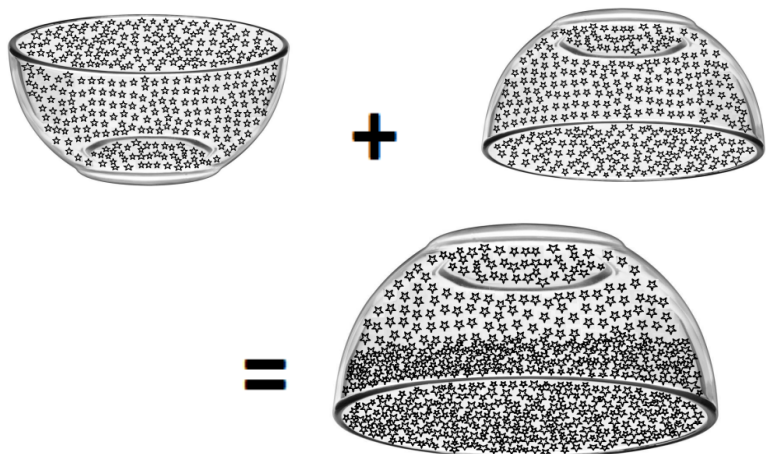
⁵⁷⁷ Ending at 16:09.

immense pile of incorrect assumptions and false claims regarding their model commitment and bias towards their current held beliefs. That result ended up in a 39.8 mile diameter sun. That is a very small object compared to the size of the earth. You will soon find out that mostly azimuth angles will never work with an object that close and small.... We have come across so many false claims and highly questionable ideas about the motion of the sun moon and stars that we find its our duty to correct these claims.

As noted, the story is the same for the stars. The flat-earth-er has the unenviable task of fitting all the stars of the southern hemisphere into a single hemisphere that the northern hemisphere of stars already occupies, and then try to keep both sets of stars in proportion. To make this analysis simple, let's concentrate on the southern circumpolar constellations.



As we noted earlier concerning how, in the flat Earth model, Antarctica would be turned from a 5.4×10^6 square mile polygon-shaped continent into an ice ring that is 75,000 miles in circumference and 200 feet high, so the constellations in the south would undergo an even more dramatic restructuring. Essentially, it would be like putting the contents of an 8-inch diameter right-side up bowl into the contents of an 8-inch diameter upside down bowl and coming out with an 11-inch upside down bowl holding both contents.



Or, it would be like cutting this illustration of the constellations...



578

...in half to show the northern constellations...

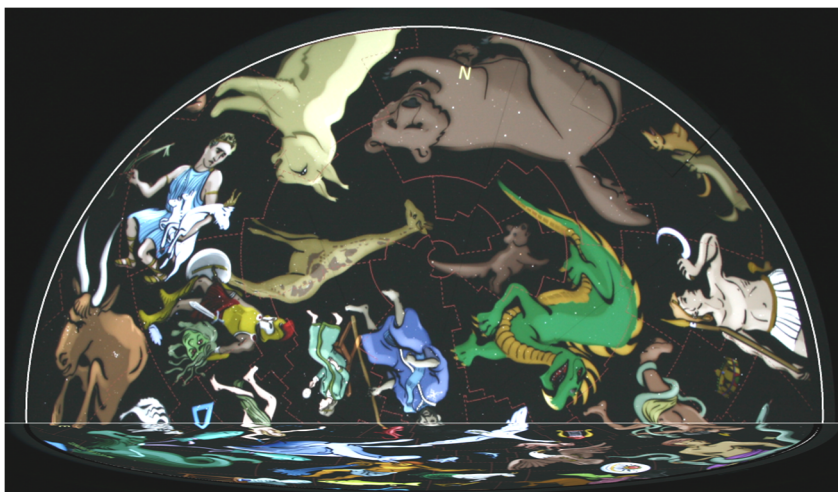
⁵⁷⁸ http://digitaliseducation.com/dome_shots



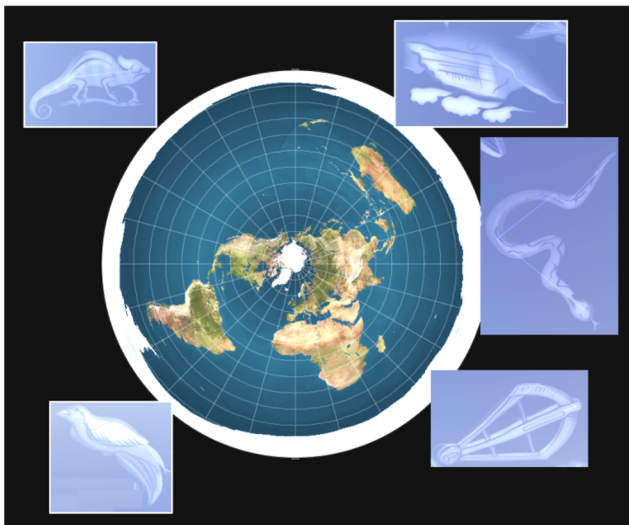
...And then trying to fit all the southern constellations...



...into the bottom section of the northern constellations...



A quite impossible task, at least if one wants to keep all the sizes and proportions we see in the sky presently. It's not looking good for the flat-earthers. Moving the land masses and oceans on a 2D map was easy in contrast to what they have to do with the stars. Not only must they fit the southern constellations into the northern celestial hemisphere, since in order to make a flat Earth they must turn the hemisphere inside out so the center becomes the circumference, they must do the same with the south celestial sky. As such, the south pole star (we will use Sigma Octantis since it is close) will be turned from a compact star into a diffused circular mass that fills the circumference of the flat Earth sky at the bottom of the proverbial dome. Similarly, the constellations immediately surrounding the south celestial pole (e.g., Chamaeleon, Mensa, Hydrus, Octantis, Apus), will be split up and each will be 12,000 miles apart at the lower perimeter of the dome. If Chamaeleon is at the 10:00 o'clock position; Mensa is at 1:00; Hydrus is at 2:00; Octans is at 4:00 and Apus is at 7:00. They will also be elongated and narrowed to the point in which they will no longer be able to be recognized as their original constellations. Unfortunately, there is no other choice if the flat-earthers insist there are no constellations beneath their dome and that what the globe-earthers see in the southern sky must be squeezed into a one-domed celestial hemisphere. As we can easily see, the flat-earth-dome model obliterates the constellations and therefore falsifies itself.



Celestial Bodies as Light Projections?

One might think the flat-earthers would give up the contest with this kind of devastating evidence against them. They, of course, have the right to find an answer, but whether they can make it convincing is the \$64,000 question. At this point I contacted one of the leading flat-earthers in the world, Mark Sargent.⁵⁷⁹

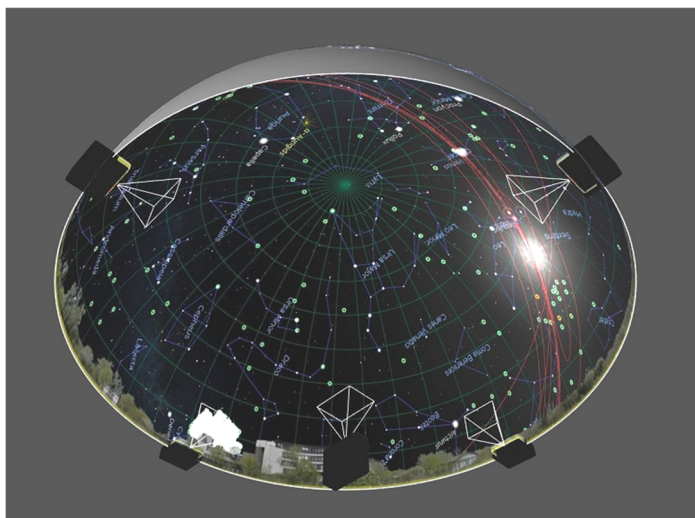
In one way, Sargent's answer to me was quite surprising, yet I began to realize he had no choice. Basically, Sargent said flat-earthers use computer generated graphics (CGI) and place images on planetarium ceilings. All they need to do is program the computer to make a flat Earth and fill the dome sky with all the constellations, and voila! they accept whatever the computer generates. Here are excerpts of the email conversation I had with Sargent (with his permission to publish):

Mark: To your question of the night sky. Everything you see above, and I do mean everything, is just the ceiling of a giant planetarium, a giant building. We can accomplish almost anything with our limited technology in our planetariums now. If the building was large enough, you would use multiple projection systems, which is what we have been doing in software for almost 20 years. It's called instancing. Two people in different locations, looking at what they think is the same sky, but it is actually tailored for each location. With it you can create star trails that split rotations at the equator, blood moons, even a solar eclipse. It's just advanced tech, nothing more. Think that's a stretch? Imagine going back just a hundred years and handing a smart phone to someone. Then try to explain it to them. Where do you even begin? To be clear, YOU ARE RIGHT, the Earth is the center of the universe. The universe however, was just a stage backdrop, very well crafted, and only detectable when we were ready.

Robert: From your answer above, it seems you are saying that you can construct a visual system in which two people can conclude they are seeing the same object, yet that object is really two objects such that one

⁵⁷⁹ Mark has written the book, *Flat Earth Clues: The Sky's the Limit*, published Feb. 27, 2016, and an accompanying video with the same title, running 2:05 hours at <https://www.youtube.com/watch?v=4SIRsbQ3nfM>. His IMDb page credits two other movies to him (<https://www.imdb.com/name/nm7392551>).

or both has been artificially created so that there are actually two images wherein one image is being seen by a person from one location, but another person is viewing an identical image from a separate location. Is that what you are saying?



Mark: That's exactly what I'm saying. We can construct visual systems with multiple projections based on a number of factors, the easiest being geographic location. It helps in completing a painted environment, adds a richness to the overall atmosphere, and most importantly, it adds the ability to create massive depth and distance where there is none. For a world like this, it's more convenient to build it into the ceiling itself, or use rear projection. Think of what they used to do with planetariums years back on the weekends, when they turned off the stars and did things like laser Led Zeppelin or laser Floyd, and that was with cheap first-generation lasers and front projection. We're orders of magnitude beyond that now.

Robert: Ok, I get it. So, let me pose this to you. On the globe model, for the southern stars, we first have the south celestial pole, and the nearest star to that pole is Sigma Octantis. Around the pole are the constellations Chameleon, Mensa, Hydrus, Octans and Apus, as one goes clockwise. Of course, at the north celestial pole, we have Polaris as the center star, and the nearest constellations around it are the Little Dipper, Cepheus, Cassiopeia, Camelopardalis and the Big Dipper, as one goes clockwise. So in your planetarium ceiling, I assume Polaris would be in the center

of the ceiling, and the above constellations would form a small circle around it, correct? For the southern stars, let's first assume there is a south pole star called Charlie. Where would it be placed on the flat Earth dome? I am assuming that Chameleon, Mensa, Hydrus, Octans and Apus would be spread out from one another and lie somewhere near the ice wall but definitely farther away from the center than all the northern constellations. Since they would have to be spread out, Chameleon would be at the 12:00 position, Mensa at the 3:00, Hydrus at 5:00, Octans at 7:00 and Apus at 10:00, if the ice wall was calibrated like a clock, correct?. I'm assuming this is the correct way to portray these constellations because, on the globe Earth, Antarctica is roughly a circular shaped land mass, but on a flat Earth map it is spread out and made into a 75,000-mile ice wall. Since that is true, something similar would need to be the case for the constellations near the south pole of a globe sky. On a flat Earth model, they would have to be spread out around the perimeter of the dome, just above the ice wall. And what you are saying about your projection ability is that you are able to project all these constellations on the dome ceiling of a planetarium, all in the right proportions, and all rotating in the right direction, correct? Do you have a video model of this, and can I see it?

Mark: Yes, everything you stated here is possible, and has been for a while now. What you're describing is essentially taking the constellations as we know them in a spherical based world, and adjusting them to SIMULATE that world on a flat surface with a domed structure overhead. I assure you, it's more than doable. Imagine the link below, but transfer the data to a massive display system, then bend and phase it to any size and shape that you need. The resolution would adjust to the civilizations level of observation. Before telescopes, you could leave it at 4k. As telescopes got better, increase resolution to avoid detection.

Virtual star constellations (www.youtube.com/watch?v=QfdCL_7jspo).

No one has built a Flat Earth star simulation because well, most people don't need it. I suppose we could hire a team of developers to build a VR Flat model with stars, but it wouldn't act much different than the star trackers we have now. You can still only be in one spot at one time. That's part of the beauty of this system. This link below caught my eye last year. Even though I was raised in the tech field, I was surprised that we already have the ability to create small realistic panels that can

simulate the sky. So much for the “useful as a skylight in a basement” joke.

Blue sky and following sun in simulated skylight (www.youtube.com/watch?v=uB8hOyWuzK0&t=1s).



My goal here isn't to convince or even persuade you of where this world is going. I'm simply informing you of the potential. Art imitates life. I'm not trying to speak for God, only to say that God is a programmer of the highest order, and extremely efficient. If 99.99 percent of the population would believe the illusion of a vast empty solar system, then you go with the illusion. Power perceived. The only catch is that whoever discovers this first has a decision to make. Do you inform the general public, and risk potential chaos? No, they chose "the devil you know", so to speak. Keep it hidden until the civilian tech is high enough that detection becomes inevitable. Space X was a test, and social media provided the consensus. You're still right of course, the solar system model still exists. It's just a series of highly rendered lights, designed to fuel our imagination, which it did.⁵⁸⁰

Robert: Mark, thanks very much! Would you mind if I used your explanation for a paper I'm writing? Also, is the explanation on your website? If so, can you give me a link?

⁵⁸⁰ <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 25:32, caption: "We never went to the moon because it's not a place you can go to."

Mark: Robert, Feel free to use anything I write or say. That explanation isn't on the website, but the transcripts to the Flat Earth clues themselves are attached to this email. If you need anything else, please don't hesitate to ask.⁵⁸¹

In an earlier email I was copied on, Mark said this:

Yes, there are time lapse videos from the equator showing the stars rotating in both directions simultaneously. Polaris doesn't even have to be brought into play. Even easier still would be the existence of a blood moon at all, because on a flat model, there is no Earth blocking the sun, so how can the red shadow even be possible?

It's possible in the same way we build it into 3D modeling. Multiple projection systems. Instancing. We've been doing it in software for almost 20 years now. If the domed structure is large enough, the individual can only see a small part of it. You and your friend are on the phone, thousands of miles apart, and you both see the belt of Orion. You assume that you are both looking at the exact same set of stars. You are not. Too simple? Maybe, but that's only because we've been taught since childhood that the universe is difficult to understand. It's not.

That's my response. Short version. If we're in a planetarium, then the ceiling has almost no limits in what can be displayed. It's the ground systems that require more effort.

This explanation is similar to Mike Cavanaugh's in that the material objects that were used by flat-earthers to explain how a flat Earth and dome sky would work are now replaced with multi-projected images on a dome sky. At the same time, Sargent doesn't see the slightest hypocrisy of accusing modern astronomy (*e.g.*, NASA) of using CGI to teach us that "the solar system model still exists" but "it's just a series of highly rendered lights, designed to fuel our imagination, which it did." So it seems that in Mark's Sargent's view, what's good for the goose is good for the gander. If, as he claims, NASA is using CGI to create solar systems and star fields (*e.g.*, Hubble deep space photos of millions of galaxies) for our viewing pleasure, then the flat-earthers can use CGI to make it all look like it fits on a flat plane and a dome sky.

⁵⁸¹ Email conversation on February 14, 2018.

The first problem with this approach is that neither Sargent nor any other flat-earther has proven that the images NASA presents of the Earth or the universe are CGI. It's one thing to make an accusation; it's quite another to back it up with proof; and the old excuse that even NASA admits that it uses CGI in some of its photographs will not suffice for evidence since it is well established that, besides the "rising Earth" shot that was pasted on the famous Apollo mission photo, NASA uses CGI to fill in gaps of Earth photos since the satellites cannot capture all of the Earth and the detail they need from it. The satellite must revolve around the Earth at least a dozen times, and each time it will produce the "peels" we noted earlier that will always have gaps at the extremities that need to be adjusted.

The second problem is so obvious that it screams for rebuke, namely, Sargent is accusing NASA of doing the very CGI manipulation of which he and his colleagues, by his own admission, are guilty! At the same time, he never delivered on the very thing I asked of him, that is, a flat Earth model of how the southern stars can be coalesced into the northern stars. He simply evaded the issue by saying: "no one has built a Flat Earth star simulation," but only because "well, most people don't need it." Yes, perhaps flat-earthers don't need it because they are already convinced the Earth is flat, but real scientists do need an explanation, and it certainly can't be based on CGI. Even a computer knows that $1 + 1 \neq 3$. And if they force the computer to believe that $1 + 1 = 3$, then it's simply a case of 'garbage in – garbage out.'

In the end, I don't think Mark really contemplated the difficult challenge I posed to him. He merely gave a knee-jerk reaction that somehow, someday, he or someone after him will be able to manipulate the results with "lights" to at least make it look like everything fits on a flat-Earth with a dome. After all, he told me, he has the same conviction that the Bible teaches a flat Earth as Rob Skiba and his other colleagues. But if the flat-earthers accept Mark Sargent's explanation for the universe, then, like Mike Cavanaugh, who also admits to the impossible hill flat-earthers must climb, one just does away with the sun, moon and stars as material objects and turns to CGI "lights, camera, action" as depicting the true reality.

While we are here, let's also remark that although the traditional biblical view is that Genesis 1:16-17's words, "And God made the two great lights,

the greater light to rule the day, and the lesser light to rule the night; he made the stars also. And God set them in the firmament of the heavens to give light upon the earth” means that Moses is speaking of the actual sun and moon, both Sargent and Cavanaugh might like the fact that the verse actually says “two great lights” (Hebrew: *הגדלים* “great” *המארת* “lights” *את־שני* “two”) instead of “sun and moon.” They might also like the fact that prior to the “two great lights” there was a primordial light on the First day when God said “Let there be light” (Hebrew: *ויהי־אור* “and was light” *אור* “light” *יהי* “let be”). But since elsewhere Scripture is clear that at least the “two great lights” are *material objects*, one of which emanates its own light (Ps 19:4) and the other reflecting light and is thus not a light source (Is 13:10), and that the stars are also material objects that emanate their own light (Ws 17:5), there is no suggestion that God created multiple light projections to give an illusion of materiality. But in Sargent’s view, it seems God will do just about anything he must in order to present the world as flat, including giving us an illusion of suns and moons from strategically placed “lights” of which we don’t know the source.

Sargent’s response to the challenge is similar to **Matthew Powerland’s** (aka Math Boylan), an ex-contractor with NASA specializing in photography and painting, and a dedicated flat-earth⁵⁸² He notes:

A conspiracy theory, eh. I could do that. I could use a nano-bio (expletive) camera filament and put in light bulbs and film it. I could do that. If I could think it, you better hope that nobody’s got the budget.”⁵⁸³

⁵⁸² <https://www.youtube.com/watch?v=vOnMzwKLhxc>, in a video titled, “How to Debate for Flat Earth and Win!” published by “TheNASACHannel” on May 18, 2017. Here (5:41) Powerland claims to have started the flat Earth movement by showing that NASA uses paintings, not photographs, to depict objects in space. See also <https://www.youtube.com/watch?v=D0-XIbAHSa4>. Caution: expletives are frequent.

⁵⁸³ <https://www.youtube.com/watch?v=QciLVJZNq4c>, video titled, “The Stephen Hawking Conspiracy: the least likely man to go in space” part 2. Caution: expletives are frequent. Published on “The NASA Channel” on Oct. 25, 2011. Most of Powerland’s lecture is designed to debunk NASA’s space program. The description beneath the video states: “Ex NASA graphics artist and space painter at area 51

The ruse here, of course, is that because it can be shown NASA *sometimes* uses either CGI or paintings in its depiction of celestial objects, then NASA *always* uses CGI or paintings and the public can thus conclude there are no such objects in existence and the Earth is flat. Flat-earthers must take this position since, as we said before but bears repeating, if even one legitimate photo of a celestial object and/or the globe Earth exists, then the flat Earth position



collapses immediately. In the end, Powerland's argument is a case in which his proverbial sword cuts both ways. The fact that every single image of a flat Earth existing today is one that has been drawn or painted and not photographed means the burden of proof is on him, and it is a big burden, since no proof of a flat Earth exists that has not been debunked. Similarly, Powerland concludes that if NASA faked the moon mission then everything NASA does is fabricated. This is a logical fallacy, otherwise known as *Tu quoque*, in which the arguer states that a certain position is false or wrong or should be disregarded because its proponent fails to act consistently in accordance with that position.⁵⁸⁴

While we are here, there are many other fallacies being used on both sides of the proverbial fence, some of which include:

- **Fallacy of composition:** assuming that something true of part of a whole must also be true of the whole.
- **False equivalence:** describing a situation of logical and apparent equivalence, when in fact there is none.

discusses all the tricks NASA has paid him and others to falsify the state and size of the earth under the Copernican model.”

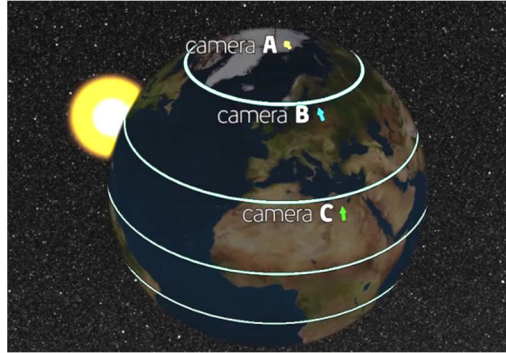
⁵⁸⁴ https://en.wikipedia.org/wiki/List_of_fallacies

- **Fallacy of the single cause** (causal oversimplification): it is assumed that there is one, simple cause of an outcome when in reality it may have been caused by a number of only jointly sufficient causes.
- **Historian's fallacy**: occurs when one assumes that decision makers of the past viewed events from the same perspective and having the same information as those subsequently analyzing the decision.
- **Inflation of conflict**: The experts of a field of knowledge disagree on a certain point, so the scholars must know nothing, and therefore the legitimacy of their entire field is put to question.
- **Inconsistent comparison**: different methods of comparison are used, leaving one with a false impression of the whole comparison.



Star Trails

One of the better videos showing how star trails coincide with a globe Earth is done by C.B.S.⁵⁸⁵ He uses computer calculations of what would be seen by three cameras placed at various latitudes on the Earth, which cameras are adjusted vertically and horizontally to provide various views of the star trails.

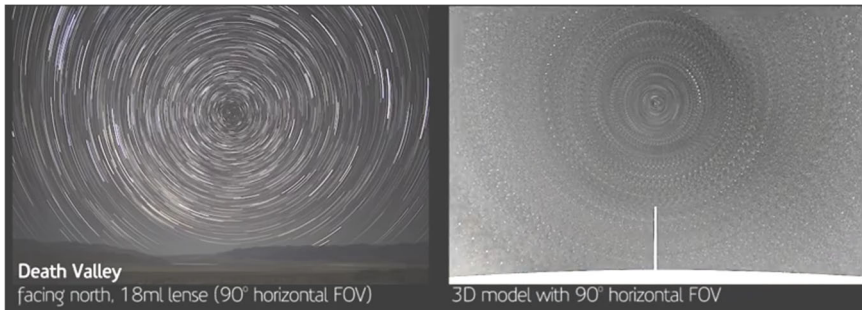


Using a photo of star trails above a famous Church at Lake Tekapo in South Canterbury, New Zealand, and comparing them to his computer animation of star trails from a globe, the star trails are virtually identical.

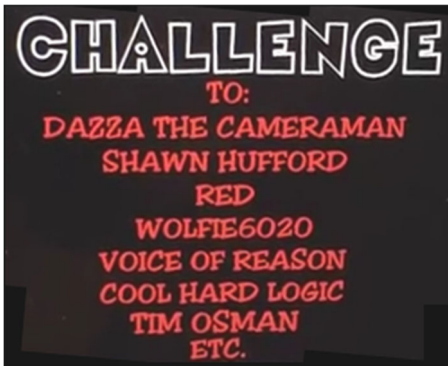


⁵⁸⁵ https://www.youtube.com/watch?v=ONeAfwT_z4w, published April 29, 2017.

Next, C.B.S. compared a photo of star trails taken from Death Valley, California with his computer animation of the globe model and the results were “virtually identical.”



All in all, the war between flat-earth-ers and globe earth-ers appears to be particularly volatile on the issue of star trails. Jeran Campanella issued a



challenge to the globe-earth-ers (at left) which was henceforth answered by Wolfie6020 (who, in my opinion, is the most technical and sophisticated of the globe-earth-ers). Wolfie6020’s answer to Mr. Campanella was, in Mixed Martial Arts parlance, a total smackdown, yet with the most polite and non-offensive Aussie-

accented repartee that even a die-hard flat-earth-er must appreciate.⁵⁸⁶ Campanella graciously responded with a new video in which he thanks Wolfie6020 for his information and admits the model he used was inaccurate. Campanella’s video was published just two days after Wolfie6020’s. The video begins with a bold and bright plaque:

⁵⁸⁶ <https://www.youtube.com/watch?v=yzG4KUSv-gs>, by Wolfie6020, published June 15, 2017, in answer to Jeran Campanella.



Here are some excerpts from Campanella's apology, most of it containing a litany of flat-earth beliefs and complaints that remain unresolved for his satisfaction:

This video is the response to WOLFIE6020 who correctly modeled the star trails on the globe earth in his video here: ([https](https://www.youtube.com/watch?v=IlnPk9UFUyI)). So a Thank You to Wolfie6020 for correcting my misunderstanding. I have deleted the challenge videos and will admit that there are star trails on the globe earth. Still don't think I live there but checkout Wolfie's channel for his other experiments and attempts at proving that we live on a spinning sphere in space....But it doesn't change my current belief as to where I live. There's too many other issues for me....Do I believe I live on a spinning ball? Well, no, I do not. Do I think I can see other suns 25 trillion miles away? No, I do not. Do I think men have been to the moon and back 50 years ago and since then human beings have maxed out at what, 300 miles? No, I don't. Do I think people are upside down in Australia? No, I don't. Do I think that the sun is 890,000 miles wide? No, I don't. Do I think boats go over the curvature? No I don't. Do I think the sun is 93 million miles away? I don't....Do I think that gravity is anymore than just an explanation for things that are heavier than air falling, and things that are lighter than are rising? No. Do I think NASA has earned or even spends the 53 million dollars it gets daily, correctly? No. Do I think there are astronauts in a space station 250 miles above Earth doing science, flying 17,000 mph and that there is a legit reason we do not get a 24/7 feed from the said craft? Nope, I do not. Do I believe that anyone on this Earth should give a damn or spend a penny on Mars rovers, Juno crafts, Cassini Saturn orbits, while we have homelessness, hunger and war on our own planet? No I don't. However, do I believe that star trails can be accurately represented on a spinning globe tilted 23.5 degrees? Well, yes I do. Does that make me believe that I live there on that spinning globe? Not at all....So again, thank you Wolfie.⁵⁸⁷

⁵⁸⁷ <https://www.youtube.com/watch?v=IlnPk9UFUyI>, published June 17, 2017.

The problem, it appears to be, is that Jeran Campanella has a much bigger itch to scratch than what a flat Earth model can provide for him. Interestingly enough, a large portion of the scratch is provided by a geocentric globe Earth model and skepticism about NASA and its agenda, but unfortunately Jeran somewhere decided that it wasn't enough.

Are Crepuscular Rays An Answer to the Southern Stars?



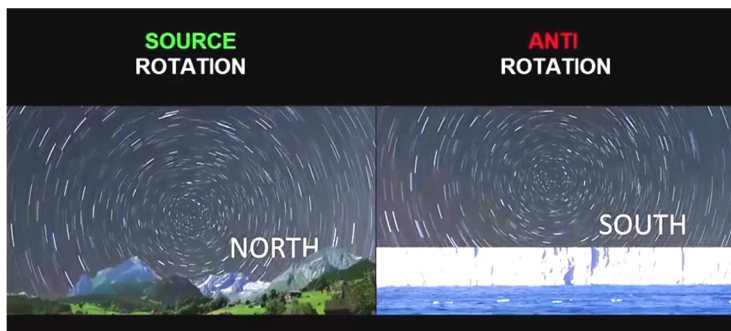
Anti-crepuscular rays appear opposite of the setting sun off the Gulf Coast of the United States, as seen from Florida.⁵⁸⁸

Another example why the flat Earth controversy can at times be nerve racking, a flat-earther with the moniker “p-brane” has come up with a rather ingenious explanation of how to fit the southern stars into the northern stars. In short, he proposes that the southern stars don't exist; rather, they are like a mirage, or perhaps a mirror image of the northern stars. We can see them only because they are formed by the “anti-crepuscular rays” of the northern stars.

⁵⁸⁸ https://en.wikipedia.org/wiki/Anticrepuscular_rays

In his Youtube video he claims the following:

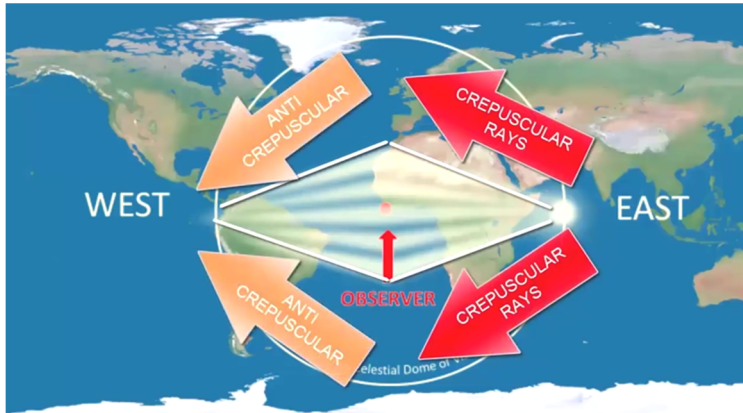
This video is about the clockwise southern celestial rotation that everybody says that he sees down from the equator south, and they say that it rotates opposite of the northern celestial rotation around Polaris.



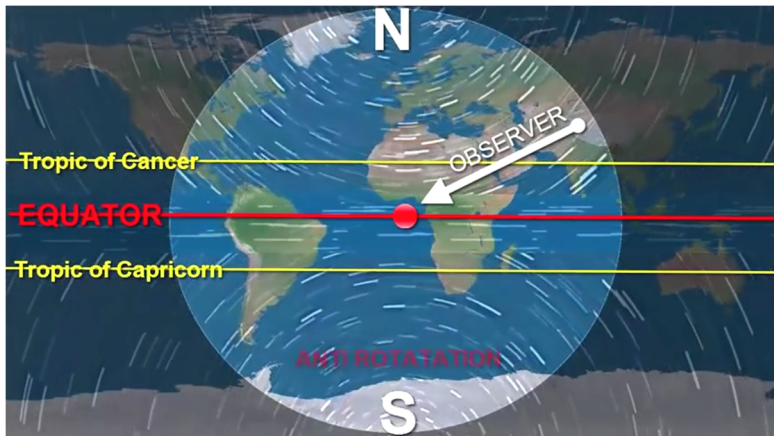
“Well, what I want to show in this video is that it’s not its own rotation but is, in fact, a ‘perspective’ illusion. It’s an anti-rotation, in the same way that anti-crepuscular rays are anti-crepuscular. They converge on the opposite horizon to a point much like when they come from the sun. They come and they diverge out and converge on the opposite horizon. Well, the southern celestial rotation is nothing but an anti-rotation of the northern celestial rotation...”⁵⁸⁹



⁵⁸⁹ <https://www.youtube.com/watch?v=t30-YbayyXE>, starting at 0:02, published July 3, 2016.

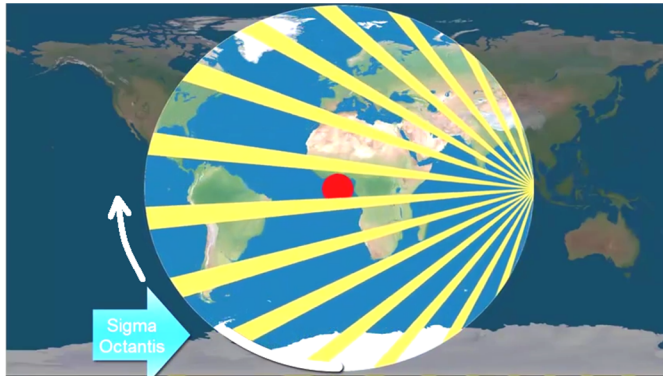


“Crepuscular rays will diverge out from the sun, spread out overhead, and converge on the western horizon, that’s if conditions are right and you can see the anti-corpuscular sunrise...

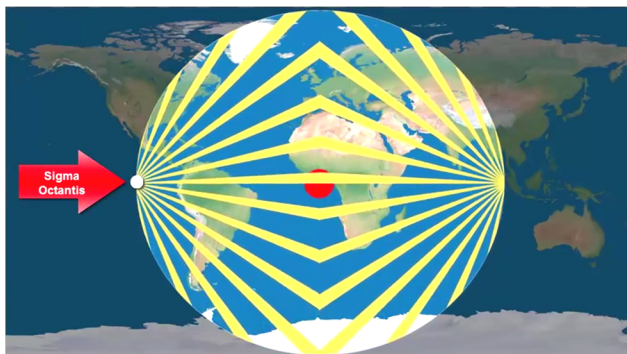


“If you are standing at the actual equator on the Earth, you would see the stars converge in the southern sky and it would create an anti-rotation; not a real rotation, only an anti-rotation of the northern celestial rotation...

“Let’s say that these stars are rotating around Polaris, and let’s say that Sigma Octantis is rotating 12,000 miles from the North Pole, and I want you to see that it is going to sweep across your entire field of view, in reality...

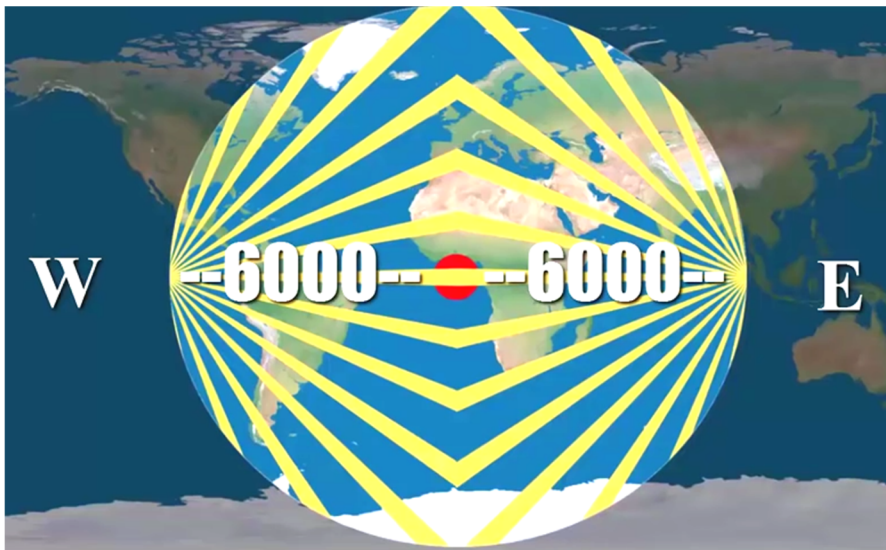


“But visually, you’re not going to see that, because as we converge these lines the way they’re supposed to be, they are going to go to a point, even though it’s circling across your field of view, it’s still going to be converged at one point because it’s 12,000 miles from the source, or 6,000 miles from the observer. Everything converges at that point. And so there you have Sigma Octantis standing still all night long.⁵⁹⁰



⁵⁹⁰ <https://www.youtube.com/watch?v=t30-YbayyXE>, ending at 19:12.

Although this attempt is quite clever, it fails to represent the real state of affairs. The simple fact is p-brane has no scientific evidence stars form anti-crepuscular rays. He merely assumes they exist because anti-crepuscular rays exist for the sun, at least sometimes. It can be proven quite easily they don't exist for the stars, even confining ourselves to using the flat Earth parameters p-brane is using. For example, a sun rising on a globe model in dusty or humid atmospheric conditions will create crepuscular rays that fan out for 6,000 miles and then they will begin to bend back for another 6,000 miles. If you are at the equator, you will see the rays fully expanded if you look north or south, and the rays will go to a point in the west, as p-brane depicts in the following picture:



The problem with p-brane's analysis, however, is the anti-crepuscular rays that travel west do not make an image of the sun when they converge. Rather, we merely see sun rays as we see in the photo below. We see not only no sun image, but the rays do not even converge to a specific point on the horizon, but each ray hits a different place that is many miles from the central ray. Since there can be no rays beneath the horizon, then the rays never converge.



In fact, the only reason we can see anti-crepuscular rays at all is the sun's light is strong enough (much stronger than stars' light) to be able to be illuminated off the humid atmosphere. Stars simply don't have that luminosity for their light is very dim. Since p-brane presents no photos of either crepuscular or anti-crepuscular rays of starlight, he has no evidence to the contrary.

More importantly, however, is that in p-brane's model the stars of the northern hemisphere each have an anti-crepuscular ray that should form an identical star near the rim of the flat Earth. Not only does this defy the fact that anti-crepuscular rays do not form images of their source, it demands that all the stars of the northern hemisphere are situated in a location that should depict the same constellations or patterns of stars that are in the northern hemisphere. This is certainly not what we see in the globe Earth's southern sky, which has the southern stars in very different places of ascension and declination compared to the northern stars. In fact, p-brane began to formulate his theory under this error by assuming that Sigma Octantis is the south pole star, but it is not. It is merely close to the southern pole, and as such, there is no direct star-counterpart to Polaris in the southern sky.

When we begin to consider the rest of the constellations in the southern sky, we can see immediately that since the pattern of the stars' placement is so different in the north than in the south, there is hardly ever a one-to-one correspondence in which the northern stars have an identical or even similar counterpart in the southern sky. Moreover, since as we noted that anti-crepuscular rays do not form an image of their source (as the sun does not form an anti-crepuscular image of itself in the west as it rises in the east), then even if anti-crepuscular rays existed for the stars, none of these rays would be able to make points of light that resemble stars, especially since p-brane is assuming the southern stars must have a luminosity that is equal to the northern stars. In short, p-brane's solution to the problem of the southern stars simply does not work. As a result, the flat-earthlers are left without a viable scientific answer to the southern stars and thus their theory of a flat Earth collapses.

Do Crepuscular Rays Show the Sun is Small?

Globebusters published a video arguing some of the same points as p-brane. At one point, TJ says:

The sun is actually 3,900 miles away when triangulated...Now, the spherical trigonometry used to place the sun at a whopping, ridiculous, absurd, 93 million miles away...the same observations can be plugged into a plane Earth, plane trigonometry matrix showing that the Sun is about 3900 miles away. So really, technically, there's no proof for either. There's only mathematics which can triangulate a distance to the apparent sun based on observation using either plane trigonometry or spherical trigonometry.⁵⁹¹

Similarly, the caption in their meme below says, "If you think these sun rays were cast from 93 million miles away, you probably failed geometry."

⁵⁹¹ <https://www.youtube.com/watch?v=pvuNdrV30Kc>, at 1:58:57

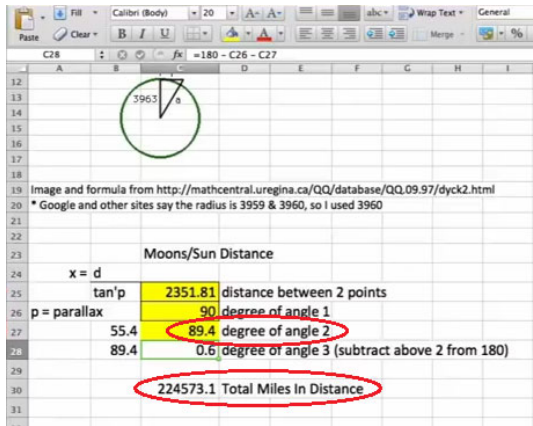


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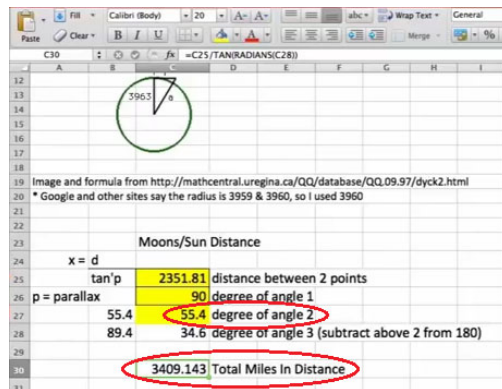
To those uneducated in the cause and effect of crepuscular sun rays, these kinds of “proofs” from flat-earthers appear quite convincing. As far as observational evidence, slanted sun rays, at least from a cursory look, appear to show the sun is very close to the Earth. It appears even more convincing when the math shows the sun could be either 93 million miles away and 864,000 miles in diameter, or about 3,000 miles high and 28 miles in diameter. As we noted earlier, with regards to the distance to the moon, an anti-flat Earth group called “Cool Hard Logic” (CHL) produced a video teaching how the distance from the Earth to the moon can be derived using trigonometric parallax, arriving at 224,573.1 miles (see formula and calculation below).⁵⁹³

⁵⁹² <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 25:46, caption. Other flat-earthers try to make the same argument: [youtube.com/watch?v=b_ppPXChyTo](https://www.youtube.com/watch?v=b_ppPXChyTo)

⁵⁹³ <https://www.youtube.com/watch?v=8h0XJ3JLb-o>, starting at 8:10 to 14:52, presented by Globebusters, published March 27, 2018.



The flat-earthers used the same formula and showed how it would produce a distance between the Earth and moon of only 3,409 miles—the precise distance flat-earthers claim is the height the moon revolves with the sun above the Earth!

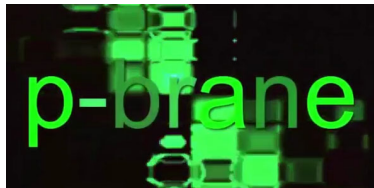


This procedure is even more significant when we discover that astronomers don't actually measure the distance of 93 million miles between the sun and the Earth. There are no satellites measuring the distance to the sun. It is usually done by estimating the radar distance between Earth and Venus, and then triangulating that estimate against the sun using Kepler's laws.⁵⁹⁴

⁵⁹⁴ <http://curious.astro.cornell.edu/about-us/41-our-solar-system/the-earth/orbit/87-how-do-you-measure-the-distance-between-earth-and-the-sun-intermediate>

But this doesn't prove anything for the flat-earthers since it can easily be shown that a sun which is 0.864 million miles in diameter and is 93 million miles away will also produce the same slanted rays; and so will a sun that is 47 million miles away and 0.432 million miles in diameter; and so will a sun that is 3 million miles away and 27,000 miles in diameter. All of these suns will look the same size and produce the same effects on the Earth. It is just a matter of proportion.

This is precisely the problem with flat-Earth science. Although it can produce various "look-alike" explanations one might use to support a flat earth, in order to be the correct view, flat-Earth science must be able to explain every problem it faces, but as we will see, it is simply not able to do so. In fact, some of its explanations are not only bizarre, the medicine they purport to cure the problem is actually worse than the disease they are trying to cure.



P-brane also has a video arguing that the crepuscular rays of the sun are evidence, if not proof, the sun is small and not far away.⁵⁹⁵ He states:

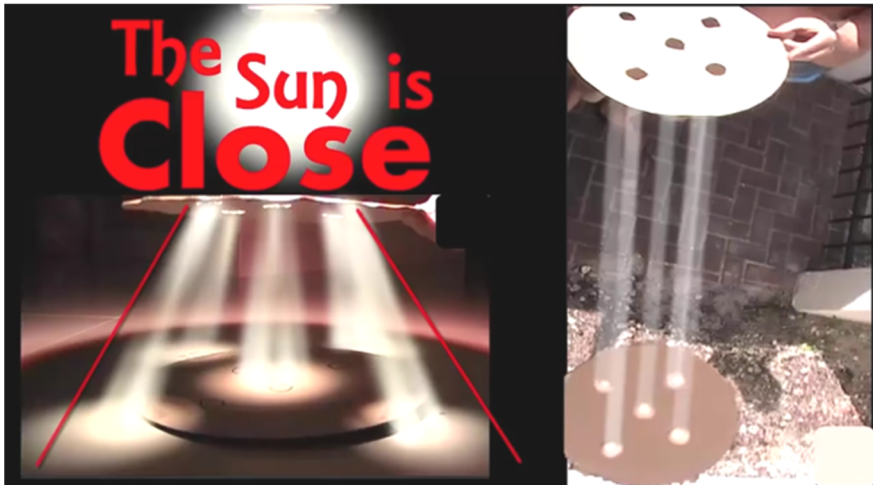
Wikipedia says that these rays are due to perspective, and for all intents and purposes, parallel lines from a sun that is almost a million miles in diameter. But the fact that we see them splaying out, to say that that is due to perspective I'm going to show its impossible.

The rays from a sun that's almost a million miles in diameter and 93 million miles away, when those rays get here, they should be parallel and dead straight....When the light source is close to the clouds, the light will diverge.

⁵⁹⁵ https://www.youtube.com/watch?v=b_ppPXChyTo, published Nov. 18, 2015.



P-brane then does an experiment with a light bulb and a cardboard “cloud” with five holes in it. The closer he brings the light bulb to the cardboard, the more the light diverges at an angle from the center.



P-brane then shows us a picture of the angle of the crepuscular rays we see.



Fig. 1

P-brane argues that since in the distant-sun model the rays of the sun are coming to the Earth in huge parallel lines, as in the next picture...

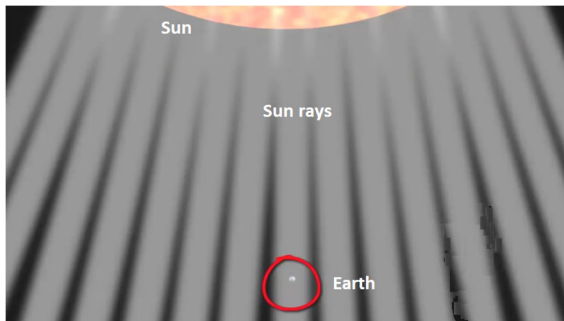


Fig. 2

...it stands to reason, he claims, the sun's rays should look more like parallel lines when they go through our clouds, as in the picture below...

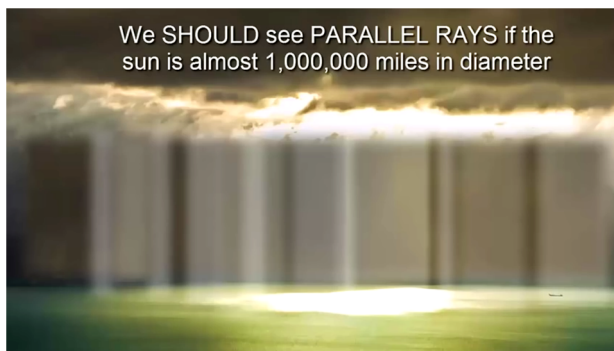
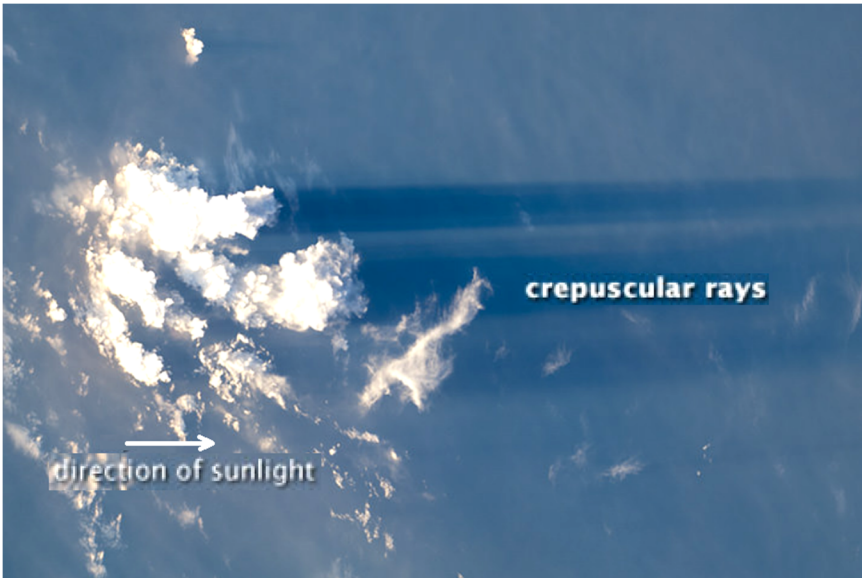


Fig. 3

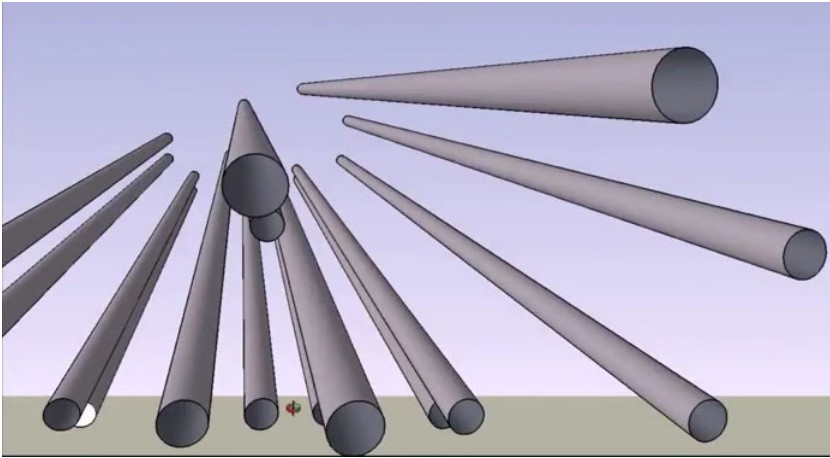


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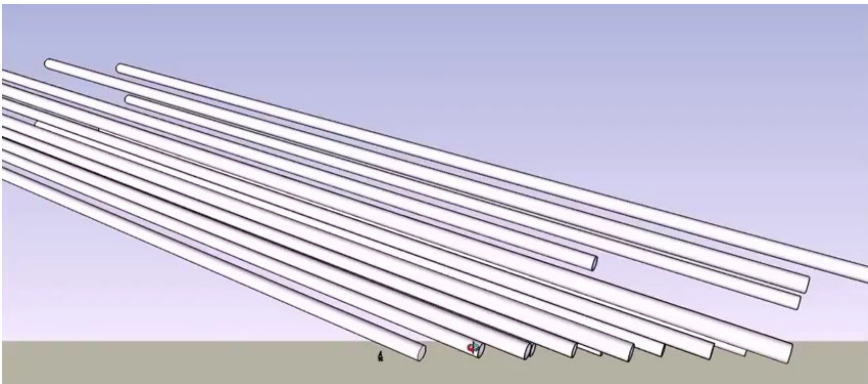
Although light from the sun travels in concentric spheres, what starts out as small spheres near the sun become very large spheres when they reach Earth. Hence when these large concentric spheres hit clouds or dust in the Earth's atmosphere, they will form alternating streaks of parallel beams and shadows. These streaks will fan out just a little due to the fact that the clouds or dust act like a prism and slow down the speed of the light, making it bend outward a little from the center. But the more important reason is that the principle of perspective will accentuate the bending for an observer on Earth, the same as when we, standing between the rails of a railroad track

⁵⁹⁶ <https://www.universetoday.com/90486/crepuscular-rays-seen-from-space>. Crepuscular rays seen from the ISS space station, Oct. 18, 2011; credit NASA. The author notes: In the images taken from the ISS, the sun was setting to the west...on the Indian subcontinent, and cumulonimbus cloud towers provided the shadowing obstructions. The rays are being projected onto a layer of haze below the clouds....Seeing crepuscular rays on Earth is a somewhat rare event, as conditions have to be just right at either sunset or sunrise for the Sun's rays to appear as though they are diverging outward from the Sun. But seeing them from space is even more rare....These rays are visible only when the atmosphere contains enough haze or dust particles so that sunlight in unshadowed areas can be *scattered toward the observer*....The light rays are actually parallel, but appear to converge to the Sun due to 'perspective,' the same visual effect that makes parallel railroad tracks appear to converge in the distance."

see the rails converge. We see similar effects on sunlight when the sun sets and its light is scattered over the horizon. In fact, the word “crepuscular” means: “resembling or relating to twilight,” which occurs as the sun sets and introduces twilight. For comparison, here is a snapshot of an animation showing how parallel tubes look as if they are slanted away from the center if they are viewed lengthwise.



Here is a snapshot of the same tubes when they are viewed widthwise:



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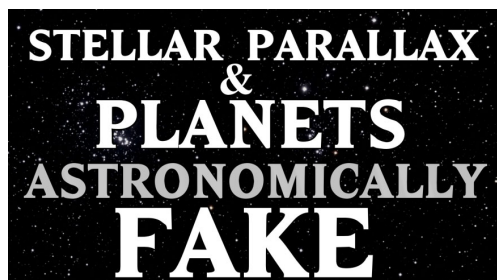
⁵⁹⁷ https://www.youtube.com/watch?time_continue=153&v=cTPLqbl-HGY

Hence, when we see crepuscular rays from the sun it is because we are standing on the Earth looking lengthwise at the sun's rays. When we look at the sun's rays from a widthwise direction—as in the NASA photo on the previous page—only then can we see the rays are actually parallel.

The other important point to understand is the flat Earth system is about 1/30,000 the size of the spherical Earth system. This means a sun of 864,000 miles of diameter will be $864,000 \div 30,000$ or 28 miles of sun diameter in the flat Earth system. Likewise, a distance of 93 million miles will be $93,000,000 \div 30,000$ or 3,100 miles. This must be so since the trigonometric proportions must balance. This is why flat-earththers believe their “dome” is about 3,000 miles above the Earth. If such is the case, then their sun (and moon) must be about 28 miles in diameter. Another way to look at it is that a diameter of 864,000 miles is 1/107 the size of distance of 93 million miles. Likewise, a distance of 3,000 miles must have a sun that is 1/107 of 3,000 miles, which is 28 miles.

The upshot of this analysis is that, in regard to what we see, there is no difference between the two systems. Whether the sun is very large and far away or very small and close, it will only displace a few radians of the sky at high noon, and that displacement must be the same in both the flat Earth and spherical Earth models. Since the radians are the same, then both models will see exactly the same sun, and that sun will produce the same precise visual effects in either model. It's all a matter of proportion. Hence the same crepuscular rays that are seen in the spherical Earth model will be seen in the flat Earth model.

Stellar Parallax and Stellar Aberration



As flat-earthers have no answer for the southern stars, they have no answer for the phenomena of stellar parallax and stellar aberration. Some flat-earthers claim there is no stellar parallax, while others ignore the issue. The fact is,

whether geocentrically or heliocentrically explained, both parallax and aberration have been known for hundreds of years. In fact, parallax is the only empirical means we have of knowing the distance to the stars. All other methods are speculative (*e.g.*, redshift, Cepheid variables).⁵⁹⁸ With advancements in telescope technology, we can now determine the distances of stars by at least 300 light years (assuming light travels at c near the stars), while some instruments are said to reach 600 light years, although with far less accuracy.

Flat-earthers have an insurmountable problem since the base of the triangle used to measure parallax and aberration is 186,000,000 million miles in both the Copernican heliocentric system (in which the Earth revolves around the sun) and the Neo-Tychonic geocentric system (in which the stars are aligned

⁵⁹⁸ Other methods of determining parallax include: Photometric parallaxes, which are found by estimating a star's absolute magnitude (M) based on a spectral classification and comparing that with its apparent magnitude (m). Statistical parallaxes could perhaps extend to 500 parsecs, but this only applies to groups of stars, not individual stars. Overall, of the half dozen or so methods employed today to measure astral distances, none of them are indisputable (including distances measured by redshift, Cepheid variables, luminosity, color of stars, *etc.*). There is only one purely empirical method, parallax (and its modifications such as Spectroscopic, Moving Cluster Method, and Statistical Method), but is limited in its applicability, since it can accurately measure only a thousand or so stars. Using Cepheid variables is not certain since Cepheids are too far away to be measured by parallax and, thus depends on an unproven statistical method to measure distance. Other methods such as Secular Parallax, Expansion Parallax, Kinematic Distance, Light Echo Distance, Baade-Wesselink Method, Expanding Photosphere Method, Main Sequence Fitting, RR Lyrae Distance and others have been proposed for measuring star distances, each with their own problems.

with the sun and both revolve around a fixed Earth). Since the largest triangle base flat-earthers can produce is about 24,000; and since all the stars are confined to the space just inside a 3000-mile high dome, not only is the base eight times the height of the stars (the total opposite of what parallax and aberration results require), the stars in the flat Earth model are so close together in their heights above the Earth that there is simply no room for parallax.

To understand how parallax is formed, place a finger from your right hand at arms length and align it with a finger from your left hand at half an arm's length, both in front of your face. Observe your fingers first with your right eye open, and then with your left eye open. As you switch from one eye to the other, your nearer finger will appear to shift to the right. The amount of shift is called the parallax. In stellar parallax, two stars are needed: one that is closer to Earth and another that is much farther away. The two stars need to be close to the same line of sight from Earth.

In the heliocentric system, parallax occurs when, on one side of the Earth's orbit, say January 1, two stars are viewed at the same time in a telescope, one star near us and the other star farther away (at least by conventional means to measure star distances). Let's say the two stars we view on January 1 are aligned vertically in the same plane, that is, one star is at a higher position in our telescope lens than the other but both are on the same vertical line. Six months pass and we look at the same two stars on July 1. If parallax is demonstrated, we will see that the stars are not in a vertical alignment any longer. Assuming the Earth has orbited in a counterclockwise direction, the nearer star appears to have shifted to the right. This is due to the fact that, in the interval of six months, one has looked at the two stars from two separate locations that are 186 million miles apart (the diameter of the Earth's orbit in the heliocentric system).

In the geocentric system the same optical phenomenon can be demonstrated. The stars are centered on the sun, not the Earth (although the Earth is the center of mass for the universe). In the geocentric system the Earth is fixed while *both* the sun and stars revolve around the Earth. On January 1, the two stars from our above example are in vertical alignment. When we look at these same two stars again on July 1, since the starfield has revolved 180-

degrees, the nearer star will appear to have shifted to the right of the farther star, and it will do so at the same precise angle as in the heliocentric model.

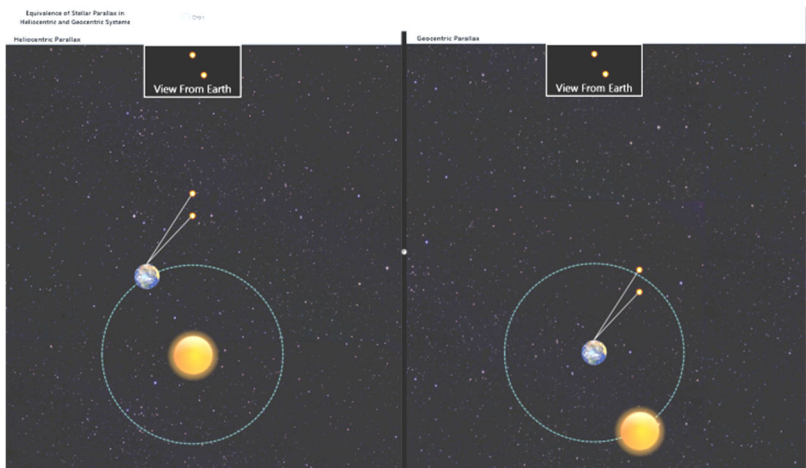


Figure 1: The heliocentric parallax is on the left, the geocentric on the right. In the heliocentric model, the Earth is at the 11:00 o'clock position and is moving counterclockwise. In the geocentric model, the sun is at the 5:00 o'clock position and moving counterclockwise with the stars. The white lines converge at Earth and form the parallax angle. Notice that in both models the parallax angle is the same. At the top of the box is the “View from Earth.” Each box has the same view, showing the equivalence of the heliocentric and geocentric models.

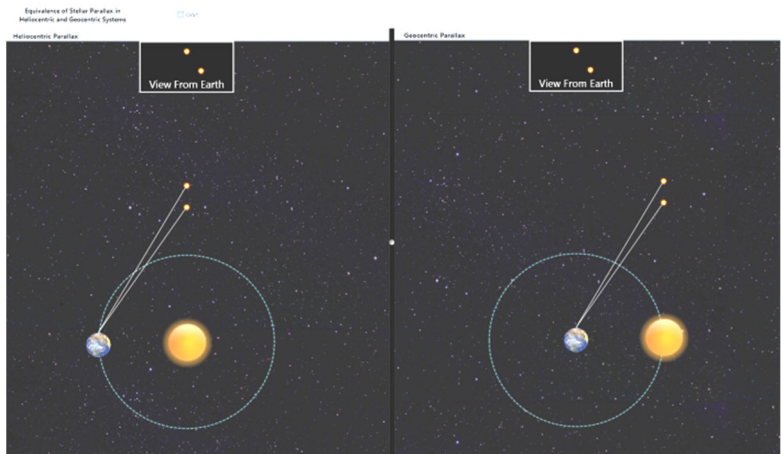


Figure 2: Heliocentric model has Earth at the 9:00 o'clock while the geocentric model has the sun at 3:00 o'clock. Parallax angle is the same in both models.

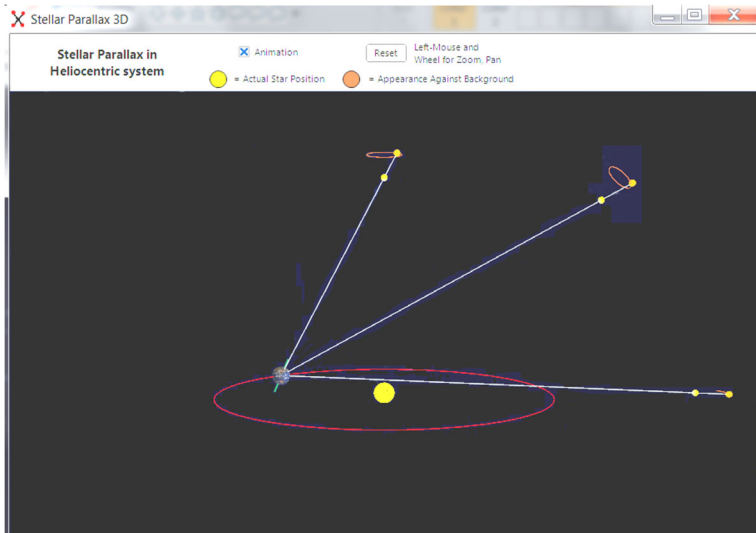


Figure 3: Three-dimensional perspective of heliocentric stellar parallax. Earth is revolving around the sun and viewing three different stars at three different latitudes. (See CDrom for the animation).

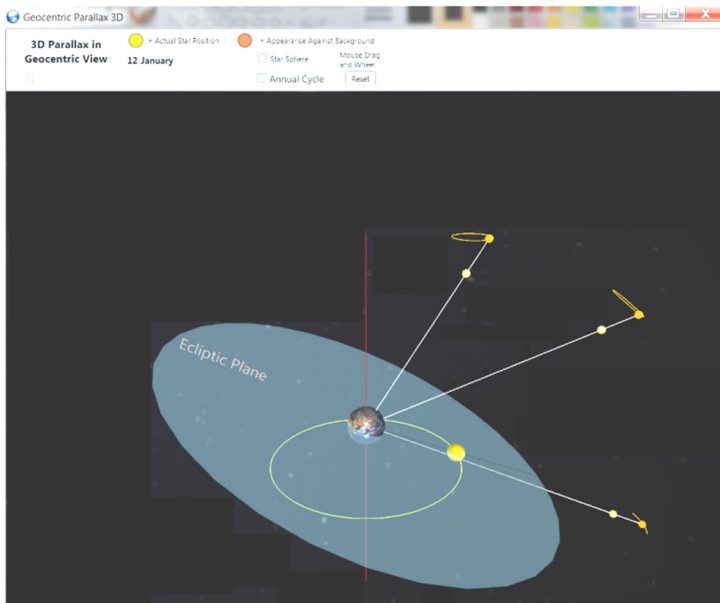
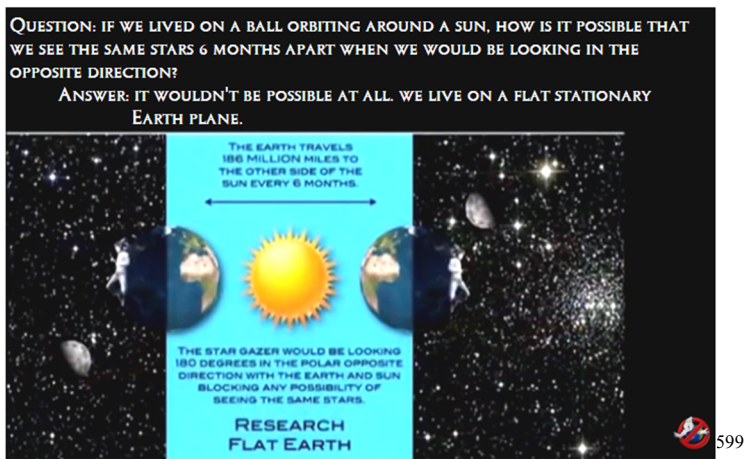


Figure 4: Three-dimensional perspective of geocentric parallax. Sun and star field are revolving around Earth where three different stars are viewed from three different latitudes. (See CDrom for the animation).

The problem for the flat Earth theory is that since the stars are confined to the inside wall of a dome structure, there will be no stellar parallax since there is little or no distance between stars. In other words, there will be no nearer or farther stars to measure any angle of parallax. Even if the flat Earth dome allows a small separation of the stars so that one star is a little farther from the Earth than another star in the same line of sight, the parallax created by these two stars will literally be off the charts, much too big for the small parallax angles that are presently measured by modern astronomy. So, in neither case does parallax work for the flat Earth model.

In some cases, flat-earthers will attempt to turn the tables, as noted in the meme below. But the meme fails to understand that the stars chosen for measuring stellar parallax are not separated by 180-degrees but by 90 degrees with respect to the position of the sun and Earth in both the heliocentric and geocentric model (see the 90 degree angle in the animation snapshots above).



Ironically, while the flat-earthers are complaining about angles and distances in their opponent's model, they have a bigger problem in their own model. If the stars are only 3,000 miles above the Earth (roughly the distance from Boston to San Diego), we should be able to point a telescope at them and discern their distinctive size, color, surface terrain, energy output, *etc.*, just as we do for the sun, the moon or Jupiter and Saturn. The fact is,

⁵⁹⁹ <https://www.youtube.com/watch?v=2TebGSZ2EQE> 24:24

however, no matter how powerful the telescope, even the Hubble telescope, the stars remain only as points of light without any distinguishing features. This alone tells us they are very far away.

In other cases, flat-earthers claim that since the star field rotates only in one direction (clockwise), the fact that we see both negative (counter-clockwise) and positive (clockwise) parallaxes means that there is no parallax occurring and that something else is causing the multi-directional shift in the stars. But this merely demonstrates stellar parallax is not easy to measure. For only about 700 stars have parallaxes large enough to be measured with a precision of 10 percent or better. Of those 700 stars, most of the ones within 20 parsecs of Earth are invisible to the unaided eye and are intrinsically less luminous than our sun. The vast majority of all known stars are too distant for their parallaxes to be measured, so that scientists must resort to non-empirical methods. Most of these methods are either statistical or indirect.⁶⁰⁰

With the advent of the Hipparcos satellite launched in 1989 by the European Space Agency, its telescopes gathered 3.5 years worth of data on stellar positions and magnitudes, which were eventually published in 1997. Viewing the stars through two telescopes 58 degrees apart, Hipparcos measured the parallax of 118,000 selected stars within an accuracy of 0.001 seconds of arc. This accuracy is comparable to viewing a baseball in Los Angeles from a telescope in New York. Another mission, named Tycho (after Tycho de Brahe) measured the parallax of a million stars, but only to an accuracy of 0.01 seconds of arc.

As accurate as these measurements appear to be, the reality is, beyond 100 light years it is hardly possible to measure an accurate parallax. Even within 20 light-years, parallax measurements are accurate only to within one light-year. At 50 light-years from Earth the error could be as high as 5-10 light-years in distance. All in all, within a 10% margin of error, Hipparcos measured the parallaxes of about 28,000 stars of up to 300 light-years from Earth. The Gaia probe, sent up in 2013, may be able to increase the distance to 6,000 light years. These huge distances alone are enough to discredit flat

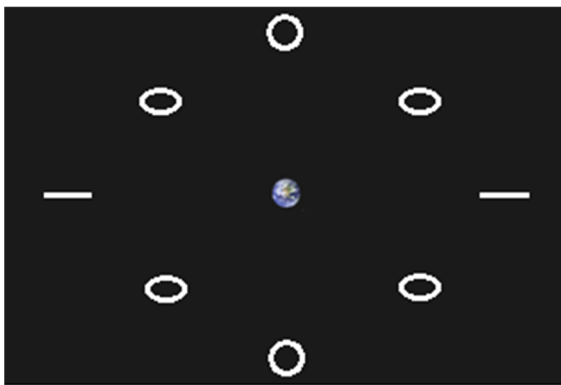
⁶⁰⁰ George Abell, *Exploration of the Universe*, 1969, pp. 377-378.

Earth theory since it holds that the stars—all of them—are about 3,000 miles above their flat Earth.

As for the reason negative parallaxes sometimes appear, this is easily explained by further difficulties in the method. First, the determined value of the parallax may be in error, an error big enough so that the error appears on the negative side of zero. Second, since half the stars in the sky are double-stars, which are known to fluctuate greatly in their energy output, this will greatly affect their parallax as seen from Earth. Third, when the more distant star that is viewed is in a cluster of other stars, this will invariably throw off the parallax measurement and often result in a negative value.⁶⁰¹

Stellar Aberration

In stellar aberration only one star is needed for observation. We observe each star moving very slightly in an elliptical, circular or hyperbolic path over the course of a year. The precise path of the movement will depend on where the star is in relation to the latitude from which they are observed on Earth. If one looks along the north celestial pole (*i.e.*, the extension of the North Pole into outer space) and plots the position of the stars in that vicinity over a year's time, he will see the stars revolve in a circle.



Movements of all stars over the course of a year as viewed from Earth

⁶⁰¹ See “On a reason for the Appearance of Negative Parallaxes in the Determination of the Distances of Stars,” Oliver Justin Lee in *Annals of the Dearborn University of Northwestern University*, Vol. IV, Part 1, p. 1.

In 1725, James Bradley observed these kinds of movements of a number of stars, but particularly Gamma Draconis, which is very close to the North Star, Polaris. The chart below shows the “constant of aberration” from Bradley’s many observations of various stars. In this particular chart, Gamma Draconis, which is at approximately 90 degrees latitude on an untilted Earth, forms a circle, and shows a circular aberration of 20.1825 arc seconds.⁶⁰² Correspondingly, if one observes a star at a 45° celestial latitude, he will see the star form an ellipse over a year’s period. The eccentricity (flatness) of the ellipse will increase the greater its distance from the North Pole. If one observes a star on the equatorial plane, one will see the star form an acute hyperbola or even a horizontal line.

The observations of many of the stars are manifestly so discordant, that it would be uninteresting to inquire into their separate results. The stars possessing the greatest weight are the following:

α Aurigæ, α Persei, η Ursæ maj., γ Draconis, β Camelopardi, τ Persei, γ Persei, β Draconis, δ Aurigæ, ζ Ursæ maj., ϵ Ursæ maj.

The results of which are given in the following table:

Names of Stars.	ℓ	i	Coefficient of cos. δ .	Mean Error.
α Aurigæ	+0.052852	−0.020364	+5.4515	±0.1945
α Persei	+0.087876	+0.012925	9.7660	0.2889
η Ursæ maj.	+0.083962	+0.008582	9.7308	0.1543
γ Draconis	+0.056265	−0.017188	9.4822	0.0699
β Camelopardi	+0.008718	−0.061429	9.0554	0.2459
τ Persei	+0.072308	−0.002281	9.6263	0.2288
γ ———	−0.019962	−0.088115	8.7980	0.1555
β Draconis	−0.018532	−0.089784	8.8108	0.0858
δ Aurigæ	+0.161441	+0.080673	10.4263	0.2998
ζ Ursæ maj.	−0.097048	−0.159841	8.1057	0.2140
ϵ ———	−0.054042	−0.101215	8.6714	0.2656

In determining the Aberration, individual stars agree better; and it is only ψ Ursæ maj., θ Aurigæ, λ Cassiopeiæ, which possess so little weight as to render it uninteresting to adduce their separate results. The rest give as follows:

Names of Stars.	κ .	Constant of Aberration.	Mean Error.
α Aurigæ	−0.053731	16.1667	±0.2709
ϵ Herculis	−0.002488	20.2046	0.2117
δ Persei	+0.032531	20.9139	0.5158
α ———	−0.019855	19.5228	0.2927
α Aurigæ	−0.048050	19.2818	0.6776
η Ursæ maj.	+0.008027	20.4176	0.1160
γ Draconis	−0.003577	20.1825	0.0585
β Camelopardi	−0.014303	19.9635	0.3389
τ Persei	+0.020213	20.6644	0.3474
γ ———	−0.010978	20.0326	0.3676
β Draconis	+0.018826	20.6363	0.0847
δ Aurigæ	−0.072790	18.7806	0.3602
α Cassiopeiæ	−0.017877	19.8929	0.1739
γ Ursæ maj.	−0.020103	19.8478	0.2490
ζ ———	−0.039185	19.4612	0.1775
ξ Draconis	+0.034394	20.9571	0.3507
λ Camelopardi	−0.044970	19.3564	0.4727
ϵ Ursæ maj.	−0.033909	19.5742	0.1863
β Cassiopeiæ	−0.043135	19.3813	0.1868
δ Ursæ maj.	−0.001919	20.2161	0.2295

⁶⁰² Taken from *Reduction of the Observations Made by Bradley at Kew and Wansted to Determine the Quantities of Aberration and Nutation*, Dr. Busch, Astronomer at the Royal Observatory of Königsberg, Oxford Univ. Press, 1838.

As noted, stellar aberration occurs for each star in the sky, without exception. It does not matter how far or how close the star is from Earth. Moreover, it will occur in both the northern and southern hemisphere, and in the same shapes and proportions for each hemisphere.⁶⁰³

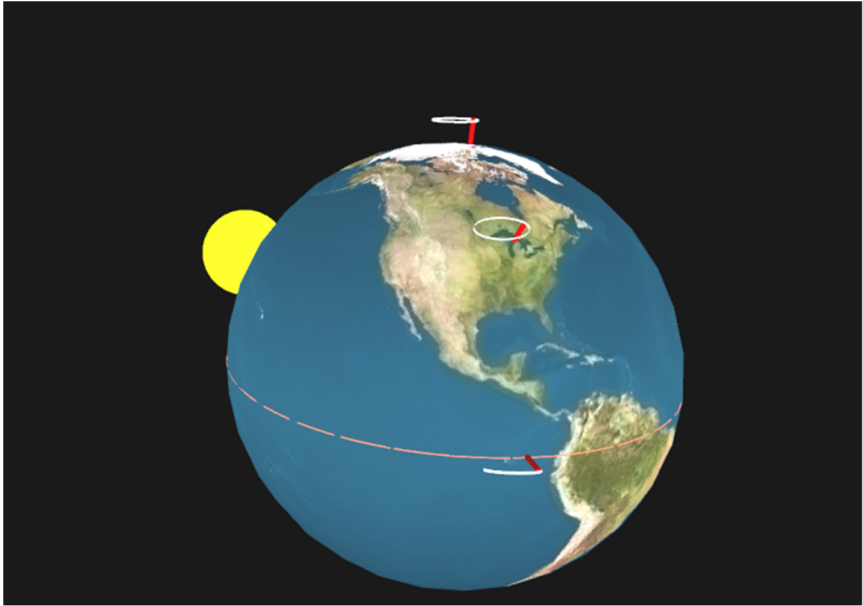


Figure 1: The Earth, moving counterclockwise in the heliocentric system, has passed in front of the sun. The three positions of aberration: the circle at the North Pole; the ellipse at 45° latitude, and the horizontal line at the equator are represented in white.

⁶⁰³ The heliocentric and geocentric models have different explanations for stellar aberration. Those interested can consult, *Galileo Was Wrong*, Vol. 1, pages 157-166. See www.gwwdvd.com or www.jttcotu.com. We have available a CDROM with over 60 animations, including those for parallax and aberration.

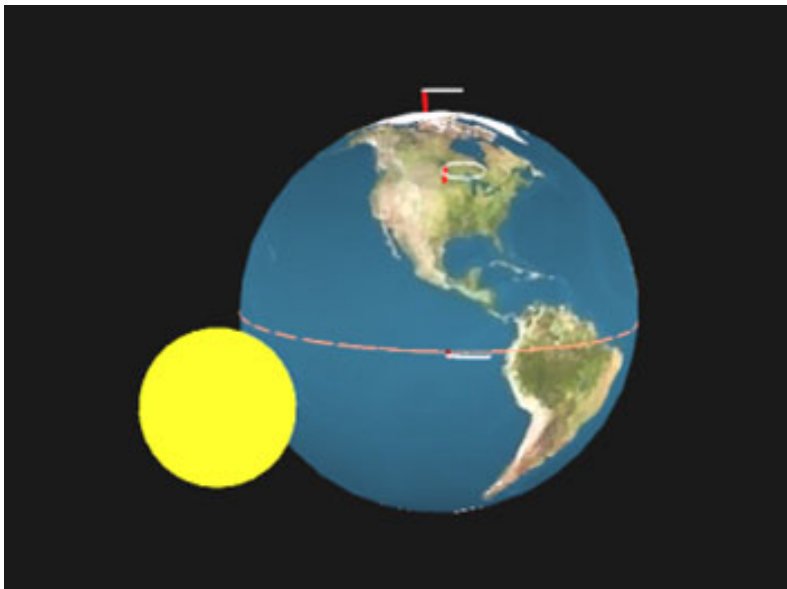


Figure 2: The Earth has now revolved in a third of its annual orbit. The red lines representing how the star is viewed from Earth are now on the far left side of the circle, the ellipse and the horizontal line.

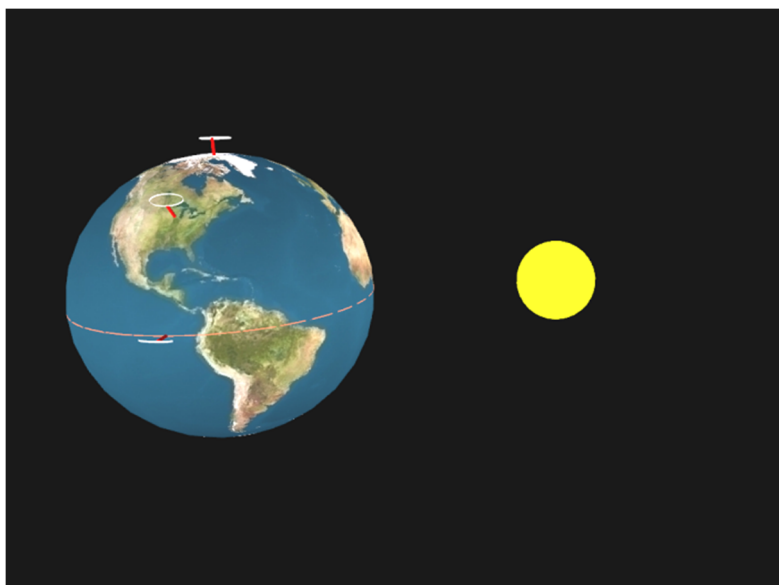


Figure 3: Earth is two-thirds through its annual orbit. Notice at 45° the red line is at the bottom half of the ellipse and is moving left to right.

In the heliocentric model, stellar aberration is said to be caused by a bending of the star's light. In the geocentric model it is caused by the revolution of all the stars around the Earth, which, depending on the latitude of the star with respect to the Earth's equator, makes the starlight appear as a circular or elliptical annual motion on Earth. The geocentric explanation for stellar aberration is very simple, and the simplicity speaks for itself. In reality, there is no "aberration" of star light. Rather, what appears as aberrated star light on Earth is caused by a movement of the whole star field around a fixed Earth. Essentially, the cause for stellar aberration is the same as stellar parallax – the stars are aligned with the sun and thus revolve with the sun around the Earth each year.

The star field rotates around the Earth on the north/south celestial pole, but the pole itself revolves with a 20.5 arc second radius. Hence as viewed from Earth, the motion of the stars on or near the celestial pole will form a circle in the north, an ellipse at 45° latitude and a hyperbola at the equator.

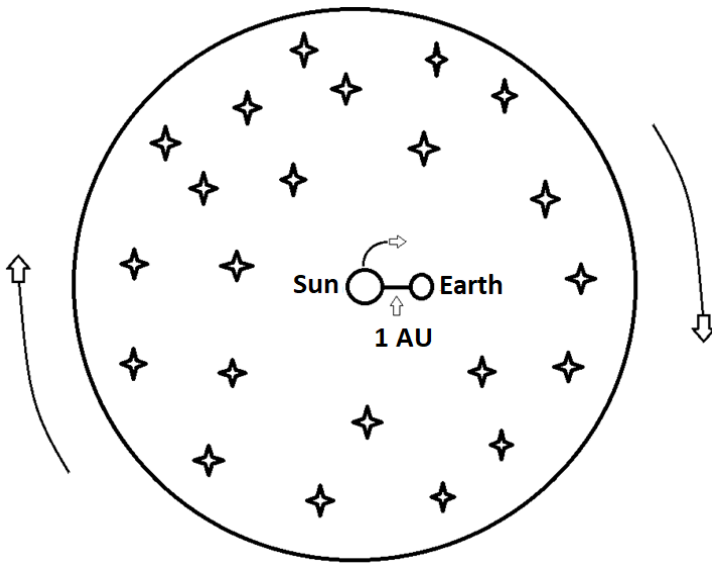


Figure 1: The sun and stars revolve around the Earth on a 1AU (astronomical unit) pivot. The only separation of the sun from the stars is that the sun lags by 3 minutes and 4 seconds.

It is also significant that James Bradley, as noted by Godfray, “...found that the changes of declination of the stars could not all be accounted for by precession and aberration alone...he found an intimate connection between these oscillations of the earth’s axis, to which he gave the name of Nutation.”⁶⁰⁴ Precession and nutation are caused by either an outside torque, the influence of gravity and/or an imbalance in mass distribution. In the geocentric system, as the universe rotates 365 times a year around the Earth, it will precess and nutate by 0.112 arc seconds per day, which will cause all the stars to move over the course of the year.

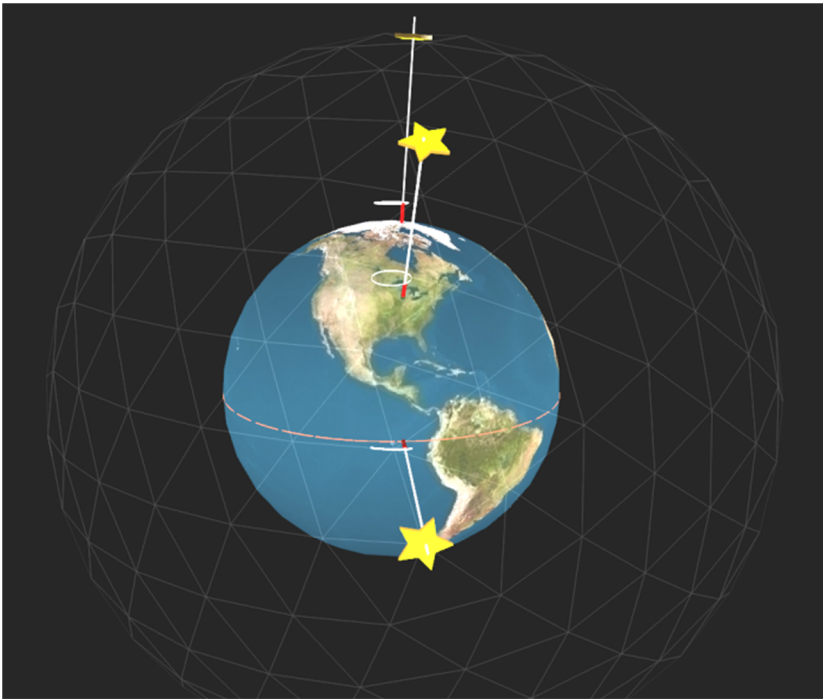


Figure 1: (left) The star field (represented by the spherical grid and the three stars) is precessing/nutating around the Earth, left to right. The three positions of aberration: the circle at the North Pole; the ellipse at 45° latitude; and the horizontal line at the equator, are represented in white. The red rods represent how the star light is viewed from Earth. Notice at 45° the red line is at the top half of the ellipse and is moving right to left.

⁶⁰⁴ Hugh Godfray, *A Treatise on Astronomy*, Cambridge, MacMillan, 1866, p. 219.

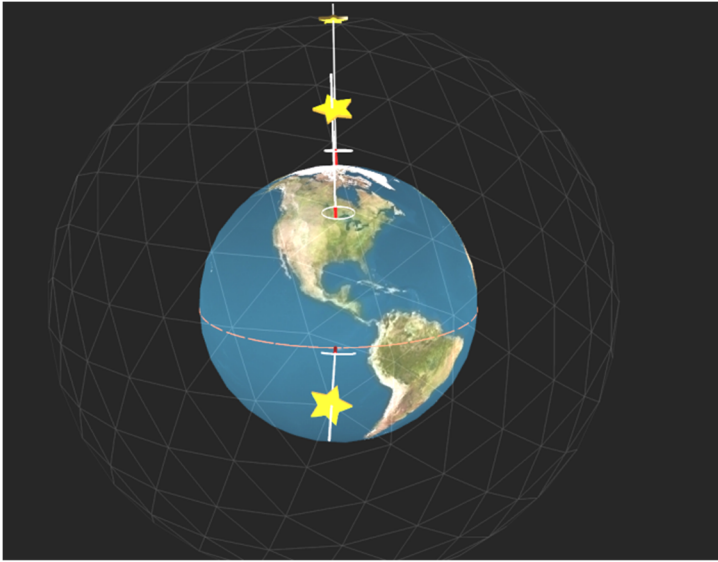


Figure 2: (above) The stars have now precessed/nutated one-third of their motion. The red lines representing the star light are now on the top side of the circle, the ellipse and the horizontal line, and moving right to left.

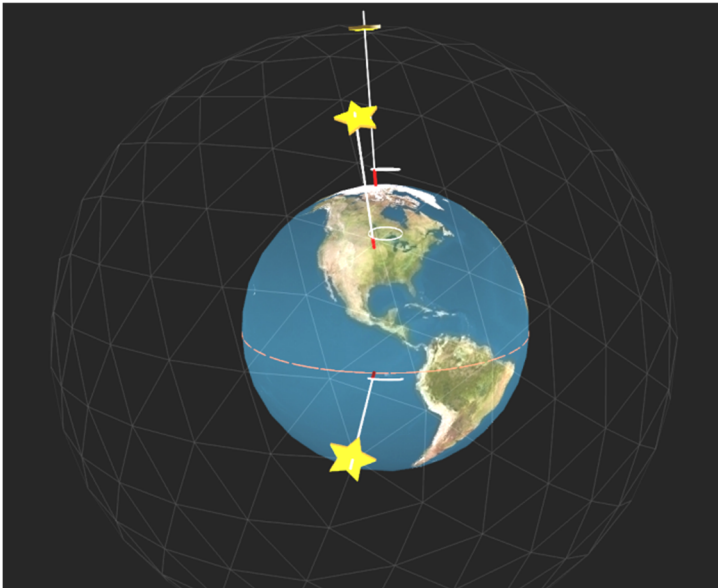


Figure 3: The stars have now precessed/nutated two-thirds of their motion. The red lines representing the star light are now on the bottom side of the circle, the ellipse and the horizontal line, and are moving left to right.

There is one other factor to consider – the speed of light and the difference between the source and the receiver of the star light. Modern heliocentrism believes: (a) star light is independent from the star once it is emitted from the star, and (b) the emitted star light is not independent of the motion of the receiver. The geocentric explanation has incorporated both of these parameters. It has shown that whereas the heliocentric explanation requires the phenomenon to be an actual aberration of light, the geocentric explanation shows it is caused by the linear direction of the starlight to the viewer on Earth. This solution agrees with the results of the telescope experiments performed in 1871 by George Biddell Airy showing that light is not aberrated in a water telescope.

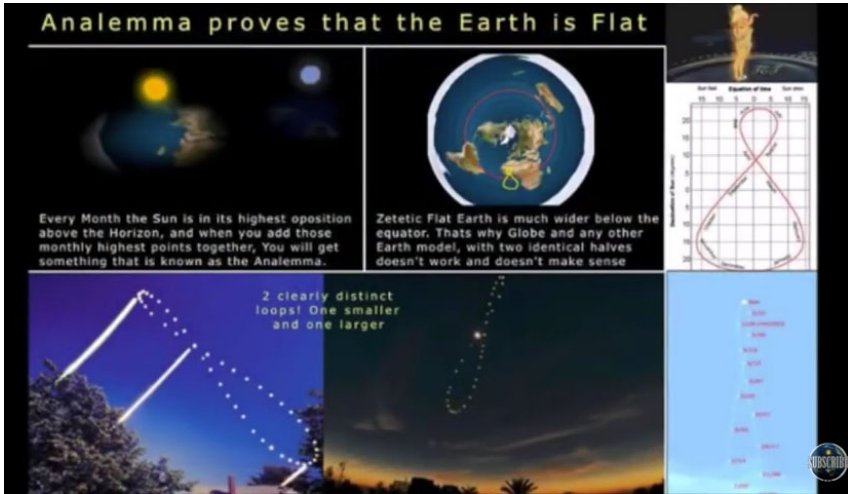
Additionally, in the geocentric model, the sun and planet's 20.5" movement is caused by their annual traveling with the rest of the star field and thus they will react in the same manner as the stars. The moon, however, does not show a 20.5" movement since it is locked in place by the gravity of the fixed Earth. The flat Earth model does not even address these phenomena, much less have an explanation.

The question remains, then, as to how the flat-earthers will explain stellar aberration. Since it is a fact of science that each star in the sky will make some degree of eccentricity within a year, flat-earthers must explain what in their model causes this phenomenon. Since their flat Earth is fixed, then the aberration can only come from some independent movement of the stars, especially since flat-earthers cannot appeal to the speed of light due to the fact that their stars are too close to their Earth for light speed to cause an aberration.

The only possibility left is if somehow their dome of stars moves with some eccentricity. To date, the issue has never been discussed in flat Earth circles.

The Analemma

Support for a Flat Earth?



Time lapse picture of the sun's movements at various dates at the same time during the year in the northern hemisphere

⁶⁰⁵ <https://www.youtube.com/watch?v=NhJnhXMWloA>, used in the video in which Mark Sargent is speaking to Russel Brand about the flat Earth theory, published Oct. 10, 2017.

⁶⁰⁶ Photo credit: Anthony Ayiomamitis.



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Time lapse in Melbourne, the southern hemisphere



Lunar analemma from New Mexico⁶⁰⁸

⁶⁰⁷

<https://www.smh.com.au/technology/in-the-loop-yearround-20110615-1g48x.html>, published in the Sydney Morning Herald, June 16, 2011, a time lapse of the sun taken in Melbourne, Australia: “It is believed to be the first picture of an analemma created in the southern hemisphere – and there is a difference, as the figure eight is reversed in the northern hemisphere, with the larger loop at the bottom. It was done by students from Melbourne Girls Grammar junior school, under the direction of science teacher Julie Radford, as an astronomy project. They photographed the sun at the same time - in this case, midday, when the sun is at its highest altitude - every week for a year.”

⁶⁰⁸

Photographs of the moon 51 minutes later on successive days, based on the moon’s tilted and elliptical orbit, produced by astronomer Rich Richins in the



Analemma (upside down) taken from Concordia station in Antarctica⁶⁰⁹

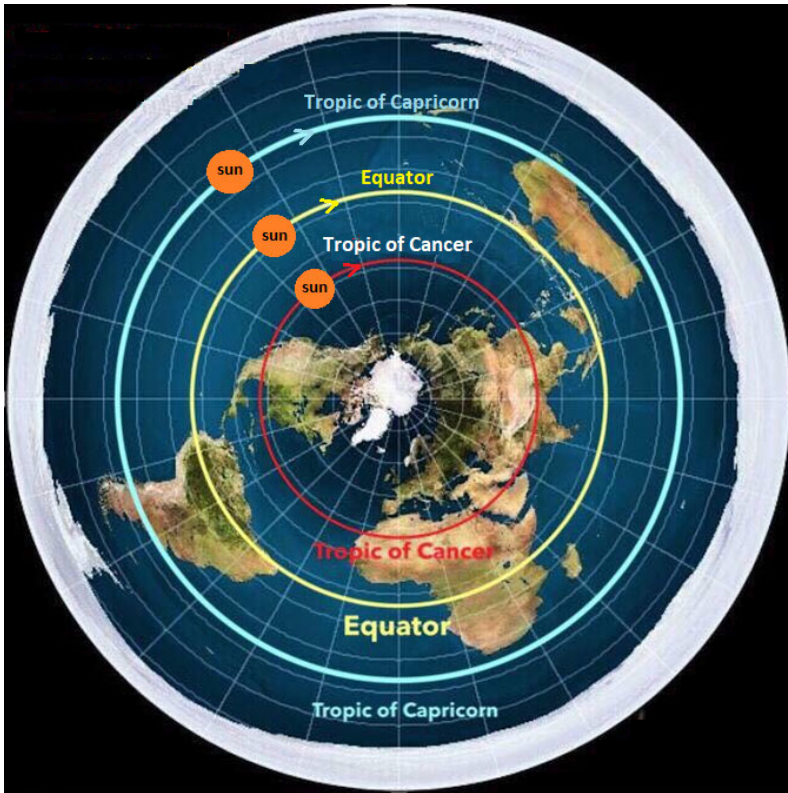
Analemma comes from the Greek word ἀνάλημμα (pronounced: an-AL-emma) meaning “pedestal of a sundial.” It appears in time-lapse photography of the sun’s yearly position when photographed from the same location and time at various days during the year. The preceding composite picture from Greece was taken in the northern hemisphere at 45 degrees latitude. Of the three positions marked, #1 represents the northern solstice about June 21; #2 represents the time near the Vernal and Autumnal equinoxes (about March 21 and September 21-22); and #3 represents the southern solstice about December 21.

The reason the analemma is important in the overall discussion is flat-earthers believe the analemma proves the Earth is flat and the heliocentric model does not work. As seen in the diagram on the next page, the flat Earth azimuthal model has the sun revolving between the Tropic of Cancer and the Tropic of Capricorn, with the Equator between the two tropics. The sun begins its revolutions at the Tropic of Cancer and then works its way down to the Tropic of Capricorn for the next six months; and then proceeds back up to the Tropic of Cancer during the rest of the year. Since the Tropic of Cancer is half the size of the Tropic of Capricorn, the sun will need to travel

southernmost full moon rises at the lower right above the Organ Mountains in southern New Mexico, with the new moon phase at the upper left.
<https://forums.homesecer.com/showthread.php?t=170377>

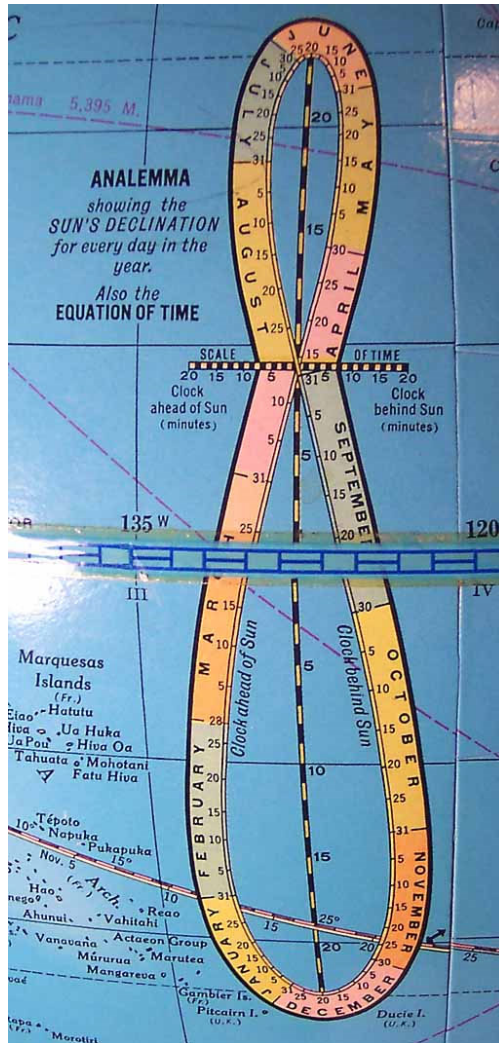
⁶⁰⁹ <http://blogs.esa.int/concordia/2015/10/14/the-analemma-in-antarctica/>

twice as fast than it does at the Tropic of Cancer. Accordingly, flat-earththers claim the Tropic of Cancer corresponds to the smaller loop on the analemma and the larger loop corresponds to the Tropic of Capricorn.⁶¹⁰



If we assume a 12,000-mile radius for the azimuthal flat Earth, this equals a 4,200-mile radius and a 26,376-mile circumference for the Tropic of Cancer; an 8,400-mile radius and a 52,775-mile circumference for the Tropic of Capricorn, making the latter twice as big as the former. Pictures and graphs of the analemma do show the bottom loop is about twice the size of the top loop, seemingly corroborating the flat-earth claim. See next page.

⁶¹⁰ <https://www.youtube.com/watch?v=khKYvogxfgg>, starting at 14:47, published Jan. 8 2016 by MrThriveandSurvive.



To answer the flat-earther's challenge, we begin with the fact that the Keplerian-elliptical heliocentric model and the Neo-Tychonic-elliptical geocentric model—basically mirror-images of one another—demonstrate three factors determining the size and shape of the analemma: obliquity, eccentricity, and the perihelion position. For example, if the obliquity is set to 23.5 degrees, the eccentricity to 0.017⁶¹¹ and the perihelion to 12.82

⁶¹¹ Eccentricity is the amount an ellipse differs from a circle. A circle's eccentricity is 0.0. The eccentricity of an ellipse is between 0 and 1.

longitude, our computer animation produces the analemma we commonly see between the tropics (small loop on top, about 9 deg above the equator).

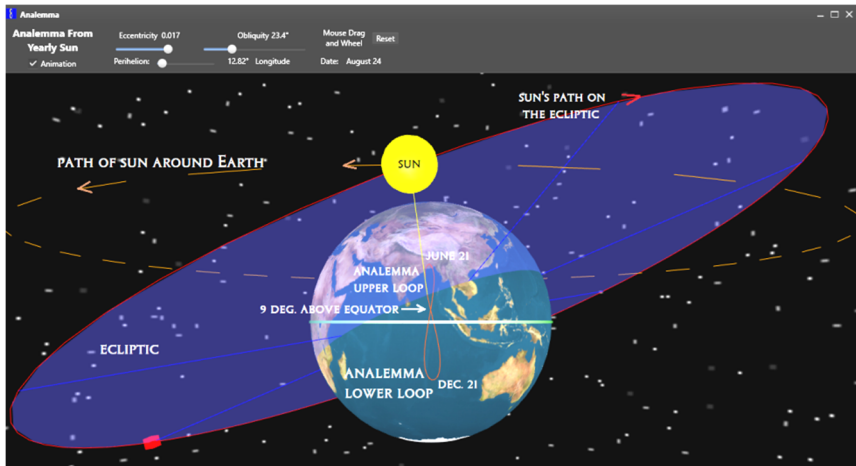


Figure 1

The same model shows that if the orbit is perfectly circular (no eccentricity) with no axial tilt (no obliquity), the sun would appear at the same point in the sky at the same time of day (*e.g.*, 12:00 pm at the Greenwich Meridian, London) throughout the year and the analemma would be a dot. See figure below.

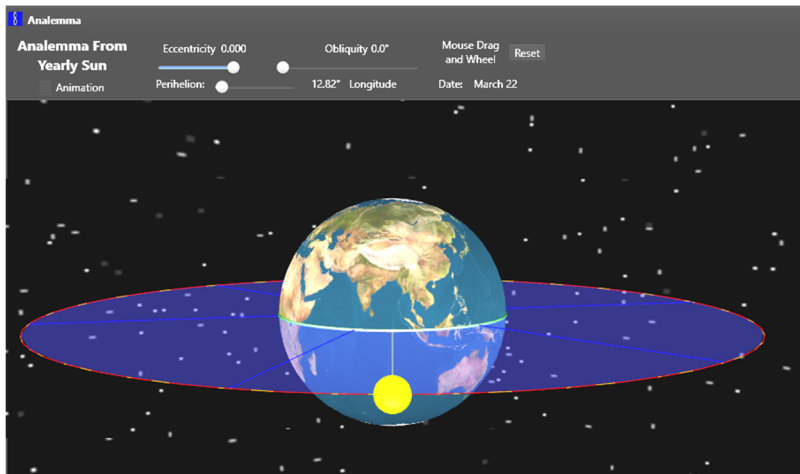


Figure 2

The same model shows that if the orbit is circular (no eccentricity) but a tilt (obliquity) more than 23.5 deg. (45 deg.) the analemma would still be a figure-8 shape but with northern and southern lobes equal in size.

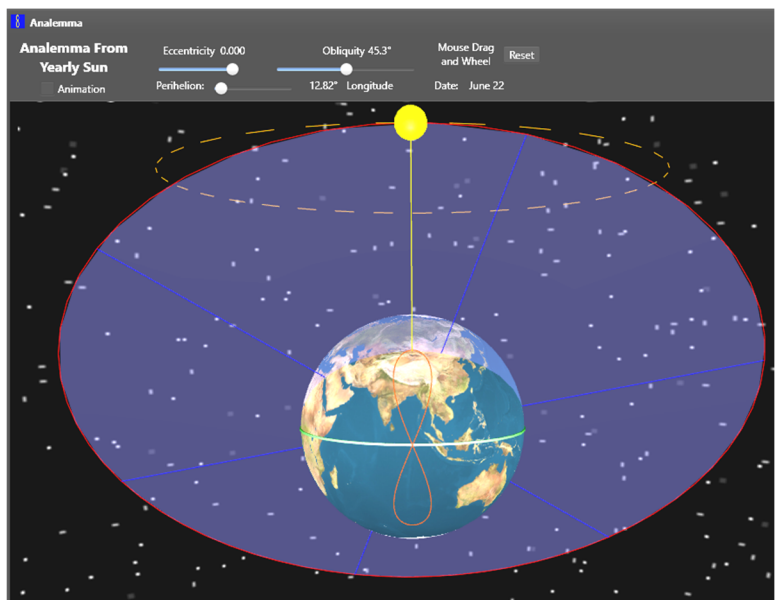


Figure 3

If the elliptical orbit is our present eccentricity, but with no axial tilt, the analemma would be a straight line along the celestial equator.

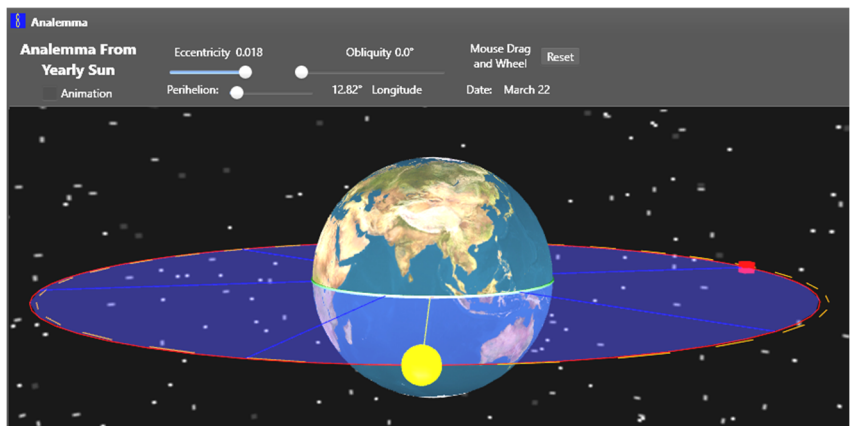


Figure 4

Let's look at a couple more shapes to get a better feel for how the analemma is formed. Below is an analemma with a 0.255 eccentricity (about 15 times our normal eccentricity) and a 12.4 obliquity (about half of our normal 23.5 obliquity). As we can see, it will produce an egg-shape.

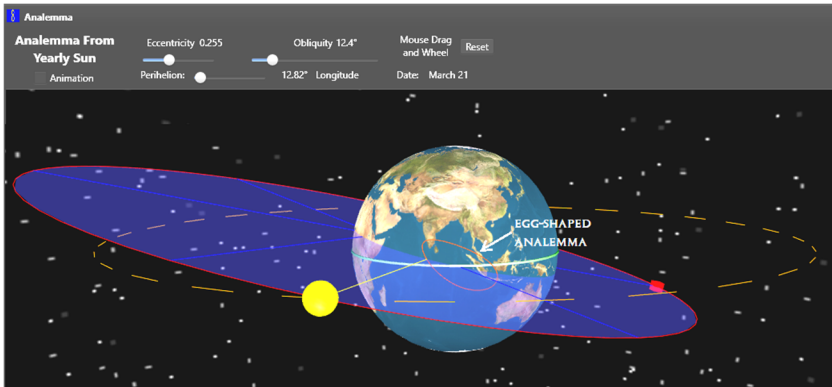


Figure 5

Next is the same animation except the perihelion is changed from 12.82 deg. longitude to 186.84 deg. Notice the analemma is still an egg-shape but is elongated and pointing downward.

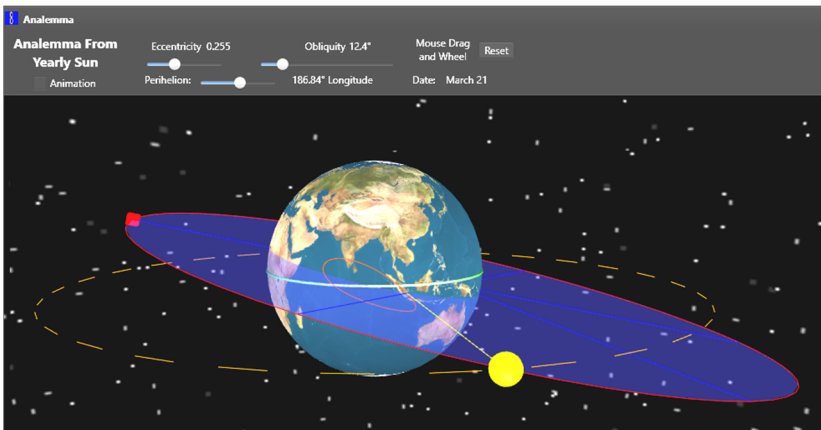
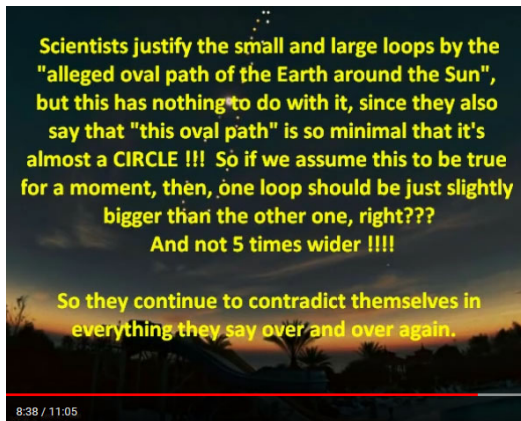


Figure 6⁶¹²

⁶¹² The analemma animations are available to operate at www.jttcotu.com. My thanks to my software engineer, Douglas Rudd, for his excellent work. Compare to <http://www.analemma.com/pages/framespage.html>

As we can see, the variations are practically infinite with the three variables: eccentricity, obliquity and the perihelion position.

As it stands, the flat-earththers contend the elliptical version (whether Keplerian or Neo-Tychonic) of the analemma cannot be correct. They contend (as seen in the memes below) the eccentricity of the orbit is not large enough to account for the different sizes of the analemma's two loops, since the sun/earth orbit is 97% of circular but produces a 50% difference in size between the loops of the analemma.⁶¹³



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⁶¹³ The difference between the perihelion and the aphelion in the heliocentric model is 3.29% (*i.e.*, 147 million miles is 96.71% of 152 million miles).

⁶¹⁴ https://www.youtube.com/watch?v=qNGnz_1MMTg, published by Zetetic Flat Earth, May 11, 2015, beginning at 8:38.

A heavy-worded critique is noted in an animation of an analemma appearing on the same site. After running the animation seen below, the flat-earther, “MrThriveandSurvive,” says the following:

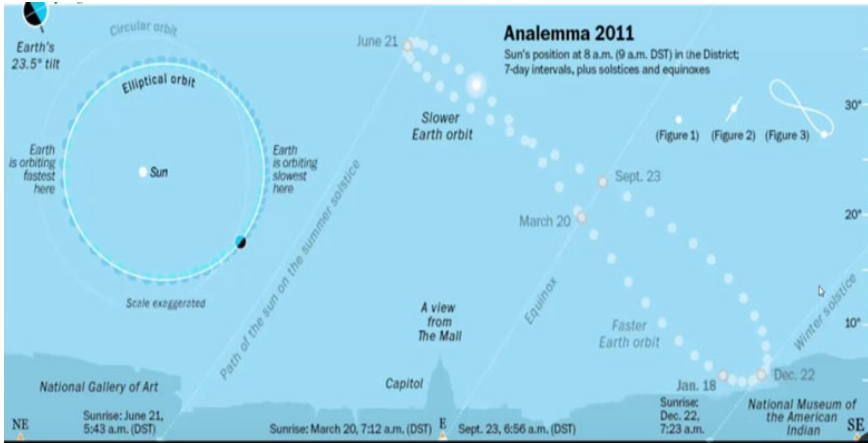


Figure 1

If we have a 3% difference the Earth is moving around the sun than the slowest point, all year round, and the Earth is this nice spinning sphere turning once per day exactly...why do we have what is going on here? First of all, again, there is way more than a 3% difference between the southern loop and the northern loop here. Look at the right side here. Much more of a difference.

We have some other thing going on too that just don't make sense. See where the equinox line is there, March 20, September 23? You'll notice that that is not where you would think it would be, which is the middle of this thing [middle of the analemma]. It's a little off center. Also, the sun is moving fastest from one day to the next right here [between Jan 18 and March 20] and on the other side. See how much space there is between the two? Now, when they're are very close together is when the sun is moving slower in the sky from one day to the next. Look how it bunches up in December and in June in bunches up! However, the big deal is, the sun moves faster in the winter than it does in the summer. And I'm still waiting for a globe person to explain to me how—I believe the sun averages, I'm sorry, the Earth averages having the sun's shadow move up and down, moving from one equinox to the other, it averages I think something like 2.5 or 3 degrees per day. But when we get to the

solstice, December 22 and June 21...what happens is the sun stays within 1 and 1.5 degrees...of the same spot on the Earth for like a month and a half. Yes where it is right now [between March 20 and June 21] it is just booking. It might be moving 5 degrees per day, maybe even faster...

Now, how can you explain that?. You don't get that with a sphere moving around the Earth [sic] [sun]. It is moving faster in December than it is in June. You can't explain it on the globe Earth model. You can only explain it if the sun is moving around the Earth, and it's controlled not with the forces they say it is....because gravitational forces don't act the same when it's supposed to act the opposite. How can the sun be over the same part of the Earth in the winter and in the summer when it's moving 3% faster in the winter than it is in the summer?

Now, if you can't answer that, you don't know how the globe works. You can answer this on the flat Earth model...This is from science. I'll bet you they just wished nobody had ever noticed this....And don't anybody send me some duffus mathematician who made a curve out of a sine wave that got it close to this and then modified it 3% and it matched it and said 'This explains it.' How in the heck does a sine wave modified 3% explain an Earth...only changing 3% in speed? It may be over 100% difference between the fastest and the slowest. Flat Earth wins again, unless these things can be explained. I'm still waiting...⁶¹⁵

A similar objection appeared on *ScienceBlogs*, managed by scientist Ethan Seigal. Under the moniker, Jobthian, a responder states:

Kepler's 1st law of planetary motion says that the earth's area speed is constant throughout the year, but it's linear and angular speed are not. So when the earth is moving from Aphelion (furthest sun) towards Perihelion (nearest sun), the sun appears to slow down (from earth's perspective) as the earth traverses its longest arc in the elliptic. And from Perihelion to Aphelion along the shortest arc, the sun appears from our perspective to speed up. This is because, when the earth is closest to the sun (perihelion), it moves fastest. When the earth is farthest from the sun (aphelion), it moves more slowly. (Exactly opposite of what we observe).

⁶¹⁵ <https://www.youtube.com/watch?v=khKYvogxfgg>, starting at 20:33 to 27:30, published Jan. 8 2016, by MrThriveandSurvive. He also contends the sun stays at the bottom of the loop for two weeks (Dec. 1-16), using Baltimore as the example. <https://www.youtube.com/watch?v=2lX-ZslGYrk>, at 5:50 to the end.

By appearance (in reality) – The sun appears to speed up as we move from summer to autumn and the sun appears to slow down as we move from winter to spring. (Exactly opposite of what Kepler’s law predicts). If you look at the Analemma on a globe, where it is correctly shown, with the small loop (fast sun) at the top, and the larger loop (slow sun) at the bottom, you would put the Aphelion at the TOP and the Perihelion at the Bottom. Now you can see that Kepler’s model does NOT comply with observations. Which proves that Kepler’s model does NOT describe the sun’s movement, AS IT IS.⁶¹⁶

Below is a common animation of the Keplerian model, but it is exaggerated for effect. Near perihelion, the planet is accelerating; but near aphelion it is decelerating. The reason for the acceleration and deceleration is due to the inertia (or conservation of angular momentum) of the orbiting body. In order to maintain the momentum, the momentum will cause the orbiting body to increase its velocity when confronted by a larger body with a significant gravitational pull. Once it is a safe distance away from the larger gravitational body and the gravitational force is much less, then, in order to conserve its momentum it must decrease its velocity.

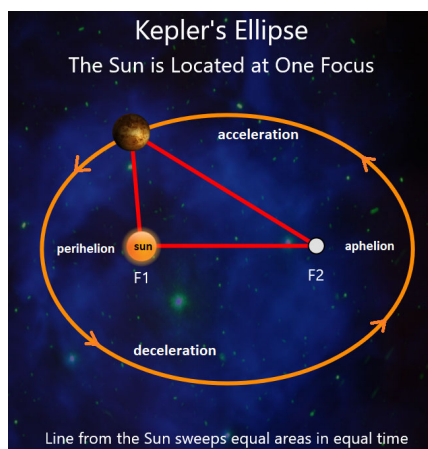


Fig. 2⁶¹⁷

That being said, the first problem with both “MrThriveandSurvive” and *ScienceBlogs* is that they eliminated both the obliquity and the perihelion

⁶¹⁶ <http://scienceblogs.com/startswithabang/2009/08/26/why-our-analemma-looks-like-a>, posted August 3, 2015 from Belvedere, Texas

⁶¹⁷ This model is available at www.jttcotu.com

position. They are right in stating that since the eccentricity is only 3% it could not create the asymmetric analemma (smaller upper loop and larger lower loop, with an intersection point 9 degrees above the equator) that we normally see between the Tropics.

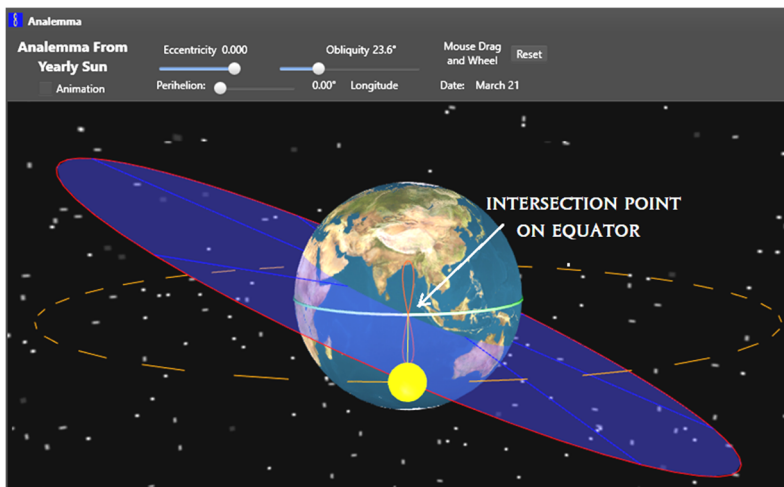


Only when the 23.5 deg. obliquity and the 12.82 longitude of the perihelion position are added could we ever get the above analemma shape. If the obliquity and the perihelion are not included, the only way to come even close to the reality is to make the speed of the sun increase and decrease in each of the four quadrants of the analemma (June 21, March 22, September 22, December 21). Since an eccentricity of 0.017 (97% of circular) is not enough to account for these apparent accelerations and decelerations, the natural conclusion for the flat-earth-er is that the Keplerian elliptical model is wrong.

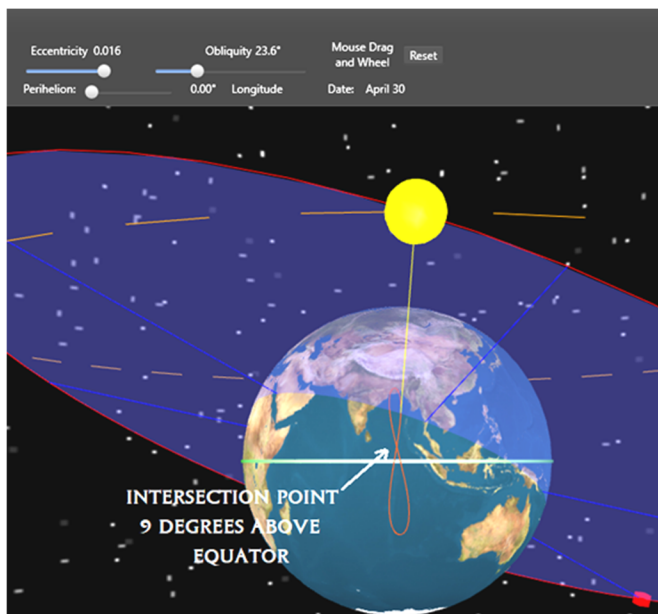
In the real world, however, whether heliocentric or geocentric, the sun is basically going the same speed around the Earth all the time. It is always 3 minutes and 56 seconds behind the sidereal rate (*i.e.*, the rotation of the stars around Earth) of 23 hours, 56 minutes and 4.1 seconds, which difference allows the sun to complete its backward run through the Zodiac in 365.25 days. This timing is more precise than a Rolex watch. We know in fact that the sidereal time never changes, and we know that the sun's relative position to the stars never changes (except for slight precessions over the long term that are practically inconsequential when accounting for diurnal orbits, *e.g.*, 26,000 year precession of the equinoxes, the 433-year Chandler wobble, the Milankovitch climate cycles, *etc.*). The precise correspondence between the

sidereal rate and the solar rate is what is wrong with the flat Earth model of the analemma. That is, there is no possible way the sun can travel twice as fast in one part of the year (at the Tropic of Capricorn as opposed to the Tropic of Cancer) and keep the exact pace with the stars in the Zodiac that we see year in and year out.

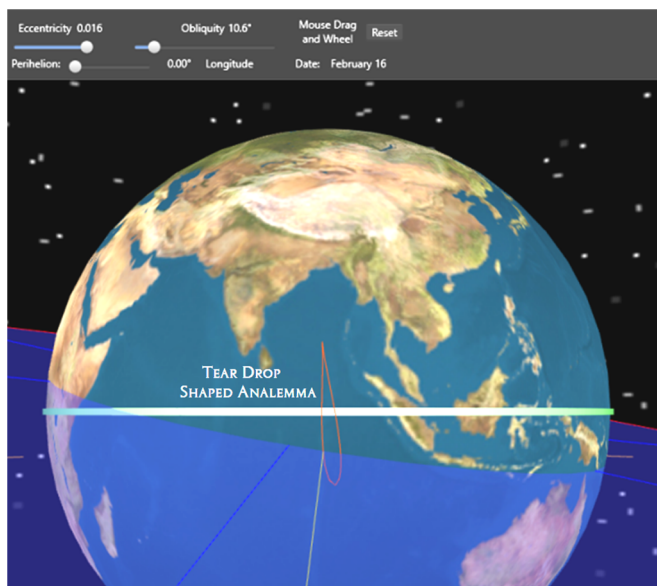
Hence the only thing that can be causing the different shapes of the analemma is the type of orbit the sun has relative to Earth. In this light, the dimension that changes quite rapidly is the position of the sun due to the obliquity of its orbit. The obliquity causes the ecliptic to rock back-and-forth by 47 degrees (23.5 degrees in each hemisphere) between June 21 and December 21. This is about 25% of the equation, so to speak. The eccentricity, at only 3%, has a smaller contribution. Its contribution raises the intersection point of the two loops to about 9 degrees above the equator. Interestingly enough, however, there are 9 extra days of the year in the analemma above the equator than there are below the equator, even though the loop below the equator has a wider area. We can see this fact in the following two animations.



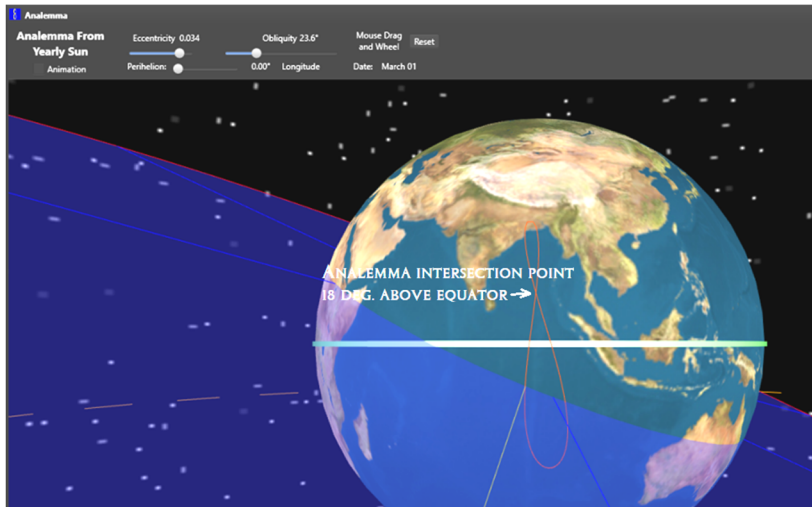
The first animation (above) shows an eccentricity of 0.0 and an obliquity of 23.5 degrees (the perihelion is ignored here). Notice the intersection point of the figure-8 rests on the equator. The second animation below has a normal eccentricity of 0.016 and a normal obliquity of 23.5 deg. The intersection point is 9 deg. above the equator.



If we change the obliquity to 10.5 degrees (below), we see the intersection point just beginning to form, but we don't see the figure-8 quite yet. We see a teardrop shape.

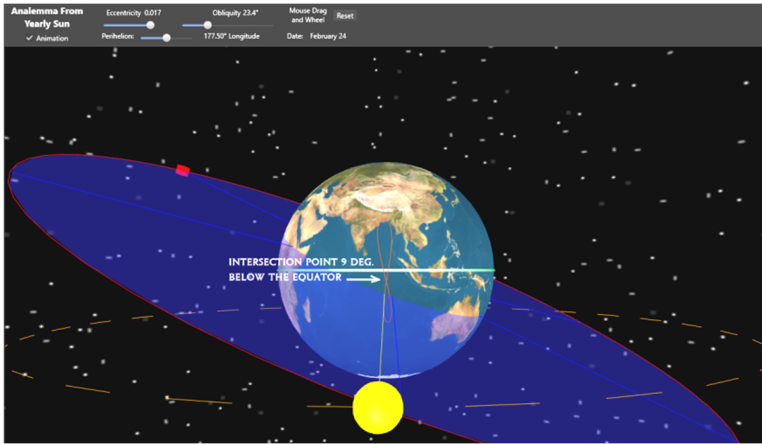


If we double the eccentricity to 0.034 but keep the normal 23.5-degree obliquity, we have the same figure-8 but with the intersection point about twice as high above the equator. See below.



One important point to keep in mind when viewing these animations or when contemplating how the analemma works in reality is to understand the sun is both moving on its orbital plane in a virtual circle around the Earth, but it is also keeping in contact and moving on the ecliptic plane, which is always tilted by 23.5-degrees. Hence it is both the near-circular path of the sun (*i.e.*, the eccentricity) and the path of the sun in accordance with the ecliptic (*i.e.*, the obliquity) that will determine the shape and orientation of the analemma. The higher the eccentricity and/or the obliquity, the more the analemma will deviate from a straight line. In effect, with the intensity of both the eccentricity and the obliquity, the sun's actual path can turn into something like a twisted pretzel when drawn on the celestial sphere.

Lastly, the perihelion position, that is, whether the sun is closer to the northern or southern hemisphere, will determine which loop is on the top and bottom, respectively. In this next animation, the longitude of the perihelion is set at 177.50 degrees, which is about halfway between 0 and 355 degrees. Notice the intersection point of the analemma is 9 degrees below the equator.

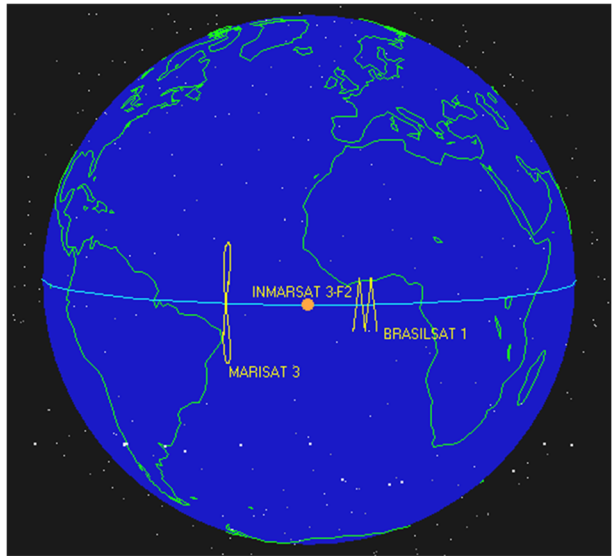


The reason we are illustrating these variations is to demonstrate the shape of the analemma is dependent on three geometric factors and not on speed factors. The differences in speed are only an illusion. We can demonstrate it further by showing satellites controlled by orbital mechanics. We see something similar to the analemma in geosynchronous satellites.⁶¹⁸

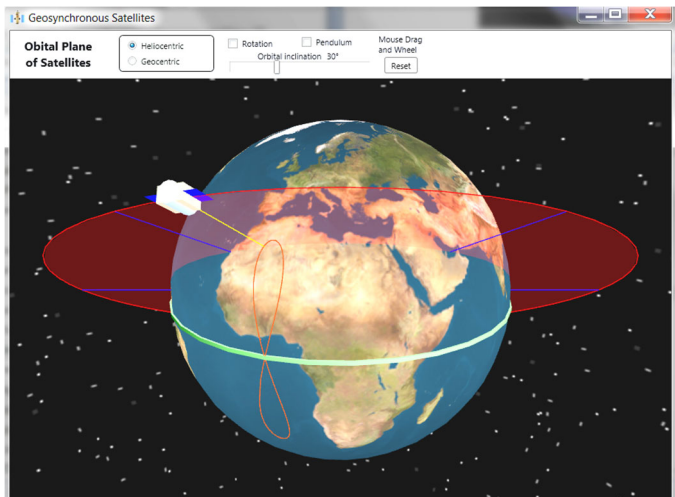
Incidentally, we can use daily satellite movements since, in certain respects, the yearly is the daily multiplied by 365.25 days. Depending on how close to the equator and the initial incline of their trajectory, satellites will produce different ground trackings as observed from Earth. This is due to the fact that the satellite, depending on its initial location and speed, will react against the gravitational and inertial forces in space (whether we use the heliocentric or geocentric system). Note the three different satellite ground trackings in the following sample. Marisat 3 produces the characteristic figure-8. This is because Marisat 3 is both on an incline and moves in an

⁶¹⁸ Geosynchronous refers to a satellite with a 24-hour period, regardless of inclination. Geostationary refers to a satellite with a 24-hour period, in a near-circular orbit, with an inclination of approximately zero. It appears to hover over a spot on the equator as shown by Inmarsat F-32. All geostationary orbits must be geosynchronous, but not all geosynchronous orbits are geostationary. An example of a geosynchronous but non-geostationary satellite would be the Marsat 3 with about a 30° inclination. The ground trace will retrace itself with every orbit, in this case in a figure-8 pattern. The ground trace will also vary between 30° north and 30° south latitude due to its 30° inclination. If the geostationary satellite has an eccentricity near zero and an inclination of 60°, the ground trace would follow a similar, larger figure-8 path between 60° north and 60° south latitude.

elliptical orbit. Inmarsat F-32 has no incline and travels in a circle, thus producing the orange dot on the equator. Brasilsat-1 is at an incline and is farther out from Earth than Marisat 3, thus producing the zig-zag line instead of the figure-8.



We can simulate these patterns on a computer.



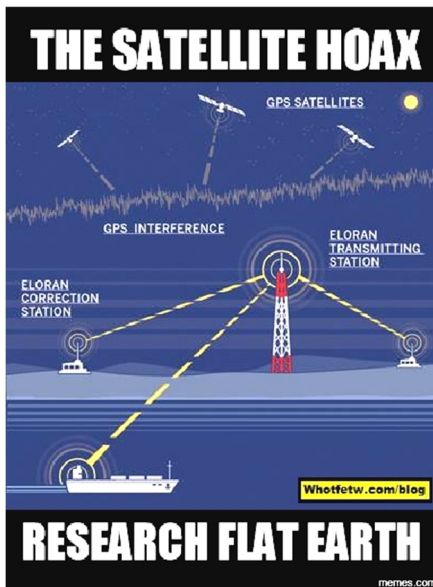
619

⁶¹⁹ Animations available from www.jttoctu.com. This one is called GeoSyn3.

Similarly, in either the heliocentric or geocentric systems, the sun can also be considered a satellite. It has an inclined orbit over a year of 23.5 degrees and an eccentricity of 0.017, which will produce the typical figure-8 pattern.

Satellites can also perform certain “tricks” in the sky depending how the eccentricity, obliquity and perihelion are coordinated. Notice this description by NASA of how it gets a satellite to hover over a certain region of the earth for many days, while the satellite is still moving the same speed in its orbit relative to the space in which it travels.

This requires the satellites to operate in a highly specialized orbit that provides a maximum dwell time around 42 degrees north latitude to allow a satellite to spend as much time as possible directly overhead (zenith) for most users in Japan. As an inclined

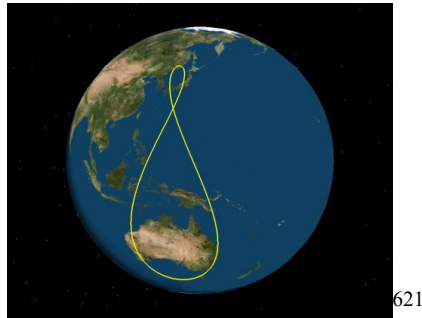


Geosynchronous Orbit, the QZSS orbit has a period of exactly one sidereal day so that the satellite passes its apogee (high point) over the same high-latitude location every day. Since the satellite’s speed (relative to Earth) is lowest around the peak altitude of its orbit, it spends the majority of time around the high-point of its orbit, known as apogee dwell. Forming an asymmetrical Figure 8 (Analemma) with

its ground track, a satellite in a Tundra orbit reaches very high elevation angles for the high latitudes which is not possible from Geostationary Orbit over the equator.⁶²⁰

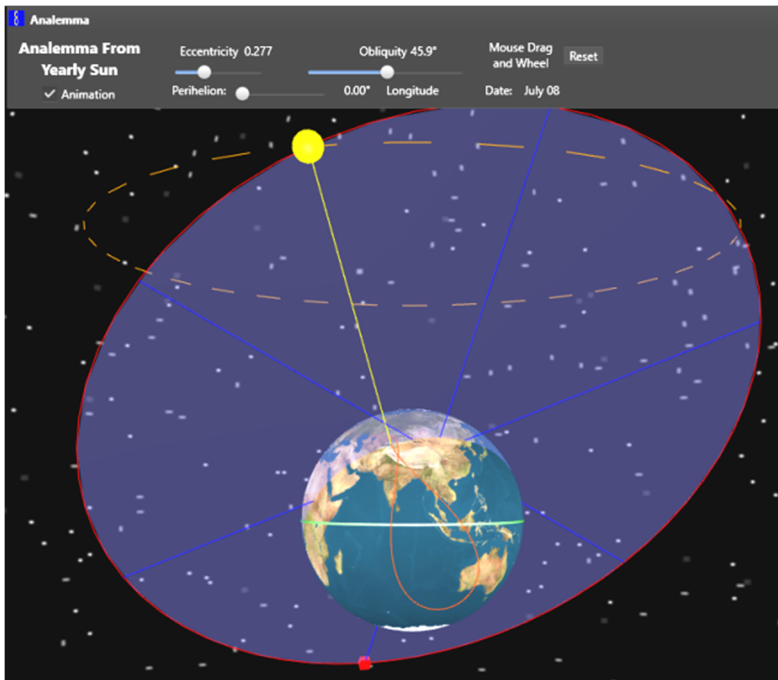
⁶²⁰ <https://earthobservatory.nasa.gov/Features/OrbitsCatalog/>
<http://spaceflight101.com/spacecraft/qzss/>

Below is an animation of how the figure-8 analemma looks when it is adjusted to “dwell” over Japan.



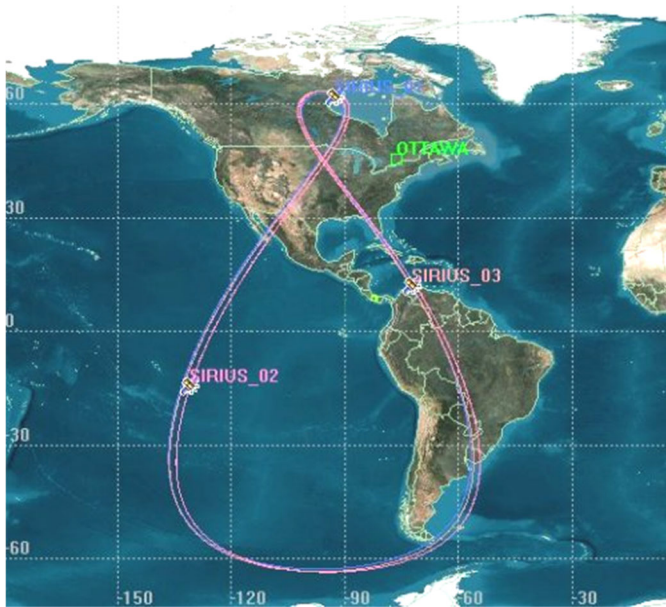
621

We can do something similar on our sun/earth analemma animation if we make the eccentricity 0.277 and the obliquity 45.9 degrees. Here we are making the sun hover over western China. See below.



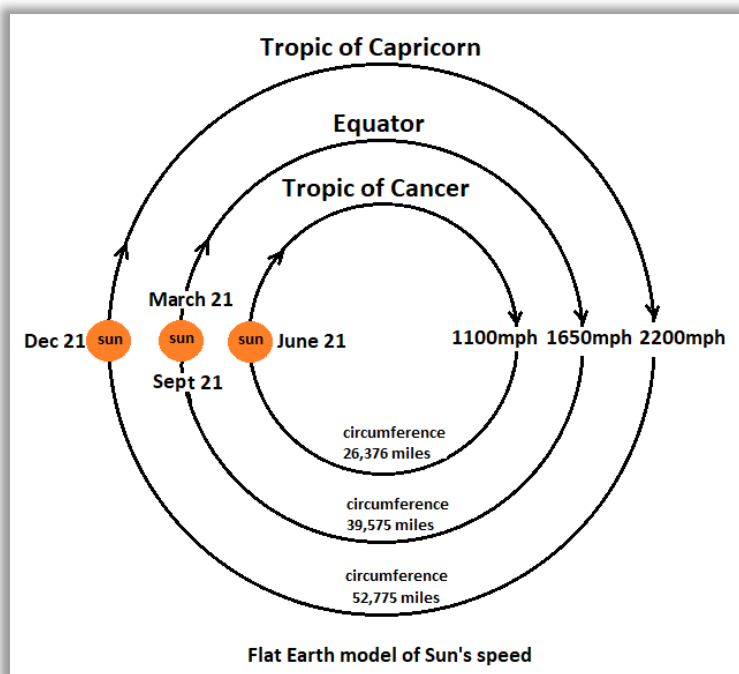
⁶²¹ https://en.wikipedia.org/wiki/Tundra_orbit

Similarly, Sirius/XM satellite radio creates a satellite orbit so it can spend more time over north America. They have more than one satellite so when the first satellite is going south, the next satellite is moving back to the north to replace it.



Flat-earthers, of course, will proudly dismiss all this information on satellites since dismissal is their only defense in the face of such highly technical instrumentation to falsify their flat Earth. As noted, flat-earthers believe the analemma shows the Earth is flat. Since the flat Earth model has the sun traveling a shorter distance at the Tropic of Cancer than it does six months later at the Tropic of Capricorn, they claim the longer distance makes the longer loop at the bottom.

But the flat Earth model would not produce the same analemma, if any. The only projection the flat Earth model would form is a progression of concentric circles, with larger spirals going out and smaller spirals going in. Since there is a 75,000-mile circumference for the flat Earth ice wall, we then have a 52,775-mile circumference for the Tropic of Capricorn in which the sun must travel at 2,200 mph; a 39,575-mile circumference for the equator in which the sun must travel 1,650 mph; and a 26,376-mile circumference for the Tropic of Cancer with the sun traveling 1,100 mph.



This model wouldn't work even if the three geometric variables (eccentricity, obliquity and perihelion) were converted into a pure speed model. Since the actual analemma shows the sun moves slower on Dec. 21, this speed is not represented in the flat Earth model which has the Sun moving its fastest speed. Likewise, the analemma shows the sun moving near its fastest during the equinoxes (March 21, Sept. 21), but the flat Earth model would only show the sun's middle speed. See chart below.

Dates	Num. of days	% annual orbit by distance	Avg. Speed (based on 93- million mile radius)
May 1 - Jul 29	91	12.95	34,630 mph; 9.61 mi/sec
Jul 30 - Oct 28	91	34.05	91,055 mph; 25.29 mi/sec
Oct 29 - Jan 27	91	18.96	50,702 mph; 14.08 mi/sec
Jan 28 - Apr 30	92	34.05	90,065 mph; 25.01 mi/sec

Second, the flat Earth model has the same problem we have noted earlier concerning forces.

- What is causing the flat-Earth sun to change its speed each day and or change the radius of its orbit?

- How does the flat Earth model explain the sun's angular momentum, since if the sun changes from a large radii orbit to one half that size, the angular momentum should make the sun move twice as fast, not twice as slow?
- How would the flat Earth model explain the fact that the speed of the sun between July 30 and Oct. 28 is almost three times as fast as between May 1 and July 29?
- In regard to geosynchronous and geostationary satellites that hover over one spot of the Earth, how could this work on a flat Earth model?

Hence both geometrically and dynamically the flat Earth model does not match the analemma.



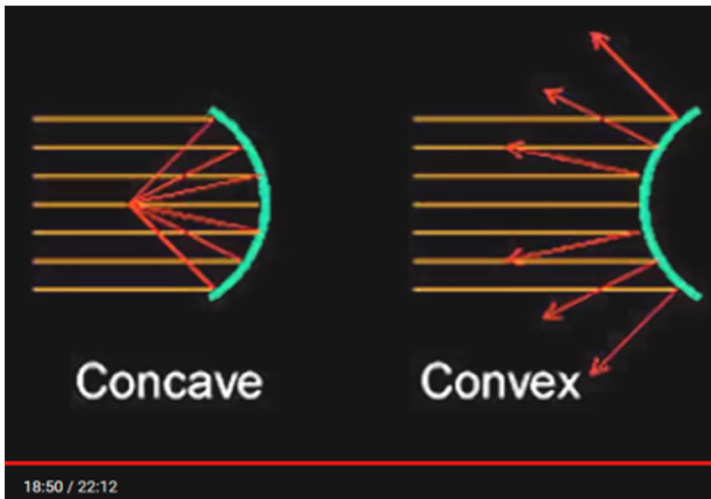
Lunar Eclipses and New Moons



An eclipse of the moon in process. The spherical shadow of the Earth forms into a curve as it proceeds across the face of the moon

An interesting addition to the moon's role as seen from a flat Earth is a video made by someone with the moniker "Masta Peace." The problem becomes readily evident. Masta Peace does not suffer from a lack of intelligence but from a severe lack of information, along with a vendetta against modern science. Reacting to Neil Degrasse Tyson's rendition of the flat Earth's model of a lunar eclipse, Masta Peace contends that if Tyson had given the correct results of the bar-shaped shadow from a flat Earth cast upon a spherical moon, the shadow would have been distorted since a shadow will

conform to the shape of the object upon which it is cast, and thus on a spherical moon the bar would thicken and become frayed at one end. See picture below. True to form, Masta Peace goes on to tell us the moon is not a sphere because, from his research, a convex surface inherent in a sphere would only reflect a very small portion of light to the Earth since most of it would spread outward, and only a concave surface would reflect enough of the moon's light so that we could actually see the moon.



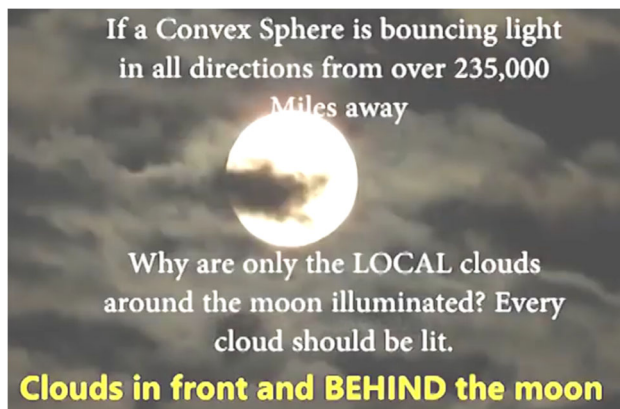
⁶²² <https://www.youtube.com/watch?v=S0oGhkN4BBE>, 7:18 to 22:00.

His conclusion, of course, is the moon is not a sphere and we are being deceived by modern society (although he never tells us what he believes the moon's shape actually is, and never explains why we see it as if it is round). After some due diligence on your part, you might find that light from a convex surface does not travel in lines but in spheres, which combined spheres, with all their lesser intense "arrows" of light, will allow the light to reach the Earth evenly; and the vector "line" used in physics for light rays represents only the highest intensity of a spherical light wave. Similarly, you might find Masta Peace failed to realize his entire demonstration of how shadows form on objects is discredited because none of his demonstrations are made to scale and thus will always distort the shadow, causing his conclusion (the Earth is not a sphere) to be totally unfounded.

Masta Peace also claims that since in the globe model the Earth reflects the sun's light, then we should be able to see a new moon (when the moon is directly between the sun and Earth) since the new moon will absorb the Earth's reflected light from the sun. But you may find in your research that he failed to realize we would not be able to see a new moon at night since a new moon only occurs during the Earth's day time. A new moon rises and sets with the sun.⁶²³ Moreover, we cannot see the new moon in daytime since the sun's background light simply overwhelms any light that is reflecting off the Earth to the moon, which is similar to the reason we cannot see the stars during the day.

But Masta Peace has yet another anomaly up his sleeve to convince us. He shows us a picture of what appear to be clouds behind the moon! Yes, this image does occur on some occasions, but it can easily be shown to be an illusion. Not realizing, however, that his analysis mixes the flat Earth model with the round Earth model by having *both* the clouds surrounding the moon *and* having the moon 235,000 miles away, Masta Peace is then led to believe that a spherical moon should illuminate all the clouds in its vicinity, both front and back, without him noticing there should be no clouds surrounding the moon if it is 235,000 miles away! See his picture below.

⁶²³ <https://physics.stackexchange.com/questions/1907/why-can-we-see-the-new-moon-at-night>



Fortunately, one of his patrons was astute enough to tell him that the image of clouds behind the moon is an illusion caused by light distortion: “I have proved to myself that it is the light that causes this illusion through tons of observations and by setting my cameras light settings down as low as I can. There is no doubt that light can blind you in more ways than one,” from which Masta Peace gave no reply.

Lastly, Masta Peace tells us moonlight is not reflected light from the sun because “the sun is yellow or warm light and the moon is blue or cold light.” Many other flat Earth videos hold similar views and actually do experiments that seem to show moonlight is colder than the shadow it casts on Earth. But here is a classic case of the difficulties of doing science experiments. Many things will affect the results of experiments that are either ignored or unknown when the experiment is taking place. This is why scientists perform dozens or even hundreds of trials of the experiment before they try to reach a conclusion, and even then they are often not sure whether their results are accurate, since there is always the possibility they were unaware of certain environmental effects. If one does the research, one may find these environmental effects and scientific unknowns are precisely the problem with flat-earther “moonlight” anomalies.⁶²⁴

⁶²⁴ <http://www.physicscentral.com/buzz/blog/index.cfm?postid=1590436706491009951>. Interestingly enough, some flat-earthers subscribe to the idea that while the moon has its own light, the stars do not, and thus what we see is reflected light from the sun from each of the stars. This, of course, is totally fallacious. Even Scripture recognizes that starlight is made from the stars. Wisdom 17:5 states: “And no power



Do Full Moons Discredit the Heliocentric System?

On the Globebusters channel of Youtube for Nov 20, 2016, “TJ” makes the following claim:

This is one of my real pet peeves because, I agree with him that there’s no problem with seeing the sun and the moon at the same time. But the issue I have is certain phases of the moon would be exclusive to the day side of the Earth, while other phases of the moon would be exclusive to the night side of the Earth. So the full moon would always be on the night side of the Earth, point blank, no matter what, yet we can see full moons in the middle of the night [sic: he means “day”], all the time. On the other hand, the new moon, or the crescent moon phase, leading up to and away from the new moon, should always be on the day side of the Earth, and yet, we can see crescent moons at night all of the time. And so these two small observations totally debunk the heliocentric model...It is the fact that we can see the sun and a full moon during the day. If you actually modeled this out, that is impossible in the heliocentric model just as a crescent moon at night is impossible in the heliocentric model.⁶²⁵

The problem with TJ’s analysis is, on the one hand, at least technically speaking, it is true that a “full moon” can only be seen at night. On the other hand, he neither defines what he means by “full moon” nor does he tell us

of fire could give them light, neither could the bright flames of the stars enlighten that horrible night” (DRA); “And no power of fire was able to give light, nor did the brilliant flames of the stars avail to illumine that hateful night.”

⁶²⁵ <https://www.youtube.com/watch?v=pvuNdrV30Kc>, at 2:03:31.

the part of the “night” to which he is referring. Technically speaking, a “full moon” only appears for a minute or so when the moon is at exactly a 180-degree angle with the sun. But as soon as that angle changes, even a tiny bit, there is no longer a full moon, regardless whether it looks full to our eyesight. Since the sun and moon are constantly moving, then the 180-degree angle can only exist for a very short time, in the microseconds, if we want to be very technical about it.

If, for example, one second after the angle has reached 180-degrees it changes to 179.9 degrees, then technically it is no longer a “full moon.” At 179.9 degrees, there will be a portion of the hemisphere of the moon which faces us, however small, that will no longer be lit by the sun. Technically speaking, then, a “full moon” barely has an existence to speak of. But practically, that is, if we consider the appearance of the moon to our low-resolution eyes that it is “full,” will appear for several days in the daylight sky prior to the scheduled full moon.

For example, on March 1, 2018 the moon was scheduled to be full. On that day, in Philadelphia, the moon rose off the horizon at 5:39 pm at twilight. Technically, it was not yet “full,” although it looked full to our human eyes. During the same time on that day, the sun was just about to set behind the horizon. This means the sun and moon had not yet reached their 180-degree separation needed for a technical “full moon.” Let’s say, for argument’s sake, the sun and moon were between 175 and 179 degrees at 5:39 pm. During the night, however, as the sun and moon both kept moving, they eventually reached their 180-degree separation, which at this point will give us the technical “full moon,” and it will be in the night sky, long after 5:39 pm.

On the days prior, beginning with February 28, the moon rose at 4:25 pm and it looked full. It stayed in the daylight sky for the next two hours until 6:30 pm, at which time day turned to night in Philadelphia. On this day, the sun and moon were at less than 180-degrees apart, but far enough apart so that the sun lit a major portion of the moon, probably 95% to 99%. Since our eyesight is not able to resolve the difference between 95% lit and 100% lit, the moon will naturally look full to our eyesight. The same is true to a lesser degree on Feb. 27 when the moon rose at 3:15 pm in the day sky; and Feb. 26 when it rose at 2:00 pm in the day sky; and Feb. 25 when it rose at

1:05 pm in the day sky. On each of these days the moon would look full or near full to our eyes. Earlier, on Feb. 20 the moon rose at 9:26 am in the day sky; on Feb. 19 it rose at 8:56 am; and on Feb 18 it rose at 8:27 am, but on each of these days the moon would be seen nearer to a half moon or less, and moving closer to a crescent phase, since on those days the sun is much closer to the moon and the angle of separation is now much less than 180-degrees and approaching 90 degrees and less.



On Feb. 28, 2018, (above) the moon is rising from the East into the day sky at about 5:00 pm, as seen from Philadelphia...



Meanwhile, on the same day (Feb. 28, above) the sun is just about to set on the other side of the Earth. Since the angle between the sun and the moon is less than 180-degrees, we not only can see both of them in the day sky at

the same time, but the moon will look full to our eye resolution, a day before it technically will be full in the night sky of March 1, 2018.



On March 1, 2018, at the same time during the day (5:00 pm) in Philadelphia, the moon does not come to the same place in the day sky because now the separation between the sun and moon is reaching closer to 180-degrees and thus the moon is still below the Earth's horizon. It will not rise above the horizon until 5:39 pm.



All in all, TJ's view of the moon's phases does not discredit the heliocentric model, nor, by reciprocation, the Neo-tychonic geocentric model that has the sun and moon orbiting a fixed Earth.

By the same token, however, the flat Earth model will have a difficult time explaining why the moon, at a 180-degree angle with the sun, will be able to be full or even have any light at all, since the flat Earth model, in order to have day and night on a flat disc, must have the sun act as a “spotlight” to light up only a portion of the disc directly below it. If, as TJ requires, the “full moon” must be in the night sky, then where is the light source that is giving the moon its light? It can’t be coming from the sun, since not only is the Sun’s light being directed in the wrong direction (that is, orthogonal to the moon), the moon is simply too far away from the sun to get even a small portion of the sun’s light. This dilemma, of course, leads the typical flat-earth-er to claim the moon makes its own light, although TJ, not seeing his error concerning why the moon could look full in the day sky, saw no reason to suggest a flat-earth alternative to the moon’s phases since at this point his only motive was to attempt to discredit the heliocentric system. Neither of his two colleagues offered any analysis of the issue.



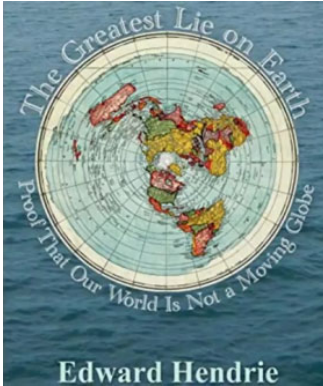
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⁶²⁶ “Salvator Mundi,” circa 1500s, artist unknown.

Gravity and the Vacuum of Space

In his book, *The Greatest Lie on Earth: Proof that Our World is not a Moving Globe*, author, Edward Hendrie writes:

Under the heliocentric theory, the earth is spinning at approximately 1,000 miles per hour at the equator.



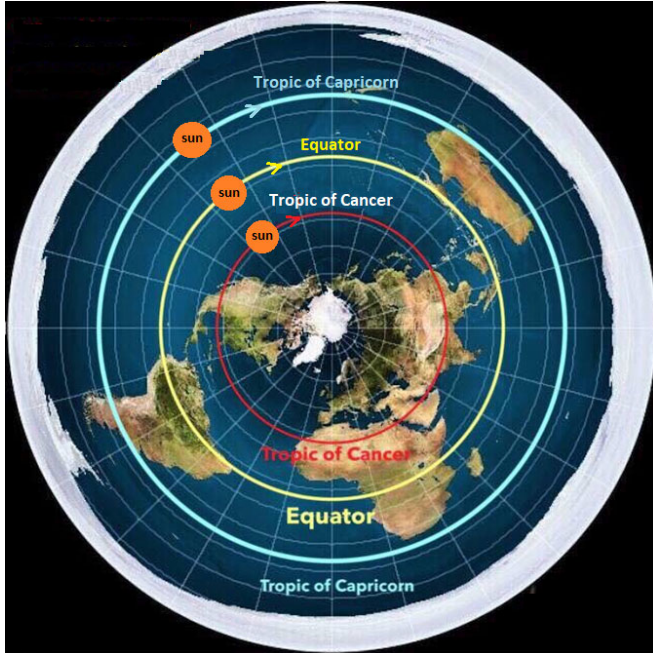
The heliocentric scientists had a problem with their theory. How could they explain how people, animals, and things do not feel the centrifugal force of the spinning earth? Isaac Newton saved the day with his theory of Gravity. Newton's theory of gravity supposedly acts as a centripetal force working against the centrifugal force of the hypothesized spinning earth. Gravity is necessary on a spinning

earth. But the earth is not spinning. On a stationary flat earth there is no centrifugal force. Since there is no centrifugal force, there can be no centripetal force. Hence, there is no gravity, because there is no need for the centripetal force of gravity on a flat motionless earth. Newton's theory of gravity is founded upon the premise that all objects are attracted to all other objects based upon their mass.⁶²⁷

Here we will see how the flat Earth model is hoist by its own petard. First, Hendrie claims gravity is needed only on a spinning body. The fact is that even a non-spinning body needs gravity to hold itself together; the objects on it; and the objects, if any, revolving around it. If there were no gravity on the moon, it would fall apart into dust, as would any celestial body. Unless the matter in a body is held together by some force, it will completely disperse, sooner or later. If for some reason it could stay whole, every time a meteor hit it (which is quite often as can be assessed by noting its numerous craters), the dust and dirt that are displaced by the meteor would simply keep floating away from the moon and the moon would be enveloped by a continual dust cloud. Since there is no atmosphere on the moon, it will have no effect on the outcome.

⁶²⁷ *Op. cit.*, p. 311.

Additionally, although the centrifugal force caused by the moon's single rotation per 27 days would be negligible, the more commanding force that must be dealt with is the centrifugal force on the moon caused by its velocity in revolving around the Earth. Since the centrifugal force is measured as mv^2/r , the force amounts to 1.7×10^{26} newtons.⁶²⁸ Without a centripetal force (gravity) to counteract that centrifugal force, the moon would simply fly off into space, not to mention that such a phenomenon would have happened long ago.

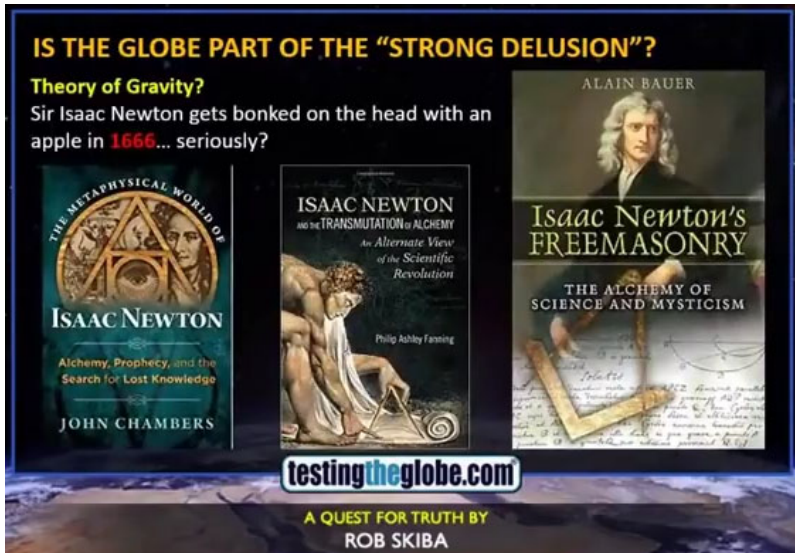


Even in the flat Earth model, the moon revolves around the Earth-disc once per day in an average equatorial circumference of 47,000 miles between the Tropic of Cancer and the Tropic of Capricorn, thus there would be a centrifugal force on the moon of 4.5×10^9 newtons.⁶²⁹ Without a centripetal

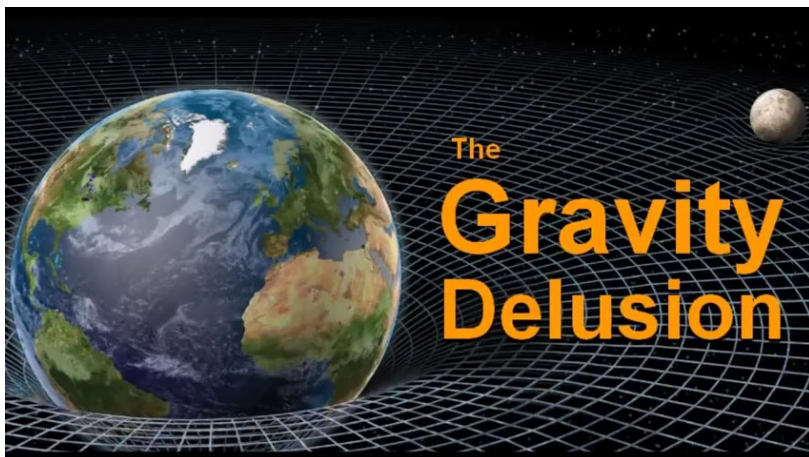
⁶²⁸ Using <http://www.calctool.org/CALC/phys/newtonian/centrifugal>, the mass of the moon is 7.35×10^{22} kg; the velocity (v) at the equatorial circumference is 2.42×10^6 km/day, which is 30 km/second; the radius between Earth and moon is 386,242 kilometers, the centrifugal force is 1.7×10^{26} newtons.

⁶²⁹ With an equatorial radius of 6000 miles or 10,000 kilometers from the Polaris/Earth axis; a mass of 50,000 kg (based on a 30-mile diameter); and 30 km/sec velocity, equals 4.5×10^9 newtons of centrifugal force.

force to counteract it, the moon would fly off the disc in a matter of seconds, and crash into the “dome.” The same would be true for the sun, since in the flat Earth model it is the same size as the moon and travels at close to the same velocity. Hence without an answer to counter the centrifugal force of their own celestial bodies, the flat Earth model will not work.



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⁶³⁰ <https://www.youtube.com/watch?v=dgGL-7H7vIw>, at 3:34, titled: “Occultist Isaac Newton: Father of Scientism Gravity Cult,” published Jan. 17, 2018.

⁶³¹ <https://www.youtube.com/watch?v=nG5zChy32KA>

The related problem for the flat Earth model is the question of how the sun and moon could even remain above the Earth's flat surface since the flat-earth's answer to gravity is attributed solely to buoyancy. Since the sun and moon would certainly be heavier and denser than the air in the dome, then both bodies should immediately fall to the flat Earth. Some flat-earthers try to escape this reality by claiming the sun and moon are not objects but only lights with their own source of energy, or energy from an unknown outside source, perhaps a hologram. But this explanation stretches the flat-earth theory into utter incredulity, since it is rather easy to see the sun and moon are material objects, with the only difference being the moon is solid material and the sun is gaseous material.

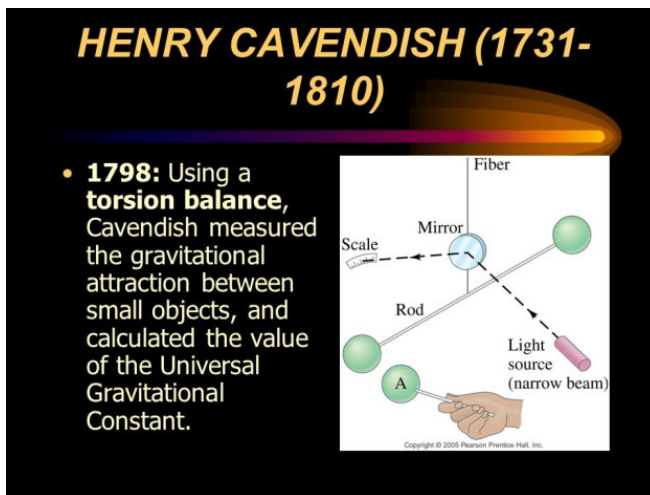
Hendrie then quotes from Eric Dubay to further establish his case:

This magnetic-like attraction of massive objects gravity is purported to have can be found nowhere in the natural world. There is no example in nature of a massive sphere or any other shaped-object which by virtue of its mass alone causes smaller objects to stick to or orbit around it! There is nothing on Earth massive enough that it can be shown to cause even a dust-bunny to stick to or orbit around it! Try spinning a wet tennis ball or any other spherical object with smaller things placed on its surface and you will find that everything falls or flies off, and nothing sticks to or orbits it. To claim the existence of a physical "law" without a single practical evidential example is hearsay, not science.⁶³²



⁶³² *Ibid.*, p. 312, from Dubay's, *The Flat Earth Conspiracy*, p. 114.

Dubay's example of the wet tennis ball that flings off water when spun is a misrepresentation. In order to mimic the proportions between gravity and centrifugal force, the tennis ball would need to be spun so that one spin occurs every 24 hours. Obviously, no drops of water will be flinging off a tennis ball with such a slow rotation. Be that as it may, Dubay's claim that there exists "no example in nature" obviously ignores the common torsion balance, first created by Henry Cavendish in 1797. It shows a gravitational relationship between even small tennis-ball-sized masses. One will also notice the movement of the the torsion balance is horizontal. This tells us the force pulling the torsion balance's mass to the stationary mass can occur from any direction, whereas buoyancy only operates vertically. As Wikipedia describes it:



The Cavendish experiment, performed in 1797–1798 by British scientist Henry Cavendish, was the first experiment to measure the force of gravity between masses in the laboratory and the first to yield accurate values for the gravitational constant. Because of the unit conventions then in use, the gravitational constant does not appear explicitly in Cavendish's work. Instead, the result was originally expressed as the specific gravity of the Earth, or equivalently the mass of the Earth. His experiment gave the first accurate values for these geophysical constants. The experiment was devised sometime before 1783 by geologist John Michell, who constructed a torsion balance apparatus for it. However, Michell died in 1793 without completing the work. After his death the apparatus passed to Francis John Hyde Wollaston and then to Henry

Cavendish, who rebuilt the apparatus but kept close to Michell's original plan. Cavendish then carried out a series of measurements with the equipment and reported his results in the Philosophical Transactions of the Royal Society in 1798....After converting to SI units, Cavendish's value for the Earth's density, 5.448 gcm^{-3} , gives $G = 6.74 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$, which differs by only 1% from the 2014 CODATA value of $6.67408 \times 10^{-11} \text{ m}^3 \text{ kg}^{-1} \text{ s}^{-2}$.⁶³³

Although some contend with these results,⁶³⁴ the fact remains Cavendish and many others who followed him were able to produce a torque just by the mere presence of two objects bigger than the objects attached to the ends of the torsion balance. Since no one has been able to prove the torque was caused by either electricity or magnetism, we then call this force "gravity," regardless whether we know why and how it works. Further, since there is no buoyancy that can be credited with the mutual horizontal attraction occurring in the Cavendish experiment, flat-earthers are quick to denounce the experiment or even ignore it since it obviously does not fit in with their "buoyancy" theory.

TRUTH #25 Gravity doesn't exist

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⁶³³ https://en.wikipedia.org/wiki/Cavendish_experiment. Various repetitions of the Cavendish experiment are available: [youtube.com/watch?v=EE9TMwXnx-s](https://www.youtube.com/watch?v=EE9TMwXnx-s); [youtube.com/watch?v=1lsLusnVZWm](https://www.youtube.com/watch?v=1lsLusnVZWm); [youtube.com/watch?v=UgWaYng2eRg](https://www.youtube.com/watch?v=UgWaYng2eRg), which shows how simple it is to repeat Cavendish's experiment.

⁶³⁴ Some denounce it claiming it has never been repeated ([youtube.com/watch?v=pJ-7kbaHUgM](https://www.youtube.com/watch?v=pJ-7kbaHUgM)), which is patently false; others say the movement is caused by static electricity in the laboratory (mathforum.org/kb/thread.jspa?messageID=7657321&tstart=0), which is also false; and others say it wasn't done to precision and it is presumption to attribute the torque to a "pull" of gravity, opting for a theory of gravity that is caused by the expansion of matter (e.g., Miles Mathis, which is akin to the theory by Mark McCutcheon in his book *The Final Theory*, both of which are unproven and unapplicable in many situations that gravity occurs, one of those being that Mathis has extreme difficulty in trying to explain the Cavendish experiment (milesmathis.com/caven.html). Similarly, some flat-earthers claim gravity is caused by Earth moving upward at a velocity of 9.8 meters per second, but the force of gravity is an acceleration of 9.8 meters sec.², which means earth would reach speed of light in one year in this flat Earth model.

⁶³⁵ <https://www.youtube.com/watch?v=NvG7b6acSTM>

After pointing out objects “weigh a fraction of a percentage less at the North Pole than at the equator,” Hendrie then says:

There is no such thing as gravity; gravity is not necessary on a flat earth. It is density that keeps objects from floating off the surface of the earth. People and objects are heavier than the air and therefore do not float off the ground. There are some gases, of course, that are lighter than air, and they float off the ground. Everyone has seen helium balloons float up in the air. Everyone understands that helium balloons are not some sort of anti-gravity devices; they float up in the air, because helium is lighter than air. Why do people not understand that apples fall from trees to the ground, not because of gravity, but because apples are denser than air? They believe in the mystical force of gravity, not because it has been proven true, but because they have been brainwashed into believing it.

Regarding the matter of buoyancy, to a man, flat-earththers claim this phenomenon as the sole reason why objects fall to earth. They are more or less forced to this position since if they admit gravity exists and it is caused by material objects attracting one another, they then must conclude it gives room for the heliocentric system that has the sun attracting the Earth by gravity and the Earth resisting by its own inertia so it can revolve around the sun.

In doing so the flat-earththers throw out the baby with the bath water since it can be shown quite easily that the geocentric Earth they covet can be explained by using the same gravitational and inertial forces used in the heliocentric system. If the Earth is the center of mass for the entire universe, all gravitational and inertial forces are neutral at the center; and thus whatever is placed in the center is immobile. As Newton himself put it: “That the center of the system of the world is immovable....This is acknowledged by all, although some contend that the Earth, others that the sun, is fixed in that center.”⁶³⁶ Moreover, even though Newton was a Copernican, he agreed that if proper forces from outside the universe were to balance with the forces in the solar system, the Earth could be the center

⁶³⁶ *Philosophiae Naturalis Principia Mathematica*, Book 3, “The System of the World,” Proposition X. In Proposition XI Newton adds: “That the common center of gravity of the Earth, the sun, and all the planets, is immovable. For that center either is at rest or moves uniformly forwards in a right line; but if that center moved, the center of the world would move also, against the Hypothesis.”

of the system and the sun would revolve around it. In a page formally destined to be the last page of his famous 1687 *Principia Mathematica*, Proposition 43, he states the following:

In order for the Earth to be at rest in the center of the system of the sun, Planets, and Comets, there is required both universal gravity and another force in addition that acts on all bodies equally according to the quantity of matter in each of them and is equal and opposite to the accelerative gravity with which the Earth tends to the sun...

For, such a force, acting on all bodies equally and along parallel lines, does not change their position among themselves, and permits bodies to move among themselves through the force of universal gravity in the same way as if it were not acting on them.

Since this force is equal and opposite to its gravity toward the sun, the Earth can truly remain in equilibrium between these two forces and be at rest. And thus celestial bodies can move around the Earth at rest, as in the Tychonic system.⁶³⁷

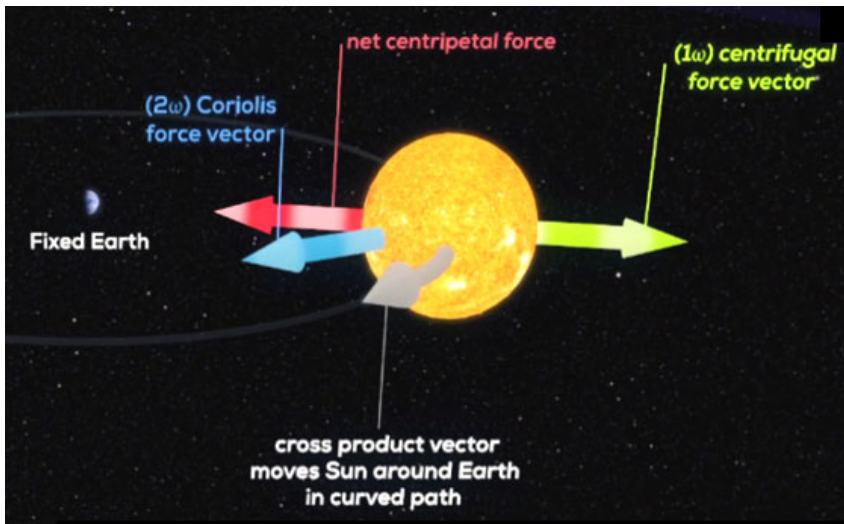
Several modern physicists have acknowledged Newton's alternative, one of them being the Nobel laureate, Steven Weinberg, in his 2015 book, *To Explain the World*. Weinberg reveals that in the view of modern physics, a rotating universe around a fixed Earth (the same system taught in Scripture) will create inertial forces that mimic the force of gravity, namely, the centrifugal, Coriolis and Euler forces. As the universe's inertial forces meet the gravitational forces in our solar system, they hold the Earth motionless

⁶³⁷ Latin: Ut Terra quiescat in centro Systematis Solis Planetarum & Cometarum, requiritur et gravitas universalis, et alia insuper vis quae agit in omnia corpora aequaliter pro quantitate materiae in ipsis et aequalis est gravitati acceleratrici qua Terra tendit in Solem, eique contraria est, tendendo secundum lineas parallelas in plagam eandem cum linea quae ducitur a centro Solis ad centrum Terrae...Nam talis vis in corpora omnia aequaliter & secundum lineas parallelas agendo situm eorum inter se non mutat sed sinit corpora eodem modo per vim gravitatis universalis inter se moveri, ac si non ageret in eadem. Terra vero, cum haec vis gravitati ejus in Solem aequalis sit & contraria, in aequilibrio inter has duas vires manere potest et quiescere. Et sic corpora caelestia circa Terram quiescentem moveri possunt ut in Systemate Tychonico. My thanks to George E. Smith of Tufts University for the granting of his essay for my use, titled: *Newtonian Relativity: A Neglected Manuscript, an Understressed Corollary*, and the accompanying Power Point presentation, in email of August 8, 2015.

in space and allow the sun, moon and stars to revolve daily around the central Earth. In an article at Wikipedia specifically concerning the Coriolis force, the authors show how it works.⁶³⁸

It is noted that the Coriolis acceleration cancels the centrifugal acceleration, and together they provide a net “centripetal,” radially inward component of acceleration that is, directed toward the center of rotation.

We can picture these forces at work in the animation below. The green vector is the 1ω centrifugal force; the blue vector is the 2ω Coriolis force; the red vector is the net centripetal force; and the gray vector is the cross product of the centrifugal and Coriolis forces that gives the resulting curved direction of the sun around the Earth.



As illustrated in the above image, although the revolving sun will have a centrifugal force that will seek to move it out in a radial direction, the Coriolis force will counteract the centrifugal force and the result is a net centripetal force on the Sun to keep it in orbit around the Earth, similar to when, in the heliocentric system, the sun, by its gravity, is said to put a

⁶³⁸ https://en.wikipedia.org/wiki/Coriolis_force, downloaded 08-26-2017

centripetal force on the revolving Earth. In this way, the geocentric inertial forces mimic or are akin to the heliocentric gravitational force.

Hence by expanding Newton's mechanics to the rest of the universe—which, in Newton's case, means his "absolute space" will be made to rotate around a fixed Earth—the inertial effects become *real* forces caused by the angular momentum of the massive universe. In this way, the universe's inertial forces contribute to the movement of everything from the revolutions of the celestial bodies to the directions of hurricanes on Earth and the turning of the Foucault pendulum. Inertial forces will likewise pull the planets around the sun and pull the sun and moon around the Earth.⁶³⁹

In turn, one way in which the flat-earthier might be able to discredit the Copernican view is the equations inherent in Newtonian mechanics for the orbits of planets around the sun require the centrifugal force to be "fictitious," and it is because of this factor that most modern physicists realize there is a "defect" in Newton's equations.⁶⁴⁰ In Newton's equations, the centrifugal, Coriolis and Euler are "effects" of motion instead of real forces. Hence one could argue that if they are not real, then what is, in real terms, counteracting the pull of gravity, which is a real force in the

⁶³⁹ The derivation of the reciprocity between the inertial forces and gravity has been produced by many physicists (e.g., Hans Thirring, "Über die Wirkung rotierender ferner Massen in der Einsteinschen Gravitationstheorie," *Physikalische Zeitschrift* 19, 33, 1918, translated: "On the Effect of Rotating Distant Masses in Einstein's Theory of Gravitation"; Julian Barbour & Bruno Bertotti, "Gravity and Inertia in a Machian Framework," *Il Nuovo Cimento*, 38(1): 1-27, 1977. Julian Barbour appears in my movie, *The Principle* (2014), in which he explains the Machian framework. Joseph Rosen, "Extended Mach's Principle," *American Journal of Physics*, Vol 49, No. 3, March 1981; William G. V. Rosser (*An Introduction to the Theory of Relativity*, 1964, who expanded on Thirring's paper and noted that the universe's rotation can exceed c by many magnitudes; Christian Møller, *The Theory of Relativity*, 1952, who also extended Thirring's paper using a ring universe rather than a shell; G. Burniston Brown, "A Theory of Action at a Distance," *Proceedings of the Physical Society*, 1955, who discovered geocentrism based on Newtonian physics; Parry Moon & Domina Spencer, "Mach's Principle," *Philosophy of Science*, 1959, who arrive at geocentrism using Mach's principle; J. David Nightingale, "Specific physical consequences of Mach's principle," 1976, who transposed the Einstein equation of Mach's principle into Newtonian physics for a geocentric universe.

⁶⁴⁰ Per Mach and Einstein.

Newtonian system so the Earth is not pulled into the sun? The usual answer is the Earth, because it is already moving, has the “inertia” to keep moving in a straight line, following Newton’s First Law of motion that “a body in motion will continue in motion unless acted upon by a net external force.” It is for this very reason Newton invented his concept of “Absolute Space,” since if a body is defined as traveling in a “straight line,” such a line can only be straight if it has an absolute or “straight” background to determine it is traveling straight (as opposed to traveling in a curved line, ala Einstein’s “curved space” and geodesic lines). Newton’s assumption of Absolute Space and inertia, of course, brings up the whole question of what “inertia” is – a question that Newton never really answered, and as such, the origin of inertia has been a hotly debated topic to this very day.

The other option, as we noted earlier, is inertia is not an inherent quality of matter but is, rather, the result of other forces keeping a body in motion, such as the real inertial forces (centrifugal, Coriolis and Euler) created by a universe rotating around a fixed Earth. In this system, there are no “fictitious” forces and therefore no “defects” to overcome. The haunting question left to modern physics is, which one is the reality? One that depends on not only a fictitious “absolute” space and fictitious inertial forces, or one that has a moving space (a rotating universe) that creates real inertial forces that can physically counteract the force of gravity?

We can see more repercussions of the “defect” in Newton’s system by analyzing how Newton calculated the amount of the centrifugal “effect” that a rotating object incurs. In the Newtonian system, the centrifugal component that counteracts the centripetal pull of gravity is noted as,

$$F = mv^2/r \quad (1)$$

...which is read, Force_{centrifugal} = mass of the object multiplied by its velocity squared, divided by the radius from the sun to the planet.

Incidentally, the equation is derived from Newton’s Second Law,

$$F = ma \quad (2)$$

...which is read, $\text{Force}_{\text{gravity or centrifugal}} = \text{mass} \times \text{acceleration}$, where a (acceleration) can be substituted for v^2/r as noted above, and thus the equations are equivalent. Thus we can say,

$$F_{\text{gravity}} = F_{\text{centrifugal}} \quad (3)$$

Since that is the case, we can also incorporate Newton's gravitational equation between two bodies (*e.g.*, the sun and the Earth) since this equation will also give us the force (in addition to $F_{\text{gravity}} = F_{\text{centrifugal}}$), which is,

$$F_{\text{gravity}} = Gm_1M_2/r^2 \quad (4)$$

...which is read, $\text{Force}_{\text{gravity}} = \text{mass of Earth } (m_1) \text{ multiplied by mass of sun } (M_2)$, divided by the radius between them squared. As such, then,

$$mv^2/r = Gm_1M_2/r^2 \quad (5)$$

But this presents a very real problem for Newtonian physics, since the math allows us to cancel the small m (mass) of both sides of the equation to get,

$$\cancel{m}v^2/r = G\cancel{m}_1M_2/r^2 \quad (6)$$

So that we end up with,

$$v^2/r = GM_2/r^2 \quad (7)$$

The problem is that the original Newtonian equation (#4) for how the Earth orbits the sun in the Copernican system depends both on the sun (M_2) and the Earth (m_1) but the reduced equation (#7) eliminates not only the Earth, but every other planet that is said to revolve around the sun. But since Newton's gravitational equation (#4) incorporates both the mass of the Earth and the mass of the sun, how can the final equation (#7) eliminate the mass of the Earth and still be valid? If there is no mass in equation (#1), then there is no Force. Likewise, if there is no m_1 in equation (#4), then there is no Force, since all the mass must be multiplied to reach the total mass. This may be a case in which the invention of Absolute Space and the inclusion of inertial forces as mere "fictitious" effects are coming back to haunt Newton.

We should also mention at this juncture that Aristotle's view of the universe, although still having some primitive ideas (*e.g.*, crystalline tubes in which the planets move), is very close to the universe rotating around a fixed Earth. In his book, *On the Heavens*, 2:14, Aristotle says the Earth rests upon itself because it is in the center of the universe, which is the place toward which all massive bodies move. Perhaps, unwittingly, Aristotle hit upon not only the shape and location of the Earth, but why, scientifically, all bodies of the universe would revolve around it by accelerating toward the universe's center of mass:

It happens, however, that the center of the earth and of the whole is the same. Thus they do move to the center of the earth, but accidentally, in virtue of the fact that the earth's center lies at the center of the whole. That the center of the earth is the goal of their movement is indicated by the fact that heavy bodies moving towards the earth do not parallel but so as to make equal angles, and thus to a single center, that of the earth. It is clear, then, that the earth must be at the center and immovable, not only for the reasons already given, but also because heavy bodies forcibly thrown quite straight upward return to the point from which they started, even if they are thrown to an infinite distance. From these considerations then it is clear that the earth does not move and does not lie elsewhere than at the center....Its shape must necessarily be spherical.⁶⁴¹

Augustine reiterated this Aristotelian model of the universe:

"Let not the philosophers, then, think to upset our faith with arguments from the weight of bodies; for I don't care to inquire why they cannot believe an earthly body can be in heaven, while the whole earth is suspended on nothing. For perhaps the world keeps its central place by the same law that attracts to its center all heavy bodies."⁶⁴²

One might ask if gravity would work on a flat Earth. The answer is negative. The reason is gravity is a force that not only attracts one material object to another, but also a force in which the molecules of a material object are attracted to the other molecules of that material object. As such, once an object gets to be a certain size and the gravity force within itself becomes

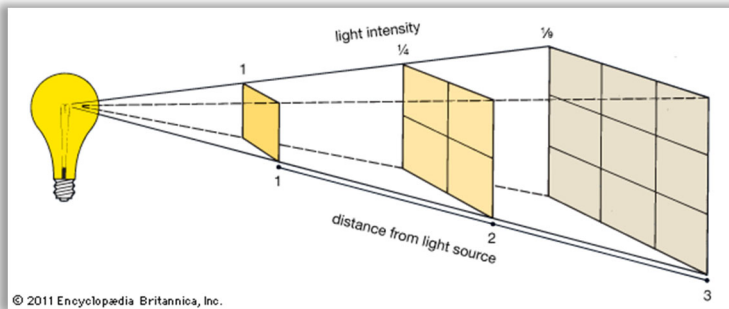
⁶⁴¹ Original in Greek, titled *De Caelo*, written in 350 BC.

⁶⁴² *City of God*, Book 13, Chapter 18.

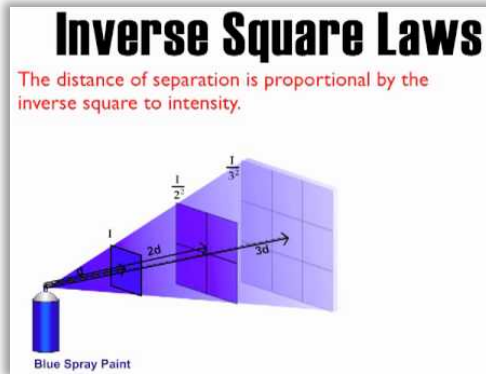
greater due to the greater mass, at a critical point, the molecules will attract each other to the point they will seek the shortest possible distance between themselves and thus will roll up into a sphere. The only thing we know of in space that does not roll up into a ball is an asteroid, but that is because asteroids don't have enough mass to create enough gravity so that the object will relieve the pressure by turning into a ball.

The tendency to form into a sphere is also determined by the material composition of the object. If the mass were made of iron, the tendency to roll up into a ball due to gravity would be minimized due to the strength of the iron to maintain its shape. But if the object were made of liquid magma or elements and loosely compressed dirt and water on its surface (as would be the case for a flat Earth, which is 75% - 80% water), then the tendency to roll up into a ball to maintain inertial and gravitational equilibrium is very great.

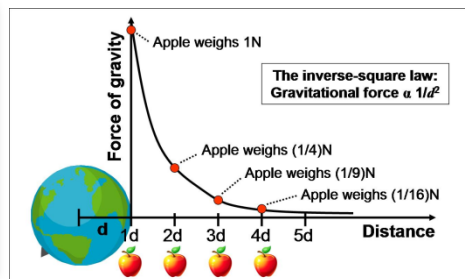
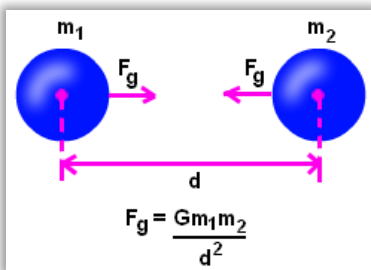
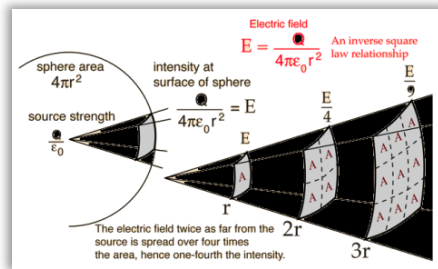
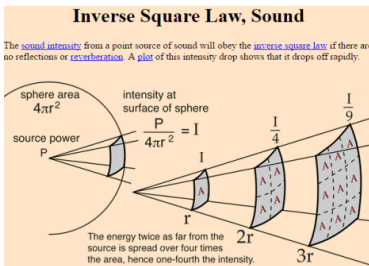
Since huge masses will seek to form a spherical structure, gravity, as measured by equation, is a radial force. This means that gravity radiates outward from all points from its center, just as a light bulb radiates its light in spherical waves. This is why gravity is measured by the inverse square law, since anything radiating at an angle (*e.g.*, from a spherical body) will diminish by four for every doubling of the distance.



Actually, the inverse square law is a common geometric calculation of anything that radiates outward at an angle. Even a can of spray paint obeys the inverse square law, since the paint discharged close to the nozzle is always denser than the paint farther away.



This is the same reason that Coloumb's equation for the attraction and repulsion of electric charges ($F = km_1m_2/r^2$) has the same structure as Newton's law for the attraction of gravity ($F = Gm_1m_2/r^2$), which, except for the coefficient, is the same for the dispersion of sound waves, since all waves radiate outward at an angle.



In fact, the similarity of Coulomb's equation and Newton's equation has led some to postulate gravity is caused by electricity. The problem here, however, is that electromagnetic energy does not affect things such as rubber and other such inert materials; and affects different metals

differently, but gravity affects every material object the same, without distinction, and the force and effects on the respective objects are always the same.

Flat-earthers complain, nonetheless, that some phenomena do not seem to make sense with the notion of gravity. For example, some say that if gravity is able to hold vast oceans to the surface of the Earth, then why can't it pull down a bird in flight? Intuitively, this seems like a legitimate objection since the oceans are so massive and a bird is so small. First, the fact is that the oceans have no means of escaping the Earth's gravity, whereas a bird, by flapping its wings, creates a vacuum above its wings that allows it to counteract the force of gravity. Once it stops flapping its wings, it will fall to the Earth just as sure as ocean waves crash on the shore.

Second, the bird needs only create a small partial vacuum to escape Earth's gravity because the force of gravity on the bird is small. If gravity is measured by $F_g = Gm_1M_2/r^2$, wherein m_1 is the bird and M_2 is the Earth, this means that the smaller m_1 is, the less the mutual pull of gravity will be between two objects. A bird is very small compared to the oceans. The oceans comprise 75% of the Earth's surface and have a depth of a few miles. Hence the m_1 of the oceans is very large, which means the mutual pull of gravity between the lower land mass (M_2) and the oceans (m_1) is also going to be very large.

Still, flat-earthers assert it is quite clear buoyancy is involved as to why things either fall to Earth or rise above the Earth, and they are correct. On Earth, both gravity and buoyancy are involved as the reason why objects fall to Earth. On the moon, however, since it has no atmosphere, only gravity is involved. In fact, since the moon is so small it cannot create enough gravity in order to hold an atmosphere. This is the same reason why the planet Mercury has no atmosphere, since the gravity force in the opposite direction is not great enough to counter the vacuum of space. Conversely, Venus, Jupiter, Saturn, Uranus and Neptune, since they have much greater mass, are able to create sufficient gravity to hold down an atmosphere. Mars has a very thin atmosphere (about one hundredth of the Earth's) and is 95% carbon dioxide, which is heavier than air. This amount of atmosphere is all it can hold, since Mars is smaller than the Earth.



The important task is to separate the effects of gravity from the effects of buoyancy. The first thing that must be realized is in order to have buoyancy we must have gravity. The larger the mass of the body, the larger the gravity force against the vacuum.

In order for buoyancy to do its work, the mass of air or water that is going to create the buoyancy must itself be stable and be held to the ground. As such, the Earth's air is held down by Earth's gravity, otherwise the air would dissipate into space. Whatever is at the bottom of the pile that creates the buoyancy for whatever is in the middle and at the top, that substance must be held down by something other than buoyancy, since buoyancy has no power to keep it all in one place. Buoyancy is not an absolute force; rather, it is a relative force to the things it contains. For example, if someone were to ask: "What allows a helium balloon to rise?" the answer would be: "Because helium is lighter or less dense than air." Likewise, if someone asks: "What causes clouds to keep above the ground?" the answer is: "Because water vapor is lighter or less dense than air." Again, if someone asked: "What causes the air to be above the ground?" the answer would be: "air is lighter or less dense than the ground." But if someone were to ask: "What causes the ground to remain stable and not move outward, since below the ground is only more ground, especially on places like the moon where there is no air?" the answer could not be buoyancy, since buoyancy must have two or more substances in order to operate. Since the moon is all "ground," there is only one substance. On the Earth, perhaps, someone could

say the ground stays in one place by the pressure of the air against it, but this can be countered by asking what keeps the air in place over the ground, since above the air is the vacuum of space. Why doesn't the air just go off into space?

What all these questions and answers tell us is there are two factors, working together, buoyancy and gravity, at least on bodies that have an atmosphere. But the nod for the force most responsible goes to gravity, because gravity can operate without buoyancy (as in the case of the moon holding its ground together so that it doesn't fly off), but buoyancy cannot operate without gravity (in the case of the Earth holding its air so that it doesn't dissipate into the vacuum of outer space).

Interestingly enough, most flat-earththers believe there is a dome covering the Earth upon which water rests (*e.g.*, "the waters above the firmament"). But if there is no gravity, then what is keeping the water on the dome? Why doesn't the water just diffuse into space? Moreover, if water always "assumes its own level," then why does this water assume the shape of a dome and have a curve on its surface?

As we can see, it is futile for flat-earththers to argue there is no such thing as gravity and all circumstances can be satisfied by buoyancy. To be fair, there are some flat-earththers who recognize gravity and buoyancy work in tandem, such as Globebusters' host "Bob." In one show he states:

Yes, we have to agree. Even in our model, or my model, or whoever's model it is—I just reinterpreted it and I agree with it—that gravity is nothing less than an electro-static force that determines up from down and after that the buoyancy/density argument takes over.⁶⁴³

So in Bob's flat Earth, gravity does exist, although he believes it can be attributed to electro-static force, whereas other scientists would disagree, since electro-static force has no effect on objects that are inert to electricity, whereas gravity affects all objects, from tiny atoms to large stars, and even affects electricity and electro-static forces. In the larger picture, gravity's

⁶⁴³ <https://www.youtube.com/watch?v=pvuNdrV30Kc>, at 2:18:08.

ubiquitous and indiscriminate effects are precisely what makes gravity and its cause so powerful yet so mysterious.⁶⁴⁴

Hendrie then concludes with the following:

Gravity is more akin to a heathen religious belief, than it is a scientific theory. The “scientists” promoting gravity are like priests in a religious cult who have immortalized the man who first postulated gravity and follow the gravitational theory like some religious dogma....What then was the source of the theory? S. Pancoast reveals that “the law of attraction and repulsion” in the Kabbalah was popularized under the name “gravity” by Isaac Newton.⁶⁴⁵

In essence, this is little more than the logical fallacy of *argumentum ad hominem*. It is a fact, well known, that most of the world’s scientists are either agnostic or atheistic. In many cases they do their experiments and make their conclusions based on presuppositions and prejudices. By the same token, various Christians do the same with the Bible. They have preconceived ideas of what the Bible says and then make conclusions in line with their preconceived ideas. Both institutions are at fault. The one thing everyone possesses is the scientific data. Whether one is interpreting the data correctly is another case altogether. Since interpretation is invariably influenced by one’s presuppositions and prejudices, it is rare we arrive at the correct interpretation of the data. As scientists show their bias by inventing such things as the Big Bang, inflation, dark matter and dark energy; Christians show their bias by inventing things such as a flat Earth with a dome and an ice wall. The so-called “Zetetic” philosophy, which more or less rejects any force it can’t see, rejects gravity because it can’t “see” gravity. In reality, flat-earthers also can’t see the density of atoms and molecules that cause buoyancy. They only see the effects of buoyancy. Similarly, we can’t see the energy particles or waves of magnetism, electricity, or sound, but we can certainly see their effects and we can measure them quite precisely. It would be totally unscientific to deny

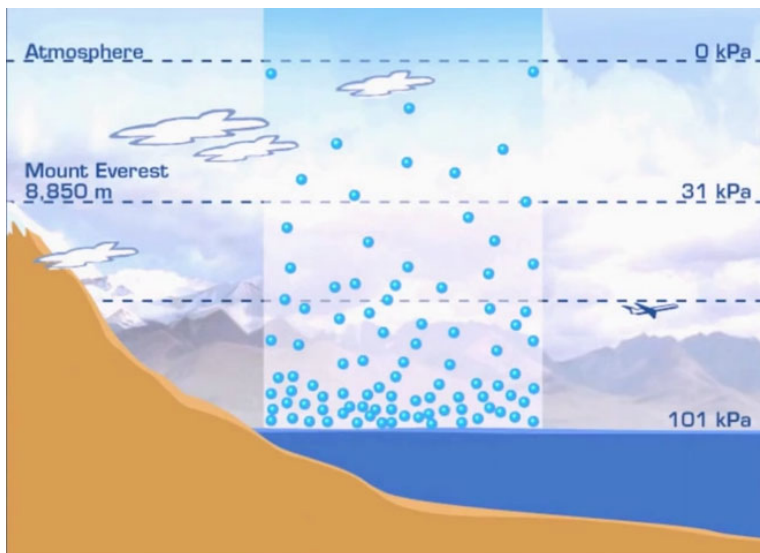
⁶⁴⁴ See my book, *A Googolplex of Tiny Blackholes: A Theory for the Cause of Gravity, Inertia and the Speed of Light*, CAI Publishing, Inc., 2016.

⁶⁴⁵ *Ibid.*, pp. 313, 315.

magnetism, electricity or sound simply because we can't see their inner workings.

Flat-earththers have additional reasons for their reluctance to accept gravity. One claims that air pressure is what keeps us bound to the Earth. Since our air pressure at the surface is 15 lbs./in², for flat-earththers this is a sufficient force. But there are two misconceptions here. First, air pressure is a force moving at every angle against each object on Earth—from the top, sides and bottom, not just the top. The pressure is equilateral, not merely vertical.

Second, it is precisely gravity that causes air pressure. Since molecules of air have mass, gravity will pull downward on that mass just as gravity will pull a rotten apple from a tree. In fact, if air were made of apples, the apples would pile upon the Earth and stack thousands of miles high. Since the apples at the bottom have to support all the mass of all the apples above them, the weight of the mass of apples will be more at the bottom than the top. Since gravity lessens with distance, there will be a point at which the apples above will start to separate from each other and thus the mass of apples will become less dense, just as air is thinner the higher we are above the Earth.



Another objection concerns the popular test in which a heavy ball is dropped at the same time as a feather in a vacuum.



As we all know, the ball drops at the same rate as the feather because there is no air resistance against the feather to stop it from falling. One flat-earther explains it as follows:

This can be put down to the fact that...the vacuum is less dense than anything else, so everything will fall through it at the same rate of speed. It does not have anything to do with the mass of the Earth beneath it.⁶⁴⁶

This flat-earther assumes the feather and ball will fall at the same rate because a vacuum is less dense than both. We can first examine this assumption on the metaphysical level. If the vacuum is “less dense,” then what is the substance of a vacuum? How does he know the vacuum is less dense than a feather or a bowling ball? In other words, he must assume something he cannot see or test, which is not allowed by Zetetic science. Modern science holds in theory the vacuum is actually one of the densest materials known, based first on the fact that “nothing” cannot exist. A vacuum must be composed a “something.” Since it is a something, then it must fill every space completely so there are no gaps at any time. Its particles must also be so small they would allow much bigger objects to pass through without friction, which would require an extremely dense yet super-granular substance as their medium. This means that 99.9+% of the feather and the bowling ball must consist of this unique substance, since the atoms of the feather and ball are spread out; and the atoms themselves, except for the protons and electrons, are 99.9% open.

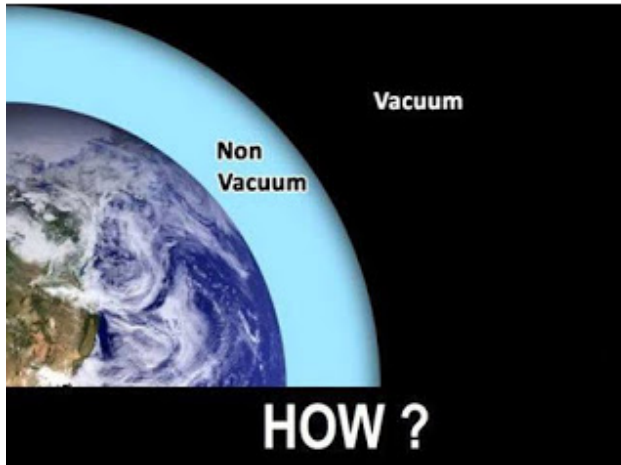
⁶⁴⁶ <https://www.youtube.com/watch?v=RdXrAZbK69c&index=11&list=PL9bIz6Hi9BApGWAdq5uR6F7dhqn2-d0nN>, at 3:25.

Second, since the rate of movement based on buoyancy depends on the density of the object, it is necessarily the case that a substance is just a little bit more dense than its medium will travel through the medium slower than a substance that is much denser than the medium. This can be tested quite easily. In a bathtub, with your hands, submerge a bar of Ivory soap (which floats on water) and a small ball filled with air. Release them at the same time. You will see both rise, but the Ivory bar will rise slowly and the ball filled with air will rise so fast it will shoot out of the water. Something similar will happen if we have a glass container filled with oil, water and gelatin. If we shake up the container, the three liquids will partially mix, and then they will begin to separate and form three layers with the gelatin at the bottom, the water in the middle, and the oil on top, but this process will take a few seconds to reach equilibrium due to friction and pressure. We could make it go a little faster if we replace the gelatin with sand. Since sand is denser than gelatin, it will fall to the bottom faster.

In any case, the point in this experiment is to show that if movement is based purely on buoyancy, it is a slow process compared to gravity. Hence whatever density the flat-earthier wants to assign to a “vacuum,” it will always be the case that the less dense of the two objects he allows to fall in the container will fall slower than the denser object. Such is the nature of buoyancy. If the flat-earthier instead wants to argue a vacuum has no density, then he has defeated his own argument—an argument that claimed a “vacuum” is less dense than either a feather or ball. Conversely, those who understand gravity as the cause for why the feather and ball fall at the same rate in a vacuum argue that when the buoyancy factor is minimized or removed, the bodies will naturally fall at the same rate since in a vacuum the elements of density and friction have been removed. In a vacuum, the rate of acceleration in free fall is $9.8 \text{ meters/second}^2$, but anything outside of a vacuum will have less acceleration due to density and friction.

The Vacuum of Space versus Gravity

Flat-earthers, at least those who believe the Earth is flat with a dome over it, argue that a spherical Earth could not exist in the vacuum of space since the vacuum is so strong it would diffuse the atmosphere and make life impossible on Earth. Instead, the flat-earthers maintain that only a dome, which would protect the Earth and its atmosphere from the vacuum, would allow for life to exist on Earth.⁶⁴⁷



⁶⁴⁷ <https://www.youtube.com/watch?v=2TebGSZ2EQE>, a “Globebusters” video published Feb. 14, 2018, beginning at 9:48. See Globebusters on this topic also at <https://www.youtube.com/watch?v=UvgKRld18d8>, published March 5, 2018.

Various charts of the strength of a vacuum are displayed, such as the one below.

Pressure ranges of each quality of vacuum in different units			
Vacuum quality	Torr	Pa	Atmosphere
Atmospheric pressure	760	1.013×10^5	1
Low vacuum	760 to 25	1×10^5 to 3×10^3	1 to 0.03
Medium vacuum	25 to 1×10^{-3}	3×10^3 to 1×10^{-1}	
High vacuum	1×10^{-3} to 1×10^{-9}	1×10^{-1} to 1×10^{-7}	
Ultra high vacuum	1×10^{-9} to 1×10^{-12}	1×10^{-7} to 1×10^{-10}	
Extremely high vacuum	$< 1 \times 10^{-12}$	$< 1 \times 10^{-10}$	
Outer space	1×10^{-6} to $< 1 \times 10^{-17}$	1×10^{-4} to $< 3 \times 10^{-15}$	
Perfect vacuum	0	0	0

The popular flat-earther, Mark Sargent, holds the vacuum of space presents such a problem to science he includes it in his top five challenges to his opponents.⁶⁴⁸ On the vacuum he writes:

The force of a vacuum (sic) is measured in units of Torr. Even a low-level vacuum can overcome gravity here on the surface. In building molecule free chambers for the manufacturing of electronics, a series of massive pumps are needed to create a 99% vacuum environment (negative 9 Torr), and for the remaining 1%, horsepower isn't enough. It can only be achieved by a chemical leeching process. That being said, how is the negative 10 Torr vacuum force of space not ripping off the atmosphere of this world? Gravity is a strong force as well, but remember that there are gasses that already defy it, like helium, hydrogen, and fluorocarbons. Isn't it more logical to suggest that the atmosphere is being contained in an enclosed pressurized system?⁶⁴⁹

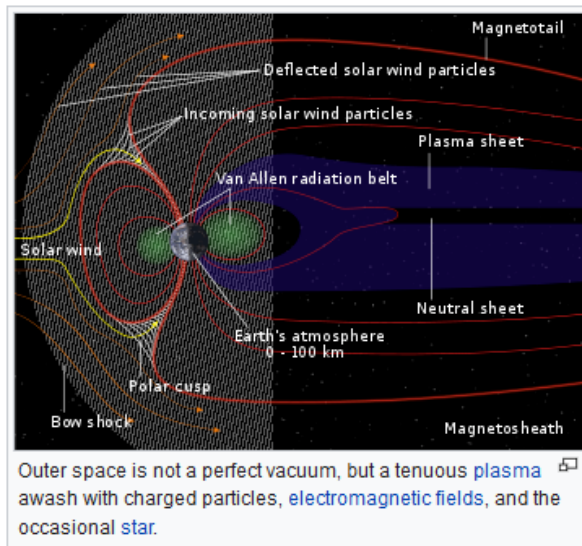
The premise of the argument is the vacuum of outer space is so strong (*i.e.*, 10^{-6} to 10^{-17} Torr) that without protection by some kind of vacuum-sealed container (*e.g.*, a dome), all the Earth's air would be diffused into outer space and leave nothing left on Earth. Likewise, the sun, moon and planets would also be protected since they are all in the dome.

⁶⁴⁸ The other four challenges are: 1. Long distance photography; 2. Eclipse shadow; 3. Moon temperature; 4. Van Allen belt trap.

⁶⁴⁹ Titled: "Questions from a Flat Earther to any mainstream scientist."

The first problem is flat-earthers do not know what the Torr measurement of outer space is. They assume it would be between 10^{-6} and 10^{-17} , which itself, being 11 orders of magnitude difference, reveals no one is certain of the true value. If it is closer to 10^{-6} , then it fits within the margins of a “high vacuum,” which can be duplicated on Earth. Even NASA O-rings for the ISS spec to 10^{-8} Torr. The old cathode ray tubes used for first generation televisions had a Torr of 10^{-7} to 10^{-10} , which is considered a high to ultra high vacuum.

Conversely, if the vacuum of outer space is any stronger and leans toward the 10^{-17} Torr, then the flat-earthers are going to have the same problem they claim against the spherical model. Unless the seal between their alleged “dome” and the Earth is super tight and has super longevity, there will be leaks in the system as the vacuum outside the dome will seek to reach equilibrium with the pressure in the dome. Or, what is to stop a vacuum of 10^{-17} from ripping a dome off its foundation? The other problem, of course, is no flat-earther has ever shown where the alleged dome is or what its substance is, the very thing Zetetic philosophy requires of them before any conclusions can be made. We have already seen in our biblical analysis there is no dome above the Earth, and the Hebrew word *raqiya* refers to the space of both the first and second heavens, but space that is “something” and has substance; not “nothing.”



Second, since above Sargent refers to the Earth's gravity as a major player in why it can retain its atmosphere, this begs the question as to the actual force of Earth's gravity on the atmosphere. The actual mass of Earth's atmosphere is 5.148×10^{18} kg. The Kármán line, which is the line in which the atmosphere is sufficiently thin so as to distinguish it from outer space which has no atmosphere, is about 100 km.⁶⁵⁰

The mass of the Earth is 5.972×10^{24} kg. If we plug these figures into the Newtonian equation for the force of gravity: $F_g \text{ (N)} = GM_1M_2/r^2$ then $F_g = 2.05 \times 10^{25}$ newtons.⁶⁵¹ Earth's surface is 5.101×10^{15} millimeters², and there is 10^{-6} Torr or 1.3×10^{-10} newtons/millimeters² of outer space vacuum against the surface. We then divide 2.05×10^{25} by 5.101×10^{15} the result is 4.0×10^{11} newtons/millimeters² of gravity, which more than compensates for the 1.3×10^{-10} newtons/millimeters² of vacuum. Hence the atmosphere can be held down by the Earth's gravity, at least up to 100 km above the Earth. Since gravity tapers off with distance, at some point after 100 km the Earth's gravity can no longer hold its atmosphere to any negligible value and thus this is where outer space begins.

⁶⁵⁰ According to Wikipedia: (<https://en.wikipedia.org/wiki/Vacuum>): "The Earth's atmospheric pressure drops to about 3.2×10^{-2} Pa at 100 kilometres (62 mi) of altitude, the Kármán line, which is a common definition of the boundary with outer space. Beyond this line, isotropic gas pressure rapidly becomes insignificant when compared to radiation pressure from the sun and the dynamic pressure of the solar winds, so the definition of pressure becomes difficult to interpret. The thermosphere in this range has large gradients of pressure, temperature and composition, and varies greatly due to space weather. Astrophysicists prefer to use number density to describe these environments, in units of particles per cubic centimetre. But although it meets the definition of outer space, the atmospheric density within the first few hundred kilometers above the Kármán line is still sufficient to produce significant drag on satellites. Most artificial satellites operate in this region called low Earth orbit and must fire their engines every few days to maintain orbit. The drag here is low enough that it could theoretically be overcome by radiation pressure on solar sails, a proposed propulsion system for interplanetary travel. Planets are too massive for their trajectories to be significantly affected by these forces, although their atmospheres are eroded by the solar winds."

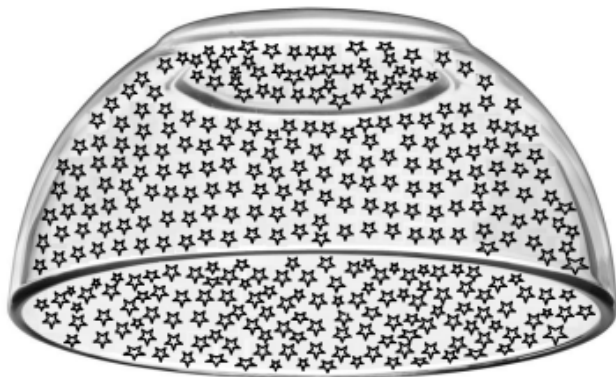
⁶⁵¹ This result is based on $r = 100$ km, which is the distance between the Earth's surface and the top of the atmosphere. If we used the radius of the Earth (6397 km), the result would be $F_g = 4.8 \times 10^{19}$ newtons.

We would also expect that very light elements, such as hydrogen and helium, will escape Earth's gravity much easier since they will initially rise to the top of the atmosphere due to their low density, and thus escape the atmosphere altogether. This effect can be measured. The precise amount of hydrogen and helium that leave the atmosphere each day is known, except hydrogen has a tendency to form water and thus does not escape proportionately as much as helium. Helium is inert and thus can't form heavier compounds to stay within the atmosphere.

Other factors affordable in a geocentric universe may also be involved in how Earth retains its atmosphere. The fact that the Earth does not spin helps because there is no centrifugal force on the atmosphere. For each of the planets that spin, the centrifugal force is compensated by the fact that these planets contain elements and compounds that are heavy compared to free nitrogen and oxygen in Earth's atmosphere (*e.g.*, the other planets contain heavy compounds such as sulfuric acid, methane, carbon dioxide, *etc.*).

By the same token, the rotating universe of the geocentric system, by its angular momentum, will create inertial forces above the center of mass (the Earth) such as the Coriolis force on the Earth's surface. Since the Coriolis is twice the centrifugal force, it results in a centripetal force on Earth's atmosphere, tying it more firmly to the Earth. We can see the residual effect of the universe's Coriolis force on the surface of the Earth as it determines in which direction a hurricane will turn, that is, counterclockwise in the northern hemisphere and clockwise in the southern hemisphere; or why a Foucault pendulum swings the opposite way in each hemisphere; or why the Sagnac effect occurs with opposite motions in each hemisphere.

We should also add that these force phenomena have no counterpart in the flat Earth model. The only thing flat-earthers have to offer is an enclosed system protected by a 3,000-mile high dome, but in this case the medicine is worse than the disease since a dome will entrap every lethal radiation emanated by everything from the sun to unstable isotopes. Moreover, the heat alone, since it cannot escape upwards through Earth's atmosphere and dissipate into space, would cook the human race in a matter of minutes, and there certainly would be no ice wall due to the extreme heat. The temperature under a sealed dome of such small proportions would be closer to the temperatures that occur on Mercury (800°F) and Venus (864°F).



The other problem with having a sealed dome is it does not rotate. If so, how are the stars in the flat Earth model revolving around the Earth on the daily sidereal rate? What force is moving them in unison so the constellations remain the same from day to day? The centrifugal and Coriolis forces we mentioned earlier would be of no help to the flat-earthers since their dome-universe is simply too small compared to their flat Earth in order to create the necessary inertial forces required to move the stars. And since the flat-earthers do not believe in gravity, then the stars do not generate a moment of inertia. Even if somehow the stars had an angular momentum, it would be undercut by the non-empty space under a dome. The pressurized air would impede any moving body within the dome so that their motion would eventually fall to zero.

Since the flat-earthers believe buoyancy is the only force acting on these stars (a buoyancy that keeps them at the top of the dome since the stars are made of fire which is less dense than air), how would buoyancy move the stars in a lateral rotation? Why are some stars at the lower end of the dome while others are near the top if only buoyancy is involved in their distribution? Do the flat-earthers claim the stars at the lower end of the dome are somehow denser than the stars at the top?

Or perhaps the stars are somehow attached to the dome and the dome is rotating once per day. If so, then the dome is not sealed to the Earth and must move on some kind of frictionless rollers, which means the dome must rotate in an unsealed channel, which means it will have severe problems with the vacuum of space outside the dome. For that matter, what force is moving the sun and moon in the flat Earth model; and what counter-force is

keeping them rotating in either the circle of Cancer or Capricorn without being overcome by the centrifugal force that would make them hit the wall of the dome? What counter-force is acting on the sun to make it move slower in rotation than the stars by about 4 minutes per day? What force makes the moon move faster than the sun in their daily revolution around the Earth? What force keeps the sun and moon near the same circular plane since, if buoyancy is the only factor determining the body's height above the Earth yet the moon, being solid, would be denser than the sun, the moon should actually fall to the Earth.

These kinds of technical question are hardly ever entertained, much less explained, in flat Earth camps. The reality is, however, no answers can be provided in a universe that has no gravity and is simply too small to create the necessary inertial forces, or even sustain them in a dome.

The Four Seasons



On the Globebusters show of Nov 20, 2016, a discussion is taking place among the hosts as to what causes the seasons. They all agree the heliocentric model does not work because if the sun is closer to the Earth in the summer of the southern hemisphere (91 million miles) than it is in the winter of the southern hemisphere

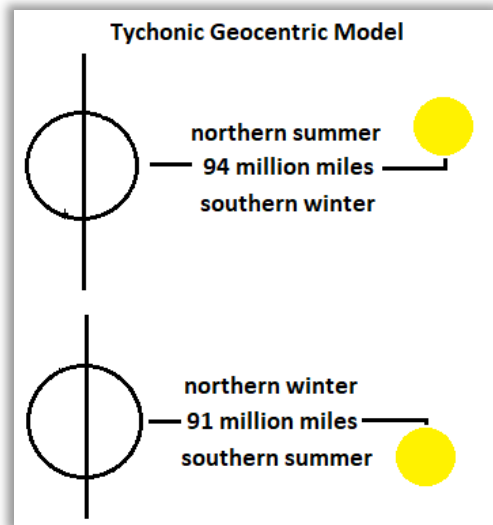
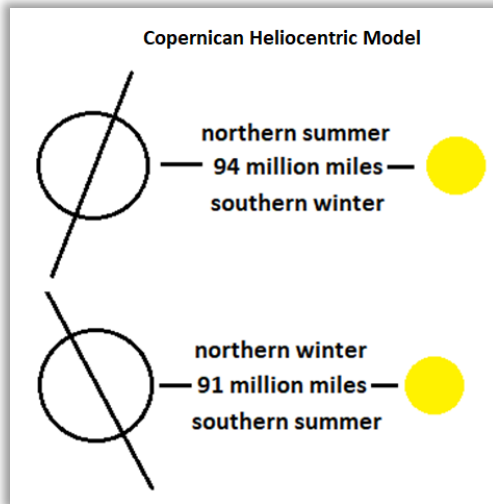
(94 million miles), then why is there no life in Antarctica whereas in the Arctic life abounds. As they reject the standard answer (that the angle of the sun between 0 degrees and 23.5 degrees has a greater effect than the distance of 3 million miles), **Jeran Campanella** argues against the heliocentric model by the following:

Anybody who tells you that's where the seasons come from, you need to ask them, so, does the Earth have equal time in the north and the south, and they are going to say yes...and then ask them why there is the difference in the north and the south. How could there be an empty pool of melted ice at the north pole, and at the south pole there is a huge continent frozen over with no animal life, no plant life; they are completely different things; and if we're talking about the heliocentric system with the sun in the middle and we're going around it, and each time gets equal, then it would be the same....In fact, if anything gets more sun, if anything gets more heat, it would be the south, which is the complete opposite we see in the north. Go up to 72 degrees. You'll see every kind of animal, plant, flower, tree, bush, all of it. Go down to the 70th of the south and you won't find a thing. I think it's 93% of the population live above the equator, because that's where the heat is.⁶⁵²

The first curious thing about this explanation is that Jeran is using the globe model in an attempt to prove his point. He speaks of Antarctica as a "huge continent." But in his model, Antarctica is not a continent, but a huge wall of ice that serves as the rim for the flat Earth and is thus 75,000 miles in circumference. Although his sun, when it is in the south, never gets beyond the Tropic of Capricorn in its orbit, by the same token, it never gets beyond the Tropic of Cancer when it is in its more northern orbit. But since in the flat Earth model the sun's light is limited to a cone in order to distinguish day from night, how is enough light and heat going to get to the Arctic when the sun is orbiting in the Tropic of Capricorn and thus its cone cannot shed light on the Arctic in order to sustain all the plant and animal life that is there? In the Capricorn cone, most of the light and heat will hit the ice wall.

Be that as it may, the more important thing is that there seems to be some confusion among these hosts in regard to the temperature effects the sun will have on Earth in either a Copernican heliocentric or Tychonic geocentric model. In both models, as they asserted, the sun will be closer to the Earth during the northern hemisphere's winter and the southern hemisphere's summer (91 million miles), but farther away in the northern hemisphere's summer and the southern hemisphere's winter (94 million miles).

⁶⁵² <https://www.youtube.com/watch?v=pvuNDRV30Kc>, at 2:25:37.



As a result of this arrangement, the average temperature in the southern hemisphere is going to be colder than in the northern hemisphere; and there is going to be more of a balance of temperatures in the northern hemisphere, but more disparate temperatures in the southern hemisphere. As we can see from the diagram, the southern winter will not only have 23.5 degrees more of an angle away from the sun, it will also be 3 million miles farther from the sun, and the combination of these two factors is going to make it colder in Antarctica than the Arctic, thus plant and animal life can survive in this

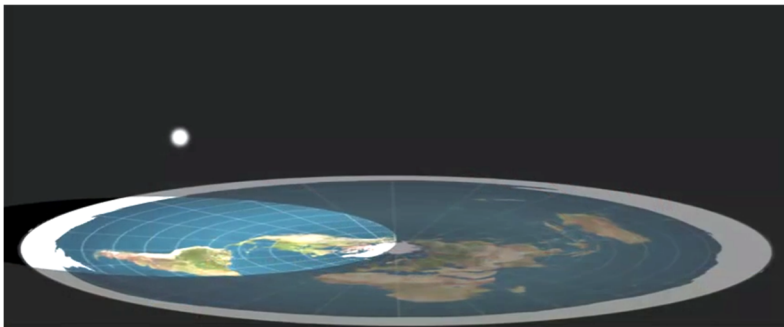
less extreme environment. One might argue that the southern summer might make up for Antarctica's colder winter, but the fact is, whatever life could survive in the Antarctic summer would be killed off in the severe Antarctic winter. With all life killed off in the winter, there is no life existing that will benefit from a hotter summer.

The Day and Night of a Flat Earth

Flat-earthers consistently argue about how their 28-mile diameter and 3,000-mile high sun will provide light for the same regions it provides light in the globe Earth model. The problems are threefold:

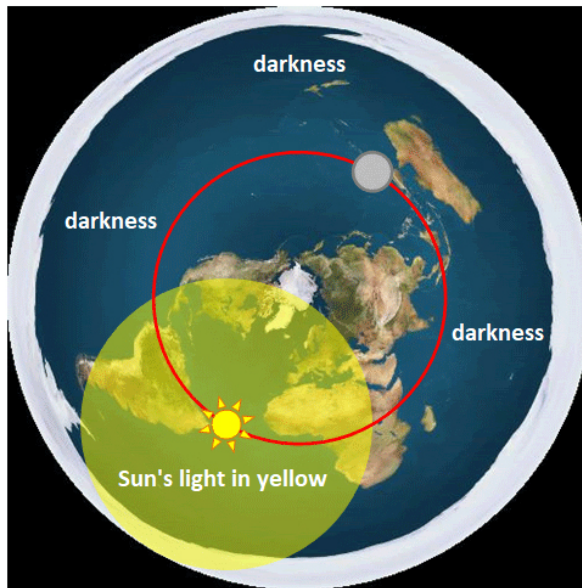
- Since in the globe model we know that at least half the Earth will be illuminated at any given time (even though as the seasons change the angle of the sun's light will change), the flat-earthers must produce a model on their azimuthal Earth that shows at least half of it being illuminated at any given time.

Yet all flat-earthers believe the sun is circling a flat Earth somewhat like a painted horse on a carousel. Additionally, they are forced to consider the sun's light as forming into the shape of a spotlight so its light points downward and does not radiate laterally. Below is a snapshot from a flat Earth animation showing daylight in North and South America.



This begs the question, of course, as to what allows the sun's light to form a cone and not radiate in concentric spheres (as the globe Earth's sun does)? The flat-earthers have no answer for this problem. Moreover, the spotlight barely illuminates a fourth of the flat Earth, but to be true to reality it is

required to shine on at least half the Earth at any given time. We notice the problem even more acutely in the pictorial below.



The flat-earthers are in a Catch-22. On the one hand, if they do not reduce the sun's light into a cone, then it will shine in every direction on an azimuthal Earth, including Australia, which is between 6,000 and 7,000 miles away from the sun in the above pictorial. Even though in Australia the sun's light will be dimmer than it is over South American and Africa, the irrefutable fact is that it will still be seen, even if it is as dim as a star. On the other hand, if they reduce the sun's light to a cone, then the sun cannot illuminate at least half the Earth at any given time, as required by reality.

- Flat-earthers must produce a model that on December 21 (and many days before and after) will show that Antarctica (which in their model is a 75,000-mile circumference ice wall) will be illuminated for 24-hours, since that is what occurs in reality. Additionally, this model must show no sunlight at the Arctic Circle on December 21. Conversely, the model must show that on June 21 (and many days before and after), the Arctic Circle is illuminated for 24-hours and Antarctica is without light for 24-hours.

We can determine the amount of sunlight the Arctic and Antarctic will receive during the year by using the online SunCalc.⁶⁵³

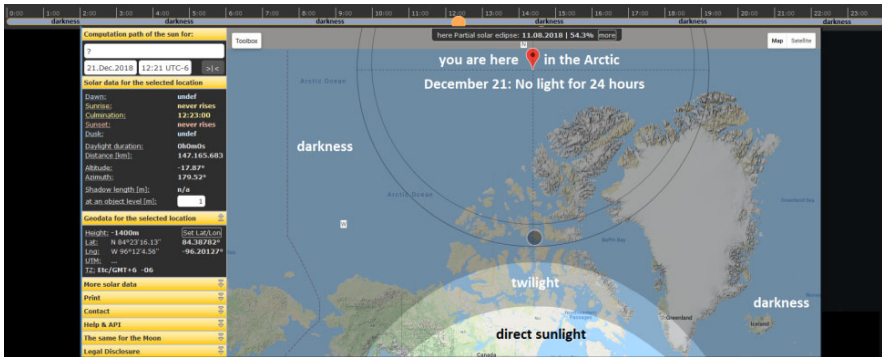


Figure #1: SunCalc shows no light in the Arctic on December 21

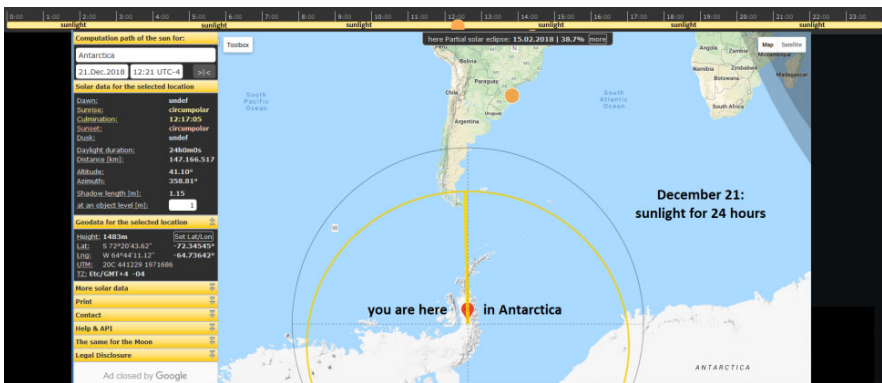


Figure #2: SunCalc show 24-hour light in Antarctica on December 21

In order to fix this problem, the flat-earthers must have at least three different emanations of light from the sun during the year. On December 21, the sun's light must cover about 75% of the flat Earth so it can completely cover the 75,000-mile ice wall. It would look something like the image below:

⁶⁵³ www.suncalc.org



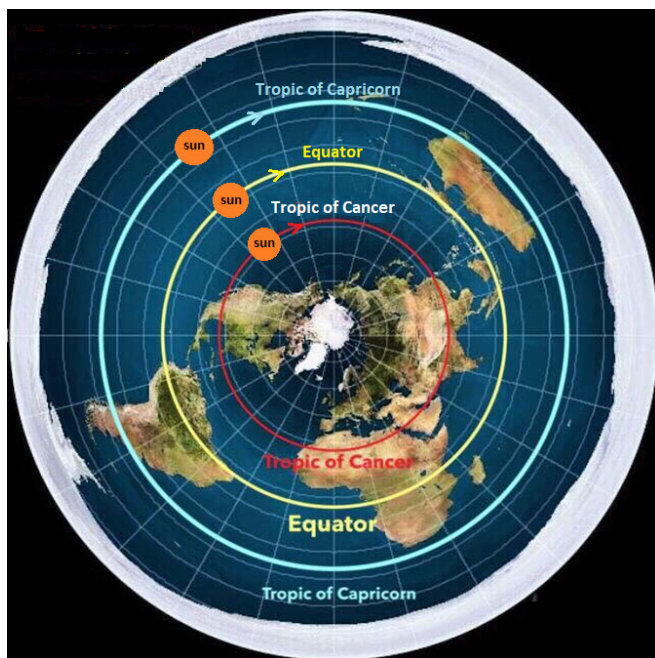
December 21

Of course, the exact opposite would be needed on June 21 since at that time Antarctica sees no light from the sun, and the Arctic receives 24 hours of sunlight per day.



June 21

So again, this kind of *ad hoc* adjustment begs the question as to how the “spotlight” sun of June 21 can suddenly turn into the “wide-scope” sun of December 21? What mechanism is causing this huge variation in sunlight? Suffice it to say, flat-earthers have no answer for this problem, at least none that can be scientifically verified.



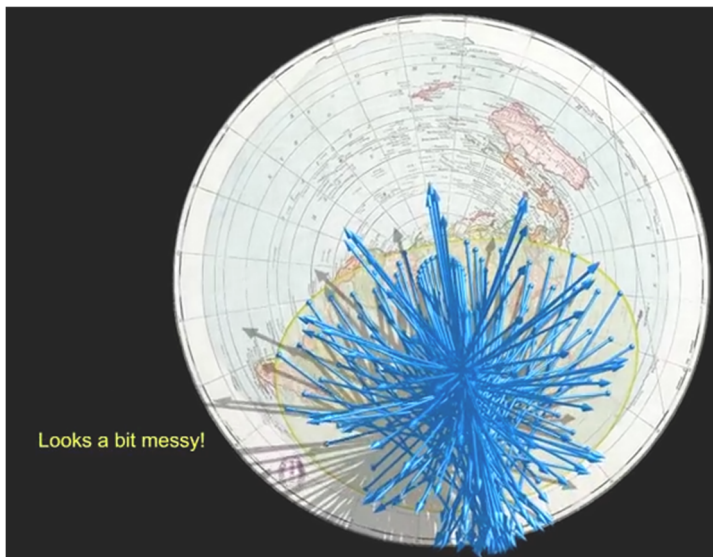
In the flat Earth model, the sun travels around the Tropic of Cancer on June 21; the Equator on March 21 and Sept. 21; and the Tropic of Capricorn on Dec 21.

- Since in the flat Earth model the sun must circle the Earth between the Tropic of Cancer and the Tropic of Capricorn (which in the globe model are 23.5 degrees from the equator, respectively), since on an azimuthal projection the Tropic of Capricorn is about twice the diameter and circumference of the Tropic of Cancer,⁶⁵⁴ this means the sun must travel twice as fast along the Tropic of Capricorn than the Tropic of Cancer (and the moon must also make the same adjustment), yet flat-earthers provide no physical cause for the vastly different velocities for the sun. In fact, the well-known phenomenon of angular momentum (*e.g.*, why a spinning skater rotates faster when she pulls in her arms) dictates that if the sun moves outward to the Tropic of Capricorn then it should revolve

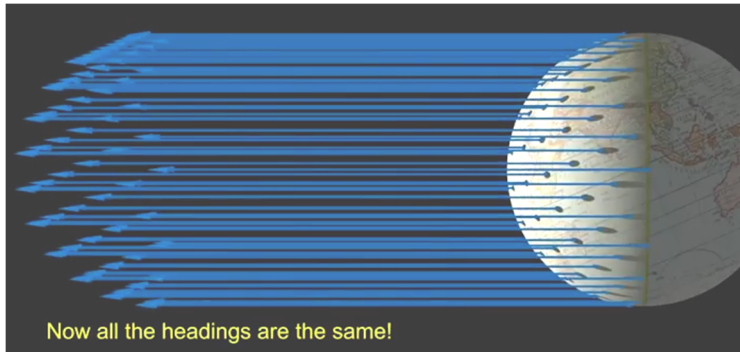
⁶⁵⁴ If we assume a 12,000 mile radius for the azimuthal flat Earth, this equals a 4,200-mile radius and a 26,376-mile circumference for the Tropic of Cancer; and a 8,400-mile radius and a 52,775-mile circumference for the Tropic of Capricorn.

much slower than in the Tropic of Cancer, not faster. Moreover, if the sun moves twice as fast in one tropic than the other, this means the stars, in their rotation around the flat Earth just inside the dome, must likewise travel with twice the speed in Capricorn than they travel in Cancer, since there is only a 3 minute and 56 second difference between the sidereal day and the solar day. In short, the flat Earth model, except for buoyancy being substituted for gravity, is solely a geometric model that is devoid of basic answers regarding forces.

An excellent video produced by Wolfie6020 from Broome, Australia (who is, in my opinion, the best technically-minded and scientifically accurate globe-earther I have been able to find) demonstrates the failure of the flat Earth “spotlight” model to account for the sun’s light throughout the year. If the headings of the light are partitioned into vectors, the flat Earth model has the light scattering in multitudinous directions whereas the globe model demonstrates how these vectors line up with the sun.⁶⁵⁵



⁶⁵⁵ https://www.youtube.com/watch?time_continue=136&v=AwGG3x3v8RA, published April 6, 2018.



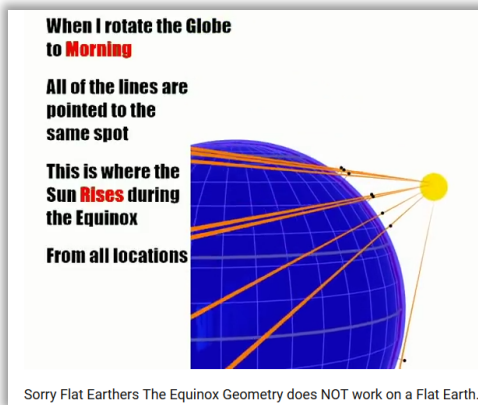
Next, Wolfie6020 responds to a challenge by flat-earthers regarding their claim the sun does not rise in the east and set in the west. The challenge stated:

Let me see _ the people who confirmed that the Sun rose due East are they by any chance ball earth worshippers?

You can just photograph the Sun and say that they Sun rose due East, is that difficult?

I admit people close to the Equator will see the Sun rise due East, no problem. But every other asshole claiming they saw the Sun rise due East is fxxxng lying out of their fast ass.

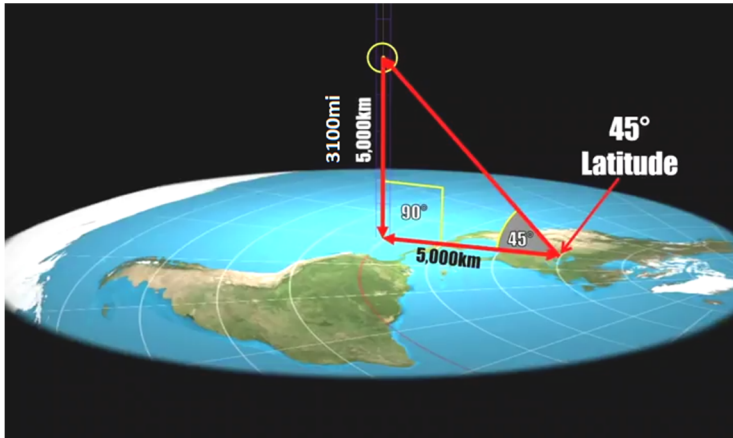
I suggest we set up an experiment where six ball earthers and six flat earthers do an experiment to check this at the next Equinox. That is not difficult if all 12 confirm that the Sun rose due East then I'll take the next flight out to New Zealand and hunt you down and I will lick your boots and will become a ball earther for life.



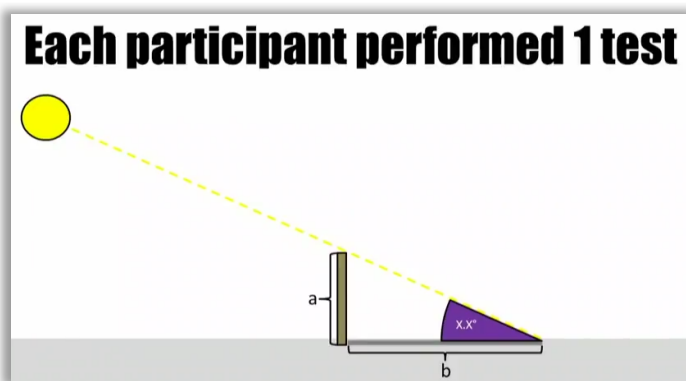
In response, Wolfie6020 organized a consortium of enthusiasts around the world to measure the angle of the sun at the equinoxes. He demonstrates quite clearly from computer animation of the results that the sun's light vectors can only work on a globe Earth.⁶⁵⁶

⁶⁵⁶ <https://www.youtube.com/watch?v=J9w4KtHxZ68>, published March 22, 2018. To date, no flat-earther has been able to discredit the challenge. Attribution is given to Sly Sparkane from Germany for the videos.

In the same video,⁶⁵⁷ Sly Sparkane shows the flat-earther claim of the sun being only 3100 miles above the earth cannot be sustained. Using the method flat-earthers use for determining the height of the sun, that is, the Pythagorean theorem with one side of a right triangle standing vertical on the equator and other side horizontal from the equator to a north latitude of 45 degrees, which makes an angle of 45 degrees.

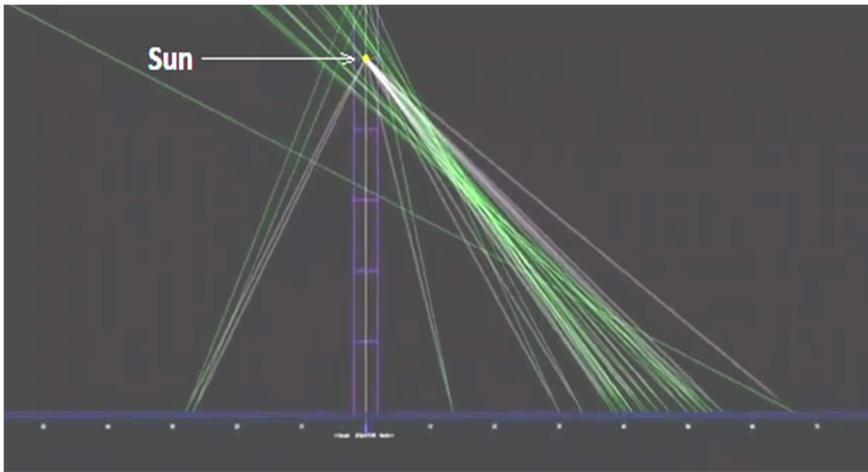


Sparkane then invited 23 participants from over a half-dozen countries to make measurements on September 21 (the day of the equinox) of a shadow cast by the sun on a given object, which will produce the sun's elevation angle above the horizon, which can then be used to determine the shape of the Earth and the distance to the sun.

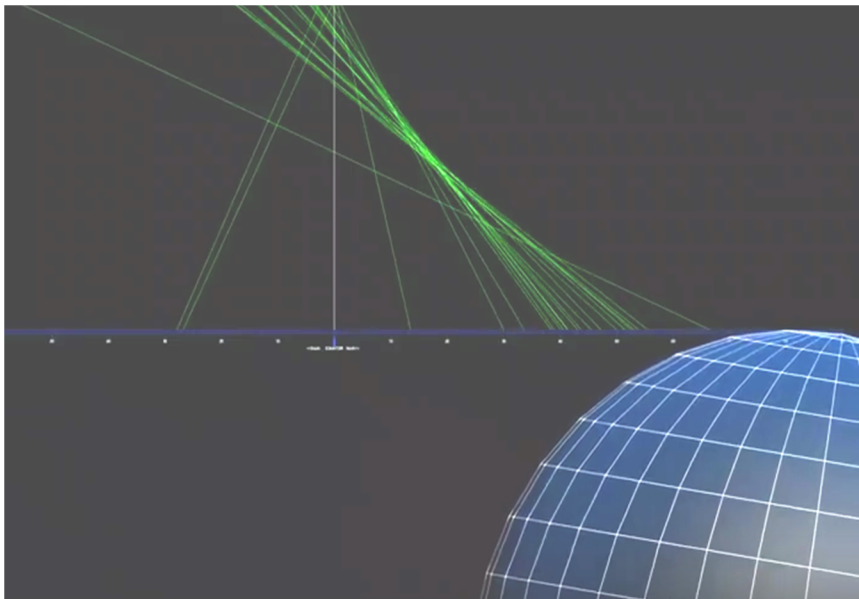


⁶⁵⁷ <https://www.youtube.com/watch?v=J9w4KtHxZ68>, beginning at 8:11.

The elevation angles of the 23 participants, except for one, did not show the angles converging on the known position of the sun. See below.



What was found, however, was if a globe is rolled underneath the known latitude points on the X axis, the latitude points on the Earth would correspond precisely with the known latitude points on the X axis, thus showing the Earth is a globe and the sun is not close to the Earth.



Sunlight in Antarctica

Regarding the sunlight that is received by Antarctica, Jeran Campanella published a video in which the flag markers at one of the stations do not show a shadow for a six-hour period. Campanella interprets this missing shadow as a deliberate attempt to hide the fact that the sun does not circle Antarctica. He also claims the station blows white smoke so anyone filming the area will not be able to see the sun. He states:

The camera simply resets. Why don't we get to watch the shadow go around....we never see it go in front of the green flag. Why is that? Because the sun isn't going around the continent.

One of the easiest ways to prove that is the amount of time it would get all-day sun or all-day night versus the north pole. And we've got people who live near the north pole in Norway, Alaska and Canada, and those people can tell us what they see. And what they see does not match the opposite down in Antarctica, meaning, if in the north pole they're getting four months of full sun, then at that exact time the south pole should be getting four months of no sun. Doesn't happen. At the most they get six weeks. So it simply means we don't live on a globe.

Now you will notice that when the sun actually starts getting low, they actually blow fog or a smoke or it could be even snow...it blows along the horizon. The reason for that is that for people who are down there don't get to see what the sun is actually doing, which is not circling their heads.

Now, I will admit that for six weeks Antarctica does get full sun. I've seen it on these webcam footages. But they don't have a view of the sun. I know it doesn't make sense and this is something we need to research, because somehow when the sun leaves to the northwest and circles all the way on the other side of the Earth in its daily path, somehow it is remaining bright in Antarctica. It proves...it's not a globe. Because if it was a globe you would simply see the sun do a complete circle above your head.⁶⁵⁸

⁶⁵⁸ <https://www.youtube.com/watch?v=YLkTm19aZGs>, published April 16, 2018, beginning at 25:10; <https://www.youtube.com/watch?v=OX-TZelHwvc>

Campanella then gives us the time-lapse video of the Antarctica station. Below is one snapshot of the video taken at the 1:52 minute mark on the webcam and 28:58 on the Youtube video. The flag's shadow is seen at about the 2:00 o'clock position.



The next snapshot is taken again at the 1:52 minute mark (no seconds displayed) and one second later on the Youtube video, at 28:59



The flag's shadow has moved 180-degrees to the 8 o'clock position in one second. Obviously, someone has deleted a half-day's time from the webcam. This apparently happens every day. Whether this is deliberate or accidental we do not know, but whether one can conclude from this that the webcams are set to hide the sun from the residents or anyone analyzing the videos is pure speculation, as is the supposition that the smoke blowing in the back is for the purpose of hiding the sun from the residents. If not, then this would truly be a Truman Burbank world of illusion.

Investigating further we find the date and time stamp at the upper left- hand corner says, "Amundsen-Scott South Pole Station 2010-12-14 15-20-00," which means this webcam film was taken from the South pole on December 14, 2010 at 3:20 pm.⁶⁵⁹ This is just seven days from the summer solstice of



Antarctica, the weeks in which it is closest to the sun in both the heliocentric globe model and the geocentric globe model. Hence there would be plenty of light shed on Antarctica to account for the "missing sun" of Campanella's claim.

This is not a time in which Antarctica will receive only "six weeks" of sunlight. If the Youtube is run to the end it will show the sun or its light always in the sky during the day, which is to be expected at this time of year.

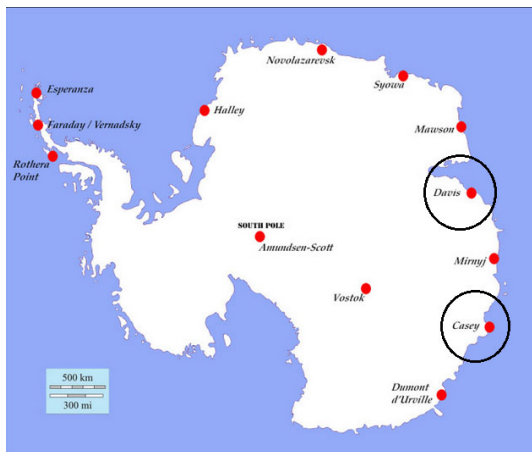
We notice in the next snapshots, which were taken at the same time of day (20:00:00) on Dec 16, 2010 and Dec 26, 2010, respectively, the sun is just peeking above the horizon in the first; and in the second, which is 10 days later, is above the horizon by about 10 degrees. This is precisely what we would expect in Antarctica since the sun will continue to circle higher in the

⁶⁵⁹ <http://www.southpole.aq/> at the South Pole

sky until the solstice on Dec 21 and will linger there for almost a week before it begins to circle lower in the sky.



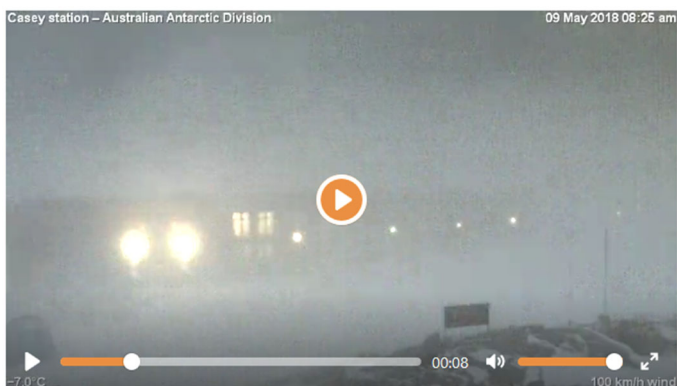
We can also show Antarctica is receiving the light we would expect on a globe by examining two current webcams from two different stations, Casey station and Davis station, both 1,250 miles from the South Pole. The first snapshot is Casey 11:15 pm on May 8, 2018. It is completely dark outside.⁶⁶⁰



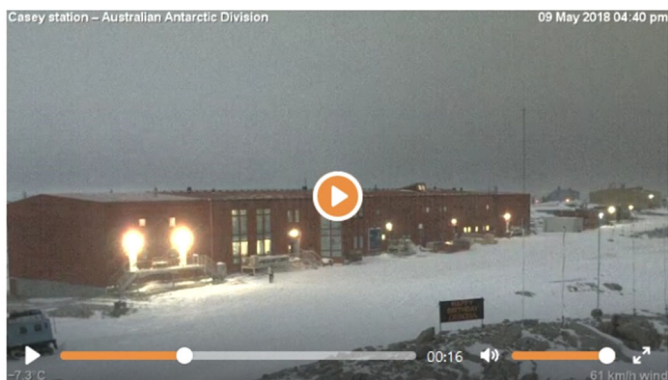
⁶⁶⁰ <http://www.antarctica.gov.au>. Go to search and type in “webcams” and then click on Casey.



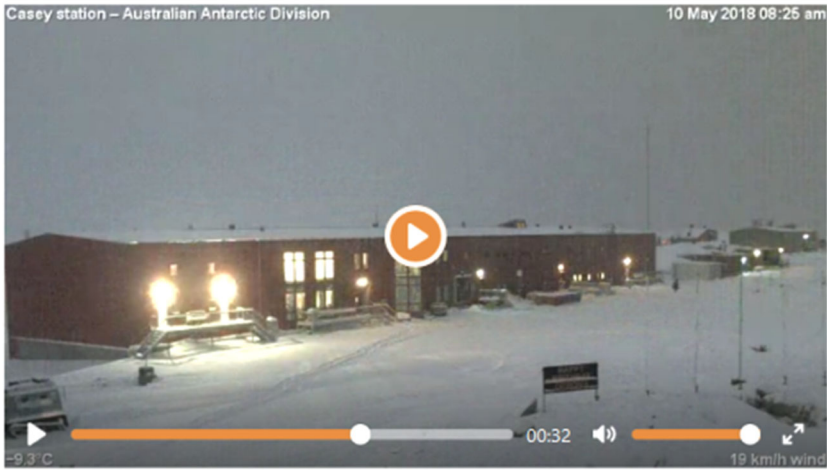
The second snapshot is Casey station at 8:25 am on May 9, 2018, the first sign of light.



The third snapshot was taken at 4:40 pm on May 9, 2018, when the sun's light was starting to recede.



The fourth snapshot was taken at 8:25 am on May 10, showing the same beginning of sunlight as in the second snapshot.



We will now compare these to six snapshots taken from the Davis station during the same days, May 8-10.

The first snapshot is taken on May 8, 2018 at 11:25 pm. It is completely dark outside.⁶⁶¹



⁶⁶¹ <http://www.antarctica.gov.au>. Go to search and type in “webcams” and then click on Davis

The second snapshot is taken on May 9, 2018 at 9:55 am, when the first notice of the sun's light is visible.



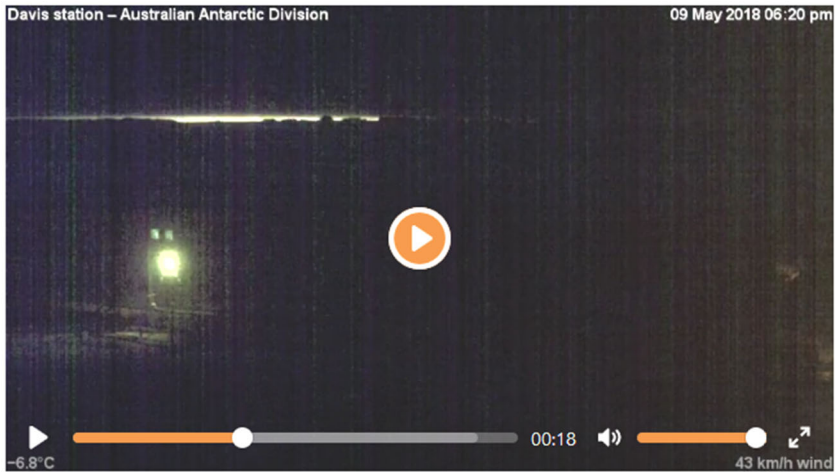
The third snapshot is taken on May 9, 2018, at 5:25 pm, just when the sun is about to set for the day.



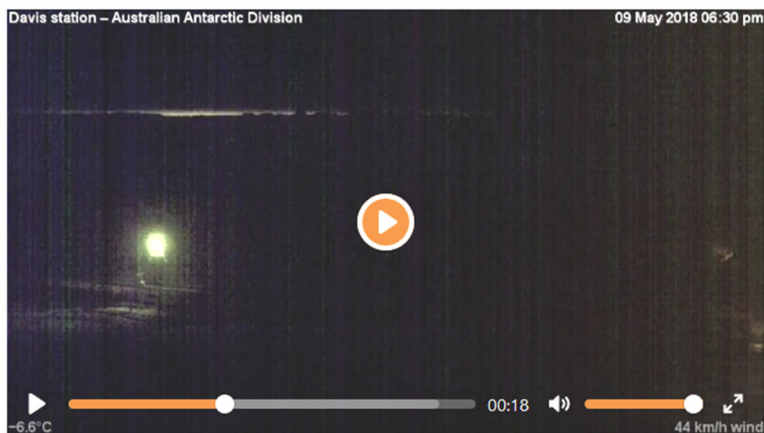
The fourth snapshot is taken on the same day at 6:00 pm, with the sun setting a little more. Notice, in opposition to Campanella's claim (that the sun only moves from northeast to northwest), at the right time of year, closer to its winter solstice when the day is shorter, the sun sets below the horizon. On June 21, Antarctica will receive much less than 8 hours of sunlight per day.



The fifth snapshot is taken at 6:20 pm:



The sixth snapshot is taken at 6:30 pm when total darkness begins. See next page:



The amount of sunlight and darkness for both the Casey and Davis stations is precisely what we would expect for a globe Earth. In these snapshots, both have about 8 hours 30 minutes of light to darkness, and 15 hours 30 minutes of darkness to light. The only difference is that while Casey's light begins at 8:25 am and ends at 4:40 pm, Davis' light begins at 9:55 am and ends at 6:30 pm, which is a difference of about an hour and a half, but this is expected since they are separated by about 1,200 miles.

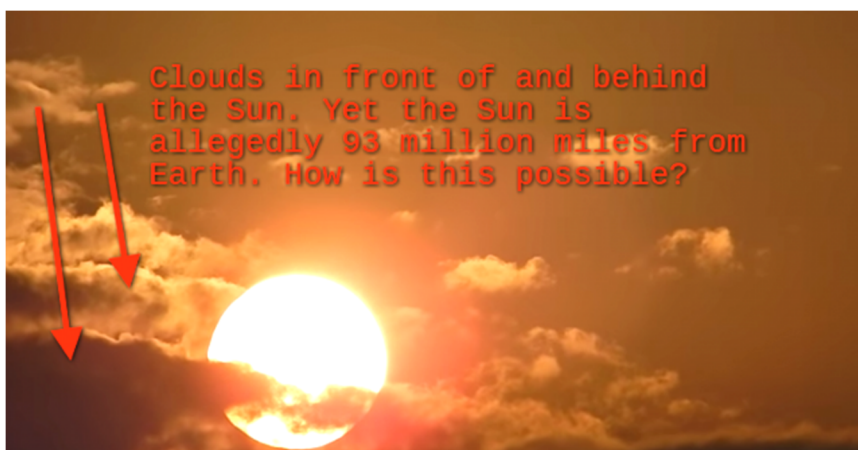


The Sun Seen Under Clouds and in Front of Clouds

A very deceiving phenomenon that often begins the quest down the flat Earth rabbit trail is how the sun appears in the sky. We saw earlier in the book the crepuscular rays of the sun that make it appear as if the sun is just a few thousand miles overhead. We explained this as a natural occurrence of the sun, since at 93 million miles away and 864,000 miles in diameter, it will appear the same as a sun that is 3000 miles away and 28 miles in diameter.



Another phenomenon occurring with the sun—and just as deceiving to our eyes—is when clouds appear to be in back of the sun as well as in front of the sun, giving the impression the sun is sandwiched between clouds.





This phenomenon also happens with the moon.



Naturally, flat-earthers seize on this phenomenon as evidence the sun is very close to the Earth and could not be 93 million miles away. But this is a Catch 22 for the flat-earthers. If they believe the sun is 3,000 miles above the Earth, they can't have the sun being sandwiched between clouds, since the clouds

⁶⁶² <https://www.youtube.com/watch?v=Uo77YGiJs6c>

⁶⁶³ *Ibid.*

are much lower than 3,000 miles from the Earth. As the old saying goes, ‘You can’t have your cake and eat it, too.’ So even for a flat-earther, a sun and moon sandwiched between clouds must be an optical illusion, and indeed it is, especially with the way camera’s work. Generally, clouds that are white or close to white will be light-drowned by the sun’s light, and thus when these clouds pass in front of the sun their light will be diffused and one cannot distinguish the sun from the white cloud, since their hues are in the same range and our eyes cannot resolve the difference. Moreover, cameras have a limit to the amount of light they will absorb. Once that limit is reached (as is often the case in photographing the sun) then everything in front of the sun is blurred, obscured or enveloped by the sun’s light and it cannot be resolved either by the camera or our eyes. With the limited resolving power of our eyes, the clouds will actually appear to be going behind the sun when, in fact, they are in front of the sun. The same thing is true for the moon. If we look carefully at the above photo (or any photo of the moon with clouds), only the darker clouds are seen in front of the moon, and that is because we are able to resolve a dark cloud from a white moon. The white clouds do not appear in front of the moon and that is because the moon’s light absorbs the light from the cloud before the total light reaches our eyes.

The sunset under the clouds.



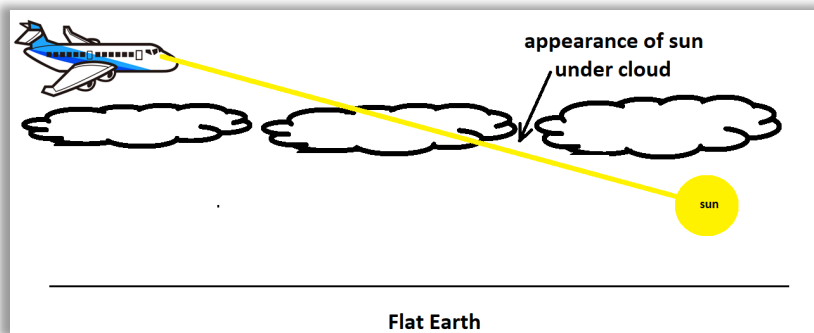
664

⁶⁶⁴ The flat-earther caption says: “Sun under the clouds???? How is that if we are on a spinning ball? How is that if the sun is 93 million miles away????”

Another curious visual phenomenon of the sun occurs when planes flying above the clouds see the Sun underneath the clouds. The sun's light peaks through the spaces between dark clouds and looks similar to a lava flow.



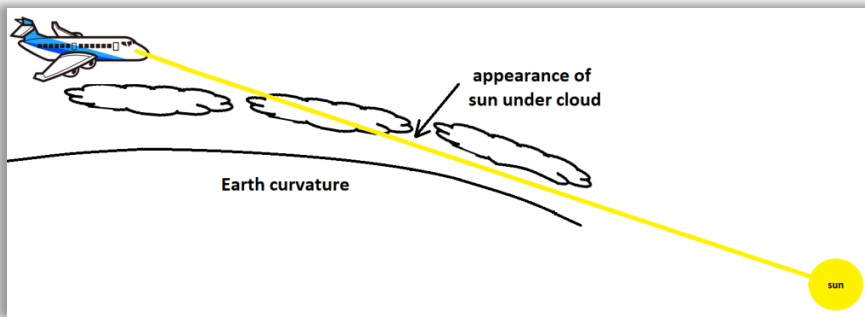
Obviously, however, this can't be interpreted by flat-earthers as being the sun actually underneath the clouds since it would destroy their whole theory that the sun is 3,000 miles above the Earth; and clouds and private planes can only be a few miles above the Earth's surface. If not, then the flat-earth explanation of the sun appearing underneath the clouds would have to look something like this:



⁶⁶⁵ <https://www.youtube.com/watch?v=XQKS0kvTWzQ>

But this fact inevitably means that the flat-earthers have no explanation for why the sun appears beneath the clouds, for if the sun is not between the clouds and the flat Earth, then there is no other place the sun could be in a flat Earth model to give the illusion that the sun is beneath the clouds.

Conversely, on a globe Earth model, it is rather easy to explain why the sun appears to be beneath the clouds. Since the clouds are curved with the curvature of the Earth and the sun is far below the curvature that the plane is above, the sun's light will pierce through the clouds and travel to the pilot's eyes.



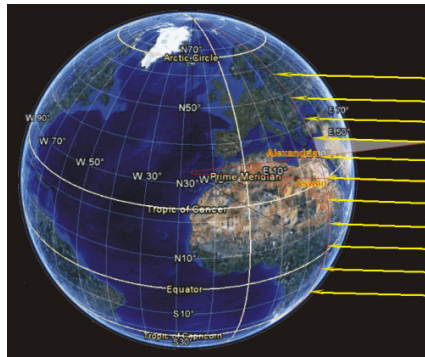
Chapter 6

Earth-Based Arguments

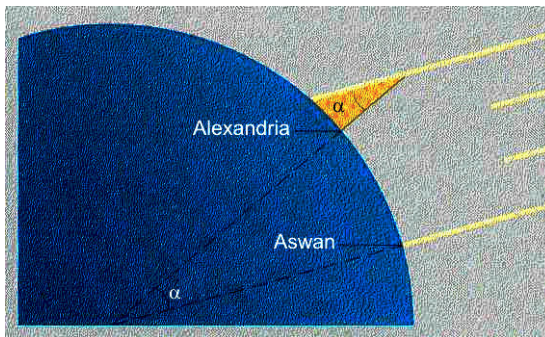
Did Eratosthenes Prove the Earth is a Globe?

The first time in history that there seems to have been scientific evidence the Earth is a globe comes from the Greek astronomer, Eratosthenes, around 235 BC. According to the *Eratosthenes Project* website, Eratosthenes first made the assumption that...

...Earth was a sphere and that the sun rays are parallel when they arrive to Earth.



If this was true then the angle (α) that the shadow made on the top of the obelisk in Alexandria would be the same as the difference in latitude between the two places.



Eratosthenes used a simple formula that relates the proportionality of distance on the meridian (d) and the difference in latitude (α) to the relation between the perimeter (P) and the angle of the circle (360°):

$$\frac{d}{P} = \frac{\alpha}{360^\circ}$$

The shadow angle at the top of the obelisk measured by Eratosthenes was 7.2° , so he calculated that the Earth was about 252,000 stadia.

$$P = \frac{5000 \text{ stadia} \times 360^\circ}{7.12^\circ} = 252,808 \text{ stadia}$$

If we assume the Egyptian stadium this is about 39,817 km ($252,808 \text{ stadium} \times 157.5 \text{ m/stadium}$) which has an error of less than 1% when compared to the accepted value of the meridional perimeter of Earth that is 40,007.86 km.

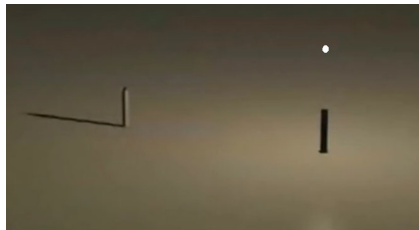
Eratosthenes' experiment was one of the most important experiments in antiquity and his estimate of the earth's size was accepted for hundreds of years afterwards. It was, in fact, the most accurate estimate until Man was able to go to Space.⁶⁶⁶



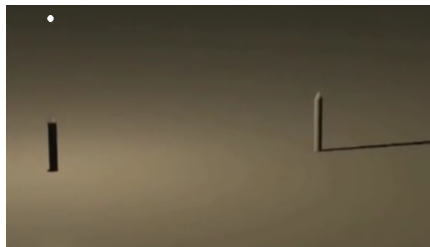
Carl Sagan Demonstrating Eratosthenes' Experiment

⁶⁶⁶ <http://www.eaac-astronomy.org/eratosthenes/eratosthenes-99456>

Contrary to popular opinion, however, Eratosthenes' experiment did not, and could not, prove the Earth is a sphere. Since his evidence was based on shadows, this means that if in the alternative the light source was smaller than Eratosthenes' estimate of the size of the sun, and the light source was overhead of a flat Earth that was much bigger than the light source, this would produce the same effect that Eratosthenes saw in his experiment. As we said at the beginning, the same result can be explained by different means, just as $2 + 2$ and $3 + 1$ both equal 4. Rob Skiba deserves credit for pointing this out. In his Youtube video, he shows that a point light that is placed above two poles that are separated by a certain distance will cast varying shadows depending on where the point light is placed. For example, in the below snapshot, the point light is over the pole at the right and thus a long shadow appears at the pole on the left.



In the next snapshot, the point light is over the pole on the left and a long shadow appears at the pole on the right.⁶⁶⁷ The difference in where the shadow appears can be caused by either a rotation of the table on which the poles rest, or the change of the point light from over one pole to the other. Since in the flat Earth model the sun is moving from one side of the disc to the other, it will cause the shadows to shift from one pole to the other.

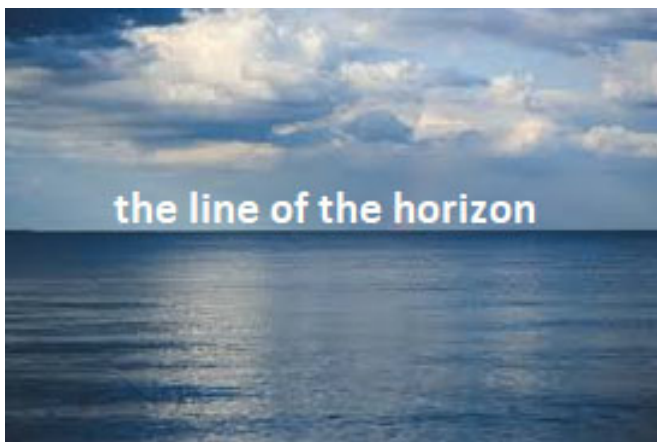


⁶⁶⁷ <https://www.youtube.com/watch?v=mDMY7DPJGSg>, beginning at 4:28.

Thus Skiba has shown that Eratosthenes did not prove that the Earth is a sphere. This does not mean, of course, that Skiba has shown that the Earth is flat; rather, he has shown that proving the Earth is a sphere is a lot more involved, at least from an Earth-based perspective.

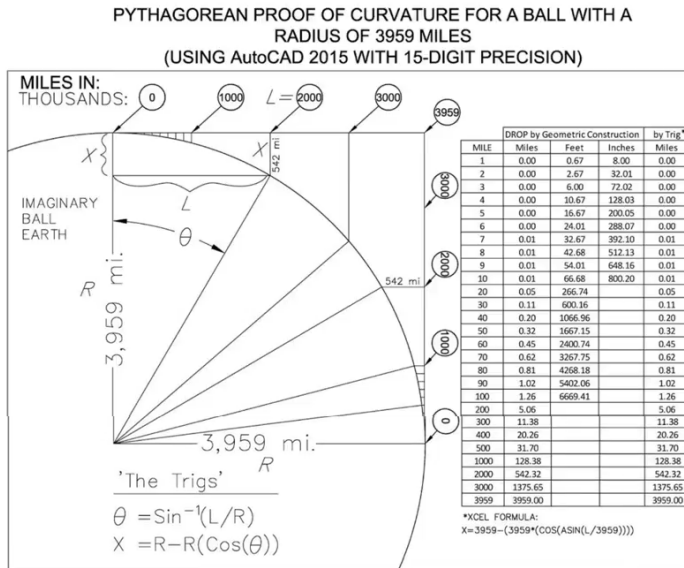
The Horizon Problem

One of the more contentious issues between flat-earththers and round-earththers is where, precisely, does the horizon form. More specifically, the question is: When can we begin to see the curvature, if any, of the Earth. Generally speaking, the line of the horizon is the distance we can see before which the curvature of the Earth becomes great enough that we cannot see any farther because the Earth's curve becomes so pronounced that it blocks our vision. Flat-earththers contend that the horizon line is basically an illusion, since if we look at the same distance under strong magnification, we can see well beyond the horizon line that our naked eye sees, weather conditions permitting. Although magnification certainly plays a part in what we can see, the question remains, even if we used strong magnification, is there a point beyond which we cannot see due to the curvature of the Earth? As we shall see, the answer to that question is affirmative, and the Earth is curved.



Flat-earththers contend that the answer to the question is negative and the Earth is not curved. To attempt to prove this, the flat-earththers have commandeered a common mathematical formula based on Pythagorean geometry. If the Earth is 3,959 miles in radius, the Pythagorean theorem

requires that for every mile squared we view in any direction, the Earth must curve by the multiple of 8 inches. A common chart that is used to calculate the curvature is noted below.



**Miles to Drop Point
(inches)**

**Distance from Drop
Point to Object**

$1 = (1^2 \times 8) =$
 $2 = (2^2 \times 8) =$
 $3 = (3^2 \times 8) =$
 $4 = (4^2 \times 8) =$
 $5 = (5^2 \times 8) =$
 $6 = (6^2 \times 8) =$
 $7 = (7^2 \times 8) =$
 $8 = (8^2 \times 8) =$
 $9 = (9^2 \times 8) =$
 $10 = (10^2 \times 8) =$
 $20 = (20^2 \times 8) =$
 $30 = (30^2 \times 8) =$
 $40 = (40^2 \times 8) =$
 $50 = (50^2 \times 8) =$
 $60 = (60^2 \times 8) =$
 $70 = (70^2 \times 8) =$
 $80 = (80^2 \times 8) =$

8 inches
 32 inches
 6 feet
 10 feet
 16 feet
 24 feet
 32 feet
 42 feet
 54 feet
 66 feet
 266 feet
 600 feet
 1066 feet
 1666 feet
 2400 feet
 3266 feet
 4266 feet

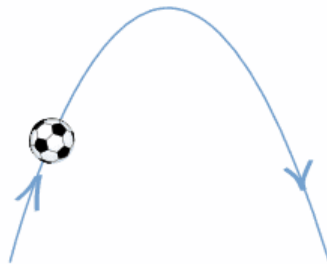
$90 = (90^2 \times 8) =$	5400 feet (1.02 mi)
$100 = (100^2 \times 8) =$	6666 feet (1.26 mi)
$120 = (120^2 \times 8) =$	9600 feet (1.82 mi)

To show how Earth's curvature relates to the "drop point," we can use the diagram on the next page. The first thing we need to qualify, however, is that as convenient as the "8 inches per mile squared" formula appears to be, in reality it is close only to a certain point, and afterwards it does not represent what is occurring when we look into the distance.

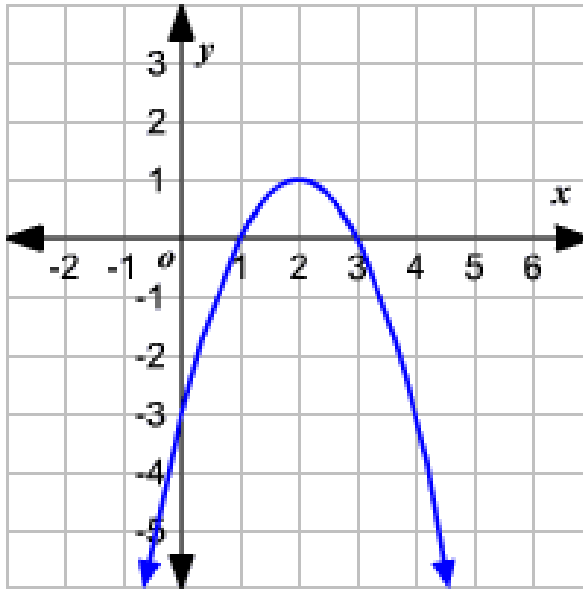
As such, surveyors will use the formula only for short distances, and then only as a 'rule of thumb' to determine in their estimation what the curvature might be before they begin their actual surveying of the land, especially when building long bridges. The actual formula to calculate the curvature of the Earth is much more complicated and it will generate figures that are often not even close to the "8 inches per mile squared" formula. In fact, many of the figures in the above table are wrong, some by a little but others by a lot. The reason for the discrepancy is that the "8 inches per mile squared" is the formula for a parabola, not a circle, but the Earth is in the shape of a circle. In geometry, "8 inches per mile squared" is based on the equation for a parabola: $x = y^2$

or such equations as: $x^2 = y$ or $x = (y + 2)^2$ or $(y + 5) = (x \times 8)^2$

As long as one side of the equation is squared and one side is not, we have the makings of a parabola. The differing equations will give us different shapes to the parabola. We see parabolas quite frequently, such as the case when we throw a ball up at an angle. The width of the parabola will depend on the angle with which we throw up the ball.



Similarly, a parabola is a somewhat V-shaped line that forms on a graph when we plot the numbers, such as:

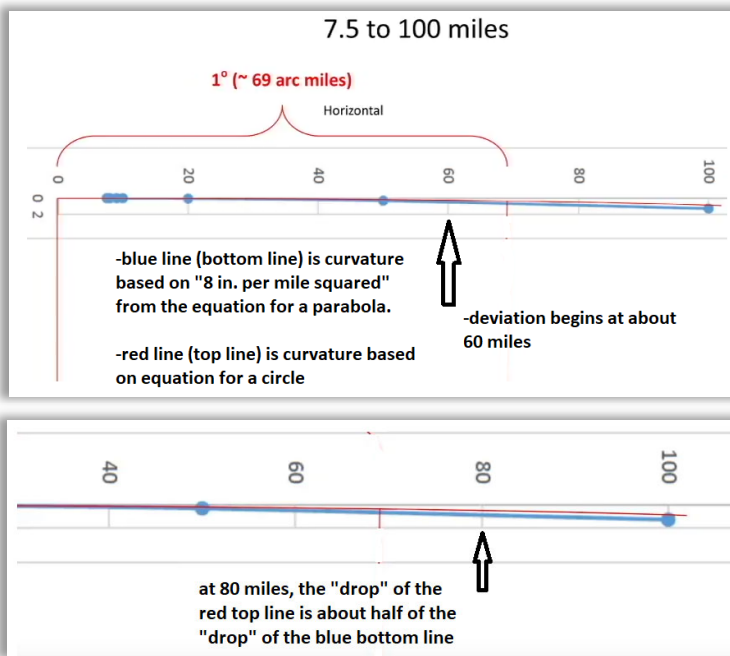


In any case, the “8 inches per mile squared” formula can be transposed into the parabola:

$$x = 8y^2$$

...wherein x = the drop due to the curvature of the Earth and y = the distance from the observer to the drop point.

But the problem here is that the Earth’s curvature is not a parabola. It is a circle with a radius of 3959 miles. As such, we can expect that if we plot the numbers on a graph, the $x = 8y^2$ formula will deviate from the real curvature of the Earth and do so rather quickly. The plotting shows that by 50 to 60-miles, $x = 8y^2$ begins to deviate rather significantly from the plot of a circle, which makes any measurement of the curvature of the Earth using “8 inches per mile squared” noticeably inaccurate at or beyond the 50-60-mile range. That is, the real curvature is less than the “8 inches per mile squared.” In fact, the graph below shows that in approximately 80 miles, the “drop” point for the “8 inches per mile squared” is about double that for the equation of a true circle.



This fact would mean, of course, that the figures from 60-miles and onward in the previous chart will be less than what was recorded for the "Distance between Drop Point and Object":⁶⁶⁸

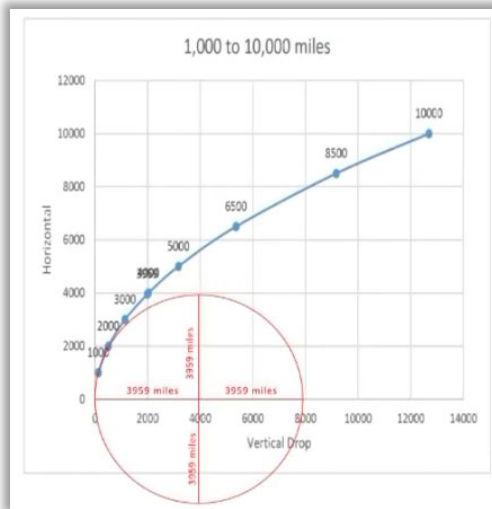
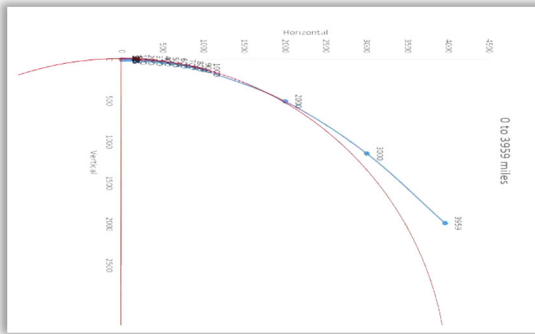
$60 = (60^2 \times 8) =$	>2400 feet
$70 = (70^2 \times 8) =$	>3266 feet
$80 = (80^2 \times 8) =$	>4266 feet
$90 = (90^2 \times 8) =$	>5400 feet
$100 = (100^2 \times 8) =$	>6666 feet
$120 = (120^2 \times 8) =$	>9600 feet

But for distances less than 50 miles, one can use the "8 inches per mile squared" formula and come close to the curvature of the Earth, but even then engineers will not use the equation when building long bridges.⁶⁶⁹ When

⁶⁶⁸ See <https://flatearthinsanity.blogspot.com/2016/08/flat-earth-follies-how-to-derive-8-per.html>, for the amount of the discrepancy.

⁶⁶⁹ My thanks to Steven Baumann for his graphics on this issue, which can be viewed at <https://www.youtube.com/watch?v=kll3tmmXseA>, and also those of

structures such as the Large Hadron Collider were built, which is 17 miles long, even small amounts of curvature must be calculated to match the precision of the Collider. Interestingly enough, when we get to about 2,500 miles of distance, the “8 inches per mile squared” equation goes the opposite direction and hardly accounts for the real curvature of the Earth.



One can determine what will be seen by using the calculator at Metabunk.org.⁶⁷⁰ For example, we plug in the following numbers: distance = 30 miles, height = 6 feet, radius = 3,959 miles:

“fiveredpears” at <https://www.youtube.com/watch?v=pFxsjOqY-xQm> as well as <http://embrace.theball.blogspot.com/2016/12/eight-inches-per-mile-squared.html>

⁶⁷⁰ <https://www.metabunk.org/curve/?d=100&h=6&r=3959&u=i&a=n&fd=60&fp=3264>

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

Distance = 30 Miles (158400 Feet), View Height = 6 Feet
Radius = 3959 Miles (20903520 Feet)

Results ignoring refraction
Horizon = 3 Miles (15838 Feet)
Bulge = 150.04 Feet (1800.46 Inches)
Drop = 600.16 Feet (7201.92 Inches)
Hidden= 486.13 Feet (5833.57 Inches)
Horizon Dip = 0.043 Degrees, (0.0008 Radians)

With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles
Refracted Horizon = 3.24 Miles (17107 Feet)
Refracted Drop= 514.42 Feet (6173.05 Inches)
Refracted Hidden= 409.3 Feet (4911.6 Inches)
Refracted Dip = 0.040 Degrees, (0.0007 Radians)

If the observer is 6 feet tall, his vision will skim the horizon at 3 miles. The imaginary “drop point” will be 600.16 feet high, and 486.13 feet will be “hidden” from his view. If there are no mitigating factors, a building 30 miles away and not higher than 486.13 feet, he will not see it at all.

Let’s use a calculator flat-earthards recommend. At one of their more well-organized websites,⁶⁷¹ it recommends a particular calculator.⁶⁷² It gives a “hidden” value of 486.15’, very close to the 486.13’ from Metabunk.

Units ☐ Metric ☒ Imperial

h0 = Eye height **feet**

d0 = Target distance **miles**

Calculate

d1 = Horizon distance 2.999547 **miles**

h1 = Target hidden height 2166.5765 **feet**

Now, let’s try the same scenario but change the distance to 60-miles:

⁶⁷¹ http://geocentricworks.com/Curvature_of_the_Earth.html

⁶⁷² <https://dizzib.github.io/earth/curve-calc/?d0=20&h0=5.7&unit=imperial>

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles: 60

Viewer height in Feet: 6

☒ Imperial
 ☐ Metric
 ☐ Advanced

Distance = 60 Miles (316800 Feet), View Height = 6 Feet
 Radius = 3959 Miles

Results ignoring refraction
 Horizon = 3 Miles (15838 Feet)
 Bulge = 600.16 Feet (7201.92 Inches)
 Drop = 2400.74 Feet (28808.93 Inches)
 Hidden= 2166.46 Feet (25997.56 Inches)
 Horizon Dip = 0.043 Degrees, (0.0008 Radians)

With Standard Refraction 7/6*r, radius = 4618.83 Miles
 Refracted Horizon = 3.24 Miles (17107 Feet)
 Refracted Drop= 2057.75 Feet (24692.99 Inches)
 Refracted Hidden= 1841.37 Feet (22096.42 Inches)
 Refracted Dip = 0.040 Degrees, (0.0007 Radians)

A more sophisticated calculator shows how air refraction affects results:

Calculator of Earth's curvature and horizon

Русский

English

Metric

Imperial

Distance between observer and the target [miles]
 60
 Observer height [ft]
 6
 Target height [ft]
 1450
 Earth radius [miles]
 3958.76

Changing unit system does NOT convert your input numbers, but Earth radius. I.e. if you input 15 meters and you change unit system, it will be 15 feet.

Common info

Central angle between observer and target, COZ [radian / degree]	0.01515626/0.86838979
Depth to chord, CP [ft]	600.1839
Chord length, CZ [miles]	59.99942570
Visible horizon drop [degree]	0.043413
Horizon drop height, FB/DB [ft]	6.0000/12.0000
Target drop height, NZ/KZ [ft]	2400.700993/2406.700993

*Polar refraction can not be predicted or calculated properly. Thus, its calculation is just an example. You can't get a real result. If we have a severe polar refraction, the target can be lifted above true horizon and can be observed from hundreds kilometers.
 Red values in the top table depend on observer's height
 Refraction is in the lower table and has a caption like: "Weak 1.07, Standard 7/6..."

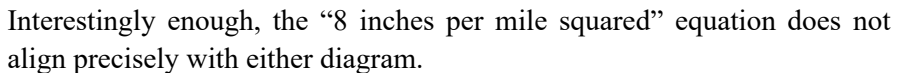
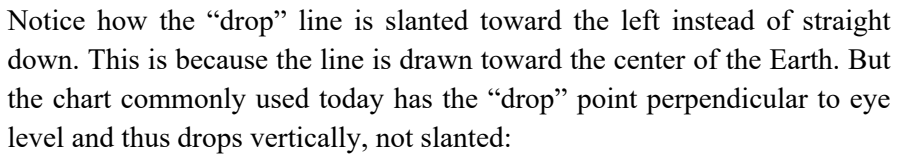
Calculate

Title	No refraction	Weak 1.07	Standard 7/6	Intense 4/3	Severe 1.5	Polar 70/20*
Visible horizon, AB [miles]	2.9995	3.1027	3.2399	3.4636	3.6737	5.6116
Target max visible distance [miles]	49.6300	51.3376	53.6064	57.3075	60.7837	92.8481
Hidden part, ZW [ft]	2166.8968	2017.7876	1841.6676	1598.7582	1410.5612	563.6260
Visible part, HW [ft]	-716.8968	-567.7876	-391.6676	-148.7582	39.4388	886.3740
Additional info	You can't see the target	You can't see the target	You can't see the target	You can't see the target	Can be observed	Can be observed

In this case, 2,166 feet will be hidden from his view on a normal day, and 974 feet. So, if there are no other mitigating conditions, if a building 60-miles away and is not higher than 2,166 feet, he will not see it at all. The flat-earther may object that the skyline of Chicago can be seen from the shore of Michigan which, depending on where on the south shore the person is viewing, is about 40 to 60-miles. If the distance is 60-miles, and the elevation of the viewer is 6 feet, the buildings in the Chicago skyline would need to be 2,166.46 feet high to see even the tops of the buildings. The tallest

⁶⁷³ <https://physicsstuff.000webhostapp.com/>

One more thing deserves our attention. The original “8 inches per mile squared” used by Rowbotham in the late 1800s applies this illustration:



But the Metabunk calculator has taken into account both diagrams such that the “drop” refers to the vertical line and the “hidden” refers to the slanted line. Notice that Metabunk’s figures match the diagram’s figures:

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

Distance = 1000 Miles (5280000 Feet), View Height = 0
Radius = 3959 Miles (20903520 Feet)

Results ignoring refraction
Horizon = 0 Feet (0 Inches)
Bulge = 31.7 Miles (167378.88 Feet)
Drop = 128.38 Miles (677824.75 Feet)
Hidden= 124.34 Miles (656525.19 Feet)
Horizon Dip = 0.000 Degrees, (0.0000 Radians)

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

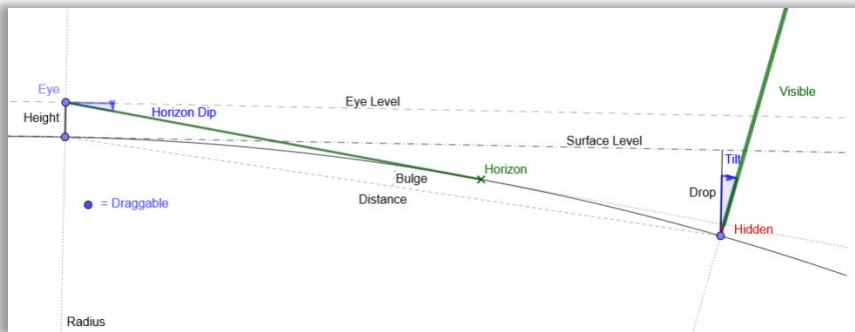
Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

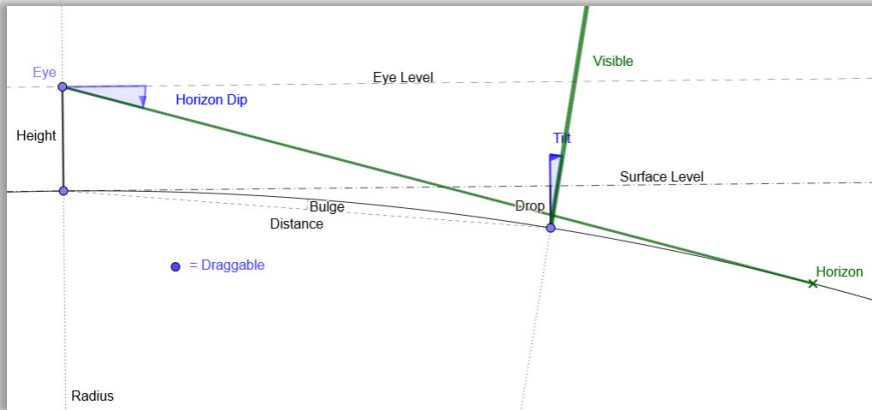
Distance = 2000 Miles (10560000 Feet), View Height = 0 Feet
Radius = 3959 Miles (20903520 Feet)

Results ignoring refraction
Horizon = 0 Feet (0 Inches)
Bulge = 128.38 Miles (677824.75 Feet)
Drop = 542.32 Miles (2863466 Feet)
Hidden= 476.5 Miles (2515932.35 Feet)
Horizon Dip = 0.000 Degrees, (0.0000 Radians)

Metabunk also has an adjustable visual calculator that allows one to see how variations in the height of the observer, the position of the Earth’s radius, and the distance to the object affect the drop points.



Below is the same, except the three variables have been moved:



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The Case of Joshua Nowicki and the Chicago Skyline

Using the same Metabunk calculator above, if the distance is 50 miles, the building would need to be higher than 1,473 feet. If 49 miles, then 1,411 feet. If 42 miles, then 1,014 feet. So it appears that the only way to see even part of the Chicago skyline from the Michigan shore is if one is viewing at



an elevation of 6 feet from 49 miles or less. Here, of course, is where the flat-earther believes he has proven the Earth is flat. He will show pictures of the

Chicago skyline that are said to be taken about 60-miles away on the Michigan shore. For example, a photo 'seen round the world' from an amateur photographer named Joshua Nowicki was taken on April 28, 2015 of the Chicago skyline from Grand Mere State Park in Stevensville, Michigan.

⁶⁷⁴ metabunk.org/curve/?d=2000&h=0&r=3959&u=i&a=n&fd=60&fp=3264



Nowicki sent the photo to meteorologist, Tom Coomes, an ABC affiliate, who then explained the skyline as a “mirage,” since if the Earth is curved, it should not be visible from Grand Mere State Park, at least if one is taking the clips at or very near ground level. Coomes stated the following:



What you’re seeing here is a mirage. You would typically not be able to see this from the Lake Michigan shore. We talked about this last night. Conditions are ripe on the lake that we are actually seeing a mirage of the Chicago skyline. Very interesting. Now here’s what’s happening is a good example of a superior mirage. So Joshua was on the Lake Michigan shore looking towards the west and Chicago’s beyond the horizon so we should not be able to see it. However, with the right conditions we have

an inversion. We have cold air near the cold lake water and some relatively warmer air above it. This will bend the image of that skyline back towards the viewer. So, typically we would not be able to see this. This image would be viewable from much, much higher in the sky, up in space, but instead we are able to see it from the Lake Michigan shore.⁶⁷⁵

Conversely, Rob Skiba, asserts that Nowicki's photo is not a mirage. His comments are as follows:

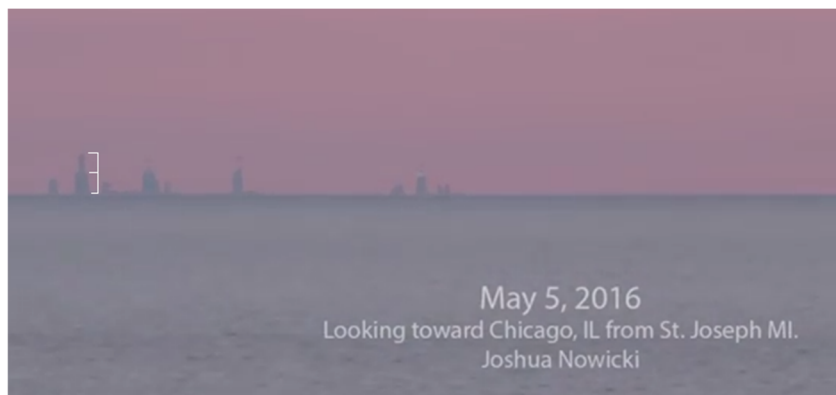
Ok, after I saw that, and looking at that picture, I'm sorry, there's no way that's a mirage. I couldn't accept that. My friend Rick Hummer could accept that either. You know he said, "We've all seen that. Anybody that lives in this area can look across the lake. We've all seen Chicago."⁶⁷⁶

To be fair to Nowicki, he has taken a number of time lapse videos of the Chicago skyline. On his website homepage, Nowicki shows seven examples of his videos, and all without comment.⁶⁷⁷ To my knowledge, Nowicki does not claim the Earth is flat. He is merely an avid photographer who enjoys taking skyline pictures. As a result, Nowicki is not inclined to record the height from which he took the clips, since he is not interested in proving the Earth is flat. Unfortunately, the above clip that Nowicki took of the Michigan skyline on April 28, 2015 from Grand Mere State Park suffers from this lack of information. Although we know the distance from the Park to Chicago is 60-miles, only Nowicki knows the height from which he took the film. Although Nowicki has had several conversations with Tom Coomes, neither Coomes' weather program, nor his subsequent article on the ABC57 website, include the height at the Park. Moreover, Nowicki often fails to communicate with those on his website and thus important questions go unanswered. Since Nowicki, to my knowledge, has not posted the height from which he took the film on April 28, 2015, the film becomes rather useless in the debate over whether the Earth is flat. Let's look at some other clips from Nowicki.

⁶⁷⁵ The ABC57 website.

⁶⁷⁶ https://www.youtube.com/watch?v=o37t6iBS_q4

⁶⁷⁷ https://www.youtube.com/channel/UChw_dD4IF2h8HQBdneDJpYw. We are assuming "fair use" for the display of these videos for public education.



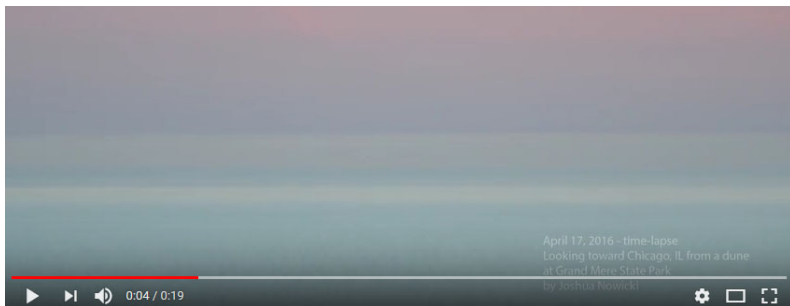
This is a 22 second clip. The Willis Tower is the second building from the left. The clip was taken from St. Joseph, Michigan, which is about 62 miles from Chicago, but Nowicki does not give us the height from which the shot is taken. Nevertheless, we notice something very significant. We see that the main structure is almost the same length as the slim structure. But in reality, the slim structure is 262 feet long and the main structure is 1188 feet long, and thus the main structure is 4.54 times the length of the slim structure. So the first thing we must conclude is that most of the main structure is beneath the horizon. In fact, barring any atmospheric distortion on either the main structure or the slim structure, we can conclude that about 900 feet of the main structure is beneath the horizon. Hence we can also make the reasonable assumption that most of the main structure, at least 900 feet of it, cannot be seen due the curvature of the Earth.

In turn, a flat-earther would have to admit that if the Earth were flat we should be able to see the *whole* Willis Tower above the horizon from about 63 miles away. This should require him to concede the Earth is not flat.

Still, the flat-earther would counter by asking why we can see *any* of the Willis Tower, since, due to the formula for the curvature of the Earth, the whole building should be under the horizon if the observer is viewing from 62 miles away and is at an assumed elevation of 6 feet. Unfortunately, since Nowicki does not give the height from which he took the clip, it is also useless for the debate.

⁶⁷⁸ <https://www.youtube.com/watch?v=3St1vXoiSzY>

So this leads us to the next issue. That is, are there any other environmental factors at work here that will affect the image and raise the Chicago skyline? A partial answer to this question is the fact that as one views the entire 22 second video, it shows all the buildings rise and fall by various amounts, thus showing that environmental factors must be at work on the images. Unfortunately, Nowicki does not record the atmospheric conditions, the temperature, pressure, or any other environmental factors that would affect his clip. So, can the environmental factors affect the images enough to raise the skyline to the point in which we see the tops of the buildings but not the lower parts of the buildings? In other words, can the curvature of the Earth and the environmental factors work in tandem to produce the partial image of the Chicago skyline in Nowicki's clip? The working hypothesis seems to be affirmative. Let's observe the next set of images on Nowicki's homepage.⁶⁷⁹



This is a 19 second clip that as Nowicki notes is, “Taken from a dune on the north side of Grand Mere State Park in Stevensville, Michigan. Time-lapse - 244 stills taken between 8:09 pm-11:23 pm.” At 0:03, the Willis Tower

⁶⁷⁹ <https://www.youtube.com/watch?v=5Y6ii4vdsdc>

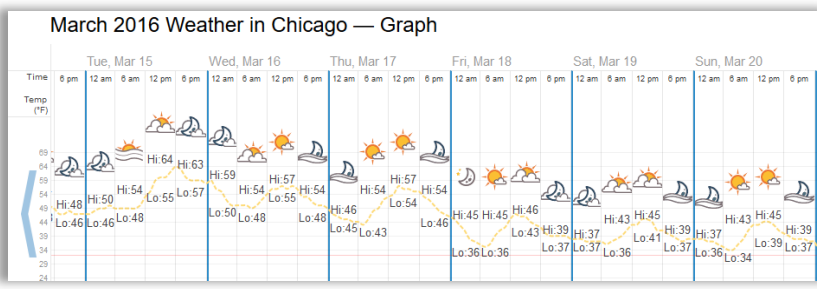
appears to be the same height as in Nowicki's May 5, 2016 video, although at 0:04 the tower is obscured by the atmosphere. Again, however, although Nowicki says he is on a "dune," he does not give us the height from which the time-lapse photos are made, nor does he provide us with the elevation above sea level of the dune, nor the atmospheric conditions, although they appear quite ominous. Let's look at another clip.



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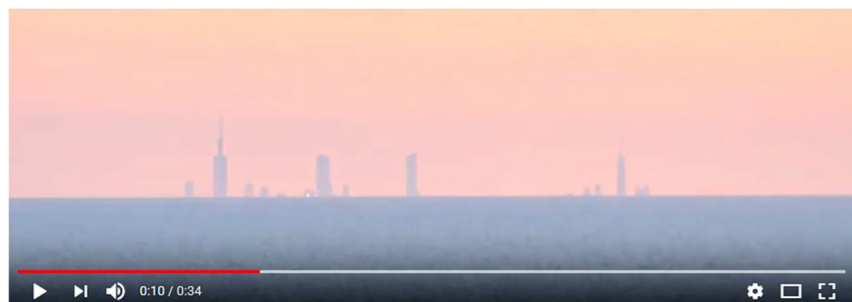
This is a 15-second video that Nowicki says is, "Looking toward Chicago, Illinois on March 16, 2016 from Union Pier, Michigan." Again, the Willis Tower is partly submerged below the horizon, but we see more of the main structure than in the previous shot. This is due to the fact that Union Pier is 47 miles from Chicago, which is 15 miles less than St. Joseph and 13 miles less than Grand Mere State Park. The weather record for Chicago on March 16 shows an abnormally high air temperature than the following days. Nowicki could have taken videos on March 17, 18 & 19 to determine whether the skyline was visible at all. If it was a clear day but he wasn't able to see the skyline, then he would know that atmospheric effects are playing a major role in what can be seen.

⁶⁸⁰ https://www.youtube.com/watch?v=gjpNfs_6wKM



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The humidity, for example, was quite aberrant on March 16. At 12:00 am, the humidity was 79%. At 6:00 am it was 64%. At 12:00 pm it dropped to 35%, and went to 49% at 6:00 pm. The barometric pressure rose from 29.4 at 12:00 am to 29.79 at 12:00 pm. All of these effects would play a role in what will be seen in a photo taken dozens of miles away, especially over a large body of water. Let's look at another video from Nowicki:



682

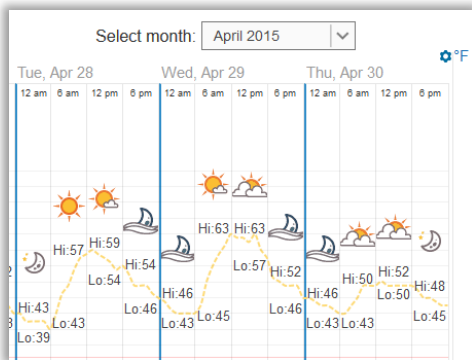
This 34-second video taken on April 30, 2015, is one of Nowicki's clearest captures of the Chicago skyline from a dune at Grand Mere State Park, 60-

⁶⁸¹ <https://www.timeanddate.com/weather/usa/chicago/historic?month=3&year=2016>

⁶⁸² <https://www.youtube.com/watch?v=FTFEu-Tod7s>

miles away. But the tell-tale sign of change is how this video contrasts with itself between the 0:01 mark to the 0:10 mark. We can safely assume that Nowicki did not change the location of his camera during this time-lapse and thus the drastic decrease in the size of the buildings can only be due to atmospheric conditions. As we will go into more detail later, the changes in the atmosphere pull the buildings up from the horizon, not to mention increase their overall size, within minutes, or perhaps seconds. Moreover, as we have seen in the other photographs, whatever day or time Nowicki took the time-lapses, the Willis Tower is always submerged partially beneath the horizon, which is again evident in the two photos above. These facts lead us to conclude there are at least two factors working to produce the images we see: (a) the curvature of the Earth, which partially submerges the buildings below the horizon, and (b) atmospheric conditions which partially raise and change the size of the buildings above the horizon.

As for the weather conditions on April 28, 2015 when Nowicki took his famous photo from Grand Mere State Park, there was a considerable fluctuation in temperature. Similarly, the humidity fluctuated from 74% in the early morning to 54% in early evening. The pressure hovered about 30 hg all day. Moreover, the air temperature fluctuated between 39 degrees and 59 degrees. The lake's water temperature was 39.2 degrees.⁶⁸³ This shows that the air temperature can fluctuate wildly while the water temperature will



remain relatively steady. As one site noted, in summer the “water temperatures on Lake Michigan make it to the 60s in July and August and can sometimes make it into the 70s when air temperatures have been in the 90s for a number of continuous days.”⁶⁸⁴

685

⁶⁸³ <https://coastwatch.glerl.noaa.gov/statistic/avg-sst.php?lk=g&yr=2016>

⁶⁸⁴ <https://www.livescience.com/32011-lake-michigan.html>

⁶⁸⁵ <https://www.timeanddate.com/weather/usa/chicago/historic?month=4&year=2015>

This brings up the crucial point concerning how and when the videos were taken. If a flat-earther wants to make anything out of these videos, as we noted earlier, he must repeat the experiment by taking videos for a successive amount of days, perhaps for three weeks or more, every day, in the varying weather conditions. And as noted, he must also know the height above the ground from which each shot is taken, as well as the elevation above sea level. Only then can he begin to have confidence of what he is actually seeing. If he continues to see the Chicago skyline, then either the atmospheric conditions remained the same for the successive days he took the clips or he might have a good case that something else is occurring.

As for Nowicki, his only interest was to capture times in which he could see the Chicago skyline from the Michigan shore. Over a two year period, he apparently produced seven time-lapse videos that were worth posting. This begs the question as to whether he took other clips of the Chicago skyline during the other 723 days; and if he did, what did he see? Since he has no interest in proving or denying a flat Earth but only of capturing the skyline, he would have no interest in keeping photos or time-lapses that *don't* show the skyline. He would simply discard them or not consider them relevant to his goal. In other words, if Nowicki had set out on a particular clear and high visibility day to photograph the Chicago skyline from Michigan, but upon arrival did not see the skyline, he would have no reason to report it and no reason to keep the footage. He might have tried to capture the skyline dozens of times but if he failed to do so we would never know it since neither he nor his audience wants to see footage of no buildings and only a horizon. The greater point here, of course, is that if only on certain days—when the atmospheric conditions are just right—can one see the Chicago skyline from Michigan, then it stands to reason that, *under normal conditions, one cannot see* the Chicago skyline from 60-miles away if viewed from an elevation of 6 feet. Again, it seems reasonable at this point in our analysis that the inability to see Chicago is due to the curvature of the Earth. A person on Nowicki's website, with the moniker, "VoysovReason," apparently saw the relevance of this logic and asked Nowicki the following question on the homepage:

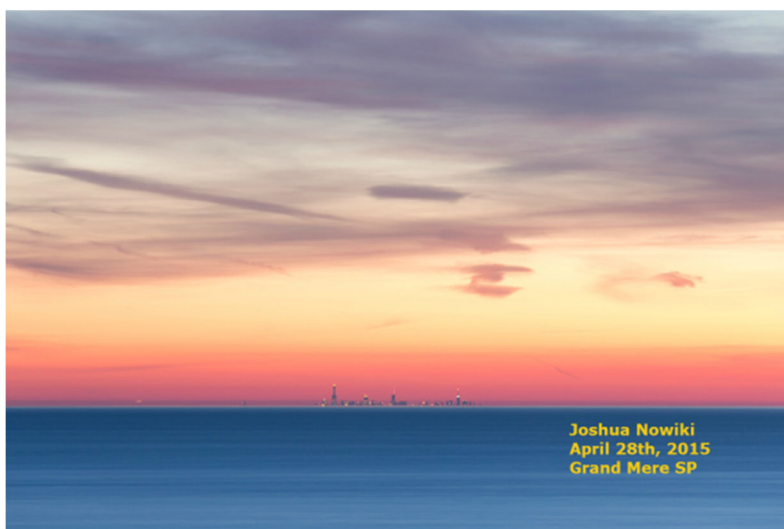
Thank you, Mr. Nowicki for these videos. I'm sure you are aware that you are the subject of some flat earth theories. Can you tell us

approximately how often the Chicago skyline can be seen from the shore? Is it invisible most days? Thanks.⁶⁸⁶

Unfortunately, this inquirer has not received an answer from Nowicki for the two years, but it remains one of the more crucial questions to determine the science of horizon-watching.

According to meteorologist Tom Coomes, in his first appearance on the ABC57 weather report, conditions on Lake Michigan were “ripe for a mirage” or a similar atmospheric effect. We will recall what Coomes said in regard to Nowicki’s photo: “We talked about this last night. Conditions are ripe on the lake that we are actually seeing a mirage of the Chicago skyline.” As he received a lot of complaints from flat-earthers over the next year, Coomes decided to tackle the question head on. He states...⁶⁸⁷

A year ago, I showed this amazing picture on air and online.



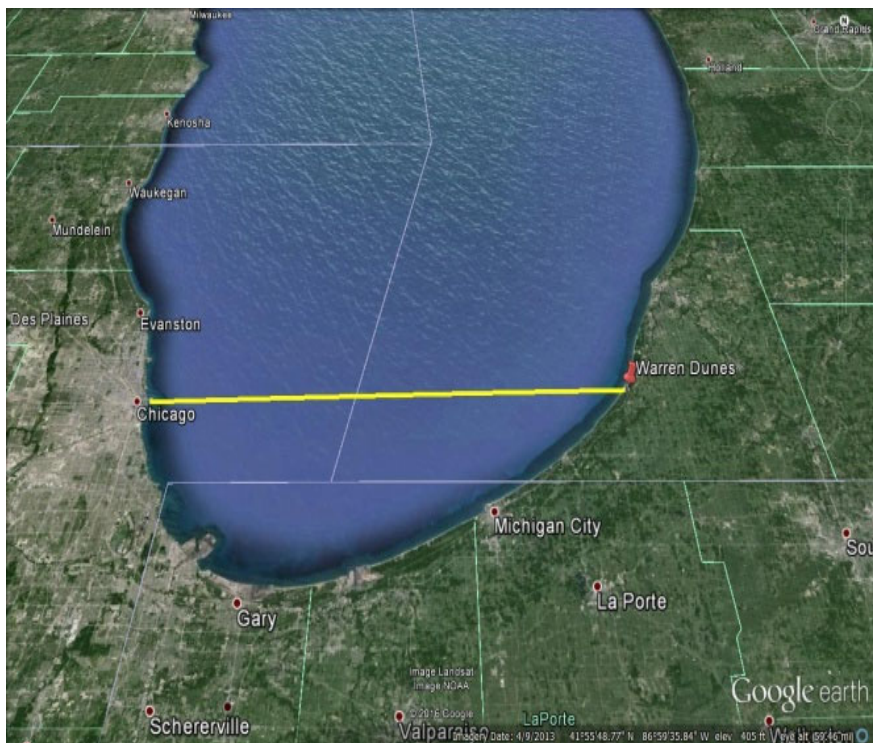
The story has been one of the most viewed stories on our website, ever. Most clicked because of its rarity, and also because there are skyline skeptics that say my explanation is a cover-up. A cover-up to their belief that this picture is proof the earth is flat.

⁶⁸⁶ <https://www.youtube.com/watch?v=3St1vXoiSzY>

⁶⁸⁷ <http://www.abc57.com/news/skyline-skepticism-the-lake-michigan-mirage>

Joshua Nowicki captured it through a lens. He's an amateur turned semi-pro photographer....Was it a mirage? Or is this proof to some the earth is indeed flat? We climbed the dunes to find out. Due to the curvature of the earth, it's not possible to see the Chicago skyline in such clarity and detail, at least under normal atmospheric conditions. How far away is the horizon?

This can be figured out with middle school math, remember the Pythagorean Theorem? Or you can just use this web-based calculator, to try for yourself.



The distance from Warren Dunes state park is about 53 miles across the lake to Chicago. Someone that's six feet tall standing on the lake shore can only see about three miles to the horizon. If you climb to the top of Tower Hill (250ft) you can see almost 20 miles to the horizon. That's still not far enough to see Chicago, at least at ground level. The Willis (Sears) Tower is 1,450 feet to the top. Doing the same calculations you could see it from up to 65 miles away on Tower Hill.

Notice here that we have been given the two crucial factors that will determine what can be seen of Chicago from Michigan. We are told that one of the photos Nowicki took was from Warren Dunes, which is 53 miles away from Chicago. We are also told that one can go to a height of 250 feet on the Michigan shore to take the shot.

That day on the shores of Lake Michigan at Warren Dunes State Park, just 50 some miles to the west, Chicago was hard to see on the slightly overcast day. Looking towards the south less than 20 miles away you can see Michigan City, the power plant and Blue Chip Casino.

It depends on where you are. Here at Warren dunes you have a better chance at seeing Chicago, up at St. Joe every once in awhile,” Nowicki said.

What is not being said here is that one of the probable reasons one can see more buildings at Warren Dunes is that it is 53 miles away from Chicago, whereas St. Joseph is 62 miles away. That 9 miles makes a big difference, as we shall see later, especially when the height of the snapshot is included, as well as the atmospheric conditions and the sea level height.

Earlier this year there was a good opportunity, It looked like 40 or 50 buildings which is the most I’ve ever had the chance to see.

On a normal sunny day, say in summer you can only see a dozen or so of Chicago’s tallest buildings from southwest Michigan. Yes, you can see Chicago, just not all of it.

Anything more than that, especially when you get above 10 or 12, something’s happening, because that’s not usually there,” Nowicki said.

Here we have, for the first time, Nowicki stating that most of the time he cannot see the Chicago skyline. That is the normal state of affairs, and, in line with our working hypothesis, it is what we would expect due to the curvature of the Earth. Anything else is the exception to the rule, not the rule. Although Nowicki is not a weatherman, he knows intuitively that if he can see the buildings then, “something’s happening,” which implies that he knows it is the atmospheric conditions that change minute by minute on the lake that will determine whether he can see the Chicago skyline. Coomes continues:

That something is a strong temperature inversion, warmer air above colder air, that causes light to bend.

A mirage is just a case of atmospheric refraction, it's caused by the fact you have temperature variations in the atmosphere and these cause density variations," says Doctor Mark Rennie, an associate professor in aero-optics at the University of Notre Dame. "So literally the speed of light varies within the air. And this variation of the speed of light has the effect of bending light rays.

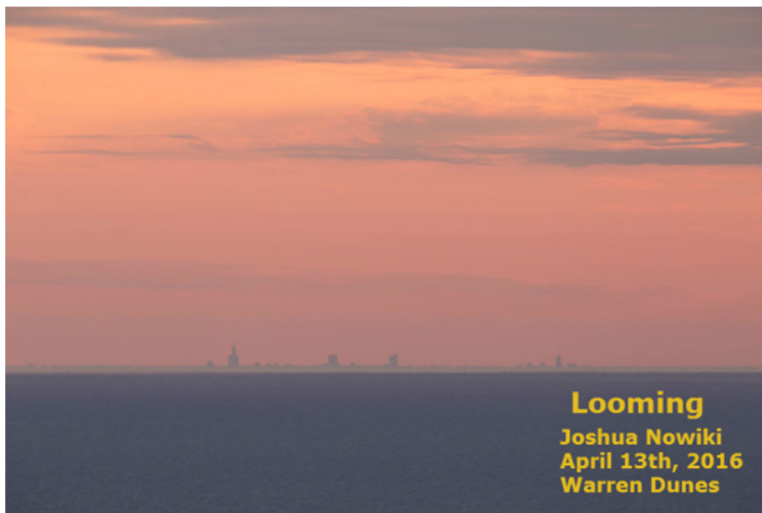
That evening at the top of Warren Dunes, it was pretty exciting as the inversion was setting-up. It was a spring night, the lake waters were very cold and it even felt warmer on top of Tower Hill than on the shore. Looking out on the horizon, a dark line started to show-up just above it, that was the inversion. We could see the atmospheric "lensing" or refraction happening. Objects would appear and disappear, there were breaks in buildings or they'd appear upside down depending on how the atmospheric conditions were changing. It's been amazing to watch how it changes. The cloud cover changed and then amount of light coming through made a big difference in the visibility of the city," said Nowicki.

What's happening is the light from Chicago is being bent by the cold air above lake Michigan, slightly downward towards the observer here. That's helping light rays get around the curvature of the earth, so that Chicago can be seen almost all the way down to ground level," Dr. Rennie said. But if it's a mirage, argues many of the biggest critics that have emailed me, the image should be upside down?

The word 'mirage' originates from the same root word as the word mirror, so technically if you're going to be a stickler about it. A mirage has to have an inverted image. But, again, the physics is all the same," Dr. Rennie said.



That now infamous picture taken a year ago, that's looming. That evening we saw both looming, looking towards Chicago and mirage near Michigan City where buildings appeared flipped.



The views along the lake are always changing, along with the weather. I do go out and take a lot of photos of Chicago along the lake. I go to different locations on different nights. I like to compare the photos as to what's changed. Are the buildings wider, taller, shorter are there more of

them? Less of them? It's always different, it's so unpredictable, I want to catch as many different views of it as I can," Nowicki said.

To those that doubt affects of refraction. The full Chicago skyline should be visible all the time if it weren't the case, barring clouds, rain or fog. However that's not the case, it is always changing. I encourage anyone to go look for themselves.

Coomes makes a crucial point here. If the Earth is flat, then we should be able to see the Chicago skyline as the rule, not the exception. It is only on certain occasions that the air is cool enough near the surface for the light to bend toward the viewer. But even then, views of the buildings on the Chicago skyline invariably show that the lower part of the building is partially submerged under the horizon when viewed from Michigan. This partial submersion, in our working hypothesis, should be due to the Earth's curvature, which then means that the upper part of the buildings that can be seen on certain occasions is due to atmospheric lensing wherein the cool air bends the light of what remains of the building's upper structure.

To see the photos we took click through the attached photo album. There are also extras in the video player including time lapse and a short lecture on mirage from Dr. Rennie. To click here and here to see more of Joshua Nowicki's photo's. And if you need more proof that the Earth is round here's a NASA live feed from the International Space Station.

Skiba describes Coomes' second telecast as one in which "he debunked himself," since Coomes, after further consultation with Dr. Rennie, concluded that one of Nowicki's photos of the Chicago skyline was not a mirage but a "looming." But Coomes also said that another of Nowicki's photos was a mirage. As such, Coomes pointed out there are at least two atmospheric conditions that must be taken into account when one is viewing the Chicago skyline from Michigan.

The truth stands, however, that since a mirage has multiple images, and at least one of them inverted, then Nowicki's famous April 28, 2015 photo could not have been a mirage. Looming has only one image, which is what Nowicki's April 28, 2015 photo shows. According to Wikipedia:

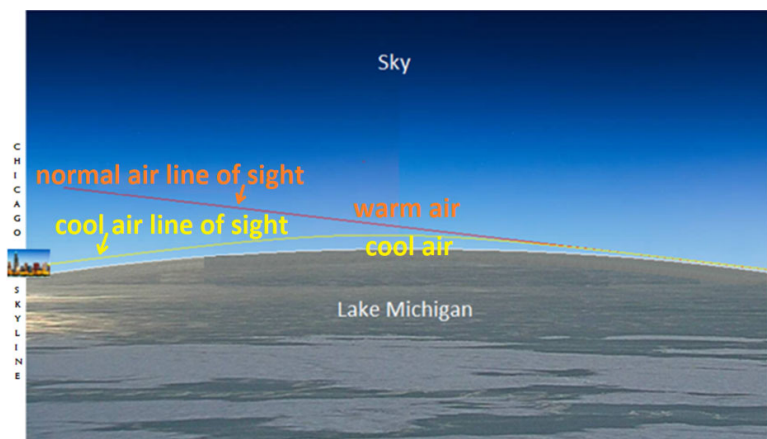
While mirages are the best-known atmospheric refraction phenomena, looming and similar refraction phenomena do not produce mirages.

Mirages show an extra image or images of the miraged object, while looming, towering, stooping, and sinking do not. No inverted image is present in those phenomena either. Depending on atmospheric conditions, the objects can appear to be elevated or lowered, stretched or stooped. These phenomena can occur together, changing the appearance of different parts of the objects in different ways. Sometimes these phenomena can occur together with a true mirage.

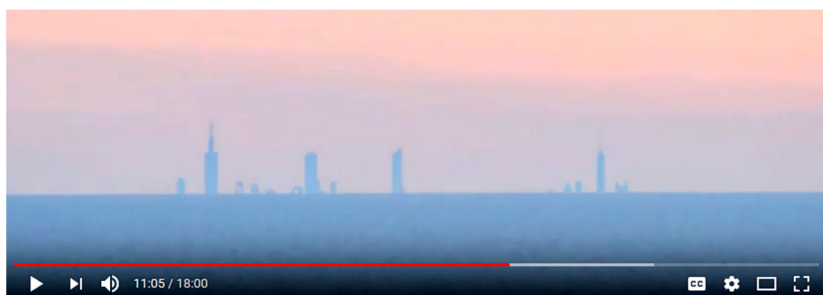
Looming is the most noticeable and most often observed of these phenomena. It is an abnormally large refraction of the object that increases the apparent elevation of the distant objects and sometimes allows an observer to see objects that are located below the horizon under normal conditions. Sinking is the opposite of looming. In sinking, objects that are normally seen above the horizon appear to be less elevated, or may even disappear below the horizon. While with looming the curvature of the rays is increasing, sinking produces the opposite effect. In general looming is more noticeable than sinking because objects that get bigger stand out more than ones that get smaller. Towering and stooping are more complex forms of atmospheric refraction than looming and sinking. While looming and sinking change the apparent elevation of an object, towering and stooping change the shape of the object itself. With towering, objects seem to be stretched; with stooping, objects appear shortened. The stretching and shortening of the objects are not symmetrical, and depends on the temperature profile of the atmosphere. The curvature of the rays changes more rapidly in some places because the temperature profile is curved.⁶⁸⁸

Below is a diagram to show how looming is manifested. Due to cool air near the horizon contrasted to warmer air above the horizon, the cool air acts like a lens. When light goes through a lens it is magnified but it is also bent. As Coomes put it, “That something is a strong temperature inversion, warmer air above colder air, that causes light to bend.”

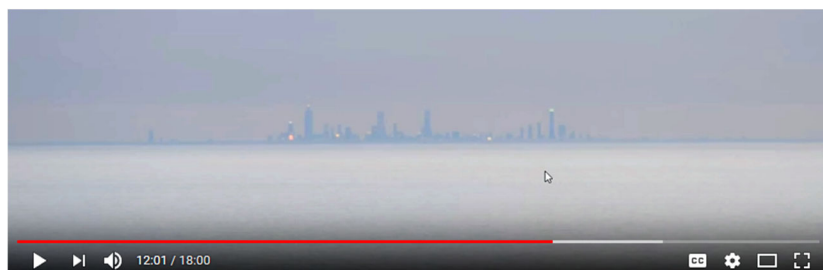
⁶⁸⁸ https://en.wikipedia.org/wiki/Looming_and_similar_refraction_phenomena. Heidorn, Keith (July 15, 1999), “The Superior Mirage: Seeing Beyond”; The Weather Doctor; Young, Andrew, “Looming, Towering, Stooping, and Sinking,” San Diego State University; Humphreys, William Jackson (1920), *Physics of the air*, J.B. Lippincott Company. p. 449.



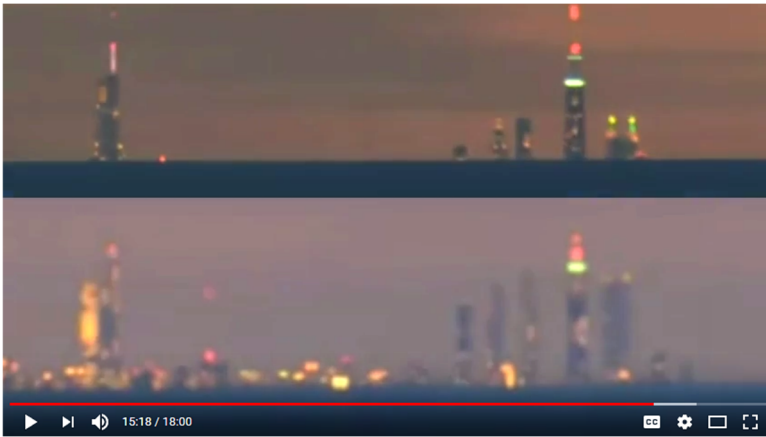
Suffice it to say, the air certainly plays tricks on our eyes. We can see more of what the air does to the Chicago skyline in this next photo comparison. The first photo shows four large buildings, beginning with the Willis Tower on the left. But notice that most of the smaller buildings we saw previously between the four larger ones don't appear now. The reason is there was varying directions to the air refraction when this clip was shot.



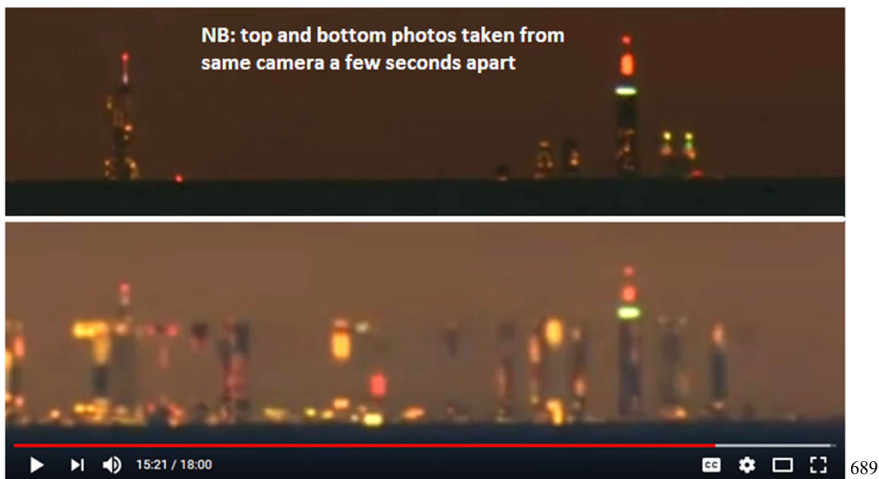
The second photo shows all of the smaller buildings. Again, the reason is that there is varying air refraction occurring.



Below, notice in the first photo most of the buildings are missing, but in the second, although we see most of the buildings, they are severely distorted.



Next, the buildings in the middle suddenly appear out of nowhere.



In respect of how severely refraction affects what we see over water, current flat-earthers, by and large, were simply not aware of this phenomenon until recently. In a discussion of some leading flat-earthers regarding how they determine the distance to the sun and moon, one of the group chimed in to remind the other two how everyone from Eratosthenes to Rowbotham had

⁶⁸⁹ <https://www.youtube.com/watch?v=t8v7mlvh8xI>, moniker: “The Quagmire.”

ignored refraction, but that he discovered what an important part refraction plays in what we can see. He states:

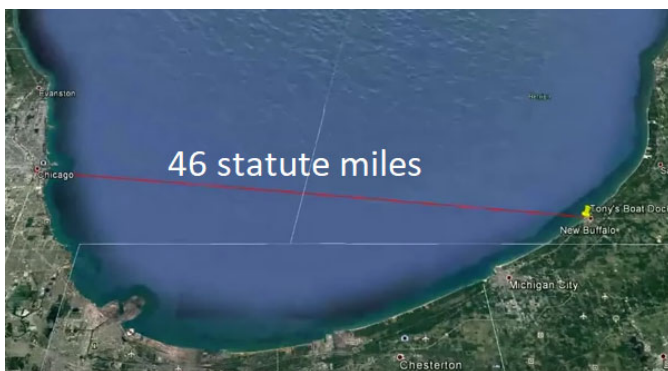
Starting with Eratosthenes and including Rowbotham, all this triangulation was done in complete ignorance of the atmosphere...and how that affects light waves coming from the celestial areas. We know pretty damn well, 100%, that refraction is causing not just perspective, it is causing the sun and moon and stars to rise and set. And so just now as of 2017 are people starting to model these things and take these triangulations and factor in the atmosphere, which does behave as a subjective convex lens. At this point in the game we just don't know what the sun and moon are. We don't know how distant they are. We can make assumptions and we can draw assumptions based on triangulation, and that's great. You know, we've had these values since the late 1800s when parallax did them, but they're totally failing to factor in what I believe is one of the biggest variables, which is that of the atmosphere. We still have some more digging to do.⁶⁹⁰

That they have some more “digging to do” is quite an understatement, considering that refraction of air can cause more aberrations to our vision than a magician pulling a rabbit out of a hat.

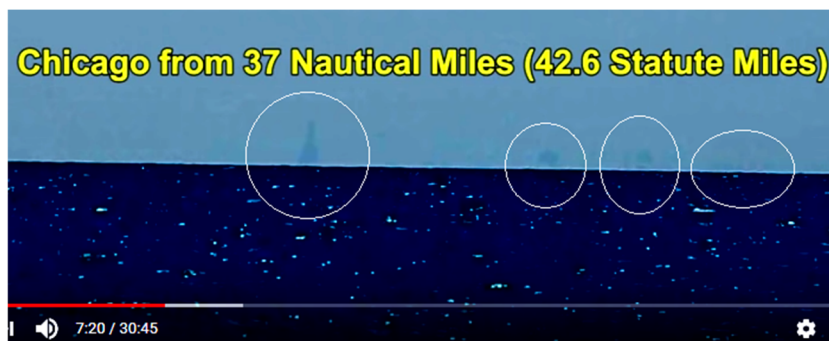
Now, let's return to Rob Skiba's commentary. He speaks about a his boat trip across Lake Michigan to determine what we are seeing in Chicago.

And he and I put together a plan to just drive toward the city, head to the city in a boat and drive back. Because if it's a mirage it's going to magically disappear and the city will roll up over a ball...that would be what we expect to happen. But if it's not a mirage, then the city is going to get bigger and bigger and bigger, or smaller and smaller and smaller, depending on which way you are going....Our plan was to get on the lake June 24, 2016. We did. Note: We were not able to get a charter closer to the 60-mile mark near where Joshua [Nowicki] took his now famous picture, but we felt 40+ miles was still a good enough distance for our test...When I went on Google Earth and charted out the same exact distance, I found that it was exactly 46 statute miles from the little alcove in the marina to the Sears Tower, or the Willis Tower as it's now called.

⁶⁹⁰ <https://www.youtube.com/watch?v=8h0XJ3JLb-o>, starting at 21:07.



Skiba then takes a picture of the Chicago skyline with his Nikon Coolpix P900 camera from 42.6 miles away.



I used a filter on Skiba's clip to darken it so that the buildings can be seen better. We are only able to see four structures. The one on the far left is the most visible. This is the Willis Tower. Skiba remarks at about 6:40:

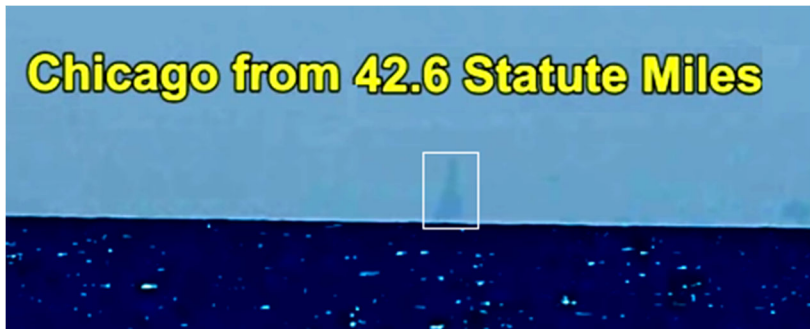
I can see Chicago. We are about 42 miles away...The problem is the camera is having trouble focusing on it because it's moving up and down and it's so zoomed in. But I can totally see it. That's amazing. Forty miles away. Ok, we're good.

Interestingly enough, Skiba does not remark on the fact that his photo shows much of the Willis Tower submerged under the horizon, which is precisely what we would expect from the curvature of the Earth from 42 miles away. Below is a photo of what the Willis Tower looks like from ground level from just a few miles away. Notice how tall it is (1,450 feet, minus the

antenna which would make the height 1729 feet). Notice that it towers over the buildings next to it.



Now, let's compare Skiba's photo taken from the boat that was 42 miles away from Chicago with a cropping of the above photo that matches the dimensions of Skiba's photo.

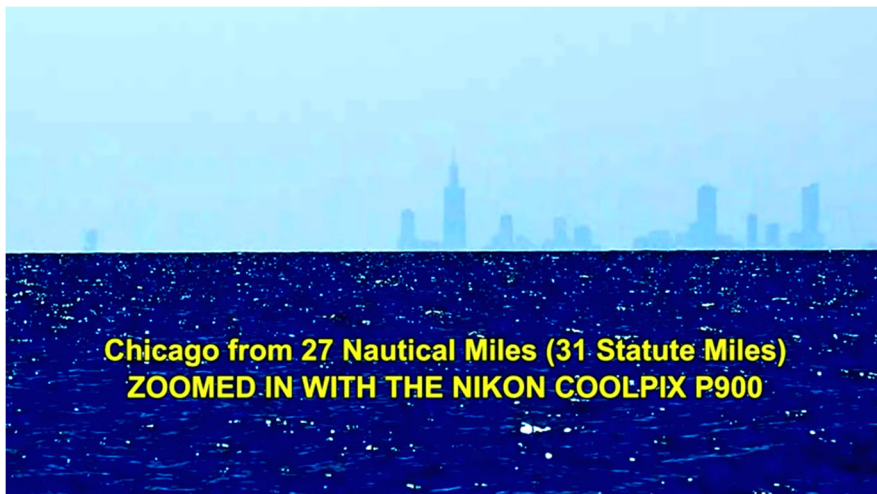


The top photo shows the bottom half of the Willis Tower is not visible. Recall earlier that we calculated that if the distance to Chicago was 40 miles, the Willis Tower would need to be higher than 912 feet; and if the air was refracted, the Willis Tower would only have to be higher than 772 feet. At exactly 42 miles, the figures would be 1,014 feet for non-refracted air and 858 feet for refracted air. This appears to be what we are seeing in Skiba's photo. Let's examine further.

The height of the image of the Willis Tower in Skiba's photo shows about 40% of the building above the horizon from 42 miles away. Since the architectural portion (*i.e.*, the main structure and the slim structure) of the Willis Tower is 1,450 feet high, if we are seeing 40% of the building, then 580 feet is above the horizon and 870 feet is hidden. Notice these figures are right in line with the values we calculated from Metabunk, which showed the building needs to be higher than 1,014 feet for non-refracted air and 858 feet for refracted air in order to see it from 42 miles away. Since the Willis Tower is 1,450 feet high, it more than compensates for the required 1,014 feet or 858 feet.

At this point Skiba ignores this important detail and merely says, "Ok, we're good." Perhaps he ignored it because, as he says himself, he was only interested in determining if meteorologist Tom Coomes' assessment of the image of the Chicago skyline as being merely a "mirage" was correct. Although he is fixated on looking for a mirage to suddenly disappear so that he can prove Coomes wrong, he ignores the elephant in the room—the fact that 60% of the Willis Tower is being obscured by what appears to be the Earth's curvature.

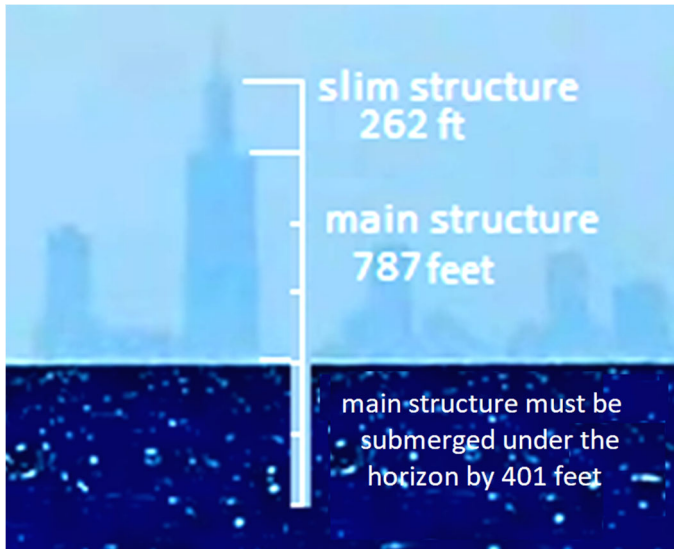
Skiba then takes another photo of the Chicago skyline at 31 miles away. The banter in the boat prior to taking the picture is: "That doesn't look like a mirage to me."



Let's take a close look at this photo. First, as we noted, the actual height of the Willis Tower's architectural structure is 1,450 feet. The actual height of the slim portion of the architectural structure, which is between the main structure and the antennas, is 262 feet, which means that the main structure is 1188 feet (rounded off). This means that the main structure is 4.53 times the height of the slim structure. Using Skiba's photo, let's use eye measurements to determine if we can see the whole main structure. See below:



How many units of the slim structure can we fit into the main structure in the above photo? We can fit, at most, 3 slim structures, which leaves 787 feet for the main structure that is above the horizon. See below:



But the main structure, as we noted above, is actually 1,188 feet, which means there must be 401 feet of the main structure beneath the horizon and obscured. Do our eye measurements coincide with the mathematical calculations from Metabunk? Indeed they do. See below.

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles: 27

Viewer height in Feet: 6

☒ Imperial ☐ Metric ☐ Advanced

Distance = 27 Miles (142560 Feet), View Height = 6 Feet
Radius = 3959 Miles

Results ignoring refraction
 Horizon = 3 Miles (15838 Feet)
 Bulge = 121.53 Feet (1458.37 Inches)
 Drop = 486.13 Feet (5833.54 Inches)
 Hidden = 384.11 Feet (4609.27 Inches)
 Horizon Dip = 0.043 Degrees, (0.0008 Radians)

With Standard Refraction $7/6^*r$, radius = 4618.83 Miles
 Refracted Horizon = 3.24 Miles (17107 Feet)
 Refracted Drop = 416.68 Feet (5000.16 Inches)
 Refracted Hidden = 322.67 Feet (3872.08 Inches)
 Refracted Dip = 0.040 Degrees, (0.0007 Radians)

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles: 27

Viewer height in Feet: 5

☒ Imperial ☐ Metric ☐ Advanced

Distance = 27 Miles (142560 Feet), View Height = 5 Feet
Radius = 3959 Miles

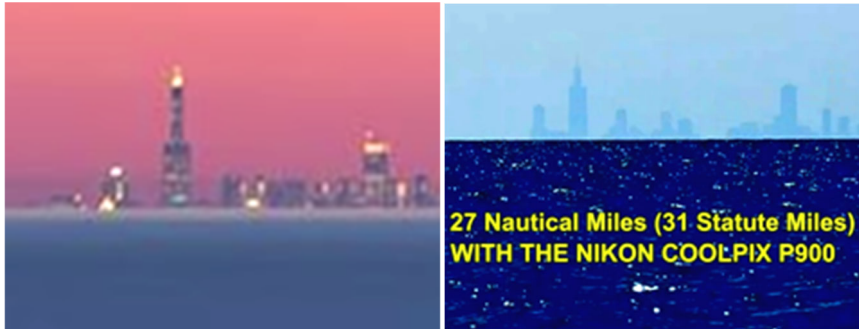
Results ignoring refraction
 Horizon = 2.74 Miles (14458.05 Feet)
 Bulge = 121.53 Feet (1458.37 Inches)
 Drop = 486.13 Feet (5833.54 Inches)
 Hidden = 392.52 Feet (4710.2 Inches)
 Horizon Dip = 0.040 Degrees, (0.0007 Radians)

With Standard Refraction $7/6^*r$, radius = 4618.83 Miles
 Refracted Horizon = 2.96 Miles (15616.48 Feet)
 Refracted Drop = 416.68 Feet (5000.16 Inches)
 Refracted Hidden = 330.39 Feet (3964.63 Inches)
 Refracted Dip = 0.037 Degrees, (0.0006 Radians)

Notice, on the calculation at left, at a distance of 27 miles (which Skiba reported) and given a height of 6 feet (although Skiba's height seems to be less than 6 feet), the "Hidden" portion of the Willis Tower will be 384 feet,

which is well within our estimated value of 401 feet we obtained by measuring with our eye. On the calculation at right, if we change the height to 5 feet to compensate for Skiba's height and the fact that the boat is probably a few inches below the water, we have 392 feet that will be hidden from view due to the Earth's curvature which Metabunk measures, which is even closer to the 401 feet measured by eye.

Let's compare Skiba's photo at 31 miles away from the Willis Tower with that taken by Joshua Nowicki on April 28, 2015 at 60-miles away.



Nowicki's photo (left) shows that the slim structure and the main structure are almost the same height, while Skiba's photo (right) is a lot closer to the actual dimensions since it shows the slim structure is one third the height of the main structure. This means there is something causing Nowicki's photo to show proportionally much less of the main structure than Skiba's photo. In normal conditions, within the Earth's curvature, we should *not* be able to see the Willis Tower from 60-miles away if viewed from an elevation of 6 feet, which means that there must be other factors that are not being considered. Let's examine further.

After Skiba takes this final photo of the Chicago skyline from 9.2 statute miles, they turn the boat around and head back to Michigan. Skiba concludes with:

We didn't see the need to go any further. We saw everything we needed to see...so I said 'just head back; I'm going to set up some cameras and point them at the city so we can watch it the whole way back and show everybody that it's not a mirage!

Skiba's boat ride toward Chicago did, in fact, prove that the image Joshua Nowicki captured in his April 28, 2015 time-lapse was not a mirage. The image of the skyline did not "suddenly disappear," but it would have disappeared if it was merely a mirage. That much of his mission Skiba accomplished. He did, by all appearances, prove Tom Coomes' first hypothesis wrong.



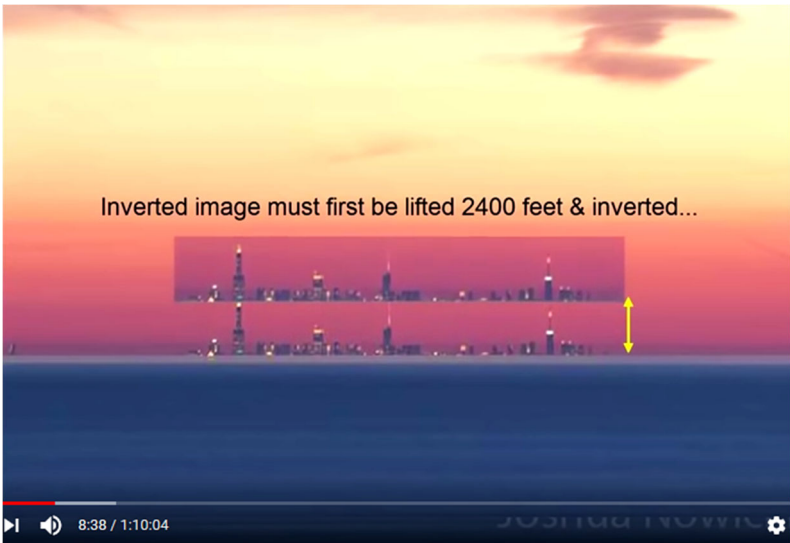
What he didn't prove, however, is that the Earth is flat. He only proved that Nowicki's photo was not a mirage.

Skiba capitalizes on his apparent victory by citing an analysis of Coomes' "mirage" explanation from an apparent expert in atmospheric aberrations, who has since become a flat-earther. The critic's rebuttal, to be sure, is quite cogent. Coomes was obviously grasping at straws when he claimed that the Chicago skyline was a "mirage." The critic⁶⁹¹ reports as follows:

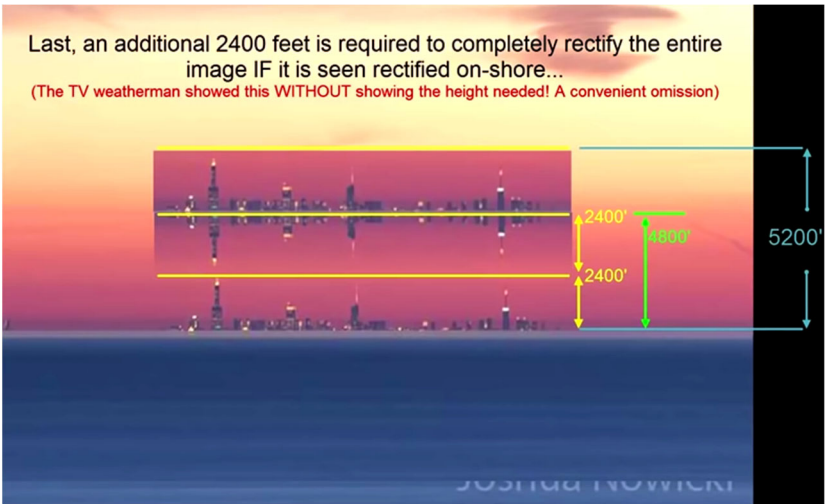
...the mainstream media's contention that this was a superior mirage. Most of you guys know my history as a weatherman...I've taken thousands of out-sea observations and know what a superior mirage looks like and what it does not look like. There wasn't one aspect, not only visually, that was a superior mirage in that photograph, but the atmospheric conditions were absolutely not correct for a superior mirage; and also for the depth of that projection to be a mirage, to be a mirage

⁶⁹¹ Skiba identifies this critic only as "Rich," from the Youtube channel, "TriveAndSurvive."

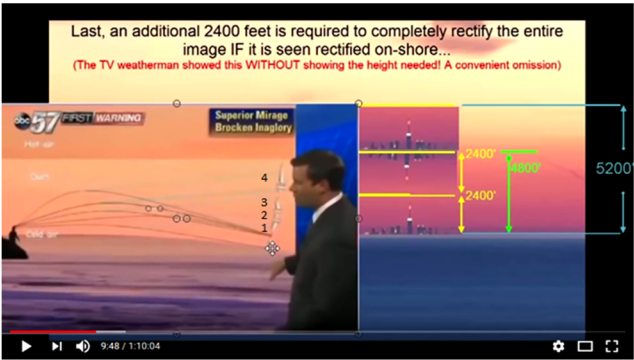
and projected like that would be in the magnitude of a 5,000 foot deep, roughly...ok, I'm going to show it. The inverted image must first be lifted 2,400 feet:



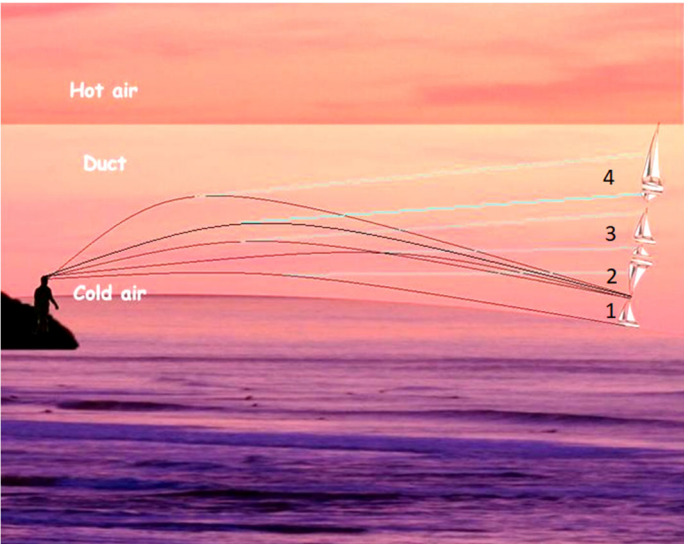
...and then inverted. They showed this but they didn't show you the height because they didn't want to show you how ridiculous it was. So after it's inverted, this is what the superior mirage would look like, this upside-down thing here at 4,800 feet.



But no, that is not what we saw, is it? No we saw it rectified up. To rectify it up, you have to add another 2,400 feet to look the way it did on the surface, not to mention the water line had to go up there all the way with it. So we got 5,200 feet here. That would be the world's deepest inversion from the water I'd ever seen. Now, just to show you that the weatherman did that, let's take a look at that.



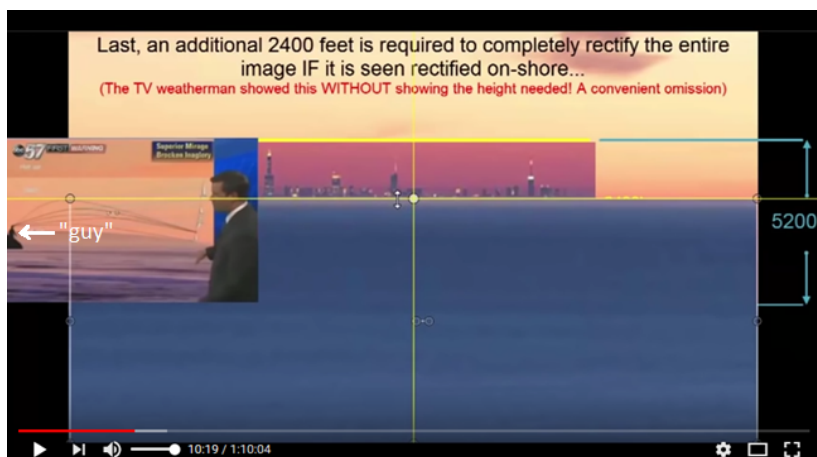
You would have to invert it, which is exactly what he [Tom Coomes] shows here. [1] He shows a ship right side up. [2] Then it goes upside down. [3] Then you have to flip it up again just like I did. [4] Then you have to raise it up one more time, just like I did, because it has to be put right back up again.



See, what they're not showing you is the ridiculousness of how high this mirage would be.



And remember, since we saw the water line the whole way, let me show you how that would look...



So the guy that took this all the way out, we're supposed to believe there was a 5,200 feet inversion that suddenly just happened to come down to the guy right on the edge perfectly, so that he saw when he looked out perfect skyline of Chicago....What they're claiming is that it was so deep, this layer here, this inversion, that it had enough to rectify back up once again, 5,200 feet. How did I come up with that number? Because the curvature from the distance would be roughly 2,400 feet from 60-

miles. So, if it happened to get the exact perfect curvature from these towers, it would require a minimum—actually it requires more than this, I’m just being generous—it requires 2,400 feet plus the height of the tower. It would be 2,400 feet just to get the base, so I’m not even including that. What’s the height of the tower?It’s that times three. Look up “superior mirages.” You’ll find ships looking upside down, one on top of the other. That’s the typical superior mirage you would see right here. That would be a minimum of 4,800 feet.

But since the image was not inverted and [was] right side up, which really tells you you’re looking at Chicago, not a superior mirage, it requires 5,200 feet. I implore you. Please call any National Weather Service office and ask them if they’ve ever seen an inversion from the surface up to 5,200 feet. Actually...to have it rectified again, you would have to add the height of the buildings [and] let’s say it’s 1,500 feet. Ask them if they’ve ever seen anywhere a balloon launch that had a mile and a half from the surface all the way up to there, an inversion. They’re going to laugh at you.⁶⁹²

“Rich’s” explanation sounds very convincing, but like Rob Skiba, the only thing he accomplished was to show that it is highly unlikely that the Chicago skyline photographed by Joshua Nowicki on April 28, 2015 was a mirage, but he did not prove the Earth was flat. What “Rich” also did not do was offer “looming” as an alternative explanation for Nowicki’s picture of the Chicago skyline. I must add that a typical weatherman would have “laughed” at “Rich” for not offering the alternative but instead imply that the Earth is flat.

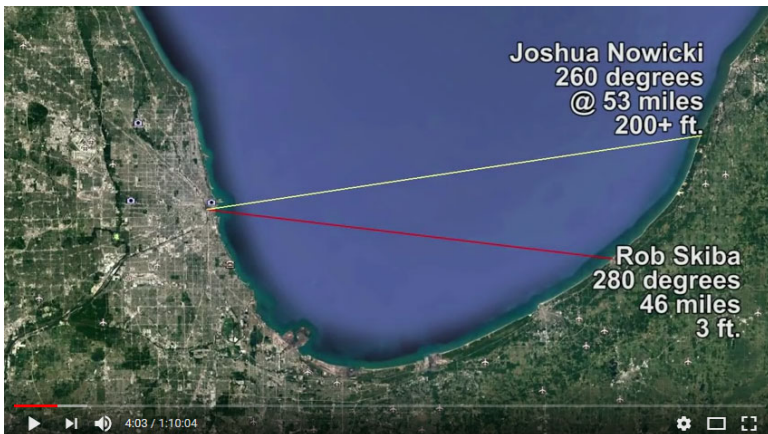
More importantly, in Skiba’s new Youtube video, we learn for the very first time some very crucial details concerning Joshua Nowicki’s April 13, 2016 photo taken with Tom Coomes. Nowicki was at a height of 200+ feet on the shore of Michigan at Warren Dunes when he took the photos, and was 53 miles away. Here again is Nowicki’s photo:

⁶⁹² <https://www.youtube.com/watch?v=I-Q-FuXJSTQ>, from 7:15 to 13:07.



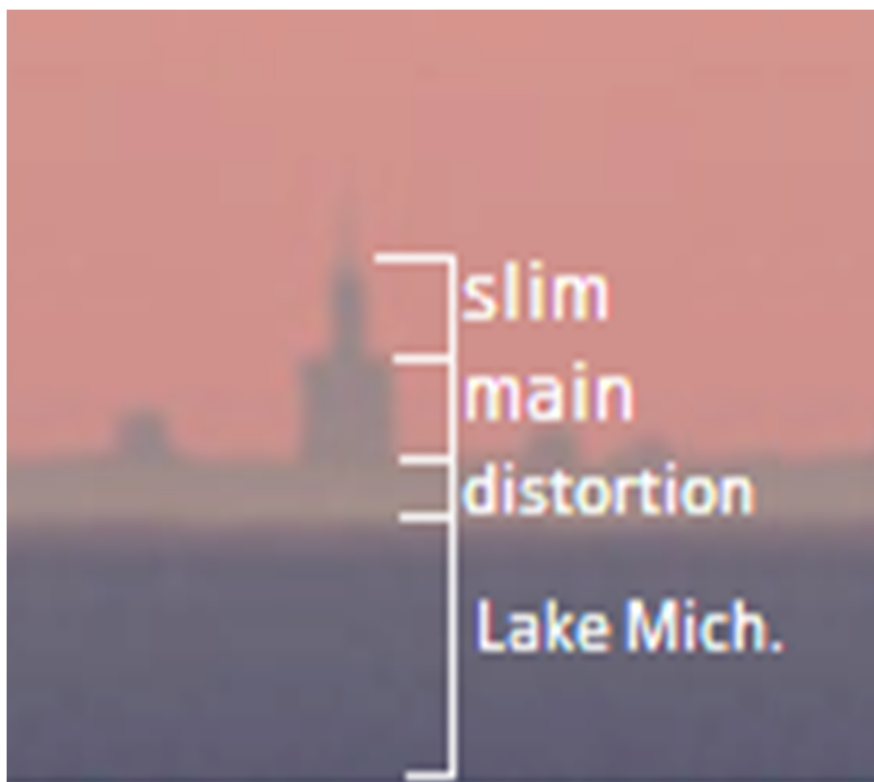
Here are Skiba's words as he provides us with a Google earth map for verification:

By the way, he [Nowicki] was about at, I believe the elevation was about 200 feet and he was somewhat in the vicinity of about 53 miles away according to the channel 57 news report.⁶⁹³



Now, let's zero in on Nowicki's May 13, 2016 photo of Willis Tower:

⁶⁹³ <https://www.youtube.com/watch?v=I-Q-FuXJSTQ> at about the 3:58 mark.



Once again, the slim structure is about the same length as the main structure. But there is also what appears to be atmospheric distortion beneath the main structure of about half the length of the main structure. As we noted earlier, the slim structure is 262 feet. Since in the photo the main structure is the same length, we can add another 262 feet.

If we consider the “distortion” as obscuring the main structure, we can add another 131 feet, allowing the horizon to be below the “distortion.” The total is 655 feet of the Willis Tower that is above the horizon. Since the Willis Tower is 1,450 feet in length, then 795 feet is below the horizon from our eyeball measurement of the photo.

Now, if we plug in 53 miles and a 200 feet elevation into the Metabunk calculator, we receive the following figures:

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial
☐ Metric
☐ Advanced

Distance = 53 Miles (279840 Feet), View Height = 200 Feet

Radius = 3959 Miles

Results ignoring refraction

Horizon = 17.32 Miles (91440.95 Feet)

Bulge = 468.29 Feet (5619.48 Inches)

Drop = 1873.22 Feet (22478.68 Inches)

Hidden= 848.98 Feet (10187.8 Inches)

Horizon Dip = 0.251 Degrees, (0.0044 Radians)

With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles

Refracted Horizon = 18.71 Miles (98767.48 Feet)

Refracted Drop= 1605.6 Feet (19267.21 Inches)

Refracted Hidden= 672.21 Feet (8066.48 Inches)

Refracted Dip = 0.232 Degrees, (0.0040 Radians)

We see that the part of the Willis Tower that will be below the horizon is 848 feet in non-refracted air, and 672 feet in refracted air. The figure of 795, done by eyeball measurement of the photo, is between the 672 feet and the 848 feet, but closer to the 848 feet. This means with only a little of refracted air to compensate for the difference, Nowicki's April 13, 2016 photo of the Chicago skyline is exactly what we would expect for the curvature of the Earth. Additionally, since Coomes stated one could go as high as 250 feet at Warren Dunes State Park, let's just add 25 more feet to the 200 feet we already used and plug that into the Metabunk calculator. See next page.

We now see that the amount of the Willis Tower that would be hidden is 799 feet, and this agrees almost exactly with the 795 feet figure we determined by eyeball measurement from Nowicki's April 13, 2016 photo. Since the Metabunk calculation is based on the presumed curvature of the Earth, this appears to confirm our working hypothesis that at least part of the phenomenon is due to the curvature of the Earth, especially since we are not adding any factors regarding refraction. So let's look at Nowicki's more

famous photo taken on April 28, 2015, the photo that started everything when it was sent to Tom Coomes.

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator
Distance in Miles:
Viewer height in Feet:
☒ Imperial ☐ Metric ☐ Advanced
Distance = 53 Miles (279840 Feet), View Height = 225 Feet
Radius = 3959 Miles
Results ignoring refraction
Horizon = 18.37 Miles (96987.81 Feet)
Bulge = 468.29 Feet (5619.48 Inches)
Drop = 1873.22 Feet (22478.68 Inches)
Hidden= 799.73 Feet (9596.74 Inches)
Horizon Dip = 0.266 Degrees, (0.0046 Radians)
With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles
Refracted Horizon = 19.84 Miles (104758.76 Feet)
Refracted Drop= 1605.6 Feet (19267.21 Inches)
Refracted Hidden= 628.46 Feet (7541.52 Inches)
Refracted Dip = 0.246 Degrees, (0.0043 Radians)

Again, since Nowicki does not reveal the height from which he took the clip, it is really of no use to anyone in the flat-earth debate. Unless we know the height, we cannot explain what will be seen of the Chicago skyline. But let's say that Nowicki was at the same height at Grand Mere State Park, 60-miles away, as he was at Warren Dunes State Park, 53 miles away, when he took the April 28, 2015 photo. Let's examine.



Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

**Distance = 60 Miles (316800 Feet), View Height = 225 Feet
Radius = 3959 Miles**

Results ignoring refraction

Horizon = 18.37 Miles (96987.81 Feet)

Bulge = 600.16 Feet (7201.92 Inches)

Drop = 2400.74 Feet (28808.93 Inches)

Hidden= 1155.69 Feet (13868.3 Inches)

Horizon Dip = 0.266 Degrees, (0.0046 Radians)

With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles

Refracted Horizon = 19.84 Miles (104758.76 Feet)

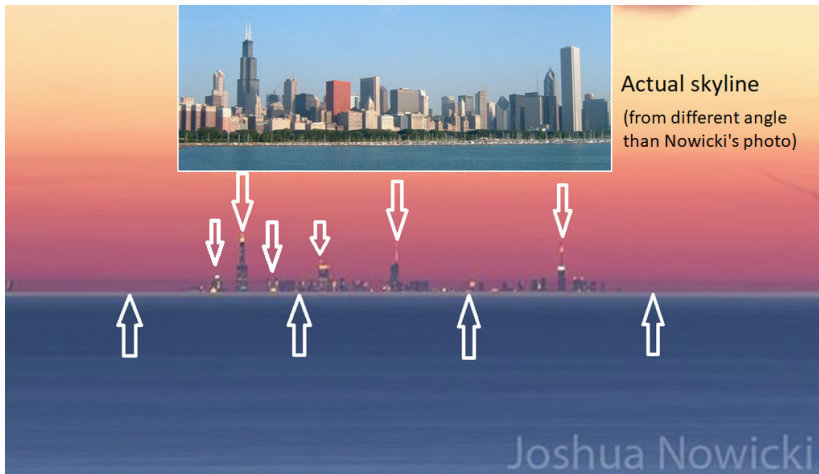
Refracted Drop= 2057.75 Feet (24692.99 Inches)

Refracted Hidden= 921.8 Feet (11061.59 Inches)

Refracted Dip = 0.246 Degrees, (0.0043 Radians)

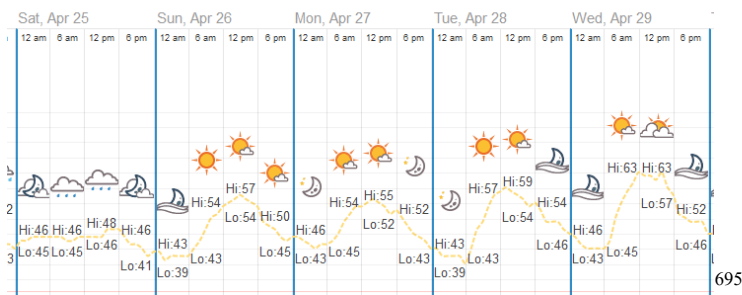
We see that the slim structure of the Willis Tower is about the same length as the main structure, which we are presuming was due to the fact that the curvature of the Earth submerged a major portion of the main structure from Nowicki's sight. We saw earlier that the slim structure is 262 feet and the main structure is 1188 feet. So if we are seeing in the photo that the slim structure and the main structure have the same length (262 feet), this means there is 926 feet of the main structure under the horizon in Nowicki's photo ($1188 - 262 = 926$). If we plug in 60-miles and an elevation of 225 feet we get 1,155 feet of the Willis Tower that will be hidden in non-refracted air, and 921 feet that will be hidden in refracted air. Since 926 is very close to 921, we have at least sight evidence that the hidden amount of the Willis Tower in Nowicki's April 28, 2015 photo is almost the same as what is obtained from Metabunk for the curvature of the Earth in refracted air.

That a refraction of air is occurring on April 28, 2015 is noted by the distortion of the buildings in this photo, in addition to the fact that all of Nowicki's time-lapses of the Chicago skyline show a continual movement of the buildings (*e.g.*, up-down, sideways, size, color, and internal structure), which we assume would be the same case for the time-lapse of the April 28, 2015 clip below.



The weather conditions were also ripe for a looming effect since by April 28 the air temperature took a substantial leap from April 25 to April 28, as noted in the chart below. The air warmed from 48 degrees on the 25th to 59 degrees on the 28th, with a three-day stretch from the 26th to the 28th in the high 50s. On the 28th, the lake's water temperature was 39.2 degrees,⁶⁹⁴ thus the air was warmer by 15 to 20 degrees than the water.

April 2015 Weather in Chicago — Graph



This difference would create a warm air layer above the colder air nearer to the surface of the water, providing the crucial ingredient to cause a major refraction of the air, which in turn creates a bending of the light from Chicago to the observer in Michigan. This is the opposite of what normally occurs since the air is warmer close to the surface and cooler higher up.

⁶⁹⁴ <https://coastwatch.glerl.noaa.gov/statistic/avg-sst.php?lk=g&yr=2016>

⁶⁹⁵ <https://www.timeanddate.com/weather/usa/chicago/historic?month=4&year=2015>

Apparently, on April 28, 2015, a thermal inversion occurred in which warm air persisted in a well-defined layer above a layer of significantly cooler air. As Tom Coomes said of these particular April days when commenting on Nowicki's photo, "We talked about this last night. Conditions are ripe on the lake..." since Spring temperatures are continually on the rise, but the water stays colder much longer thus making the air near the surface colder than usual. Coomes' only error, it seems, was that he called the resulting phenomenon a "mirage" rather than a "looming," a mistake for which he was duly corrected.

So, as we calculated earlier from Metabunk that at 60-miles away and assuming an elevation of 225 feet (both sea level and platform level), there should be at least 921 feet obscured by the curvature of the Earth; and as our analysis of Nowicki's photo showed at least 926 feet of the main structure of the Willis Tower was submerged under the horizon, the mystery of Nowicki's April 28, 2015 photo of the Chicago skyline appears to have been solved.

We also saw that all of the photos of the Chicago skyline that Nowicki displays on his website homepage, in addition to the views of the same skyline from Skiba's boat trip, all can be explained by the curvature of the Earth under either non-refracted air conditions or under refracted air conditions.

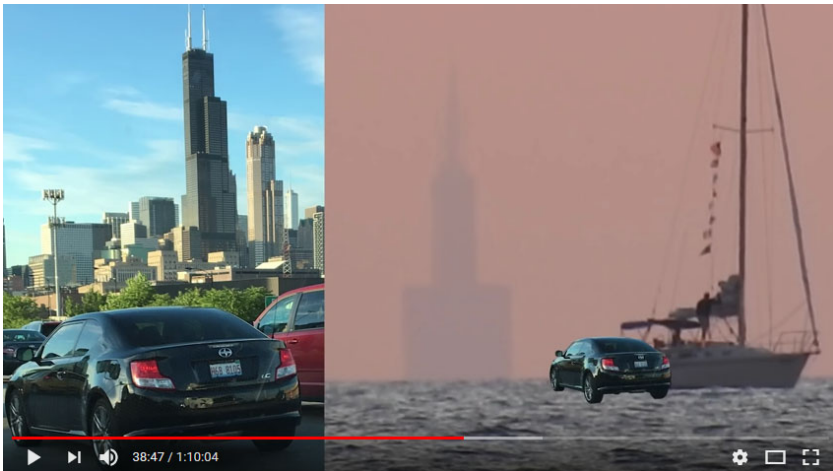
But the story is not over. Skiba, being quite an avid and knowledgeable photographer and film maker himself asserts the possibility that the same phenomena could be due to factors other than a curved Earth and refraction. Although it appears from everything Skiba says in his video that he now accepts a curved Earth with refracted light as an explanation for the phenomena, still, he wants to show that a flat Earth and some other distortion of light can also explain the phenomena. Skiba begins:

Let's just say we don't start with any preconceived notions of the Earth as a globe. Let's entertain for the moment the completely absurd notion that water is flat and it always seeks its own level.⁶⁹⁶

⁶⁹⁶ <https://www.youtube.com/watch?v=I-Q-FuXJSTQ>, published on Youtube Jan. 27, 2017.



Skiba then shows the above clip he took on Lake Michigan of the Willis Tower 46 miles away by means of his 83-power magnification camera lens. Right before he left Chicago, Skiba took the below photo of the Willis Tower from about a half mile away (at left below). He asks us to notice the size of the Willis Tower compared to the black car, and then he

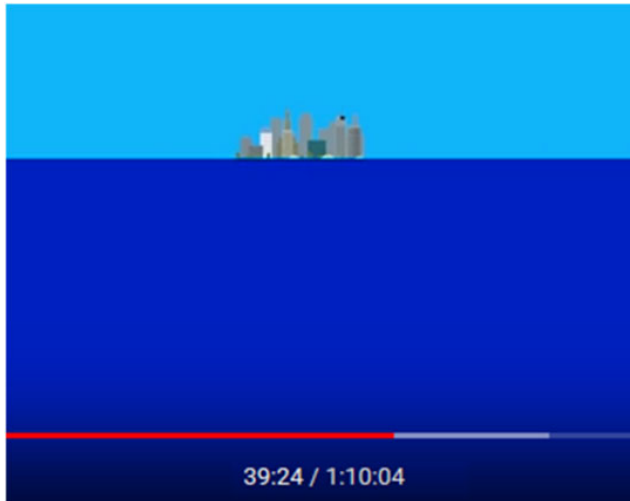


inserts the car into the photo at right and makes it proportionally the same size as the sailboat. The sailboat is about 1.5 to 2.0 miles from Skiba who is on the Michigan shore. Skiba continues:

Do you see something rather interesting here? This building is significantly magnified....The atmosphere is really acting like a lens...a

convex lens or a magnifying glass. So I'm going to suggest that this is what is happening....

Skiba then shows an illustration of the Chicago skyline as viewed by the unaided eye and in which the buildings are only partially submerged beneath the water-line horizon.

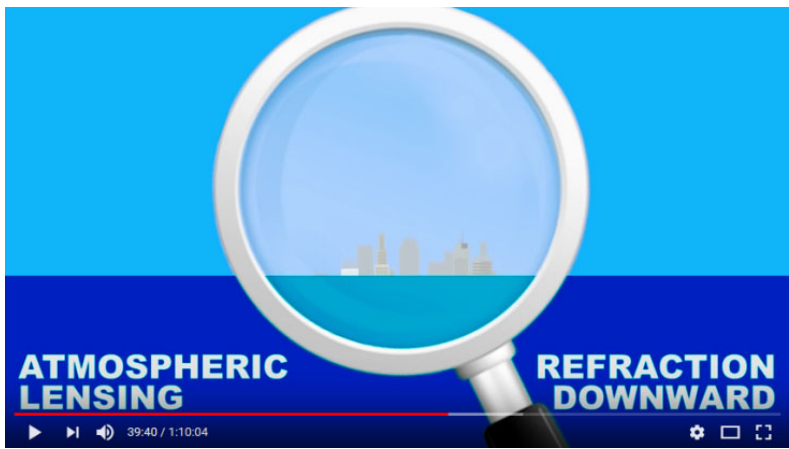


He then shows an illustration of the same skyline viewed through a magnifying glass. He continues with his explanation:

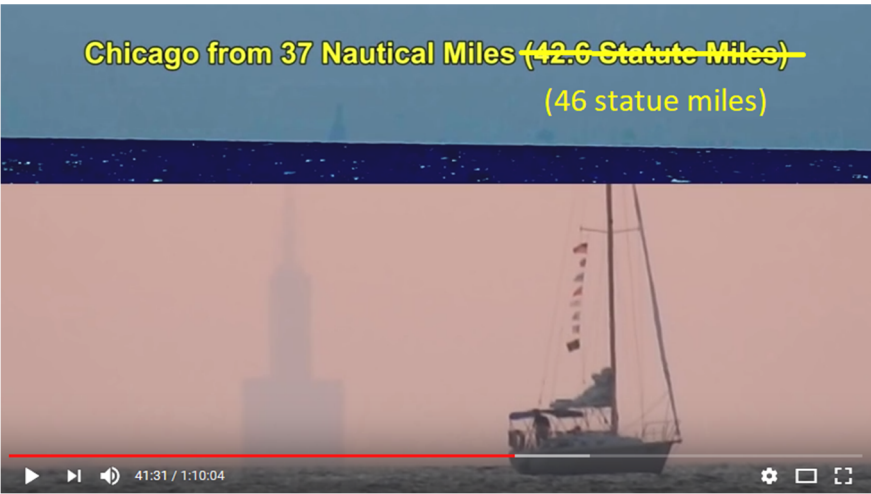


The atmosphere is acting like a lens, which magnifies the city and brings it up a little closer and as it does we start to lose a little bit of the bottoms

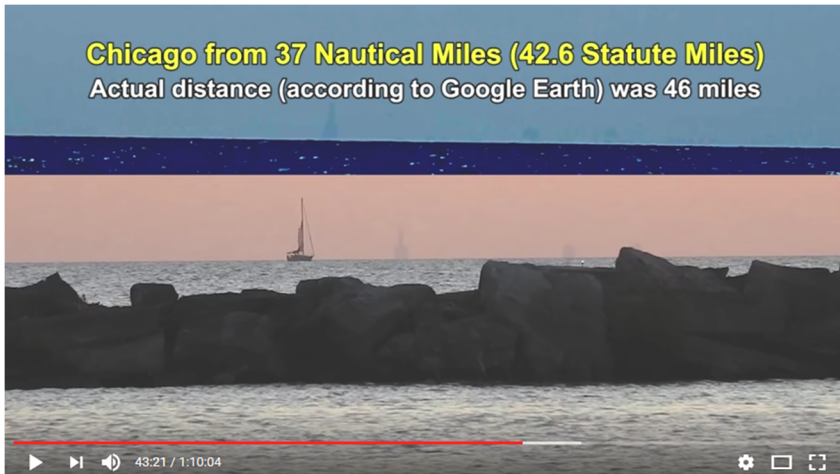
of the buildings...and perhaps due to density in the atmosphere there is additional refraction that takes place that makes it drop down even more.



Skiba then compares the clip that he took from his boat trip with the clip that he took on the Michigan shore, although he makes a correction of the distance that is now 46 miles instead of the previous 42 he stated from the boat. We can see the Willis Tower in both photos and both appear to give the similar proportions of the main structure as compared to the slim structure, except that the bottom photo is magnified by at least 5 times in width and almost 8 times in height. The small discrepancy between width and height may be because the photos were taken on different days.



Skiba then tries to recreate the top photo by zooming the lens halfway to its maximum, since that is the zoom power that was taken on the boat. The result is below. The buildings look proportionately the same:



Skiba then zooms his camera to full and compares it to the picture he had taken previously that included the sailboat. The images of the Willis Tower appear almost identical.

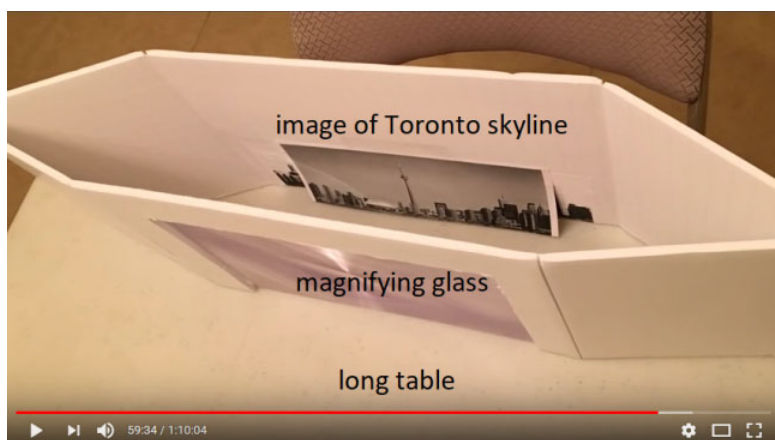


Although Skiba shows a few more comparisons for effect, the conclusion he makes from all the comparisons is the following:

Based on what I saw with my own eyes, as well as what the ‘experts’ had to say regarding how the atmosphere can act like a magnifying glass, I’m still going to go with it as being magnified.

Thanks to Dr. Rennie from ABC57, although Skiba admits to two atmospheric phenomena occurring on Lake Michigan (which are magnification and convex refraction), he has decided—apparently due to his prior conviction from the Bible for a flat Earth—that magnification plays the greater part and refraction plays a lesser part. Hence, for Skiba, the Chicago skyline *always* has the possibility to be visible since both it and Grand Mere State Park are resting on flat land 60-miles apart. But in order to see Chicago from the Park, he adds that one must have the significant magnification provided by a zoom camera or a telescope. He also adds that when one views Chicago from the Park, the magnification from the zoom lens causes the lower part of the buildings to be submerged below the horizon, although he also admits they may sink down a little more due to Dr. Rennie’s convex refraction.

To demonstrate his “magnification” alternative, Skiba shows, rather ingeniously, what happens when a camera is pulled back from a picture when viewed through a magnifier. Below is a picture of the Toronto skyline that will be viewed through a magnifying plate.



Skiba then puts his camera right up against the magnifying glass, which shows the whole Toronto skyline unobstructed. See below.



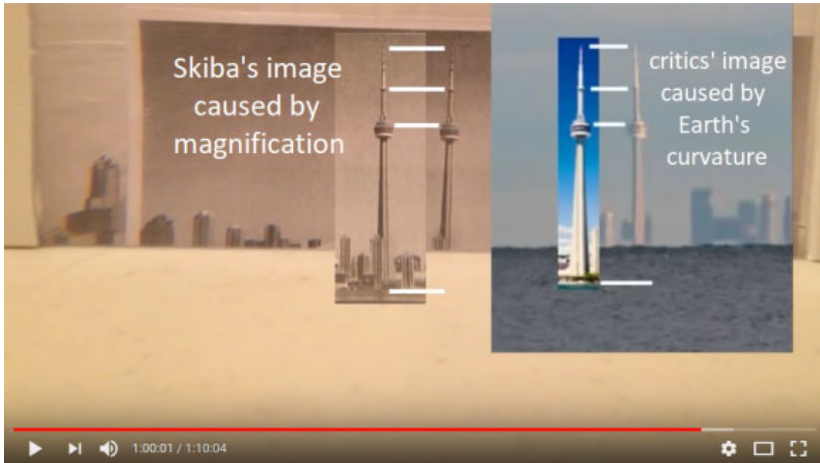
Skiba then moves his camera away from the magnifying glass by sliding it to the opposite end of the table to show how it affects the picture.



As we can see, Skiba has proven his point that magnification has a great effect on what we will see of the skyline. All the buildings disappear and the only thing left is upper part of the tower. Skiba then moves the camera closer to the magnifying glass. The buildings reappear.



Skiba then superimposes a picture of the Toronto skyline that his critics use to claim that when photos are taken of the skyline from many miles away, the bottom part of the tower is still submerged under the horizon (or water line), from which the critics conclude this happens due to the curvature of the Earth.



So it seems Skiba has proven his point, which is, that he can, to a large extent, duplicate in the laboratory the results of what happens when one is viewing objects over the curvature of the Earth. He has not proven the Earth is flat; rather, he has proven that he can simulate the results of a curved Earth in the laboratory. In other words, Skiba has shown equivalency, but that is rather easy to do. As we noted earlier, $2 + 2 = 4$ and $1000 - 996 = 4$. Both can get to the number 4. But which equation's addends apply to the specific case at hand is the only correct answer.

From his laboratory experiment, it is Skiba's contention that, if the Earth were flat, buildings that are a great distance away will be impossible to see unless there is magnification; and when they are magnified, the bottom part of the buildings will be obscured from view. Is this correct? That is, is it correct for Skiba to assume that what he created in the laboratory is actually what occurs in nature, or is it the case that, when a building is already partially submerged below the horizon, if we then magnify it, will it show more of the building or will it just show only a larger version of the same partially submerged building? The conventional answer is that we will see a larger version of the partially submerged building.

Skiba believes, however, that he has disproven the conventional answer and thus claims that the magnification of the building actually allows us to see more of it than just a larger version of it. This explanation is what Skiba claims occurred when Joshua Nowicki took his photo of the Chicago skyline on April 28, 2015. We must keep in mind that Skiba has not proven that if one views the Chicago skyline 60-miles away on a flat Earth that the bottom part of the buildings will be obscured. He has only demonstrated that if he pulls the camera back in his make-shift laboratory model, the bottom part of the skyline picture is obscured from the camera's line of sight. Whether or not the laboratory model is what is precisely happening on Lake Michigan is the \$64,000 question.

Be that as it may, Skiba appears to have come a long way from outright denial of the curved Earth model. His study of Dr. Rennie's refractive model has at least led him to the possibility that the Earth could be curved. It would seem to be the case, however, that since Skiba now has two scientific options, he is choosing the flat Earth model because there are some other factors influencing his decision (*e.g.*, his personal study of the Bible that led him to believe the Bible teaches a flat Earth covered by a hard dome; and his dislike for NASA based on various fabrications it has told to the public).

The alternative, of course, is that the Earth is curved, and although there was certainly a magnification from Nowicki's lens of the Chicago skyline from 60-miles away, it would be secondary compared to the amount of refraction that had to occur to neutralize the Earth's curvature that would normally hide Chicago's buildings. As such, the curved Earth model says that due to the cold air on the surface of Lake Michigan, the refraction was great enough to pull the skyline above the horizon, with the resulting image also magnified by Nowicki's lens, resulting in the partial capture of the Willis Tower. So far we have:

Skiba's View

- Flat earth + great magnification + little refraction = partial skyline

Customary View

- Curved earth + little magnification + great refraction = partial skyline

Can the curved Earth model prove that the refraction of the air on Lake Michigan was enough to pull up the Chicago skyline from 60-miles away? The first answer, as we noted previously, is that we still don't know the height from which Nowicki took the April 28, 2015 photo, which means that Nowicki's photo is useless as a test case. All we know is that Nowicki says he took the photo "on top of a sand dune."

Be that as it may, normally the refraction due to air is minimal. Air's refractive index is calculated to be 1.000293, which means that except for a 0.000293 bending, a light beam going through air will travel straight. Conversely, a light beam going through water will be bent by 1.333, which means that it will be bent by one third. Since there is water in the air in the form of moisture (humidity), we can safely say that the bending of the light beam across Lake Michigan due to water content alone will be somewhere between 1.000293 and 1.333. As noted, the general humidity in Chicago on April 28, 2015 fluctuated from 74% in the early morning to 54% in early evening but the humidity just above the lake is not known.

There are more elements we must consider. Pressure and temperature will also affect the amount of refraction. Even the silhouetting effect from the sun has an effect, as will the distance to the sea's horizon.



⁶⁹⁷ <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 26:34

In short, calculating the bending of light is a complex science that has almost a half dozen variables.⁶⁹⁸ If on a certain day all these variables meet together at their optimal level, the bending of light rays could be off the charts. Just with differences in temperature and pressure, as one source puts it, “refraction...may cause the bending to be up or down by extremely variable amounts.”⁶⁹⁹

The pressure in Chicago on April 28, 2015 hovered at about 30 hg all day. The air temperature fluctuated between 39 degrees and 59 degrees but the lake’s water temperature was 39.2 degrees.⁷⁰⁰

As noted, to create a looming of the Chicago skyline there must be a layer of cold air near the surface of Lake Michigan with a warmer layer of air on top of the cold air. The cold air tends to contract the volume of air so that it is denser, while warm air tends to expand it and will be less dense. Air that is denser will cause a greater refraction, and a greater pressure will cause the cold air to become even denser.⁷⁰¹

We must also keep in mind that the refraction values that we retrieved from Metabunk are in normal refraction conditions. As Metabunk itself notes:

Standard Refraction is an approximation of the refraction expected under Standard Atmospheric conditions. Actual atmospheric conditions can vary, and the resultant refraction can be complex, especially close to the horizon.⁷⁰²

⁶⁹⁸ See: aty.sdsu.edu/explain/atmos_refr/bending.html; aty.sdsu.edu/explain/atmos_refr/altitudes.html; aty.sdsu.edu/explain/atmos_refr/horizon.html; aty.sdsu.edu/explain/atmos_refr/dip.html

⁶⁹⁹ <https://www.aboutcivil.org/curvature-and-refraction.html>

⁷⁰⁰ <https://coastwatch.glerl.noaa.gov/statistic/avg-sst.php?lk=g&yr=2016>

⁷⁰¹ Even if the air were isothermal (the same temperature everywhere), it wouldn’t have the same density everywhere, because it’s in hydrostatic equilibrium: the air at each level is compressed by the weight of the air above it. The higher you go, the less compression; the density is lower at greater heights (which is why it’s hard to breathe on mountaintops, and why jet airliners have to be pressurized, as noted at http://aty.sdsu.edu/explain/atmos_refr/bending.html).

⁷⁰² See https://en.wikipedia.org/wiki/International_Standard_Atmosphere. The International Standard Atmosphere (ISA) is an atmospheric model of how the pressure, temperature, density, and viscosity of the Earth’s atmosphere change over a wide range of altitudes or elevations.

Other authoritative sources show us even more variables and conditions that affect what we see on the horizon. Note my emphasis in italics added to the author's words.

Unfortunately, the refraction varies considerably from day to day, and from one place to another. *It is particularly variable over water*: because of the high heat capacity of water, the air is nearly always at a different temperature from that of the water, so there is a thermal boundary layer, in which the temperature gradient is far from uniform.

Worse yet, these temperature contrasts are particularly marked near shore, where the large diurnal temperature swings over the land *can produce really large thermal effects over the water*, if there is an offshore breeze. This is particularly bad news for anyone standing on the shore and wondering how far out to sea a ship or island might be visible.

It gets worse. While the dip of the horizon depends only on an average temperature gradient, and so can be found from just the temperatures at the sea surface and at the eye, *the distance to the horizon depends on the reciprocal of the mean reciprocal of the temperature gradient*. But the structure of thermal boundary layers guarantees that there will be large variations in the gradient, even in height intervals of a few meters. *This means that on two different days with the same temperatures at the eye and the water surface (and, consequently, the same dip), the distance to the horizon can be very different*.

In conditions that produce superior mirages, there are inversion layers in which the ray curvature exceeds that of the Earth. Then, in principle, you can see infinitely far—there really is no horizon.

Of course, we all know that visibility is limited by the clarity or haziness of the air. And the duct that (in principle) might allow you to see around the whole Earth doesn't really extend that far; it typically exists for some limited region, perhaps a few tens or a few hundreds of kilometers.

So the nice-looking formulae for calculating "the distance to the horizon" are really only rough approximations to the truth. You can consider them accurate to a few per cent, most of the time. *But, occasionally, they will be wildly off, particularly if mirages are visible*.

*Then it's common to see much farther than usual — a condition known as looming.*⁷⁰³

Dip, without refraction

...the effective curvature of the Earth is simply diminished by the curvature of the ray: the Earth's curvature is $1/R$, the ray's curvature is k/R , and the difference of the curvatures is $(1 - k)/R$.

In other words, everything is the same *with* refraction as it would be on a fictitious planet with a radius of $R/(1 - k)$ and *no* refraction. So, as long as k isn't very big, the numbers aren't greatly changed by refraction.

Dip and Temperature

So how big is k ? That depends on the temperature gradient; see the ray bending page for details. It turns out that in “normal” conditions—when the Standard Atmosphere is a fair approximation— k is about $1/6$ or $1/7$ at sea level, and less on sunny afternoons, or at higher elevations. Values of k around 0.13 have been used in correcting surveyors' data for a century or more. You can find the value of k for different conditions using my JavaScript calculator.

Clearly, both the dip and the distance to the horizon are still proportional to \sqrt{h} , but the proportionality constant depends on the value of k adopted — which is equivalent to assuming a particular *lapse rate* between the eye and the surface, as the ray bending depends mainly on this temperature gradient. Typical values used in practice are $\text{dip} = 1.75' \times \sqrt{h}$, meters...and $\text{horizon range} = 3.83 \text{ km} \times \sqrt{h}$, meters.

On the other hand, when there is a strong temperature inversion, k can reach, or exceed, unity. The case $k = 1$ corresponds to horizontal rays that orbit the Earth indefinitely (a situation considered in exquisite detail by Kummer). Values larger than 1 correspond to ducting conditions; if the observer is inside the duct, a pseudo-horizon appears *above* the astronomical one, so the dip of this apparent horizon is negative — a remarkable phenomenon that really is observed, occasionally.

Caution: Please be aware that the preceding argument contains several unrealistic assumptions. For example, the lapse rate near the ground is

⁷⁰³ http://aty.sdsu.edu/explain/atmos_refr/horizon.html, emphasis mine.

never constant, so the path of the horizon ray is never an arc of a circle. Fortunately, in calculating the *dip* of the horizon, this idealization makes very little difference. In our paper on the dip diagram, George Kattawar and I showed that the *dip depends almost entirely on the difference in temperature between the air at eye level and that at the apparent horizon*, regardless of the thermal structure in between.

On the other hand, the distance to the horizon turns out to be sensitive to the intervening thermal structure. That structure *tends to make the distance to the apparent horizon appreciably larger* than the simplistic argument above would suggest.

Furthermore, the air temperature near the perigee point on the horizon ray is considerably closer to the temperature at eye level than is the temperature of the actual surface. That's because the Earth's surface isn't smooth: on land, your line of sight is usually intercepted by plants and structures well above the ground surface; and at sea, the apparent horizon is at a wave crest, well above the mean surface of the water. So it's difficult to know what temperature to use for the lowest point along the horizon ray.

Even so, it's fair to say that the dip is increased when inferior mirages are present, and decreased (or even negative) when thermal inversions and superior mirages occur.⁷⁰⁴

Usually, the density of the air just above the surface of the Earth is greater than its density at greater altitudes. *This makes its refractive index greater near the surface than at higher altitudes, which causes light that is travelling roughly horizontally to be refracted downward.*⁷⁰⁵

This makes the actual distance to the horizon greater than the distance calculated with geometrical formulas. With standard atmospheric conditions, the difference is about 8%. This changes the factor of 3.57, in the metric formulas used above, to about 3.86. This correction can be, and often is, applied as a fairly good approximation when conditions are close to standard. *When conditions are unusual, this approximation fails.*

⁷⁰⁴ http://aty.sdsu.edu/explain/atmos_refr/dip.html, copyright Andrew Young, 2003-2013.

⁷⁰⁵ Proctor, Richard Anthony; Ranyard, Arthur Cowper (1892), *Old and New Astronomy*, Longmans, Green and Company. p. 73. Archived from the original on 2017-03-29.

*Refraction is strongly affected by temperature gradients, which can vary considerably from day to day, especially over water. In extreme cases, usually in springtime, when warm air overlies cold water, refraction can allow light to follow the Earth's surface for hundreds of kilometers.*⁷⁰⁶

Opposite conditions occur, for example, in deserts, where the surface is very hot, so hot, low-density air is below cooler air. This causes light to be refracted upward, causing mirage effects that make the concept of the horizon somewhat meaningless. Calculated values for the effects of refraction under unusual conditions are therefore only approximate. Nevertheless, attempts have been made to calculate them more accurately than the simple approximation described above.⁷⁰⁷

How far can you see?

Still, even with those caveats, it's of interest to consider how far the eye can see under different conditions. Usually the visibility is limited by scattered light in the lower atmosphere.⁷⁰⁸ Even under extremely clear conditions, it's unusual to see more than a couple of hundred kilometers [124 miles].

However, there is one situation in which objects can be made out at great distances: when they are silhouetted against a bright background, such as the setting sun, or (just after sunset) a bright twilight sky.

Here in San Diego, we rarely can see San Clemente Island, about 125 km offshore. The top of the island should just be visible above our horizon with normal refraction, but it's concealed by "airlight" during the day. Even in the clear air of a "Santa Ana," which causes looming and raises more of the island above the apparent horizon, it's often hard to make out.

⁷⁰⁶ NB: 100 kilometers = 62 miles; 200 kilometers = 124 miles; 300 kilometers = 186 miles; 400 kilometers = 248 miles.

⁷⁰⁷ https://en.wikipedia.org/wiki/Horizon#Effect_of_atmospheric_refraction

⁷⁰⁸ Craig F. Bohren and Alistair B. Fraser, "At what altitude does the horizon cease to be visible?" *American Journal of Physics* 54, Issue 3 (March, 1986) p. 222.



But just after sunset, the island is often visible, if you know where to look. The air between you and the island is only dimly illuminated after sunset, but the sky behind the island (*i.e.*, the air beyond the horizon that is still in direct sunlight) is still fairly bright. Then the silhouette of the island is striking, even if it had been invisible a few minutes before sunset.

The sun itself can be seen through a long duct when it is several degrees below the astronomical horizon; however, its image is then so distorted that any intervening terrestrial object (such as an island, a mountain, or even a cloud) would probably also be so distorted that its silhouette against the sun would be unrecognizable. Some extreme claims can surely be discounted, such as Jessen's 1914 illusion. (Jessen claimed to have seen a mountain nearly 900 km (559 miles) away, but he certainly did not; Korzenewsky (1923), who refers to this report in a footnote, somehow inflated that to 1177 km (731 miles)).

What's the record for visibility without help from the silhouetting effect? I think that might belong to the report of the expedition led by Korzenewsky (1923), who reported seeing snow-capped peaks of a mountain range 750 km (466 miles) away. Conditions were perfect: the lower atmosphere was in shadow at sunset; the peaks were quite high (4650 meters, or over 15,000 feet); they were covered with white snow,

increasing their visibility; and there must also have been considerable looming to bring these distant features above the observers' horizon. As the observation was made on June 1, near the peak of superior-mirage season, the looming is not improbable, though the amount required is hard to believe. The observers themselves were in the deserts of Turkestan [now southeastern Kazakhstan] at a height of nearly a kilometer, where the dryness of the air favored extreme clarity, and looking across a broad, sandy depression. And, of course, much of the air path was in thinner air well above ground level, because of the mountains' height.

For less extreme, but very reliable, observations, consider some listed by Commander C. L. Garner of the Coast and Geodetic Survey in 1933. He says that instrumental measurements were made in both directions "between Mt. Shasta and Mt. St. Helena in California, a distance of 192 miles." Apparently this was done in normal conditions, with no looming; heliotropes having 12-inch [30-cm] mirrors were used. He also credits the 1911 sighting of the Fairweather Mountains in Alaska from the ship *Explorer* from the Gulf of Alaska, 330 miles [531 km] away.⁷⁰⁹

As we can readily see, the distances we can see on a curved Earth range from zero to many hundreds of miles depending on everything from temperature gradients to sun silhouetting. The science of determining or experiencing how far one can see across a land mass or a body of water is much too variable and complicated for anyone to claim evidence for a flat earth. As a result, the famous Nowicki photo of the Chicago skyline taken from 60-miles away can hardly qualify as a definitive test case, much less evidence that we live on a flat Earth.

Leaving out every other variable and dealing only with the variables in refraction, no hard and fast conclusions can be made. Using the calculator that provides five gradients of refraction due to atmospheric conditions, the tenuousness of the issue is quite apparent. For example, let's say that Mr. Nowicki was standing on a sand dune 30 feet high with his camera, and the distance from Grand Mere State Park to Chicago was 57 miles, and we want to see the Willis Tower which is 1450 feet high:

⁷⁰⁹ http://aty.sdsu.edu/explain/atmos_refr/horizon.html

Calculator of Earth's curvature and horizon

Русский

English

Metric

Imperial

Distance between observer and the target [miles]

57

Observer height [ft]

30

Target height [ft]

1450

Earth radius [miles]

3958.76

The results with various gradients of refraction are as follows:

Title	No refraction	Weak 1.07
Visible horizon, AB [miles]	6.7072	6.9379
Target max visible distance [miles]	53.3376	55.1728
Hidden part, ZW [ft]	1686.8850	1562.0786
Visible part, HW [ft]	-236.8850	-112.0786
Additional info	You can't see the target	You can't see the target

Standart 7/6	Intense 4/3	Severe 1.5	Polar 70/20*
7.2446	7.7448	8.2146	12.5479
57.6111	61.5887	65.3246	99.7844
1415.1396	1213.4610	1058.1454	376.4969
34.8604	236.5390	391.8546	1073.5031
Can be observed	Can be observed	Can be observed	Can be observed

710

Hence with “no refraction” and “weak” refraction, we can’t see the Tower. But with “standard,” “intense” and “severe” refraction, we can see the

⁷¹⁰ <https://physicsstuff.000webhostapp.com/>

Tower. If we included the antenna towers of the building, totally 1750 feet, all five gradients could see the building:

Distance between observer and the target [miles]

57

Observer height [ft]

30

Target height [ft]

1750

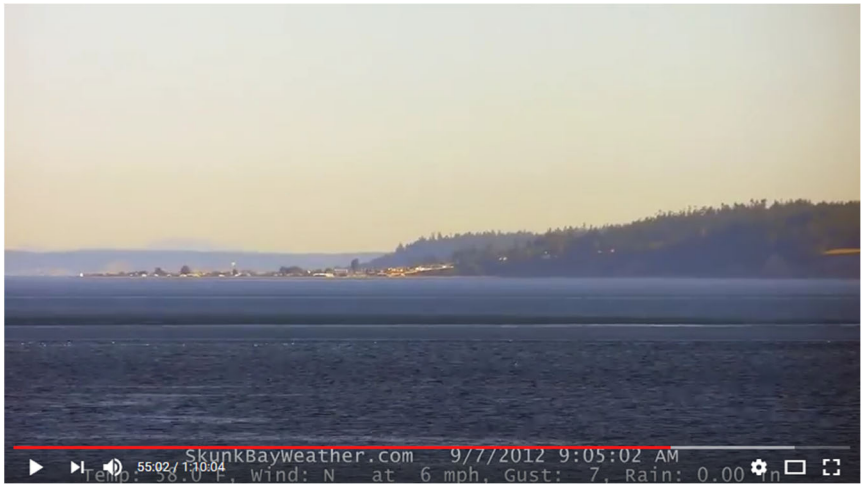
Earth radius [miles]

3958.76

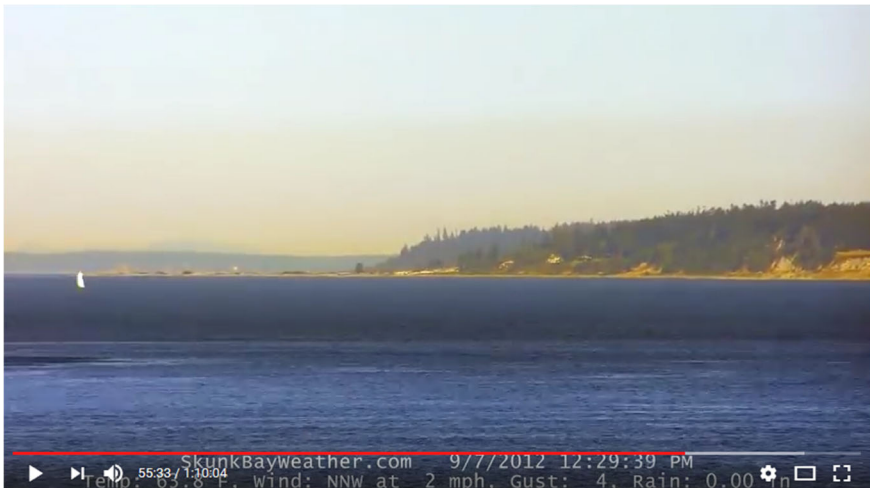
Title	No refraction	Weak 1.07	Standart 7/6
Visible horizon, AB [miles]	6.7072	6.9379	7.2446
Target max visible distance [miles]	57.9350	59.9284	62.5768
Hidden part, ZW [ft]	1686.8850	1562.0786	1415.1396
Visible part, HW [ft]	63.1150	187.9214	334.8604
Additional info	Can be observed	Can be observed	Can be observed

Still, we will cover one more anomaly that Skiba presents as evidence. Since Skiba is advocating a flat Earth, in his understanding, the only time we would not be able to see Chicago from Grand Mere State Park with the aid of a zoom lens is if there is something like fog obstructing our view, and, in competition with Dr. Rennie’s concept of concave refraction, Skiba now adds that our view might also be obstructed by a convex refraction that pulls the water and air up over the buildings so that the buildings are hidden, even on a flat Earth.

Skiba attempts to back up his view by showing us more clips and illustrations. Below he shows a time-lapse from SkunkBayWeather.com of a view across an inlet. The first clip below was extracted at 9:05:02 am on September 7, 2012. See below.



The second clip was extracted at 12:29:39 on the same day. See photo below.



One will notice in the second clip the buildings are obscured. The temperature had risen by noon and caused an atmospheric distortion that hid the buildings from the camera on the shore. Skiba remarks on this phenomenon as follows:

Sometimes you see it sometimes you don't. The default is to see it, though. That's the point. The default is minus distorting atmospheric conditions you would be able to see everything clearly. But due to

different temperature variations and density in the atmosphere and what not, sometimes you can see the whole shore line and the building; sometimes you can't. But the magic trick is not in being able to see it but what is taking place that obscures your ability to do so....

But this video is really of no use for Skiba since all it can do is show how atmospheric distortion works, with which we all agree. The video can't show more than that since Skiba failed to tell us how far away the buildings were from the camera. If the buildings were only a few miles away then seeing them from the opposite shore would, indeed, be the "default" position. Only when the atmosphere distorts the line of sight would we not be able to see them. But if the buildings are very far away so that not even refraction could pick them up to the camera's level, then atmospheric distortion would play no part in the process.

Skiba then tries to tie in what he concluded from the SkunkBayWeather video to what he saw on Lake Michigan:

I think that is exactly what is going on on Lake Michigan....I really do believe, just like the experts said, the globalist guys....they are the ones who said, 'hey, the atmosphere really is acting like a lens, and they put a lens in front of the camera to show how it works, so I'm just doing what they're doing. I'm using the same logic that they're using. The same science that they're using.

In other words, Skiba is saying that in the flat Earth model, the Chicago skyline is always possible to see since there is no horizon to block one's vision, but we can't see them with the unaided eye because they are too far away (60-miles). Hence the reason one sees the buildings, and only part of the buildings, is due to the magnified image that Nowicki's camera provides; but at the same time, Skiba says, the magnification creates larger buildings with their bottoms cut off. But the problem with Skiba's interpretation is that even with Nowicki's magnification, on most days the buildings of the Chicago skyline cannot be seen. It is only on rare occasions, according to Nowicki himself, that he can see the skyline through his camera lens, even on a very clear day. Nowicki's photo was the talk of the town due to its rarity, not its frequency. This means that not being able to see the skyline is the rule; and seeing the skyline is the exception. Skiba claims that

seeing the skyline is the rule; not seeing the exception. The evidence shows otherwise.

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

**Distance = 165 Miles (871200 Feet), View Height = 300 Feet
Radius = 3959 Miles**

Results ignoring refraction

Horizon = 21.21 Miles (111991.97 Feet)

Bulge = 4539.14 Feet (54469.67 Inches)

Drop = 3.44 Miles (18162.47 Feet)

Hidden= 2.61 Miles (13782.53 Feet)

Horizon Dip = 0.307 Degrees, (0.0054 Radians)

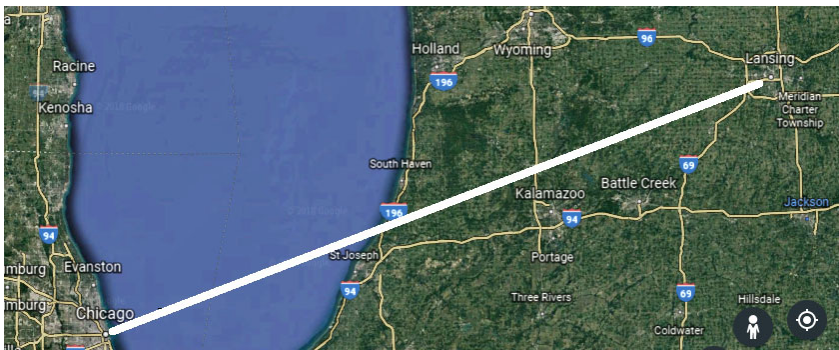
With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles

Refracted Horizon = 22.91 Miles (120965.09 Feet)

Refracted Drop= 2.95 Miles (15566.04 Feet)

Refracted Hidden= 2.19 Miles (11537.07 Feet)

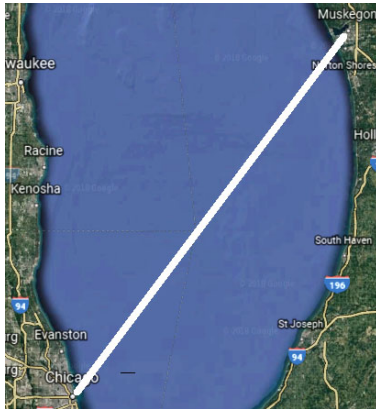
Refracted Dip = 0.284 Degrees, (0.0050 Radians)



In fact, according to our study of refraction and its complexities, if the Earth were flat we should be able to see Chicago from perhaps 100 miles or more, every day, visibility permitting, at least with a camera that has a very powerful zoom lens or with a high-powered telescope. Perhaps on a clear day we should also be able to see Chicago from Lansing, with a high-powered telescope, from the tallest building in Lansing, the 300-foot Boji

Tower, 165 miles away from Chicago. Metabunk tells us these distances would hide the Chicago skyline from between 2.19 to 2.61 miles from the viewer if the Earth were curved. But if the Earth were flat we should be able to see all of the Chicago skyline.

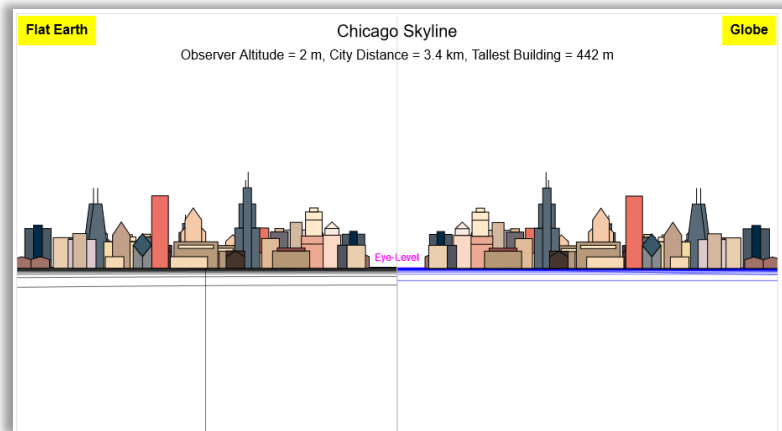
Or, if one wants to continue the investigation only over water, then one could look from Muskegon atop the Jefferson Tower which stands 138 feet high and is about 115 miles away from Chicago.



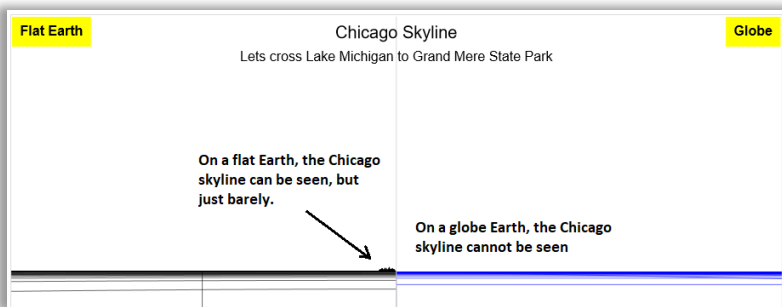
Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator	
Distance in Miles:	115
Viewer height in Feet:	138
<input checked="" type="radio"/> Imperial <input type="radio"/> Metric <input type="checkbox"/> Advanced	
Distance = 115 Miles (607200 Feet), View Height = 138 Feet Radius = 3959 Miles	
Results ignoring refraction Horizon = 14.39 Miles (75956.5 Feet) Bulge = 2204.84 Feet (26458.08 Inches) Drop = 1.67 Miles (8820.75 Feet) Hidden = 1.28 Miles (6749.44 Feet) Horizon Dip = 0.208 Degrees, (0.0036 Radians)	
With Standard Refraction 7/6*r, radius = 4618.83 Miles Refracted Horizon = 15.54 Miles (82042.38 Feet) Refracted Drop = 1.43 Miles (7560.22 Feet) Refracted Hidden = 1.07 Miles (5653.7 Feet) Refracted Dip = 0.193 Degrees, (0.0034 Radians)	

Metabunk tells us that the Chicago skyline would be submerged under the horizon from between 1.28 to 1.43 miles, which means the Willis Tower would be 5,300 to 6,100 feet beneath the horizon if the Earth were curved. If the Earth were flat we should be able to see the whole skyline, and much more. Surely a high-powered telescope that can see craters on Jupiter's moons millions of miles away would be able to see the Chicago skyline from 115 miles away on a clear day if the Earth were flat. Additionally, various other tests could be performed over Lake Superior if someone desired an even longer distance over water. In other words, it seems that this debate concerning a flat Earth can be settled rather quickly, especially if the depth below the horizon of a building on a curved Earth (as is the case from both Muskegon and Lansing) is so great that the likelihood that it could be compensated by refraction is severely minimized. It is certainly better than making conclusions on Joshua Nowicki's 60-mile distant photo of Chicago from Grand Mere Lake Park.

The very best website I have found that puts things in proper perspective regarding the effects of height, distance, atmospheric conditions, *etc.*, is that created by Walter Bislin.⁷¹¹ His animations show precisely what happens in all conditions. Here we show a series of shots of the animation for seeing the Chicago skyline from Grand Mere State Park in Michigan.

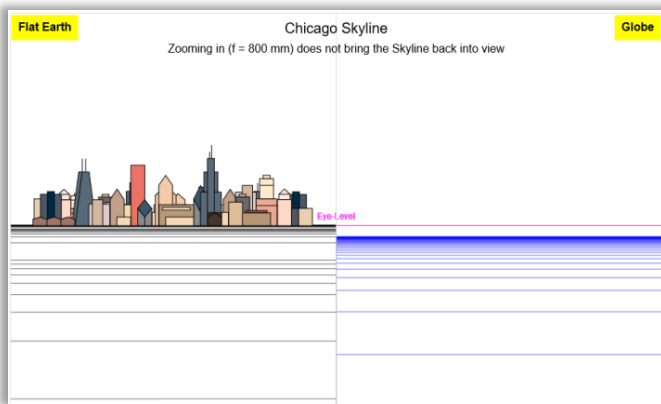


Above: 6' height; 2.11-mile distance

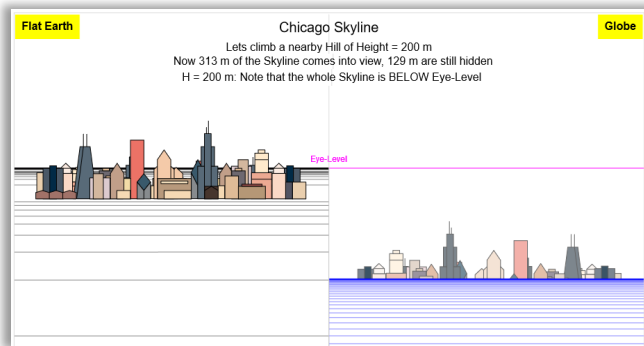


Above: 6' height; ~60-mile distance.

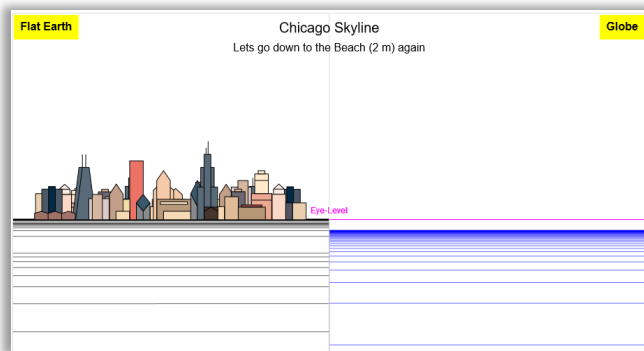
⁷¹¹ <http://walter.bislin.ch/bloge/index.asp?page=Flat-Earth%3A+Finding+the+curvature+of+the+Earth>



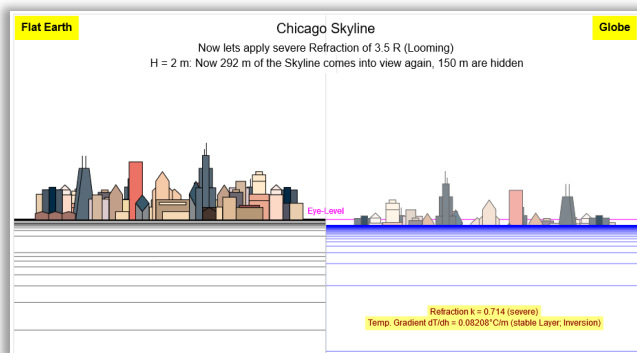
Above: zoom: $f = 800$ mm cannot make skyline visible for globe model.



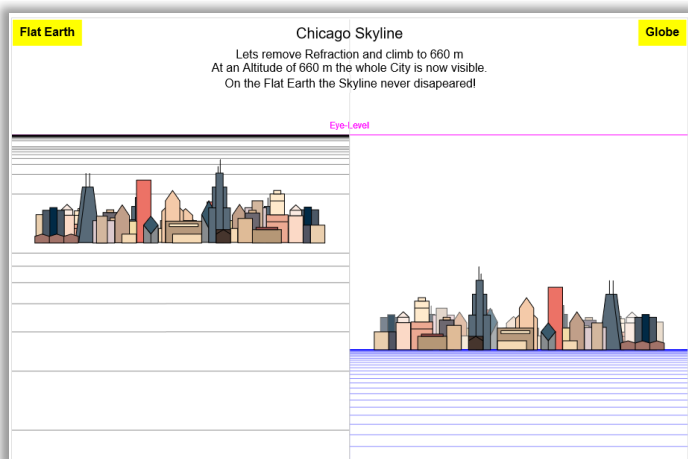
Above: 656' height; ~60-mile distance. 1062 feet of Willis Tower can be seen and 423 feet cannot be seen, for globe model.



Above: 6' height; ~60-miles distance. Skyline under horizon, globe model.



Above: 6' height; ~60-mile distance; refraction of 3.5 R (looming). As such, 958 feet of Willis Tower reappears; 492 feet is still below horizon.



**Above: 2165 feet height; ~60-mile distance; no refraction.
The whole skyline is observable**

In each snapshot for the flat Earth model, the skyline is always visible, in full. Incidentally, these figures coincide almost exactly with the figures we used in our analysis of Skiba's claims. Everything works precisely as expected in a globe model, whereas the flat Earth model does not coincide with the reality. Once over the horizon, no amount of magnification can bring the Chicago skyline back into view. Only when the skyline is partially submerged is magnification able to bring back into view the portion that is not submerged in the globe model.

The Bedford Level Experiment



712

The Canal at Bedford, England

According to the Wikipedia flat Earth site:

The first investigation was carried out by Samuel Birley Rowbotham (1816-1884), the president of the Flat Earth Society, in the summer of 1838. He waded into the river and used a telescope held eight inches above the water to watch a boat with a five-foot mast row slowly away from him. He reported that the vessel remained constantly in his view for the full six miles to Welney bridge, whereas, had the water surface been curved with the accepted circumference of a spherical earth, the top of the mast should have been some eleven feet below his line of sight.

Rowbotham repeated his experiments several times over the years but his discoveries received little attention until, in 1870, a supporter by the name of John Hampden offered a wager that he could show, by repeating Rowbotham's experiment, that the earth was flat. The noted naturalist and qualified surveyor Alfred Russel Wallace accepted the wager. Wallace won the bet. Hampden, however, published a pamphlet alleging that Wallace had cheated and sued for his money. Several protracted

⁷¹² <https://www.theflatearthsociety.org/>

court cases ensued, with the result that Hampden was imprisoned for libel, but the court also determined that Wallace had, indeed, cheated.⁷¹³

According to Wikipedia for a spherical Earth:

The Bedford Level experiment is a series of observations carried out along a six-mile (9.7 km) length of the Old Bedford River on the Bedford Level of the Cambridgeshire Fens in the United Kingdom, during the 19th and early 20th centuries, to measure the curvature of the Earth. Samuel Birley Rowbotham, who conducted the first observations starting in 1838, claimed he had proven the Earth to be flat. However, in 1870, after adjusting Rowbotham's method to avoid the effects of atmospheric refraction, Alfred Russel Wallace found a curvature consistent with a spherical Earth.

In 1901, Henry Yule Oldham, a reader in geography at King's College, Cambridge, reproduced Wallace's results using three poles fixed at equal height above water level. When viewed through a theodolite (a precision instrument for measuring angles), the middle pole was found to be almost three feet (0.91 m) higher than the poles at each end.⁷¹⁴ This version of the experiment was taught in schools until photographs of the Earth from space became available.

Advocates of a flat Earth, however, were not defeated: On 11 May 1904 Lady Elizabeth Anne Blount, who would go on to be influential in the formation of the Flat Earth Society, hired a commercial photographer to use a telephoto lens camera to take a picture from Welney of a large white sheet she had placed, touching the surface of the river, at Rowbotham's original position six miles (9.7 km) away. The photographer, Edgar Clifton from Dallmeyer's studio, mounted his camera two feet above the water at Welney and was surprised to be able to obtain a picture of the target, which should have been invisible to him given the low mounting point of the camera. Lady Blount published the pictures far and wide.

⁷¹³ https://wiki.tfes.org/Bedford_Level_Experiment

⁷¹⁴ Correspondent (25 September 1901). "The British Association," *The Times*, London (36569): 12, "Mr Yule Oldham on his re-measurement of the curvature of the Earth along the Bedford Level"; Oldham, H. Yule (1901), "The experimental demonstration of the curvature of the Earth's surface." Annual Report. London: *British Association for the Advancement of Science*: 725–6.

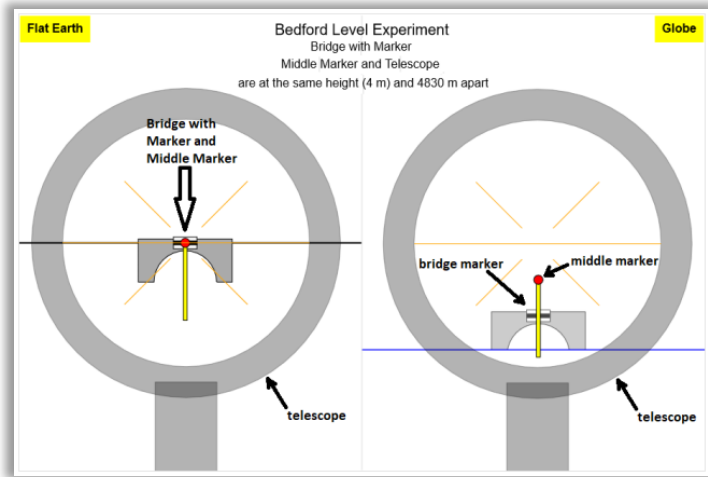
These controversies became a regular feature in the *English Mechanic* magazine in 1904–5, which published Blount’s photo and reported two experiments in 1905 that showed the opposite results. One of these, by Clement Stratton on the Ashby Canal, showed a dip on a sight-line only above the surface.

On 25 July 1896, Ulysses Grant Morrow, a newspaper editor, conducted a similar experiment on the Old Illinois Drainage Canal, Summit, Illinois. Unlike Rowbotham, he was seeking to demonstrate that the surface of the earth was curved: when he too found that his target marker, 18 inches (46 cm) above water level and five miles (8.0 km) distant, was clearly visible he concluded that the Earth’s surface was concavely curved, in line with the expectations of his sponsors, the Koreshan Unity society. The findings were dismissed by critics as the result of atmospheric refraction.⁷¹⁵

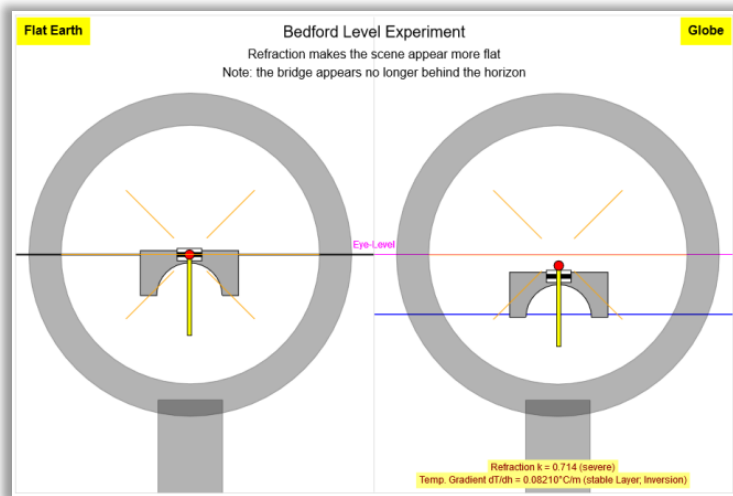
As we can see, flat Earth science has its ups and downs. Just the Bedford Level experiment alone produced three different results: a convex Earth curvature, a concave Earth curvature, and a non-curved or flat Earth. Obviously, the variations are due to the variables in the experiment. The one variable that plays the chief role (perhaps above human pride) is atmospheric refraction. As we noted, there is a whole science devoted to refraction due to its complexity. Once it is acknowledged that light can be bent, convexly or concavely, and rather severely at times, it takes the mystery out of the above anomalies. In short, temperature inversions, such as those at the Bedford Level in which the temperature increases with height, are quite common in bodies of water at low height. As we noted earlier, when all the right ingredients are present, air refraction will occur and sometimes be so acute that a body which, by geometrical calculation, should be below the horizon, will be seen above the horizon since geometry is not the only thing that determines what we will see at long distances.

⁷¹⁵ Garwood, Christine (2007), *Flat Earth*, Macmillan. pp. 104–125. We also note that “Cyrus Reed Teed (1839–1908)....in 1869, claiming divine inspiration, Teed took on the name Koresh and proposed a new set of scientific and religious ideas he called Koreshanity, including a unique Hollow Earth theory that posits the Earth and sky exist inside the inner surface of a sphere.” (Wikipedia).

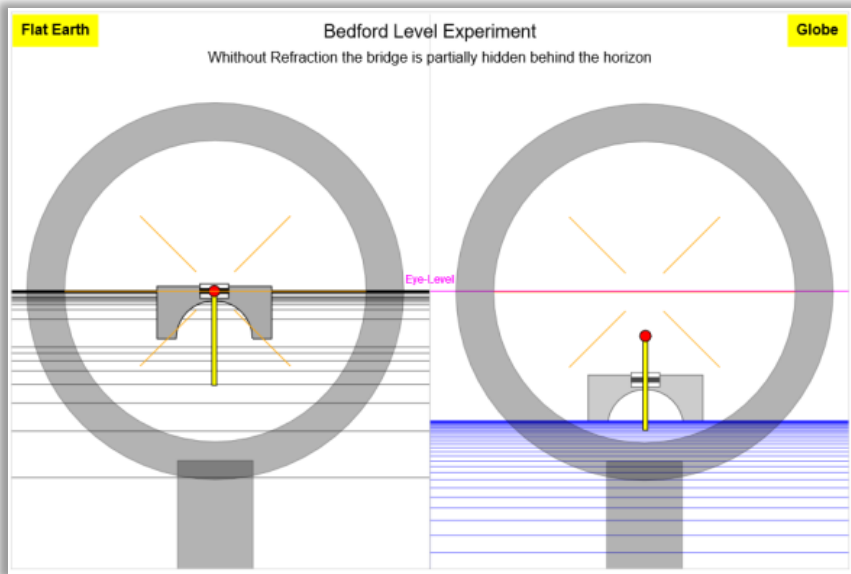
Once again, let's observe Walter Bislin's animation. This one is of the Bedford Level experiment:



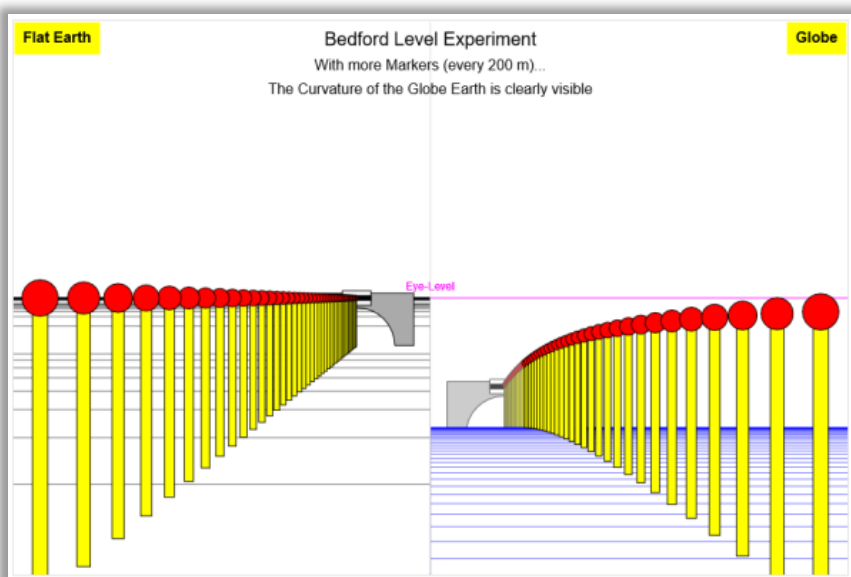
Above: on a flat Earth, bridge marker (black line) and middle marker (pole with red ball) are both 13 feet high. The telescope is 15,846 feet away from the markers. A globe Earth, without refraction, would show the bridge is lower than the middle marker, due to the distance of 15,846 feet from the observer.



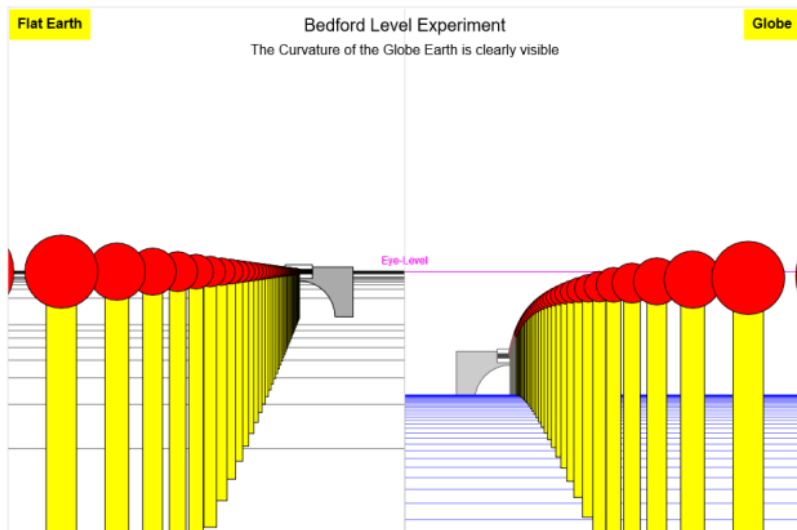
Above: On the globe model, refraction bends the light and results in the pulling the bridge up toward eye level.



Above: If no refraction, bridge is below eye level & partly below horizon.



Above: adding markers shows a distinct curvature to the Earth.



Above: shows that the curvature is vertical, not horizontal. NB: Horizontal curvature is often due to perspective or non-straight markers.

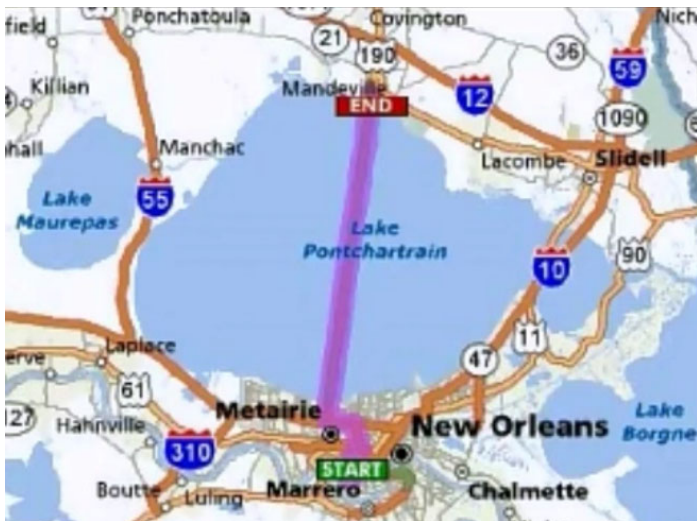
Unfortunately, despite the obvious effects of refraction, the Rowbotham results are still quoted by modern flat-earthers as if they have never been refuted and thus stand as definitive proof of a flat Earth. For example, Edward Hendrie's book, *The Greatest Lie on Earth: Proof That Our World Is Not a Moving Globe*, after he spends 17 pages priming his reader with anecdotes that anti-flat-earth opposition is basically of the devil, he begins his proofs by a detailed recounting of Rowbotham's experiment at Bedford, but he does so without even one mention of how refraction would affect the results.⁷¹⁶ Similarly, Eric Dubay, a leader of the flat-earth movement, cites Rowbotham's work as his first choice of flat Earth proof, but instead of refuting refraction effects, he follows the section on Rowbotham with a treatise on why gravity doesn't exist.⁷¹⁷ This is certainly cognitive dissonance at its worst.

⁷¹⁶ Edward Hendrie, *The Greatest Lie on Earth: Proof That Our World Is Not a Moving Globe*, Great Mountain Publishing, 2016, 6th edition, pp. 18-23.

⁷¹⁷ <http://www.atlanteanconspiracy.com/2015/01/water-proves-earth-flat.html>. Youtube banned Dubay on Dec. 12, 2017 for alleged "hate speech" for a single video he produced but Dubay does not identify the video. Youtube also refused to

As such, it is often difficult to take these people seriously. Their close-minded approach to the subject stems from their “zetetic” philosophy, which depends solely on experience and reason as opposed to scientific dogma, but with the crucial qualification that only personally acquired facts are permissible for study, which severely limits the amount of information they will consider. Contrary information against their thesis, such as photos from satellites and refraction of light due to atmospheric conditions are summarily discounted when they apply their “experience and reason” to the question at hand, a “reason” that is invariably tainted with animosity and total distrust of the opposition. Those who try to reason with them are often caught in Solomon’s quandary: “Answer not a fool according to his folly, lest you be like him yourself. Answer a fool according to his folly, lest he be wise in his own eyes.”⁷¹⁸

The Lake Pontchartrain Causeway and Transmission Lines



consider his appeal (see <http://www.atlanteanconspiracy.com>). Up to that time, Dubai had 135,000 subscribers and 28 million views.

⁷¹⁸ Proverbs 26:4-5. See also: <https://www.metabunk.org/attempt-at-recreating-rowbothams-bedford-level-experiment-by-flat-earth-believers.t7710/#post-185729>

The bridge connecting Metairie and Mandeville is about 24 miles long. This is long enough to show the curvature of the Earth. If we plug the proper figures into the Metabunk calculator, the result is the following:

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

**Distance = 24 Miles (126720 Feet), View Height = 6 Feet
Radius = 3959 Miles**

Results ignoring refraction

Horizon = 3 Miles (15838 Feet)

Bulge = 96.02 Feet (1152.29 Inches)

Drop = 384.1 Feet (4609.21 Inches)

Hidden= 294.08 Feet (3528.99 Inches)

Horizon Dip = 0.043 Degrees, (0.0008 Radians)

With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles

Refracted Horizon = 3.24 Miles (17107 Feet)

Refracted Drop= 329.23 Feet (3950.74 Inches)

Refracted Hidden= 246.33 Feet (2956.02 Inches)

Refracted Dip = 0.040 Degrees, (0.0007 Radians)

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

**Distance = 24 Miles (126720 Feet), View Height = 11 Feet
Radius = 3959 Miles**

Results ignoring refraction

Horizon = 4.06 Miles (21444.76 Feet)

Bulge = 96.02 Feet (1152.29 Inches)

Drop = 384.1 Feet (4609.21 Inches)

Hidden= 265.09 Feet (3181.13 Inches)

Horizon Dip = 0.059 Degrees, (0.0010 Radians)

With Standard Refraction $7/6 \cdot r$, radius = 4618.83 Miles

Refracted Horizon = 4.39 Miles (23162.98 Feet)

Refracted Drop= 329.23 Feet (3950.74 Inches)

Refracted Hidden= 219.87 Feet (2638.41 Inches)

Refracted Dip = 0.054 Degrees, (0.0009 Radians)

Not including refraction, a man six feet tall should see the transmission lines sink beneath the horizon by 294 feet. Since the bridge from which the film was shot is about 11 feet high, and assuming the camera was resting on the rail of the bridge, the calculation changes to 265 feet. The below snapshot of the transmission lines is important because it appears to show a downward curvature of the towers. We also see that as the pylons disappear, the towers continue, which appear to show that the pylons went below the horizon while the towers partially remain above the horizon.



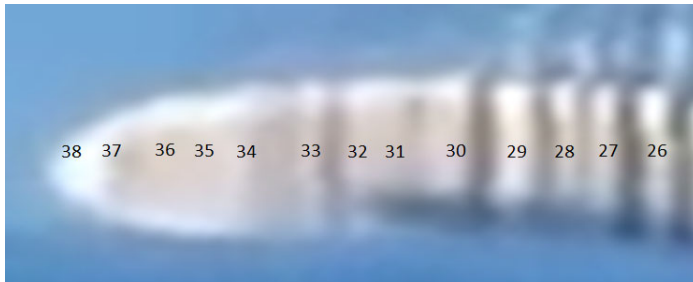
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We know that the pylons are 950 feet apart. We know that the top of the towers are each the same height above the water. We know the distance to the first pylon from the shore is .52 miles. We know from the photographer, that he was between 30-50 feet above the surface.⁷²⁰ Although the following is a somewhat crude method, we will surprise ourselves at how accurate it can be. In the below snapshot (which the photographer, “Soundly,” took and we will use later), we have marked the first 26 pylons. If we magnify the boxed portion of the above image, we can make out approximately 12 more

⁷¹⁹ www.youtube.com/watch?v=Zr-tNw_s5nM; other videos of the towers: youtube.com/watch?v=ipqronPSXGM; youtube.com/watch?v=BNPpO5n6m9I, youtube.com/watch?v=kADO7nkt-rk, youtube.com/watch?v=k79xNo2y8-s

⁷²⁰ youtube.com/watch?v=ojMctpxCon8, at 12 second mark.

pylons, give or take, which will bring us to 38 total pylons in the photo, after which they disappear.



Since there are 38 pylons in view and each is 950 feet apart, we have a total of 36,100 feet or 6.84 miles. Interestingly enough, if we then plug these figures in the Metabunk calculator, we obtain the following:

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles: 6.84

Viewer height in Feet: 30

☒ Imperial
☐ Metric
☐ Advanced

Distance = 6.84 Miles (36115.2 Feet), View Height = 30 Feet
Radius = 3959 Miles
Results ignoring refraction
Horizon = 6.71 Miles (35414.86 Feet)
Bulge = 7.8 Feet (93.59 Inches)
Drop = 31.2 Feet (374.38 Inches)
Hidden= 0.01 Feet (0.14 Inches)
Horizon Dip = 0.097 Degrees, (0.0017 Radians)

With Standard Refraction 7/6*r, radius = 4618.83 Miles
Refracted Horizon = 7.24 Miles (38252.42 Feet)
Refracted Drop= 26.74 Feet (320.9 Inches)
Refracted Hidden= None, refracted horizon is beyond the target distance
Refracted Dip = 0.090 Degrees, (0.0016 Radians)

We see that at 6.8 miles away, the “hidden” portion of the pylons is zero (0.0), which means we can see the 38th pylon from the shore and is exactly what the above photo shows. Considering also that many of the latter pylons will become much smaller than the previous pylons due to how “perspective” will contract the images in our line of sight; and considering that we would need greater magnification and distortion correction to know precisely what is able to be seen at 6.8 miles, we are within the margin of error to conclude that the pylons disappear due to the Earth’s curvature. If this is what we can obtain from this crude methodology, imagine what more precise facts and measurements would provide. Nevertheless, since the 39th pylon is not visible any longer, but the towers are not only visible but continue to drop below the horizon, we have yet another visual proof of downward curvature.

We can calculate approximately the same if we use 6.8 miles and height of 23 feet. We do this because the bridge has a 15 foot clearance, and we estimate that the average height of the person behind the camera is 5.5 feet, and we should include about another 2.5 feet or so for the distance from the clearance to the road surface.

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator
 Distance in Miles:
 Viewer height in Feet:
☒ Imperial ☐ Metric ☐ Advanced
Distance = 6.8 Miles (35904 Feet), View Height = 23 Feet
Radius = 3959 Miles
Results ignoring refraction
Horizon = 5.87 Miles (31009.07 Feet)
Bulge = 7.71 Feet (92.5 Inches)
Drop = 30.83 Feet (370.01 Inches)
Hidden= 0.57 Feet (6.88 Inches)
Horizon Dip = 0.085 Degrees, (0.0015 Radians)
With Standard Refraction 7/6*r, radius = 4618.83 Miles
Refracted Horizon = 6.34 Miles (33493.62 Feet)
Refracted Drop= 26.43 Feet (317.15 Inches)
Refracted Hidden= 0.12 Feet (1.43 Inches)
Refracted Dip = 0.079 Degrees, (0.0014 Radians)

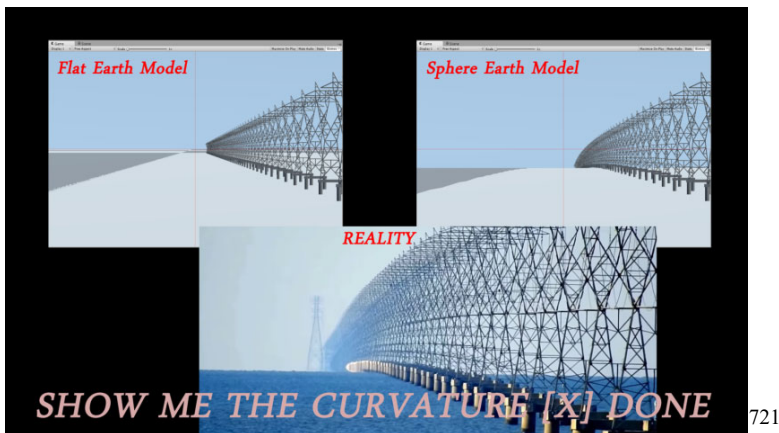
Now, any smart flat-earthier worth his salt is going to raise two viable objections to the above calculation. The first is what we cited above, namely,

“perspective.” He will contend that the image of the towers is caused by the fact that as we view any elongated object, the object will become compressed the farther away its end is. For example, if we look at train tracks from one end, the other end will appear to converge the rails.



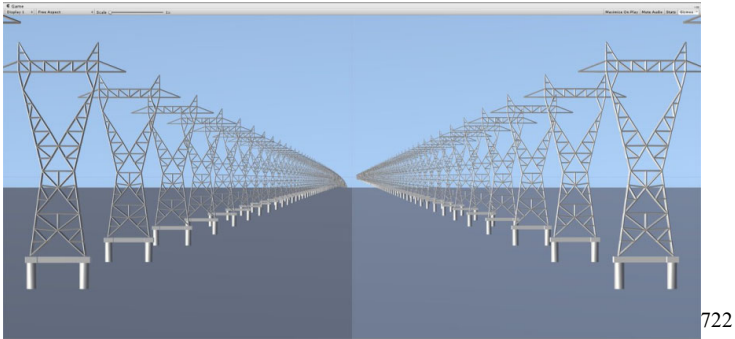
The problem with this argument, however, is that “perspective” will not show curvature, at least consistent curvature. It will only shrink the whole image. In fact, the person who took the

earlier image of Lake Pontchartrain’s transmission towers shows the difference between curvature and perspective quite easily. Although both the flat Earth and curved Earth model both show “perspective,” only the curved Earth model can account for the steep decline of the towers below the horizon. The flat Earth model would show “perspective” to the “vanishing point” at which point the latter towers become so small that they cannot be seen, but the entire length of the tower complex will still be straight. Conversely, the curved Earth model shows that the towers begin to drop long before the “vanishing point” of “perspective” is reached.



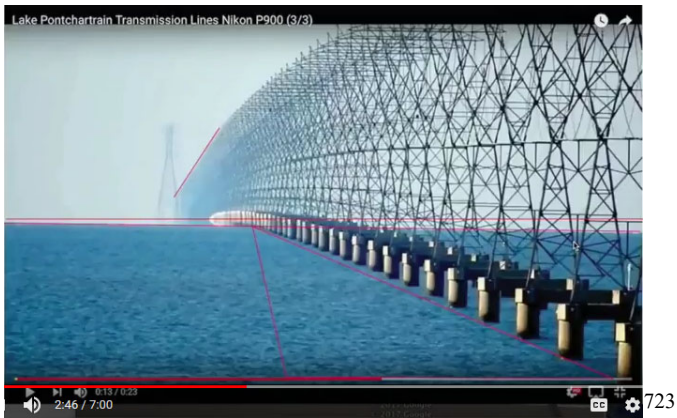
⁷²¹ https://www.youtube.com/watch?v=Zr-tNw_s5nM, beginning at 15 sec. mark.

Another image shows the same effect.



There is little argument that the flat-earthers can raise against this fact since in their model, regardless of “perspective,” the tower should continue onward to the other side of Lake Pontchartrain, 24 miles away, and we should be able to see, on a very clear day, the last tower with a powerful zoom lens camera or, even better, a powerful telescope.

Another argument raised against the photos of the Lake Pontchartrain towers is that if there really is a curvature that extends the length of the towers into the z-axis, then why is there no curvature on the Earth along the horizon or x-axis? The below photo shows a red line drawn on the...



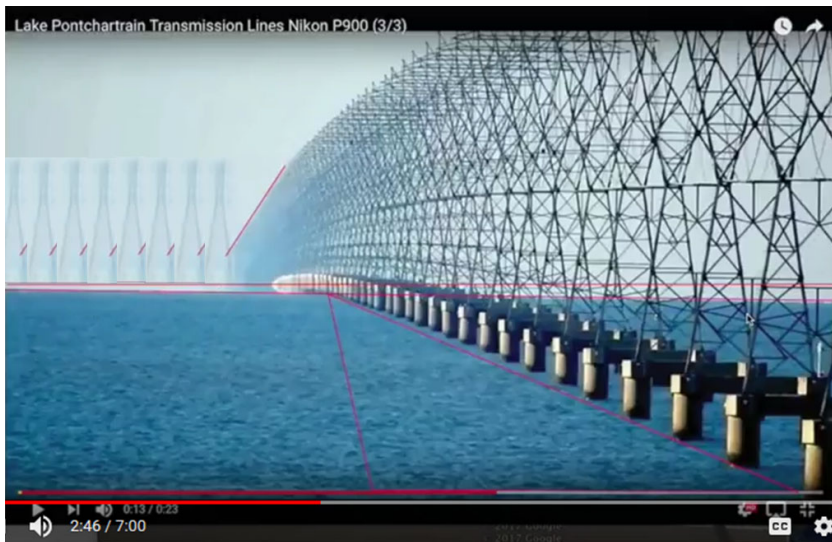
⁷²² <https://twitter.com/skeptropolis/status/877017905115922432>

⁷²³ <https://www.youtube.com/watch?v=VoSsfDHLdE>

...horizon which is straight from the left to the right. (Don't be bothered by the second line on top of the first, since this was drawn to show the camera was at a very slight tilt when the above photo was taken). If the line is straight, the proper conclusion seems to be that there is no curvature along the horizon.

So how can there be a curvature looking into the photo but not one looking left to right? We will notice in the background a tall tower. Let's say the width of that tower is 100 feet. How many towers could we fit on the left side of the photo? At most, 8 will fit. On the other side, we could fit no more than 18. So we have 26 towers, each 100 feet wide, which equals 2,600 feet.

As such, we are not going to see any curvature on the horizon, since the distance is too small to register any. Again, the method is crude, but the results are well within the ballpark. NB: the angle allowed by a Nikon P900 zoom camera is very small.



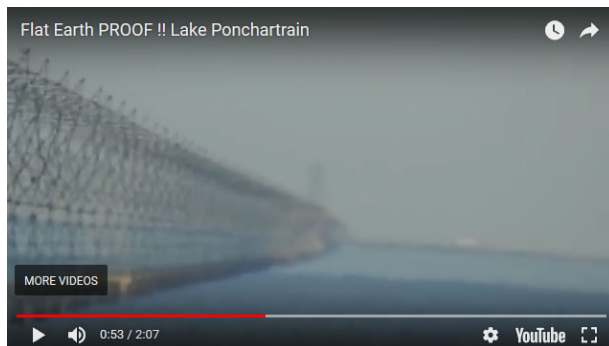
Since, as we have learned, there are many variables that determine how a photograph will appear in the end (distance, height, visibility, pressure, temperature, haze, refraction, amount of light, silhouetting, highlights, shadows, camera angle, camera zoom, camera height, camera focal length, *etc.*), not all photographs of either Lake Pontchartrain transmission towers

or anything else are always going to look the same, and some may be very different from each other. Hence, we should not be surprised if a flat-earther takes a shot of the towers and produces something different, as in the video below:



In this shot,⁷²⁴ the Earth does appear to be flat, at least until the horizon line, and it does appear that perspective plays a large part in what we see at the far end of the towers. The person who posted this video is very excited about it and says the following:

Hello, flatearthers. This is the shot I've been trying to get. I am dangerously on the 55 and 910 junction, in New Orleans over Lake Pontchartrain. These are the untility poles that run 18.6 miles across the lake. And I just wanted to show you....



⁷²⁴ https://m.youtube.com/watch?v=d3_umFGu_gc&feature=youtu.be

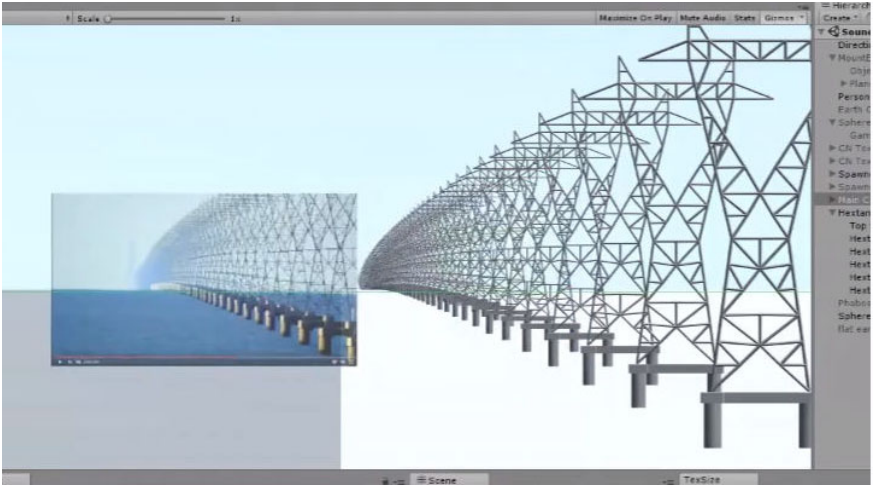
There is the shore on the other side. They [the towers] do not dip down 60 feet. They are perfectly level the entire way, all the way to the shoreline, right there. They don't disappear. They don't go over a curve.

But is this really what we see? This appears to be another case of a flat-earther 'seeing what he wants to see.' Despite the fact that the the film has (a) lack of zoom, (b) the camera is in a bad position, (c); the image is poor due to low resolution, and (d) there is an obvious atmospheric distortion, still, we can see a curvature at the end despite all these variables.

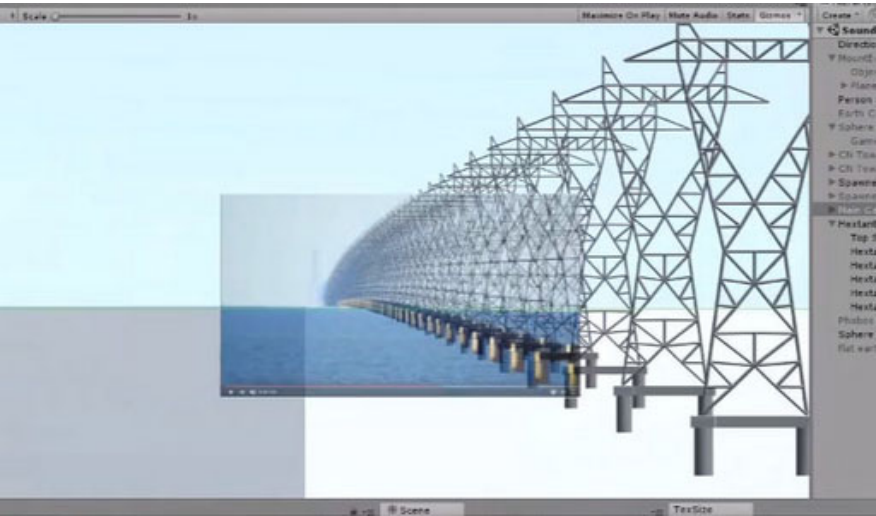
If we magnify his photo and look carefully, we will see about 26 pylons before we begin to see any significant change. Once the curvature begins a few pylons after the 26th, the curvature becomes rather steep in the photo.



What is even more intriguing is how our modern computer programs can tell us by how much the Earth's curvature will bend the towers downward. Below is a snapshot of the result after all the proper numbers were fed into the computer. On the left is the actual photo taken from the bridge. On the right is the computer's image of how the towers will be curved by the Earth's surface. The two images are virtually identical.



In fact, they are so similar that the photo can be superimposed on the computer image with virtually no overlap.



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⁷²⁵ <https://www.metabunk.org/soundly-proving-the-curvature-of-the-earth-at-lake-pontchartrain.t8939/>, courtesy of Mike West

Below are two views of the Lake Pontchartrain Causeway which show a distinct curvature of the Earth.



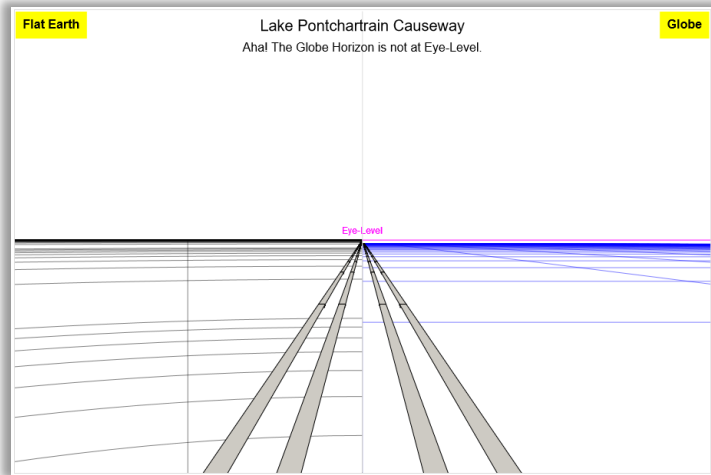
**The west side of the west (south bound) lane.
Notice the birds on the horizon**



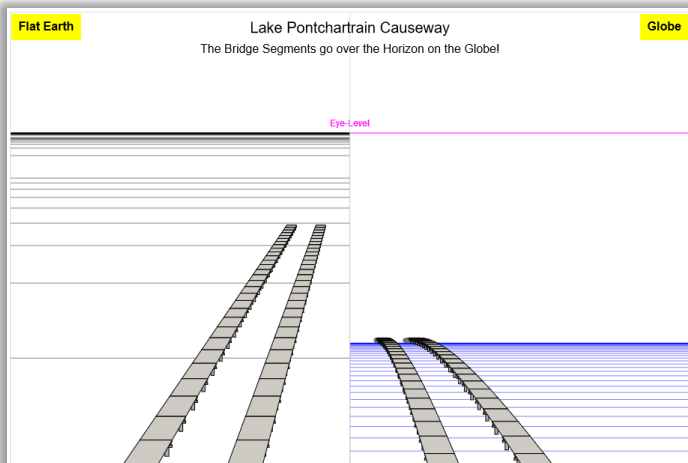
**Below the west (south bound) lane as seen
from Metairie, LA, south shore.**

⁷²⁶ <https://www.youtube.com/watch?v=AtODdWv6PVk>, published Dec. 18, 2017.

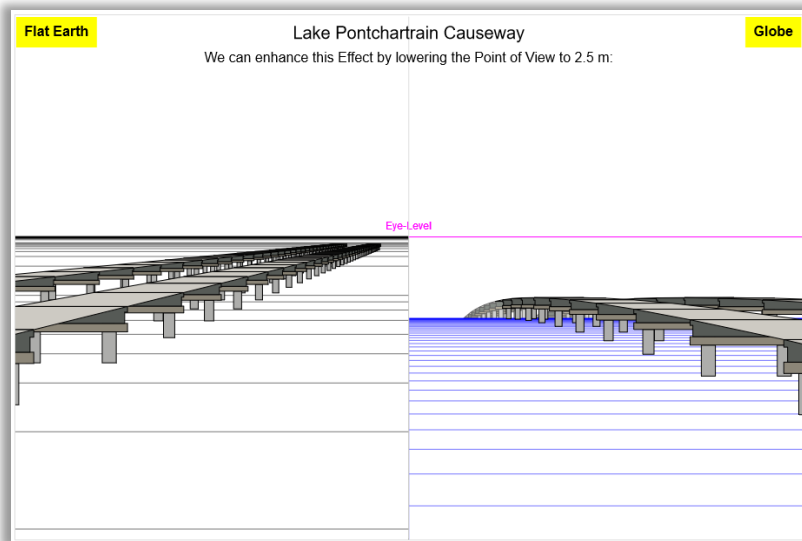
To put the finishing touches on this analysis, we will once again consult Walter Bislins' animations.



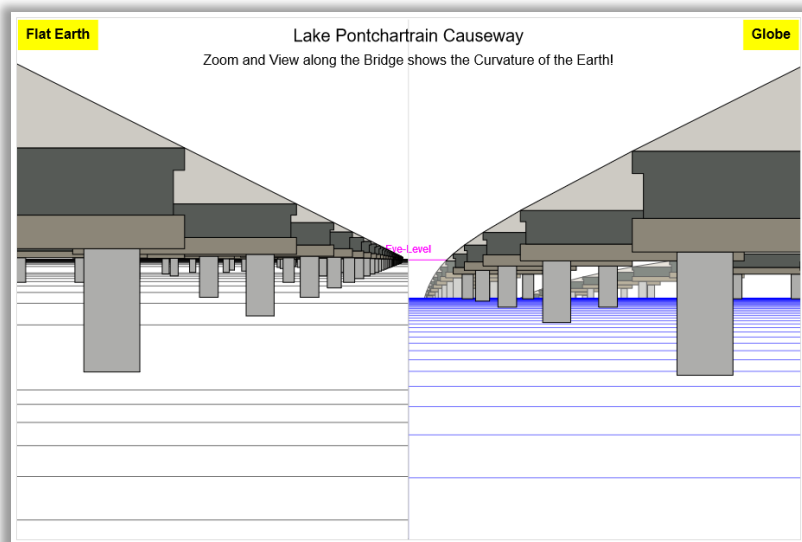
Above: If we put the flat model and the globe model next to each other we see that the globe view does not reach the eye level of the flat model. Although we cannot see this difference with the unaided eye, it will have a profound effect on what we will be able to see if we magnify the images.



Above: When the difference is magnified, using eye level as the basis, it clearly shows that there is a curvature of the Earth



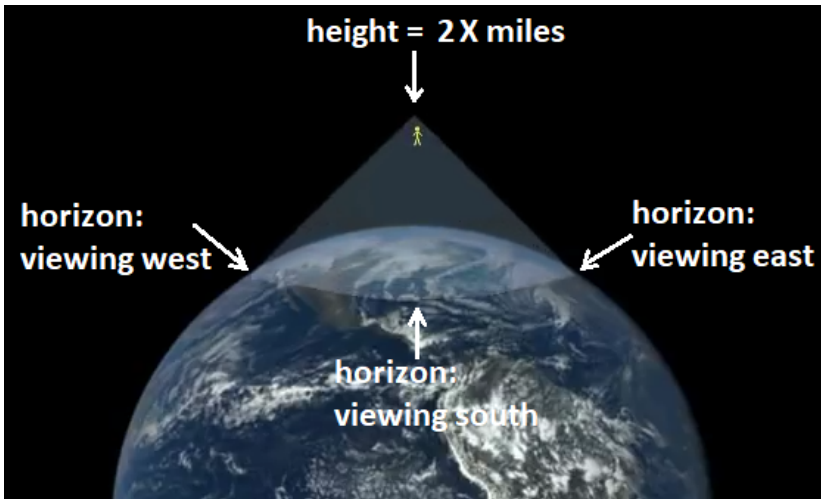
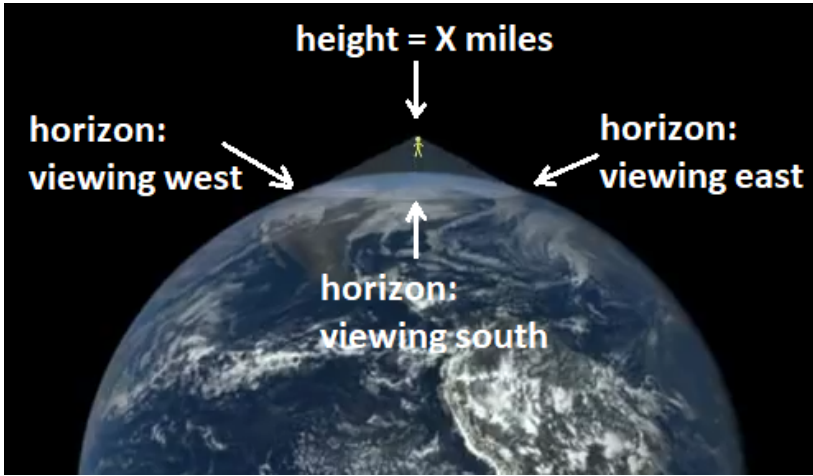
Above: if the view is lowered to 8 feet, the cuvature of the globe model is just as pronounced.



Above: if the view is lowered to below the bridge, the curvature is more subtle but is definitely observable.

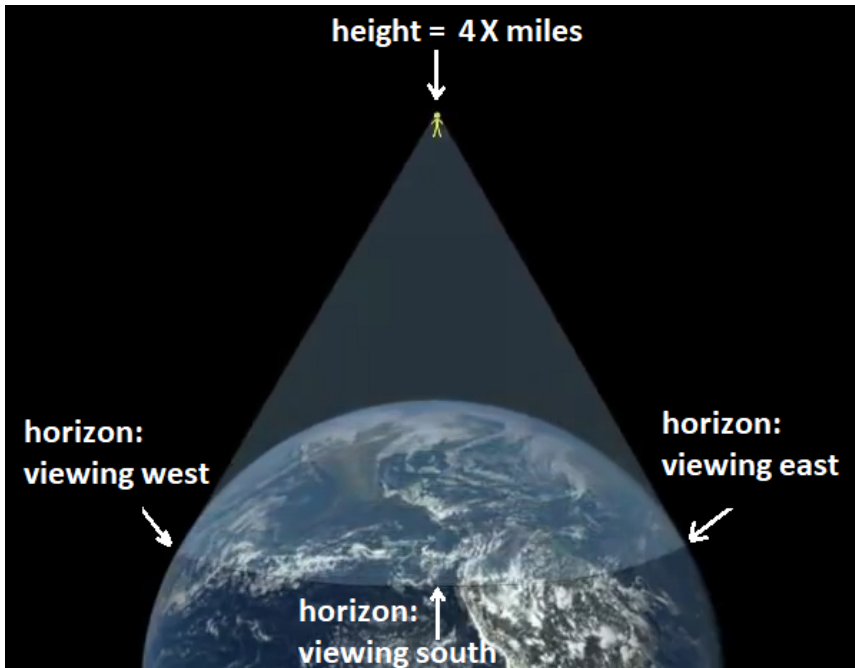
So How Do We Understand the Horizon?

In doing experiments like this, we should never forget that the horizon really doesn't exist. It is not like a bridge going across the photo. The horizon is the perimter of the 360 degree circle that forms around us as we look in any direction, and this circle moves left or right and gets larger or smaller as we change our position.



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⁷²⁷ <https://www.youtube.com/watch?v=-W6JuyClxZg>. My thanks to VoysovReason for the basic illustration, critiquing Skiba's concept of the horizon.



One important aspect to notice is that the horizon will always be a circle, which is the reason why, when we are standing on the ground, we can turn 360 degrees and see the the line of the horizon as a complete circle, since the line will not rise or fall. Although the horizon line will follow the Earth's curvature, nevertheless, it will appear level from our viewing angle. For example, as noted in the diagram above, if we are at the North Pole or higher, the area that will follow the curvature of the Earth is what we see looking east, west or south, but the horizon line will always be level or flat from our limited view. The horizon is simply too far away for us to notice any differences.

Distinguishing the horizon from everything else has its pitfalls. As noted by Lynch:

What do we mean by "horizon"? Usually we mean the apparent boundary between the sea and sky, or distant landscape and sky. But Bohren and Fraser⁷²⁸ showed that an observer at an altitude greater than a mile or so

⁷²⁸ C. F. Bohren and A. B. Fraser, "At what altitude does the horizon cease to be visible?" *Am. J. Phys.* 54, 222–227 (1986).

cannot see the hard Earth’s horizon, *i.e.*, the line-of-sight tangent point. Rayleigh scattering and scattering by aerosols usually reduce the height to less than a mile. The apparent horizon from commercial altitudes is not a sharp line, but rather a low-contrast transition from bright sky above to a slightly darker “sky” below. The location of this boundary is difficult to define.

What the observer perceives as the horizon is actually a transition from an optically thick line of sight through atmosphere below the “horizon” to an optically thin line of sight above the “horizon.” This apparent horizon is produced entirely within the atmosphere, and the hard Earth plays little or no role in its formation. The actual location probably corresponds to a line of sight with an optical depth near unity, which passes several miles above the surface of the Earth. From space this elevation is about 12 miles. Twelve miles (19 km) is about 0.3% of the Earth’s radius, too small to influence the curvature discussed in this study.⁷²⁹

So far can we see? The following chart shows that even on an exceptionally clear day, we can only see about 27 miles in any direction.

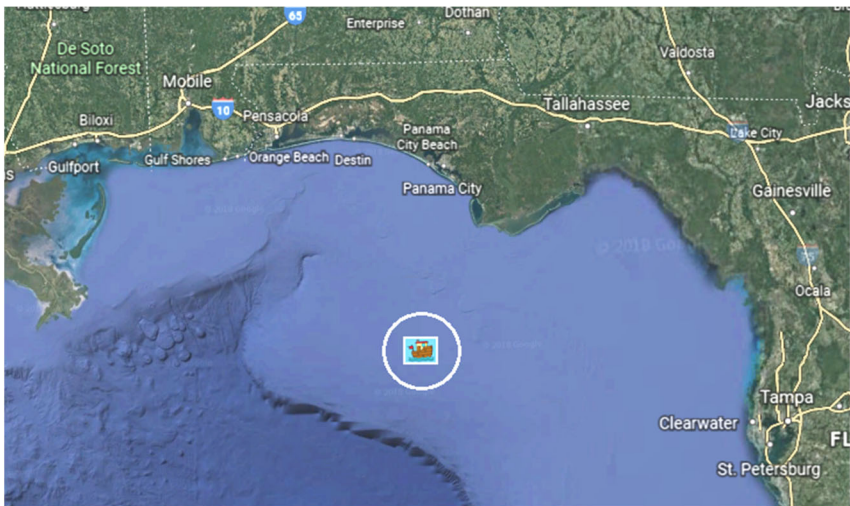
INTERNATIONAL VISIBILITY CODE		
CODE	WEATHER	DISTANCE SEEABLE
0	DENSE FOG	< 50 YARDS
1	THICK FOG	50 - 200 YARDS
2	MODERATE FOG	200 - 500 YARDS
3	LIGHT FOG	500 - 1000 YARDS
4	THIN FOG	0.5 - 1 MILE
5	HAZE	1 - 2 MILES
6	LIGHT HAZE	2 - 5.5 MILES
7	CLEAR	5.5 - 11 MILES
8	VERY CLEAR	11 - 27 MILES
9	EXC. CLEAR	OVER 27 MILES

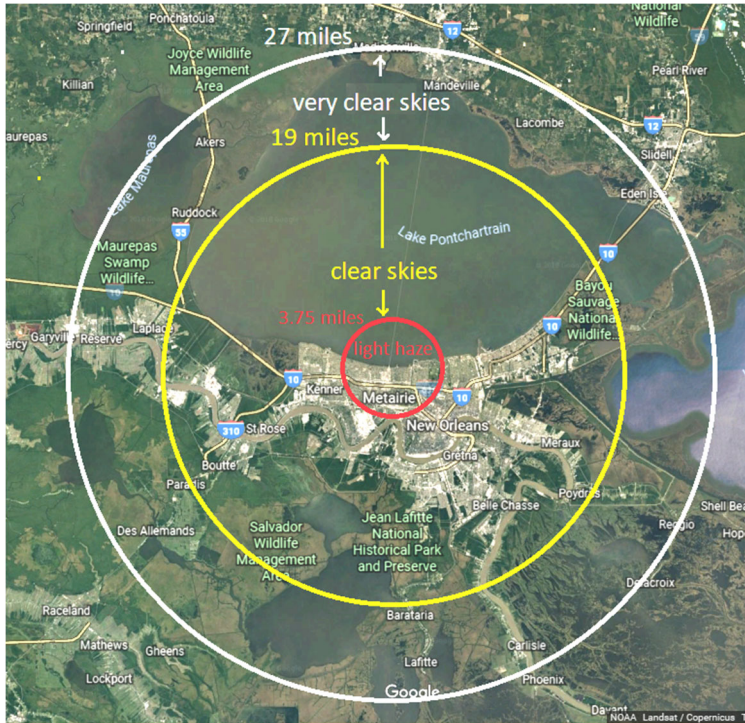
⁷²⁹ “Visually discerning the curvature of the Earth,” David K. Lynch, p. 840.

We will now apply this to a map. First we can get some perspective of how big the Earth is from Google Earth.

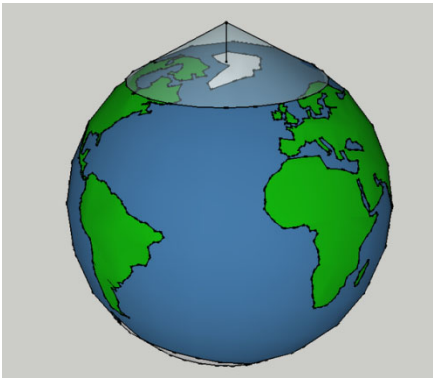


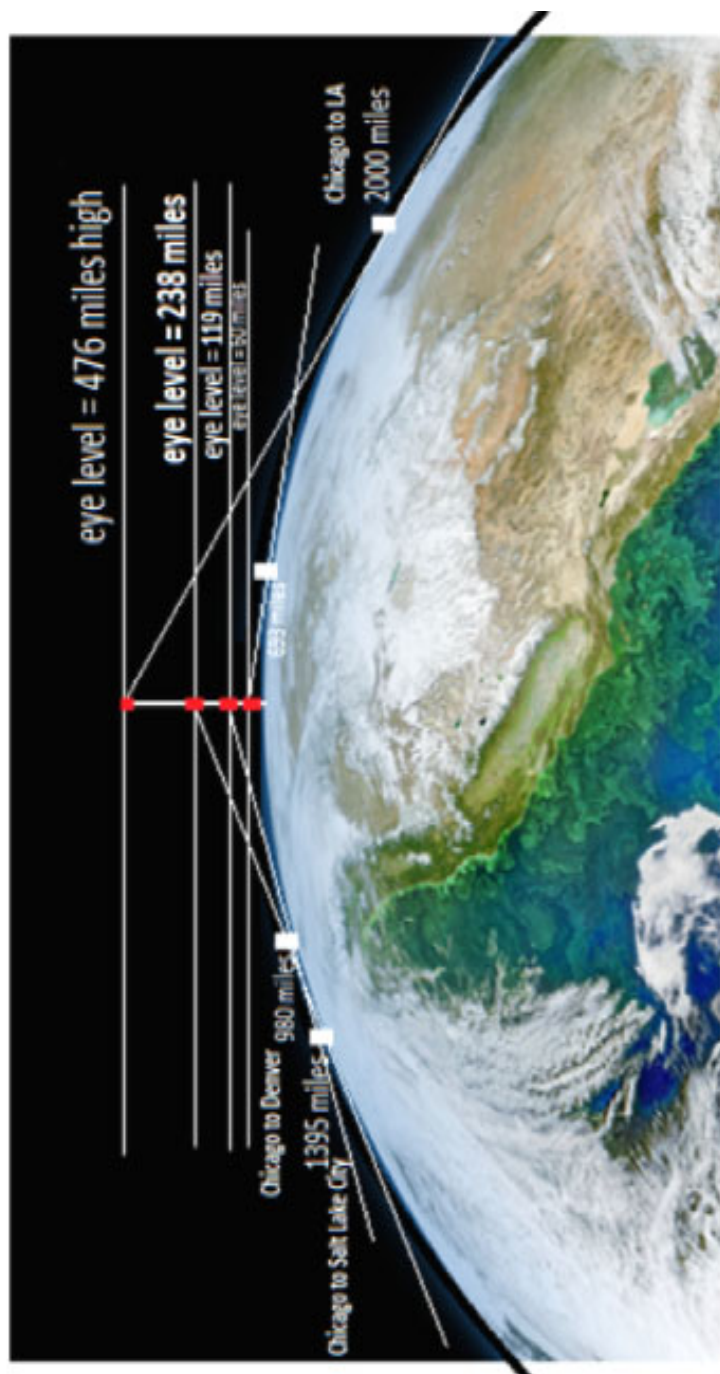
Now, just to demonstrate, let's zoom in on the Gulf of Mexico. Let's say you are in a boat about 100 miles off the coast of Panama City, Florida (note the white circle with the little boat inside). With a 27-mile radius to your line of sight, after which you will see nothing but the horizon, notice how small your little world is compared to the the land and water mass.





Taking averages of the above International Visability Code, we see that the atmosphere alone, excluding curvature for the moment, has a great effect on our line of sight, and thus it will affect on how far the 360 degree horizon will be from our position. Our sight may vary from 20 miles to 100 miles, depending on the degree of magnification, but there will always be a 360 degree horizon line.





Some wonder why the horizon always looks flat, as if it were a straight line going perpendicular to your line of sight, which leads them to believe the Earth is flat. But the horizon, as it extends itself left to right or right to left in our line of sight, will never curve. If it did, then we would be in big trouble since then the curvature of the Earth would need to be confined to a radius of 3-27 miles, which would make the Earth extremely small, about 0.75% or less of its present size of 3,950 miles in radius. The horizon will always be straight from our line of sight because we can only see a relatively short distance in any direction and hence there would be no negligible curvature for us to see of the horizon.

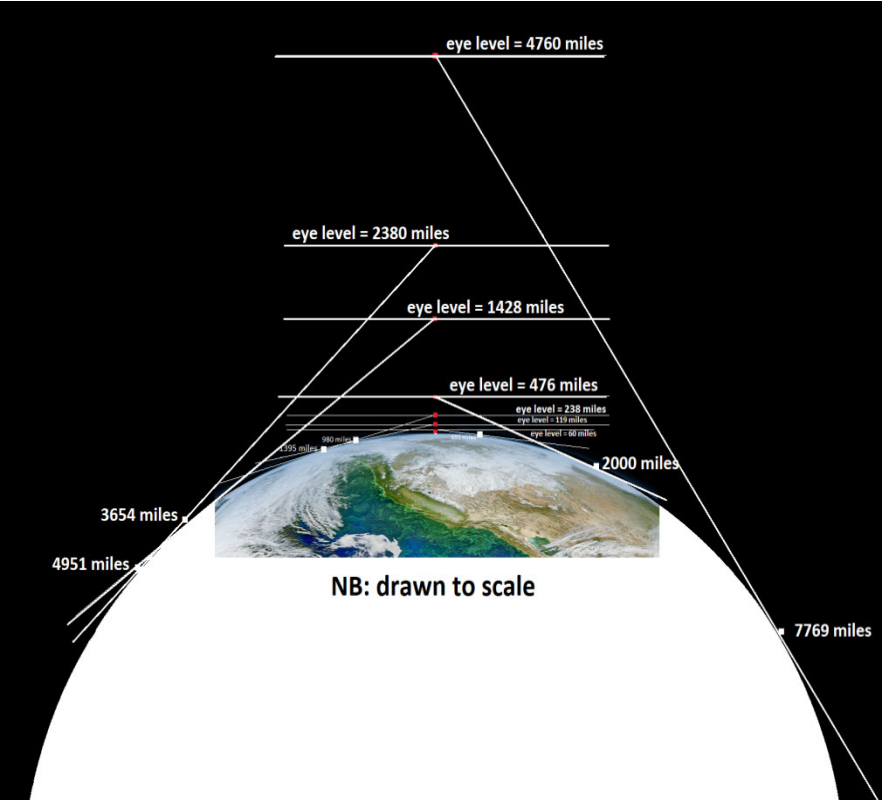


Figure 1

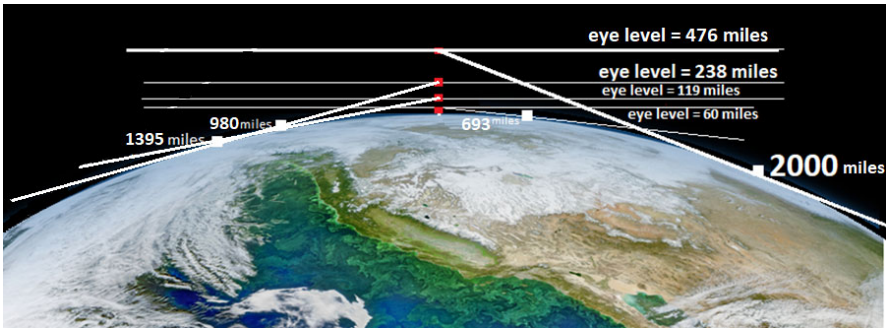
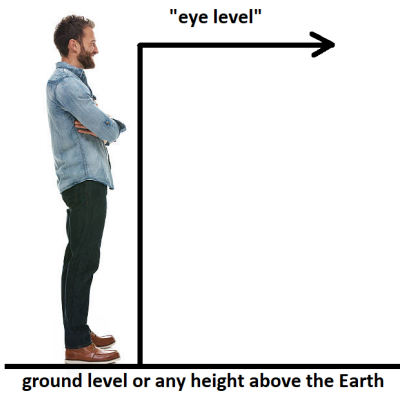


Figure 2

Some claim that the horizon always moves with you, or is “at eye level,” even if one’s viewpoint rises above the Earth. In reality, “eye level” refers to your line of sight as you look straight across, such that your line of sight forms a 90 deg. angle between yourself and the place you are standing, whether you are standing on the ground or standing hundreds or thousands of miles above the Earth.

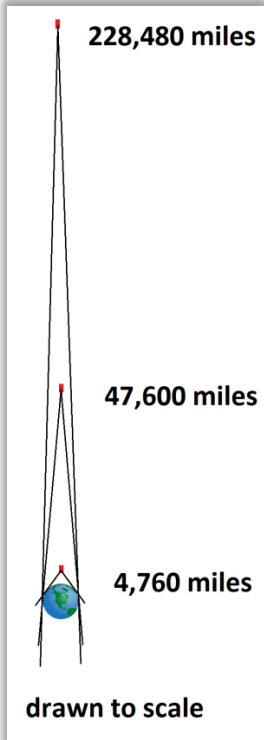


The flat-earthers make the claim that the horizon always comes up to our eye-level because that would mean the Earth is flat. In other words, if there is no distinction between what you see at eye level and what you see at the horizon, then there cannot be any curvature to the Earth. But the truth is, the horizon *never* comes up to your eye level, except when you are face down on the ground!



ground level = eye level = horizon level

As soon as you rise above ground level, your eye level rises above the horizon level, even if you rise just an inch. As such, the horizon will *always* be below your eye level. It is then just a matter of *how much* the horizon will be below your eye level depending on how high your eye level rises above ground level. The same will be the case on a curved Earth or a flat Earth. After that, the question is: are you able to distinguish your eye level from the horizon level? The difference between the two is called the “angle of depression.” The closer one is to the Earth—with the limitations of your human sight, both in how far you can see and the resolution⁷³⁰ your eye can determine—will make it difficult to know where your eye level and the horizon begins and ends.



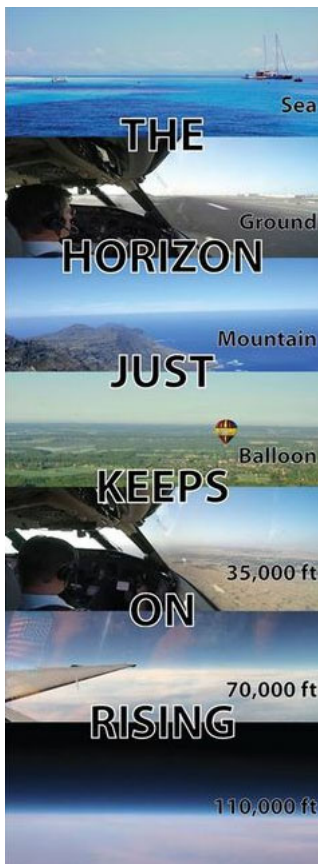
On a sphere, there are two other consequences: (1) whether at ground level or higher than ground level, if you try to move closer to the horizon, the horizon will move away from you by the same distance you tried to move closer. Obviously, as

you move around the globe, so will your horizon. This is analogous to a dog chasing its tail, since no matter how fast he turns he will never be able to

⁷³⁰ “Resolution” is the ability to distinguish two objects from one another. Up close, it is easy for our eyes to see the two objects apart, but the farther the objects are from us, the closer they will appear to come together, until they finally appear to merge together into one object. There are other factors involved, but the resolution of the human eye is about 576 megapixels. In comparison, the resolution of an eagle eye is between 2,304 and 4,608 megapixels, which means it can distinguish the separation of the same two objects at distances four to eight times greater than the human eye. For more information on resolution, see <https://www.youtube.com/watch?v=4I5Q3UXkGd0>

catch it. For all practical purposes, the horizon is infinite. Flat-earthers don't seem to understand this fact.

By the same token, for a flat Earth, going closer and closer to the horizon means that one should reach an edge beyond which he can no longer move. Theoretically, he could then peer over the horizon and see what is on the other side. It is at this point, however, that flat-earthers leave the debating table and claim that such journeys are not possible because there is a worldwide conspiracy by the governments of the nations to keep all citizens away from the Earth's edge. Meanwhile, other evidence shows there is no such conspiracy and that citizens take vacations and work-related trips to Antarctica on a daily basis. We will cover more of this in chapter 6.



(2) On a sphere, the higher one rises above the Earth to view the horizon, the horizon will not only move away from you proportionately, you will never reach a point in which you can see over the horizon, and thus you can never see the curvature of the Earth behind the horizon. As we can see from Figure 1 above, whether one is at 476 miles or 4,760-miles above the Earth, one's line of sight always terminates at the horizon, which is 2,000 miles or 7,769 miles, respectively. Even if one were 47,600 miles or 228,480 miles or 2,000,000 miles above the Earth, one will always see a horizon, beyond which he will not be able to see the curvature of the Earth.

Effectively, depending on the acuity of our depth perception, far away spheres will sometimes look more like discs than spheres, and it is only by actually going around the sphere at the proper altitude that we will be able to know it is a sphere as opposed to a disc.

If we are too high or too low in altitude, the limitations on our human depth perception will not allow us to distinguish a

sphere from a disc. This is why the sun sometimes looks more like a disc depending on how we view it, as does the moon.

In the end, the claim by flat-earththers that the horizon “always rises to eye level” is not only false, it really has no meaning in itself, at least for the short altitudes in which they seek to confine the debate, since they accept no altitudes that are created hundreds of miles above the Earth’s surface (*e.g.*, those altitudes claimed by NASA) where it would be a lot easier to see the curvature of the Earth. As it stands, their convenient elimination of most of the data cripples the discussion and forces us to deal with miniscule altitudes that can hardly make a difference. For example, at an altitude of 7 miles (that of the average commercial jet liner in flight), the angle of depression is 3.4 degrees. In other words, the horizon would be below “eye level” by only 3.4 degrees, which is barely discernable. Not only is the angle too small, the more difficult task is determing what the eye level is! How does one know that when he looks out his airplane window that his line of sight is directly perpendicular to the ground 37,000 feet below? He could be off by dozens of degrees and not even know it. Obviously, there are no lines that can be drawn from a plane to show precisely where the eye level sits above the horizon. The only stable figure in this equation is the horizon itself, but unless we have something against which to measure it and the things attached to it, it is a futile endeavor.

Felix Baumgartner’s Space Flight

In 2012, Felix Baumgartner ascended, by means of a hot air balloon, to a height of 128,100 feet (24.26 miles) above the Earth. But even at this height, the angle from which one’s line of sight can distinguish a curvature of the horizon (the angle of depression) is only 6.3 degrees.

Visible horizon drop [degree]	6.324720	731
Horizon drop height, FB/DB [ft]	128260.5328/256260.5328	

At the peak of his ascent, he opened his capsule hatch to reveal the Earth’s horizon. Since here the horizon appears to be straight, flat-earththers claim the Earth must be flat, either in the X axis (going across the window) or the Z

⁷³¹ <https://physicsstuff.000webhostapp.com/>

axis (going away from the window). As Jeran Campanella puts it: “He opens the door and the horizon is right there for you to see and it is completely flat at his eye level.”⁷³²



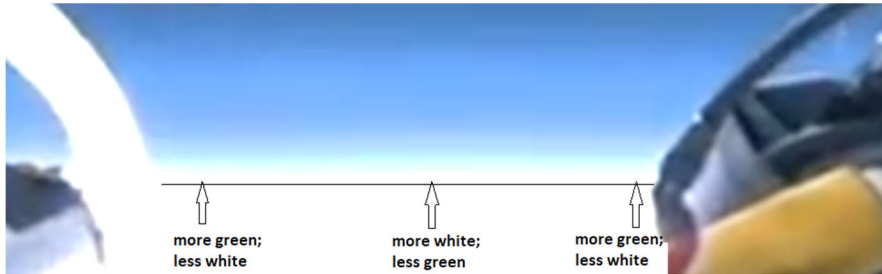
Notice that Jeran assumes, even with the miniscule amount of the horizon available to see out the window, that it is beyond doubt the horizon is “completely flat.” He simply leaves no room for the possibility that he doesn’t have enough length of the horizon (or FOV: field of vision) to make such a determination. As such, this is simply a case of seeing what one wants to see, since it is quite difficult to discern a curvature from only a 6.3 degree depression angle and an FOV of about 1-degree, much less do we even know where “eye level” is in relation to the horizon. In any case, let’s blowup the picture to get a better view:



⁷³² <https://www.youtube.com/watch?v=pvuNdrV30Kc>, at 24:30, presented by “Globebusters,” published Nov. 20, 2016.

⁷³³ <https://www.youtube.com/watch?v=FHtvDA0W34I>

Can we clearly tell where the horizon even begins, much less determine if it has a curvature? If the edge of the white area is the horizon, we see some of it is diffused into the light green area. Nevertheless, let's engage in Jeran's methodology and assume that such a small snap shot of the Earth's horizon can actually reveal something. To do so, we will draw a black line near the edge of the white area.

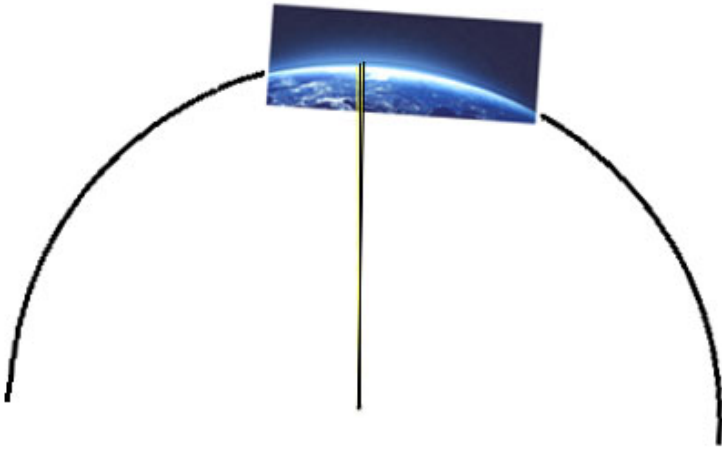


What we see, if we look closely enough, is that the area right above the middle has more white just above the arrow than either the left or right of the snap shot. We also see that the light green area forms a small hump in the middle that lessens if we move our view to the left or right. We could conclude that this is the beginning, as small an angle as it is, of a curvature of the Earth. Who could say differently, especially since the margin of error is only 6.3 degrees and we don't even know where the "eye level" is?

While we are here, let's determine what percentage of the Earth's horizon we are actually seeing from the capsule's window. The percentage can be estimated since the distance to the horizon at 128,100 feet is 438 miles, along with the fact that the horizon line in the window is approximately the same width as the helmet of Mr. Baumgartner, about 1 foot. A rough estimate shows the horizon line from the window is capturing only 0.0065% of the Earth's circumference, or 8,500 feet, a very small amount, indeed.

To get a picture of how small it is, 8,500 feet is much less than the space we are able to discern between the endpoints of the yellowed angle drawn below. The width of the angle at the top (where the yellow lines meet the surface of the Earth), which, drawn to scale as we have done, represents 60-miles, which is 37 times longer than 8,500 feet. With such a small sample, Jeran is certainly not permitted to conclude that the horizon line in the

capsule's window shows no curvature, much less that the horizon comes to "eye level."



His partner, TJ, says the following:

It would be extremely obvious the exponential drop due to vertical curvature, which we all know the calculation, 8 inches per mile squared.

Perhaps TJ is using "exponential" in a colloquial sense, but for precision's sake we must note that the drop of '8 inches per mile squared' is not exponential, it is geometric. If one uses the term "exponential" in mathematics, he is speaking of exponents such as $10^2 = 100$ and $10^3 = 1000$. Since the drop does not increase by 10 times for each mile squared, it is not exponential. He continues:

When you're looking across a body of water which is 50, closer to 60-miles, that's an extreme amount of expected vertical curvature. It's about a quarter mile, or more than a quarter mile of expected vertical curvature, and we can see it's not some trick of atmospheric refraction, it's not a mirage, but that, indeed, the water, the surface of the water, is a plane, and it's not curving downward away from you in all directions exponentially, and there is very good evidence for that, not just viewing evidence up to...

Notice how TJ switches topics to the issue concerning what can be seen across Lake Michigan from Grand Mere State Park to Chicago. But the issue concerning Baumgartner's view of the horizon has nothing to do with the horizon at the other side of Lake Michigan. Apparently, however, TJ wants to plant a seed in the viewer's mind that the globers' explanation of why we can sometimes see buildings over the Lake Michigan horizon that the '8 inches per mile squared' formula does not allow, is nothing but a cheap meteorological "trick." As we have seen in our extensive analysis of Lake Michigan, it is anything but a cheap trick. The one who is performing a "trick" is he who denies that light refraction has anything to do with what we can see across a body of water 60-miles away.

...I think that that Felix Baumgartner dude went up to 130 plus thousand feet, and when he popped that hatch open, you're right, the horizon was right there in front of him, and of course, they had to switch to the Go-Pro fisheye lenses outside of the craft to give the illusion of Earth curvature, which made New Mexico appear to take up about, I don't know, about three-fourths of the Earth's surface.



The reality is that a "fisheye" lens was not chosen for the mission to "give the illusion of Earth curvature" but to get the largest visual field possible. Fisheye lenses are useless for determining the real shape and size of anything. Even at 128,000 feet, Baumgartner's visual field from Roswell, without any refraction, is only 480 miles in any direction, which means that Baumgartner would not see any bodies of water since the Gulf of Mexico and the Baja California peninsula are hundreds of miles farther. Hence the blue tint we

see in the photo is not the ocean, but only a light distortion to the blue end of the spectrum. The line between the black and the blue is the horizon, and with a normal lens (not a wide-angle lens), the horizon would have only a very slight curve (if any), just as we saw through the window of the capsule.



So that was obviously, you know, curvature due to fisheye lens, and yeah, the horizon itself you should have to look lower and lower with altitude – now he said that it would be a third of a degree, but that’s not the point. The horizon would not raise continually with you up to 100,000 feet. There is very good evidence for that. He says it would drop gradually, however that’s incorrect. It would drop exponentially. There is a difference, fundamentally, between the term ‘gradually’ and ‘exponentially.’ So his premise is completely wrong; his claim is fallacious. If the Earth is a sphere, the vertical drop would not be gradual, it would be exponential.

Again we see that TJ has a problem distinguishing between the geometric drop of the ‘8 inches per mile squared’ formula and that of an exponential drop. Be that as it may, it is TJ who “misses the point” since not only did he get the depression degree wrong (it is 6.3 degrees at 128,000 feet, not a “third of a degree”) he fails to understand that even at that altitude there is only a 6.3 degree window in which anyone could possibly determine if there was any perceivable curvature, and that task would need to be done on the absolute clearest of days and without any camera or visual errors, even assuming TJ knows where “eye level” is.

For example, if the camera was either up or down by more than 3.15 degrees (half of 6.3 degrees) with respect to the horizon, then it will present a totally distorted image. Obviously, Baumgartner’s team was not doing this project to determine whether the Earth was flat, and thus no preparations were made either to make sure the camera took into account the 6.3 angle of depression or that when Baumgartner looked out his capsule window he was precisely at eye level, 90 degrees from a spot 128,000 feet below.

Calculator of Earth's curvature and horizon

РусскийEnglishMetricImperial

Distance between observer and the target [miles]
500

Observer height [ft]
128000

Target height [ft]
100

Earth radius [miles]
3958.76

Changing unit system does NOT convert your input numbers, but Earth radius. I.e. if you input 15 meters and you change unit system, it will be 15 feet.

Common info

Central angle between observer and target, COZ [radian / degree]	0.12630218/7.23658160
Depth to chord, GP [ft]	41665.7846
Chord length, CZ [miles]	499.66772775
Visible horizon drop [degree]	6.324720
Horizon drop height, FB/DB [ft]	128260.5328/256260.5328
Target drop height, NZ/KZ [ft]	166497.028106/294497.028106
<p>*Polar refraction can not be predicted or calculated properly. Thus, its calculation is just an example. You can't get a real result. If we have a severe polar refraction, the target can be lifted above true horizon and can be observed from hundreds kilometers.</p> <p>Red values in the top table depend on observer's height</p> <p>Refraction is in the lower table and has a caption like: "Weak 1.07, Standard 7/6..."</p>	

Calculate

Title	No refraction	Weak 1.07	Standard 7/6	Intense 4/3	Severe 1.5	Polar 70/20*
Visible horizon, AB [miles]	438.7801	453.8323	473.8333	506.4662	537.1202	819.9870
Target max visible distance [miles]	451.0256	466.4992	487.0600	520.6062	552.1179	842.8963
Hidden part, ZW [ft]	2647.4050	1429.6021	442.3616	-	-	-
Visible part, HW [ft]	-2547.4050	-1329.6021	-342.3616	-	-	-
Additional info	You can't see the target	You can't see the target	You can't see the target	No hidden part	No hidden part	No hidden part

What is more disturbing about TJ’s analysis is the pick-and-choose method of what he will allow as evidence, which is true for all flat-earthers. On the one hand, he accepts the fact that Baumgartner and his crew sent him up 128,000 feet into the sky in a sophisticated capsule with oxygen flow, and TJ knows of rockets that other civilians have made that ascend even higher, but when it comes to accepting that NASA, ESA, the Russians or the Japanese have sent rockets, satellites or probes at even higher altitudes so that we can see the Earth is a sphere, then all bets are off for the flat-earthers since they have predetermined that all space agencies are total liars who have never told one truth in their entire existence, and are actually funded only to deceive us into believing that the Earth is round – a classic case of throwing the baby out with the bath water. Be that as it may, Jeran then adds:

Here is an even bigger problem they never pay attention to. So if you are up as high as a plane, 30,000 feet, based on the curvature formula, you can see, I believe it’s about 200 miles in every direction...Now picture

the Earth a beach looking out to the ocean, and they say at 3 miles you start to lose the boat. Let's say it happens at 10 miles. So you start to lose the boat and by 15 miles the boat is gone beyond the curvature in their mind. So at 15 miles, I've lost the entire height of a boat. But they then say that there would not be enough change to notice a building leaning when you're up in a plane 200 miles high! Now, I lost a boat from the ground because it went over the curvature, meaning that the Earth is curved enough that I lost an entire 30-foot high boat, yet from 200,000 feet, I'm sorry, from 30,000 feet high, and I can see 200 miles, they're saying, 'no, you wouldn't notice anything; you wouldn't even notice it's only a 3 degree change. Those two things – you can't say both. And that's what they always do. Just because science says something does not mean it's a fact.

First we should never fail to remark that, on the face of it, Jeran's method of arguing is disingenuous because if the Earth were flat, we should be able to see the whole boat from not only 15 miles away, but 50, 100, 200 or 300 miles away, at least with a good telescope on a very clear day. But it is a fact that we can't see it at any of those distances, even if we use a telescope. Once the boat's mast is actually under the horizon, no amount magnification is going to bring it back into view. Although it is true that magnification can bring back into view an object that has disappeared from naked eye sight, it will always show a good portion of the object below the water line, and this missing portion, contrary to flat-earththers, is not due to "perspective," since perspective will show *the whole boat*, but it will be a much smaller boat. This phenomenon has been demonstrated time and time again, but flat-earththers always seem to find an excuse for dismissing it.

Be that as it may, Jeran fails to realize that one can easily see a boat go over the horizon from 15 miles away because one has something against which to measure the disappearance of the boat. Since the horizon is non-moving, it serves as a stable reference point from which to measure the movement of the boat.

Furthermore, the angle from which we view the boat moving below the horizon is very small and thus there is no margin of error of which to be concerned. But when viewing the tilt of buildings, against what would one be able to measure the tilt? Not only are there no markers in the sky, neither the building nor its surroundings are moving, so how is one to determine a

tilt? A boat actually moves away from view by 15 miles and then sinks below the horizon proportionate to its distance away. A building does not move, and therefore we cannot perceive its tilt with our eyesight.

To measure the tilt of a building requires the same thing that must be done to measure the tilt of the towers of suspension bridges, that is, with a laser beam discharged at the top of one tower to the top of the other tower, and comparing that distance to the same laser measurement between the bottoms of the towers. For example, the Verrazano-Narrows bridge connecting Staten Island and Brooklyn has two towers that are 41 millimeters (1.61 inches) wider at the top than the bottom. Obviously, they build it with such a difference because they have taken into account the curvature of the Earth.

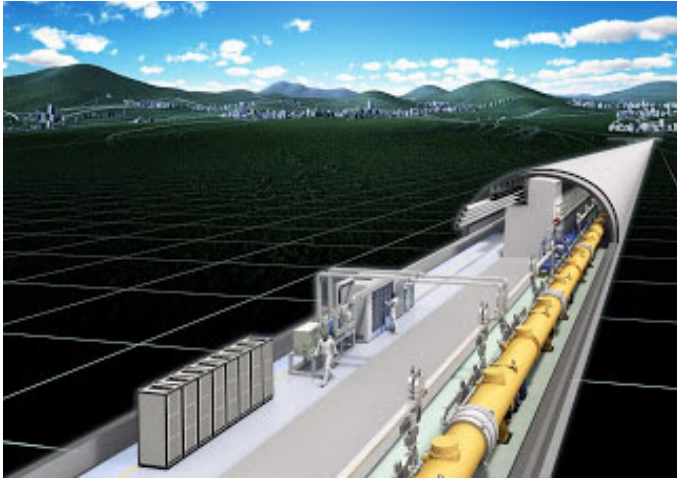


734

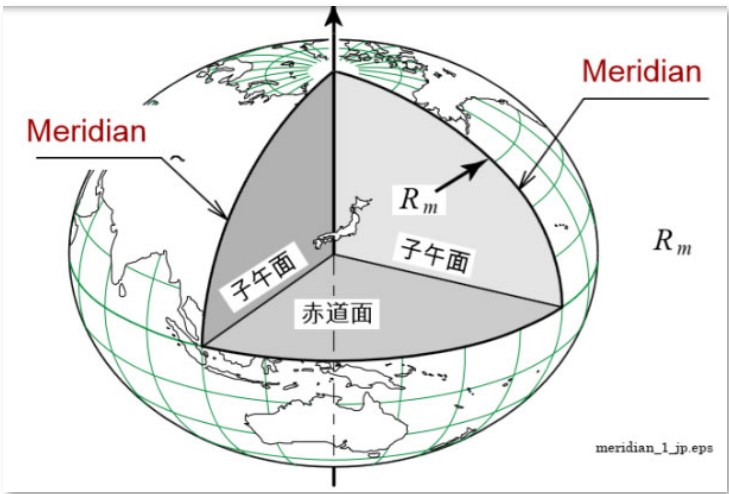
⁷³⁴ <https://www.youtube.com/watch?v=VNqNnUJVCVs>, at 3:27 mark

Do Engineers Consider Curvature When Building?

Although some flat-earthers deny that a curvature of the Earth is taken into account when bridges are built, the fact is they are forced into this denial since without it their theory collapses. On large-scale projects, engineers always take account of the earth’s curvature. This was the case, for example, for the Japan Proton Accelerator Research Complex of 2006.



The engineers published a 33-page paper outlining how the accelerator was built to accommodate the curvature of the Earth.



It states:

The Effect of Curvature of the Earth for the Beam Height: It is general that height of these components of accelerator is aligned along a horizontal plane. However, this straight line is parallel straight line to curvature of the earth. This line is not straight line for the beam. The curvature of the earth affects for the Beam height. Therefore, the curvature of the earth must be considered when components of the accelerator are aligned. The radius of curvatures are Three types. 1. Radius of Curvature in Meridian 2. Radius of Curvature in Prime Vertical 3. Radius of Curvature in Vertical Cut. These Radius of Curvatures are different according to latitude and longitude. Therefore, it is necessary to set the tangential plane by the latitude and the longitude.⁷³⁵



Similarly, in designing the Humber Bridge in the United Kingdom, the Earth's curvature was an integral part of the construction plan.

The Humber Bridge is a Grade 1 listed iconic structure linking Lincolnshire and Yorkshire on the A15. The 1.4-mile long bridge was opened in 1981 to create a new, faster route between the two banks of the Humber. It remains the longest single-span suspension bridge in the world to cycle or walk across⁷³⁶.... the towers, although both vertical, are 34 mm (1.3 inches) farther apart at the top than the bottom due to the curvature of the earth.⁷³⁷

⁷³⁵ http://www.slac.stanford.edu/econf/C06092511/presents/TU004_PPT.PDF

⁷³⁶ https://www.humberbridge.co.uk/explore_the_bridge/bridge_history_and_detail/construction.php

⁷³⁷ https://en.wikipedia.org/wiki/Humber_Bridge

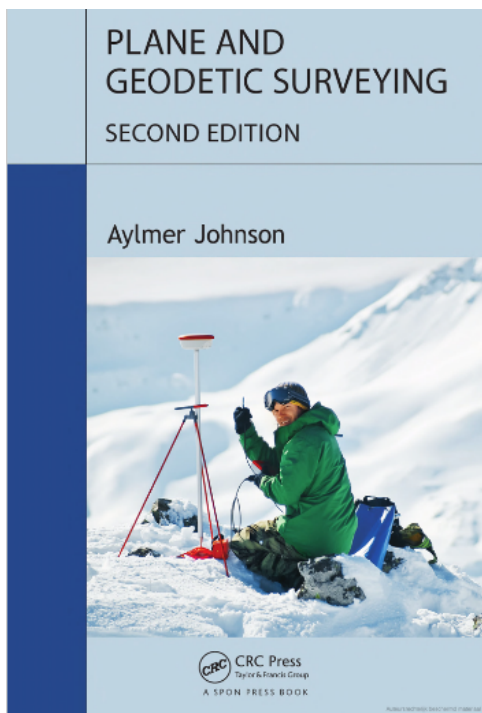
Mick West of Metabunk.org relates a pertinent story of the consequences of engineers who did not take into account Earth's curvature:

What Happened When Engineers Forgot The Earth Was Round:
Discussion in 'Flat Earth' started by Mick West, Aug 13, 2017.

An amusing anecdote about forgetting the curvature of the Earth. In 2 Miles the pipe would drop 32 inches, and have a "bulge" in the middle of 8 inches. It also shows the difference between "level" (following the curve of the earth), and "straight," or "flat." Colgate gravitated to the University of California at Berkeley, then making the world's largest linear accelerator, the A-48. A half-year later at the inception of a neighboring laboratory, now called Lawrence Livermore National Laboratory, Colgate was invited to join the fledgling counterpart to LANL. "Instead of doing magnetic fusion, which is what I wanted to do, I was put in charge of the "fast" diagnostics (neutrons and gamma rays) for the Bravo test, on Bikini Atoll, the U.S.'s largest thermonuclear test with a yield of 15 megatons," he said. Colgate was 27 or 28 at the time, very young for all this responsibility to be dropped in his lap. He said there were few Ph.D.'s with his background, such as his experience as an electrician in the Merchant Marines, a marine engineering license to operate seagoing ships, and a Ph.D. in measuring gamma-ray absorption coefficients. "These measurements are still used by the Bureau of Standards," he adds, a hint that his experimental acumen was well-known to the higher-ups. There was one particularly amusing part of this bomb test experiment involving a dozen two-mile-long vacuum pipe lines necessary to accurately view the device from far enough away to save the recording equipment from the expected blast. "When six of us young physicists arrived in Bikini several months before the test, but after an immense effort by thousands working for the contractor Holmes and Narver, we found that the gamma rays from a radioactive test source wouldn't pass through the vacuum pipelines for a distance of two miles." After a few of the "juvenile young scientists" straightened one pipe line using a special telescope, Colgate recalls being awakened that night by another still younger engineer, who showed him the corrections. "I took one look, calculated the geometry, and said out loud so everyone in the tent could hear, **'Oh my God, they forgot that the earth is round!'**" he

said. For gamma rays to get through, the pipes had to be straight, not level with the ground.⁷³⁸

All surveyors agree that in large projects the Earth's curvature must be taken into consideration otherwise every other part of the project will suffer accordingly.⁷³⁹ Scores of books have been written on large-scale surveying. One of the more recent is *Plane and Geodetic Surveying* by Aylmer Johnson (2014). It contains various references to the Earth's curvature, some of which are cited below.⁷⁴⁰



⁷³⁸ <http://www.nmt.edu/news/all-news/516-2013/4971-meet-dr-stirling-colgate-iconic-tech-president>; from Mick West at Metabunk.org at: <https://www.metabunk.org/what-happened-when-engineers-forgot-the-earth-was-round.t8990/#post-209322>

⁷³⁹ <http://landsurveyorsunited.com/video/curvature-and-refraction>;
<http://www.landsurveyors.com/resources/accuracy-of-land-surveys/>

⁷⁴⁰ Aylmer Johnson, *Plane and Geodetic Surveying*, 2nd edition, CRC Press, Boca Raton, 2014, pp: 101-128

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These tasks are achieved using networks of so-called control points. This book aims to give the civil engineering surveyor all the necessary theoretical knowledge to set up, manage and use such networks for the construction and monitoring of large or small engineering works.

The exact way in which control networks are established and managed depends on a number of factors:

1. *The size of the construction project and the accuracy required.* The accuracy of each technique described in this book is explained, together with the limitations of the various assumptions used in subsequent calculations. In particular, guidance is given as to when a project is sufficiently large that the curvature of the earth must be taken into account.

Also, any adjustment program which accepts vertical angle observations must either make corrections for atmospheric and earth curvature effects itself or require that the observations are corrected before entry (see Chapter 12). LSQ takes zenith angle observations to be 'raw' input, and makes the appropriate corrections—while slope angles are taken to be corrected values, which have been computed using the method explained in Chapter 12, Section 12.5.

⁷⁴¹ See also: <http://www.aboutcivil.org/errors-in-levelling.html>
<http://www.aboutcivil.org/curvature-and-refraction.html>

Viewing Ships Going over the Horizon



#1



#2



#3



#4



#5



#6



#7



#8



#9



#10



#11



#12

One of the more controversial topics in the flat Earth v. globe Earth debate regards boats going over the horizon. The above snap shots were taken over a period of about an hour and a half.⁷⁴² These photos more or less speak for themselves. As the ship moves farther away from the camera, two things happen: (1) the ship's hull begins to go farther and farther below the horizon line, and (2) the ship becomes smaller and smaller. In order to explain this acute variation in what we see of the ship, flat-earthers will claim that it is all a matter of "perspective" and magnification. For example, TJ from *Globebusters* says the following:

I've seen plenty of examples where a ship that has appeared to disappear over the curve of the Earth has been restored by a high-powered telescope....The reason this happens is that our eyes are convex lenses, so are binoculars, so is a telescope...the way that they operate is that everything is going to join at the horizon. And at a certain distance, an objects angular size is going to diminish; it's going to merge with the horizon because it is actually getting miraged behind the atmosphere, but

⁷⁴² <https://www.youtube.com/watch?v=VSy9oKHlpiE&feature=youtu.be> from the site: *Let's Do it Live* at the 25:00 mark.

again, if you zoom into that, it is restored. This proves that at least Columbus was wrong and that this is not a good proof of the sphere of the Earth. I wouldn't go so far as to say it proves flat Earth...⁷⁴³

As we noted earlier, because of perspective, any object moving away from the viewer will appear smaller and smaller. Hence the height and the width of the ship will decrease in size by the same proportion. Flat-earthers add, however, that if the image is magnified by a zoom lens or a telescope, we will again see the image in its full size. Although it is true that magnification will bring back into view a portion of the ship that is not seen with the unaided eye, it cannot bring back into view *all* of the ship, specifically the part of the ship that has already sunk beneath the horizon. We saw something similar occur in the case of viewing buildings on the Chicago or Toronto skyline. Although the zoom lens magnified the building, it did not bring back into view the portion of the building that had already sank below the horizon. Obviously, barring the portion that our unaided eye cannot see, a magnification of the ship can only magnify the portion of the ship that is above the horizon line. If this wasn't true, then on a flat Earth a ship that was 100, 200 or more miles away and had thus disappeared from the unaided eye, should easily be brought back into view by a high-powered telescope (at least on a very clear day), but at these distances a retrieval of the ship never happens, no matter how powerful the telescope. To illustrate this fact, photo #6 (below) shows that the hull of the ship has completely gone under the horizon.



⁷⁴³ <https://www.youtube.com/watch?v=pvuNDRV30Kc>, at 41:51, presented by Globebusters, Nov. 20, 2016.

If we magnified the above image by a zoom lens or telescope, we may be able to see some of the hull as it would appear in photo #5 below...



...or even perhaps photo #4 below:



But we could not see the ship as depicted in photo #1.



744

⁷⁴⁴ There many such videos available, and all show the same effect of curvature:
<https://www.youtube.com/watch?v=WOZd6t9uzhY>

Flat-earthers will attempt to counter this clear evidence with other videos in which a zoom lens is used to magnify the boat. Their purpose is to show that a magnification of the boat will show more of the boat than the naked eye. They do so in hopes of concluding that what the naked eye sees as the disappearance of the boat over the horizon is really an optical illusion since a magnification proves the boat is still there. If they can prove it is an optical illusion, they will use this fact as evidence that the Earth has no curvature. As we will see, not only is this logic ill conceived, as much as flat-earthers accuse NASA of using “fake photos” and “CGI” in their pictures of a spherical Earth, so this flat-earth uses real photos but ends up with fake conclusions.

In the below video, the photographer begins by showing us a video of a boat that is a long way from the shore. Even though the image of the boat is very small, we can discern three layers of the boat: a white layer on the bottom, a black layer in the middle, and a white layer on top. We should also mention that the photographer does not reveal how far away the boat is from him or how long the body of water is, and there is a reason for that, as we shall see momentarily.

Before we get to that, we should mention the double standard the flat-earthers use when explaining such phenomenon. Earlier we transcribed TJ’s disavowal of using the refraction of air as the reason why buildings on the Chicago skyline can be seen from the shore of Michigan 50 to 60-miles away. He stated:

When you’re looking across a body of water which is 50, closer to 60-miles, that’s an extreme amount of expected vertical curvature. It’s about a quarter mile, or more than a quarter mile of expected vertical curvature, and we can see it’s not some trick of atmospheric refraction, it’s not a mirage, but that, indeed, the water, the surface of the water, is a plane, and it’s not curving downward away from you in all directions exponentially, and there is very good evidence for that...⁷⁴⁵

A little earlier he stated:

⁷⁴⁵ <https://www.youtube.com/watch?v=pvuNdrV30Kc>, at 25:20, presented by Globebusters on Nov. 20, 2016

...and you've got atmospheric refraction, which is much, much thicker towards the ground – more dense air towards the ground, getting less and less dense as it is proportionately with altitude so that it creates the illusion of a falling off point or a cut off point, but instead that's just the limit of our vision due to atmospheric refraction. I would submit if there were no atmosphere, you could see much, much further at 100,000 feet, but unfortunately, the atmosphere becomes totally opaque and much more relective at specific distance, depending on density and temperature, and that sort of thing.⁷⁴⁶

As we can see, the same phenomenon – atmospheric refraction – is later appealed to when it appears that it might support the flat-earth argument (*e.g.*, bringing a boat above the horizon), but denied earlier when it doesn't support his argument (*e.g.* bringing a building partially up from the horizon).

Below is another attempt using a boat.

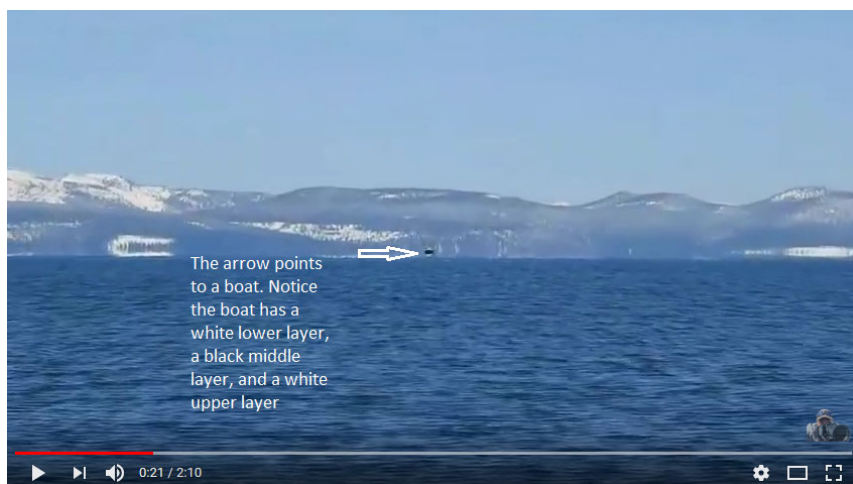


Photo #1

The photographer then zooms in with his Nikon P900. We notice that there is a very thin gray layer beneath the bottom white layer, and a little thicker gray layer on top of the top white layer.

⁷⁴⁶ *Ibid.*, at 31:50 to 32:27, and discussion to 46:50.



Photo #2

In other words, photo #1 really hasn't changed much in photo #2. The bottom white layer is still barely above the horizon in photo #2. In fact, the bottom right side of the boat barely has any gray layer at all and thus the white layer is very close to the horizon, just as in photo #1. We can barely see the white strip of the bottom right window. As we will see later, the gray smudges represent the roof and the hull of the boat, both of which slant back and thus do not serve as good reflectors of the sun's light, which makes them darker.

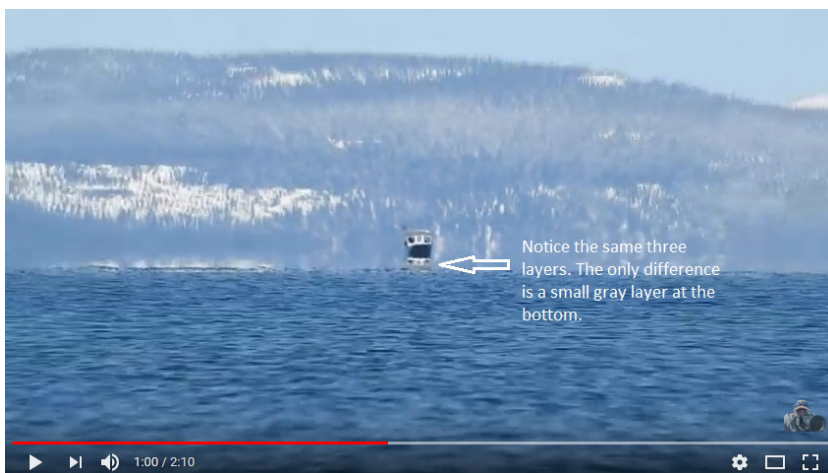


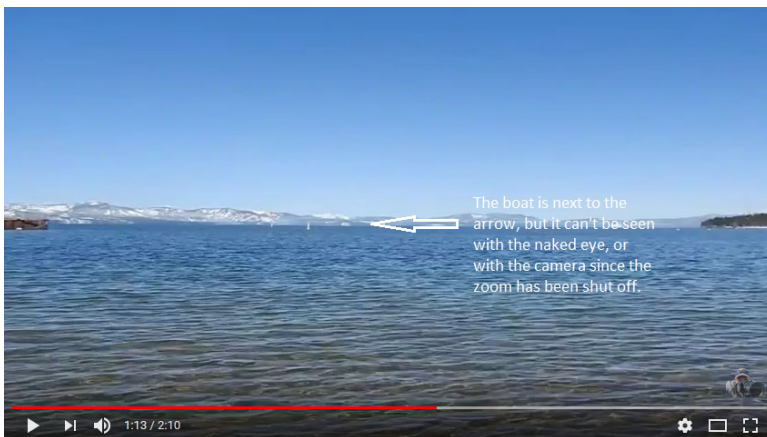
Photo #3

In photo #3 above, we can still see the gray smudges, but the most pronounced parts of the boat are the two white layers with a black layer between them. So again, things haven't changed much among the three photos. In other words, the only thing the P900 has done is magnify what was already salient in photo #1, and this is exactly what we would expect to see since a magnification is only going to magnify what is available to be magnified. For even more clarity, let's see the 25-sec. mark in photo #4.



Photo #4

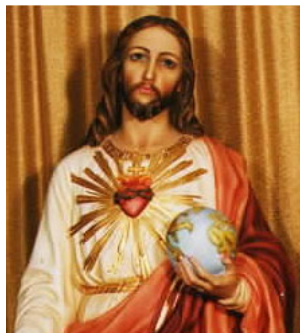
We see the three layers of white-black-white. The gray smudge on top is the roof and the gray smudge on the bottom is the curved hull. There is one more important feature to this boat scene. The video stops at the 1:13 sec:



We can no longer see the boat because the photographer has shut off his zoom and it is as if we were looking at the boat with the naked eye. We know the photographer is close to the shore since the water is a greenish-brownish color. At this point, the video is complete at the 1:13 second mark. It is at this point we realize that the photographer has defeated the very purpose for which he made the video. On the one hand, his purpose was to show there is no curvature of the Earth because we can see the boat once it is magnified. But because he doesn't tell us either how far away he is from the boat or how long the body of water is, then he doesn't know whether the boat is far enough away to be affected by the Earth's curvature to any significant degree that can be seen, even with his zoom lens! At a height of 6 feet, there won't be any noticable curvature until at least 6 miles out.

On the other hand, if the body of water were long enough to show curvature, it is quite convenient that he stops his video at 1:13 since it disallows us to see whether the boat does, indeed, reach the point where the Earth's curvature begins to show the boat sinking beneath the horizon. In fact, the only way he could possibly prove his point is by waiting to see if the boat traveled far enough for it to be affected by curvature. Without doing so, he is eliminating evidence for his own convenience. Unfortunately, those without the acumen to discern this sleight of hand will be convinced the Earth is flat.

In the end, the only thing he has shown is that no matter to what degree he magnifies an image that is prior to the horizon, that image will also show the same amount of the boat above the water, albeit one picture may be proportionately larger than the other.



Convex Earth: The Documentary



A new flat Earth documentary was produced by a number of Brazilian scientists at Dakila Pesquisas titled *Convex Earth: The Documentary*.⁷⁴⁷ Prior to the actual release of the documentary on March 26, 2018, there was made a press release for the contents of the film on Feb. 19, 2018 from Sao Paulo. The PRNewswire stated:

SAO PAULO, Feb. 19, 2018 /PRNewswire/ -- Inquiries concerning the shape of the Earth have been a recurring theme in human history. Based on a series of natural phenomena that contradict accepted academic teaching on the matter, Brazilian scientists at Dakila Pesquisas decided to investigate these inconsistencies. In seven years of studies, scientific experiments were conducted at different points in the world, with the involvement of government institutions and professional researchers from a variety of fields. The results will be presented in the feature-length *Convex Earth: The Documentary*. The preview, by invitation, will take place on March 26, at 7:30 pm, at the Shopping Eldorado in São Paulo (SP). Three days later, the documentary will be released at convexearth.org, in Portuguese, English and Spanish.

⁷⁴⁷ <https://www.youtube.com/watch?v=McMMmclGVc>. Its description of itself is: “Founded in 1997, in Corguinho, Mato Grosso do Sul, Dakila Pesquisas is comprised of researchers and scientists from diverse fields of knowledge, mainly the exact and natural sciences.”

Advertised were the following points:

- 1) Planar shape of the surface of water
- 2) Lunar eclipse can be explained by other shapes than a sphere (a convex Earth, but the convexity is vertical, not horizontal)
- 3) Curvature of the horizon at high altitudes allows convex shape (but the water is also convex), occurs by atmospheric effects and not the shape of the earth
- 4) Circumnavigation does not prove Earth is round, since CN works on any geographical model
- 5) Trajectory of constellations does not prove sphericity. The trajectory is different than what science says, and this makes a new position of the continents.
- 6) All images of Earth are process through satellite data processing (CGI), so there is no real photo taken from space of the Earth.
- 7) The experiment of Eratosthenes, didn't consider time zones and elevation of sea level. It could be a proof for convexity, but not sphericity.⁷⁴⁸

The description continues with a brief biography of its founder and those working with him:

According to Urandir Fernandes de Oliveira, founder of Dakila Pesquisas, the thesis that the Earth is round has been refuted by seven experiments: a geodesic experiment, which consists of measuring two buildings at a considerable distance; using sea level as a reference; a laser experiment to ascertain the flatness of water surfaces; leveling of water surfaces; optical distortions relating to processes of reflection; an experiment with boats on the horizon line; and experiments involving gravity and heavenly bodies. All the experiments had the participation of astronomers, cartographers, geologists, topographers and civil engineers, among other professional researchers. Cutting edge equipment was used. After the release of the documentary, Dakila Pesquisas will make available all of the methodology and technology used so that those interested can verify the results. "In addition to addressing the shape of the Earth, the documentary will reveal the discovery of a new continent sealed off by a great wall of ice. New knowledge will also be

⁷⁴⁸ <https://www.prnewswire.com/news-releases/scientists-at-dakila-pesquisas-release-documentary-proving-that-the-earth-is-not-round-300598977.html>

demonstrated concerning the sun, the moon and the constellations,”
Urander Fernandes de Oliveira disclosed.

Since the team made Urander’s conversations with Bilu (NB: Bilu is the extraterrestrial who spoke with a raspy voice in English to the Spanish-speaking Urander) part of the promotion of the movie, we would be amiss if we did not reiterate here what we covered in the beginning of our book. According to Urander, he was commissioned by Bilu to conduct these seven experiments. We would also be amiss if we neglected to point out that from such a bizarre phenomenon and Urander’s apparent gullibility in accepting Bilu as some kind of authority he must obey, that the experiments were already tainted with personal bias in that Urander accepted Bilu’s conclusion that the Earth was not spherical before the experiments were ever done. Obviously, any other results would have been rejected by Bilu.

Be that as it may, the larger question with which we are left is the identity of Bilu. Apparently, Urander believes Bilu is, indeed, an extraterrestrial who possesses certain knowledge about the Earth, perhaps from his being located away from Earth and able to “see” that it is not a sphere. In turn, this fact necessarily forces the audience to question not only Urander’s sanity but his scientific methodology and ability to interpret the evidence without partiality. As we will see, not only are Urander’s conclusions highly suspect, in all cases the proper scientific protocol was not followed; nor was room left for alternative answers to the data collected. Despite these anomalies, all the conclusions made by the team were definite and absolute, e.g., “...this proves that the Earth is not a sphere,” when, in fact, the best that could be said about the data was “...this provides evidence that must be investigated more thoroughly before any conclusions can be drawn.”

Convex Earth: The Boat Experiment

One of the seven experiments performed by the Dakila researchers is to determine why boats that go farther and farther out to sea disappear over the horizon. First, the researchers give us a series of time-lapse snapshots that show, from the perspective of the naked eye, how the boat changes in size and shape as the distance increases from the shore of Lake Titicaca in Peru.

The photos seem to confirm to them that the Earth is spherical, since the boat eventually disappears over the horizon.



Photo #1



Photo #2



Photo #3



Photo #4



Photo #5



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Photo #6

⁷⁴⁹ <https://www.youtube.com/watch?v=McdMMmclGVc>, beginning at 13:42 and ending at 14:09.

Beginning at 34:30, the narrator states the following:

To what conclusion did the researchers arrive in relation to the experiments with ships? The researchers realized that after some time of looking at the boats with the naked eye, they began to disappear on the horizon. First the hull; then it was no longer possible to see the boat; and finally, the mast lowered until it disappeared completely, as the spherical Earth theory explains. When the boats reached a certain distance, it was no longer possible to see them with the naked eye. Does this mean the Earth is even spherical?

With the loss of eye contact, it's time for the team to use optical instruments in an attempt to still see the boats. If the boats are still visible through the equipment, it's proof they have not traveled below the horizon. And to everyone's surprise, the boats were still there! Visible!



Photo #7

We can't help but notice how the documentary first creates its own criterion and then congratulates itself on finding that criterion. The criterion is, if they can still see the boat when they look through a telescope, this shows the boat has not gone over the horizon, with the implied conclusion that the Earth must be flat. But this conclusion is certainly premature, especially since photo #7 shows a boat image that is severely distorted from the original image in photo #1. The hull has been reduced to half the size it was in photo #1; has turned mostly white, and is a few feet above the water. Conversely, the masts are double the length they were in photo #1 and run alongside of

the hull, whereas in photo #1 they were on the top of the hull. In effect, photo #7 hardly resembles photo #1. It is as if we are looking at two different boats. This fact should have immediately arrested any conclusions from the commentator, namely, “it’s proof they have not traveled below the horizon.” The boat may have indeed gone below the horizon, but the atmospheric conditions are bringing the image of the boat above the horizon. Such a possibility is not even considered by the researchers. Instead, the researchers only speak in general terms of an “optical pheneomena.” The narrator continues:

The researchers realized that the images of the equipment presented some optical phenomena.



Photo #8

During the experiments, we perceived the formation of optical phenomena that we initially attributed to the Fata Morgana effect, which is the refraction of light in the layers of the atmosphere. This phenomenon is very common in deserts. There are the famous mirages. The mirage is the Fata Morgana effect. A formation of images occurs; virtual images; images that are not real at specific points.

Through the observations and the collected data during the experiments, we were able to determine that the optical phenomena had a certain pattern. After some distance, we began to have a visual loss, which...



Photo #9



Photo #10

...increased to a distance that our direct visual was compromised. When we lost the view with the naked eye, we used optical equipment, in this case, the telescope, and the boat was still there, only we realized it was an inverted image, a mirror image.

The above is a reiteration of the process that is stated not by the narrator but by one of the researchers.

We realized that the real image was practically disappearing, and we had the formation of an inverted virtual image...an inverted mirror image, when the angle of incidence of light on the surface, in this case water, tended to zero.



Photo #11

As we learned earlier in the examination of Joshua Nowicki's photograph of the Chicago skyline, an inverted image would mean that the height displacement is at least double what would normally be seen, which means that the very reason the researchers can view the boat with the telescope is that the air has lifted the image of the boat to at least twice the normal height. The researchers should have noticed these atmospheric effects from the very beginning since the naked eye snapshots of photos #2, #3 and #4 show an elongated mast that is almost twice the length of the mast in photo #1; and photo #3 shows a distortion that hardly resembles the hull. In any case, the researchers desire their own explanation for the optical distortion.



Photo #12

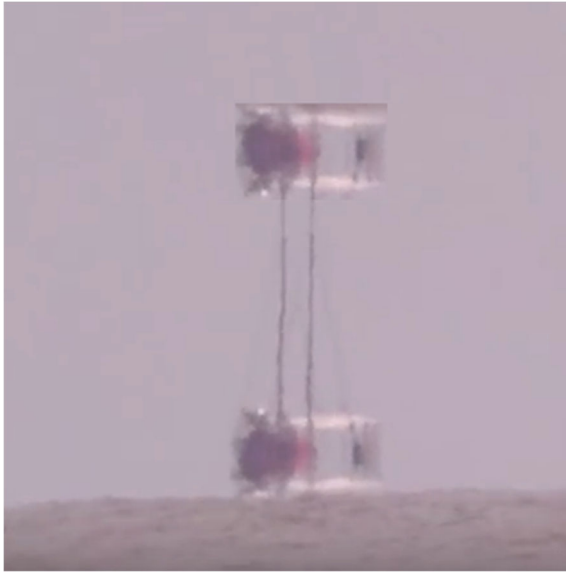
This occurs because of the mirroring effect, where the reflection of the image occurs.....With the unfolding of the experiments, we perceived that the optical instruments amplified the visual phenomena. In the case of the use of Newtonian telescopes, in which its optics, which is of supreme precision, amplifies, thousands of times, the capacity of the human eye, and could see things we did not see. This led to amplifying the visual phenomena we observed during the execution of the experiments.

We deepened the studies, and we could determine that most optical phenomena, which are attributed to the refraction of light, or Fata Morgana effect, actually occurs by reflection.



Photo #13

We must remark here that the researchers seem to be unaware that an inverted image (*e.g.*, a mirage or Fata Morgana) requires that the image be at least twice the height of the boat above the horizon; and, more importantly, that the hull of the boat be upside down and above the masts. But Photo #12 and #13 show one boat that is on or a little above the surface of the water. The researchers do not explain how they determined that the image is inverted. Their photos (12 & 13) show the masts are still above the boat, just as in Photo #2 that was seen with the naked eye. If the image was inverted, the hull would be on top and the masts would be below the hull. See our image below:



In effect, the rightside up position of the boat in Photo #12 and #13, along with the elongation of the masts, suggest that the optical phenomenon taking place here is the same “looming” effect that was determined in the Joshua Nowicki photo of the Chicago skyline. Looming keeps the image rightside up, but both elongates it and pulls it above the horizon from the observer’s point of view. As such, the telescope allowed them to see the full looming effect from the atmosphere that the naked eye view only partially saw.

The researcher continues:

It is the reflective process of light on a surface with an angle tending to zero. With the observations we make, we have been able to promote a new physical theory that explains the Fata Morgan effect from a new optic, a new point of view. We call it the Theory of Optics Applied to Visual Phenomena.

The only “reflection” that appears to be occurring is that the sun light is bouncing off the water and hitting the hull, which turns the hull white. In any case, we notice that the reseracher does not explain how a “reflection” can invert the image (since he believes the image is inverted) nor does he explain how an “angle tending to zero” effects what he is seeing.

This conclusion helped us explain three phenomena that we know are illusions: 1) why the boat seems to disappear going down the horizon line,

In reality, the researchers merely showed that as the boat goes farther out, various atmospheric distortions occur rather quickly that prohibit giving the experiment any validity in determining whether the Earth is flat or not. The fact that the researchers did not even entertain the possibility that their “inverted” image was a product of the same or similar atmospheric phenomenon that is known to raise images up over the horizon means that they were either ignorant of it or chose to hide it from the audience.

2) why first fades the hull and then the boat,

We assume by “hull” the lady means the boat, and that by “boat” she is referring to the masts. In any case, there was no explanation in the video of why the hull fades first and then the masts. If they are using their “Theory of Optics Applied to Visual Phenomena” or “reflection” to explain either that the hull is inverted or that it turned white, this may explain “fading” but it does not explain disappearance. In all instances of a boat going out to sea, the hull and mast both “fade,” but the hull will be removed from view before the masts.

The obvious reason that the hull disappears first and then the masts is because something is obstructing the view of the hull that is not obstructing the view of the masts. That obstruction is the horizon. But since atmospheric distortion brings the image back above the horizon, and a telescope allows us to see this process taking place, the explanation of the reality is clear.

3)...and why when an observer is taller, can see farther. We conclude that boats don't descend at the horizon and that we lose the ability to observe them, to see them in function of an optical phenomena.

As we noted, if anything, the optical phenomenon commonly known as “looming” should have been considered by the researchers. This phenomenon elongates the images and draws them up above the horizon. Since the images in the unaided eye photos show a marked vertical elongation of the boat, yet the boat still went over the horizon, it simply means that whatever level of refraction that was occurring (there are six levels), it wasn't enough to

compensate for the distance the boat gained away from the observer on the shore.

With this experiment, one of the main arguments of the spherical Earth theory – that boats disappear on the horizon due to the curvature – is totally refuted. This is the first proof of the flatness of the waters.

Not only is the “flatness of the waters” not “totally refuted,” the researchers short analysis doesn’t even begin to disprove a spherical Earth. The scientific analysis of the boat was rather amateurish and did not leave room for other explanations that would counter the conclusion of the researchers. Only when each and every other explanation is totally discredited could the researchers possibly offer a conclusion “that boats disappear on the horizon due to curvature is totally refuted,” and that the Earth is not spherical. Not only did the researchers seem confused about what an “inverted” image is, they seem to be ignorant of other effects from the distortion from the atmosphere, such as looming.

Convex Earth: Experiment with Long Range Telescope

The researchers go on to their next topic, titled, “Experiment with Long Range Telescope.”⁷⁵⁰ The narrator begins:

Among the long distance viewing experiments performed with telescopes, the one with the greatest impact was at Lake Titicaca where the team tried to record images at 110 kilometers (68 miles). The site was chosen due to the low humidity of the air at certain times of the year, which is a prime factor for the result.

The researcher then adds testimony from one of the inhabitants that the people of the village can see from one side of Lake Titicaca to the other. The inhabitant states, “I can see almost 50 or 60 kilometers...normal, without binoculars,” which is 31 miles or 37 miles. We are then shown a map of a 37 miles distance across the width of the lake:

⁷⁵⁰ <https://www.youtube.com/watch?v=McdMMmclGVc>, beg. at 40:18.



Photo #1

The narrator continues:

With the telescope, the team was able to record images that were a distance of more than 100 kilometers (62 miles), which would be impossible in the theory of a spherical Earth, as the curvature would have a height of 237 meters (777 feet), equivalent to a 79 story building. This experiment is yet another proof that the Earth cannot be a sphere.

We are then shown what the researchers saw through their telescope at a 100+ kilometer distance, at the end of this section of the documentary.



Photo #2

The first thing we should point out is that the above snapshot captured by the high-powered telescope shows no images. The only thing we see is a wavy water line with clouds and a mountain in the background, but the mountain is certainly high enough to be above the horizon. The researchers offer no pointer on the photo to let the audience know what the researchers consider an “image” on the opposite shore. Thus the claim of the researchers, “With the telescope, the team was able to record images that were a distance of more than 100 kilometers” was simply not demonstrated. If there were at any time images of buildings or towers on the opposite shore sticking out above the horizon, these are not shown in the video, and thus we can only conclude that either the researchers are hallucinating, or seeing what they desire to see, or are, in fact, making deceptive claims. Additionally, the researchers take no “before” and “after” photos so that the audience can compare what can be seen at, say, 5 to 10 miles in contrast to what can be seen at 15 to 30 miles, or anywhere in between. Since there is no such control in the experiment, it automatically becomes invalid.

Second, the researchers do not investigate whether the inhabitant they interviewed is always able to see the opposite shore from 31-37 miles or just on certain occasions. Considering the atmospheric conditions that appear to be quite severe in photo #2, to leave out the frequency of sightings, or to confine the analysis to one-day of fact gathering and ignore what might occur on other days of the month, is simply shoddy research, much less “proof that the Earth cannot be a sphere.”

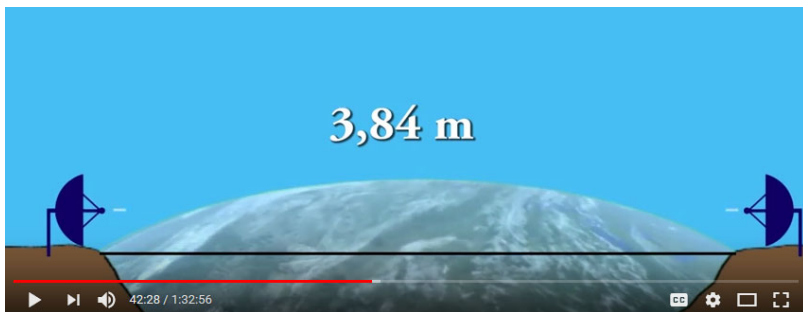
Third, in beginning the narrator says, “Among the long distance viewing experiments performed with telescopes, the one with the greatest impact was at Lake Titicaca.” We can only wonder, then, since the Lake Titicaca experiment, in an effort to prove that objects on the opposite shoreline appeared above the horizon, showed no objects in the telescope’s lens to prove the case, what did the other experiments show that were of lesser grade? We can take an educated guess that they also didn’t show any objects on the opposite shoreline. In any case, the researchers have the responsibility to allow the audience to see all the results rather than the researchers cherry-picking what they believe proves their case.

Convex Earth: Experiment with Radio Waves

The researchers then proceed with their third proof titled, “Experiment with Radio Waves.” The narrator begins:

...and the result of the experiment with radio waves? The researchers used directional parabolic antennas where, in the spherical Earth model, communication would be impossible, since the minimum obstacle would preclude this, since at the distance of the experiment, the curvature of the Earth would generate an obstacle of 3.84 meters in height (12.59 feet).⁷⁵¹

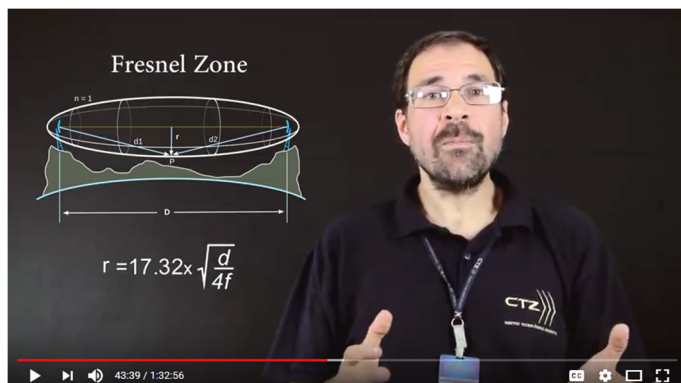
We are then shown a pictorial of two parabolic antennas placed on opposite sides, with the sphere of the Earth between the antennas. The narrator continues:



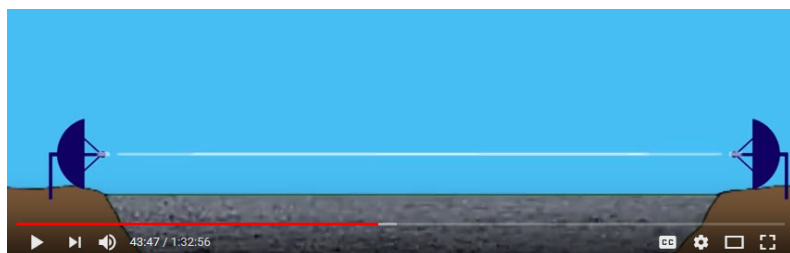
Communication has been established. It has been proven at this distance we have been able to establish communication. We know that any interference in the way would mean not to achieve communication.

The test with radio waves was, let's say, unusual, because at the time we set our antennas, and with the design of the spherical Earth, we started to work with almost complete obstruction of the Fresnel Zone, which is the zone, the region, where propagation of radio waves occurs, which would make communication impossible between the two points.

⁷⁵¹ <https://www.youtube.com/watch?v=McdMMmclGVc>, beg. at 42:06. Note: in South American math, the decimal point of the US is made with a comma, and the comma of the US that separates large numbers, is made with a point.



“However, with the idea of level waters, we would already have approximately 50% of the Fresnel Zone unobstructed, which will allow communication between the two points, even if precarious.



“This is yet another proof of the flatness of the waters, refuting the spherical model of the Earth.

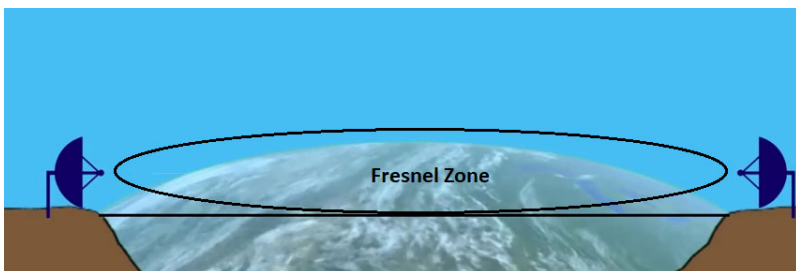
There are several things wrong with the planning, analysis and conclusion of this experiment. First, as the researchers reveal that the obstruction is 3.84 meters (12.59 feet), it seems they don’t realize that such a short distance carries with it a high margin of error that must be included in their analysis and conclusion. A slight movement of either antenna by the wind, vibration, or ground sinkage, will affect the results.

Third, although the researchers take into account the Fresnel Zone within which the electromagnetic waves will travel, they do so in a way that allows for a spherical Earth more than disallows it; and in any case, certainly doesn’t prove the Earth is not spherical. The first thing we notice is the puzzling statement: “...at the time we set our antennas, and with the design of the spherical Earth, we started to work with almost complete obstruction

of the Fresnel Zone.” This appears to be a bad translation of the researcher’s meaning. Perhaps he means that if they *assumed* the Earth were spherical they would have had almost a complete obstruction of radio waves in the Fresnel Zone, but since they didn’t have a complete obstruction in the Fresnel Zone they were then allowed to assume the Earth was flat. This meaning fits with the second statement, which says, “with the idea of level waters, we would already have approximately 50% of the Fresnel Zone unobstructed.” The \$64,000 question is whether the researcher’s interpretation of the “Fresnel Zone” is correct and applicable to his experiment; and, in the final analysis, decisive. The reader can find a good summation of the Fresnel Zone (pronounced: *fray nel*) at Wikipedia.⁷⁵² If we borrow the researcher’s image of the two antennas, the Fresnel Zone would be a long oval sitting on the top of the water:

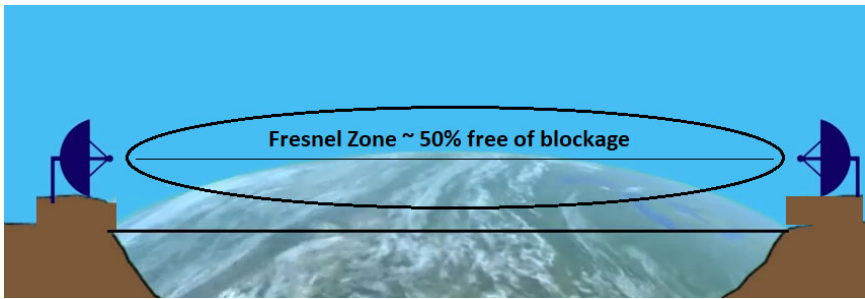


So, when the researcher then says that in “level waters we would already have approximately 50% of the Fresnel Zone unobstructed,” he means that there is no blockage from the curvature of the Earth for at least 50% of the Fresnel Zone, for in a curved Earth the Fresnel Zone would fit as follows, using his previous pictorial:



⁷⁵² https://en.wikipedia.org/wiki/Fresnel_zone

As we can see, using his pictorial, there is much less than 50% of an unobstructed Fresnel Zone, and that is because his pictorial misplaces the Earth. Since the highest point of the Earth's curvature, according to the researcher himself, is only 3.84 meters (12.57 feet), it is hardly possible to depict this small curvature, but we will indeed make the attempt because it is very important. We will need to raise up the antennas so that the line of their signal cuts across just 3.84 meters (12.57 feet) of the surface of the Earth. Although the image below shows a cut that would indeed be many miles in depth, it is the best we can do to show at least some land above the signal for teaching purposes.

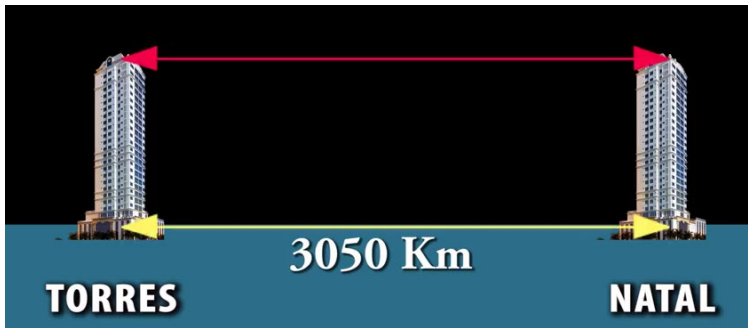


As we can see, when the line between the antennas is made more accurately, we see that the Fresnel Zone in which the signal can travel is much bigger than the previous pictorial. It is about 50% free of blockage from the Earth. So, in that sense, the researcher is correct, that is, with a flat Earth he would have 50% more Fresnel Zone than the 50% available for a spherical Earth. But these facts work against him. Since there exists 50% of free Fresnel Zone between the antennas situated on a curved Earth, then the signal from one antenna to the other can freely flow in this unobstructed area. Perhaps the signal may be out of phase due to the fact that it travels in the upper portions of the Fresnel Zone (see article at Wikipedia for more information on this fact), it remains a fact that the signal will reach the other antenna. Since it can reach the other antenna, this disallows the researchers' conclusion that the signal reached the other antenna because the water was flat. As such, this experiment serves as no proof whatsoever that the Earth is not spherical. A better test is to have the antennas 50 feet above the ground and measure the signal; then slowly lowering the antennas down to zero feet and checking the signal strength.

Convex Earth: Exp. of Geodesic Curvature in Buildings

The documentary then proceeds with its next proof against a spherical Earth titled, “Experiment of Geodesic Curvature in Buildings.”⁷⁵³ The narrator states:

Measurements were done on the bases and tops of two buildings, one in Torres, Rio Grande do Sol, and another in Natal, Rio Grande do Norte, 3,050 kilometers (1895 miles). According to the theory of the spherical Earth, the distances of the measurements of the bases must be different than the measurements of the top, even in a few meters. But if the measurements are equal, this would show that the Earth has no curvature....When the results arrived, the measurements for the base and the top were the same, showing that the two buildings are leveled upright....The identical measurements between the bases and the tops prove that between the two buildings there is no curvature, proving that the Earth has no spherical shape.

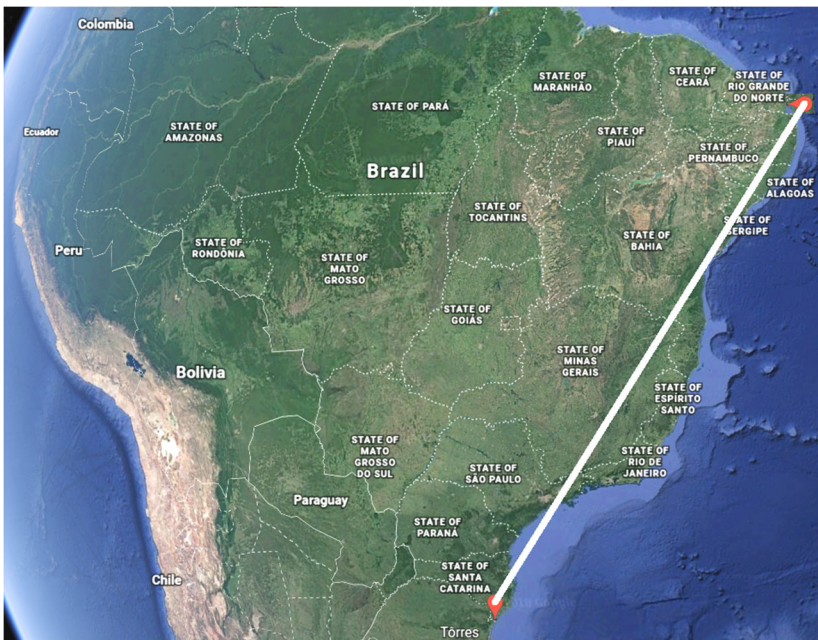


According to the theory of the spherical Earth, the distances of the measurements of the bases must be different than the measurements of the top, even in a few meters. But if the measurements are equal, this would show that the Earth has no curvature....When the results arrived, the measurements for the base and the top were the same, showing that the two buildings are leveled upright....The identical measurements between the bases and the tops prove that between the two buildings there is no curvature, proving that the Earth has no spherical shape.

There are many problems with this experiment. First, the only piece of information we are given is that the distance between the buildings is 3,050

⁷⁵³ <https://www.youtube.com/watch?v=McdMMmclGVc>, at 44:09.

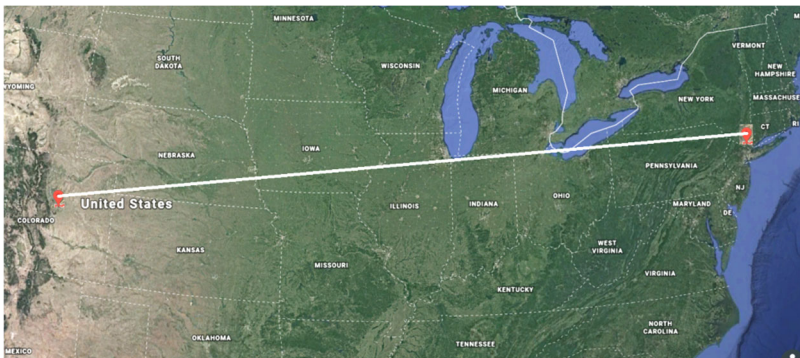
kilometers. No information is given on the heights of the buildings or their elevation above sea level; no information is given of the names of the buildings or what is around them; no information is given on the type of equipment used or its quality; no information is given on how the measurements were determined, the results of the study, or the calculated margin of error; no information is given on the weather conditions; no information is given on whether the experiment was repeated at the given location or another location in order to verify its results; no information is given on whether this experiment was conducted by other researchers. In short, the experiment does not follow scientific protocol and appears to be invalid from the start.



Second, it would be impossible to measure the distance between the bases of the two buildings and not have the measurement obstructed by various buildings, trees or other objects, especially due to the claimed distance between them (1895 miles). According to Google Maps, the terrain between Torres and Natal in Brazil is mostly land mass. One would not be able to measure the base distances of two buildings even a mile apart without running into obstructions, much less two buildings 1895 miles apart. Perhaps one might be able to measure the distance between the tops of the

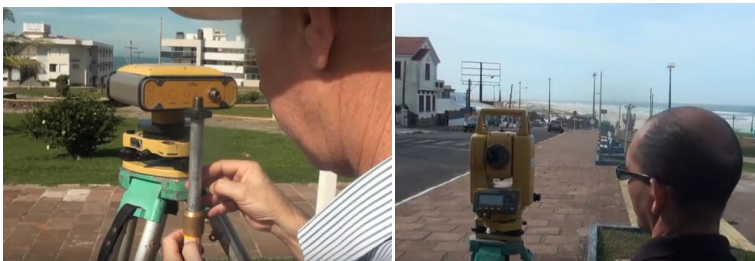
two buildings if the heights of both buildings were higher than any other in the path, but without the base distance this information would be superfluous.

Third, we should also remind ourselves how far the researchers are claiming to have measured the distance between the two buildings. For those who live in the United States, a distance of 3,050 kilometers (1,895 miles) is a little more than the distance between New York City and Denver, which is 1778 miles. What kind of electromagnetic signal could travel such a great distance without several boosts of energy along the way; focus precisely on an average size building from top to bottom; and then determine a difference within a few meters? If they were using a professional GPS device, it provides latitude, longitude and altitude from sea level, but the latitude and longitude of a building is not going to change from top to bottom even if the building is 100 miles tall. The latitude and longitude are obviously going to be the same at the top of the building as at the base of the building.



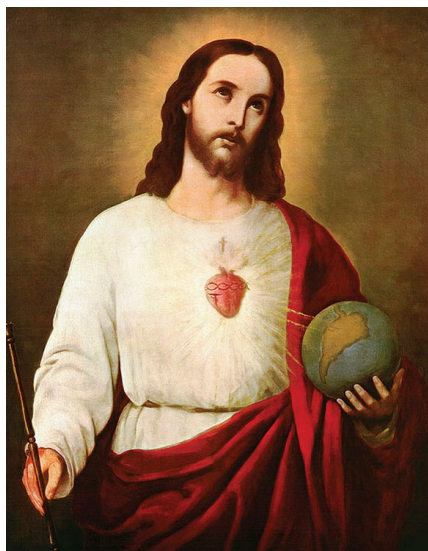
The only thing we are shown is a computer screen with three sections. Since we aren't told how the procedure is taking place, we are left to guess what is being examined. The labels on the V-shaped angle below are all blurred so that we cannot determine what is being analyzed. The narrator does nothing to help. He merely makes general statements that something is being analyzed.

This whole enterprise appears to be even more dubious when we see the kind of equipment the researchers use. It resembles equipment that is used in surveying when roads or buildings are constructed in local areas and not anything close to what would be needed to measure a few meters difference from a distance 1895 miles away.





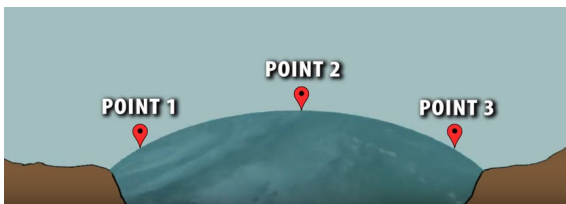
Lastly, it is uncanny to realize that, if this experiment is giving an accurate measurement and could be reduplicated wherein it was found that there was no difference between the height versus the base of two buildings 1895 miles apart, it would be the most astounding and irrefutable evidence of a flat Earth ever recorded. The only way it could be refuted is if somehow the land mass between Torres and Natal was flat and everything else around it was curved. With this profound evidence, we would expect the researchers would have gone to great lengths to prove their point, doing the experiment over and over again to make sure they weren't being deceived by their own mistakes; giving us all the required details and providing answers to all the possible objections and anomalies. Yet what we find is that this section of the 90-minute documentary is one of the shortest, taking up only three minutes (44:08 to 46:12).



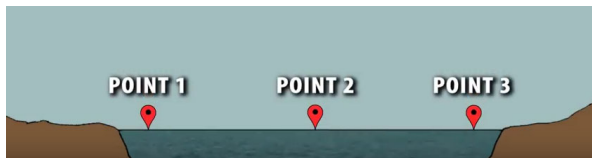
Convex Earth: Experiment of Geodesic Curvature in Water

The next section of the documentary is titled, “Experiment of Geodesic Curvature in Water.”⁷⁵⁴ The narrator begins:

In the experiment of geodesic curvature in the water, three points were obtained with a high precision GPS on the Três Marias dam on the Minas Gerais (Brazil) whose extension exceeds 70,000 meters (43 miles). This first point, the elevation in relation to sea level is at 556 meters (1,824 feet) altitude. The second point also presented the same result, 556 meters of altitude. If the third point were different, the water would be following the curvature of the Earth.



If the measurements are the same, it will be proven that there is no curvature but indeed flatness in the waters. And the measure of the third point surprised the researchers. “Here we obtained the same measurement, 556 meters at the level of the lagoon.” “We analyzed the data collected by the equipment, and all points show the same results, the same altitude. Thus showing that the water in the damn remains level.” “These data overthrow the theory of sphericity, because according to this theory, the water should follow the curvature of the Earth. Only in a curve there is no level.” The three altitude measurements were identical, proving the leveling of the water; proving the Earth has no spherical shape.



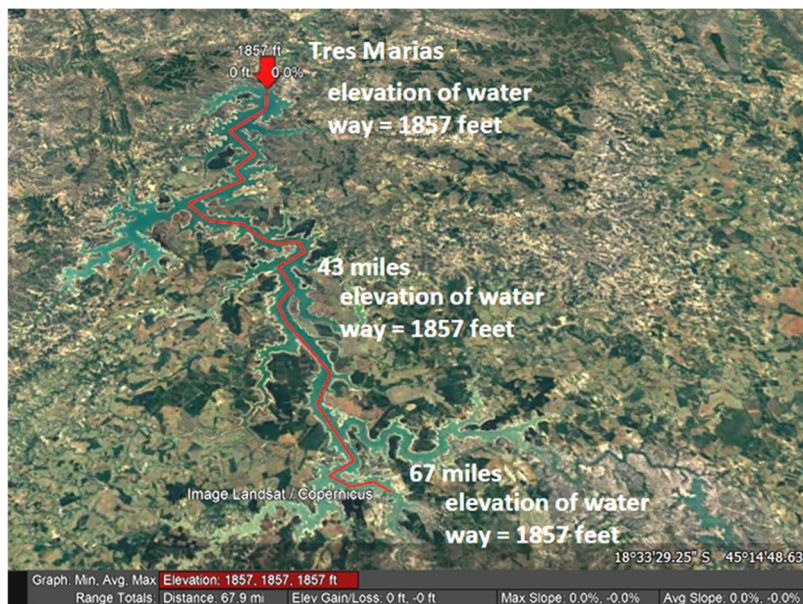
There are several problems with the procedure. First, the researchers do not tell us what “points” they are measuring or even how they are being

⁷⁵⁴ <https://www.youtube.com/watch?v=McdMMmclGVc>, at 46:14.

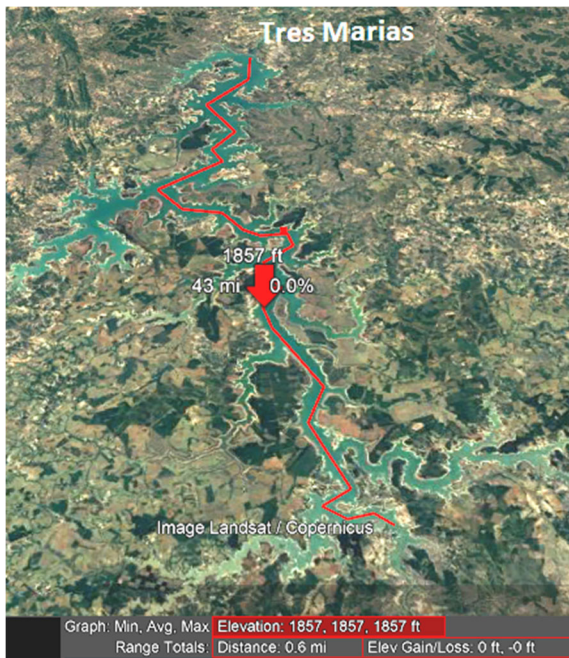
measured. All we know from the narrator is that each “point” is calculated to be 556 meters (1,824 feet) above sea level. Second, the narrator states that the body of water is the “Minas Gerais (Brazil) whose extension exceeds 70,000 meters (43 miles).” This gives the impression that the Minas Gerais is a lake that is 43 miles long, but it is actually more like a river that juts in and out of land masses. See below.

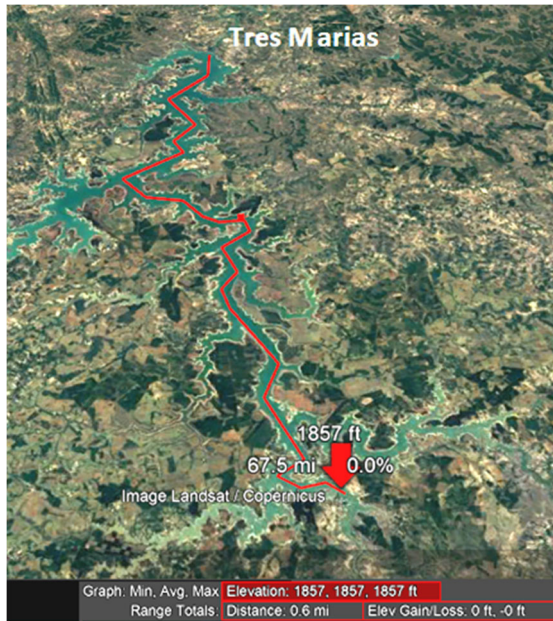


Third, the only way that three distinct measurements could be taken within a 43-mile span on the water is if three points were chosen on the zig-zag line that extends from near the dam at Três Marias to South Rio São Francisco. Since the researchers are intending to measure the three heights on water, no points on the land masses can be included. This raises the question of how the researchers are going to obtain straight lines from a 43-mile line on the water that juts in and out at least 11 times before it reaches the 43rd mile. At most, there will be 3-4 juttings by the time they reach the 13th mile. So we assume they merely picked three arbitrary points within a 43-mile path and then measured how high each point was above sea level. They found each point was 556 meters or 1824 feet. Google Earth yields 1857 feet but we will ignore the discrepancy. In actuality, we extended the water pathway to 67 miles and found the same 1857 feet elevation at the end as at the beginning. See below.

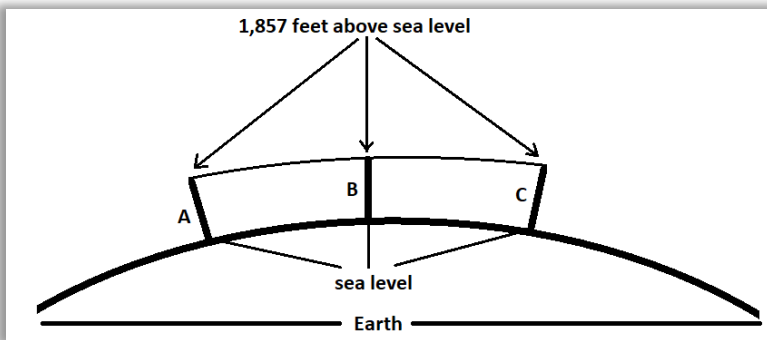


To prove from Google Earth that the points at 43 miles and 67 miles are both 1,857 feet, we show two more snapshots of the Google measurement with the distinctive red arrows showing distance and elevation:

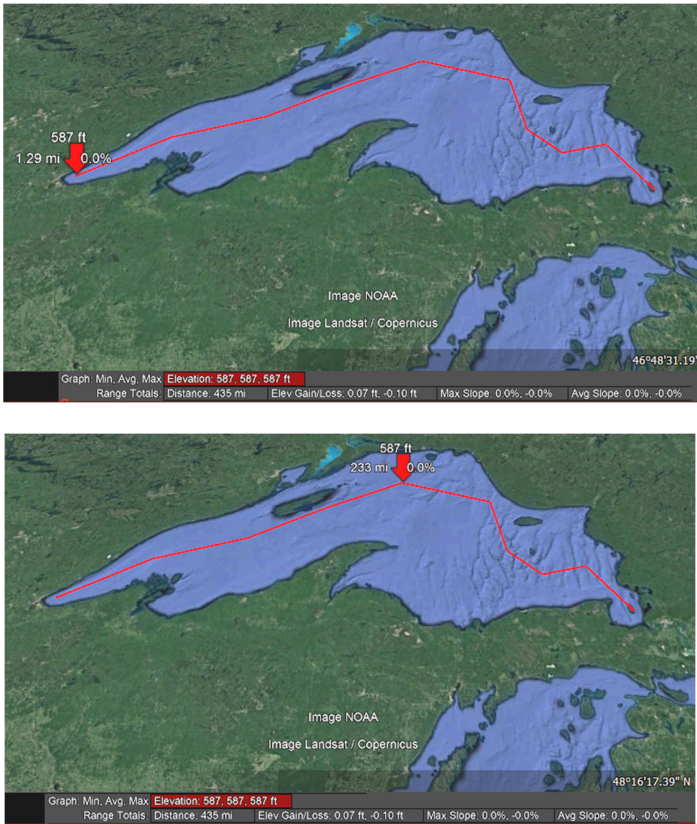


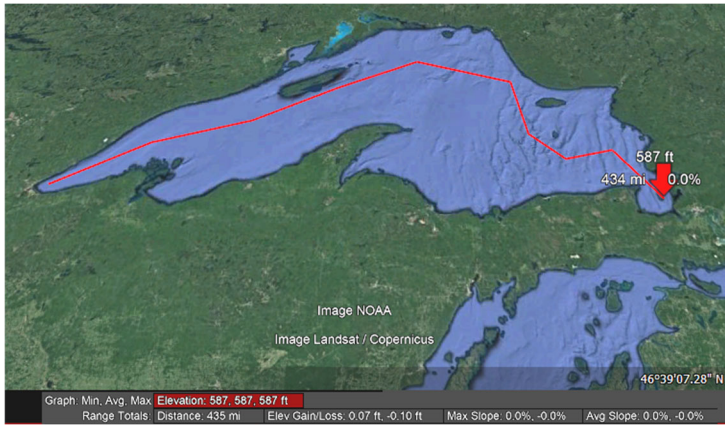


So let's assume the researchers chose three arbitrary points on the zig-zag line, two at the ends and one in the middle. They report finding that the three points are "556 meters (1824 feet) at the level of the lagoon." This means that all three points were 1,824 feet above sea level. This is close to the Google measurement, which says that the whole stretch of the 67-mile red pathway is "Elevation 1857 ft," that is, 1,857 feet above sea level. But what does that really tell them? Nothing of significance. It certainly doesn't tell them the Earth is flat. On a curved Earth they will get the same elevation above sea level for all three measurements. Let's look at a diagram to help us see why.



As we can see, if lines A, B and C are 1,857 feet long, then any place A, B or C are placed on a curved Earth, the height above sea level will always be 1,857 feet. Obviously, since the “sea level” curves with the Earth, so will all the heights above sea level. Hence we would expect to find that if we arbitrarily pick three points on the lagoon of Tres Marias, they are all going to be the same height above sea level, since water does not rise or fall when it fills its container (the lagoon) but will assume the shape of its container. If the water level rose at C in contrast to A, then the water would be defying gravity – the gravity of a curved Earth. We can prove this fact by measuring the sea elevation of another big body of water, Lake Superior. If we draw a line connecting the greatest distances across Lake Superior, we will get a total distance of about 434 miles. If we then measure the sea level of three arbitrary points on the lake, two at the end and one in the middle, we will obtain the same height above sea level for each point, which is 587 feet. See snapshots from Google Earth below:





If the researchers wanted to do a valid test for the curvature of the Earth, they could have used the longest distance available on the water way of the lagoon (about 14 miles) to observe whether a land structure just beyond it would appear to sink below the water line. See below.

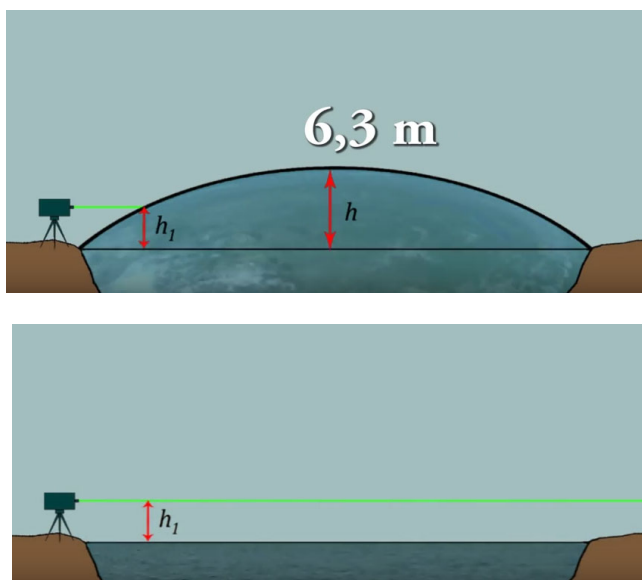


Google Earth tells us that the red arrow is pointing to a land structure that is 1,951 feet above sea level, which is 94 feet above the water line of 1,857 feet. Since at 14 miles from an observer of 5 feet tall, the land structure should be hidden by 84 feet if no refraction (or 69 feet with standard refraction). That means that about 90% (or 75% with refraction) of the land structure would have been hidden beneath the water line (or the line of sight). Unfortunately, the researchers didn't do this test and thus their whole escapade to Três Marias was futile.

Convex Earth: Experiment with a Laser Beam

The next is titled, “Experiment with a Laser Beam.” The narrator states:

And what is the result of the laser experiments? Did the team see the laser light on the other side? ‘We are here in the nocturnal experiment in the Três Marias reservoir. We are on the shore of the lake. The positioning of the laser is here by the lake, a meter or so from the water, where the second laser is. It is also in the same position, exactly one and a half meters from the level of the reservoir. As you can see it, the two devices are communicating at a distance of 18 kilometers. We have successfully done an experiment today and we are proving that the Earth does not have the format that science believes it has. So as we are at 18 kilometers, there is no water level difference from here to the other crew that is 18 kilometers away. It’s exactly level. On this distance, there should be a visual obstruction by virtue of the curvature of approximately 6 meters. And we were able to get the signal from a laser from the other shore at 18 kilometers from a little more than a meter from the level of the lagoon. This is the ultimate test. There is no curvature.’⁷⁵⁵



⁷⁵⁵ <https://www.youtube.com/watch?v=McdMMmclGVc>, at 48:28, conducted by Paulo Cesar Parra, “civil engineer and geotechnical.”

As we can see, scientific protocol is again lacking in this experiment. Tests need to be repeated over and over again before any such “ultimate” conclusions can be made. Different days with different temperature and pressure gradients, atmospheric conditions, static electricity, along with calculated margins of error, can be the only way this kind of experiment can be done scientifically. This is especially so since the video is hampered by misinformation. For example, at 18:58 we are told that the distance between the two lasers is 15,000 meters, but at 49:50 we are told the distance is 18 kilometers, a difference of 3,000 meters. Additionally, there is also no mention in this or other sections what effect refraction will have on the laser beam. Any experiment that does not take refraction into account is simply not acceptable. A fact that must be accepted is that light bends or curves; and if there is enough refraction, the light beam could follow the curvature of the Earth but seem straight to the observer whose eye acuity cannot discern the difference. Interestingly enough, in a later section dealing with how light is bent, the Dakila researchers chalk it up to Einstein’s gravity!

During the experiment, the only picture of receiving the laser light the Dakila researches provide us is one flashing on and off, but mostly off. In fact, they apparently did the scene with a hand-held laser (but didn’t show a hand-held laser) seemingly to obfuscate the fact that the received beam was flickering. But the flickering beam was the actual image resulting from the fixed and mounted test. Since the received beam is flickering it means atmospheric refraction is present; and if there is atmospheric refraction then how would they know whether the laser was pointed precisely on the target and not pushed off the target by refraction? Similarly, how would they know whether the laser was hitting the bulge of water (from a curved Earth) or whether atmospheric refraction bent it into the target? To assume that one will be able to answer these crucial questions by using a hand-held laser to get the beam precisely on the target 15 miles away is simply unacceptable.

For the experiment to assume, without testing or proof, that their laser beam is precisely horizontal with the water level, which is one of the most important parameters that must be established before any measurements or conclusions can be made. Even the slightest deviation from a perfect horizontal will make the results useless. For example, since deviations from horizontal will multiply at an increasing angle, the deviation can be

measured using the inverse square law. As such, a 1 millimeter deviation from perfect horizontal at a 30.5 meter (100 feet) distance from the shore to the water will turn into a 528 millimeter deviation at 3.9 kilometers (12,800 feet or 2.42 miles); the 1 millimeter deviation will turn into a 2,112 millimeter (6.9 feet) deviation at 15.6 kilometers (51,200 feet or 9.7 miles). Even determining the horizontal on a body of water that is constantly moving vertically and horizontally is a difficult task in itself; much more is it harder to level a laser beam on top of moving water. They also assume that the equipment has not shifted vertically during the experiment when it is often the case that within seconds or minutes it can move without the researcher being aware of it. Lastly, no consideration of refraction is made for the experiment or the interpretation, which dooms it as a totally unscientific endeavor.

The Experiment at Lake Titicaca



The Dakila researchers then try the same experiment on Lake Titicaca, but again with the same lack of protocol.⁷⁵⁶ At one point the reasearches state they could only see the laser in the treetops and that it was hitting the hill behind them. They exclaim, “It’s very high.” But this just proves that the bulge of water (from the curved Earth) would not allow them to get the laser beam any lower.

⁷⁵⁶ <https://www.youtube.com/watch?v=McdMMmclGVc>, at 51:52.



Similar experiments to the above have been done many times by various enthusiasts.⁷⁵⁷ One of the more studious efforts was performed by a Spanish team led by a “Dr. Zack”⁷⁵⁸ on Lake Balaton. To go through the tests would be redundant for our purposes, but what does interest us is the discussion on Metabunk.org that was initiated by these tests and especially the expert opinion of

Mick West who runs the site. West is by far one of the most knowledgeable and technically-minded people dealing with these issues, along with being very polite to his opponent, Dr. Zack. All in all, there are 26 sections of discussion; each section having hundreds of entries by various participants. Below are the salient points of the discussion, which mostly regard the lack of precision in Dr. Zack’s experiments.

- Since the laser cannot be leveled *exactly*, multiple readings should be taken to calculate both the curve of the lake and the slope of the laser.⁷⁵⁹
- If the laser is pointing *down* a bit, then it will initially match the curve of the earth, and so appear to be level for the first mile or two.⁷⁶⁰
- A much more accurate “Wallace” method was suggested several times.⁷⁶¹
- Initial results from the experiment started to be discussed.⁷⁶² The experiment at night was unusable due to refraction of the beam, but gave some excellent photos of this refraction and inferior mirage. This led to some interesting discussion.⁷⁶³

⁷⁵⁷ Jeranism: [youtube.com/watch?v=9uersWDp-3c](https://www.youtube.com/watch?v=9uersWDp-3c); Groutatone “7.5 Mile Flat Earth Laser Test On Frozen Lake” at [youtube.com/watch?v=bwCRej0BoA4](https://www.youtube.com/watch?v=bwCRej0BoA4),

⁷⁵⁸ “Dr. Zack,” Part 2, <https://www.youtube.com/watch?v=GBhDFO4NMrv>

⁷⁵⁹ <https://www.metabunk.org/lake-balaton-laser-experiment-to-determine-curvature-of-the-earth-if-any.t7780/#post-186843>

⁷⁶⁰ [t7780/page-2#post-186880](https://www.metabunk.org/lake-balaton-laser-experiment-to-determine-curvature-of-the-earth-if-any.t7780/page-2#post-186880)

⁷⁶¹ [t7780/page-3#post-187601](https://www.metabunk.org/lake-balaton-laser-experiment-to-determine-curvature-of-the-earth-if-any.t7780/page-3#post-187601)

⁷⁶² [t7780/page-4#post-188309](https://www.metabunk.org/lake-balaton-laser-experiment-to-determine-curvature-of-the-earth-if-any.t7780/page-4#post-188309)

⁷⁶³ [t7780/page-4#post-188365](https://www.metabunk.org/lake-balaton-laser-experiment-to-determine-curvature-of-the-earth-if-any.t7780/page-4#post-188365)

- The refraction was due to the water temperature being warmer than the air temperature.^{764 765}
- Calibration of the laser height was done with a tape measure at an angle of 20° from vertical, making it lower than intended.⁷⁶⁶
- Using the 1m edge of the board as a guide the height of the target tape is measured at under 1.20m but was claimed to be 1.30m. Since the laser itself was at 1.25m, this means the laser was pointing downwards.⁷⁶⁷
- Some measurements were taken with the boat stationary, some with it underway, resulting in an approximately 5cm variation.⁷⁶⁸
- Times on the photo comparisons do not match, being several minutes off in some cases.⁷⁶⁹
- After the laser left the target, subsequent sightings were only from a retroreflective patch on the back of the pilot's jacket, and from reflections off the camera glass.⁷⁷⁰
- The motion of these reflections through the beam indicate that it eventually diverged to several feet wide, from the camera glass reflection,⁷⁷¹ and from the earlier jacket retroreflective patch.⁷⁷²
- Some later measurements were claimed to be from a "direct hit" in a camera on the boat, however these "direct hits" lasted for over a minute while the boat moved significant distances perpendicular to the beam. This indicated a "direct hit" could be had anywhere within a large cone, meaning height estimates were possibly catching the bottom of the cone.⁷⁷³
- It was suggested geoid variations might be a factor, but did not seem to be significant.⁷⁷⁴

⁷⁶⁴ t7780/page-5#post-188421

⁷⁶⁵ t7780/page-13#post-190061

⁷⁶⁶ t7780/page-19#post-190631

⁷⁶⁷ t7780/page-19#post-190631

⁷⁶⁸ t7780/page-19#post-190668

⁷⁶⁹ t7780/page-16#post-190262

⁷⁷⁰ t7780/page-18#post-190576

⁷⁷¹ t7780/page-18#post-190574

⁷⁷² t7780/page-19#post-190623

⁷⁷³ t7780/page-18#post-190419

⁷⁷⁴ t7780/page-14#post-190169

The Discover Channel's Laser Experiment

Interestingly enough, a similar experiment performed by *Discovery Channel* showed the exact opposite results (but suffers from some of the same imprecision as the above Três Marias experiment).⁷⁷⁵



In the first reading (below, photo #1), the height above the water marked on the boat by the laser was taken 500 feet from the shore. It appears that the mark is about 3 feet from the water, although the narration does not specify the height.



⁷⁷⁵ <https://www.youtube.com/watch?v=QVa2UmgdTM4>. As of this writing, the video has over 1.65 million views, with 33K for and 6.6K against its conclusion.

Photo #1



Photo #2

The second reading (above) is taken at 3 miles away from the shore. Using a long plank positioned vertical to the boat, the laser mark on the plank is about 9 feet above the water or 6 feet from the previous measurement on the boat hull. Although one could easily reason that the 6 feet difference between the first and second readings leads to a curved Earth as the cause, since we don't know whether the laser is precisely level with the water at the start, the 6 feet could be due to an error in horizontal leveling, or any number of uncalculated errors we mentioned earlier. Being aware of this possibility, the robot-voice narrator (which sounds very similar to the voice-over of Stephen Hawking) seeks to eliminate that variable when he says,

Just three miles away, the laser seems to have risen by 6 feet, but we know the beam is level, so that suggests that the lake is 6 feet lower.

The fact is, he doesn't know the beam is level, and it is quite unscientific to claim that it is level without showing the viewer how it was made level and how they tested for its levelness.

Irrespective of that anomaly, the *Discovery Channel* team does another experiment that is far different. They do a clever version of the proverbial ship going over the horizon by having a helicopter fly up and down the horizon, which is then observed by someone 6 miles away with a telescope.

The team shows that due to the 6 mile distance, the Earth has curved by at least 24 feet, since the helicopter cannot be seen by the telescope until it rises 24 feet from the water.



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Checking the results from Metabunk.org we see that a distance of 6 miles, with a telescope eyepiece at 3 feet above the ground, yields a 24.01 foot drop of the Earth due to curvature.

Earth's Curve Horizon, Bulge, Drop, and Hidden Calculator

Distance in Miles:

Viewer height in Feet:

☒ Imperial ☐ Metric ☐ Advanced

Distance = 6 Miles (31680 Feet),
View Height = 3 Feet (36 Inches)
Radius = 3959 Miles (20903520 Feet)
Results ignoring refraction
Horizon = 2.12 Miles (11199.16 Feet)
Bulge = 6 Feet (72.02 Inches)
Drop = 24.01 Feet (288.07 Inches)
Hidden= 10.03 Feet (120.4 Inches)
Horizon Dip = 0.031 Degrees,

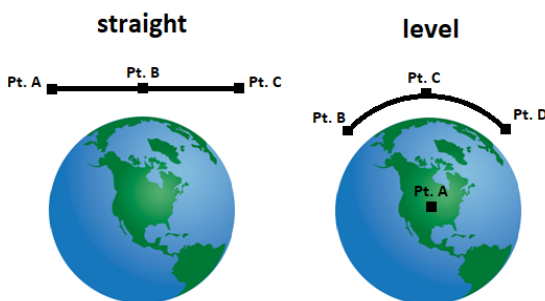
⁷⁷⁶ <https://www.youtube.com/watch?v=QVa2UmgdTM4>, at 6:41 mark

Convex Earth: on Gravity

After the previous laser experiment across water, the Brazilian researchers do another experiment of the same type over Lake Titicaca producing the same results but with the same errors and lack of scientific protocol. The most significant conclusion the researchers develop is that since water always finds its own level, then there can be no gravity, since the flat water levels they found defy gravity. In their estimation, since they did not measure a curve to the water they can safely conclude there is no gravity to pull the water into a curve.⁷⁷⁷ But this conclusion is totally presumptuous.

What Does “Level” Mean?

The problem with many flat-earthers is that they have a misconception of what “level” means. It does not necessarily mean “straight.” The word “straight” is defined as the shortest distance between any two points in space. Anything other than straight is longer in length. The word “level” also refers to the shortest distance between two specific points, but one of the points must be the center of the Earth (which is Pt. A on the right side of the below diagram). Hence, the word “level” necessarily implies gravity, and gravity requires one of the points of measurement to be the center of the Earth.⁷⁷⁸ Notice the diagram below.



⁷⁷⁷ <https://www.youtube.com/watch?v=McdMMmclGVc>, at 58:18.

⁷⁷⁸ Newtonian gravity requires an “absolute space” that does not move, and thus a “straight line” can be defined. Gravity pulls an object from absolute space. Conversely, Einstein said space is not absolute but can move, and is “curved” by the Earth’s gravity, which pulls space instead of the object.

As the saying goes, “water always takes the shape of its container,” but the reason is not because water has some magical quality that will allow it to spread out evenly. It takes the shape of its



container because gravity forces it to do so. Gravity will not allow water to pile up on one side of the container and leave the other side empty. It will pull all water down toward the center of the Earth. Thus it will naturally flow into the strongest gravitational point (or the lowest potential energy state) which point is the closest to the Earth’s center of gravity. In other words, gravity creates the “container.” Nature is simple. It will always seek the path of least resistance. As the Earth forms

into a sphere because nature makes it seek the lowest energy state, so the oceans follow the same physical rule and thus will wrap themselves around the Earth. Since there is no force pulling the oceans away from the Earth, the oceans are very comfortable clinging to the Earth. The only time the oceans will rise and fall is due to the tides. The tides are caused when the gravitational potential, caused by the sun and moon, becomes greater on the surface of the Earth, and thus will pull the oceans up on one side of the sphere, which necessarily lowers the oceans at the orthogonal side of the sphere.

Although flat-earthers don’t believe in gravity, they believe the oceans will fall off the Earth if they are not contained by an ice wall.



This belief necessitates there is something pulling the water off the Earth. So what force is doing the pulling? In a word, the flat-earthers want all the effects of gravity yet without believing in gravity. Flat-earthers also don't believe the Earth is in relative motion with space so for them there is no centrifugal or Coriolis force upon the water to make it move outward. They also don't believe anything is moving up, down or laterally and thus there are no other inertial forces on the water. Moreover, the flat Earth system has the sun and moon directly overhead and thus if there were any pulling effect due to gravity on the oceans it would be upward, not off the edge of the flat disc. All of this tells us that the flat Earth world is one in total confusion.

The Brazilian researchers posit that things are held to Earth by a combination of four forces: magnetism, density, pressure and light, noted by the acronym MDPL.⁷⁷⁹ As we noted previously, neither of these four phenomena, either together or separately, are able to perform what gravity performs. Magnetism only affects objects of ferrous composition and electro-magnetic waves;⁷⁸⁰ density (*e.g.*, buoyancy) only affects mixtures of materials but does not have the power to hold the most dense to the Earth; pressure is the result of a force, not a force in itself; and light has no attractive power in itself. (See section on gravity).



It is particularly odd, if not exposing the whole documentary as a complete contradiction, that Urindar, the lead scientist, dogmatically says,

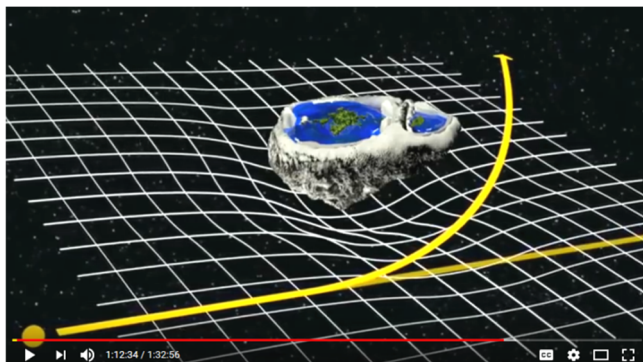
To justify that people stay fixed on the Earth's surface without being thrown off by the spin of the planet, they created a magical force called gravity. But this

⁷⁷⁹ *Ibid.* at 1:01:36

⁷⁸⁰ At 1:03:06, the scientists claim that the formation of circular waves in disturbed water is caused by “the modulation of the Earth’s magnetic field,” but with no evidence that magnetism affects water; or any rebuttal to the commonly known fact that disturbed water makes concentric waves instead of square or oblong ones since energy dispersion seeks the least resistant path in the geometric pattern of the inverse square law.

magical force is torn down by the plumb and level because the physical behavior is perceived levelly.⁷⁸¹

But just a few minutes later, the narrator refers to the gravitational theory of Einstein as the cause for why the Earth looks curved from high altitudes⁷⁸² If the Dakila scientists accept Einstein's theory, they must also accept Newton's theory since Einstein's $G = 8\pi T$ is just a more complex form of Newton's $F = ma$, which then means they must accept gravity at large.



The means by which this twisted logic develops is rather interesting to watch. The scientists did an experiment in which they took photos of the Earth from cameras mounted to a balloon. See next photo.



⁷⁸¹ *Ibid.* 1:03:36.

⁷⁸² *Ibid.* 1:12:39

The narrator then states:

And why do photos taken from space show a curvature? We launched several atmospheric probes and we noticed that the images recorded in the upper layers of the atmosphere begin to show a certain curve after a certain height. This occurs in the high layers of the atmosphere, above the stratosphere, that is. In an airplane window you would not notice this curvature.⁷⁸³

They then show a photo of the Earth's curvature.



So, on the one hand, the scientists admit that “the images recorded in the upper layers of the atmosphere begin to show a certain curve after a certain height,” but on the other hand, they apparently do not want to give any credence to the fact that the curve they see is the Earth’s and was taken by their own camera at a “certain height.” Instead, without disproving it, they disregard the possibility in favor of their own pet theory, stating:

We observed that this curvature does not occur due to the supposed curvature of the planet but due to two factors. The first due to the large convex lens of our atmosphere; and the second according to the theory of the curvature of light proposed by Albert Einstein, experimentally proven in 1919.

Unless there is something wrong with this English translation, these scientists didn’t “observe” that the “curvature does not occur due to the supposed curvature of the planet,” rather, they observed a curvature of the Earth *and nothing else*. They simply *interpreted* the curvature to be due to

⁷⁸³ *Ibid.* 1:11:50.

something other than the Earth itself. Again, they “observed” only a curvature. They did not “observe” the reason for the curvature.

But even with regard to interpretation, the easiest interpretation was plain, that is, we can’t see Earth’s curvature when we are too close to the Earth, but we can see it if we rise high enough, as when a camera takes a picture at high altitudes. But, of course, allowing for that possibility would have destroyed their whole documentary, especially since it is so dogmatic that it has found irrefutable “proof” that the Earth is flat.

Apparently not realizing that the left hand of their video does not know what the right hand is doing, the narrator adds:

According to Albert Einstein’s theory, the mass of a large object can create a curvature in spacetime around it, able to bend the path of a beam of light in its vicinity. This phenomenon was called a gravitational lens. A proven physical law has to work in both macro and micro environments...Then we conclude that the curvature of light in high layers of the atmosphere also occurs as a function of the mass of the planet itself and of its magnetic field.

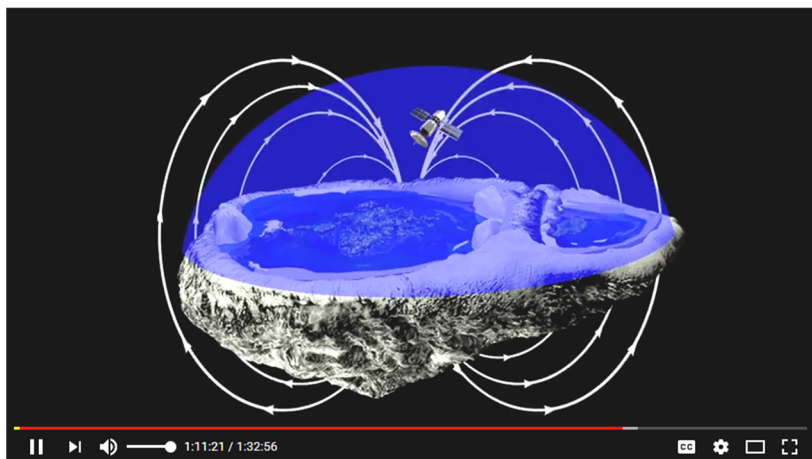
Notice the scientist refers to “mass making light curve” (otherwise known as “gravity” by Einstein) as “a proven physical law.” He then attempts to use this “law” to prove that the curvature they saw in their camera was not of the Earth but of light outside the Earth that is allegedly curved by the mass of the Earth. So, in their view, gravity doesn’t exist 99% of the time, but it does exist when the scientists are trying to show that pictures of a curved Earth cannot be of a curved Earth and must be due to the curving of light by Einstein’s gravity. A more convoluted and contradictory state of affairs is hard to imagine.

The video also shows a blatant contradiction when dealing with satellites. The scientist states:

The magnetic field of our planet is primarily responsible for keeping the satellites in orbit. Briefly, there are two types of satellites, the geostationary and the orbitals.⁷⁸⁴

⁷⁸⁴ *Ibid.* 1:11:21

As the video did throughout, it makes assertions that the audience is expected to accept at the word of the scientists, of which they present not one shred of evidence. How he knows that satellites are kept in orbit by “magnetism” is anyone’s guess. How a flow of magnetism from north to



south has the capability to keep a geostationary satellite hovering over one spot on the Earth, he doesn’t even begin to explain. How these satellites, most of which contain very little or no ferrous material, are controlled by magnetism, much less how it keeps these multi-tonned vehicles from either being overtaken by “the mass of the planet” (as they believe light is so affected, according to Einstein) and falling toward Earth or drifting off into space never to be seen again, there is absolutely no explanation, or even the beginnings of an explanation.

This kind of shoddy science tends to make the whole documentary a farce, and gives us pause to remember that the film was prompted by an “extraterrestrial” named Bilu and a “scientist” who accepted his every word. In the end, the Dakila scientists make it up as they go along. In the first hour they had mistakenly concluded that because light sometimes does not seem to follow the curvature of the Earth, this supposed fact means the Earth is not curved. This dubious presupposition then becomes the foundation of their whole documentary and the sole means to interpret the evidence. They then tie together bits and pieces from other issues of science and try to dress up their theory as best they can; as well as eliminating any recourse to interpreting the data in a more conventional way.

Another instance of contradiction occurs when one of the woman participants, Ana Catharina Alencar, is speaking about NASA. She is trying to convince the audience that all NASA photos of the Earth are fake.



We have been conditioned since childhood to accept that our planet has this round format, but if I say there doesn't even exist a real image of our entire planet, to date, none of the space agencies of this [sic] institutions have managed to register an entire image of our planet. With all the technology and advances of science, this image does not yet exist.

So how are they made, all those beautiful photographs we see on the Internet, and posters and films? This is very simple. Photo images are taken; passed to a computer program. They are manipulated, forged into a format we know today, this beautiful image, a photograph of the blue planet that we know is nothing more than propaganda, just like many others we see daily.⁷⁸⁵

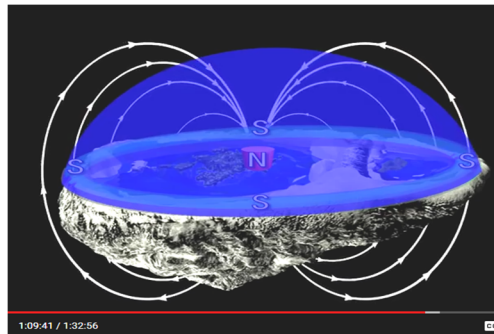
So, let's take stock: (1) we have seen the Dakila scientists admit they believe in satellites that NASA sends above the Earth, both geostationary and orbiting, and these satellites are usually equipped with cameras to take pictures of the Earth at altitudes between 500 miles for orbiting satellites to a whopping 22,242 miles for the geostationary satellites; (2) the Dakila scientists have sent up their own balloons and have taken pictures of the Earth that they admit "shows a curvature when the camera reaches a certain height."

⁷⁸⁵ *Ibid.* 1:16:00

The irony is plain to see. Even though the Dakila scientists admit NASA makes sophisticated satellites with sophisticated cameras, they suddenly change their tune when it involves NASA having the capability to produce a real and credible picture of the Earth, leading the Dakila group to conclude, “no such image exists.” That they can say such a contradiction with a straight face is rather amazing. But as we noted before, as incredible as it seems, the position that there exists no real photos of a spherical Earth *must be held by all flat-earthers*, regardless whether they know for certain that such is the case. Obviously, if they were to admit that even one such real photo exists or is even possible to exist, then the whole movement comes to a screeching halt. The ploy is very clever. They take the simple truth admitted by NASA itself (that NASA sometimes uses computer graphics to make a picture of the whole Earth), but conclude from this one truth a total lie, that is, that the final picture NASA produces does not represent the true Earth. They only wish this were true.

Another instance of contradiction occurs when the Dakila scientists present their model of the atmosphere. The narrator states:

The magnetic field is also responsible for modeling the shape of our atmosphere, which takes the form of a plain convex lens. In this way, the atmosphere, formed by several gases and water in gaseous state, takes on the characteristic of a giant magnifying glass, with a high degree of refraction, responsible for day and night.⁷⁸⁶



So again we see that magnetism is called upon to do yet another trick that is unexplained by the Dakila scientists. Somehow it has the power to make an

⁷⁸⁶ *Ibid.* 1:09:40

atmosphere controlled by magnetism but made of gases, including water vapor, that have no direct relation to magnetism. But the scientists are so prone to making scientific assertions without backing them up that it becomes routine for them.



After claiming their magnetically created atmosphere acts like a convex lens, the scientists put a thick convex lens over a circular map of the Earth, and then shine a light on the lens, after which appears a half-lit map of the Earth. The scientists then present it as a model of how the day and night sequence occurs on their flat Earth. See photo below:



It is amazing to see how much credibility the Dakila scientists give to the refraction of light by the atmosphere when it is to their advantage to do so (e.g., when they want to simulate day and night), but earlier in the video when they were testing how light beams travel across water from which they concluded the water was not curved, we heard next to nothing about the possibility of refraction being the reason the Earth appeared flat. Hence, these scientists cherry-pick both the evidence and the interpretation.

Second, we notice in the above day/night image that the light source reflecting off the convex lens is off center by a few degrees. Apparently, the scientists tried to position the light source so that when it was dispersed into the lens, the light would appear on half the map, simulating the 50% light and darkness we actually receive on Earth. Unfortunately, they were not successful, since the shadow curves inward at both ends by a significant amount. They could not solve this problem by moving the light source more towards the center since that change would cause the whole map to be lit. Convex lenses are very sensitive to position. Errors resulting from the wrong position are exponential. In other words, a convex lens cannot simulate what occurs on Earth. This is especially true since their above model of how light shines on Earth would mean that Antarctica, which they, like other flat-earthers, must believe is an ice ring of 75,000-miles long, would receive light about 10 hours per day, at the very least, which is not anywhere close to what is received by Antarctica at certain times of the year. Of course this brings up the whole issue of the absurd idea that Antarctica does not exist as a continent, one of the most important issues concerning whether the Earth is flat or spherical, yet the Dakila scientists do not address it.

Instead of addressing Antarctica, the scientists cherry-pick once again and decide to address an alleged problem with how the sun's light is received on various places of the Earth. After observing this light for a number of years, the scientists say they were forced to conclude that the Earth could not be a sphere. The narrator states:

In this research, which lasted several years, images were recorded by cameras installed in all these places during the day and at night. We found several differences in the trajectory of the sun. One of the most significant was between Australia and Argentina, which are in the same tropic. While in Argentina, the sun moves about 180-degrees. In

Australia, it moves almost 270 degrees, which would be impossible in a spherical Earth model.⁷⁸⁷



These two “proofs” are presented in a mere 65 seconds (1:06:55 to 1:08:00), so there is little to go on, except the word of the scientists. The closest we were educated to their view was in the model with the convex lens, but that was of little help. We will have to assume that the Dakila scientists mean to say that Argentina gets 12 hours of sunlight but Australia gets 18 hours of sunlight.

Of course, 18 hours of sunlight in Australia would be highly unlikely on a spherical Earth, since the most Australia receives is 15 hours. But 18 hours



would also be impossible on the flat Earth model with a convex atmosphere that produces, according to their own image, 50% light and 50% day on the Earth. No place in that model would receive 18 hours of sunlight, except, perhaps, the Arctic region or its environs. That the finding of 18 hours by

the Dakila scientist is based on only one location in Australia (see above map with one red arrow), we suggest they go back to the drawing board, taking several measurements over several places over several days and

⁷⁸⁷ *Ibid.* 1:07:00

months before making any conclusions. It would also be beneficial to reveal what time of the year the measurements are taken, since summer in the lower parts of eastern Australia (*e.g.*, Canberra) receive as much as 14.5 hours of sunlight on a given summer day.

Sunrise and sunset times during summer:

	Sunrise	Sunset	Daylight Hours
Sydney	5:58AM	8:09PM	14hrs 11mins
Melbourne	6:13AM	8:45PM	14hrs 32mins
Brisbane	5:06AM	6:48PM	13hrs 42mins
Perth	5:24AM	7:26PM	14hrs 02mins
Adelaide	6:16AM	8:33PM	14hrs 17mins
Canberra	5:52AM	8:21PM	14hrs 29mins
Hobart	5:49AM	8:50PM	15hrs 01mins
Darwin	6:32AM	7:19PM	12hrs 47mins

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Sunrise and sunset times during winter:

	Sunrise	Sunset	Daylight Hours
Sydney	6:59AM	5:03PM	10hrs 04mins
Melbourne	7:33AM	5:19PM	9hrs 46mins
Brisbane	6:37AM	5:10PM	10hrs 33mins
Perth	7:16AM	5:29PM	10hrs 13mins
Adelaide	7:22AM	5:21PM	9hrs 59mins
Canberra	7:10AM	5:09PM	9hrs 59mins
Hobart	7:38AM	4:55PM	9hrs 17mins
Darwin	7:09AM	6:36PM	11hrs 27mins

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Now, when we compare the same winter months of Australia with those in Argentina (Buenos Aires, which is close to the red arrow on the Dakila map), we see the same figures of the amount of daylight, namely, 14.5 hours, to the minute. We would expect this to be the case since both southwest Australia and the middle of Argentina are in the 33-degree latitude range. See next chart. Additionally, the Dakila scientist will also have no answer for why Antarctica receives 24-hours of sunlight in December, whereas the Arctic is in darkness at those times.⁷⁸⁹

⁷⁸⁸ <https://www.bobinoz.com/blog/16600/daylight-hours-australia-and-the-uk-winter-and-summer-compared/>
⁷⁸⁹ <https://www.amazon.com/Antarctica-Year-Ice-Anthony-Powell;>
<https://www.youtube.com/watch?v=BgZa9oZDN5g>; Some flat-earththers attempt to use a Gleason flat map projection to show 24 hours of light in Antarctica, but it is

Daylight Hours of Buenos Aires Argentina					
Current Time:		12:59 AM			
Current Date:					
Observe Time:		Argentina Time			
2017	December	15	Go		
Month	Day	Week Day	Sun Rise Time	Sun Set Time	Daylight Hours
Dec	15	Fri	5:35	20:02 (8:02 PM)	14 hrs 27 mins
Dec	16	Sat	5:35	20:03 (8:03 PM)	14 hrs 28 mins
Dec	17	Sun	5:35	20:03 (8:03 PM)	14 hrs 28 mins
Dec	18	Mon	5:35	20:04 (8:04 PM)	14 hrs 29 mins
Dec	19	Tue	5:36	20:04 (8:04 PM)	14 hrs 28 mins
Dec	20	Wed	5:36	20:05 (8:05 PM)	14 hrs 29 mins
Dec	21	Thu	5:37	20:05 (8:05 PM)	14 hrs 28 mins
Dec	22	Fri	5:37	20:06 (8:06 PM)	14 hrs 29 mins
Dec	23	Sat	5:38	20:06 (8:06 PM)	14 hrs 28 mins
Dec	24	Sun	5:38	20:07 (8:07 PM)	14 hrs 29 mins

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One more thing. We also notice from their map there is one city in northwest Antarctica that the Dakila scientists claim to have taken measurements, which means the crew would have had to travel there from somewhere in South America, and thus they could have obtained evidence that Antarctica is not an ice wall and is only 650 miles from the tip of Argentina, but no such report is given to us.

The Dakila scientists also claim that the star trails seen from the Canary Islands (off the coast of Spain) near the equator, should not be circular.

Another significant example was in the Canary Islands, for a time-lapse of the stars showed a circular movement that is incompatible with a

little more than a sleight of hand. Instead they will show 24-hour light of the Artic region, <https://www.youtube.com/watch?v=ANcFz6c00Es>.

⁷⁹⁰ <http://www.timebie.com/sun/buenosairesar.php>

spherical model of the Earth. This movement would only be justified if the place were near the poles in a spherical Earth, which is not the case.⁷⁹¹

Since the Canary Islands are very near to the equator, they provide an excellent vantage point to view the stars.



But the claim of the Dakila scientists is just a case of their ignorance as to how star trails are seen and formed. As we noted previously in our section dealing with how the constellations are seen from Earth in both the northern and southern hemisphere, we saw that one can make Polaris come very close to the equator but cannot make it go below the equator. In the next photo, the farthest Polaris can go is 10-15 degrees above the equator.



"Star trails over Observatorio del Teide" by Bartosz Wojczyński. (Via Imgur. Click image to see full size.)

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⁷⁹¹ *Ibid.* 1:07:00

⁷⁹² Bartosz Wojczyński (personal friend of mine) took the photographs at Teide Observatory, which is located on Tenerife, one of Spain's Canary Islands. The observatory's prime location (close to the equator) and clear, dark night skies offer stargazers and astrophotographers full views of the northern hemisphere. Here,

In fact, since the Canary Islands are so close to the equator, there may be two swirls of trailing stars, one rotating right and the other rotating left, as seen in the photo below. This is because it is capturing both the northern stars above the equator and the southern stars below the equator. As we also see in the photo, at least one of the polar points will not be visible, since it would be impossible to see both at the same time on a spherical Earth.



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Wojczyński was able to position Polaris, the North Star, at the center of his star trail rings. He used a Nikon D5100 camera with a Samyang AE 10mm lens at f/4.8 and ISO 1600 on a Baader Astro & Nature tripod.


⁷⁹³ Star Trails over Tenerife, by Juan Carlos Casado, taken at the Teide Observatory in Tenerife.

Antarctica: Continent or Ice Wall?





⁷⁹⁴ <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 29:02. A Ghostbusters original, with the caption originally spelled: “Why is Antartica (sic) is (sic) the most guarded place on Earth?”

⁷⁹⁵ Stamp dedicated to Admiral Byrd issued in 1934. It shows a globe earth with Antarctica at the bottom.



ANTARCTICA
ISN'T WHAT YOU THINK IT IS



 *Federal Lodge No. 1*
Free and Accepted Masons of Washington D.C.

Richard E. Byrd, US Admiral
Initiated in Federal Lodge
No. 1 and founded First
Antarctic Lodge No. 777
in 1935

 **RESEARCH FLAT EARTH**
OPERATION DEEP FREEZE - OPERATION HIGHJUMP

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Against all odds, flat-earthers valiantly try to defend the idea that Antarctica is a giant ice wall surrounding their flat Earth. As one diehard flat-earther put it:

Antarctica is said to be a continent of ice situated at the bottom of the ball. From 78 degrees south latitude it should, therefore not have a perimeter greater than 12,000 miles. However, early explorers like Captain Cook and James Clark Ross, in attempting to circumnavigate Antarctica, took three to four years to do so, and clocked in the distance travelled at 50 to 60,000 miles.⁷⁹⁷

⁷⁹⁶ <https://www.youtube.com/watch?v=czW0iRJuH1A&t=518s>, here Admiral Byrd is interviewed and tells of his experience in Antarctica. At 1:41 Byrd states: "Strangely enough, there is left in the world today, an area as big as the United States, that's never been seen by a human being. And that's beyond the pole, on the other side of the south pole from Little America" (his station in Antarctica). In addition to saying Antarctica is as big as the United States, Byrd refers to it five times as the "bottom of the world" (e.g., 2:00; 3:27; 4:45; 7:25; 10:25).

⁷⁹⁷ <https://www.youtube.com/watch?v=WtYWkTEDgjM>, published Oct. 27, 2016, 0:54 to 1:29.



Capt. James Cook

James Clarke Ross

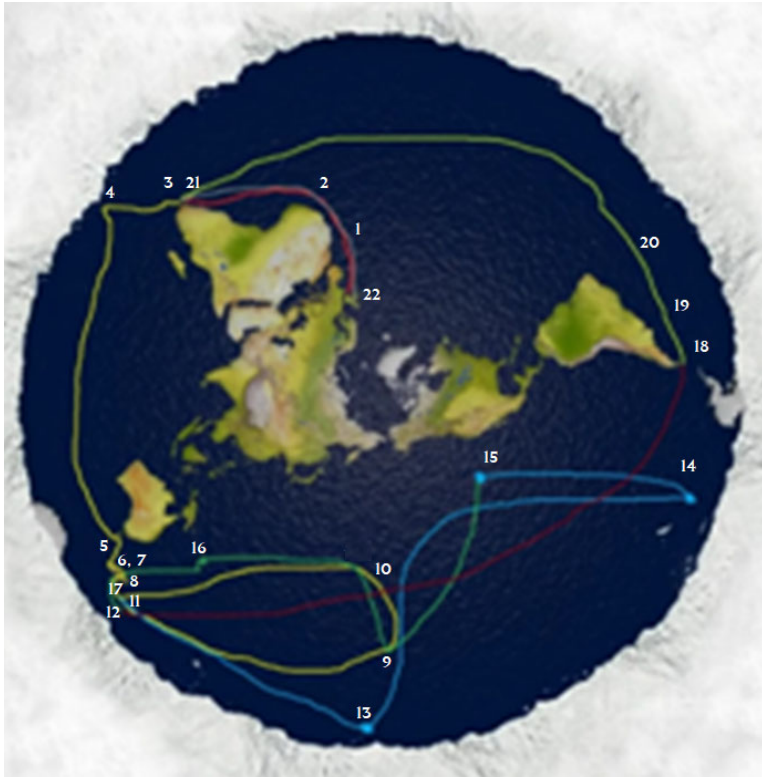
Another flat-earther cleverly connects James Cook's voyage below the equator and then adds a circular ice wall to the extremities of the voyage, making it appear that Cook ran into a giant ice wall instead of Antarctica. This will be a good example of how deceptive flat Earth interpretations can be.

It shows the voyage, the second voyage, the one where he goes down to the Antarctic circle, and he is going to go in these weird directions, but the directions will make sense when I overlay the directions with things on a flat Earth map.⁷⁹⁸

Using the points of entry and departure from *YouWhatMate?* video, we have numbered them and placed them on the corresponding points of entry and departure that *YouWhatMate* had originally made on the globe. Suffice it to say, it is the flat Earth version of Cook's trip that make no sense. For example, why would Cook travel the red line from New Zealand at #17 to the tip of S. America at #18, which on an azimuthal map is about 6,000 miles, and make no stops along the way? Why, after stopping at the tip of S. America, would he make two near stops (South Sandwich Islands and Montagu Island, respectively), but then travel from Montagu at #20 to South

⁷⁹⁸ <https://www.youtube.com/watch?v=OkLExcpts-k>, published by "Gift from God" and mirrored by "YouWhatMate?" on Sept 9, 2016.

Africa at #21, a distance of 6,000 on the flat Earth map, and not make any stops along the way?

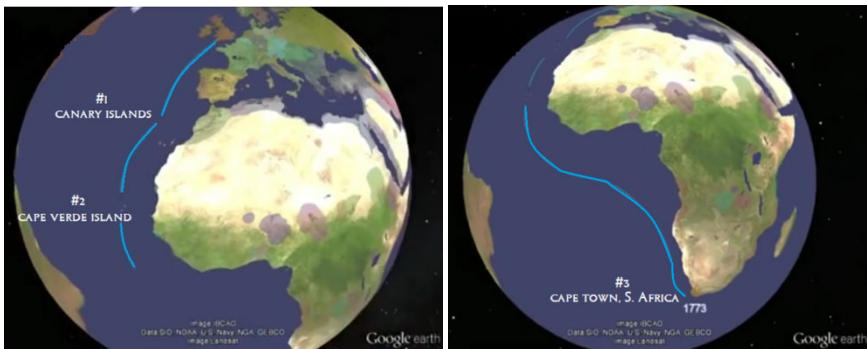


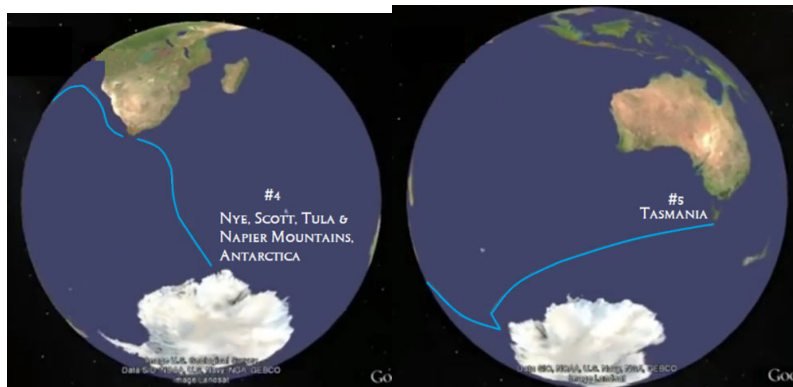
More puzzling is, if Cook is on his way home from Montagu at #20 and wishes to go back to England at #22, why would he not travel directly from Montagu to England, but instead travel to S. Africa first, which would have decreased his trip by about 8,000 miles? Again, why would Cook travel from Walker Mountain in Antarctica at #13 to Easter Island or Pitcairn Islands at #14, which is about 8,000 miles on the flat Earth map, and then travel back another 4,000 miles back to French Polynesia? Here is an itinerary of Cook's voyage.

- 1) England to Canary Islands
- 2) Canary Islands to Cape Verde Island (total: 2690 miles)
- 3) Cape Verde Island to Cape Town, S. Africa (4355 miles)
- 4) Cape Town to Nye, Scott, Tula and Napier Mountains, Antarctica. See no coastal landing possible. (2372 miles)

- 5) From Antarctica to Tasmania (3894 miles)
- 6) From Tasmania to southwest New Zealand (Coal Is.) (905 miles)
- 7) Along coast, turns at Wellington, goes through Cook Strait (800 miles)
- 8) Travels to Chatam Islands, east of New Zealand (346 miles)
- 9) Travels to French Polynesia Islands (2352 miles)
- 10) Travels to Tongatapu Island, NWW of Polynesia Islands (1657 miles)
- 11) Travels down to Chatam Islands (1622 miles)
- 12) Travels to Antarctica, but sees Rockefeller Mountains and Alexandra Mountains. Again, sees no coastal landing possible (2346 miles)
- 13) Circles eastward and comes down to Antarctica, near Walker mountains, sees sea cliff hundreds of miles high, cannot land, no coast. (923 miles)
- 14) Travels northeast to Easter Island and/or Pitcairn Islands to French Polynesia (5637 miles)
- 15) Travels west to Samoa Islands (1508)
- 16) Travels west to Vanuatu, then south to New Caladonia (1848 miles)
- 17) Travels south to New Zealand, crosses at Cook Strait (1636 miles)
- 18) Travels east to tip of South America (4681 miles)
- 19) Travels east to South Sandwich Islands (1259 miles)
- 20) Travels east to Montagu Island (470 miles)
- 21) Travels to tip of South Africa (2624 miles)
- 22) Travels back to England, via Cape Verde Is & Canary Is. (7064 miles)

Using a globe, Cook traveled about 51,000 miles, which is between the 50K and 60K he himself recorded. On an azimuthal map, according to *YouWhatMate's* drawing, Cook's trip would register 74,000 miles. Looking more closely, Cook's route on a globe also makes much more sense than on a flat Earth model. See below.

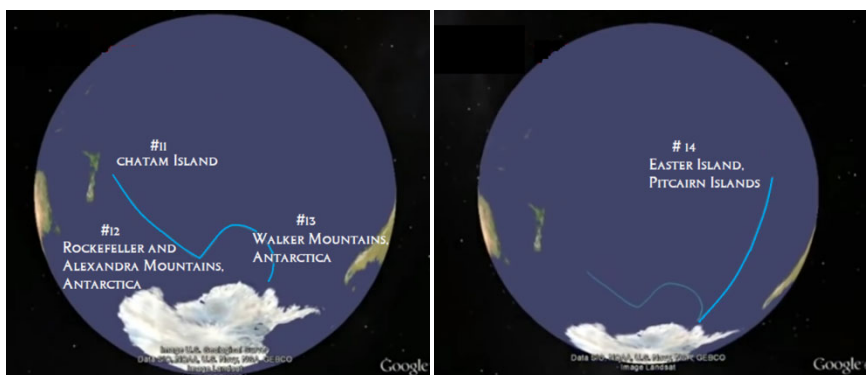




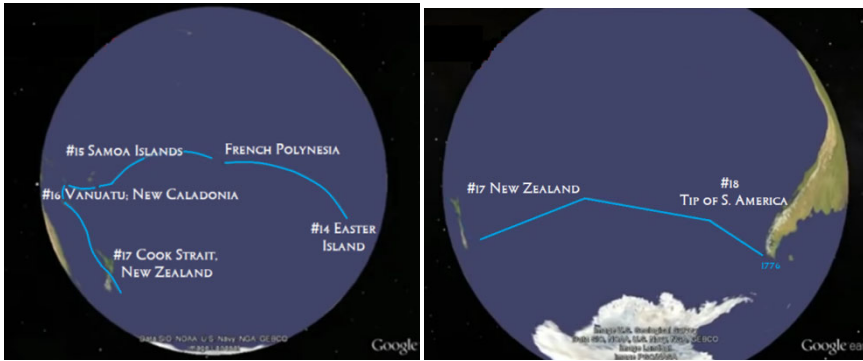
We see that as Cook reaches Antarctica he runs into the ice shelf on the north side of the continent. This can be verified by using Google Earth. There are also four mountain ranges on top of the ice shelf. In short, there are no coastal beaches for Cook to land his ship. Thus he turns away.



Cook then heads northeast toward New Zealand and makes a big circle in order to visit the French Polynesia islands and Tonga.



Cook then makes another attempt to visit Antarctica hoping for a landing place. He sees the same high rocky cliffs at Rockefeller and Alexandra mountain ranges; he makes a third attempt to find an inviting coast by heading east, only to find the same ice shelf near Walker mountain range.



Giving up on Antarctica, Cook decides to take one more swing through the Pacific southwest islands. Returning to England, Cook stops at S. America.



He then makes two more stops (the Sandwich Islands and Montagu Island) before porting in S. Africa. From there it is almost a straight shot back to England. The trip makes perfect sense on the globe map and no sense on a flat Earth map.⁷⁹⁹

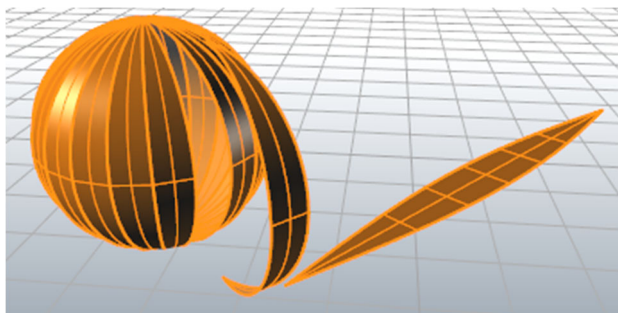
Largely because of the choice made long ago by the pioneer flat-earththers to use the azimuthal map projection as the closest that identifies with a flat

⁷⁹⁹ See <https://www.youtube.com/watch?v=x1fGb3piQA0>, for a detailed look by Wolfie6020 on how to measure the differences in distance on a globe v. flat Earth.

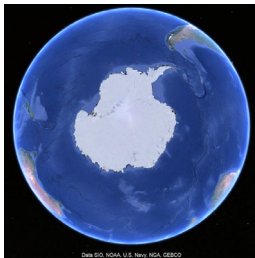
Earth, the devotees have been more or less forced to regard Antarctica as a 75,000-mile ice wall going around a flat disc instead of a 5.5 million square-mile continent with a circumference of 11,000 miles.



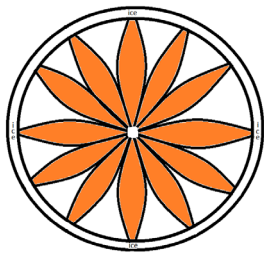
Previously we demonstrated how a sphere is made flat. If we cut equilateral peels from a globe and spread them out...



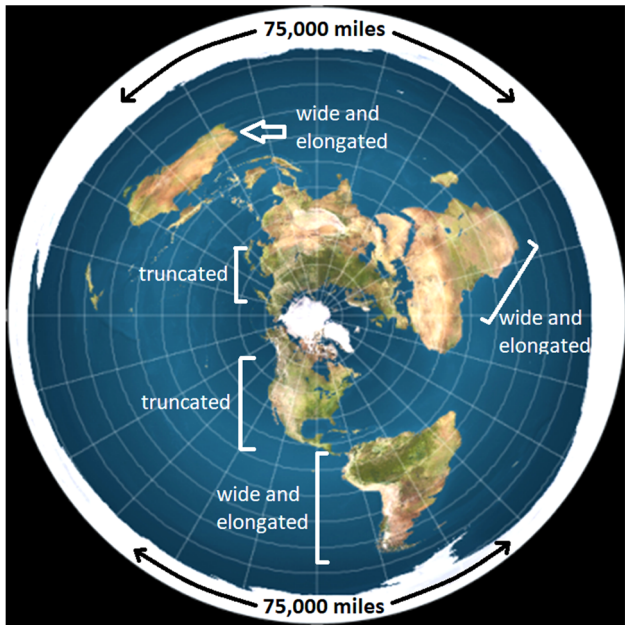
The gaps left from cutting the sphere are fixed ‘on paper’ by filling-in the extra space with more ocean and land surfaces. So this...



...becomes this...



...which becomes this...



Although the other continents are also distorted by the azimuthal map, at least they are still recognizable, whether truncated or elongated. But Antarctica is totally morphed into another shape. Unfortunately for the flat-earthlers, they have little choice in the matter. Any two-dimensional map will do something similar to Antarctica.

In being forced to explain how a land mass that we have always known as the cold continent at the very bottom of the Earth can be credibly retaught as an ice wall that is over ten times the mass of the continent version, this is the best model the flat-earthlers can produce. It certainly defies the imagination, but such obstacles usually don't stop avid flat-earthlers. Once they believe in their hearts that either the Bible teaches a flat Earth and/or they are convinced that experiments over water show the Earth is flat, they can turn just about any counter-evidence they see into, at worst, a curious conversation piece and, at best, another in a long list of conspiracy theories created by the nations of the world.

Once they have a visual geometric model, the flat-earthlers must explain each and every objection to that model, but they have not been able to do so. Even though they have at their disposal every imaginable help from modern technology, including the Global Positioning Satellites that have mapped every corner of the Earth; and even though they have members all over the world who have access to this sophisticated equipment or know someone who does, they have been unable to produce an accurate map or model of the Earth. If the Earth is indeed flat, then all the flat-earthlers would need to do is hire some professional cartographers from each nation to map out the continents on a flat, planar surface. It should be one of the easiest tasks ever performed. In fact, it is much easier to produce a flat map than it is a spherical map. In other words, the flat-earthlers are not being asked to turn a spherical map into a flat map, which can be quite difficult and has never really been done to 100% accuracy. Rather, the flat-earthlers are being asked to produce a flat map of the flat Earth they believe exists. A few expert cartographers could get it done in a few weeks, if that. The difficulty is quite apparent. Since the Earth isn't flat, they can't make an accurate flat map. Conversely, if the Earth were flat, then making a spherical map of it would be extremely difficult and would never be 100% accurate.

The flat-earthers must also answer all the practical issues concerning human activity, both scientific and popular, that occurs on Antarctica and which is documented, including commercial tourist trips;⁸⁰⁰ satellite observations of the continent; aerial surveys; Lidar mapping; ground level surveys; and circumnavigation, such as the one recently completed by Lisa Blair.⁸⁰¹ The surveys of Antarctica alone show that the entire continent has been mapped, and dozens of scientific outposts line the entire coast, such as the Australian Antarctic Data Centre and the Scott Polar Research Institute of Cambridge University.⁸⁰² There are 66 scientific bases in Antarctica; 37 occupied year round. About 4,000 people live there during the summer months and about 1,000 during winter, each year.

⁸⁰⁰ http://www.dailymail.co.uk/travel/travel_news/article-3341332/Boeing-757-lands-blue-ice-runway-Antarctica-time.html

⁸⁰¹ Blair, 32, is the latest example of someone who has circumnavigated Antarctica, accomplishing the feat in 2017 in 184 days. Blair initially attempted to break Russian adventurer Fedor Konyukhov's 2008 record for the fastest solo, unassisted and non-stop trip around the icy continent. See <http://www.abc.net.au/news/2017-07-26/lisa-blair-arrives-in-albany-after-antarctic-circumnavigation/8743320>

⁸⁰² <https://data.aad.gov.au>; and <https://www.spri.cam.ac.uk/library/catalogue/sprilib/antarctica>; Other such dozens of projects are: The McMurdo Antarctica Lidar Project (<http://ciresblogs.colorado.edu/lidar>); The Gamburtsev Subglacial Mountain Survey (<https://nerc.ukri.org/planetearth/stories/338>); The Falkland Islands and Dependencies Aerial Survey Expedition (<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1477-9730.1958.tb01083.x>); The Prince Charles Mountains Expedition of Germany-Australia (PCMEGA) (<https://researchdata.anders.org.au/prince-charles-mountains-australia-pcmega/699583>); The British Antarctic Survey (<https://www.bas.ac.uk/data/our-data/maps>); Soviet geological maps of the Prince Charles Mountains, East Antarctic Shield (<https://www.tandfonline.com/doi/abs/10.1080/08120099308728100>), courtesy of the Australian Journal of Earth Sciences: An International Geoscience Journal of the Geological Society of Australia



As we noted earlier, dozens of webcams dot the landscape of Antarctica taking 24-hour recordings of all that takes place. The Australian government has a website that shows all its webcams.⁸⁰³



McMurdo station, about 1000 miles from the South Pole⁸⁰⁴

⁸⁰³ <http://www.antarctica.gov.au>. Some of these webcams do not record for 24 hours.

⁸⁰⁴ http://www.coolantarctica.com/Bases/South_Pole/thumbs4.php;
<http://www.coolantarctica.com/Bases/McMurdo/thumbs1.php>

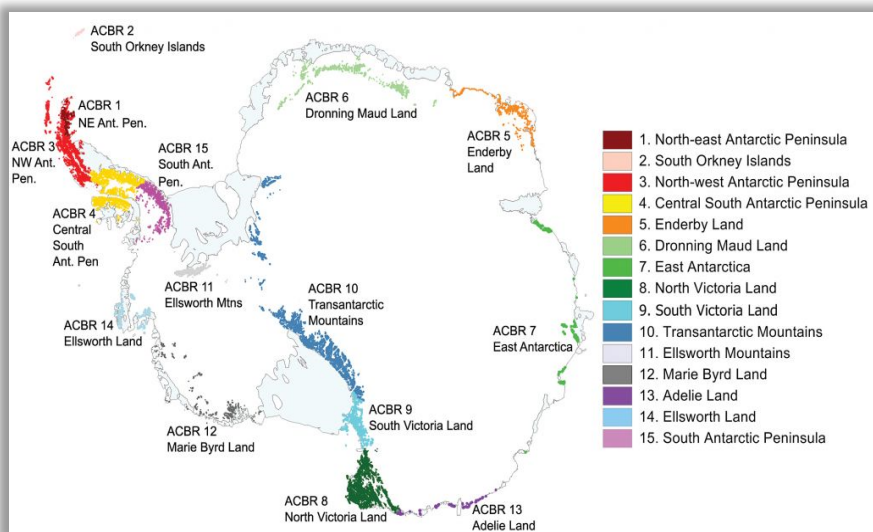
Some of the answers from flat-earthers are what we would expect for those desperate to protect their flat model. As satellite observations are discounted by the flat-earthers denying the existence of satellites; so human activity on Antarctica is answered by claiming there is a worldwide conspiracy among the nations, led by the UN, to curtail anyone from venturing into most of Antarctica. Hence they believe the Antarctic Treaty⁸⁰⁵ signed by various nations in 1961 is actually an agreement to keep almost everyone off of Antarctica so that no one finds out the truth “that it is not a continent.”

Of course, the flat-earthers don’t explain how, if a nationwide treaty exists to hide a flat earth, why the nations would publish such a treaty for the whole world to see? If one actually reads the treaty, it contains no hint of such a conspiracy; rather, it merely restricts the nations not to overuse or abuse Antarctica, such as strict curbs on private property, housing communities, businesses, mining,⁸⁰⁶ nuclear reactors, waste dumping, and the use of flora and fauna indigenous to Antarctica.⁸⁰⁷

⁸⁰⁵ <https://www.ats.aq/e/ats.htm>; *The Antarctic Treaty* was signed in Washington on December 1, 1959 by the twelve countries whose scientists had been active in and around Antarctica during the International Geophysical Year (IGY) of 1957-58. It entered into force in 1961 and has since been acceded to by many other nations. See also the *Protocol on Environmental Protection to the Antarctic Treaty* (1991) at (<https://www.bas.ac.uk/about/antarctica/the-antarctic-treaty/environmental-protocol/protocol-on-environmental-protection-to-the-antarctic-treaty-1991/>)

⁸⁰⁶ According to Wikileaks, mining is not permitted until 2046.

⁸⁰⁷ <http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001888>, titled: “Antarctica’s Protected Areas Are Inadequate, Unrepresentative, and at Risk,” and <http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001888> “Assessing the effectiveness of specially protected areas for conservation of Antarctica's botanical diversity.”



Treaty Protected Areas in Antarctica

Popular use of Antarctica is just buzzing with activity and is obviously not merely for the Empire penguin. Facebook has a site titled “I’ve Been to Antarctica” on which hundreds of people share stories of their encounters on the continent.⁸⁰⁸ Travel blogs encourage trips to Antarctica.⁸⁰⁹ Qantas sponsors airplane trips that go over the whole continent.⁸¹⁰ Presently, 45 companies sponsor trips to Antarctica, and thousands of people visit the continent every year. The evidence against the flat-earth contention that Antarctica is virtually humanless and confined is made so embarrassingly clear that we wonder how anyone of conviction could hold to such a belief.

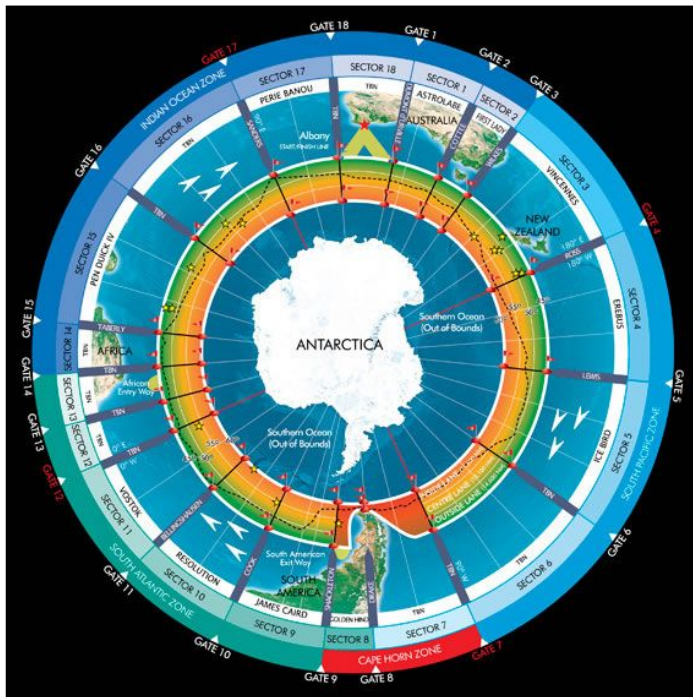
⁸⁰⁸ <https://www.facebook.com/groups/2212798205>;

http://www.coolantarctica.com/Travel/Fly_to_Antarctica.php; <http://www.swoop-antarctica.com/cruises/flights>; Antarctica Cruise: Visiting The Antarctica Peninsula (<https://youtu.be/wEKDAgytQcw>); Antarctica Adventures with the Best Cruise Ship Ever Built (<https://youtu.be/s6pXARR4vdA>); Expedition cruise to Antarctica with Polar Star Expeditions (<https://youtu.be/2zEJapASyyU>); Want to travel to Antarctica? (<https://youtu.be/snYw2Y6L0g8>).

⁸⁰⁹ <https://www.hurtigruten.us/destinations/antarctica>; <http://info.poseidonexpeditions.com/antarctic>

⁸¹⁰ <http://www.antarcticaflights.com.au/>; https://www.youtube.com/watch?time_continue=247&v=UZVFan7jL80

Antarctica even sponsors yacht races around the entire continent, called the Antarctic Cup Race.⁸¹¹



Gates for the Yacht Races in Antarctica

Jon Sanders was the first man to circumnavigate Antarctica on his yacht, performing the feat twice between 1981 and 1982 and it is recognized in the *Guinness Book of Records*. But it doesn't stop there. The flat-earthers must also include all the businesses that deal with these nations in Antarctica (tourism, airlines, shipping, cable and telegraph, food, raw materials, engineering equipment, *etc.*). In 2017 a Chinese business jet landed safely at the Wolfs Fang Airport in Antarctica, the first time a Chinese private jet operator has operated a flight to this continent. The aircraft, with 22 Chinese passengers onboard, flew from Hong Kong to Cape Town International Airport, and then flew to Antarctica. Next, the team will fly around five to

⁸¹¹ <http://www.acronautic.com/antarctica-cup-ocean-race/>

six hours to the South Pole, and it will become the first self-organized Chinese scientific research team.⁸¹²



Of course, the flat-earthers ignore all this evidence of human activity in Antarctica and instead will show memes like the above to lead gullible people to believe there really is a 75,000-mile ice wall instead of a continent. Yes, it sure looks like an ice wall, but is the same kind of ice wall we saw earlier in our book—the Ross Wall near the McMurdo station that takes up only a fraction of the circumference of Antarctica. The image above is from a blog titled “Our World Heritage” that explains the image, namely, the FS

⁸¹² <http://usa.chinadaily.com.cn/a/201712/20/WS5a39a82fa31008cf16da24ce.html>; “Antarctica flight herald’s new era for tourism to South Pole area - 3,944 people went in 2016.”

Polarstern is taking supplies to the Neumayer Station, a permanent research outpost located on the ice shelf.⁸¹³



Flat-earthers are also confronted with the scores of expeditions to Antarctica that have occurred over the last 100 years. Of all the ships and all the nations that sent them, not one ever remarked that Antarctica was a 75,000-mile ice wall. Here is a list of them:

- 1907 – 1909: Nimrod Expedition, January 9.
- 1909: Ernest Shackleton reached 88°23'S (Farthest South)
- 1909, 16 January, Edgeworth David reached the South Magnetic Pole at (72°25'S 155°16'E / 72.417°S 155.267°E/-72.417; 155.267).
- 1908 – 1910: Fourth French Antarctic Expedition, led by Jean-Baptiste Charcot
- 1910 – 1912: Japanese Antarctic Expedition, led by Nobu Shirase
- 1910 – 1912: Roald Amundsen's South Pole expedition, December 14, 1911, reached the South Pole (90° S)
- 1910 – 1913: Terra Nova Expedition, Jan. 17, 1912, Robert Falcon Scott, reached the South Pole (90° S)
- 1928 – 1930: Richard Evelyn Byrd, first expedition
- 1931: H. Halvorsen, discovered Princess Astrid Coast

⁸¹³ <http://blog.ourworldheritage.be/2016/01/02/antarctica-3-reaching-the-ice-and-neumayer-station/> ("Antarctica (3): reaching the ice and Neumayer station.")

⁸¹⁴ <https://www.youtube.com/watch?v=2TebGSZ2EQE>, see at 28:46, another Globebuster original.

- 1931: Hjalmar Riiser-Larsen, flew over Antarctica
- 1933 – 1935: Richard Evelyn Byrd, second expedition
- 1933 – 1939: Lincoln Ellsworth, aircraft expedition
- 1934 – 1937: British, Graham Land Expedition
- 1936: Lars Christensen, dropped Norwegian flag over Prince Harald Coast
- 1938: Third German Antarctic Expedition. New Swabia, or Neuschwabenland, claimed for Nazi Germany, led by Alfred Ritscher
- 1939 – 1941: United States Antarctic Service Expedition, led by Richard Byrd
- 1943 – 1945: Operation Tabarin, led by Lieutenant James Marr
- 1946 – 1946: US Operation Highjump, led by Richard Byrd
- 1947: First Chilean Antarctic Expedition
- 1947 – 1948: Operation Windmill, led by Commander Gerald Ketchum
- 1947 – 1946: Ronne Antarctic Research Expedition, led by Finn Ronne
- 1949 – 1952: Norwegian-British-Swedish Expedition, led by John Giaever
- 1955 – 1956: US Operation Deep Freeze, led by Richard Byrd
- 1955 – 1957: 1st Soviet Antarctic Expedition, led by Mikhail Somov
- 1956: Amundsen-Scott South Pole Station established
- 1956 – 1958: Commonwealth Trans-Antarctic Expedition, led by Vivian Fuchs
- 1956 – 1958: 2nd Soviet Antarctic Expedition, led by Aleksei Treshnikov
- 1957 – 1958: International Geophysical Year
- 1957: Scott Base established
- 1957 – 1958: Luncke Expedition
- 1957 – 1959: 3rd Soviet Antarctic Expedition, led by Yevgeny Tolstikov
- 1958 – 1960: 4th Soviet Antarctic Expedition, led by Aleksandr Dralkin
- 1959 – 1961: 5th Soviet Antarctic Expedition, led by Yevgeny Korotkevich
- 1960: South African National Antarctic Expedition
- 1960 – 1962: 6th Soviet Antarctic Expedition, led by V.Driatsky
- 1961 – 1963: 7th Soviet Antarctic Expedition, led by Aleksandr Dralkin
- 1962 – 1962: Vostok traverse, led by Australian National Antarctic Research
- 1962 – 1964: 8th Soviet Antarctic Expedition, led by Mikhail Somov
- 1963 – 1965: 9th Soviet Antarctic Expedition, led by Mikhail Somov
- 1964 – 1966: 10th Soviet Antarctic Expedition, led by M.Ostrekin, I.Petrov
- 1965 – 1967: 11th Soviet Antarctic Expedition, led by Maksutov & Dubrovin
- 1966 – 1968: 12th Soviet Antarctic Expedition, led by Senko & Gerbovich
- 1967 – 1969: 13th Soviet Antarctic Expedition, led by Aleksei Treshnikov
- 1968 – 1970: 14th Soviet Antarctic Expedition, led by Maksutov & Krenkel
- 1969 – 1971: 15th Soviet Antarctic Expedition, led by Senko & Gerbovich
- 1970 – 1972: 16th Soviet Antarctic Expedition, led by Petrov & Tarbeyev
- 1971 – 1973: 17th Soviet Antarctic Expedition, led by Korotkevich & Averyanov
- 1972 – 1974: 18th Soviet Antarctic Expedition, led by Pavel Senko
- 1973 – 1975: 19th Soviet Antarctic Expedition, led by D.Maksutov, V.Ignatov
- 1974 – 1976: 20th Soviet Antarctic Expedition, led by V.Serdyukov, N.Kornilov
- 1975 – 1977: 21st Soviet Antarctic Expedition, led by O.Sedov, G.Bardin
- 1976 – 1978: 22nd Soviet Antarctic Expedition, led by Tyabin & Dubrovin

- 1977 – 1979: 23rd Soviet Antarctic Expedition, led by V.Serdyukov, O.Sedov
- 1978 – 1980: 24th Soviet Antarctic Expedition, led by A.Artemyev, O.Sedov
- 1979 – 1980: 25th Soviet Antarctic Expedition, led by N.Kornilov, N.Tyabin
- 1980 – 1981: Transglobe Expedition, led by Ranulph Fiennes
- 1980 – 1982: 26th Soviet Antarctic Expedition, led by Serdyukov & Shamontyev
- 1981 – 1983: 27th Soviet Antarctic Expedition, led by D.Maksutov, R.Galkin
- 1982 – 1984: 28th Soviet Antarctic Expedition, led by N.Kornilov, A.Artemyev
- 1983 – 1985: 29th Soviet Antarctic Expedition, led by N.Tyabin, L.Bulatov
- 1984 – 1987: In the Footsteps of Scott, led by Robert Swan
- 1984 – 1985: 1st Uruguayan Antarctic Expedition, led by Omar Porciúncula
- 1984 – 1986: 30th Soviet Antarctic Expedition, led by D.Maksutov, R.Galkin
- 1985 – 1987: 31st Soviet Antarctic Expedition, led by N.Tyabin, V.Dubovtsev
- 1986 – 1988: 32nd Soviet Antarctic Expedition, led by V.Klokov, V.Vovk
- 1987: Iceberg B-9 calves and carries away Little Americas I – III
- 1987 – 1989: 33rd Soviet Antarctic Expedition, led Kornilov & Khabarov
- 1987 – 1988: First Bulgarian Antarctic Exped. St. Kliment Base established
- 1988 – 1990: 34th Soviet Antarctic Expedition, led by Pryamikov & Bulatov
- 1989 – 1991: 35th Soviet Antarctic Expedition, led by V. M. Piguzov
- 1991 – 1992: 36th Soviet Antarctic Expedition, led by Lev Savatyugin
- 1996: Lake Vostok discovered
- 2004 – 2005: Tangra 2004/05 created Camp Academia.
- 2004 – 2005: AGASEA/BBAS joint U.S.-U.K. aerogeophysical survey of the Amundsen Sea Embayment.
- 2005: Ice Challenger Expedition, went to the South Pole in six-wheeled vehicle.
- 2005 – 2006: Spanish Trans-Antarctic Expedition, led by Ramon Larramendi, reached the Southern Pole of Inaccessibility using kite-sleds.
- 2007 – 2008: Norwegian-U.S. Scientific Traverse of East Antarctica.
- 2008 – 2009: Impossible 2 Possible (i2P) unsupported South Pole quest by Ray Zahab, Kevin Vallely and Richard Weber.

Plain Problems with Plane Flights

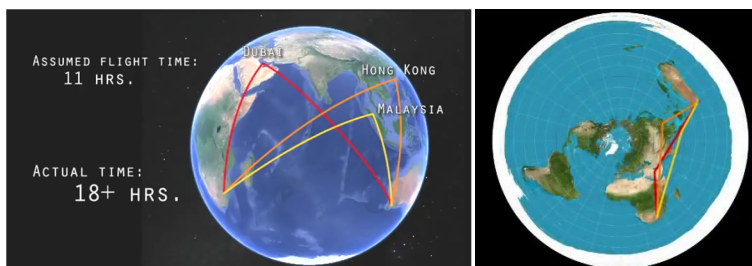
It should be no surprise that because the common azimuthal map used by flat-earththers is a map that is necessarily truncated near the center and necessarily increasingly elongated the closer to the perimeter, it will have distances between continents that simply don't match up either with a globe earth or other map projections. In fact, none of the 70-odd map projections available today match up with each other or with a globe. Some come close, and some not so close, but each map has its own set of problems to overcome.

We saw earlier that the azimuthal flat Earth map begins by slicing the globe into sections and then flattening them. It doesn't make a difference how many sections are cut. Each peel, at the lower extremity, when spread out flat, will have huge gaps that must be filled with either larger oceans and/or elongated continents. When all is said and done, the flat Earth map made from a globe will be 2.5 times in size—an enormous difference. This means that the distance between the oceans and the continents is going to be much greater than on a globe.



Flat Earth arguments to the contrary, using the distances that planes fly from one southern continent to the next, seem quite convincing to the uneducated. One flat-earthther puts it this way:

But the real proof for the flat Earth map is in the flight paths. On a ball Earth, several flights would have their shortest, quickest and straightest paths over or around the Antarctic continent, but instead these flights take all manner of tangential detours, crossing into the northern hemisphere to refuel. The reason? Antarctica is too cold, they claim. Wow! I'm not buying it. When they claim there are bases with working machinery set up all over Antarctica?



So let's take a look at the actual flight paths and see what they have to disclose. One flight that should be a simple 11-hour shot across the Indian Ocean is from Johannesburg, South Africa to Perth, Australia. However, this flight takes a detour north, stopping in Dubai, Hong Kong or Malaysia to refuel, for a total flight time averaging over 18 hours....On the flat Earth map it starts to make sense.⁸¹⁵

Another quick and easy flight...is from Johannesburg to Santiago, Chile. While an easy 12-hour flight below the Tropic of Capricorn is to be expected, instead, every flight crosses the equator to refuel in Senegal...for a total flight time of 19 hours. Thought it doesn't make sense on the globe, as you can see, it fits perfectly on the flat Earth map.



⁸¹⁵ <https://www.youtube.com/watch?v=WtYWkTEDgjM>, published Oct. 27, 2016, at 1:31.

To answer this, all that needs to be pointed out is there may be some flights that stop in Dakar, Senegal,⁸¹⁶ but not all flights do. See flights below:

Johannesburg to Santiago

Best prices for: Jul 4 - Aug 14 | 1 Person, Economy

Edit search

Sort by:

Price

FlyScore^{beta}DurationBest ValueTime

Book Flight + Hotel & Save. Expedia Guarantees the Best Price!

See Johannesburg to Santiago package deals on Jul 4 - Aug 14

View Deal

LATAM Airlines

JNB 10:35 AM

SCL 11:29 PM

18h 54m

1 stop

SCL 12:55 AM

JNB 8:50 AM⁺¹

26h 55m

2 stops

TAM Airlines Brazil (now LATAM Airlines) operates flight #8158, #8009, #8163, #8162

HIDE DETAILS

FlyScore: 7.3

Itinerary

Amenities

Fares

Reviews

\$692

CheapTickets

View Deal

5 deals

LAN Airlines (now LATAM Airlines) #8158

Economy

Depart

Wed, 7/4

8:05 PM

GRU Guarulhos Intl Airport

Airbus A320

Arrive

Wed, 7/4

11:29 PM

SCL Arturo Merino Benítez Airport

Operated by TAM Airlines Brazil (now LATAM Airlines)

RETURN (SCL to JNB)

26h 55m

LAN Airlines (now LATAM Airlines) #481

Economy

Depart

Tue, 8/14

12:55 AM

SCL Arturo Merino Benítez Airport

Airbus A321

Arrive

Tue, 8/14

3:00 AM

EZE Ministro Pistarini Airport

LAN Airlines (now LATAM Airlines) #8009

Economy

Depart

Tue, 8/14

11:35 AM

EZE Ministro Pistarini Airport

Airbus A321

Arrive

Tue, 8/14

2:25 PM

GRU Guarulhos Intl Airport

Operated by TAM Airlines Brazil (now LATAM Airlines)

Layover at GRU for 3h 30m

LAN Airlines (now LATAM Airlines) #8162

Economy

Depart

Tue, 8/14

5:55 PM

GRU Guarulhos Intl Airport

Boeing 767-300

Arrive



Wed, 8/15

8:50 AM

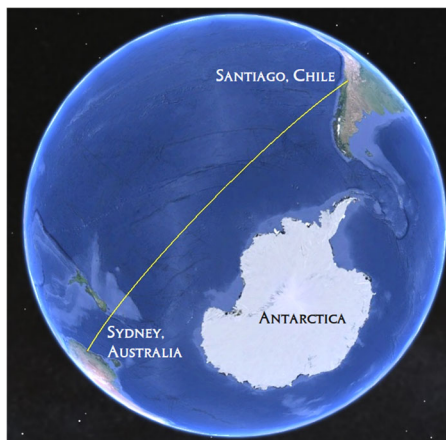
JNB O.R.Tambo Intl

⁸¹⁶ https://www.tripadvisor.com/ShowTopic-g293740-i9186-k2185027-Flights_to_johannesburg_stops_in_senegal-South_Africa.html
⁸¹⁷ https://www.tripadvisor.com/Flights-g294305-o312578-Johannesburg_to_Santiago.html. The above flight goes from Johannesburg to Sao Paulo, Brazil, and

722

<div>Sydney</div> <div>Sydney Kingsford Smith Airport (SYD)</div>	<div>QF27</div> <div>Qantas</div> <div></div>	<div>Santiago</div> <div>Santiago International Airport (SCL)</div>					
<div>Ontime Frequency</div> <div>38%</div>	<div>Distance:</div> <div>11340 km / 7046 miles</div>	<div>Average Speed</div> <div>952 km/h 591 mph</div>					
<div></div> <div>QF 27 Qantas Sydney to Santiago Daily Flight History</div>	<div>Average Delay</div> <div>33.1 min</div>						
<div>Airports Widgets: Embed the Table Below on Your Site or Blog - Get Code Here ></div>							
Date	From	To	Scheduled-Departure	Departure	Scheduled-Arrival	Arrival	Status
25/05/2018	SYD	SCL	12:35	13:16	11:10	11:38	<div>Delayed</div> <div>Track ></div>
22/05/2018	SYD	SCL	12:35	12:50	11:10	10:59	<div>Landed</div> <div>Track ></div>
20/05/2018	SYD	SCL	12:35	13:57	11:10	12:10	<div>Delayed</div> <div>Track ></div>
18/05/2018	SYD	SCL	12:35	13:35	11:10	11:09	<div>Landed</div> <div>Track ></div>
15/05/2018	SYD	SCL	12:35	13:17	11:10	11:02	<div>Landed</div> <div>Track ></div>
13/05/2018	SYD	SCL	12:35	13:06	11:10	11:12	<div>Landed</div> <div>Track ></div>
11/05/2018	SYD	SCL	11:35	12:18	10:10	10:03	<div>Landed</div> <div>Track ></div>
08/05/2018	SYD	SCL	11:35	12:10	10:10	09:54	<div>Landed</div> <div>Track ></div>
06/05/2018	SYD	SCL	11:35	12:12	10:10	10:25	<div>Landed</div> <div>Track ></div>
04/05/2018	SYD	SCL	11:35	12:24	10:10	10:19	<div>Landed</div> <div>Track ></div>
02/05/2018	SYD	SCL	11:35		10:10		<div>Scheduled</div> <div>Track ></div>
01/05/2018	SYD	SCL	11:35	12:25	10:10	10:21	<div>Landed</div> <div>Track ></div>


723



Santiago is the furthest south South American city with direct flights to Australia. There are also flights to and from New Zealand.



A similar thing is Johannesburg, South Africa, to Perth, Australia. A short 9-hour flight in the real world, but impossibly long on a Flat Earth.


9:10p - 12:20p +1
 South African Airways


9h 10m
 JNB - PER

Nonstop

\$734.90
 Live
 Free Cancel w/in 24 hrs
 one way

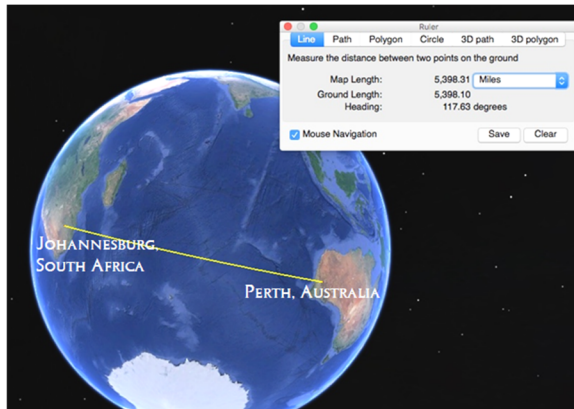
Flight details and baggage fees ★ Very Good Flight (7.8 out of 10)

One way price for 1 traveler, including taxes and fees: \$734.90
 You'll always get the **best price**. We guarantee it. **Free Cancellation** within 24 hours of booking!

9:10p → **12:20p** **9h 10m**  Overnight - Arrives Wed, Jun 29

Johannesburg to Perth
 O.R. Tambo Intl. (JNB) to (PER)
 South African Airways 280
 Economy / Coach (T)
 AIRBUS INDUSTRIE A340-600

Select



Yet people don't realize there are these flights, and claim this as evidence.

Flat-earthers try to defend their model—this one doing so by claiming that refueling by jetliners occurs in places that make logical sense on a flat Earth model but not on a globe model.



Globe model

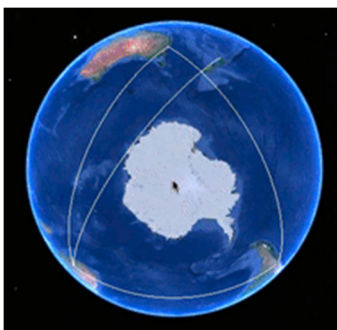


Flat Earth model

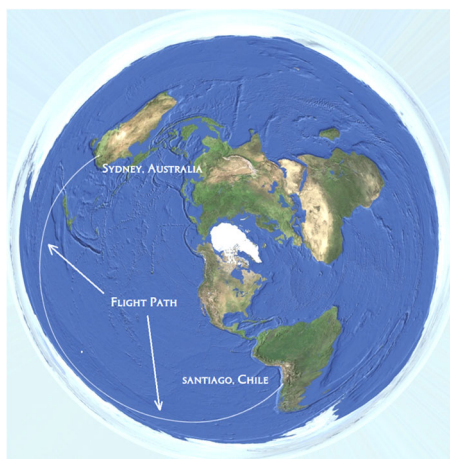
On a ball-Earth, Johannesburg, South Africa to Perth, Australia should be a straight shot over the Indian Ocean with convenient re-fueling possibilities on Mauritius or Madagascar. In actual practice, however, most Johannesburg to Perth flights curiously stop over either Dubai, Hong Kong or Malaysia, all of which make no sense on the ball, but are completely understandable when mapped on a flat Earth.

Mick West then shows what the flat-earth is missing:

The misunderstanding here is the idea that the flights “Stop Over” in Dubai. They don't. You *make a connection* in Dubai (or other places) - *i.e.*, there are two different flights. There is simply not that much call for flights from Johannesburg to Perth, so you (mostly) have to get there with connecting flights via a larger hub airport. There are really only four cites that have flights near Antarctica: Sydney, Australia; Auckland, New Zealand; Santiago, Chile; Johannesburg, South Africa. Sydney and Auckland are fairly close, and so the three regions form a triangle around the South Pole.



See also this practical demonstration, where the pilot of a Quanta jet videoed the sea ice, and then matched it with satellite images.⁸²⁰ It's even worse than a simple straight line on the flat surface would suggest. If you take the great circle route (which they would have to take to "pretend" to be on a globe), then the route looks like this: About three times as long as Santiago to London, when it's actually a much shorter flight.



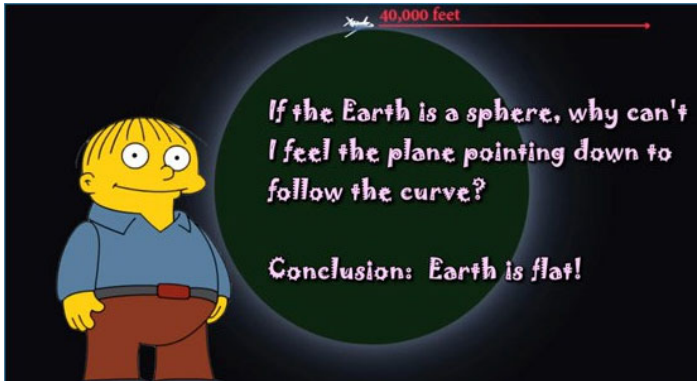
A participant in the discussion, who is a Qantas pilot, verifies the conclusion from Metabunk's Mick West:

I fly for Qantas Chris, although not on the 747 which does that route. The flat earth does not work for people like me. I can tell you that the QF28 (Santiago to Sydney) is airborne as I write this. It has a planned flight time of 13 hours 27 minutes and a planned distance 6347 nautical miles. Here is the planned route, currently the aircraft would be approaching the 70-degree South waypoint. The guidance system is linked to GPS receivers and inertial systems. I fly over a globe, otherwise none of what I do would work. Simple as that....Qantas runs four days a week Syd-SCL. I have mates who fly it. FlightAware is the place to check all this. On a personal note I find the flat-earthers exasperating; more so than the chemmies.⁸²¹

⁸²⁰ <https://www.metabunk.org/a-flight-over-the-antarctic-sea-ice-from-chile-to-australia-qf28.t8235/>. See also <https://flightaware.com/>

⁸²¹ See also https://www.youtube.com/watch?time_continue=8&v=Vss6zPpfHQo, with Wolie6020, a pilot showing a flight path from Sydney to Santiago.

Do Airplanes Need to Adjust the Nose Downward?



822

Asking a pilot whether or not he must keep adjusting the nose of his plane downward in order to stay level with the curved Earth and not drift off into higher altitudes is like asking a man if he has stopped beating his wife. He could give a yes or no answer and be correct or incorrect in both cases. As a pilot put it:

⁸²² <https://www.youtube.com/watch?v=2TebGSZ2EQE>, 28:19

I've flown plenty of times...so to answer his question how to follow the curvature of the Earth? Easy...when leveling off from a climb remember APT – set aircraft attitude, then power, then trim. Now your aircraft will follow the curvature of the earth as lift will cancel gravity when your plane is properly trimmed.⁸²³



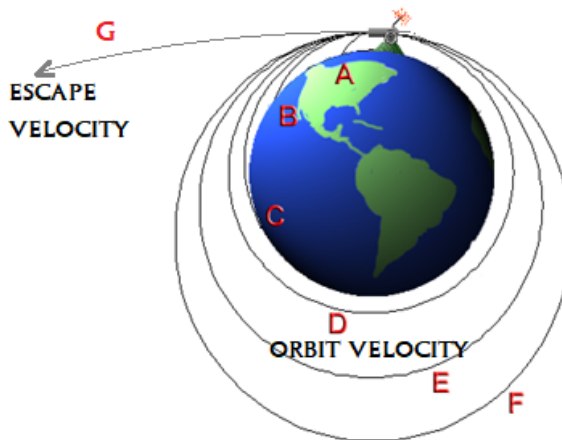
Flat-earthers use this pilot's answer as evidence of a flat Earth. From their perspective, since the Earth is flat and there is no gravity (only buoyancy on the plane based on the plane's density with regard to the air), then the fact that the pilot does not need to compensate for the additional force of gravity proves the Earth is flat. The problem here is, although the pilot does not adjust the plane manually, each minute, to the Earth's curvature, he does so once when leveling off from a climb. Once it is set, he does not need to keep setting it. The plane will automatically seek for equilibrium between the pull of Earth's gravity and the lift of the plane and adjust itself accordingly.

The flat-earther has a similar problem but in the opposite direction. The flat-earther believes that buoyancy, not gravity, is why the plane will fall to Earth if the plane does not have enough lift and speed. Since the plane is more dense than the air around it, the flat-earthers must maintain that the natural

⁸²³ <https://www.youtube.com/watch?v=wDOAZRzyfwo>, in the remarks section. Notice the pilot referred to "attitude," not altitude.

place for the plane is below the air, on the ground of the flat Earth. Hence, if the plane is flying, the flat-earth-er must then say that the higher density of the plane means that the nose is constantly being pulled downward by the buoyancy effect, and the pilot should constantly have to adjust upward for the downward pull. But that does not happen, at least not by the pilot himself unless there is an emergency due to other factors. He simply programs the plane after he reaches his cruising altitude and does not need to touch it again until he is landing. The flat-earth-er does not then conclude there is no buoyancy. Likewise, a globe-earth-er will not dismiss gravity if he does not have to manually adjust his aircraft every minute.

The one cause for the downward pull that the flat-earth-er will avoid, of course, is gravity, and along with it, the escape velocity of the Earth. Note the diagram below:



If, for example, a cannon ball is shot at any velocity below the escape velocity, it will either fall back to Earth (see paths A, B and C) or go around the Earth (see paths D, E, F). Only if the velocity reaches 11.2 kilometers per second (or 6.959 miles per second) could the cannon ball escape the Earth's gravity and fly off into space. The escape velocity of an object from the Earth is determined by the equation:

$$v_{\text{escape}} = \frac{\sqrt{2Gm}}{r}$$

...where v is the velocity needed to escape the Earth, G is the gravitational constant, m is the mass of the Earth and r is the radius of the Earth. The resulting velocity is 11.2 kilometers per second or 6.959 miles per second. This means that in order for a plane to escape the Earth it would need a velocity of at least 25,052 miles per hour. But since jet aircraft fly only 500 to 600 mph they are nowhere near the escape velocity and thus can easily pre-set their plane's instruments to counter the force of gravity. In other words, since the tendency of the plane is to move downwards, the wing angle and the speed of the plane must be maintained in order to keep the plane from falling back to Earth.

Flat-earthers also claim that since planes use gyroscopes to calibrate their pitch, roll and yaw, the fact that gyroscopes always remain in the same position would mean that on a curved Earth the horizon will keep rolling back in the plane's attitude monitor, but this is false. Planes are built with a mechanism that allows the gyroscope to adjust to the Earth's gravity and thus the gyroscope will not remain in the same position. The adjusting mechanism can operate manually through pendulous vanes or electronically by mercury switches which are connected to torque motors, both of which continually adjust the gyroscope to Earth's gravity.

In light of a downward pull being true for both the globe-earth and flat-earth model, let's ask the question of an expert in the field of aeronautics. He is Wolfie6020. He is a certified pilot with an ATP license, which means, more or less, he has a Ph.D. in aeronautics.⁸²⁴ This question is posed: Do aircraft change attitude⁸²⁵ to follow the curvature of the Earth?

The answer is yes the aircraft does change attitude as it cruises along the curved Earth. An average pilot will never notice this, as the rate of attitude change is so slow it is undetectable to the human senses. The pilot will never be conscious of pushing the nose down to follow

⁸²⁴ https://en.wikipedia.org/wiki/Airline_Transport_Pilot_Licence. The Airline Transport Pilot Licence (ATPL), or in the United States of America, an Airline Transport Pilot (ATP) certificate is the highest level of aircraft pilot certificate.

⁸²⁵ https://en.wikiversity.org/wiki/Aircraft_piloting/Straight-and-level_flight. The pitch attitude for level flight (constant altitude) is usually obtained by selecting some portion of the airplane's nose as a reference point, and then keeping that point in a fixed position relative to the horizon.

curvature as the necessary change in attitude occurs simply by the action taken to maintain a constant altitude. The Autopilot is quite irrelevant. I see a lot of people focusing too much on this. Regardless of whether the aircraft is being hand flown or on autopilot, the simple act of maintaining altitude results in the aircraft following the curvature. There is no exponential drop required as this only applies to the view from a stationary observer. For a moving aircraft the attitude change is linear. At 450 Knots it is a smooth progressive 1-degree change spread across the first 8 minutes, then 1-degree spread across the next 8 minutes and 1-degree for every 8 minutes after that. This is a linear rate of attitude change, not exponential at all. Think of it this way. If you drive your car around a steady circle of fixed diameter at a steady speed you do not have to keep turning the steering wheel tighter and tighter do you? The turn is linear, just like the motion of the aircraft following the Earth's curvature. Anyone who tells you the aircraft will have to descend is also mistaken and is confused by the geometry as there is no descent required to fly at a constant altitude. The graph in the Globebuster's video at the two-hour mark is complete nonsense as it has no relevance to a moving aircraft. There is NO descent required. The Original Z axis is totally irrelevant to the current position of the aircraft as it travels. However, if you do wish to understand motion relative to the Original Z axis then it is traversed not by any descent but by the forward motion of the aircraft which is progressively adjusting downwards. After moving 1/4 of the way around the Earth the forward motion of the aircraft is now aligned with the original Z axis.⁸²⁶

Although one can see by reading the comments section of this video that we are indeed in a somewhat complex topic since much of the discussion revolves around what is being used as the absolute reference point to judge the position or motion of other points. In the end, it really makes no difference whether the Earth is a globe or a flat disc in this discussion, since, as we have noted earlier, both systems have a force, whether it be buoyancy or gravity, that is pulling down on the plane and the plane, whether manually or by autopilot, must compensate for this pull, whether it is set at takeoff and/or adjusted in flight, all in order to maintain the same altitude from the plane to the ground. For both the flat Earth and the globe Earth, an object will have a force pulling downward (32 feet/sec^2 in the globe model) which

⁸²⁶ <https://www.youtube.com/watch?v=avXJqA3w7qk>, published Sept. 22, 2016.

means that in both models the same compensation (pitch, roll, yaw) will need to be administered to the plane to maintain the same altitude. According to Wolfie6020, the adjustment is ongoing but is so subtle that the pilot would not notice, since it is akin to watching the minute-hand on a clock move.⁸²⁷ In either case, the results of this analysis does not prove the Earth is flat.

The other problem here for the flat-earththers is explaining how buoyancy can simulate gravity, since buoyancy requires different falling speeds for objects of different densities, whereas gravity has one falling speed for all objects (if air friction is neutralized). Since all planes have similar densities, the problem of buoyancy does not show itself, but it shows itself when the disparity in density becomes a crucial factor.



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⁸²⁷ Other videos by the ATP licensed pilot, Wolfie6020, on this subject are: [youtube.com/watch?v=XqI-3_ImD_0](https://www.youtube.com/watch?v=XqI-3_ImD_0); [youtube.com/watch?time_continue=442&v=skR2gN0swcM](https://www.youtube.com/watch?time_continue=442&v=skR2gN0swcM)

⁸²⁸ Sculpture: “God Created the Earth,” by Donna Bingaman, Waynesboro, PA.