

## **APPENDIX A**

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### **Is the Earth Flat?**

#### **Why Write About a Flat Earth?**

Many people will probably wonder why it is necessary to defend a round earth, or, more specifically, an earth that is spherical. (You see, the earth could be both round and flat, if it were disk shaped.) Early in 2016, I had conversations with several people who were concerned about Christian young people they knew who were arguing that the earth is flat. One of these young people did not actually believe that the earth is flat. Rather, he found the topic interesting and the discussion of it stimulating. Indeed, it can be. In my years teaching at the university, I always asked the same sort of questions in my introductory astronomy classes to motivate my students into thinking more deeply. By raising the question, I challenged our cultural mythology that, until the time of Christopher Columbus five centuries ago, nearly everyone thought the earth was flat. Supposedly, with our sophistication and intelligence today, we know better than the ignorant people of the past. Most of my students were surprised to learn that the facts of history are very different. The question of the earth's true shape had been settled two millennia before Columbus. Also, rarely could any of my students give a good reason the earth is spherical. So much for our modern smug superiority over the supposedly ignorant people of the past.

Most people have not given this question any thought, because they have been taught their entire lives that the earth is spherical, so why worry about it? Consequently, with no idea of the reasons why we know that the earth is spherical, most people long ago entered a complacent state of more or less taking someone else's word for the matter. When someone comes along, such as this young man, who has given this some thought and begins to raise what

appear to be simple objections to the earth's spherical shape, it doesn't take much to fluster most people. When cornered in this manner, people generally respond with the observation that we have photos from space that clearly show a spherical earth. My students usually came up with this answer too. However, I always pointed out that such photos easily can be faked. Indeed, because we all know that it is very easy to fake such photos, perhaps those photos don't prove much after all. Furthermore, those sorts of photos have been available only for a little more than a half-century. Belief in a spherical earth goes back much earlier than this, so obviously there must be better responses.

Once the arguments based on space photos of a spherical earth are shot down, the vast majority of people usually have one of two responses. The most common response is to dismiss the person asking the questions as a crank or fool, because "everyone knows that the earth is round." The other response is to pay more attention to the "flat-earthers," looking for errors in their facts or logic. However, rarely having the knowledge readily at hand to refute the case for a flat earth, most people who take this approach soon look for help. That search for help usually is on the internet, whereupon they quickly find a slew of websites and videos promoting the flat earth, but precious few, if any, refuting it. Some people emerge a few hours later, their egos bruised and their intelligence a bit insulted because they still think that the flat earth is nonsense but are frustrated that they can't seem to answer many of the arguments they've just encountered. Still others never emerge from this rabbit hole and end up thinking that maybe the conspiracy theories they have encountered along the way may be right. Perhaps for a long time we've all been fed a whopping lie about the true shape of the earth!

Despite the widespread belief in a spherical earth, at least in the West, for more than two millennia, there have been a few people who persisted in insisting that the earth is flat. The modern movement for a flat earth, though, has its origins in the nineteenth century. For much of the time since then, flat-earthers<sup>1</sup> have been viewed as cranks. However, there has been a resurgence of belief in a flat earth in recent years, especially among people who claim to be Christians. This appendix is intended as a response to this threat.

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<sup>1</sup> The term "flat-earther" long has been used as a term of derision, so I was loathe to use it. However, I have noticed that some modern flat-earthers use the term to describe themselves in what appears to be an attempt to reclaim it. It is a more compact phrase than something like "those who support the flat-earth theory" to describe people who believe the earth to be flat. Therefore, I will use the term occasionally. Please understand that in this context I use it in a descriptive manner, not meaning it in an insulting way.

## Reasons We Know the Earth Is Spherical

Chapter 1 discussed some of the reasons for believing that the earth is spherical, arguments that go back to ancient times. I will briefly describe some of those here as well. The earliest recorded discussion of a spherical earth is from Pythagoras. In the sixth century BC Pythagoras correctly understood that the cause of lunar eclipses is the shadow of the earth falling on the moon. This can happen only when the moon is opposite the sun in our sky, which coincides with full moon. The earth's shadow is larger than the moon, so we cannot see the entire shadow at once. However, during a lunar eclipse we see the earth's shadow creep across the moon. Because the edge of the earth's shadow always is a portion of a circle, the earth's shadow must be a circle. If the earth were flat and round, similar to a disk, it could cast a circular shadow, but only for lunar eclipses that occur at midnight. For a lunar eclipse at sunrise or sunset, the earth's shadow would be an ellipse, a line, or a rectangle, depending upon how thick the disk was compared to its diameter. However, the earth's shadow during a lunar eclipse is always a circle, regardless of the time of night when the eclipse occurs. The only shape that consistently has a circular shadow, regardless of its orientation, is a sphere.

Another argument involves the stars that are visible in the northern and southern parts of the sky. The North Star lies within a degree of the north celestial pole, the direction in space toward which the earth's rotation points. As the earth rotates each day, the stars, the sun, and the moon appear to spin around the north celestial pole, so the north celestial pole remains fixed in the sky. In the ancient world, many people thought that the celestial sphere rotated each day around a non-spinning earth. For our purposes here, it doesn't matter which is the case. The north celestial pole makes an angle with the northern horizon. We call this angle the altitude of the north celestial pole. Since the North Star is so close to the north celestial pole, we can approximate the altitude of the north celestial pole with the North Star's altitude.

The altitude of the North Star is noticeably higher in the sky at northern locations than it is at southern locations. For example, the North Star is much higher in the sky in the northern United States and Canada than it is in Florida, as anyone vacationing in Florida can attest (provided they pay attention). This can happen only if north-south motion is along an arc. This is further underscored by other considerations. There is a region around the North Star

in which the stars do not rise or set but instead are continually up and appear to go in circles around the north celestial pole. We call these circumpolar stars, meaning “around the pole.” The region of circumpolar stars is larger at northern locations than in southern locations. Likewise, there is a circumpolar region below the southern horizon whose stars are always below the horizon. The northern circumpolar region, where stars are always visible, is very large, and the southern circumpolar region, whose stars are never visible, is also large. Closer to the earth’s equator, the two circumpolar regions are smaller. For example, for many years I lived in South Carolina, about  $4^\circ$  farther south in latitude from where I now live in northern Kentucky. I can see that the North Star is slightly higher in northern Kentucky than it was in South Carolina. Furthermore, during winter in South Carolina, the bright star Canopus barely rose above the southern horizon each night; but in Kentucky I can never see Canopus. This is because in northern Kentucky, Canopus is in the southern circumpolar region where stars are never visible, while in South Carolina it is not. This too shows that the earth is curved in the north-south direction.

Not only is the earth curved in the north-south direction, it also is curved in the east-west direction. There is a time difference of three hours between the east and west coasts of the United States. That is, the sun rises and sets approximately three hours earlier on the east coast than it does on the west coast. This is easily verified by anyone who has flown between the east and west coasts of the United States. Not only will your watch show that there is a time difference of three hours, but your body will notice the difference in time as well. If one drives from one coast to the other, the trip will take several days, so our bodies will not notice the time difference as much. However, our watches reveal that the time has changed. Such rapid transportation was not possible in ancient times, but the ancients could see this time difference another way. A lunar eclipse obviously must happen simultaneously for everyone on earth, but it will be different times at different locations. For instance, a lunar eclipse may start shortly after sunset in the eastern Mediterranean, such as in Greece. However, in the western Mediterranean, such as in Spain, the moon would already be in eclipse when the moon rose that night. This means that the lunar eclipse began before sunset/moonrise in Spain, but after sunset/moonrise in Greece. Communication in the ancient world was such that people were aware of this effect. This shows that the earth is curved in the east-west direction. If

the earth is curved in both the north-south and east-west direction, the most likely shape of the earth is a sphere.

Ancient sources, such as Aristotle, also mentioned that the hulls of ships disappeared before their masts did as the ships sailed away. This would happen only if the earth is spherical. Without optical aid, this is difficult to see. However, one easily can see a related effect. If one is perched atop the mast of the ship, one can spot land or other ships before people on the deck can. This is why spotters often were placed in a crow's nest high above a ship's deck. If the earth were flat, there would be no advantage to being above the deck. A similar thing can be observed on land. The Door Peninsula in Wisconsin forms the eastern shore of Green Bay. The distance across Green Bay from the northern portion of the Door Peninsula to Northern Michigan is about 20 mi (30 km). Looking across Green Bay from the beach on the west side of the Door Peninsula, one cannot see Northern Michigan. However, if one ascends the bluffs above the beach, one can see the shoreline of Northern Michigan. This is possible only if the earth is spherical.<sup>2</sup>

Not only did ancient people know that the earth was spherical, one of them accurately measured the size of the earth around 200 BC. Eratosthenes worked at the Great Library in Alexandria, Egypt. Eratosthenes is the father of geography because he coined the term and commissioned the creation of many maps. One year on the summer solstice, Eratosthenes was in southern Egypt near modern-day Aswan. Being on the northern limit of the tropics, the sun was directly overhead at noon on the summer solstice. Eratosthenes realized this because he could look down into a deep well and see the bottom.

Normally, the bottom of a well is not visible because the sun's light does not shine directly on the bottom, but it did at noon on the summer solstice because the sun was directly overhead. The sun never was directly overhead in Alexandria, because Alexandria is not in the tropics. Back in Alexandria the following year, Eratosthenes measured the altitude of the sun at noon on the summer solstice. He did this by measuring the length of a vertical pole of known height at noon. Trigonometry allowed Eratosthenes to compute the sun's altitude. The difference between  $90^\circ$  and the altitude was how far the

<sup>2</sup> Even with a telescope, seeing the disappearance of the hull of a ship first often is difficult. This is because of a temperature inversion that frequently happens with air near the surface of a large body of water. This temperature inversion can bend the light from a distant object around the surface of the earth for many miles. However, if one ascends above this temperature inversion, as to the mast of a ship or to bluffs above a shoreline, and compares to the view at water's edge, the effect of the earth's sphericity is more apparent.

sun was from being vertical. Eratosthenes found that the angle was about  $1/50$  of a circle. This meant that Alexandria and Aswan were separated by  $1/50$  of the earth's circumference. Eratosthenes knew the distance between those two locations, so multiplying that distance by 50 gave him the earth's circumference.

Why do so many people today assume everyone thought the earth was flat until the time of Columbus? The argument at the time of Columbus was not over the earth's shape, but over the earth's size. Muslims had closed off to Europeans the overland trade routes to the Far East. Everyone realized that travel to Asia by sailing west from Europe was possible, but why would you want to? There was a vast ocean (they didn't know about the two American continents in between) separating Europe and Asia. It was much shorter to sail eastward from Europe, perhaps around Africa, to reach Asia. In the small ships used at the time, it was not advisable to sail more than a few days out of sight of land. Columbus was proposing a voyage of a few months over open, uncharted waters. That was very dangerous. To make his proposed voyage more palatable, Columbus overestimated the eastward distance from Europe, and at the same time he decreased Eratosthenes' measurement of the earth's circumference. The difference in these two was Columbus' expected distance to Asia by sailing westward from Europe. In Columbus' estimation, it was shorter to reach Asia by sailing westward than eastward. A glance at a modern globe or map of the world reveals that this is false. In other words, Columbus was wrong, and his critics were right!

In the late nineteenth century, two atheistic skeptics, Andrew Dickson White and John Draper, created the conflict thesis—that Christianity held back the progress of science. One of their major arguments was that, throughout the Middle Ages, the church had taught that the earth was flat. In creating this myth, Draper and White suggested that the church could redeem itself for this supposed error on the earth's shape by getting in on the ground floor of Darwinism. This ploy was very successful in that much of the church capitulated on evolution. It also falsely altered history. It is this false version of history that most people have learned.

### **The Recent Version of the Flat Earth**

The most popular flat-earth cosmology promoted today is what some call a snow globe earth. A snow globe is a water-filled glass sphere on a base with a

scene on a flat plate on the inside of the sphere on the sphere's bottom. Often the scene is one of winter. There are small white particles in the water that are slightly denser than water. If one shakes the globe and sets the globe down on its base, snow appears to fall down upon the scene for a while. The snow globe earth is flat and round, with a hard sphere above it. Instead of water, the sphere is filled with air. And there are no fake snow particles. The stars are embedded on the sphere above, and the sun and moon are either on the sphere or just inside the sphere. The center of the flat earth is the North Pole, with the continents and oceans distributed similarly to how they are projected on the United Nations flag.<sup>3</sup> Each day the sun (and presumably the entire sphere) spins around the North Pole, causing the sun and stars to move across the sky. There is no South Pole. Nor does Antarctica exist as we know it. Instead, the edge of the round, flat earth is ringed by a high ice wall that no one has been able to penetrate, so no one knows how far outward the ice extends. According to the snow globe earth model, since no one has penetrated far into Antarctica, no one knows where the hard dome of the sky touches the ground. Apparently, Roald Amundsen lied about leading the first expedition to reach the South Pole in 1911, as have all others who have claimed to have reached the South Pole since. Furthermore, the United States government lies when it claims that the Amundsen-Scott South Pole Station has been staffed continuously since 1956; and the many people who claim to have spent time working at the Amundsen-Scott South Pole Station are lying too. Sir Edmund Hillary and Sir Vivian Fuchs led the Commonwealth Trans-Antarctic Expedition, the first Antarctic land crossing (from one side to the other), in 1958 as part of the International Geophysical Year. Of course, if the flat-earth conspiracy theorists are correct, not only Hillary, Fuchs, and their crew, but every person who has claimed to have crossed the Antarctic continent since are liars too. The number of people supposedly involved in this vast conspiracy of the spherical earth is staggering.

The snow globe earth model is geocentric. That is, the earth remains stationary and does not orbit the sun each year. For that matter, the moon does

<sup>3</sup> In fact, some promoters of the flat earth suggest that the United Nations flag is an admission that the earth actually is flat. After all, it would seem that the people running the United Nations certainly would be in a position to know the earth's true shape. But this makes no sense—why would a conspiracy devoted to maintaining belief in a spherical earth create a flag that supposedly spills the beans on what is really going on? This reminds one of the supervillains on the campy 1960s television farce *Batman* who prominently displayed outrageous clues to their crimes.

not orbit around the earth each month, nor do man-made satellites orbit the earth. Man has not ventured into space, and the Apollo astronauts did not land on the moon. As you can see, belief in a flat earth naturally leads to numerous other conspiracy theories, such as the notion that the Apollo moon landings were faked. To be fair, there are people who deny that we actually landed on the moon who believe that the earth orbits the sun and that the earth is spherical. But many other people have come to believe that the manned space program and the moon landings are a hoax primarily because of belief that the earth is flat.

As bizarre as this modern flat-earth model may seem, it recently has gained considerable traction. In addition to the conversation that I had in early 2016 with several older people concerned about young people being taken in by the flat-earth movement, there were other indications of the spread of this new phenomenon. Several people who regularly speak about creation (including those who are full-time speakers for Answers in Genesis) reported that questions about the flat earth began occurring in 2015 and 2016. Answers in Genesis likewise began to receive correspondences enquiring about the flat earth. This immediately raised two questions: Who are the people responsible for this recent interest in a flat earth? And what is their motivation? It appears that many of the people interested in this question are young, suggesting that social media is a major conduit. A quick internet search reveals tens of thousands of hits on the web promoting a flat earth. There are some articles, but many of these are videos of varying length and quality of production. Some are very short, less than a minute long, but typically these videos last five to 15 minutes. Many videos are of rather poor quality, with inferior sound and graphics. However, a number of others are best described as documentaries that are well-done from a technical standpoint. Many of these documentaries run up to two hours long.

An internet search for material promoting a flat earth often seems like a lengthy trip through the rabbit hole. As in the story of Alice in Wonderland, not everything is as it appears. Most people are aware that there is a Flat Earth Society, thinking that the Flat Earth Society is a serious group of people dedicated to promoting their own peculiar view of the world. The situation is far murkier than that. Actually, there have been several Flat Earth Societies. Some of them clearly have been tongue-in-cheek, while others appear to be far more serious. Some flat-earth advocates obviously are having fun, and they



don't seem to mind if their audience is in on the gag. However, some people promoting a flat earth appear to enjoy watching people squirm uncomfortably when confronted with an argument that they disagree with but can't quite manage to refute. Of course, these people are not about to let on that they are anything but serious about the flat earth. This is perverse.

### **Examples of Flat-Earth Proponents**

An example of someone who may not be serious about the earth being flat is Matthew Boylan. According to some sources on the flat earth, Boylan is an artist who was an independent contractor with NASA. Furthermore, he supposedly left that job after NASA employees took him into their confidence and invited him to join the conspiracy promoting the lie that the earth is spherical. According to Boylan, NASA fakes nearly everything that it does. Boylan has several videos on the Internet, but some of them appear to be comedy routines. In at least a few of the videos, audience members certainly reacted in a manner that suggested they understood they were watching a comedy routine. Boylan's delivery, including his frequent use of profanity, is similar to many other comedy routines today. In this routine, Boylan included a photo that he says shows the Apollo 11 Lunar Excursion Module (LEM) landing on the moon. According to him, because there had to be a camera crew already on the moon to take the photo, NASA faked the moon landing. However, the photograph clearly shows the curved edge of the moon, indicating that the LEM was far above the lunar surface. Actually, this photo was taken by Michael Collins, who remained aboard the Apollo 11 Command Module (CM), as the two other astronauts, Neil Armstrong and Buzz Aldrin, landed on the moon. Collins took the photo shortly after separation of the LEM from the CM. Similarly, Boylan shows an image of the Galileo probe arriving at Jupiter. Boylan mockingly notes that the Galileo probe must have been followed very closely by another spacecraft carrying a camera. NASA frequently produces this sort of image of spacecraft superimposed over an image of some space object relevant to the spacecraft's mission. In other words, this is an artist's rendition. As an artist, Boylan must understand this. He must be very amused that so many people think that he is serious.

Probably the person who many flat-earth promoters consider most authoritative on the subject is Eric Dubay. Dubay has written at least two

books on the flat earth, *The Flat-Earth Conspiracy* and *200 Proofs Earth Is Not a Spinning Ball*, and he is featured in, or is credited with, several videos on YouTube. From a production standpoint, these generally are among the better quality videos promoting a flat earth on the internet.

Dubay's argument (and hence the argument of those who have been influenced by him) for a flat earth relies upon a number of misunderstandings and false information. For instance, flat-earth arguments frequently repeat the previously mentioned cultural mythology that nearly everyone believed that the earth was flat until five centuries ago with the historic voyage of Christopher Columbus.<sup>4</sup> As previously mentioned, this faux history arose from the conflict thesis promoted by Andrew Dickson White and John William Draper during the latter part of the nineteenth century. Supposedly, the modern era was preceded by a long dark age after the fall of Rome, a dark age from which humanity had just recently emerged during the Enlightenment. The darkness of medieval times was caused by superstition perpetuated by Christianity. Once this impediment was removed during the Enlightenment, true progress could occur. One of the impediments supposedly was belief in a flat earth, which both the Bible and the church allegedly taught. It might make for a good story, but none of it is true. First, the Middle Ages were not quite as dark as often thought. Second, the church never taught that the earth was flat.<sup>5</sup> Furthermore, belief in a spherical earth has been common for more than two millennia. Both Ptolemy (early second century AD) and Aristotle (fourth century BC) taught that the earth was spherical. Not only did the teachings of Aristotle and Ptolemy dominate medieval thinking, but their teachings heavily influenced the medieval church as well. It would make no sense to accept all that these two men wrote, except for what they said about the earth's shape. There is no record that the church did; nor is there any record that the church taught that the earth was flat. There was not much discussion of the earth's shape in medieval writings because there was no question that the earth was anything but spherical. Supporters of a flat earth commonly claim that belief in a spherical earth accompanied a belief in evolution and a rejection of God

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<sup>4</sup> Eric Dubay, *The Flat-Earth Conspiracy* (self-published, 2014), 3, 7, 242. Page numbers in future references to Dubay's work refer to this book.

<sup>5</sup> For a good refutation of the idea that the medieval church taught that the earth was flat, see the work of the medieval scholar Jeffrey Burton Russell, *Inventing the Flat Earth: Columbus and Modern Historians* (Westport, Connecticut: Praeger, 1991).

and the Bible beginning five centuries ago.<sup>6</sup> However, none of this stands up to historical scrutiny. A true student of history would know better than this.

On page 149 of *The Flat-Earth Conspiracy*, Dubay incorrectly stated that “the first person to ever present the idea of a Sun-centered universe was Pythagoras of Samos in around 500 B.C.” Actually, it was Aristarchus of Samos, who lived about two-and-a-half centuries after Pythagoras, who proposed the first sun-centered system that we are aware of. Perhaps Dubay was thinking of Philolaus, a Pythagorean philosopher about a century after Pythagoras, who apparently was the first to propose that the earth was not the center of the universe. However, Philolaus’ cosmology was not heliocentric, because he envisioned the earth, sun, moon, and other planets orbiting a central fire. Or perhaps Dubay has confused Pythagoras’ conclusion that the earth is spherical with the heliocentric model. As previously mentioned, Pythagoras was the first person that we know of who taught that the earth is spherical.

Dubay’s arguments also suffer from the all-too-common misunderstanding of the cause of the seasons. All of us were taught early in our education that the earth’s  $23\frac{1}{2}^{\circ}$  tilt causes the seasons. As the earth orbits the sun each year, we alternately tilt toward the sun (resulting in summer) and away from the sun (resulting in winter). Unfortunately, most people fail to understand what this means, because most people, like Dubay, think that it is the changing distance from the sun due to the earth’s tilt that is responsible for seasonal changes (pages 71–72, 245). It is not, as Dubay argues:

if the heat of the Sun travels 93,000,000 miles to reach us, a small axial tilt and wobble, the difference of a few thousand miles, should be completely negligible.

If it is not the change in distance that causes the seasons, then what does cause the seasons? There are two effects at play. First, when tilted away from the sun, the sun’s altitude is much lower in the sky than when we are tilted toward the sun. For instance, where I live the sun’s altitude at noon on the summer solstice is a little more than  $74^{\circ}$ . At noon on the winter solstice, the sun’s altitude is a little more than  $27^{\circ}$ . Because the sun’s rays strike the ground at a lower angle in winter than in summer, the energy of the sun’s rays is spread

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<sup>6</sup> Eric Dubay in *The Flat-Earth Conspiracy*, 8, 172–215, discusses evolution and its supposed connection to spherical earth.

out over a much larger area than it is during the summer. In the specific case of my location, the ratio is a little more than 2:1. Since the sun's rays are required to heat more than twice the surface area in the winter than they do in the summer, winter is cooler. However, not only is the sun much lower in the sky during the winter, the sun is not in the sky very long during the winter. Again, at my location, the sun is above the horizon for nearly 14 hours and 45 minutes near the summer solstice, but the sun is up for a little more than 9 hours and 20 minutes near the winter solstice. With less sun exposure during the winter (and correspondingly more time for radiative cooling at night), winter is much cooler than summer. These two effects involving area and time combine easily to explain the seasons. Thus, in using this sort of argument against the spherical earth, Dubay exposes his ignorance of the true cause of the seasons. Whether intentional or not, this amounts to a straw-man argument.

But Dubay's ignorance is displayed in many other ways. He correctly states that if the earth revolves around the sun each year, the positions of the stars ought to shift back and forth. We call this effect parallax. Ancient astronomers debated this point, and because they failed to measure parallax, most concluded that the heliocentric theory must not be true. Some of the ancients who believed in the heliocentric theory responded that parallax would be too small to measure if the stars were incredibly far away. Indeed, that turned out to be the case. Parallax measurements require the use of a telescope. Even then, the first parallax measurements were not successful until the 1830s, more than two centuries after the invention of the telescope. Traditional parallax measurements from the ground are difficult, usually because of the blurring effect of the earth's atmosphere. Several spacecraft have made more precise parallax measurements possible. The Hubble Space Telescope can provide very precise parallax measurements, but only on a very limited basis. The HIPPARCOS mission in the early 1990s was optimized for measuring the parallaxes of many stars. The HIPPARCOS high precision catalog contains parallax measurements for nearly 120,000 stars. This produces distances with accuracy of about 20% for many of the stars within 600 light years of earth. The Gaia spacecraft, launched on a five-year mission late in 2013, will accurately measure the parallaxes, and hence distances, of millions of stars, increasing the margin for accurate distance measurements to about 6000 light years. Yet Dubay appears to be ignorant of this progress, for he wrote on page 12,

After almost two hundred million miles of supposed orbit around the Sun, not a single inch [*sic*] of parallax can be detected in the stars!

This claim is repeated on page 14 and on pages 242–243, and it is implied elsewhere. Many other flat-earthers have repeated this false information about the lack of parallax.

Dubay's book contains many false assertions, such as that the midnight sun cannot be explained by a spherical earth (page 70) or that Polaris, the North Star, can be seen as far as 23.5° south latitude (pages 71, 75) (Polaris generally is not visible south of the earth's equator). The only evidence for these false assertions—when any evidence is actually given—are quotes from various other authors writing in defense of the flat earth. And these quotes are frequent, often occupying entire pages of Dubay's book. Some of these other works are Samuel Rowbotham's 1864 *Zetetic Astronomy: Earth Not a Globe!*, William Carpenter's 1885 *100 Proofs the Earth Is Not a Globe*, Thomas Winship's 1897 *Zetetic Cosmogony*, and David Wardlaw Scott's 1901 *Terra Firma: The Earth Not a Planet Proved from Scripture, Reason, and Fact*. Rowbotham's work is the original source on the flat-earth theory, and the other authors, as well as Dubay, have repeated and embellished much of what Rowbotham claimed. None of these are credible sources, so appeal to them hardly constitutes evidence.

In his videos and in his books, Dubay clearly demonstrates that he does not understand physics. In at least one video he claimed that rockets cannot work in space because there is no air. In actuality, rockets work because of Newton's third law of motion (action-reaction), not because they push off of the air. Dubay protests that gravity seems to have two contradicting properties: making things stick to the earth and causing other things to orbit the earth. If Dubay understood even elementary physics, he would know that because of Newton's first law of motion, an object requires a centripetal force in order to orbit. Gravity provides that force. This is no different from any other object that goes in a circular or nearly circular path. A weight whirled around by a string is compelled in its orbit by tension in the string. In a similar manner, gravity provides the force required to make the moon orbit the earth. Centripetal force required for circular motion is described fully in any physics course. From his discussion, Dubay clearly does not understand the Coriolis Effect. Different latitudes on earth have different radii from the earth's rotation axis, hence there are different rotation speeds at different latitudes. Consequently,

as air currents move from one latitude to another, they deflect rightward on the earth's surface. This is the Coriolis Effect. The Coriolis Effect explains why the dominant wind directions are different at different latitudes, and why low-pressure systems spin counter-clockwise in the Northern Hemisphere (high-pressure systems spin clockwise, and the direction of either is reversed in the Southern Hemisphere). Incidentally, flat-earthers never even mention this, for there is no explanation in their model. There are many other examples of Dubay's failure to comprehend even basic physics. Many of Dubay's followers repeat his failure to comprehend physics.

### **Christians Supporting the Flat-Earth Belief**

It is not clear who is primarily responsible for the spread of belief in a flat earth among Christians. There are numerous videos, both long and short, available on the Internet that appear to promote a biblical argument for a flat earth. One such resource is a relatively well-done documentary, *The Biblical Flat Earth Series: The Global Lie Flat Earth Revelation Documentary*. Three of the people credited in the documentary are Philip Stallings, Rob Skiba, and Robbie Davidson. Davidson apparently is the filmmaker and primarily responsible for the production of the documentary. Both Skiba and Stallings have other videos promoting a flat earth, as well as other ideas, on the Internet. Stallings is identified as the founder of the Bible Flat Earth Society. An organization called Celebrate Truth also was involved in the documentary. It is not clear what Celebrate Truth is or who is behind it. Both Celebrate Truth and the Bible Flat Earth Society appear to have a presence solely on social media.

This documentary repeats many of the false claims of Dubay, such as the claims that we do not see stellar parallax, and that stars are not nearly as far away as astronomers maintain. In addition, there are other details included that Dubay does not mention in his book. These include the denial of the existence of extrasolar planets, the denial that meteors strike the earth, and the denial that the source of the sun's energy is nuclear. This video also echoes the Aristotelian objection that if the earth were moving, it would leave its atmosphere behind. The video likewise posits a variation of this theme with the claim that an airplane could not land on a runway if the earth were moving. Supposedly, when a plane leaves a moving earth, the plane is left behind by the earth's motion. This false claim is made by other supporters of a flat earth.

Once one postulates a flat earth, it leads to other preposterous claims. If the earth is flat rather than a sphere, then it is inconceivable that we have ventured into space. In the previously mentioned interview with Eric Dubay, he denied that there are any satellites orbiting the earth or that astronauts have gone into space. He claims that all photos and videos taken from space are faked. For example, Dubay says that the famous photograph of the earth taken by the Apollo 17 astronauts is a computer-generated image. Of course, this line of argumentation automatically requires belief that the Apollo moon landings were hoaxes. However, there are good reasons to believe that we really did land on the moon during the Apollo program.

Christians who want to entertain this nonsense ought to know that during his six-month stay on the International Space Station in 2006, astronaut Jeffrey Williams photographed the earth more than any astronaut in history. Some of Williams' photos are found in his book, *The Work of His Hands: A View of God's Creation from Space*. Many of the photos show that the earth is spherical. It ought to be apparent from the book's title that Williams is a Christian, and the book's content makes it abundantly clear. Hence, to doubt that the earth is spherical or that astronauts have gone into space is to accuse a Christian brother of perpetuating a tremendous lie.

But Williams is not the only Christian to have gone into space: Jim Irwin and Charles Duke were among the 12 men who walked on the moon. Recently, I asked Brigadier General Charles Duke to respond to those who think that the earth is flat and those who think that NASA faked the Apollo moon landing. This is what he wrote back to me:

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. . . . it [was] 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 six times? One needs only to look at the photos from the Lunar Reconnaissance Orbiter from my mission. The photos of our landing site shows 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.

Again, Christians who think that the earth is flat or that men never set foot on the moon are effectively accusing several Christian brothers of lying about one of the biggest things that ever happened in their lives. Are professing Christians among the Apollo moon-landing-deniers prepared to make this accusation?

### **“Support” for a Flat Earth**

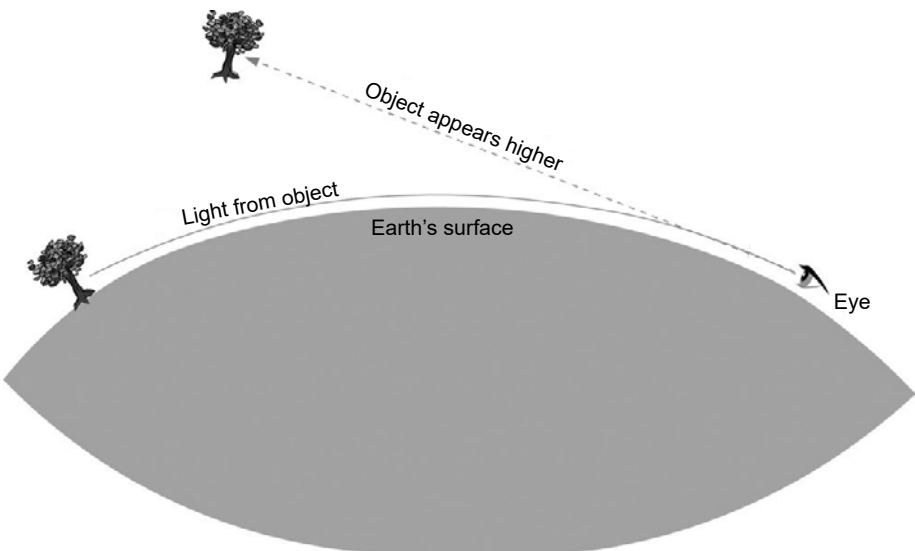
Let us discuss some of the more frequent claims that supposedly prove that the earth is flat rather than spherical. Most of the supposed evidences are negative; that is, they are attempts to show that the earth is not spherical. However, at least one, the Bedford Level Experiment, is positive, a direct attempt to show that the earth is flat. In 1838, Samuel Birley Rowbotham claimed to have conducted an experiment on the Old Bedford River on the Bedford Level near Norfolk, England. The Bedford Level is a six-mile stretch of the Old Bedford River that is straight, allowing an uninterrupted view along the six miles. Furthermore, there is no gradient there, so that portion of the river amounts to a slow-flowing drainage canal. If the earth is curved, then the drop from one end to the other is about 24 ft (7 m). That is, if one were to use a telescope at water level to view along the water on one end of the Bedford Level, a mast or pole 24 ft (7 m) high on the other end would not be visible.

Rowbotham waded into the river and used a telescope held 8 in (20 cm) above the water to observe a rowboat with a 5 ft (1.5 m) high mast row away. Rowbotham claimed that he could see the mast when it was 6 mi (10 km) away, even though the spherical earth required that the top of the mast be about 11 ft (3 m) below his horizon (as viewed from 8 in (20 cm) above the water). Rowbotham concluded that the earth must be flat—or it is more likely that he already thought this and this experiment proved his thesis, at least to his satisfaction. Rowbotham, using a pseudonym, published his results in a pamphlet titled *Zetetic Astronomy* in 1849, which he expanded into a book in 1865.



Most people ignored Rowbotham's work. However, in 1870 John Hampden, another flat-earth proponent, offered a wager of a hefty sum to anyone who could demonstrate a convex curvature of a large body of water, as a spherical earth would require. The famous Alfred Russell Wallace took the challenge. Apparently unaware of Rowbotham's result, Wallace altered the technique a bit. He placed two identical objects at different locations along the Bedford Level. Wallace examined either object from a telescope mounted on a bridge. He found that the nearer object appeared higher than the more distant one, consistent with the results predicted by a spherical earth. Why the difference? The density of air decreases with increasing height. Because this causes a slight change in the index of refraction in air, rays of light passing close to the earth's surface are bent downward. As can be seen in the following figure, this makes distant objects appear higher than they actually are (Figure A.1).

Incidentally, this well-understood effect causes the sun to appear to rise about two minutes earlier than it actually does. A temperature inversion, where the temperature increases with height, is common at low heights along the Bedford Level and other bodies of water. Temperature inversions accentuate refraction. If the rate of increase of air temperature with height is great enough, a temperature inversion can even cause objects far in the distance to appear

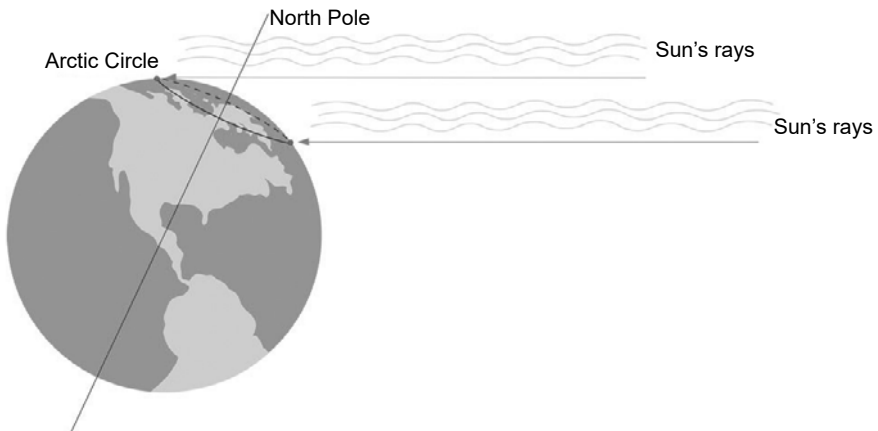


**Figure A.1.** Illustration of refraction of light passing close to earth's surface.

above the horizon. In 1896, Ulysses Grant Morrow conducted a similar experiment on the Old Illinois Drainage Canal under these conditions and found results consistent with the earth being curved concavely (there are, strangely enough, people who think that the earth's surface is the inside of a shell). Apparently, Wallace was aware of these effects, while Rowbotham was not. This is what prompted Wallace to conduct his experiment high enough above the water to eliminate the major contribution of refraction due to a temperature inversion at low height.

Those who promote the flat earth often mention the Bedford Level Experiment as proof that the earth is flat. They seem to think that Rowbotham's 1838 experiment settled the matter for all time. They are willfully ignorant that the experiment has been repeated many times since 1838. When those experiments are properly conducted to minimize the effect of refraction, they are consistent with a spherical earth.

What other "evidence" for a flat earth has been set forth? Some Internet videos promoting the flat earth show a time-lapse film of the midnight sun. The sun appears to move rightward along the horizon, slowly bobbing up and down once each day. The claim is made that the midnight sun is visible anywhere north of the Arctic Circle (around  $66.6^\circ$  north latitude), but that if the earth were spherical, the midnight sun would be visible only at the North Pole. The following figure shows the correct situation (Figure A.2).

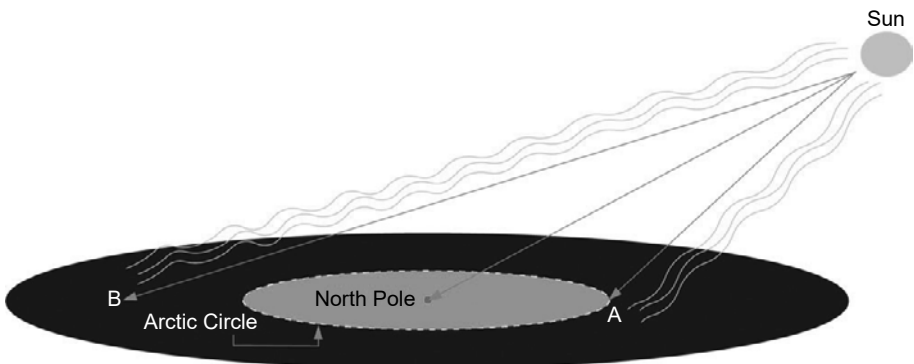


**Figure A.2.** Illustration of midnight sun on spherical earth.

On the summer solstice, the earth's Northern Hemisphere has its maximum tilt toward the sun. Consider an observer on the Arctic Circle. At point A, it is noon, and the sun is as high in the sky as it can be, nearly  $47^\circ$ . To an observer facing the sun with the North Pole to his back, the sun would appear in the southern part of the sky. However, 12 hours later the earth's rotation will take the observer to point B. This will be at midnight. As you can see, the sun's rays pass over the North Pole and reach point B tangent to the earth's surface. The sun's rays being tangent to the earth's surface means that the sun is on the horizon. Since the observer must face the North Pole to view the sun, the sun is in the northern part of the sky.

On the edge of the Arctic Circle, the midnight sun is visible only on the summer solstice. At higher latitudes, the midnight sun is visible for more days. At the earth's North Pole, the sun is above the horizon for six months. The sun does not appear to bob up and down each day at the North Pole. Instead, the sun appears to circle each day at about the same altitude. Actually, the sun rises on the vernal equinox and slowly gains altitude until the summer solstice, whereupon the sun slowly descends again until it sets on the autumnal equinox. The sun's maximum altitude on the summer solstice is  $23.4^\circ$ .

There is an irony here. While supporters of the flat earth falsely claim that the midnight sun on the Arctic Circle cannot happen if the earth is spherical, it is the flat earth that has difficulty explaining the midnight sun. Most flat-earth models have the North Pole at the center of a disk-shaped earth, as in the following illustration (Figure A.3).

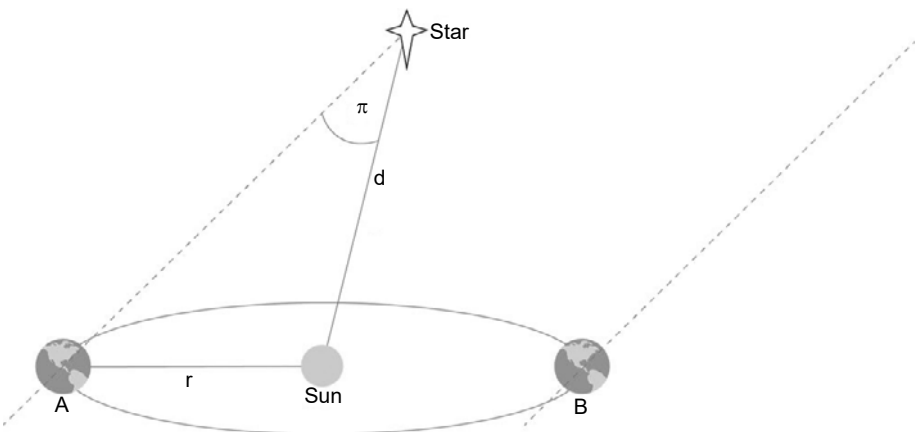


**Figure A.3.** Illustration of the impossibility of midnight sun on flat earth.

Suppose that the midnight sun is visible at the North Pole as well as on the Arctic Circle. This is indicated by lines from the sun to the North Pole and at point A on the Arctic Circle. Notice that on a flat earth, we can draw a line from the sun to any point on the earth not within the Arctic Circle (such as point C). Hence, if the earth were flat, the midnight sun must be visible everywhere, not just within the Arctic Circle. Because this clearly is not the case, the earth must not be flat.

Some of the flat-earth promotional videos that deal with the midnight sun show the sun orbiting each day around the earth's North Pole. Mysteriously, there is a shadow on the earth on the other side of its North Pole opposite the sun. As the sun orbits the North Pole, so does the shadow. Apparently, the shadow indicates where it is night on the earth. However, because the sun clearly is above the horizon for locations in that shadow, it ought to be day there. The origin of this shadow-producing night is never explained. Furthermore, since the sun clearly is above the horizon for the entire flat earth, it ought to be day everywhere on the earth. This, too, is not explained.

Another claim made against the spherical earth is that if the earth were a spinning globe that orbited the sun each year, the earth's spin axis would not stay aligned with the North Star. This is because, as we shift from one side of the earth's orbit to the other, our perspective changes, as can be seen in Figure A.4.



**Figure A.4.** Illustration of stellar parallax as assumed by flat-earth proponents.

If the earth's axis were aligned with the North Star at point A, then the earth would not align with the North Star six months later when the earth arrives at point B. This effect is well enough known to warrant a name: parallax. At least one of the videos gives what astronomers think is the distance to the North Star (four quadrillion kilometers, but it's actually about twice that distance) and the radius of the earth's orbit (95,000,000 mi [150,000,000 km]). We can use these numbers to find how much the parallax angle,  $\pi$ , is. As we shall see, the angle  $\pi$  is a small angle, so we can use the small angle approximation. If an angle is small, we can express the angle, in radian measure, as the ratio of the baseline to one of the other sides. The baseline is the earth's orbital radius,  $r$ , and the other side is the distance to the North Star,  $d$ . That is,

$$\pi = r/d = (150 \text{ million km}) / (2 \text{ quadrillion km}) = 7.5 \times 10^{-8} \text{ radians.}$$

To convert this to degrees, we must multiply by 57.3. After doing this, the angle is  $4.3 \times 10^{-6}^\circ$ , or a little more than four millionths of a degree. That is the apparent diameter of a dime when viewed 150 mi (250 km) away. The parallax is defined as half the total shift, so the total shift that we would see would be twice this amount, but remember, the distance given in the video is about half the true value. Obviously, this is a very small angle, far too small for our eyes to notice. Therefore, this supposed proof that the earth is flat is specious.

### Supposed Biblical Support for a Flat Earth

Proponents of the flat earth who profess to be Christians commonly assert that the Bible indicates the earth is flat and list biblical passages which supposedly support this idea. It is interesting that many of the passages given in support are the same passages that skeptics list in an attempt to discredit the Bible for allegedly teaching that the earth is flat. It causes one to wonder if at least some of the flat-earth promoters who claim to be Christians actually are skeptics engaging in a stealth campaign against the Bible. Here we will examine some of these passages which supposedly indicate that the earth is flat. Unfortunately, many of the presentations of biblical passages that supposedly support a flat earth merely quote verses with no comment or explanation. Instead, there is usually an invitation to read all the passages listed and then to ponder what these verses mean in totality. With little or no discussion, one is left to conjecture just how the authors intended to interpret these verses so that they

support a flat earth. Rather than addressing the earth's shape, some of the listed biblical passages apparently are intended to support concepts that are related to the snow globe earth model. Besides the earth being flat in the snow globe earth model, there are at least two related ideas: that the earth is stationary, and that it is surrounded by a hard sphere on which astronomical bodies are affixed. So now let us consider the verses that supposedly support these three claims, that the earth is stationary, that there is a solid sphere surrounding the earth, and that the earth is flat.

### ***Is the Earth Stationary?***

Let us first examine some of the verses that supposedly teach geocentrism, with its accompanying belief that the earth does not move. Chapter 13 of my previous book, *The Created Cosmos: What the Bible Reveals about Astronomy*, discussed the flat earth and geocentrism in some detail; what I write here must necessarily repeat some of that material. However, the version of geocentrism addressed there was the Tychonic model. In the Tychonic model, the earth is stationary and is orbited by the moon and sun. However, the other planets orbit the sun, so that the motion of the planets with respect to the earth is a combination of their motion around the sun and the sun's motion around the earth. In some sense, this is a heliocentric (sun-centered) model, and it amounts to a coordinate transformation from the sun to the earth. Promoters of the flat earth do not discuss the motion of the planets, so it is not clear what sort of model they have for the planets' motion (the lack of discussion suggests that they have not even considered this question). At any rate, it is clear that those who believe the Tychonic model want nothing to do with those who promote a flat earth.

Some supporters of the Tychonic model quote Bible verses that speak of the sun rising or setting. Treating these verses in a hyper-literal manner, they conclude that earth does not spin. Hence, the heliocentric model with a spinning earth must be false.<sup>7</sup> How do we who believe in the authority of Scripture and a spinning earth respond to this? The earth spins, causing the sun to *appear* to rise and set. Relative and absolute motion are tricky concepts.

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<sup>7</sup> I must emphasize that supporters of the Tychonic model are split. While all of them believe that the earth does not move through space, some believe that the earth rotates on its axis each day, while others do not. Obviously, the ones that believe that the earth does not rotate are the ones who argue that verses which speak of sunrise and sunset show that the Bible is geocentric.

In some sense we can say that the sun *does* rise each day, move across the sky, and then set. To be absolutely literal about it, we properly ought to say that the sun *appears* to rise, *appears* to move across the sky, and *appears* to set. This is a bit clunky, and no one speaks this way. We are totally comfortable with people speaking in a phenomenological sense, that is, in the manner describing the way things appear to happen. Professional astronomers, such as myself, nearly always talk and write in this way of the sun, moon, and stars rising and setting, yet no one accuses us of denying the earth's rotation. Why would the Bible be any different? In many respects, this is a moot point because the flat-earth geocentrists never mention these verses. It may be because, as already discussed, sunrise and sunset are difficult concepts to explain for those who believe in a flat earth.

One verse that flat-earth supporters use to show that the earth does not move is Joshua 10:13, wherein Joshua commanded the sun and moon to stand still.<sup>8</sup> Certainly, it is argued, this must mean that it is the sun and moon which move, or else Joshua would have commanded the earth to stop rotating. As just argued with the rising and setting of the sun, even professional astronomers often speak of the sun, moon, and stars moving in the sky—even though we know that it is the rotation of the earth that causes the motion. In that sense, it is quite reasonable for Joshua to have used the words that he did.

A common verse appealed to by geocentrists of all types, including flat-earthers, is 1 Chronicles 16:30, which reads,

Tremble before him, all the earth;  
yes, the world is established; it shall never be moved.

Surely, they reason, if this verse means anything, it means that the earth does not move. Or does it? What is the context of this verse? In 1 Chronicles 15, David brought the Ark of the Covenant to Jerusalem, and in 1 Chronicles 16:1–7, David brought the Ark into a tent and presented offerings before it. The narrative continues with a song of thanksgiving in 1 Chronicles 16:8–36, which includes the verse in question. Being a song, it amounts to poetry. Indeed, portions of this song are repeated in Psalm 96, 98, 100, and 106. For instance, the relevant portion of 1 Chronicles 16:30 appears word for word in

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<sup>8</sup> For a more detailed discussion of Joshua's long day, see Chapter 6 of *The Created Cosmos: What the Bible Reveals about Astronomy*.

Psalm 96:10. (Psalm 96:10 is likewise included in most lists of verses allegedly supporting a stationary earth.) However, a hallmark of poetry is imagery and figurative language. For instance, 1 Chronicles 16:31, which immediately follows 1 Chronicles 16:30, states,

Let the heavens be glad, and let the earth rejoice,  
and let them say among the nations, “The LORD reigns!”

Notice here that the heavens and earth are personified, for the heavens are described as being glad and the earth is commanded to rejoice. It is doubtful that even the most literal of literalists (including flat-earthers) would insist that the heavens can feel emotions or that the earth can speak. They would agree that these are poetic statements. Yet flat-earthers insist that 1 Chronicles 16:30 must mean that the earth does not move in some literal sense. The phrase “the world is established; it shall never be moved” from 1 Chronicles 16:30 and Psalm 96:10 essentially says the same thing two different ways. In these verses, the earth not moving is not to be understood as a reference to its lack of motion, but to the fact that God created the earth to endure—God created *and* continually sustains the earth. The modern geocentrists are claiming that these verses mean something other than what the authors intended them to mean in their respective literary and historical contexts. Another verse used to argue that the Bible teaches an immovable earth is Psalm 93:1, which reads,

The LORD reigns; he is robed in majesty;  
the LORD is robed; he has put on strength as his belt.  
Yes, the world is established; it shall never be moved.

The relevant phrase, “the world is established; it shall never be moved” is the exact same wording of 1 Chronicles 16:30 and Psalm 96:10. This is because the Hebrew wording underlying the translation is likewise the same.

In a similar manner, flat-earthers reference verses that mention the foundation(s) of the earth (e.g., Job 38:4; Psalm 102:25, 104:6; Isaiah 48:13) or the pillars of the earth (e.g., 1 Samuel 2:8; Job 9:6; Psalm 75:3). If taken in a rigidly literal fashion, the earth having a foundation or pillars would suggest that the earth rests upon something. What is the earth resting upon? What is its foundation? If one views these verses strictly in a literal sense, the earth itself cannot be the foundation or pillars. Strangely, though, flat-earthers also quote



Job 26:7:

He stretches out the north over the void  
and hangs the earth on nothing.

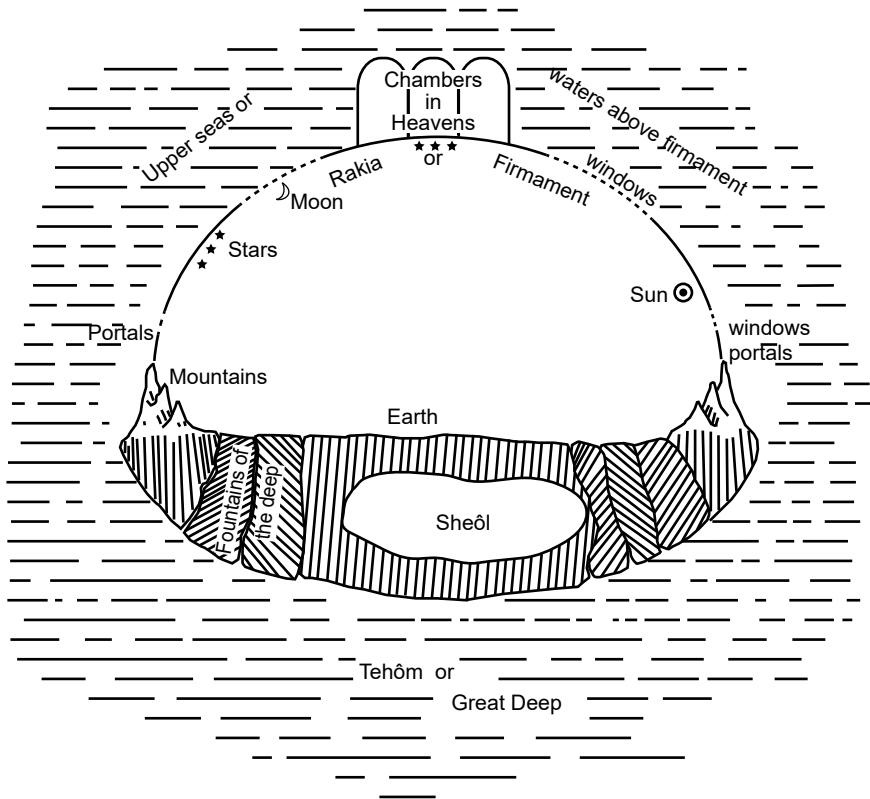
This verse clearly indicates that the earth is supported by nothing. One might claim that this verse merely means that the earth is not *suspended* by anything (such as a cable), but that the earth could be supported by a foundation or pillars below. But wouldn't that mean that one could now understand Job 26:7 (interpreting Scripture in terms of Scripture) as, "He stretches out the north over the void and hangs the earth on nothing (but it is supported below)"? Clearly, such a reading would entirely gut the majesty and power of God that Job 26:7 conveys.

The problem is that most, if not all, of the cited verses come from poetic passages. Poetry, including ancient Hebrew poetry, contains much imagery. By its very nature, imagery employs figurative, symbolic allusions. That is to say, there are many aspects of poetry that clearly are non-literal. This does not mean that *everything* in poetry is non-literal, because then poetry would be meaningless. Hence, one must exercise some caution in exegeting poetic passages in the Bible. For instance, the book of Job is classed with the poetic books of the Old Testament, because it clearly is written in a poetic style. However, that does not mean that the man Job merely was a poetic device. Rather, Job was a real, breathing human being who endured hardship. It is just that his story of suffering is told (mostly) in a poetic style.<sup>9</sup> Often, conservative Christians are accused of believing that every word in the Bible is to be taken literally. This clearly is not true. Unfortunately, the hyper-literal manner of interpretation employed by those who claim that the Bible teaches a flat earth provides fodder for this false accusation.

### ***Is the Earth Surrounded by a Hard, Transparent Sphere?***

The snow globe earth model features a flat earth with a hard, transparent dome above. Many times, presentations of this supposed biblical cosmology feature a figure illustrating this model, as the accompanying figure here shows (Figure

<sup>9</sup> Outside of the traditional poetic books there are often some poetic passages present. Some critical scholars claim that poetic elements of the first few chapters of Genesis override all other considerations and thus that none of the events described therein actually happened. That is, there was no literal Adam, no Garden of Eden, no temptation, and no Flood in Noah's day. This is nonsense, because there are many hallmarks of historical narrative found in the book of Genesis.



**Figure A.5.** Illustration of “snow globe earth”. (G.L. Robinson, *Leaders of Israel*. New York: Association Press, 2)

A.5). Where do flat-earthers get the idea that the Bible teaches this? Certainly, such illustrations were never part of the inspired canon of Scripture. Many of the verses cited in support of this concept involve the word *firmament*. This word occurs 17 times in the King James Version of the Bible, though more modern translations often translate the underlying Hebrew word as *expanse*. The Hebrew word is *rāqîaʿ*. Its exact meaning is not readily apparent, which has led to confusion and uncertainty. A major part of the problem is that the word occurs so infrequently, with more than half of the instances of its use in Genesis 1 alone.

The noun *rāqîaʿ* derives from a verb that means to beat, press, or stamp out. A good illustration of this verb would be in the beating or rolling out of gold into thin sheets. Gold is very malleable, which allows craftsmen to spread gold

out into very thin foil that they can apply to surfaces to give the impression of a solid gold object. It would appear that the intended property of this thing called the *rāqîa'* is that it is spread out, or expanded. That is why many modern English translations render it as *expanse*. As explained in Chapter 2 of *The Created Cosmos: What the Bible Reveals about Astronomy*, the unfortunate translation of *rāqîa'* as *firmament* goes back to the Septuagint more than 2000 years ago in an attempt to wed the Genesis creation account to the Hellenistic cosmology of that day. That cosmology included a solid, transparent dome over the earth to which the astronomical bodies were attached. This was similar to the cosmologies of ancient cultures that surrounded ancient Israel, so many Bible scholars have incorrectly assumed that the Genesis creation account must reflect the thinking of that era of antiquity. Hence, some of these Bible scholars have constructed diagrams of what they think the ancient Hebrew cosmology must have been. This is the view that modern flat-earthers have embraced.

However, as shown in Chapter Two of *The Created Cosmos: What the Bible Reveals about Astronomy*, this view is almost certainly wrong. Rather, the *rāqîa'* of Genesis 1 probably refers to what we would call space today, with perhaps at least part, if not all, of the earth's atmosphere included as well. Hence, there is no biblical reason compelling us to believe in the snow globe earth.

### ***Does the Bible Say the Earth Is Flat?***

The phrase “ends of the earth” appears 28 times in the King James Version (e.g., Job: 28:24; Isaiah 41:9; Jeremiah 16:19), though more modern translations may vary on the wording of some of the occurrences. Supporters of a flat earth insist that these verses must refer to a physical edge to the earth, requiring that the earth be flat. Presumably the edge of the flat earth is where the transparent globe surrounding the earth intersects the earth, beyond the ice wall that we call Antarctica. Actually, the phrase “ends of the earth” is idiomatic, and it refers to the remotest parts of the earth. The phrase “four corners of the earth” appears three times in the Bible. Many skeptics claim that this must refer to a flat, square earth, thus proving that the Bible teaches a flat earth. There are some examples of flat-earth cosmologies from the ancient world, but they always consisted of a flat, *round* earth. A circle was considered a much more perfect shape than a square, so none of the flat-earth cosmologies were square. If a square flat earth were the cosmology of the Bible, then it would have been at

odds with every other ancient flat-earth cosmology. The one occurrence of “the four corners of the earth” in the Old Testament, Isaiah 11:12, should be taken in the same manner as other Old Testament passages mentioning the “ends of the earth.” It is likewise an idiomatic expression. The two New Testament occurrences of “the four corners of the earth” are in the book of Revelation. Revelation 7:1 speaks of four angels standing on the four corners of the earth and restraining the four winds of the earth. The four winds obviously refer to the four directions of the wind: north, south, east, and west. This repetition (“four angels . . . four corners . . . four winds”) makes it clear that this is an idiom referring to the four compass directions. The phrase “four corners of the earth” from Revelation 20:7 also is idiomatic, referring to the four directions. Since most flat-earth enthusiasts today believe that the earth is flat but round, they generally do not mention these verses, though a few do.

One of the more bizarre biblical passages that flat-earth supporters claim proves their point is Daniel 4:10–11, which reads:

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. The tree grew and became strong and its top reached to heaven, and it was visible to the end of the whole earth.

Presumably, this passage teaches a flat earth, because only on a flat earth could the top of the tree be visible from the entire earth. Alternately, perhaps only in a snow globe earth could the top of a tree reach to heaven. There are many problems, however, with claiming that this passage indicates that the Bible teaches the earth is flat. For instance, even flat-earth advocates agree that the tallest mountains are not visible over the entire earth—the angular height of the mountains is exceedingly small when viewed from hundreds, or even thousands, of miles. To be readily visible over the entire flat earth, a tree would have to be hundreds, if not thousands, of miles high. Do flat-earth supporters think that this tree actually existed? No, for this tree appeared in a *dream* that King Nebuchadnezzar had one night. If one reads Daniel 4 in its entirety, one will readily see that Nebuchadnezzar described what he experienced as a dream (verses 5, 6, 7, 8, 9, 18, and 19), and Daniel called it a dream too (verses 19). Four times Nebuchadnezzar called his dream a vision (the phrase “visions in my head” occurs in verses 5, 10, 13, and “visions of my dream” appears in verse 9). In verses 8–18, Nebuchadnezzar recounted his dream to Daniel and

requested that Daniel interpret the dream. Daniel interpreted the dream in verses 19–27, in which Daniel said that Nebuchadnezzar was the tree in the dream (verse 22). Daniel told Nebuchadnezzar that because of his pride, he would lose his mind for seven years. The fulfillment came a year later (verses 28–33), but after seven more years Nebuchadnezzar was restored to his mind and his kingdom (verses 34–37).

Key to properly understanding this text is that Daniel metaphorically identified Nebuchadnezzar with the tree. That is, there was no literal tree, because it appeared in a dream in which the tree *represented* Nebuchadnezzar. We have no idea whether Nebuchadnezzar believed in a flat earth and thus understood his dream within that cosmology. It really doesn't matter, because this dream does not address cosmology, and even if it did, it would not amount to an endorsement of any particular type of cosmology on God's part. Rather, it would be the statement from Nebuchadnezzar, who likely was a pagan at the time, concerning his cosmology, not revelation from God about what particular cosmology were true.

Supporters of the flat earth probably have similar reasoning in mind when they cite Matthew 4:8–9, which reads,

Again, the devil took him to a very high mountain and showed him all the kingdoms of the world and their glory. And he said him, "All these I will give you, if you will fall down and worship me."

This account concerns the temptation of Jesus after His 40-day fast (Matthew 4:1–11). Presumably, those who believe that the earth is flat think that it would be impossible to view all the kingdoms of the world from a high mountain if the earth were spherical, but it would be possible if the earth were flat. However, if the flat-earthers are correct on this matter, then shouldn't there be a mountain on the earth from which one literally can see all the kingdoms on earth? If so, where is this mountain? Clearly, no such mountain exists.<sup>10</sup>

How do we properly understand this second temptation? Some clues may come from the parallel account in Luke 4:1–13. Verse 5 in the King James Version

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<sup>10</sup> One could argue that this exceedingly high mountain exists beyond the ice wall in Antarctica. However, if all the earth's kingdoms were visible from such a mountain, conversely that mountain must be visible from all the earth's kingdoms. Why hasn't anyone spotted this towering mountain?

includes the description of the Devil taking Jesus up to a high mountain to show Him all the kingdoms of the world, but most modern translations of Luke's account omit the mention of a high mountain, stating simply that the Devil "took Jesus up." This is because while the phrase concerning a high mountain exists in the *Textus Receptus* of Luke's account of the temptation of Jesus, earlier, more reliable manuscripts do not include this phrase. This probably is because a later copyist, being familiar with the language of Matthew's account, inserted the additional words into Luke's account. More revealing, Luke's gospel adds a mention of a time element by stating that the Devil showed Jesus all the kingdoms of the world "in a moment of time." A more literal rendering into English would be "in a point of time." That is, the Devil showed Jesus all the world's kingdoms virtually instantly. This would not be possible if indeed the Devil literally took Jesus to a high mountain and literally pointed out each of the world's kingdoms. That is not to say that the temptation did not take place; it did. Rather, certain elements of the temptation may not be as literal as some would propose. For instance, this portion of the temptation may have been a vision that the Devil shared with Jesus.

Yet another sort of related reasoning apparently occurs when those who believe that the earth is flat list Revelation 1:7 as support. That verse refers to the return of the Lord Jesus Christ, and reads,

Behold, he is coming with the clouds, and every eye will see him, even those who pierced him, and all tribes of the earth will wail on account of him. Even so. Amen.

Once again, the argument appears to be that it would be impossible for every eye to see Jesus' return if the earth were spherical, but it would be possible if the earth were flat. Again, strict hyper-literalism fails the test. Notice that "those who pierced" Jesus are included among those who will witness the Lord's return. Who pierced Jesus' side? According to John 19:31-37, the soldiers who crucified Jesus literally pierced His side (and, more specifically, according to verse 34 it was *one* of the soldiers who actually thrust the spear into Jesus' side). In his Crucifixion account, the Apostle John quoted Psalm 34:20, which states that "not one of his bones would be broken," as well as Zechariah 12:10, which says that "they will look on him whom they pierced." The Apostle John quoted his own gospel and Zechariah 12:10 in Revelation 1:7. But wouldn't those who

pierced Jesus' side be at *least* 2000 years old when they will witness the Lord's return? Obviously, this cannot be true in a rigidly literal sense. However, since Jesus died for the sins of all mankind, then in a metaphorical sense, we all are responsible for Jesus' Crucifixion and hence also are responsible for piercing His side. Clearly, there are certain elements of this verse that are not absolutely literal.

Coming back to the question at hand, is it possible for *every eye* to see the Lord's return, even on a spherical earth? Of course. To doubt this would be to limit God's power. Christ's return will be a display of God's power in a *miraculous* way. Therefore, this verse hardly teaches that the earth is flat, and those who insist that it does obviously have approached it with an agenda or, at the very least, with several hidden assumptions.

## Conclusion

Many of the arguments put forth by Dubay and others for a flat earth are so poor that one has to wonder how serious these people must be.

Are these people who believe in a flat earth for real? It's hard to say. They could be well-intentioned but seriously misguided people. Or they could be attempting to discredit the Bible and Christianity. If the latter, their approach probably is, "If you think that the Bible is literally true, then I'll show you just how literally true the Bible is!" But this is a false dichotomy. Christians who believe in the inspiration of the Bible and have a high regard for the authority of Scripture usually don't say that the Bible is literally true. Rather, they understand that the Bible is true because it is inspired by God. As such, it is authoritative on all matters and is reliable. The Bible contains imagery and poetry. However, those passages are easy to identify. When it comes down to the sorts of questions that matter here (such as "Did God create the world?"), the Bible must be read and understood historically and grammatically. That is, historical narrative does not lead to symbolic interpretation. Hence, the creation account is literally true.

At least some of the people behind this upsurge in the flat-earth movement may be lampooning the creation movement. As such, they clearly are no friends of the church; rather, they oppose Christ and His kingdom. Christians therefore need to be very discerning about the teachings of those who espouse a flat earth.