The Flat Earth Frenzy  
Unscientific and Unbiblical

The Flat-Earth Society is growing very rapidly today. Websites, blogs, books, lectures and debates are being held all over the world today seeking to promote the idea that the Earth is not a sphere but is a flat circular disc.

The reasons for this upsurge are varied. Some firmly believe that organizations like NASA are deliberately deceiving the populace by creating fake pictures of a spherical Earth. Others believe the Bible clearly teaches a flat earth. Some have even done their own experiments that, in their minds, prove the Earth must be flat.

Youtube is filled with normal everyday people who have become amateur scientists and producers, all telling us that society as a whole has been deceived into thinking that the Earth is round, despite the fact that almost every other celestial body we see in the universe, from our sun, our moon, the planets or the stars, are round.

Some of the proofs that flat-earthers present can appear quite convincing. For example, they point out that the sun rays coming through clouds are slanted, as if the sun is only a few thousand or less miles above the Earth. We must agree that, if the sun were only 3000 miles high and was only 27 miles in diameter, it would produce the sun rays we see in the two above pictures. But this doesn’t prove anything for the flat-earthers since it can easily be shown that a sun with is .864 million miles in diameter that is 93 million miles away will also produce the same slanted rays. So will a sun that is 47 million miles away and is .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 and produce the same effects on the Earth.

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1 See this Youtube for the argument:  
https://www.youtube.com/watch?v=b_ppPXChvTo. The main problem with this video is that the sun and its rays are not drawn to scale, and thus the results are distorted.
This is precisely the problem with flat-Earth science. Although it can produce various explanations that 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 that 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 give us is actually worse than the disease they are trying to fight.

For example, a small sun that is only 3000 miles high might be able to produce the slanted rays we see in the above picture, but it is not going to be able to produce enough gravity to hold in the planets; and it is not going to be able to produce enough light to reflect off the moon and the planets for us to be able to see them from Earth. Flat-earthers try to solve these problems by claiming that gravity is a fiction and that the planets are mere mock-ups from NASA. In effect, they have solved one problem only to create two bigger problems.

As we will see, it is their poor exegesis of the Bible that drives them to think that everything NASA tells them about the Earth is a lie. Although it can be shown in some cases that NASA is certainly not the highest epitome of truth and honesty, it is quite another thing to claim that NASA deliberately forges pictures of a spherical Earth, a large sun, or the existence planets.

Scientifically speaking, on the principle that flat earth advocates must be able to answer all the anomalies in their model, it is rather easy to discredit. Just two simple scientific facts will show this to be the case.

First, if the earth were a flat disc, the North Star, Polaris, would be at the top dead center and we would be able to see it from anywhere on the disc, even from the perimeter of the disc. (See FIG. 1).

But the fact is, a little less than half the humans on earth, that is, those who live in what is normally understood as the southern hemisphere, don’t see Polaris at all. Instead, those in the southern
hemisphere see the South Pole star, Sigma Octantis (with a telescope because it is dim). Likewise, those in the northern hemisphere cannot see Sigma Octantis.

There could only be one reason for the inability to see these pole stars: The Earth must be a sphere.

These are pictures of Earth taken very recently from the geostationary weather satellite, Elektro-L, from 22,242 miles high, courtesy of the Russian Federal Space Agency.²

² http://electro.ntsomz.ru/en/; One can see the reflection of the Sun following the equatorial line. 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. As is common knowledge, the Russians are just as leery of some of NASA’s claims as are some Americans.
The Japan Meteorological Agency launched its latest weather satellite called the Himawari 8 this past October. A few days ago the agency released the first true color photo (shown above) captured with their new “eye in the sky.”

More stills and moving slides from Russia’s Elektro-L

Notice no composites.

Two pictures of Earth taken a few hours apart. Notice the Sun's light traveling east to west.

Conversely, flat-earthers have never shown a photograph of a flat earth from space. We have never seen anything from flat-earthers resembling the picture below. All their pictures of a flat-earth are either drawn by hand or are computer generated graphics (CGI). Of course, flat-earthers try to answer this by assuring that all satellites and space probes are fake, which is completely absurd.

http://petapixel.com/2014/12/21/heres-first-true-color-photo-earth-snapped-japans-new-himawari-8-weather-satellite/. Flat-earthers claim that such photos are from a fish-eye lense, which makes a circle out of the landscape. This is a discredited objection as can be seen in this video: https://www.youtube.com/watch?v=Mlyz3B3g-ZE&feature=youtu.be
Second, if the Earth were flat it would mean that the 25,000 miles that we normally understand as its circumference would be spread out as a flat disc, somewhat like taking a ball of dough and spreading it out on a round pizza pan.

So, let’s say we are on the edge of this flat earth and we climb a building that is as tall as the Sears Tower in Chicago, and we mount one of the world’s most powerful telescopes, one that can see Pluto on a clear night, on the roof of the Tower.

If we point the telescope toward the opposite edge of the flat earth, on a clear day or night, we should be able to see all the way to the opposite edge, the whole 8,000 mile diameter. But the reality is, we can only see a few hundred miles and the end point is always at the horizon. It is even more problematic for flat-earthers since they believe the diameter of the Earth is only 4,000 miles.

The reason should be obvious. The Earth must be a sphere and thus our line of sight drops off after only a few hundred miles, even at heights as high as the Sears Tower, and even with telescopes that can normally see details of planets millions of miles into outer space.
We can also point out other phenomenon that show the Earth is a sphere. For example, hurricanes in the north rotate counter-clockwise but in the south they rotate clockwise. This can only happen on a spherical surface that is rotating against space or space that is rotating around a sphere.

Also, a person in the southern hemisphere of Earth sees the moon upside down in contrast to someone in the north. One can easily verify this by obtaining pictures of the Moon in Australia. The inverted image could only happen on a spherical Earth, since everyone on a flat earth is standing with their head pointing north.

Since the Moon is inclined by 5 degrees to the ecliptic, Earth’s line of sight to the Moon will vary, causing the dark spots to shift a little. But generally speaking, as viewed from the Earth’s southern hemisphere, the Moon’s dark spots will be in the Moon’s southern hemisphere; while if viewed from the Earth’s northern hemisphere, the Moon’s dark spots will be in the Moon’s northern hemisphere.

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SO WHAT IS DRIVING THE FLAT-EARTHERS?

What is it that is driving flat earth advocates to persist in their belief despite these scientific anomalies?

Well, something similar happens to the very people they believe are deceiving them against a flat earth. Organizations such as NASA, the JPL, and much of the scientific community today believe in the Big Bang and evolution, but they do so not because the scientific data has provided overwhelming evidence.

If it were merely a matter of gathering evidence, NASA would not need to invent ad hoc problem-fixers like Inflation, or make even more embarrassing claims to make the Big Bang work (e.g., that an unseen and undetected Dark Matter and Dark Energy make up 96% of the universe).

No, they do so because ideas concerning the origin and makeup of the universe have become somewhat of a religion for its adherents. As Big Bang evolutionist Richard Lewontin has honestly put it,

> 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. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door.\(^5\)

Religious beliefs, even agnostic and atheistic ones, go very deep into the human psyche and they are often used as the ultimate criteria for how one judges reality. If something goes against one’s religious beliefs, no matter how true or right it may be, the religious beliefs have a tendency to win the battle.

People who believe in a flat earth are not immune from this psychological malady. Almost to a man, they believe the Earth is flat because they believe the Bible says so.

Once that foundational belief is set, then the adherent will tend to interpret all the data he gathers and squeeze it into a flat earth model, no matter how counterintuitive some of the data may be to his cherished belief.

Because they believe a flat earth is taught by Scripture and that they have scientific evidence to support it, flat earth adherents have tried to forge an academic relationship with geocentrists, since the Bible teaches geocentrism.

Since flat-earthers believe the Earth is in the center of the universe and doesn’t move, this fact seems like a ready-made relationship with geocentrists a no-brainer.

Geocentrists, in turn, have had to tell flat-earthers that there can be no such relationship since:

1. the Bible does not teach a flat earth
2. neither the Church Fathers nor the Church after them taught a flat earth
3. the scientific data does not support a flat earth.

**Exegesis of Isaiah 40:22**

As an example of how flat-earthers interpret Scripture, they make the mistake of reading into Scripture what they are seeking for. For example, a typical passage that is used to support a flat earth is Isaiah 40:22:

> 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 (RSV).

Flat-earthers argue that the word “circle,” which they understand as a two-dimensional figure, is the best biblical description of a flat Earth.

At first glance, their interpretation sounds plausible. After all, Isaiah uses the word “circle.” But upon closer inspection we see a number of things that will go against their 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.

Someone might argue, of course, that God would know if it was a circle or a sphere, so his vantage point really doesn’t solve the problem. In that case, we need to go deeper in our analysis of the word “circle.” We find it is the Hebrew word כדור (pronounced KUG) and it is used also in Job 22:14:
12“Is not God high in the heavens? See the highest stars, how lofty they are!
13Therefore you say, ‘What does God know? Can he judge through the deep darkness? 14Thick clouds enwrap him, so that he does not see, and he walks on the vault of heaven.’” (RSV)

The word translated “vault” by the RSV is the Hebrew KUG. In this case it is a curved vault. The verse could thus be translated, “He walks on the circle of heaven.”

But flat-earthers, if they know their Bible, do not believe that heaven is a flat circular disc, since Scripture never describes heaven in that way.

As such, the interpreter cannot claim that KUG refers to a flat circular disc. Rather, KUG refers to any shape that is curved.

But since heaven, according to flat-earthers, is not a flat circular disc, then the Hebrew word KUG in Isaiah 40:22 cannot be used as proof of a flat Earth, for flat-earthers believe that the shape of heaven is a dome, which is a curved shape that is half of a sphere, or what we call a hemisphere.

Thus they believe that since heaven is a hard dome, it can then be used to cover the flat earth the same as a dome-shaped covering is used to cover a flat plate.
The same would be true of both Proverbs 8:27 and Job 26:10, which are two other passages that flat-earthers use for biblical support.

Proverbs 8:27

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)

Here again the Hebrew word KUG is used. So, the meaning could be that God drew a circle or a sphere.

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

But since KUG can also refer to a sphere, Proverbs 8:27 can simply mean that God drew or encompassed a sphere of water, which surface is the top or face of the sphere.
OTHER PROBLEMS WITH A FLAT EARTH

The physics of a flat Earth causes a contradiction for at least some flat-earthers. Most, if not all, flat-earthers believe the Bible when it says that the Earth is motionless in space and the Sun revolves around it. This is precisely why some flat-earthers want to build bridges with Geocentrists, since both believe in a motionless Earth.

But the fact is, some flat-earthers don’t believe in a motionless Earth, and thus they contradict their stand on the Bible. Here’s why. If the Earth were flat and had gravity, the tendency would be for the Earth to roll itself into a ball, since that is the most economical shape to accommodate the force of gravity. That is why all the celestial objects we see are round or near round. This is especially true of an object that is 75% water, as the Earth is. Since water is very flexible, it would form into a sphere in the same way that water dripping from a faucet forms spherical drops. The surface tension and gravity will make it form into a sphere, which is the shape that requires the least energy to hold the object together.

In order to deal with the problem of a flat earth being gravitationally uneconomical, the flat-earthers claim that there is no gravity. It is just a figment of Newton’s wild imagination. This, they believe, will allow them to keep the Earth flat.

So how do flat-earthers propose that people and objects can remain on Earth without floating away into outer space? Some propose that the flat Earth is moving upwards at the rate of 9.8 meters per second, which is the escape velocity of Earth determined by experiment. This upward movement of the flat Earth creates inertia against all bodies on the surface and more or less adheres them to the flat Earth, similar to the same inertial force one feels against the back of his seat when he accelerates his car forward. But if that is the case, then the flat-earthers have made the Earth move, which is a contradiction to their biblical beliefs that the Earth does not move.

Some flat-earthers have proposed that we are held to the Earth by magnetism. But the fact is that magnetism only attracts iron in things like compasses, not human beings which are composed of 92% water and very little iron. Besides, magnetism is too powerful a force, which can be seen by watching how fast a paper clip is attracted to a magnet.

Other flat-earthers claim that what holds us humans to the ground is the fact that our density is greater than air. If we were filled with helium, it would make our density less than air and we would rise above the ground. Although this solution answers the issue of how density affects buoyancy, it does not answer the issue of gravity, since it gives no answer as to how the Earth’s air is held close to the Earth and is not sucked into the vacuum of space. Nature abhors a vacuum. The planets that have very tenuous atmospheres, such as Mercury and Mars, are the planets with the least amount of gravity to hold an atmosphere. The larger planets, such as Jupiter, Saturn, Uranus and Neptune, have very thick atmospheres, since there is more gravity to hold an atmosphere.

In the end, the flat-earthers are left without an answer as to why people on Earth don’t float off into space.
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. (RSV)

Here we have the Hebrew word KUG, but this time in the Qal preterite for the past tense and thus it is pronounced KAG (גג). As before, KAG could refer to a circle 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. During a total eclipse, for example, the moon is between the Earth and the Sun and thus the side of the moon facing us is in total 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.

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.

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 Youtube sites, the sun is depicted as going around 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 figure:
The flat-earthers say the Sun’s light is limited because they believe the Sun is the same size as the moon and very close to the moon, which is also why they believe the moon blocks the Sun in a total eclipse. But if the Sun is the same size as the moon it means that the intensity of the Sun’s light is going to 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 equilateral radiating body.

But this raises another problem. How do the moon and the planets radiate light? The flat-earther’s Sun would not be powerful enough to give light to the moon and 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 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 flat-earthers believe. Unfortunately, there is no scientific evidence that planets and moons can 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.

![Sun and Moon](image)

**REVELATION 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)

The 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 comes back, the people will still be on the surface of the Earth. But this is not the picture suggested in Scripture. For example, 1 Thessalonians 4:16-7 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. (RSV)

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 Peter 3:10-13; John 5:29). Christ will judge the good and the bad, in the air, and they will be sent to their respective destinations.

WHAT IS THE FIRMAMENT?

One of the reasons flat-earthers believe that heaven is a dome is due to the interpretation they give to the Firmament, mentioned first in Genesis 1:6-9

6 And God said, “Let there be a firmament in the midst of the waters, and let it separate the waters from the waters.” 7 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. 8 And God called the firmament Heaven. And there was evening and there was morning, a second day. (RSV)

They might find support in some modern translations that have rendered the Hebrew word as a “dome,” such as appears in the 1971 New American Bible:

6 http://aplanetruth.info/2015/03/24/flat-earth-images/
Then God said, "Let there be a dome in the middle of the waters, to separate one body of water from the other." And so it happened: 7 God made the dome, and it separated the water above the dome from the water below it. 8 God called the dome "the sky." Evening came, and morning followed – the second day.

But “dome” is a misrepresentation of the Hebrew word. The Hebrew word is RAQUIA (רָקיע), and it does not mean “dome.” So where did this inaccurate translation originate?

In order to know the origin and reasoning behind the translation “dome” one must know the sad state of modern biblical scholarship. 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 started by rejecting the divine miracles of the Bible. If divine miracles are denied, then divine inspiration to write Scripture is the next logical step, thus leading Spinoza to reject divinely-inspired Mosaic authorship of the Old Testament.

By 1878, the German 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 and Moses was not one of them. Instead, the authorship of Genesis 1 was attributed to a Jewish scribe coming from the Babylonian captivity around 515 BC; who was merely trying to invigorate the Jewish people during their return to Jerusalem, not give factual rendering of ancient history, much less was he under “divine inspiration.”

Since the Jews had been under the worship of the Babylonian god Marduk for 70 years, the Documentary Hypothesis holds that to reintroduce the Jewish God back into Jewish consciousness, the leaders invented a Jewish God that was much more powerful than Marduk, for the Jewish God created the universe in six days just by speaking!

As such, modern scholars do not believe anything in the Genesis account is factual; rather it is merely a psychological crutch to fill the spiritual vacuum when the Jews left Babylon and returned to Palestine. To make the psychological appeal strong enough to get the attention of his readers, the Jewish scribe used an exaggerated description of the Jewish God creating the cosmos.
Since from the human perspective the heavens appear as dome above a flat earth (even as it appears to us today as we look into the heavens when standing on earth), the NAB translators slant their translation to depict that primitive picture.

In turn, this slanted translation allows these modern scholars to disregard the literal teachings of Genesis 1 and make the text appear as fanciful 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 miraculous creation in six days spoken into existence by God, these scholars believe in such theories as the Big Bang and evolution as the only way the material world came into being. They have the same disregard for divine miraculous intrusion for all the other narratives in Genesis (e.g., the great flood of Noah’s day; the exodus from Egypt, etc.).

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 Genesis 1 cannot accommodate modern scientific theories like the Big Bang and evolution which hold that the sun and stars came before the Earth.

The solution for these scholars 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 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 of how the real world originated or operates.

In turn, these liberal-minded scholars regards 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 God as to how the universe should be built.

What does the 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.

Here’s the second rub. Since the flat-earthers believe that Genesis 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-earther’s mantra. In actuality, they have been deceived by the Wellhausen scholars and have become the very unsophisticated and clueless Bible-thumpers that the scholars wish to portray them as.
HOW DOES ONE GET OUT OF THIS TRAP?

The first thing he does is make a firm belief with all his heart that the scholars who follow the Graf-Wellhausen Documentary Hypothesis are misguided men who, in part or in whole, don’t believe in God-inspired Scripture (and often don’t even believe in God). Rather, he must believe that every detail God wrote in Genesis 1 is a historical reality and it contains nothing that is mere story-filler or inaccurate in any way.

Second, he must study the scholars that came before the modern scholars. One will find that the traditional scholars were faithful to the principle of divine inspiration and miraculous intrusion and thus regarded every word of Holy Writ as factual truth from the mouth of God. As Jesus said to the devil, “Man does not live by bread alone, but by every word that comes from the mouth of God.”

Third, he must thoroughly study the modern theories of Copernicanism, Relativity and Darwinism to know what they are saying. When he does so, he will find that each of these theories is more fanciful than the NAB scholars think Genesis is! He will find that each modern scientific theory is filled with biased assumptions, twisted facts and ad hoc solutions that are invariably covered over with a veneer of pedantic nomenclature and obtuse mathematics to make them appear intelligent and sophisticated. In short, he will discover that all three modern theories are nothing but fabrications propped up to save the humanistic and often atheistic foundations that the scholars live by.

Fourth, he must do a thorough grammatical and historical exegesis of the Bible passages in question to discover what the inspired author said; and once he finds that truth, he must cling to it with all his might and never be deterred by persecutions and ridicule from those who don’t believe the Bible, in its entirety, is the inspired and inerrant word of God.

HOW CAN ONE CORRECTLY EXEGETE SCRIPTURE?

To give an example of the rigor that must be applied, let’s examine the Hebrew word behind the traditional translation of Genesis 1:6-9’s “firmament.”

As noted, the Hebrew word is RAQUIA (רַqueeא), which is used 17 times in the Old Testament, nine of which appear in Genesis 1.

The first major clue as to the identity of the firmament appears in Genesis 1:8: “And God called the firmament, heavens,” which means that the two words are synonyms and can be used interchangeably.

Obviously, we should then investigate the word “heavens.” It is the Hebrew word SHAMAYIM (שָׁמַיִם) and appears 10 times in Genesis 1.
Sometimes it is called the firmament referring to the heavens in outer space (verses 8, 9, 14-17, 20) and sometimes it refers to the space in which the birds fly (verses 20, 26, 28, 30).

Four times, between verses 14 and 20, the words “firmament” and “heavens” are combined in the phrase “the firmament of the heavens.”

Three of those times, in verses 14-17, “firmament of the heavens” refers to the space in which the sun, moon and stars are contained.

One time, in verse 20, “on the face of the firmament of the heavens” refers to the beginning space of air in which the birds fly.

What this immediately tells us is that the firmament cannot be a solid dome that covers the earth. If birds fly in the firmament—and it is a fact that birds fly in the air, relatively close to the ground—then the firmament cannot be a dome a few thousand of miles above the earth. Rather, the firmament must start at the surface of the earth and extend outward into the rest of outer space in which the sun, moon and stars reside.

Second, the Hebrew specifies in verses 14-17 that the sun, moon and stars are placed “in” the firmament (Hebrew: וּלְכֵי, used three times, with ל meaning “in”). But this is not the picture of the firmament that flat-earthers provide on their websites. The firmament is exclusively pictured as a thin-walled dome about three-thousand miles above the surface of the Earth, and the stars and sun are placed on the face of the firmament, not “in” the firmament. Obviously, stars cannot be placed “in” a hard dome and thus the dome theory cannot satisfy the Genesis details. Nor can ל be limited to “inside,” since then the stars would need to be distributed throughout the firmament and not be clinging to the wall of the firmament—the very opposite presented by flat-earth cosmology.

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7 http://aplanetruth.info/2015/03/24/flat-earth-images/
Some images seem to incorporate a lower firmament that touches the Earth:

![Diagram of firmament](image)

They call it the “firmament of the sky,” but it is in sharp contrast to the firmament as being a dome a few thousand miles above the Earth. Hence, the flat-earther’s dual usage of the firmament causes a dichotomy, since the meaning of the Hebrew word RAQUIA is something hard, which is why the word “firmament” is often chosen as the translation since the operative syllable refers to something “firm.”

So, while trying to accommodate Genesis 1:20’s usage of a “firmament of the heavens” or “firmament of the sky” in which the birds fly, the flat-earthers cannot then say that the firmament is a solid dome over the Earth, for how can a firmament be both tenuous like air and solid like a dome?

To verify that the Hebrew RAQUIA refers to something hard, we will investigate its etymology and usage in other biblical passages.

It originates from the verbal root RAQA (יָרַק), which means “stamp” or “spread out” or “stretch.” It is used both to refer to a firm substance that is spread out (as in beaten metal) and the actual constitution of the heavens, which must include the air above the Earth and outer space.9

These contrasting images certainly make it difficult to pin down precisely what the firmament is. Is it something hard and firm or something vaporous and tenuous, or is it something between these two contrasting images?

We then find further information about the heavens. In Exodus 24:10 it is implied that it is as solid as sapphire and yet as clear as space:

> “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.”

We also find in Exodus 39:3; Numbers 17:3; and Jeremiah 10:9 that RAQA is the word “hammered,” as gold that is beaten down into very fine sheets.

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8 [http://aplanetruth.info/2015/03/24/flat-earth-images/](http://aplanetruth.info/2015/03/24/flat-earth-images/)

9 *e.g.*, Gn 1:14, 15, 17, 20; Ps 19:2; 150:1; Ez 1:22-26; 10:1; Dn 12:3
In Ezekiel 6:11 and 25:6 RAQA is the word “stamped.”

In 2 Samuel 22:43 RAQA is translated as “beaten” or “crushed.”

THE CURIOUS PASSAGE OF JOB 37:18

One of the most interesting passages in this regard is Job 37:18. In this passage Job is challenged by one of his friends with this curious question:

“Can you, like him, spread out the skies, hard as a molten mirror”?

The difficulty in exegeting this verse is that we normally understand the sky as a vaporous and tenuous mixture of various gases. It is why birds are able to fly in the firmament (Genesis 1:20), since they flap their wings against the air to create a partial vacuum above their wings.

One might venture to say that the hardness of the sky might refer to the fact that near the top of the Earth’s atmosphere could be considered hard in the sense that if a rocket or meteor hit the atmosphere at a slight angle, it would tend to bounce off the atmosphere.

By the same token, a rocket or meteor that came straight down toward the Earth’s atmosphere would pierce right threw it, showing that it is not hard.

So the problem with Job 37:18 is that what we know to be true of the Earth’s air near its surface must also be true of the volume of outer space, since both are designated “the firmament of the heavens” (cf. Genesis 1:14 and Genesis 1:20).

The only distinction that Genesis makes between the firmament of celestial space and the firmament of the Earth’s air is that the latter is called “the face of the firmament.” But this is understandable since the “face” is the front part or surface of what is behind it. The firmament near to the Earth’s surface is its face.

So the meaning of Job 37:18 is mysterious. How can the firmament of the heavens be hard and at the same time soft, soft enough for the birds to fly in it?
The Church versus Foscarini on Job 37:18

This dilemma did not go unnoticed during the time when the Church confronted Copernican cosmology in the early 1600s.

During the Church’s investigations into the Copernican theory, a Carmelite friar named Fr. Paolo Foscarini was censured for his heliocentric cosmology in 1615, just a year prior to Galileo censure.

Little known is the fact that Foscarini was also censured for his belief that the heavens were “very thin and tenuous.” The Church’s censor stated the following against Foscarini:

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.10

Obviously, the Catholic censor was treating Job 37:18 the same way the Catholic Church had treated the verses in Scripture, that is, they were taken at face value and considered factual truth, regardless of what subject matter they addressed. Evidently, even the constitution of space was not considered trivial or obscure information that could be ignored. Whatever Scripture said on the issue of space was promptly regarded with the utmost divine authority and the basis for rejecting Foscarini’s whole approach to Scripture.

According to the Catholic censor, the heavens are solid and dense, even though they are spread out like the air. He apparently agrees that the image of a solid and dense gaseous-type substance is not immediately understandable to our perceptions and thus concludes, “the solidity of the heavens is not apparent to us.”

If we do an etymology on the words used in Job 37:18 we find some very interesting features that support the censor’s contention against Foscarini. The Hebrew sentence reads as follows:

תַּא‐רֵע‐קַי‐א הַרְבּוֹרְפָּא ("can you beat out or spread out") שָׁמָיִם ("with him") לֶשֶׂפֶר‐לָוֶכ ("the sky, the heavens") הָרֶא ("hard") מְשָׁג ("like a mirror") כָּשֶׁב ("cast").

The first word, ta-re-quiah (םְרֵﬠַיָּא) is a verb appearing twelve times in the Hebrew bible and normally means “to spread or stretch out.”11 It is very similar to the noun ra-qui-a (כָּשֶׁב) which is translated as “firmament” in Genesis and the Psalms.12

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10 The censor’s document is titled: *Judicium de spistola F. Pauli Foscarini de mobilitate terrae* (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.


12 Gn 1:6-8, 14-17, 20; Ps 19:1.
The noun li-she-ka-quim (לֶיהָשֶׁקְוָיִם) (“the sky, the heavens”) is from the root sha-kaq (שָׁקַח) and appears twenty-one times as either “sky”;13 “clouds”14 “heavens,”15 or “dust,”16 as when Isaiah 40:15 says that the nations, to God, are like “dust on the scales.”

The verbal form of sha-kaq (שָׁקַח) is used four times and refers to beating out something so that it becomes very small, like dust particles, such as “I did beat them as small as dust” in 2 Samuel 22:43.

All in all, sha-kaq (שָׁקַח) carries the idea of a finely-grained substance that fills the sky, and by extension, it must also fills outer space since Genesis 1 insists that the firmament of the heavens includes both the Earth’s air and the space where the stars reside.

It cannot be air, which is composed of nitrogen and oxygen, since there is no air in outer space. This finely grained yet hard substance must be something common to both the Earth’s air and the vacuum of outer space.

Another passage of interest here is Proverbs 8:28

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

The word “skies” is the Hebrew sha-kaq (שָׁקַח). Some translations render it as “clouds,” but that choice doesn’t fit with the verb. The phrase “made firm” is from the Hebrew verb a-mats (אָמַת), which is a Piel infinitive, the intensive form of the Qal. The Piel of a-mats is normally understood as “harden” (Deut 15:7) or “make strong” (2Chr 11:17). Clouds cannot be made strong or firm, since they are nothing but water vapor, unless, possibly, the author is referring to the cloud’s making ice crystals.

Further study in Job 37:18 shows that the word kaz-a-quim (כָּזַהְוָיִם) (“hard”) appears over forty times and is translated as “strong” (Ex 13:9); “mighty” (Ex 32:11); “hard” (Ez 3:9). The idea expressed here is that the firmament of the heavens is not only hard but very strong in its hardness.

Also, the word mey-at-saq (מֵאְצָסָאֵק) “cast” is from the root yat-saq (יָטָסָא) 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). The idea expressed here is that the firmament of the heavens is also like a hard liquid or can act like a liquid.

The remaining passages that use the Hebrew RA-QUI-A are: two times in the Psalms (19:1 and 150:1) and Ezekiel 1:22-26, both of which do not give any more detail. The former is used for praise to God and the latter is a symbolic vision observed by Ezekiel.

13 Dt 33:26; 2Sm 22:12; Jb 37:18; Ps 18:11; 77:17; 108:4; Is 45:8; Jr 51:9.
14 Jb 35:5; 36:28; 37:21; 38:37; Ps 36:5; 57:10; 78:23; Pr 3:20; 8:28.
15 Ps 68:34; 89:6, 37.
16 Is 40:15.
The last place RAQUIA appears is Daniel 12:3, which is similar to Genesis 1:14-17 in that it states, in a style of Hebrew poetry, that the firmament is very bright and contains the stars.

**SO WHAT IS THE FIRMAMENT?**

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 all the criteria.

In order to fulfill the biblical criteria, the firmament of the heavens must be:

- Hard and dense
- Have qualities that act like a solid, liquid and gas.
- It must be transparent
- It must be easily penetrable so that birds can fly in it
- It must be flexible so that it can be stretched billions of miles
- It must fill the whole universe so that the stars may be contained in it
- It must be combined with or be a substrate of Earth’s atmosphere, filling all of the space between the oxygen and nitrogen molecules of Earth’s air
- It must be combined with or be a substrate of the vacuum of outer space

**THE STRETCHING OF THE FIRMAMENT**

Another feature of the firmament of the heavens 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 from the waters."

![Waters of the Deep](image)

This means that at the beginning the Earth was covered with water. Since there was no heat, the water was in the form of ice.
When the Light was created on the First Day, this melted the ice and it became liquid water.

This water may have been billions of miles deep, with the Earth being like a tiny seed.
After God created the firmament on the Second Day, he stretched out the firmament so that it would take the greater portion of water far away from Earth, perhaps billions of miles. Other passages in Scripture give the same picture. Job 9:8 says

"God...who alone stretched out the heavens, and trampled the waves of the sea; who made the Bear and Orion, the Pleiades and the chambers of the south.

The phrase "stretched out" here is a Hebrew Qal participle na-tsa-ha (נַסֵּה). The implication here is that after the firmament of the heavens were stretched in Genesis 1:6 to make the celestial space we see today, then the stars, identified here as the constellations The Bear, Orion and The Pleiades, were placed in the firmament.

This shows that the chronology of Genesis 1 is very scientific, since the firmament must be built on the Second Day before the stars can have a place to reside and thus were made on the Fourth Day. Likewise, if the universe is to have a cornerstone, as it were, it would be proper to put the Earth in that special place on the First Day and then build everything around it. Hence, the firmament is built around the universe's cornerstone, the Earth, and stretched out as a sphere with Earth as the pivot point.

The same Hebrew Qal participle referring to stretching appears in Ps 104:2:

"The Lord, who coverest thyself with light as with a garment, who hast 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"
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 the drapery to undo its folds. This, of course, means that the constitution of the firmament has to be something that can be stretched billions of miles yet not rip apart. What kind of substance can this be?

It is certainly an unusual 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 by the fact that it takes up the whole Second Day of Creation.

Day 1: 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 that 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, pinpoints 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 that 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 that 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.

So what kind of material substance could the firmament of the heavens be?

First, let’s look at some suggestions from modern science. Interestingly enough, when modern scientists have to describe the Big Bang, they seem to be borrowing from the Bible’s description about the “stretching of the firmament,” but perhaps without even knowing it.

In doing so, they give us a clue as to what the fundamental substance could be that makes up the firmament, as well as how fast the stretching may have been.

Stephen Hawking, no stranger to innovative ideas, describes something unusual in his 2010 book, *The Grand Design*. Pay special attention to Hawking’s last sentence:

...during this cosmic inflation, the universe expanded by a factor of $1 \times 10^{30}$ in $1 \times 10^{-35}$ seconds. It was as if a coin 1 centimeter in diameter suddenly blew up to ten million times the width of the Milky Way. That may seem to violate relativity, which dictates that nothing can move faster than light, but that speed limit does not apply to the expansion of space itself....physicists aren’t sure how inflation happened....But if you go far enough back in time, the universe was as small as the Planck size, a billion-trillion-trillionth of a centimeter...\(^{17}\)

Although we by no means subscribe to the Big Bang theory, Hawking does tell us what modern science believes is the fundamental particle. He says it is a particle of “the Planck size.” Modern physics has come to realize that there must be a shortest length for matter—the state in which matter becomes indivisible. It is the entity of indivisibility the Greeks called the “atom.”

In essence, a Planck-particle’s spherical volume is so small that there would be no space between adjacent Planck-particle’s, which would necessarily make an accumulation of Planck-particles into supersolid sphere. Normally, when individual spheres touch each other in closed quarters there is always space between the spheres. For example, if we put 100 marbles in a box and filled the box with water, we can measure just how much space exists between all the spherical marbles. But if we make the marbles smaller and smaller, there should come a point in which we cannot add any water to the box.

That precise point is what we attribute to the Planck-particle diameter of a sphere.

Of course, it is hard for us to imagine how spheres could have no space between them, but neither can we conceive of particles having a diameter of only $10^{-35}$ meters. This is similar to Zeno’s Paradox such that if we continue to halve the distance between two points, theoretically the two points should never touch, since it should always be possible to take half of even the smallest distance. But, in fact, the two points do meet, as when my finger hits the keyboard so that I can type this sentence.

There is also a paradox on the other side (let’s call it Mrs. Zeno’s Paradox). If one wants to insist there is space between adjacent Planck-particles, what substance would constitute the unfilled space? It can’t be “nothing” since, metaphysically speaking, it is impossible for “nothing” to exist. It must be “something.” (NB: when he says “atoms” here he means Planck-particles).

In his new book, *Spooky Action at a Distance*, physicist George Musser gives us the historical background:

> Still, these shenanigans are occurring way down on the Planck scale, or close to it….Trillions upon trillions of spatial atoms blur together into a single unbroken expanse. Those atoms are mutually independent, so locality should hold; each part of space should have an independent existence….

> 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.”

> Likewise, space might be built of pieces that are not themselves spatial….Clearly, constructing space isn’t going to be as straightforward as melding molecules into a fluid. What could its building blocks possibly be?….When it comes to space, though, there can be no “smaller,” because size itself is a spatial concept. The building blocks cannot presume space if they are to explain it. They must have neither size nor location; they are everywhere, spanning the entire universe, and nowhere, impossible to point to. What would it mean for things not to have position” Where would they be?….Einstein foresaw there difficulties. “Perhaps…we must also give up, by principle, the space-time continuum,” he wrote.\(^\text{18}\)

So the question remaining is: how small can the radius of matter be such that it remains ponderable matter, yet with no spaces between its independent material particles? Planck-particles are the closest thing we have to solving that metaphysical and physical conundrum. If there is something else, I am certainly open to see it, but so far the Planck world is the limit.

Many other modern physicists have realized that Planck-dimensions exist. In 1957, Princeton professor John Wheeler was the first to describe the Planck dimensions as “space-time foam.”\(^\text{19}\) Stephen Hawking supported Wheeler’s theory, stating that, on extremely small scales in the Planck

\(^{18}\) *Spooky Action at a Distance*, George Musser, 2015, pp. 160-170.

dimensions, space is alive with “turbid random activity and gargantuan masses.” Others, such as Ian Redmount and Wai-Mo Suen speak of “quantum space-time foam” or “Lorentzian space-time foam,” as does S. J. Prokhovnik.

Jean-Pierre Vigier refers to it as a “non-empty vacuum” and outlines the phenomenon of superluminal interactions in an “underlying deterministic substructure.” Vigier points to the experiments by Alain Aspect, which confirm the results.

The 1993 Nobel laureate for physics, Robert Laughlin, adds:

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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. It is filled with “stuff” that is normally transparent but can be made visible by hitting it sufficiently hard to knock out a part. The modern concept of the vacuum of space, confirmed every day by experiment, is a relativistic ether. But we do not call it this because it is taboo.
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Robert Moon, professor emeritus in physics at University of Chicago, adds:

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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.
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So it seems that modern science is turning the corner on this vitally important issue. As of today, modern science believes in a hard and dense substrate to space just as the Catholic censor of Fr. 20

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20 Black Holes and Baby Universes and Other Essays, Bantam, 1994; A Brief History of Time, pp. 104-123.
25 Robert B. Laughlin, A Different Universe: Reinventing Physics from the Bottom Down, 2005, pp. 120-121. The two chapters of Laughlin’s book that deal with these issues are: “The Nuclear Family,” (pp. 99-116 and “The Fabric of Space-Time” (pp. 117-126). Laughlin can speak so boldly about ether and not be afraid of suffering chastisement because, as one author notes: “…the impression of suggesting an ether theory is carefully avoided, because such can still be career suicide. Only physicists who were established beyond reproach could discuss ether-like aspects openly, like George Chapline, Gerd ’t Hooft, Robert Laughlin, or Frank Wilczek, just to alphabetically list a few who did. Today, we finally witness the dams breaking and ever more people dare to ‘come out.’” Sascha Vongehr, “Supporting Abstract Relational Space-Time as Fundamental without Doctrinism Against Emergence,” Nanjing University, China, Dec. 2009, p. 2.
Foscarini did 400 years ago. Its modern adherents may call it by different names, but as Shakespeare said, “that which we call a rose by any other name would smell as sweet.”

Another familiar name, Paul C. W. Davies, wrote an article for *New Scientist* in 2001 titled “Liquid Space.”27 Here are some relevant excerpts from his article:

*Is space just space? Or is it filled with some sort of mysterious, intangible substance. The ancient Greeks believed so, and so did scientists in the 19th century. Yet by the early part of the 20th century, the idea had been discredited and seemed to have gone for good. Now, however, quantum physics is casting new light on this murky subject. Some of the ideas that fell from favor are creeping back into modern thought, giving rise to the notion of a quantum ether....*

*If so, we'll have answered a question that has troubled philosophers and scientists for millennia. In the 5th century BC, Leucippus and Democritus concluded that the physical universe was made of tiny particles – atoms moving in a void. Impossible, countered the followers of Parmenides. A void implies nothingness, and if two atoms were separated by nothing, then they would not be separated at all, they would be touching. So space cannot exist unless it is filled with something, a substance they called the plenum.*

*If the plenum exists, it must be quite unlike normal matter. For example, Isaac Newton's laws of motion state that a body moving through empty space with no forces acting on it will go on moving in the same way. So the plenum cannot exert a frictional drag – indeed, if it did, the Earth would slow down in its orbit and spiral in towards the Sun.*

*Nevertheless, Newton himself was convinced that space was some kind of substance. He noted that any body rotating in a vacuum – a planet spinning in space, for example – experiences a centrifugal force. The Earth bulges slightly at the equator as a result. But truly empty space has no landmarks against which to gauge rotation. So, thought Newton, there must be something invisible lurking there to provide a frame of reference. This something, reacting back on the rotating body, creates the centrifugal force.*

*The belief that space is filled with some strange, tenuous stuff was bolstered in the 19th century. Michael Faraday and James Clerk Maxwell considered electric and magnetic fields to be stresses in some invisible material medium, which became known as the luminiferous ether. Maxwell believed electromagnetic waves such as light to be vibrations in the ether. And the idea that we are surrounded and interpenetrated by a sort of ghostly jelly appealed to the spiritualists of the day, who concocted the notion that we each have an etheric body as well as a material one.*

*In 1976 I began investigating what quantum mechanics might have to say. According to quantum field theory, the vacuum has some strange properties. Heisenberg’s uncertainty principle implies that even in empty space, subatomic particles such as electrons and photons are constantly popping into being from nowhere, then fading away again almost immediately. This means that the quantum vacuum is a seething frolic of evanescent “virtual particles.”*

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Although these particles lack the permanence of normal matter, they can still have a physical influence. For example, a pair of mirrors arranged facing one another extremely close together will feel a tiny force of attraction, even in a perfect vacuum, because of the way the set-up affects the behaviour of the virtual photons. This has been confirmed in many experiments.

So clearly the quantum vacuum resembles the ether, in the sense that there’s more there than just nothing. But what exactly is the new version of the ether like? You might think that a real particle such as an electron moving in this sea of virtual particles would have to batter its way through, losing energy and slowing down as it goes. Not so. Like the ether of old, the quantum vacuum exerts no frictional drag on a particle with constant velocity.

Other physicists are beginning to see it. Abhay Ashtekar holds that at the Planck scale the concept of space-time is replaced by a network of what he calls “loops and knots” of energy. This theory is being further developed by Carlo Rovelli and Lee Smolin.²⁸ Roger Penrose, who has coined the word “twistors” for Planck particles, believes that the concept of “space-time” may be eliminated from the basis of physical theory altogether.²⁹ 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. He also notes that Casimir in 1948 showed that “quantum fluctuations in the space between two flat conducting plates with separation $d$ would produce a force per unit area equal to $\frac{\hbar c}{240\pi} d^4$, or $1.30 \times 10^{-18}$ dynes cm$^{-2}/d^4$. This was measured by Sparnaay (1957), who found a force per area of $(1-4) \times 10^{-18}$ dynes cm$^{-2}/d^4$ when $d$ was varied between 2 and 10 μm.”³⁰ Alan Kostelecký adds: “The observable effects of Planck-scale Relativity violations are likely to lie in the range of $10^{-34}$ to $10^{-17}$,”³¹ adding:

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.³²

With the Scientific American editor adding:


³² Ibid.
In quantum physics, short distance and short times correspond to high momenta and high energies. Thus, at sufficiently high energy – the so-called Planck energy – a particle should “see” the graininess of spacetime. That violates relativity, which depends on spacetime being smooth down to the tiniest size scales.33

THE BIG BANGSTERS AND THE STRETCHED FIRMAMENT

As noted earlier, Big Bang theorists also have what we might call a “stretching of the firmament” similar to Genesis 1:6-9, although unfortunately, theirs is chronologically misplaced since they forgot to put the Earth as the cornerstone for the stretching firmament.

Big Bang theorists hold that at the very beginning, about 13.78 billion years ago, the universe was compacted in the Planck volume of about $10^{-40}$ cm$^3$ with a diameter of about $10^{-13}$ cm. They believe it was filled with Planck particles that were $10^{-33}$ cm in diameter, each with a mass of $10^{-5}$ g, and thus had a Planck density of $10^{94}$ g/cm$^3$.

To initiate the Big Bang explosion and/or inflation, theorists like Hawking believe that $10^{30}$ of the Planck particles broke away, creating a hole of $10^{-13}$ cm in diameter but which was filled in $10^{-35}$ seconds.

The problem for the Big Bang theorists, however, is they give no reason for:

1. why the $10^{30}$ Planck particles broke away,
2. why the particles that break away are not immediately reabsorbed in the hole, especially when the gravitational potential of Planck particles is immense at about $10^{50}$ dynes, and
3. why the $10^{30}$ Planck particles don’t cease to exist in the Planck time of $10^{-44}$ seconds but somehow keep expanding and make the present universe.

We should mention one other theory of modern science related to Planck particles. It is called Superstring theory. In Superstring theory, the fundamental particle is in the Planck dimensions and is pictured as a tiny string. The strings are said to have the Planck length of $10^{-33}$ cm and a mass of $10^{-5}$ g. Mathematically, String Theory has succeeded in uniting all the known and theorized particles, including the Higgs boson and fermions, within one spatial superstructure.

A further development of superstring theory is Massive Superstring theory, which is the closest modern science seems to have come in understanding what may constitute the universe’s underlying superstructure, the Firmament. In this theory, the “string” possesses the complete Planck dimensions of length ($10^{-33}$ cm), mass ($10^{-5}$ gm), time ($10^{-44}$ sec), temperature ($10^{32}$ K) and density ($10^{94}$ g/cm$^3$).

The problem is that this super string-structure must have at least 10 dimensions to hold it all together. One reason why these 7 extra dimensions are needed (in addition to the 3 Euclidean dimensions) is to get around the limited speed of light that Einstein’s theory of Special Relativity imposes on all attempts to create a Big Bang universe, or any kind of universe.

It is the same obstacle, as noted above in the *Grand Design*, that leads Stephen Hawking to depend on a superfast “cosmic inflation in which the universe expanded by a factor of $10^{30}$ in $10^{-35}$ seconds.” As such, in a rather convenient ad hoc fashion, Hawking and the rest of the scientific community claim that Einstein’s limitation on the speed of light does not apply to the speed of space expansion, either at the beginning explosion (the Big Bang inflation) or the continuing expansion of the Big Bang that theorists claim is occurring at the edge of the present universe.

Of course, they also don’t explain what space actually is or how it can be immune from their universal speed limit of 186,000 miles per second. For them, space expansion must exceed the speed of light otherwise there can be no Big Bang.

**CAN THE BIBLICAL FIRMAMENT BE COMPOSED OF PLANCK PARTICLES?**

So how does all this relate to the biblical firmament and its stretching out by the hand of God?

Remember that, according to all the biblical descriptions of the firmament of the heavens, we know the firmament is hard, dense and transparent, but has qualities of a solid, liquid and a gas. We know it is penetrable and flexible so that birds can fly in it. We know can be stretched to great proportions. We know it fills the whole universe so that the stars are contained in it. We know it must be the substrate of Earth’s atmosphere, and the substrate of the vacuum of celestial space.

Since the Planck particles are the smallest independent material entities known but can exist together without any space between them, we have a substance that, on the one hand, with a radius of $10^{-35}$ meters, is so super-granular that it would behave as a frictionless medium, but on the other hand, at $10^{94}$gm/cm$^3$, is so super-dense, that it would be the hardest solid known—a truly remarkable substance. No wonder Psalm 150:1 calls it “God’s mighty firmament.” As such, everything from giant celestial bodies to the smallest atomic matter will require certain characteristics in order to exist in a Planck-dimension universe. They would need to move by wave motion through the dense firmament, which is probably why light seems to both a particle and a wave, and why particles such as electrons have a pilot wave, known as a deBroglie wave.

In conclusion, the firmament is the underlying medium for the whole universe. Our current science tells us it is a super-dense and super-granular medium which mimics a plenum. It is what holds everything together and through which everything must travel. In short, it determines all the physics of the universe; and most of all, it answers all the requirements of the firmament as defined and described in Scripture. Four hundred years later, we can be proud of the Catholic censor’s rejection of Fr. Foscarini’s tenuous firmament, and the acceptance of a hard and dense one. Conversely, a solid-shell model of the firmament, which is popular among flat-earthers ignores the atmospheric and celestial dimensions required for the firmament, and consequently, influenced by the Documentary Hypothesis, have failed to properly understand the Scriptural language.34

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The Bible and The Church Fathers On a Spherical Earth

Because of certain phrases in the Bible (e.g., “four corners of the earth”) some believe the Bible is following ancient Babylonian, Hindu, Egyptian and early Greek ideas of a flat earth surrounded by a dome. In actuality, such fallacious ideas among ancient pagans were the result of the lack of both divine revelation and scientific study. Not until the Greeks noticed in the 6th century B.C. that lunar eclipses caused circular shadows on the moon did they suspect the earth was spherical. The biblical testimony, as well as the Hebrews who interpreted it, understood the Earth as spherical.

As for the Fathers of the Church, the following facts are evident:

- **The Fathers of the Church knew of eclipses, how they were formed, and the implications for the shapes of the heavenly bodies.**

  **Basil:** “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.”

- **The Fathers understood that the heavens were wrapped around the entire earth, calibrating it in increments of a sphere of 360 degrees.**

  **Basil:** “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.”

Interestingly enough, there is not a lot of information in the Pentateuch about the shape of the Earth. Except for Job, which may have been written earlier, most of the information we have about the shape and substance of the Earth comes from the Psalms and Proverbs, while some comes from the prophets (Isaiah, Jeremiah, Micah), and a couple references in 1 Samuel. There is also a mention in the book of Hebrews in the New Testament.

The Bible speaks about the “corners of the Earth,” or “ends of the Earth.” The latter two terms do not, of course, mean that the Earth has literal corners or ends. Rather, “corners” refers to the four compass points (north, east, south and west), while “ends” refers to the respective east and west

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35 Orthodox Faith, Bk 2, Ch VII.
36 Orthodox Faith, Bk 2, Ch VII.
37 Jb 37:3; Is 11:12; 41:9; Ez 7:2; Ap 7:1; 20:8.
38 Dt 28:64; 33:17; 1Sm 2:10; Jb 28:24; 38:13; Ps 19:4-6; 22:27; 46:9; 48:10; 59:13; 61:2; 65:5; 41:9; Jr 51:16; Dn 4:10-11; Mk 13:27.
horizons. Hence, Scripture is not implying that the Earth is flat. Not only does Scripture imply that the Earth is a sphere,\textsuperscript{39} it never refers to the Earth as being flat.

Job 38:4 shows that the foundation of the Earth is a complicated structure with precise measurements that are unfathomable to Job. Jeremiah 31:37 echoes this perspective as it says “the foundations cannot be discovered.” We understand from this language that the “foundation of the earth” is its core, upon which everything else rests. It is a substance of extreme strength, as Micah 6:2 and Ps 104:5 indicate. Modern science has not been able to tell us the exact composition of the core of the earth, since everything from molten iron to rock has been proposed without resolution.

The Bible also speaks of the “the foundation of the earth,”\textsuperscript{40} and the “pillars of the earth.”\textsuperscript{41} The latter would be the structures that rest on the foundation, which is more or less indicated in 1Samuel 2:8. Scripture maintains that the earth rests in space and is not supported by any material thing for it “hangs upon nothing” (Job 26:7). This would mean that the “pillars” apply only to the interior of the Earth. The pillars rest between the core and the surface. Science knows this as the “mantle” of the earth. They also know that the mantle is made up of rock, much of it granite rock, which is one of the hardest structures known. They also know that these structures appear intermittently around the globe, and are always positioned vertically, one end facing the core and the other facing the surface of the Earth.\textsuperscript{42}

To recap, there is an inner core. Around the core is the mantle, which contains vertical pillars radiating from the top of the mantle to the surface of the Earth. Around the mantle, is the land surface of the Earth, but it is uneven. Between the uneven portions, water collects. If one were looking at this from a two-dimensional perspective, one could draw a circle (concentric with the core and the mantle) that would cut through the uneven land mass and the water mass, serving as a boundary for the land and water (Pro 8:27; Job 26:10; Is 40:22).

- The Fathers were very clear that the Earth is a sphere.

\textbf{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

\textsuperscript{39} Jb 26:10; Pr 8:27-29; Is 40:22.

\textsuperscript{40} 2Sm 22:16; Ps 18:15; 102:25; Pr 8:27-29; Is 48:13; Jn 17:24.

\textsuperscript{41} 1Sm 2:8; Jb 9:6; 38:4-6.

\textsuperscript{42} Dr. Robert Gentry has made studies on granite rocks that are near the surface and has found that they contain Polonium 218 halos. Since Polonium 218 has a half-life of 3 minutes, this means that the granite columns had to have been made instantaneously. Modern science has never produced granite in the laboratory. Its crystalline structure will not allow reproduction. (www.whalos.com)
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.43

**Basil:** “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.”44

**Basil:** “These are lakes, and there is only one sea, as those affirm who have traveled round the Earth.”45

**Clement of Alexandria:** “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 didst create this ordered sphere, and from the shapeless mass.”46

**Augustine:** “But they do no remark that, although it be supposed or scientifically demonstrated that the world is of a round and spherical form...”47

**Augustine:** “Ye have heard in the Psalm, ‘I have seen the end of all perfection.’ He hath 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.’”48

**Augustine:** “…this Christ’s one Church, this the Unity which we are, is crying form 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.”49

**Augustine:** “...the earth more abundantly hath given her fruit, and that crop now hath filled the round world.”50

**Augustine:** “…the whole round world repeopled 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.”51

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43 On the Soul and the Resurrection.  
44 Orthodox Faith, Book 2, chapter 10.  
45 Hexameron, Homily IV, 4.  
46 Paedagogus (also found in Clement of Rome).  
47 City of God, Bk XVI, Ch 9.  
48 Homilies on First John, Homily X, 5  
49 Homily on Psalm 61, 2.  
50 Homily on Psalm 67, 8.  
51 Homily on Psalm 69, 1
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."52

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."53

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.”54

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."55

- 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 back from their smooth flashing surface. Those who see this, but do not examine it, think that the light comes form 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

52 Homily on Psalm 72, 9.
53 Life of Constantine, Bk 2, Ch LVII.
54 On the Making of Man, XXI, 3.
55 Letters, 124, To Avitus.
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.”

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.”

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.”

- The Fathers recognized both the earth as the center of the universe, and that it is round, as noted by his reference that water goes "round the Earth."

Athanasius: “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.”

- 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 pente-decagon with four-and-twenty parts.”

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 this to the circle of Mercury,

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56 On the Soul and the Resurrection.
57 Homily on Hebrews, Homily 8, 7.
58 Catechetical Lectures, Lec 6, 3.
59 Against the Heathen, First Book, Pat 1, 27.
60 The Paschal Canon, Chapter XVII.
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.”

- 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.”

Lactantius: “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.”

Robert Sungenis
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61 Refutation of All Heresies, Bk 4, Ch 8
62 Discourse On the Virgins, Dis. VIII, Thekla, Ch XIV.
63 False Wisdom of Philosophers, Bk 3, Ch 24, On the Antipodes.