Response to Ethan Siegel on Venus' Phases

From Robert Sungenis @ www.galileowaswrong.com

First, let's see what Mr. Siegel has to say. I will comment at the end. (NB: I've taken off some of his pictures because they take up too many megs and don't add anything to his argument).

Mr. Siegel writes:

Geocentrism: Was Galileo Wrong?

Category: Astronomy • Solar System
Posted on: September 13, 2010 8:13 PM, by Ethan Siegel

"I do not feel obliged to believe that the same God who has endowed us with sense, reason, and intellect has intended us to forgo their use." -*Galileo Galilei*

While practically every scientist (and 79% of Americans) accept that the Earth and the other planets go around the Sun, it isn't quite everyone. In fact, a number of people have recently pointed out the following conference to me.

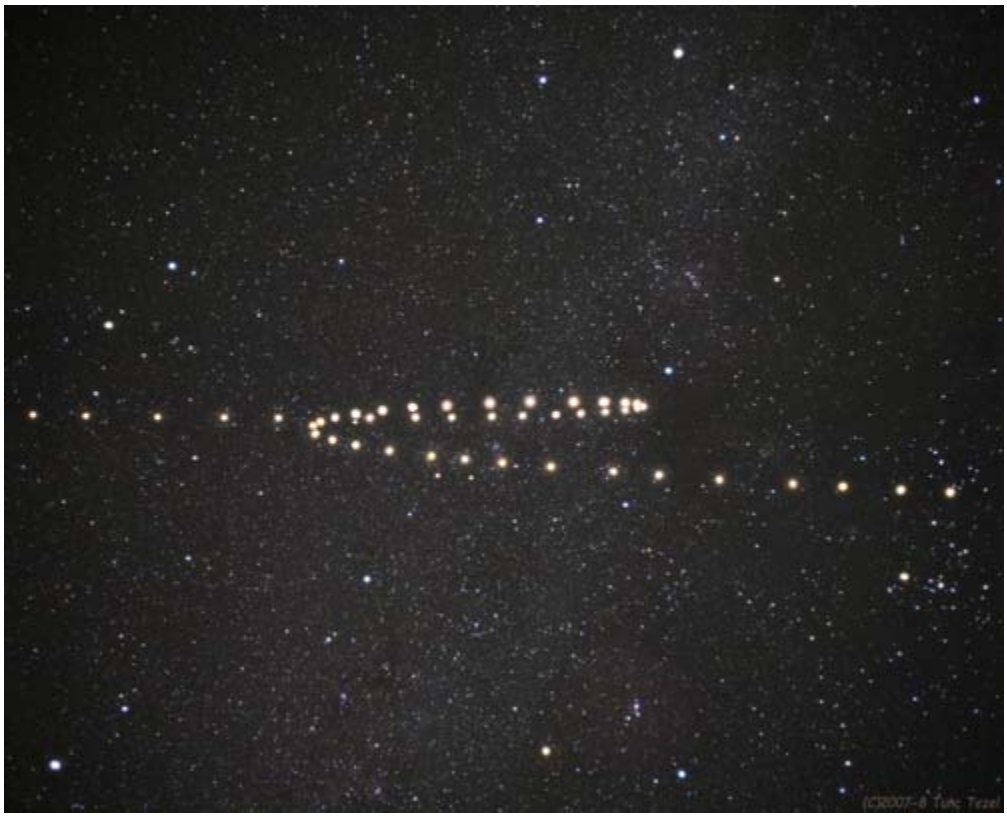
That's right, this November, a group of people are going to get together and try to put together as convincing an argument as possible for *geocentrism*, or the model that the Sun (and all the other planets) revolve around the Earth.

This is in stark contrast to our standard, *heliocentric* (Sun-centered) model, where the Earth is just one out of many planets, all of which orbit the Sun in elliptical orbits.

Both models allow for the same *very reasonable* observations, all visible with the naked eye. This includes the following:

1. The explanation of days and nights.
2. The explanation of Moon phases.
3. The explanation of seasons.
4. And finally, the observation that planets appear to "wander," or shift their position across the night sky, relative to the fixed, background stars.

But the greatest puzzle, back in the time of Copernicus, was the problem of **retrograde motion**. What's that? If you observe the planets, night-to-night, you'll find that they move across the sky in roughly a smooth line. But if you look up at Mars during the right time of the year, you'll find that it seems to stop in its tracks, *reverse* direction, go backwards for a little while, stop again, and continue forward in roughly the original direction.



This happens for *all* of the outer planets, by the way, and has been confirmed *hundreds of times* over the centuries.

Both models -- heliocentric and geocentric -- had a way to explain this by time Galileo came along. The geocentric explanation came first, by way of Ptolemy.

(Image credit: Nick Strobel's Astronomy Notes.)

Rather than making a *perfect* circle, each planet moved about the Earth on a "circle upon a circle." When the planet passes by closest to Earth, it appears to reverse its motion! This worked remarkably well for predicting the positions in the sky of the planets, and was the most accurate method we had by a lot. In fact, by even the late 1500s, 50 years after Copernicus, this geocentric explanation was far-and-away the most superior way to predict what the positions of the planets would be.

But the heliocentric explanation was a little more elegant, and didn't need these epicycles or "circles-upon-circles" at all. Instead, the inner planets, in theory, moved around the Sun more quickly than the outer ones! When an inner planet passed by an outer one, the outer one would *appear* to move backwards for a brief period of time, and as the inner one continued to move forwards, eventually the outer planet would resume its original course.

It wasn't until the early 1600s, when Kepler finally figured out that planets moved in *ellipses* (and not circles) around the Sun, that finally allowed the heliocentric model to catch up with the geocentric one in terms of predictive power.

So which was better? Was Galileo, the most *passionate* of all the heliocentric proponents, justified in his adamant rejection of geocentrism?

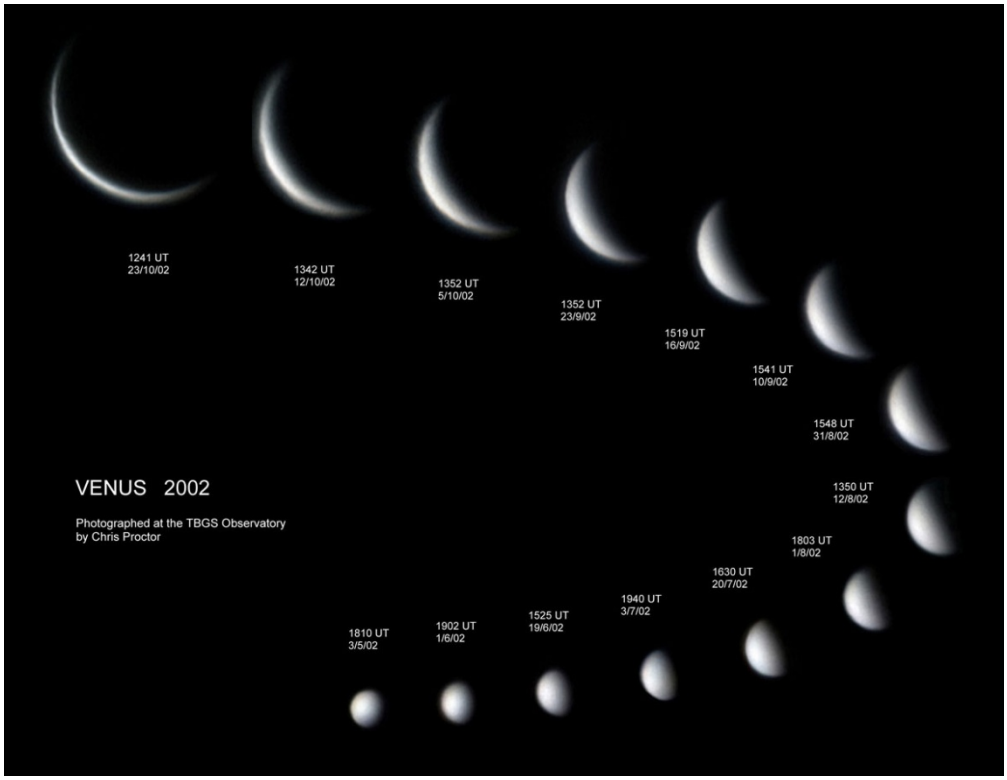
Up until the early 1600s, I would have said "no." But right around 1609, something remarkable happened that **scientifically** settled the issue.

The *telescope* was invented! (Note, you can repeat *any* or *all* of the following observations with even the simplest and cheapest of telescopes.)

And one of the first things that people looked at through a telescope was the planet Jupiter. In a single night, check out what you can see!

This video is a time-lapse of about 3 hours condensed into 10 seconds. (And it *is* taken with an amateur telescope, albeit a good one.) And you'll notice that there are definitely **moons orbiting Jupiter**, *not* Earth!

But perhaps even more striking is what you see when you look at the planet Venus. Taken over the course of a few months, you can see the individual phases of Venus, which go all the way from crescent to full.



Both heliocentric and geocentric models will allow Venus to run the full gamut of phases. But you'll notice something with a telescope that you'd *never* notice without one: Venus appears *much larger* when it's at its "new" phase and *much smaller* at its "full" phase.

This is different from the Moon:

and from the Sun:

which vary in size only slightly as seen from Earth.

Believe it or not, this observation *is a killer* for geocentrism! Why?

Because in the old geocentric model, sometimes Venus is on the same side of Earth as the Sun (and appears new), and sometimes it's on the opposite side (and appears full).

Notice how the closeness of Venus to Earth (which determines how big Venus appears) has *nothing* to do with what its phase should be! And yet, a crescent Venus is always huge, and a full Venus is always tiny!

But, in the heliocentric model...

Venus is huge when it's a crescent **because it's closer to Earth**, and small when it's full **because it's on the other side of the Sun**!

R. Sungenis: That Mr. Siegel hasn't availed himself to refuting geocentrism with anymore than these old and tired arguments about the inadequacy of the Ptolemaic model is, unfortunately, representative of the inept caliber of people we find trying to make a case against geocentrism. If he had searched the Internet for even a few minutes he would find that hardly anyone is using the Ptolemaic model to support geocentrism (unless proper modifications have been made to it).

Be that as it may, let's be fair to Ptolemy. In his day the distances to the sun, moon and planets were not known. Hence, he could not create as accurate a model as would have been possible had he known the distances. Had he known the distances, he simply would have made the path of the sun around the earth the deferent of all the planets and the radius of the sun on the deferent to the planet equal to the distance from the sun to the planet. And if he did so, his model would have transposed into the Tychonic model, which is the model that has the planets revolving around the sun, but the sun revolving around the earth.

The only thing Galileo's telescope really did was destroy the crystalline spheres model of the geocentric universe from Aristotle. Aristotle proposed that the planets stayed in their orbits by rolling in tube-like circular structures made of crystal. These crystal-walled structures were supposed to be impervious to penetration. But once the telescope found objects crossing their paths (e.g., moons, asteroids, comets, etc.) the crystalline spheres model was abandoned.

All things considered, Ptolemy couldn't have had a crystalline spheres model since his equants and deferents were a little too wobbly for the rigidness of the spheres. In effect, Ptolemy's model

was merely a computing device, never meant to represent the exact reality, and mainly because neither he nor anyone else knew how far away the sun or planets were. So he did the best he could. He rejected the Pythagorean/Aristarchus school which tried to make a heliocentric model with perfect circles, mainly because, as Hipparchus also discovered, that heliocentric model simply didn't match what everyone saw in the sky. The best Ptolemy could do was put the planets in epicycles to fit what he saw in the sky, at least for everything except Venus' phases.

But Ptolemy was not the only one making geocentric models. The Indians and Arabs were doing it also, and were getting very close to the truth. But since the west was so familiar with Ptolemy's model (and it worked to a reasonable degree), no one had really investigated the eastern models.

But when Tycho Brahe came on the scene, we might say that the "corrected" Ptolemaic model was finally produced. The sun's revolution around the Earth was made the deferent of all the planets and the problem was solved. That is because Tycho had computed the distances to the planets much better than Ptolemy.

But Kepler stole Tycho's forty-years worth of planet-charting (after, it is alleged, that he murdered him by mercury poisoning) and used the charts for his favored heliocentric model (which he was endeared to because of his occultism), and then he borrowed the idea of ellipses from Jerome Schreiber and came reasonably close to the movements of the planets. Of course, had Kepler applied the same elliptical orbits to Tycho's geocentric model, Tycho's model would have been just as accurate.

The fact remains, we don't use Ptolemy's model any longer, and haven't for about 500 years. If anything, we use Tycho's model or a variation of it.

Seigel: And while there are many, many, *many* other, subsequent observations that support the heliocentric model and contradict the geocentric model (such as the laws of gravity,

R. Sungenis: "laws of gravity"? Again, this shows Mr. Siegel's ignorance of science. Celestial objects revolve around their center of mass, but even Newton wrote that the Earth could serve as the center of mass if it was positioned correctly among all the other celestial masses.

Seigel: accelerometers on spacecraft orbiting other worlds,

R. Sungenis: I think this is a case of Mr. Seigel trying to sound scientific but not knowing what he is talking about.

Seigel: the orbits of comets,

R. Sungenis: Only in the crystalline spheres model, as I noted above.

Seigel: the discovery of other stars and extra-solar planets, etc.), *this is enough*!

R. Sungenis: The only thing we have had “enough” of is Mr. Seigel’s fallacious attempts to discredit geocentrism with his ignorance of science and history. Planets will revolve around their stars in every place of the universe except one – the place where Earth is the center of mass for the universe and from which everything else will then revolve around it.

Seigel: In other words, once we were able to make observations that were more sophisticated than the simple "position of the planets over time against the background stars", the geocentric model gives wild predictions about the apparent sizes and accelerations of the planets, *inconsistent* with observations.

R. Sungenis: Correction: Copernicus’ original model was even worse than Ptolemy’s. When Copernicus was done with his original model of heliocentrism that he started with 30 years earlier in his *Commentariolis*, he ended up with 48 epicycles to Ptolemy’s 40 in his final work, *de Revolutionibus*.

Seigel: But the idea that "Galileo was wrong" is now 401 years out of date, and very, *very* easy to disprove. The geocentric model has yet to come up with an explanation for the apparent size of Venus in its different phases, and the scientific conclusion is *that's because it's wrong.* But perhaps someone out there knows better... any ideas?

R. Sungenis: I suggest that Mr. Seigel go back to the drawing board, as the saying goes. It would be better if he learned a little astronomical history and physics before he decides again to enter into this arena. The truth is, ever since geocentrism was based on a Tychonic model, Mr. Seigel’s arguments against geocentrism are about “401 years out of date.”

For further information on Mr. Seigel, consult these websites

http://www.phys.ufl.edu/siegel/personal.html

http://www.phys.ufl.edu/siegel/personal.html

http://scienceblogs.com/startswithabang/.

http://www.phys.ufl.edu/siegel/halloween.html.