Prior the earth rotated on its own

[Philosophy]

Prior to the Copernican revolution, the Ptolemaic model of the solar system was the dominant mode of understanding the solar system.

It was a geocentric model, in which the sun, stars and planets orbited around a stationary Earth in epicycles. Ptolemy proposed a very complex model comprising over a hundred epicycles to explain the movement of celestial bodies (Ferris, 1997). Copernicus, in contrast, proposed a heliocentric model of the solar system in which planets orbited around the sun. Aside from this, he also proposed that the Earth rotated on its own axis, taking an entire day to complete a single revolution (Westman, 1998). When we compare and contrast the Copernican and Ptolemaic models of the solar system, we find that the Copernican model was much simpler and had greater explanatory value. It was a much better system for the following reasons.

Firstly, the heliocentric model proposed by Copernicus was simpler than the geocentric one. There was still a need for epicycles to explain planetary motion as Copernicus postulated that planets moved in circular orbits (rather than the elliptical orbits we now know planets revolve around). Even then, this model required fewer epicycles than the Ptolemaic model, making it a much simpler model. Secondly, the Copernican model was able to explain how we experience day and night.

By having the Earth rotate on its own axis around the sun, with each rotation takin 24 hours, each point on Earth receives some amount of sunlight each day. A single point on earth would experience both day and night in the span of one day. Thirdly, it was able to explain how we came to experience seasons by proposing that the Earth has an axial tilt. With the Earth having an axial tilt and revolving around the sun, different parts of Earth would experience differing amounts of heat and light energy from the sun during different times of the year.

This results in fluctuating temperatures at every point on Earth, with regions receiving more heat and light during some months, and less of it during others. Thus, the Copernican model was able to explain the seasons as a natural phenomenon. Fourthly, it was able to explain why Mercury and Venus never seemed to travel too far from the sun.

This occured simply because Mercury and Venus are the two closest planets to the sun, which means they have smaller revolutions around the sun. Since the Earth is the third planet from the sun after Mercury and Venus, it is only natural that Mercury and Venus are always in closer proximity to the sun than the Earth. Fifthly, it was able to explain the changing observed brightness of planets. All planets in our solar system revolve around the sun in epicycles of different diameters. At every point in time, the planets are in movement.

The planets move towards and away from each other and the varying distance between the Earth and other planets resulted in the varying observations of planets' brightness (" The Copernican Model: A Sun-Centered Solar System", n. d.). To illustrate, imagine that the solar system is flat, with a straight line cutting through the sun, and Earth and Venus revolving on circular epicycles around the sun. The direction and speed of the planets' movement is arbitrary.

The two planets are bound to meet on the line cutting through the sun at least once, and that is when they are closest to each other, and Venus seems the brightest to us here on Earth. When the planets move away from each other, Venus seems to become less bright to us. Lastly, the Copernican model was able to explain retrograde motion in a very simple manner.

Mars, being further from the sun than Earth is, naturally has a larger orbit than Earth. This means that it takes less time for the Earth than Mars to go around the sun. If we imagine Earth and Mars circling the sun on a flat plane, we would see that one point on earth would observe the seemingly looping motions of Mars.

While the Copernican model of the solar system was much better than the Ptolemaic one, it was not perfect and had its flaws. Firstly, it was not able to predict the positions of planets with much greater accuracy than the Ptolemaic model. Like the Ptolemaic system of the solar system, the reliance on circular epicycles instead of elliptical epicycles resulted in many inaccurate predictions of planetary positions. Secondly, it was unable to answer the question of how we don't move from our original position when we jump vertically, and why we are do not experience extremely strong winds from the Earth moving on its own axis around the sun. This was one of the main reasons that the Copernican model was not widely accepted. Copernicus' model was a break from the norms of the day both philosophically and biblically. Firstly, Greek philosophy places the Earth as the center of the universe. According to Aristotle, everything on Earth is comes from the four element: water, fire, air and earth in a constant cycle of decay and renewal while everything in the heavens was made of aether which was incorruptible and unchanging (MacLean, 2008).

As a result of this, earthly elements were thought to fall towards the center of the Earth while aether and the perfect heavenly bodies must move in perfect circles. By proposing a heliocentric system, Copernicus defied the belief that the only perfect celestial bodies (and not the imperfect Earth) moved in perfect circles. At the same time, the sun which was considered a perfect celestial body would be put at the center of the solar system, a position reserved for the imperfect. At the same time, the Copernican model contradicted the bible in some places. In the bible, it is implied in several places that the sun is capable of movement. The language used, in referring to the sun rising and setting, convinced the devout that the Earth stood still while the sun revolved around it (“ Geocentric Scriptures: The Sun Circuits the Earth”, n. d.

). By suggesting the heliocentric system, Copernicus went directly against the bible’s teachings. Copernicus was aware of this and tried to soften the blow by dedicating his book to Pope Paul III and wrote of his hesitancy and reasons for publishing his work, but it was to no avail (Rabin, 2004). One way in which the religious authorities of the time tried to neutralize this break, was to say that Copernicus’ work was simply a hypothesis, and not the truth. It is not clear how Pope Paull III felt about Copernicus’ work, but Pope Clement VII was in favour of it. Some astronomers who disagreed nonetheless accepted and even adopted some of his mathematical models all the while rejecting his cosmology. They relied on his mathematical models but fell back on Ptolemy’s ordering of the planets (Rabin, 2004).