

Good essay about planetary science

[Environment](#), [Earth](#)



- The Role of the Doppler effect in determining the rotation rates of both Mercury and Venus

The Doppler Effect describes how waves of any kind move, depending on the direction the source of the waves is moving in and the position of the observer. For example, in the diagram below, the two individuals perceive the siren's noise differently depending on the length of the wavelength and degree of the frequency, premised on where each person is standing.

Source: <http://www.physicsclassroom.com>

The rotational rate of Mercury cannot be determined through optical observation since the planet is comparatively small and is very close to the sun (see the diagram below). The Doppler Effect was used to measure the planet's rotational rates, by transmitting radar from earth and measuring the reflected waves (The Physics Classroom).

Source: <https://www.google.com/search?q=diagram+of+mercury>

The Doppler Effect was similarly used on Venus since the planet reflects most of the sunlight that falls on it, and has low lying clouds on its surface. Consequently, microwave signals were bounced off Venus from a giant telescope in Puerto Rico. Astronomers then used the returning waves to determine the rotational rates of the planet (Science Encyclopedia).

2. The effect of the possible melting of the West Antarctic ice sheet

The Antarctic Ice Sheet is divided into the East and West segments. Although separated by mountains, the two ice sheets play a great role in determining sea levels around the world. Due to global warming and concomitant impacts on human life, focus is shifting to the Antarctica and the two ice sheets (Earth Observatory).

The Western Antarctic Ice Sheet (WAIS) is found in the western hemisphere and is said to lie below the sea level. WAIS comprises 10% of the total mass of the Antarctic Ice Sheet (Howard). WAIS has been losing a lot of ice due to global warming. Consequently, it is estimated that the sea level will rise by about 26 feet (Poore, Williams and Tracy). The following diagram illustrates how the process occurs:

Source: <http://www.sciencedaily.com/releases/2009/02/090205142132.htm>

As a result of the melting of ice sheets, some major cities are likely to be submerged. Global warming poses a grave danger to human settlements that are located along the sea shore. For WAIS, these settlements are found especially in the Southern Indian Ocean and the North American shorelines. They include Washington DC and New York among others.

3. The effect of the possible melting of the East Antarctic ice sheet

Just as with the western ice sheet, the Eastern Antarctic Ice Sheet is expected to contribute massively to increase in sea levels worldwide but on a higher scale. The sea level will rise by about 212 feet (Poore, Williams and Tracy). Major cities that are likely to be submerged include London and Amsterdam. The following diagram illustrates the expanse of the East Antarctic Ice Sheet.

Source: <http://www.realclimate.org>

4. Compare and contrast the variation in surface temperatures on Mercury and Venus and explain why they are so different.

Mercury has extreme temperature variations (as shown in the diagram below) because it is close to the sun. During the night, the planet can record

temperatures as low as 90°K, while the day can be as hot as 700°K.

Contrastively, Venus experiences slight temperature variations due to its slight axial tilt and small orbit. Its average annual temperature is about 750°K (Harvey).

Source: <http://www.schoolandmotivationalposters.com/samposters.cgi/KUP69>

5. How can there possibly be ice on the surface of Mercury and not Venus?

It is possible to have snow on Mercury because of the extreme weather that it experiences. Since it lacks an atmosphere, it cannot retain heat for long and temperatures can go below zero. On the other hand, Venus has relatively stable but high temperature and cannot support formation of ice (University of Connecticut).

Source: <http://www.ck12.org/book/CK-12-Earth-Science-Concepts-For-High-School/section/14.8/>

6. Explain why we think Mercury's radius has decreased since its formation.

Mercury's radius has decreased since its formation because its rotation was interfered with and stopped by waves from the sun in the past. The planet became smaller because its innermost section, which was in liquid form, changed into a solid, as seen in the diagram below. The hardening of its crust resulted in a decrease of about a kilometer or two. Consequently, the planet has craters like those found on the moon (University of Connecticut).

Source: http://dev.laptop.org/pub/content/wp/en/Mercury_%28planet%29.html

7. Explain why we do not observe Mercury or Venus transiting the sun each synodic period.

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When Mercury and Venus transit the sun each synodic year, it is not possible to observe the two planets because their orbits are slanted in relation to the orbit of the earth. The two planets are so small that the shade they form when passing between the earth and the sun does not reach the earth (see the diagram below). The planets are either below or above the sun, thus making it impossible for a person who had not been informed earlier to realize that such an event is taking place (Espenak).

Source: [http://www. syix.](http://www.syix.com/elmer/Cool%20Stuff%20/Solar_System_Scope.htm)

[com/elmer/Cool%20Stuff%20/Solar_System_Scope. htm](http://www.syix.com/elmer/Cool%20Stuff%20/Solar_System_Scope.htm)

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