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Title :

**"INTRODUCTION TO ASTRONOMY AND SOLAR
SYSTEM"**

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In the historical side, it shows between 610 and 632 Al-Quran has stated the authorization and the wisdom of the creator. This shows astronomy is important and it always caught attention of human no matter in the past or now. In Latinos, astronomy is about the stars. In Arabic, it is about Falaq. In scientific case, it is about the study of all celestial bodies in the sky. According to Doctrine of Islam, Muslims must pray and do all the positively things that beneficial to all people but not ourselves since all of this is related to astronomy. Allah S.W.T creates everything included a millions of star, galaxies, planets, sun, moon and all things in the universe. At the same time, Allah will control all the movement of the celestial bodies in the universe precisely and accurately. In ancient civilization before Islamic Reign, people differentiate direction using the sun, moon or star. However, there is a quick growth of knowledge in astronomy after the Islamic Reign (began at the end of the Bani Umaniyah reign until Abbasiyah reign).

There are a lot of famous Muslim astronomers who have contributed in this astronomy field. One of them is Al-Khawarizimi(Figure 3) who worked in mathematics, astronomy and geography and invented the taqwim system (Ibnor Azli Ibrahim, 2012). Al-Biruni(Figure 4), the great psilosophy, astronomy and geometry. Al-Biruni always provided a lot of astronomical works about the different phases of the moon(Figure 5). The astronomers also included Muhammad Al-Fazari who invented the ‘astrolabe’, Ibn-Rusyd who wrote about the solar flare and understand the mercury stars move around the sun surface, Al-Battani, Ulugh Beg in Uzbekistan who invented the Hijri Calender using moon Phase Almanac and Al-Farghani who helped Caliph Al-Mamun to observe the earth diameter. There are 2 books of him which related to introduction to stars.



Figure 3 shows Al-Khawarizmi



Figure 4 shows Abu Rayhan al-Biruni

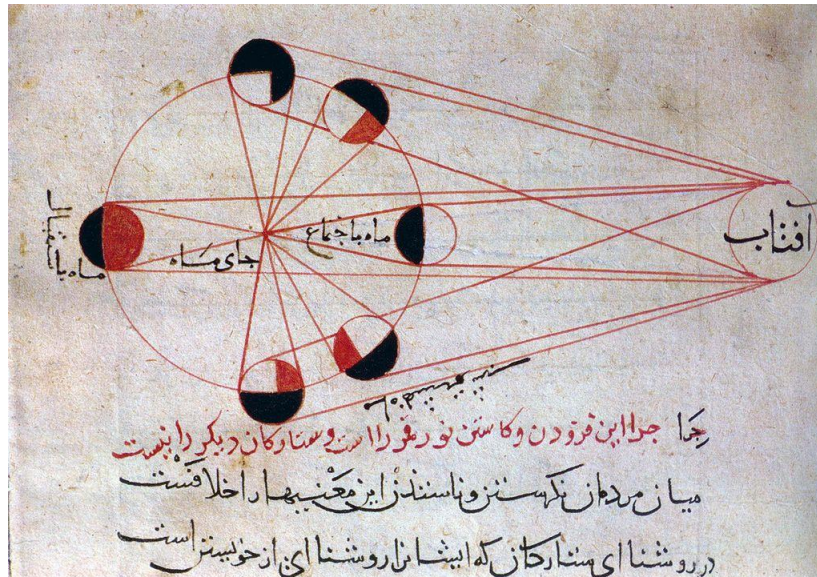


Figure 5 shows astronomical work of Al- Biruni, explains the different phases of the moon.

On the other side, there are also some western astronomers like Claudius Ptolemaeus(Ptolemy) in Greek who understand that all planets move around the earth, Nicholas Copernicus(Figure 6) in Poland who discovered that sun can be the center of motion of all planets. That means all planets rotates around the Sun at their own orbits. His theory is true until today. Western astronomers also include Tycho Brache proved that dutch, sun and moon move around the earth and others planets moving around the sun. Johannes Kepler in Germany who produced the Kepler Orbital Planetary Rules. Of course, Galileo Galilei from Italy who designed the first binocular to observe the celestial bodies in sky. Last is the Isaac Newton produced the laws of the movement and earth gravity field and showed that all planets have its own forces and the forces between planets by using the Universal Gravity Rules.

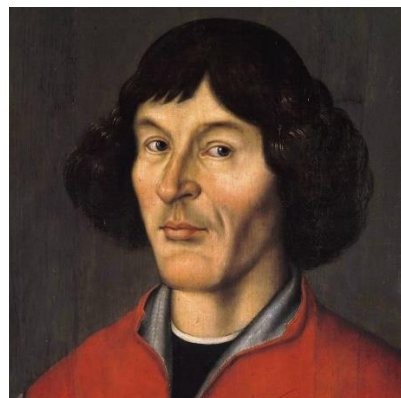
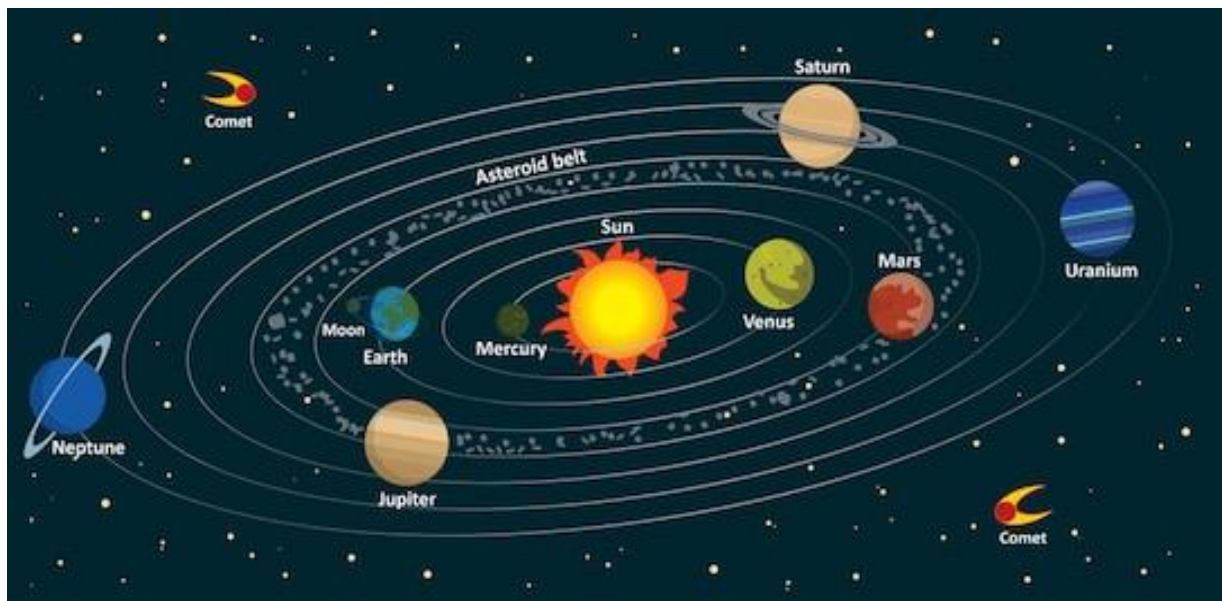


Figure 6 shows Nicholas Copernicus, the western astronomer

Lastly, the disciplines related to astronomy are cosmology, astrophysics, astrometric, cosmogony, astrofiqh, astrology and cosmography.

SOLAR SYSTEM



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Figure 7 shows the solar system

The solar system (Figure 7) is the sun and all the planets moving around the centre, sun. As we know, sun is the centre. Sun is the brightest star in the solar system and it is full of heat energy. Its temperature is about 5505 degree Celsius. The sun is orbited by planets, asteroids, comets and other unknown things. The solar system is about 4.6 billion years old and it is formed by the gravity in a large molecular cloud (Wikipedia, 2020). There are 8 planets in the solar system. In their order from the sun, from closest to furthest, they are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. The first four planets are called terrestrial planets whereas the last four are called gas giants. Asteroids are mostly between Mars and Jupiter. Further from the Neptune, there is Kuiper belt and scattered disc.

The Eight Planets

Mercury



Mercury (Figure 8) is the closest planet to the sun. It is also the smallest planet among the eight planets. Mercury is a tiny black dot as it transits the sun. Mercury can only be seen during solar eclipse or during morning or evening twilight. Actually, Mercury looks like a moon. Mercury has no atmosphere but has exosphere. Surface temperature of this planet could be 90-700K.

Figure 8 shows Mercury planet.

Venus



Figure 9 shows Venus planet

We can imagine how hot, hellish and volcanic the Venus planet (Figure 9) is through the figure above. Actually, Venus is the second planet from the sun. Venus and Earth are like twins because their size, mass, density, composition and gravity are similar. Venus is the hottest planet in the solar system as the interior of this planet is made up of metallic iron core that is roughly 6000 km in diameter. The temperature of Venus can reach 880 F (471 degrees Celsius). So, the spacecraft from Earth can only last a few hours after landing on Venus.

Earth



Earth is a loving planet that human can breath and live on comfortably. It is the third planet from the sun. The mass Earth is great enough to make the moon move around it. Earth turns around the sun for 365 or 366 days where Earth turns in its axis for 24 hours. The Earth is only planet in solar system to have liquid water and oxygen for human to breathe in. About 70% of the Earth surface is covered by water. Average surface temperature of Earth is about 14.6 degree Celsius.

Figure 10 shows the Earth.

Mars

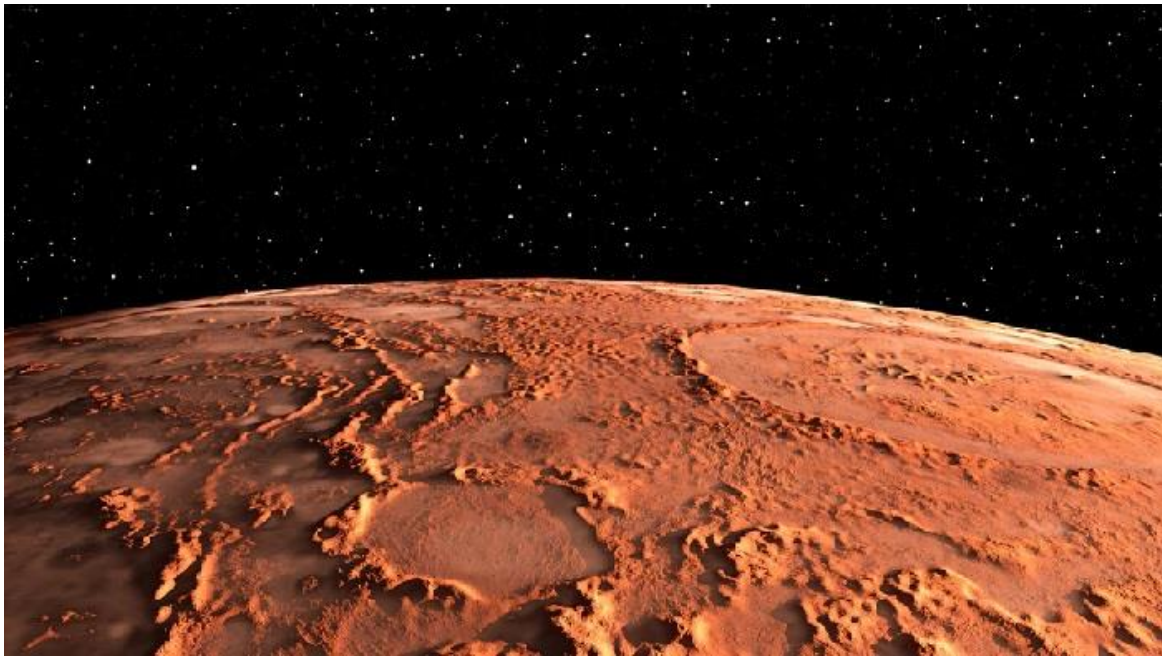


Figure 11 shows the surface of Mars



Figure 12 shows Mars planet.

Mars planet (Figure 12) is the fourth planet from the sun. Mars consists of many frozen water and carbon dioxide. It also has the largest volcano in the solar system and very large impact craters. The ground of Mars is red (Figure 11) as it consists of iron oxide in the rocks and dust. Actually, Mars has two small moons which are Phobos and Deimos. The surface temperature of Mars is about -143 degree Celsius to 35 degree Celsius. Mars consists of life, that is bacteria-type organisms.

Jupiter

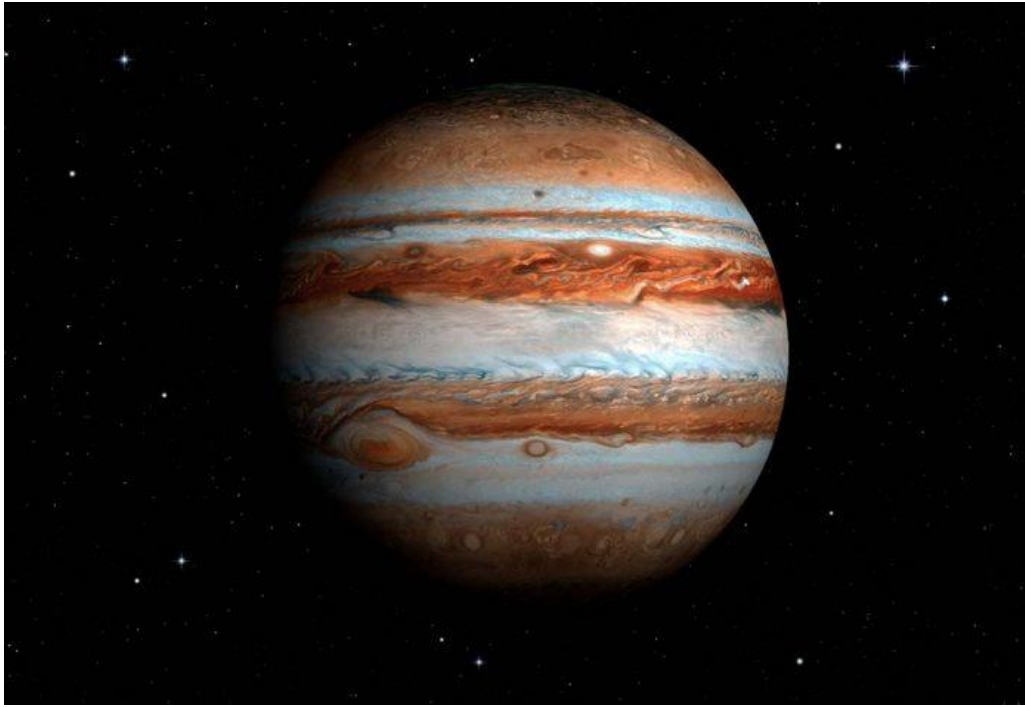


Figure 13 shows Jupiter planet

Jupiter (Figure 13) is the largest planet in the solar system. Jupiter's mass is about 300 times heavier than the mass of earth and its diameter is about 11 times greater than the diameter of earth. Jupiter is the fifth planet from the sun. Jupiter is large enough so that it can be seen even without the telescope. There are at least 79 moons around the Jupiter. Jupiter consists of 88% to 92% of hydrogen. We can see that Jupiter has a lot of layers on its surface. These are the bands of clouds going horizontally around its surface. The white parts are zones and the brown parts are belts.

Saturn



Figure 14 shows Saturn planet.

Saturn (Figure 14) is the sixth planet from the sun in the solar system and it is the second largest planet in the solar system after Jupiter. Atmosphere of Saturn made up of 96% of hydrogen. As we know, Saturn is known for its planetary rings. However, there is only a big moon moving around Saturn a millions years ago. Eventually, the moon came closer and closer to Saturn and moved faster and faster. Finally, the moon broke into several parts consist of ice and rocks. Then, the chunks kept rotating and smash out each other, there are most dust and snows created. All of them mix together in a flatted doughnut shape and form a ring. That is how a planetary ring of Saturn is formed. The average temperature of Saturn is -288 degree Celsius, it is pretty cool.

Uranus

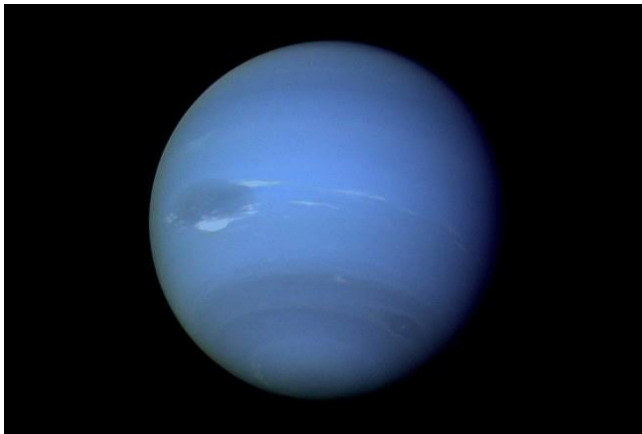


Figure 15 shows Uranus planet.

Uranus (Figure 15) is a seventh planet from the sun in the solar system. It is the third largest planet in the solar system after Jupiter and Saturn. This planet is made up of ice, gases and liquid metal. Its surface temperature is about -197 degree Celsius. Uranus has the coldest temperature recorded instead of Neptune planet, which the further planet away from the sun. Actually, Uranus has 27 unknown moon. The surface of Uranus is blue as its surface is covered with methane. Uranus has 13 planetary rings which is less than the planetary rings of Saturn.

Neptune

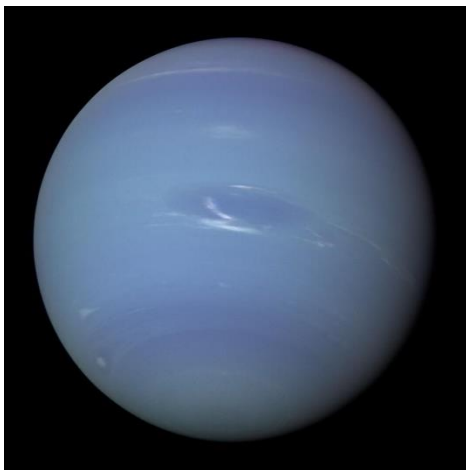


Figure 16 shows Neptune Planet

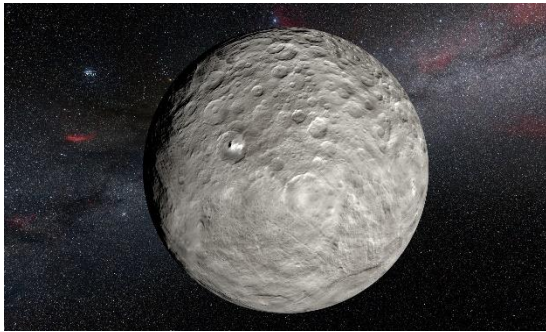
Neptune (Figure 16) is the last planet from the sun. Its overall temperature is the coldest among the planets but it has no the coldest temperature record. . Neptune's atmosphere mostly made up of hydrogen and helium. Neptune is slightly darker than the Uranus and consists of small amount of methane which will make the surface blue.

Dwarf Planets

Pluto

The formal name of Pluto is 134340 Pluto. At first, it is called a planet but now it is considered as largest body in the Kuiper belt. Pluto is made up of rock and ice. The average temperature of Pluto is only -223 degree Celsius as it is very far from the sun. In 2006, Michael E Brown downgraded the Pluto from list of planets and put it in list of minor planets.

Ceres



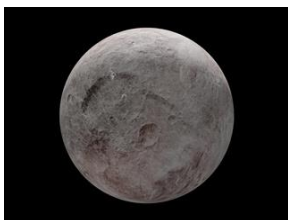
The another name for Ceres (Figure 17) is 1 Ceres and it is the smallest dwarf planet in solar system. However, it is the largest object in the main asteroid belt. Ceres is discovered by Giuseppe Piazzi.

Figure 17 shows Ceres

Haumea

In year 2005, Michael E Brown discover Haumea. It has two famous moons, which are Hiiaka and Namaka. The specification of Haumea is the day time is short and its odd shape. Haumea can turns in its axis every hour. This consider as fast turning and this fast turning will cause Haumea to be shaped like ellipsoid. Its temperature is about -241 degree Celsius.

Eris



Eris (Figure 18) is the second largest dwarf planet in solar system. Eris orbit the sun once every 557 years. The moon that orbiting Eris is discovered in year 2005 called Dysnomia. The temperature of Eris is from -217 degree Celsius to -243 degree Celsius.

Figure 18 shows Eris.

Makemake

The formal name for Makemake is 136472 Makemake. Makemake consists of many ice and rock. The ice in this dwarf planet is as hard as rock as its temperature is only -293 degree Celsius and its orbital period is almost 310 times the earth years.

Structure of Solar System

Solar system consists of several parts like inner solar system, outer solar system, trans-Neptune region and Oort cloud.

Inner Solar System

Inner solar system consists of the first four planets closest to the sun. They are Mercury, Venus, Earth and Mars. These four are terrestrial planets. On the other side, the asteroid belt or main belt region also included in this inner solar system. It is a ring made up of small rocks, sand, dust between the orbits of Mars and Jupiter. Asteroid region consists of Ceres and asteroids (space rock).

Outer Solar System

Outer solar system the last four gas giant planets which are Jupiter, Saturn, Uranus and Neptune (Figure 19) .



Figure 19 shows outer solar system

Trans-Neptune Region

It consists of Kuiper belt region (Figure 20) and scattered disc region.

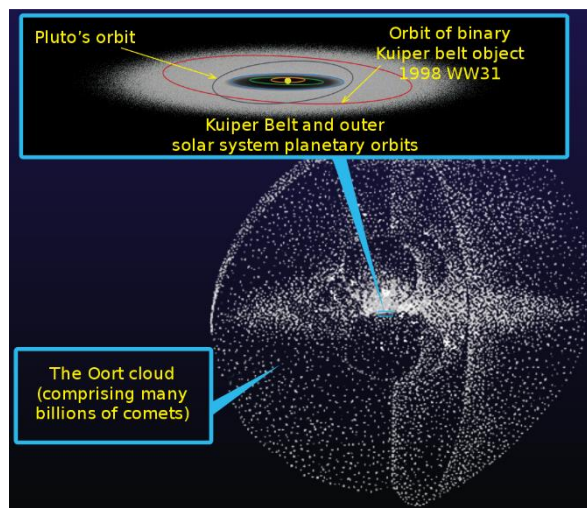


Figure 20 shows Kuiper belt region and Oort Cloud.

Dwarf planets such as Pluto, Haumea, Makemake and Kuiper belt, short-period comets are included in this Kuiper belt region. Scatter disc consists of Eris and scattered disc objects. When these two regions combined, the Trans-Neptune region is formed and it is one of the structures of the solar system.

Oort Cloud

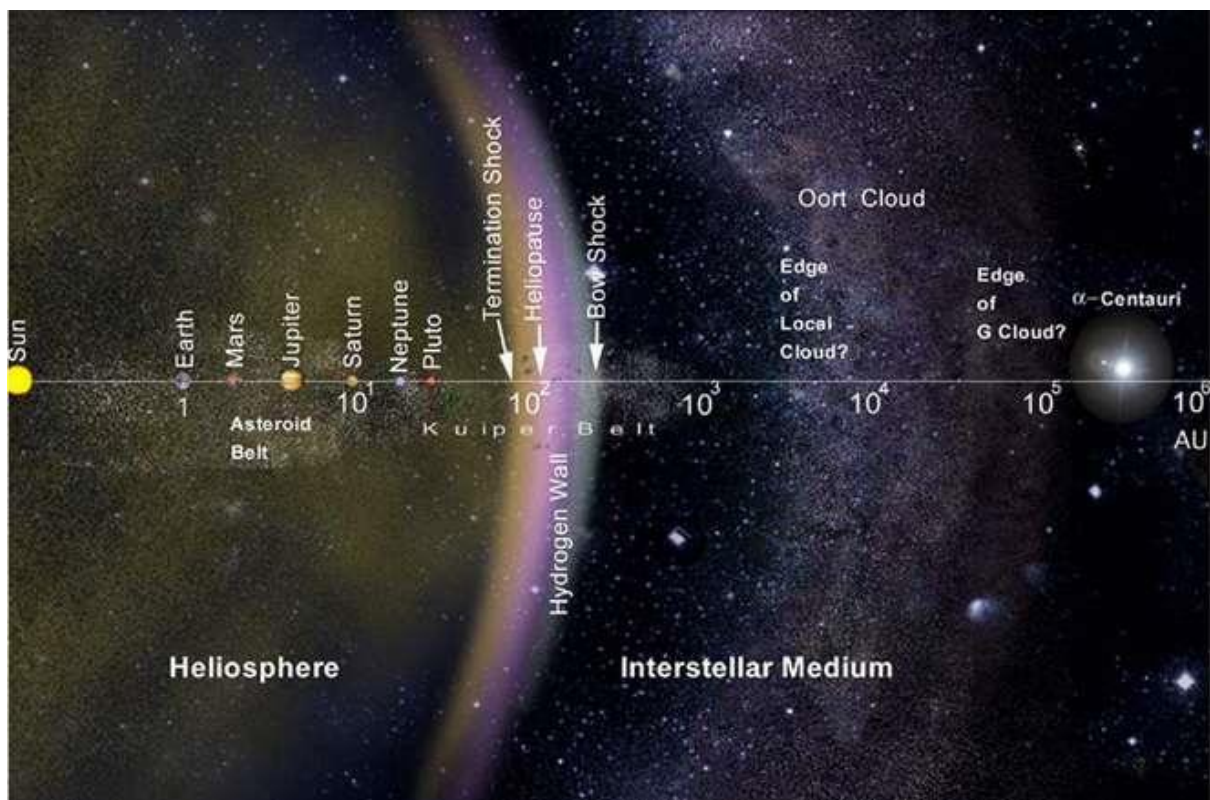


Figure 21 shows the position of Oort Cloud.

Oort cloud is a cloud of comets and other objects. The outer Oort cloud is bound to the Sun, while the inner Oort cloud or Hills Cloud will make the comets.

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