

Venus (vi-naəs), the second planet nearest to the sun is the sixth largest. It belongs to the group of terrestrial planets and believed to be the earth's sister planet due to the similarity in size and composition. It is the second brightest object aside from the moon during the night. Venus is also called as the Morning Star or as the Evening Star (Hamilton, Calvin, 2001).

For most, the planet's name was derived from Venus – the roman goddess of love thus, most of its surface features were named after known mythical women. The term Venusian (adj) is mostly used for items and features associated to the planet Venus.

General Features of Venus

Venus is sweltering with a surface temperature of four hundred eighty two degrees Celsius (482 °C) or nine hundred degrees Fahrenheit (900 °F). This scorching temperature is primarily due to the green house effect cause by the character of the clouds and the atmosphere of the planet (Robinson, Cordula, 1995). Venus as an inferior planet (meaning it belongs to the group of planets close to the sun) has a nearly circular orbit having a radius of 0.7 AU (astronomical unit). With the shape of its orbit, this gives the Venus 225 days to revolve around the sun. One thing unusual about Venus is the **Retrograde Motion** – the unusual reversing of a planet's direction of motion for a short time. Unlike Earth and other **Jovian** (gas giants) planets, Venus has no satellite of its own. Because the planet is made up mainly of thick layers of dense and reflective gases, Venus' surface is unseen from visible light. Venus' atmosphere is composed mainly of carbon dioxide and because of this; it has the densest atmosphere resulting to a green house effect inside the planet. Venus' atmosphere has a pressure that is ninety (90) times that of the Earth. These are one of the main reasons why life is not possible in Venus.

Venus is composed mainly of rocks; this is why it belongs to the group of terrestrial planets. According to size and mass, it is very relative to Earth. Venus has a diameter of 650 km

and mass 81.5% of the Earth's. Due to its weak magnetic field, it has a very slow rotational velocity. That is why one day on Venus is equal to two hundred and forty three (243) Earth days. Since Venus' atmosphere is covered mainly of thick gases, the clouds in Venus achieve complete rotation around the planet in four days. Reports from the missions to the surface of the planet indicate that the clouds begin only at almost fifty kilometers from the surface. The main components of the cloud layers that surround the planet are sulphur acid droplets. Venus is composed of clouds lying close to the atmosphere and clouds in the upper region. The clouds in the upper Venusian atmosphere have high velocities ranging up to three hundred kilometer per hour. (300 km/hr). Venus' winds have high velocities but up to now, it is still unexplainable. Only small amount of water vapor composes the cloud in the planet. Some studies suggested that several billion years ago, the atmosphere of Venus was more likely that of the earth's today, however the greenhouse effect that is present in the planet because of its atmosphere might have dried up all the water in the surface as well as the water in its atmosphere.

On the other hand, the surface of Venus is relatively smooth in most of its areas. Moreover, there are also Venusian structures that are present on Earth like canyons, volcanoes, lava flows, rift valleys, craters and plains. It was also proved by some investigations on the surface of Venus that volcanic activity is present in the planet. These are likewise proven by the characteristics of the Venus' surface. The planet is believed to be single crustal plate though there are sufficient evidences that show geologically active regions. Tectonic activities are believed to have occurred in the planet. Studies show that there are two large regions above average elevations (continents) which are called *Istar Terra* and *Aphrodite Terra*.

There are several Venusian features which are relative to that of the earths:

- (1) **Mountains** – Because of the seismic activities in the planet, high mountains which are volcanic in nature and origin are present in Venus. The highest mountain range on Venus is the Maxwell Montes (two km more than the elevation of Mt. Everest above sea level on Earth)
- (2) **Volcanoes and Lava Flows** – There is sufficient evidences that volcanoes really exist in the planet though still, there is no direct proof yet. Strong indirect evidences such as frequent change in the chemical composition of the atmosphere and the findings of lightning in several regions prove that volcanoes really inhabit the planet. Pictures of recent lava flows are also, strong evidences for their existence.
- (3) **Rift Valleys** – Due to the tectonic motion in Venus, the formation of rift valleys were made possible. Rift valleys as large as the East African Rift are present in the surface of the planet.
- (4) **Meteor craters** – Though it has a thick layer of gases surrounding it, the planet is still susceptible to meteors. Though the surface of Venus is always smoothed by recent lava flows, the presence of meteors cracking up the surface of the planet is visible in some of its areas.

Up to today there is still no certainty as to what the interior of the planet Venus looks like. The interior characteristics of Venus are inferred from the magnetic field and gravity field measured by the space probe Magellan and other prior spacecrafts who were launched to outer space to investigate on the planet.

Orbit and Rotation

Almost all the planet's orbits are elliptical and they revolve around the sun based on the eccentricity of their elliptical orbits. Venus, however, is the only planet in the solar system with its orbit close to being circular. It has an eccentricity of less than 1 percent and completes one periodic revolution at a distance of about one hundred six million kilometers for two hundred and twenty four days. When the planet lies between the earth and the sun often called inferior conjunction, Venus is about forty million kilometers. This is the point where the planet is closest to earth.

Venus rotates on its axis once every 243 days. At its equator, Venus rotates at 6.5km/hr. Unlike when one is in the Earth, an observer in Venus would rather say that the sun is rises in the west and sets in the west every about 116 days. From the upper pole of the sun, one would view Venus rotate clockwise in retrograde motion. At present, no moon is known and recorded orbiting Venus aside from asteroid 2002 VE₆₈.

Early Studies

The planet is known as *Shukra* in the Hindu Jyotisha since early times. However, in the West, before the invention of the telescope, it was known as a 'wandering star'. Moreover, different cultures historically held its appearances as a morning star different from its appearance as the evening star. Pythagoras is known as the man who discovered that the morning and the evening star are just the same, though he advocated the view that Venus was once the earth's satellite. Upon the advent of the telescope, during the early 17th century Galileo observed the planet showing phases like the Moon's. This phenomenon was pronounced possible only if Venus orbited the Sun, and this clearly contradicted the Ptolemaic geocentric model that the solar system was concentric and centered on the Earth (Kaufmann, W.J., 1994).

Venus' atmosphere was discovered in the late 1970's by John Schroter and found out that He found out that the arcs made by the planet are elliptical extending more than 180° . He assumed that it was due to the dispersion of light in the dense atmosphere of the planet. Later, the observation of a complete ring around the dark side of the planet when it is at inferior conjunction provided further evidence that Chester Smyth Lyman's conclusion that the planet has an atmosphere was valid.

Earlier Views of Venus

During the earlier times, there were speculations on the possibility of life on Venus. Once on 1686, a French 'man of letter' Bernard de Fontenelle described the appearances of the people in Venus. He illustrated them as small black people, burned by the sun and full of wit and fire. He also described them as persons who are always in love, writing verse and fond of music, festivals, dances and tournaments everyday (National Geographic, 1975). Now, due to the studies on the planet, and the evidences of the general characteristics and surface features of the planet, it was inferred that de Fontenelle was erroneous in his statement.

Space Explorations

The first unmanned probe sent to Venus and onto outer space was Venera 1. It began on the 12th of February 1961. The Venera 1 was the first space probe launched by the Soviet Venera Program which was launched on direct trajectory. After one week, the probe passed within 100 000 km from Venus and after that, it lost contact. The US explorations with Mariner 1 ended up with the same result as with Venera 1. Mariner 2 on the other hand succeeded as the first probe which had undergone interplanetary missions passing through Venus at 34 833 km above its surface. Today, still many probes are being launched and investigations are being conducted in the study of Venus.

Facts and Figures



Fig1. The image of Venus in visible as captured by Galileo.

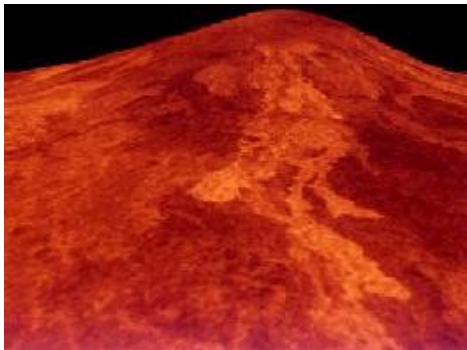


Fig3. Image of apparent lava flows.

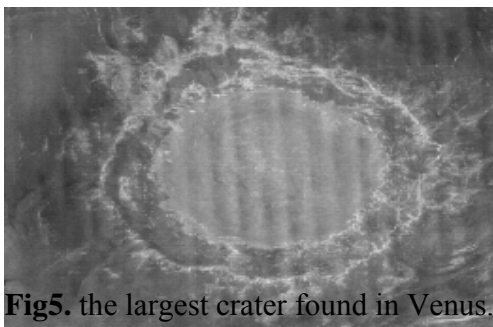


Fig5. the largest crater found in Venus.

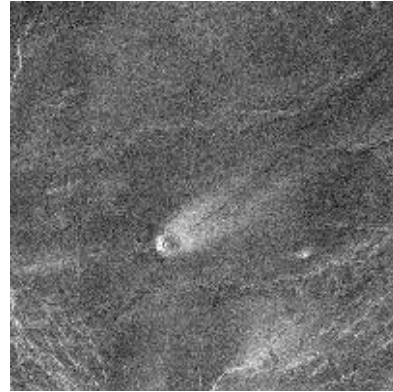


Fig2. An image of a volcano about three miles in diameter.

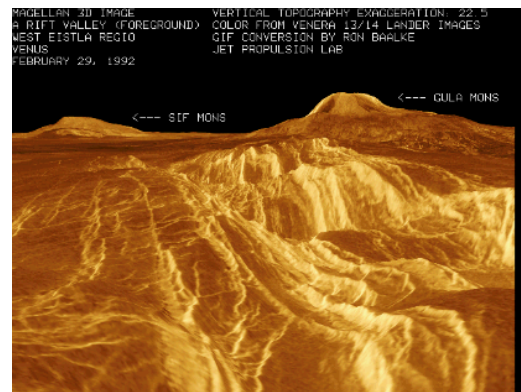


Fig4. Rift valleys like that of the earth also



Fig6. Venus as evening star (next to crescent moon).

Table1. Venus statistics.2

Mass (kg)	4.869e+24
Mass (Earth = 1)	.81476
Radius from the Equator(km)	6,051.8
Radius from the Equator (Earth = 1)	.94886
Average density (gm/cm³)	5.25
Average distance from the Sun (km)	108,200,000
Average distance from the Sun (Earth = 1)	0.7233
Days per One Rotation	-243.0187
Days per One Revolution	224.701
Average orbital speed (km/sec)	35.02
Eccentricity of the Orbit	0.0068
Degrees of Axis Tilt	177.36
Degree of Orbital Inclination	3.394
Surface Gravity from the Equator (m/sec²)	8.87
Escape Velocity from the Equator (km/sec)	10.36
Visual geometric albedo	0.65
Magnitude (Vo)	-4.4
Average Surface Temperature	482°C
Atmospheric Pressure (bars)	92
Composition of Atmosphere Carbon dioxide (CO₂) Nitrogen (N) Small Amounts of: sulfur dioxide, water vapor, carbon monoxide, argon, helium, neon, hydrogen chloride, and hydrogen fluoride.	96% 3+%

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The Planet Venus

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