



Venus Mission 2024

For Prelims: Robotic missions (DaVinci Plus and Veritas) to Venus, Previous Missions Sent on Venus, Important Highlights of Venus

For Mains: ISRO Space Mission to Venus, Space Technology

Why in News?

Recently, the new Chairman of [Indian Space Research Organization \(ISRO\)](#) has announced that it is expecting to **launch the Venus mission by December 2024**.

- The aim of the mission is to study Venus' atmosphere, which is toxic and corrosive in nature as clouds of sulfuric acid cover the planet.
- Earlier, the [National Aeronautics and Space Administration \(NASA\)](#) announced two new **robotic missions (DaVinci Plus and Veritas) to Venus**.

What are the Key Objectives of the Mission?

- Investigation of **surface process and shallow subsurface stratigraphy**.
 - Until now, no prior observation of the sub-surface of Venus has been done.
 - Stratigraphy is a **branch of geology** in which **rock layers and layering are studied**.
- Study of the **structure, composition and dynamics of the atmosphere**.
- Investigation of [Solar wind](#) interaction with Venusian [ionosphere](#).

What is the Significance of the Mission?

- It will help to learn **how Earth-like planets evolve and what conditions exist on Earth-sized exoplanets** (Planets that orbit a star other than our sun).
- It will help in **modelling Earth's climate** and serves as a cautionary tale on how dramatically a planet's climate can change.

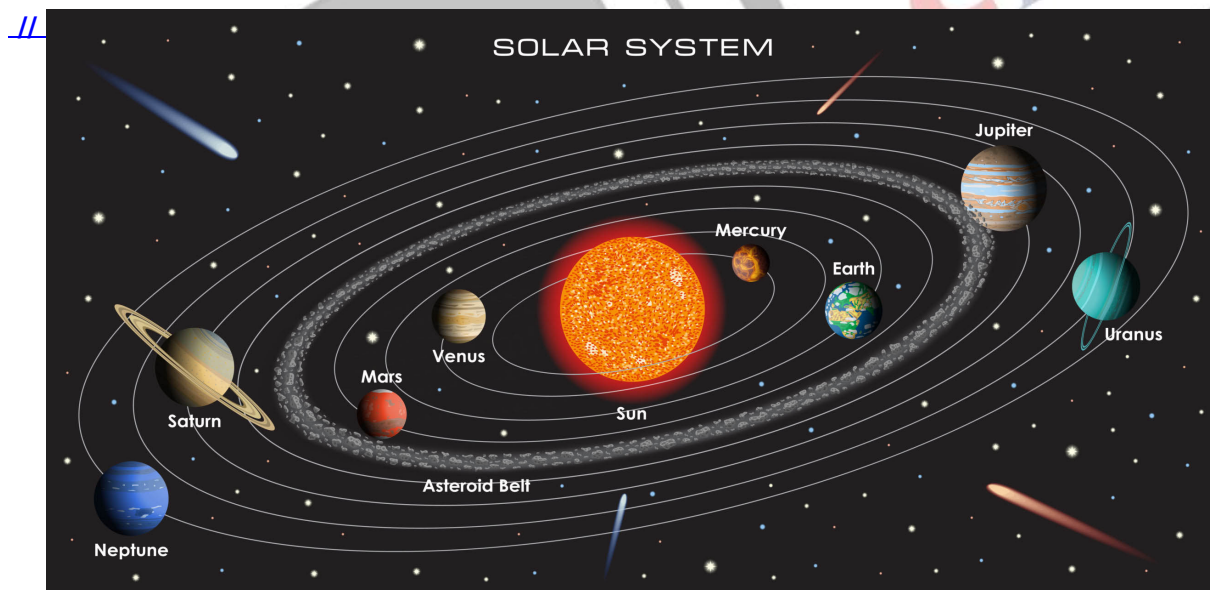
What are the Challenges for the Mission?

- Venus offers **different challenges compared to Mars**, given the **thick atmosphere and surface activity, which make it a complex planet**.
- In order to have a deeper understanding, **the instruments need to go deep through the atmosphere**.
- One of the instruments the space agency is planning to use on the spacecraft is a high resolution [Synthetic Aperture Radar](#) (SAR) that would examine Venus' surface, despite the clouds around the planet, which lowers visibility.
 - It refers to a technique for **producing high-resolution images**. Because of the precision, the radar can penetrate clouds and darkness, **which means that it can collect data day and night in any weather**.

Previous Missions Sent on Venus			
US	Russia	Japan	Europe
<ul style="list-style-type: none"> ▪ Mariner series 1962-1974, ▪ Pioneer Venus 1 and Pioneer Venus 2 in 1978, ▪ Magellan in 1989. 	<ul style="list-style-type: none"> ▪ Venera series of space crafts 1967-1983, ▪ Vegas 1 and 2 in 1985. 	<ul style="list-style-type: none"> ▪ Akatsuki in 2015. 	<ul style="list-style-type: none"> ▪ Venus Express in 2005.

What is Venus?

- It is named after the Roman goddess of love and beauty. It is the **second planet from the Sun** and **sixth in the solar system in size and mass**.
- It is the **second brightest** natural object in the night sky **after the Moon**, probably that is the reason why it was the **first planet to have its motions plotted across the sky**, as early as the second millennium BC.
- Unlike the other planets in our solar system, **Venus and Uranus spin clockwise** on their axis.
- It is the **hottest planet** in the solar system because of the **high concentration of carbon dioxide** which works to produce an intense **greenhouse effect**.
- **A day on Venus is longer than a year**. It takes Venus **longer to rotate once on its axis than to complete one orbit of the Sun**.
 - That's **243 Earth days to rotate once** - the longest rotation of any planet in the Solar System - and only **224.7 Earth days to complete one orbit of the Sun**.
- Venus has been called **Earth's twin** because of the **similarities in their masses, sizes, and densities and their similar relative locations** in the solar system.
 - No planet approaches closer to Earth than Venus; at its nearest **it is the closest large body to Earth other than the Moon**.
 - Venus has **90 times the atmospheric pressure of Earth**.



UPSC Civil Services Examination Previous Year Questions (PYQs)

Q. What is the difference between asteroids and comets? (2011)

1. Asteroids are small rocky planetoids, while comets are formed of frozen gases held together by rocky and metallic material.
2. Asteroids are found mostly between the orbits of Jupiter and Mars, while comets are found mostly

between Venus and Mercury.

3. Comets show a perceptible glowing tail, while asteroids do not.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 3 only
- (d) 1, 2 and 3

Ans: (b)

Explanation:

- **Asteroids** are small and rocky objects that orbit the Sun. Although asteroids orbit the Sun like planets, they are much smaller than planets.
- There are lots of asteroids in our solar system. Most of them are found in the main asteroid belt—a region between the orbits of Mars and Jupiter.
- Comets are cosmic snowballs of frozen gases, rock and dust that orbit the Sun.
 - When a comet's orbit brings it close to the Sun, it heats up and spews dust and gases into a giant glowing head larger than most planets.
 - The dust and gases form a tail that stretches away from the Sun for millions of miles

Source: TH

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