# New missions to Venus

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**In news-** NASA recently announced two missions to Venus, as **part of its 'Discovery Program'** that aims to explore and study the solar system.

***About the two new missions-***

- The **VERITAS (Venus Emissivity, Radio Science, InSAR, Topography, and Spectroscopy)** mission will map the surface of the planet in 3D and study its geology.
- It will also study **infrared emissions** from the surface to map various kinds of rocks.
- It hunts for **volcanic activity** and tries to find out if any active volcanoes are releasing water vapour into the atmosphere, sustaining its **greenhouse effect.**
- The **DAVINCI+ (Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging)** will study the dense atmosphere of Venus to understand the trigger and evolution of the runaway greenhouse effect active on the planet.
- The mission will also try to **determine if the planet held an ocean of liquid water in the past.**
- The mission will return the first high-resolution images of **unique surface features** known as **"tesserae"** on Venus, which are akin to the continents on Earth, and suggest the existence of plate tectonics.

- The mission's **accompanying Plus probe** will drop into the atmosphere, making measurements of **noble gas composition** in the layers.

- The **"ultra-precise" Deep Space Atomic Clock-2** will be tested on VERITAS while the Compact Ultraviolet to Visible Imaging Spectrometer **(CUVIS) will fly with DAVINCI+** to make high-resolution UV measurements.
- The missions are **funded for $500 million each** and are

expected to **launch** somewhere **around 2028-2030.**

***About Venus-***

- Venus is often called **Earth's twin** because of similar mass, size, gravity, surface composition and complex atmospheric processes.
- For those on Earth, Venus is the **second-brightest object in the sky after the moon.**
- It appears bright because of its **thick cloud** cover that reflects and scatters light.
- The planet's thick **atmosphere traps heat** and is the reason that it is the hottest planet in the solar system with a **surface temperature of 500C- high enough to melt lead.**
- Venus moves forward on its orbit around the Sun but spins backwards around its axis slowly, which means **on Venus the Sun rises in the west and sets in the East**.
- One day on Venus is **equivalent to 243 Earth days** because of its backward spinning.
- Venus **does not have any moons,** a distinction it shares only with Mercury among the planets in the Solar System.
- It is also known as the "morning star" and "evening star".

Venus ***orbiters*** include-

- Mariner 2 (1962),
- Soviet Venera (1967) (( first successful probe to enter and return data from another planet)),
- Venera 7 lander (1970), the first craft to successfully land on another planet,
- Venera 8 (1974),
- Venera 9 & Venera 10 (1975),
- Pioneer Venus (1978), the first orbiter around Venus and carried the first radar to observe another planet,
- The most recent observations of Venus are from the **Galileo spacecraft,** which flew past Venus in February

**1990** on its roundabout journey to Jupiter.

- On November 9th of 2005, the European Space Agency's **Venus Express** mission was launched on a Russian rocket, with support from NASA.
- The **Cassini Orbiter**, which orbited Saturn until September 2017, also observed Venus briefly and sent home some useful data.

As of now, **Japan's Akatsuki mission** is studying the planet from Orbit.

***About Shukrayaan-***

- Shukrayaan-1 is a proposed orbiter to Venus by the Indian Space Research Organisation (ISRO) to study the surface and atmosphere of Venus.
- The mission concept to Venus was first presented at a Tirupati space meet in 2012.
- From 2016 to 2017, ISRO collaborated with JAXA to study the Venus atmosphere using signals from the Akatsuki in a radio occultation experiment.
- The **three broad research areas of interest** for this mission include surface/subsurface stratigraphy and re-surfacing processes; study of atmospheric chemistry, dynamics and compositional variations; study of solar irradiance and solar wind interaction with Venus ionosphere.
- ISRO and **France (CNES)** are holding discussions to collaborate on this mission and jointly develop autonomous navigation and aerobraking technologies.
- The science payload would have a mass of 100 kg and would consist of instruments from India and other countries.