Europe’s Juice Mission

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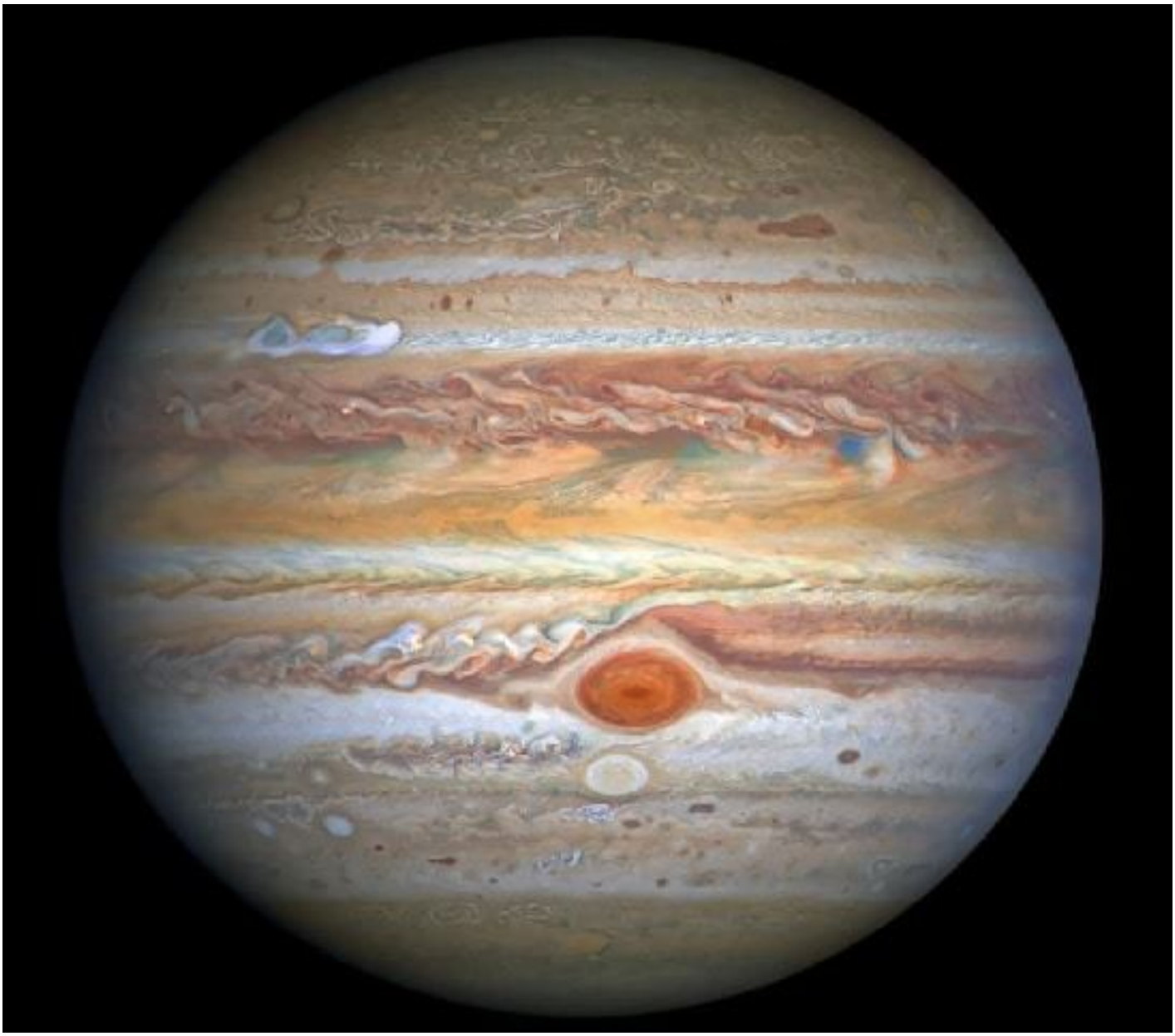

What’s in today’s article?

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- **Is Juice capable of detecting life?**
- **What other missions will study Jupiter?**

Why in news?

- The European Space Agency (ESA) is all set to launch the Jupiter Icy Moons Explorer (Juice) mission from its spaceport in French Guiana on an Ariane 5 launcher.
- Planned to reach Jupiter in 2031, the mission aims to carry out a detailed exploration of the Solar System's largest planet and its icy moons, which potentially have habitable environments.

What is the Jupiter Icy Moons Explorer (Juice) mission?

- **About**
  - The Juice mission will make detailed observations of the giant gas planet and its three large ocean-bearing moons — Ganymede, Callisto and Europa.
    - It will do so by using remote sensing, geophysical and in situ instruments.
  - Scientists know that these three moons of Jupiter possess icy crusts, which they believe contain oceans of liquid water underneath, **making them potentially habitable**.
  - Juice mission will help probe these water bodies by creating detailed maps of the moons' surfaces and enable the scientists, for the first time, to look beneath them.
  - Another primary goal of the mission is to create a comprehensive picture of Jupiter by trying to understand its origin, history and evolution.
  - Juice will also analyse the chemistry, structure, dynamics, weather, and climate of Jupiter and its ever-changing atmosphere.
- **What will the mission do?**
  - Although the mission will examine all three moons, the main focus will be on **Ganymede**, as it is the largest moon in the Solar System.
    - Ganymede is larger than Pluto and Mercury. It is the only one to generate its own magnetic field.
  - The mission will use its suite of ten sophisticated instruments to measure:
    - how Ganymede rotates, its gravity, its shape and interior structure, its magnetic field, its composition, and to penetrate its icy crust using radar down to a depth of about nine km.

Is Juice capable of detecting life?

- As the three moons of Jupiter are believed to hold immense amounts of water, which could be around six times more than the volume of water in Earth's oceans.
- Hence, there is a possibility that life is present on them. According to ESA, life on these moons could be in the form of microbes.
- However, Juice is not equipped to detect life.

- It is only capable of is finding out whether there could be places around Jupiter, inside the icy moons, where the necessary conditions to sustain life are present.
    - Basically, it will look for water, biological essential elements, energy, and stability.

What other missions will study Jupiter?

- Juice is not the only mission investigating Jupiter and its moons.
- So far, two other spacecraft have examined Jupiter:
    - the **Galileo probe**, which orbited the gas giant between 1995 and 2003, and
    - **Juno**, which has been circling the planet since 2016. Its focus has been the planet itself rather than its moons.
- Another new NASA mission, Europa Clipper, is being launching in October 2024. Europa Clipper would arrive at Jupiter in 2030 and aims to study its Europa moon.

Q1) What is Jupiter?

Jupiter is the fifth planet from the Sun and is the largest planet in the Solar System. It is a gas giant with a diameter of approximately 86,881 miles (139,822 kilometers), which is more than 11 times the diameter of Earth. Jupiter is primarily composed of hydrogen and helium and has no solid surface. Jupiter has 79 known moons, with the four largest being Io, Europa, Ganymede, and Callisto, which are known as the Galilean moons.

Q2) What were the objectives of Galileo probe?

The Galileo probe was a NASA spacecraft that was sent to study Jupiter and its moons. It was designed to provide a comprehensive study of Jupiter and its moons, and to help scientists better understand the formation and evolution of the Solar System.

Source: European Space Agency set to launch Jupiter Icy Moons Explorer (Juice): What is the mission about | NyTimes