BEPICOLOMBO MERCURY MISSION – SCIENCE & TECHNOLOGY

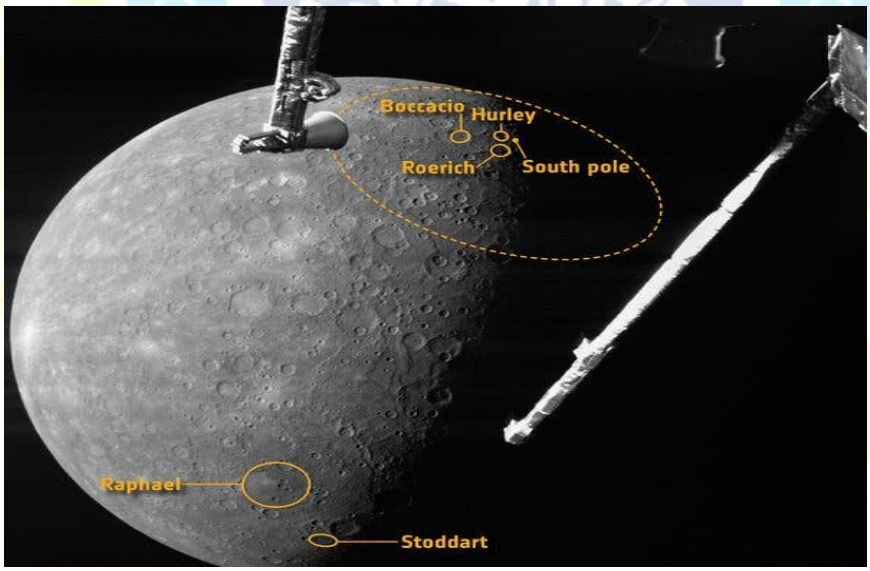
News: *On **September 8, 2024**, BepiColombo made its closest approach to **Mercury**, capturing sharp black-and-white images of its surface.*

- These images provide the **first clear view of Mercury's South Pole**, showing **cratered terrain** and **peak ring basins** like **Vivaldi** and **Stoddart**.

Details

BepiColombo Mission

- **BepiColombo** is a joint mission between the **European Space Agency (ESA)** and the **Japan Aerospace Exploration Agency (JAXA)**, launched in **2018**.
- Its main goal is to study **Mercury**.
- The spacecraft is set to orbit Mercury by **2026**, following a series of flybys of **Earth, Venus,** and **Mercury** to gradually slow down its velocity.
- BepiColombo has two more flybys scheduled for **December 2024** and **January 2025**.
- After these, it will spend two years orbiting the Sun before finally reaching its orbit around Mercury.



Significance

- The mission aims to explore **Mercury's composition, geology, magnetic field,** and its origins.
- Studying **peak ring basins** will help to understand
- the planet's **ancient volcanism** and ongoing geological activity.

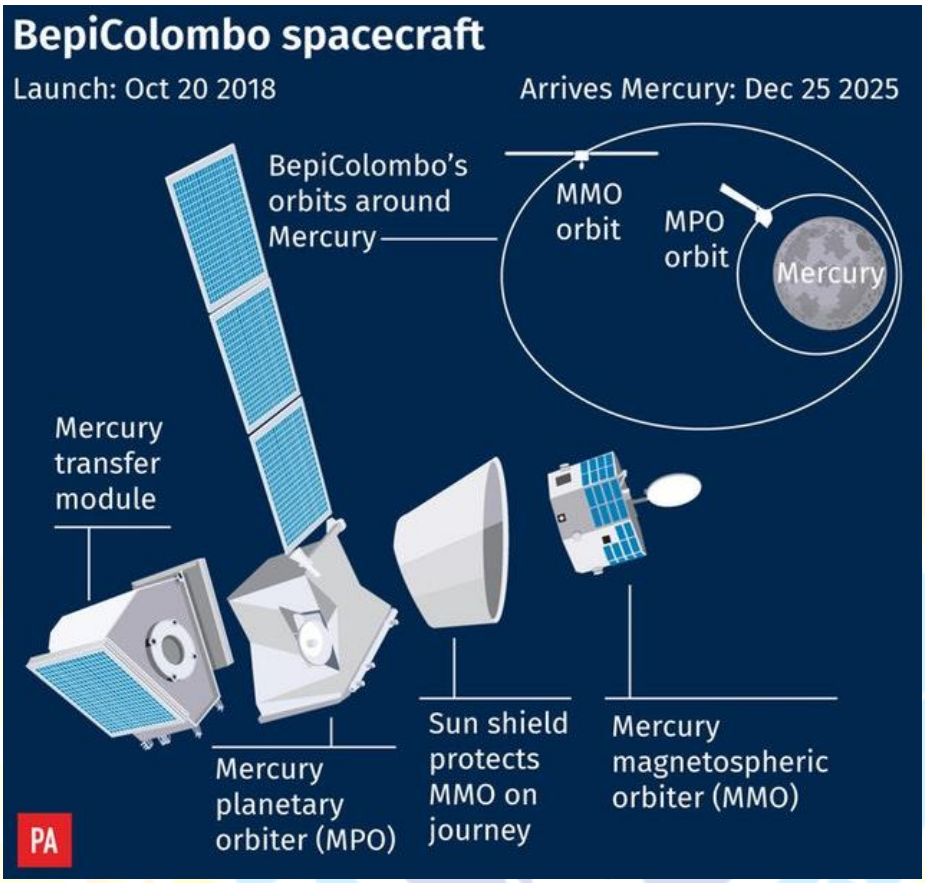
- The mission also seeks to understand how **Mercury's large core**, volatile-rich composition, and the presence of **water ice** on its surface can exist despite its proximity to the Sun.

Feature	Details
Position	Closest planet to the Sun.
Size	Smallest planet in the solar system.
Moons	None.
Orbital Speed	Revolves around the Sun faster than any other planet. Named after the Roman god Mercury (messenger god).
Density	Second densest planet after Earth with a metallic core that makes up 75% of its diameter (3,600-3,800 km).
Surface Temperature	Day: 450°C; Night: -170°C.
Craters	Surface pockmarked with craters due to lack of atmosphere.
Caloris Basin	Vast impact crater formed by an asteroid about 4 billion years ago.
Spin	Research suggests a large impact may have affected its spin.
Shrinking Planet	Shrinking due to the cooling and solidifying of its iron core.
Atmosphere	Thin exosphere containing 42% oxygen, 29% sodium, 22% hydrogen, 6% helium, and 0.5% potassium.
Orbital Period	Completes one orbit around the Sun every 88 Earth days.
Orbit Shape	Highly elliptical (oval-shaped) orbit.
Spin-Orbit Resonance	3:2 resonance: This means that it spins on its axis two times for every three times it goes around the sun. So a day on Mercury lasts 59 Earth days, while Mercury's year is 88 Earth days.
Year Duration	A year on Mercury is 88 Earth days.
Temperature Comparison	Mercury is not the hottest planet in the solar system (Venus is hotter).

Space Missions to Mercury

Mission	Agency	Launch Date	Objectives	Status/Outcome
Mariner 10	NASA	1973	First mission to fly by Mercury; mapped ~45% of its surface	Successful: Performed 3 flybys in 1974 and 1975
MESSENGER	NASA	2004	Orbited Mercury; studied geology, magnetic field, and thin atmosphere	Successful: Orbited Mercury from 2011-2015; ended with crash into Mercury

BepiColombo	ESA & JAXA	2018	Two orbiters studying Mercury's surface, magnetic field, and exosphere	En route: Orbit insertion planned for 2026



Source: https://indianexpress.com/article/explained/explained-sci-tech/explained-first-clear-images-mercury-9556396/