

World's first steam-propelled spacecraft

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In news– Japan's space agency JAXA has successfully used water to propel a spacecraft (EQUULEUS).

About the spacecraft-

- Japan claimed that it represents **“the world's first successful orbit control beyond low-Earth orbit using a water propellant propulsion system.”**
- The EQUULEUS mission's **primary goal is to demonstrate low-energy trajectory control technologies** for reaching deep space locations such as EML2 using less fuel.
- It performed a maneuver that moved it toward its planned **orbital path on the second Earth-Moon Lagrange point (EML2), located beyond the Moon.**
- To get there it used an engine named AQUARIUS (AQUA ResIstojet propUlsion System) that uses water as fuel. The craft uses waste heat from communications kit to heat the water into steam that is squirted out to produce thrust.
- **Lagrangian points are locations in space where the gravity of large objects, such as planets, are balanced** out by the centrifugal force of a spacecraft, allowing for a very stable orbit.
- Much like NASA's CAPSTONE mission, which is testing a lunar orbit for the U.S. space agency's lunar Gateway orbital station project, the **EQUULEUS spacecraft will allow scientists to test the stability of EML2 for a potential construction of a deep spaceport that will enable deep space exploration.**
- The mission will carry out a number of investigations, including testing of the radiation environment to help determine what precautions future astronauts would have

to take out in the deep space location.

- **EQUULEUS carries an instrument called DELPHINUS (DEtection camera for Lunar impact PHenomena IN 6U Spacecraft) designed to observe Lunar impact flashes and near-Earth asteroids from EML2.**
- **Another instrument aboard EQUULEUS will observe Earth's plasmasphere.**
- The **plasmasphere**, or inner magnetosphere, is **a region of the Earth's magnetosphere consisting of low-energy plasma.**
- It is **located above the ionosphere**. The outer boundary of the plasmasphere is known as the plasmopause, which is defined by an order of magnitude drop in plasma density.