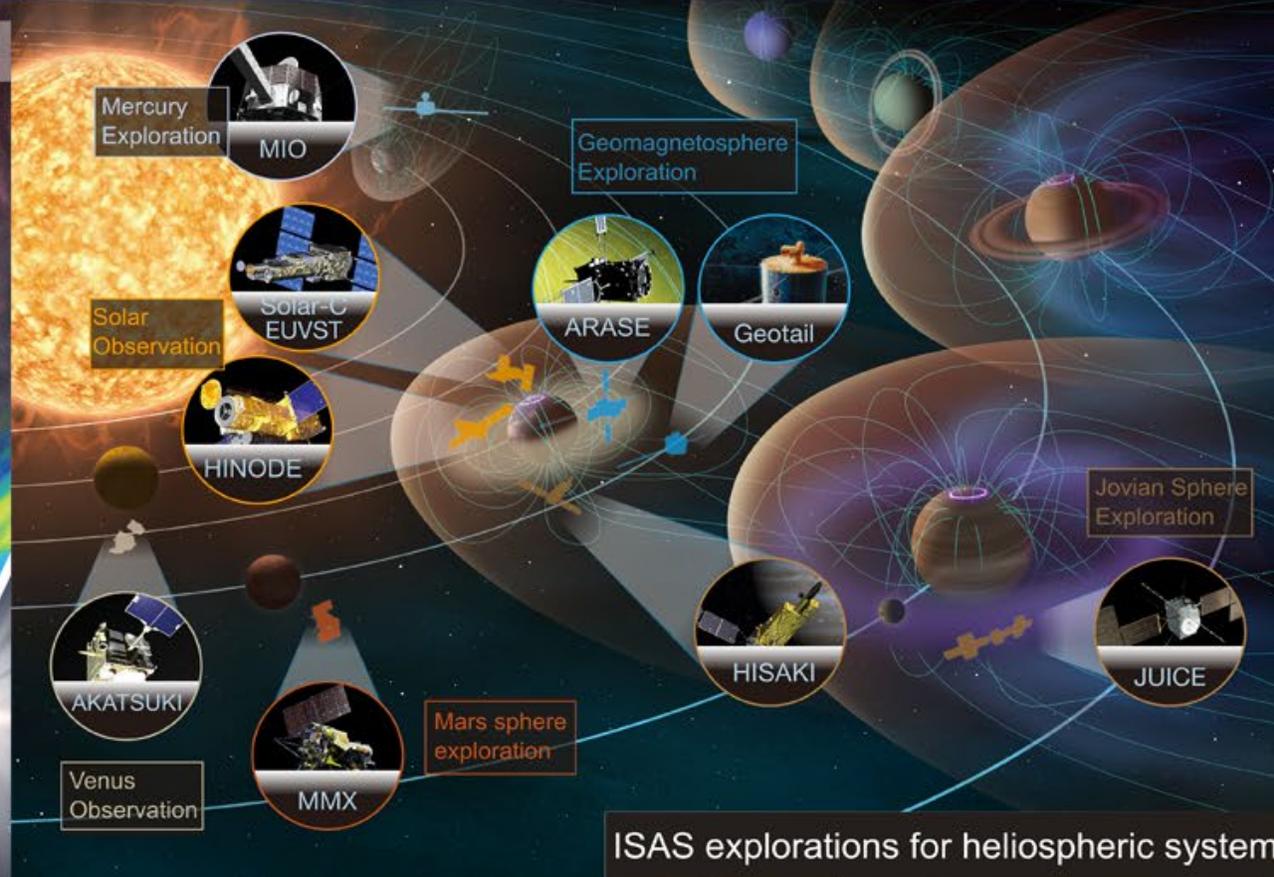
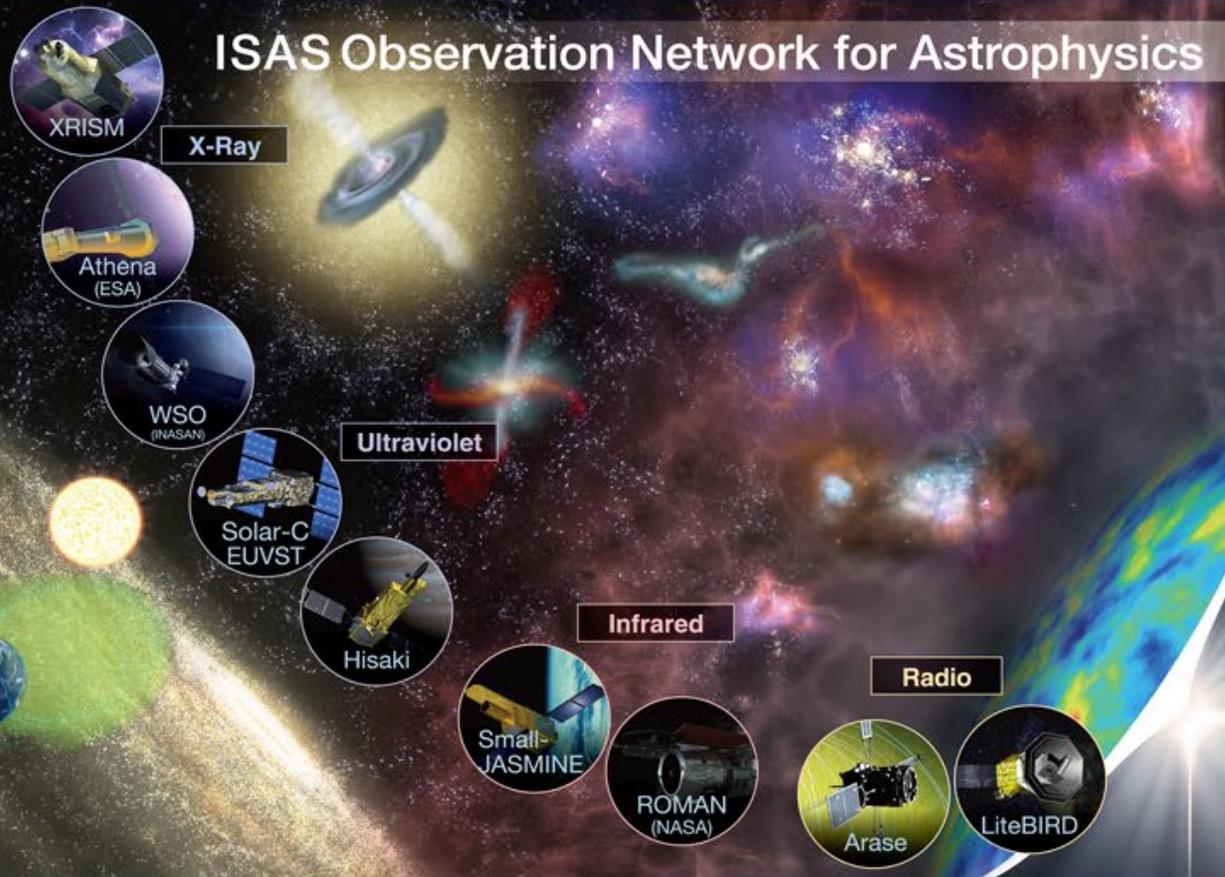


Japan Aerospace Exploration Agency -Science Highlights

Yuichi Tsuda

Deputy Director General, Professor

Institute of Space and Astronautical Science, JAXA



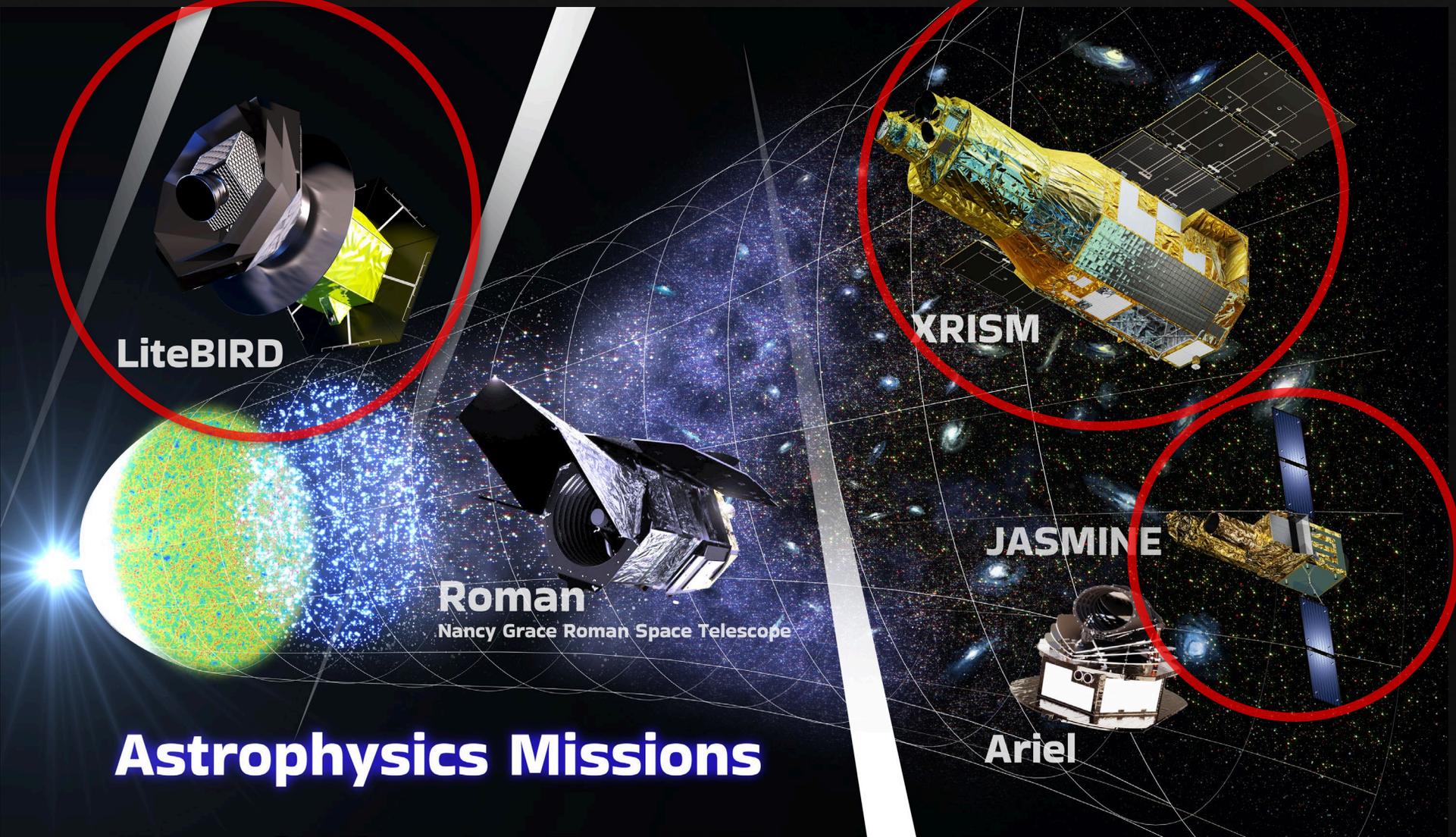
ISAS: Institute of Space and Astronautical Science. Based in Sagamihara, Japan.

JAXA-led missions versus Participation to foreign missions

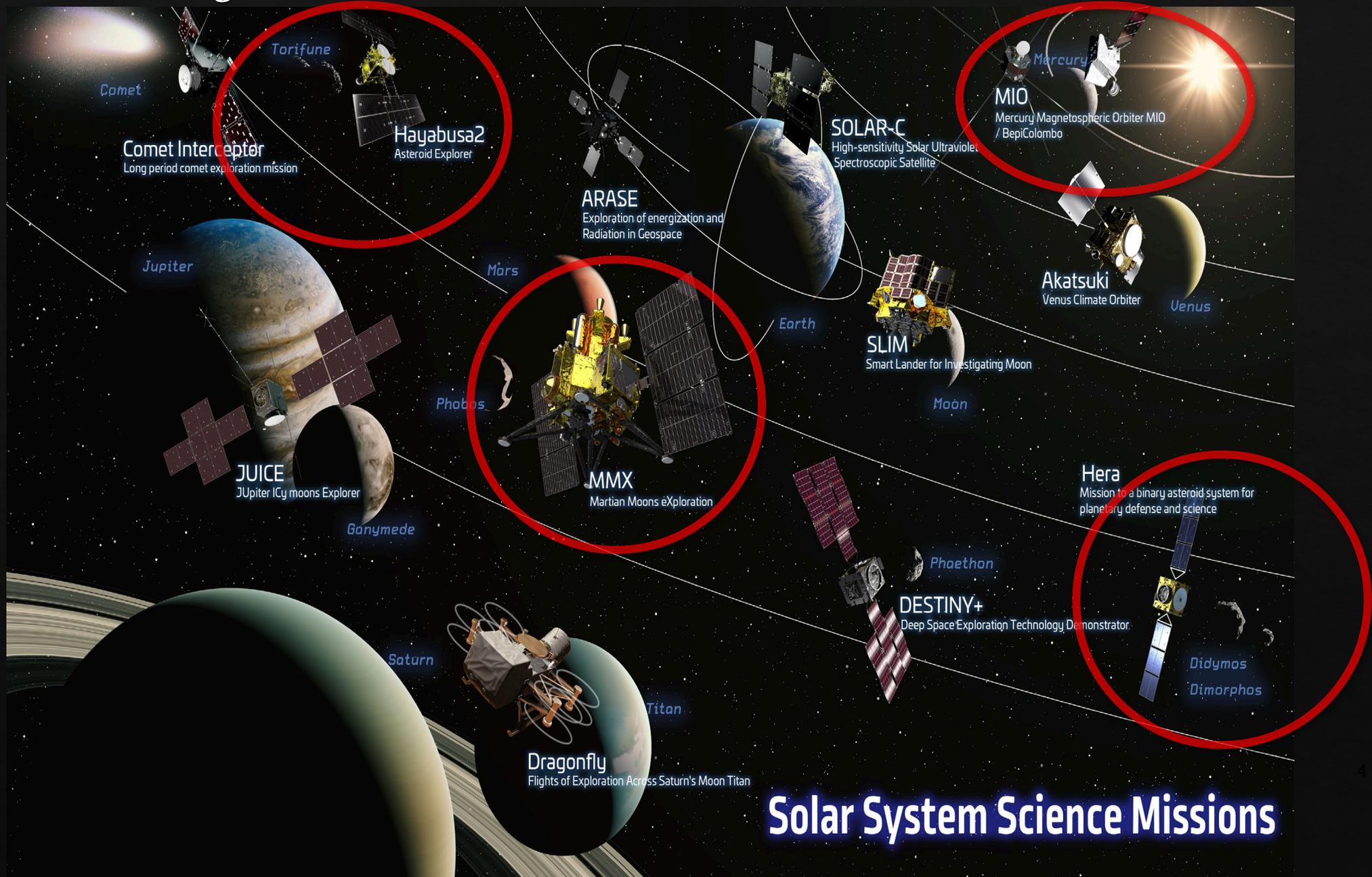
In Astrophysics.,

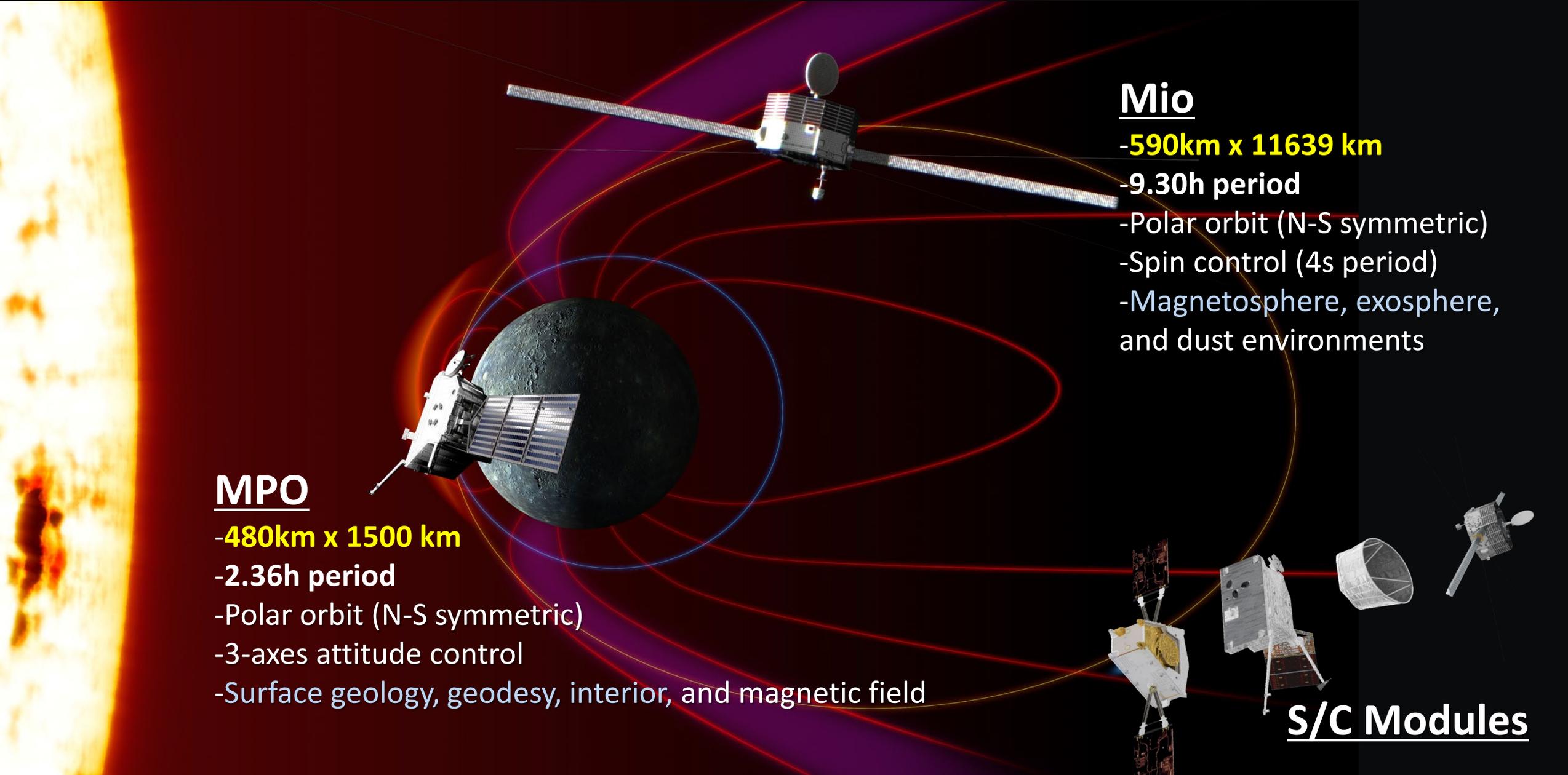
Be the **precursor/stepping-stone** to open up a new horizon...XRISM, LiteBIRD.

Go for a big fruit that cannot be reached JAXA-led missions...RST, HWO.



JAXA aims to contribute to global space science efforts by providing valuable data and insights from its missions.





MPO

- 480km x 1500 km
- 2.36h period
- Polar orbit (N-S symmetric)
- 3-axes attitude control
- Surface geology, geodesy, interior, and magnetic field

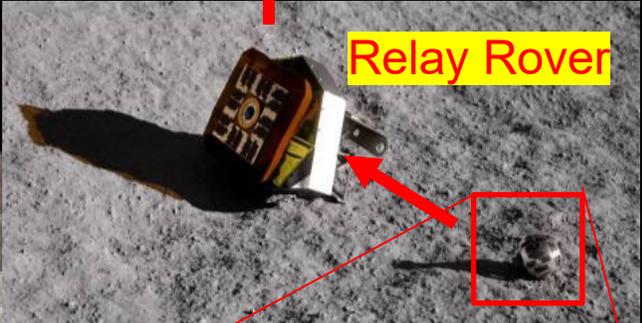
Mio

- 590km x 11639 km
- 9.30h period
- Polar orbit (N-S symmetric)
- Spin control (4s period)
- Magnetosphere, exosphere, and dust environments

S/C Modules



Earth

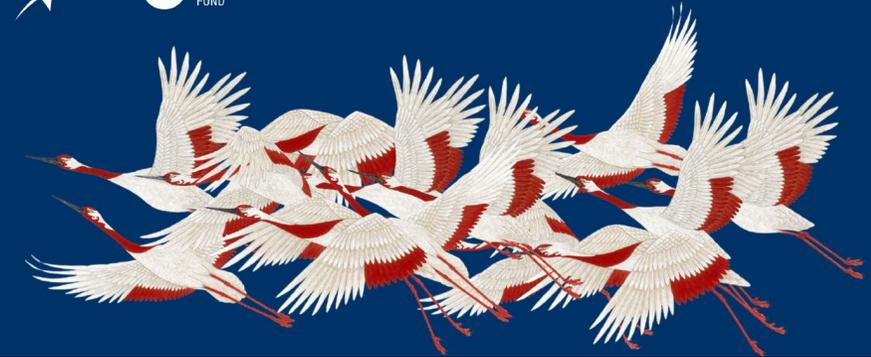


Relay Rover

Camera Rover

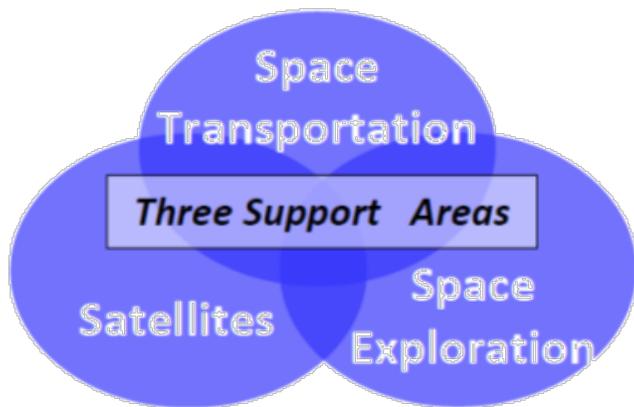


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Space Strategic Fund since 2023

1 Trillion Yen (approx. 6.7B \$) in 10 years



Three goals

- Expanding the space market

Double the size of Japanese domestic space market (4T JPY → 8T JPY (approx. 60B USD) in the early 2030s)

- Solving global and social issues

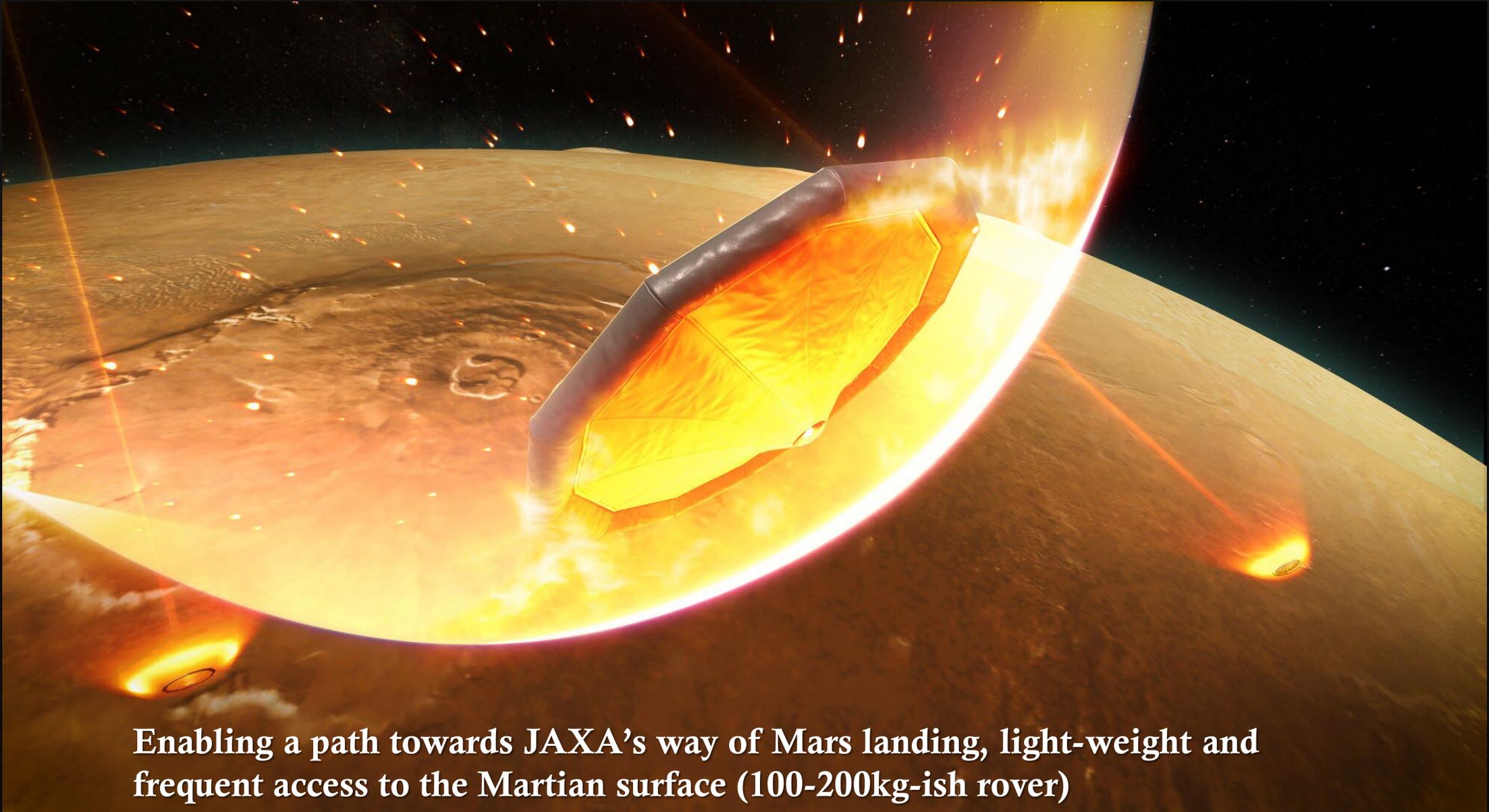
Contribute to solving global and social issues by utilizing space

- Pioneering frontier

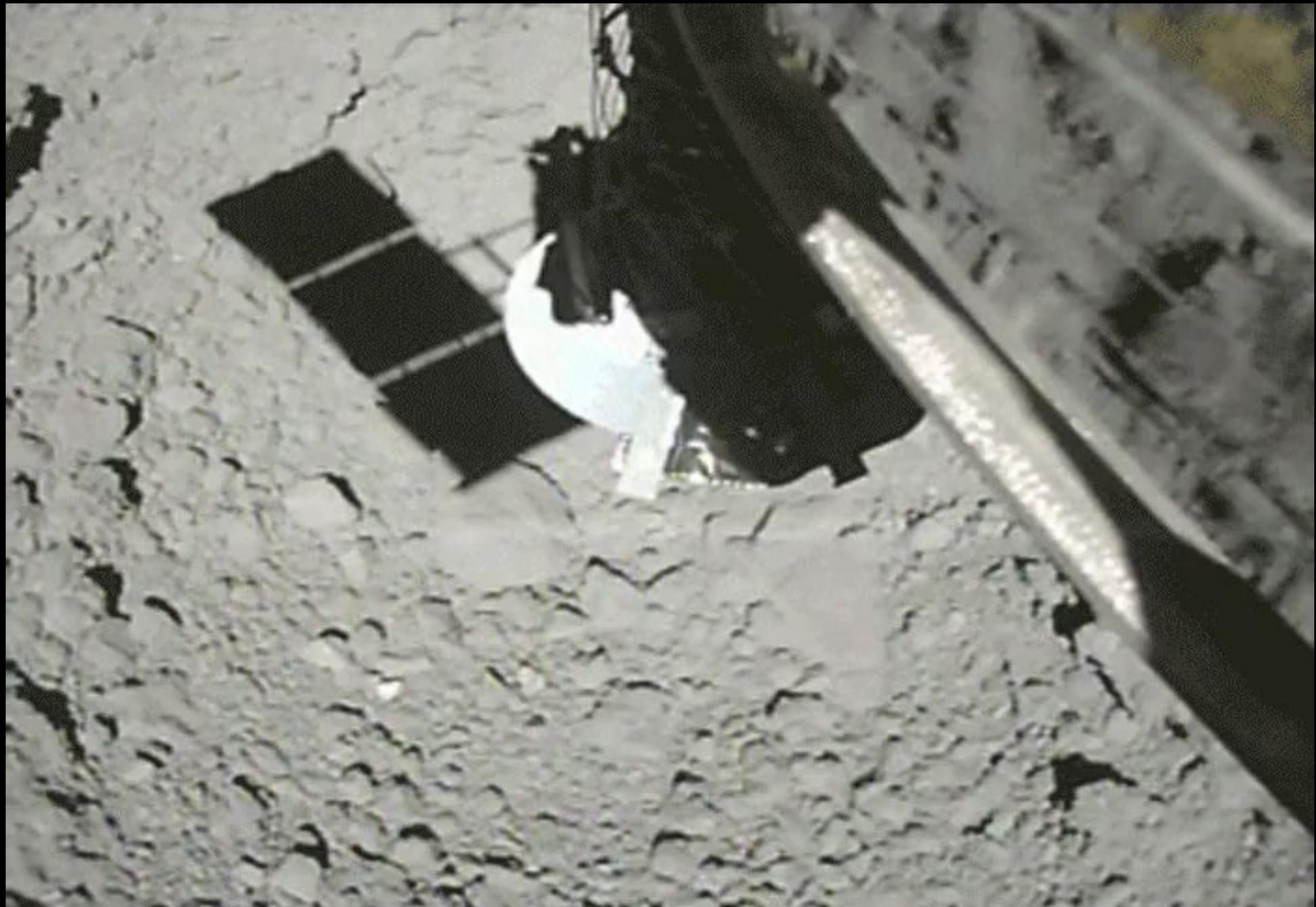
Deeper exploration of knowledge in the universe, and stronger basic and fundamental technologies

Space Strategy Fund – First Round Technology Development Theme (Exploration)

Technology Development Theme Title : Low-Cost Elemental Technologies for Atmospheric Entry and Aerodynamic Deceleration



Enabling a path towards JAXA's way of Mars landing, light-weight and frequent access to the Martian surface (100-200kg-ish rover)

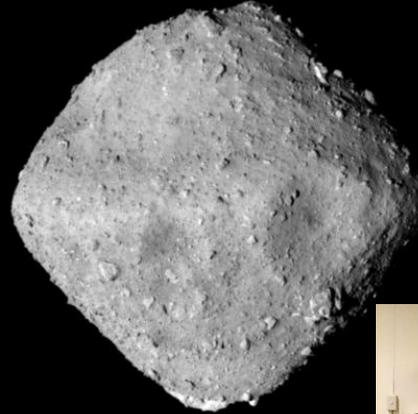
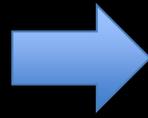
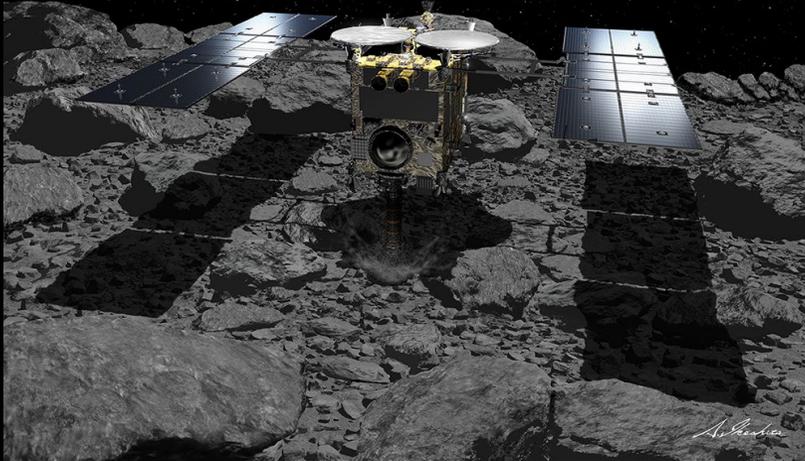


Hayabusa2 landed on carbonaceous asteroid Ryugu twice in 2019.

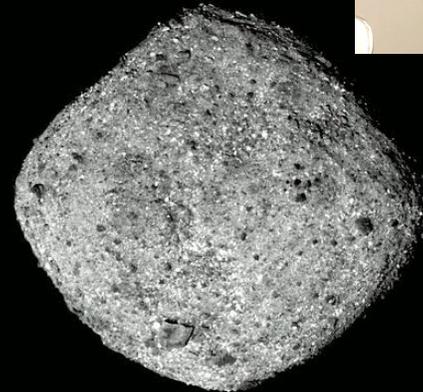
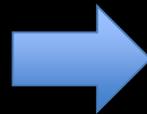
Hayabusa2/ORISIR-REx friendship and rivalry

©JAXA

C-type asteroid Ryugu (d=900m)



Joint Landing Strategy meeting, Apr.2019

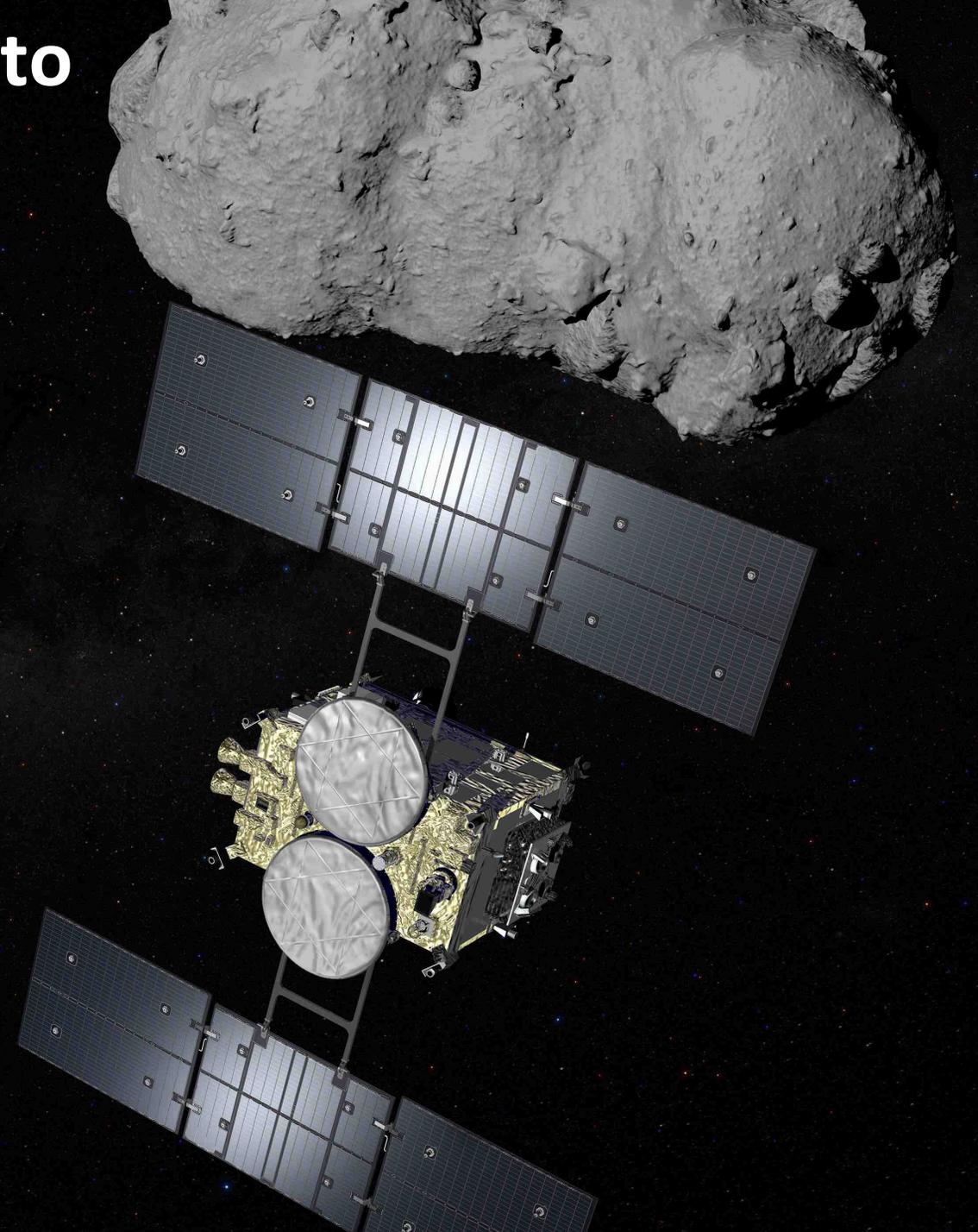


B-type asteroid Bennu (d=500m)

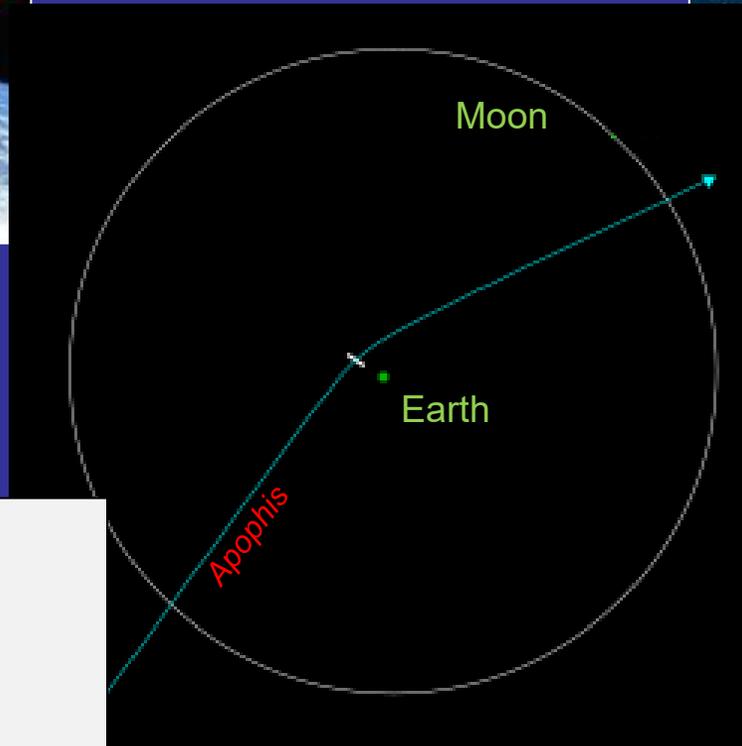
©NASA, U of Arizona

High-Speed Super-Close Flyby to Asteroid *Torifune*

- Fly-by Torifune in July 5, 2026
- Intercept velocity $\sim 5.1\text{km/s}$
- Super-close flyby ($\sim 1\text{km}$)



Planetary Defense Fleet to Apophis in 2029

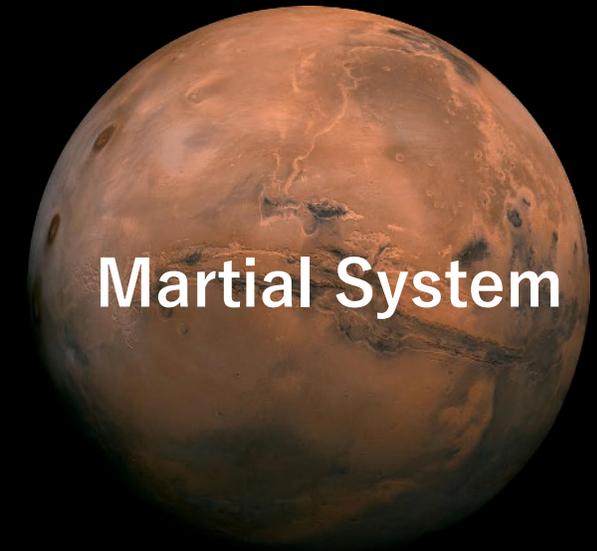


- Closest encounter to Earth on **April 13, 2029** at the Earth distance of 32000km.
<No chance of collision to Earth>
- Estimated diameter :**340m**. (big!)
- Scientific interests:
 - characteristics of such hazardous NEO,
 - gravitational interaction at Earth encounter, etc.



Martian Moons eXploration (MMX) : - Sample return mission from Martian moon -

Launch Target: 2026
Earth Return : 2031



- JAXA's space science missions cover **space physics, heliophysics, geospace and space engineering**.
- Japan launches the **Space Strategic Fund** to stimulate the space industry.
- SSF's focus includes themes for **exploration to moon, Mars and beyond**, where ISAS plays a big role.
- ISAS's small body exploration expertise is being applied to **Planetary Defense**. Exploration not only for science, but also for social interest.
Hayabusa2#, RAMSES, Destiny+, HERA
- ISAS's next sample return mission: **MMX to phobos!**