

Update on Japanese mission

**Space Mission Planning Advisory Group (SMPAG), 21st Meeting
11 October 2023@Online**

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Japanese missions related to the planetary defense

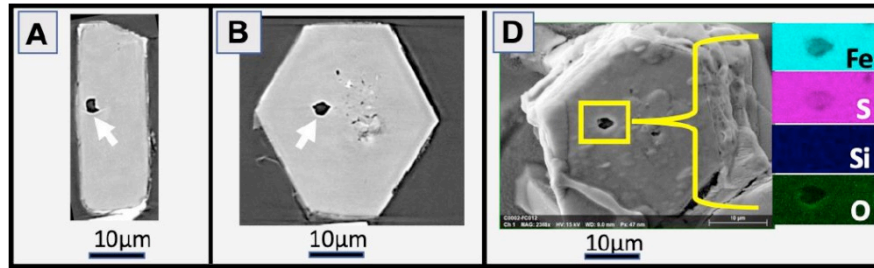
Current status : summary

- Hayabusa2 extended mission (Hayabusa2#)
 - The spacecraft is operating as scheduled.
- DESTINY⁺
 - The launch is scheduled for Japanese Fiscal Year 2024.
- Collaboration with Hera
 - JAXA will provide a thermal infrared imager (TIRI) to Hera.
 - We are participating in Hera test campaign with EM equivalent to TIRI's flight model. (PFM is under testing)

References

Highlights from Sample Analysis of Ryugu

- The bulk elemental abundance of Ryugu is **consistent with CI chondrites, the chemically most primitive**
- Prebiotic molecules include amino acids as **racemic mixture** (right : left = 1 : 1)
- **Uracil** (one of the four nucleobases in RNA) and **Niacin** (vitamin B3) are found.
- **Framboidal magnetite** is found, and it records paleomagnetic intensity of 20-700 μT
-> Possibility to be originated from outer solar system
- **Liquid carbonated water** was contained



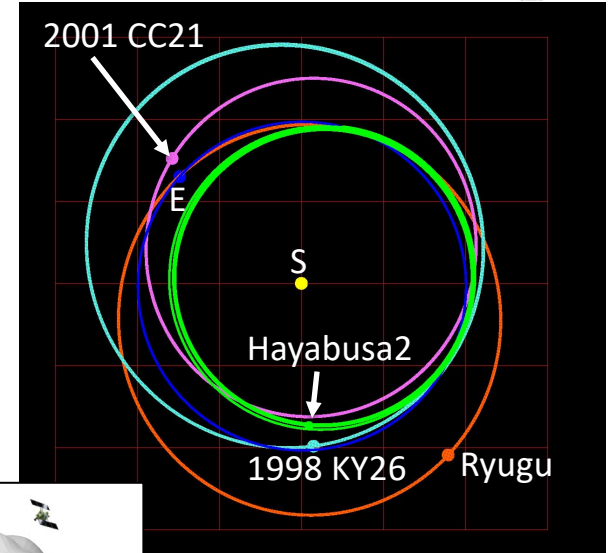
Sample analysis is continuing...

Hayabusa2 Extended mission : Hayabusa2#

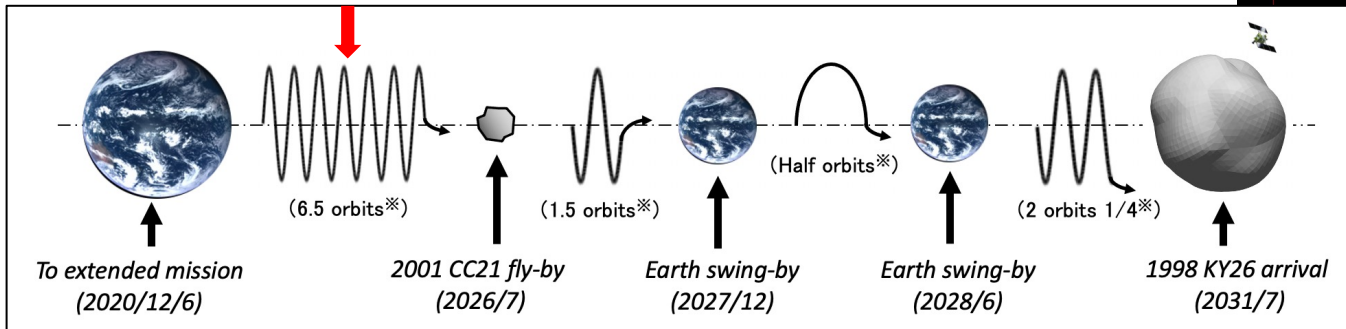
(SHARP) : Small Hazardous Asteroid Reconnaissance Probe



- After returning to the Earth in December 2020, we continue to operate Hayabusa2.
- The next target is the fly-by of 2001 CC21 in July 2026.
- The final target is the rendezvous of 1998 KY26 in July 2031.



Object positions on 8 Feb. 2023



※ indicates the number of orbits around the Sun.

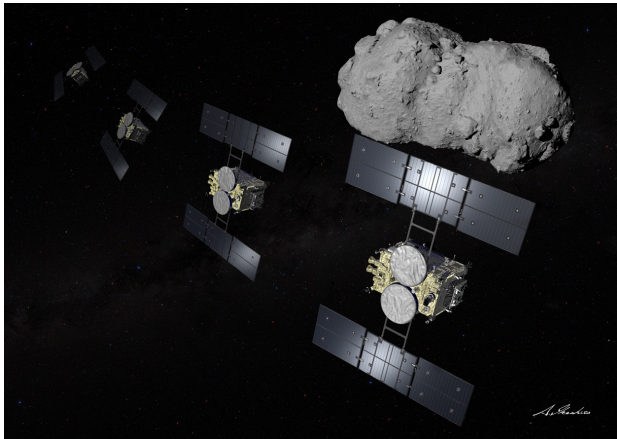
(Image credit: JAXA)

Hayabusa2 Extended mission : Hayabusa2#



The target asteroids

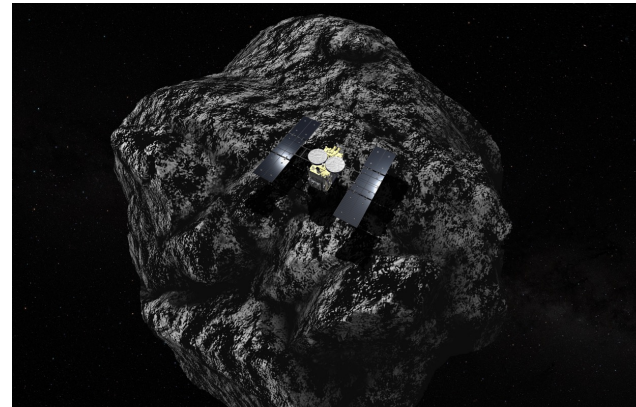
2001 CC21



Shape	elongated?
diameter	700 m (albedo 0.15 assumed)
Spin period	5.017 hours
Spectral type	L type → S type
Semimajor axis	1.03 au
Orbital period	1.05yr(383 day)

(artist's illustration by A. Ikeshita)

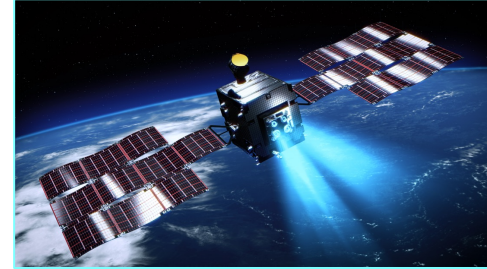
1998 KY26



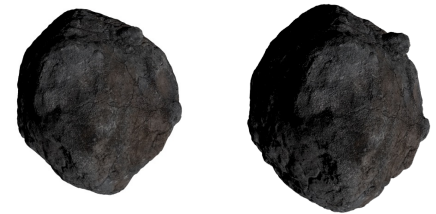
Shape	Spherical (from radar observation)
Av. diameter	About 30 m
Spin period	10.7 min (0.178 hr)
Tumbling motion	No short-term variability detected
Spectral type	Possible carbonaceous asteroid
Semimajor axis	1.23 au
Orbital period	1.37yr(500 day)

DESTINY⁺ (by Takeshi Takashima)

- DESTINY⁺ is a science and technology demonstration mission to asteroid (3200) Phaethon, the parent body of the Geminids meteor shower.
- It will explore the asteroid during a flyby (>33km/s), and conduct scientific observations of cosmic dust, which is considered to be a source of the organic matter on Earth.
- This mission will demonstrate technologies that will enable future low-cost and high-frequency deep space exploration.
- Launch : FY2024, Phaethon fly-by : 2028



(Image credit: JAXA)



artist's illustration of Phaethon (©JAXA)

International collaboration

- DLR : Development of Dust Analyzer
- US (Sean Marshall [Arecibo observatory/Univ. of Central Florida]) : Shape model of Phaethon
- US (IOTA(International Occultation Timing Association), JPL, Minor Planet Center) : Orbit determination of Phaethon

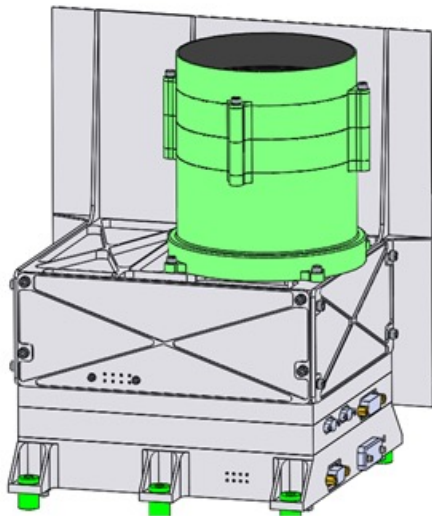
Collaboration with Hera

(by Tatsuaki Okada)

JAXA will provide a thermal infrared imager (TIRI) to Hera.

TIRI is developed based on TIR of Hayabusa2.

Hera TIRI



Detector	Lynred PICO1024
Wavelength	7-14 [μm], with 6 narrow bands
Pixels	1024 x 768
FOV	13.3 x 10.0 [deg]
IFOV	0.013 [deg]
Temperature	150-400 [K]
NETD(@300K)	< 0.1 K
Mass	4.0 +/- 0.4 kg
Power	17 +/- 3 W