Update on Japanese mission

Space Mission Planning Advisory Group (SMPAG), 20th Meeting
9 February 2023@Vienna

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Japan Aerospace Exploration Agency

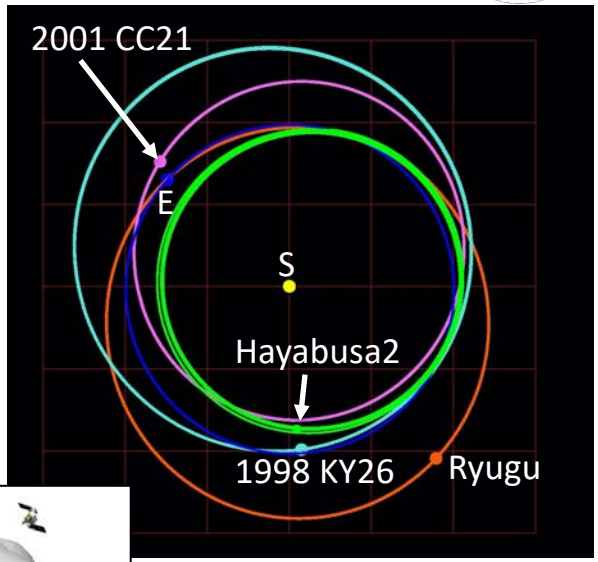
Japanese missions
related to the planetary defense

- Hayabusa2 extended mission (Hayabusa2#)
- DESTINY^{+}
- Collaboration with Hera

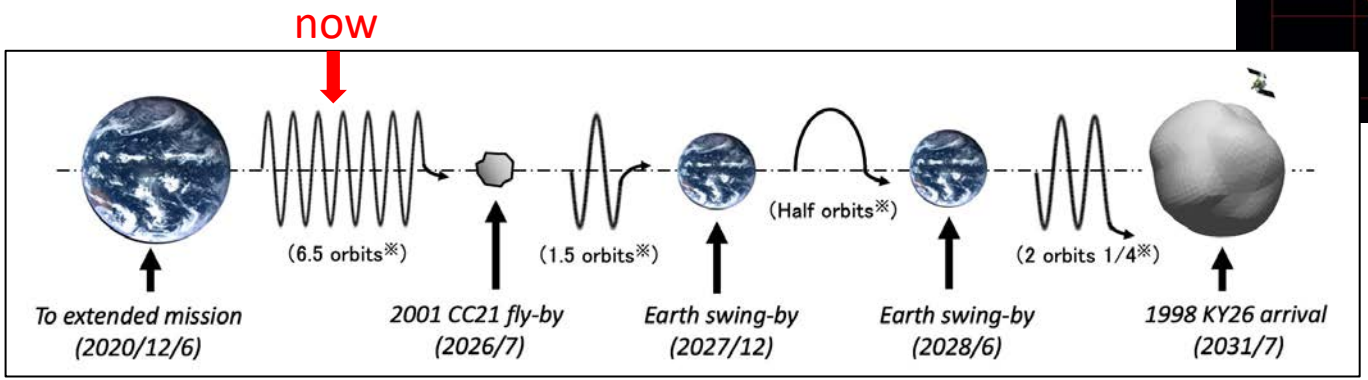
Hayabusa2 Extended mission : Hayabusa2#

 # (SHARP) : Small **H**azardous **A**steroid **R**econnaissance **P**robe

- After returning to the Earth in December 2020, we continue to operate Hayabusa2.
- The status of the spacecraft is normal.
- 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



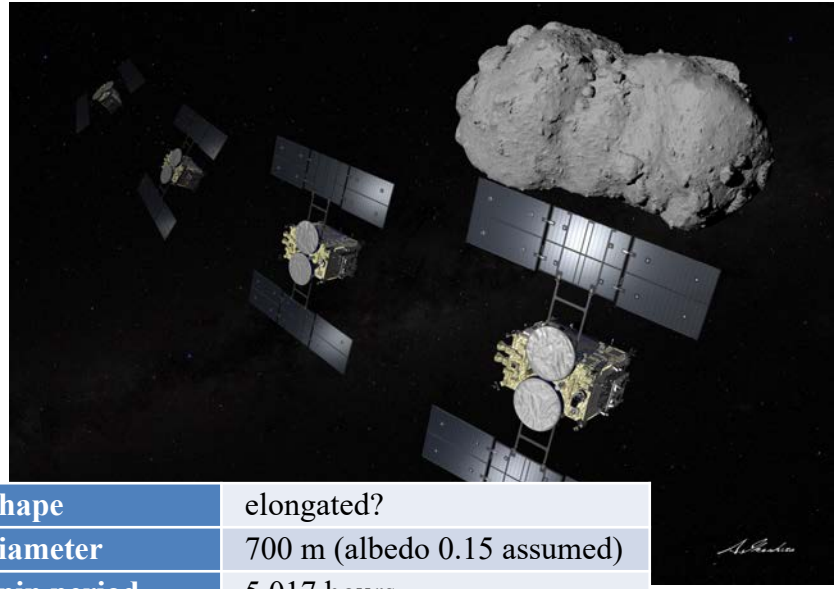
※ indicates the number of orbits around the Sun.

（Image credit：JAXA）

Hayabusa2 Extended mission : Hayabusa2#

 # (SHARP) : Small **H**azardous **A**steroid **R**econnaissance **P**robe

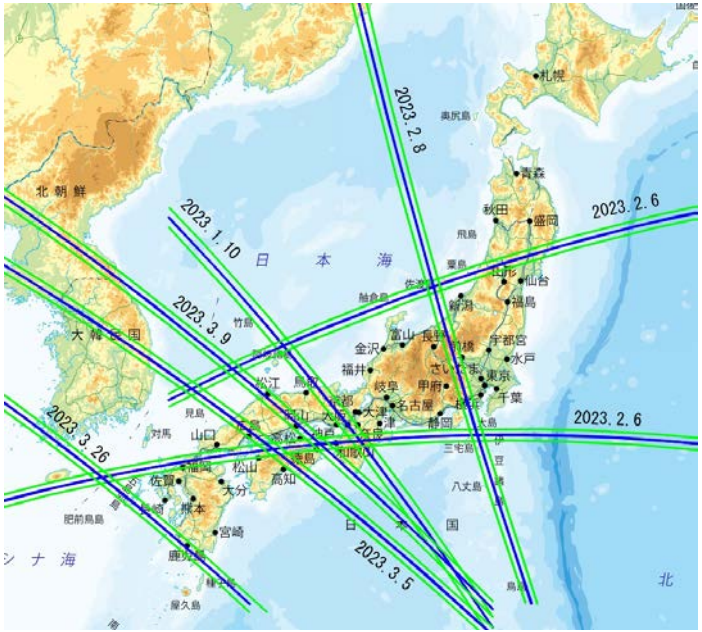
2001 CC21 artist's illustration



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

（Image credit：A. Ikeshita）

Occultation observations (Jan - Mar 2023)



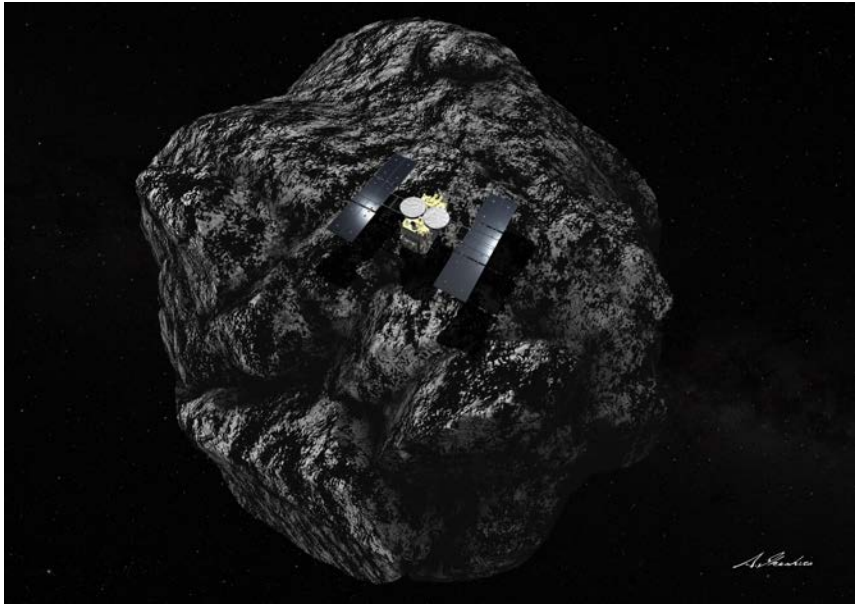
（Image credit：JAXA）

Hayabusa2 Extended mission : Hayabusa2#

 # (SHARP) : Small **H**azardous **A**steroid **R**econnaissance **P**robe

1998 KY26

artist's illustration



（Image credit：A. Ikeshita）

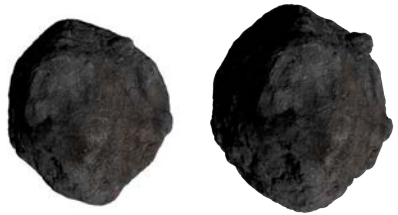
Shape	Spherical (from radar observation)
Av. diameter	About 30 m
Spin period	10.7 min (0.178 hr)
Tumbling motion	No short-term variability detected
Spectral type	Possible carbonaceous asteroid
Semimajor axis	1.23 au
Orbital period	1.37yr（500 day）

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.

Current status:

- The basic design (Phase B) and PDR for whole system are almost finished.
- The critical design reviews (CDR) for a few components have finished.
- Launch : FY2024, Phaethon fly-by : 2028



artist's illustration of Phaethon (©JAXA)

International collaboration

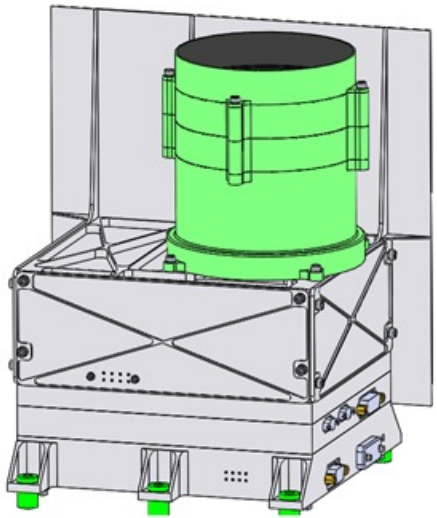
- DLR : Development of Dust Analyzer
- US (Sean Marshall [Arecibo observatory/Univ. of Central Florida) : Shape model of Phaethon
- US (IOTA(International Occultation Timing Association), JPL, Minor Planet Center) : Orbit determination of Phaethon

Collaboration with Hera

(by Tatsuaki Okada)

JAXA will provide a thermal infrared imager (TIRI) to Hera.
TIRI is developed based on TIR of Hayabusa2.
EQM has been completed, and we will conduct calibration and environmental tests.

Hera TIRI



（Image credit：JAXA）

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**