Update on Japanese missions (JAXA)

Space Mission Planning Advisory Group (SMPAG), 18th Meeting
10 February 2022, (online)

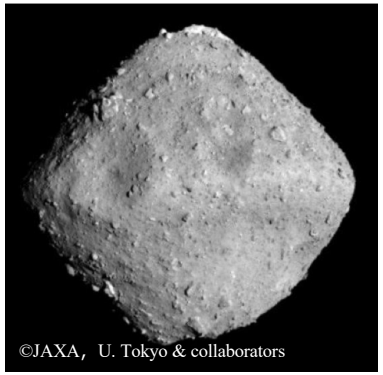
Makoto Yoshikawa

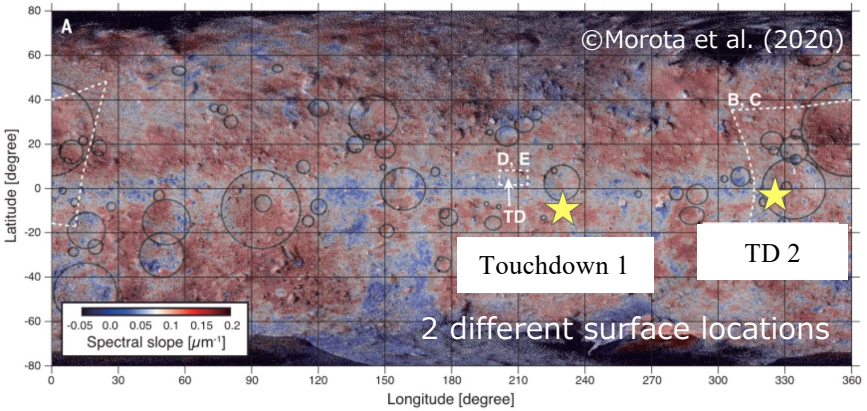
Japan Aerospace Exploration Agency

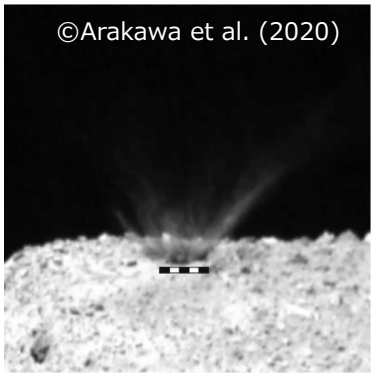
Topics

- Hayabusa2
- DESTINY$^+$
- Hera
- Other issues

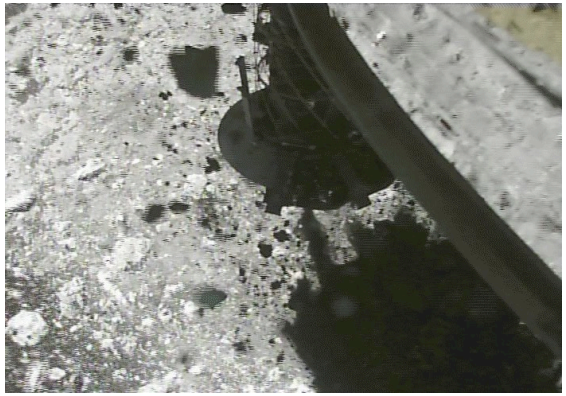
Summary of Hayabusa2





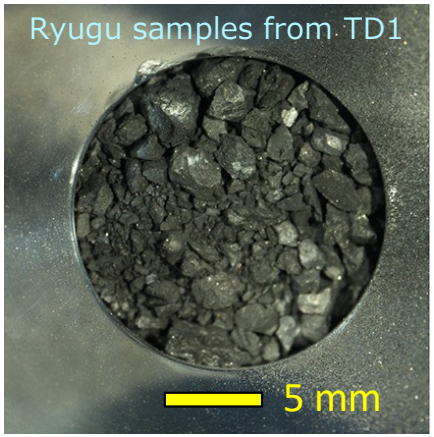


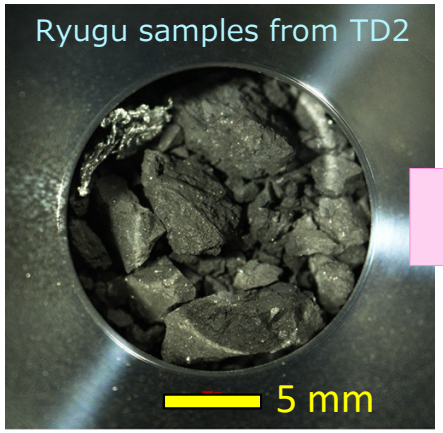
Impact experiment

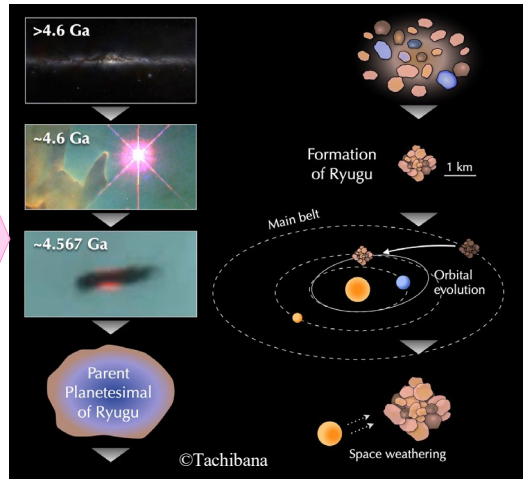


1st touchdown

©JAXA







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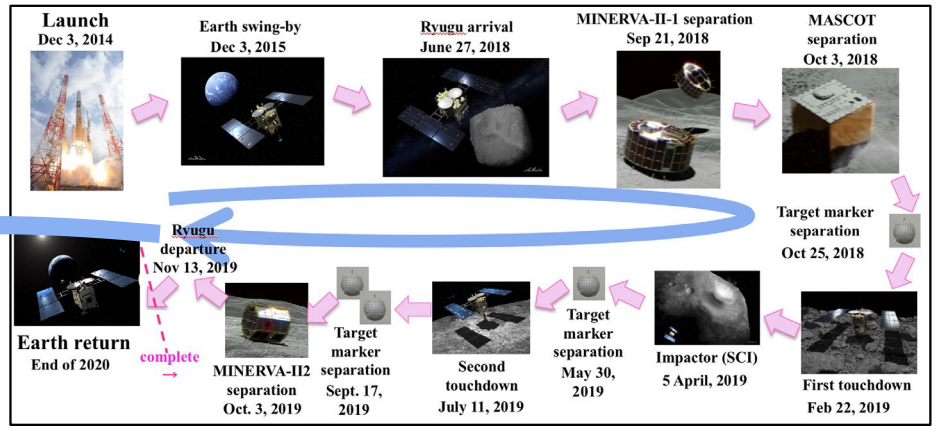
Ryugu samples

Now we have Ryugu samples from different locations and depths.

Hayabusa2 Extended mission

Hayabusa2 mission (2014–2020)

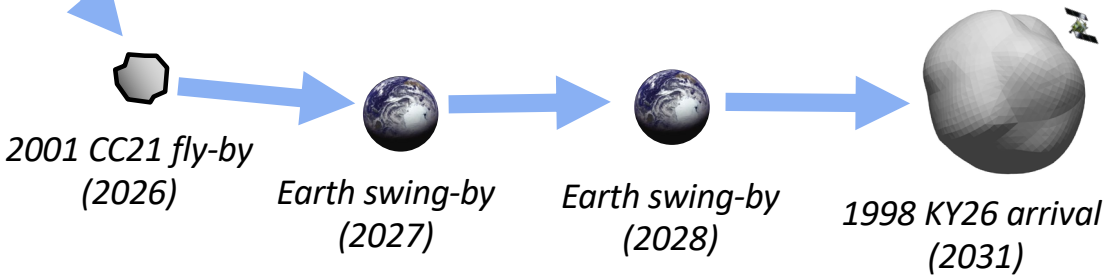


After the main mission, the extended mission is ongoing, and the spacecraft is flying smoothly. (One year has passed.)

- 2001 CC21 fly-by
- 1998 KY26 rendezvous

Extended mission (2021–2031)

In flight : Continue observing zodiacal light and exoplanets

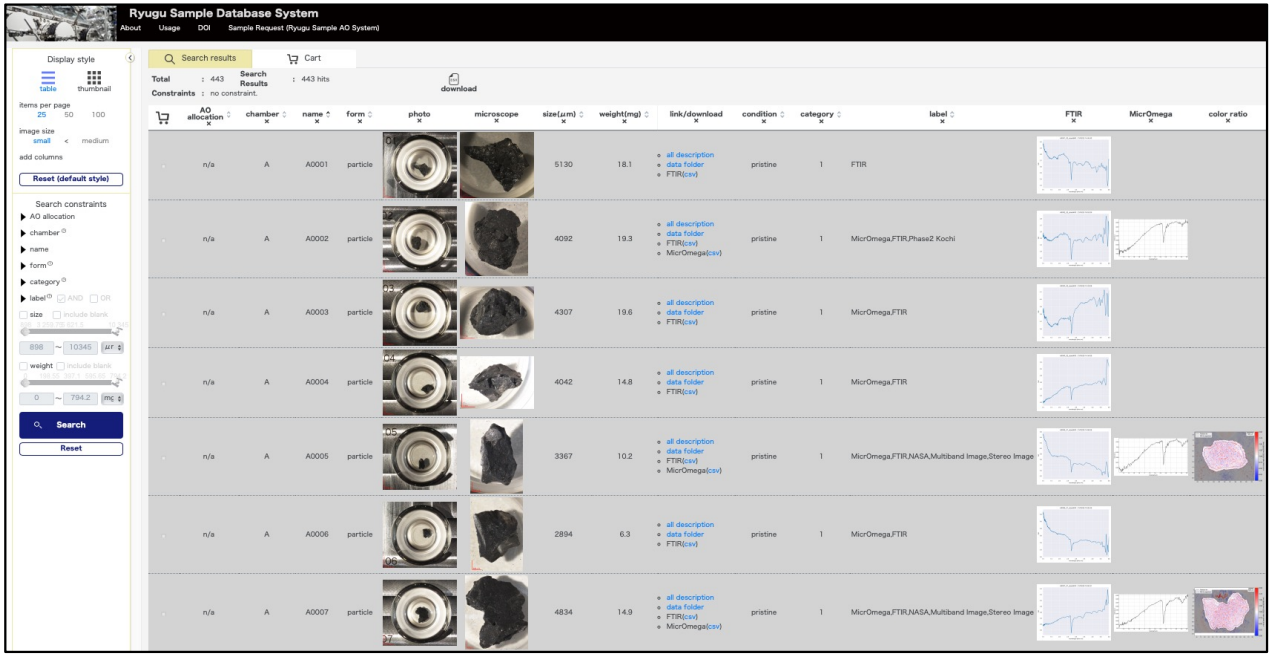


1998 KY26	
Discovery	May 28, 1998, by Spacewatch
Shape	Spherical (from radar observation)
Av. diameter	About 30 m
Spin period	10.7 min (0.178 hr)
Spectral type	Possible carbonaceous asteroid
Semimajor axis	1.23 au
Orbital period	1.37yr（500 day）

（Image credit：JAXA）

Publication of the Ryugu Grain Catalogue

The sample catalogue has been open to the public from January 13, 2022.
The Astromaterials Science Research Group (ASRG) of JAXA calls for proposals for Hayabusa2 returned samples.

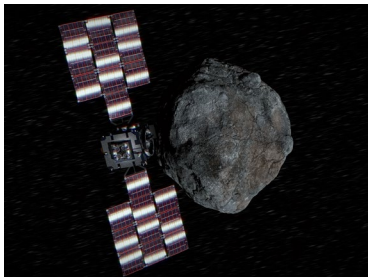


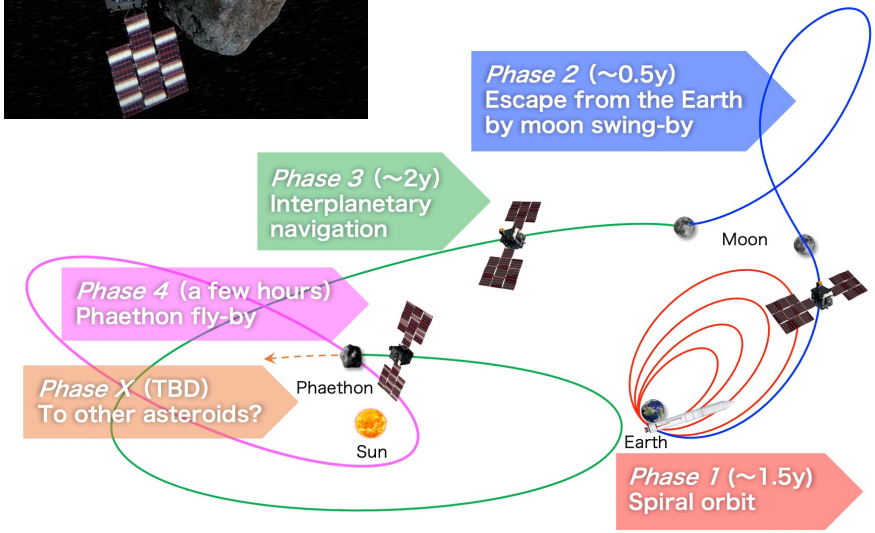
Catalogue site : https://darts.isas.jaxa.jp/curation/hayabusa2/
Also from the ASRG website at ISAS JAXA: https://curation.isas.jaxa.jp/

DESTINY+

Demonstration and Experiment of Space Technology for INterplanetary voYage with Phaethon fLyby and dUst Science

- Target object is Phaethon.
- Fly-by observation in the relative velocity of 35-36 km/sec.
- Interplanetary dust observation
- The basic design (Phase B) is almost finished. The preliminary design reviews (PDR) for the components have started.
- PDR for whole system will be finished until Q1 of fiscal year of 2022.
- Launch : FY2024, Phaethon fly-by : 2028





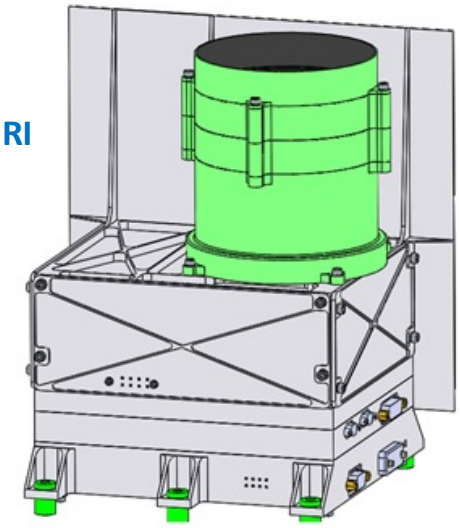
Thermal infrared imaging experiment of S-type binary asteroids in the Hera mission

*Tatsuaki Okada[1,2], Satoshi Tanaka[1,2], Naoya Sakatani[3], Yuri Shimaki[1], Takehiko Arai[4], Hiroki Senshu[5], Hirohide Demura[6], Tomohiko Sekiguchi[7], Masanori Kanamaru[1], Toru Kouyama[8], Joris Blommaert[9], Ozgur Karatekin[10] and Hera TIRI Team

1: ISAS/JAXA, Japan, 2: U. Tokyo, Japan, 3: Rikkyo U., Japan, 4: Maebashi IT, Japan, 5: Chiba IT, Japan, 6: U. Aizu, Japan, 7: Hokkaido U-Edu, Japan, 8: AIST, Japan, 9: VITO, Belgium, 10: ROB, Belgium

- **Thermal imaging reveals the surface physical state of planetary bodies, key parameters for planetary defense & science.**
- **TIR on Hayabusa2 revealed the surface porous nature of C-type asteroid Ryugu [Okada+2020, Nature; Shimaki+2020, Icarus]**
- **In the Hera mission, a thermal imager TIRI is being developed to investigate Didymos and Dimorphos binary system**

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

EPSC 2021, EPSC2021-317, SB7, Fri, 17 Sep 2021 / 16:15-17:00 CEST

Other issues

- NEO observations
  - Bisei Spaceguard Center (BSGC)
  - Overlaping method to detect small fast moving objects
    (We are trying to apply this technique to BSGC.)

  → IAWN?
- Planetary defense WG has been established in October 2021 in JAXA. (not official)
  - Planetary defense symposium : Feb. 14-15, 2022
    (online, in Japanese)