

Update on Japanese missions (JAXA)

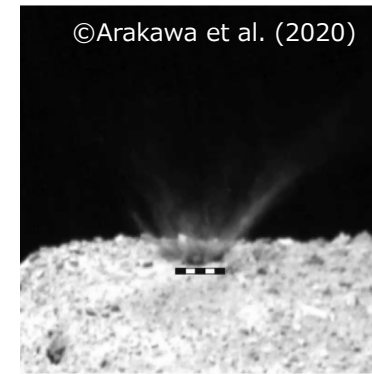
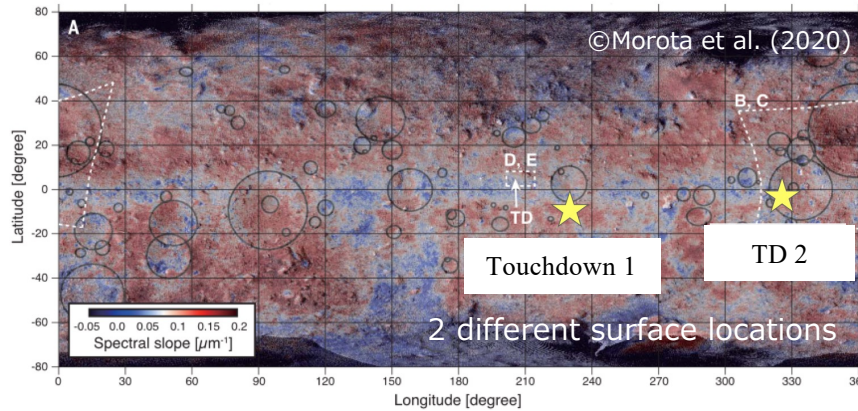
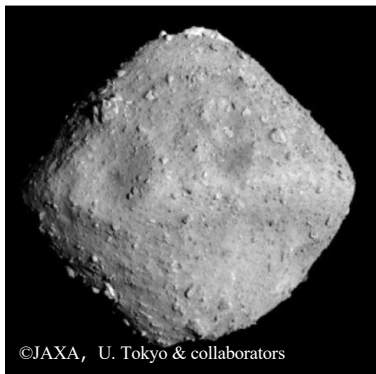
**Space Mission Planning Advisory Group (SMPAG), 18th Meeting
10 February 2022, (online)**

Makoto Yoshikawa
Japan Aerospace Exploration Agency

Topics

- Hayabusa2
- DESTINY⁺
- Hera
- Other issues

Summary of Hayabusa2

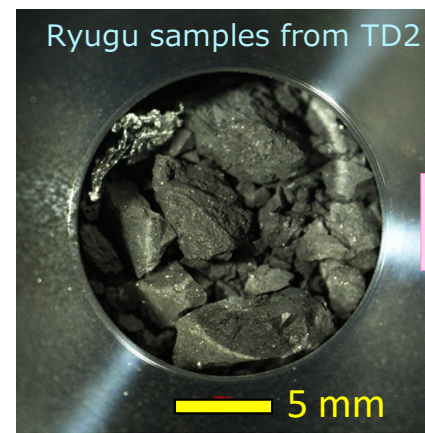
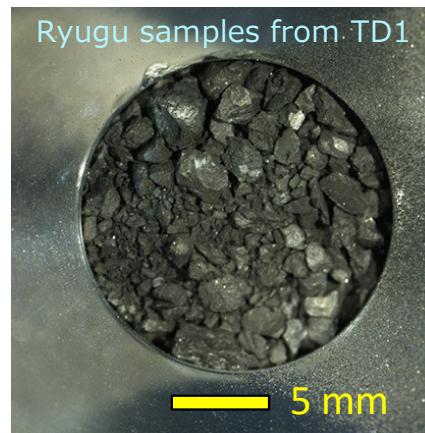


Impact experiment

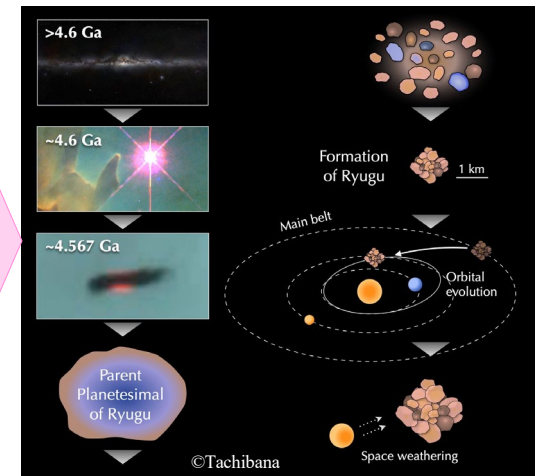


1st touchdown

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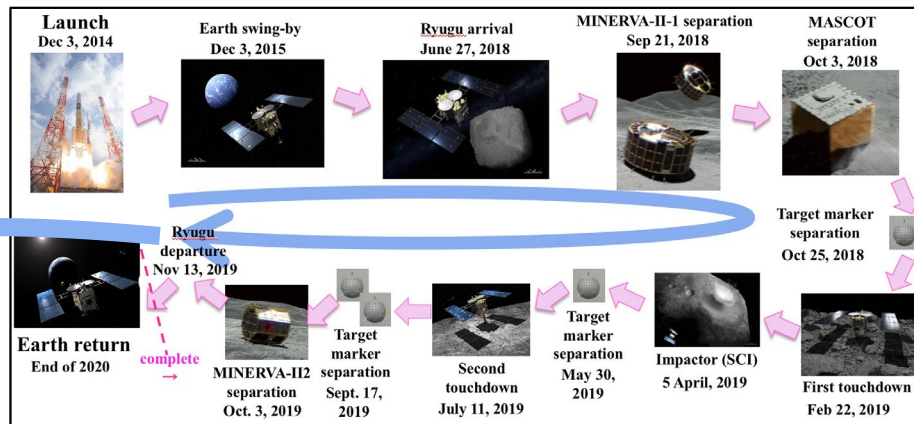
Ryugu samples



Now we have Ryugu samples from different locations and depths.

Hayabusa2 Extended mission

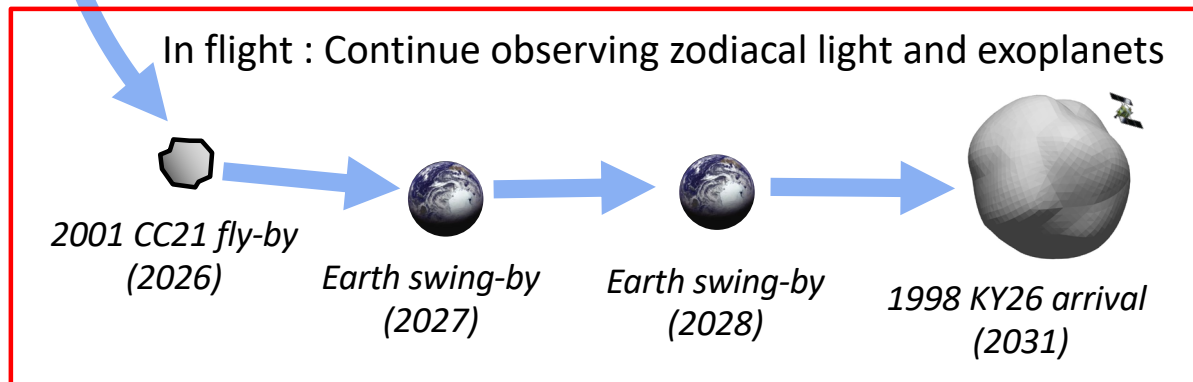
Hayabusa2 mission (2014–2020)



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)

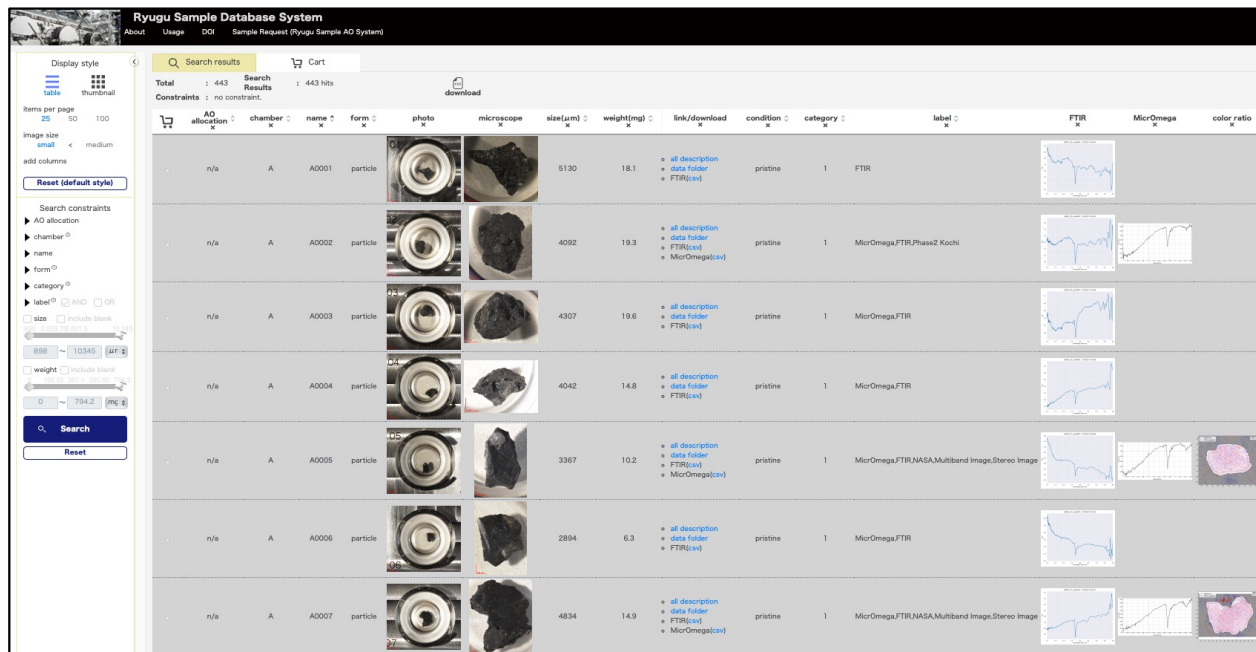


(Image credit: JAXA)

	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)

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.



The screenshot displays the 'Ryugu Sample Database System' interface. It features a search bar at the top with 'Search results' and 'Cart' options. Below the search bar, there are filters for 'Total' (443) and 'Search Results' (443 hits). The main content is a table of search results with the following columns: AO allocation, chamber, name, form, photo, microscope, size(um), weight(mg), link/download, condition, category, label, FTR, MicroOmega, and color ratio. The table lists seven sample entries (A0001 to A0007) with their respective details and associated data links.

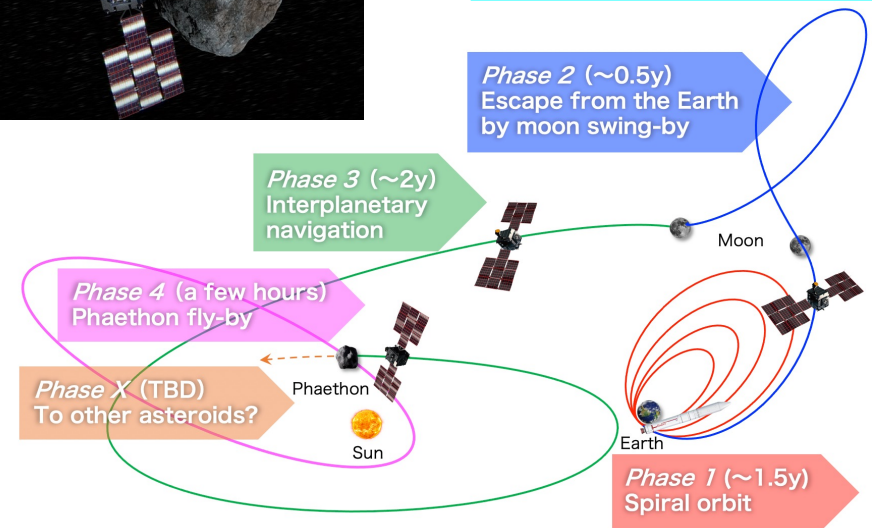
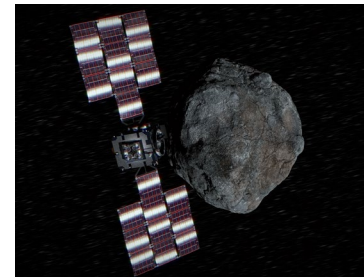
AO allocation	chamber	name	form	photo	microscope	size(um)	weight(mg)	link/download	condition	category	label	FTR	MicroOmega	color ratio
n/a	A	A0001	particle			5130	18.1	all description data folder FTR(csv)	pristine	1	FTR			
n/a	A	A0002	particle			4092	19.3	all description data folder FTR(csv) MicroOmega(csv)	pristine	1	MicrOmega.FTR.Phase2.Kochi			
n/a	A	A0003	particle			4307	19.6	all description data folder FTR(csv)	pristine	1	MicrOmega.FTR			
n/a	A	A0004	particle			4042	14.8	all description data folder FTR(csv)	pristine	1	MicrOmega.FTR			
n/a	A	A0005	particle			3367	10.2	all description data folder FTR(csv) MicroOmega(csv)	pristine	1	MicrOmega.FTR.NASA.Multiband Image.Stereo Image			
n/a	A	A0006	particle			2894	6.3	all description data folder FTR(csv)	pristine	1	MicrOmega.FTR			
n/a	A	A0007	particle			4834	14.9	all description data folder FTR(csv) MicroOmega(csv)	pristine	1	MicrOmega.FTR.NASA.Multiband Image.Stereo Image			

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

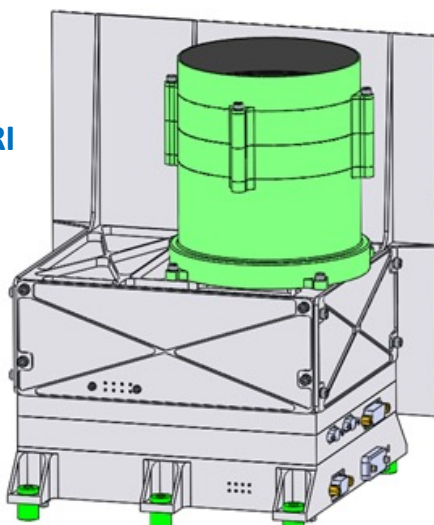


Thermal infrared imaging experiment of S-type binary asteroids in the Hera mission

***Tatsuaki Okada**^{1,2}, Satoshi Tanaka^{1,2}, Naoya Sakatani³, Yuri Shimaki¹, Takehiko Arai⁴, Hiroki Senshu⁵, Hirohide Demura⁶, Tomohiko Sekiguchi⁷, Masanori Kanamaru¹, Toru Kouyama⁸, Joris Blommaert⁹, Ozgur Karatekin¹⁰ 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

Hayabusa2 TIR

23 June 2019, at Box-A: 20.2 km (~17.8 m/pixel):
 Solar distance: 1.14 au, SPE angle (~phase angle) = 35.5°



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

Other issues

- NEO observations
 - Bisei Spaceguard Center (BSGC)
 - Overlapping 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)