

Looking back at Hayabusa2 over the year, and into the future

2021.12.20

Management and Integration Dept.

It has been one year since Hayabusa2 returned to Earth with the capsule containing material from asteroid Ryugu. Analysis of the sample is now underway. Ryugu is a C-type asteroid, a class that has attracted attention as a candidate for delivering both water and organics to the primordial Earth (**Hayabusa2 is also the world's first sample return from a C-type asteroid!**). Analysis of the sample will help us understand the transportation process of water and organics, offering **clues to the origin of our Earth, seas and life!**

2020/12/6

CAPSULE RETURN



Hayabusa2 launched on 2014/12/3 and successfully brought home to Earth a sample gathered from asteroid Ryugu, while achieving a stream of world firsts! The sample capsule was recovered from the Woomera desert, Australia

2020/12/14

OPENING



Opening the capsule revealed 5.4g of sample from Ryugu, greatly exceeding the target! **For the first time in the world, asteroid material was handled and gas extracted in vacuum conditions!**

2021/9/3~

CAPSULE DISPLAY



Since 2021/09, the sample return capsule has been on a nationwide travelling exhibition in cooperation with 21 groups selected by open recruitment to show the capsule that returned to Earth after 6 years in space.

One year after the return to Earth

CAPSULE ARRIVAL AT ISAS

2020/12/8



A crowd greeted the capsule's arrival at the Institute of Space and Astronautical Science. To prevent contamination, the sample was stored at the JAXA Extraterrestrial Sample Curation Center about 57 hours after landing in Australia.

SAMPLE DELIVERY (Domestic teams)

2021/6/17



After the initial description was completed at the ESCuC, the sample was shared with 8 research teams in Japan. **Water and traces of organics were confirmed in the sample, and a detailed analysis is underway in collaboration with multiple institutes.**

SAMPLE DELIVERY (NASA)

2021/11/30



Based the NASA-JAXA agreement, part of the Ryugu sample was delivered to NASA's Johnson Space Center.

● Ryugu sample opened to the public

From December 2021, it is possible to see grains of the Ryugu sample in Japan! Hayabusa2 collected material during two touchdowns, one sample from Ryugu's surface and one of subsurface material. Grains from both samples will be exhibited during the ISAS open campus.



Sample on display: this grain was collected in the 1st touchdown

● Hayabusa2 future plans

Results from the initial analysis from the Ryugu sample that was distributed in June 2021 are expected to be published in the spring of 2022. After this, **samples from Ryugu will be distributed to researchers from around the world based on selection via the announcement of opportunity in the summer of 2022, accelerating the creation of world-leading results!** The Hayabusa2 spacecraft continues on a long journey through deep space towards a new mission with the theme, 'defending the Earth from asteroid impacts'. We are ready for new challenges!

● The Martian Moons eXploration Mission (MMX)

The next step in understanding the movement of water and organic matter in the Solar System

Hayabusa and Hayabusa2 established JAXA's credentials as a world leader in small body sample return exploration and curation! Building on these expertise, JAXA will launch the **Martian Moons eXploration** mission in 2024 JFY in the **first round-trip to the Martian sphere and Martian moon sample return!** Returning a sample from the small celestial body Phobos, which is also a moon of Mars, will allow us to further **tackle the transportation mechanisms that brought water and organics to the primitive Earth.** In addition, the close proximity of Phobos to Mars is thought to result in material ejected from Mars coating the moon and entering the sample to give **the world's first Mars sample return!**

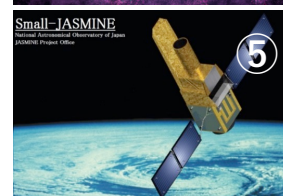


● Exploring the mysteries of habitable worlds through exoplanet exploration

Exploration missions that JAXA is leading and participating in with international partners to approach the mysteries of habitable worlds through planetary science and space exploration.

The icy moons of Jupiter and Saturn are attracting attention as **unexplored terrain where life may exist.** JAXA is participating in (1) **The Jupiter Icy Satellite Exploration Project, JUICE**, scheduled to be launched by ESA in 2022, and (2) the NASA-led **Dragonfly mission** to fly and land on Saturn's moon, Titan.

Additionally, plans are underway to **search for planets similar to the Earth** around stars other than the Sun (exoplanets) with participation in (3) the **ultraviolet World Space Observatory (WSO-UV)** set to be launched by Russia in 2025, and (4) NASA's **Roman Space Telescope**, also planned for a 2025 launch. JAXA is also leading the (5) **infrared astrometric observation satellite, JASMINE**, that will search for terrestrial planets that may support life around stars less luminous than the Sun.



(credit : JAXA & collaborators, unless specified)
Institute of Space and Astronautical Science, JAXA



MMX Project



Hayabusa2
Project



ISAS developing
missions



ISAS future plans