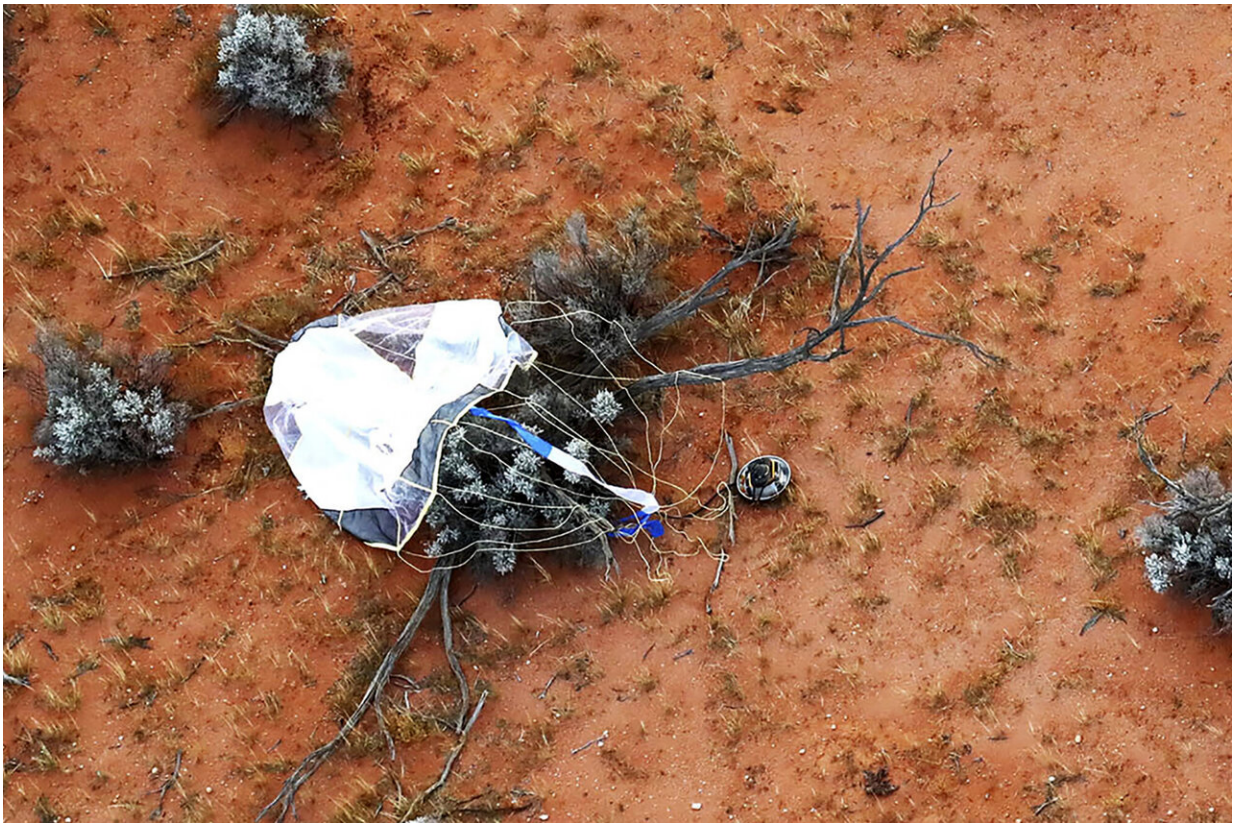


Japan's capsule with asteroid samples retrieved in Australia

December 6 2020, by Mari Yamaguchi



In this photo provided by the Japan Aerospace Exploration Agency (JAXA), a capsule, center, dropped by Hayabusa2 is seen before being retrieved in Woomera, southern Australia, Sunday, Dec. 6, 2020. A Japanese capsule carrying the first samples of asteroid subsurface shot across the night atmosphere early Sunday before successfully landing in the remote Australian Outback, completing a mission to provide clues to the origin of the solar system and life on Earth. (JAXA via AP)

A Japanese capsule carrying the world's first asteroid subsurface samples shot across the night atmosphere early Sunday before landing in the remote Australian Outback, completing a mission to provide clues to the origin of the solar system and life on Earth.

The spacecraft Hayabusa2 released the small [capsule](#) on Saturday and sent it toward Earth to deliver samples from a distant asteroid. At about 10 kilometers (6 miles) aboveground, a parachute was opened to slow its fall and beacon signals were transmitted to indicate its location in the sparsely populated area of Woomera in southern Australia.

About two hours after the reentry, the Japan Aerospace Exploration Agency, or JAXA, said its helicopter search team found the capsule in the planned landing area. The retrieval of the pan-shaped capsule, about 40 centimeters (15 inches) in diameter, was completed after another two hours.

"The capsule collection work at the landing site was completed," the agency said in a tweet. "We practiced a lot for today ... it ended safe."

The capsule's return came weeks after NASA's OSIRIS-REx spacecraft made a successful touch-and-go grab of surface samples from the asteroid Bennu. China, meanwhile, announced last week that its lunar lander collected underground samples and sealed them within the spacecraft for return to Earth, as space developing nations compete in their missions.



In this photo provided by the Japan Aerospace Exploration Agency (JAXA), a member of JAXA retrieves a capsule dropped by Hayabusa2 in Woomera, southern Australia, Sunday, Dec. 6, 2020. A Japanese capsule carrying the first samples of asteroid subsurface shot across the night atmosphere early Sunday before successfully landing in the remote Australian Outback, completing a mission to provide clues to the origin of the solar system and life on Earth. (JAXA via AP)

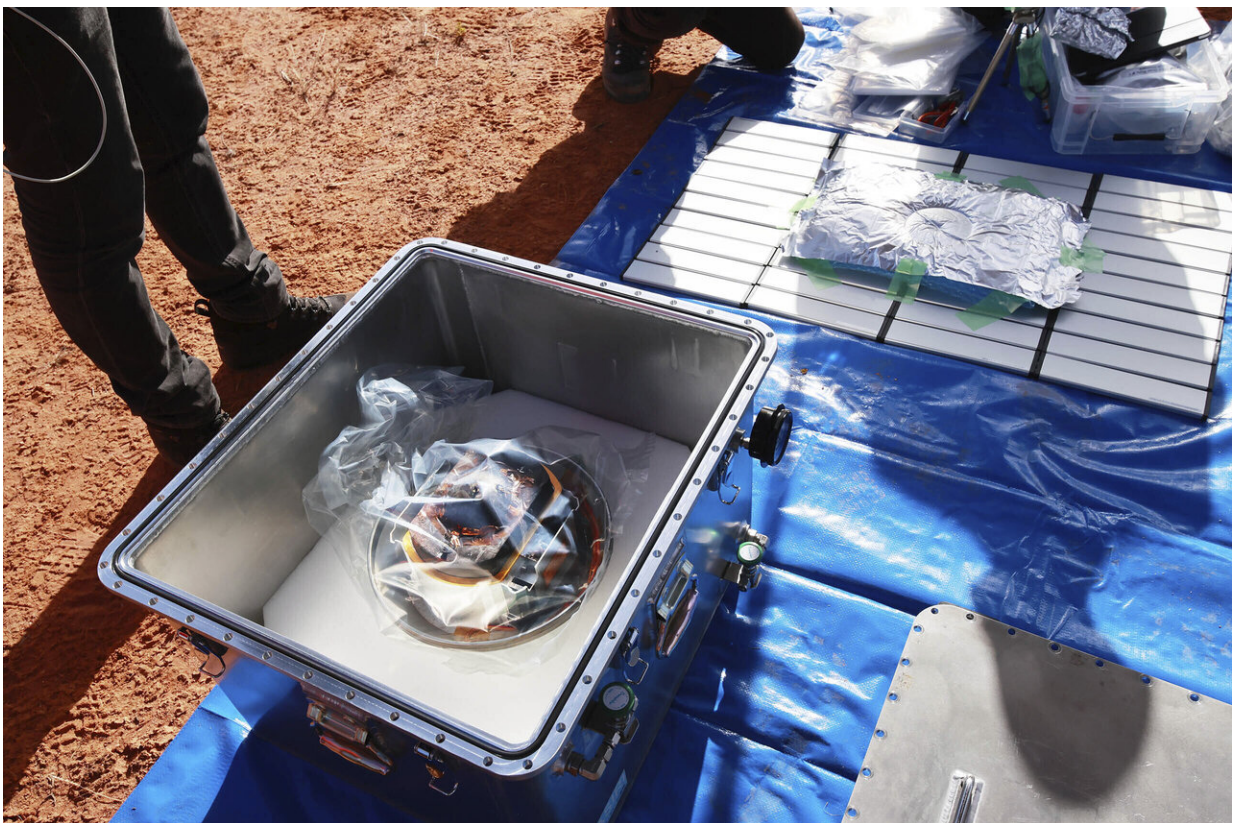
Thomas Zurbuchen, a Swiss-American astrophysicist and the associated administrator of NASA's Science Mission Directorate, congratulated the Japanese space agency and "the many individuals in Japan and beyond who made this possible."

"Together, we'll gain a better understanding of the origins of our solar

system, & the source of water & [organic molecules](#) that may have seeded life on Earth," Zurbuchen wrote on Twitter.

The fireball could be seen even from the International Space Station. A Japanese astronaut, Soichi Noguchi, who is now on a six-month mission there, tweeted: "Just spotted #hayabusa2 from #ISS! Unfortunately not bright enough for handheld camera, but enjoyed watching capsule!"

Hayabusa2 left the asteroid Ryugu, about 300 million kilometers (180 million miles) away, a year ago. After it released the capsule on Saturday, it set off on a new expedition to another distant asteroid.



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The capsule descended from 220,000 kilometers (136,700 miles) away after it was separated from Hayabusa2 in a challenging operation that required precision control. JAXA officials said they hoped to conduct a preliminary safety inspection at an Australian lab and bring the capsule back to Japan soon.

Dozens of JAXA staff had been working in Woomera to prepare for the [sample](#) return. They set up [satellite dishes](#) at several locations in the target area inside the Australian Air Force test field to receive the signals.

Australian National University space rock expert Trevor Ireland, who was in Woomera for the arrival of the capsule, said he expected the Ryugu samples to be similar to the meteorite that fell in Australia near Murchison in Victoria state more than 50 years ago.

"The Murchison meteorite opened a window on the origin of organics on Earth because these rocks were found to contain simple amino acids as well as abundant water," Ireland said. "We will examine whether Ryugu is a potential source of organic matter and water on Earth when the solar system was forming, and whether these still remain intact on the asteroid."



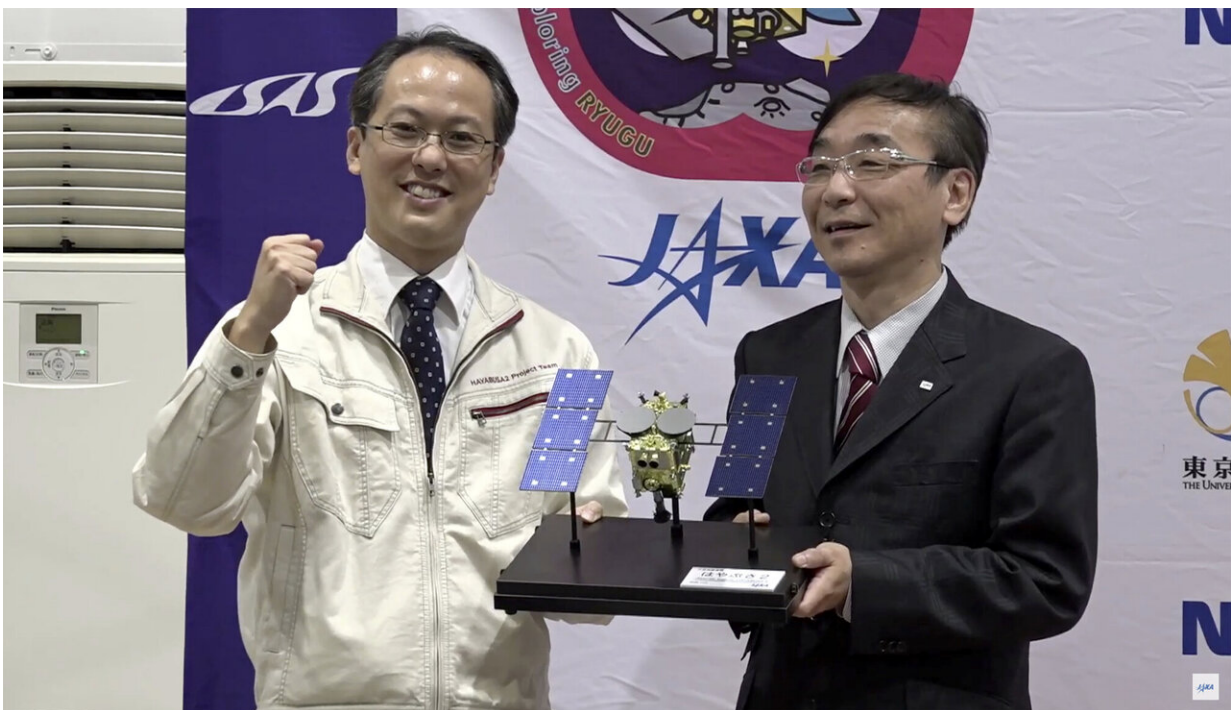
In this photo provided by the Australian Space Agency, members of the Japan Aerospace Exploration Agency (JAXA) arrive at a range support facility in Woomera, Australia, Sunday, Dec. 6, 2020, carrying a box containing asteroid samples that they retrieved on a remote area in southern Australia. JAXA said Hayabusa2 released the small capsule of samples Saturday. JAXA officials said they hoped to conduct a preliminary safety inspection at an Australian lab and bring the capsule back to Japan soon. (Australian Space Agency via AP)

Scientists say they believe the samples, especially ones taken from under the asteroid's surface, contain valuable data unaffected by space radiation and other environmental factors. They are particularly interested in analyzing organic materials in the samples.

JAXA hopes to find clues to how the materials are distributed in the solar system and are related to life on Earth. Makoto Yoshikawa, the Hayabusa2 project mission manager, said 0.1 gram of the dust would be enough to carry out all planned research.

For Hayabusa2, it's not the end of the mission it started in 2014. It is now heading to a small asteroid called 1998KY26 on a journey slated to take 10 years one way, for possible research including finding ways to prevent meteorites from hitting Earth.

So far, its mission has been fully successful. It touched down twice on Ryugu despite the asteroid's extremely rocky surface, and successfully collected data and samples during the 1½ years it spent near Ryugu after arriving there in June 2018.

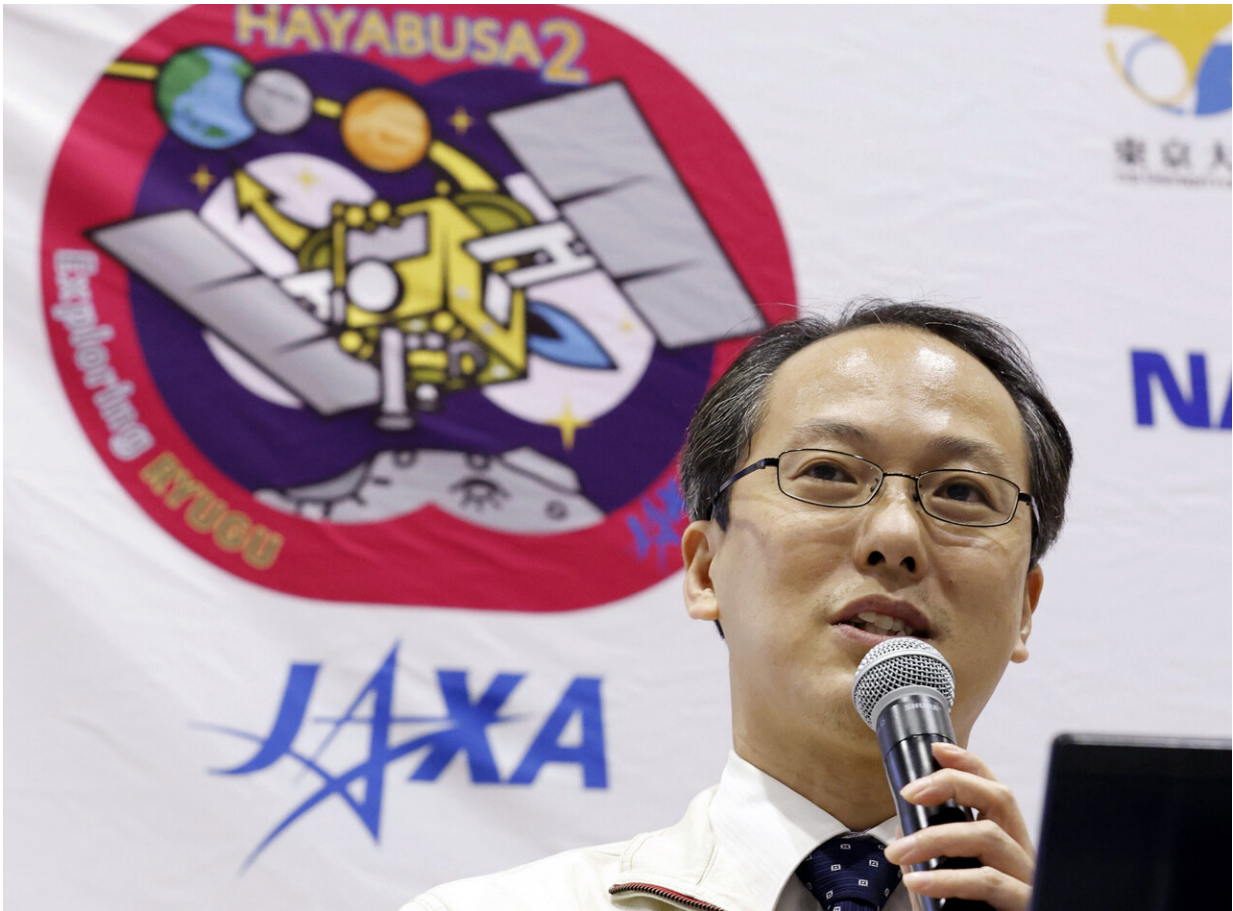


In this image made from video provided by JAXA, its project manager Yuichi Tsuda, left, and Hitoshi Kuninaka, Director General of ISAS/JAXA, pose with a

Hayabusa2 model, during a press conference in Sagamihara, near Tokyo, Sunday, Dec. 6, 2020. Japanese space agency officials said Sunday they are excited about looking inside a capsule and analyzing soil samples of a distant asteroid subsurface that safely landed in the remote Australian Outback as planned. (JAXA via AP)



In this photo provided by the Japan Aerospace Exploration Agency (JAXA), members of JAXA retrieve a capsule dropped by Hayabusa2 in Woomera, southern Australia, Sunday, Dec. 6, 2020. A Japanese capsule carrying the first samples of asteroid subsurface shot across the night atmosphere early Sunday before successfully landing in the remote Australian Outback, completing a mission to provide clues to the origin of the solar system and life on Earth. (JAXA via AP)



Yuichi Tsuda, Hayabusa2 project manager at Japan Aerospace Exploration Agency, speaks during a press conference at JAXA's Sagami-hara Campus in Sagami-hara, near Tokyo Sunday, Dec. 6, 2020. Japanese space officials said Sunday they are excited about bringing home a capsule carrying soil samples from a distant asteroid and safely landed on Australian Outback and look inside and analyzing what's inside. (Masanori Takei/Kyodo News via AP)



In this photo provided by the Japan Aerospace Exploration Agency (JAXA), Hayabusa2 project members react as they watch over the live streaming about the fireball phase of the re-entry capsule at a control room of JAXA's Sagami-hara Campus in Sagami-hara, near Tokyo, early Sunday, Dec. 6, 2020. A Japanese capsule carrying the first samples of asteroid subsurface shot across the night atmosphere early Sunday before successfully landing in the remote Australian Outback, completing a mission to provide clues to the origin of the solar system and life on Earth. (JAXA via AP)



This photo provided by Japan Aerospace Exploration Agency (JAXA) shows the Japanese space capsule about to re-enter Earth with asteroid samples seen in Cooper Pedy, southern Australia, on Sunday, Dec. 6, 2020. A Japanese capsule carrying the first samples of asteroid subsurface shot across the night atmosphere early Sunday before successfully landing in the remote Australian Outback, completing a mission to provide clues to the origin of the solar system and life on Earth. (JAXA via AP)



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This photo provided by Japan Aerospace Exploration Agency shows the Japanese space capsule about to re-enter Earth with asteroid samples on Saturday, Dec. 5, 2020. Japan's Hayabusa2 spacecraft successfully released a small capsule and sent it toward Earth to deliver samples from a distant asteroid that could provide clues to the origin of the solar system and life on our planet, the country's space agency says. (Japan Aerospace Exploration Agency (JAXA) via AP)

In its first touchdown in February 2019, it collected surface dust samples. In a more challenging mission in July that year, it collected underground samples from the asteroid for the first time in space history after landing in a crater that it created earlier by blasting the asteroid's surface.

Asteroids, which orbit the sun but are much smaller than planets, are

among the oldest objects in the solar system and therefore may help explain how Earth evolved.

Ryugu in Japanese means "Dragon Palace," the name of a sea-bottom castle in a Japanese folk tale.

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