

Press Release

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Intense sequence for CNES, DLR and JAXA Hayabusa2 and MASCOT arrive at asteroid Ryugu

The Japanese Hayabusa2 space probe has reached the end of its 3.2-billion-kilometre journey with its passenger, the French-German MASCOT (Mobile Asteroid Surface Scout) lander. Launched in 2014, Hayabusa2 has completed three orbits of the Sun in four years, after which it began a few weeks ago its very slow approach to its final destination. Since today, Hayabusa2 is now escorting Ryugu at a close distance of some 20 kilometres, collecting images and data from this celestial object that spins on itself in a little more than seven and a half hours. MASCOT is scheduled to land on the asteroid in early October.

For the first time in the history of space, a lander is set to move about on the surface of an asteroid, making small 'hops' to sample Ryugu's soil at different points on the surface just a few metres apart.

Scientists are seeking to investigate the properties and structure of near-Earth asteroids in order to gain new insights into how our solar system and planets formed, and possibly to devise solutions in the event that an object of this type might find itself on a collision course with Earth.

After 18 months studying the asteroid remotely and then collecting samples, Hayabusa2 will begin its return journey to Earth to bring back its precious cargo, arriving late in 2020.

"Ryugu is an amazing asteroid for scientists," says Francis Rocard, CNES's solar system specialist. "It's relatively small, only 900 metres across, which means it has evolved very little since it was formed. It's a C-type asteroid rich in carbon and water, affording the first opportunity to analyse such a primitive body—a true remnant of the solar system's formation—in the laboratory. The first images acquired during the approach phase revealed its unusual shape, like a child's spinning top, as well as impact craters and numerous rocks of varying sizes."

"Now that we know what Ryugu looks like, we're set for a fascinating and exciting phase of the mission with the partner science and engineering teams. We're going to map the asteroid in its entirety to identify potential landing sites for MASCOT and sites where Hayabusa2 will collect samples for return to Earth. On 14 August, CNES will be inviting all mission partners to Toulouse to select two landing sites for MASCOT, from which JAXA will select one on 17 August," explains Aurélie Moussi, CNES's MASCOT project leader, in eager expectation.

The prospect of finding new clues to how the solar system formed by studying materials more than 4½ billion years old has scientists excited and the public on the edge of their seats.

Hayabusa2 and MASCOT - A world first in space

At the start of October, MASCOT is scheduled to be released by Hayabusa2 and set down on Ryugu after several bounces. It will operate automatically for 16 hours powered by its battery and make small uncontrolled 'hops' with the aid of its swing arm, allowing it to cover several tens of metres and take measurements at different points across the surface. Four scientific instruments are on board MASCOT, which resembles a shoe box of 30 cm x 30 cm x 20 cm: the French MicrOmega infrared spectrometer developed by the IAS space astrophysics institute, a radiometer and camera developed by the German space agency DLR, and a magnetometer built by Braunschweig University of Technology (TUB). These instruments will examine the mineral composition and geological properties of the asteroid's soil and measure surface temperature and its magnetic field.

Asteroid Ryugu and Hayabusa2 are currently about 280 million kilometres away from us, so signals from Earth take roughly 15 minutes to reach the probe. The first images reveal that Ryugu is unusually shaped. Its gravitational field is some 60,000 times weaker than Earth's. Ryugu, named after an undersea palace in Japanese mythology, spins on an axis perpendicular to its orbital motion.

A very mineral cosmic neighbourhood

There are currently 800,000 recorded asteroids. Only a small number of these—roughly 18,000—are on elliptical orbits that take them deep into the inner solar system and sometimes cross Earth's orbit. About 1,000 of these Earth-crossing asteroids are larger than one kilometre.

The Hayabusa2 mission was launched on 3 December 2014 from Japan's Tanegashima Space Centre with the French-German MASCOT lander. Their mission is to discover new clues about the structure and composition of Ryugu (162173), a primitive Earth-crossing asteroid rich in carbon. Scientists will be focusing on the role that asteroids played in the formation and early evolution of Earth and other rocky planets in an attempt to find out if some of the water on our planet could have come from asteroids, and if an asteroid's structural characteristics might pose a threat to Earth. While there is currently no known collision threat, we want to be ready with a solution if one was to appear.

About the Hayabusa2 mission

Hayabusa2 is a sample return mission to asteroid Ryugu led by the Japan Aerospace Exploration Agency (JAXA). The French-German MASCOT lander on Hayabusa2 was developed and built by the German space agency DLR, in close collaboration with CNES. The lander's scientific instruments were developed by DLR, the IAS space astrophysics institute and Braunschweig University of Technology (TUB). MASCOT and its experiments are being operated and controlled by DLR with support from CNES and in constant communication with JAXA.

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