Japan probe Hayabusa2 set for asteroid landing

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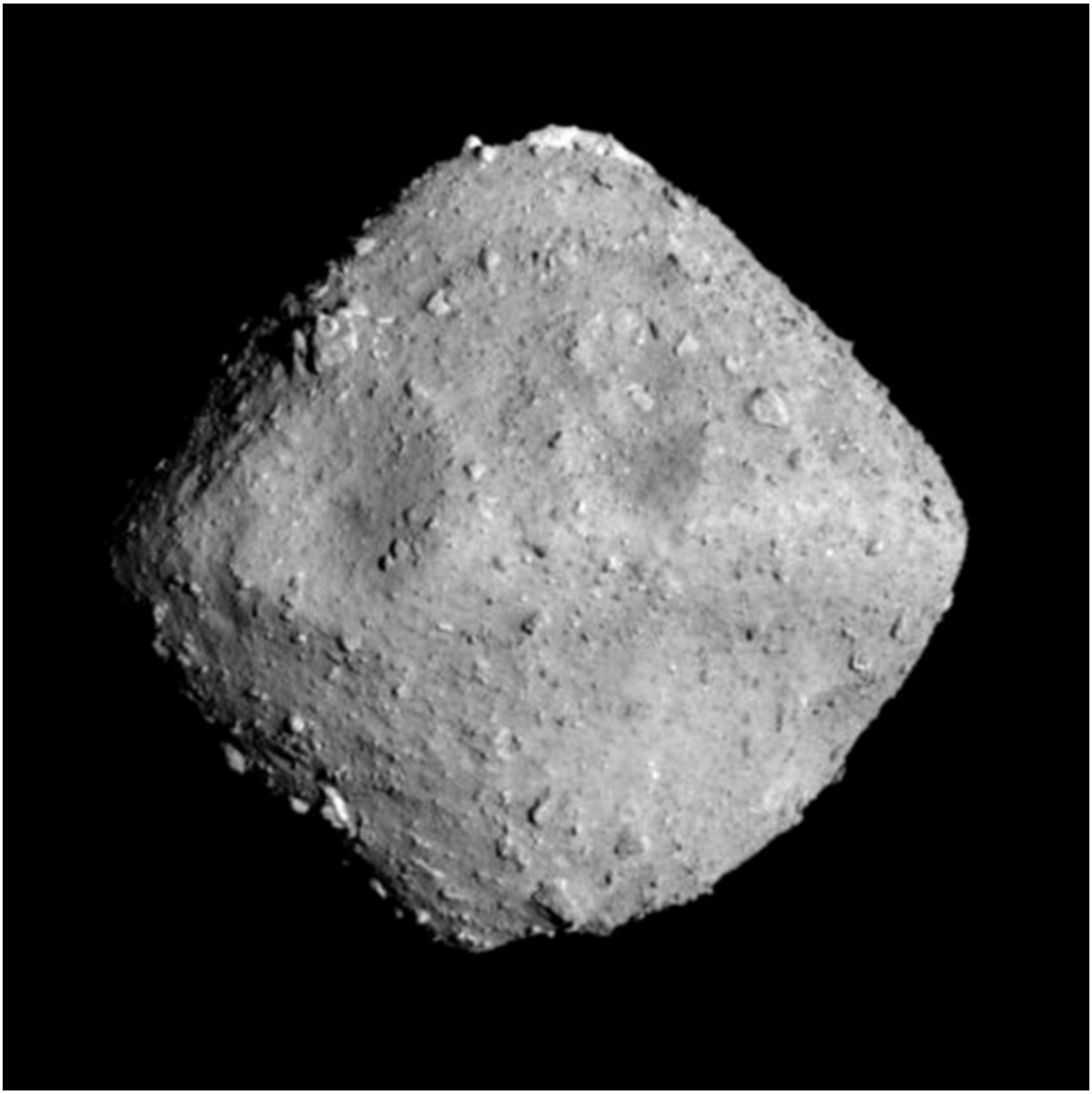

Scientists hope the asteroid will offer clues to the origins of Earth

A Japanese probe is expected to land on a distant asteroid Friday, aiming to blast a "bullet" into the surface to collect clues about the origins of Earth and the solar system.

The Hayabusa2 probe is scheduled to touch down at 8:25am local time (2325 GMT Thursday) on the Ryugu asteroid, some 300 million kilometres from the Earth, according to officials at the Japan Aerospace Exploration Agency (JAXA).

If the landing is successful, Hayabusa2 will fire a projectile at Ryugu's surface to stir up surface matter, which the probe will then collect for analysis back on Earth.

The asteroid is thought to contain relatively large amounts of organic matter and water from some 4.6 billion years ago when the solar system was born.

The probe will eventually fire an "impactor" to blast out material from underneath Ryugu's surface, allowing the collection of "fresh" materials unexposed to millennia of wind and radiation.

Scientists hope the samples may provide answers to some fundamental questions about life and the universe, including whether elements from space helped give rise to life on Earth.

On Wednesday, as the final preparations were underway, JAXA officials said they were cautiously optimistic the operation would go ahead.

"So far we haven't experienced any major troubles... but we can't feel a

sense of relief at this point while we are still bracing for a touchdown," Hayabusa2 mission manager Makoto Yoshikawa told reporters.

"We are expecting a successful touchdown... but the unexpected can happen."

"We feel tense," he admitted.

After the hoped-for landing, the probe will return to its orbit above Ryugu, with further touchdowns planned for later in the year.

'Touchdown is imperative'

Communication with Hayabusa2 is cut off at times because its antennas are not always pointed towards Earth.

And the communication time lag between Earth and the probe means confirmation of a successful touchdown is not expected for several hours, likely around 11:00am local time (0200 GMT) on Friday.

"We'll be able to announce a success if we confirm that the probe returned (to a home position above the asteroid), that the probe touched down, and that the command to fire the metal bullet worked," said senior project manager Takashi Kubota.

But it could take several more days to confirm the bullet was actually fired to allow the collection of samples, Kubota added.

"A touchdown is imperative for collecting samples, so we really hope to have the first touchdown success here," JAXA spokeswoman Azusa Yabe told AFP.

The probe's landing was originally scheduled for last year.

But it was pushed back after surveys found the asteroid's surface was more rugged than initially thought, forcing JAXA to take more time to find a suitable landing site.

Spinning-top shape

The Hayabusa2 mission, with a price tag of around 30 billion yen ($270 million), was launched in December 2014 and is scheduled to return to Earth with its samples in 2020.

Photos of Ryugu—which means "Dragon Palace" in Japanese and refers to a castle at the bottom of the ocean in an ancient Japanese tale—show an asteroid shaped a bit like a spinning top with a rough surface.

Hayabusa2 observes the surface of the asteroid with its camera and sensing equipment but has also dispatched two tiny MINERVA-II rover robots as well as the French-German robot MASCOT to help surface observation.

Scientists are already receiving data from these probes deployed on the surface of the asteroid.

The 10-kilogramme (22-pound) observation robot MASCOT is loaded with sensors, and can take images at multiple wavelengths, investigate minerals with a microscope, gauge surface temperatures and measure magnetic fields.

At about the size of a large fridge, Hayabusa2 is equipped with solar panels and is the successor to JAXA's first asteroid explorer, Hayabusa—Japanese for falcon.

That probe returned from a smaller, potato-shaped, asteroid in 2010 with dust samples despite various setbacks during its epic seven-year Odyssey

and was hailed as a scientific triumph.

"Lessons from what we experienced in Hayabusa are very useful," Yoshikawa said.