

NASA's New Horizons spacecraft just visited the farthest object ever explored

Watch NASA celebrate as New Horizons spacecraft completes most distant flyby

NASA's New Horizons spacecraft successfully flew past the farthest object humans have ever explored in space, called "Ultima Thule," on Jan. 1, 2019 (Reuters)

By [Sarah Kaplan](#)

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As Earthlings marked the start of a new year, one of the most distant spacecraft successfully explored the farthest — **4 billion miles from Earth** — and most primitive objects that humans have ever seen.

NASA received confirmation Tuesday that its New Horizons probe survived its 12:33 a.m. eastern encounter with Ultima Thule, a rocky relic from the solar system's infancy whose name means "beyond the borders of the known world."

The midnight rendezvous occurred in the Kuiper belt, a halo of icy bodies so far from Earth it takes more than six hours for signals to travel at the speed of light to reach the Earth.

But just after 10:30 Eastern time on Tuesday, at the Johns Hopkins Applied Physics Laboratory in Laurel, Md., mission operations manager Alice Bowman turned to her colleagues with a wide grin.

The probe's systems were working. Its cameras and recorder were pointed in the right direction.

"We have a healthy spacecraft," Bowman announced. "We have just completed the most distant fly-by. We are ready for Ultima Thule science transmission — science to help us understand the origins of our solar system."

At mission control, and in an APL auditorium where the rest of the science team was watching, people jumped from their seats and burst into cheers. The borders of the known world had expanded just a little bit more.

"I don't know about you, but I'm really liking 2019 so far," said the mission's principal investigator, Alan Stern.

Though coincidental, the timing of New Horizons' encounter — in the early hours of a new year — is "auspicious," Stern said. At a moment when humanity marks the passage of time, looking forward and thinking back, New Horizons is doing the same. At 4 billion miles from Earth, Ultima Thule is the farthest celestial body scientists have ever viewed up close; it is a door to future exploration in a region that is still almost entirely unknown. But it is also a window to the past — a time capsule from the era when the planets formed, which might contain clues about how the Earth came to be.

Already, scientists are analyzing early data collected just before the moment of closest approach. An image taken from half a million miles away from Ultima Thule showed a blurry bowling **pin-shaped body about 20 miles across.**

Until New Horizons's fly-by, no person had ever seen a Kuiper belt object as anything but a pinpoint of light in the distance. By Wednesday, the scientists at APL will receive their first high-resolution images of the distant rock, revealing whether it has craters, and whether it is one long object or comprises two small bodies orbiting each other.

As for answers to other questions about the Kuiper belt object, Stern advised patience. "This mission has always been about delayed gratification," he said. "**It took us 12 years to sell the spacecraft, five years to build it, 13 years to get here.**"

It will take as long as **20 months for scientists to download and process all the data collected** during that brief encounter.

But the resulting science will be worth the wait, project scientist Hal Weaver said. "Ultima Thule will be turned into a real world."



New Horizons principal investigator Alan Stern, center, of the Southwest Research Institute in Boulder, Colo., celebrates with other mission team members after they received signals from the New Horizons spacecraft that it is healthy and collected data during the flyby of Ultima Thule, Tuesday, Jan. 1, 2019, at the Mission Operations Center at the APL in Laurel, Md. (Bill Ingalls/NASA/AP)

New Horizons was the first mission dedicated to exploring the outermost edges of the solar system. In 2015, it took the first close-up photos of Pluto, revealing a complex and colorful world mottled with methane mountains and a vast, heart-shaped nitrogen ice plain.

When mission was first conceived in the early 1990s, no one knew what lay beyond the distant dwarf planet. But in the intervening decades, scientists discovered that the Kuiper belt – which extends from **Neptune's orbit to 5 billion miles from the sun** — is home to millions of small and icy objects.

Out there, where sunlight is 0.05 percent as strong as it is on Earth and temperatures hover near absolute zero, primitive bodies like Ultima Thule have existed in a “deep freeze” since they first formed.

The Kuiper belt object, whose official name is 2014 MU69, was discovered five years ago during a sky-wide search for potential New Horizons targets after the probe left Pluto.

But the rock is so dim and so distant that even the most powerful telescopes could barely make it out. Prior to Tuesday, some of the only information about its size and shape came from coordinated observations last summer, when astronomers measured the shadow Ultima Thule cast as it passed in front of a star.

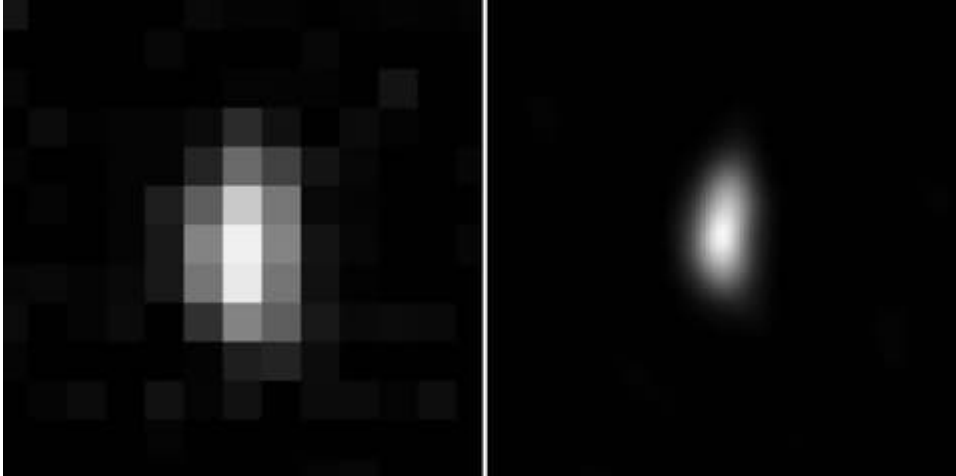
The encounter was riddled with uncertainties, making it among the more difficult feats NASA has attempted. Ultima Thule is 1 percent the size of Pluto, and New Horizons had to get four times closer to image it. At the moment of closest approach, the **spacecraft was moving at a breathtaking 32,000 miles per hour**. If its cameras were even slightly off track, or if scientists' projections about Ultima Thule's trajectory were just a little bit wrong, the probe might fail to capture useful information about its target.

Besides, New Horizons is a 13-year-old vehicle; operators must carefully prioritize their use of remaining fuel. “This is history-making, what we're doing, in more ways than one,” Stern said. Every image sent back from New Horizons is the most distant photograph ever taken. Each maneuver is further than anything NASA has done before.

Helene Winters, the mission's project manager, said Monday that spacecraft operators had been subsisting on chocolate and sleeping on air mattresses at the APL so they could make the most of every minute until New Horizons reached its target. Navigators kept a watchful eye out for potential hazards, which can be hard to spot in this faraway corner of the solar system.

Asked whether she thought she would be able to sleep that night, Winters laughed. “Ask me again tomorrow.” But as minutes to the close encounter ticked by, the atmosphere at APL was festive. Scientists and their guests munched on crudités in a room lit with sparkling blue and white lights. Small children up long past their bedtimes scurried between chairs and sneaked cookies from the buffet.

“This is like a dream come true,” said Chuck Fields, a podcast producer from Indianapolis who drove nine hours to attend Monday’s event. He was dressed in a blindingly bright blazer and tie bearing images of planets, galaxies and the sun. His wife, Dawn, wore matching pants.



LEFT: An image of Ultima Thule taken just over 24 hours before the vessel's closest approach. RIGHT: A sharpened version of the recent New Horizons photograph. (NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute/AP)

NASA nodded to the encounter by counting down to 12 a.m. and distributing plastic cups of champagne. Astrophysicist Brian May, better known as lead guitarist for the rock band Queen, debuted a song he wrote for the occasion.

“This is an anthem to human endeavor,” he said.

Thirty-three minutes after the rest of the East Coast had already popped their champagne, the scientists at APL were still waiting.

Way out in the Kuiper belt, they knew, New Horizons was performing its riskiest observations yet. Particle and dust detectors were probing the chilly Kuiper belt environment. Three cameras were snapping as many images as possible in an effort to map the tiny world and determine its composition. And Ultima Thule was growing ever larger in New Horizons’s field of vision, glowing like a full moon.

“Thirty seconds to fly-by,” Stern said. “Are you ready? Are you psyched? Are you jazzed?”

Twenty seconds. Ten. And then Stern raised his hand in the air while confetti fell from the ceiling. The crowd cheered.

“New Horizons is at Ultima Thule,” Stern proclaimed.

Or so he hoped.

New Horizon probe captures images of solar system's furthest region

NASA said its New Horizons explorer spacecraft reached the solar system's outermost region on Jan. 1. (Reuters)

The following morning, New Horizons’s operators sat in mission control, anxious. Data from the Deep Space Network, a chain of radio antennas NASA uses to communicate with distant spacecraft, was displayed on their screens.

Bowman sat with her hands folded, leaning toward her computer.

“In lock with telemetry,” Bowman said.

In the APL auditorium, where the rest of the team and their families were watching, the crowd erupted.

Next came the status check: Planning — nominal. Power — green. Solid state recorders — pointed right where NASA wanted them. Every subsystem looked good. New Horizons had survived.

Thirty minutes later, members of the New Horizons mission operations team entered the APL auditorium to high-fives and riotous cheers.

“I’m not a New Year’s kind of guy,” said Mike Ryschkewitsch, the head of APL’s space exploration sector.

“But I can’t think of a better reason to stay up late.”