

Europe's comet probe Rosetta ends 12-year mission with crash

September 30 2016, by Frank Jordans



The artist impression provided on the website of the European Space Agency ESA on Sept. 29, 2016 shows ESA's Rosetta cometary probe. The spacecraft will be crash landed on Comet 67P/Churyumov-Gerasimenko Sept. 30, 2016. (J. Huart/ESA via AP)

After 12 years of hurtling through space in pursuit of a comet, the Rosetta probe ended its mission Friday with a slow-motion crash onto

the icy surface of the alien world it was sent out to study.

Mission controllers lost contact with the probe, as expected, after it hit the surface of [comet 67P/Churyumov-Gerasimenko](#) at 1039 GMT (6:39 a.m. EDT) Friday, the European Space Agency said.

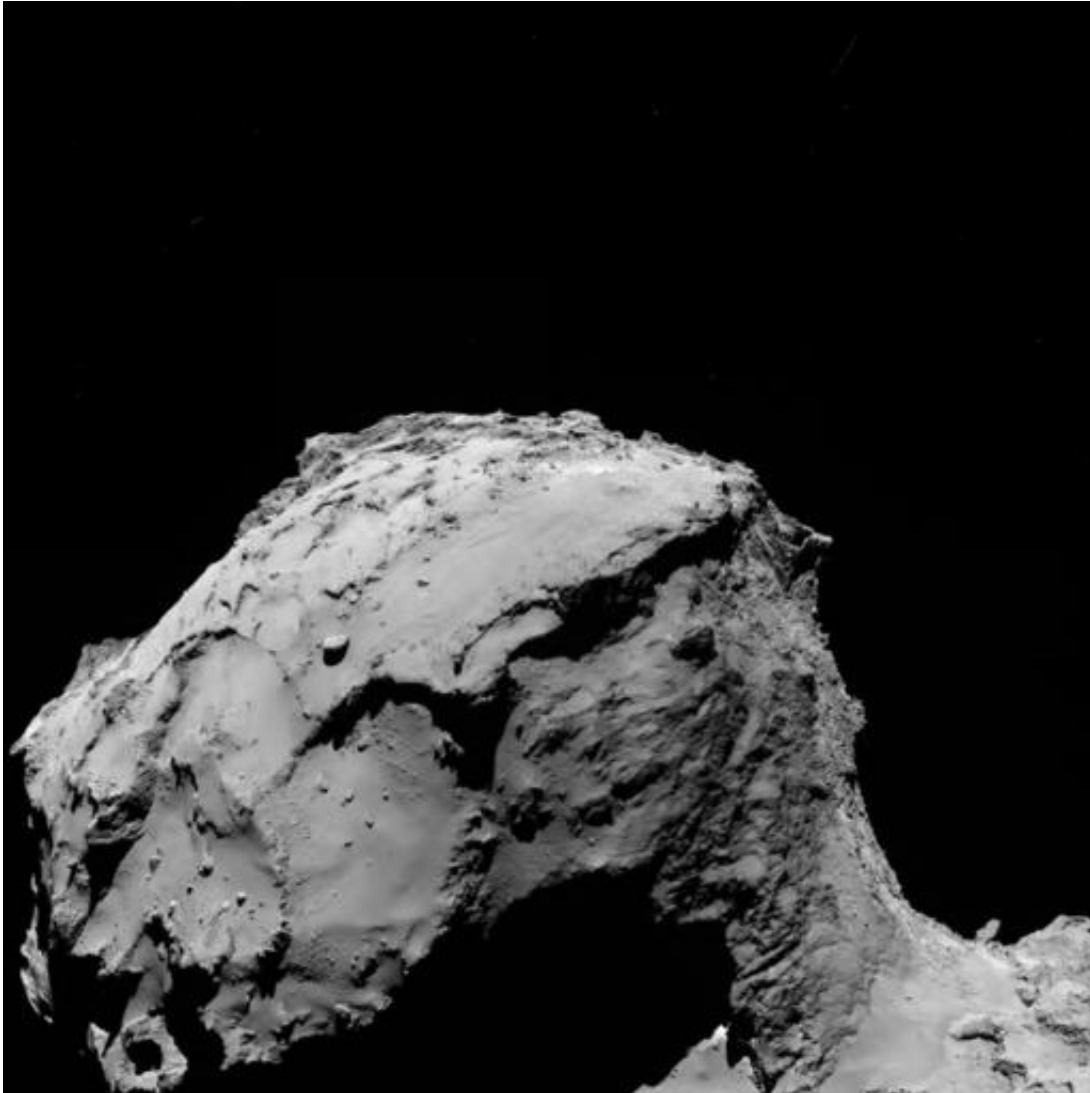
"Farewell Rosetta, you've done the job," said mission manager Patrick Martin. "That is space science at its best."

ESA chief Jan Woerner called the 1.4 billion-euro (\$1.57 billion) mission a success. Aside from sending a lander onto the surface of comet 67P in November 2014—a cosmic first—the Rosetta mission has collected vast amounts of data that researchers will spend many years analyzing.

Scientists have already heralded several discoveries from the mission that offer new insights into the formation of the solar system and the origins of life on Earth.

Spectacular images taken by the orbiter and its comet lander revealed a desert-like landscape on the comet with wide, featureless regions but also high cliffs and sinkholes that were more than a hundred meters (110 yards) across.

The shape of 67P itself—two orbs connected by a "neck" that have been likened to a giant rubber duck—surprised scientists when Rosetta first got up close. Researchers now believe the orbs formed independently and later merged into one.



In this photo provided by the European Space Agency ESA Rosetta's OSIRIS wide-angle camera captured this image of Comet 67P/Churyumov-Gerasimenko at 02:17 GMT from an altitude of about 15.5 km above the surface during the spacecraft's final descent on Friday, Sept. 30, 2016. The image scale is about 1.56 m/pixel and the image measures about 3.2 km across. (ESA via AP)

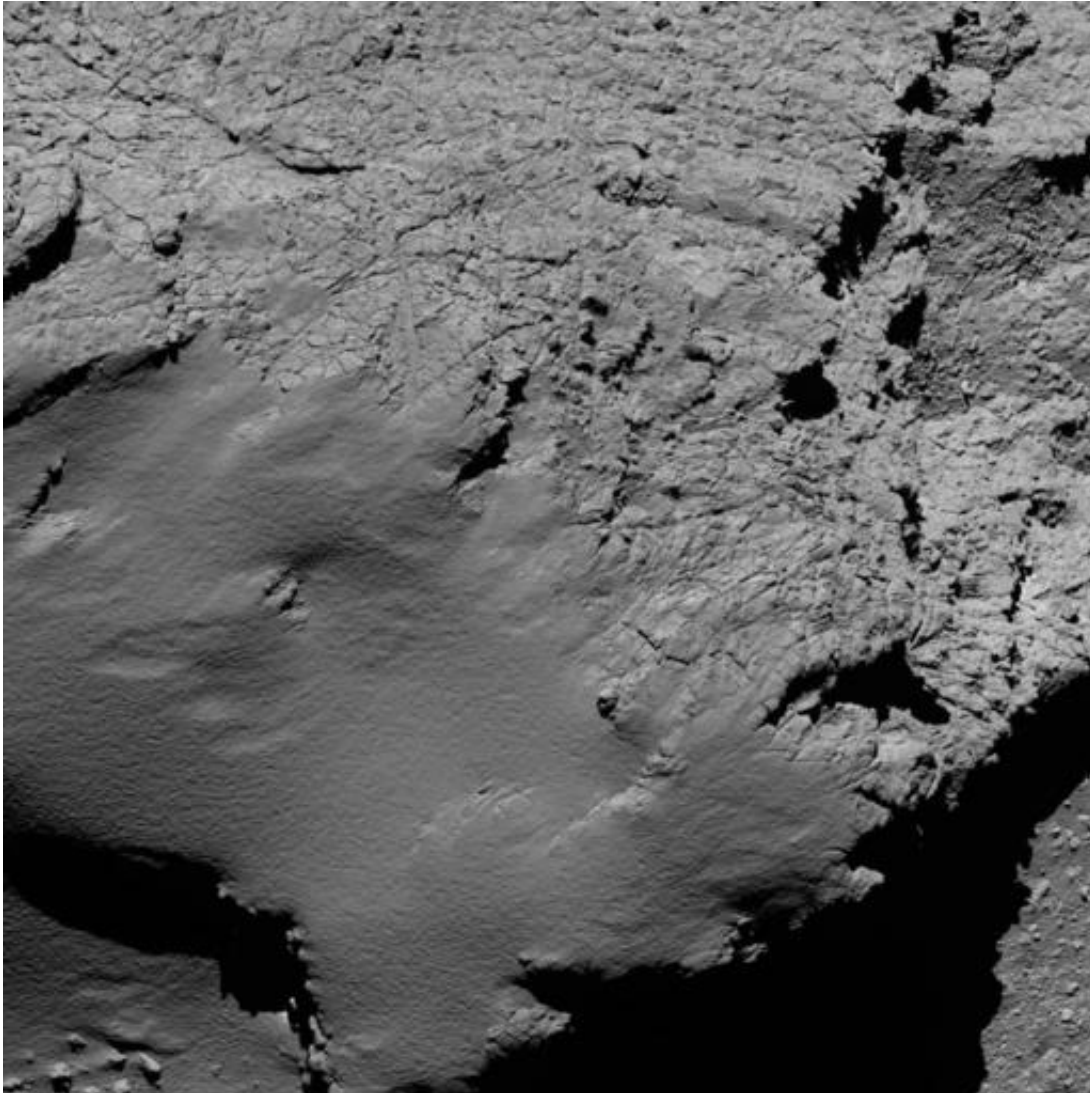
Jessica Sunshine, a senior scientist on NASA's Deep Impact and Stardust comet missions, said the way the comet was formed has implications for the model of how other objects in the solar system, including Earth, formed about 4.5 billion years ago.

Scientists were also surprised to find that the surface of 67P is changing, not just due to steady erosion as particles are released into the void, but also from sudden large events such as landslides.

"We see evidence of mass movement of materials on this comet," said Sunshine, who wasn't directly involved in the Rosetta mission. "That's nothing like what we imagined."

One of the crucial differences between Rosetta and previous missions was the probe's ability to study one comet for an extended period of time. While Deep Impact fired a projectile into comet Tempel 1 back in 2005 and studied the crater for 15 minutes, Rosetta spent 786 days flying alongside 67P, observing its evolution across several "seasons" as it raced toward and then away from the Sun.

"Rosetta is what I would call a Cadillac mission that had all the right instruments and stayed reasonably close to the comet since fall 2014," said Mike A'Hearn, an emeritus professor at the University of Maryland who worked on the Rosetta mission.



The provided by European Space Agency ESA on Friday, Sept. 30, 2016 was captured by Rosetta's OSIRIS narrow-angle camera captured this image of Comet 67P/Churyumov-Gerasimenko at 08:21 GMT from an altitude of about 5.7 km during the spacecraft's final descent on Friday, Sept. 30, 2016. (ESA via AP)

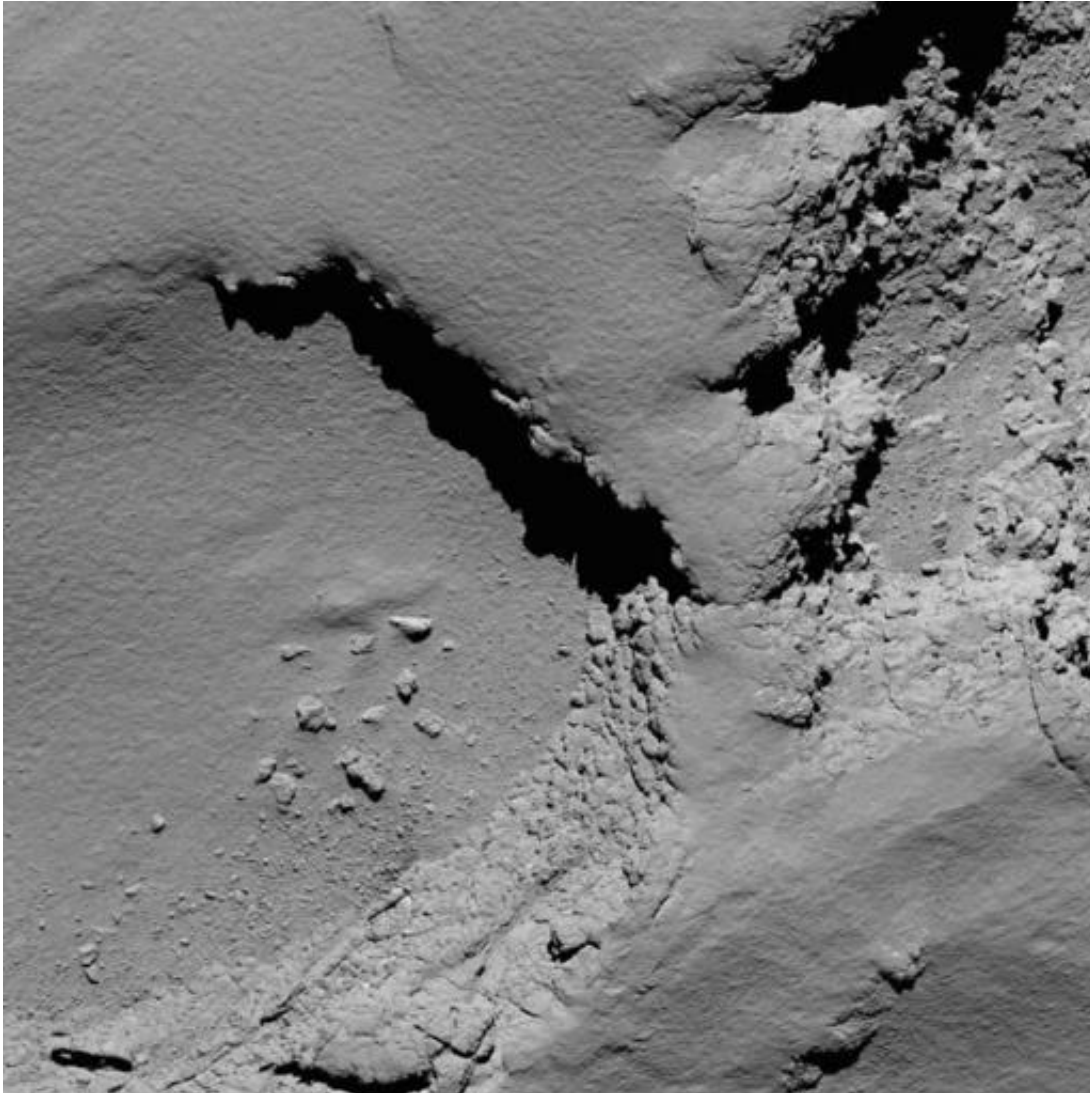
"It's the first detailed study of a comet," he said. "We have collected a wealth of data that has come in so fast we haven't even had a chance to look at some of it, let alone analyze it properly."

Data from the probe has also challenged some existing scientific theories, such as those about the origins of water on Earth and how best to hunt for extraterrestrial life.

"Rosetta has blown it all open," said Matt Taylor, the mission's project scientist. "It's made us have to change our ideas of what comets are, where they came from and the implications for how the solar system formed and how we got to where we are today."

Scientists decided to crash-land the probe on the comet because Rosetta's solar panels would not have been able to collect enough energy as it flew away from the Sun along 67P's elliptical orbit.

After receiving its final command late Thursday, Rosetta fired its thrusters for 208 seconds and performed a last series of scientific measurements as it swooped toward the surface of the 4-kilometer (2.5-mile) wide comet.



The provided by European Space Agency ESA on Friday, Sept. 30, 2016 was captured by Rosetta's OSIRIS narrow-angle camera captured this image of Comet 67P/Churyumov-Gerasimenko at 08:18 GMT from an altitude of about 5.8 km during the spacecraft's final descent on Friday, Sept. 30, 2016. (ESA via AP)

Because of the vast distance between the comet and Earth—almost 720 million kilometers (447 million miles)—confirmation of the probe's crash took about 40 minutes to reach ESA's mission control in Darmstadt, Germany.

The controlled descent took place at about 90 centimeters per second (35 inches a second)—roughly half of walking speed. That gave Rosetta a chance to snap some unprecedented low-altitude images of the comet that could reveal surface features as small as a grape.

Fans of the mission—which ESA promoted heavily with cartoons , short films , music and social media—may be disappointed to learn there's no chance of a Rosetta revival when the comet itself swings back toward the sun.

"It will not be possible to reactivate it again," said ESA's head of mission operations, Paolo Ferri. "We wanted a clean end."

Still, Rosetta guards one last message.



In this photo provided by the European Space Agency, ESA, Rosetta's OSIRIS narrow-angle camera captured this image of Comet 67P/Churyumov-Gerasimenko at 10:14 GMT from an altitude of about 1.2 km during the spacecraft's final descent on Friday, Sept. 30, 2016. The image scale is about 2.3 cm/pixel and the image measures about 33 m across. (ESA via AP)

On board is a small metal plate with texts etched in over 1,000 languages—an enticing discovery for future spacefarers from Earth or elsewhere who might chance upon the probe on the comet.

More information: rosetta.esa.int

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