Space-exploration history is made as probe lands on comet

By Los Angeles Times, adapted by Newsela staff on 11.13.14

~ Word Count 862 ~

Experts watch their screens at the control center of the European Space Agency (ESA) in Darmstadt, Germany, Aug. 6, 2014. A mission to land the first space probe on a comet reached a major milestone when the unmanned Rosetta spacecraft caught up with its quarry on Wednesday. Photo: AP Photo/dpa, Boris Roessler

For the first time in history, humans have successfully landed a spacecraft on a comet.

The European Space Agency (ESA) sent Philae, a mobile laboratory the size of a washing machine, deep into space, where on Wednesday, it landed on a comet known as 67P.

The agency made space-exploration history with the landing. Spacecraft had slammed into comets before, but had never gently landed on one.

Scientists launched the mission to study the makeup of comets. They believe comets could contain material from the earliest days of the solar system. Studying the comets more closely might help us to learn about the history of the solar system.

Cutting The Cord On Philae

Philae, which had been attached to the Rosetta orbiter for a decade, detached at 3:35 a.m. EST Wednesday. The lander took about seven hours to complete its journey toward the comet, which it had been circling for months.

The probe had to dodge many dangers to land on the comet's surface. Even a small miscalculation in speed could have made a safe landing impossible. Scientists were not able to steer the probe once it separated, and the operation relied on communication between the two spacecraft, because only one of them could communicate with Earth.

Still, the landing was not entirely smooth. The Philae lander was supposed to fire two harpoons that would attach the spacecraft to the comet. These did not fire, the agency confirmed, and scientists are looking at options to fire them again, an operation that could be problematic in itself.

Comet Catcher

This project has been underway since 1993, when the European Space Agency approved it and began to design and build the spaceship and lander with a specific comet in mind. The agency had to choose a different comet, however, after engineers found a problem with one of the rockets on the spacecraft and the launch had to be delayed. A new target, 67P, was chosen.

For the last 10 years, the Rosetta orbiter has been chasing 67P through space. For the last three months, it has been escorting the comet on its journey toward the sun. The orbiter will continue to fly with the comet through 2015, collecting data on

what the comet looks like, what it's made of, and how much water it is expelling into space.

Rosetta launched in March 2004, traveling through space for seven years until the European Space Agency team put it in a three-year hibernation to conserve energy.

Then, on Jan. 20, alarm clocks on the craft woke it up to prepare it for landing. It had been orbiting the comet since early August, scanning its surface for the best landing site.

The lander orbiting the comet is expected to provide some of the best images yet of a comet's nucleus. Sensors on its underside are designed to gather data on the texture of the comet's surface.

Philae Phones Home

At about 3 a.m. EST Wednesday, the three mechanical screws on the Rosetta orbiter started to turn, and the Philae lander detached and began its 14-mile free-fall to the surface of comet 67P/ Churyumov - Gerasimenko.

Philae was falling, but it was falling much slower than it would have on Earth. The gravity of the mountain-sized comet is much, much weaker than the gravity on Earth — only 1/60,000 the gravity. Scientists estimated it would take the lander between seven and 10 hours to reach the comet's surface.

Once on the surface, Philae was supposed to send out two harpoons to keep it from bouncing off. ESA confirmed Wednesday that those harpoons did not deploy. Agency officials said the lander was still in great shape and they were looking for ways to refire the harpoons.

Mark Bentley, a scientist with the Austrian Academy of Sciences and a lead investigator on the Rosetta project, tweeted Wednesday that deciding whether to refire the harpoons is "tricky." Because the comet has such low gravity, it is possible that firing the harpoons could produce recoil that might push Philae off the comet.

Once it landed, Philae sent a message to the Rosetta orbiter to let it know where it had ended up. From there, Rosetta relayed the information to Earth. The data took 28 minutes to cross 300 million miles of space. The message spurred cheers at the command center in Germany.

Many Scientific Queries

Scientists had warned that there was a very real chance that the Philae landing would fail. To function properly, the lander needed to land upright. Because the surface of comet 67P is scattered with boulders, there was a good chance Philae could land on one and topple over. Luckily, it did not.

Scientists are hoping the Rosetta mission will provide answers to many scientific questions like what comets are made of, if they are responsible for bringing water to the young Earth, what their insides are like, and why their surfaces are so inky black.

Researchers believe that in the nuclei of comets are materials from the very earliest days of the solar system. It's possible the ingredients for life were originally brought to Earth by comets. These space scientists hope to see the origins of our planets, and ourselves, up close.