

# Despite landing fumble, comet probe working well (Update)

November 13 2014, by Mariette Le Roux

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A handout photo released by the European Space Agency (ESA) on November 13, 2014 shows an image taken by Rosetta's lander Philae

Europe's comet probe Philae was "working well" despite a rough-and-tumble touchdown that left it partly shadowed from battery-boosting sunlight, ground controllers said Thursday.

Clearly relieved, they reported that in the first 24 hours after its historic landing, the lab had sent home a slew of data and images from comet 67P/Churyumov-Gerasimenko—though from a mystery location.

New data showed the washing machine-sized lander had bounced twice after its initial touchdown Wednesday, likely ending up at a slight angle with one leg dangling and in the shadow of a cliff.

Harpoons were meant to have anchored Philae to the low-gravity comet zipping towards the Sun at 18 kilometres (11 miles) per second.

The spears failed to deploy for the precision manoeuvre 510 million kilometres (320 million miles) from Earth.

But this has not prevented Philae sending precious data to Earth, relayed via its orbiting mothership Rosetta.

"We have a better understanding of how we got there, but we still do not really know where," lander manager Stephan Ulamec said at a press conference webcast from European Space Agency (ESA) ground control in Darmstadt, Germany.

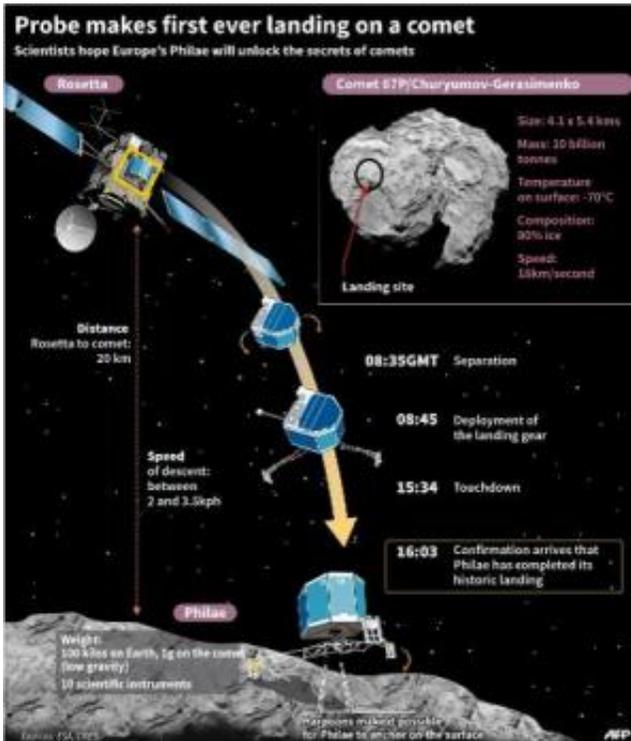
"We could be somewhere in the rim of this crater," he added, pointing to a surface shot on which deep crevices lie in permanent, pitch-black shadows.

"We are almost vertical—one foot probably in open space" and two on the comet surface, added mission scientist Jean-Pierre Bibring, an evaluation made from the angle of photographs Philae took.

The images were the first ever taken on the surface of a comet—a highlight achievement in ESA's flagship 1.3-billion-euro (\$1.6-billion) project.

According to Philippe Gaudon of France's CNES space agency, eight of the robot lab's 10 onboard science instruments have kicked into action as planned, and the lander was "working well".

Early data revealed the first bounce, "a huge leap" according to Ulamec, lasted about two hours and moved the lander a kilometre (0.6 miles) off target, followed by a second, smaller rebound.



Probe makes first-ever landing on a comet

Ground teams had to contend Thursday with the possibility that Philae may run out of power sooner than they had hoped.

The 100-kilogramme (220-pound) probe's onboard batteries will last only about 60 hours, but it also carries solar panels for a recharge.

Given its awkward position, however, Philae was not getting enough sunlight—only 1.5 hours per day instead of the six or seven required.

"We are calculating now what this means," said Ulamec.

Philae may also never be able to ever use the drill with which it was equipped to take sub-surface comet samples for chemical testing.

Trying to activate the drill with the lander likely balanced precariously on a steep slope may be dangerous.

"We may just tip over our lander," said Ulamec, adding Philae may not have enough power for "a dedicated jump out of the hole in which we may be."

## **Success**

Wednesday's elation at the first landing confirmation from Philae after a seven-hour descent, soon turned to worry as fluctuations in the radio signal indicated it may have lifted off again.

When contact was restored on Thursday morning after an anticipated break, "we were very relieved", said spacecraft operations manager Ignacio Tanko.

ESA experts on Thursday underlined the achievements of Philae—the jewel in the crown of a project some 20 years in the making.

"Many of the... instruments have already acquired what they wanted to," said Bibring.

"What is really impressive is not the degree of failure, but the degree of success."

The Rosetta mission aims to unlock the secrets that comets, primordial clusters of ice and dust, are thought to hold about how the Solar System

was formed around 4.6 billion years ago.

Some scientists theorise that comets may even have "seeded" Earth with some of the ingredients for life.

Rosetta, with Philae riding piggyback, was hoisted into space in 2004, and reached its target in August this year, having used the gravitational pull of Earth and Mars as slingshots to build up speed.

The pair covered 6.5 billion kilometres (four billion miles) together before Wednesday's separation and Philae's 20-kilometre descent.

Philae complements 11 instruments aboard Rosetta, a three-tonne orbiter responsible for four-fifths of the mission's expected science haul.

Whatever happens to Philae, Rosetta will continue to escort the comet as it loops around the Sun.

On August 13, 2015, they will come within 186 million km of our star, before heading off to the outer Solar System.

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