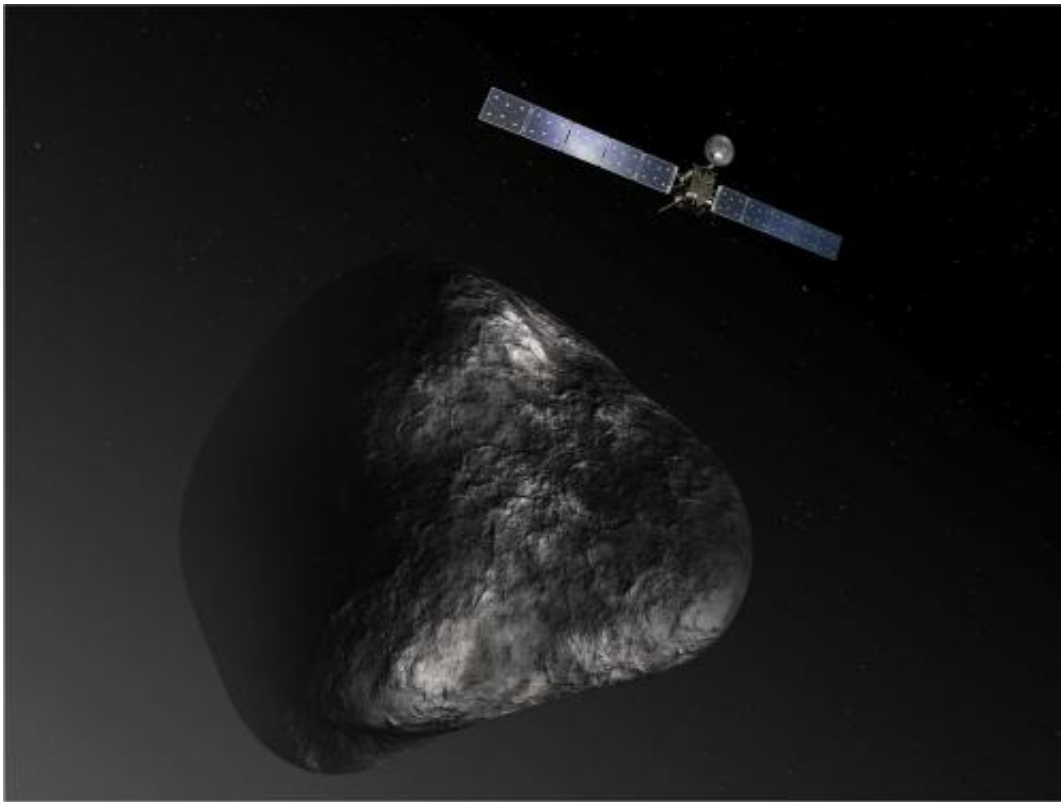


# Comet probe in race against time to crown stellar feat (Update)

November 14 2014, by Mariette Le Roux

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This artist's impression shows the Rosetta orbiter at comet 67P/Churyumov-Gerasimenko. The image is not to scale. Credit: ESA/ATG Medialab

Europe's deep-space robot lab Philae worked against the clock Friday, attempting to drill into a comet 510 million kilometres (320 million miles) from Earth to crown a historic exploration before its battery runs out.

Charged with 60 hours of onboard power, the lander bounced twice after touchdown Wednesday, settling in a crevice in a mystery location, shadowed from battery-boosting sunlight that could have extended its core mission.

Despite a rough start, the washing machine-sized probe sent back fascinating images and data from mankind's first on-site survey of a comet, proud scientists said during Friday's countdown to hibernation.

All 10 onboard experiments had kicked into action—including Friday the drill meant to take a sub-surface sample of comet 67P/Churyumov-Gerasimenko, racing towards the Sun at 18 kilometres (11 miles) per second.

It was as yet unclear whether the drill had managed to pierce the shell of the enigmatic Solar System comet, or whether it would have enough power to relay any data to its orbiting mothership, Rosetta.

The orbiter and lander have two communications windows per day—the next should open at about 2100 GMT, but with a long delay for the signal from Rosetta to arrive on Earth, scientists face a nervous wait to know if Philae is still awake, and whether a drill sample had been uploaded.

"We're hoping to get contact again this evening. This would be fantastic, but it's not secured," lander manager Stephan Ulamec said in a briefing webcast from mission control in Darmstadt, Germany.

"It's going to be really, really close, whether we make it to the link or not," added mission scientist Valentina Lommatsch.

Astrophysicist Philippe Gaudon, who heads the Rosetta mission at French space agency CNES, told AFP: "We think the robot may switch

off around midnight."

A drill sample had been among the most highly anticipated results from Philae's mission, with scientists hoping for clues to the formation of the Solar System 4.6 billion years ago and even the appearance of life on Earth.

Philae landed on the low-gravity comet after a nail-biting seven-hour, 20-km descent from Rosetta, which had travelled more than a decade and 6.5 billion kilometres (four billion miles) to get there.

The touchdown did not go entirely as planned, when Philae's duo of anchoring harpoons failed to deploy and it lifted off again... twice.

Its location remains unknown, but data and photos from the lander showed it was probably at an angle in a crevice, in the shadow of a cliff about a kilometre from where it first touched down.

Besides 60 hours of power on its main battery, the lab had been designed with solar panels for a potential recharge.

But in its dark location, one solar panel was receiving about 80 minutes of sunlight per 12.4-hour comet day and two others 20 or 30 minutes—much less than the six or seven hours engineers had bargained on.

## **Mission accomplished**

When it eventually does fall into slumber, there is always the off chance that Philae may be jolted back to life in the coming months as comet "67P" draws closer to the Sun, said ground controllers, and then pass on outstanding data.

But, "we would have to be extremely lucky," said Lommatsch.

The Rosetta-Philae team said they were already ecstatic at the results.

"Let's stop looking at things that we could have done if everything had worked properly," said Andrea Accomazzo, flight operations director.

"Let's look at things we have done, what we have achieved. This is unique and will be unique forever!"

So far, the 100-kilogramme (22-pound) lab has sent back the first-ever photos taken on a comet, and probed its surface density, temperature and composition.

The 1.3-billion-euro (\$1.6-billion) mission aims to unlock the secrets of comets, which some astrophysicists believe may 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.

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