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## Rosetta still listening out for Philae

**After its trailblazing successful landing on 12 November 2014, Philae spent two and a half days collecting in-situ measurements and observations on the surface of comet Churyumov-Gerasimenko, a first for science and a notable contribution to ESA's record-setting mission. Despite the lander's continuing silence and uncertainties about its current position, there is still a chance of restoring contact between Philae and Rosetta in the months ahead.**

The pioneering Rosetta mission has been keeping both the public and scientists on the edge of their seats since 12 November 2014, when its Philae lander, tracked closely by teams at the Science Operations and Navigation Centre (SONC) at CNES's Toulouse Space Centre, touched down on the comet's surface. The orbiter and lander have since accomplished a number of firsts. After a bumpy first landing, the envisioned scientific programme could not be performed at the Agilkia site. However, Philae was able to conduct 60 hours of unprecedented science on its unplanned flight away from Agilkia to its eventual landing point at Abydos. It then went into 'hibernation' as power ran out, but awoke late in April 2015 when the ambient solar illumination and temperature became sufficient, sending signals during eight communication slots in June and July indicating that it was still alive. Subsequent attempts to restore contact with the lander since 9 July until now have not been successful, neither as the comet approached perihelion in mid-August 2015, nor after passing it.

However slight, there is still a chance Rosetta may hear from Philae on one of its regular approaches, defying the dangers posed chiefly by the dust outgassing from the comet as the orbiter dips closer to the nucleus. The orbiter is currently 50 kilometres from the lander, so the closer it can get, the greater are the chances of restoring contact. On the minus side, as the comet is now hurtling away from the sun, the lander's solar panels are receiving less sunlight. Lastly, Philae's position and orientation can now only be assumed from calculations, as the orbiter would ideally need to get within 10 kilometres to take precise pictures, but for the moment the dangers posed by this close an approach would be too great. Such altitudes will be attained later in the summer of 2016, when it will be possible to image Philae and its environment from sufficiently close up to assess where and how it is presently resting on the surface. There could also still be a chance to resume science operations if communications can be established with the lander during a series of close flybys over Abydos in the weeks ahead.

The first science results published in the review *Science* of 31 July 2015 reveal the wealth of data that Philae acquired during its 60-hour science phase on the surface of the comet. Other papers are set to be published, but the initial science return has already taught us a great deal, above all about the unique organic molecules detected by the first chemical analysis performed by Philae, since 16 different components have been identified in six classes, four of which had never been reported on a comet before, one of them being acetone. Concerning the environment at the Abydos site, the CIVA camera (Comet Infrared and Visible Analyser) was able to image dark surface features that are most likely organic mineral grains, the kind that could have seeded life on Earth. Elements highlighted during Philae's landing and rebound suggest the soil at Agilkia may consist of 20 centimetres of granular material, whereas the surface at Abydos appears to be covered in a three-centimetre layer of dust. On the other hand, the CONSERT radar-sounding instrument (COMet Nucleus Sounding Experiment by Radio Transmission) showed the inside of comet Churyumov-Gerasimenko is more homogenous than expected and has enabled the interior structure of a comet's nucleus to be determined for the first time. Other results revealed new information about surface temperature variations on the comet and its soil

composition, showing that in addition to the omnipresent dust there are boulders several metres high as well as grains of a few centimetres to 10 centimetres across.

As of today, Philae has completed 80% of its planned science operations on the comet's surface, a fine achievement for a scientific world first. For Philippe Gaudon, CNES's Rosetta mission project leader, and the SONC team in Toulouse, even with scaled-back resources and a skeleton staff, the mission remains the same: to keep listening to Rosetta, whose antennas are still trained towards Philae in the hope of catching the faintest sign of life.

**More infos here :**

<https://rosetta.cnes.fr/fr/mince-espoir-d-etablir-une-liaison-avec-philae>

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