Press release

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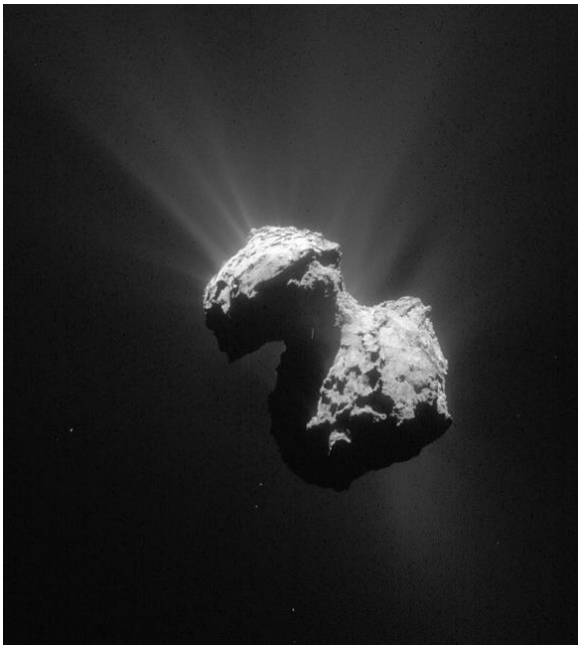
Rosetta and Philae
A unique science adventure

The Rosetta spacecraft escorting comet 67P/Churyumov-Gerasimenko is set to reach an important and symbolic milestone during the night of Wednesday 12 to Thursday 13 August, when the comet passes perihelion, the closest point on its orbit to the Sun. While waiting for the next attempt to regain contact with the Philae lander, time to look back at some of the highlights of a unique scientific adventure.



Comet Churyumov-Gerasimenko pictured by NAVCAM – July 2015

Comet 67P/Churyumov-Gerasimenko will reach the point on its elliptical orbit nearest the Sun during the night of Wednesday 12 to Thursday 13 August. The Rosetta spacecraft has been surveying the comet close-up since 6 August 2014, while the Philae lander touched down on its surface on 12 November 2014. For over one year now, the two celestial objects—one natural, one man-made—have been hurtling through space at a speed of nearly 120,000 km/h, every week bringing new insights into the origins of the Solar System and life on Earth.

Rosetta and its comet are currently 265 million km from Earth, just 186 million km from the Sun. Viewing the latest pictures of the comet's nucleus, which reveal its intense activity, it seems hard to believe that a little over a year ago, in Rosetta's eyes 67P/Churyumov-Gerasimenko was just a speck in the vast expanse of the cosmos. We had to wait until late June 2014 for the sensor of the OSIRIS-NAC camera developed by the LAM astrophysics laboratory in Marseille to begin resolving the nucleus. On 14 July 2014, the comet finally revealed its unique double-lobed shape. Less than one month later, on 6 August, Rosetta was placed onto an escort trajectory and the first high-resolution pictures of the nucleus' chaotic surface burst onto screens the world over.

Once a landing site for Philae had been selected that summer and increasingly detailed pictures of the nucleus began streaming in shortly afterwards, the 'big day' on 12 November 2014 was soon upon us. Following a seven-hour descent and several bounces on landing, Philae finally came to rest on the comet's surface. For the mission engineers and scientists, the time to savour this outstanding scientific and human achievement was short-lived. Although teams at the Science Operations and Navigation Centre (SONC) at CNES's field centre in Toulouse had only two days to operate the lander's 10 instruments, they were well prepared, having worked hard in the months leading up to the landing to be ready to locate the landing point, determine Philae's orientation and build numerous scenarios (batteries fully or partly charged, with full or partial power from the solar panels, etc.). After an initial phase lasting 60 hours, Philae's science mission had to be halted as power ran out. Lying in the shadow of a cliff in the comet's northern hemisphere with little sunlight, the lander hunkered down to endure seven months of winter.

From 26 April 2015, Philae began waking up automatically every day on the comet, twice daily on Earth. Initially, it was only generating enough power to warm up and charge its batteries, but not to send back data. And since March, the comet's activity had been constantly building up, forcing Rosetta to back off from 30 km to 300 km. On 13 June, with Rosetta between 170 km and 200 km from the comet, contact was restored with the lander during a series of windows lasting a few minutes, but not for long enough to resume science activities. After establishing a good link on 9 July, Rosetta had to back away from the comet again. But all hope of communicating with Philae and getting its scientific instruments working again is not lost.

"With the increased amounts of material outgassing from the nucleus as the comet passes perihelion, the levels of dust are confusing Rosetta's star trackers," explains Philippe Gaudon, Rosetta project leader at CNES. "The only way to keep the orbiter safe is to move it further away from the nucleus where there's less dust." During the first two weeks of July, Rosetta was still only 150 km from the nucleus, so it was able to get a good signal on 9 July. Since then, it has had to move to 170 km, 190 km and even beyond 200 km from the nucleus, and is today at a safe distance of 300 km as the comet's activity peaks. "Of course, we're still listening out for Philae, but we don't think it will be possible to communicate with it from this far away, barring a miracle!" says Gaudon. "On the other hand, we hope to get closer to the nucleus by mid-September, if everything goes to plan. We estimate that Philae won't be generating enough power to function by the end of November, so October is going to be a race against the clock to attempt to regain contact!"

While Philae was going through all of these trials and tribulations, the mission of the orbiter's instruments continued unchecked. Over the 12 months spent in close proximity to the comet, they have collected a wealth of data. Never has a comet's nucleus been observed so close and for so long during the build-up of activity as it approaches the Sun. Articles already published in international science reviews only draw on data gathered during the first months escorting the comet and from Philae. More articles are set to appear in the months and years ahead, such is the depth of data obtained.

Further opportunities to penetrate the cloak of secrecy surrounding the comet's composition could arise with the peak in activity as it passes perihelion. Scientists are hoping that the powerful gas jets produced by the intense heat will catch some of the organic particles left behind from the formation of the Solar System and trapped inside its ice for 4.6 billion years.

Comet 67P/Churyumov-Gerasimenko is currently between the orbits of Mars and Earth. Outgassing from the nucleus is expected to reach a maximum in the next few days, just after perihelion. During the post-perihelion period ahead, Rosetta will be moving further away from the nucleus to a distance of 1,000 km in order to analyse the make-up of the comet's tail while it is still dense and well-formed.

This November, one year after Philae's landing, the comet will be passing beyond the orbit of Mars, and in September 2016 it will be close to the orbit of Jupiter. During the last three months of the mission, from July to September 2016, Rosetta plans to spiral gradually down toward the comet's surface before ending its extraordinary adventure by landing on the nucleus.

More informations on Rosetta :

rosetta.cnes.fr

Contacts

Pascale Bresson	Tel. +33 (0)1 44 76 75 39	pascale.bresson@cnes.fr
Alain Delrieu	Tel. +33 (0)1 44 76 74 04	alain.delrieu@cnes.fr
Julien Watelet	Tel. +33 (0)1 44 76 78 37	julien.watelet@cnes.fr

cnes.fr/presse