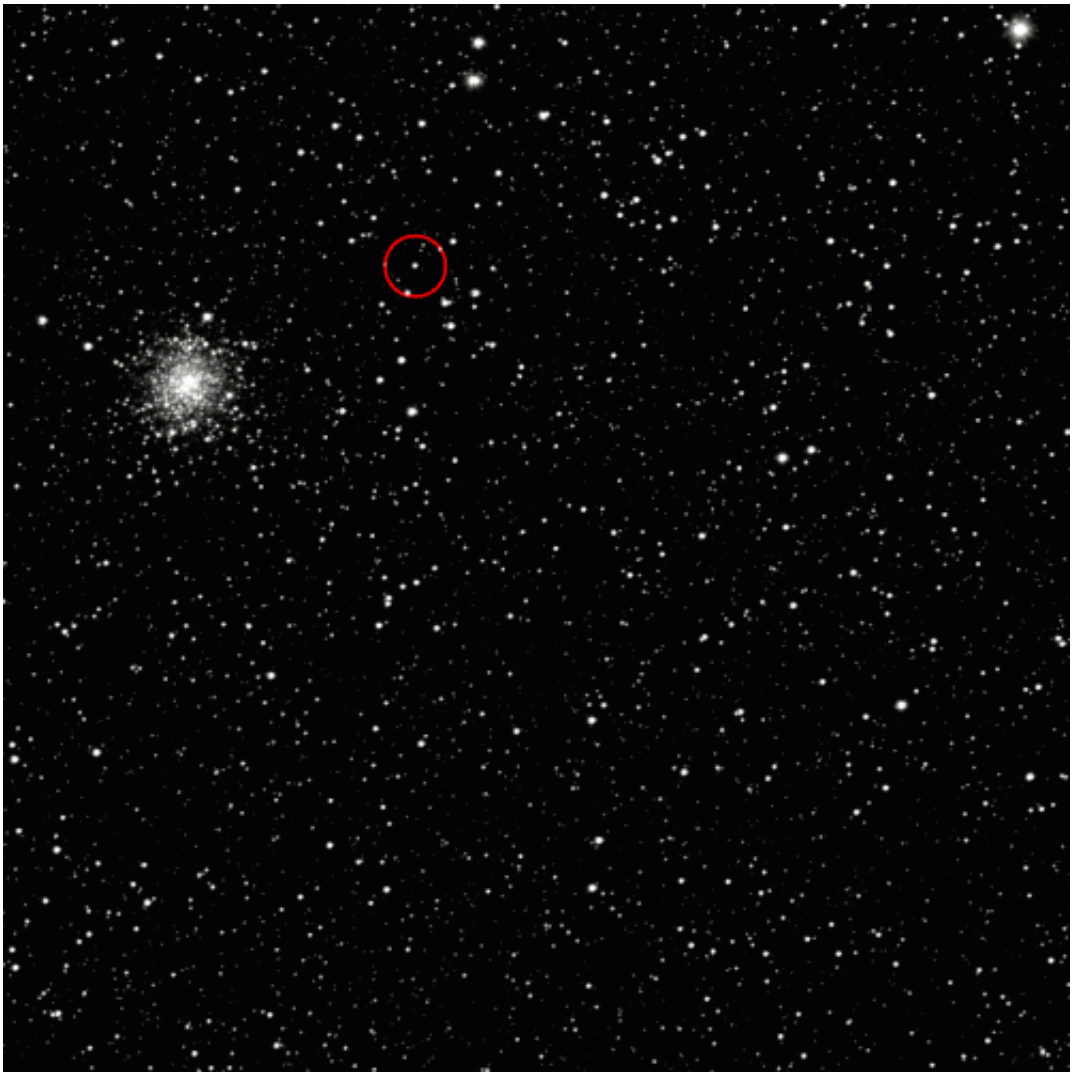
Rosetta's target comet is becoming active

May 15 2014



A sequence of images showing comet 67P/Churyumov–Gerasimenko moving against a background star field in the constellation Ophiuchus between 27 March and 4 May 2014, as the distance between the spacecraft and comet closed from around 5 million to 2 million kilometres. The comet (and Rosetta) were between 640 million km and 610 million km from the Sun during the sequence. The comet is seen to develop a dust coma as the sequence progresses, with clear

activity already visible in late-April. Exposure times are 720 seconds for each image, taken with the OSIRIS Narrow Angle Camera. The globular cluster M107 is also clearly visible in the field of view. Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

(Phys.org) —The target of ESA's Rosetta mission has started to reveal its true personality as a comet, its dusty veil clearly developing over the last six weeks.

The sequence of images presented here of comet 67P/Churyumov-Gerasimenko were taken between 27 March and 4 May, as the gap between craft and comet closed from around 5 million km to 2 million km.

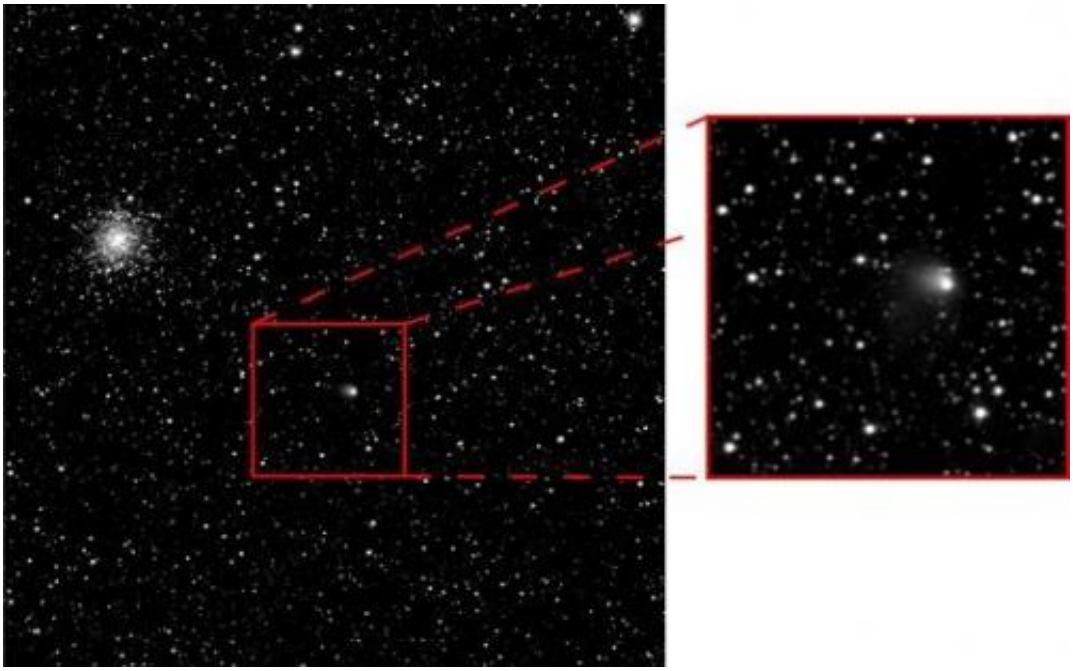
By the end of the sequence, the comet's dusty veil—the 'coma'—extends some 1,300 km into space. By comparison, the nucleus is roughly only 4 km across, and cannot yet be 'resolved.'

The coma has developed as a result of the comet moving progressively closer to the Sun along its 6.5 year orbit. Even though it is still more than 600 million km from the Sun—more than four times the distance between Earth and Sun—its surface has already started to warm, causing its surface ices to sublimate and gas to escape from its rock-ice nucleus. As the gas escapes, it also carries a cloud of tiny dust particles out into space, which slowly expands to create the coma.

As the comet continues to move closer to the Sun, the warming continues and activity rises, and pressure from the solar wind will eventually cause some of the material to stream out into a long tail.

Rosetta and the comet will be closest to the Sun in August 2015, between

the orbits of Earth and Mars.



On April 30th, the comet's coma extended over 1300 km from the nucleus. For the close up view on the right, a long sequence of images (each with a 10 minute exposure) was taken and stacked. The left panel shows the comet against the star field, covering the same area as figure 1. ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

The onset of activity now offers scientists the opportunity to study dust production and structures within the coma before getting much closer.

"It's beginning to look like a real comet," says Holger Sierks, principal investigator for OSIRIS, the Optical, Spectroscopic and Infrared Remote Imaging System, at the Max Planck Institute for Solar System Research, Germany.

"It's hard to believe that only a few months from now, Rosetta will be

deep inside this cloud of dust and en route to the origin of the comet's activity."

In addition, tracking the periodic changes in brightness reveals the nucleus is rotating every 12.4 hours—about 20 minutes shorter than previously thought.

"These early observations are helping us to develop models of the comet that will be essential to help us navigate around it once we get closer," says Sylvain Lodiot, ESA Rosetta spacecraft operations manager.

OSIRIS and the spacecraft's dedicated navigation cameras have been regularly acquiring images to help determine Rosetta's exact trajectory relative to the comet. Using this information, the spacecraft has already started a series of maneuvers that will slowly bring it in line with the comet before making its rendezvous in the first week of August.

Detailed scientific observations will then help to find the best location on the comet for the Philae lander's descent to the surface in November.

The images shown here were taken during a six-week period that saw the orbiter's 11 science experiments and the lander and its 10 instruments switched back on and checked out after more than 2.5 years of hibernation.

Earlier this week, a formal review brought these commissioning activities to a close, giving the official 'go' for routine science operations.

"We have a challenging three months ahead of us as we navigate closer to the comet, but after a 10-year journey it's great to be able to say that our spacecraft is ready to conduct unique science at comet 67P/C-G," says Fred Jansen, ESA's Rosetta mission manager.

Provided by European Space Agency