Rosetta and Philae – target comet becomes active

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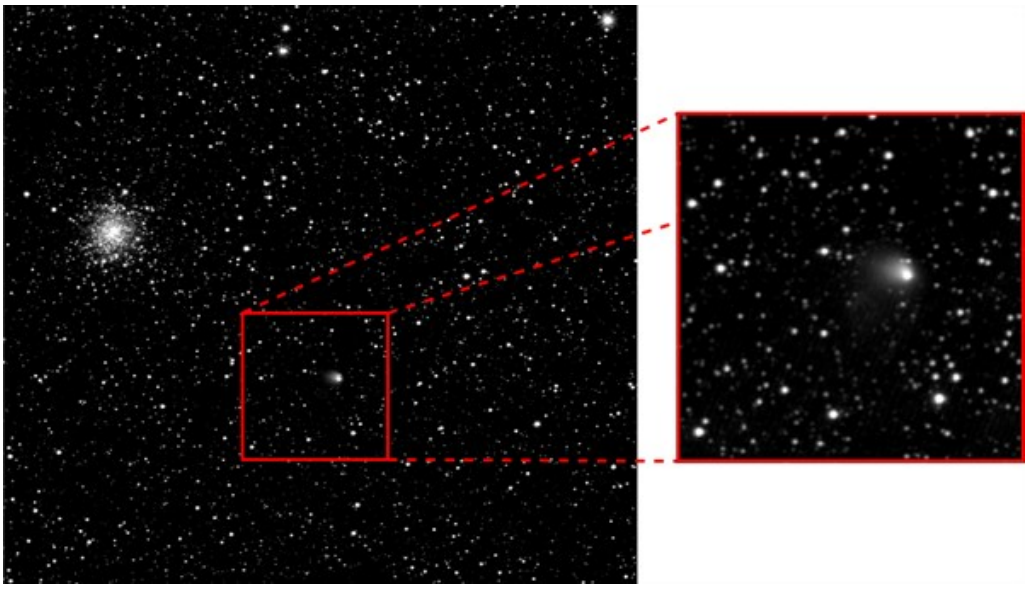
The European Space Agency (ESA) Rosetta spacecraft and its lander Philae are currently around two million kilometres from their target comet, 67P/Churyumov-Gerasimenko. Even at this distance, images acquired by the OSIRIS (Optical, Spectroscopic and Infrared Remote Imaging System) camera system already show the comet awakening on its way towards the Sun, enveloped in a cloud of small dust particles. Using these observations, the OSIRIS science team, which includes planetary researchers from the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), have been able to determine the comet's rotation period with additional precision – 12.4 hours. In August, Rosetta will arrive at the comet, and will deploy the Philae lander onto the comet's surface in November – the first ever landing on a comet.

The sequence of images acquired by the OSIRIS camera system between 24 March and 4 May, during the flight towards Churyumov-Gerasimenko, reveal the expansion of the comet's dusty veil, or coma. Although 67P is still more than 600 million kilometres from the Sun, its surface has already started to warm up, and, as a result, volatiles have begun to evaporate from its surface, carrying tiny dust particles with them. The images acquired in early May show that the comet's gas and dust cloud has reached approximately 1300 kilometres into space. The comet nucleus has a diameter of about four kilometres. "It's beginning to look like a real comet," says Holger Sierks from the Max Planck Institute for Solar System Research (Max-Planck-Institut für Sonnensystemforschung; MPS), the OSIRIS Principal Investigator.



This image, acquired by the OSIRIS camera system on 30 April 2014, shows Comet 67P/Churyumov-Gerasimenko. The target of the Rosetta comet mission has a dust cloud formed around it, which stretches up to 1300 kilometres into space.

Unveiling the unknown

The OSIRIS team also revealed a new fact. Until now, comet researchers believed the rotation period of Churyumov-Gerasimenko to be 12.7 hours. Through observation and analysis of the changes in brightness of the comet, the research team was able to determine that the comet only takes 12.4 hours to rotate around its axis. "Knowing the exact rotation period of the comet is of vital importance, both for the optimal planning of the mission and scientific data gathering

and for the interpretation of the acquired data," said Stefano Mottola, who studies comets at the DLR Institute of Planetary Research and is a member of the OSIRIS team.

Any information obtained during the approach to the comet also helps to plan the manoeuvres required for the Rosetta spacecraft to enter orbit around the comet and the landing by Philae. One thing is certain – with the awakening of the comet, Rosetta and Philae will be able to study its coma and tail. The first manoeuvre to prepare the probe for its rendezvous with Churyumov-Gerasimenko in August has already been carried out. This week, the engineers and scientists were also able to breathe again – all the instruments on the spacecraft and lander have survived two and a half years of hibernation during their journey through space – they have all passed their 'Health Check'. Eleven instruments are being carried on board the Rosetta orbiter and ten scientific experiments on the lander. For the first time ever, measurements will be conducted directly on the surface of a comet.

About the mission

Rosetta is a European Space Agency mission with contributions from its Member States and NASA. Rosetta's Philae lander has been contributed by a consortium led by DLR, MPS, the French space agency, CNES (Centre National d'Études Spatiales), and the Italian space agency, ASI (Agenzia Spaziale Italiana).

The OSIRIS camera system was developed by a consortium under the leadership of MPS (Germany) in cooperation with the Center of Studies and Activities in Space (Centro Interdipartimentale di Studi e Attività Spaziali; CISAS) at the University of Padua (Italy), the Laboratoire d'Astrophysique de Marseille (LAM) at Aix-Marseille University (France), the Andalusian Institute of Astrophysics (Instituto de Astrofísica de Andalucía) of the Spanish National Research Council (Consejo Superior de Investigaciones Científicas; CSIC), the ESA Scientific Support Office, the Spanish National Institute for Aerospace Technology (Instituto Nacional de Técnica Aeroespacial; INTA), the Technical University of Madrid (Spain), the Department of Physics and Astronomy at Uppsala University (Sweden), and the Institute of Computer and Network Engineering the Technical University of Braunschweig (Germany). OSIRIS has been financially supported by the national agencies of Germany (DLR), France (CNES), Italy (ASI), Spain (MEC) and Sweden (SNSB), and by ESA's Technical Directorate.

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Comet 67P/Churyumov-Gerasimenko

Acquired by the OSIRIS camera system on board ESA's Rosetta spacecraft, this series of images shows Comet 67P/Churyumov-Gerasimenko in the period from 24 March to 4 May 2014. During this time, the spacecraft has moved closer to the target comet, which it will reach in August 2014 – reducing the distance from five to two million kilometres. In November 2014, the Philae lander will touch down on the comet and perform measurements with its instruments. The images from the OSIRIS camera system reveal that the comet began outgassing in April, during its journey towards the Sun, and it is now surrounded by a growing cloud of dust particles.

Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA.