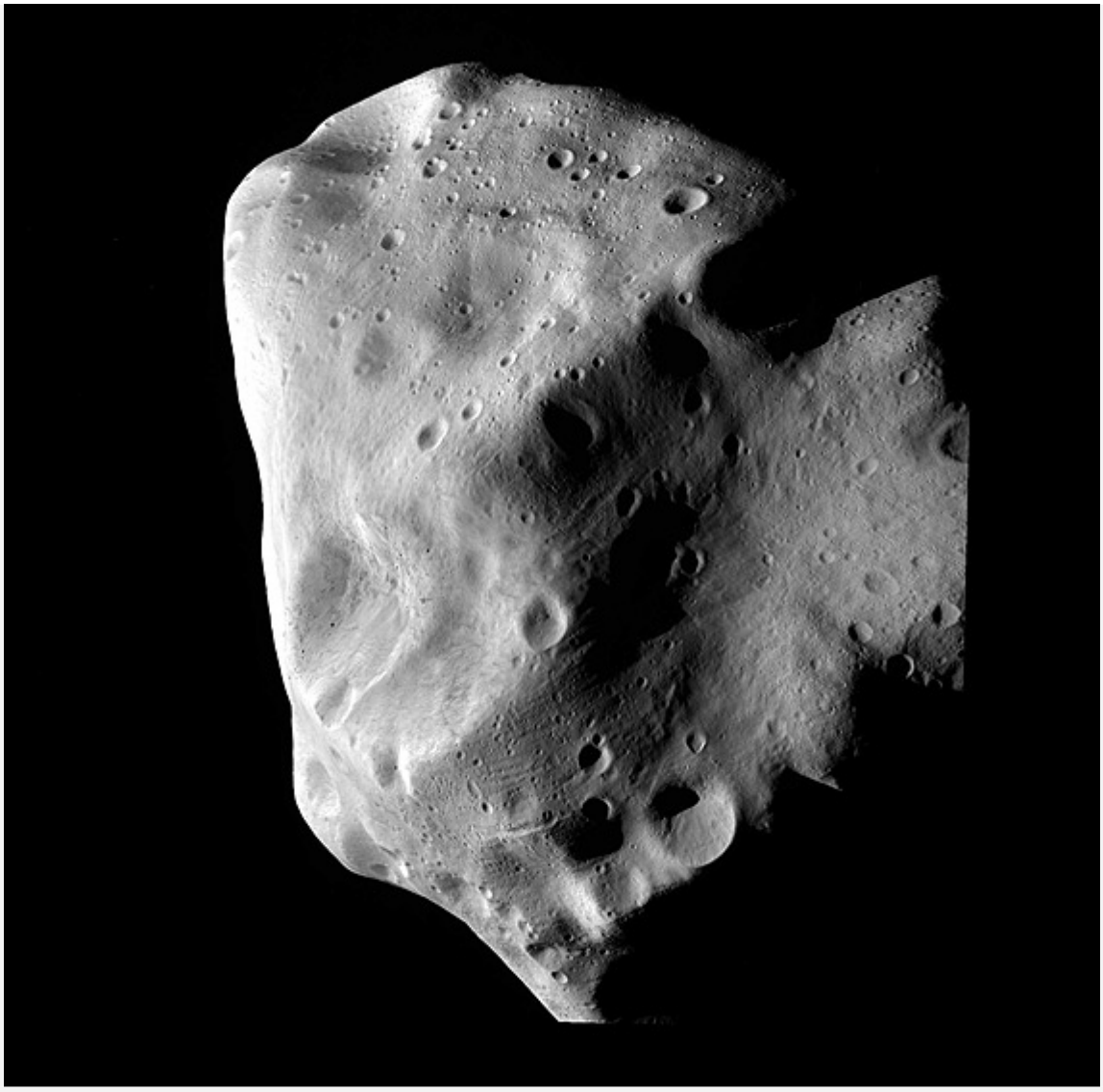
News-Archiv

Rosetta spacecraft returns unique glimpses of asteroid Lutetia

10 July 2010

DLR scientists participate in a unique mission



Lutetia as seen from Rosetta

The European Rosetta spacecraft has achieved a further milestone on its journey to the comet Churyumov-Gerasimenko. On 10 July 2010 at 17:45 CEST, the orbiter flew past asteroid Lutetia on its second and final pass of the asteroid belt at about 15 kilometres per second – 54,000 kilometres per hour – merely 3162 kilometres from the asteroid. The confirmation was delivered at 18:10 CEST to

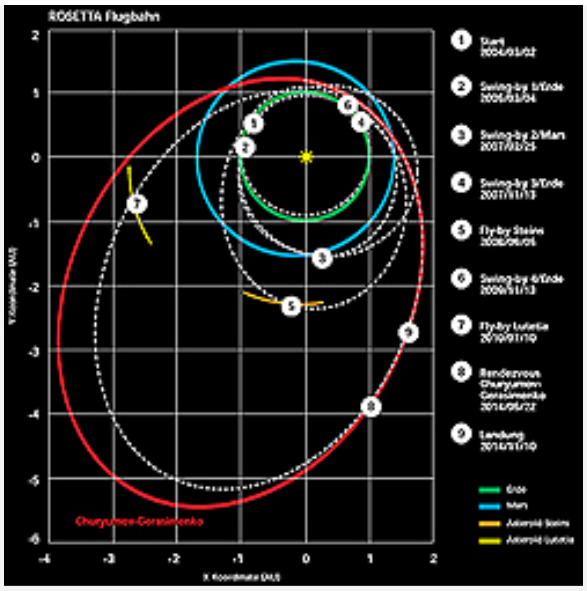
ESA's European Space Operations Centre in Darmstadt. The German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) is participating in this unique mission.

Lutetia image sequence before closest approach

The spacecraft’s fly-by of 21 Lutetia offered the unique scientific opportunity to examine the size, surface structure and rotational characteristics of this relatively large, but unexplored asteroid from close range. "The high resolution images and spectrometer measurements taken from various angles will provide clues to the age, mineralogical and geochemical composition and geological history of Lutetia," explains Dr. Ekkehard Kührt of the DLR Institute of Planetary Research, coordinator of DLR's scientific participation in Rosetta. "The flyby was a choice opportunity to test all the orbiter's instruments and several of the lander's experiments ahead of arrival at the comet in 2014," adds Kührt.

Beginning July 2011, Rosetta will enter hibernation for roughly 2.5 years. The orbiter will awake again in January 2014 to prepare for the arrival at Churyumov-Gerasimenko in May 2014. The spacecraft flew by an asteroid for the first time in September 2008 when it closed in on Šteins. Examination of the small bodies of the Solar System - of which asteroids Lutetia und Šteins are two – has delivered important information regarding the earliest periods of the Solar System. 21 Lutetia, with a diameter of about 100 kilometres, is substantially larger than 2867 Šteins, which is five kilometres in diameter.

DLR scientists are involved in several experiments on Rosetta, particularly the OSIRIS imaging system hat was used to observe Lutetia with a resolution of up to 50 metres per pixel, the Visible and Infrared Thermal Imaging Spectrometer (VIRTIS) used to gauge the composition and temperature of the asteroid's surface and the RPC instruments investigating the plasma environment and possible magnetic field of the asteroid.



Rosetta's route through the inner Solar System

"Even from a distance of 500,000 km we could see that Lutetia is a remarkable asteroid with a very irregular shape. But it was only when the OSIRIS imaging system took its best images, from about 3000 km away, that we realized the beauty of this object," remarked Dr Stefano Mottola, DLR planetary researcher in the OSIRIS team, following successful transmission of the first data. He and his colleagues from the Max Planck Institute for Solar System Research (Max-Planck-Institut für Sonnensystemforschung; MPS) in Katlenburg-Lindau analysed this data during the night between 10 and 11 July 2010. "Lutetia's surface is laced with big craters, ridges and landslides, which indicates a history of massive events. On its surface we see rocks several hundred meters in size. The great quality of the science data allows us scientists to better understand the processes the create these phenomena," added Mottola. The OSIRIS imaging system was commissioned by the DLR Space Agency and developed by MPS in collaboration with European partners. It imaged the asteroid before, during and after closest approach.

At the moment of closest approach, Lutetia was about 407 million kilometres from the Sun and 455 million kilometres from Earth. Following the flyby, the data signals transmitted by the spacecraft had travelled for more than 25 minutes before they were received here on Earth.

The data collected by VIRTIS has also been transmitted to Earth. "Our team started evaluation of the data straight away," reports Dr Gabriele Arnold, the DLR researcher co-ordinating the German contribution to VIRTIS. In contrast to the images captured, the spectral data that had been acquired, in visible and infrared light at a wavelength of up to five micrometres, is harder to interpret because a detailed evaluation requires time.

Rosetta orbiting the comet with Philae in view

In addition to managing the Rosetta Lander Imaging System (ROLIS) for observation of the comet's surface during the landing phase, the Surface Electrical, Seismic and Acoustic Monitoring Experiments (SESAME) and the Multi-Purpose Sensors for Surface and Subsurface Science (MUPUS) that will gauge the comet's surface temperature and consistency, DLR planetary researchers in Berlin are involved in the scientific analysis of the Rosetta Lander Magnetometer and Plasma Monitor (ROMAP) as well as the Cometary Sampling and Composition Experiment (COSAC). The latter also analysed the chemical composition of the frozen surface down to a depth of 20 centimetres.

The DLR Microgravity User Support Center (MUSC) in Cologne is responsible for the Philae lander. DLR will deploy Philae on to the surface of Churyumov-Gerasimenko in November 2014. MUSC researchers have been testing and calibrating the payload regularly since Rosetta's launch on 2 March 2004 to ensure its operational readiness. Thus those responsible for Philae have prepared in advance, on 7 July, for the activities planned for the flyby. The lander was placed under a special thermal configuration as it was directly illuminated by the Sun. Three of the ten instruments on Philae were also active during the Lutetia flyby.

Contact

Elisabeth Mittelbach
German Aerospace Center
Space Administration, Strategy and Communications
Tel: +49 228 447-385
Fax: +49 228 447-386
E-Mail: Elisabeth.Mittelbach@dlr.de

Dr.rer.nat. Ekkehard Kührt
German Aerospace Center
Institute of Planetary Research, Asteroids and Comets
E-Mail: Ekkehard.Kuehrt@dlr.de

Dr. Stephan Ulamec
German Aerospace Center
Space Operations and Astronaut Training
Tel: +49 2203 601-4567
E-Mail: Stephan.Ulamec@dlr.de
