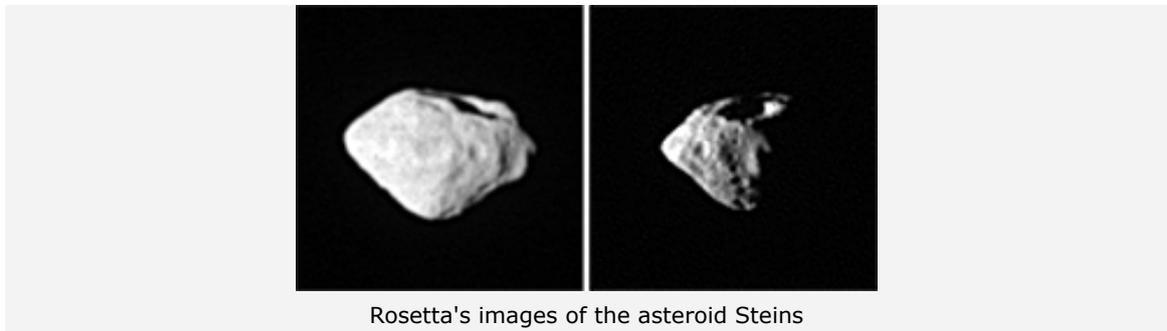


News-Archiv

A perfect manoeuvre at the limit: Rosetta flies by asteroid Steins at a distance of just 800 kilometres

6 September 2008

DLR scientists involved in many experiments



Rosetta's images of the asteroid Steins

For the first time ever, a European space probe has performed a flyby of an asteroid. At 22:14 Central European Summer Time (CEST), the European Space Agency (ESA) control centre in Darmstadt received the first signals from its Rosetta space probe via NASA's 70-metre antenna in Goldstone (California). Exactly as planned, the space probe flew by Steins at a speed of 31 000 kilometres per hour relative to this small rock in the asteroid belt. Before the end of the evening, and before the start of the data transmission, ESA was able to announce that the flyby manoeuvre had been a complete success. The experiment creates very interesting new opportunities for the scientists of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). "The first images which we were already able to analyse in the few hours since the data transmission show that Steins has a very irregular shape and is littered with many impact craters", according to enthusiastic DLR scientist Dr Ekkehard Kührt, who is involved in Rosetta's camera experiment.

Asteroid Steins - initial predictions have been confirmed

"According to preliminary analysis, Steins has a diameter of 4.6 kilometres", says Dr Kührt. "This roughly confirms the predictions we had made based on observations from Earth", he adds. Because Steins is an example of a very rare type of asteroid which was chipped off a larger planetoid in a large cosmic collision in the young Solar System, a few billion years ago, the scientists are very eagerly awaiting detailed analysis of the images and the measurement data of the experiments. "This will take several more weeks and even months, however", says Dr Kührt. DLR scientists are involved in several experiments on board Rosetta, including the OSIRIS camera system and the VIRTIS spectrometer, which plays an important role in analysing the mineralogical composition of the asteroid's surface. "Perhaps this will allow us to establish whether Steins does indeed have a volcanic past as part of a body which was much larger at the time", Kührt adds.

Remarkable impact craters on Steins

The OSIRIS camera on board Rosetta was developed with support of the DLR Space Agency (DLR Raumfahrt-Agentur) and under the direction of Dr Horst Uwe Keller by the Max Planck Institute for Solar System Research (Max-Planck-Institut für Sonnensystemforschung) in Katlenburg-Lindau. After preliminary analysis of the images which have already been transmitted, the researcher states: "One thing which immediately stands out is an impact crater one and a half to two kilometres in diameter, almost half that of the asteroid as a whole - it's amazing that this small body was able to survive the impact at the time. The asteroid is probably fractured through and through. Another striking

phenomenon is a chain of small, aligned impact craters. We have not yet seen anything like it on other asteroids."

Precision work by spaceflight engineers



ESA's Rosetta space probe (artist's impression)

ESA's spaceflight engineers have prepared the flyby with great precision, pushing the space probe to the limits of its technological capacity. In August, the small asteroid was observed using several hundreds of images recorded by Rosetta's star-tracker navigational camera and OSIRIS camera system, and its orbit and exact position at the time of the rendezvous in space were calculated. This allowed the probe to be orientated towards Steins so accurately that only two small corrective manoeuvres were necessary during the last month.

Shortly before the flyby, the space probe was completely turned around in a quick manoeuvre. It then entered the pre-programmed flyby mode, with fully automatic navigation by the navigational camera. Between 20:47 and 22:14 (CEST), no radio contact was possible between Rosetta and Earth. The scientists and engineers were therefore very relieved when the first signals were received exactly at the scheduled time. On Friday, the space probe was at a distance of 365 million kilometres from Earth, which means that signals from Rosetta needed to travel through space for twenty minutes before reaching Earth. Data transmission started at 2:00 (CEST) in the morning of 6 September 2008 and is still ongoing. Rosetta is now on the way to the comet Churyumov-Gerasimenko, which it will reach in 2014. The manoeuvre near Steins was the seventh-closest flyby of an asteroid in the history of space exploration.

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