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Author: Dr. Rita Schulz
European Space Agency (ESA), The Netherlands

THE ROSETTA MISSION – HOW TO EXPLORE SOLAR SYSTEM FORMATION

Abstract

ESA's Planetary Cornerstone Mission Rosetta is a rendezvous mission with a comet nucleus combining an Orbiter with a Lander. Rosetta is on its way to meet Jupiter-family comet 67P/Churyumov-Gerasimenko in 2014. It will go in orbit around the comet nucleus when it is still far away from the Sun, and escort it for more than a year along its pre- and post-perihelion orbit. With the 11 scientific instruments on board the Orbiter, Rosetta will investigate the nucleus and the cometary atmosphere (coma) as well as their evolution as a function of increasing and decreasing solar flux input. Moreover, the Lander Philae will get down onto the surface of the comet nucleus at a time when it is still at a low state of activity, and analyse comet nucleus material in-situ with the 10 instruments on board. Rosetta was launched with an Ariane-5 from Kourou / French Guiana on 2 March 2004, and has already successfully completed all four gravity assists (3 at Earth and 1 at Mars) that were necessary to acquire sufficient orbital energy for being able to rendezvous with its target comet and go in orbit around the nucleus. After the second and third Earth gravity assist Rosetta performed close fly-bys at main-belt asteroids. On 5 September 2008 the spacecraft flew by the 5-km sized asteroid (2867) Steins at a distance of 802.6 km, and on 10 July 2010 it passed its main asteroid target, the 100-km sized asteroid (21) Lutetia, at a distance of 3162 km. The spacecraft is now moving into the outer solar system to rendezvous with its target comet at a heliocentric distance of about 4.5 AU. An overview of the Rosetta mission and of the results of the two asteroid fly-bys will be given.