SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (4)

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ROSETTA MISSION TO COMET 67P/CHURYUMOV-GERASIMENKO

Abstract

Late in 2014, the European Space Agency (ESA) will place the Rosetta spacecraft in orbit around comet 67P/Churyumov-Gerasimenko and deliver a lander (called 'Philae') to the comet's surface. This exciting mission is the third of ESA's cornerstone missions within its Horizon 2000 science program. Science objectives of the Rosetta mission include the manner in which a comet nucleus heats and becomes active, the chemistry, evolution and dynamics of the coma, the relationship between cometary and interstellar material, and strides toward understanding the origin and evolution of the solar system. The mission includes such detailed scientific studies as: chemical /mineralogical analyses, surface morphology studies, gas/dust interactions. Following the rendezvous and the Lander mission, the Rosetta Orbiter will escort the comet through perihelion, outbound to 2.0 AU. The following is a brief recap of the mission. Launched from the Guiana Space Centre on 2 March 2004 in an Earth-escape trajectory, Rosetta executed a complicated set of gravity assists to accumulate the delta-V needed to match the spacecraft's heliocentric orbit with that of the comet. Those maneuvers included Earth swing-bys in March 2005, November 2007, and November 2009, and a Mars swing-by in February 2007. This trajectory provided for flybys and science opportunities at asteroid 2867 Steins in 2008 and asteroid 21 Lutetia in 2010. The present mission plan calls for delivery of the Lander on 11 November 2014. Instruments bolted to the orbiter include Alice, COSIMA, CONSERT (orbiter), GIADA, MIDAS, MIRO, OSIRIS, ROSINA, RPC, SREM, and VIRTIS. Instruments mounted on the Philae lander include: APXS, CIVA, COSAC, CONSERT (lander), MUPUS, PTOLEMY, ROLIS, ROMAP, SD2, and SESAME. These instruments collectively are capable of providing surface morphology studies, compositional information including temporal and spatial distributions, important atomic and molecular species in the coma and nucleus; they provide thermo-physical information, including dielectric, magnetic, thermal inertia and conductivity properties; they provide for optical and spectral properties at a variety of wavelengths, and they provide for radio science, and radiation environment studies. In this paper, presented on the eve of the mission's arrival at its target, we expect to present first reconnaissance results, as well as they are known at the time of the meeting. Rosetta is an ESA Mission with instruments funded by the ESA member states and NASA.