

SPACE EXPLORATION SYMPOSIUM (A3)  
Small Bodies Missions and Technologies (Part 1) (4A)

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## THE OPERATIONS LEGACY OF THE ROSETTA MISSION

**Abstract**

The International Rosetta Mission was launched on 2nd March 2004 on its 10 year journey to rendezvous with comet 67P Churyumov-Gerasimenko, reached on 6th August 2014. In November 2014 Rosetta delivered the lander Philae to perform the first soft landing ever on the surface of a comet. After this critical operation Rosetta escorted the comet throughout its orbit around the Sun, passing the perihelion in August 2015, observing and measuring the comet and its environment's evolution during a large part of the orbital lifetime. On 30 September 2016, after a final series of very close orbits down to 2 km altitude, the mission was terminated by "landing" the Rosetta spacecraft onto the surface.

The Rosetta mission has been a first in the history of spaceflight for many aspects, most of which involving the design and implementation of completely new operational approaches, techniques and support tools, for instance: reaching Jupiter distances from the Sun with solar panels; undergoing a long hibernation of 2.5 years before the start of the main operational phase; performing a rendezvous with a comet, orbiting it for 2 years down to distances of 2 km from the surface; ballistically delivering a lander onto the comet's surface. The amount of know-how and experience the implementation of this unique mission has generated in the operations teams is enormous and precious for future exploration of the solar system.

This paper summarises the experience gained during the 20 years that have seen the initial mission operations preparation and ground segment design work, the implementation and testing activities, the flight operations in cruise and in the exciting last 2 years of the mission, when the spacecraft had to face the unknown comet environment and perform its main scientific mission. Emphasis will be on those lessons learned, - whether related to the spacecraft design, ground systems or planning and operations approaches - which are considered as directly applicable to future interplanetary missions to small bodies like comet and asteroids.