

50th IAA HISTORY OF ASTRONAUTICS SYMPOSIUM (E4)  
Scientific & technical histories (2)

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ROSETTA: 27 YEARS OF MISSION EVOLUTION FROM FIRST FEASIBILITY CONCEPTS TO  
FINAL IMPACT ON THE COMET**Abstract**

The Rosetta mission for cometary exploration required, like most planetary missions, a significant period of time including many adaptations of the original plan until it arrived at its target and completed the mission objectives 2016. This contribution addresses the evolution of mission objectives, spacecraft design and target comet.

The author was already involved from early system definition studies for the “Comet Nucleus Sample Return (CNSR)” in 1989. The mission was first planned as joint mission by ESA/NASA, landing the complete spacecraft on the comet in order to enable drilling and sampling to a depth of 3 m. The acquired comet materials were stored in a return capsule to transfer them to Earth for detailed analyses in laboratories.

After withdrawal of NASA from this mission, the nuclear batteries were missing and there followed an ESA-Mission with the payloads Champollion / RoLand to land on the comet, while the core spacecraft Rosetta focussed on remote observations. Later only one lander fitted into the mass budgets and thus the Rosetta/Philae mission materialized. After the Ariane-5 maiden flight failure, the target comet had to be changed from 46P/Wirtanen to 67P/Churyumov-Gerasimenko with significant impact on the approach trajectory.

After an interplanetary transfer of 8 years including several flybys at Earth, Venus and Mars Rosetta finally arrived in in 2014 at the comet and inserted in an orbit around the comet. After a period of near range observations in November 2014 the Lander Philae settled on the surface of comet P67 Churyumov-Gerasimenko. In August 2015 the perihel passage offered near range observation of the most active phase of the comet. Finally in September 2016 the Rosetta spacecraft will attempt a controlled impact on the cometary surface.

This contribution will emphasize the mission and spacecraft design evolution during this 27 years period. It will in particular address the technology challenges and the solution approaches of the related changes during this very long mission preparation and operations period.