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Author: Mr. Andrea Accomazzo
European Space Agency (ESA), Germany

Dr. Paolo Ferri
European Space Agency (ESA), Germany
Mr. Sylvain Lodiot
European Space Agency (ESA), Germany
Mr. Jose-Luis Pellon-Bailon
European Space Agency (ESA), Germany
Ms. Armelle Hubault
Telespazio VEGA Deutschland GmbH, Germany
Mr. Roberto Porta
Telespazio VEGA Deutschland GmbH, Germany
Mr. Ritchie Kay
LSE Space GmbH, Germany
Mr. Jakub Urbanek
Telespazio VEGA Deutschland GmbH, Germany
Mr. Matthias Eiblmaier
SCISYS Deutschland GmbH, Germany
Mr. Tiago Francisco
Telespazio VEGA Deutschland GmbH, Germany

ROSETTA - FOLLOWING A LIVING COMET

Abstract

The International Rosetta Mission was launched on 2nd March 2004 on its 10 year journey to rendezvous with comet 67P Churyumov-Gerasimenko. Rosetta performed comet orbit insertion on the 6th of August 2014, after which Rosetta characterised the nucleus and orbited it at altitudes as low as a few kilometres. In November 2014 Rosetta delivered the lander Philae to perform the first soft landing ever on the surface of a comet. The critical landing operations have been conducted with remarkable accuracy and will constitute one of the most important achievements in the history of spaceflight. After this critical operation, Rosetta began the escort phase of the comet on its journey in the Solar System, heading to the perihelion, to be reached in August 2015. Throughout this period, the comet environment will keep changing with increasing gas and dust emissions. The spacecraft and its flight plan will have to cope with this changing environment and operations will have to be adapted accordingly. A first phase of bound orbits was followed by a sequence of complex flyby segments which allowed the scientific complement to perform in depth investigation of the comet environment and nucleus. The unpredictable nature of the comet activity forces the mission control team to consider unplanned changes to the flight plan prepared for this mission phase and at the same time a fall-back plan, should the activity exceed the limits affordable for flight operations. This paper will report the details of the landing operations and of the main comet escort phase. This will include the mission status as achieved after perihelion, the findings about the evolution of the comet and its environment from a mission operations point of view. The details of the next mission phases, which might include a mission extension into 2016, will also be described.