

SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

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PHILAE : SCIENCE SCHEDULING AND UNDETERMINED CONTEXT; LESSONS LEARNED

Abstract

Rosetta is an ambitious mission launched in 2004 to study the nucleus as well as the coma of the comet 67P/Churyumov-Gerasimenko. An intense observation phase of “Chury” started last summer with the Rosetta probe to select a landing site for the Lander Philae. Then in November 2014, Philae was the first human device to land on a comet nucleus. Once on the comet, the lander has performed its first science sequence which design has been initiated months ago. Philae’s aim is to perform detailed and innovative in-situ investigations on the comet’s surface to characterize the nucleus by performing mechanical chemical and physical investigations on comet surface.

The French space agency (CNES) is contributing to the mission by providing the Science Operation and Navigation Centre (SONC) located in Toulouse. One of its tasks is to schedule and optimize the operational science activities of the 10 lander experiments and then to provide it to the Lander Control Center (LCC) located in DLR Cologne. Nevertheless the specific context of the Rosetta mission made it more complex than for usual spacecraft or landers. Indeed the teams in charge of the Philae activity scheduling have to cope with huge constraints in term of energy, data management, asynchronous processes and co-activities or exclusions between instruments, ...

In addition to these huge constraints it is important to note that the comet, its environment and the landing conditions remained unknown until the delivery time and that the landing site was selected a short time before landing once the baseline sequence was already designed. This paper will explain the specific context of the Lander mission and all the constraints that the activity scheduling has to face to fulfill the scientific objectives specified for PHILAE. A specific tool was developed by CNES and used to design the complete sequence of activities on the comet with respect to all the constraints. The baseline scenario designed this way will also be detailed to highlight the difficulties and challenges that the operational team has to face. A specific focus will be done on the landing site selection and the impacts on the science

scheduling. Moreover the operational scenario really performed on the comet will also be detailed and analyzed to deduce the lessons that could be learned from such an operation. Indeed as for every mission of exploration the flexibility concept was anticipated but had to face unexpected events.