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Conference or Workshop Item

Geophysical Research Abstracts
Vol. 16, EGU2014-14877, 2014
EGU General Assembly 2014

The Operational plans for Ptolemy during the Rosetta mission

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Ptolemy is a Gas Chromatography – Isotope Ratio – Mass Spectrometer (GC-IR-MS) instrument within the Philae Lander, part of ESA's Rosetta mission [1]. The primary aim of Ptolemy is to analyse the chemical and isotopic composition of solid comet samples. Samples are collected by the Sampler, Drill and Distribution (SD2) system [2] and placed into ovens for analysis by three instruments on the Lander: COSAC [3], ÇIVA[4] and/or Ptolemy. In the case of Ptolemy, the ovens can be heated with or without oxygen and the evolved gases separated by chemical and GC techniques for isotopic analysis. In addition Ptolemy can measure gaseous (i.e. coma) samples by either directly measuring the ambient environment within the mass spectrometer or by passively trapping onto an adsorbent phase in order to pre-concentrate coma species before desorbing into the mass spectrometer.

At the time of this presentation the Rosetta spacecraft should have come out of hibernation and Ptolemy's Post Hibernation Commissioning phase will have been completed. During the Comet Approach phase of the mission Ptolemy will attempt to measure the coma composition both in sniffing and pre-concentration modes. Previous work has demonstrated that spacecraft outgassing is a significant component of the gaseous environment and highlighted the advantage of obtaining complementary measurements with different instruments [5]. In principle Ptolemy could study the spatial evolution of gases through the coma during the lander's descent to the comet surface, but in practice it is likely that mission resources will need to be fully directed towards ensuring a safe landing.

Once on the surface of the comet the lander begins its First Science Sequence which continues until the primary batteries are exhausted after some 42 hours. SD2 will collect a sample from a depth of $\sim$5cm and deliver it to a Ptolemy high temperature oven which will then be analysed in five temperature steps to determine the carbon isotopic composition of CO, CO_2 and organics; the nitrogen isotopic composition of N2 and organics; and the oxygen isotopic composition of water.

The Long Term Science phase of the lander relies on Solar power and the secondary batteries. There will be intermittent operations of Ptolemy to measure the temporal evolution of the coma gas as the comet activity increases. As sufficient power becomes available Ptolemy can continue with more detailed analyses of further comet samples extracted by SD2.

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[3] Goesmann, F. et al (2007) Space Sci. Rev., 128, 257
[4] Bibring, J-P. et al. (2007) Space Sci. Rev., 128, 397
[5] Morse A.D. (2012) et al. Planetary and Space Sci., 66, 165