***ROSETTA*: THE FINAL FURLONG.**

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Introduction: Launched in 2004, the *Rosetta* spacecraft [1], which is en-route to rendezvous with, and land on, comet 67P/Churyumov-Gerasimenko [2], awoke from its current deep space hibernation on January 20th, 2014. The 2-part mission includes an Orbiter, which will travel alongside the comet for many months, and a Lander (*Philae*), destined to be set down on the surface of the nucleus in November, 2014. One of the (eleven) instruments on board *Philae* is a gas chromatograph-mass spectrometer system aimed at determing the nature, abundances and stable isotopic compositions of the so-called *light elements* (e.g. hydrogen, carbon, nitrogen, oxygen), as well as making certain measurments of nobles gases and qualitative assessments of the organic compounds present. In addition to the on-comet investigations *Ptolemy* will also be operated prior to separation/landing, as the spacecraft approaches the comet.

***Ptolemy*:** As described previously [3,4] the instrument is intended to determine the chemical and isotopic compositions of cometary material sourced from beneath, on and above the comet's surface. It has been designed to work with liberated volatiles and determine their concentration, chemical and accurate isotopic compositions (D/H, $^{13}C/^{12}C$, $^{15}N/^{14}N$, $^{18}O/^{16}O$ and noble gases). The primary intended purpose of *Ptolemy* is to analyse solid materials taken from the Sampler, Drill and Distribution system (SD2); these are heated in discrete increments of temperature, and evolved volatiles passed to an ion trap mass spectrometer for detection and quantification. *Ptolemy* can also passively adsorb coma material onto a molecular sieve substrate for later thermal release/analysis, and can make direct detections of the spacecraft environment via a vent pipe.

Post-Hibernation Commissioning: Following the wake-up of *Rosetta*, a number of system-level tests were performed, followed by the re-commissioning of Orbiter instruments. The quivalent procedures for the Lander and its instruments were carried out during April, 2014. By the end of this activity it was apparent that all aspects of the mission were nominal.

Landing Site Selection: During May/June (2014) a practice campaign was initiated to replicate the anticipated process that will be carried out later in the year as the spacecraft gets ever closer to the comet. The idea was obviously to learn how to do this efficiently and effectively. Inputs to the activity will ultimately come from instruments on board the Oribiter, whilst different shape models of the nucleus can be used (during practice, for instance, the models were based on published work, e.g. [2]). The first phase of the process was/is to choose 5 sites, followed by down-selection to 2, of which one assumes priority and is considered to be the default option.

Summary: There are many reasons to study comets, and there have been a number of space missions that have been successful in doing so. *Rosetta* represents the first time that a controlled landing will be attempted. A successful outcome will result in a variety of measurements that are of interest to studies of Solar System formation and evolution.

References: [1] Glassmeier, K-H. et al. (2007) *Space Sci. Rev., 128*, 1. [2] Lowry, S. et al. (2012) *A&A, 548,* A12. [3] Wright, I.P. et al. (2013) *LPSC44,* Abstract #2129. [4] Morse, A.D. et al. (2009). In: *Rosetta*: ESA's mission to the origin of the solar system, Springer, ch.19.6, pp.669-686.