EPSC Abstracts
Vol. 9, EPSC2014-249, 2014
European Planetary Science Congress 2014

Rosetta in context: Ground-based observations of 67P/Churyumov-Gerasimenko

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ESA's Rosetta mission to comet 67/Churyumov-Gerasimenko will produce a step change in our understanding of comets, as the first mission to rendezvous with, land on and then follow a comet as its activity evolves with decreasing solar distance. The first results from the pre-landing phase of the mission are expected to be presented during the 2014 EPSC conference, which falls during the intensive nucleus mapping phase prior to landing in November 2014. By September Rosetta will already have returned more detailed information on the nucleus of a comet than any previous mission, even though it will still be only starting its near-comet operations.

While Rosetta will study 67P in incredible detail, the overall goal of the mission is to understand cometary processes in general. It is therefore necessary to link 67P to other Jupiter family comets, including the vast majority that will never be visited by spacecraft. Astronomical observations are therefore required to give context to the Rosetta mission, allowing direct comparison between 67P and other comets observed in the same ways from Earth. These observations also allow Rosetta results to be placed into the context of the wider coma – it is worth remembering that Rosetta orbits very close to the nucleus, around a 100km from it most of the time, but the comet's coma stretches over tens of thousands of km.

For these reasons, there is an international campaign of observations in support of the Rosetta reason. The campaign, initiated through a Europlanet networking activity on coordination between space missions and observers, now brings together a large group of astronomers and Rosetta scientists. Throughout 2014 it is provided with observations of the comet by the ESO VLT, along with many other facilities worldwide. More details on the campaign are available at the website `http://www.rosetta-campaign.net`. In addition to the professional astronomer involvement, the campaign will also provide great opportunities for collaboration with the large and enthusiastic community of amateur comet observers, especially in 2015 when the comet is brighter (see also talks in the program sessions at EPSC).

The comet has been recovered (in late February 2014), with early indications from VLT photometry suggesting that activity had indeed already started beyond 4 AU from the Sun, as predicted[1]. Its activity level, as measured by the dust brightness, will be followed all year and used to make further predictions about the future activity. The comet is observable until November 2014 using large telescopes (primarily in the Southern hemisphere), and is getting brighter as it approaches the Sun. In addition to photometric observations, visible wavelength spectroscopy will be attempted during 2014, to constrain gas emissions. Polarimetric observations and high resolution imaging with the HST are also proposed. A wide range of observational techniques and wavelength ranges will be covered by the campaign in 2015 as the comet reaches perihelion.

I will present an update on the ground-based observation campaign in support of the Rosetta mission, the current status of various observation programmes at the time of the EPSC conference, and results on the 2014 activity of the comet, for comparison with early Rosetta results. I will also discuss how well the 2014 observations match with our earlier predictions, and make an assessment of how active the comet appears to be relative to previous orbits. I will also describe what further observations are planned in 2015, and how these will support the primary 'escort' phase of the mission.

References

[1] Snodgrass C., Tubiana C., Bramich, D. M., et al., 2013, Beginning of activity in 67P/Churyumov-Gerasimenko and predictions for 2014-2015, A&A, 557, id.A33.