

# Evolution of Cometary Activity at 67P/Churyumov-Gerasimenko as seen by ROSINA/Rosetta

A. Jäckel (1), K. Altwegg (1), H. Balsiger (1), U. Calmonte (1), S. Gasc (1), L. Le Roy (1), M. Rubin (1), C. Y. Tzou (1), P. Wurz (1), A. Bieler (2), J. Berthelier (3), B. Fiethe (4), M. Hässig (5), J. deKeyser (6), U. Mall (7), H. Rème (8) and the ROSINA Team

(1) Institute of Physics, University of Bern, Switzerland, (2) University of Michigan, Ann Arbor, MI, USA, (3) LATMOS Laboratoire Atmosphères, Milieux, Observations Spatiales, Paris Cedex 05, France, (4) Technical University of Braunschweig, Germany, (5) Southwest Research Institute, San Antonio, TX, USA, (6) Belgian Institute for Space Aeronomy, Brussels, Belgium, (7) Max-Planck Institute for Solar System Research, Göttingen, Germany, (8) IRAP, Institut de Recherche en Astrophysique et Planétologie, Toulouse, France (jaeckel@space.unibe.ch)

## Abstract

Since nine months the European Space Agency's spacecraft Rosetta, with the Rosetta Orbiter Spectrometer for Ion and Neutral Analysis (ROSINA) onboard, is in the comet escort phase. ROSINA is a suite of three instruments, consisting of the COMetary Pressure Sensor (COPS), the Double Focusing Mass Spectrometer (DFMS), and the Reflectron-type Time-Of-Flight (RTOF) mass spectrometer [1]. The two mass spectrometers measure in situ the neutral and ionized volatile material in the coma of comet 67P/Churyumov-Gerasimenko (67P/C-G). With COPS we are able to derive the total gas density, bulk velocities and temperatures of the coma.

## 1. ROSINA Characteristics

Due to the high sensitivities of DFMS and RTOF, measurements of very low particle densities are possible. The two mass spectrometers have high dynamic ranges and complement each other with a large mass range (RTOF) and with high mass resolution (DFMS). The results of both of them will allow us to detect heavy organic molecules as well as isotopic ratios of the main cometary species. Synchronized measurements of cometary neutrals with one mass spectrometer and cometary ions with the other mass spectrometer are also possible.

## 2. Measurements and Results

In this work, we will present the latest ROSINA measurements, i.e. the time from April through September 2015. From mid-May on, the southern

hemisphere of comet 67P/C-G starts to become more illuminated by the Sun than the northern hemisphere. We will discuss the evolution in the activity especially from the southern hemisphere and compare these results with our measurements of the northern hemisphere.

## Reference

[1] Balsiger, H. et al.: ROSINA - Rosetta Orbiter Spectrometer for Ion and Neutral Analysis, *Space Science Rev.*, 128, 745-801, 2007.