

Study of the coma of comet 67P/Churyumov-Gerasimenko based on the ROSINA/RTOF instrument onboard Rosetta

M. Hoang (1), P. Garnier (1), H. Rème (1), K. Altwegg (2), H. Balsiger (2), U. Calmonte (2), B. Fiethe (3), A. Galli (2), S. Gasc (2), A. Jäckel (2), U. Mall (4), L. Le Roy (2), M. Rubin (2), C.-Y. Tzou (2), J.H. Waite (5), P. Wurz (2)

(1) IRAP, Institut de Recherche en Astrophysique et Planétologie, Toulouse, France (2) University of Bern, Physikalisches Institut, Bern, Switzerland, (3) Technical University of Braunschweig, Braunschweig, Germany, (4) Max-Planck Institute for Solar System Research, Göttingen, Germany, (5) Southwest Research Institute San Antonio, San Antonio, TX, United States.

Abstract

The Rosetta ESA mission investigates the environment of the comet 67P / Churyumov-Gerasimenko since August 2014. Among the experiments onboard the satellite, the ROSINA experiment (Rosetta Orbiter Spectrometer for Ion and Neutral Analysis) includes two mass spectrometers (DFMS and RTOF) to analyze the composition of neutrals and ions, and an instrument (COPS) to monitor the density and velocity of neutrals in the coma [1]. We will here analyze and discuss the data of the ROSINA/RTOF instrument during the comet escort phase. A detailed description of the main volatiles (H_2O , CO_2 , CO) dynamics and of the heterogeneities of the coma will be provided.

during the inbound leg of the comet course (until perihelion in August 2015). The heterogeneities of the coma will in particular be investigated on a statistical basis, and the variability of the species abundance will be given as a function of various relevant parameters (distance, phase angle, longitude/latitude, illumination etc.) and compared with the COPS density measurements.

3. References

- [1] Balsiger, H. et al.: ROSINA - Rosetta Orbiter Spectrometer for Ion and Neutral Analysis, Space Science Rev., 128, 745–801, 2007.
- [2] Scherer, S. et al., Int. Jou. Mass Spectr. 251 (2006) 73–81.

1. The RTOF instrument

The Reflectron-type Time-Of-Flight (RTOF) mass spectrometer is one of the two mass spectrometers of the ROSINA experiment [2]. It possesses a wide mass range (from 1 amu/e to >300 amu/e) and a high temporal resolution. It was designed to measure cometary neutral gas as well as cometary ions, and is in particular able to detect heavy organic molecules with a very good mass resolution.

2. Results

We will first describe the data analysis process to derive counts/second versus mass/charge spectra from the initial abundance versus time of flight data. The evolution of the abundance of the main volatiles H_2O , CO_2 and CO will then be investigated in detail