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The volatile inventory of comet 67P/Churyumov-Gerasimenko from Rosetta/ROSINA at 3 AU

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Abstract

Comets are believed to be the most pristine bodies in the solar system. The study of their composition can therefore give us important clues about the processes that occurred during the solar system formation. We will report abundances of the major observed species with focus on the hydrocarbons detected by ROSINA/DFMS in the coma of 67P/Churyumov-Gerasimenko in October 2014 at 3 AU.

1. ROSINA experiment

ROSINA consists of a suite of three instruments: a pressure sensor (COPS: COMetary Pressure Sensor) and two mass spectrometers: the Reflectron Time of Flight mass spectrometer (RTOF) and the Double Focusing Mass Spectrometer (DFMS).

For this study, the data have been obtained with the high-resolution mass spectrometer DFMS, a traditional magnetic mass spectrometer that combines an electrostatic analyzer for energy analysis with a magnet for momentum analysis. Its mass resolution is 9000 at FWHM at 28 u/e, which allows to resolve CO from N₂ at m/z= 28 u/e [1].

2. Objective

In October 2014, before lander release, the Rosetta spacecraft trajectory around the nucleus was in the terminator plane at different distances from the nucleus. This study focuses on the parent species detected during the 10 km orbit. The abundance/detection of the different parent species will be presented and compared to the

abundance reported for other comets such as 103P/Hartley 2, 1P/Halley, Hale-Bopp, Hyakutake, and also to the composition in the interstellar medium.

References

Balsiger H., Altwegg K., Bochsler P., et al. 2007, Sp. Sci. Rev., 128, 745.