EPSC Abstracts
Vol. 11, EPSC2017-132-1, 2017
European Planetary Science Congress 2017

Noble gases in the coma of comet 67P/Churyumov-Gerasimenko

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Abstract

The European Space Agency's Rosetta mission accompanied comet 67P/Churyumov-Gerasimenko (67P) for over two years along its orbit around the Sun. Comets are among the most pristine objects in our solar system. Investigating their composition was one of the main goals of the Rosetta mission. Abundances and isotopic ratios of the different volatile species provide crucial insights into the physical and chemical conditions during and possibly even before the comet's formation in the early solar system.

The Rosetta Orbiter Spectrometer for Ion and Neutral Analysis (ROSINA) consisted of a pressure sensor and two mass spectrometers and was dedicated to the detection of volatiles in the coma of 67P [1]. Already early in mission, in October 2014, ROSINA detected the noble gas argon at the comet [2]. Then late in the mission in May 2016, after an intense phase of gas and dust activity around the perihelion, Rosetta spent several weeks within 7 to 10 km of 67P. These conditions allowed the detection of additional noble gases - krypton and xenon. In this presentation, we will report on our latest results from the investigation of the relative abundances and the isotopic ratios of these noble gases measured in the coma of 67P.

Acknowledgements

UoB was funded by the State of Bern, the Swiss National Science Foundation and by the European Space Agency PRODEX Programme. Work at MPS was funded by the Max-Planck Gesellschaft and BMWI (contract 50QP1302), at Southwest Research institute by Jet Propulsion Laboratory (subcontract #1496541 and JPL subcontract to JWH NAS703001TONMO710889), at the University of Michigan by NASA (contract JPL-1266313).This work has been supported through the A*MIDEX project from the French National Research Agency (ANR) (n° ANR-11-IDEX- 0001-02) and by CNES grants at IRAP, LATMOS, LPC2E, LAM, CRPG, by the European Research Council (grant no. 267255 to B. Marty) and at BIRA-IASB by the Belgian Science Policy Office via PRODEX/ROSINA PEA 90020.

References

[1] Balsiger, H., et al., Rosina - Rosetta orbiter spectrometer for ion and neutral analysis. Space Science Reviews. 128**,** 745-801, 2007.

[2] Balsiger, H., et al., Detection of argon in the coma of comet 67P/Churyumov-Gerasimenko. Sci Adv. 1**,** e1500377, 2015.