



**HAL**  
open science

## Ion composition variety and variability around perihelion

Arnaud Beth, Kathrin Altwegg, Étienne Behar, Tom Broiles, Jim Burch, Christopher Carr, Anders Eriksson, Marina Galand, Charlotte Goetz, Pierre Henri, et al.

### ► To cite this version:

Arnaud Beth, Kathrin Altwegg, Étienne Behar, Tom Broiles, Jim Burch, et al.. Ion composition variety and variability around perihelion. 19th EGU General Assembly, Apr 2017, Vienne, Austria. pp.928. insu-03568161

**HAL Id: insu-03568161**

**<https://hal-insu.archives-ouvertes.fr/insu-03568161>**

Submitted on 12 Feb 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution| 4.0 International License



## **Ion composition variety and variability around perihelion**

Arnaud Beth (1), Kathrin Altwegg (2), Étienne Behar (3), Tom Broiles (4), Jim Burch (4), Christopher Carr (1), Anders Eriksson (5), Marina Galand (1), Charlotte Goetz (6), Pierre Henri (7), Kévin Heritier (1), Hans Nilsson (3), Elias Odelstad (5), Ingo Richter (6), Martin Rubin (2), Xavier Vallieres (7), and the ROSINA team and the RPC Team

(1) Department of Physics, Imperial College London, London, United Kingdom, (2) Physikalisches Institut, Universität Bern, Bern, Switzerland, (3) Swedish Institute of Space Physics, Kiruna, Sweden, (4) SouthWest Research Institute, San Antonio, Texas, USA, (5) Swedish Institute of Space Physics, Ångström Laboratory, Lägerhyddsvägen 1, Uppsala, Sweden, (6) Institut für Geophysik und extraterrestrische Physik, TU Braunschweig, Braunschweig, Germany, (7) LPC2E, CNRS, Université d'Orléans, Orléans, France

For two years, the Double Focusing Mass Spectrometer (DFMS), one of the Rosetta Orbiter Spectrometer for Ion and Neutral Analysis (ROSINA) onboard Rosetta probed the neutral gas and the plasma composition of the comet 67P/Churyumov-Gerasimenko's coma (67P). Major ion species detected include water ions (e.g.  $\text{H}_2\text{O}^+$ ,  $\text{H}_3\text{O}^+$ ,  $\text{HO}^+$ ) observed throughout the escorting phase. The analysis of DFMS data revealed a large zoo of ion species near perihelion (summer 2015). In particular, protonated versions of high proton affinity neutrals (e.g.,  $\text{NH}_4^+$ ) were detected, but also hydrocarbon and organic ion species. Near perihelion, ion composition was also highly variable and showed interesting variations in the complexity of the observed ion species.

We will first present an overview of the rich variety of ion species observed during perihelion. This study will be supported by ionospheric modeling of ion composition below the ion exobase. We will then show an intercomparison between DFMS data and Rosetta Plasma Consortium (RPC) plasma and particle data to interpret the DFMS ion composition variability. Our primary goal is to highlight any correlation between observations from these different instruments (i.e. ion composition, ion and electron number density, energy distribution, magnetic field) and to find relevant signatures of physical processes which can affect the chemistry and dynamics (e.g., acceleration and deflection) of the involved neutral and ion species.