EGU21-1719
https://doi.org/10.5194/egusphere-egu21-1719
EGU General Assembly 2021

Analyzing 67P's dusty coma

Nora Hänni[1], Kathrin Altwegg[1], Daniel Müller[1], Boris Pestoni[1], Martin Rubin[1], and Susanne Wampfler[2]

[1]Space Research and Planetary Sciences, Physics Insitute, University of Bern, Bern, Switzerland
[2]Center for Space and Habiatability, University of Bern, Bern, Switzerland

While the volatile species in comet 67P/Churyumov-Gerasimenko's coma have been analyzed in great spatial and temporal detail, e.g., Rubin et al. (2019) or Läuter et al. (2020), little is so far known about the less volatile, heavier species. There is growing evidence, however, that less volatile species, such as salts, may play a key role in explaining some of the puzzling properties of comets, as for instance shown by Altwegg et al. (2020). These authors also have demonstrated the unique capability of ROSINA/DFMS (Rosetta Orbiter Spectrometer for Ion and Neutral Analysis/ Double Focusing Mass Spectrometer; Balsiger et al. (2007)) to detect exactly such little volatile species in-situ, namely during a dust event on 5 September 2016 (when a dust grain entered the instrument and sublimated inside).

Complementary information on 67P's dusty coma can be obtained from data collected during time periods of high dust activity. A clear advantage of such data is they also allow for a quantitative interpretation thanks to the much more stable measurement conditions. Moreover, a comparison to data collected during a time period of little dust activity (e.g., to the days around end of May 2015 as in Rubin et al. 2019) also allows to link species to dust.

End of July / beginning of August 2015, the comet was approaching its perihelion and ejecting a lot of dust, as seen by the OSIRIS camera (Vincent et al. 2016). The data from this period are therefore a promising starting point for the search of heavier species (m > 100 Da). Altwegg et al. (2019), for instance, reported on the tentative identifications of the simplest polyaromatic hydrocarbon species naphthalene as well as of benzoic acid, the simplest aromatic carboxylic acid. To confirm these identifications and to achieve a more complete inventory of heavier and chemically more complex species, we are now analyzing these data sets strategically. In our contribution we will share what we have learned from pushing the exploration of 67P's dusty coma.

Altwegg et al., 2020, Nat. Astron., 4, 533-540.
Altwegg et al., 2019, Annu. Rev. Astron. Astrophys., 57, 113-55.
Balsiger H. et al., 2007, Space Sci. Rev., 128, 745-801.
Läuter et al., 2020, MNRAS, 498, 3, 3995-4004.
Rubin et al., 2019, MNRAS, 489, 594-607. Vincent et al., 2016, MNRAS, 462 (Suppl_1), 184-194.