Geophysical Research Abstracts
Vol. 14, EGU2012-5061, 2012
EGU General Assembly 2012

Using in situ coma composition measurements to probe a comet nucleus

J. De Keyser and F. Dhooghe
Belgian Institute for Space Aeronomy, Brussels, Belgium (Johan.DeKeyser@aeronomie.be, 0032-2-3730368)

The composition of a cometary coma depends on the variable outgassing rate and composition of volatile material on the surface of the nucleus. For given outgassing characteristics, and assuming that the flow field is known, one can determine the composition of the coma if one has sufficient knowledge of the photo-ionization reactions and of the complex chemistry that transforms the gas as it expands outward. We demonstrate how the inverse problem can be tackled, namely, to determine the volatile outgassing rate and the surface composition on the nucleus from in situ coma composition measurements on the same streamline. We intend to use this technique during the encounter of ESA's Rosetta spacecraft with comet Churyumov-Gerasimenko, as a means to exploit the data from the ROSINA/DFMS mass spectrometer in which the Belgian Institute for Space Aeronomy plays a major role. This technique turns in situ mass spectrometry into a remote sensing technique for the source of the volatiles. It would be extremely interesting to correlate the derived outgassing rate and composition with images of the nucleus.