Geophysical Research Abstracts
Vol. 18, EGU2016-11772, 2016
EGU General Assembly 2016

Millimeter and Submillimeter Observations of Comet 67P's Nucleus, Gas, and Dust with the Rosetta/MIRO Instrument

Mark Hofstadter and the MIRO Team

Jet Propulsion Laboratory, Pasadena, USA (mark.hofstadter@jpl.nasa.gov)

The Microwave Instrument for the Rosetta Orbiter (MIRO) has been making measurements of comet 67P/C-G since June 2014, when the comet was 3.92 AU from the Sun and Rosetta was approximately 400,000 km from the nucleus. Those first observations were spatially unresolved measurements of the 556 GHz water line, used to infer the abundance and velocity of water vapor in the coma (Gulkis et al. 2015, *Science* 347). In the almost two years since that time, as the spacecraft has moved closer to the nucleus and the comet has become more active (perihelion at 1.2 AU from the Sun occurred in August 2015), MIRO's submillimeter spectrometer (working at frequencies near 550 GHz, or wavelengths near 0.5 mm) has been used to determine the velocity, abundance, and spatial distribution of $H_2^{16}O$, $H_2^{17}O$, $H_2^{18}O$, CH_3OH, NH_3, and CO in the coma as a function of time (e.g. water is discussed by Biver et al. 2015 and Lee et al. 2015, *Astron. and Astrophys.* 583).

In addition to its submillimeter spectrometer, MIRO has two broad band continuum channels operating at wavelengths near 0.5 and 1.6 millimeter. These channels are designed to probe the nucleus $\sim$1 millimeter to 10 cm below the surface. Data have been used to infer properties such as thermal inertia, porosity, and ice content as functions of location, depth, and time (e.g. Schloerb et al. 2015 and Choukroun et al. 2015, *Astron. and Astrophys.* 583). These channels have also been used to map the distribution of relatively large dust grains (radius $>$ $\sim$1 mm) in the inner coma of the comet, with the potential to constrain models of dust acceleration, cooling, and fragmentation.

This talk will review the latest results from MIRO's measurements of the nucleus, coma, and dust, and discuss some of the processes that couple these components of the comet.