



Porosity and water ice content of the sub-surface material in the Imhotep region of 67P/Churyumov-Gerasimenko constrained with the Microwave Instrument on the Rosetta Orbiter (MIRO) observations

Paul von Allmen (1) and the Paul von Allmen Team

(1) Jet Propulsion Laboratory/California Institute of Technology, 4800 Oak Grove Dr., California, 91109 USA., (2) LERMA, Observatoire de Paris, CNRS, UPMC, 61 avenue de l'Observatoire, 75014 Paris, France, (3) LESIA-Observatoire de Paris, CNRS, UPMC, Université Paris-Diderot, 5 place Jules Janssen, 92195 Meudon, France., (4) Max-Planck-Institut für Sonnensystemforschung, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany., (6) National Central University, Jhongli, Taiwan., (7) University of Massachusetts, 619 Lederle Graduate Research Tower, Amherst, MA, USA

In late October 2014, the Rosetta spacecraft orbited around 67P/Churyumov-Gerasimenko at a distance less than 10 km, the closest orbit in the mission so far. During this close approach, the Microwave Instrument on the Rosetta Orbiter (MIRO) observed an 800-meter long swath in the Imhotep region on October 27, 2014. Continuum and spectroscopic data were obtained. These data provided the highest spatial resolution obtained to date with the MIRO instrument. The footprint diameter of MIRO on the surface of the nucleus was about 20 meters in the sub-millimeter band at $\lambda=0.5$ mm, and 60 meters in the millimeter band at $\lambda=1.6$ mm. The swath transitions from a relatively flat area of the Imhotep region to a topographically more diverse area, still making the data relatively easy to analyze.

We used a thermal model of the nucleus, including water ice sublimation to analyze the continuum data. The sub-surface material of the nucleus is described in terms of its porosity, grain size and water ice content, in addition to assumptions for the dust bulk density and grain packing geometry. We used the optimal estimation algorithm to fit the material parameters for the best agreement between the observations and the simulation results. We will present the material parameters determined from our analysis.