**SPATIAL AND TEMPORAL VARIATIONS OF THE NEAR-SURFACE THERMAL PROPERTIES OF 67P/CHURYUMOV-GERASIMENKO OBTAINED FROM CONTINUUM OBSERVATIONS WITH MICROWAVE INSTRUMENT ON THE ROSETTA ORBITER (MIRO).** P. von Allmen[1], S. Lee[1], M. Hofstadter[1], N. Biver[2], D. Bockelee-Morvan[2], M. Choukroun[1], S. Gulkis[1], P. Hartogh[3], M. Janssen[1], C. Jarchow[3], S. Keihm[1], E. Lellouch[2], C. Leyrat[2], L. Rezac[3], P. Schloerb[4], J. Crovisier[2], P. Encrenaz[5], T. Encrenaz[2] and W. Ip[6], [1]Jet Propulsion Laboratory/California Institute of Technology, [2]LESIA-Observatoire de Paris, [3]Max-Planck-Institut für Sonnensystemforschung, [4]University of Massachusetts, Amherst, [5]LERMA, Observatoire de Paris, [6]National Central University.

**Introduction:** Since early summer 2014, the Microwave Instrument on the Rosetta Orbiter (MIRO) has been measuring the thermal emission from the surface of 67P/Churyumov-Gerasimenko with a maximum spatial resolution of about 20 meters in the sub-millimeter channel (562 GHz) and 70 meters in the millimeter channel (190 GHz). These observations are providing antenna temperatures for scans of large portions of the surface and are enabling detailed correlation with topographic features and insolation conditions. We will discuss inhomogeneities in the thermal properties of the near-surface regions as derived from comparison with numerical modeling.

**Approach:** We have developed a software package that enables the reduction of the observational data into estimates of near-surface thermal properties. The relative positions of the comet, spacecraft and the sun, the pointing of the MIRO telescope, and the orientation of the comet are derived from flight dynamics data provided by the Rosetta project. The thermal profiles and the radiative transfer of the millimeter and sub-millimeter radiation are computed numerically. We use a numerical model that describes thermal transport as well as gas diffusion through a porous medium. Bulk sublimation is also included as well as surface dust ablation. The thermal properties of the near-surface materials are then derived from fitting the observations to the numerical results. We will discuss the spatial variation of the thermal transport coefficients and near surface ice composition as derived from fitting the observed diurnal antenna temperature variations with numerical results.

**Results:** Figure 1 shows an example of the sub-millimeter antenna temperature contour plot superimposed over an illumation map of the digital shape model for a MIRO observation in August 2014. A clear correlation between the illumination and the measured antenna temperature is observed. Correlation with topographic features can also be seen. Further studies have revealed differences between the sub-millimeter and millimeter antenna temperatures that can be ascribed to diurnal and seasonal effects. Topographic effects can be deduced from the observed difference in the diurnal cycles of the antenna temperatures in the head and neck regions of the nucleus (Fig. 2).

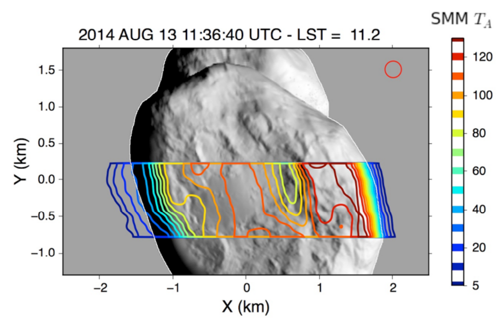


**Figure 1. Contour plot of the sub-millimeter antenna temperature for a MIRO scan on August 13, 2014. The red circle represents the size of the sub-millimeter beam. The nucleus is shown as an illumination projection map of the digital shape model SHAP2.**

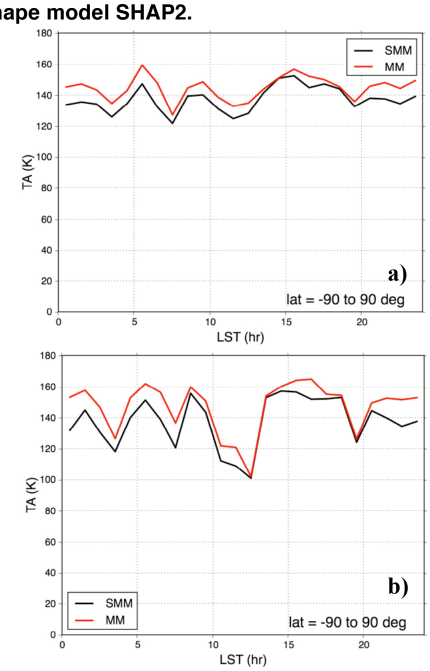


**Figure 2. Sub-millimeter and millimeter antenna temperatures averaged over all MIRO observations in August 2014, and for the entire nucleus (a) or for the neck region only (b). The data was binned according to the local solar time. A clear dip at around 12 hours LST is seen in the neck region results.**

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