Geophysical Research Abstracts
Vol. 17, EGU2015-9871-1, 2015
EGU General Assembly 2015
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MIRO/Rosetta observations of the subsurface thermal emission from comet 67P: general trends and analyses of the diurnal curves

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Since mid-2014, the MIRO instrument onboard Rosetta is acquiring continuum measurements of the thermal emission from the nucleus at 0.5 mm and 1.6 mm, and spectroscopic data of the coma in the 0.5 mm band. The continuum measurements probe the near subsurface and sample a variety of locations (latitude, longitude) on the surface under diverse conditions of illumination, local times and emission angles. Initial inspection of data recorded in Sept. 2014 (Gulkis et al. 2015, Science in press) reveals large temperature variations with latitude, as well as distinct diurnal curves, most prominent in the 0.5 mm channel, indicating that the electric penetration depth for this channel is comparable to the diurnal thermal skin depth. We will elaborate on these results by (i) presenting a more detailed study of the variation of the measured temperatures with the above parameters (ii) modeling the diurnal curves in terms of global thermal properties (e.g. diurnal thermal inertia as a function of latitude, penetration depth in the two channels) (iii) investigating possible changes of these properties with heliocentric distance as comet 67P approaches perihelion.