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# Search for regional variations of thermal and electrical properties of comet 67P/CG probed by MIRO/Rosetta

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## Abstract

The Microwave Instrument for Rosetta Orbiter (MIRO, [1]) on board the Rosetta (ESA) spacecraft observes comet 67P-CG since June 2014. MIRO operates in millimeter and submillimeter wavelengths respectively at 190 GHz (1.56 mm) and 562 GHz (0.5 mm). Both bands provide a broad-band continuum channel for sensing the thermal emission of the nucleus. The submillimeter channel is also coupled to a Chirp Transform Spectrometer (CTS) for spectroscopic analysis of the coma.

Continuum measurements of the nucleus probe the subsurface thermal emission from two different depths. The first analysis of data obtained essentially in the Northern hemisphere [2] [3] have revealed 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. Initial modelling of these data have indicated a low surface thermal inertia, in the range 10-30 J $K^{-1}$ $m^{-2}s^{-1/2}$ and probed depths of order 1-4 cm [4].

We here investigate potential spatial variations of thermal and electrical properties by analysing separately the geomorphological regions described by [4]. For each of the 19 regions, we select measurements corresponding to those areas, obtained at different local times and effective latitudes. We model the thermal profiles with depth and the outgoing mm and submm radiation for different values of the thermal inertia and of the ratio of the electrical to the thermal skin depth. We will present the best estimates of thermal inertia and electric/thermal depth ratios for each region selected. Additional information on subsurface temperature gradients may be inferred by using observations at varying emergence angles.

The thermal emission from southern regions has been analysed by [5] during the polar night. By the time the comet reaches perihelion, the South Pole will be fully illuminated, allowing extension of this study to these regions.

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