Title: Large scale morphological changes in the Hapi region on comet 67P/Churyumov-Gerasimenko

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Abstract: The Hapi region is located on the northern hemisphere of comet 67P/C-G at the neck that joins the two lobes of the nucleus. It primarily consists of granular material that is unresolved at 0.35 m/pixel resolution and that forms a smooth surface with small slopes with respect to local gravity. The OSIRIS cameras on the ESA spacecraft Rosetta observed Hapi regularly since its rendezvous with the comet in August 2014. No changes were seen during the first five months in orbit but on December 30, 2014, two spots appeared in Hapi. Over the course of two months they grew gradually into a 110 by 70 meter shallow depression with a depth of about 0.5 meters. We use OSIRIS observations to characterize the morphology and spectrophotometry of the region. We use measurements of the thermal emission of the comet by the MIRO millimeter and submillimeter radiometer in combination with thermophysical modeling to characterize the surface temperature, near surface temperature gradient, and thermal inertia of the region. The formation mechanism of the depression is discussed in view of these empirical data.