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Surface changes on 67P/Churyumov-Gerasimenko indicating possible seasonality in the erosion of the dust mantle

Xuanyu Hu (1), Xian Shi (1), Holger Sierks (1), Jürgen Blum (2), Jean-Baptiste Vincent (1), Nilda Oklay (1), Matteo Massironi (3,4), Carsten Güttler (1), Cecilia Tubiana (1), Björn Davidsson (5), Olivier Groussin (6), and the OSIRIS Team

(1) Max-Planck-Institut für Sonnensystemforschung, Justus-von-Liebig-Weg 3, 37077 Göttingen,Germany (hu@mps.mpg.de), (2) Institut für Geophysik und extraterrestrische Physik (IGEP), Technische Universität Braunschweig, Mendelssohnstr. 3, 38106 Braunschweig, Germany, (3) Centro di Ateneo di Studi ed Attività Spaziali, "Giuseppe Colombo" (CISAS), University of Padova, via Venezia 15, 35131 Padova, Italy, (4) INAF, Osservatorio Astronomico di Padova, 35122 Padova, Italy, (5) Department of Physics and Astronomy, Uppsala University, Box 516, 75120 Uppsala, Sweden, (6) Aix Marseille Université, CNRS, LAM (Laboratoire d'Astrophysique de Marseille) UMR 7326, 13388 Marseille, France

We present Rosetta/OSIRIS observations of certain surface changes in the northern hemisphere of comet 67P/Churyumov-Gerasimenko in the period from September 2014 to April 2015. These changes are manifest dominantly as "honeycomb" features, associated with outstanding macroscopic surface roughness on spatial scales ranging from ∼0.1 m up to ∼10 m that originated in the formerly smooth dust deposits [1]. Some recurrently observed features exhibit development, likely indicative of thinning of the dust mantle over time. The honeycomb features span various geomorphological regions of the nucleus surface, and may suggest a wide erosion process within the dust mantle as the comet was approaching perihelion [2]. The global distribution of these features shows certain correlation with latitude as well as morphology. We analyze a few carefully selected datasets with comparable resolutions and viewing geometries to verify and quantify the observed erosion, with effects of varying illumination conditions in mind. We will explore the possible underlying mechanisms in triggering the observed changes, such as local dynamical environment and energy input of insolation, during the period of interest. In particular, we will study the relationship between global distribution of the honeycomb features and the seasonality in cometary activities, by investigating the pattern of accumulated insolation and the modeled erosion in time.

Reference
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