Geophysical Research Abstracts
Vol. 17, EGU2015-12582, 2015
EGU General Assembly 2015

Where do we expect activity on 67P/CG ? – A thermo-physical point of view

Sebastian Höfner (1,2), Jean-Baptiste Vincent (1), Holger Sierks (1), Laurent Jorda (3), and Jürgen Blum (2)

(1) Max Planck Institute for Solar System Research, Göttingen, Germany (hoefner@mps.mpg.de), (2) Institut für Geophysik und Extraterrestrische Physik, TU Braunschweig, Germany, (3) Laboratoire d'Astrophysique de Marseille, France

+ the OSIRIS Team

OSIRIS, Rosetta's scientific camera system, has been mapping the nucleus surface of 67P/CG for several months by now. Images clearly show faint structures in the inner coma that can be linked to dust being lifted off the surface. These jet-like structures appear to be associated with local areas on the nucleus in most cases and show diurnal variations and confined dimensions. The main driver of this activity is sublimation of ices due to absorbed solar irradiation.

The complex nucleus surface structure of 67P/CG, in combination with its orbital eccentricity and the rotational axis obliquity, creates a wide range of illumination conditions. The bumpy and fissured, partly fractured morphology leads to a significant influence of shadowing and indirect heating through infrared radiation. In interaction with the variations of fine and dusty material of the cometary crust, the thermal behavior of the local nucleus surface shows unique temporal patterns.

3 D shape models of different surface resolution scales allow quasi-3-D thermo-physical modeling. These thermal models combine orbital and rotational elements with shape and morphologic information and discrete resolution of the cometary nucleus in depth. We can therefore distinguish thermal waves from diurnal to orbital scales, and effects that are due to evolution of the cometary crust.

We look at the temperature pattern at several regions of 67P/CG in low and high spatial resolution. We are especially interested to identify areas that reach temperatures sufficiently high to trigger considerable sublimation effects. In our analysis, we show correlations of active regions in the recent months of observation to our model, as well as perspectives for the approaching perihelion passage. We suggest an answer to the problem, which areas are expected to have high potential for activity. By comparing simulated areas to active regions on the nucleus, we contribute to a better understanding of the ruling mechanisms of heat transfer to deeper layers. We aim to predict the occurrence of active regions on the basis of the underlying thermo-physical processes.