Thermal investigation on the nucleus of 67P/CG from the dataset of VIRTIS-H onboard Rosetta

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Since 6 August 2014, VIRTIS has been observing comet 67P/Churyumov-Gerasimenko with two different channels: VIRTIS-M and VIRTIS-H. The first one is a mapper working from 0.25 to 5.1μm which covers a large field of view. The second one is a point spectrometer covering 1.9 to 5.0μm with higher spectroscopic resolution. Since it covers the near infrared (NIR) part of the electromagnetic spectrum, VIRTIS gives us the possibility to derive thermal properties from observations of the nucleus (e.g. temperature, emissivity). After the failure of the VIRTIS-M channel in April 2015, VIRTIS-H became the only instrument to look at the nucleus in the NIR and therefore the only one to provide us temperature estimates. The limited footprint of the instrument was balanced by making scans across the nucleus during August and the following months.

The available data are calibrated in radiance (W/m2/sr/μm). In order to use them, we convert every spectrum in reflectance, which removes the solar distance effects. A basic thermal model is used to retrieve effective temperature in every pixel. Improvements will be tested carefully and step by step in order to constrain as better as possible the derivation since the SNR is lower in the NIR part of the data.

One of the goals is to study the thermal behavior of the surface. For example, because the dataset of VIRTIS is sufficiently varied in observations conditions, we will be able to study some areas in transition between light to shadow or shadow to light. Once the thermal signal will be removed, we will also be able to look for new spectral feature in the concerned range.