

The inner coma of 67P/Churyumov-Gerasimenko as seen from OSIRIS and VIRTIS on board Rosetta

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Abstract

The Rosetta spacecraft had the unique opportunity to follow comet 67P/Churyumov-Gerasimenko (hereafter 67P/C-G) for 2.5 years, examining how the comet evolved while moving along its orbit. On 27 April 2015, when 67P/C-G was at an heliocentric distance of 1.76 au moving towards perihelion, the Visible InfraRed Thermal Imaging Spectrometer (VIRTIS-M) [1] and the Optical, Spectroscopic, and Infrared Remote Imaging System (OSIRIS) [2] onboard Rosetta monitored the inner coma, observing the evolving dust and gas during a complete comet rotation. Given the spacecraft – to – comet distance of 125 – 142 km at the time of the observation, 67P/C-G was entirely contained in all OSIRIS WAC images and in 7 out of 9 VIRTIS-M images.

In this work we want to take advantage of the capabilities of the two instruments to analyze, in a more comprehensive way, the dust and gas behavior during a complete comet rotation. We have analyzed the diurnal behavior of the dust at about 630 nm. The comparison between the diurnal curve obtained from the OSIRIS and VIRTIS-M datasets allow inter-instrument cross-calibrations to be able then to directly compare OSIRIS and VIRTIS-M measurements at different wavelengths. We also studied the evolution of the emission due to CO₂ at 4200 nm and water vapor at 2700 nm over the comet day, and we compared the observed water production rate with the one computed by a thermo-physical model.

The diurnal variations of dust, H₂O and CO₂ will be presented, compared and discussed.

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References

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