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Comet 67P/CG compositional maps at regional scale in the VIS-IR from Rosetta/VIRTIS-M

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Abstract.

In August 2014 ESA's Rosetta mission has started the exploration of 67P/Churyumov-Gerasimenko comet nucleus. VIRTIS-M, the Visible InfraRed Thermal Imaging Spectrometer, onboard the orbiter (Coradini et al. 2007) has acquired the entire nucleus' illuminated hemisphere in the 0.25-5.1 μm spectral range from a heliocentric distance of 3.2 AU. These data allow us to derive albedo and compositional maps suitable to trace the distribution of dust and refractory material, water and carbon dioxide ices, and other minor species. Two different mapping phases are currently foreseen: 1) in August 2014 during early *Comet Characterization (CC)* period, when the spacecraft will orbit between 50-100 km distance from the nucleus with 25°-40° solar phase angle. A large number of these observations shall be performed at stationary illumination conditions (constant solar phase at about 30°) allowing us to reduce the effect of photometric corrections on surface's mosaics; 2) in September 2014 during the *Global Mapping Phase (GMP)* when the spacecraft shall be at about 30 km distance and 60°-70° phase. During these two periods, VIRTIS-M on-ground resolution shall be about 12-25 and 7.5 m/pixel, respectively. The GMP is planned for more detailed observations of some pre-selected Philae landing sites, although in worse illumination conditions with respect to the CC. In addition, to mitigate the effects of the expected compositional differences, surface roughness and the highly irregular double-lobed shape of the comet's nucleus, we have planned to observe each surface's point more than one time at different illumination conditions. Finally, compositional maps are built by using specific VIS-IR spectral indicators (Filacchione et al. 2012) namely: band ratios, spectral slopes, band parameters (depth, position, width, asymmetry) adapted to characterize the different spectral classes of the nucleus' surface. Beyond being appropriate to map surface composition, those indicators allow us to infer regolith grain size and surface roughness and to correlate them with local morphological features (patches, boulders, scarps, crevasses, active areas) and thermal properties. Authors acknowledge the funding from Italian, French and German Space Agencies.

References

Coradini, A., Capaccioni, F., Drossart, P., et al. 2007 Space Sci. Rev., 128, 529
Filacchione, G., Capaccioni, F., Ciarniello, M., et al. 2012, Icarus, 220, 1064