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Publication:	American Astronomical Society, DPS meeting #47, id.#500.08
Publication Date:	11/2015
Origin:	AAS
Abstract Copyright:	(c) 2015: American Astronomical Society
Bibliographic Code:	2015DPS....4750008F

Abstract

VIRTIS-M, the 0.25-5.1 µm imaging spectrometer on Rosetta (Coradini et al., 2007), has mapped the surface of 67P/CG nucleus since July 2014 from a wide range of distances. Spectral analysis of global scale data indicate that the nucleus presents different terrains uniformly covered by a very dark (Ciarniello et al., 2015) and dehydrated organic-rich material (Capaccioni et al., 2015). The morphological units identified so far (Thomas et al., 2015; El-Maarry et al., 2015) include dust-covered brittle materials regions (like Ash, Ma'at), exposed material regions (Seth), large-scale depressions (like Hatmehit, Aten, Nut), smooth terrains units (like Hapi, Anubis, Imhotep) and consolidated surfaces (like Hathor, Anuket, Aker, Apis, Khepry, Bastet, Maftet). For each of these regions average VIRTIS-M spectra were derived with the aim to explore possible connections between morphology and spectral properties. Photometric correction (Ciarniello et al., 2015), thermal emission removal in the 3.5-5 micron range and georeferencing have been applied to I/F data in order to derive spectral indicators, e.g. VIS-IR spectral slopes, their crossing wavelength (CW) and the 3.2 µm organic material band's depth (BD), suitable to identify and map compositional variations. Our analysis shows that smooth terrains have the lower slopes in VIS (<1.7E-3 1/µm) and IR (0.4E-3 1/µm), CW=0.75 µm and BD=8-12%. Intermediate VIS slope=1.7-1.9E-3 1/µm, and higher BD=10-12.8%, are typical of consolidated surfaces, some dust covered regions and Seth where the maximum BD=13% has been observed. Large-scale depressions and Imhotep are redder with a VIS slope of 1.9-2.1E-3 1/µm, CW at 0.85-0.9 µm and BD=8-11%. The minimum VIS-IR slopes are observed above the Hapi, in agreement with the presence of water ice sublimation and recondensation processes observed by VIRTIS in this region (De Sanctis et al., 2015).Authors acknowledge ASI, CNES, DLR and NASA financial support.References:-Coradini et al., SSR, 28, 529-559, 2007-Ciarniello et al., A&A, in press-Capaccioni et al., Science, 347, aaa0628 1-4, 2015-Thomas et al., Science, 347, aaa0440 1-6, 2015-El-Marry et al., A&A, in press-De Sanctis et al., Nature, in press

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