COMPOSITIONAL MAPPING OF VESTA QUADRANGLE V-23. K. Stephan[1], R. Jaumann [1,2], C.M. De Sanctis[3], E. Ammannito[3], C.M. Pieters[4], K.-D. Matz[1], F. Preusker[1], Th. Roatsch[1], C.T. Russell[5], C.A. Raymond[6] and the Dawn Science Team. [1]Institute of Planetary Research, DLR, Berlin, Germany, [2]FU Berlin, Inst. of Geosciences, [3]INAF, Rome, Italy, [4]Brown University, Providence, USA,[5]UCLA, Los Angeles, USA, [6] JPL, Caltech, Pasadena, USA.

Introduction: Since the arrival of the Dawn spacecraft [1] at Vesta the Visible and InfraRed Imaging Spectrometer (VIR) [2] has acquired hyperspectral images of Vesta's surface in the wavelength range from 0.25 to 5.1µm. As part of the analysis of Vesta's surface composition, a series of four quadrangle maps following the scheme of [3] have been produced showing the results derived from the spectroscopic analysis of the VIR data. We present the results of the spectroscopic analysis achieved for the quadrangle V-23, which covers Vesta's surface between 57°N - 57°S and 180° - 360°.

Major spectral properties: VIR spectra show clear evidence that pyroxenes, with the typical absorptions near 0.9 and 1.9µm, dominate Vesta's surface composition. However, significant variability in slope, strength and wavelength position of the spectral signatures is observed, which indicates multiple physical surface processes [4]. The surface of Vesta imaged by VIR shows spectral variations at local and global scale, which are mostly related to specific geological units or morphological surface features. Different surface materials are identified by combining different spectral channels or band ratios into color images (Fig. 1), and are known to be sensitive to the content of mafic minerals in the surface material as well as its relative freshness [5]. In combination with the visible albedo of Vesta's surface this color-ratio composite shows 1) bright materials are yellow/green, and 2) dark materials blue/violet.

Based on spectral parameters [4], the V-23 quadrangle can be divided very broadly into the following terrain types. 1) The *Mid-Latitude Terrains* (MLT) located mainly in the southern hemisphere (between 20 and 50°S) are characterized by deep pyroxenes bands. Similar terrains are found in the northern hemisphere in correspondence of specific geological structure. These terrains. 2) The *Equatorial Terrains* (ET) show predominantly intermediate pyroxenes band depths. 3) The *Copious Ejecta Terrains* (CET) includes a couple of locations where copious crater ejecta are found. These terrains are characterized by low reflectance in the VIS and shallow pyroxenes bands

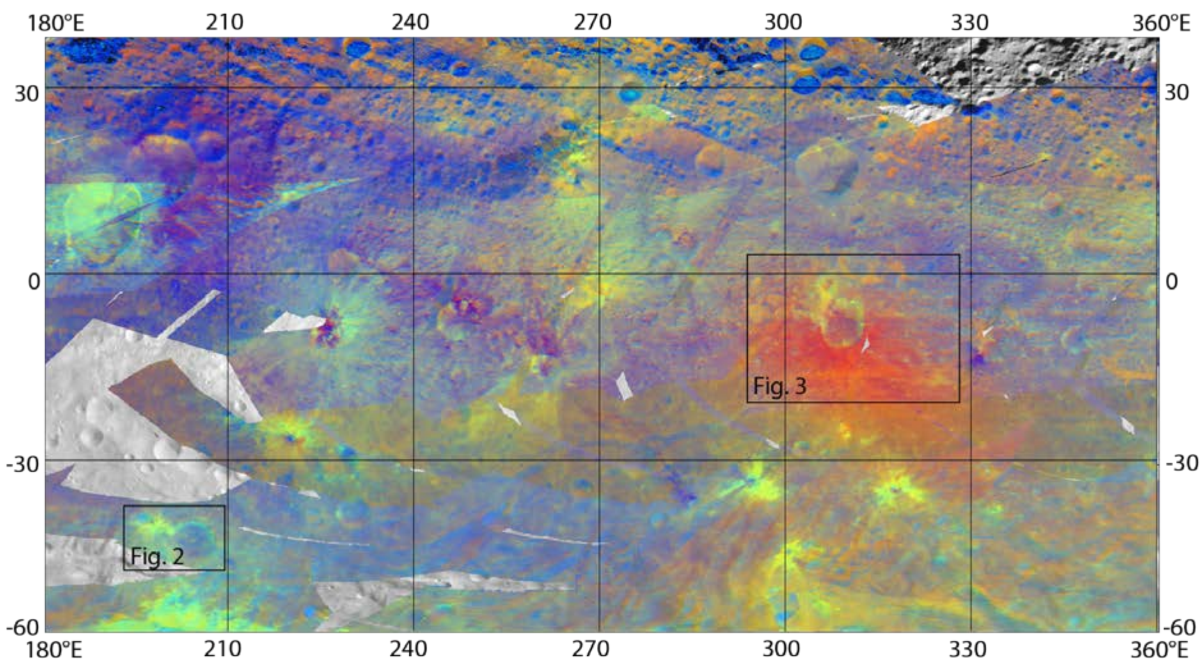

Fig. 1 VIR ratio color composite of Vesta for quadrange V-23 using ratioes of VIR channels 438nm/749nm (Red), 749nm/917nm (Green) and 749nm/438nm (Blue), superimposed on an orthorectified image mosaic [6].

Correlations to geological surface features: *Fresh bright materials* are often associated with strong pyroxene (Fig. 2). Their ejecta presumably represent the composition of subsurface material, buried beneath Vesta's regolith, which has been excavated during the impact process. These impact craters are most frequent in the southern part of our area of interest. This region marks the transition into Vesta's prominent southern impact basin and corresponds to the general south/equatorial dichotomy of Vesta's surface composition [4]. In addition, bright relatively fresh material can also be observed on crater walls of impact craters with pronounced topography where fresh material became exposed due mass wasting processes.

A second group of small presumably fresh impact craters mainly located in the equatorial region partly show *dark ejecta*, dark material covering the crater floor and/or being exposed on the crater walls [6]. The dark material appears blue in the ratio color composite and exhibits VIR spectra with a strongly reduced pyroxene signature [4].

Of special interest is one of Vesta's largest impact craters named Oppia (6.5°S/307.8°E) which is surrounded by extended ejecta material, classified as CET. The ejecta show significantly different pyroxene signatures and can be distinguished from the surrounding terrain by its red color in the ratio color composite (Fig. 3).

References: [1] Russell, C.T. et al. (2004) *PSS*, 52, 465–489. [2] De Sanctis, M.C. et al. (2011) *SSR, 163*. [3] Greeley, R. and Batson, G. (1990) *Planetary Mapping, 32*. [4] De Sanctis, M.C. et al. (2012) this session. [5] Tompkins, S. & Pieters, C.M. (1999) *Meteor. & Plan. Sc*., 34, 25-41. [6] Jaumann et al. (2012) this session.

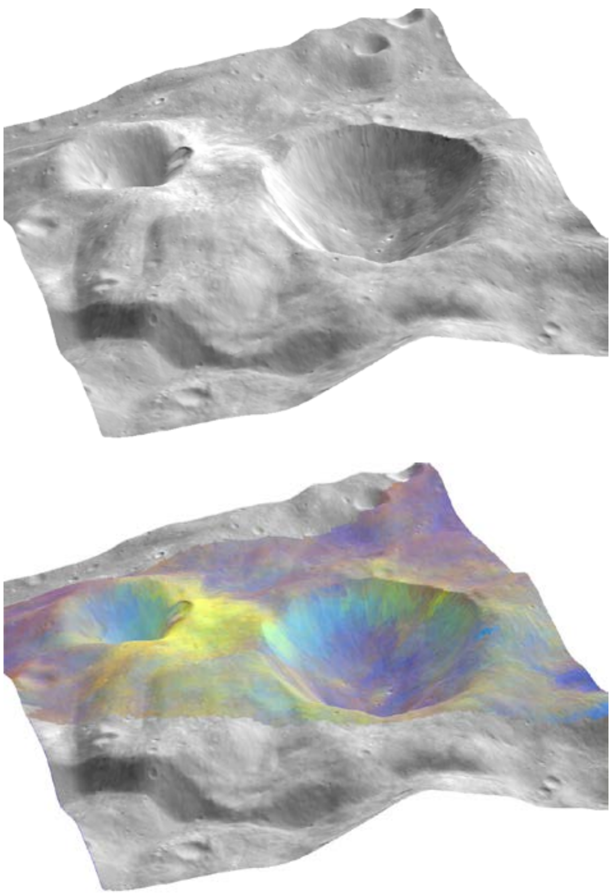

Fig. 2 Fresh bright material associated with a small fresh impact crater (~45°S/120°E) characterized by strong pyroxene signature compared to the surrounding region (FC Clear filter image (top), ratio color composite as shown in Fig. 1 (bottom).

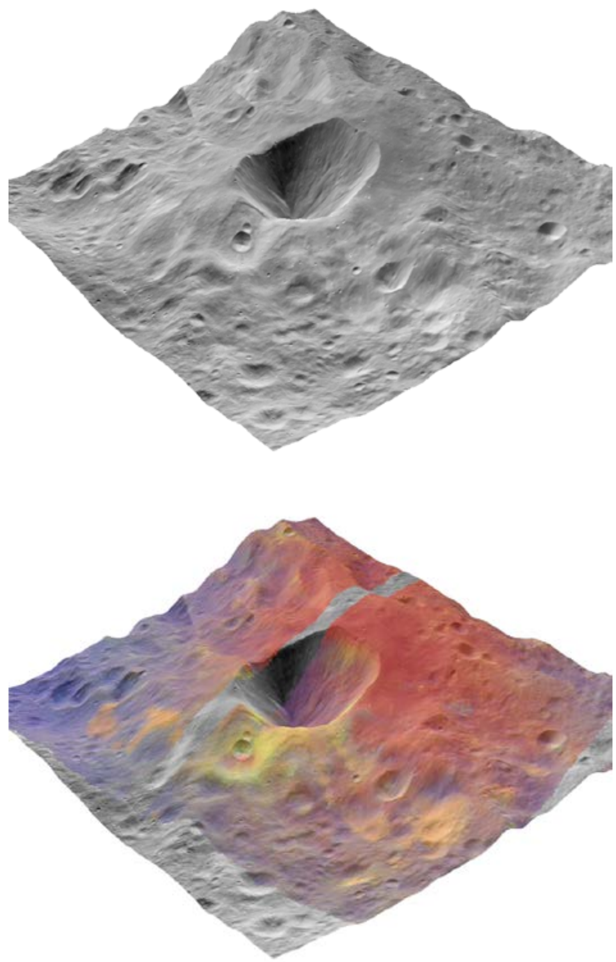

Fig. 3 Impact crater Oppia (6.5°S/307.8°E) as seen by the CLEAR filter of the FC camera (top), VIR ratio color composite as shown in Fig. 1 (bottom).