

VESTA AND THE HED METEORITES: COMPARISON OF SPECTRAL PROPERTIES. E. Ammannito¹, M.C. De Sanctis¹, S. Fonte¹, G. Magni¹, F. Capaccioni¹, F. Carraro¹, M.T. Capria¹, M. Farina¹, A. Frigeri¹, S. Marchi², E. Palomba¹, F. Tosi¹, F. Zambon¹, D. Blewett³, J.P. Combe⁴, T. B. McCord⁴, D.W. Mittlefehldt⁵, H. Y. McSween⁶, C.M. Pieters⁷, J.M. Sunshine⁸, T.N. Titus⁹, M. Toplis¹⁰, S.P. Joy¹¹, C.A. Polansky¹², C.A. Raymond¹² and C.T. Russell¹¹ and C.A. Raymond¹², ¹Istituto di Astrofisica e Planetologia Spaziali INAF, Roma, Italy (eleonora.ammannito@inaf.it), ²NASA Lunar Science Institute, Boulder, USA, ³Johns Hopkins University APL, Laurel, USA, ⁴Bear Fight Institute, Winthrop, USA, ⁵NASA/Johnson Space Center, Houston, USA, ⁶University of Tennessee, Knoxville, USA, ⁷Brown University, Providence, USA, ⁸University of Maryland College Park, Greenbelt, USA, ⁹USGS Astrogeology Science Center, Flagstaff, USA, ¹⁰Observatoire du Midi-Pyrenees, France, ¹¹UCLA, Los Angeles, USA, ¹²JPL, Pasadena, USA.

Introduction: We present the main results obtained comparing spectral data in the visible-near infrared range of Vesta's surface acquired by the Dawn spacecraft with those for howardite, eucrite, diogenite (HED) meteorites. HEDs are commonly associated with Vesta's composition based on spectral similarities [1]. Because of such association, much effort is being made to merge the information from HEDs with that from Vesta to characterize the lithologic diversity of its surface and to infer clues regarding its thermal history.

Using information provided by Dawn's VIR spectrometer [2,3], we studied the distribution of spectral heterogeneities on the surface and used our findings to perform a comparison with HED spectra searching for analogies and/or incompatibilities.

Measurements: In this study we focused on data acquired by VIR during Survey and HAMO [4]. VIR is an imaging spectrometer sensitive in the spectral range between 0.3 and 5.0 μm . During Survey, VIR covered more than 65% of the Vesta's surface acquiring 3.7 million spectra with a nominal spatial sampling of 700m. During HAMO, VIR covered more than 7.8% of the Vesta's surface acquiring 3.8 million spectra with a nominal spatial sampling of 200m. HED spectra were downloaded from the RELAB database [5].

Discussion: We focused on the two pyroxene absorption bands near 0.93 μm (Band I) and 1.95 μm (Band II). In the Band I vs. Band II center plot, the HEDs have a well defined trend, although the distribution of the three groups partially overlap. This type of plot is often used to examine spectra of Vesta/Vestoids and HEDs [6]. In this study we used this approach for the comparison. A plot of Band I vs. Band II centers for the VIR/Survey (Vesta) and RELAB (HED) spectra is shown in Fig. 1. The average spectrum (green star in the plot) considers only one spectra for each location in order to avoid oversampling of repeatedly observed regions.

In general the VIR spectra acquired during Survey are compatible with an howarditic composition. However, at some locations the spectra are consistent with more diogenitic or eucritic compositions. Areas closer to Vesta's south polar basin have Band I and Band II

centers at shorter wavelength (diogenitic/howarditic composition) while mid and equatorial latitudes generally have band center values compatible with eucritic/howarditic composition. Spots which differ from this general trend are of particular interest and will be studied in more detail.

References: [1] McCord et al., *Science* 1970 [2] Russell et al., 2011 [3] De Sanctis et al., 2011 [4] De Sanctis et al., submitted. [5] Pieters and Hiroi, 2004 [6] Moskovitz et al., 2010.

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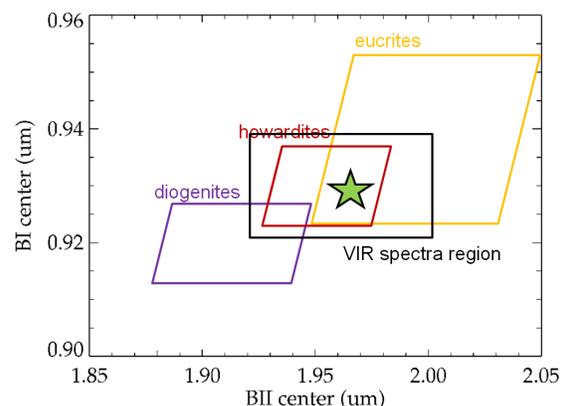


Figure 1: Band I center versus Band II center. The red, yellow and violet boxes outline the distribution of howardites, eucrite and diogenites respectively. The black box is the distribution of the VIR spectra acquired in Survey. The green star is the average value of the VIR spectra.