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# Hyperspectral views of Vesta details: LAMO results

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## Abstract

4 Vesta has a surface of basaltic material (1) with strong absorption features centered near 0.9 and 1.9 µm, indicative of Fe-bearing pyroxenes. The spectra of HED (howardite, eucrite and diogenite) meteorites have similar features (1). This led to the hypothesis that Vesta was the parent body of the HED clan (2,3) and the discovery of a dynamical Vesta family of asteroids (Vestoids) provides a further link between Vesta and HEDs (4). Data from the Dawn VIR (Visible InfraRed mapping Spectrometer) (5,6) characterize and map the mineral distribution on Vesta, strengthen the Vesta – HED linkage and provide new insights into Vesta's formation and evolution.

## 1. Introduction

VIR acquired data during Approach, Survey, High Altitude Mapping (HAMO) and Low Altitude Mapping (LAMO) orbits that provided very good coverage of the surface. Data of high quality, from 0.2 to 5 microns in 864 spectral channels have been acquired. The data from LAMO are those at highest resolution and give us a detailed view of some areas of Vesta surface. Most of the data acquired during LAMO have been obtained for the South Polar region, where the giant impact basin RheaSilvia is located.

## 2. LAMO data

Dawn VIR spectra are characterized by pyroxene absorptions at 0.9 and 1.9 µm (hereafter BI and BII). Vesta exhibits spectral variations at both large and small scales, but the materials on the surface are always dominated by rocks formed via mafic magmatism, as indicated by the ubiquitous BI and BII pyroxene signatures.
In particular VIR data strongly indicate that the south polar region (Rheasilvia) has its own spectral characteristics: deeper and wider band depths, average band centers at shorter wavelengths, quite uniform spectral behavior of the central mound. These spectral behaviors indicate the presence of Mg-pyroxene-rich terrains in Rheasilvia

The LAMO data help in understanding the details of the mineralogy seen on Rheasilvia basin. Here an example of LAMO VIR data. In fig. 1 is shown a portion of Rheasilvia basin where Tarpeia Crater is located and, in fig. 2, the same area but in different color composite in order to highlight the excavated material on the Tarpeia crater walls. The spectra of the different material are depicted in fig. 3.
The spectra of the Tarpeia floor and of the area external to the crater show similar behaviour, indicating the same mineralogy (fig. 3 brown and yellow spectra). The difference between the crater floor (fig. 3 yellow spectrum) and the exposed walls (fig .3 blue spectrum) are mainly in the band depths, suggesting a more pyroxene rich or fresher composition for the crater walls material. In this case, that material must have been exposed during a landslide or a similar event on the crater side. Otherwise, the deeper band could indicate a different, more diogenitic rich, lithology (6).

Detailed spectral parameters as band canters and depths will be used to map the small scale mineralogy of RheaSilvia basin.

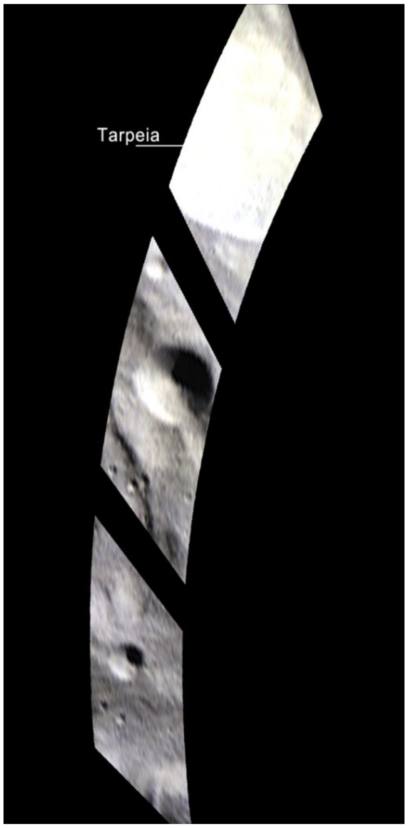


Figure 1: Sterographic projections of VIR data.

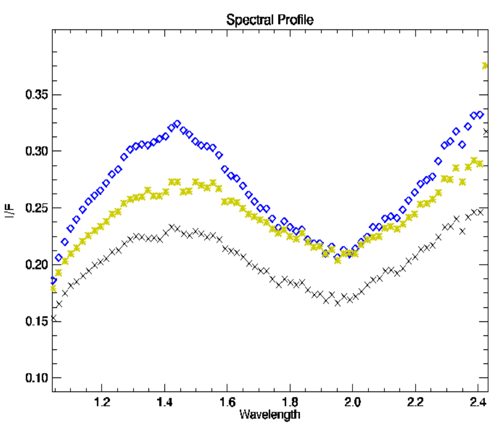


Figure 3: Spectra of the materials in figure 2.

## References


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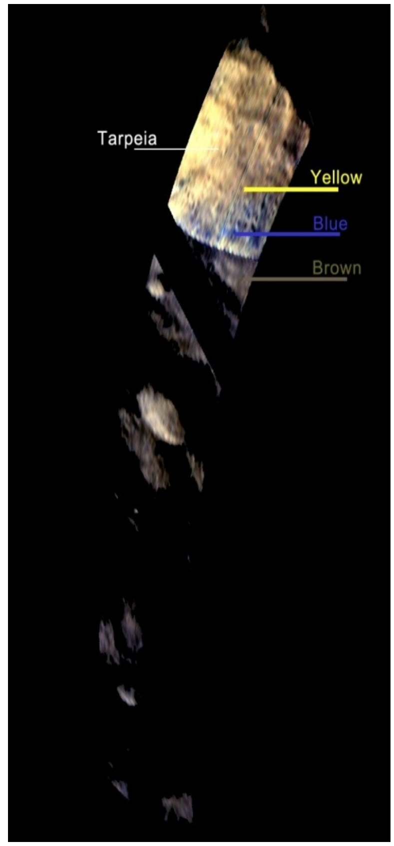


Figure 2: Sterographic projections of VIR data enhanced to highlight exposed crater walls material.


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