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Compositional mapping of Vesta quadrangle Av-10

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The Dawn spacecraft entered orbit around asteroid 4 Vesta in mid-July 2011. Since then, the Visible and InfraRed Imaging Spectrometer (VIR) acquired hyperspectral images of Vesta's surface in the overall wavelength range from 0.25 to 5.1 μm.
During the Approach and Survey mission phases (23 July through 29 August 2011), VIR obtained resolved images of Vesta with spatial resolution between 1.31 km and 0.68 km/pix. More than 65% of the surface, from the South Pole up to $\sim$40°N, was observed under different illumination conditions and local solar elevations. Further data were acquired in the subsequent HAMO and LAMO phases.
Based on this datasets, the Dawn Team is conducting mineralogical mapping of Vesta's surface in the form of 15 quadrangle maps. In this work we present the results of the spectroscopic analysis carried out for the quadrangle Av-10 ("Oppia"), spanning Vesta's latitude 22S° - 22N° and longitude 288° - 360°.
Vesta is known to have a basaltic surface from visible/near-infrared reflectance spectroscopy. Although pyroxenes' spectral signatures at about 0.9 and 1.9 μm are ubiquitous on Vesta and largely dominate its surface composition, significant variability in slope, strength and wavelength position of the center of these features can be measured, which indicate multiple physical surface processes. Absorption band depth is sensitive to abundance, texture and multiple scattering effects. On the other hand, the position of the band centers is sensitive to Calcium and Magnesium abundance in pyroxenes, which is crucial to establish a link with Howardite, Eucrite and Diogenite meteorites' clan (HEDs).
On the basis of several spectral indices, the surface of Vesta can be divided into different terrain types, which are mostly related to specific geological units or morphological surface features. By combining VIR channels and ratios into colour images, the presence and abundance of these materials can be revealed. Among the terrain types identified on Vesta, Copious Ejecta Terrains (CET) are the most abundant in the Av-10 quadrangle. These terrains are characterized by low reflectance in the VIS and shallow pyroxene bands, compared to Mid-Latitude Terrains (MLT).
Combined with the visible albedo of Vesta's surface, the RGB composite made by using "Clementine" colours shows that: 1) bright material are yellow/green, 2) dark material blue/violet, and 3) spectrally distinct material (ejecta) are red/purple.
In the Oppia quadrangle, some unnamed craters have ejecta showing deeper absorptions at 1.9 μm. Conversely, other small craters partly show dark ejecta, which appear blue in the Clementine ratio color composite and exhibit VIR spectra with a strongly reduced pyroxene signature. However, the most notable feature of quadrangle Av-10 is the Oppia crater (6.5°S/307.8°E), from which the quadrangle itself is named. The Oppia crater is surrounded by extended ejecta material, classified as CET. These ejecta show significant differences in pyroxenes' signatures (reduced band depths) and they can be distinguished in the above ratio color composite by their prominent red colour compared to the surrounding terrains.