GEOLOGIC STRUCTURES IN CRATER WALLS ON VESTA.

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The Framing Camera (FC) on the Dawn spacecraft has imaged most of the illuminated surface of Vesta with a resolution of ~20 m/pixel through different wavelength filters that allow for identification of lithologic units. The Visible and Infrared Mapping Spectrometer (VIR) has imaged the surface at lower spatial resolution but high spectral resolution from 0.25 to 5 µm that allows for detailed mineralogical interpretation. The FC has imaged geologic structures in the walls of fresh craters and on scarps on the margin of the Rheasilvia basin that consist of cliff-forming, competent units, either as blocks or semi-continuous layers, hundreds of m to km below the rims. Different units have different albedos, FC color ratios and VIR spectral characteristics, and different units can be juxtaposed in individual craters. We will describe different examples of these competent units and present preliminary interpretations of the structures.

A common occurrence is of blocks several hundred m in size of high albedo (bright) and low albedo (dark) materials protruding from crater walls. In many examples, dark material deposits lie below coherent bright material blocks. In FC Clementine color ratios, bright material is green indicating deeper 1 µm pyroxene absorption band [1]. VIR spectra show these to have deeper and wider 1 and 2 µm pyroxene absorption bands than the average vestan surface [2]. The associated dark material has subdued pyroxene absorption features compared to the average vestan surface [3-5]. Some dark material deposits are consistent with mixtures of HED materials with carbonaceous chondrites [3]. This would indicate that some dark material deposits in crater walls are megabreccia blocks. The same would hold for bright material blocks found above them. Thus, these are not intact crustal units.

Marcia crater is atypical in that the dark material forms a semi-continuous, thin layer immediately below bright material [6]. Bright material occurs as one or more layers. In one region, there is an apparent angular unconformity between the bright material and the dark material where bright material layers appear to be truncated against the underlying dark layer.

One crater within the Rheasilvia basin contains two distinct types of bright materials outcropping on its walls, one like that found elsewhere on Vesta and the other an anomalous block ~200 m across. This material has the highest albedo; almost twice that of the vestan average [7]. Unlike all other bright materials, this block has a subdued 1 µm pyroxene absorption band in FC color ratios [8]. These data indicate that this block represents a distinct vestan lithology that is rarely exposed.

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