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Geologic and Mineralogic Mapping of Av-6 (Gegania) and Av-7 (Lucaria) Quadrangles of Asteroid 4 Vesta

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NASA's Dawn spacecraft arrived at the asteroid 4 Vesta in July 2011 and is now collecting imaging and spectroscopic data during its one-year orbital mission. The maps we present are based on information obtained by the Visible and Infrared Mapping Spectrometer VIR-MS and the multi-color Framing Camera FC. VIR covers the wavelength range between 0.25 to 5.1 μm while FC covers the range 0.4 to 1.0 μm. The VIR instrument has a significant higher spectral resolution than FC but the latter achieves higher spatial resolution data.
As part of the geological and mineralogical analysis of the surface, a series of 15 quadrangles have been defined covering the entire surface of Vesta. We report about the mapping results of quadrangle Av-6 (Gegania) and Av-7 (Lucaria). The Gegania quadrangle is dominated by old craters showing no ejecta blankets and rays while several small fresh craters do. The most obvious geologic features are a set of equatorial troughs, a group of three ghost craters of similar diameter ($\sim$57 km), an ejecta mantling of the Gegania crater and three smaller craters showing bright and dark ejecta rays. The quadrangle contains two main geologic units: 1) the northern cratered trough terrain and 2) the equatorial ridge and trough terrain. The quadrangle shows moderate variation in Band II center wavelength and Band II depth. FC color ratio variations of some recent craters and their ejecta are linked to the bright and dark material. The bright material is possibly excavated eucritic material while the dark material could be remnants of a CM2 impator(s) or an excavated subsurface layer of endogenic origin. The most prominent geologic features in the Lucaria quadrangle are the 40 km long hill Lucaria Tholus, a set of equatorial troughs, some relatively fresh craters with bright and dark material and mass wasting. The quadrangle contains three main geologic units: 1) the northern cratered trough terrain, 2) the equatorial ridge and trough terrain, and 3) the equatorial cratered terrain. The quadrangle exhibits moderate variation in Band II center wavelength and only small variation in Band II depth. FC ratio maps show a distinct variation of the pseudo 1-μm band depth. Ejecta material showing steeper VIS spectral slope is located in the western part of the quadrangle.