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Colors and photometry of bright materials on Vesta as seen by the Dawn Framing Camera

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The Dawn spacecraft has been in orbit around the asteroid Vesta since July, 2011. The on-board Framing Camera has acquired thousands of high-resolution images of the regolith-covered surface through one clear and seven narrow-band filters in the visible and near-IR wavelength range. It has observed bright and dark materials that have a range of reflectance that is unusually wide for an asteroid. Material brighter than average is predominantly found on crater walls, and in ejecta surrounding caters in the southern hemisphere. Most likely, the brightest material identified on the Vesta surface so far is located on the inside of a crater at 64.27°S, 1.54°. The apparent brightness of a regolith is influenced by factors such as particle size, mineralogical composition, and viewing geometry. As such, the presence of bright material can indicate differences in lithology and/or degree of space weathering. We retrieve the spectral and photometric properties of various bright terrains from false-color images acquired in the High Altitude Mapping Orbit (HAMO). We find that most bright material has a deeper 1-μm pyroxene band than average. However, the aforementioned brightest material appears to have a 1-μm band that is actually less deep, a result that awaits confirmation by the on-board VIR spectrometer. This site may harbor a class of material unique for Vesta. We discuss the implications of our spectral findings for the origin of bright materials.