PHOTOMETRIC MAPPING OF VESTA FROM HST OBSERVATION. Jian-Yang Li[1], L.A. McFadden[1], P.C. Thomas[2], M.J. Mutchler[3], J.Wm. Parker[4], E.F. Young[4], C.T. Russell[5], M.V. Sykes[6], B.E. Schmidt[5], [1]Dept. of Astronomy, Univ. of Maryland, College Park, MD (*jyli@astro.umd.edu*), [2]Center for Radiophysics and Space Research, Cornell University, [3]Space Telescope Science Institute, [4]Southwest Research Institute, [5]IGPP, University of California at Los Angeles, [6]Planetary Science Institute.

Introduction: Vesta is the only large asteroid known to have a basaltic surface that preserves a record of ancient volcanic activity. It is considered the parent body of Howardite-Eucrite-Diogenite (HED) meteorites and small vestoids [1,2,3]. In previous observations with HST/WFPC2, its northern hemisphere from 15°S to 50°N latitude was mapped [4]. To better support NASA Dawn mission's orbital investigation of Vesta in 2011 [5], and study the composition around the large crater near its south pole, we obtained WFPC2 images of Vesta at a sub-Earth latitude 18°S.

Observations and Data Reduction: The observation has complete and almost uniform coverage over the rotation of Vesta through all four filters, which were used in previous observations. The pixel scale is ~38.5 km at Vesta, or ~9° longitude/latitude at disk center. All images went through the standard HST calibration pipeline, then were calibrated for absolute photometry. The shape of Vesta was modeled from these data and found to agree with the previous shape model [6] very well, which was used in our analysis.

Results: Disk-resolved photometric modeling and mapping is performed following the same method used for Ceres mapping [7]. Deconvolved images were used in order to correct for PSF. Photometric modeling was performed and is good at incidence and emission angles <50°, limiting the final maps to be between latitudes 50°S and 20°N. After removing limb-darkening profiles from all images, they are projected onto a longitude-latitude coordinate system and combined to construct albedo maps. The maps from original images and deconvolved images are consistent with each other, but the latter have fewer seams and artifacts (Fig. 1). These new maps agree with previous ones [4] in the overlapped region.

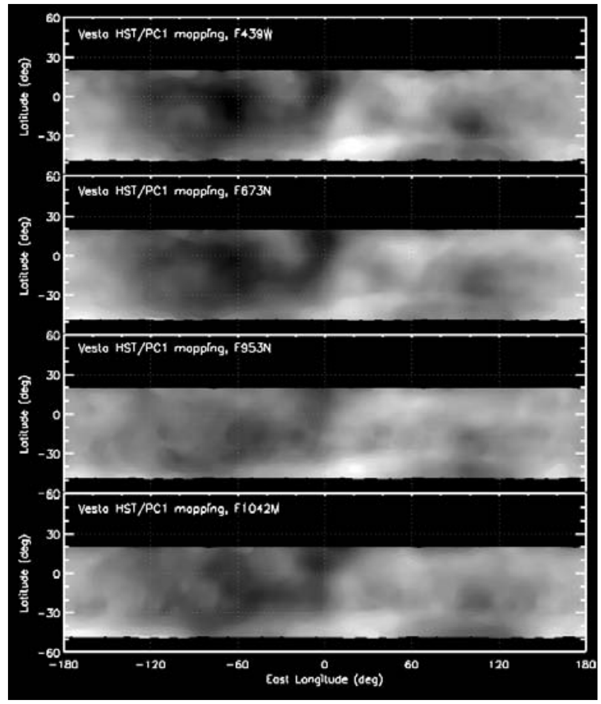

Fig. 1. Albedo maps of Vesta, displayed at a linear gray scale from -17% to +17% from the global averages at four wavelengths. They are smoothed by 9°.

We combined the albedo maps at four wavelengths following the color scheme used in [4], as shown in Fig. 2, with the features identified in [4] marked. Overall the new map is consistent with the previous color composite map. The mineralogical diversity represented by color is clearly shown. Comparison between the color composite map and topographic map [3] reveals a correlation between broader and deeper 1-μm absorption and topographic highs near the rim of the south pole crater (e.g., at 120E,50S). This is an indication of more mixture with minerals from depth and upturned during crater excavation.

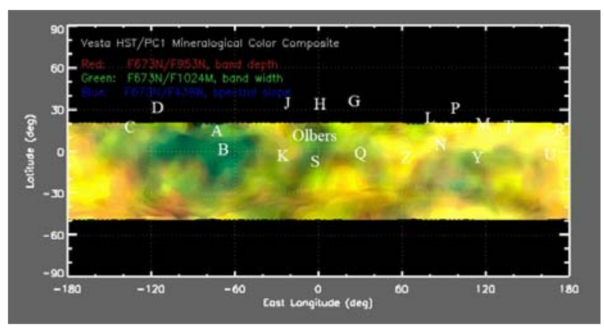

Fig. 2. Compositional map with the same color scheme as used in [4]. Red represents 1-μm band depth, green the band width, and blue the out-of-band red-slope. The color has been adjusted to match Fig. 3 in [4] as close as possible.

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