MAPPING VESTA USING A HYBRID METHOD FOR INCORPORATING SPECTROSCOPIC AND MORPHOLOGIC DATA. R.A. Yingst[1], Daniel C. Berman[1], W. Brent Garry[2], Scott C. Mest[1], David A. Williams[3] and Tracy K.P. Gregg[4]; [1]Planetary Science Institute (1700 E. Fort Lowell, Suite 106, Tucson, AZ 85719; yingst@psi.edu); [2]Goddard Spaceflight Center; [3]Arizona State University; [4]University at Buffalo (SUNY).

We are constructing a 1:300,000-scale global geologic map of Vesta using the Dawn Framing Camera (FC) images, DTM-derived slope / contour maps, and visible color and spectroscopic data. Our goal is to explore best practices for geologic mapping with multiple, disparate datasets, under the challenges presented by an airless, rocky body with complex topography.

Mapping using color/multispectral data is difficult as boundaries and the "colors" themselves are often gradational. Thus it is problematic to tie a combination of colors to a rock body. It is possible to interpret the composition of the sampled layer, but because that layer is only a few µm thick, in the absence of other information it is not always clear how or whether that color data correlate with a surficial unit. However, spectral data also yield unique information: on an airless body, the ejecta of an impact event can persist relatively unchanged, potentially over geologic timescales. Thus, even the upper microns of the surface can contain records of the vertical composition of the rock body, as observed on Vesta.

In previous map iterations, we found that unique information provided by spectral data was being lost in the mapping process. We are now designing a hybrid method that requires creating a map based primarily on color/spectral data, and then combining those results with a "traditional" map based on morphology / topography. Our objective is to tie color data into meaningful map units, presented in a new visual scheme not normally used for maps of other bodies.

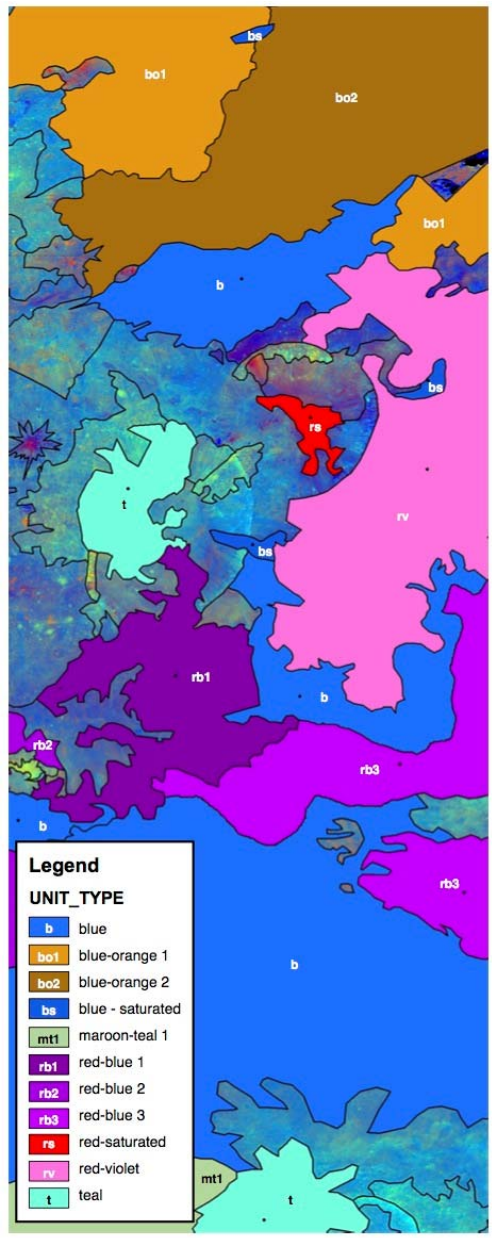

Figure 1. Color unit map of Marcia crater and environs; color basemap is visible as bluish-green material in the upper left and lower right, where units have not yet been defined. Note how the crater rims of Marcia and Calpurnia (left, center) are difficult to see, and the rim of Minucia (right) is not resolved in the color data. The basemap used for this was FC visible color data provided by the research group headed by A. Nathues, Max Planck Institute for Solar System Research, 2018.