MAPPING TYRRHENA PATERA AND HESPERIA PLANUM, MARS. Tracy K.P. Gregg[1] and David A. Crown[2], [1]Department of Geology, 876 Natural Sciences Complex, University at Buffalo, Buffalo, NY 14260, tgregg@geology.buffalo.edu; [2]Planetary Science Institute, 1700 E. Ft. Lowell Rd., Suite 106, Tucson, AZ 85719, crown@psi.edu.

Introduction: Hesperia Planum, characterized by a high concentration of mare-type wrinkle ridges and ridge rings [1-4], encompasses > 2 million km^2 in the southern highlands of Mars (Fig. 1). The most common interpretation is that the plains were emplaced as "flood" lavas with total thicknesses of <3 km [4-10]. The wrinkle ridges on its surface make Hesperia Planum the type locale for "Hesperian-aged ridged plains" on Mars [e.g., 9], and recent investigations reveal that wrinkle-ridge formation occurred in more than one episode [4]. Hesperia Planum's stratigraphic position and crater-retention age [e.g., 9, 11-12] define the base of the Hesperian System. However, results of geologic mapping reveal that the whole of Hesperia Planum is unlikely to be composed of the same materials, emplaced at the same geologic time. To unravel these complexities, we are generating a 1:1.5M-scale geologic map of Hesperia Planum and its surroundings (Fig. 1). We have identified 4 distinct plains units within Hesperia Planum and are attempting to determine the nature and relative ages of these materials (Fig. 2) [13, 14].

The volcano Tyrrhena Patera (22°S, 104°E) is located within Hesperia Planum. Its products are both embayed by, and superpose, Hesperia Planum materials [15, 16]. We were previously funded to generate a 1:1 million scale map of Mars Transverse Mercator (MTM) quadrangles -15257 and -20257, which include the Tyrrhena Patera materials north and west of the Tyrrhena Patera summit. The goal for these maps was to constrain the nature and extent of the Tyrrhena Patera deposits, and to determine the relationship between Tyrrhena Patera materials, Hesperia Planum, and the adjacent highlands [16].

Mappable Materials: Geologic units within Hesperia Planum can be broadly classified as those associated with Tyrrhena Patera, and those that are not (Fig. 2). Crown and others [14] discuss the characteristics and relative ages of the Tyrrhena Patera materials. The plains materials to the south and southeast of Tyrrhena Patera are heavily affected by fluvial, ice, and possibly lacustrine processes [17-19], making interpretations of the original nature of the materials difficult. Here, we discuss previously unidentified plains units within eastern Hesperia Planum and the adjacent highlands.

The region of Hesperia Planum located to the east of Tyrrhena Patera (Fig. 2) is the typical "Hesperian ridged plains" [7, 9]. Aside from Tyrrhena Patera, no obvious volcanic vents have been found within Hesperia Planum [cf. 4, 12, 16, 20, 21]. Lava flows can be seen at available image resolutions in the Tyrrhena Patera lava flow field [22] that post-dates the ridged plains, but lava flow lobes are not readily apparent within the ridged plains. Rare channels can be observed in THEMIS infrared and visible images: channels tend to be linear and generally trend north-south; in one case deposits can be observed at the channel margins.

In eastern Hesperia Planum, we have identified the following plains units: *highland knobby plains*, *smooth plains*, *highland smooth plains*, and *knobby plains*. MOLA data reveal that the east and west boundaries of the continuous topographic basin that defines Hesperia Planum closely follow the 2-km contour, and most of what has been geologically defined as Hesperia Planum [cf. 1, 7] is contained within that contour line. In contrast, highland plains occur in isolated outcrops surrounded by highlands material (Fig. 3). Units with the descriptor "highlands" are found at elevations above 2 km [23]. Jones-Krueger [23] discusses the potential for these basins to have been sites of temporary lakes, fed by highland valley networks.

The highlands materials surrounding Hesperia Planum show various abundances of gullies/channels and the sharpness (or roundness) of their summits [23]. It is unlikely, however, that these erosional variations reflect material properties, but rather differing degrees of erosion.

Mapping Progress: MTM quadrangles -15257 and -20257 have been mapped; crater size-frequency distributions have been calculated using Barlow's crater database for craters ≥5 km in diameter. However, we would like to complete a more detailed crater count, using craters >1 km in diameter. We plan to have the MTM map submitted for review by the end of this summer. Within the Hesperia Planum map area, the plains-forming materials are mapped; we are mapping the highlands materials and comparing our results with those found in published 1:500K-scale maps of the region. Crater statistics are being compiled. We hope to have this map submitted for review by the end of the calendar year.

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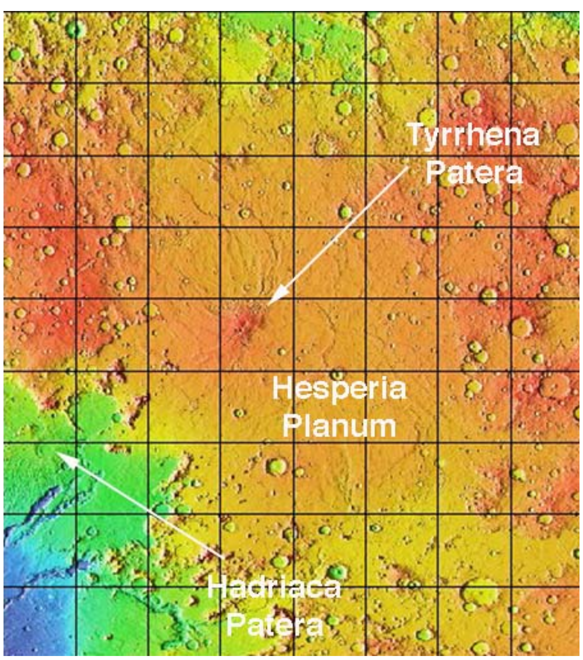

Figure 1. Gridded MOLA data (128 pixels/degree) of the area being mapped at 1:1.5 million. Reds are topographic highs (Tyrrhena Patera summit is ~3 km above mean planetary radius) and blues are lows.

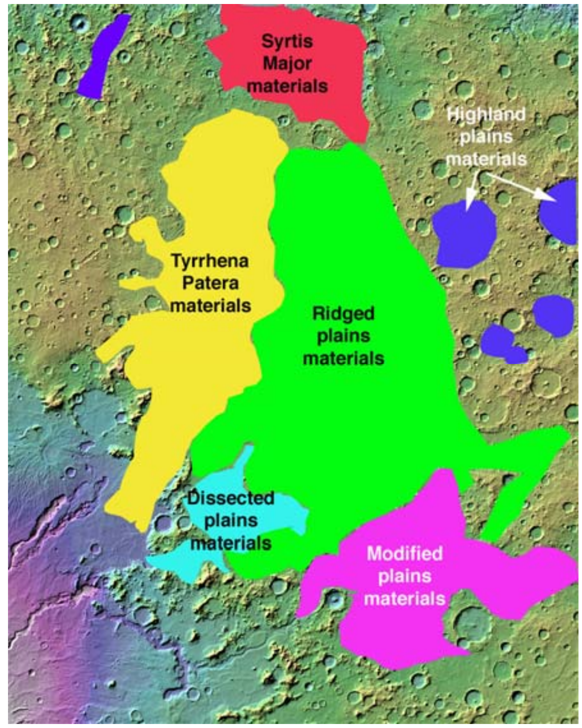

Figure 2. Rough boundaries of identified plains materials within Hesperia Planum. Portions of these materials were originally mapped as "Hesperian-aged ridged plains" at 1:15 million [9].

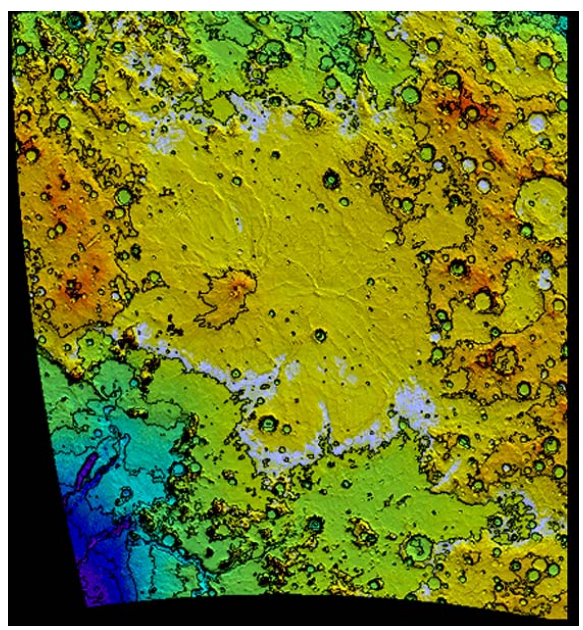

Figure 3. Hesperia Planum with 1-km-interval contour lines. The boundary of Hesperia Planum [9] roughly corresponds with the 2-km elevation line [21].