

GEOLOGIC MAPPING OF MTM QUADRANGLES -20022, -25022, -20017, AND -25017 IN MARGARITIFER TERRA, MARS. S. A. Wilson and J. A. Grant, Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, 6th at Independence SW, Washington, DC, 20560, wilsons@si.edu and grantj@si.edu.

Introduction: Margaritifer Terra is one of the most impressive water-modified landscapes on Mars. This region preserves a suite of fluvial landforms including the highest density of valley networks on the planet, the Uzboi-Ladon-Morava meso-scale outflow system, and younger alluvial fans within numerous craters [e.g., 1-10]. With an expected completion date of 2023, we are mapping Mars Transverse Mercator (MTM) quadrangles -20022, -25022, -20017, and -25017 within Margaritifer Terra (**Fig. 1**). The map encompasses the medial to distal portions of the Samara-Himera and Paraná-Loire valley network systems, two of the largest and best integrated valley systems on Mars [12], whose trunk valleys integrate much of the drainage coming from mapped areas to the east and west (**Fig. 2**).

Motivation for Mapping: Prior geologic mapping in this greater region focuses on the drainage evolution and juxtaposition of various units in either the eastern or western portions of Margaritifer Terra and adjacent northwestern Noachis Terra. The gap in map coverage connecting these regions, however, prevents the evaluation of valleys over a regional scale (**Fig. 1**). Mapping MTM quadrangles -20022, -25022, -20017, and -25017 at a scale of 1:1,000,000 will connect the gap between existing published USGS maps to the east, west, and north to yield a complete regional view of a landscape that records a long history of aqueous

processes. The final product will provide the scientific community with a dataset to understand the morphologic and morphometric investigations of valleys and fluvial/alluvial deposits, the timing of fluvial activity for climate models, and may inform efforts related to understanding the history of Martian habitability.

Initial Reconnaissance and Next Steps in Year

1: We have concluded a broad reconnaissance of the map region using various datasets including CTX, THEMIS day and nighttime IR, and MOLA. We identified localities for understanding how the map area meshes with (and can inform) adjacent maps. For example, the area around Jones crater (**Fig. 3**) has been shaped by the Jones impact event and was subsequently modified by fluvial activity in Samara Valles as well as alluvial fan formation, thereby providing an important constraint on when latest aqueous activity occurred in the region. Key regions that help constrain the timing and duration of fluvial activity will be compared to adjacent map areas. We have identified candidate features and localities in the map area to submit to the IAU for official names. During the first year of mapping, we will create map layers (GeoContacts as well as linear, surface, and point features), clean the linework and build and attribute unit polygons, define unit groups, names, and labels, and create and edit the nomenclature layer.

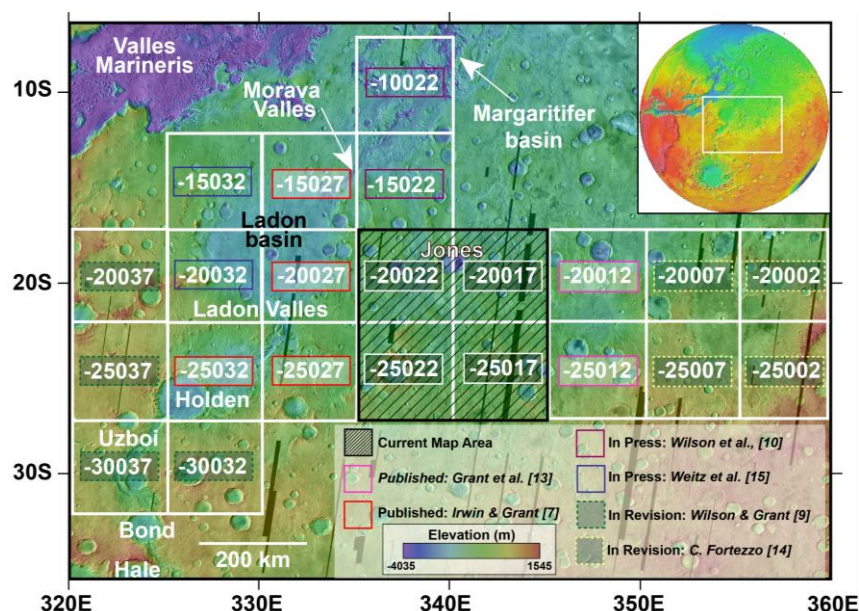


Figure 1. Margaritifer and Noachis Terrae on Mars (white box in inset for context) showing location of MTM quads -20022, -25022, -20017, and -25017 (black hatched area, -17.5°N to -27.5°N between 335°E and 345°E) that are being mapped at 1:1,000,000 scale. Map quads correlate to the yellow box in Fig. 2 and the main panel in Fig. 3. Map base is MOLA over THEMIS daytime infrared mosaic. North is toward the top.

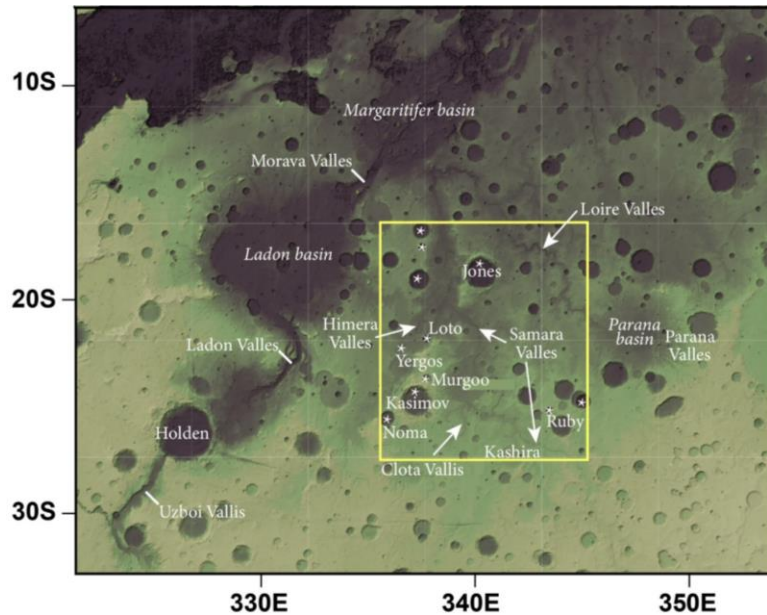


Figure 2. Select place names in and around the region of the map from the International Astronomical Union (IAU) [Gazetteer of Planetary Nomenclature](#) with informal place names in italics. Approximate boundary of the 4 MTM quadrangles for mapping (yellow box, see hachured area in Fig. 1 and Fig. 3 for context) is east of the Uzboi-Ladon-Morava mesoscale outflow system, and includes much of the medial to distal portions of the Samara-Himera and Paraná-Loire valley network systems. Several craters (white stars) host alluvial fans or fan-shaped deltas. Base map is MOLA from [16]. North is toward the top.

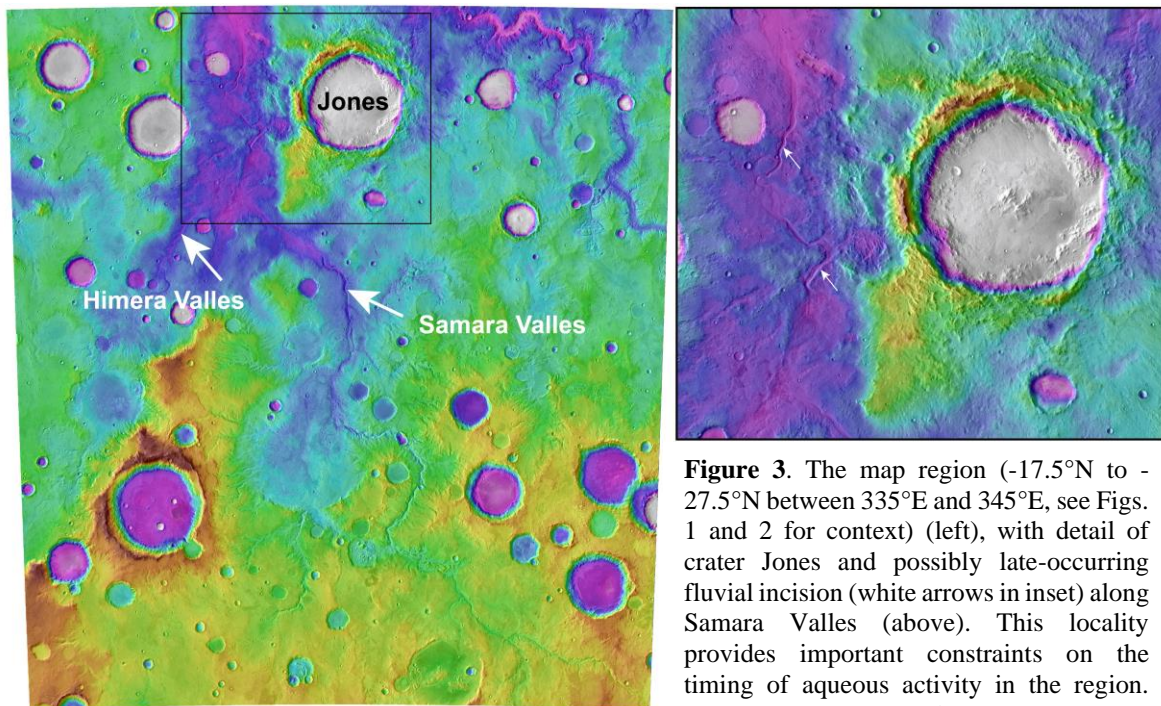


Figure 3. The map region (-17.5°N to -27.5°N between 335°E and 345°E , see Figs. 1 and 2 for context) (left), with detail of crater Jones and possibly late-occurring fluvial incision (white arrows in inset) along Samara Valles (above). This locality provides important constraints on the timing of aqueous activity in the region. MOLA over THEMIS day IR.

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