

Introduction: Geomorphic mapping at 1:500,000 scale within three quadrangles in Margaritifer Terra, Mars, is nearing completion (Fig. 1) [e.g., 1 – 4]. This region was previously studied [5-9] because of the combination of geomorphic processes that have shaped its surface, and the current mapping has revealed details that were not visible in Viking Orbiter images used by those previous studies. The large Uzboi-Holden-Ladon-Margaritifer megaoutflow system has shaped the western part of Margaritifer Terra (Fig. 1), and flow in the Samara and Paraná-Loire valley systems merged with UHLM in MTM -15022 [3]. The area in MTMs -20022 and -20017 has also been shaped by many impact craters, including an outer ring of Ladon basin and the relatively young Jones crater. Fluvial erosion associated with Loire Valles and Samara Valles and their tributaries has influenced much of the surface, and many areas are covered by resurfacing deposits (possibly fluvial, volcanic, and/or aeolian).

MTMs -20022 and -20017 include Jones crater, the confluence of Himera Valles and Samara Valles, and a significant portion of Loire Valles (Fig. 1). One of the main objectives of this mapping is to determine the relative timing of fluvial activity and impact cratering, specifically the impact that created Jones.

Methods: Geomorphic mapping utilized ESRI's ArcMap GIS software to register Viking, THEMIS IR and VIS, HiRISE, and CTX images as well as MOLA topography. Together, these data sets allowed for the delineation of geomorphic contacts and structures. Standard crater counting techniques were also used to estimate ages of the surfaces.

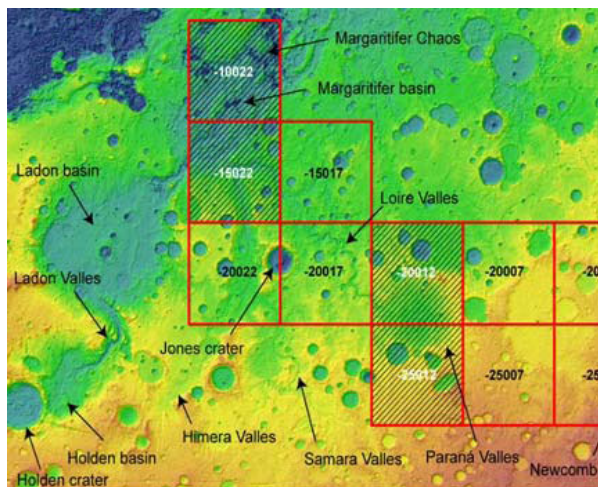


Fig. 1. Areas within Margaritifer Terra mapped at 1:500K shown on the 128 pixel/degree MOLA topography. The shaded red boxes are areas whose maps are in revision and second submission. The open red boxes are those currently being mapped. MTM quadrangles -20022 and -20017 (the focus of this abstract) are in the center of the figure.



Fig. 2. THEMIS daytime IR image I23141002. Image is ~30 km across. [NASA/JPL/ASU]

Summary of Observations: The area to the southwest and southeast of Jones crater was not well imaged by Viking; however, much better resolution images now provide the detail needed to address the history of geomorphic processes affecting the area. Figure 2 shows a reach of Loire Valles in which there is now an impact crater. There is some evidence that this crater might have occurred while fluvial processes were still active in Loire.

The relative timing of fluvial activity in Samara Valles is also of interest. Figure 3 shows a portion of Samara Valles almost directly south of Jones crater. The effects of ejecta from Jones can be seen in the top of the image, but it appears as though fluvial erosion within Samara may have continued after the impact that created Jones. Other images west of Jones suggest that fluvial activity in Samara did cut through ejecta from Jones. Today, much of Samara Valles is filled by aeolian deposits, but details shown in the images are allowing the geomorphic history to be unraveled.

In addition to erosion, several resurfacing deposits have been mapped in this area. At least one of the resurfacing units embays portions of Loire, helping to determine the relative timing of fluvial activity in the three main valleys in this area

References: [1] Grant J. A. and D. A. Clark (2002) *Planetary Mappers Meeting*, Tempe, AZ. [2] Williams K. K. et al. (2005) *LPS XXXVI*, Abstract #1439. [3] Williams K. K. and J. A. Grant (2007) submitted map, USGS. [4] Fortezzo C. M. et al. (2008) *LPS XXXIX*, Abstract #2244. [5] Saunders S. R. (1979) *USGS I-1144*, USGS. [6] Parker T. J. (1985) Masters Thesis, CA State Univ., L.A. [7] Parker T. J. (1994) Ph.D. Thesis, USC, L.A. [8] Grant J. A. (2000) *Geology*, 28, 223. [9] Grant J. A. and T. J. Parker (2002) *JGR*, 107(E9), 5066.

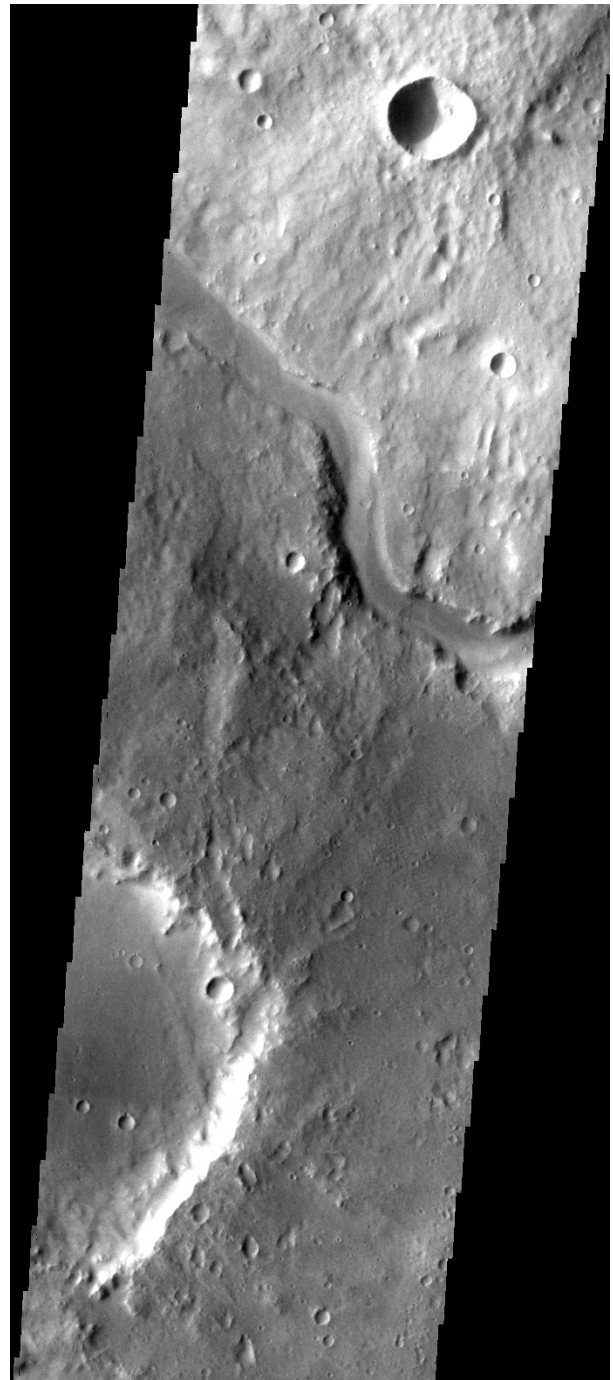
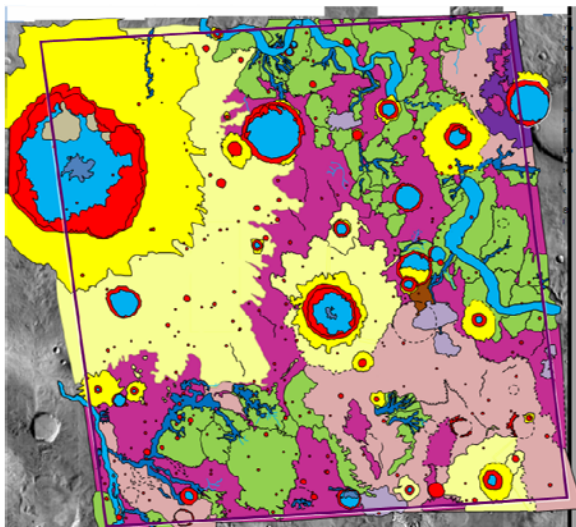


Fig. 3. THEMIS Visible image (V27147006) showing a portion of Samara Valles directly south of Jones crater. Image is ~35 km across. [NASA/JPL/ASU]

Fig. 4. Preliminary geomorphic map of MTM -20017 to the southeast of Jones crater. Shades of purple are resurfacing units, and the lighter purple unit is younger than the darker purple unit. Fluvially etched terrain (green) is younger than the resurfacing units.