

NEW GALILEO OBSERVATIONS OF IONIAN MOUNTAINS. E. P. Turtle¹, W. L. Jaeger¹, A. S. McEwen¹, L. P. Keszthelyi¹, M. P. Milazzo¹, D. Simonelli², and the *Galileo* SSI Team, ¹Lunar and Planetary Lab., Univ. of Arizona, Tucson AZ 85721; turtle@lpl.arizona.edu, ²Cornell Univ., Ithaca, NY 14853.

Introduction: Io's high mountains present significant puzzles. Despite Io's ubiquitous volcanism, the vast majority of the mountains appear to have tectonic rather than volcanic origins [e.g. 1,2]. On the other hand, a high proportion of mountains are in direct contact with paterae [e.g. 1,2]. In order to address the questions of how ionian mountains form and what their relationship to volcanism is, *Galileo* made several observations of Io's high mountains and plateaus during three flybys (I24, I25, and I27) of the *Galileo* Europa Mission [1-4]. The images ranged from 260 m/pixel to 1.5 km/pixel in resolution. They showed significant variation in mountain morphologies and revealed the substantial role played by mass wasting upon Io [1,5]. They also provided more evidence of the association of mountains with paterae [1,2,6].

In an effort to build upon these observations several more, even higher resolution, observations were specifically planned to target mountains and plateaus during the I31, I32, and I33 orbits of the *Galileo* Millennium Mission. Sadly, most of the I31 images, including very high resolution of one of the best candidates for erosion by sapping, were lost due to a camera problem caused by the high-radiation environment near Jupiter [7] and all of the I33 images were lost due to a spacecraft safing event. However, I32 has provided the best mountain images to date!

I32 Mountain Observations:

Telegonus. One of the major limitations on interpreting earlier very high resolution observations of Io had been the lack of context images. I32 gave us an excellent opportunity to not only acquire very high resolution (~10 m/pixel) images of a scarp at Telegonus Mensa, but also to get lower resolution (~40 m/pixel) context images. Furthermore Telegonus Mensa had also been observed at ~350 m/pixel and high sun during orbit I27, providing yet another level of context.

In the I27 observation the arcuate nature of the southeastern margin of Telegonus Mensa had been noted as possible evidence that sapping by SO₂ might be occurring [1,5]. Both I32 observations indicate that the dominant erosion process on Telegonus' scarps is mass wasting. Figure 1 shows part of the ~10 m/pixel observation which reveals large slump blocks on the cliff face. The ~40 m/pixel context also shows evidence for slumping from one of the arcuate scarps.

Tohil. Another target for high-resolution imaging with lower resolution context was Tohil Mons. Tohil was observed during both I24 and I27 (at ~190 and

~165 m/pixel, respectively) in order to get stereo data. These revealed that the mountain is ~5400 m high [1] but the limited vertical resolution and the high sun angle obscured topographic details. During I32 it was possible to observe Tohil Mons near the terminator at ~50 m/pixel. In addition, a slightly later observation captured Tohil near the terminator at ~325 m/pixel.

Both of these observations reveal significant topographic information. For example, a lack of topographic relief in Tohil Patera and a series of NW-SE trending scarps along the northeastern margin of the mountain which resemble an imbricate thrust belt [8] and which appear to have been interrupted by the formation of a small, dark patera.

Gish Bar. This observation is the first half of a stereo pair designed to investigate Gish Bar Mons and Patera as well as an intriguing Y-shaped feature to its west that may be a set of radiating fractures. Sadly the second part of this observation was lost during I33.

References: [1] Turtle E.P. *et al.* (2001) *JGR*, 106, 33,175. [2] Jaeger W.L. *et al.*, in prep. [3] McEwen A.S. *et al.* (2000) *Science*, 288, 1193. [4] Schenk P.M. *et al.* (2001) *JGR*, 106, 33,201. [5] Moore *et al.* (2001) *JGR*, 106, 33,233. [6] Masursky H. *et al.* (1979) *Nature*, 280, 725. [7] Keszthelyi L.P. *et al.* (2002) *LPSC XXXIII*. [8] Jaeger W.L. *et al.* (2002) *LPSC XXXIII*.

Figure 1: A slumping scarp on Telegonus Mons at a resolution of ~10 m/pixel. The illumination is from the upper right. The top of the scarp is at the upper right and the base is at the lower left. The entire image is ~8 km across.

