

A LONG LAVA FLOW IN THE THARSIS REGION OF MARS AS MAPPED USING THEMIS DATA. K. M. Shockey¹ and J. R. Zimbelman¹; ¹Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, MRC 315, Washington, DC 20013-7012, shockeyk@si.edu, zimbelmanj@si.edu

Introduction: A long lava flow to the west of Ascraeus Mons [1], the northernmost volcano of the Tharsis Montes volcanoes, was previously examined [2] using Mars Orbiter Laser Altimeter (MOLA) data. The same flow is now being mapped using the Mars Odyssey Spacecraft Thermal Emission Imaging System (THEMIS) data, under a grant from the Planetary Geology and Geophysics program of NASA. The daytime infrared (IR) THEMIS data, at 100 m/pixel, reveal a much more detailed picture of the flow then could be inferred from MOLA shaded relief images.

Description: Recent planetary missions have provided several data sets that are of great use to mapping projects. The Mars Odyssey Thermal Emission Imaging System (THEMIS) operates in the thermal infrared. Owing to the uniformly low thermal inertia of the dust-mantled study area encompassing the flow, the 100 m/pixel daytime THEMIS imaging effectively shows subtle variations in slope along with other properties [3]. The daytime infrared (IR) is the image base for this mapping project. THEMIS images are referenced to the same coordinate system used for the precise topographic measurements made by the MOLA instrument on Mars Global Surveyor, so both the images and topography can be precisely registered in a fixed global reference system. Gaps in the THEMIS coverage are presently filled by the MOLA topography at 430 m/pixel (Fig. 1).

Discussion: The flow contains a central channel not easily seen in the MOLA shaded relief data [4]; we now see that the channel extends at least 230 km in length. One section of the channel can be seen using THEMIS daytime visible imaging (Fig. 2). Due to the higher resolution of the visible imaging, more detail can be discerned than in the IR data. This image shows a section of the channel where a levee can be seen. The possibility exists that the levee is in other locations along the channel but cannot yet be determined using only the THEMIS IR.

THEMIS data have shown that the flow width appears to be narrower in places than the margins previously identified from the MOLA data (Fig. 3). The proximal portion has shifted to the south of what was previously thought. The source of the flow previously was believed to have been a knob located close to the first identifiable portion of the flow. The new data show that the flow actually went south of the knob and possibly further than can be seen in the currently released data. .

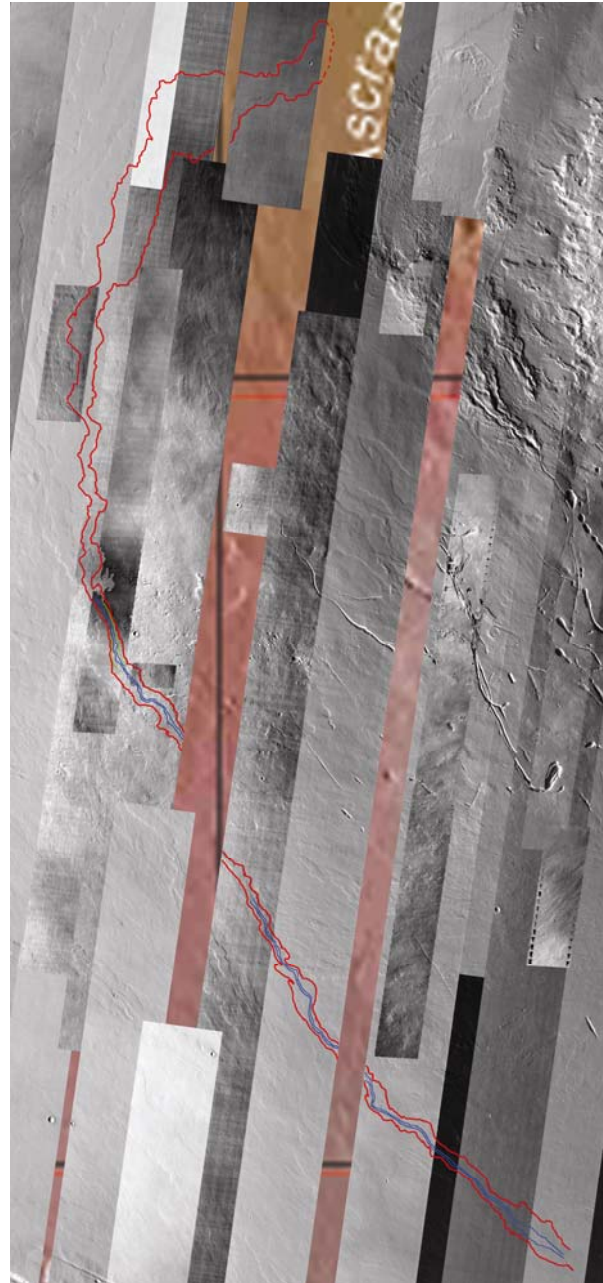


Figure 1: The lava flow west of Ascraeus Mons, mapped using THEMIS daytime IR data co-register with MOLA. North is at top of this and all subsequent images. Scene shown is ~240 km in width.

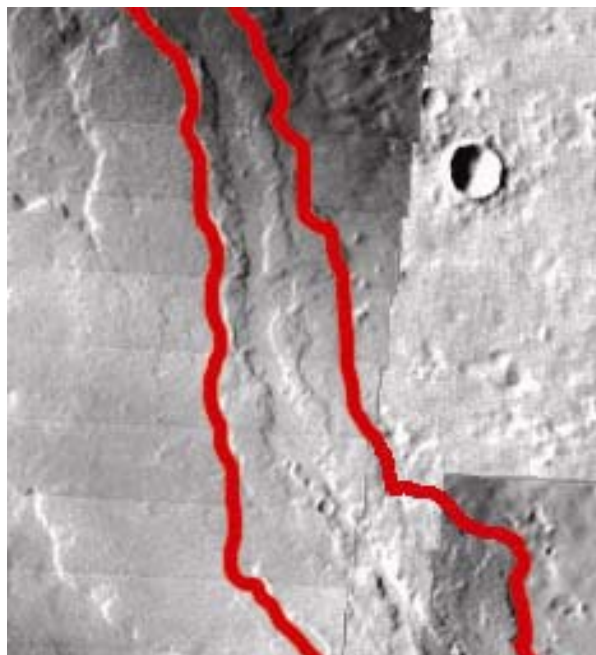


Figure 2: The most recent outline of the flow margin using THEMIS data is marked in red. A leveed channel can be seen near the center of the flow. Scene width ~40 km.

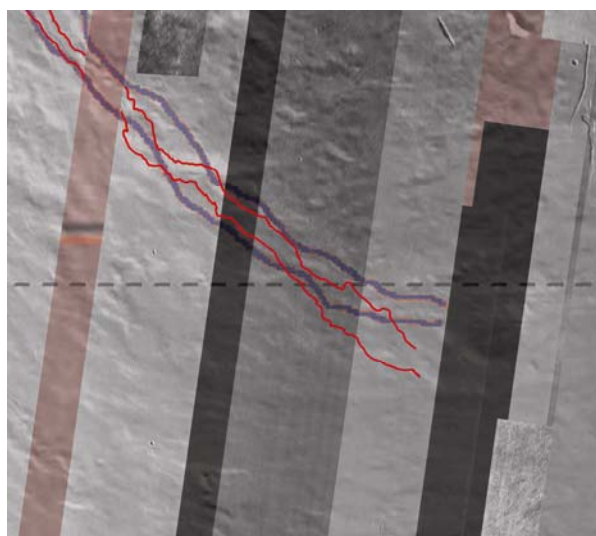


Figure 3: Proximal end of the flow, south of Ascræus Mons. The purple line indicates the outline previously derived from MOLA data [2], and the red line indicates the outline derived using THEMIS data. Scene width ~170 km.

Conclusion: THEMIS data have changed the mapped outline of a long flow west of Ascræus Mons. Due to the coverage of released data, we cannot yet determine whether the flow extends beyond what was previously thought. The first identifiable section of the flow, as seen in MOLA alone [2], has now been changed, based

on THEMIS data released thus far. The flow likely extends beyond what was previously thought to be the source of the flow.

As more THEMIS data are released, the gaps in the coverage of the flow can be filled in, giving a more complete picture of this distinctive flow.

References: [1] Zimbelman J.R. (1998) JCR, 103 (B11), 27503-27516. [2] Peitersen M.N. et al. (2002) LPS XXXIII, Abstract #1026. [3] Zimbelman J.R. et al. (2003) LPS XXXIV, Abstract #1387. [4] Peitersen M.N. et al. (2004) LPS XXXV, Abstract # 1421.