Iani Chaos as a landing site for the Mars Science Laboratory. T. D. Glotch[1], [1]Jet Propulsion Laboratory, California Institute of Technology. tglotch@gps.caltech.edu

Iani Chaos, the source region of Ares Valles, is centered at ~342°E, 2°S. The chaotic terrain is widely-believed to have formed via the removal of subsurface water or ice, resulting in flooding at the surface, and the formation of Ares Vallis. Within Iani Chaos, deposited stratigraphically above the chaotic terrain, are smooth, low-slope, intermediate-to-light-toned deposits that are rich in a hydrated mineral that is most likely gypsum [1] as well as hematite[2-3] (Figure 1).

Crystalline hematite and sulfates have been detected from orbit in numerous locations, including Meridiani Planum [4], Aram Chaos [1,5-6], Valles Marineris[5], and Aureum and Iani Chaos[2-3]. The MER Opportunity rover landed at Meridiani Planum and has shown that hematite is present as spherules that erode from a light-toned sulfate-rich outcrop. The MER team's hypothesis of an ancient dune/interdune playa environment at Meridiani Planum[7] has been challenged by both volcanic[8] and impact[9] models. A rover sent to one of the other locations rich in hematite and sulfates will help to resolve the current debate and increase understanding of the role of ground and surface water in the Martian past.

Each location with sulfate and hematite-rich deposits represents a desirable opportunity for the MSL lander in terms of interesting geology and mineralogy/geochemistry. Iani Chaos is likely the most desirable for several reasons. Like other hematite-rich regions, Iani Chaos is within several degrees of the equator, which is beneficial from an engineering standpoint. Iani Chaos is the source region for Ares Vallis, providing a clear link to the past presence of surface and subsurface water, making the site of prime astrobiological interest. The light-toned layered deposits, which are the source of the sulfate and hematite detections, are smooth and areally abundant compared to similar units in Aram and Aureum Chaos, and represent relatively little topography over which a rover would have to traverse. Other than Meridiani Planum, Iani Chaos is likely the safest hematite-and sulfate-rich region to land a rover. The layered units in Iani Chaos are also a desirable landing site from a thermophysical standpoint, with nighttime surface temperatures in excess of 200K in some areas (Figure 2). Finally, based on crater counts, the formation of chaotic terrains and outflow channels occurred during the late Hesperian[10], perhaps 0.8-1Gy after the formation of the hematite-bearing unit in Meridiani Planum. Thus, Iani Chaos also represents the opportunity to examine the role of water during a time period much later than the formation of Meridiani Planum in the Noachian.

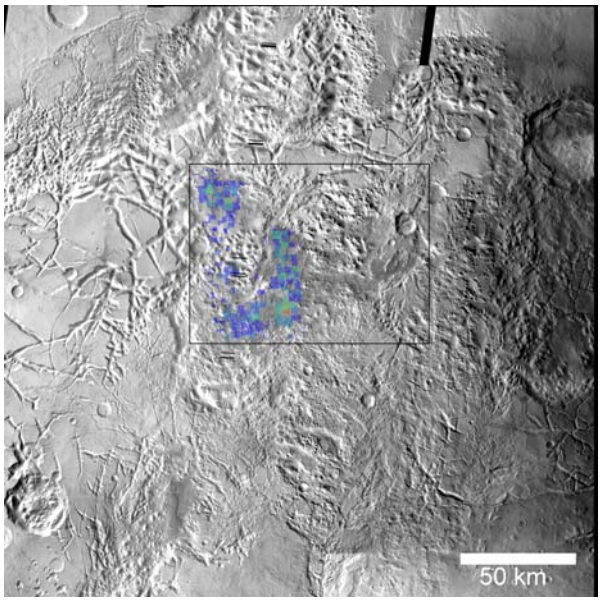
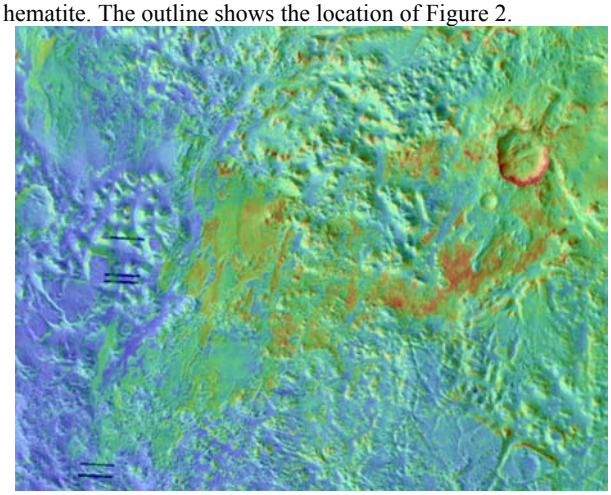


Figure 1. Map of hematite abundance in Iani Chaos. Hematite abundance varies from ~5-20%. Based on OMEGA data[1], the presence of sulfate roughly correlates with that of hematite. The outline shows the location of Figure 2.



THEMIS night-time radiance overlaid on THEMIS daytime radiance. Other than a rocky crater rim, the smooth layered deposits are the warmest surfaces in the scene. Nighttime temperature ranges from ~180-206K.

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