EAST MELAS CHASMA LANDING SITE RATIONALE. M. Chojnacki and B. Hynek, Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, 392 UCB, Boulder, CO 80309-0392. chojnack@lasp.colorado.edu.

Introduction: East Melas Chasma (EMC) is a particularly intriguing potential landing site in Valles Marineris (VM) for the Mars Science Laboratory (MSL) mission. Understanding the many aspects of VM, and the nature of the interior layer deposits (ILDs) in particular, would contribute vastly to our knowledge of Mars' internal and external history. This region is of particular interest for a future landed mission because of its thick layered outcrops, hydrated minerals and fluvial features. The OMEGA instrument onboard Mars Express found numerous occurrences of sulfates in East Melas Chasma usually associated with ILDs [1]. MSL with its capable instrument suite at EMC would provide valuable insight into the formation of VM, ILDs, and water-related processes in early Martian history.

Site Characteristics: Our topographically smooth landing ellipse (centered on 290.45°E, -11.62°N, Fig. 1) sits on the canyon floor with a variety of different terrains within and nearby. Local sites of interest include ~2km crater to the northwest which excavated canyon floor material. To the northeast light-toned material is seen eroding out of resistant ~3km tall erosional wall remnant at the mouth of Coprates Chasma. MOC NA image M2001176 (Fig. 1) reveals excellent trafficability and some layering to the south. M1300309 shows darker material and possible inverted fluvial features. THEMIS VIS coverage shows mesas (~400-700m thick) immediately S and SE of the ellipse that are likely ILDs and targeting with OMEGA and CRISM should reveal interesting mineralogy. A priority "go to" site (~30km south of ellipse) resides: a massive ~1100km² deposit of kieserite and poly-hydrated sulfates associated with dark and light-toned ILDs [1] that can be reached via a trafficable path as seen from THEMIS VIS. This thick layered (>500m) mesa complex would provide an excellent opportunity for use with the Chemistry & Micro-Imaging (ChemCam) and XRD/XRF instrument.

Engineering Constraints: For this site, all of the MSL engineering criteria are meet, with the exception of rock abundance, which we attribute to the large sample size of IRTM data that includes wall material to the east. Within the ellipse, hazard and slope trafficability look to be ideal with limited aeolian material and minimal slopes. Traversing to the aforementioned local sites of interest look equally reasonable. Initial analysis of a southern traverse to the layered sulfates deposits (290.5°E, -12.4°N) looks encouraging but additional MOC NA/HiRISE coverage is needed. We anticipate that additional OMEGA and forthcoming CRISM coverage will reveal that water-related minerals are widespread at the surface in our ellipse and immediate surroundings. Furthermore, this site has sufficient flexibility in the placement of the current 20km landing ellipse and if future remote sensing data supports it, could be moved ~25km east or west.

Expected Results: The ILDs within VM have up to 8km relief a volume of 2.4 × 10^5 km^3 [2] and have captivated people since their discovery in Viking data. The competing hypotheses for the nature of ILDs within VM have been postulated as aeolian, lacustrine, mass wasting, glacial or volcanic in origin [e.g., 3]. MSL has the potential to settle this debate and gain important insight into the nature of VM's formation, such as whether the IDLs post-date the canyon, or whether they are an ancient, integral part of the Martian crust. Finally, this landing site would allow measurements of pressure, temperature, and humidity over a large atmospheric column. Beyond the tremendous science return this site yields, it also promises inspirational panoramic views with Mast Camera (MastCam) of the solar systems largest canyon system that will inspire Earth-bound observers.

References: [1] Gendrin A. et al. (2006) *Science*, *307,* 1587-1591. [2] Hynek B. et al. (2003) *JGR, 108.* [3] Scott D. and K. Tanaka (1986) *Map I-1802-A*, U.S. Geol. Surv. Misc. Invest. Ser. [4] Rafkin S. (2004) *unpublished data.*

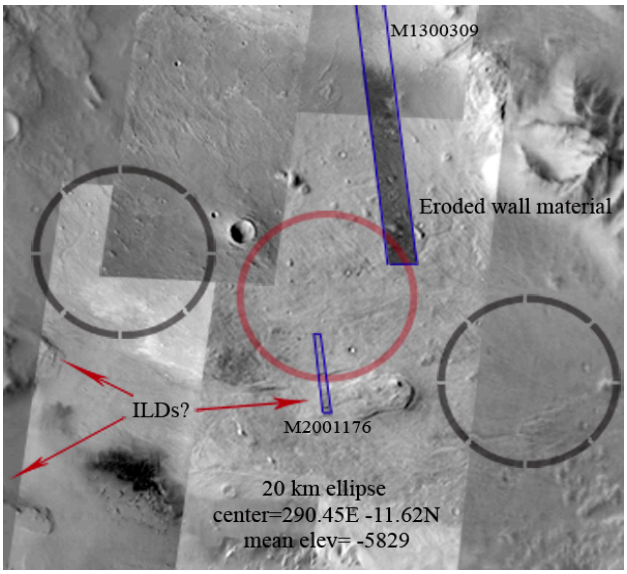

Figure 1. A THEMIS VIS mosaic with MOC NA coverage of the EMC landing site.

Table 1: Summary of engineering requirements

Engineering Parameter		*Requirement*	*East Melas Chasma Candidate Landing Site*			
Slopes	**2 to 5km length scale**	≤ 3°	2km (avg/max)	3km	4km	5km
			0.42°/1.45°	0.39°/0.91°	0.36°/1.01°	0.35°/0.78°
	20 to 40m length scale	≤ 15°	THEMIS VIS/MOC NA show a smooth unmantled surface			
	5m length scale	≤ 15°	MOC NA shows relatively smooth surface free of aeolian features			
Rock abundance (IRTM)		~10%	12.1% (see text for explanation)			
Steady state horizontal		≤ 30m/s	Average of 18m/s over 3 modeled sols (8am-6pm local time) [4]			
Radar reflectivity		Ka band reflective and >0.01	Relatively low albedo and high thermal inertia imply radar reflective surface.			
Load bearing surface	**TES thermal inertia**	>100 J m^{-2} $s^{-0.5}$ K^{-1}	244 J m^{-2} $s^{-0.5}$ K^{-1}			
	albedo	<0.25	0.13			