**TERBY CRATER AS A POTENTIAL LANDING SITE FOR THE MARS SCIENCE LABORATORY.** S. A. Wilson[1], A. D. Howard[2] and J. M. Moore[3], [1]Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Inst., MRC 315, 6th St. and Independence Ave. SW, Washington DC 20013-7012, wilsons@si.edu, [2]Dept. of Environmental Sci., Univ. of Virginia, Charlottesville, VA 22904, [3]NASA Ames Research Center, MS 245-3 Moffett Field, CA 94035.

**Introduction:** We propose Terby Crater as a potential landing site for the Mars Science Laboratory (MSL). Terby Crater is a large (D=164 km), Noachian-aged [1] crater located on the northern rim of Hellas (28S, 287W). Topographic, morphologic and stratigraphic evidence of Hellas suggests that the interior fill of Hellas was deposited in water [2], and that Hellas may have been the site of a basin-wide sea [3] or may have contained one or several ice-covered lakes [2] in the Noachian.

Terby Crater hosts a diverse suite of geomorphic units [4] and landforms including massive layered ridges and mantled ramps that extend across layered sequences as well as bowl-like depressions, sinuous channels, scoured-looking caprock, viscous flow features, fans, esker-like ridges, arcuate scarps and prominent linear ridges that may be indicative of past and present ice flow [5]. The size and age of Terby intimate that the geologic evolution of this crater represents a significant duration of the Martian history, thus its interior deposits can provide insight into the past environments in which they were deposited and modified.

**Proposed Landing Site:** The smooth, moat-like depression in the center of Terby Crater (Fig. 1a) would provide access to the primary areas of scientific interest outlined below. The moat occurs at the southern end of the interior deposits, occupying an area of ~1300 km$^2$. This large, flat-floored depression is the lowest topographic point in Terby with an elevation of about -5000 m and has a low to medium thermal inertia measured by TES, possibly representing a range of grain sizes from loose, fine surface dust to a combination of crusted fines and coarser particles [6]. The moat-like depression in the center of Terby Crater meets the current engineering criteria defined by the MSL project.

**Primary Scientific Interests:**

*Possible Lacustrine Sedimentary Layers:* High-resolution MOC images of Terby Crater have revealed sedimentary layered sequences up to 2-km thick that are exposed in the main ridges, in the scarp at the southern edge of the moat deposit and in the troughs between ridges (Fig. 1a and 1b). The nature and geometry of the layers are indicative of a lacustrine origin, consistent with deposition in a relatively deep body of water [4, 5], and the spectral signature of the layers from OMEGA indicate the presence of hydrated minerals such as clay or sulfates [7]. The presence of layers with a lacustrine origin has vast implications about the early climate on Mars and the search for hospitable environments. Terby Crater may have been capable of sustaining and preserving life forms, and is therefore a prime candidate for the MSL to search for chemical and physical evidence associated with this depositional environment.

*Possible Ice-Related Features:* The moat floor exhibits 2 km-long narrow, sinuous and symmetrical ridges that may be analogous to eskers (Fig. 1b), supporting the presence of ice-related activity [5]. The far northwestern corner of the moat deposit has a very distinct lineated and softened texture with well-defined margins (Fig. 1b). It appears that a smooth, overlying mantle is being dissected to reveal the underlying lineated texture, a morphology that is analogous to textures on Mars that are indicative of a mixture of ice and dust [8, 9].

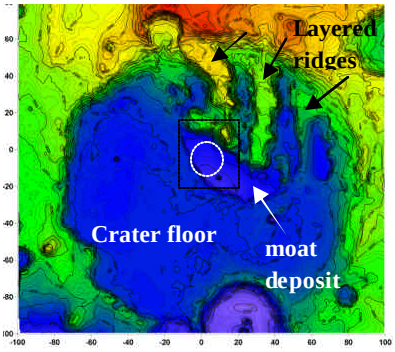


**Figure 1a**. MOLA topography of Terby Crater showing interior deposits banked along northern rim that terminate in the moat-deposit in the center of the crater. White 10 km-radius circle indicates landing site. Black box shows location of Fig. 1b.

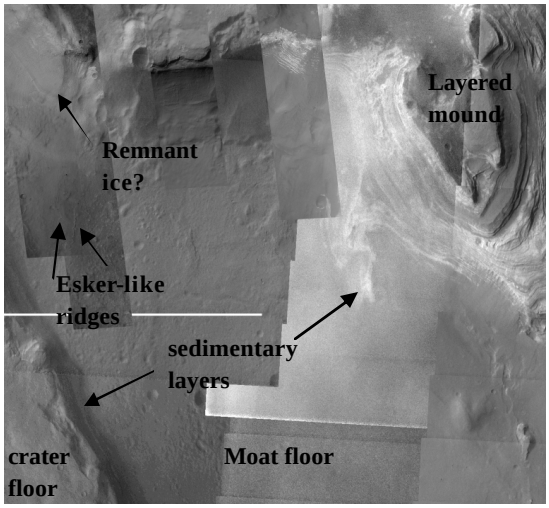


**Figure 1b.** THEMIS VIS and IR mosaic of moat floor showing proximity to sedimentary layers and potential ice-related features.

**References:** [1] Leonard G. J. and Tanaka K. L. (2001) *USGS Geol. Ser., Map I-264.* [2] Moore J. M. and Wilhelms D. E. (2001) *Icarus, 154*, 258-276. [3] Malin M. C. and Edgett K. S. (2000) *Science, 290*. [4] Wilson S. A. and Howard A. D. (2005) *LPSC XXXVI* Abstract #2060. [5] Wilson, S. A. et al. (2006) LPSC XXXVII Abstract #1863. [6] Mellon et al. (2000), *Icarus, 148*, 437-455. [7] Ansan etl al. (2005) *LPSC XXXVI*, *abstr.* 1324. [8] Mustard et al. (2001), *Nature, 412*, 411-414. [9] Milliken et al. (2003), *JGR, 108*, doi:10.1029/2002JE002005.