DELTAS AND RELATED PONDED SEDIMENTARY DEPOSITS: A KEY CLASS OF LANDING SITES FOR THE MARS SCIENCE LABORATORY MISSION. J.L. Dickson, C.I. Fassett, J.W. Head, M.A. Kreslavsky, J.B. Madeleine, and M.A. Ivanov. Dept. Geo. Sci., Brown University, Providence, RI, 02906. USA. jdickson@brown.edu.

Introduction: The science objectives for MSL focus on biological potential, processes of relevance for past habitability, and geological characterization of such sites. Water is a fundamental factor in the origin and evolution of life, aqueous and fluvial processes represent the focus of liquid water, and sedimentary deposits represent environments in which fluvial and aqueous deposits now reside. Where these deposits represent former standing bodies of water, the potential for extant and extinct life is likely to be highest. Therefore, to optimize for the scientific objectives for MSL we propose a class of landing site locations that emphasize depositional areas related to fluvial processes. These sites are all located at the termination of fluvial channels of a variety of types and thus represent environments at the specific location (e.g., deltas, etc) but also sites at the depocenter of much larger fluvial basins or repositories for water from underground sources, optimizing the possibility for information about biological habitats and fossil and extant life.

This category of ponded sedimentary deposit (PSD) sites includes two sub-categories: 1) Ponded impact basin deposits (generally Hesperian age; channel terminations in Argyre and Hellas) and 2) Ponded valley network deposits (locations where valley networks terminate in closed depressions, such as impact craters, form deltas, and perhaps flood and breach the crater rims). Examples of this type of deposits include Eberswalde [1], just north of Holden Crater, and an unnamed 40 km crater near Nili Fossae [2]. Here we outline the Eberswalde site in detail as an example of a PSD site for MSL.

Engineering Constraints for Eberswalde: The Eberswalde fan and the surrounding plains meet all of the regional and local engineering constraints for landing and traversability. Located at ~23°S, it is well within the longitude constraint of 60° north or south of the equator. Both the fan and the plains sit more than a kilometer below the datum (Fig. 1), well below the 2 km threshold for landing. The entire basin records high thermal inertia, with the lowest values at ~400 $J/m^2K\ s^{1/2}$. Albedo measurements are low across the basin, with all values < 0.20.

Eberswalde is flat at all measurable baselines. Slopes greater than 15° are only found along the margins of the basin, far away from any potential landing ellipse. Statistical analysis of MOLA ground tracks shows that of 1662 point-to-point slopes analyzed to the east of the fan deposit, no slopes greater than 15° were recorded. Only 10 slopes greater than 10° were recorded, yielding 99.4% of slopes below 10°.

Eberswalde crater is well-suited for rover traverses, with a very flat floor and accessible exposures of the sedimentary fan in the western portion of the crater. We have outlined a potential traverse for the rover along the distal margin of the fan deposit, entering from a landing site to the east (Fig. 2). This type of traverse will provide access to several different lobes of the sedimentary fan deposit and to multiple layers within each, as well as sediments on the floor of the crater. We feel that a traverse similar to the one proposed would offer the greatest biologic and geologic return for this mission and readily achieve the major scientific objectives.

References: [1] Malin M. C. and Edgett K. S. (2003) *Science, 302,* 1931-1934. [2] Fassett C. I. and Head, J.W. (2005) *Geo. Res. Let., 32,* doi: 10.1029/2005GL023456.

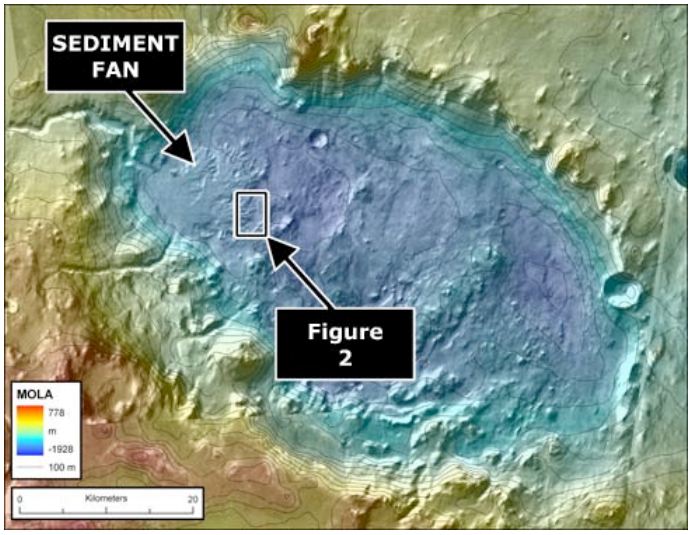

Fig. 1. MOLA topography over Themis IR mosaic.

Fig. 2. Subframe of MOC release MOC2-1225, with candidate traverse superposed.