

**SEDIMENTARY FEATURES WITHIN THE PROPOSED MARS SCIENCE LABORATORY (MSL) LANDING ELLIPSE IN EBERSWALDE CRATER.** M. S. Rice and J. F. Bell III, Department of Astronomy, Cornell University, 406 Space Sciences Building, Ithaca, NY 14853, [mrice@astro.cornell.edu](mailto:mrice@astro.cornell.edu).

**Introduction:** Eberswalde Crater (Fig. 1a) has been selected as a high-priority candidate landing site for the Mars Science Laboratory (MSL) mission based on the presence of a fan-shaped sedimentary rock unit interpreted as the lithified remains of a fluvial delta [1,2]. This feature provides the best known evidence for persistent fluvial activity on the surface of Mars. The proposed landing site is ~10 km east of the margin of the fan-shaped feature where the Eberswalde basin might have contained a lake [3]. Several sedimentary features have been identified within the landing ellipse [4,5], and here we investigate the stratigraphic relations between these features and the delta to help unravel the sequence of aqueous sedimentation.

**Stratigraphic Units and Geologic Features:** Our study uses a ~6 m/pxl MRO Context Camera (CTX) mosaic [6] and ~25 cm/pxl MRO HiRISE images [7].

*Basal unit and meggabreccia.* The basal unit represents the oldest materials in the study area and is characterized by sharp peaks and ridges. In places this unit is massive and texturally smooth, while other occurrences are highly fractured. Schieber [4] interpreted these outcrops as meggabreccia formed by a large, nearby impact. Some outcrops contain veins suggestive of breccia injection dikes [8].

*Discontinuous light-toned unit.* Veneers of discontinuous light-toned materials cover most of the Eberswalde basin and are overlain by a mantling unit and aeolian deposits. Pondrelli *et al.* [9] interpreted this unit as having been emplaced in the deepest part of what they considered to be an Eberswalde lake.

*Mantling and aeolian bedforms.* This unit consists of a dark, smooth material that occurs above the fractured and the discontinuous light-toned units. Small craters are preserved in this unit, and in many locations the smooth mantling grades into aeolian bedforms typically ~100 m in length with ~40 m spacing.

*Fractured light-toned unit.* Flat-lying, light-toned

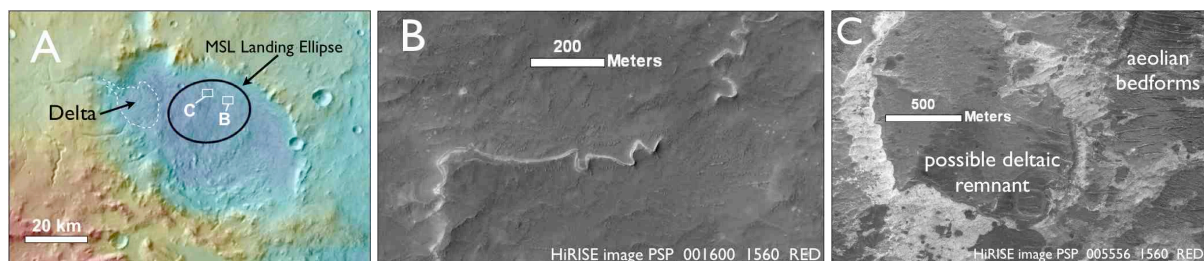
materials with extensive polygonal fractures outcrop in four major exposures within the landing ellipse. These exposures are stratigraphically below the layered light-toned unit, and could represent desiccation cracks in dehydrated clay-rich strata or sulfate minerals [4].

*Inverted channels.* Within the landing ellipse we find thirteen sinuous features with raised relief (*e.g.*, Fig 1b), with lengths ranging from 10 to 1000 meters. These are interpreted as inverted channels of fluvial origin [4]. Several narrow, elongated mesas observed within the ellipse may be remnants of additional inverted channels.

*Layered light-toned unit and possible deltaic features.* Three inverted channels within the ellipse terminate in lobe-shaped features comprised of light-toned, layered materials (*e.g.*, Fig. 1c). These materials resemble the light-toned layered unit at the Eberswalde delta margin; these might be erosional remnants of other deltaic materials [4]. Analysis of MRO CRISM spectra suggests that some light-toned layered materials contain phyllosilicates [10].

**Conclusions:** The variety of geologic materials within the proposed MSL landing ellipse, some of which might be aqueous sediments, adds to the science value of Eberswalde Crater as a high-priority landing site. MSL traverses *within the ellipse* could include exploration of sedimentary features of potential fluvial origin.

**References:** [1] Malin M. and Edgett K. (2003) *Science*, 302, 1931-1934. [2] Moore *et al.* (2003) *GRL*, 30. [3] Wood L. (2008) *GSA Bulletin*, 118. [4] Wood L. (2008) *GSA Bulletin*, 118. [5] Schieber J. (2008) 39<sup>th</sup> LPSC, abs. no. 1391. [6] Rice M. and J.F. Bell III (2010) 41<sup>st</sup> LPSC, abs. no. 2524. [7] Malin M. *et al.* (2007) *JGR*, 112. [8] McEwen A. *et al.* (2007) *JGR*, 112. [9] Tornabene L. *et al.* (2009) 40<sup>th</sup> LPSC, abs. no. 1766. [10] Pondrelli M. *et al.* (2008) *Icarus*, 197. [11] Milliken R.E. *et al.* (2006) 7<sup>th</sup> International Conf. on Mars, abs. no. 3282.



**Figure 1.** (a) MOLA topographic map of Eberswalde Crater showing locations of b-c within the landing ellipse; (b) sinuous, raised-relief channel; (c) possible deltaic remnant of light-toned layered material.