**Sites of Potential Long Term Sub-surface Water, Mineral-rich Environments, and Deposition in South Elysium Planitia, Hellas-Dao Vallis, Isidis Basin, and Xanthe-Hypanis Vallis: Candidate Mars Science Laboratory Landing Sites.**

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**Introduction.** Several candidate landing sites are proposed based on characteristics that support the scientific objectives of MSL, including biological potential, diverse geology at local scales, and geologic processes relevant to past habitability. The selection of these sites for initial analysis considers the significance of observed topographic, geochemical, and geologic characteristics indicative of water storage, water emergence, long-term recurrence, and possible geochemical and mineralogical activity, many of which offer significance science potential for the MSL payload.

Surface flow of water represents a minor part of water voluyme transport, particularly in arid environments or sites of intermittent recharge. Abrupt changes in hydrologic gradient are often manifest at the surface as down-gradient changes in visible surface characteristics of morphologic features associated with flow. The common theme to all of these sites is their location in positions where subsurface fluids might emerge at the surface. The elevated subsurface temperatures and mineral-laden pathways increase the likelihood of extended presence of water, complex chemistry, and hard sediment deposition and preservation.

**Brief Site Descriptions.** Each of these are near sites previously proposed during the MER or earlier site selection process [1, 2, 3, 4]. New data enhances the value of these sites.

*South Elysium Basin-Avernus Colles*. The location is unique in terms of extremely elevated iron, and youthful and unmantled terrain. Its location down gradient from a major valley and volcanic center offer significant opportunities for chemistry associated with deeply convected water and corresponding mineral deposits.

*Hellas Basin-Dao Vallis*. This valley originates at the base of a significant highland volcano and empties into the lower Hellas Basin where complex sedimentation and low elevation combine to yield an interesting setting for preservation of early complex chemistries.

*Isidis Basin*. This area is a long-term sink for valley networks and contains morphological evidence as a site for escape of materials from the fluid reservoir.

*Hypanis Vallis delta*. Mapping of the Hypanis, Nanedi Vallis areas of Xanthe Terra has shown that these valleys were long-lived. Distinct sediment "delta" occurs where it empties onto the lowlands where events from a significant fractions of Mars geologic time could be preserved in aqueous sediments.

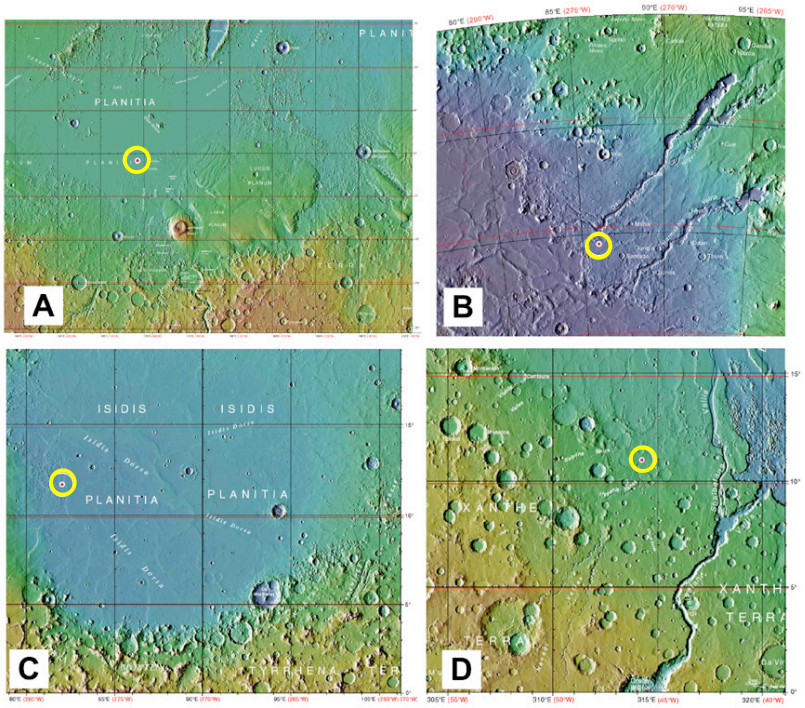


**Figure 1.** Four candidate sites for MSL Landing Sites. (Smaller inside the yellow circle circles represent 20 km landing circle.) (A) South Elysium basin-Avernus Colles (-1.0, 169.5E), a region of exceptionally high iron abundance down hydrologic gradient from significant volcanic center (Apollinaris patera); (B) Valley floor terminus of Dao Vallis (-40, 85E), a major valley originating in the Hadriaca Patera region; (C) Isidis Basin floor (5-15, 80-95E), a concentrated sink for volatiles and an area of potential long-term spings/gaseous volatile release; and (D) The terminal delta of Hypanis Vallis (11, 314E), a major long-lived highland valley.

**References:** [1] Gulick, 2nd LS Workshop, Buffalo, NY, 1999; [2] McEwen et al., 1st MER LS Workshop, NASA Amexs, 2001; [3]Crumpler, 2nd LS Workshop, Buffalo, NY, 1999.