LEADING MSL TO WATER: PALEOLACUSTRINE LANDING SITES REDUX.

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Introduction: The highest priority landing site for achieving the scientific objectives (assessment of local region for habitat potential for past or present life) of the Mars Science Laboratory will be a paleolacustrine basin containing accessible layered sediments. Ideally, this type of landing site would be selected from both morphologic and mineralogic evidence. The MER Project had the luxury of selecting two landing sites. One site based on mineralogy (Meridiani Planum) and one on morphology (Gusev Crater). To date the Meridiani site has proven to be the wettest. The morphologic approach was unsuccessfully attempted with the Gusev Crater site. However, it should be mentioned that some of us (voices in the wilderness) argued that the morphologic and geologic evidence in Gusev Crater was much more complicated and that the commonly accepted lacustrine story was flawed. MSL will only get one chance. The morphologic approach can successfully select the site if it contains overwhelming evidence of a true lacustrine setting. Some conditions that must be met include evidence of persistent flow (meandering channels, meander cutoffs and scrolls, inverted channels, cross cutting channels), ponding in a basin, and deposition of laterally continuous layered materials. Obviously, supporting mineralogic evidence would aid in providing the 'slam dunk' for site selection. Unfortunately, the surface of Mars does not always cooperate due to its annoying dusty veil of suppression. All of the following sites satisfy engineering requirements.

Candidate Sites:

Eberswalde Crater

Location: 23.8.S,326.7E
Diameter: 65 km
Elevation: –1.480km
Thermal Inertia: 380-510 SI units
Geology: Numerous channels cut western rim of Eberswalde. Distributary multi lobate fan ($115km^2$) composed of layered sediment, meandering channels, inverted channels, meander cutoffs and scrolls, cross cutting channels. Medium thermal inertia represents a combination of coarser loose particles, crusted fines, a fair number of scattered rocks, and/or perhaps a few scattered bedrock outcrops. This is consistent with a lacustrine setting.

Holden Crater

Location: 26.1.S,326E
Diameter: 154 km
Elevation: –2.200km
Thermal Inertia***:*** 320-470 SI units
Geology: Uzboi Vallis cuts the SW rim of Holden. The southern floor of Holden contains laterally continuous layered sediments, distributary fan ($225km^2$), inverted channels and meandering channels. Medium thermal inertia represents a combination of coarser loose particles, crusted fines, a fair number of scattered rocks, and/or perhaps a few scattered bedrock outcrops. This is consistent with a lacustrine setting.

Palos Crater

Location: 2.7S,110.8E
Diameter: 55 km
Elevation: –0.750km
Thermal Inertia: 320-520 SI units
Geology: Tinto Vallis dissects the SW rim of Palos. Crater floor is made of laterally continuous layered sediments. Medium thermal inertia represents a combination of coarser loose particles, crusted fines, a fair number of scattered rocks, and/or perhaps a few scattered bedrock outcrops. This is consistent with a lacustrine setting.

Nili Fossae Crater

Location: 18.4.N,77.68E
Diameter: 45 km
Elevation: –2.600km
Thermal Inertia: 290-320 SI units
Geology: Valley networks cut northern rim of crater. Crater floor contains fans ($56km^2$), layered sediments and cross cutting inverted channels. Medium thermal inertia represents a combination of coarser loose particles, crusted fines, a fair number of scattered rocks, and/or perhaps a few scattered bedrock outcrops. This is consistent with a lacustrine setting.