

Top Landing Sites for the Mars Exploration Rovers. M. Golombek¹, J. Grant², T. Parker¹, J. Crisp¹, M. Adler¹, S. Squyres³, R. Arvidson⁴, M. Carr⁵ and C. Weitz⁶, ¹Jet Propulsion Laboratory, Caltech, Pasadena, CA 91109, ²Smithsonian Institution, Washington, D.C. 20560, ³Cornell University, Ithaca, NY 14853, ⁴Washington University, St. Louis, MO 63130, ⁵U. S. Geological Survey, Menlo Park, CA 94025, ⁶NASA Headquarters, Washington, DC 20546.

Four landing sites are being considered for selection of the final two for the Mars Exploration Rovers in 2003. Three prime sites (Hematite, Gusev, and Isidis) are being carried forward from the 3rd landing site workshop for further characterization. Because of concerns over horizontal winds during landing, an additional low-wind prime site has been added in Elysium Planitia.

Hematite, Gusev, and Isidis show evidence for surface processes involving water and appear capable of addressing the science objectives of the MER missions, which are to determine the aqueous, climatic, and geologic history of sites on Mars where conditions may have been favorable to the preservation of evidence of possible pre-biotic or biotic processes. TES spectra indicate coarse-grained hematite distributed across a basaltic surface at the Hematite site, suggesting precipitation from liquid water or a hydrothermal deposit. Gusev has been interpreted as a crater lake with interior sediments deposited in standing water. Isidis Planitia is located to sample ancient Noachian rocks shed off the highlands that might record an early warm and wet environment as suggested by the abundant valley networks. Evaluation of science criteria at the 3rd workshop place Hematite and Gusev as the highest priority science sites.

Thermophysical properties of the sites and comparison to the Viking and Pathfinder landing sites indicate the Hematite site will likely look very different from the three previous landing sites with a darker surface, few rocks and little dust. Gusev crater will likely be similar to Viking 1, but with fewer rocks. The Isidis site has moderate albedo and a high red/blue ratio, suggesting a rocky weathered crusty surface with some dust. Evaluation of safety criteria such as slopes, rocks and winds at the 3rd workshop indicate that Hematite is probably the safest, followed by Gusev and Isidis.