LANDING SITE STUDIES USING HIGH RESOLUTION MGS CRATER COUNTS AND PHOBOS-2 TERMOSKAN DATA. William K. Hartmann and Daniel C. Berman (Planetary Science Institute, Tucson, AZ). Bruce H. Betts (San Juan Capistrano Research Institute, San Juan Capistrano, CA).

Introduction We have examined a number of potential landing sites to study effects associated with impact crater populations. We used Mars Global Surveyor high resolution MOC images, and emphasized "ground truth" by calibrating with the MOC images of Viking 1 and Pathfinder sites. An interesting result is that most of Mars (all surfaces with model ages older than 100 My) have small crater populations in saturation equilibrium below diameters D ~ 60 meters (and down to the smallest resolvable, countable sizes, ~ 15 m).

This may have consequences for preservation of surface bedrock exposures accessible to rovers. In the lunar maria, a similar saturation equilibrium is reached for crater diameters below about 300 meters, and this has produced a regolith depth of about 10-20 meters in those areas. Assuming linear scaling, we infer that saturation at D ~ 60 m would produce gardening and Martian regolith, or fragmental layers, about 2 to 4 meters deep over all but extremely young surfaces (such as the very fresh thin surface flows in southern Elysium Planitia, which have model ages around 10 My or less).

This result may explain the global production of ubiquitous dust and fragmental material on Mars. Removal of fines may leave the boulders that have been seen at all three of the first landing sites. Accumulation of the fines elsewhere produces dunes. Due to these effects, it may be difficult to set down rovers in areas where bedrock is well preserved at depths of centimeters, unless we find cliff sides or areas of deflation where wind has exposed clean surfaces (among residual boulders?)

We have also surveyed the PHOBOS 2 Termoskan data to look for regions of thermal anomalies that might produce interesting landing sites. For landing site selection, two of the more interesting types of features are thermally distinct ejecta blankets (Betts and Murray, 1993) and thermally distinct channels and valleys (Betts and Murray, 1994). Martian "thermal features" such as these that correlate closely with non-aeolian geologic features are extremely rare, presumably due to reworking of the surface as discussed above, and due to aeolian processes. Thermally distinct ejecta blankets are excellent potential future locations for landers, as well as remote sensing, because they represent relatively dust free exposures of material excavated from depth. However, few, if any meet the current constraints on elevation for Mars '01.

Thermally distinct channels, which tend to have fretted morphologies, and are higher in inertia than their surroundings, offer a unique history and probable surface presence of material from various stratigraphic layers and locations, views of the surrounding walls, and possible areas of past standing water, flowing water, or increased amounts of diffusing water. Any presence of water (e.g., diffusing) may have enhanced duricrust formation in the channels, thus increasing the thermal inertias (flowing water may alternatively have enhanced rock deposition, which also could explain the inertia enhancements instead of crust formation). Some of the thermally distinct channels do meet the elevation criteria for '01. We are looking particularly at the relatively flat areas at the northern end of Hydraotes Chaos (eastern end of Valles Marineris), near the beginnings of Tiu and Simud Valles, which appear to meet most all of the current '01 landing criteria. For thermally distinct channels, valleys, and ejecta blankets, we have searched and continue to search for MOC images that may help clarify their characteristics and assist with potential landing site characterization.

References: Betts, B. H. and B. C. Murray, Thermally Distinct Ejecta Blankets from Martian Craters, J. Geophys. Res., 98, 11043-11059, 1993.
Betts, B. H. and B. C. Murray, Thermal Studies of Martian Channels and Valleys Using Termoskan Data, J. Geophys. Res., 99, 1983-1996, 1994).