THE MARS SURVEYOR 1998 LANDING ZONE: SEARCHING FOR MARS POLAR LANDER IN HIGH RESOLUTION MOC IMAGES. M. C. Malin and K. S. Edgett, Malin Space Science Systems, P. O. Box 910148, San Diego CA 92191-0148, USA.

Between mid-December 1999 and early February 2000, forty images (~400 MBytes) were acquired of the area believed to be the location where the ill-fated Mars Polar Lander is believed to have crashed, uniquely covering 667 km^2 and, additionally, covering most of this area stereoscopically. These images cover most of the landing ellipses identified as encompassing the most probable crash site (Figure 1). No evidence of the lander or of the lander delivery system (parachute or aeroshell) was seen. A geomorphic sketch map was created at a scale of 10 m/pixel (Figure 2). Eleven characteristic morphologies (+ one "other") and three qualitative assessments of topographic roughness were plotted on a base map compiled from the MOC images. By these criteria, 36% of the surface is considered smooth, 26% intermediate and 33% rough (5% was not classified owing to uncertainty in application of the qualitative criteria, *e.g.*, are sand dunes rough or smooth?). To quantitatively assess the topographic roughness, a topographic profile in a characteristically rough area was constructed by point stereophotogrammetry. These data were then calibrated against a nearby Mars Orbiter Laser Altimeter (MOLA) topographic profile to produce a controlled MOC topographic profile (Figure 3). Slopes were measured over distances ranging from 10 to 150 m, with slopes measured over long distances typically shallower than those measured over short distances. In the most topographically rugged region within the landing zone (*e.g.*, on the slopes of the depression along the western margin of the landing zone uncertainty ellipses), no more than 12% of the surface has slopes in excess of 10° when sampled at scales of 10-40 m/pixel; about 4% of the surface has slopes greater than 15°. Sampling over longer distances yielded lower slope values. Indeed, much of the landing zone is substantially smoother. Figure 4 shows the frequency of occurrence of a given slope angle as a function of slope angle for the same three metrics as described above. The overlap between the adjacent sample metric (red circles) and the other, larger sampling window computations (blue squares and green diamonds), shows that these measurements reasonably sample the range in slopes. Figure 5 shows close-up examples of some stereo pairs, illustrating the steepest and most rugged relief in the vicinity of the landing site. The polar landing site was less hazardous than many areas on Mars, but not without hazards. It is unlikely that the lander failed owing to geology.

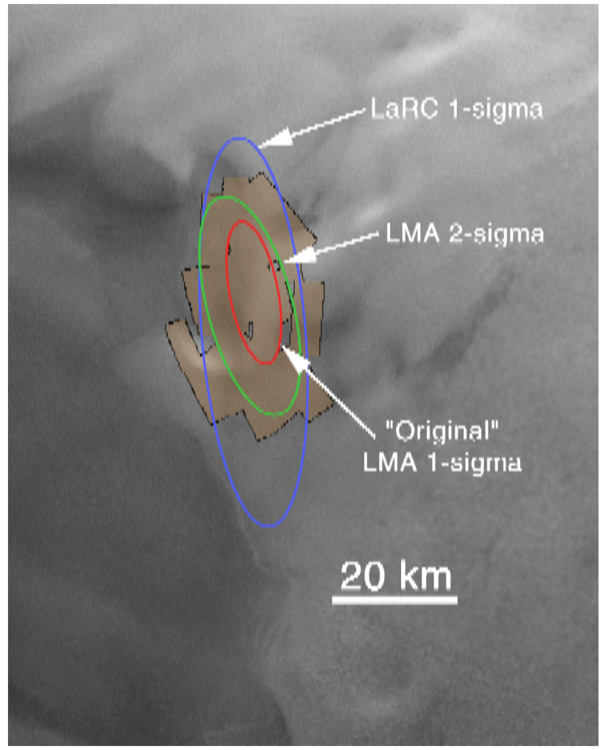

Figure 1: Location of MOC narrow angle image coverage as determined by simulataneous wide angle imaging, superimposed on a two-frame Viking Orbiter image mosaic registered to the targeting inertial coordinate system.

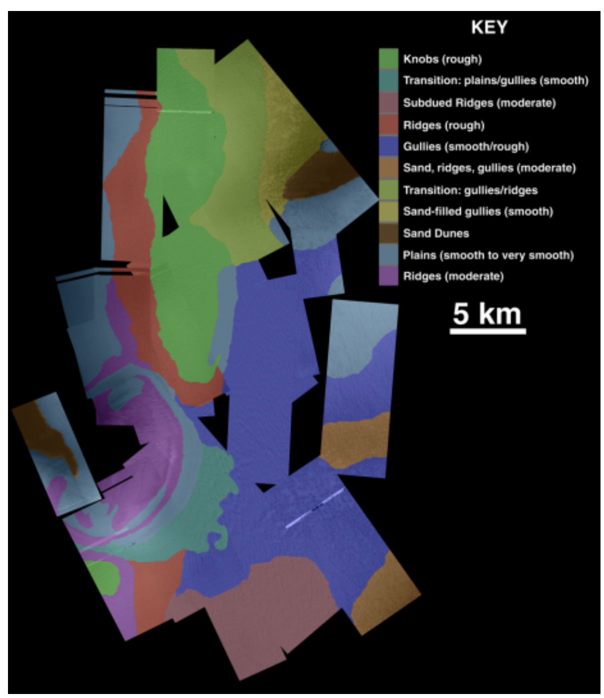

Figure 2: Geomorphic Map of MOC Images of MPL landing zone.

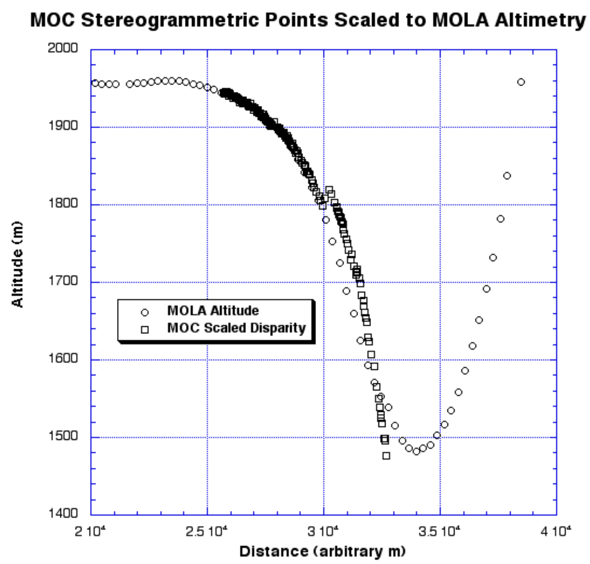

Figure 3: Scaling of MOC Photogrammetric Profile (squares) to MOLA Laser Altimetry Profile (circles).

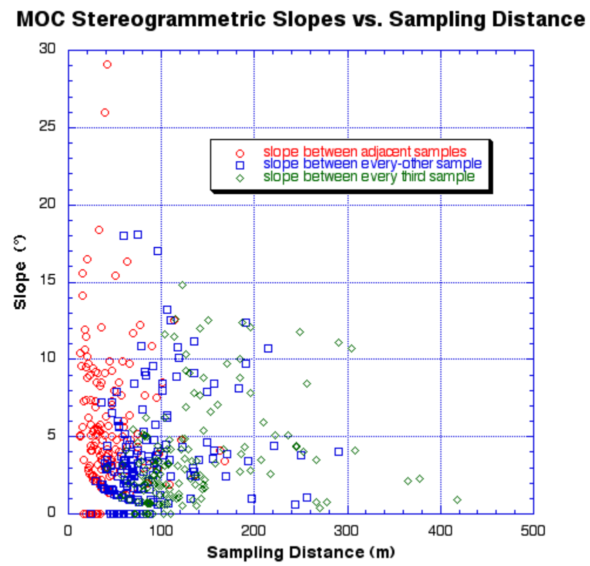

Figure 4: Scattergram of Photogrammetric Slope as function of Sampling Distance.

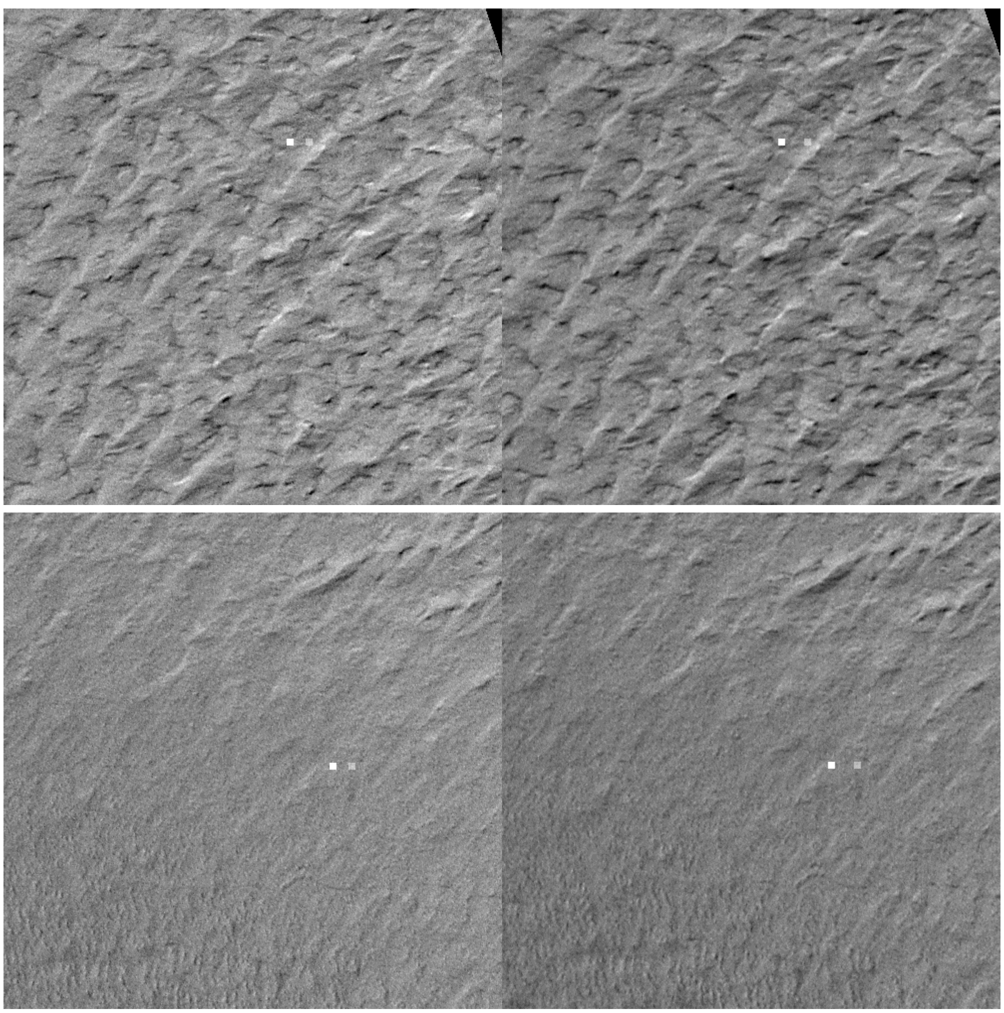

Figure 5: Two representative stereopairs from the MOC images used in determining the topographic profile. The two small squares in each image are 10 m on a side, 40 m apart horizontally, and 10 m apart vertically. It can be seen by comparing the vertical relief of nearby features to these squares that the typical local relief in the area is less than 5 m.