SIMULATED MANTLED SURFACES ON CRATERED TERRAIN, J. Zimbelman and R. Greeley, Dept. of Geology, Arizona State University, Tempe, AZ 85281

Large portions of Martian cratered terrain are considered to be mantled with deposits of aeolian and/or other origins (1). In order to qualitatively assess the appearance such a terrain would have, a modelled cratered surface was progressively covered with fine grained material. This resulted in increasingly subdued morphology and the burial of surface features as the depth of the deposit increased. Sequential vertical photographs (Fig. 1 to 7) were taken with constant illumination at an incidence angle of 80°. The model shows a typical cratered surface (the largest crater is scaled to be 90 km in diameter) with a 2.9X vertical exaggeration. Figure 1 shows the clean model surface with its abundance of craters and surface features. Particles were added in six increments, each of which resulted in deposition of a simulated layer \( \sim 120 \) m thick for a uniform distribution. Figure 2 shows the model after the first deposition of material; already most craters less than \( \sim 4 \) km in diameter were no longer observable while the gross morphology of the larger craters was hardly affected.

Each successive deposition reduced the sharpness of the surface morphology. The horizontal scale of features controlled the depth of material required to completely obscure it; most small craters became unrecognizable after only the second deposition while features of larger horizontal extent but of comparable vertical relief remained observable even after being completely buried (e.g. the shallow crater right of center). This result would influence crater statistics by reducing the apparent number of smaller craters with respect to the larger craters that remain observable. Crater ejecta and wall textures for the larger craters became obscured after only a few deposition increments.

As expected, surface morphology is correlated with the thickness of material that mantles a cratered surface. Figure 8 shows a portion of Viking image 746A53, centered at 9.8°S, 354.2°W, which displays the subdued morphology suggestive of mantling and which has observational conditions similar to those of the model photographs (incidence angle = 76°, emission angle = 1°, largest crater is 740 m in diameter). Future work with a better model surface will provide estimates of the amount of material involved in mantled cratered surfaces, as well as the effects of viewing and illumination geometry on the results, and may provide a semiquantitative assessment of the effects of mantling on crater statistics.

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