EVIDENCE OF PYROCLASTIC ACTIVITY NEAR ELYSIUM MONS, MARS. Kathleen McBride, University of Houston-Clear Lake and Lunar and Planetary Institute, 3303 Nasa Road 1, Houston, Tx., 77058 and James R. Zimbelman, Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, Washington, DC, 20560.

Preliminary photogeologic mapping of Elysium Mons on a 1:500,000 scale has revealed several features indicating the possible occurrence of both pyroclastic and effusive volcanic activity.

(1) Elysium Mons is approximately 500 X 780 km in diameter and stands 13 km above the surrounding plains. Slopes for Elysium are an average of 4.4° steepening to a maximum of 18° near the summit [1]. These slopes are steeper than those of other martian volcanoes indicating different types of volcanic processes may have occurred in this region [3]. An increase in the proportion/ratio of pyroclastics to lavas or a decrease in the rate of effusion (producing shorter flows) may account for the steepness of the summit slopes. Also a more viscous lava (possessing a higher silica content) could produce steeper slopes but this seems unlikely due to earth-based telescopic observations and multispectral Viking orbiter images indicating Mars is mafic to ultramafic in composition [2].

(2) The eastern flank of Elysium Mons appears smooth and slightly hummocky with no distinct lava flows visible at 150 m/pixel. Some craters appear mantled by some surficial deposit, possibly dust or volcanic ash [4].

(3) Analysis of Viking Infrared Thermal Mapper data has revealed a strong correlation between low thermal inertia values and Zephyrus Fossae, a linear fracture located at 23°N, 216.5°W, indicating a possible volcanic vent [5]. Image resolution for this area is poor and only a few degraded lava flows are visible in the vicinity. Craters tend to be irregularly shaped and appear subdued as if mantled by dust or volcanic air fall deposit. Located northeast of Zephyrus Fossae along the southwestern edge of Elysium Mons are several small shield volcanoes [6], but these features do not appear related to the low thermal inertia material.

(4) Four alligned domes resembling terrestrial cinder cones have been identified at 27°N, 218-219°W . These domes are from 4.0 to 7.5 km in diameter. They possess circular summit depressions and are alligned roughly parallel to the concentric fractures circumferential to Elysiun Mons, indicating possible tectonic control. However, there are many other dome-shaped features in this area that are randomly oriented and lack any evidence of summit craters at a resolution of 150 m/pixel.

Small, randomly distributed dome-like structures are also present in the area around Elysium Fossae. These features vary in size from 1 to 5 km in diameter. Most lack summit depresssions and a few appear to be elongated ridges.

(5) There have been several investigations into possible volcano-ground ice interactions in Elysium Planitia. Mouginis-Mark et al.,[7], found a variety of morphological features indicative of an interaction of ground ice with erupting magma. Some features include possible mega-lahars, the lobate ejecta of impact craters in the area, and the fluvial-like appearance of the Elysium Fossae channels.

REFERENCES: [1] Blasius and Cutts, Icarus 45, p. 87-112, 1981. [2] Greeley and Spudis, Rev. Geophy. Space Phys. 19, p. 13-41, 1981. [3] Malin, Geol. Soc. Am. Bull 88, p. 908-919, 1977. [4] Mouginis-Mark, LPSC 12, p. 726-728, 1981. [5] Zimbelman and McBride, (this volume). [6] Plescia, NASA-TM 82385, p. 261-262, 1980. [7] Mouginis-Mark et al., Icarus 64, p.265-285, 1985.