SCHIAPARELLI BASIN: CRATER COUNT CHRONOLOGY AND GEOLOGIC EVOLUTION OF AN ANCIENT MARTIAN IMPACT STRUCTURE. S. J. Jaret[1], A. N. Crane[2], and E. F. Albin[1]; [1]Department of Space Sciences, Fernbank Science Center, Atlanta, Georgia 30307 USA (ed.albin@fernbank.edu); [2]Department of Physics and Astronomy, Agnes Scott College, Decatur, Georgia 30030 USA (acrane@agnesscott.edu).

Introduction: Schiaparelli is a 470-km diameter impact structure found in eastern portion of the Terra Meridiani region of Mars (Figure 1). In this investigation we seek to map the distribution of geomorphic units within and immediately about this impact structure. In conjunction with our ongoing mapping efforts [1], cratering statistics were utilized in order to formulate a geologic history depicting the timing for the emplacement of various map units. Martian basins, such as Schiaparelli, are of significant importance for several reasons: 1) large impact basins excavate basement rock that would not otherwise be exposed at the surface of the planet, 2) basin ejecta serve as an important stratigraphic marker within the cratered uplands [2], 3) exhumed plutonic features (e.g., dikes) may be associated with rich hydrothermal ore deposits, and 4) they may have served as depositional sinks for layered (lacustrine?) deposits.

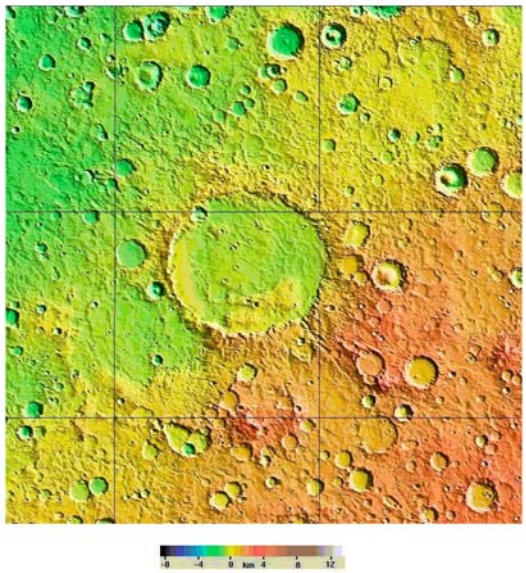
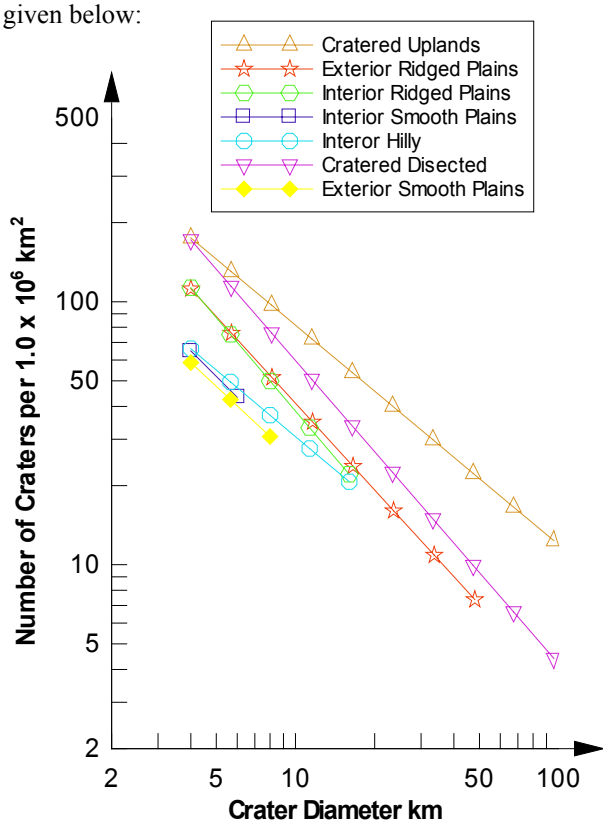


Figure 1. MOLA map of the Schiaparelli Basin.

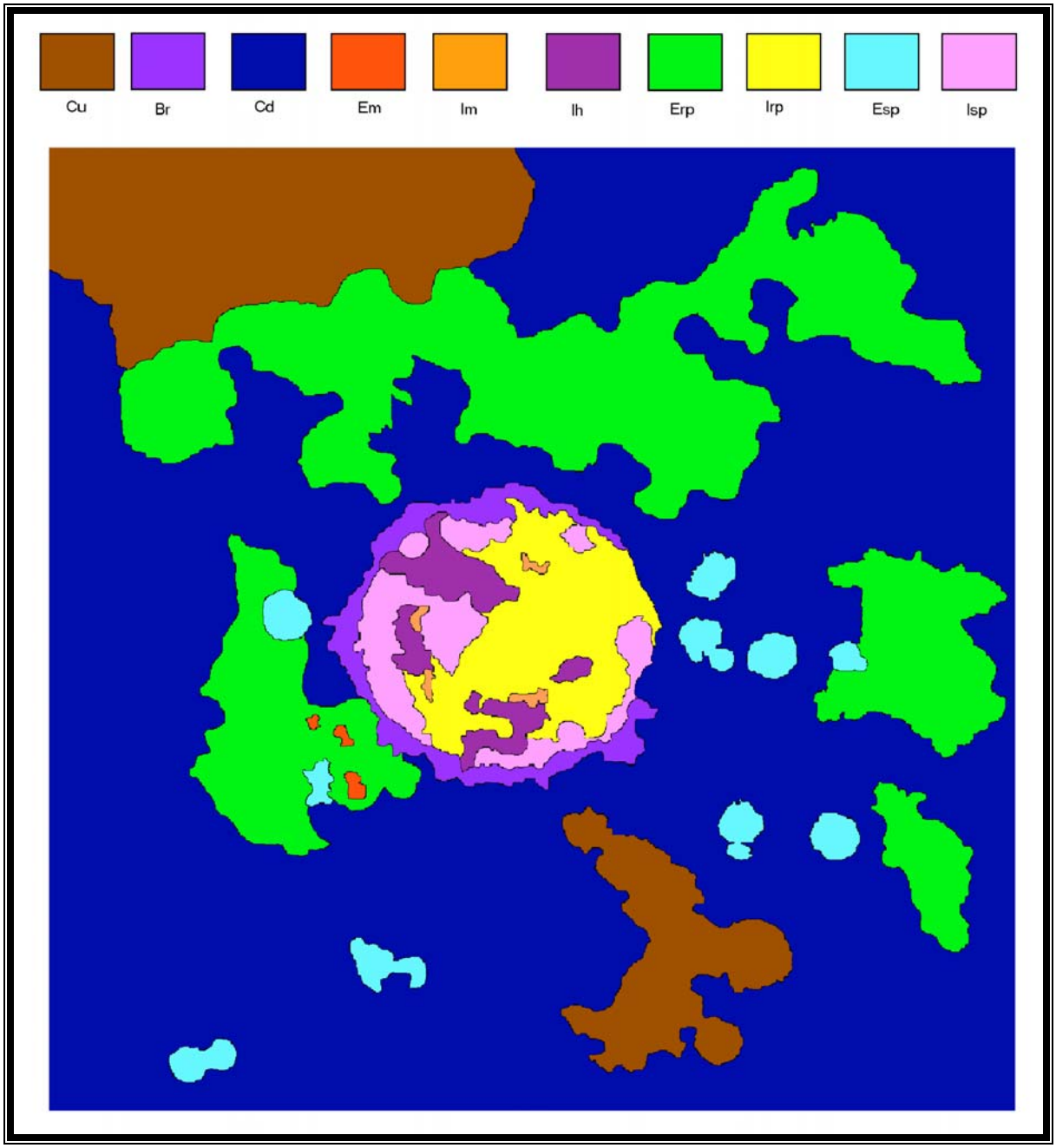
Geologic Mapping: Viking Orbiter image mosaics were used as a substrate for the creation of a detailed geologic map (see map on next page) of the impact basin. High resolution Global Surveyor MOC and MOLA data provided information for the interpretation of individual map units. The basin rim [Br] separates distinct sets of interior and exterior units. Within the basin, the following units are found: a) [Im] interior mountain (inner peak ring), b) [Ih] interior hilly material (fallback ejecta), c) [Irp] interior ridged plains (lava flows), and d) [Isp] interior smooth plains (lacustrine deposits). The exterior basin units include: a) [Cu] cratered upland material (pre-impact target surface), b) [Em] exterior mountain (basin ring), c) [Cd] cratered dissected material (continuous ejecta), d) [Erp] exterior ridged plains (lava flows), and e) [Esp] exterior smooth plains (lacustrine deposits).

Crater Densities: The relative age of the different map units was determined using crater count statistics [e.g., 3 and 4]. All units, with the exception of the basin rim and mountain material, were dated by this crater size-frequency technique. Impact craters greater than two kilometers in diameter were counted across an area normalized to one million square kilometers for each of the map units. Craters were grouped accordingly: 2.0 – 4.0 km, 4.1 – 6.0 km, 6.1 – 8.0 km, 8.1 – 12.0 km, 12.1 – 16.0 km, 16.1 – 24.0 km, 24.1 – 32.0 km, 32.1 – 48.0 km, 48.1 – 64.0 km, and 64.1 – 96.0 km. A graphical representation of our results is given below:



Geologic History: Schiaparelli, like other martian basins and their ejecta deposits, was formed during the Noachian epoch. The tectonic framework produced by the impact event led to the emplacement of volcanic plains within and adjacent to the basin. Cratering chronology suggests that both interior and exterior volcanism was concurrent. Lacustrine processes may have been responsible for the deposition of layered deposits making up smooth plains material. Subsequent aeolian / fluvial weathering has etched and removed considerable ejecta deposits. Future work will include inter-basin comparisons of the timing and deposition of deposits. In particular, age comparisons of dissected crater material (interpreted as basin ejecta deposits) should provide insight into the history of basin formation on the planet Mars.

References: [1] S. J. Jaret and E. F. Albin, 2002, *Bull. AAS, 34*, 15.24. [2] Edgett, K. S., 1991, *LPSC, 21*, 657-667. [3] Gilmore, M. S. et al., 2001, LPS, 22, 2038. [4] Yoburn, J. B., 1991, LPS, 22, 1077.



Geologic map of the Schiaparelli basin. The map covers an area of 20 square degrees within the Terra Meridiani region of Mars, extending from 330° to 350° longitude and –10° to 10° latitude. See text for a key and description of the map units.