

PRELIMINARY 1:500,000-SCALE GEOLOGIC MAPPING OF ARSIA MONS, MARS; James R. Zimbelman, Center for Earth and Planetary Studies, National Air and Space Museum, Smithsonian Institution, Washington, DC 20560

Geologic mapping of the Tharsis Montes at a scale of 1:500,000 was recently initiated as part of the Mars Geologic Mapping Program of NASA. Detailed mapping of the three large shield volcanoes and their surroundings will help to clarify the sequence of events which led to the formation of these features, as well as provide a basis for comparing the geologic histories of the three related (but still distinctive) volcanic centers.

Previous investigations have identified various differences among the three Tharsis Montes volcanoes. Crater counts show increasing relative age from Ascraeus Mons in the north to Arsia Mons in the south (1-3). This trend agrees with the structural evolution of the volcano edifices (4). Variations in caldera morphology among the Tharsis Montes and Olympus Mons suggest a variable size and depth for the magma chamber on the individual volcanoes (5). Remote sensing studies show subtle differences in physical properties between the four large shield volcanoes (6), which may be related to either volcanic emplacement conditions (7) or surface degradation (8). TERMOSKAN images obtained during the Phobos mission reveal six intensities of surface emission at thermal infrared wavelengths around the southern portion of Arsia Mons (9). Roughness estimates from Viking bistatic radar results display a maximum of at least 8° rms slope on the western flank of Arsia Mons (10). The rich variety evident from these studies support the diversity of landforms encountered in the mapping.

Four MTM (Mars Transverse Mercator series) sheets (-10127, -10122, -10117, -05117) are being mapped by the author (Fig. 1) and two adjacent MTM sheets (-05122, -05127) will be mapped by D. Scott as part of the MGM program. Basemap generation dictates that mapping will proceed from -10122 to -10127 to -10117 to -05117. Preliminary mapping of the -10122 sheet has revealed separable map units on the deeply eroded western flank of the volcanic construct, similar to units identified on the western flank of Ascraeus Mons (11). A connection may exist between the scoured western flanks of the Tharsis Montes and the aureole deposits northwest of all four large Tharsis shield volcanoes. The enigmatic aureole deposits will be the focus of study for MTM sheet -10127 and a prominent thermal inertia anomaly (12) will be compared to mapped units on MTM sheet -10117.

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Figure 1. 1:500,000 scale mapping around Arsia Mons, shown on the Viking photomosaic for MC-17NW (13). The region northwest of the volcano is being mapped by another MGM investigator (see text).

