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MARS GEOLOGIC MAPPING PROGRAM: REVIEW AND HIGHLIGHTS.

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The Mars Geologic Mapping Program (MGM) was introduced by NASA in 1987 as a new initiative in the Planetary Geology and Geophysics Program (PGG). The overall purpose of the program is to support research on topical science problems that address specific questions. Among the objectives of the project are (1) producing highly detailed geologic maps that will greatly increase our knowledge of the materials and processes that have contributed to the evolutionary history of Mars, (2) defining areas of special interest for possible future investigation by planned missions (Mars Observer, Mars Sample Return), and (3) maintaining the interest of the planetary community in the development of new concepts and the re-evaluation of Martian geology as new data in usable form become available. Two types of proposals may be submitted to the Mars Geologic Mapping Program: those involving the preparation of geologic maps on existing bases, or those requiring the preparation of 1:500,000-scale base maps. In both cases, the proposals must discuss the scientific rationale and the topical problems to be addressed by the geologic mapping. Completed maps will be published by the U.S. Geological Survey in the Miscellaneous Investigations Series.

At the close of FY90, 23 principal investigators (Fig. 1) were active in the Mars Geologic Mapping Program. They currently represent 9 universities, 2 NASA centers, 2 private institutions, the Lunar and Planetary Institute, the National Aeronautics and Space Museum, and the U.S. Geological Survey. During 1990, 9 new proposals and 10 renewal proposals were submitted to the MGM review panel for funding requests and 2 proposals submitted for base map constructions. Seventy-five MGM 1:500,000-scale quadrangles have been approved for geologic mapping; about 15 of these maps are in advanced stages of preparation. A meeting of MGM principal investigators was held at the USGS Center, Flagstaff, Arizona, during June 27-28, 1990. Scientific issues relevant to the program were discussed and specific mapping problems addressed. Presentations of mapping progress of some 20 quadrangles were made by PI's. Following the meeting, members of the MGM Steering Committee and Review Panel met on June 28-29 to evaluate new and renewal proposals to the program.

Some interesting highlights of the geologic mapping indicate that multiple flood episodes occurred at different times during the Hesperian Period in both Kasei and Maja Valles. Studies of small channels in the Memnonia, Mangala, and Tharsis regions show that fluvial events appear to have occurred during the Amazonian Period at equatorial latitudes. Flood waters from Mangala Valles may have seeped into surficial materials with the subsequent development of numerous sapping channels and debris flows; this suggests that the ancient highland terrain consists of relatively unconsolidated materials. Multiple layers have been observed for the first time in the ridged plains lava flows covering large areas of Lunae Planum; some wrinkle ridges in this area are associated with grabens and collapse pits, which suggests that the ridges originated as dikes. The distribution of volcanic units at Hadriaca and Tyrrhena Paterae indicates that the units may have been emplaced by gravity-driven pyroclastic flows. Unlike the north polar layered deposits, those in the south polar region show no angular unconformities or evidence of faulting and folding. Water ice in the south polar layered deposits may be protected from solar heating and sublimation by a weathering rind or lag deposit on the surface.

MARS GEOLOGIC MAPPING STATUS (1:500,000 scale) FY 90

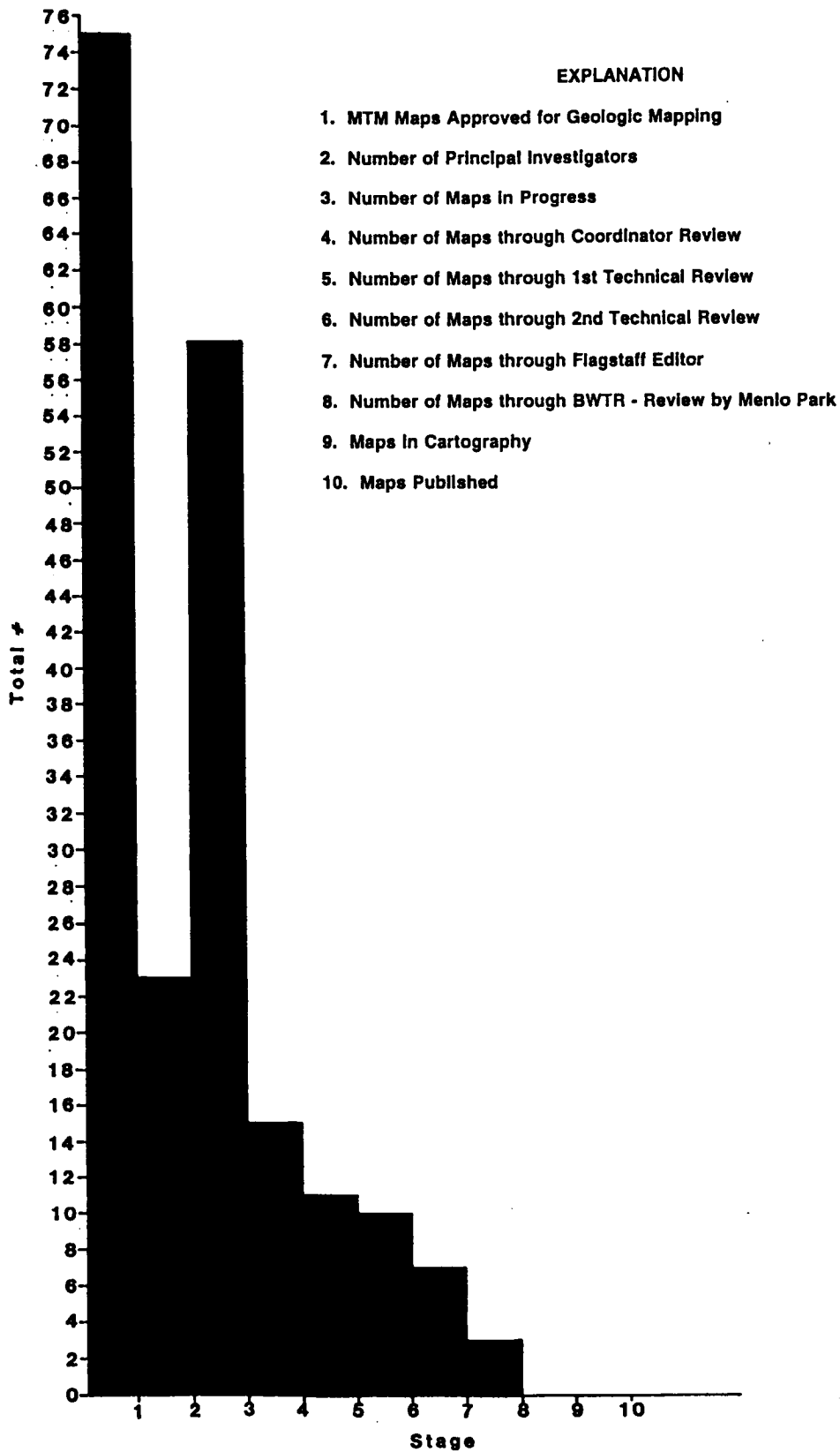


FIGURE 1