

Dunes, yardangs, and mantles of fine sediment on volcanic flows west of Arsia Mons and east of Medusae Fossae, Mars: Radar “Stealth” and possible Late Amazonian ash deposits

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“Stealth” is a radar-dark region that extends about 2,000 km west of Arsia Mons volcano on Mars. The region has no radar echo at 3.5-cm distinguishable from noise (Muhleman et al., *Science*, v. 253, p. 1508–1513, 1991). Previous work has led to the hypothesis that Stealth represents a 2–15 meters thick deposit of fine-grained material, possibly volcanic ash. Stealth lies stratigraphically above some of the youngest geologic features on Mars. We examined Viking orbiter infrared observations and high resolution images of the most enigmatic portion of Stealth: the lava flows west of Arsia Mons. The flows are indeed partially mantled by fine-grained debris. However, the deposit is discontinuous and exhibits evidence of both erosion (yardangs; pedestal craters), and depositions (mantles in the lee of obstacles; aeolian dunes). Dunes in the region cover more than 1,680 sq. km and are probably inactive (mantled by dust). On Earth, the source for aeolian dunes is usually closely associated with water-lain sediments, but there is no such source for the dunes near Arsia Mons. The dunes are instead the best evidence for a volcanic origin of the sediments in the Stealth region. The extent and relatively young age of the deposits implies that multiple, major explosive eruptions might have occurred late in martian history. Like global dust storms on Mars today, such eruptions would have lofted fine grains high into the atmosphere, and thereby might have left ash beds that could someday serve as global marker-horizons useful in correlating geologic events across the planet’s surface.