

Nature and source of low-albedo surface material in the sandy aeolian environment of Sinus Meridiani, Mars

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Mars Global Surveyor (MGS) is expected to have reached Mars on 12 September 1997. It carries a Thermal Emission Spectrometer (TES) to map surface mineral composition. Assuming successful arrival, the first TES observations will be made in mid-September. The strongest infrared spectral features should come from low-albedo surfaces (e.g., Sinus Meridiani) that have effective particles diameters of sand size or larger.

Sinus Meridiani is a low-albedo surface feature that has been recognized for ~400 years. It occurs between lat. 7°N and 13°S, lon. 10°W and 10°E. Viking Infrared Thermal Mapper (IRTM)-derived rock abundance, thermal inertia, and albedo together indicate that Sinus Meridiani is dominated by spatially-variable amounts of sand and rocks, but it is less rocky than low-albedo Acidalia, and more rocky than low-albedo Syrtis Major. High-resolution Viking images reveal that very few sand dunes are present. The only confirmed dunes are a few barchans in Airy Crater (5°S, 0°W).

The substrate on which Sinus Meridiani is superposed offers clues to the origin of sand in the region. The northern half of Sinus Meridiani is underlain by a smooth-surfaced deposit up to 1 km thick. The southern half consists of typical martian heavily-cratered terrain. Dominant winds blow from north to south. Wind erosion of the smooth deposit is proposed to be the source of dark sand, which has encroached southward upon the adjacent heavily-cratered terrain. Edgett and Parker (1997; Conf. on Early Mars, Lunar and Planet. Inst. Contrib. 916) suggested that the smooth deposit is a subaqueous sedimentary unit. It is possible that, by looking at the low-albedo surface material, MGS TES will actually provide some information about the composition of the underlying smooth-surfaced sedimentary unit. Observation of water-lain sediment is an emergent theme in the Mars Surveyor Program. Sinus Meridiani occurs within the latitude and elevation constraints for the 2001 lander/rover Surveyor mission.

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