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The Martian Surface As Investigated by the Mars Global Surveyor Thermal Emission Spectrometer Experiment

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The surface of Mars has been studied using the Thermal Emission Spectrometer (TES) instrument during the initial phases of the Mars Global Surveyor mission. The TES spectra observed from orbit are a complex combination of surface and atmospheric emitted and transmitted energy. These spectra exhibit the signatures of atmospheric dust, water-ice clouds, CO₂, water vapor, and surface minerals in varying abundances. Separation of these components is complex and requires careful modeling of the composition, particle size, and temperature of the atmospheric constituents. The abundance of atmospheric dust and water-ice clouds has been determined and can be mapped in space and time. Temperature retrievals have been performed using the 15 μm CO₂ absorption feature, and used to study the dynamics of the atmosphere. To date several surface components have been identified. The most significant of these is an accumulation of hematite within a localized zone with relatively sharp boundaries approximately 300 km in diameter centered near the equator at ~5°W. The hematite discovered by the TES most likely did not form by a ubiquitous surface weathering processes.