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Atmospheric Results from the Mars Exploration Rovers

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Although at first glance, the Mars Exploration Rover (MER) payload may beperceived as primarily suited to geological investigation, it is in factquite well-suited to carry out a robust and dynamic program of atmosphericmonitoring and characterization with a particular emphasis on theplanetary boundary layer. More to the point, it has been doing so at boththe Gusev and Meridiani locations for more than one martian year. Ongoingatmospheric observations include(1) periodic thermal infrared spectra of the Martian sky by theMiniature Thermal Emission Spectrometer (Mini-TES). The actualsequences consist of both standard 200-second integrations and long"stares" of up to (almost) an hour. These data are highlydiagnostic of vertical thermal structure (from 10 meters to 3kilometers) and aerosol optical depths. (2) direct solar imaging using the Panoramic Camera (Pancam) and440/880 nm + neutral density (ND5) filters, providing accuratemeasurement visible optical depths. (3) near-sun and "sky-arc" sequences using the full suite ofgeological filters, intended to capture the forward-diffraction peakand the phase function characteristics of the aerosol particles. (4) carbon dioxide (15 micrometer band) profiling of the Mini-TES surfaceobservations, providing an average near-surface (1 m) air temperature. The above activities have been (and will continue to be) used tocharacterize diurnal and secular temporal trends and to examine thespatial variability of such trends. In addition, serendipity hasprovided the unique opportunities of watching the decay of a moderatedust storm from two widely-separated sites as well as of multiplesimultaneous orbiter-rover observing "campaigns. " The latterincludes thus far the Mars Express and Mars Global Surveyor over-flights. During our presentation, we will briefly summarize the atmosphericresults obtained and analyzed through the end of the first 700 sols (days)of operations, the unique contributions/capabilities of each instrument, and the synergy which comes from combining the two, e.g., visible-to-infraredoptical ratio.