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SENSITIVITY TO ENVIRONMENTAL PROPERTIES IN GLOBALLY AVERAGED SYNTHETIC SPECTRA OF MARS AND EARTH.

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We are using computer models to explore the observational sensitivity to changes in atmospheric and surface properties in the globally averaged spectra of Earth and Mars. Using AIRS (Atmospheric Infrared Sounder) and General Circulation Model interpolations of Mars data as input on atmospheric and surface properties, we have generated spatially resolved high-resolution synthetic spectra using the SMART radiative transfer model (developed by D. Crisp), for a variety of conditions, from the UV to the far-IR (beyond the range of current satellite data). We have then averaged over the visible disk for a number of different viewing geometries to quantify the sensitivity to surface types and atmospheric features as a function of viewing geometry, and spatial and spectral resolution.
These results have been processed with an instrument simulator to improve our understanding of the detectable characteristics of terrestrial planets as viewed by the first (and probably second) generation extrasolar terrestrial planet detection and characterization missions (Terrestrial Planet Finder/Darwin and Life finder).
We have validated our model against observations by the Mars Global Surveyor Thermal Emission Spectrometer (MGS TES).