IMPROVEMENTS IN LIMB RETRIEVALS OF TES SOLARBAND AND IR DATA (AND MCS SOLARBAND DATA)

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Introduction:

Vertical variations in aerosol distributions (and their microphysical properties) can have a dramatic impact on the state and evolution of the Martian atmosphere. This has been clearly delineated recent work using retrieval products produced by the Mars Climate Sounder (MCS) team from limb observations by the MCS IR bolometers. However, similar products for Thermal Emission Spectrometer (TES) limb observations have not been as widely disseminated. In addition, the solar band channels of both datasets have been essentially unanalyzed. Our overarching goal has been to fill these gaps in order to address particle size studies, as well as to generate products that can be used by the wider community.

Presentation Highlights:

In our presentation, we will include:

- A summary of our limb radiative transfer algorithms and retrieval scheme, including our implementation of the Multiplicative Algebraic Reconstruction Technique (MART; [1]).
- The limitations imposed by "Smoothing Error" [1,2] and by systematic radiometric error on retrievals in lower and upper atmosphere, respectively;
- Vertical profiles of opacity and particle size associated with the evolution of the 2001 TES dust storm;
- The use of limb retrievals to estimate integrated-column optical depths (validated against Mars Exploration Rover and TES emission phase function measurements)
- The plans for an ongoing archive to be used for the distribution of the derived profiles and associated retrieval metadata.

References: [1] Bourassa AE, Degenstein DA, Gattinger RL, Llewellyn EJ. 2007. Stratospheric aerosol retrieval with optical spectrograph and infrared imaging system limb scatter measurements. Journal of Geophysical Research (Atmospheres) 112: 10217; [2] Bourassa AE, McLinden CA, Bathgate AF, Elash BJ, Degenstein DA. 2012. Precision estimate for Odin-OSIRIS limb scatter retrievals. Journal of Geophysical Research (Atmospheres) 117: 4303.

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