(9-240326-A) **Ground-based Thermal Infrared Spectrometers: What We Can Learn**

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Ground-based infrared spectrometers (IRS) observe the downwelling spectral radiance typically between 3 and 19 microns at about 1 wavenumber resolution. These observations contain a wealth of information about the atmosphere. IRS observations are used for a wide range of applications including: improving infrared radiative transfer models, looking at decadal trends in downwelling IR radiance over the central U.S., characterization of atmospheric dust layers, thermodynamic profiling and characterizing the evolution of the planetary boundary layer, quantifying the surface radiative forcing of carbon dioxide, and more. This talk will demonstrate the power of these observations, and argue for the need for an extended network of operational IRS instruments.

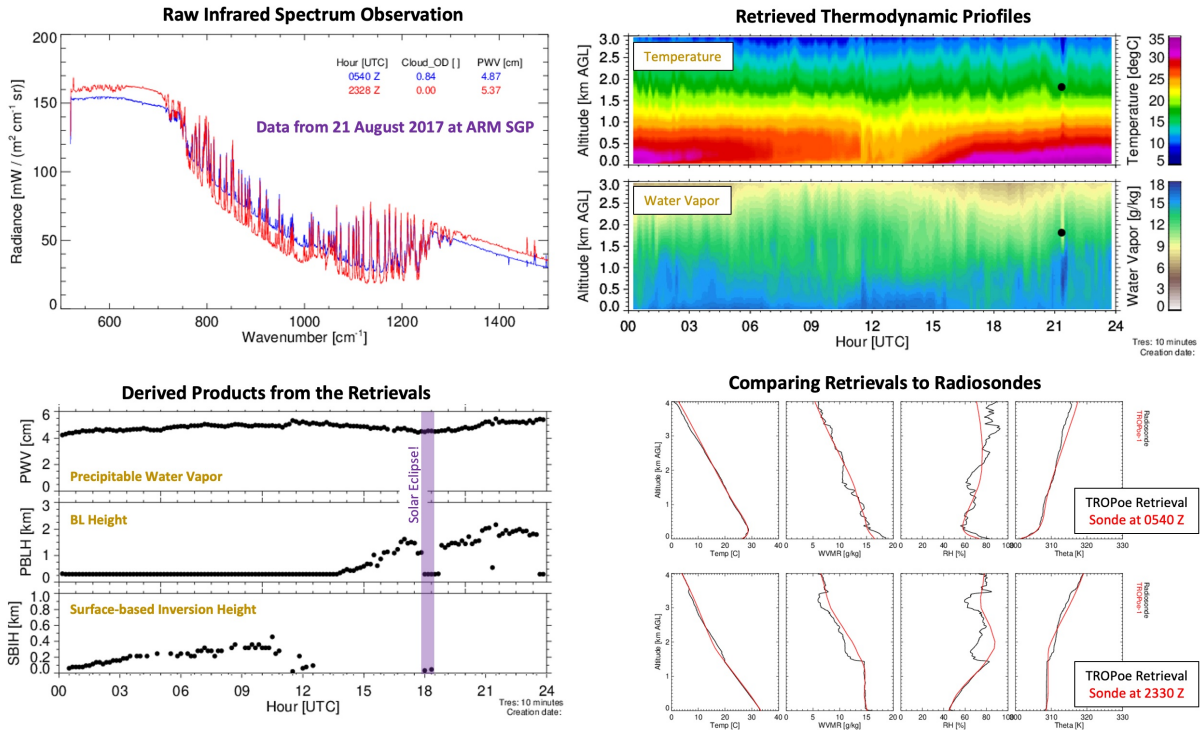

Figure 1. Examples of downwelling infrared radiance observed by an IRS at the ARM Southern Great Plains site on 21 August 2017 (upper left); time-height cross-sections of temperature and water vapor mixing ratio retrieved from the IRS data on this day using the retrieval algorithm TROPoe (upper right); derived products from the TROPoe retrievals showing PWV, height of the boundary layer, and height of the surface based inversion (lower right); and comparison of retrieved profiles (black) with collocated radiosondes (red) for 0540 and 2330 UTC. Note that the solar eclipse occurred on this day, which can be seen by the rapid change in the boundary layer height and the development of a surface-based inversion between 1800 and 18:20 UTC.