The RHUBC-II Campaign: Analysis of Downwelling Infrared Radiance

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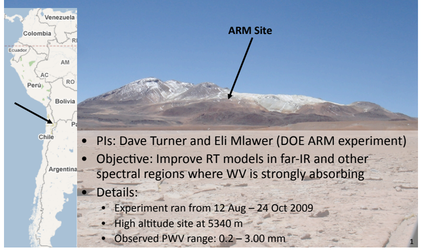
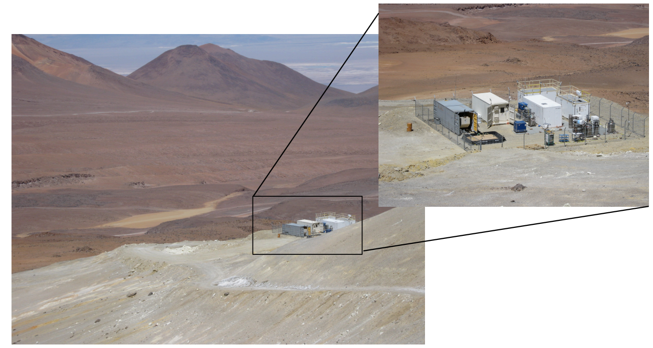
Radiative Heating in Underexplored Bands Campaign (RHUBC-II)

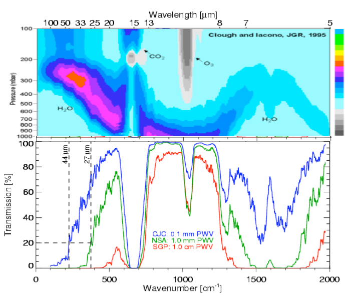


Abstract

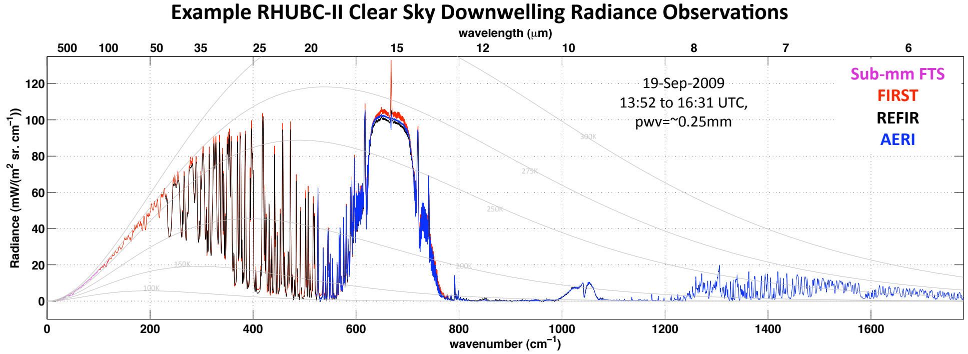
Radiative heating and cooling are important drivers of Earth's climate. In the mid-to-upper troposphere, the dominant radiative processes in both the solar and thermal regimes are due to water vapor. In order to properly model the atmospheric circulation, the radiative transfer models used within GCMs in the strong water vapor absorption bands, which are spectral regions that drive mid-to-upper tropospheric heating, must be accurate. The Radiative Heating in Underexplored Bands Campaigns (RHUBC-I and RHUBC-II) were conducted under the auspices of the ARM Climate Research Facility to collect the data needed (e.g., accurate water vapor profiles and spectrally resolved radiance observations) to evaluate and improve detailed radiative transfer models in the strong water vapor bands. This poster focuses on the analysis of the radiance observations in the 6.7 µm vibrational water vapor band and the rotational water vapor band in the far-infrared (wavelengths longer than 15 µm) using data collected during RHUBC-II, which was conducted at an altitude of 5380 m in northern Chile. The precipitable water vapor was as low as 0.2 mm (approximately 100 times less than a typical SGP value), which resulted in the normally opaque far-infrared region of the spectrum being semi-transparent from 16-43 µm. This provides a unique opportunity to evaluate the water vapor absorption line parameters and the water vapor continuum absorption model in this region of the spectrum. **Also see RHUBC-II posters of Mlawer et al. and Mlynczak et al.**



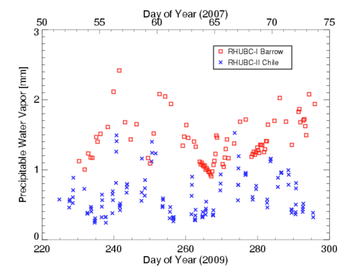
Cooling Rates and Transmission



Example RHUBC-II Clear Sky Downwelling Radiance Observations

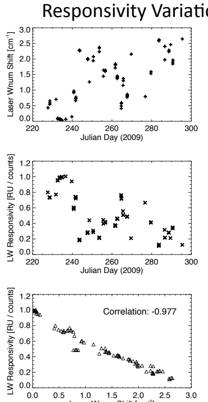


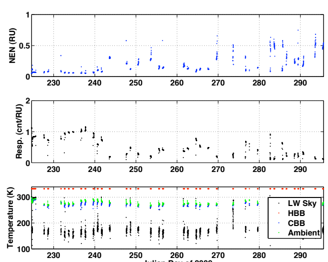
Radiosonde (Vaisala RS-92s) Precipitable Water Vapor



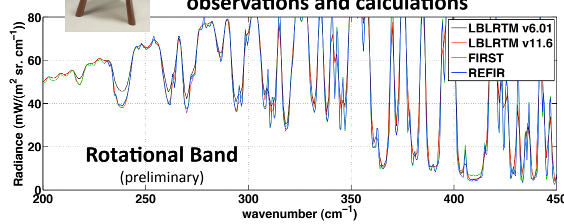
AERI: Atmospheric Emitted Radiance Interferometer

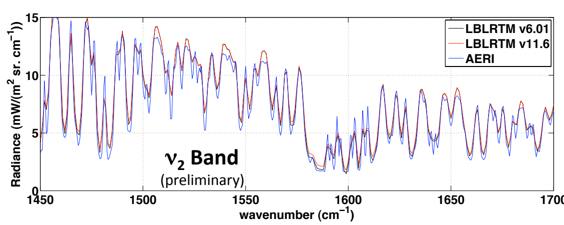
Spectral Calibration and Responsivity Variations





Reconciling differences between observations and calculations





REFIR: Radiation Explorer in the Far Infra Red

Clear Sky Obs/Calcs and PWV retreivals