

Radiative Heating in Underexplored Bands Campaign (RHUBC)

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RHUBC Breakout Session
2008 ARM Science Team Meeting
13 March, 2008
Norfolk, Virginia



Motivation

- Radiative heating/cooling in the mid-troposphere modulate the vertical motions of the atmosphere
 - This heating/cooling occurs primarily in water vapor absorption bands that are opaque at the surface
- Approximately 40% of the OLR comes from the far-IR
- Until recently, the observational tools were not available to evaluate the accuracy of the far-IR radiative transfer models
 - Spectrally resolved far-IR radiances, accurate PWV
- Need to validate both clear sky (WV) absorption and cirrus scattering properties in these normally opaque bands

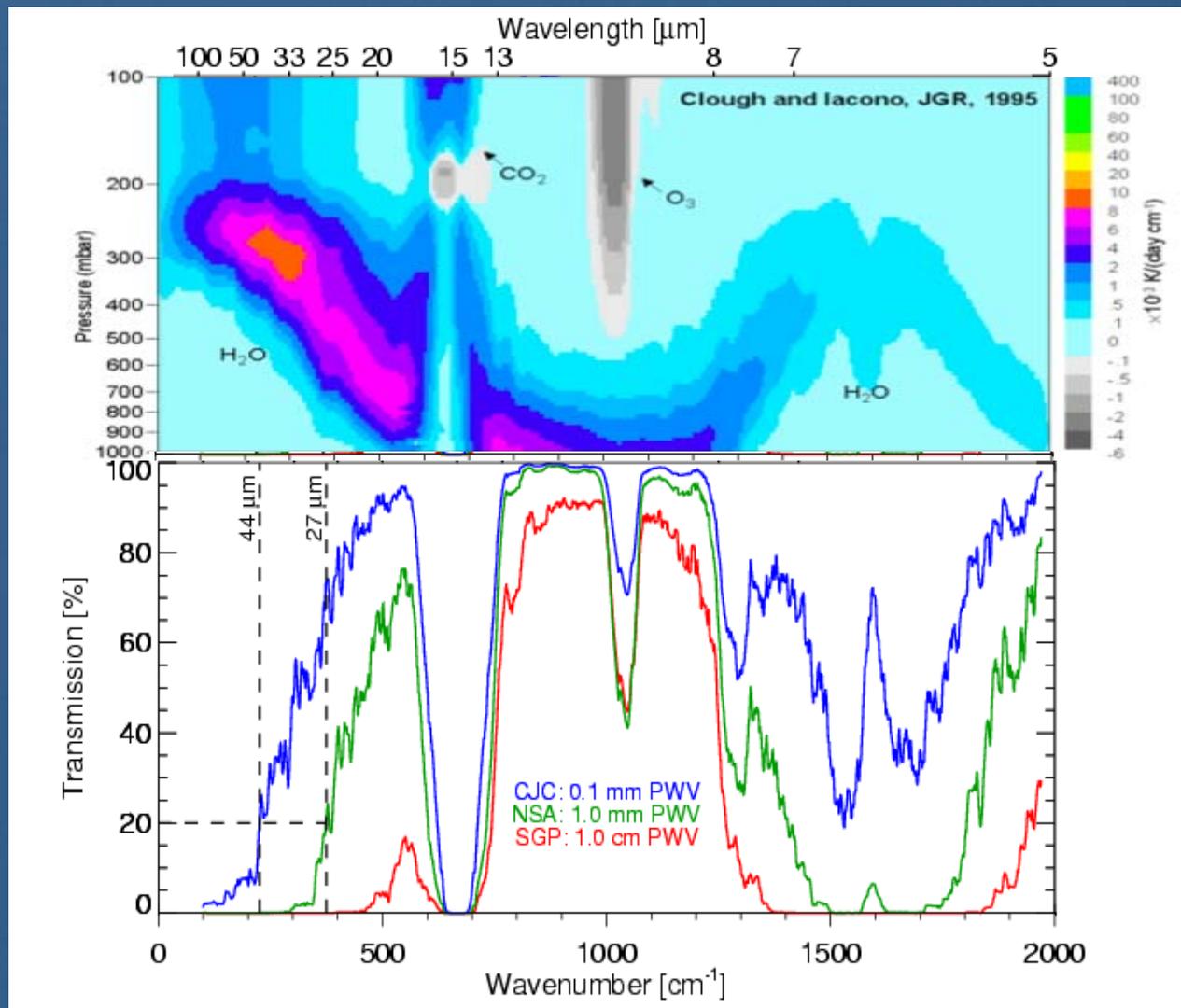
Scientific Objectives

- Conduct clear sky radiative closure studies in order to reduce uncertainties in WV spectroscopy
 - Line parameters (e.g. strengths)
 - WV continuum models
- Investigate the radiative properties of cirrus in the far-IR

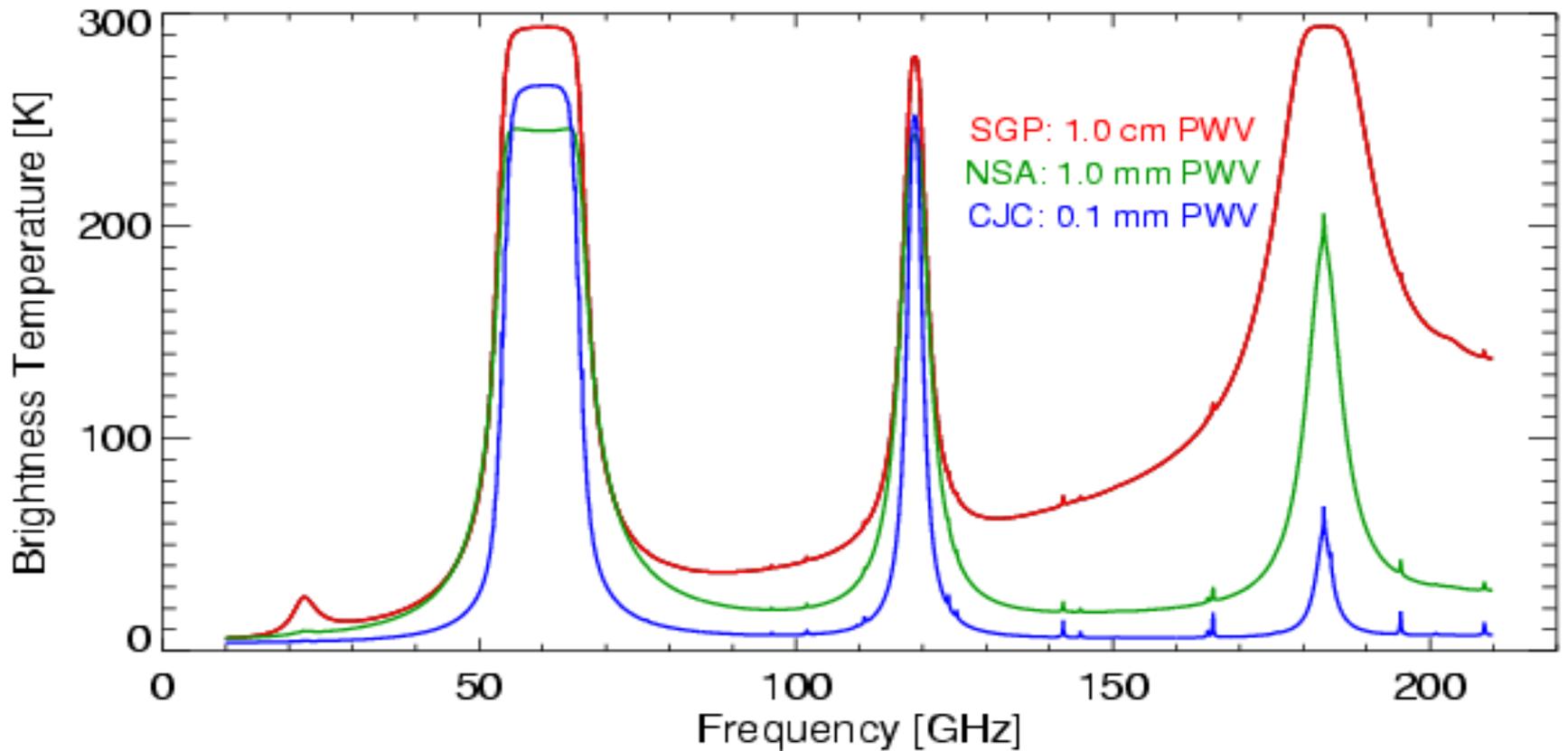
Campaigns

- RHUBC-I
 - 22 Feb - 14 Mar 2007
 - ARM NSA site, Barrow, Alaska
 - Minimum PWV: 0.95 mm (observed)
 - Key instrumentation:
 - AERI-ER, GVR, RS-92 radiosondes (extras), MPL
 - TAFTS, GSR, MP-183
- RHUBC-II
 - 1 Aug - 31 Oct 2009
 - Cerro Toco or Chajnantor Plateau, Chile
 - Minimum PWV: 0.1 mm (anticipated)
 - Key instrumentation:
 - AERI-ER, MP-183, RS-92 radiosondes, MPL, GVR (?)
 - FIRST, ASTI, REFIR-PAD (?)

Importance of the Far-Infrared

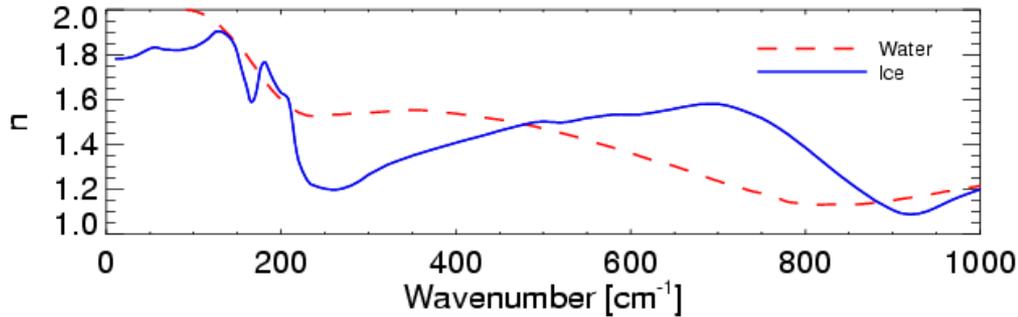


Sensitivity to Water Vapor in the Microwave and Millimeter-wave

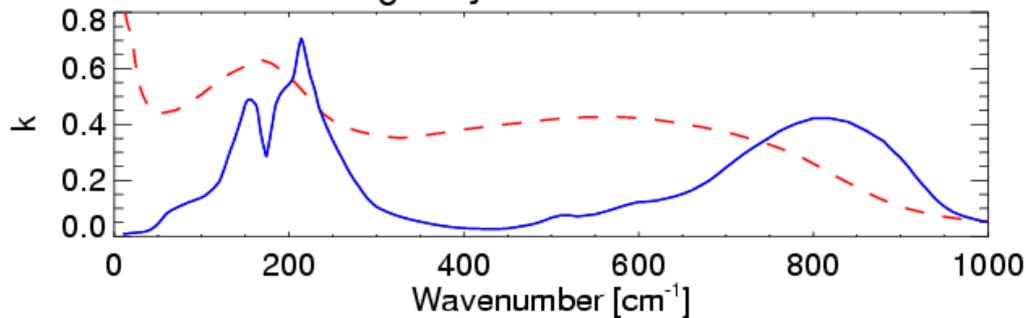


Ice Cloud Properties in far-IR

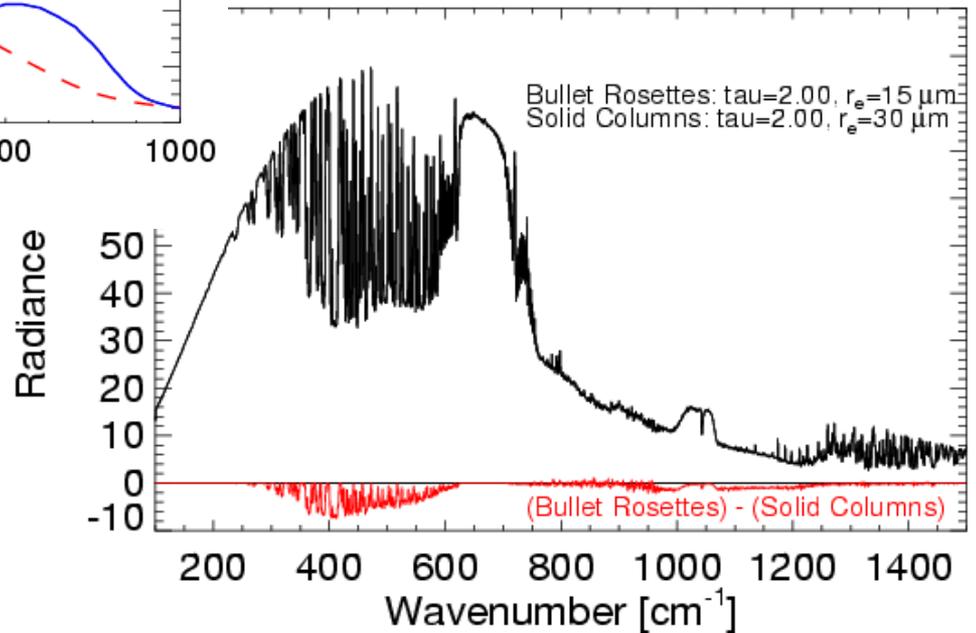
Real Refractive Index



Imaginary Refractive Index



Truncated US STD (0.07 cm)



Transparency of the Atmosphere in the Near-Infrared

