

The RHUBC Campaign: Analysis of Water Vapor Profiles

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The Radiative Heating in Underexplored Bands Campaign

Motivation:

- Mid-tropospheric radiative cooling modulates vertical motions of the atmosphere
 - Occurs primarily in **water vapor** absorption bands that are opaque at the surface
- Approximately 40% of the OLR comes from the far-IR
 - Need to validate water vapor absorption models in these normally opaque bands.**

RHUBC-II Campaign – Atmospheric Radiation Measurement Program (DOE)

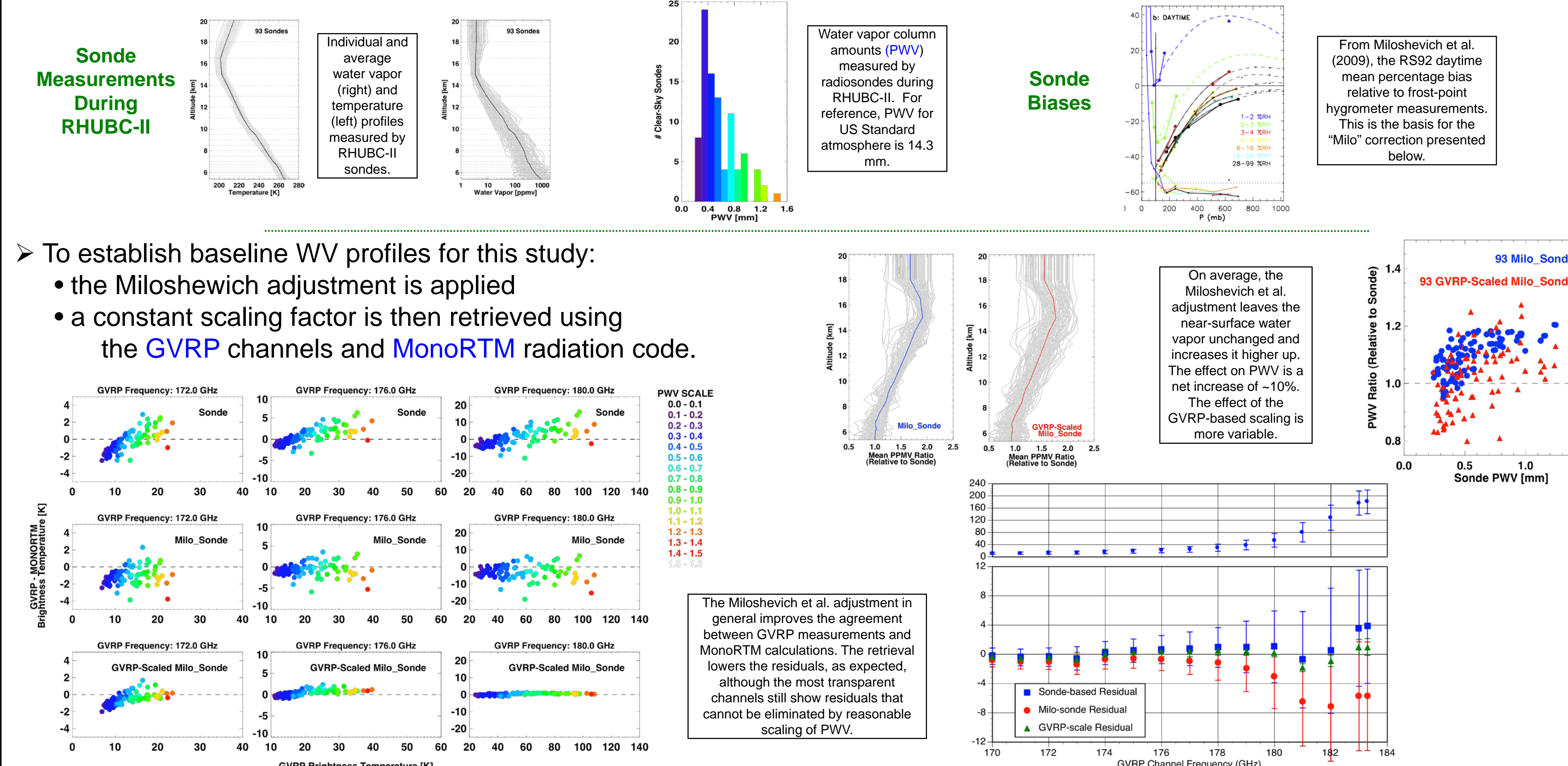
- Held in location with extremely low water vapor: Atacama Desert, Chile
 - high altitude site – Cerro Toco (5350 m)
- July – November 2009
- Key Instruments
 - Vaisala **RS-92** radiosondes – ~130 launches
 - G-band Vapor Radiometer Profiler (**GVRP**) – 15 channels on side of 183.3 GHz WV line
 - SAO FTS** – zenith radiance from 300-3500 GHz (resolution 3 GHz)
 - U. Cologne **HATPRO** – 7 channels from 22.2-31 GHz, 7 channels from 51-58 GHz
 - NASA LaRC Far-IR Spectroscopy of the Troposphere (**FIRST**) – 100-1600 cm^{-1} (res. 0.6 cm^{-1})
 - CNR (Italy) Radiation Explorer in the Far-IR (**REFIR-PAD**) – 100-1400 cm^{-1} (res. 0.5 cm^{-1})
 - U. Wisc. Atmospheric Emitted Radiance Interferometer (**AERI**) – 550-3000 cm^{-1} (res. 0.5 cm^{-1})

Analysis of the data collected is underway

Publication – D. Turner and E. Mlawer, The Radiative Heating in Underexplored Bands Campaigns (RHUBC), *Bull. Amer. Met Soc.*, in press

Specifying Water Vapor Profiles During RHUBC-II

- Sondes provide an initial determination of the water vapor field above the site, but have known issues.



Initial Evaluation of Multi-level WV Retrieval from GVRP Measurements: 9/19, 1530 UT; PWV~0.28mm

