RESULTS FROM THE 2004 NSA/AAO ARCTIC WINTER RADIOMETER EXPERIMENT

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Moisture and clouds in the cold, dry polar regions play key roles in climatic feedback. Also, the development of accurate radiative transfer models requires accurate measurement of water vapor. However, the measurement of water vapor during cold arctic conditions has been particularly problematic. Radiosonde soundings of humidity, especially those using Carbon Hygristor (CH) humidity elements, have been suspect. In addition, the standard measurements of total columnar vapor by either Microwave Radiometers (MWR) or Global Positioning Systems (GPS) lack sensitivity for column amounts less than about 3 mm. To determine the ability of Millimeter Wavelength Radiometry to measure small amounts of both vapor and cloud liquid, the Arctic Winter Radiometric Experiment was conducted at the Department of Energys Atmospheric Radiation Measurement (ARM) Program North Slope of Alaska site near Barrow, Alaska, from March 9 to April 9, 2004. Instruments that were operated included the NOAA Environmental Technology Laboratorys Ground-based Scanning Radiometer, the dual-frequency MWR and Multichannel Microwave Profiler, developed by Radiometrics Corporation and operated by ARM, and a GPS water vapor instrument. Moreover, active and passive microwave and infrared instruments are run operationally at the site by ARM, such as the Millimeter-wave Cloud Radar, the Micropulse Lidar and the Atmospheric Emitted Radiance Interferometer. Brightness Temperatures (Tb) over the frequency range 22.235 to 400 GHz were measured. In addition, as many as five simultaneous radiosondes were launched that used CH, Vaisala RS90, or Chilled Mirror humidity elements. In this presentation, we compare forward model calculations of Tb based on five contemporary absorption models, humidity soundings of the various radiosonde types, and selected derived meteorological products.

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2. F - Wave Propagation and Remote Sensing

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4. C - Contributed Paper

5. No special instructions