OBSERVATION OF ARCTIC CLOUD PROPERTIES WITH A SUBMILLIMETER-WAVE RADIOMETER

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Abstract Submission Form

2004 National Radio Science Meeting

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Date Received: September 22, 2004

Radiometric brightness temperatures around 20 and 31 GHz have been used for several years to retrieve operationally integrated vapor water path and cloud liquid water path. Studies of moisture and clouds in the cold, dry Polar regions play significant roles in climate feedback. Theoretical studies indicate that radiometric brightness temperatures at 340 GHz may be sensitive to ice in clouds, yielding the possibility of integrated ice water path retrievals. During the recent experiment Arctic Winter Water Vapor Intensive Operating Period 2004 (WVIOP04), from March 9 April 9, the Ground-based Scanning Radiometer (GSR) of NOAA/Environmental Technology Laboratory was deployed in Barrow, Alaska. The GSR is a multi-frequency scanning spectrometer operating at radiometric bands ranging from 50 to 380 GHz, with eleven channels in the 50-56 GHz oxygen band, dual linearly polarized channels at 89 and 340 GHz, seven channels around the 183.31 GHz water vapor absorption line, and three channels around the 380.20 GHz water vapor line. The main goal of the WVIOP04 experiment was to demonstrate the capability of millimeter wavelength radiometers to improve water vapor observations during the arctic winter. One of the secondary goals included evaluation of the sensitivity of millimeter-wave window channels to arctic clouds. The 340 GHz radiometer was the primary radiometer used for the study of arctic ice clouds. Based on active remote sensing data from a cloud radar and lidar, case studies of the GSR vertically pointing brightness temperatures as well as the polarization difference at 340 GHz are being analyzed over the periods when mixed-phase clouds and ice clouds were present. By using estimates of IWP from 20-31 GHz radiometer retrievals and radar and lidar data, the possibility of radiometric ice water path retrievals are investigated.

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2. F - Wave Propagation and Remote Sensing

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4. C - Contributed Paper

5. No special instructions