Geophysical Research Abstracts, Vol. 9, 09214, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09214

The Ground-based Scanning Radiometer (GSR): a Tool for Polar Atmospheric Research

D. Cimini (1,2), E. R. Westwater (1), M. Klein (3), V. Leuski (3), A. J. Gasiewski (1)
(1) CU/CET, USA, (2) CETEMPS, University of L'Aquila, Italy, (3) CU/CIRES, USA,
(nico.cimini@aquila.infn.it / Phone: +39-0862-433076)

The University of Colorado (CU) Center for Environmental Technology (CET) has developed a new instrument, the Ground-based Scanning Radiometer (GSR). The GSR is based on an original design that provides a list of features for atmospheric research in extremely dry and cold environments, such as the polar regions. The GSR operates over a broad frequency range (50 to 400 GHz), including several channels near the strong water vapor absorption lines at 183.31 and at 380.2 GHz. The set of frequencies was selected for the simultaneous retrieval of atmospheric temperature profiles, precipitable water vapor (PWV), cloud liquid water path (LWP), and cloud depolarization ratio. The millimeter- and submillimeter-wave channels are very sensitive to PWV and LWP and allow for accurate observations at extremely low burdens. The GSR was deployed for the first time during the Arctic Winter Radiometric Experiment Water Vapor Intensive Operative Period (WVIOP), held in March-April 2004 at the Atmospheric Radiation Measurement (ARM) Program North Slope of Alaska (NSA) site in Barrow, USA. The primary purpose was to demonstrate that millimeter-wave radiometers can substantially improve PWV and LWP observations in the Arctic conditions. The GSR is planned to be deployed again at the ARM NSA site during the Radiative Heating in Underexplored Bands Campaign (RHUBC) in February-March 2007 to supplement high spectral-resolution infrared observations of downwelling radiances across the near- and far-infrared spectrum. The major goals include radiative tranfer modeling studies over a broad frequency range and the development of retrieval algorithms to support long-term Arctic profiling for climate monitoring purposes. We first outline the GSR basic design, and then present a summary of results obtained during the 2004 WVIOP. We next present preliminary results from RHUBC, and we conclude with plans for future deployments and retrieval algorithm development.