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INTRODUCTION

- The Ground-based Scanning Radiometer is a 28 channel radiometer that operates from 50 to 400 GHz. The channels were selected to provide profile retrievals of temperature, water vapor and cloud liquid, during cold and dry Arctic conditions. In the **Arctic Winter Radiometric Experiment 2004**, the GSR was operated for the first time, and its data were compared with ARM operational instruments: (MWR, MWRP, and BBS) as well as radiosondes of the National Weather Service. In addition to new results given here, three open literature submissions have been accepted (see References).
- The GSR was recently deployed in the **Radiative Heating in Underexplored Bands Campaign** at the NSA. Here, the GSR provided real time retrievals of Precipitable Water Vapor and Cloud Liquid path. Preliminary results from this RHUBC deployment are given here.

EXPERIMENTS

- Arctic Winter Radiometric Experiment 2004
Period: March 9-April 9 2004
Location: ARM NSA, Barrow, Alaska
- RHUBC (<http://science.arm.gov/rhubc/>)
Period: February 22, 2007 to present
Location: ARM NSA, Barrow, Alaska

GOALS

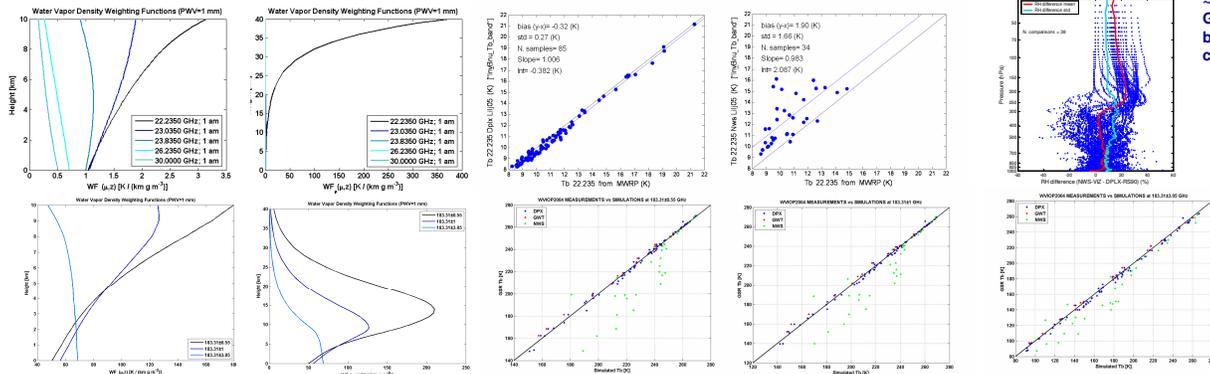
- Provide real time retrievals of PWV and CLP
- Compare observations with ARM and Radiometrics millimeter-wave radiometers
- Forward model radiative transfer studies

GSR Frequency bands	Frequencies (GHz)	Parameters
O2	50, 300, 51,769, 52,625, 53,290, 53,845, 54,400, 54,950, 55,520, 56,025, 56,215, 56,325	T(z)
Window 1	89 (H & V)	PWV and LWP
H2O 1	183.31 ± (0.55, 1.0, 3.05, 4.7, 7.0, 12.0, 16.0)	PWV, LWP, ρ(z)
Window 2	340 (H & V)	LWP
H2O 2	380.197 ± (0.4, 1.5, 4.0, 9.0, 17.0)	PWV
IR	10 μm	Cloud

Fig.1 List of GSR channels deployed during RHUBC.

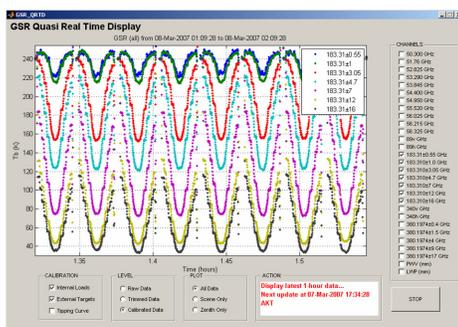
GSR and MWRP RADIOSONDE COMPARISONS DURING NSA IOP-2004

MWRP and GSR Weighting Functions Showing Tropospheric and Stratospheric Response at 22.235 GHz and near 183.31 GHz

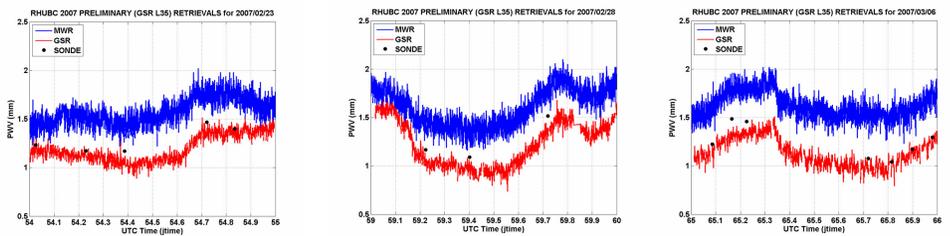


GSR OBSERVATIONS DURING RHUBC2007

QUASI REAL TIME DISPLAY OF GSR DATA



COMPARISONS OF GSR, MWR, AND RS92 MEASUREMENTS OF PWV



GSR retrievals of PWV from 89 and 183.31 ± 7 GHz channels and after tipicals were done.

OPEN LITERATURE REFERENCES ABOUT GSR AND THE ARCTIC WINTER RADIOMETRIC EXPERIMENT 2004

V. Mattioli, E. R. Westwater, D. Cimini, J. S. Liljegren, B. M. Lesht, S. I. Gutman, and F. J. Schmidlin "Analysis of Radiosonde and ground-based remotely sensed PWV data from the 2004 North Slope of Alaska Arctic Winter Radiometric Experiment" *Journal of Atmospheric and Oceanic Technology* **24**(3), 415-431, 2007.

D. Cimini, E. R. Westwater, A. J. Gasiewski, M. Klein, V. Leusky, and J. C. Liljegren, "The Ground-based Scanning Radiometer (GSR): a powerful tool for the study of the Arctic Atmosphere", *IEEE Transactions on Geosciences and Remote Sensing* (in press).

D. Cimini, E. R. Westwater, A. Gasiewski, M. Klein, V. Leusky, J. Liljegren, "Ground-based millimeter- and submillimeter-wave observations of low vapor and liquid water contents, MRS06 Special Issue of *IEEE Transactions on Geosciences and Remote Sensing* (in press).

SUMMARY

- The GSR is a single instrument that can provide measurements of temperature, water vapor, and cloud liquid.
- During the entire RHUBC experiment, the GSR provided real time measurements of brightness temperature and retrievals of PWV.
- The GSR is continuing at the NSA Great White and is operating remotely under commands from Boulder
- Both the GSR and the MWRP can identify spurious water vapor measurements by radiosondes, both in PWV and in the stratosphere

PLANS

- Continue forward model studies from 50 to 400 GHz
- Development of profile retrieval algorithms for zenith and angular-scanned data
- Preliminary design of upward hemispheric scanning with the GSR
- Add 19, 23.8, and 31 GHz channels to GSR
- Participation in RHUBC 2