Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06672, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06672
EGU General Assembly 2008

Enhancement of cloud observations by combining passive microwave radiometry with diverse remote and in-situ sensors

U. Löhnert (1), S. Crewell (1), K. Ebell (1), S. Kneifel (2), D. Turner (3)

(1) Institute for Geophysics and Meteorology, University of Cologne, Germany, (2) Meteorological Institute, University of Munich, Germany, (3) SSEC, University of Wisconsin – Madison, USA

During COPS (Convective and Orographically-induced Precipitation Study) in the summer of 2007, the University of Cologne deployed two state-of-the-art microwave radiometers at the ARM Mobile Facility (AMF), which was situated in the Black Forest. The Humidity and Temperature PROfiler (HATPRO) including full hemispheric scanning capability and the Dual Polarization Radiometer (DPR) with channels at 90 and 150 GHz were both positioned next to each other on top of a container in direct vicinity of a relevant number of active and passive remote sensing instruments suited for cloud remote sensing (www. .arm.gov/sites/amf.stm) provided by the AMF.

Due to the channel combination of HATPRO & DPR, the enhancement of sensitivity towards liquid water clouds is examined, especially for clouds with a low liquid water path (LWP) – i.e. clouds which generally still have a high radiative impact. The full azimuth and elevation scanning capability of HATPRO has been used to derive a picture of the hemispheric LWP and integrated water vapour (IWV) distribution. Full hemispheric scans have been performed every 15 min over a period of $\sim$4 months and each lasted about 10 min. This measurement configuration makes it possible to monitor the changes in horizontal inhomogeneity – both in water vapour and liquid water – on small time scales. These hemispheric measurements have the advantage of supplying a quasi instantaneous measurement of the atmospheric variability in a volume comparable to a NWP model box, which bear potential for subgrid-scale model

evaluation and radiative closure studies.

We have also applied the well documented Integrated Profiling Technique (IPT) to derive the thermodynamic state including the cloud liquid water profiles from a combination of zenith viewing microwave radiometer, cloud radar, ceilometer measurements and additional radiosonde data. Recently the method has been expanded to derive number concentration and effective radius. The resulting profiles will be used to assess the quality of the 1D-radiation code used in the NWP model of the German Weather Service (COSMO-Model) and in its climate version (regional climate model CLM) by systematically comparing simulated surface radiative fluxes with the ones observed at the AMF over the full 9 month deployment.

In the next months the AMF data will be used to combine microwave and multispectral infrared measurements. First results show significant improvements in the retrieval of temperature and humidity profiles during clear sky cases. Additionally the combination of these measurements is expected to provide a much higher sensitivity to optically thin clouds – including the retrieval of their effective radius and optical depth.