The use of microwave radiometers in experimental campaigns for atmospheric research: from radiometer intercomparisons to studies dedicated to clouds

Crewell, S. (1), D. Engelbart, D. (2) and U. Löhnert (1)

(1) Meteorological Institute, University of Munich, Theresienstr. 37, 8033 Munich, Germany; Phone +49 89 21804210, Fax +49 89 2805508, crewell@meteo.physik.uni-muenchen.de
(2) Deutscher Wetterdienst (DWD) Meteorological Observatory Lindenberg, Am Observatorium 12, 15848 Lindenberg (Tauche), Germany, Phone +49 33677 60-274, Fax +49 33677 60-280, Dirk.Engelbart@dwd.de

Microwave radiometers are frequently used in atmospheric research as they provide information about many parameters. Ground-based radiometers can observe the liquid water path, precipitation, temperature and humidity profiles. A relatively new product are stability indices (KO-index, Showalter index, CAPE, etc.) and those who can be derived through synergy with other instruments like cloud radar and lidar (profiles of liquid water content, effective radius, number concentration, etc.).

Because of the strong desire to observe the above parameters operationally, experimental campaigns have bee performed to inter-compare different microwave radiometers like the BBC campaign 2001 in the Netherlands (Crewell et al, 2004) or the TUC campaign in Payerne 2003/2004. Here we will report on the inter-comparison of eight microwave radiometers with very different specifications in terms of frequency, bandwidth, integration time, angular resolution and accuracy, e.g., in total about 50 frequencies during BBC. The results of this campaign lead to the development of network suitable microwave radiometers for operational monitoring.

Whenever campaigns directed towards clouds and precipitation are undertaken, microwave radiometers play a crucial role. As one example we will describe their role in the recent (fall 2005) LAUNCH (International *L*indenberg campaign for *a*ssessment of h*u*midity a*n*d *c*loud profiling systems and its impact on *h*igh-resolution modelling) campaign in Germany. In this campaign microwave radiometers were operated in conjunction with cloud radar and lidar in a regional network centred around the Meteorological Observatory Lindenberg super site. The campaign is part of the COST-720 action on “Integrated Ground-based Remote-Sensing Stations For Atmospheric Profiling”.

Due to their capabilities microwave radiometers will be used in several campaigns dedicated to specific atmospheric processes like the African Monsoon Multidisciplinary Analysis (AMMA) project taking place in West Africa 2006 and the Convective and Orographically-induced Precipitation Study (COPS) in southern Germany.

This invited talk will provide an overview about Experimental Campaigns but also contribute to the topics: Atmosphere: Temperature and Humidity Sounding, Atmosphere: Clouds and Precipitation, Instruments and Advanced Techniques and Retrieval Methodologies and Radiance Assimilation.