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Cloud liquid water content measurements from the high mountains to the equator using ground-based microwave radiometers

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Cloud liquid water is a prognostic variable in atmospheric models providing an immediate connection between radiation and dynamics. However, cloud microphysical parametrizations are still insufficient leading to large discrepancies even in mean cloud liquid water contents of different models (van Meijgaard and Crewell, 2005). One of the reasons is the scarcity of observations for model evaluation and improvement. Passive microwave remote sensing is by far the most direct, accurate and cost efficient technique to estimate the cloud liquid water path (LWP). Recently, ground-based microwave radiometers have become less expensive and highly automated allowing continuous observations of LWP at certain sites.

Cloud observations have been performed with the 14-channel microwave radiometer HATPRO during the last year under various climatic conditions. To obtain liquid water path from the measured brightness temperatures statistical retrieval algorithms were developed on the basis of a large set of atmospheric profiles observed by radiosondes. The algorithms for the liquid water path have a theoretical accuracy of about 20 gm-2. The continuous measurements with a resolution of about 1 s give also good information on the cloud variability over the measurement site.

The aim of this presentation is to give an overview of the statistical properties of LWP at very different atmospheric states: The data set includes observations from the high mountain station Schneefernerhaus (2650 m MSL) in the German Alps in winter, results from the LAUNCH campaign in mid-latitude summer 2005 at Lindenberg, Germany and tropical measurements in Darwin, Australia as part of the Tropical Warm Pool International Cloud Experiment (TWP-ICE) as well as in Djougou, Benin as part

of the African Monsoon Multidisciplinary Analysis (AMMA) project.