

## **USING MICROWAVE PROFILING AND SENSOR SYNERGY TO EVALUATE MESOSCALE MODEL FORECASTS**

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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. Relatively new products are stability indices (KO-index, Showalter index, CAPE, etc.) and those which can be derived through synergy with other instruments like cloud radar and lidar (profiles of liquid water content, effective radius, number concentration, etc.).

Under the assumption of horizontal homogeneity a much better resolution in the boundary layer can be achieved by adding angular information in addition to the spectral one: The lower the elevation angle the more information comes from the lowest atmospheric layers. For the highly opaque channels of the oxygen line this information is only useful when the brightness temperatures can be observed at least with an accuracy of 0.1 K putting high constraints on radiometer stability. If this is achieved the uncertainty in the temperature profile reduces to 0.5 K in the lowest kilometer with a vertical resolution of about 100 m. Above ~2 km the boundary layer scanning does not provide a better accuracy than the zenith pointing mode. In the past mesoscale models have shown problems in accurately forecasting inversion strength and height. These analyses are based on comparisons with conventional radiosoundings which are typically performed twice per day. The microwave observations will deliver continuous observations, however, the vertical structures will be smoothed stronger which might better represent the model grid box. The possibility of sensing temperature and humidity profiles already indicates that information about the atmospheric stability might be deduced. Therefore as a completely new application, retrieval algorithms to derive stability indices like the KO-index, showalter index and the convective available potential energy (CAPE) were developed on the base of a large radiosonde data set.

In order to provide information on the vertical structure of clouds the combination of microwave radiometers with cloud radar and lidar is very promising. The Integrated Profiling Technique (IPT) [Löhnert et al., 2004] allows the simultaneous retrieval of the profiles of liquid water content, effective radius, temperature and humidity profiles in a physical consistent way together with their respective uncertainties.

With the products described above a continuously operating microwave radiometer is well suited to describe boundary layer process like the temporal development of temperature inversions, the activity of convection judged by water vapour fluctuations and cumulus cloud formation (LWP time series) and the thunderstorm potential. Here we will present observations of the microwave radiometer HATPRO performed during the LAUNCH campaign in mid-latitude summer 2005 at Lindenberg, Germany. The quality of the observations will be assessed through intercomparison with the auxiliary measurements like radiosoundings, high spatial resolution radar etc. In addition, the boundary layer parameters will be used to evaluate model forecast by the Lokal-Modell Kurzestfrist (LMK) of the German Weather Service operating at a spatial resolution of 2.8 km.