

Network operability of ground-based microwave radiometers: Calibration and standardization efforts

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Ground-based microwave radiometers (MWR) are already widely used by national weather services and research institutions all around the world. Most of the instruments operate continuously and are beginning to be implemented into data assimilation for atmospheric models. Especially their potential for continuously observing boundary-layer temperature profiles as well as integrated water vapor and cloud liquid water path makes them valuable for improving short-term weather forecasts.

However until now, most MWR have been operated as stand-alone instruments. In order to benefit from a network of these instruments, standardization of calibration, operation and data format is necessary. In the frame of TOPROF (COST Action ES1303) several efforts have been undertaken, such as uncertainty and bias assessment, or calibration intercomparison campaigns. The goal was to establish protocols for providing quality controlled (QC) MWR data and their uncertainties. To this end, standardized calibration procedures for MWR have been developed and recommendations for radiometer users compiled.

Based on the results of the TOPROF campaigns, a new, high-accuracy liquid-nitrogen calibration load has been introduced for MWR manufactured by Radiometer Physics GmbH (RPG). The new load improves the accuracy of the measurements considerably and will lead to even more reliable atmospheric observations.

Next to the recommendations for set-up, calibration and operation of ground-based MWR within a future network, we will present homogenized methods to determine the accuracy of a running calibration as well as means for automatic data quality control. This sets the stage for the planned microwave calibration center at JOYCE (Jülich Observatory for Cloud Evolution), which will be shortly introduced.