



Calibration of ground-based microwave radiometers - Accuracy assessment and recommendations for network users

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Ground-based microwave radiometers (MWR) are becoming widely used in atmospheric remote sensing and start to be routinely operated by national weather services and other institutions. However, common standards for calibration of these radiometers and a detailed knowledge about the error characteristics is needed, in order to assimilate the data into models.

Intercomparisons of calibrations by different MWRs have rarely been done. Therefore, two calibration experiments in Lindenberg (2014) and Meckenheim (2015) were performed in the frame of TOPROF (Cost action ES1303) in order to assess uncertainties and differences between various instruments. In addition, a series of experiments were taken in Oklahoma in autumn 2014.

The focus lay on the performance of the two main instrument types, which are currently used operationally. These are the MP-Profiler series by Radiometrics Corporation as well as the HATPRO series by Radiometer Physics GmbH (RPG). Both instrument types are operating in two frequency bands, one along the 22 GHz water vapour line, the other one at the lower wing of the 60 GHz oxygen absorption complex.

The goal was to establish protocols for providing quality controlled (QC) MWR data and their uncertainties. To this end, standardized calibration procedures for MWR were developed and recommendations for radiometer users were compiled.

We focus here mainly on data types, integration times and optimal settings for calibration intervals, both for absolute (liquid nitrogen, tipping curve) as well as relative (hot load, noise diode) calibrations.

Besides the recommendations for ground-based MWR operators, we will present methods to determine the accuracy of the calibration as well as means for automatic data quality control. In addition, some results from the intercomparison of different radiometers will be discussed.