
Assessment of microwave radiometers for operational network deployment and its observational value for forecasting models

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Abstract

The DWD currently runs the project "Pilotstation" to evaluate ground-based remote sensing instruments at dedicated testbed sites for their operations, readiness for network deployment, and forecast benefits. One of the maturing technologies that are tested are ground-based microwave radiometers (MWRs). This complements well the efforts of the EUMETNET's E-PROFILE observation program towards an operational MWR network by 2023.

MWRs have shown their potential for a 24/7 monitoring of brightness temperature (BT) and retrievals such as temperature and water vapour under all-weather conditions except rain, which can be assimilated into numerical weather prediction systems. However, the most common challenges we identified are gaining reliable absolute calibration results, identifying hydrometeors on the hygroscopic window and the need to routinely quality-assure the observations for forecast applications. Additionally, the use of MWR-derived BTs for data assimilation requires developments for the implementation in the data assimilation system, e.g. the forward operator RTTOV-gb, in combination with the ICON limited area model (ICON-LAM).

This work introduces our developments for the technical monitoring and assessing data quality and stability in near real time, using e.g. observations minus background statistics, and presents results of the first assimilation experiments. This knowledge is important to make the MWR applicable to routine network operation.

Keywords: ground, based remote sensing, microwave radiometer, instrument network, data assimilation

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