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Ground based microwave radiometer – exploring model based LWP retrievals and artificial sky-clearing
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Abstract Text

Ground based microwave radiometers (MWR) are moving into the focus of meteorological agencies which intend to deploy MWR in network setups. The centralized processing of MWR data products within ACTRIS and the imminent integration of MWR into the EUMETNET E-PROFILE network are two prominent examples for this development.

Assimilation experiments with clear-sky MWR TB at DWD show a positive impact on the numerical weather prediction. A positive impact is less likely under cloudy-sky conditions, as they involve large random differences between model and observation. Therefore, the most frequent reason for rejecting data from data assimilation is the suspected presence of clouds. Apart from reliably detecting clouds, artificial sky-clearing is a possible mitigation strategy.

We will present the progress we made in detecting the presence of liquid water clouds from the observed TB at any elevation and a subsequent liquid water path retrieval. A neural network (NN) is trained with TB computed with a line-by-line radiative transfer model (Rosenkranz 2022, non-scattering) from ERA5 reanalysis data. The NN exploits the spectral signature of the observation and is trained with the local climatology.

We will also present the results of a first attempt to artificially subtract the spectral signature of the liquid water clouds from the TB spectrum. We will probe the feasibility of this approach by comparing the cloud-corrected observed TB with the TB obtained from the ICON-D2 model.