

Thermodynamic profiles, IWV and LWP from ground-based microwave radiometers during MOSAiC

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Within the Collaborative Research Centre on Arctic Amplification: Climate Relevant Atmospheric and Surface Processes and Feedback Mechanisms (AC)³ we focus on the contribution of water vapour, the strongest greenhouse gas, to Arctic Amplification. Significant uncertainties regarding the magnitude of the Arctic moistening trend must be examined more thoroughly. Measurements gathered during the MOSAiC campaign will serve as a reference to evaluate satellite and reanalyses water vapour products.

To provide a high temporal resolution reference data set for this purpose we evaluate products (temperature and humidity profiles, integrated water vapour (IWV), and liquid water path (LWP)) derived from three microwave radiometers (MWRs) onboard Polarstern (HATPRO, MiRAC-P, and the Atmospheric Radiation Measurement (ARM) two-channel MWR). In dry conditions, MiRAC-P has a significantly greater sensitivity towards humidity than HATPRO. With Polarstern radiosondes as reference, IWV from MiRAC-P (HATPRO) agrees very well during the Arctic winter (summer). Additionally, we will present the comparison of IWV derived from the ARM MWR with that from the other instruments. Regarding LWP, HATPRO and the ARM MWR show good agreement while MiRAC-P generally yields lower (higher) values in winter (summer). Furthermore, the presentation will illustrate to which degree vertical profiles can be derived from ground-based MWRs.