Assessing the water vapor variability in Ny-Ålesund from long-term microwave radiometer measurements

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The role of water vapor in contributing to Arctic amplification is still uncertain and under investigation (Wendisch and co authors, 2023). Understanding the role of water vapor in the mechanisms driving Arctic amplification requires detailed information of its spatio-temporal variability. However, significant uncertainties in satellite products (Crewell et al., 2021) and reanalyses (Rinke et al., 2019) hinder a clear understanding of water vapor trends and variability. Thus, high-quality water vapor measurements, e.g., from ground-based microwave radiometers, are needed to evaluate satellite products and reanalyses.

The Humidity and Temperature Profiler (HATPRO) has been operating at the AWIPEV research base in Ny-Ålesund since 2011, allowing local long-term analyses of retrieved Integrated Water Vapor (IWV) and Liquid Water Path (LWP). The high temporal resolution of HATPRO (2–3 seconds) enables detailed analyses of water vapor variability. However, a careful quality control of the data is essential. Using these quality checks, a novel long-term, user-friendly dataset of IWV and LWP will be provided. This dataset includes 10-min resolved statistics (i.e., mean, median, standard deviation, percentiles) of IWV and LWP. For example, data are excluded if the microwave radome is affected by liquid precipitation. Additionally, spectral inconsistencies and ambiguous peaks in IWV are identified and removed.

Based on this new data record, we look into water vapor variability on different timescales and seasons. We aim to understand the timescales of IWV variations and specifically analyze the impact of rapid drying and moistening events on the atmospheric column.

Acknowledgements

We gratefully acknowledge the funding by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) — Project Number 268020496 — TRR 172, within the framework of the Transregional Collaborative Research Center "ArctiC Amplification: Climate Relevant Atmospheric and Surface Processes, and Feedback Mechanisms (AC)3". We thank the AWIPEV team for their support in the operation of our instruments at AWIPEV.

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