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Arctic Amplification

Title:

Water vapour in the central Arctic: How well do satellite products, reanalyses and reference observations from the MOSAiC expedition agree?

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Abstract (max. 200 words):

The water vapour feedback is of high relevance for the Arctic as a warming signal has stronger effects on moisture and thus longwave downward radiation at cold temperatures. In the Arctic, only few reliable water vapour observations exist because of the sparsity of ground stations and challenges in satellite remote sensing (i.e. sea ice, clouds, polar night). The vertically integrated water vapour (IWV) differs among different satellite products and reanalyses, resulting in high uncertainties regarding water vapour trends and variability.

We investigate whether reference water vapour measurements from the MOSAiC expedition can help to understand and eventually overcome the uncertainties in the satellite products and reanalyses. Newly developed water vapour retrievals combining radiances measured by ground-based microwave radiometers at low and high frequencies (22-340 GHz) and radiosonde observations serve as reference data. The reference data will be used to evaluate water vapour products from satellites (IASI merged infrared and microwave observations, and a product based on AMSR-E/2 observations) and

reanalyses (ERA5 and MERRA-2). In particular, we will and analyze the capability of these products to capture moisture inversions. We also quantify the uncertainties of the downward terrestrial radiation resulting from different humidity profile representations among the satellite products and reanalyses.