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Investigation of water vapor transport processes into the Arctic using satellite water vapor isotope retrievals

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With pronounced Arctic Amplification and a clear upward trend in atmospheric moisture, there is a pressing need to investigate the transport mechanisms that deliver moisture into the region. Water vapor isotopes offer a powerful tool for tracing moisture pathways and understanding atmospheric processes.

Using satellite-based water vapor isotope data presents both scientific opportunities and challenges, particularly under the complex conditions of the Arctic environment. These isotope observations provide wide spatial coverage and enable the study of moisture transport. In this work, satellite water vapor isotope retrievals are combined with atmospheric modelling to diagnose moisture sources, transport pathways, and phase changes relevant to Arctic moistening. The talk introduces the fundamentals of water vapor isotopes, outlines the datasets used, presents first results on Arctic moisture transport, and offers an outlook on future analyses aimed at improving our understanding of moisture transport in a warming Arctic.