



The Sudden Stratospheric Warming 2010 over the European Arctic region observed by ground based measurements of the Mesosphere/Mesopause region

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Sudden Stratospheric Warmings, accompanied by mesospheric coolings, are extreme events forced by strong planetary wave drag disturbing the polar vortex causing dynamical coupling and chemical mixing throughout the whole middle atmosphere.

Mesospheric water vapor and winds are excellent tracers for dynamical processes such as waves on different timescales, horizontal and vertical exchange and the containment of the polar vortex. The major Sudden Stratospheric Warming (SSW) in January 2010 was observed by different instruments in the European Arctic region. Two ground based microwave radiometers measured middle atmospheric water vapor profiles, one in Andenes, Norway (69.3 N, 16 E) and one in Sodankylä, Finland (67.4 N, 26 E). At both locations, these measurements were supplemented by wind profiles and temperatures in the mesopause region derived from two identical Meteor Radars. Additionally, the Andenes-MF radar measured winds at altitudes between 74–94 km.

For the presented case study we combine the measurements of these 5 instruments, all having a time resolution of a few hours, in order to investigate the temporal development of winds, temperatures and water vapor variations during the SSW 2010 with a special focus on coupling processes, tides and waves in the mesosphere/mesopause region.