



Mesospheric Water and Temperature in the Vicinity of the polar Vortex - Comparisons between two Rocket / Lidar Campaigns and Odin Data

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The middle atmospheric campaigns Hygrosonde-2 and MAGIC took place at Esrang, Sweden, in December 2001 and January 2005. With a combination of rocket, balloon and ground-based measurements, they provided detailed vertical profiles of water vapour and temperature. Both campaigns were coordinated with overflights of the Odin satellite. They have thus provided important opportunities to co-analyse local measurements and large-scale satellite data.

The rocket- and balloon-borne measurements of water vapour have been based on optical hygrometers using the OH fluorescence technique. Local temperature data were obtained with a Rayleigh lidar and meteorological rockets. Odin's water and temperature measurements in the mesosphere are based on the water line at 556.936 GHz, the strongest water line in the millimetre and sub-millimetre frequency region. The limb measurements of the submillimetre radiometer (SMR) onboard the Odin satellite cover a frequency range of 800 MHz around this line center. Based on a non-linear scheme of the optimal estimation method (OEM), retrieval algorithms for water and temperature from this strong line are currently being developed.

The water and temperature data presented here were obtained during dynamically disturbed conditions in the vicinity of the winter polar vortex. As a result, considerable stratification and horizontal humidity gradients are found. While these atmospheric situations present highly interesting case studies, they also imply basic challenges for the comparison of local data and satellite-borne remote sensing measurements. Possibilities and limitations of such a co-analysis will be discussed.