



Dynamical case study using ground based microwave remote sensing of water vapour

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The ground-based microwave radiometer MIAWARA (Middle Atmospheric Water Vapour Radiometer), measuring the 22 GHz rotational transition of water vapour, is able to retrieve middle atmospheric water vapour profiles in the range of 20-80 kilometres. It has started operation in 2002 at Bern, Switzerland.

The instrument was successfully validated in 2003 and 2004 using different reference data (satellites, balloons) and took part in the LAUTLOS validation campaign in early 2004 in Northern Finland. This campaign showed that MIAWARA, as the first ground-based radiometer, can measure the stratospheric water vapour profiles as low as 20 kilometres. The agreement with the reference satellite instruments HALOE and POAM III was generally better than 10%, the agreement with the balloon borne sensors NOAA hygrometer and FLASH-B was even better than 5%.

In October 2003 MIAWARA recorded different changes in the stratospheric water vapour content over Bern on timescales in the order of 1-4 days. A back-trajectory study showed that the dynamical pattern of the stratosphere changed during this month. The water vapour changes were highly time correlated with the changes in the dynamical pattern, leading to significant higher temperatures and higher water vapour mixing ratios in the stratosphere over Bern

The change in the water vapour content was also compared with ENVISAT MIPAS water vapour values collected along the path of the back trajectories. The water vapour evolution as recorded by MIPAS shows high correlation with the MIAWARA measurements.