

# Retrieval of water vapour from the ground to the mesosphere combining different instruments

René Bleisch (Institute of Applied Physics, University of Bern, Switzerland)

Water vapour is the most important greenhouse gas and plays a key role in climate processes. To be able to model the influence of water vapour, a good knowledge of its variability in space and time is required.

Retrieving surface to middle atmosphere water vapour profiles is one research focus of the Institute of Applied Physics at the University of Bern, which operates a group microwave spectrometers.



## Now:

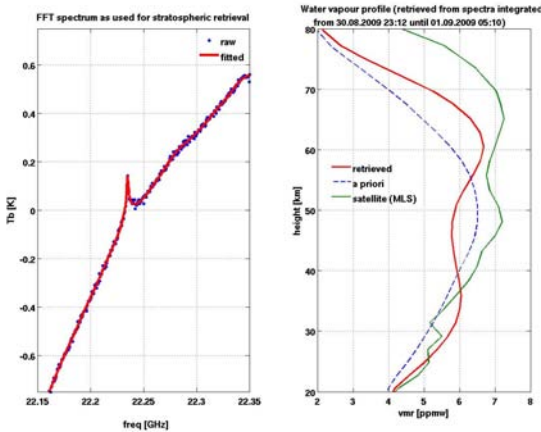
Data from the FFT-Spectrometer of MIAWARA (Middle Atmospheric Water Vapour RAdiometer), operated at Zimmerwald facility, south of Bern, Switzerland. (Center frequency: 22.235 GHz, bandwidth: 1 GHz)



### Stratospherical retrieval:

- difference FFT-spectra
- uses mainly the information contained into the peak of the spectra
- very high spectral resolution (61 kHz)
- inverted with optimal estimation algorithm, using Qpack and Arts
- > Profiles from ~25 - 80 km

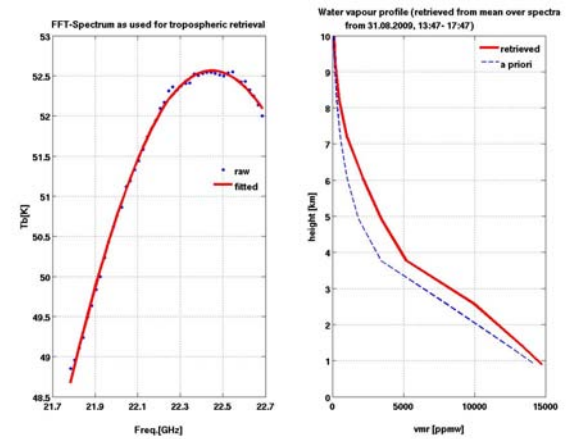
Performed operationally within NDACC



### Tropospheric retrieval:

- absolute FFT-spectra, tipping curve calibration
- uses the information contained into the wings of the spectra
- binning of the raw spectra to 20 MHz bins
- inverted with an optimal estimation algorithm, using Qpack and Arts
- > Profiles up to ~9 km

experimental, planned to become operational



## Future plans:

Development of an integrated retrieval approach from bottom to lower mesosphere, including spectra of other instruments

Proposed instruments:

- HATPRO (Humidity and Temperature Profiler) of MeteoSwiss at Payerne, retrieves tropospheric water vapour from five channels between 20 and 30 GHz
- FTIR (Fourier-Transform Infrared Spectrometry) on Jungfraujoch, retrieves water vapour of Troposphere and lower stratosphere from wavenumbers between 750 and 4250 cm<sup>-1</sup>

