MWR Activities at MeteoSwiss:

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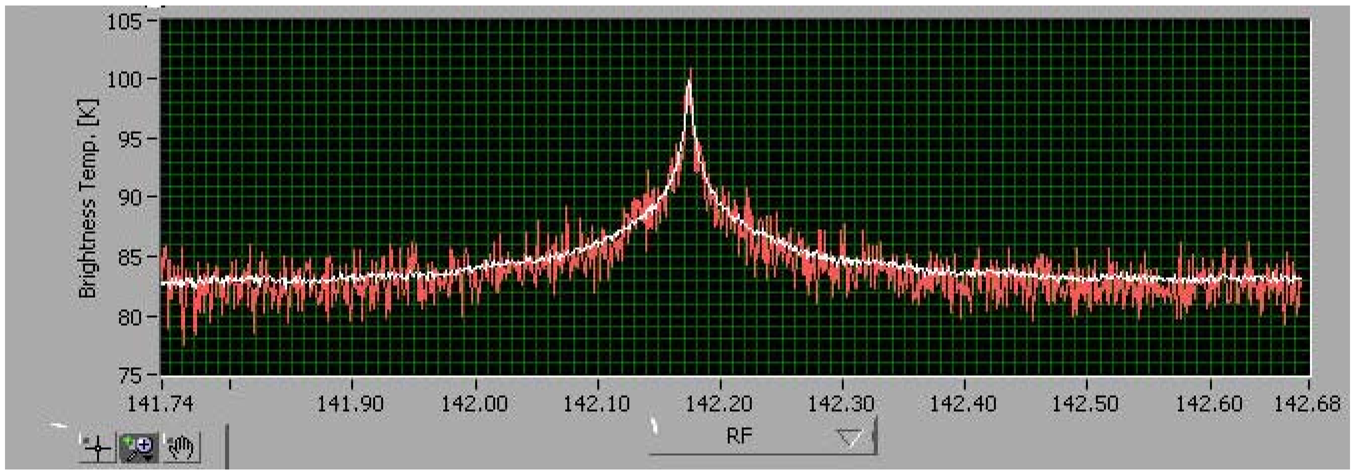
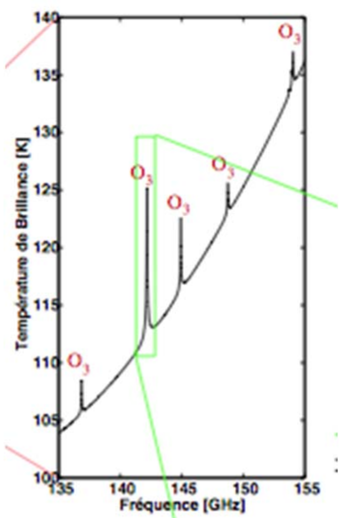
NDACC

Microwave Radiometer SOMORA





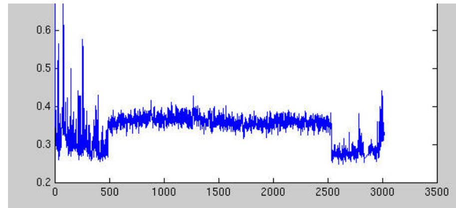
- O3 line at 142.17 GHz
- 39° elevation angle
- 1 cycle : 20 sec
- Resolution FFT spectrometer: 61 kHz/ch (16384 ch for 1GHz)
- Corrections for window effect and for tropospheric opacity

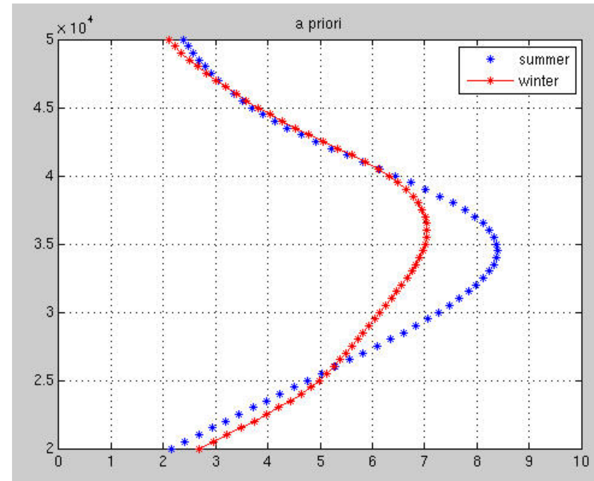
Microwave Radiometer SOMORA

continuously operated since 2000	time resolution: 30 min
ozone profiles from 20 to 65 km	vertical resolution: 8-15 km
2 major instrumental modifications	2005: front-end change 2009: spectrometer change from AOS to FFT

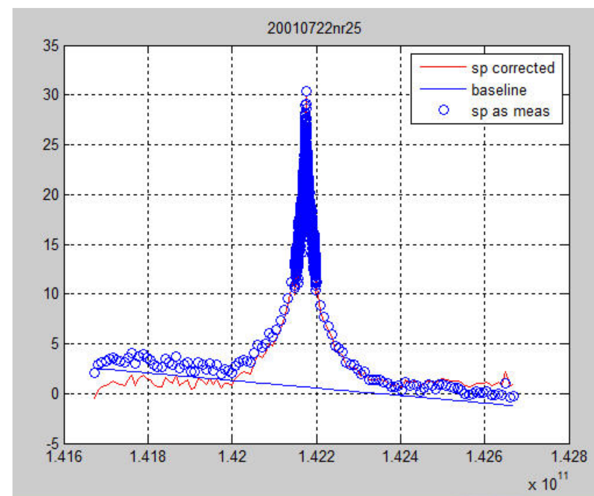
- Retrieval of ozone profiles: ARTS/Qpack based on OEM by Rodgers

described in ERIKSSON, P., et al, 2005, *Journal of Quantitative Spectroscopy & Radiative Transfer,* 91, 47–64

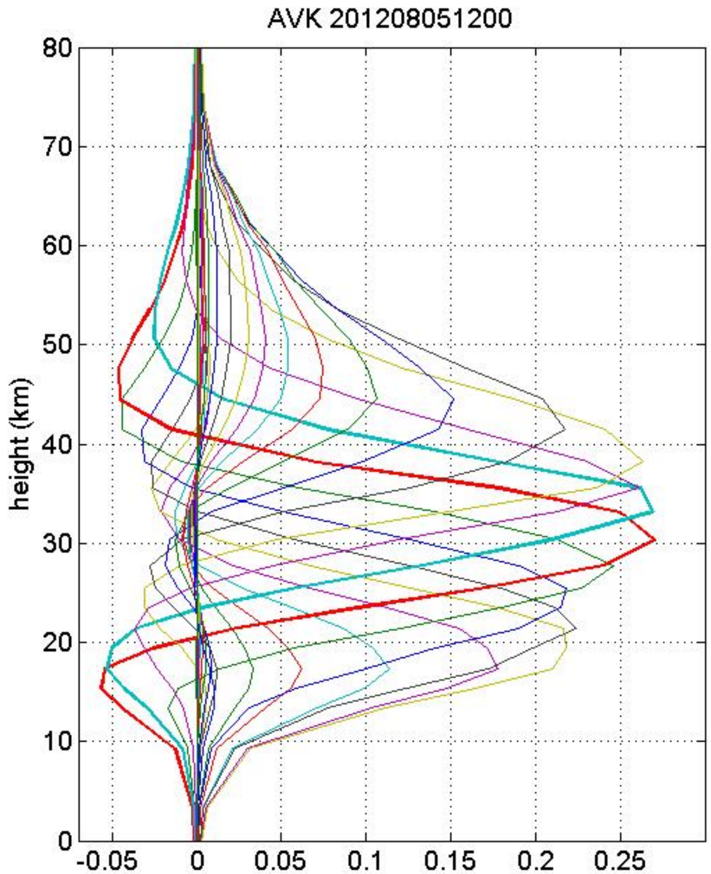




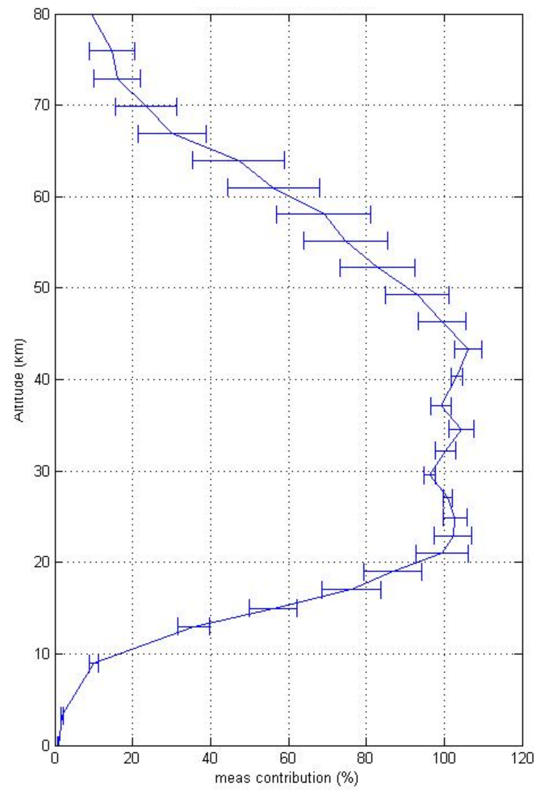
binning	1000 channels : center of the line: 800 ch (resolution of 61kHz) Wings: 200 ch
Correction for troposphere	Ingold method [Ingold et al., Radio Sci. Vol. 33, pp. 905-918, 1998]
Noise cov matrix	Varies with spectrum noise for each spectrum
A priori cov matrix	determined from a statistical analysis of ozonesonde between Nov 1994 and Oct 1998 completed by stdev of GROMOS profiles for upper stratosphere and mesosphere.
A priori	2 standard profiles (W & S) [Keating,1990]:
baseline	Linear
Nb output levels	30 pressure levels



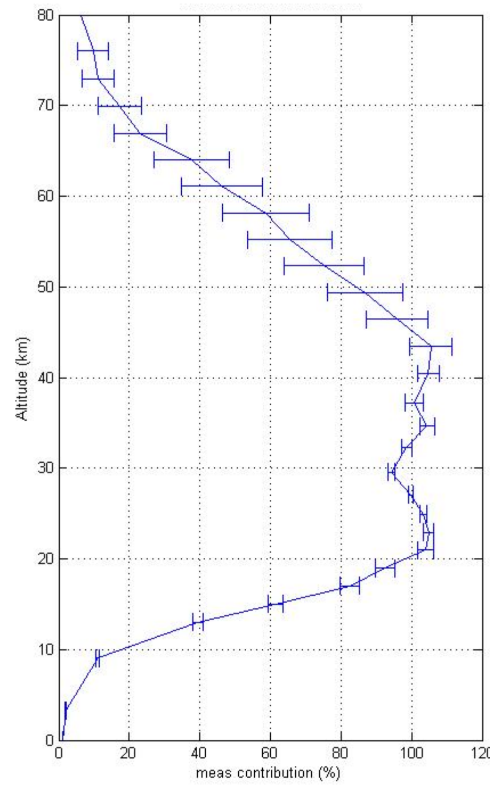
AVK, measurement contribution, vertical resolution



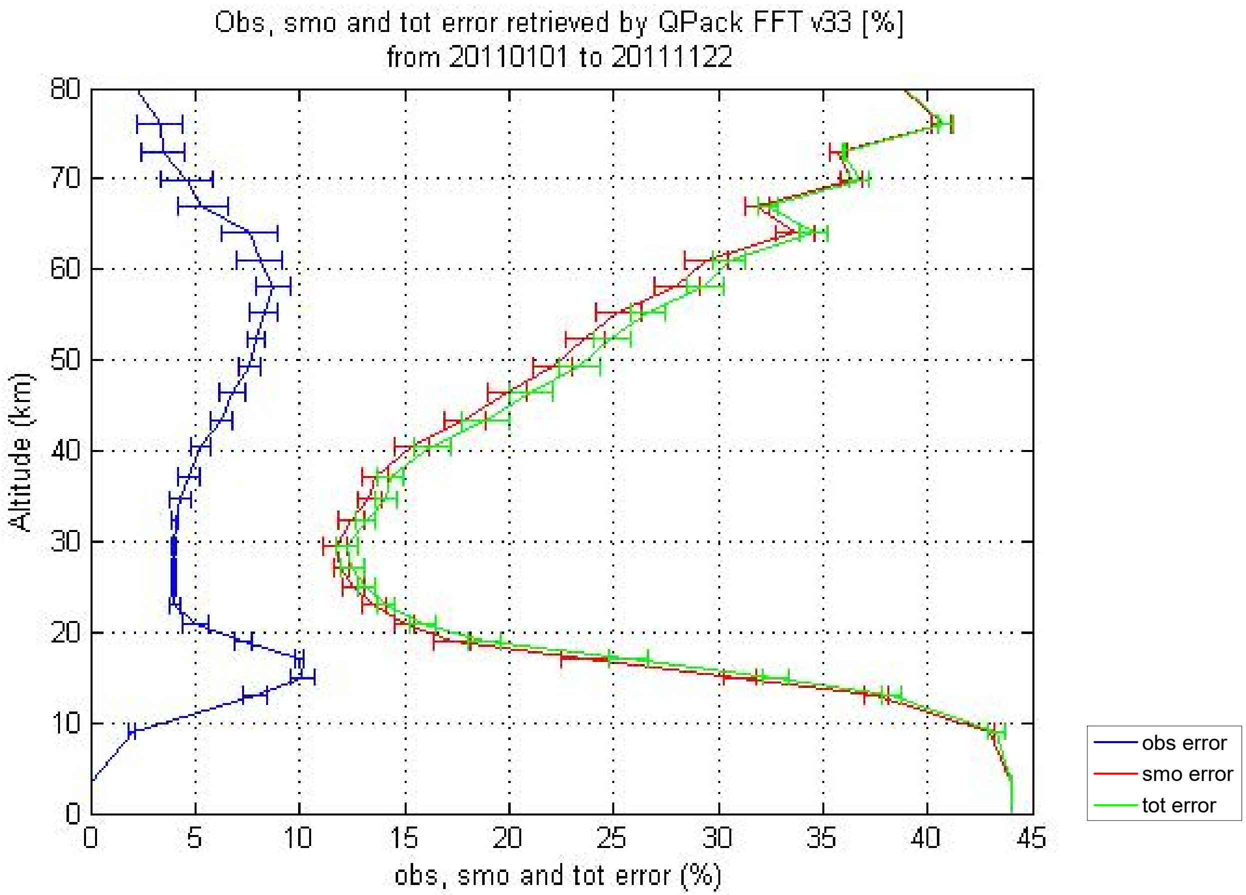
Measurement contribution AOS
Annual mean for 2010



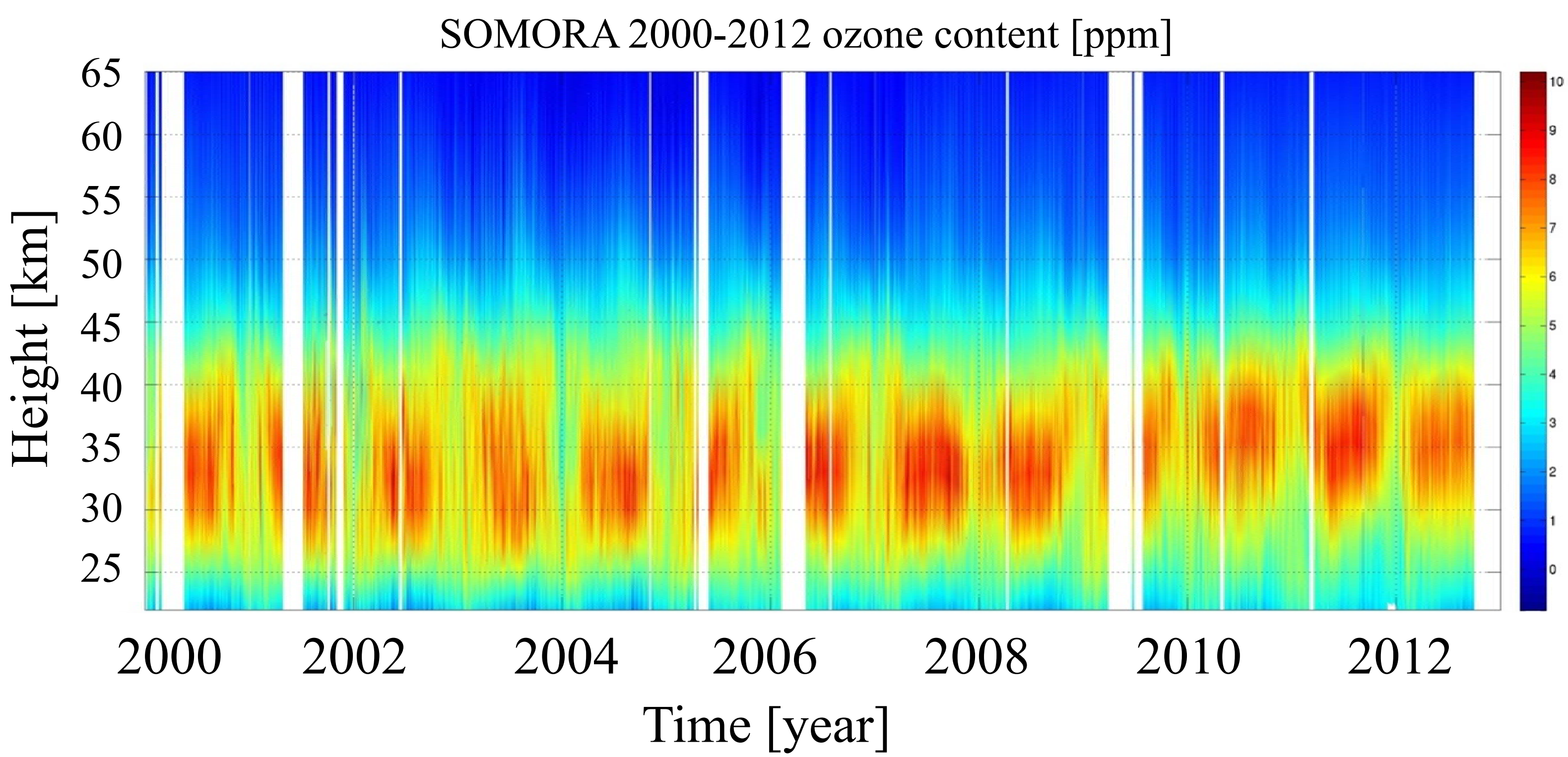
Measurement contribution FFT
Annual mean for 2010



Obs, smoothing and total errors



Microwave Radiometer SOMORA: timeseries



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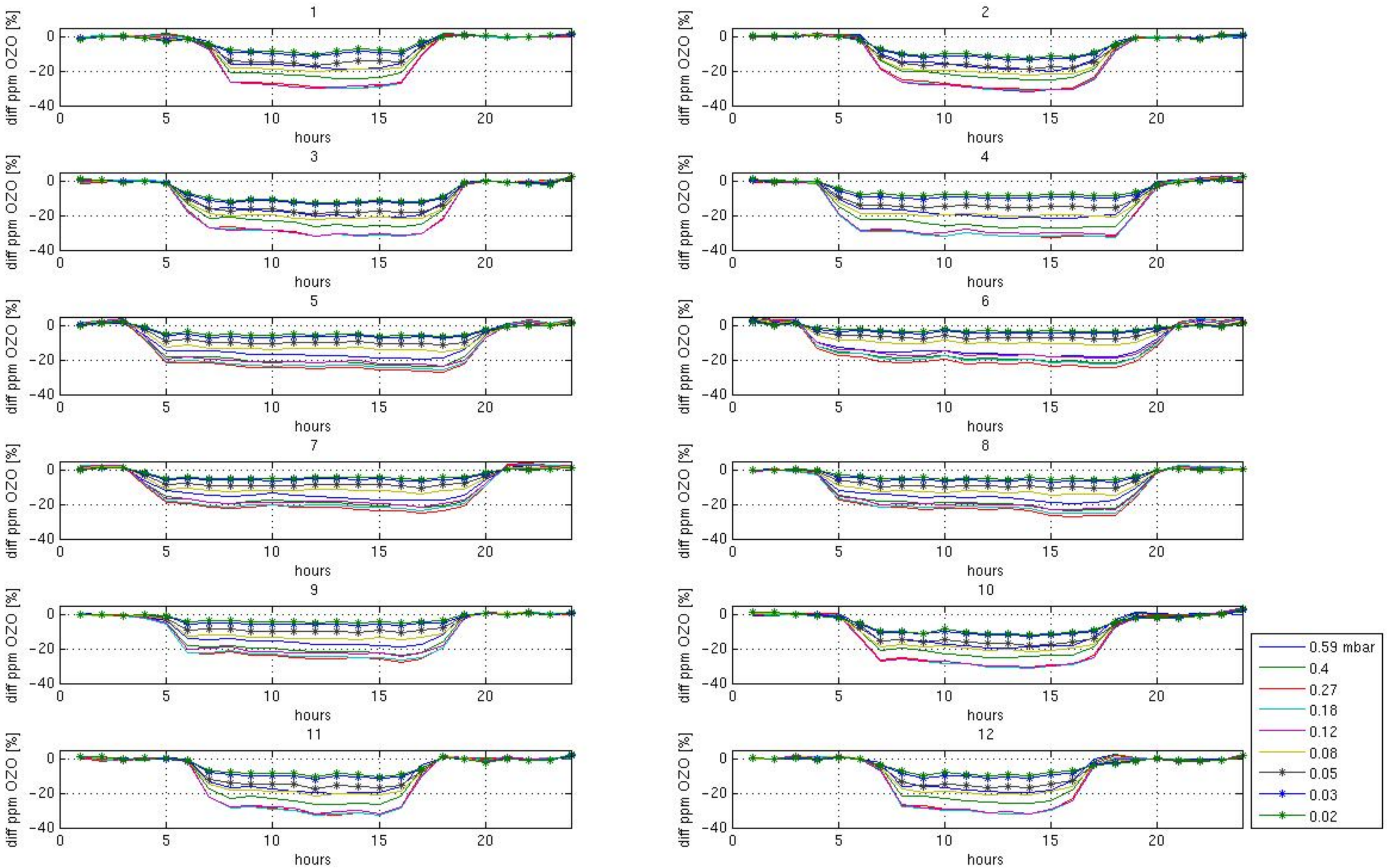
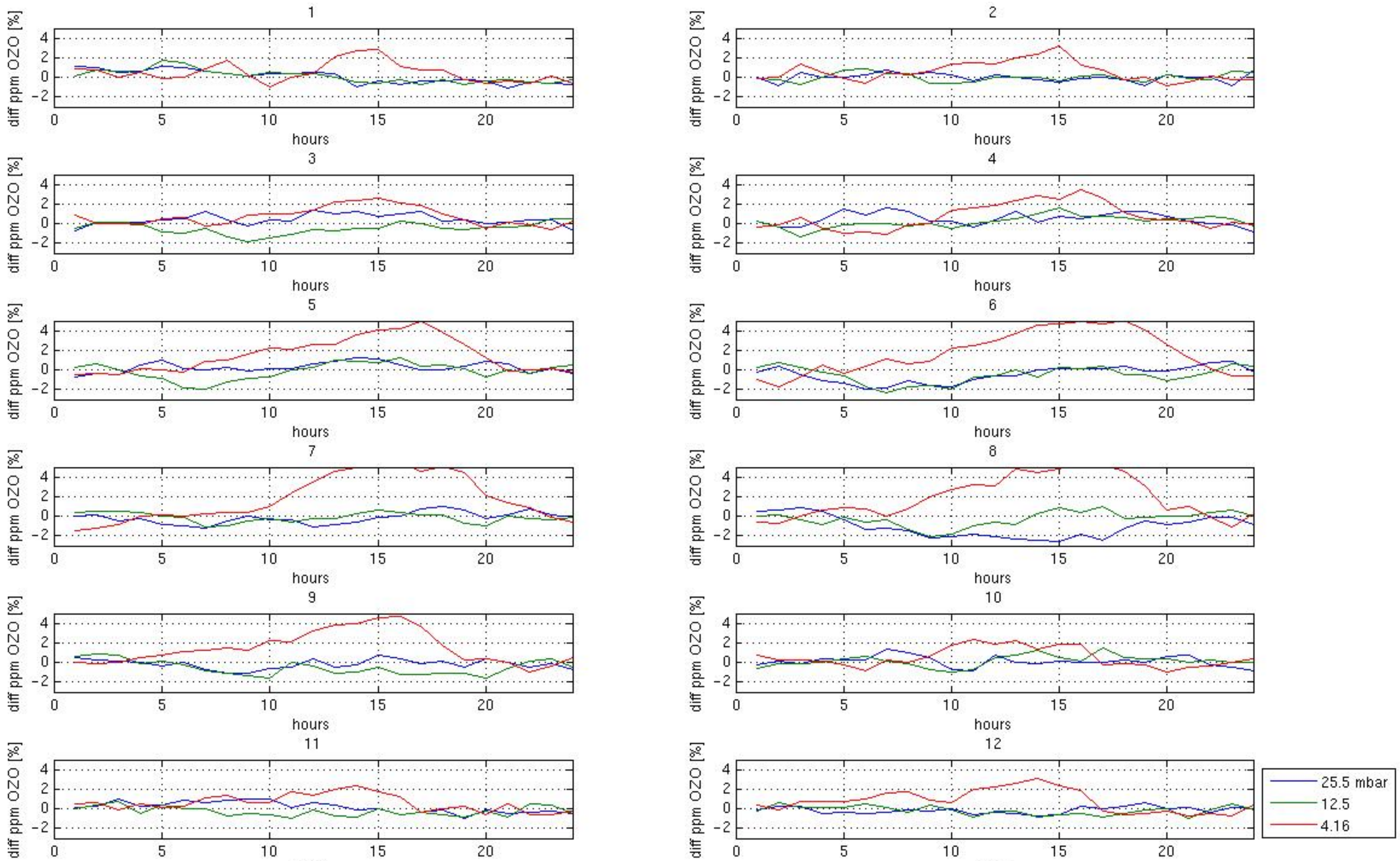
Microwave Radiometer SOMORA: diurnal cycle



Microwave Radiometer SOMORA: diurnal cycle



(24,29,36 km)

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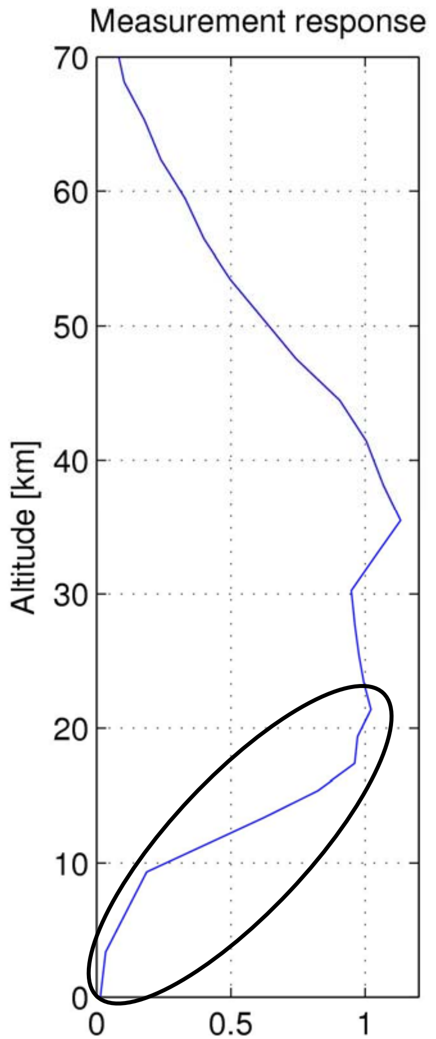
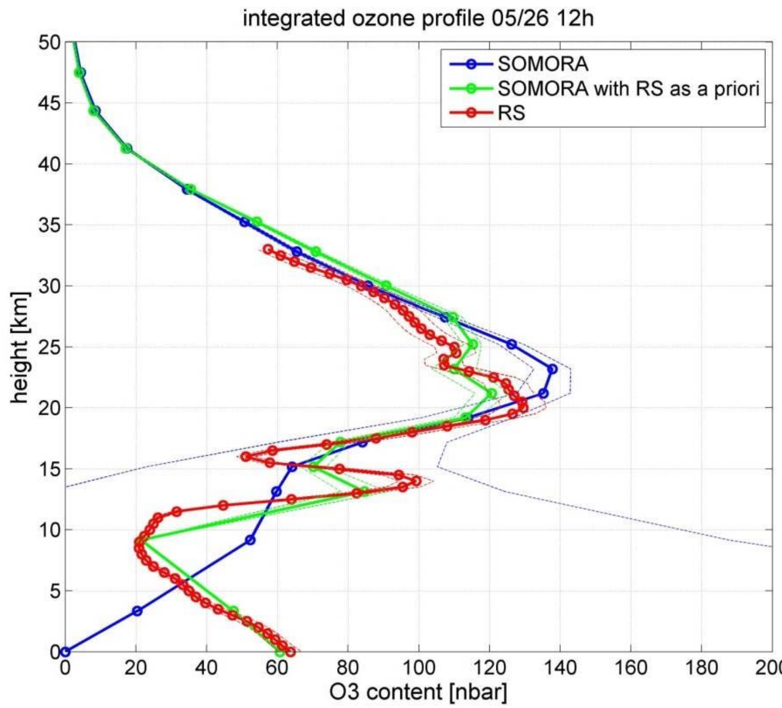
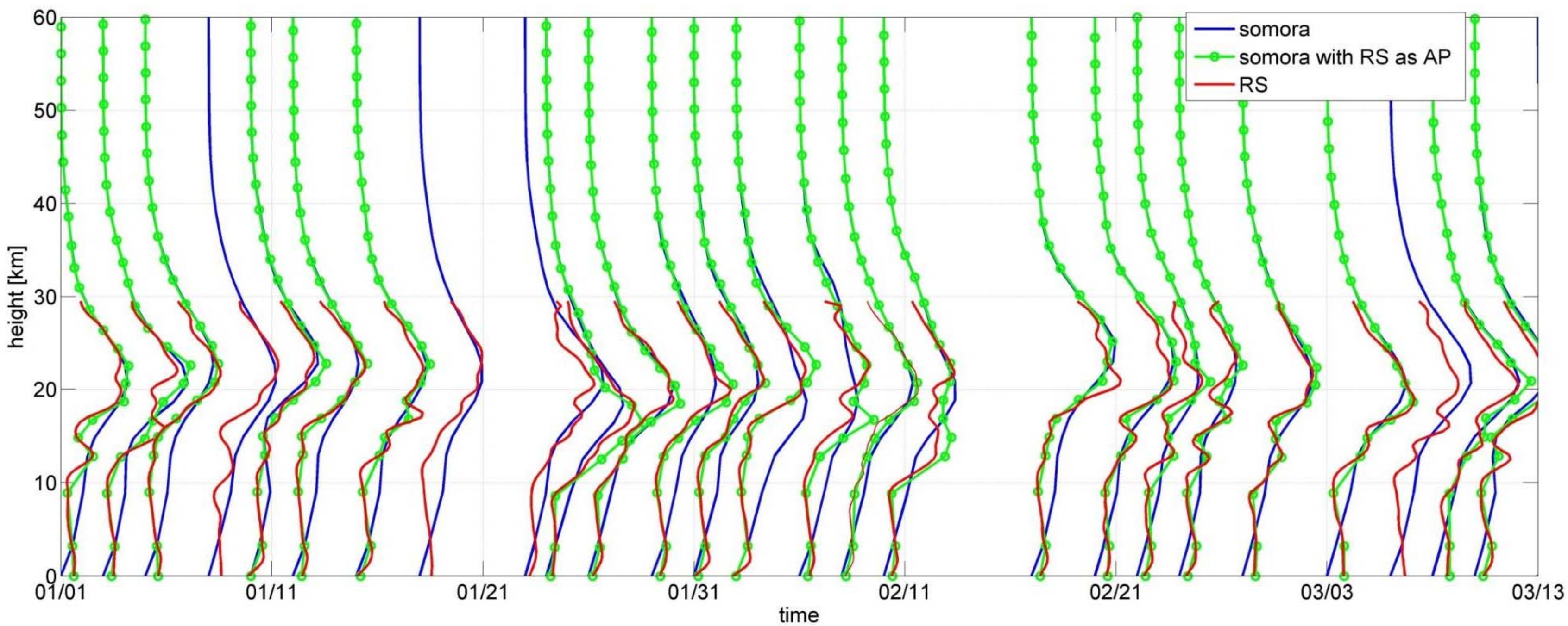


Consider the **radiosounding as an a priori** and retrieve SOMORA ozone profile with an exclusive weight on radiosounding below 23 km



SASBE : ozone profile at Payerne, Switzerland



By the combination of Radiosonde and SOMORA ozone profiles, the integrated ozone profile timeseries show profiles with reliable values from ground up at the time resolution of RS.

CTM model (J. Aschmann, Uni Bremen)

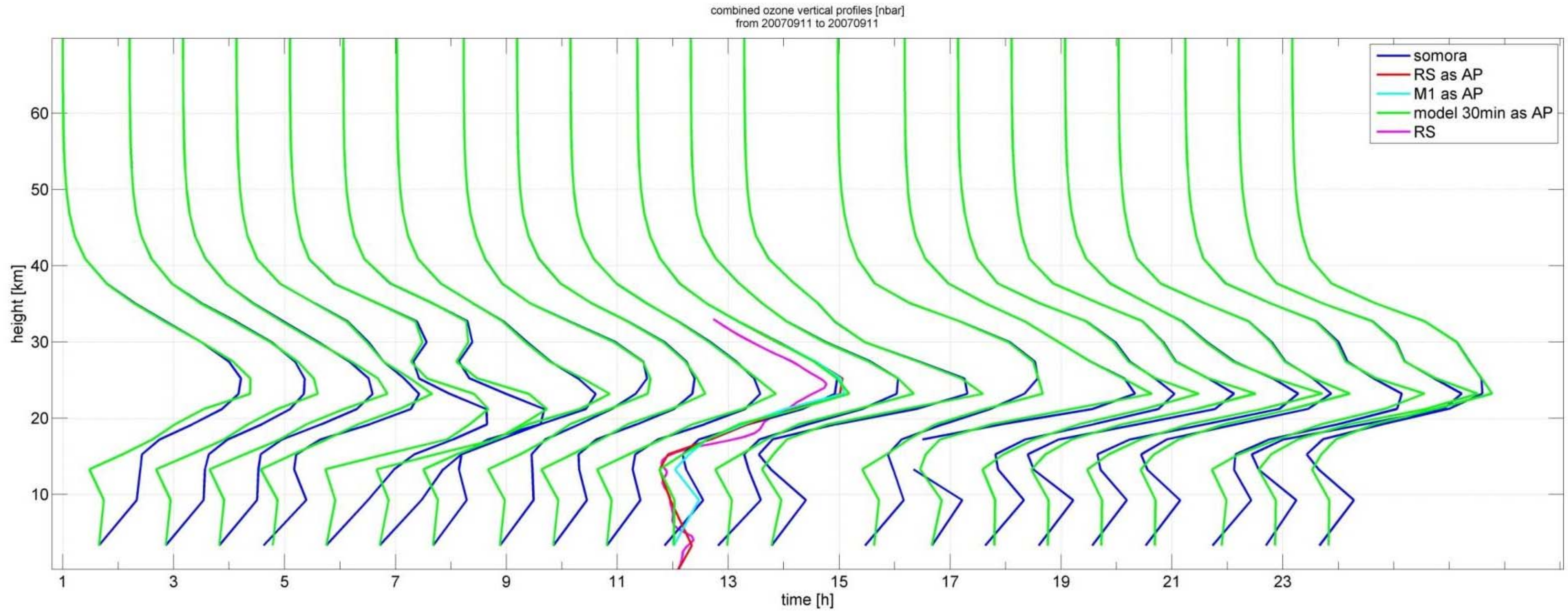
Sequential assimilation of SBUV ozone profile observation into a 3-D chemical transport model.

- Horizontal transport is driven by analyzed windfields and temperatures (ECMWF ERA-INTERIM 2000–2007).
- Vertical transport is derived directly from interactively calculated diabatic heating rates using the MIDRAD scheme.
- Horizontal resolution : 3.75° x 2.5°
- 24 isentropic levels as vertical coordinates (10 – 55 km, vertical resolution of 2 km)
- Model time step : 30 min

CTM MODEL
Alt range: 10 km – 50 km
Time resolution: 30 min
Vertical resolution: 2 km
Error: 10%

➢ Kiesewetter, G., B.-M. Sinnhuber, M. Vountas, M. Weber, and J. P. Burrows (2010), A long-term stratospheric ozone data set from assimilation of satellite observations: High-latitude ozone anomalies, J. Geophys. Res., 115, D10307, doi:10.1029/2009JD013362.

SASBE : ozone profile at Payerne, Switzerland



By the **combination of the CTM MODEL and SOMORA** ozone profiles, the error on the ozone value below 20 km is small when compared to the profiles obtained by the standard retrieval and the 30 min time resolution of the SOMORA timeseries is preserved.

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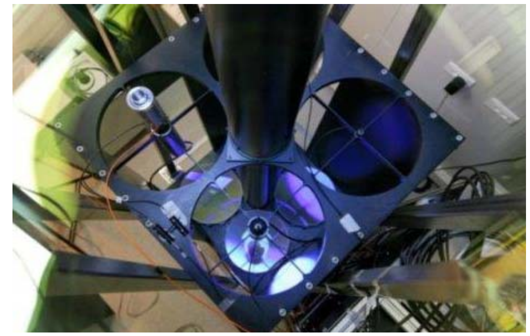
HATPRO MWR RPG

K-band receiver (7 channels between 22 and 31 GHz) for WV profiling
V-band receiver (7 channels between 51 and 58 GHz) for T profiling

Time resolution : 10 min
Vertical resolution and range :
100 m from 0-2 km
1000 m from 2-6 km
Calibration with internal references

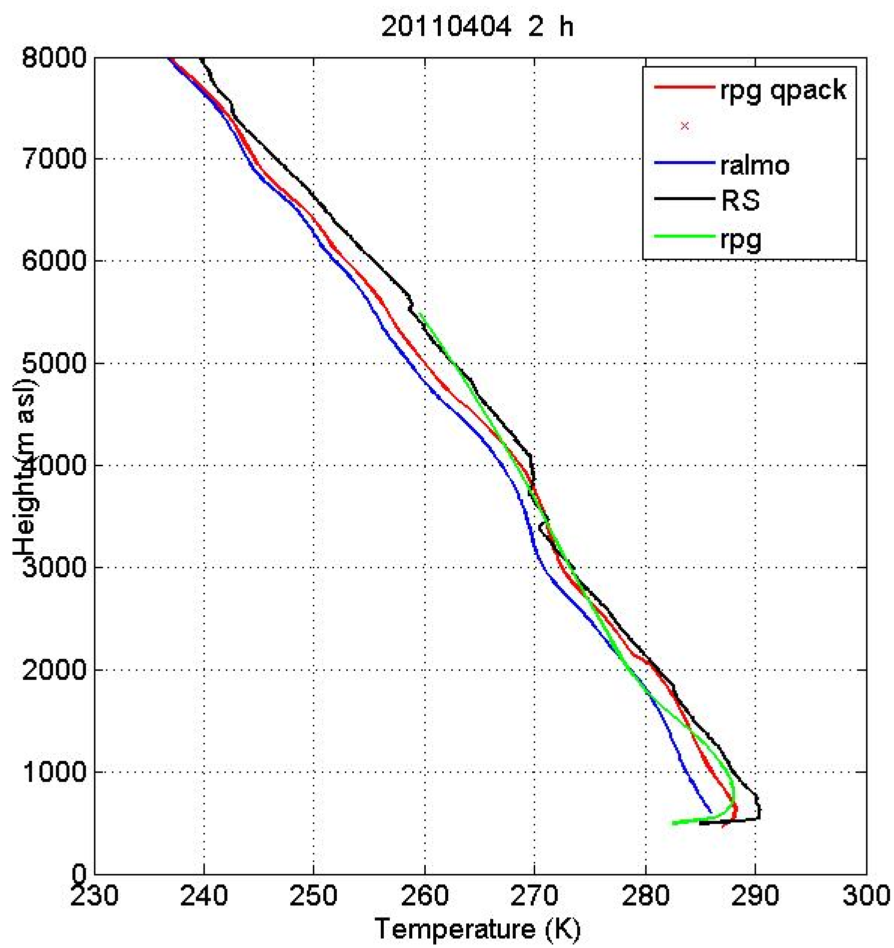
LIDAR RALMO



Nd:YAG (300 mJ per pulse @ 355 nm, 30 Hz repetition rate)
Receiver: 4 mirrors (30 cm diameter)
RALMO is calibrated automatically once a day at midnight with the operational radiosonde, given cloud free conditions.
Saturation effects increase the uncertainty below 2-3 km

Time resolution : 30 min
Vertical resolution : 100 m
Vertical Range: 0-12 km
Calibration with RS

SASBE: MWR and RALMO T profiles



ARTS/QPack 2.0.2

RALMO temperature profile used as a priori profile in the OEM retrieval.

The square roots of the diagonal elements of **R** (standard deviation of measurement) are set to 0.4 K, and the off diagonal elements are set to zero.
The square roots of the diagonal elements of **B** (standard deviation of lidar temperature profile) are set to 5 K. The off-diagonal elements are calculated assuming an exponentially decreasing correlation function with a correlation length of 3 km.

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