A fast H_2O total column density product from GOME

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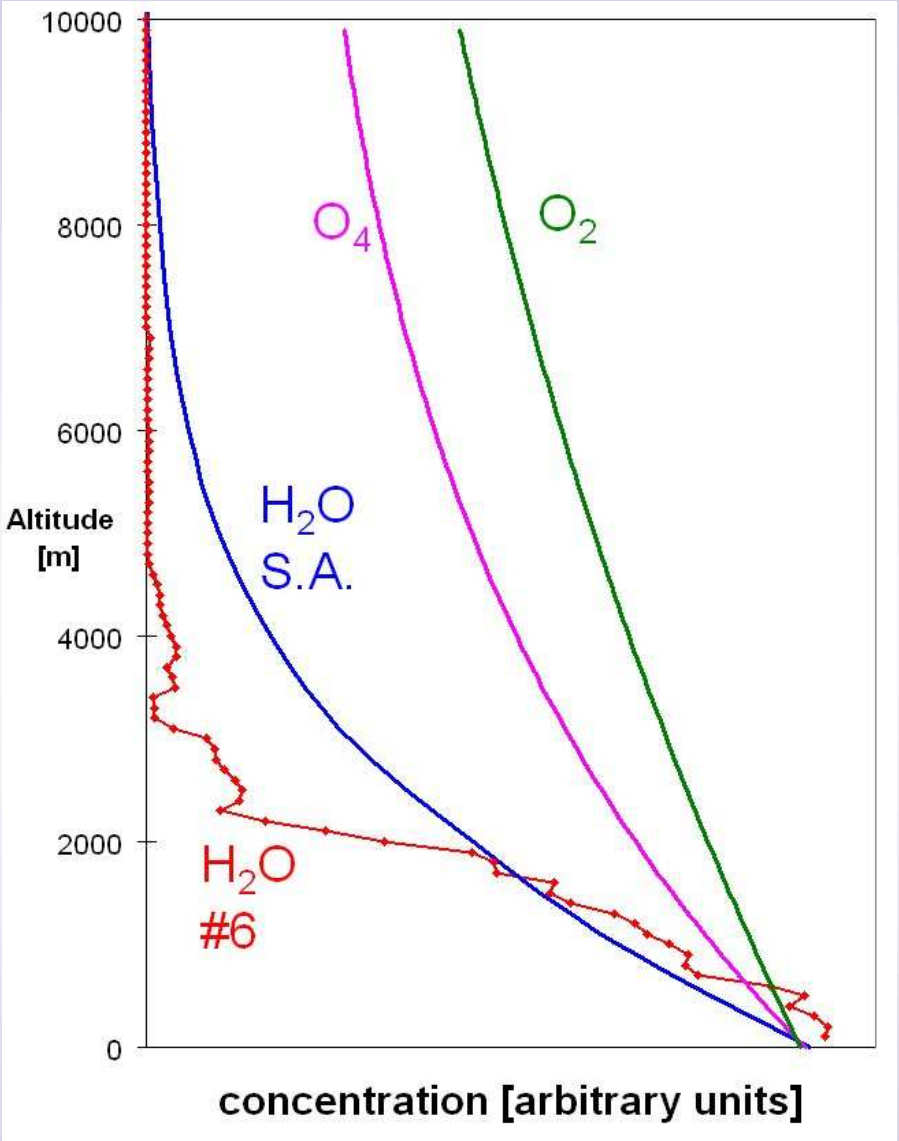
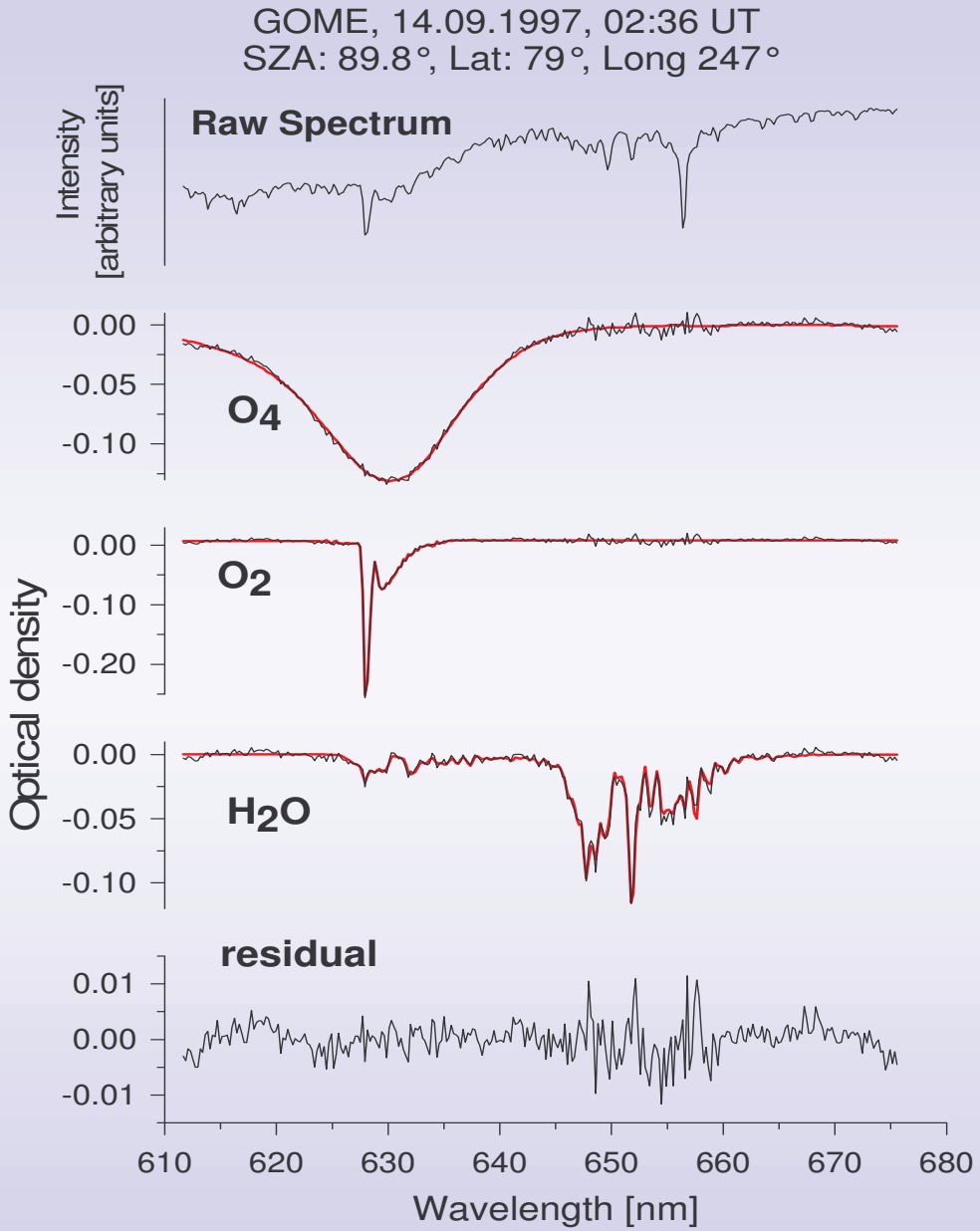
- H2O from GOME: long time series
- largest uncertainty: clouds
- ‘measured‘ AMF
- Validation with Aircraft measurements

Atmospheric height profiles for H_2O, O_2, and O_4. The bulk of the atmospheric O_4 column is located much closer to the earth's surface than that for O_2. ('H_2O SA' indicates the H_2O profile of the 1976 US standard atmosphere, 'H_2O #6' that of the MINOS flight #6)



In the upper panel a raw spectrum measured by GOME for the wavelength range of the H_2O analysis is shown. Below the results of the spectral evaluation for H_2O and O_4 for this GOME spectrum are presented. Also the result of the simultaneously analysed O_2 are included. The thick lines show the trace gas absorption spectra scaled to the respective absorptions detected in the measured GOME spectrum (thin lines).



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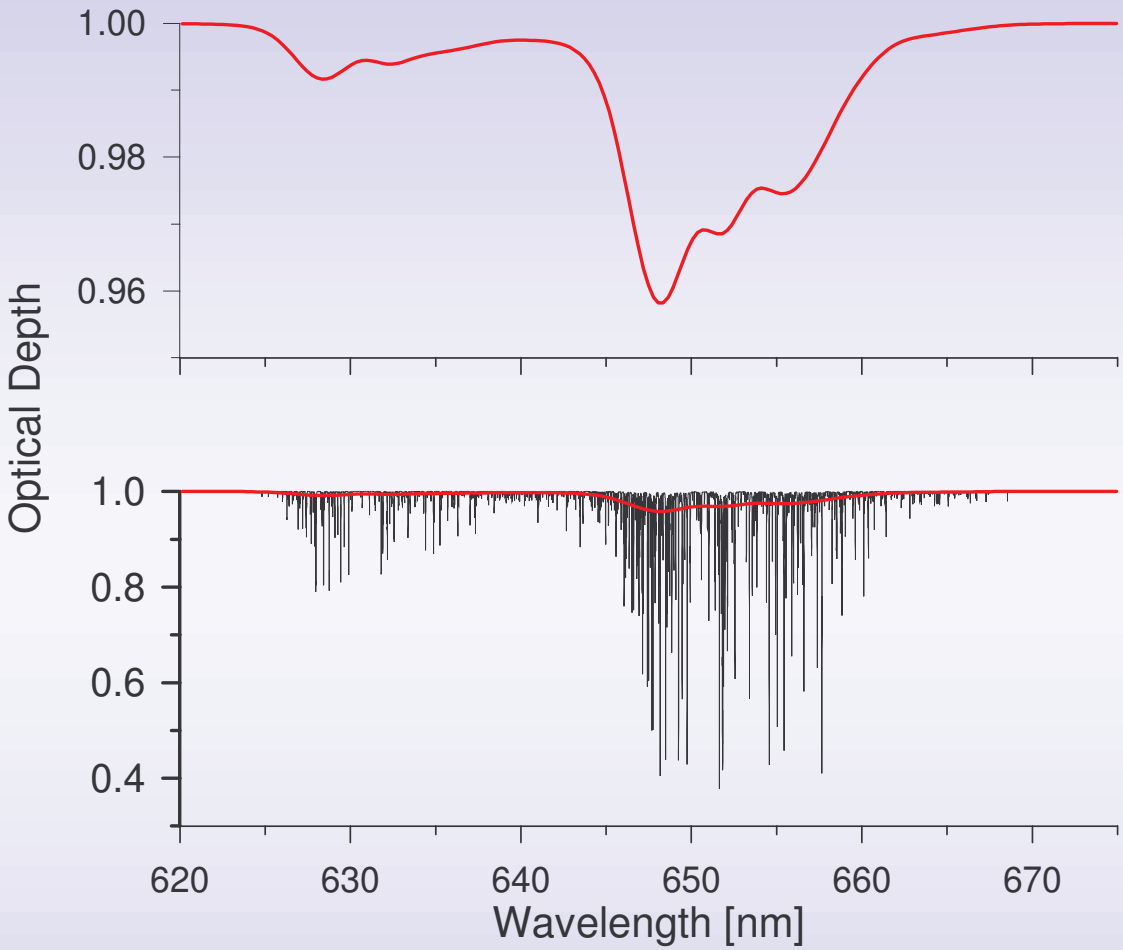
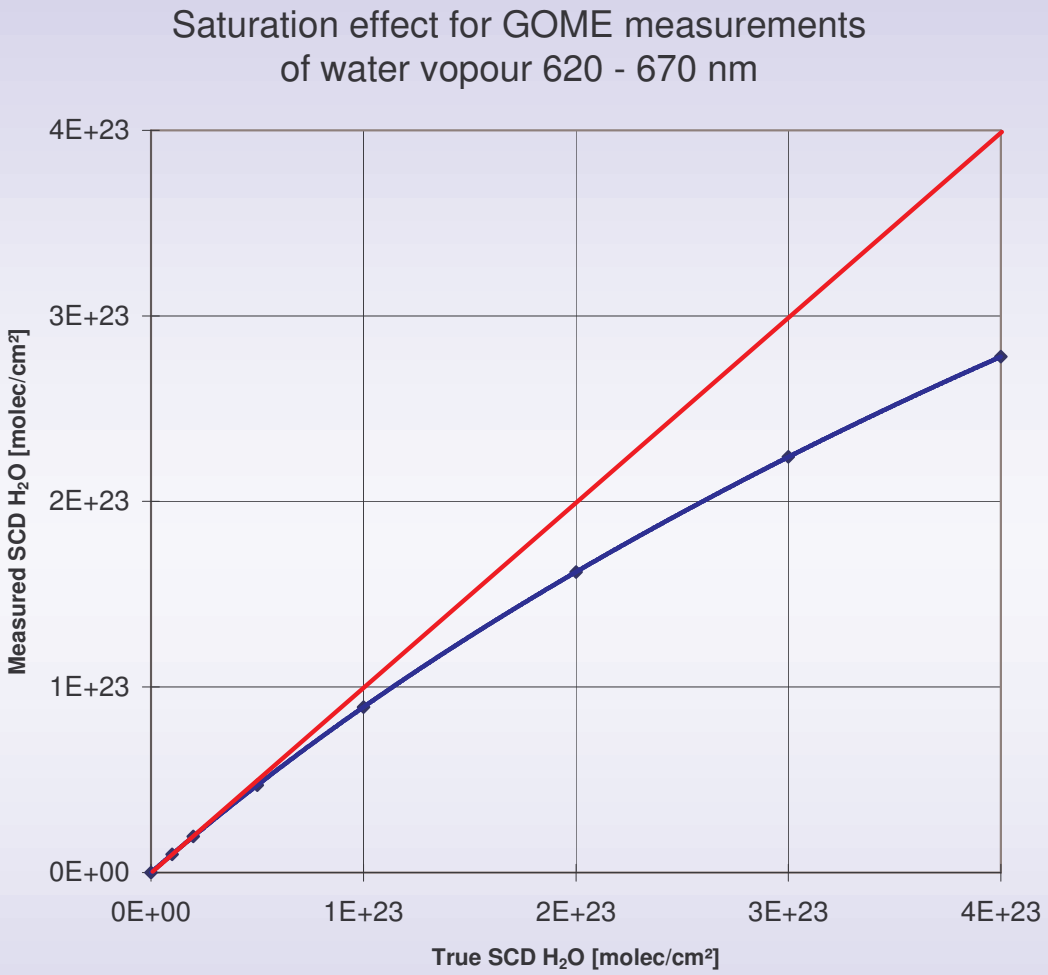
Modelling of the non-linearity of DOAS H2O observations



Results of the numerical Simulation of the saturation effect of the H_2O measurements (at 650 nm) from GOME. The non-linearity between the actual H_2O VCD and the observed H_2O VCD from the DOAS analysis is indicated by the blue line.

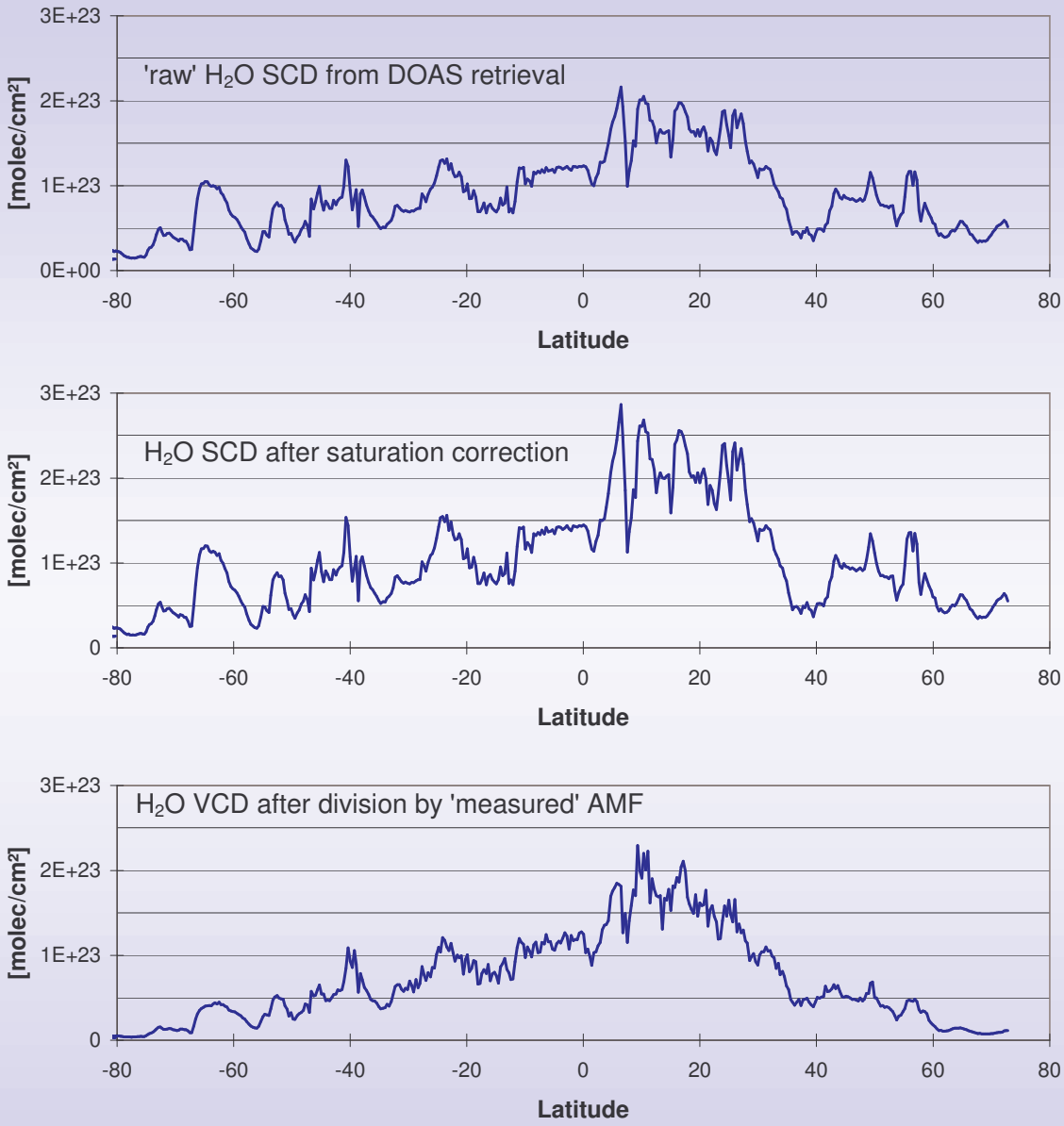


Different steps of the GOME H_2O retrieval

Upper panel: the uncorrected H_2O SCDs as derived from the DOAS retrieval.

Middle panel: H_2O SCDs after the correction of the 'saturation effect'

Lower panel: H_2O VCDs after application of the 'measured AMFs'.



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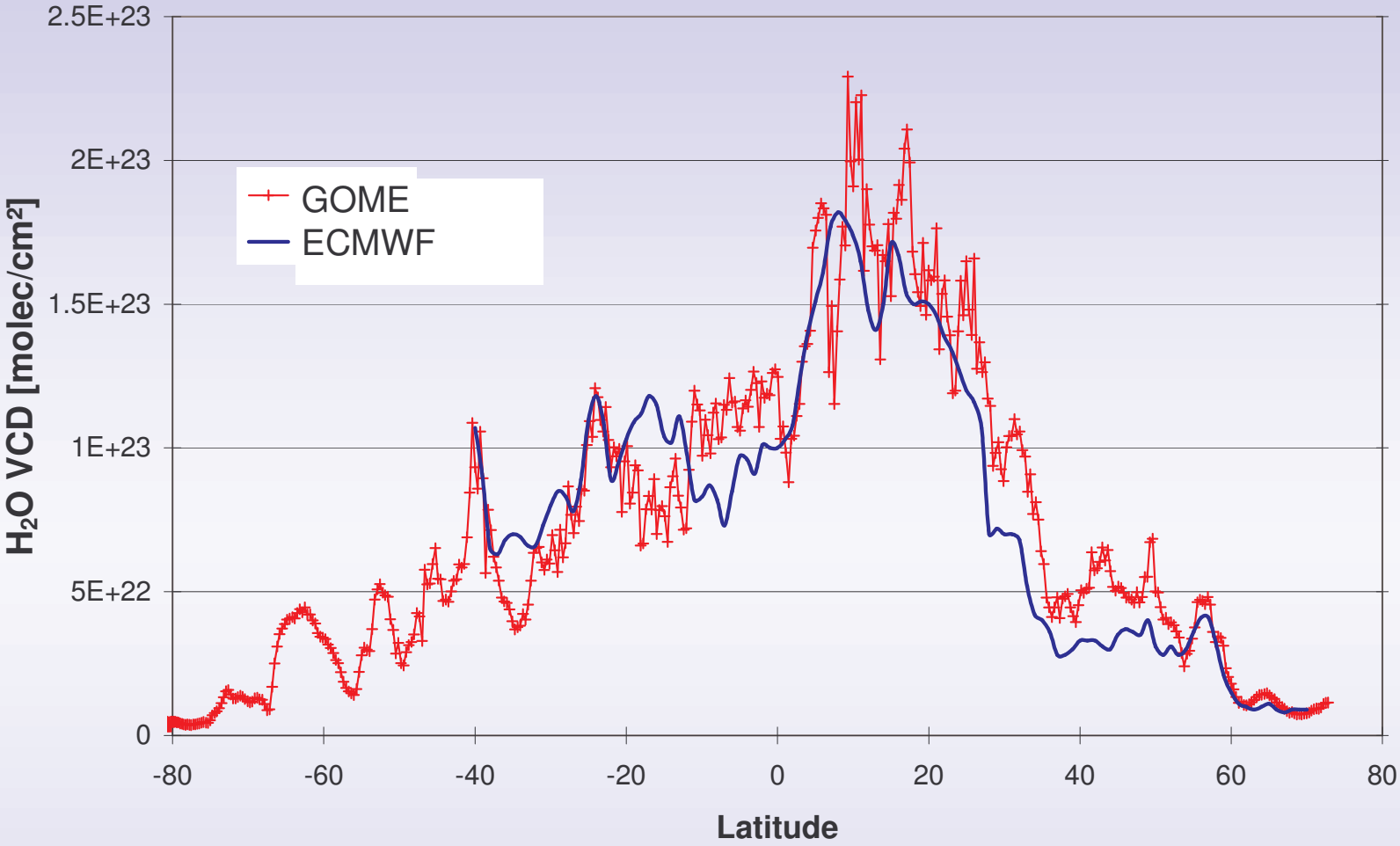
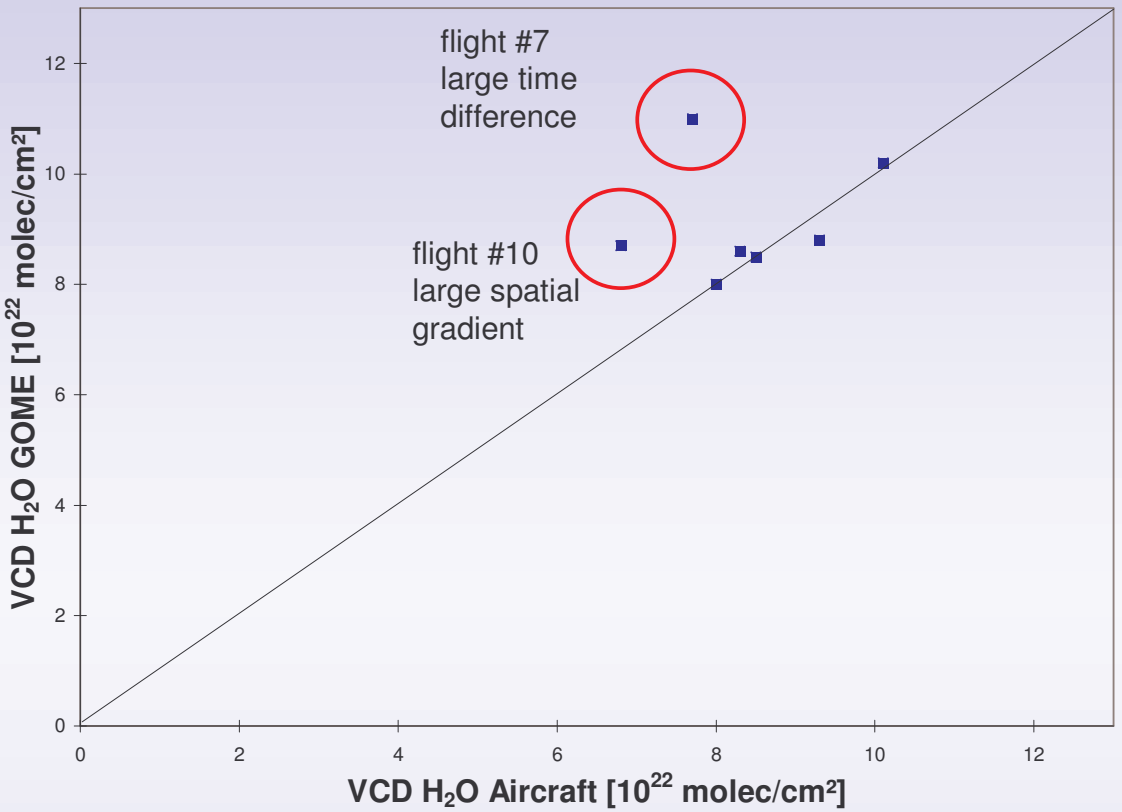
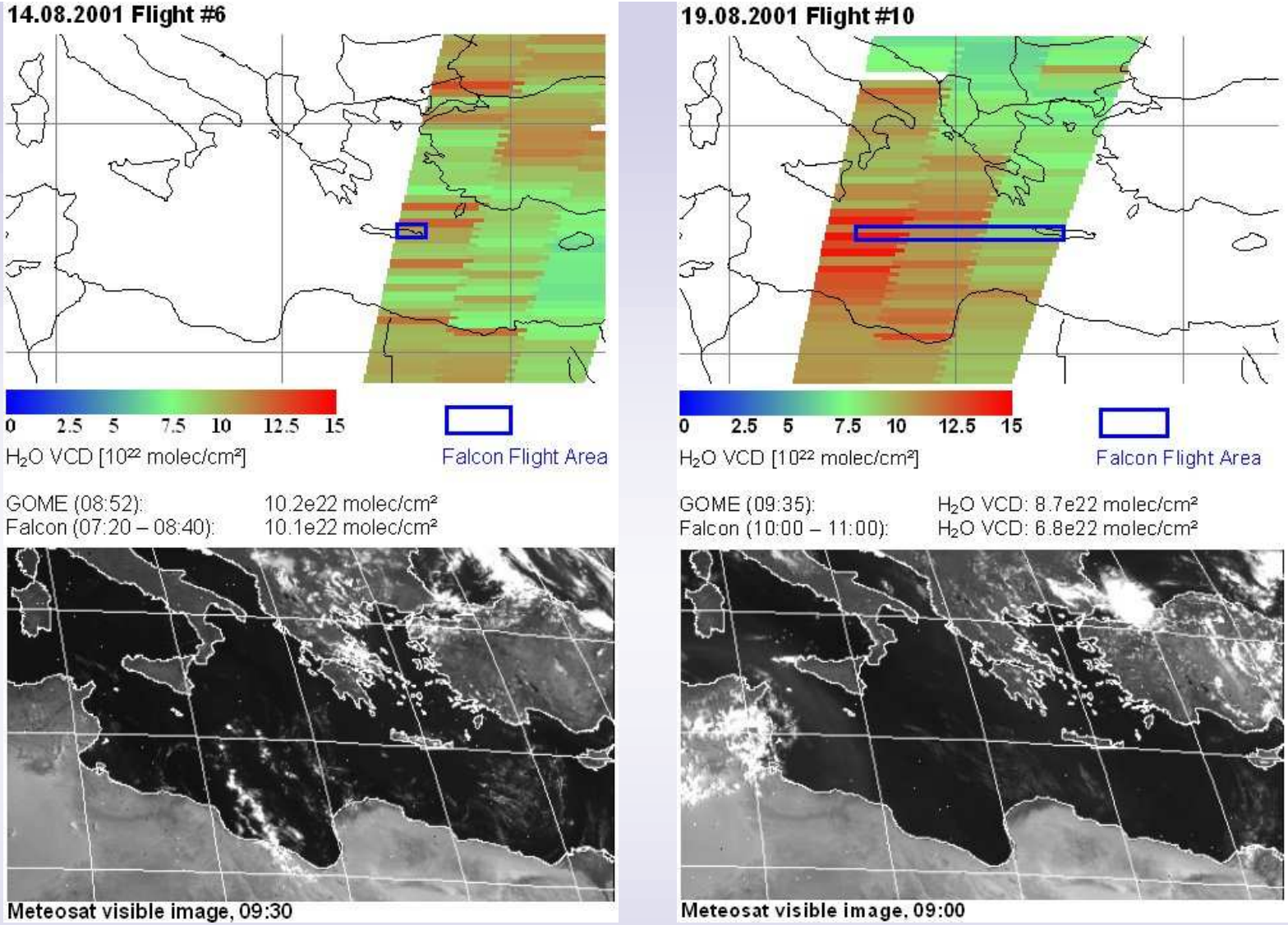


Comparison of the GOME H_2O analysis with modelled H_2O VCDs (ECMWF). The same orbit was also analysed by Maurellis et al. (2000) (from whom the model data are taken) and Lang et al. (2002).

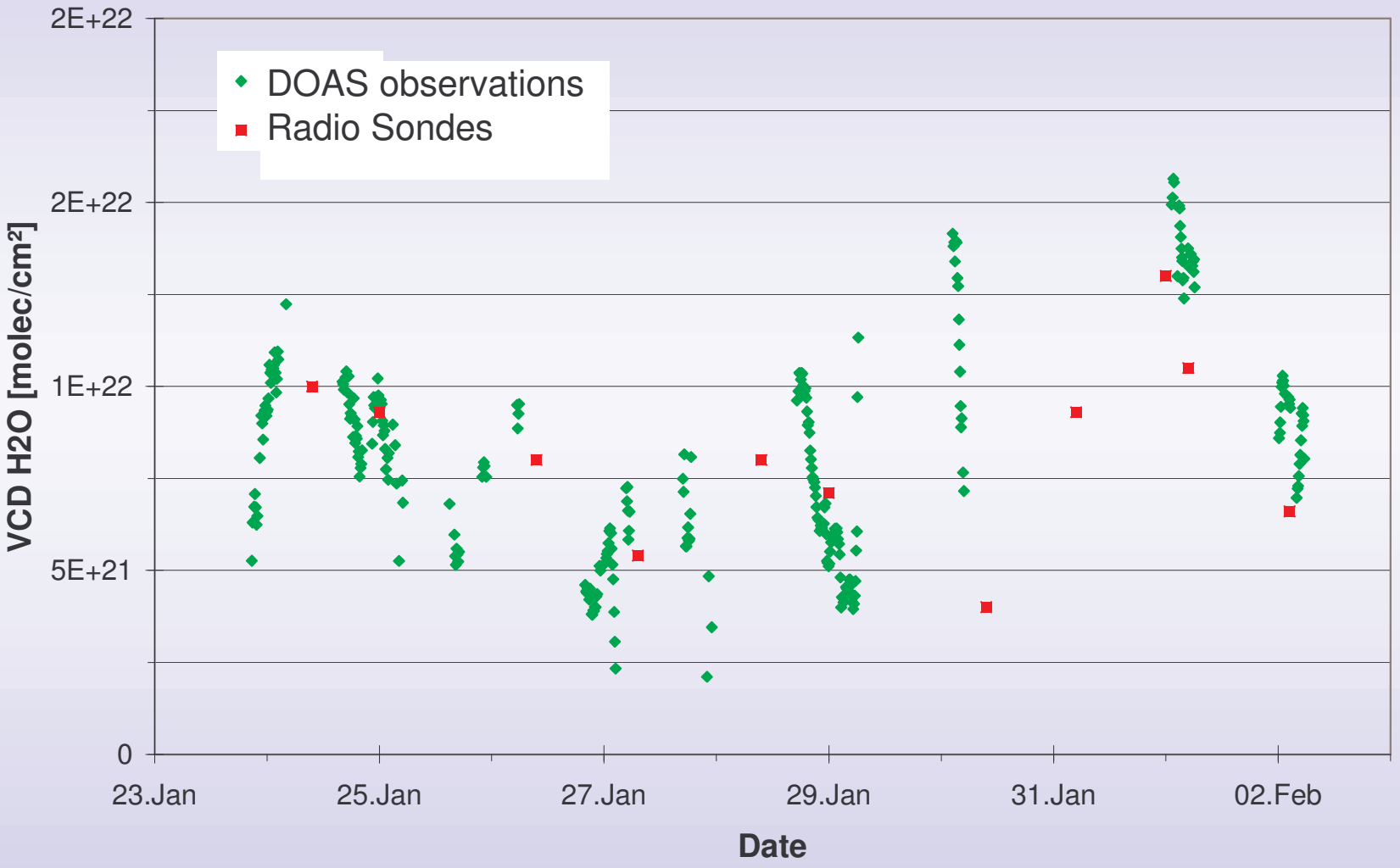


Comparison between the H_2O VCD derived from the aircraft (x-axis) and satellite (y-axis). For the cases of good temporal and spatial coincidence good agreement is found. For some cases with a large temporal difference or large spatial gradients the agreement is worse (indicated by red circles).



GOME H_2O maps over the Mediterranean for July 14 (flight #6) and July 19 (flight #10). Also shown are satellite images from METEOSAT (Mannstein, 2002).

Ground based H2O observations, Kiruna, direct moon light



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Conclusions

- Fast GOME H2O algorithm
- Measured AMFs (O4)
- Cloud-, albeodo-, and aerosol correction
- Comparison with model results and aircraft measurements