

Retrieval of Tropospheric Water Vapour from FTIR Solar Absorption Measurements

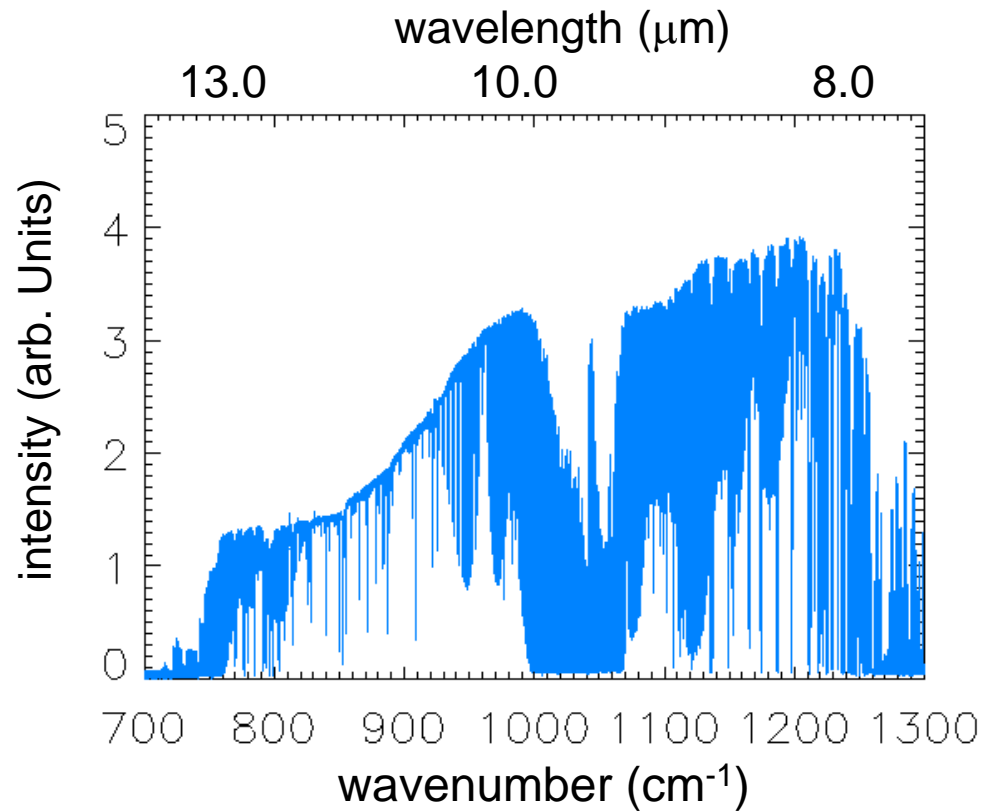
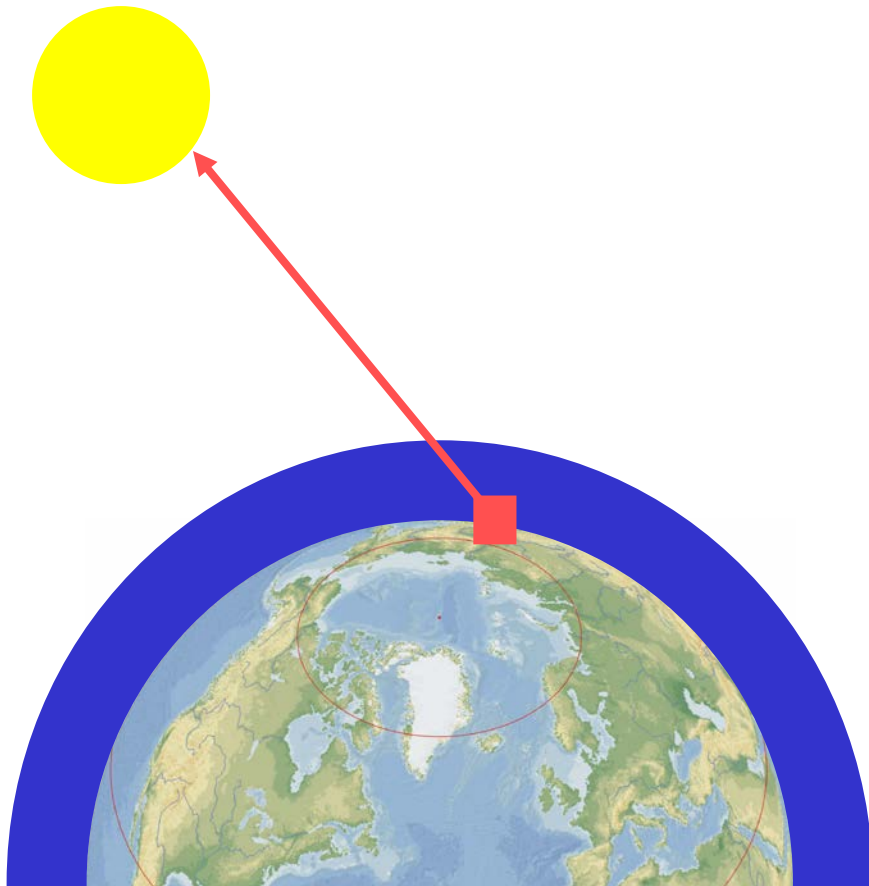
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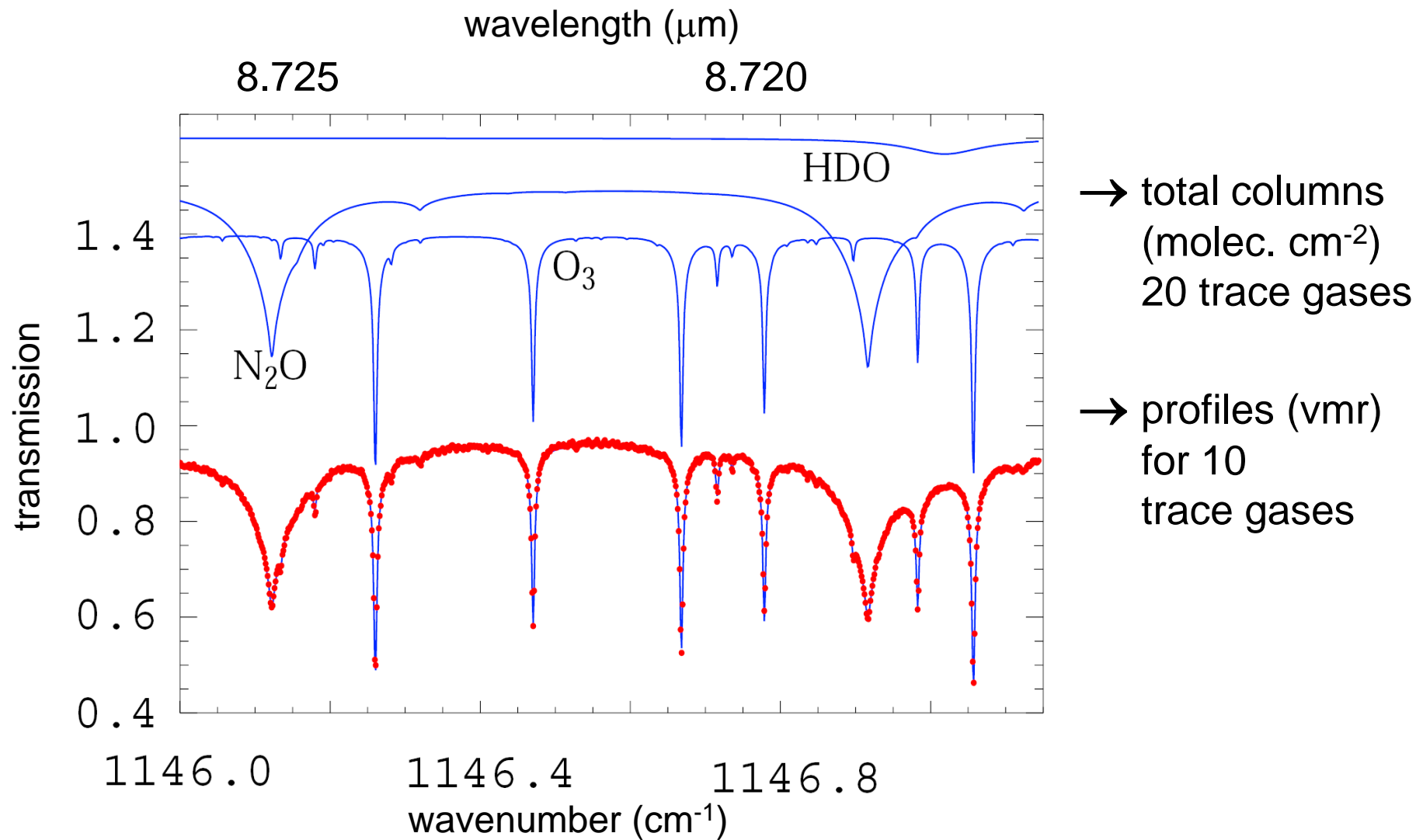
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Remote sensing of in the infrared using the Fourier Transform Infrared Spectroscopy (FTIR)





Spectral lines

ALFIP: Automatic Line Finding Program

<http://www.iup.physik.uni-bremen.de/ftir/alfip>

Automatic search for lines with highest signal contribution
in defined altitude region

Tropics:

H₂¹⁶O: 2429.5, 2485.3, 2497.1, 2940.9, 3145.5, 3147.8, 3158.6

HDO: 2660.3, 2672.2, 2675.0, 2725.5, 2737.8, 2747.3, 2854.5, 2860.4

H₂¹⁸O: 2900.4, 2942.55, 2954.95, 3000.45

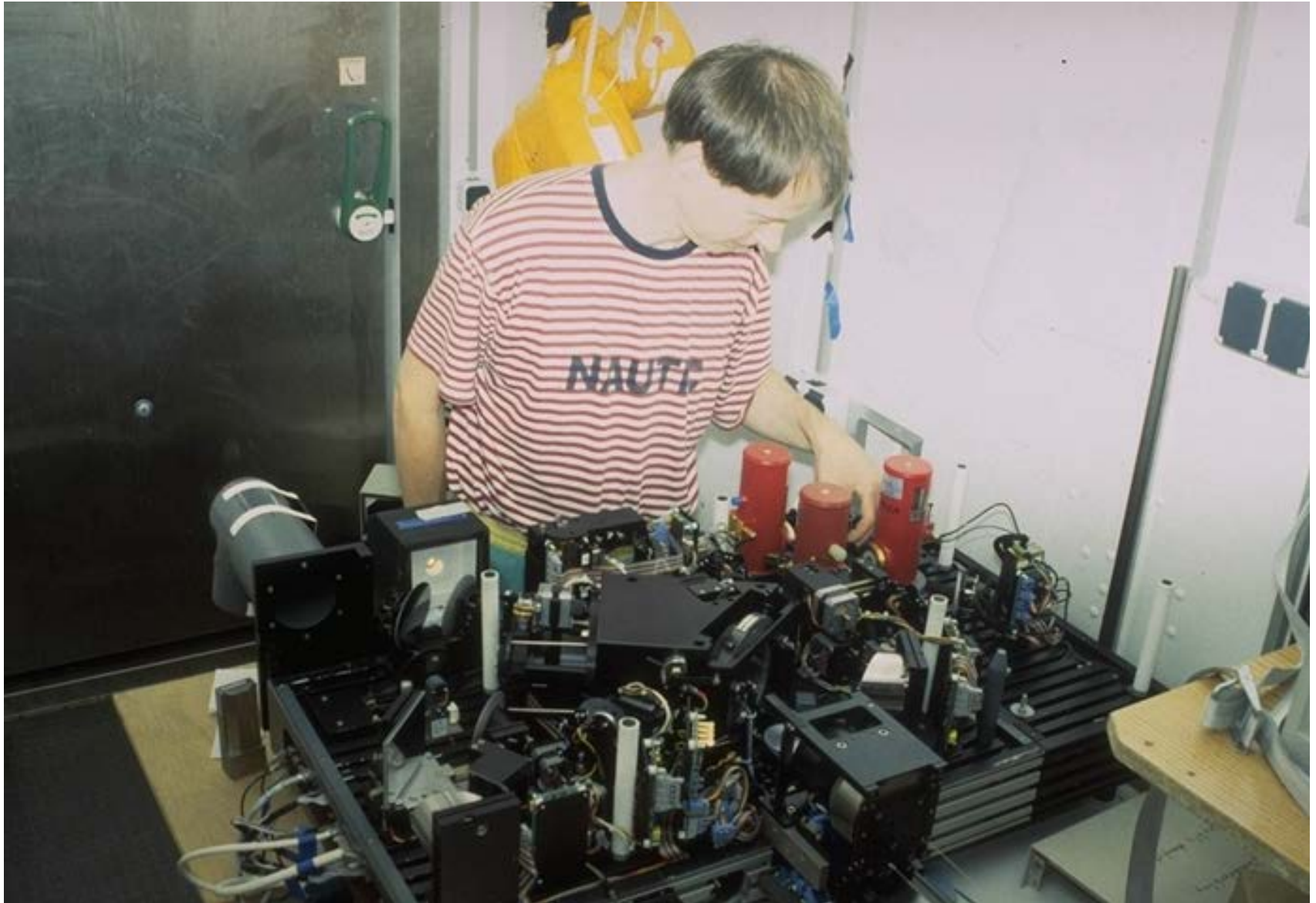
Midlatitudes:

H₂¹⁶O: 2911.2, 2930.6, 3050.55, 3146.75, 3147.9, 3152.5, 3189.6

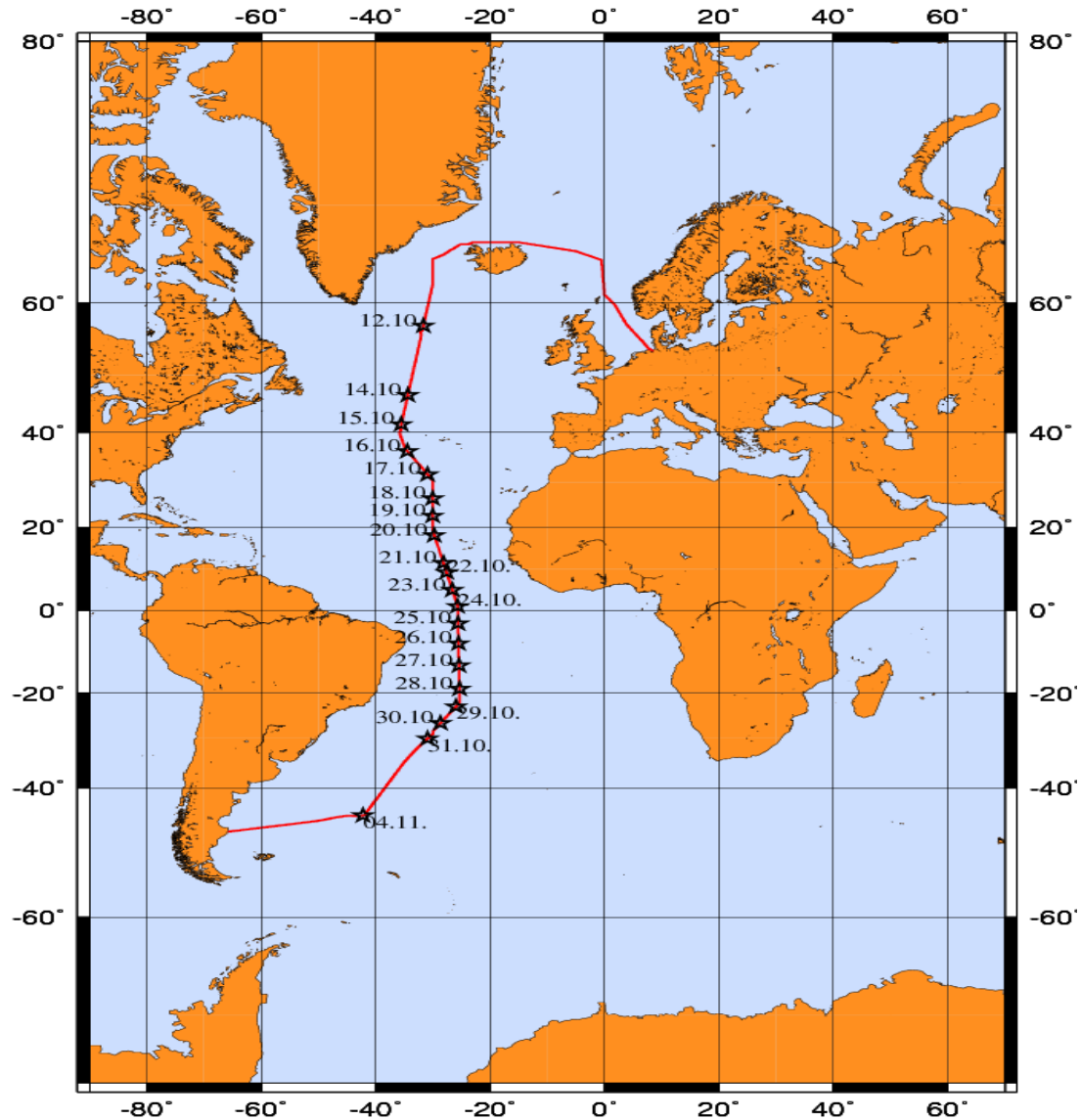
HDO: 2657.1, 2660.4, 2671.9, 2722.5, 2730.5, 2737.8, 2747.2

H₂¹⁸O: 2955.0, 2976.2, 3001.0, 3023.6, 3043.6, 3091.0

Observations onboard of *Polarstern*



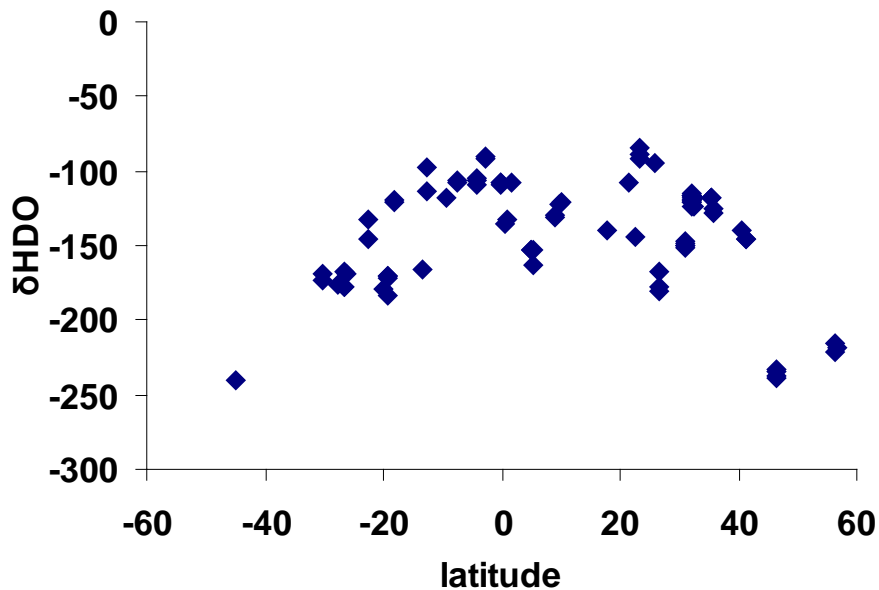
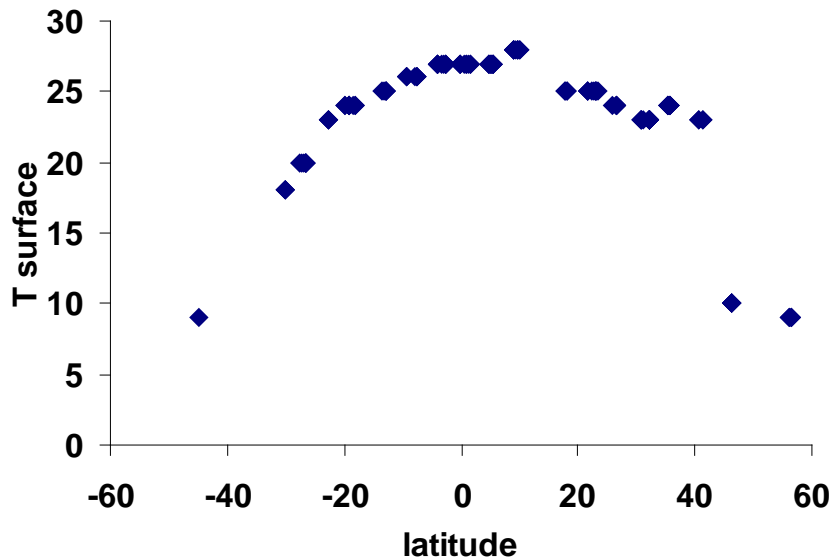
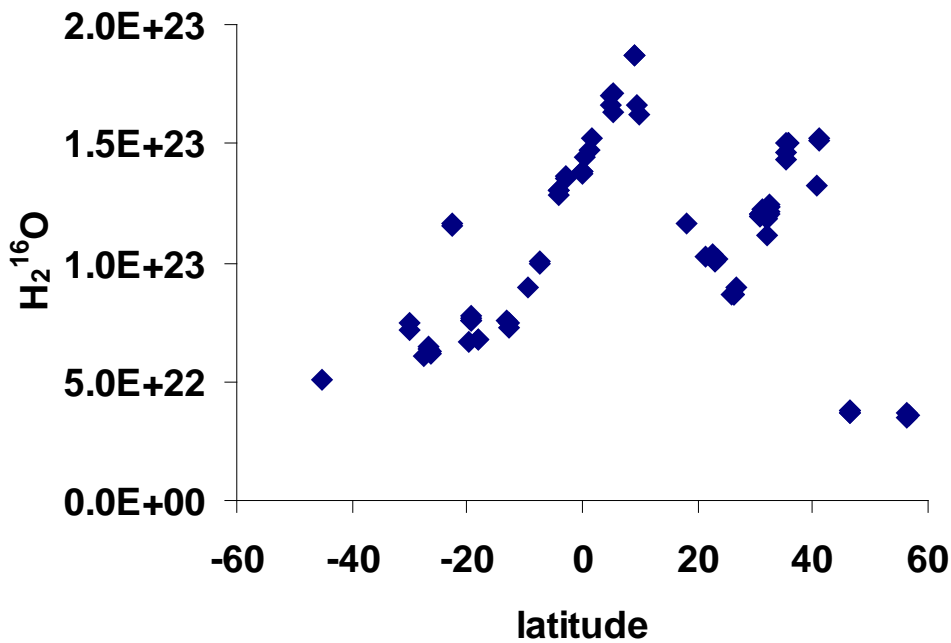
Polarstern campaign Oct./Nov. 1996



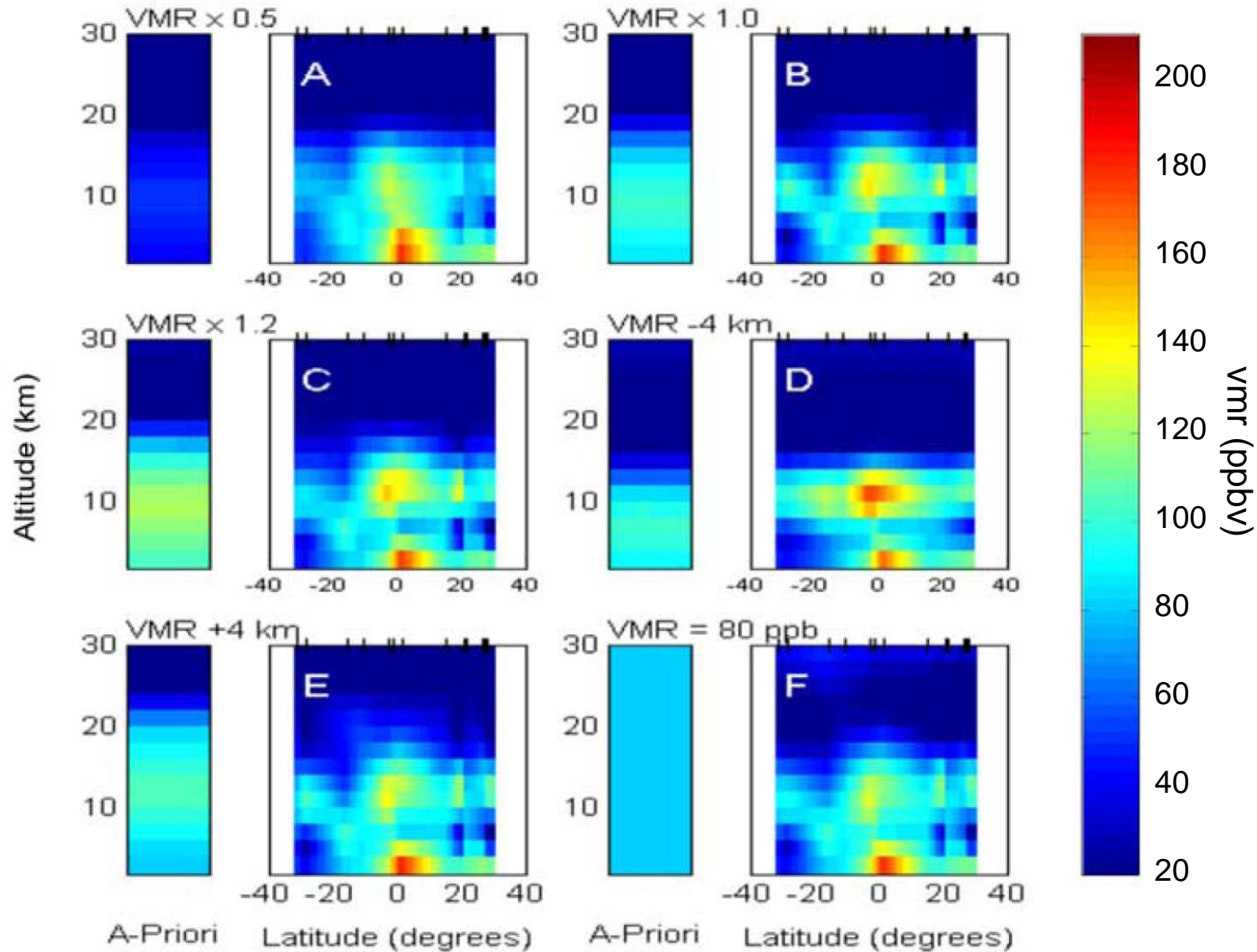


Polarstern cruise

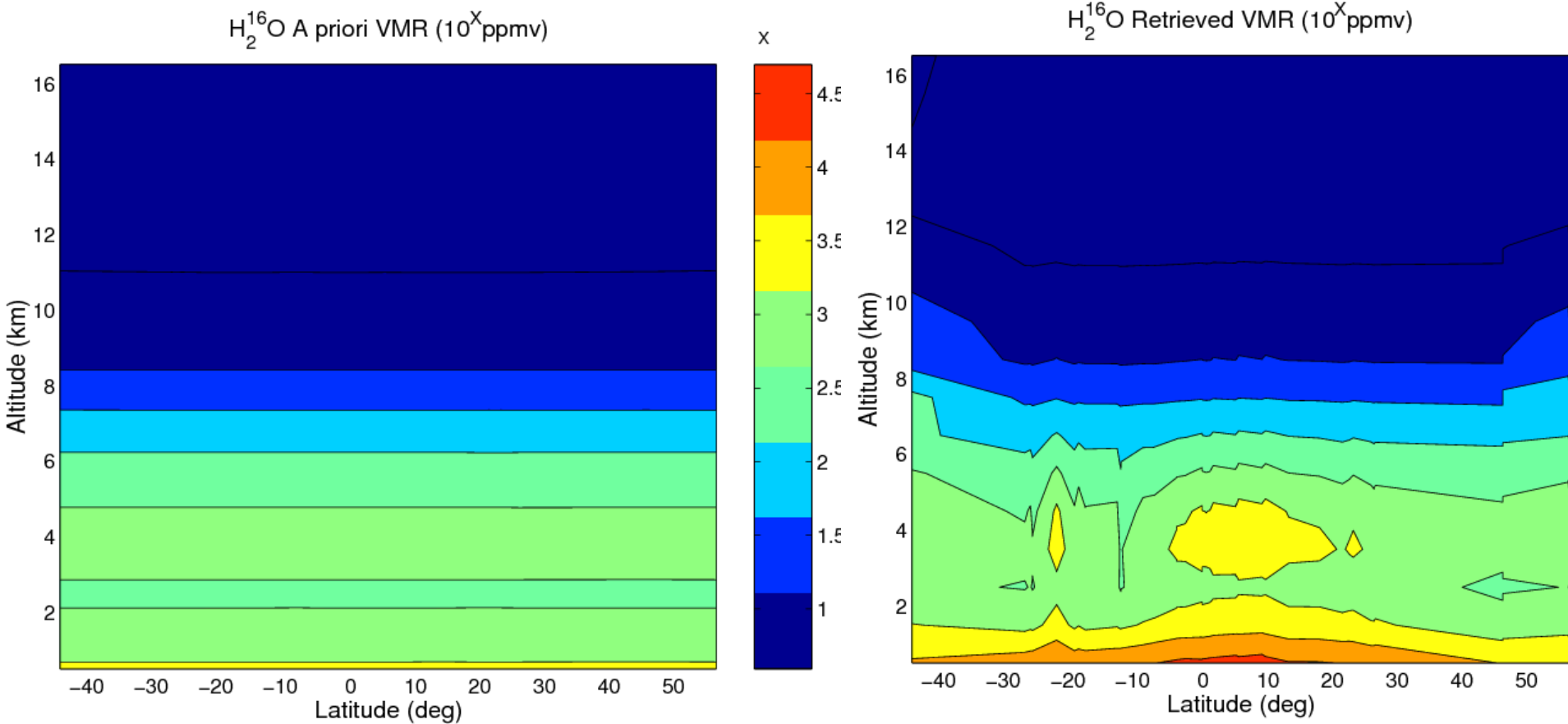
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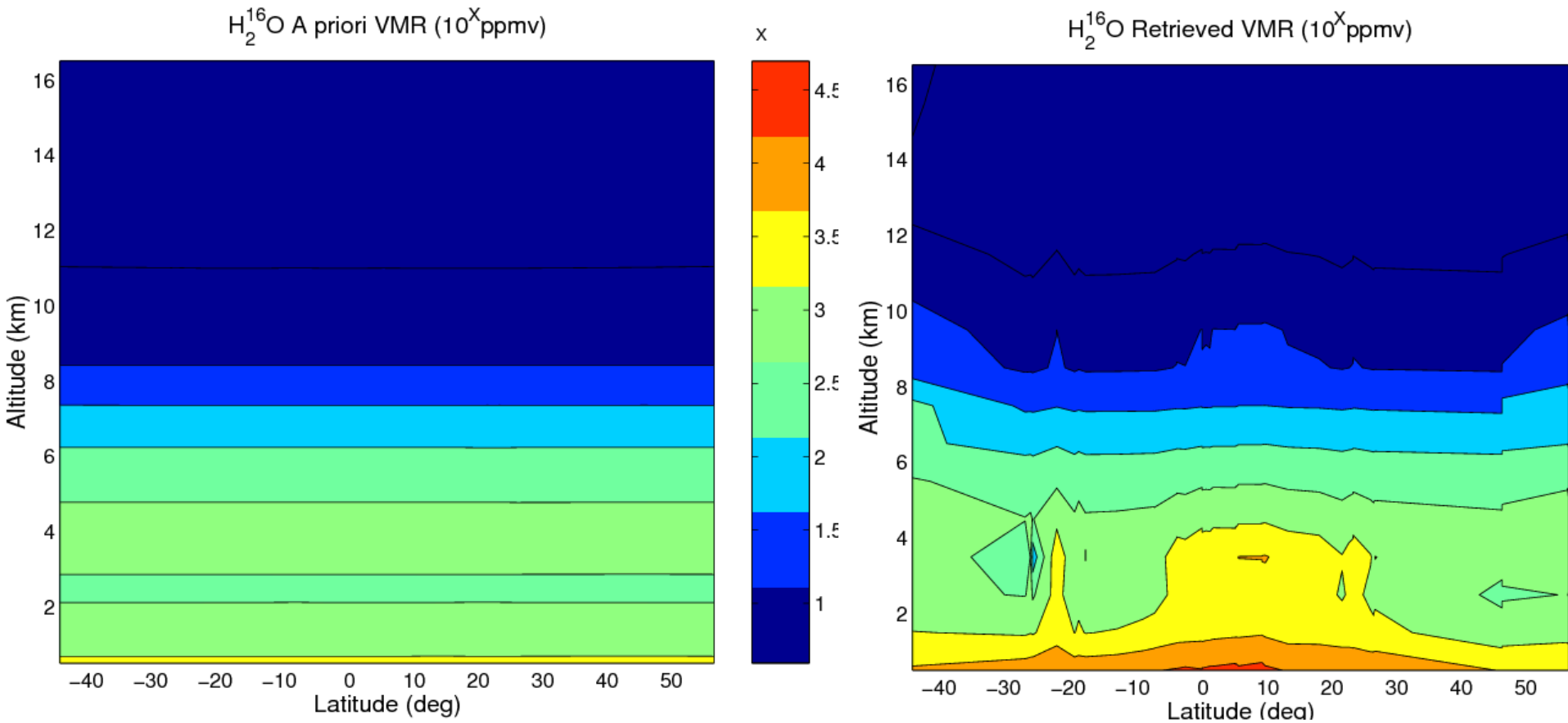
Dependancy of vmr-profile results on a-priori

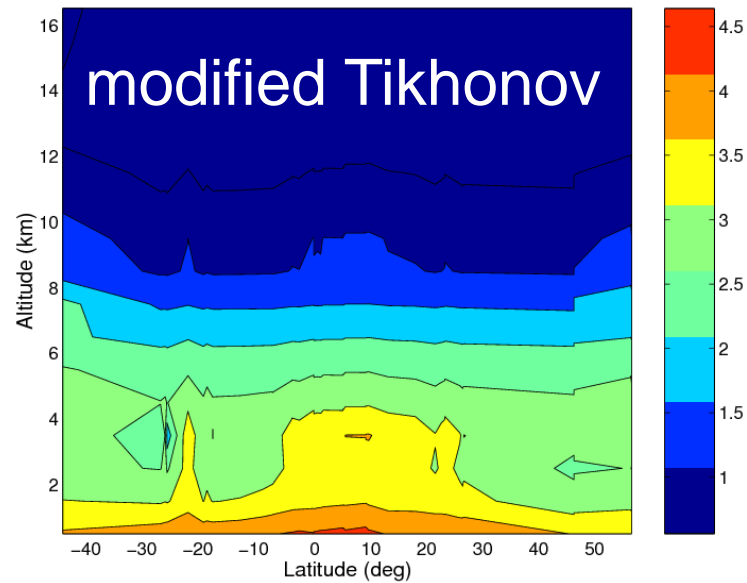
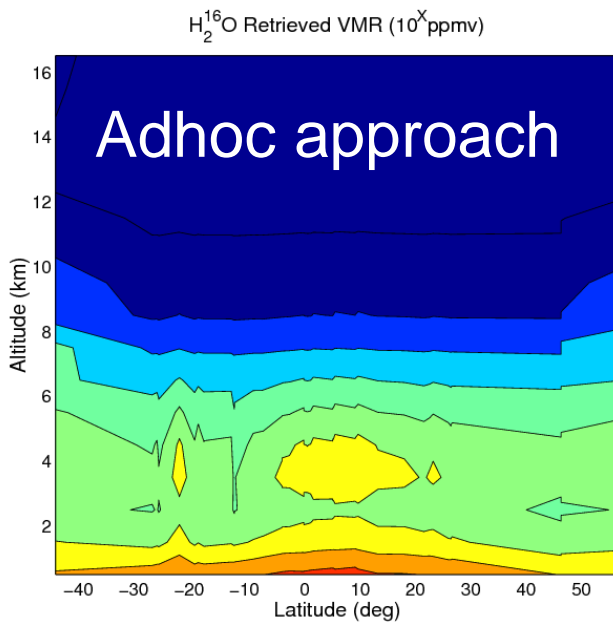
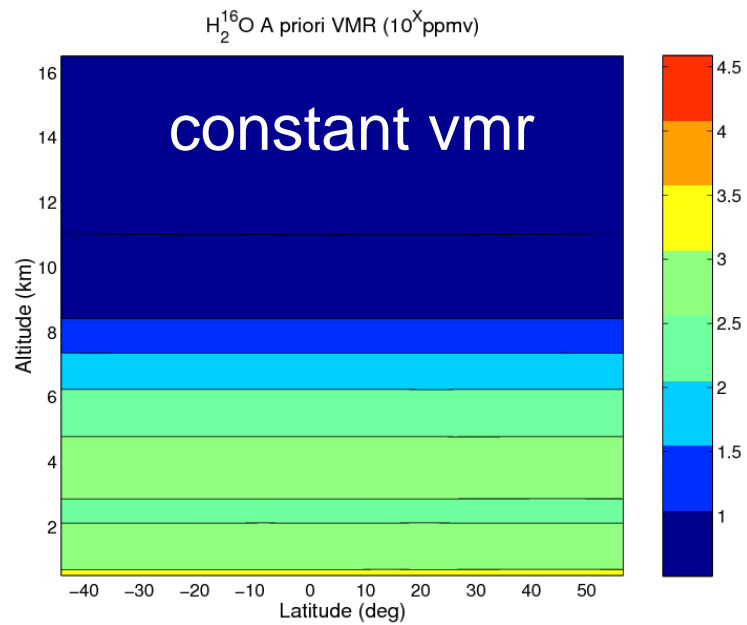
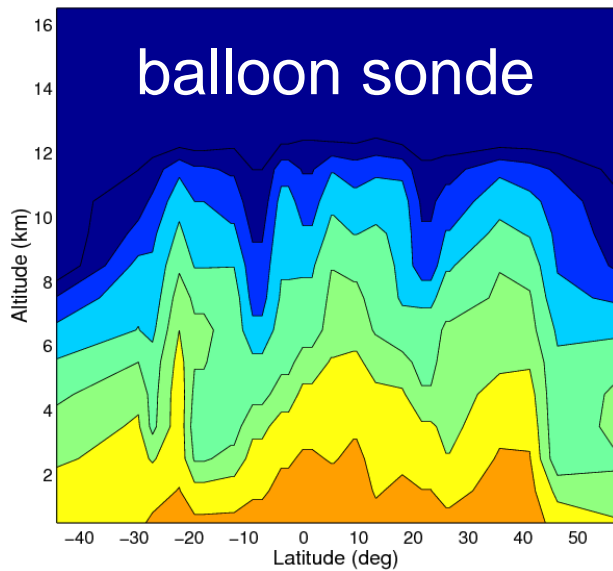


Sensitive to a-priori profile, Adhoc covariance



Sensitive to a-priori profile, modified Tikhonov

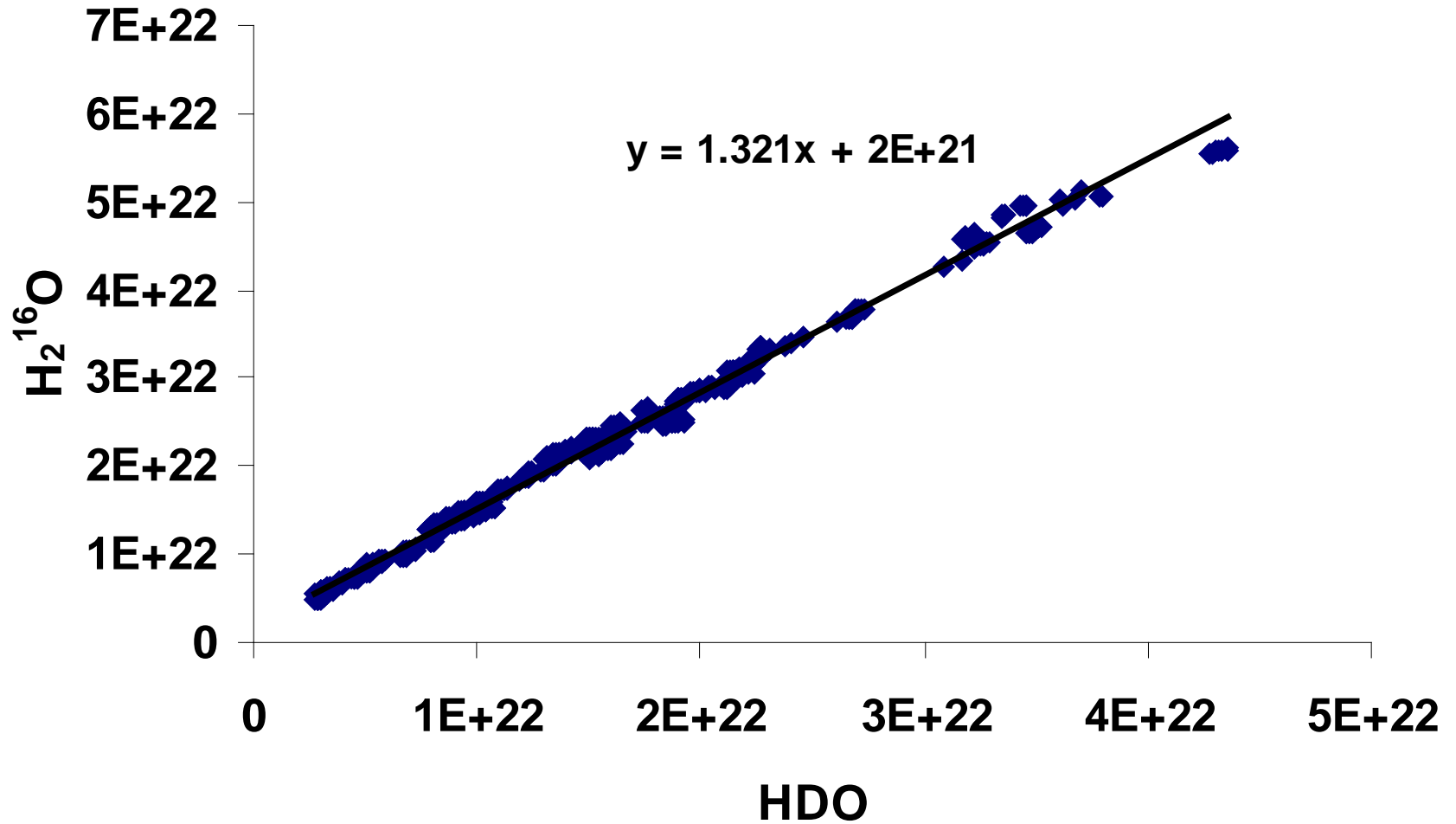




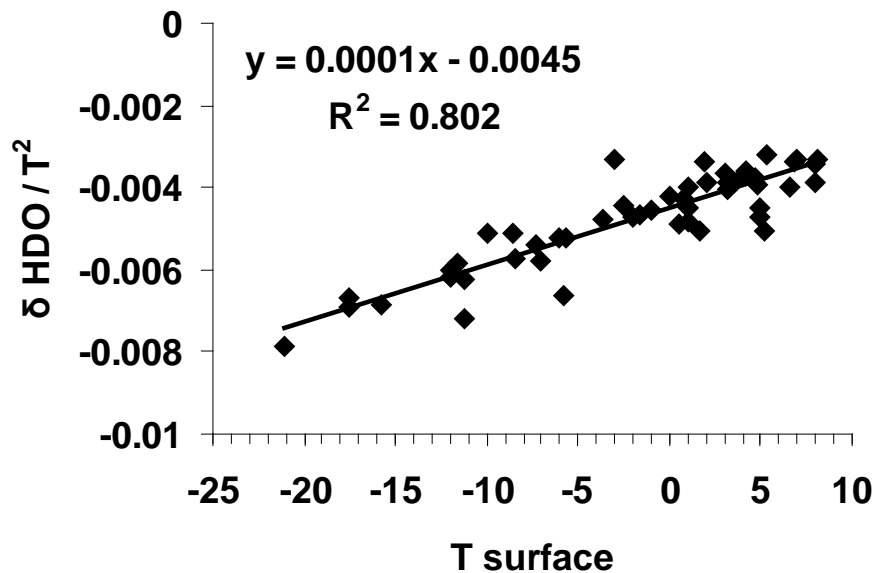
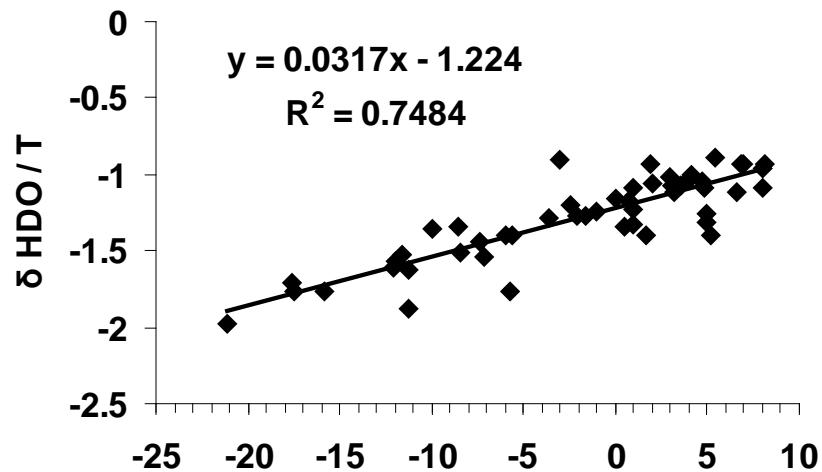
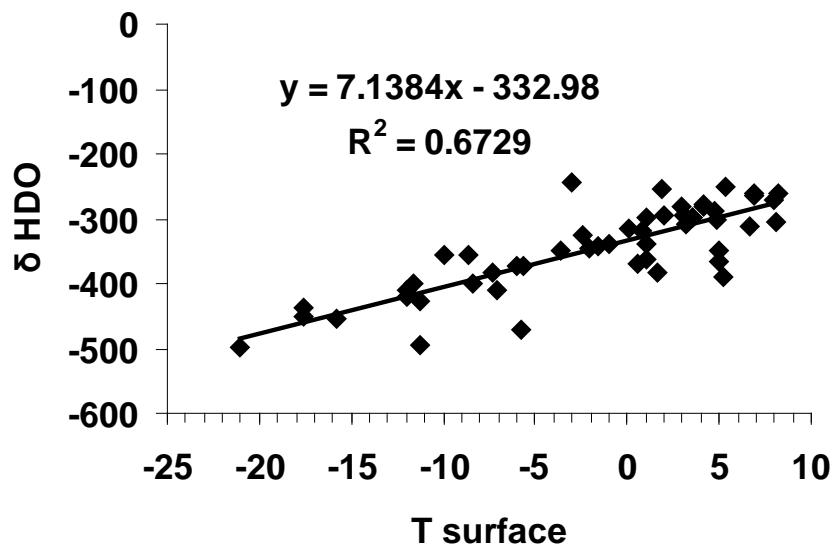
Spitsbergen, 79°N, 12°E



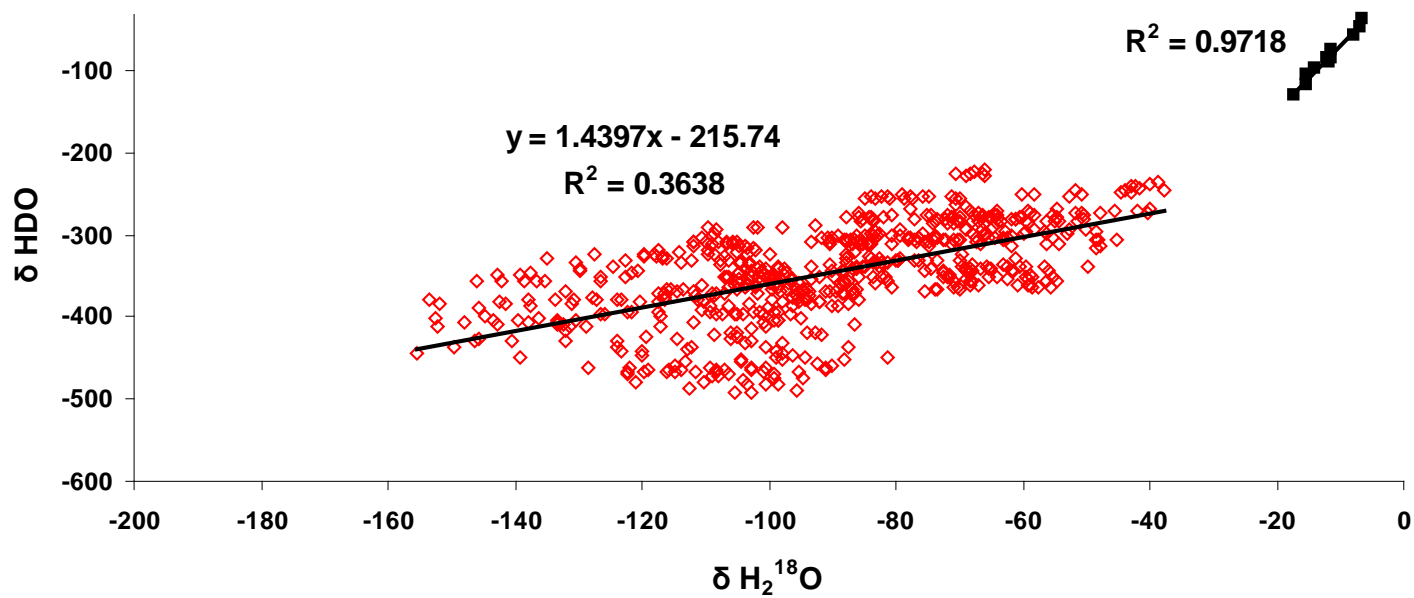
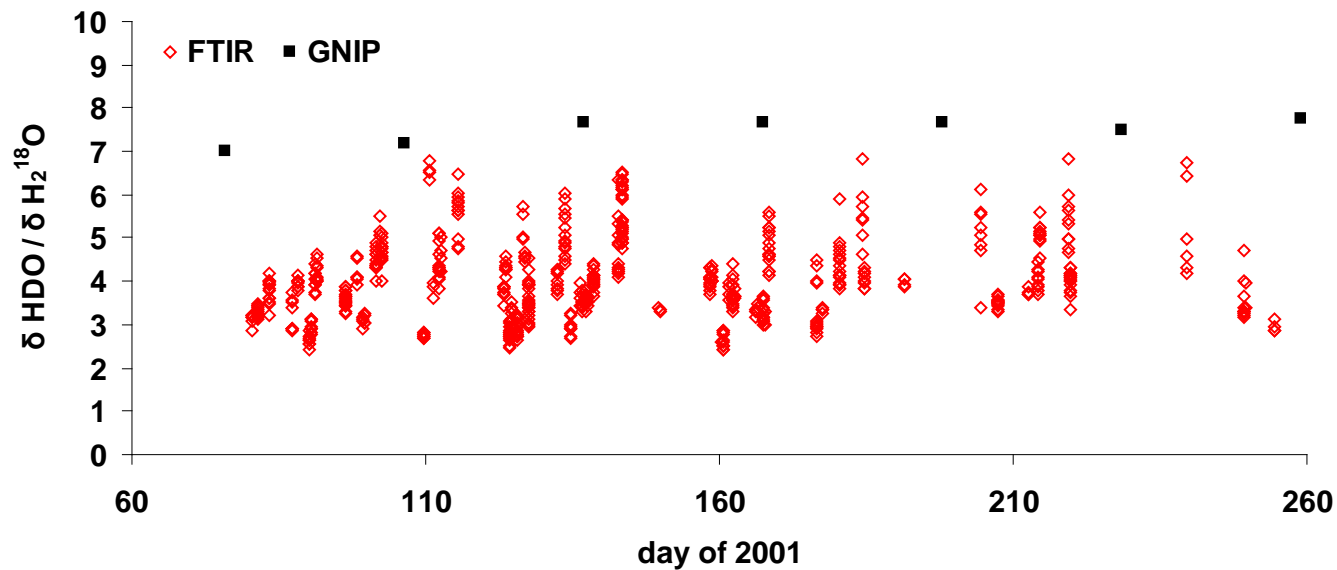
Spitsbergen 2001



Temperature dependance of δ HDO



Meteoric Water Line: $\delta \text{HDO} = 8 * \delta \text{H}_2^{18}\text{O} + 10$



Summary and conclusions

- total columns of H_2^{16}O , H_2^{18}O and HDO
- profiles with 2-3 degrees of freedom
- tropopause region difficult to reach
- work in progress