

# **Airborne Millimeter- and Submillimeterwave Observing System AMSOS**

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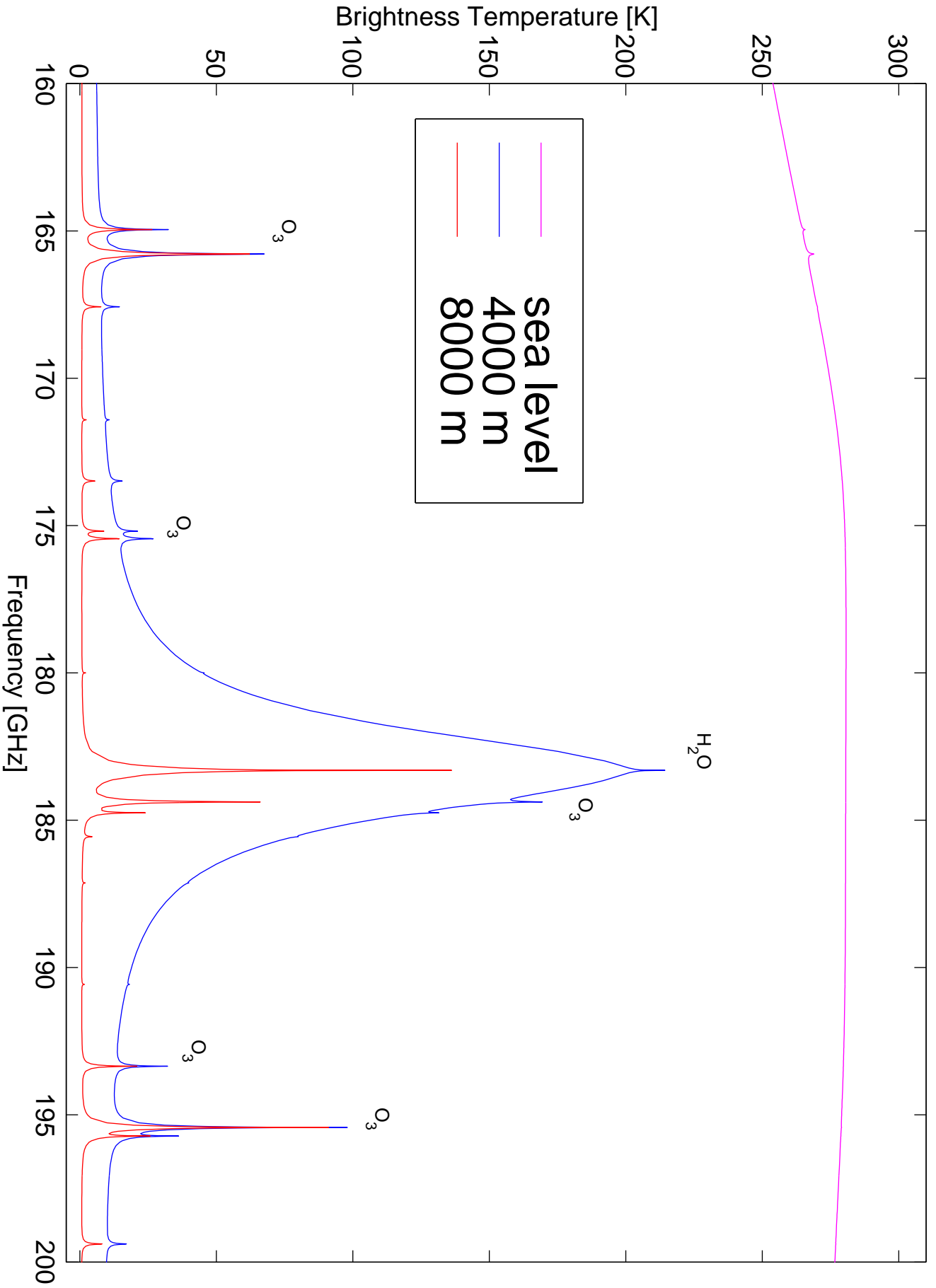
April 3, 2003

<http://www.iapmw.unibe.ch>

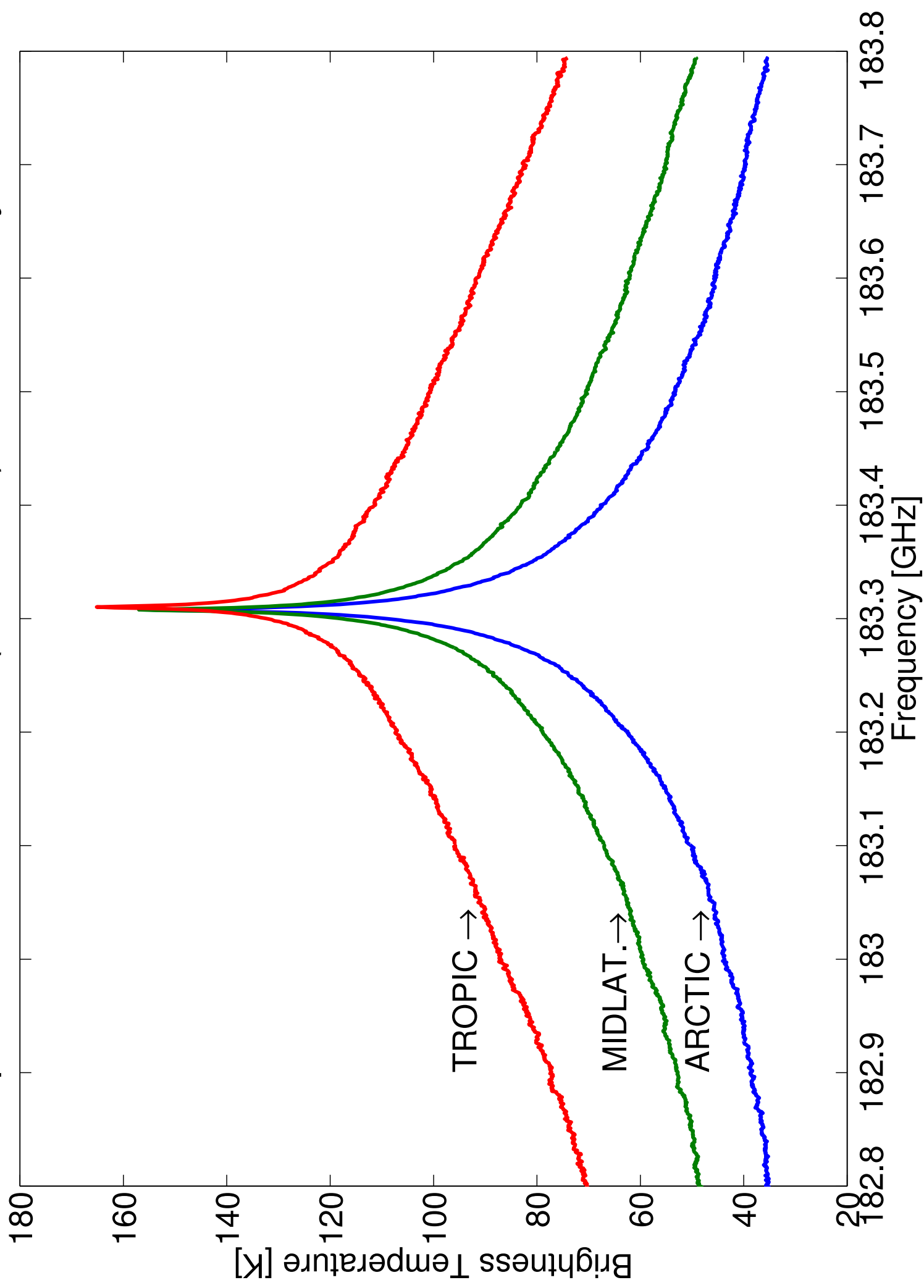
## **The AMSOS instrument**

- Heterodyne microwave receiver at 183.31 GHz
- Two acusto-optical spectrometers (AOS)
- Water vapor measurements in the upper side band
- Ozone measurements in the lower side band
- Built and optimized for aircraft operations

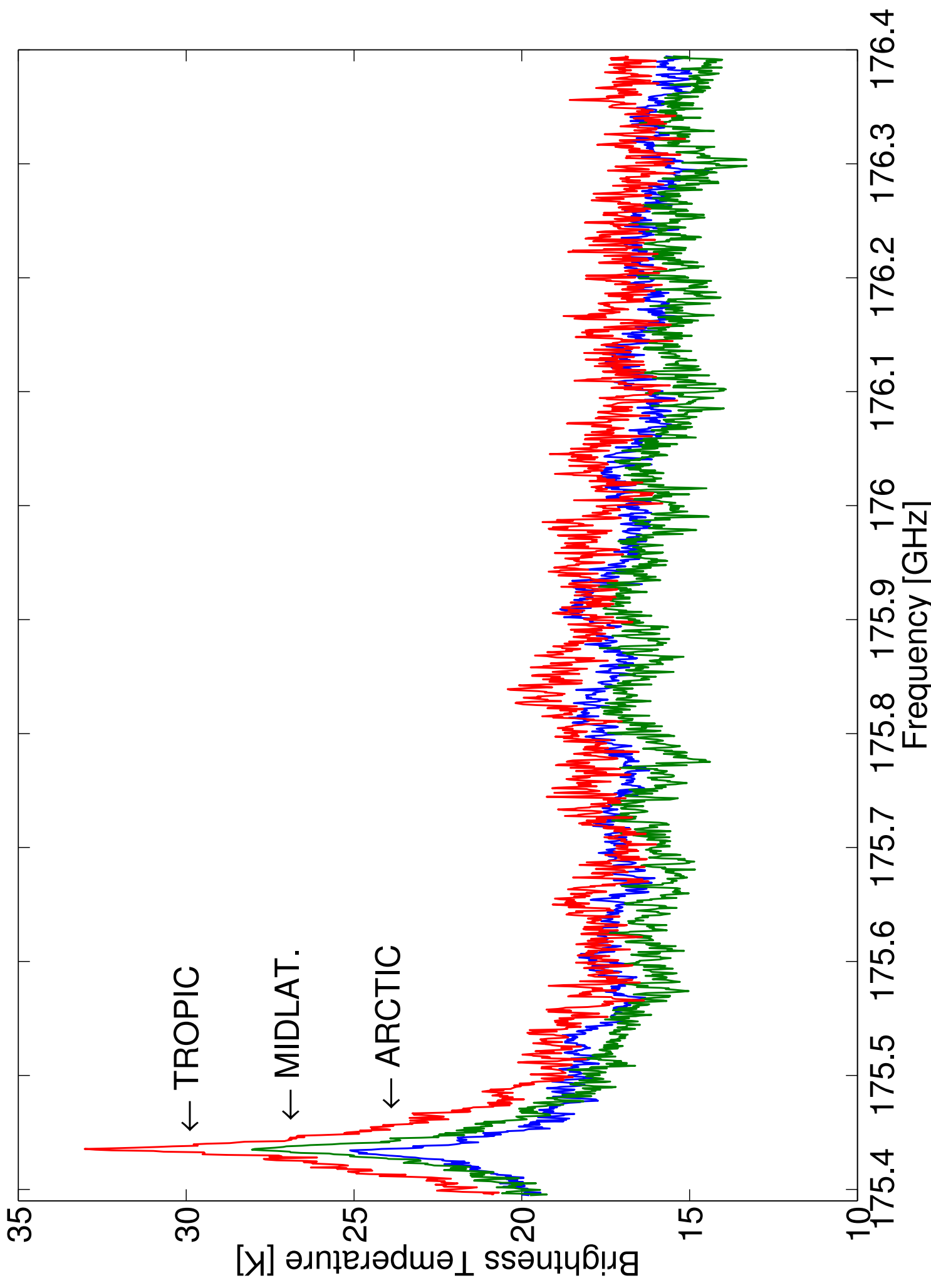
Water vapor line at 183.31 GHz



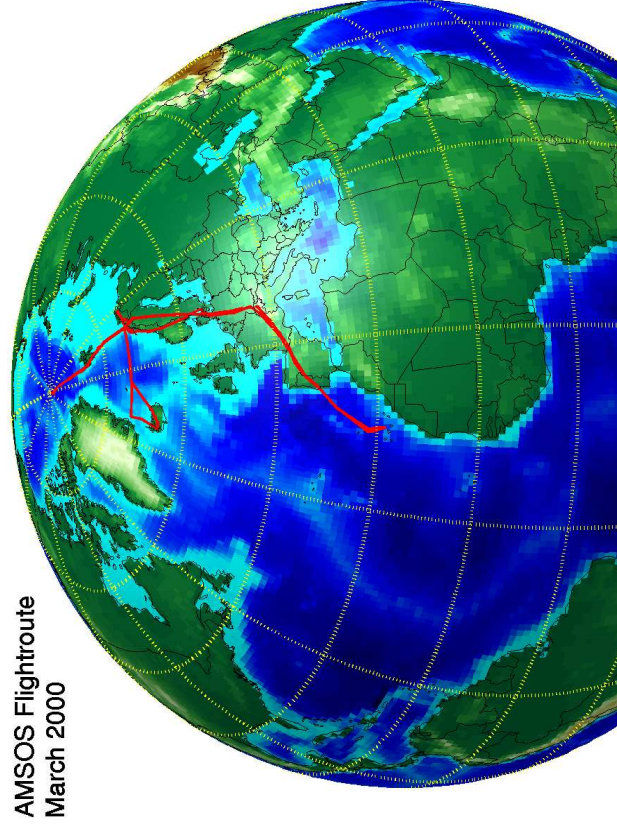
H2O Spectra at 183.31GHz (11km alt.) measured by AMSOS



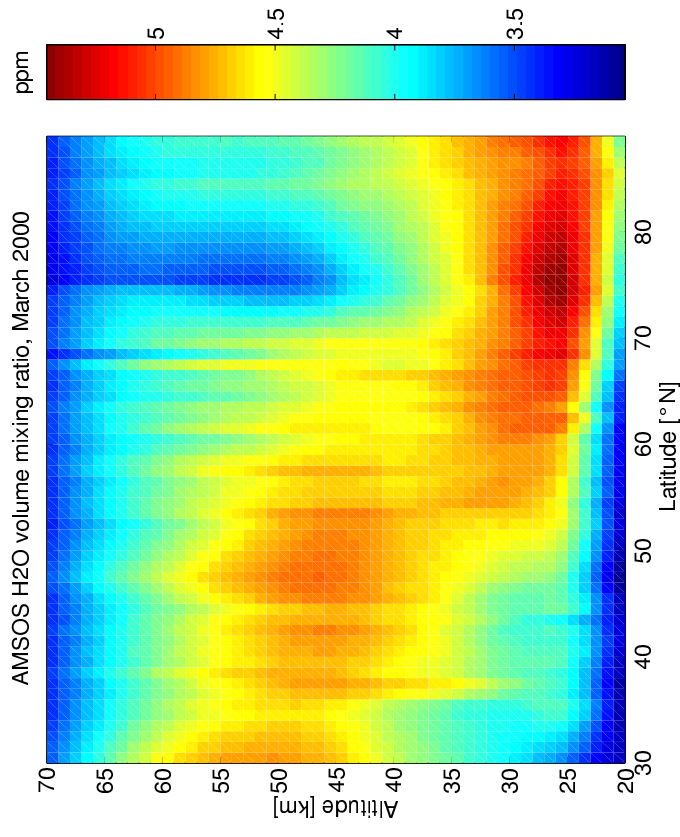
O3 Spectra at 175.45GHz (11km alt.) measured by AMSOS



# Airborne measurements

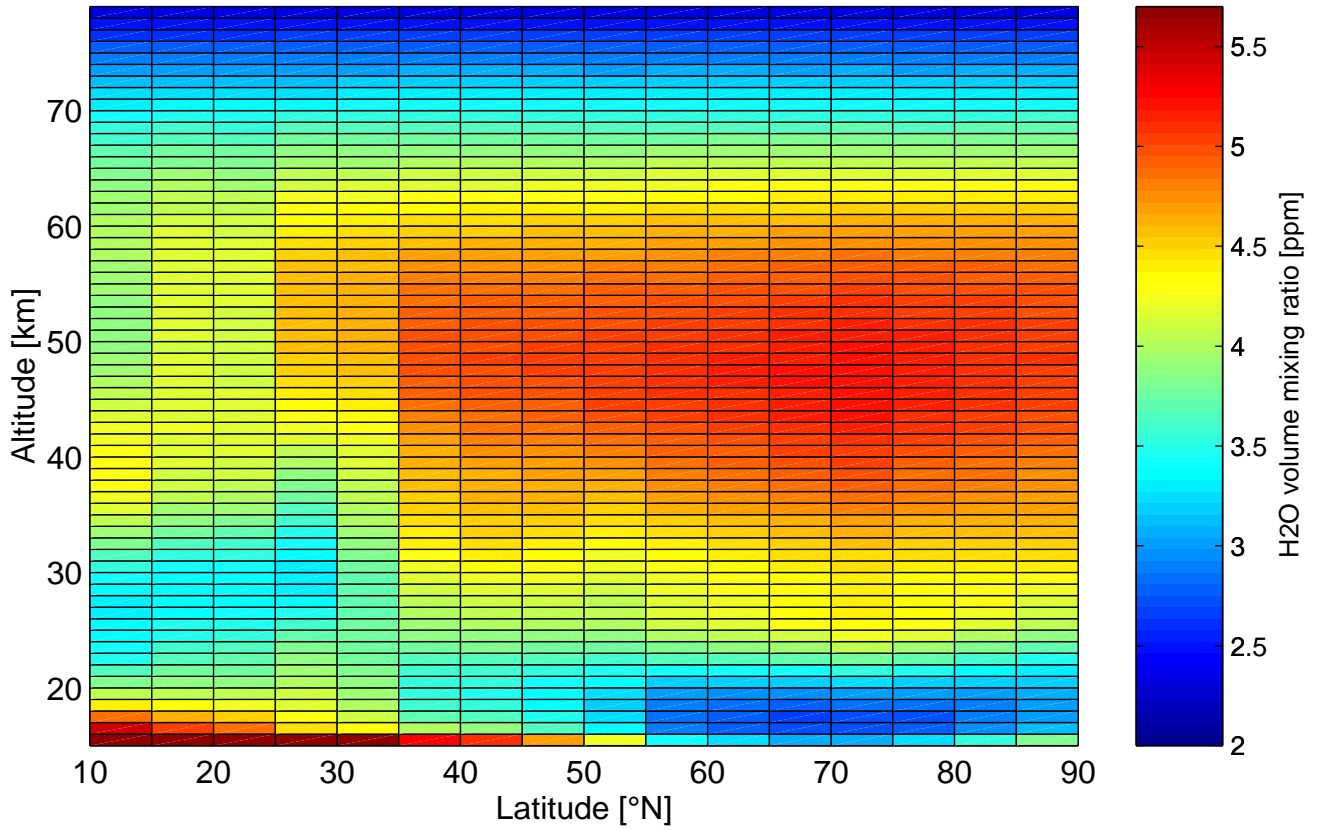


AMSOS Flightroute  
March 2000

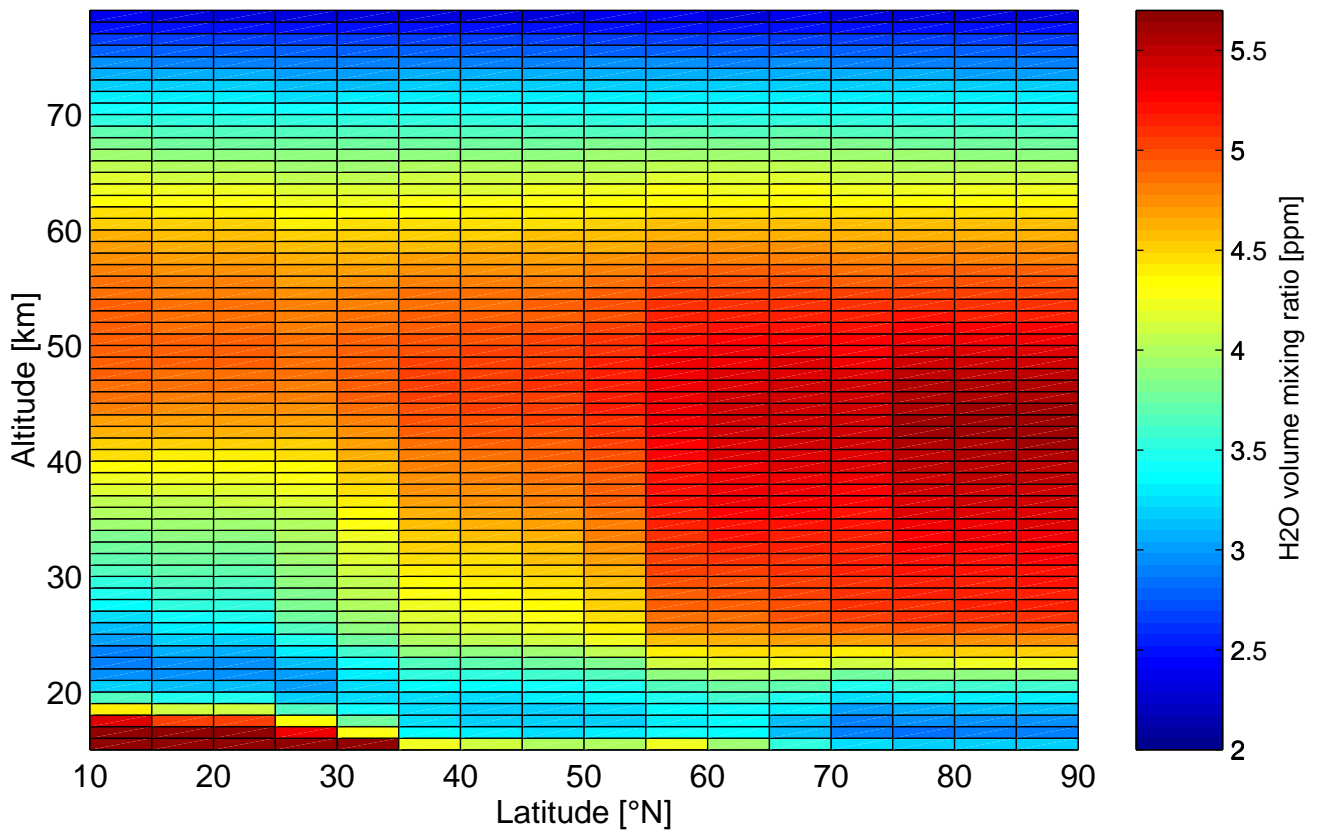


The Airborne Millimeter and Submillimeter Observing System (AMSOS) is usually used for airborne measurement campaigns of stratospheric H<sub>2</sub>O at 183 GHz.

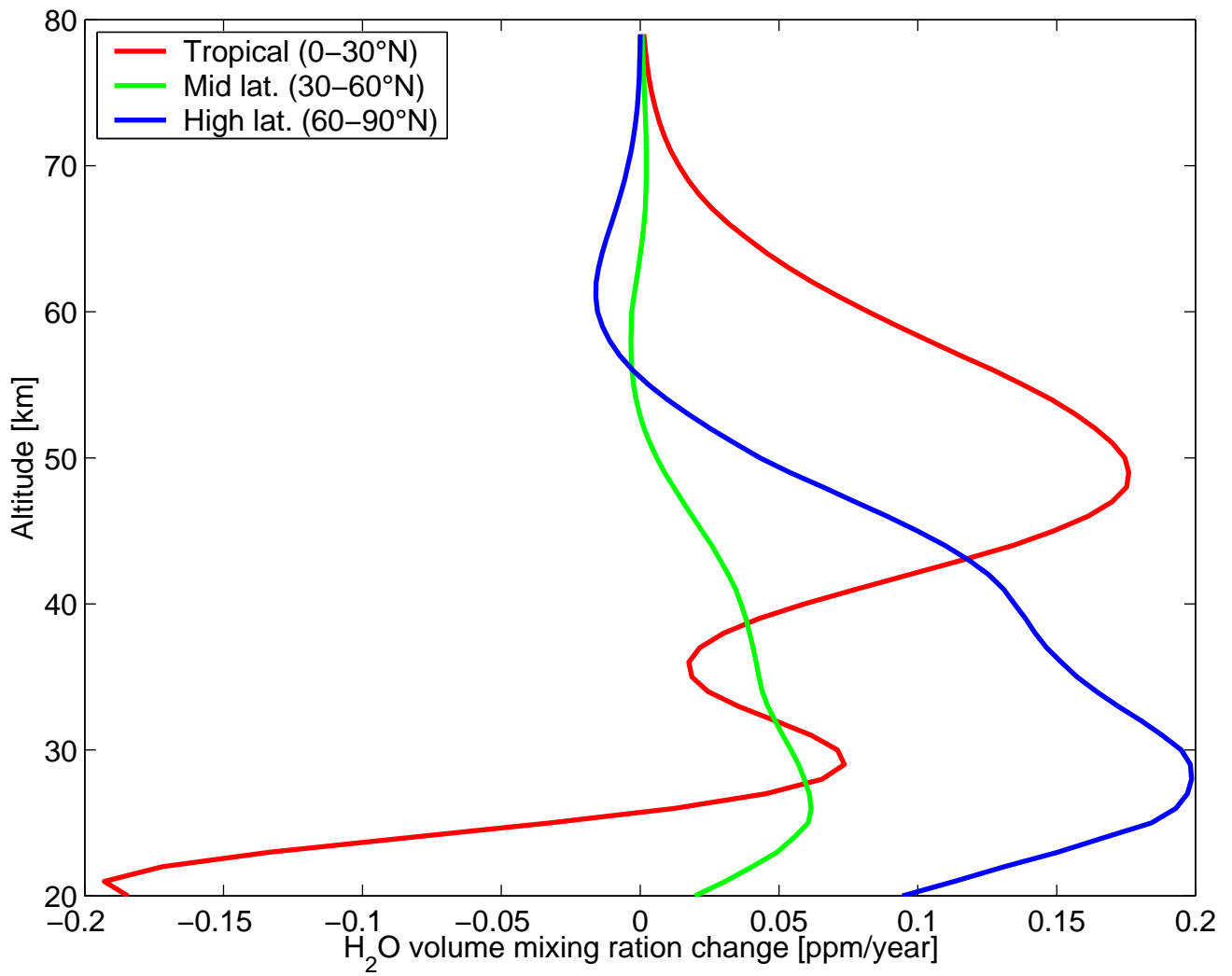
Stratospheric H<sub>2</sub>O survey 24–Aug–1998 to 28–Aug–1998



Stratospheric H<sub>2</sub>O survey 16–Sep–2002 to 20–Sep–2002



Change in stratospheric H<sub>2</sub>O from Aug 1998 to Sep 2002



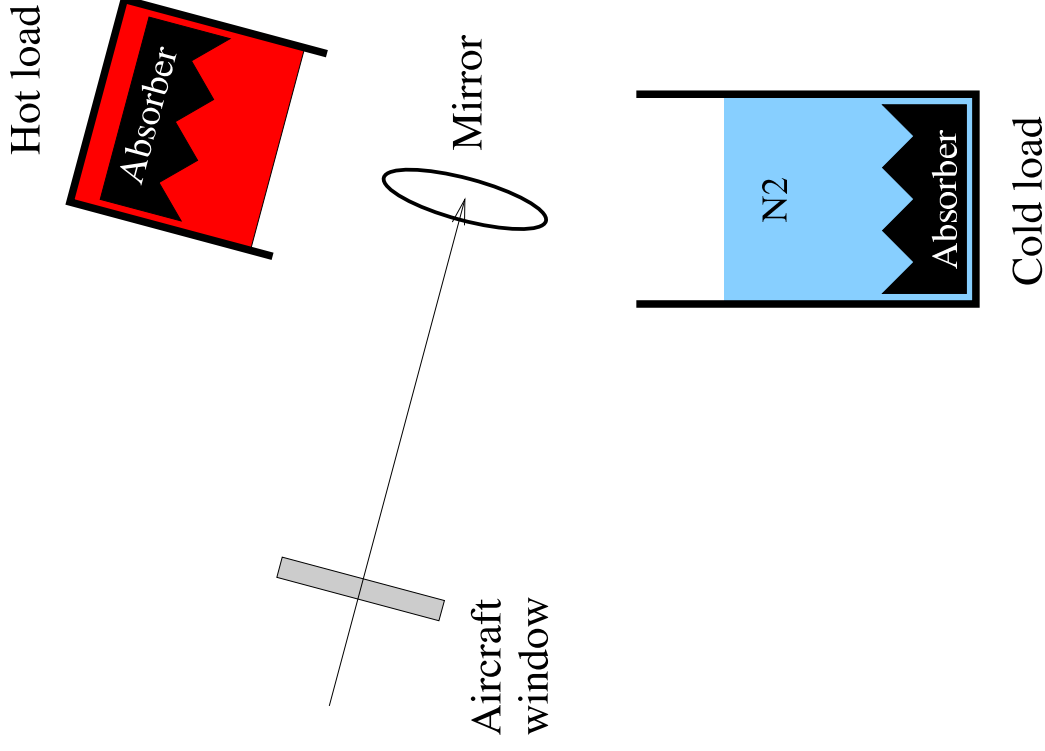


# AMSOS calibration setup

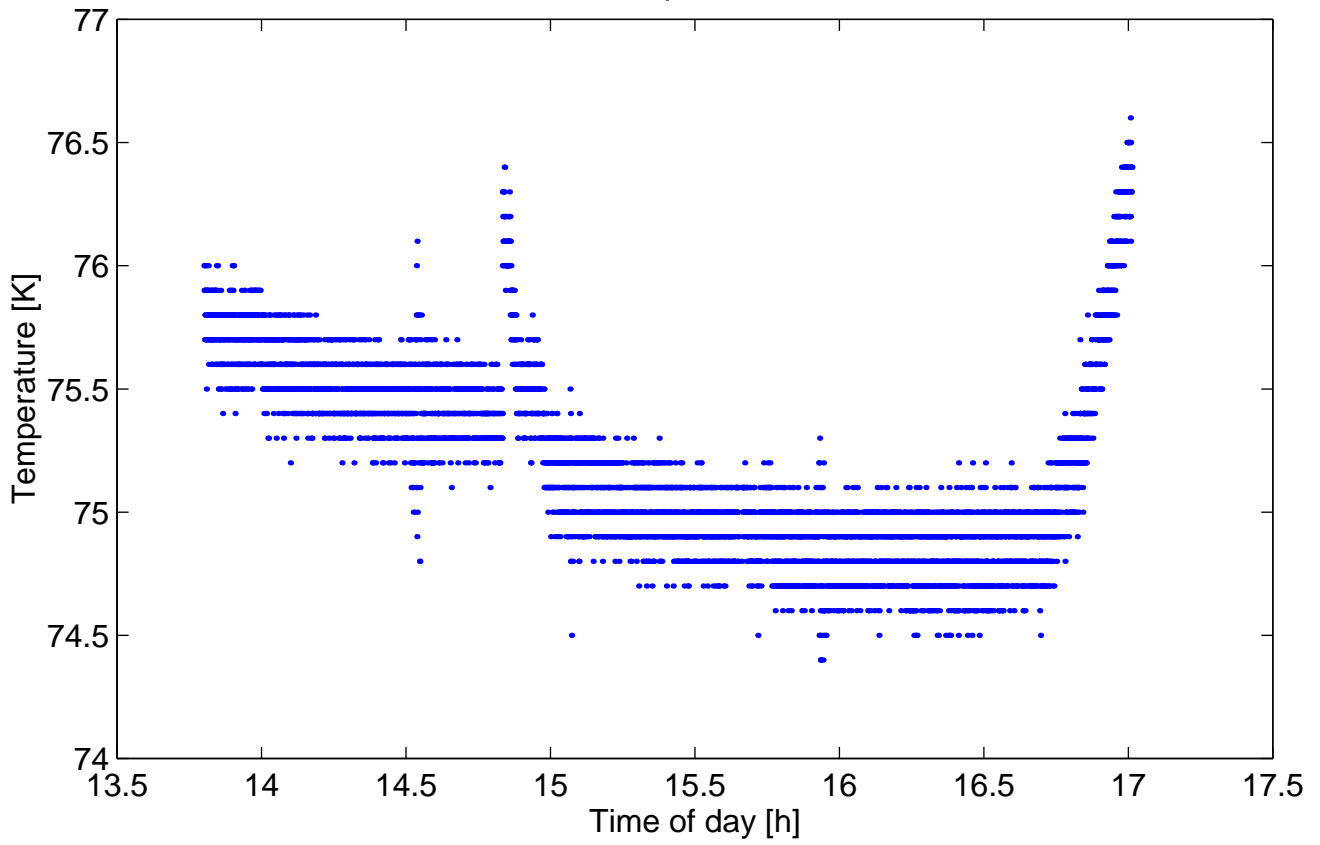
**Hot load:** heated absorber in thermally insulated box

**Cold load:** absorber in liquid nitrogen

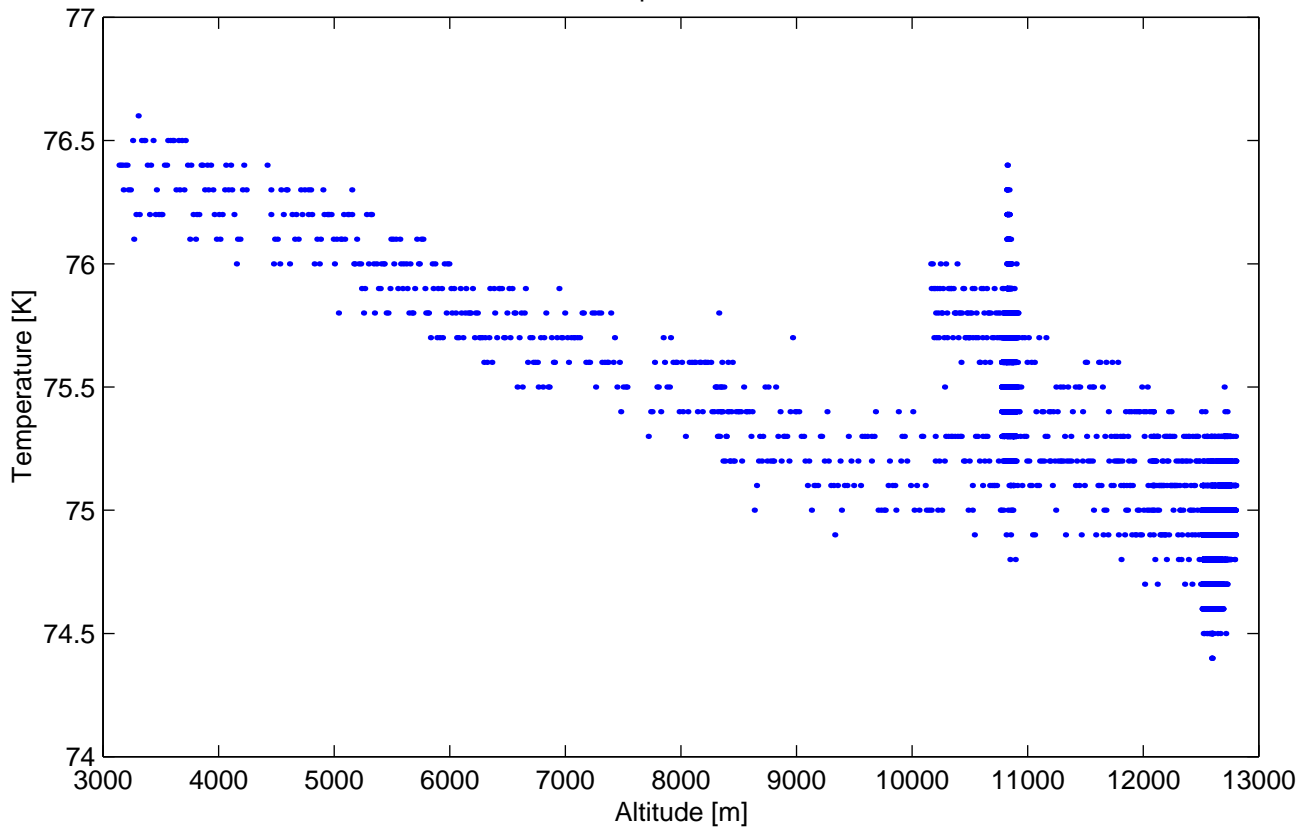
**Problem:** liquid nitrogen temperature changes with cabin pressure



Cold load temperature over time



Cold load temperature over altitude



## **AMSOS calibration issues**

- Fluctuating cabin temperature causes drifts of many parameters
- Absolute liquid nitrogen temperature difficult to measure
- Frequency stability and calibration
- Baseline approximately 2 K
- Longterm stability of whole instrument
- Use of intensity vs. brightness temperature
- Accuracy of spectral line data