

NO₂ over the tropics and the arctic measured by AMAX DOAS in September 2002

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Overview

- The AMAX DOAS Instrument and data analysis
- North flight September 4th 2002
- South flight September 17th 2002
- Clouds on September 25th 2002

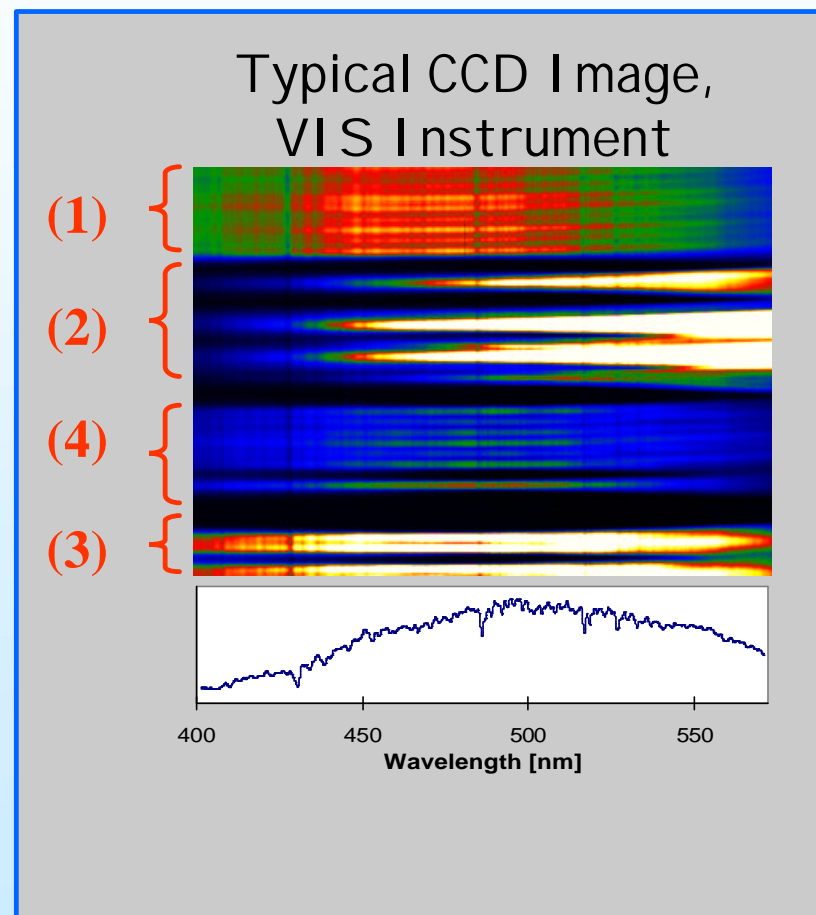
AMAX DOAS Instrumental Setup



(2) +2° elevation (1) Zenith

(3) -2° elevation (4) Nadir

- Different viewing angles
- Separation of tropospheric and stratospheric column
- UV and VIS instrument
- High temporal resolution



DATA analysis

Analysis programme

Win DOAS [IASB/BI RA version 2.1]

Raw Spectra

VIS spectrometer for all the shown flight

Fitting window

A: 420 – 444 nm (NO₂)

B: 437 – 458 nm (Check for NO₂)

C: 465 – 515 nm (H₂O and O₄)

Background spectra

same viewing direction, same flight

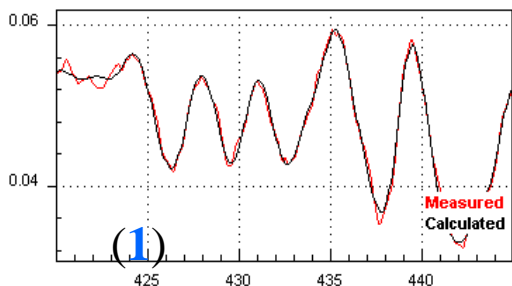
Reference spectra used

A: NO₂(223K), O₃(223K), O₄, Ring

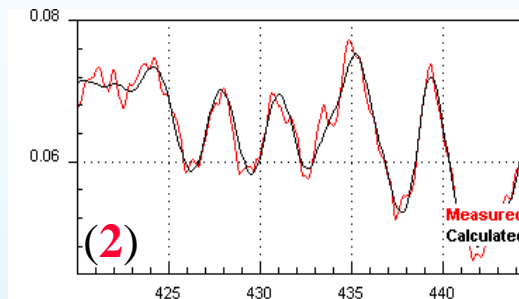
B: NO₂(223K), O₃(223K), O₄, H₂O, Ring

C: NO₂(223K), O₃(223K), O₄, H₂O, Ring

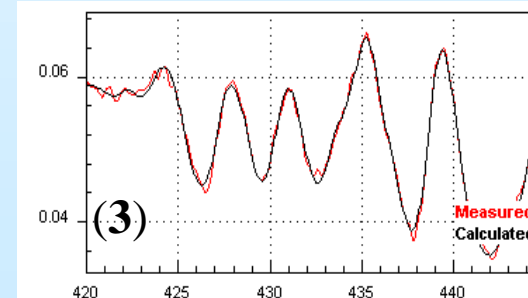
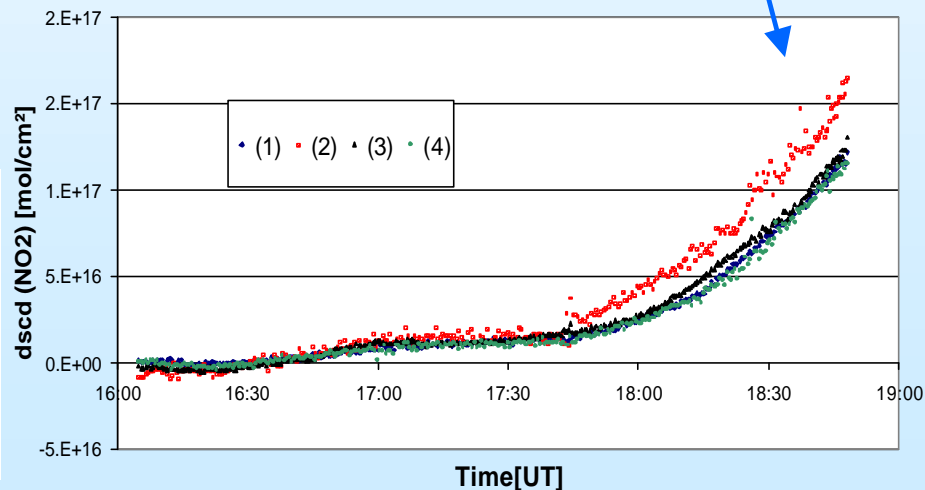
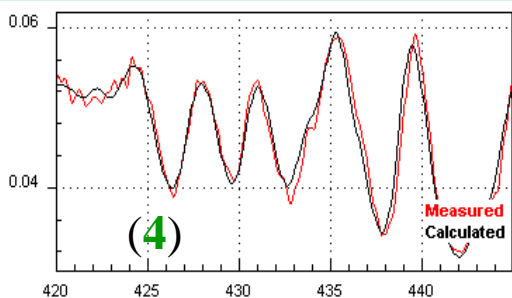
Differential slant column densities from the flight on 4th of September: Kiruna -Spitsbergen -Kiruna



• Clear NO₂ Signal in all 4 spectra



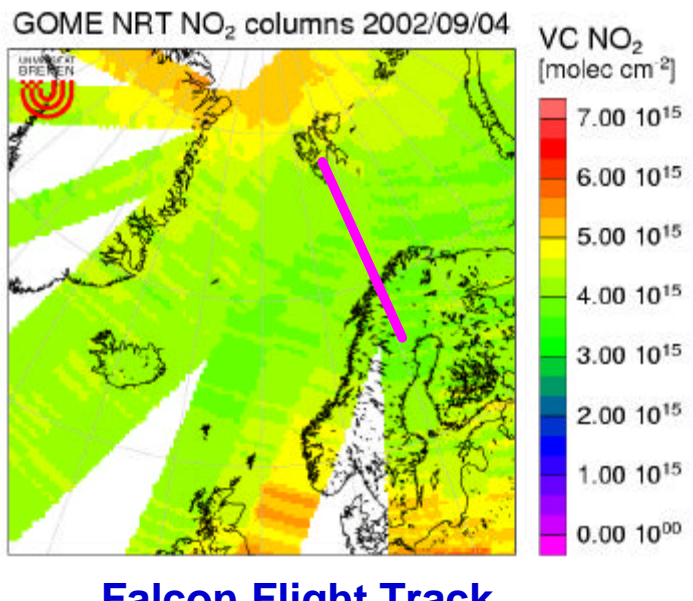
differential slant column densities



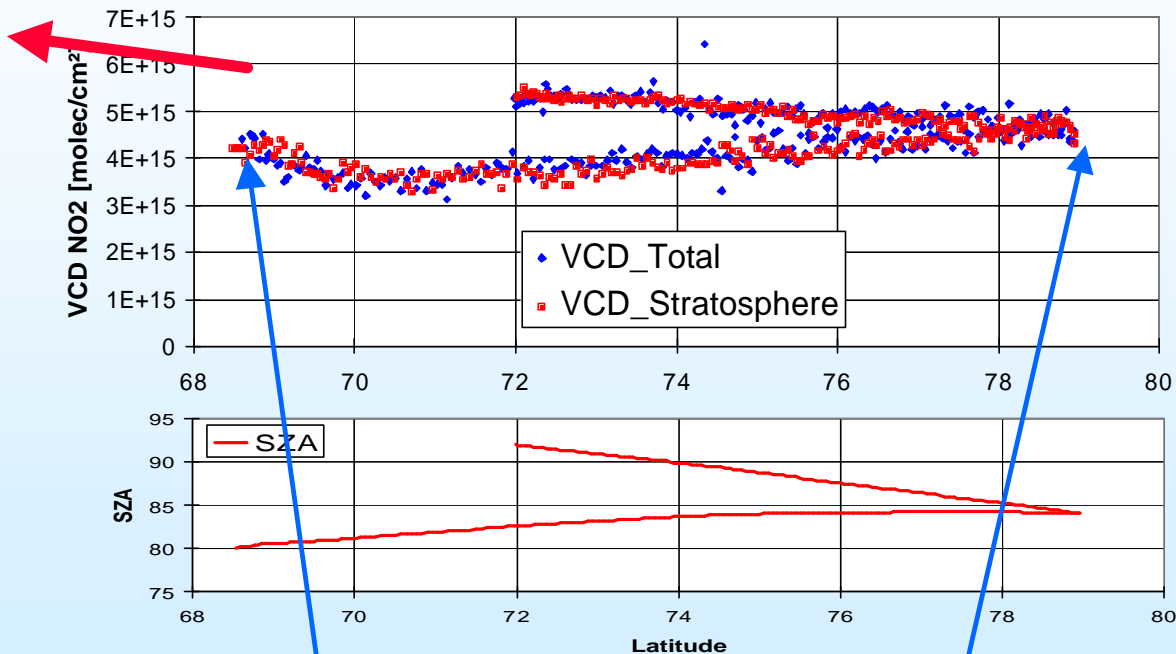
AMAXDOAS NO₂: GOME and Groundbased Comparisons

AMAXDOAS NO₂ VCD, 04.09.2002, Kiruna - Spitsbergen - Kiruna

No significant NO₂ in the troposphere



**Falcon Flight Track
04.09.2002**



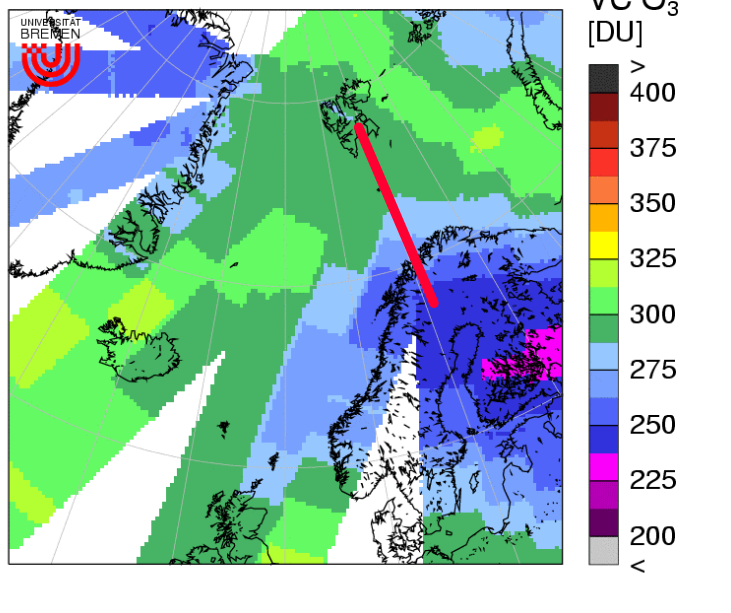
Kiruna, 67°N, (06.09.):
 Morning: 3.5e15 cm⁻²
 Afternoon: 5.0e15 cm⁻²

Ny-Ålesund, 79°N,
 Morning: 4.3e15 cm⁻²
 Afternoon: 4.8e15 cm⁻²

Ground Based: →

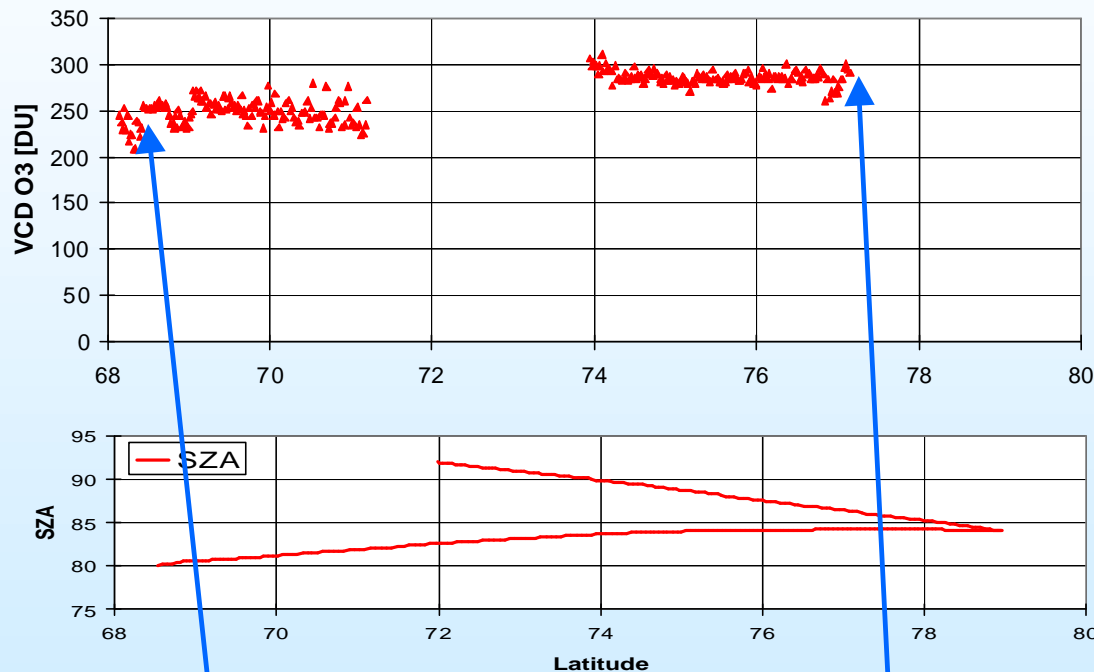
AMAXDOAS O₃: GOME and Groundbased Comparisons

GOME NRT O₃ columns 2002/09/04



**Falcon Flight Track
04.09.2002**

AMAXDOAS O₃ VCD, 04.09.2002, Kiruna - Spitsbergen - Kiruna

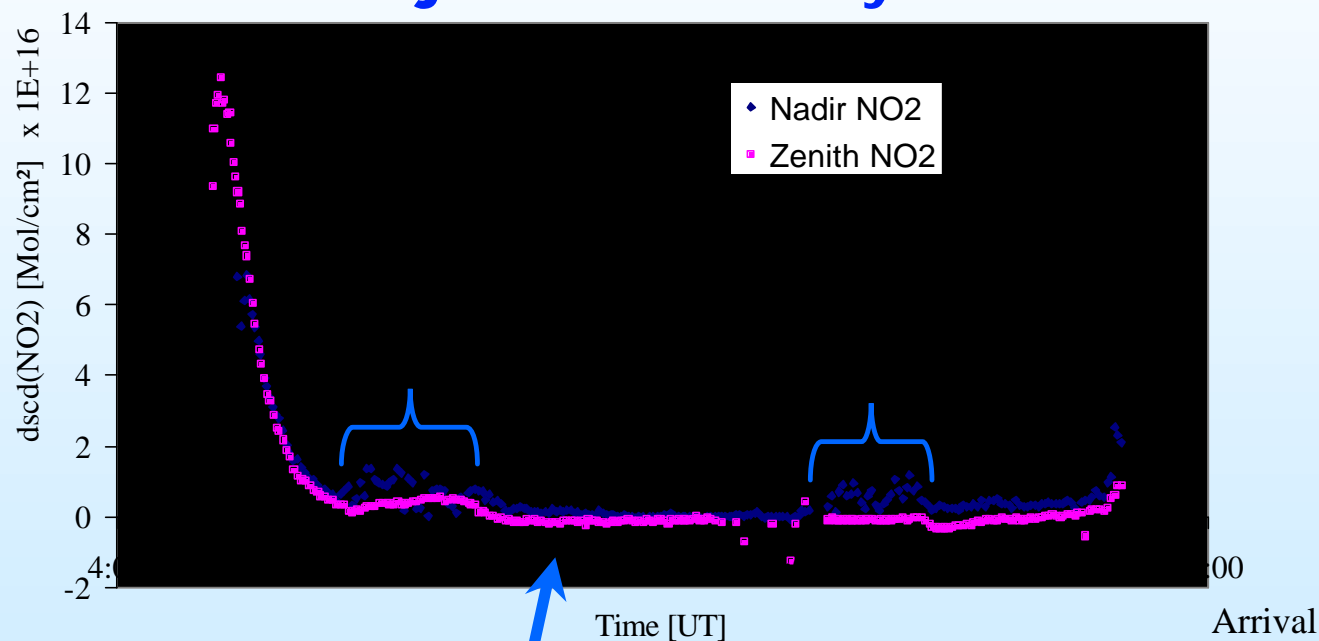


Kiruna, 67°N, (06.09.):
 Morning: 264 DU
 Afternoon: 271 DU

Ny-Ålesund, 79°N,
 Morning: 305 DU
 Afternoon: 305 DU

Ground Based: →

Differential slant column densities from flight on 17th of September: Mallorca - Djerba - Niamey - Yaoundé

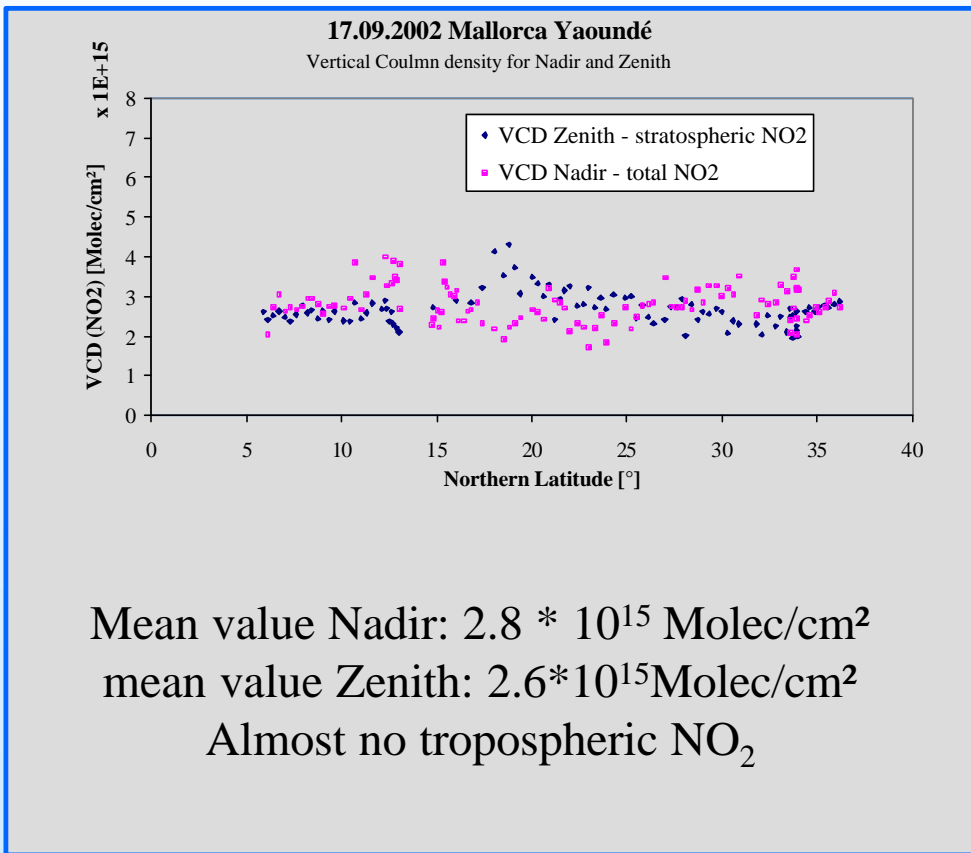
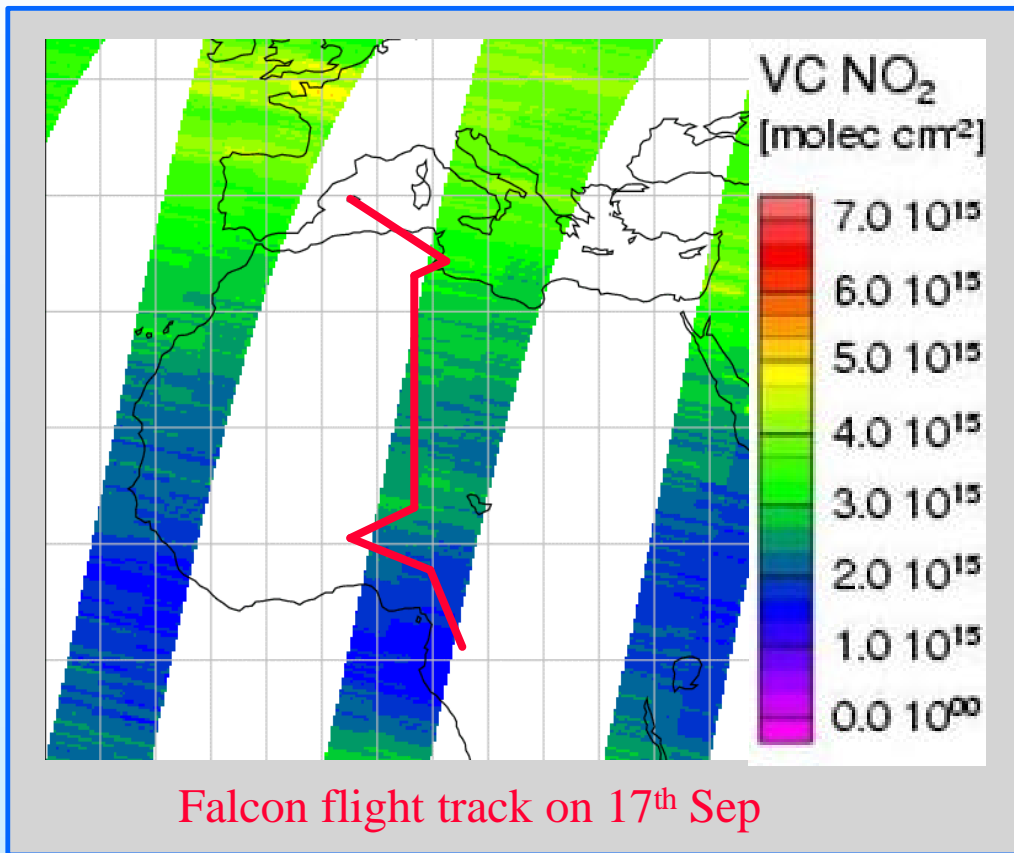


Take off in Mallorca: 5:29

Arrival in Yaoundé: 15:50

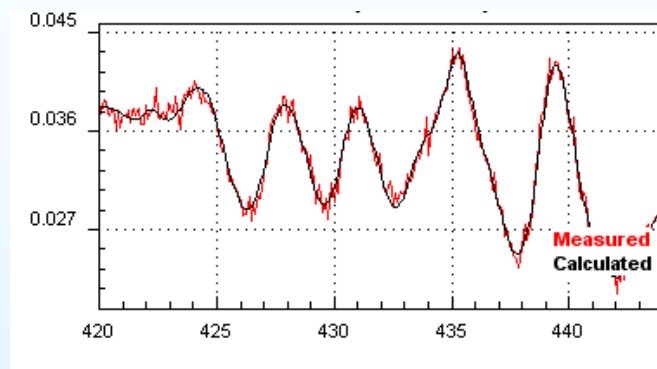
The slant column density for nadir is a little higher than for zenith – tropospheric NO₂?

Vertical NO₂ Columns 17th Sep. 2002 - GOME comparison

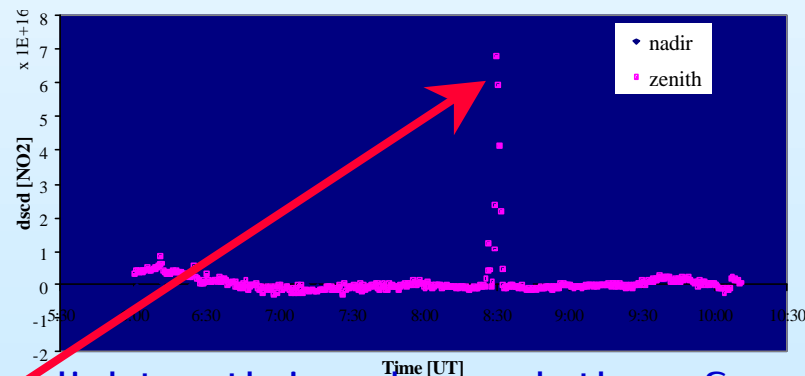
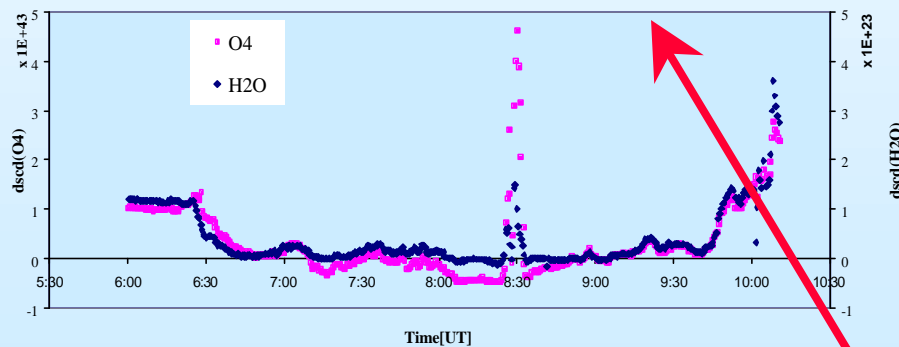


Slant column density for Sep. 25th: large cloud at 8:29 UT

Log file at 8:13: "between two thick layers of clouds"
at 8:26: "turbulent air" - "inside a cloud"



25.09.2002 Nairobi Yaoundé



Due to multiple scattering inside the clouds the light path is enhanced, therefore the absorption for all absorbers O₄, H₂O, NO₂ increased in all viewing directions.

Conclusions and outlook

- AMAX DOAS is well suited for SCI AMACHY validation
- The vertical NO₂ column densities are comparable to those found from GOME data
- There was no signature of tropospheric NO₂ in the data shown
- The data from the February-March campaign have not yet been analysed, due to the burning season in the Congo rainforest they might be interesting