

SCIAMACHY Validation Workshop

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AMAXDOAS measurements and results for the SCIAVALUES campaigns

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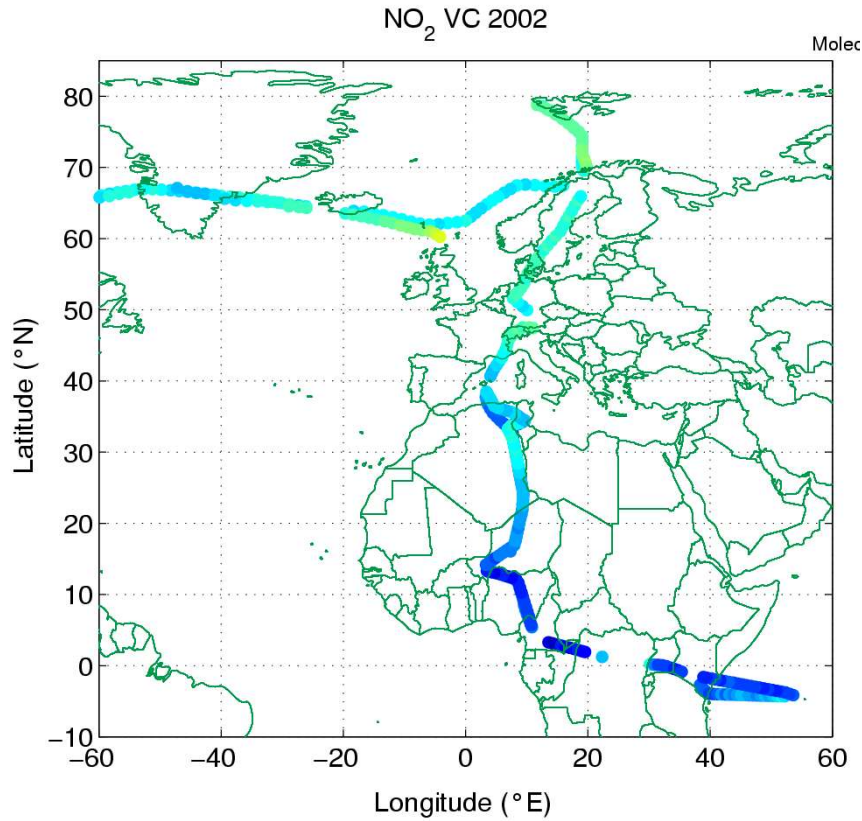
Overview

AMAXDOAS

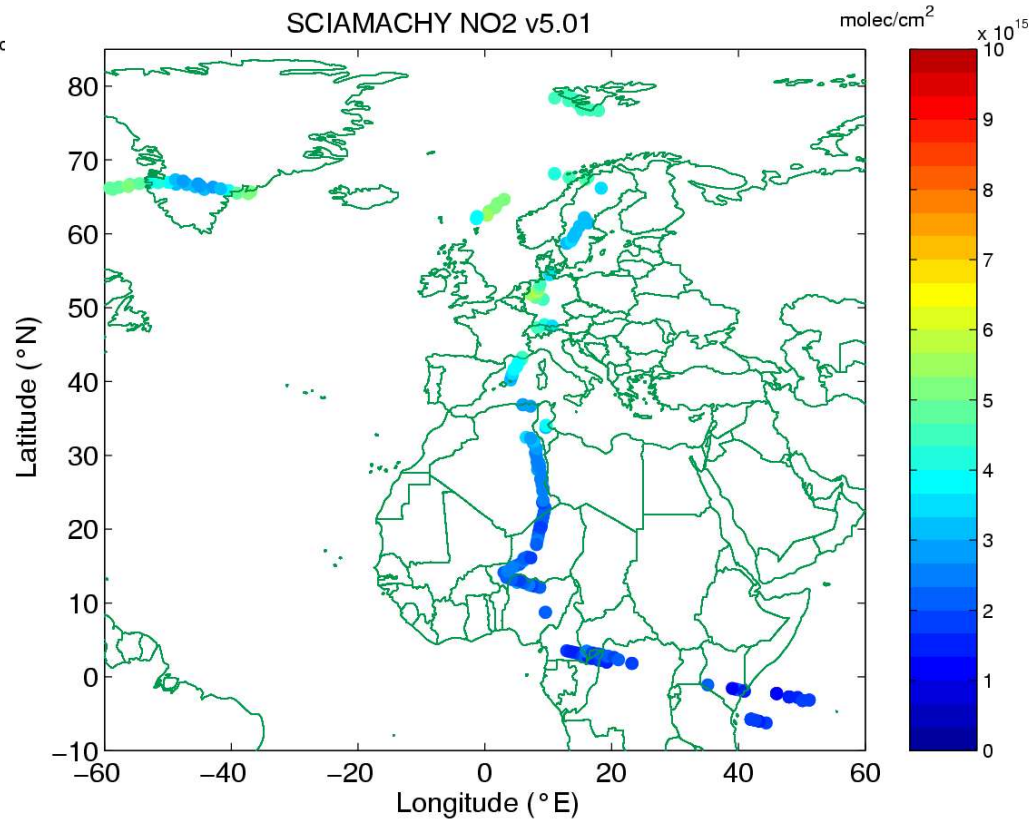
= Airborne Multi-AXis Differential Optical Absorption Spectroscopy

- AMAXDOAS results for SCIAMACHY validation
 - O₃ and NO₂ total vertical columns
- AMAXDOAS results for scientific utilisation
 - OCIO and BrO slant columns
 - tropospheric NO₂ over clouds
- Conclusions

AMAXDOAS vs. **SCIAMACHY** NO₂ Sep. 2002

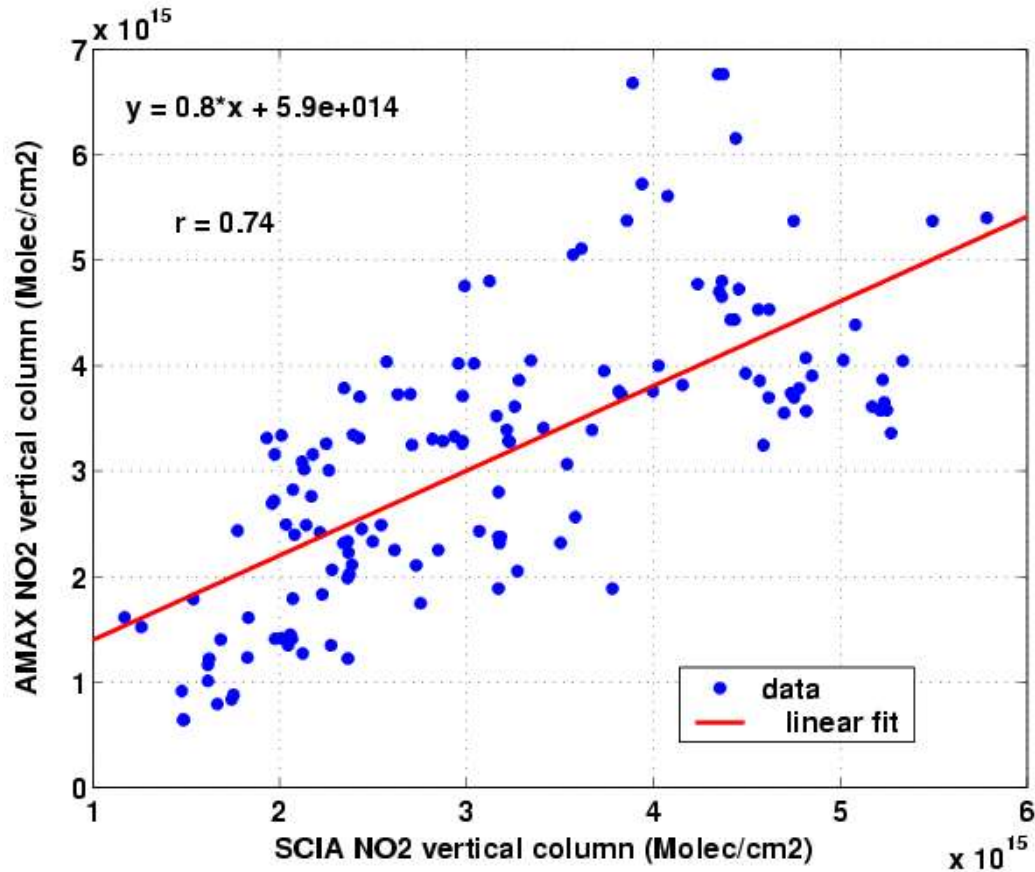


AMAXDOAS



SCIAMACHY operational v5.01
for the same days

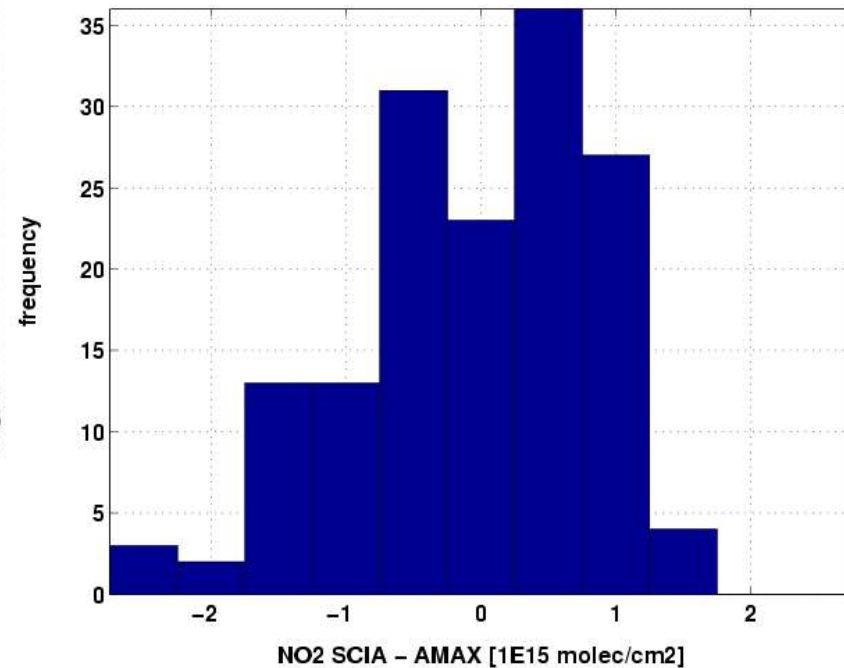
SCIAMACHY vs. AMAXDOAS NO₂ Sep. 2002



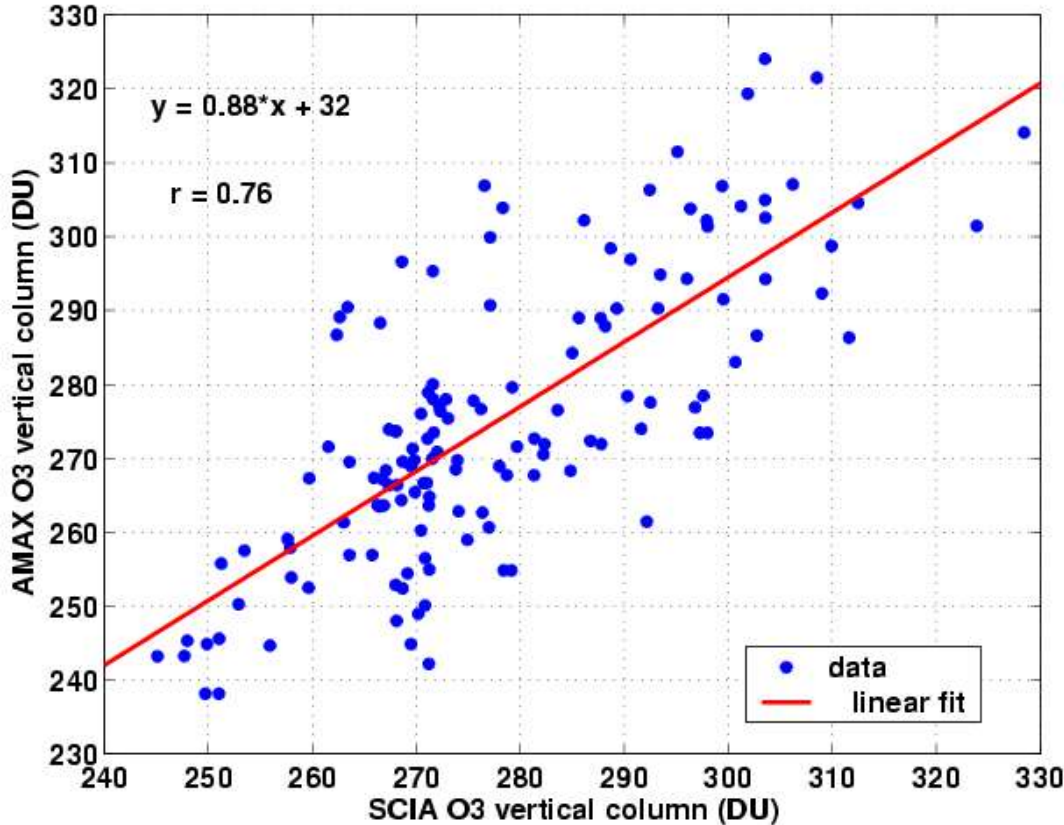
SCIAMACHY Iv2 V5.01

linear correlation

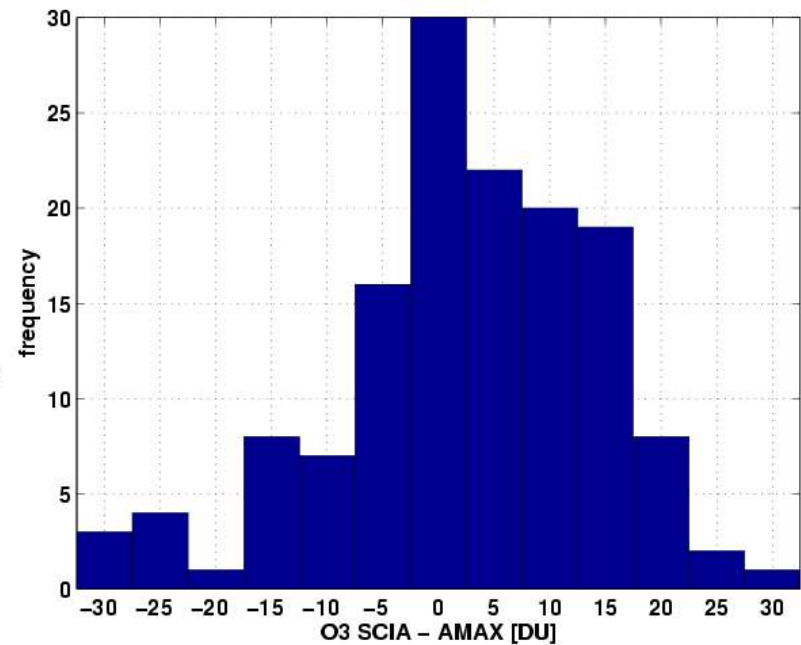
The differences are mainly within $\pm 1 \cdot 10^{15}$ molec/cm²



SCIAMACHY vs. AMAXDOAS O₃ Sep. 2002

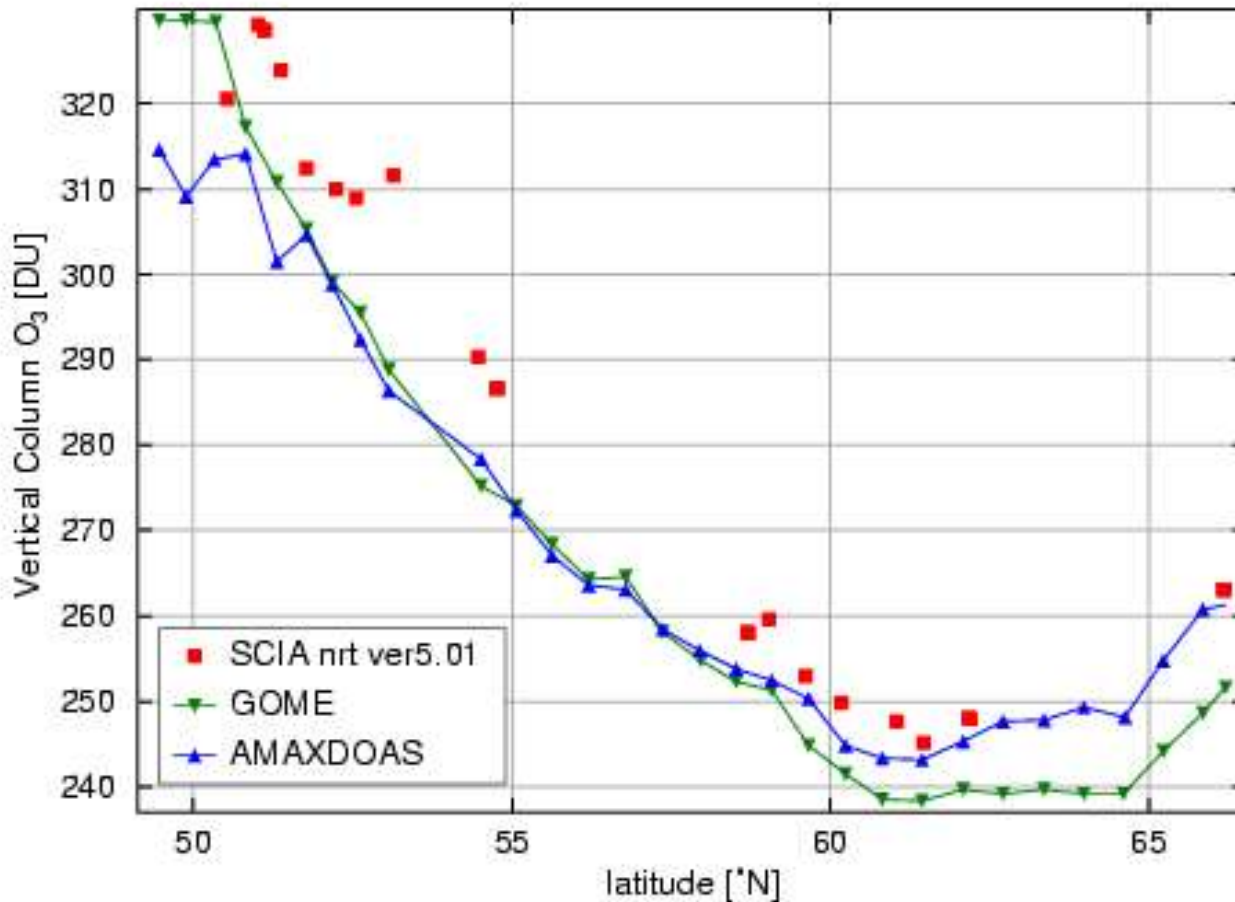


- linear correlation
- significant scatter
- SCIAMACHY O₃ larger than AMAXDOAS O₃



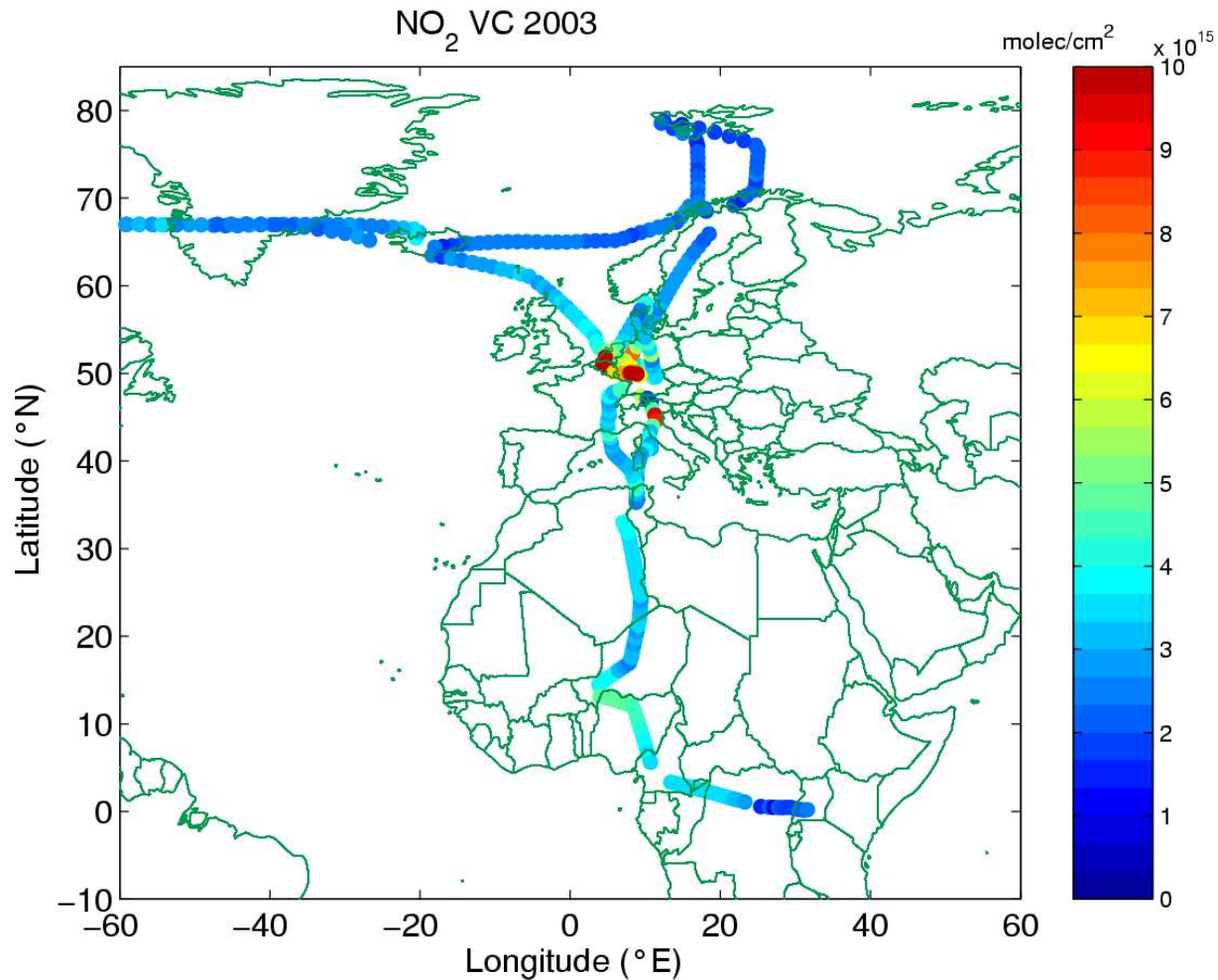
SCIAMACHY Iv2 V5.01

SCIAMACHY and GOME vs. AMAXDOAS O₃ 20020903

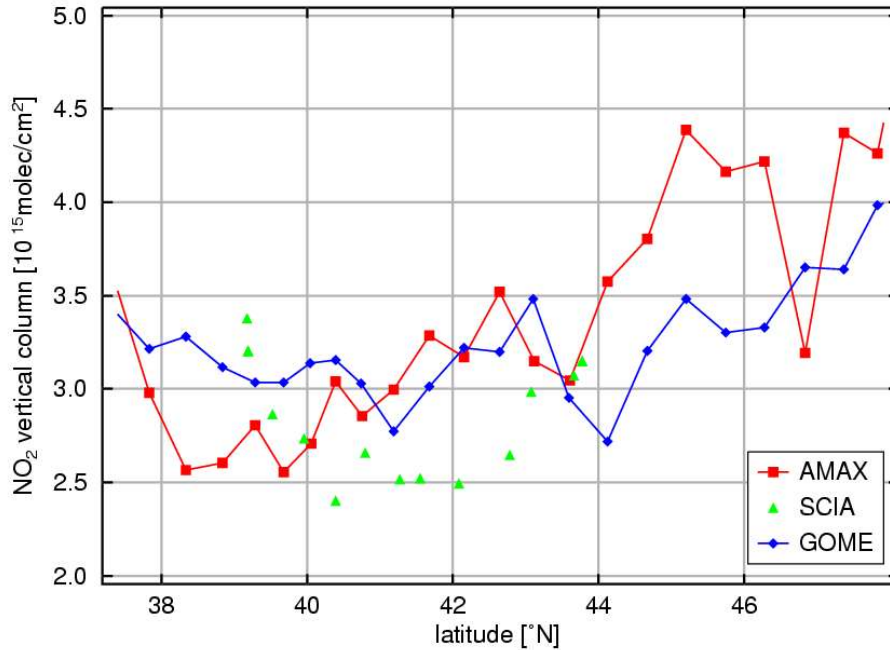


- Same tendency
- SCIA NRT V5.01 O₃ vertical columns are larger than AMAXDOAS and GOME O₃ vertical columns.

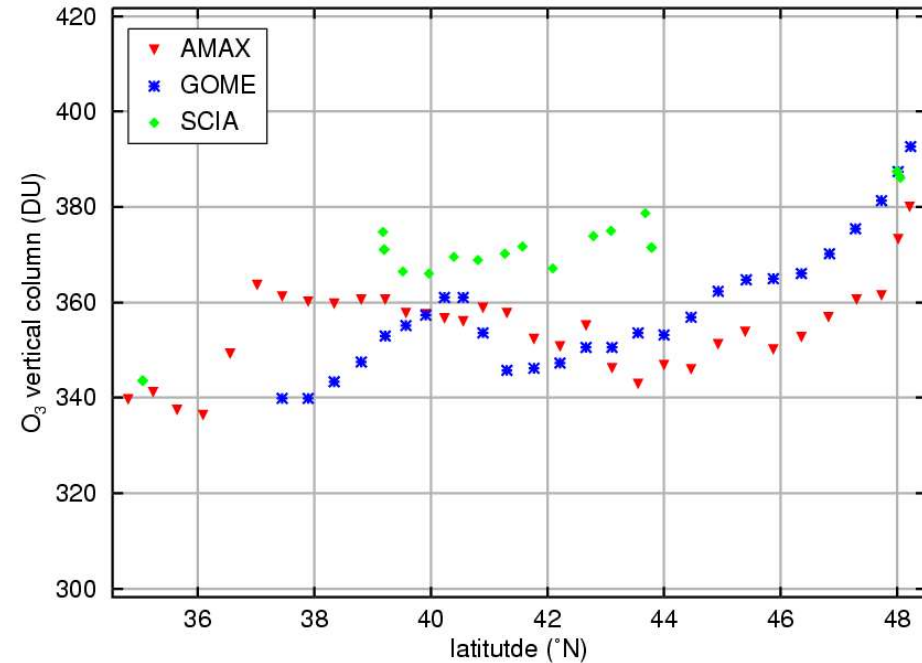
AMAXDOAS NO₂ Feb. March 2003



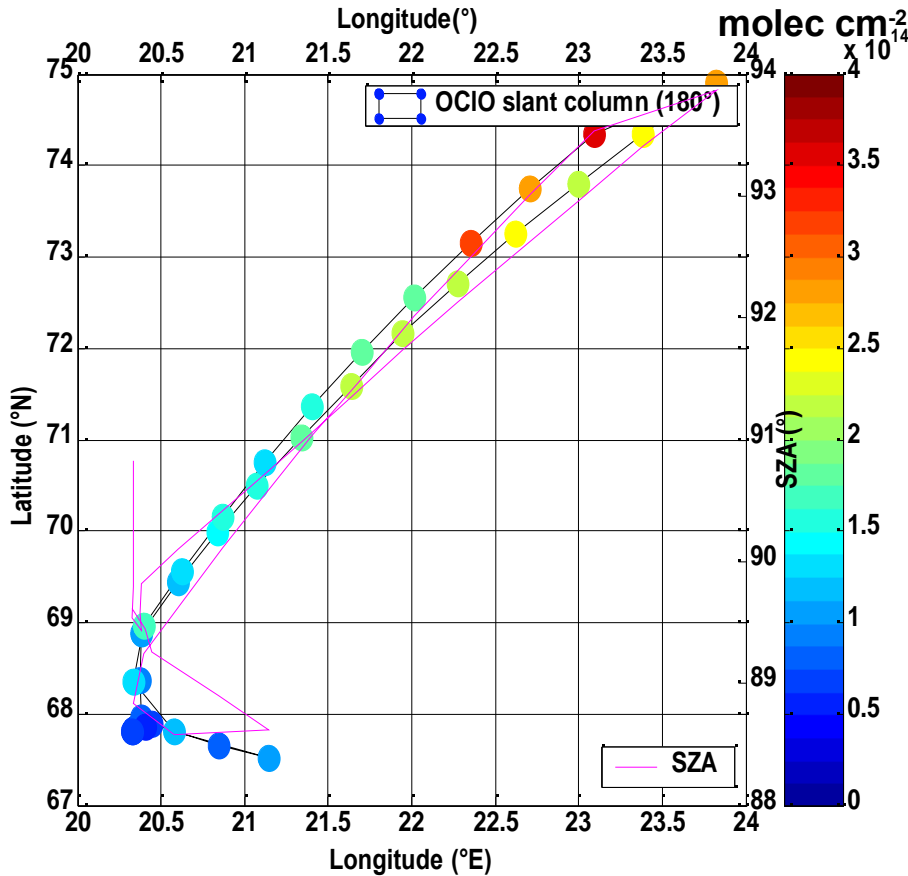
AMAXDOAS, GOME and SCIAMACHY O₃ and NO₂ 20030303



- The flight led from Tuzeur home to Oberpfaffenhofen
- SCIAMACHY O₃ and NO₂ lv2 version 5.04



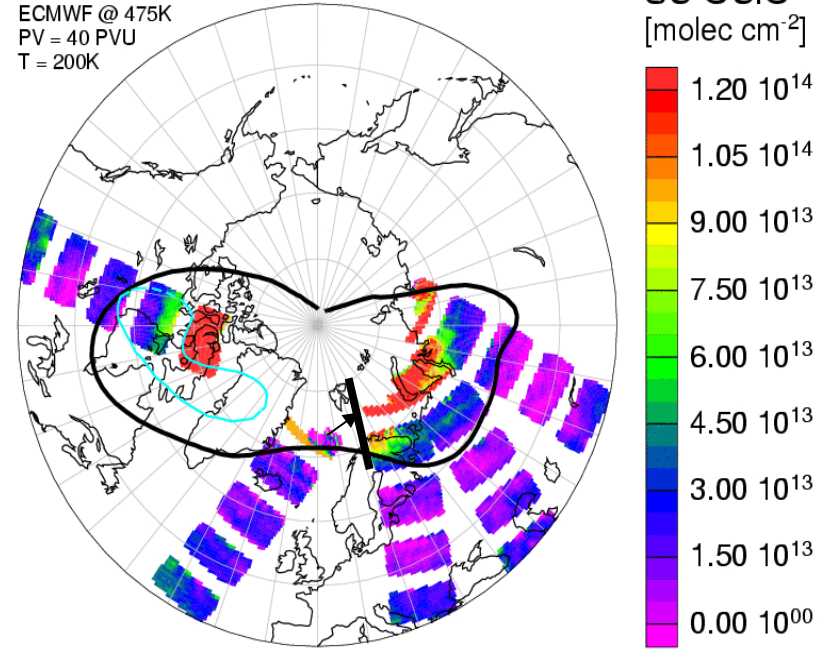
OCIO slant column AMAXDOAS -- SCIAMACHY



SZA: 90°, 70°N, 21.8°E,
OCIO SC: $1.2 \sim 1.4 \times 10^{14} \text{ molec cm}^{-2}$

SCIAMACHY OCIO, 2003/01/26

ECMWF @ 475K
 PV = 40 PVU
 T = 200K

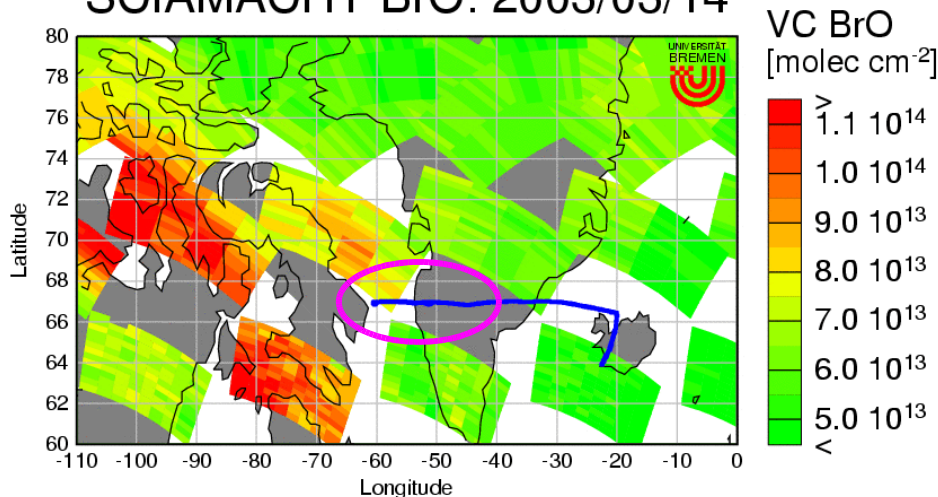


SZA: 90°, 71.5°N,
OCIO SC: $1.2 \times 10^{14} \text{ molec cm}^{-2}$

=> Interpret the OCIO slant columns with photochemistry model ?

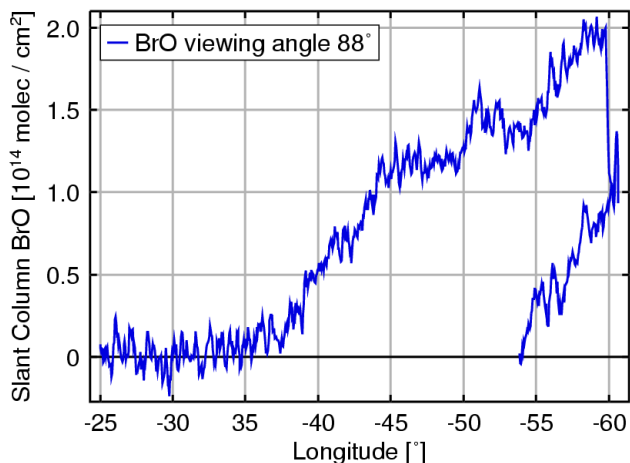
First AMAXDOAS Detection of BL BrO

SCIAMACHY BrO: 2003/03/14

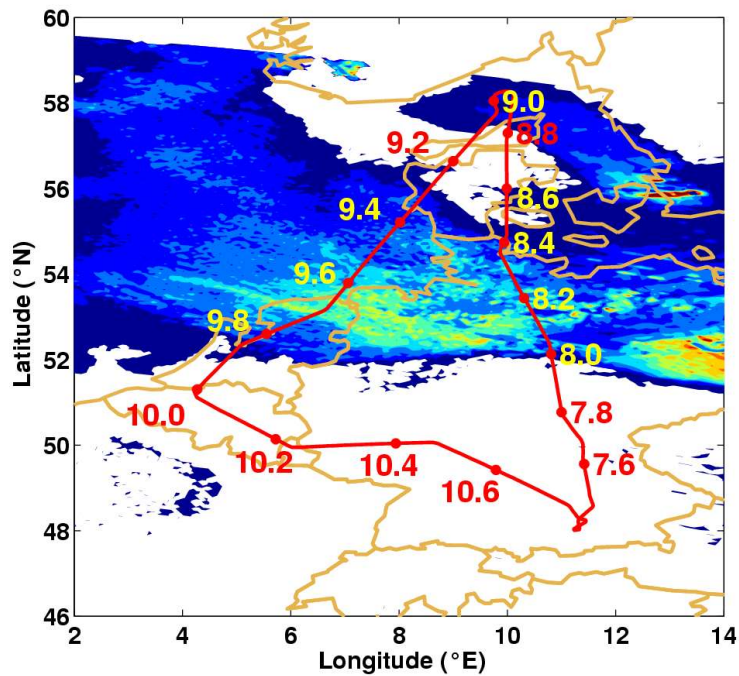


- Falcon flight track from Iceland over Greenland and back
 - during last part of measurements close to but not above regions with large BrO concentrations
 - large BrO signals in nadir off-axis direction
- => has BrO been lifted into the free troposphere?

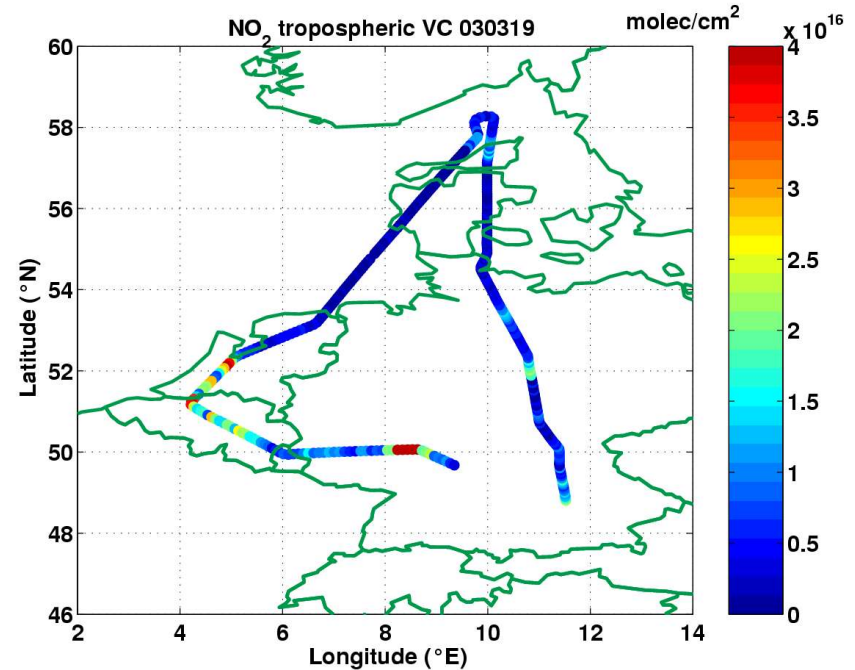
AMAX-DOAS BrO



AMAXDOAS detected NO_2 at the cloud edge



**MODIS cloud optical thickness
20030319 at 10:50UT**



**NO_2 tropospheric vertical column
measured by AMAXDOAS.**

=> relevant for tropospheric NO_2 retrieval from SCIAMACHY!

Wang, P. et al., Measurements of tropospheric NO_2 with an airborne multi-axis DOAS instrument, *Atmos. Chem. Phys. Discuss.*, **4**, 7541-7559, 2004

Conclusions

- AMAXDOAS performed continuous measurements during the SCIAVALUE campaigns.
- The AMAXDOAS NO₂ and O₃ vertical columns were compared with [GOME data](#) and good agreement was found.
- The AMAXDOAS total NO₂ and O₃ vertical columns were compared with the [SCIAMACHY NRT product versions 5.01 and 5.04](#), and similar variations but poorer quantitative agreement was found than with GOME data.
- The AMAXDOAS NO₂ total vertical column and tropospheric NO₂ vertical columns were compared with [SCIAMACHY IUP Bremen scientific products](#), and good agreement was found.
- The AMAXDOAS OCIO, BrO and tropospheric NO₂ over clouds are good case studies for scientific applications.

Acknowledgements

Thanks for your attention !

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