

# AMAXDOAS measurements and results in the SCIAVALUES campaigns: 1<sup>st</sup> part tropospheric NO<sub>2</sub>

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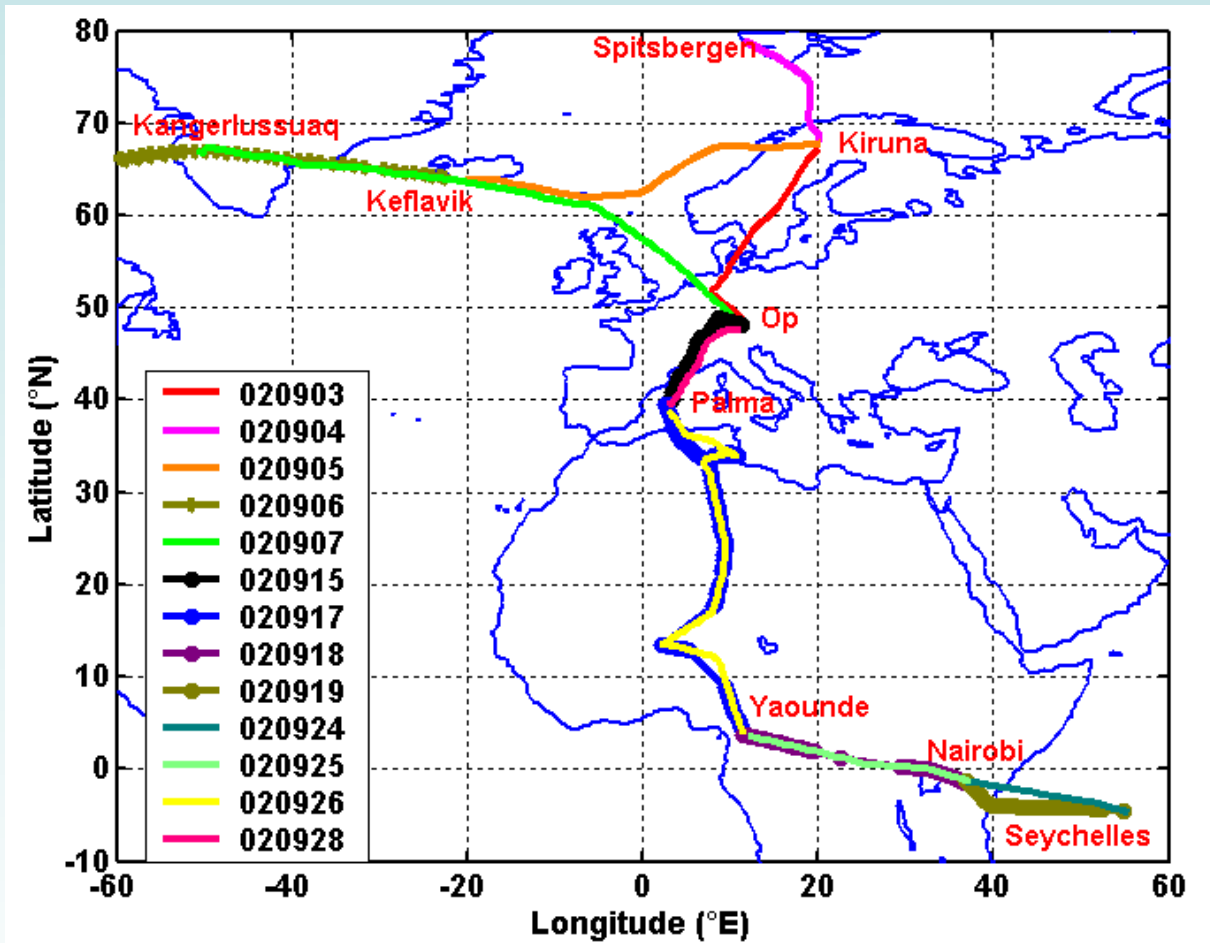


# Overview

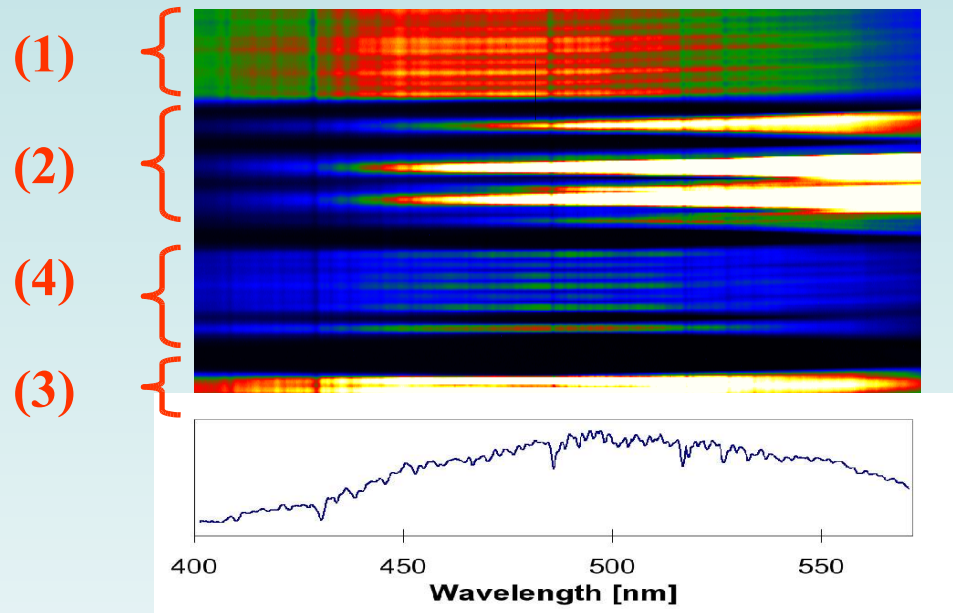
- The SCIAMACHY-Validation Campaigns
- The AMAXDOAS instrument
- 19th Feb. 2003
  - Flight track & cloud coverage
  - dSCD – Trop. VCD
  - Validation of tropospheric columns
- 10th Mar. 2003
  - Comparison of total vertical columns
  - Tropospheric vertical column
  - Cloud coverage



# The SCIAMACHY-Validation Campaigns



# the AMAXDOAS-Instrument



Typical CCD Image, VIS Instrument

Total wavelength range 310nm-550nm with two spectrometers:

- 310nm-440nm uv fwhm~0.8nm
- 390nm-550nm vis fwhm~1.2nm

# 19<sup>th</sup> Feb. 2003

## flight track – cloud coverage

Flight track:

Basel (Switzerland) to Tozeur  
(Tunisia)

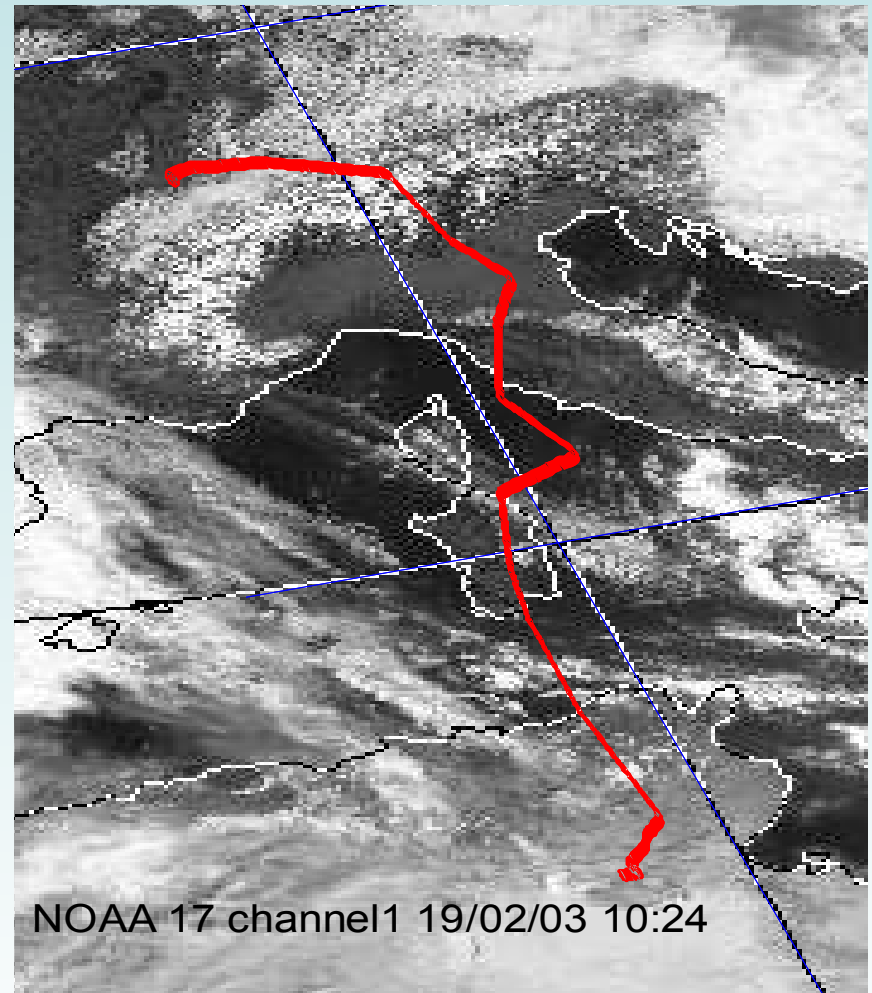
Cloud coverage:

Fog in the Rhine-valley and  
over lake Constance

dense clouds north-east of  
Sardegna

thin clouds south of Sardegna

NO clouds above Flight altitude –  
OLEX



# 19<sup>th</sup> Feb. 2003

## dSCD – trop. VCD

dSCD

polluted regions:  
north of Alps  
Po-Valley

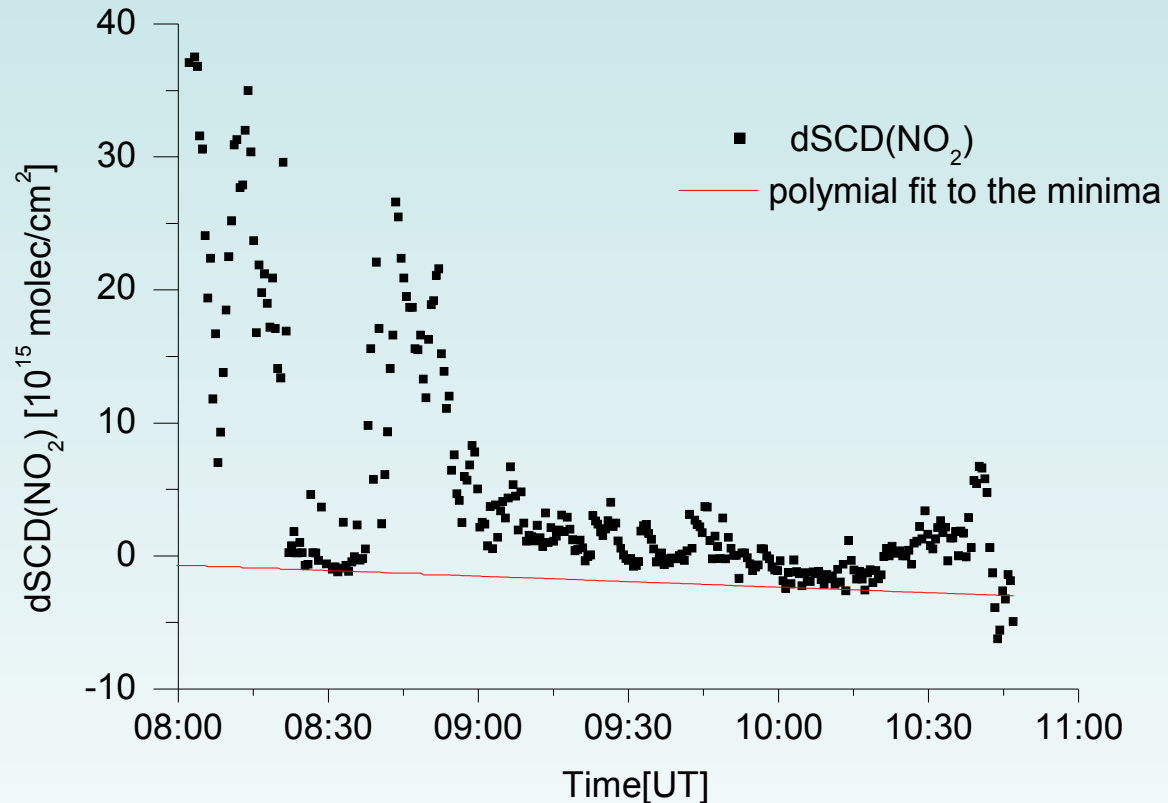
unpolluted regions:  
Alps – southern  
Mediterranean

Concept:

No tropospheric NO<sub>2</sub> in  
these regions –  
stratospheric  
background can be  
subtracted

Result:

Tropospheric Slant  
Column – TSCD



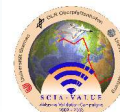
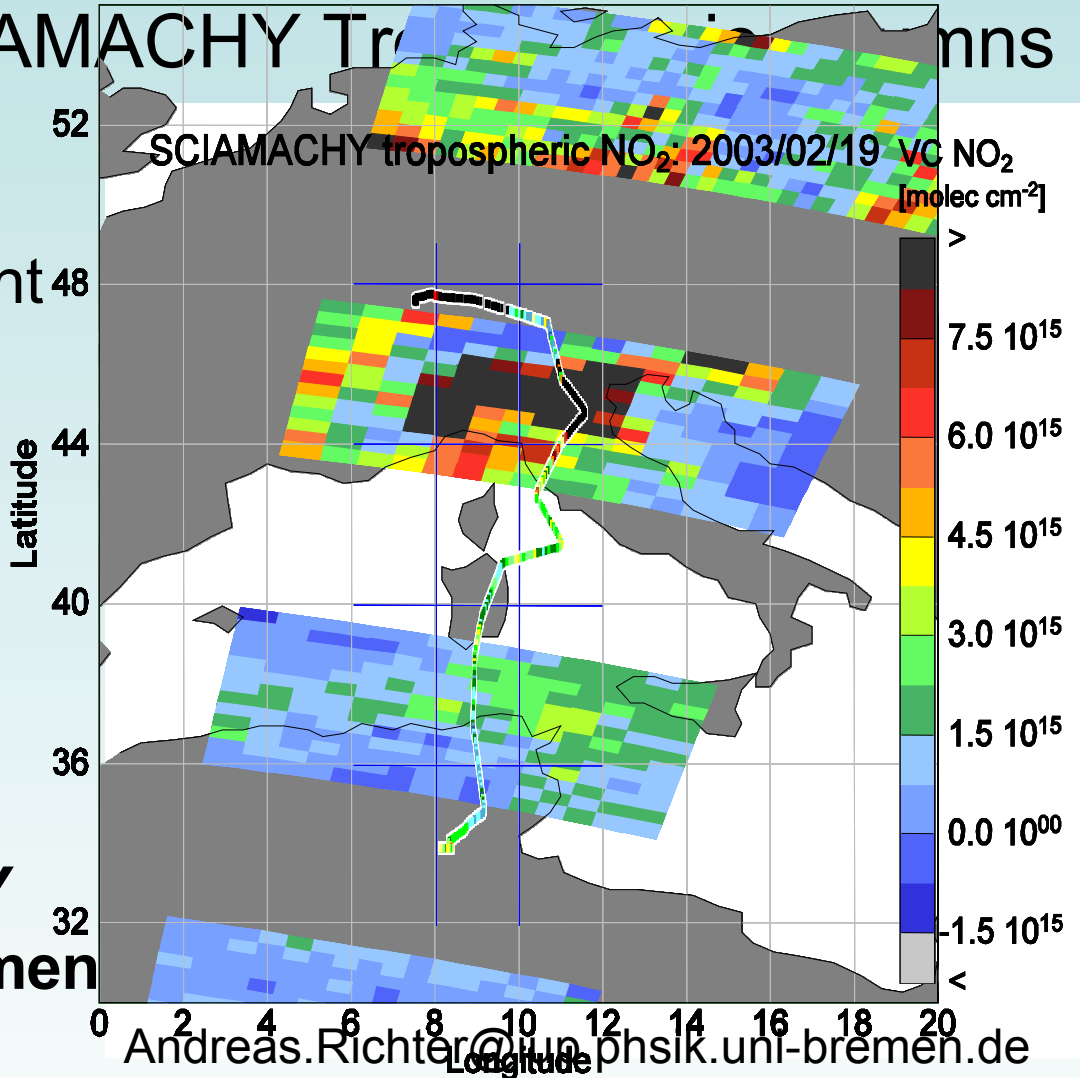
# 19<sup>th</sup> Feb. 2003

## Validation of SCIAMACHY Tropospheric NO<sub>2</sub> Columns

Trop VCD:

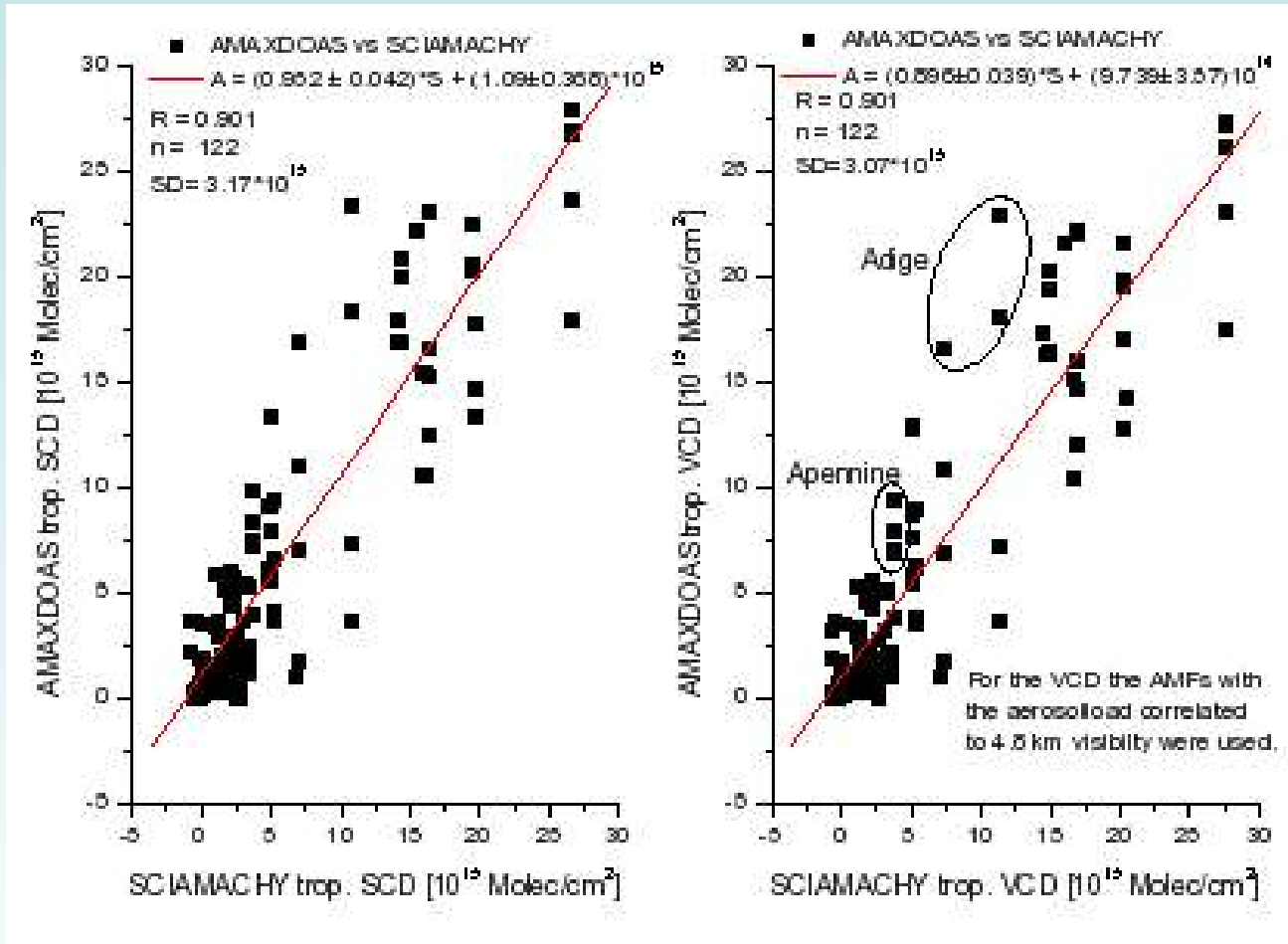
Very good agreement  
over the observed  
SCIAMACHY-pixel

**Scientific SCIAMACHY  
product from IUP Bremen**



19<sup>th</sup> Feb. 2003

# Validation of SCIAMACHY Tropospheric columns



The SCIAMACHY data were gridded to get a 1to1 function – correlation plot is possible.

Two outliers can be attributed to the different horizontal resolution:

Adige-highway.  
A valley in the Appennine





# 10<sup>th</sup> Mar. 2003

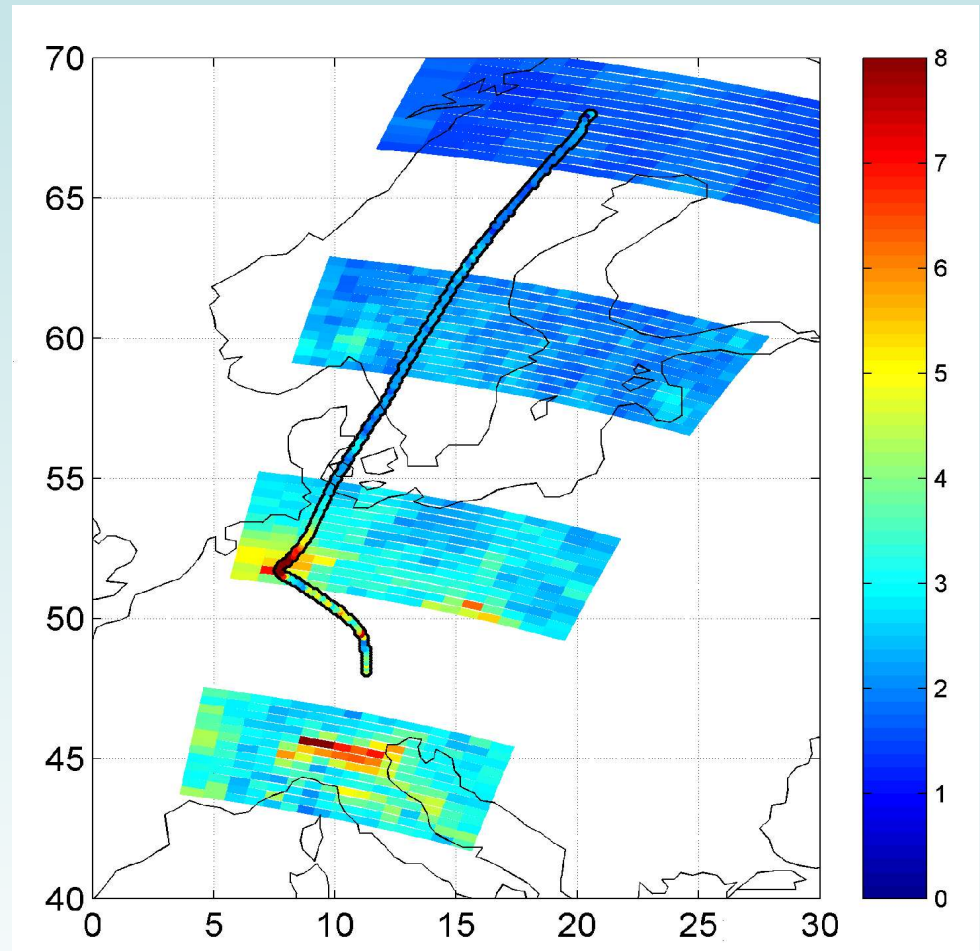
## Total vertical column

Total vertical Column:

Generally good agreement  
High NO<sub>2</sub> – columns over  
the Ruhrgebiet and only the  
stratospheric columns over  
northern Sweden.

But:

In Northern Germany  
(including the Ruhrgebiet)  
AMAXDOAS and  
SCIAMACHY differ by a  
factor of two.



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# 10<sup>th</sup> Mar. 2003

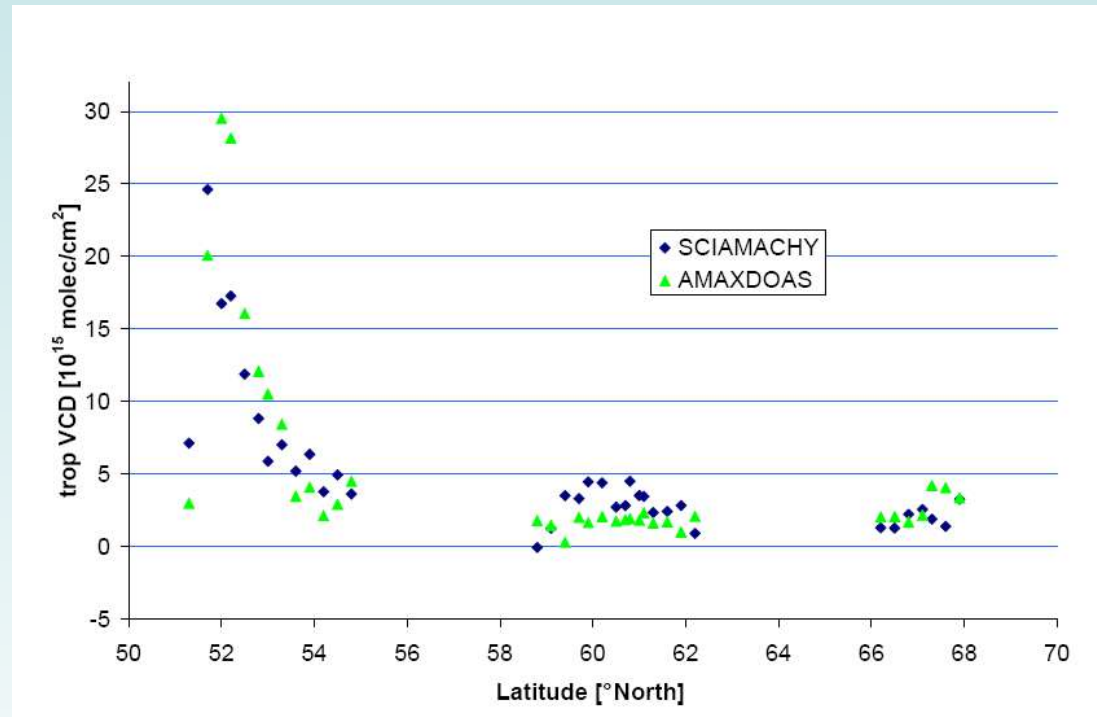
## Tropospheric Vertical Column

Tropospheric VCD using  
Cloud-less-AMF:

- Still good agreement in Scandinavia and most Northern Germany
- The same mismatch over the Ruhrgebiet

Correcting the AMFs due to  
Clouds:

- Better agreement over the Ruhrgebiet
- These AMF were calculated with a Cloud coverage of 10%



# 10<sup>th</sup> Mar. 2003

## cloud coverage

### Cloud coverage

dense clouds over  
Germany close to the  
Ruhrgebiet  
scattered clouds over  
Bremen and almost  
complete Sweden

### Cloud coverage

over the Ruhrgebiet



# Conclusion and Outlook

19/02/2003:

- Cloud free situation over the most polluted part of the flight
- Very good agreement between SCIAMACHY and AMAXDOAS
- Observed differences can be attributed to different resolution and temporal mismatch

10/03/2003

- Cloudy situation over Germany – most polluted part
- Underestimation of the local pollution by SCIAMACHY
- Temporal mismatch and resolution effects have to be checked
- Better AMF have to be simulated for both SCIAMACHY and AMAXDOAS

