SCIAMACHY Validation with the BREDOM Network

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Overview

• Bremian DOAS Network for Atmospheric Measurements

• Selected results ($O_3$, $NO_2$)
  – Arctic (Ny Ålesund, Summit),
  – Mid latitudes (Zugspitze),
  – Tropics (Merida, Nairobi)

• Summary
Bremian DOAS Network for Atmospheric Measurements (BREDOM)

In operation:
- Ny Ålesund (79°N, 12°E)
- Summit (72°N, 38°W)
- Bremen (53°N, 9°E)
- Merida (8°N, 71°W)
- Nairobi (1°S, 37°E)

Temporary in operation:
- Zugspitze (47°N, 10°E)
BREDOM (II)

Advantages:
• Similar setup and data analysis for all measurement sites
• High-sensitivity DOAS-instruments for stand-alone operation
• Zenith-sky and horizon (off-axis) viewing mode
• Two tropical stations

Target Quantities:
• O₃ and NO₂ as well as minor absorbers (e.g. BrO, OCIO, IO, HCHO)

Aims:
• Validation of satellites (e.g. SCIAMACHY onboard ENVISAT)
• Long-term measurements
NO$_2$ (Arctic)

- Seasonal trend is good represented
- Good agreement of absolute values between SCIAMACHY and ground based data

sciencet scientific operational
NO₂ (mid latitudes)

- Offset to SCIAMACHY slant column is added
- SCIAMACHY NO₂ column within 500 km radius of station!
- Good agreement with scientific product if minimum VC is used

Smallest SCIAMACHY NO₂ column within 500 km radius of station!
NO$_2$ (Tropics)

- No significant seasonal trend
- Good agreement between SCIAMACHY and ground based data
- Offset to SCIAMACHY slant column is added

Scientific

Operational

- SCIAMACHY
- DOAS am
- DOAS pm
SCIAMACHY
DOAS mean

- O₃ (operational) -

- Seasonal trend is good represented
- SCIAMACHY O₃ column within 500 km radius of station!
- Good agreement of absolute values
Nairobi

Stratospheric BrO

Tropospheric NO$_2$

BrO DSCD 90-80°, Nairobi 2003

Tropospheric NO$_2$ above Nairobi, 21.02.2004

SCIAMACHY NO$_2$ columns: 2004/02/21

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Summary

• 5 Ground-based UV/visible instruments from the BREDOM network have been operated to collect data for SCIAMACHY validation

• Validation of scientific NO$_2$ product shows excellent agreement at all stations (an offset of 2E15 molec/cm$^2$ is added)

• Validation of operational NO$_2$ and O$_3$ products shows scatter but nice agreement at all stations

• Seasonal and latitudinal variation is well represented

• MAX DOAS can be used to provide information about tropospherical NO$_2$
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