Comparison of profiles retrieved from SCIAMACHY-measurements and from ground based microwave radiometry

Mathias Palm, Christian v. Savigny, Manuel Quack, Gerd Hochschild†, Pedro Hoffmann‡, Justus Notholt

Institute of Environmental Physics, University of Bremen
† Forschungszentrum Karlsruhe
‡ Universidad de los Andes, Mérida
Overview

- Where we are and what we do.
- Results of a statistical comparison of ozone profiles.
- First results of water vapour profiles.
State of the RAM instruments

- OZORAM (Ozone) and WARAM (Water vapour) on Svålbard and BreRAM in Bremen are fully operational.

- WARAM 2 (Water vapour) in Mérida, Venezuela is set up since March 2004 and becomes fully operational in January 2005. It has been delayed for about 2 years due to political unrest in Venezuela.

- First water vapour profiles from Ny-Ålesund and Mérida could be retrieved and were compared with MIPAS and HALOE.
## The Instruments

<table>
<thead>
<tr>
<th></th>
<th>SCIAMACHY</th>
<th>BreRAM</th>
<th>WARAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pixel size</strong></td>
<td>1000x400 km</td>
<td>20 x 20 km</td>
<td>20x20 km</td>
</tr>
<tr>
<td><strong>Geometry</strong></td>
<td>Limb</td>
<td>Upward zenit</td>
<td>Upward zenit</td>
</tr>
<tr>
<td></td>
<td>15-40 km</td>
<td>15 - 70 km</td>
<td>25 - 55 km</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>5 km</td>
<td>&gt; 15 km</td>
<td>12-16 km</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>15-40 km</td>
<td>15 - 70 km</td>
<td>25 - 55 km</td>
</tr>
</tbody>
</table>
Data set of the various RAM’s

- 2001/02
- 2002/03
- 2003/04

- RAM Ozone profiles
- BreRAM Ozone Profiles
- WARAM measurements
- RAM Ozone measurements
- BreRAM Ozone measurements
- WARAM2 measurements
Requirements for the comparison

Measurements of RAM and SCIAMACHY are regarded coincident, if

- the SCIAMACHY window plus 500 km covers the respective radiometer location,
- the mean of the column within SCIAMACHY measurements does not differ more than 5 % from the column above the RAM location,
- the variation of the column within the SCIAMACHY windows is less than 10 %.

Number of measurements above Bremen about 120 per Year.
**Method of the comparison**

<table>
<thead>
<tr>
<th></th>
<th>found until Dec 2003</th>
<th>compared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bremen (53 N, 8 E)</td>
<td>60</td>
<td>34</td>
</tr>
<tr>
<td>Ny Alesund (79N, 11 E)</td>
<td>80</td>
<td>36</td>
</tr>
</tbody>
</table>

Method:
- Comparison of RAM-profiles with simulated retrieval using SCIAMACHY profiles (Rodgers and Connor 2003).

Advantage: Uncertainty induced by this comparison is of the order of the noise of the profiles. Direct comparison induces a much higher uncertainty.

Features compared:
- Altitude of the maximum $O_3$ vmr.
- Difference of the $O_3$ profiles.
Examples

- General shape of profile is similar.
- Comparison very sensitive to the a priori profile.
Altitudes of the maximum vmrs are the same in 25% of the cases. Differences are minimal and not more than one altitude level where the gradient of the $O_3$ vmr is small.

Profiles match within the errorbars. BreRAM tends to find higher vmr-values than SCIAMACHY.
Altitudes of the maximum vmrs are the same in all but two cases. Differences are again only one altitude level where the gradient of the $O_3$ vmr is small.

Difference of profiles match with the errorbars below 35 km. Above 35 km RAM tends to find lower values than SCIAMACHY.
Water vapour profiles from Ny-Ålesund (December 2003), Mérida (31.03.2004 - 5.04.2004) and Zugspitz (March 2003).

First comparisons with MIPAS and HALOE show reasonable agreement.

Altitude of the maximum vmr is retrieved.
**Acknowledgements**

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- Tine Weinzierl and Gunter Näveke for technical support.
- The staff of the Koldewey station, Ny-Ålesund, for operating the radimeters and handling the data.
- Prof. Dr. Pedro Hoffmann for support around the WARAM 2.
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