INTRODUCTION

Ground based data on atmospheric trace gases from NDSC instruments operated by NIWA at Lauder, New Zealand (45°S, 170°E) and a number of other sites around the world have been submitted to the NADIR CAL/VAL correlative database at NILU as part of the project AO ID 179. These include Dobson total ozone column data, ozonesonde data, FTIR total and partial columns, uv/visible total columns and microwave ozone profiles. These efforts have been recently refocused under the TASTE (Technical ASsistance To Envisat validation) programme, coordinated by J.C. Lambert of BIRA. The data have been used in the validation exercises for GOMOS, MIPAS and SCIAMACHY data, contributing to the general presentations at this meeting. Work on MIPAS validation with ground based FTIR data has been done in conjunction with AO ID 126 and M De Maziere. A number of preliminary comparisons have been made. Examples of which are shown here. More detailed comparisons using NIWA data appear in several of the presentations at this meetings and this document is intended as an overview of NIWA data and involvement, rather than a full paper.

Figure 1

Figure 1 shows a comparison between vertical NO\textsubscript{2} columns from ground-based uv/visible spectrometers plotted against NO\textsubscript{2} columns from SCIAMACHY for Lauder, New Zealand (45°S). The ground-based columns have been calculated from a slant column density using an assumed airmass factor. The local time of day for the SCIAMACHY measurements is in the morning, and so the measurements are closer to the sunrise ground based measurements.

Figure 2

Figure 2 shows a similar plot for Kiruna in Sweden (67°N). The agreement does not look quite as good, but perhaps this simply represents the greater variability within the region we have defined for coincident data for
these plots (±5° lat, ±10° long) or that within that spatial region there is a much greater variation in observation time.

Figure 3

Figure 3 shows some results for O$_3$ partial columns at Lauder. Ground-based data from the Dobson spectrophotometer has been modified by subtracting the expected value for tropospheric ozone and plotted against O$_3$ partial columns from MIPAS. In addition, partial columns from ground-based FTIR measurements have also been plotted.

Figure 4

Figure 4 shows a similar plot of partial column of HNO$_3$ from Arrival Heights (78°S). Ground-based data from FTIR measurements can separate a stratospheric partial column for comparison with MIPAS columns. Seasonal variations are well reproduced. Data for other molecules, such as CH$_4$, N$_2$O, are also available.

More detailed comparisons would look at the effect of different co-incidence criteria, in space and time, and the source of any biases, eg from a priori information used or from differing separation of the partial columns, in the retrievals of each dataset. A more detailed look at the issues can be obtained from comparisons of vertical profiles where they are available. However, measurements can differ in vertical resolution and information content, and some caution is required if this difference is large.

Figure 5

Figure 5 shows some profile comparisons comparing individual MIPAS profiles of HNO$_3$ and O$_3$ with coincident profiles from ground-based FTIR measurements at Lauder, showing reasonable agreement. Where the FTIR profiles are close to the a priori profile used, there is little real information in the FTIR measurements. These comparisons are simple or raw comparisons only and do not take into account the differing characteristics of the two measurement systems. To properly account for these, the contribution of a priori information and the smoothing effect of the measurement and retrieval must be taken into account.

Figure 6

Figure 7

Figures 6 and 7 compare the average of MIPAS profiles of O$_3$ and HNO$_3$ over the validation period with a similar average of the profiles from ground based FTIR data.

A more detailed look at profiles comparisons between MIPAS and FTIR is planned in
conjunction with investigators at BIRA to be presented at the COSPAR meeting in July 2004. This will address issues such as averaging kernels, where information is coming from a priori or from the measurement, and vertical resolution in a more formal comparison that properly accounts of the different measurement characteristics of the two measurement systems.

Ground based measurements of ozone profiles include ozonesonde, microwave radiometer and LIDAR, and all 3 of the ENVISAT instruments that measure ozone in some way (GOMOS, SCIAMACHY and MIPAS) and so there are many comparisons possible. As examples, Figures 8 and 9 and 10 show the ground based microwave data compared against GOMOS and SCIAMACHY respectively. These are more detailed comparisons than those shown in earlier figures in that matches between measurements have been identified and the difference between vertical profiles has been plotted. A central issue in these comparisons is whether the altitude or pressure grids used with each dataset are a source of error, so data are plotted against both pressure and altitude. Where such errors are suspected, offsets can be applied to the grids in order to see if improvements are found.

**Figure 8**

**Figure 9**

**Figure 10**

**Future Plans**

These validation activities have been incorporated into the coordinated presentations at this workshop. Developing them further will be in collaboration with other investigators, and this workshop will provide guidance on where these efforts will be best directed.

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