**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Precision validation of MIPAS-Envisat products" *by* C. Piccolo and A. Dudhia

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1. p914, l. 5

The text will be amended as suggested.

2. p914, l. 23

We agree, Fig. 3 is wrong. This will be fixed. The correct Fig. 3 could be found at: http://www.atm.ox.ac.uk/group/mipas/meetings/m111.html

3. p915, l. 5:

We will also include the plot of the NESR at 68km which confirms the statement at p915, l5 and which shows that there is less seasonal variability since there is less atmospheric signal.

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4. p925, Fig. 4

The maxima in bands AB, B, C and D for 80N-90N in Dec 2002 and 2003 could be attributed to a stratospheric warming observed in the arctic in Dec 2002 and 2003. This is visible from Fig. 3 (time series of retrieved temperature). A comment on the maxima in bands AB, B, C and D for 80N-90N in Dec 2002 and 2003 will be added to the text.

5. p915, l. 14

The values of seasonal noise variation have been derived from Fig. 5 while the signal variation has been estimated taking into account that in polar regions the 100% Temperature variation is derived from the assumption that temperature variability is approx 20-30K and that radiance B(T) sensitivity is approx 3-4% per 1K, dependent on the band.

6. p916, l. 17

It's not a question of the vertical coordinate used for the interpolation, it's that *any* simple interpolation results in an interpolated value that has a smaller uncertainty than either of the two profile levels used for the interpolation. This could be handled properly if the full profile covariance matrix is used, but we opted for the simpler solution of applying an independent 'climatological' bias correction, although, in this case, the 'climatology' is derived from the averaged data itself so not strictly independent.

7. p918, l. 1

In the text we will explain more how the E matrices have been calculated.

8. p918. l.18

The error analyses on the web-page are based on an optimal estimation technique used for the microwindow selection, whereas here we have used the 'correct' pT error propagation matrices based on a least-squares fit solution, which tends to magnify the

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error sensitivity in regions where signal/noise is poor.

However, it is strange that HNO3 should be relatively more sensitive to temperature uncertainties than other species which use shorter wavelength microwindows. We think this is related to the fact that, unlike most other molecules, the HNO3 microwindows consist of a relatively small number of discrete lines.

There are two ways of retrieving vertical profile information from limb-view spectra: preferably you would use spectral features which have a strong altitude dependence, switching to different features for different altitude ranges. However, if you only have a few isolated lines to choose from, you can only obtain the altitude information by taking the (relatively small) difference signal between adjacent spectra using the same spectral points. These difference signals are particularly sensitive to any error in retrieved temperature since all spectral points at one altitude have a common systematic error.

9. p919/920

1. The unrealistically small positive numbers (1.E-10) in the MIPAS level 2 products have been filtered out but we had not considered the reduction in observed scatter that would result from comparing only 'positive' profiles. We have evaluated the number of screened profiles. In the case of O3 the number of screened profiles does not affect the result. In the case of HNO3 there is a significant number of screened profiles and this might affect the result although for HNO3 this is due to fluctuations of the noise rather than retrieval problems.

2. We agree about the influence of non-detected clouds and this will be added to text.

3. We think that the day/night variability in O3 would show up more in the bias than in the SD. Most of the time the polar comparisons are day v day or ngt v ngt unless for equinoxes and solstices, so there is no diurnal O3 variability unless an increase at equinoxes and solstices.

4. The selected criteria of 300km in distance is the same criteria adopted for the

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validation comparisons of the MIPAS products, but not the time window. The time interval for the validation of MIPAS products is 3 hours, we modified it since there are no orbit intersections within 3 hours. However, since there is no significant difference between polar summer and polar winter in the observed versus predicted scatter, as it can be seen in Fig. 7, whereas the atmospheric variability is significantly larger in polar winter, we do not believe that atmospheric variability significantly affects the scatter in our results.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 911, 2007.

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