

Interactive comment on “Validation of nitric acid retrieved by the IMK-IAA processor from MIPAS/ENVISAT measurements” by D. Y. Wang et al.

D. Y. Wang et al.

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Reply to the Review Report from H. Roscoe

Many thanks for your comments on our paper. The followings are your original comments and our point-to-point responses. Our page and line numbers are given for the revised manuscript.

This careful and detailed work should definitely be published after minor revision. The authors are to be congratulated on their innovative use of the formality of retrieval theory to derive a better comparison between values retrieved from remote-sensing data and in situ values, on p9734. As stated there, it is not enough to smooth the in-situ data by the weighting functions of the remote sensor, the same dependence on

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the remote sensor's a priori data must also be ensured. To the best of my knowledge, this is the first time this has been pointed out and derived - if so, it is a very important first and the authors should say so, vigorously.

Our Response

A few sentences taken from you are added (Page 5, Col2, Lines 5-10) and read as: "This innovative use of the formality of retrieval theory leads to a better comparison between values retrieved from the measurements of MIPAS and other instruments, since the other data sets are smoothed by the weighting functions of the MIPAS remote sensor and the same dependence on the MIPAS a priori are also ensured."

Most of the comparisons show that the new MIPAS HNO₃ product is in great shape, better than the previous MIPAS HNO₃ product described by Mencaraglia et al (2006). Furthermore, because most of the comparisons show good agreement, with small standard deviations, the fact of poor agreement with the ODIN HNO₃ values, with large standard deviations, reflects badly on the ODIN product but the authors do not say so. Obviously it is bad practice to make derogatory comments about the ODIN product, but the authors should find a form of words to say what is obvious to the reader, for example that the ODIN product needs more work and should meanwhile be treated with caution.

Our Response

Comparison with Mencaraglia et al (2006) is addressed below in item 4.

For MIPAS/Odin comparison, the reviewer's comments and suggestions are basically just summarizing what we have done anyway: there's already a large discussion in the Odin part on the reasons for the disagreement (-> altitude shift). Also, if one corrects the altitude shift, the differences are not much larger than those of the ACE and ILAS comparisons, not to mention the balloon comparisons. So what we do is to have some statements in the conclusions (Page 8, Col 2, Lines 7-13), which are read as:

"The IMK-IAA MIPAS and Odin/SMR V2.0 HNO₃ VMR profiles taken in September 2002 and February 2003 showed reasonable agreement (Fig. 8) with largest differences of -2 and +1 ppbv only seen around 20 km and 35 km at high latitudes of 60°N. The differences are due to an altitude displacement within the Odin data. Note that an improved Odin/SMR HNO₃ product is underway at the time of writing this article. "

Some editorial comments are:

1. Many of the figures are rather small. They should be stretched to the full margins allowed by ACPD.

Our Response

Figures 2 to 7 on Pages 11-26 are re-plotted. We wish that the copy editor stretch all figures to the full margins allowed by ACP.

2. The last sentences on p9729 should be clarified, it was confusing to find the end result.

Our Response

The sentence (Page 3, Col 2. Lines 7-9) is re-phrased as "This led to an average 13% increase in our IMK-IAA HNO₃ VMR presented in this paper in comparison with those retrieved with the HITRAN 2000 spectroscopic database."

3. On p9734, x_{mipas} is used for what was earlier $x_{\text{retrieved}}$ without explanation. Either use only one symbol, or explain the substitution.

Our Response

As stated in the original text, corresponds to $x_{\text{retrieved}}$, not x_{mipas} . We clearly defined them and phrased (Page 5, Col 1, Lines 3-4 from the bottom) as "The difference between the MIPAS measurements x_{mipas} and the transformed other data sets is δ "

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4. Reference Mencaraglia et al., with some comment about the improvement of your result.

Our Response

In section 2.2 (The ESA operational MIPAS Data) (Page 3 Col. 2 Line 1-3 from the bottom to Page 4, Col 1,, Lines 1-3), we mention the reference:

“The ESA MIPAS HNO₃ profiles are also validated by comparison with the measurements from the far Infrared Balloon Experiment (IBEX) (Mencaraglia et al., 2006), and an agreement of $\leq 5\%$ is obtained in the altitudes between 15 and 70 hPa.”

In section 7 (Conclusion) (Page 8, Col 1, Section 7, the beginning of the 2nd paragraph), we add the following:

“Most of the comparisons show that the new MIPAS HNO₃ product is in great shape. In particular, the altitude range where reliable information is retrieved seems to be larger in comparison to the ESA HNO₃ product described by Mencaraglia et al (2006).”

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 9723, 2006.

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