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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Validation of MIPAS HNO_3 operational data" *by* D. Y. Wang et al.

D. Y. Wang et al.

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Many thanks for your comments and suggestions. We have revised the manuscript accordingly. Our responses are detailed below, following your comments.

This paper compares the operational retrieval of HNO3 performed by ESA from the MIPAS/ENVISAT dataset to a variety of other profiles retrieved from ground-based, airborne, balloon-borne and satellite measurements. The paper is clear and focused. It presents the right amount of materials (tables, figures) and about the right amount of details on the different datasets and different retrieval procedures. I recommend its publication, after some minor corrections.

1. The MIPAS and other data sets are searched for coincident measurements. Criteria on horizontal separation, time difference, and PV difference are used. a. The 300 km and 3h criterion is never justified. Is it imposed by the physics or by the statistics b. The different subsection (hence different authors?) do not have the same idea of statisti-

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cal significance: 12 coincident profiles is enough for statistical consistency with FTIR (Jungfraujoch), but 23 coincidences are not considered enough for ASUR comparisons, for example. Most of the balloon measurements have even far less coincidence than 12 or 23. A more consistent approach should be used, or a better explanation when the criteria need to be relaxed.

Our response: According to your comments, we re-phrased the first paragraph of Section 3 as follows.

For comparisons between individual profiles, the MIPAS and other data sets are searched for coincident measurements. The coincidence criteria of horizontal separation less than 300\,km and time difference less than 3\,h are used. This choice is based on our empirical knowledge of satellite data validation, and is to reduce the influence of small-scale gravity waves and large horizontal gradients at high latitudes. However, due to the characteristics of the data sampling scenarios, other more or less restricted coincidence criteria have also been applied. Nevertheless, the numbers of available coincidence profiles vary from case to case from several hundreds to low tens, or even far less for most of the balloon measurements. This implies different statistical significances for the comparisons. Details will be discussed later in Sects. 4 to 7. Also, to avoid the influence of the error in the ESA MIPAS altitude registration (von Clarmann et al. 2003b; Wang et al. 2005; Kiefer et al, 2007), the comparisons are conducted in pressure coordinates.

2. The MIPAS and other data sets do not have the same altitude range and vertical resolution. a. The vertical range and vertical res-olution is not always clearly stated for each other experiment than MIPAS, especially for the balloon-borne experiments. Please try to add this information. b. This is all the most valuable that the difference between the MIPAS and the others assume that there is not a priori information in the others. This will be of course only true where the information content dominates. So we need this information.

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Our response: We have added the MIPAS-B vertical resolution (typically between 2 to 3 km). In the original text, we already mentioned the retrieval-altitude levels corresponding to each pressure level.

We have selected data by information contents. For example, we specifically mentioned that in Section 7.1 “the Odin/SMR HNO3 data usually have a measurement response (a ratio derived from the Odin/SMR averaging kernel matrix and providing a measure on how much information comes from the spectral measurement and the a priori profile for each individual retrieval altitude level) lower than 0.75, implying dominance of the a priori climatology. Thus, we select data with the measurement response larger than 0.75 for comparison.”

This information is important, but it seems not necessary to discuss it in such detail for each instrument.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 5173, 2007.