

## ***Interactive comment on “Validation of water vapour profiles (version 13) retrieved by the IMK/IAA scientific retrieval processor based on full resolution spectra measured by MIPAS on board Envisat” by M. Milz et al.***

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Received and published: 13 May 2009

We would like to thank reviewer #3 for the helpful and constructive comments. The reviewer pointed out several inconsistencies between plots and text which were introduced during the writing process. In this period various plots had to be redone a few times as the number of used measurements permanently increased during the reprocessing with the new retrieval setup (Version 13) and text and plots partly diverged.

Please find below our answers addressing the reviewer's comments.

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### *Reviewer Comments*

#### **Reviewer #3:**

*The paper presents an ample effort of MIPAS/Envisat water vapour profile validation. It is built up on a large comprehensive data set which offers the possibility to compare the performance of this space borne passive remote sensor with other instruments in a statistically meaningful approach. The basic problem remains: none of these instruments can be considered as a reference measuring the "true" water vapour concentrations. Nevertheless the paper's conclusion carefully circumvents this sad fact and states that at least the MIPAS instrument's uncertainties are well characterized (in most cases). This is of fundamental importance for all data users. The paper is well written and suitable for publication in AMT, contains however numerous inconsistencies between the figures and their descriptions which are listed below.*

*Specific comments:*

#### **Reviewer comment:**

*Abstract: A summary on the geographical positions and the vertical range of the comparisons must be given here.*

#### **Answer:**

This information will be added.

#### **Reviewer comment:**

*It would also be useful to include the overall MIPAS instrument uncertainty resulting from this study, either as one number or given as an uncertainty range.*

#### **Answer:**

This information will be added to the abstract.

#### **Reviewer comment:**

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Section 4.1, last sentence: *At mid-latitudes, longitudinal variations can also be pronounced, particularly in the vicinity of the polar and subtropical jet streams.*

**Answer:**

We did not consider longitudinal variations as being so prominent. The reviewer is right that this variability can be large at mid-latitudes. We will add an according caveat to address this.

**Reviewer comment:**

*Section 4.3: Eq. 7 is identical to Eq. 4 from Rodgers & Connor (2003). You should cite them here again.*

**Answer:**

A citation will be added

**Reviewer comment:**

*P. 500, line 22: I could not find any chi-sq analysis in the SPARC (2000) report. You can omit this ref here and eliminate it from the reference list.*

**Answer:**

The SPARC 2000 reference is the source of the HALOE errors used for the  $\chi^2$  evaluation. It is not the reference describing the calculation of the  $\chi^2$ .

**Reviewer comment:**

*P. 500, line 24: remove "and above 55 km".*

**Answer:**

This will be done.

**Reviewer comment:**

*P. 500, line 29: remove "indicating".*

**Answer:**

This will be done.

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**Reviewer comment:**

*P. 501, line 11: ...overestimation of the [errors] at all altitudes...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 501, line 12: For altitudes above 66 km the assumed errors ...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 504, line 9: Only between 14 and 17 km ...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 505, line 3: Between 15 km and 26 km both...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 505, line 8: ...between 15 and 26 km.*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 507, line 3: ... occurs at 17 km...*

**Answer:**

This will be corrected.

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**Reviewer comment:**

*P. 507, line 5: For altitudes below 13 km...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 507, line 7: Above 13 km...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 507, line 17/18: The prominent bump is weaker. The maximum difference of 0.7 ppmv or 15% is found at 23 km.*

**Answer:**

This sentence will be corrected.

**Reviewer comment:**

*P. 508, line 10: Also between 12 and 20 km...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*P. 510, line 1: ... values (cf. Fig. 27) calculated...*

**Answer:**

The reference to the according Figure will be added

**Reviewer comment:**

*Section 5.3: The present manuscript is not the first and only comparison effort with MIPAS Version V3O\_H2O\_13. Kiemle et al. (ACP 8, 2008, p. 5256) present several comparisons between MIPAS and airborne water vapour lidar in the tropical UT/LS with*

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*good agreement above 12 km. It may be useful to refer to that paper here for the sake of completeness.*

**Answer:**

the reviewer is right. This study addresses the same IMK/IAA data version. We will refer to that paper and give a short summary of the results

**Reviewer comment:**

*P. 510, line 27: ...the agreement is very good below 30 km and...*

**Answer:**

This will be corrected.

**Reviewer comment:**

*Fig. 28, left: Why are the differences above 30 km larger than the error bars in this situation with the smallest distance? Is it due to different air masses or different fields-of-view, despite the good co-location, or is there another reason?*

**Answer:**

The good agreement in geolocations refers to the lowermost altitudes around 15 to 20 km. For higher altitudes the scan locations deviate more and more. e.g. is the distance at 30 km around 270 km. Additionally there was a strong North-South-gradient in air masses, visible also in other trace-species.

**Reviewer comment:**

*P. 513, line 27: ...have a slight dry bias compared to FLASH-B and NOAA FPH.*

**Answer:**

This will be corrected.

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Interactive comment on Atmos. Meas. Tech. Discuss., 2, 489, 2009.