

## ***Interactive comment on “Validation and data characteristics of methane and nitrous oxide profiles observed by MIPAS and processed with Version 4.61 algorithm” by S. Payan et al.***

**S. Payan et al.**

Received and published: 11 September 2008

Please find below answers to the referees and explanations on how their comments/questions were taken into account (added in quota in the referee comment). When "Done" is used as answer, this means that we agree and we have changed the manuscript as suggested by the referee.

Answer to anonymous referee #2

Specific comments: My first three comments are related to the scientific quality and give recommendations on how to improve the balance between the different parts of the paper. The last comment addresses the presentation quality.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

1) In particular, only little effort was made to quantitatively summarise the results obtained in the individual comparisons, (...). "We have introduced a summary table."

2) The introduction section also lacks a summary (...). "The corresponding papers have been mentioned in introduction of section 7"

3) The section on comparisons to other satellite data sets is far from being complete (...). "The Intercomparison with ODIN has been removed and the corresponding ODIN validation paper has been mentioned. The term intercomparison has been used in title of section 7 that has been changed by accordingly."

4) My last general criticism concerns the technical form on how the material is presented (...). "The figures have been systematically improved, split or deleted according to the reviewer's recommendations. Text has been modified and completed following recommendations. A summary table has been added in conclusion of the paper."

Detailed technical remarks or suggestions:

Shorter title? e.g. <<Validation of version-4.61 methane and nitrous oxide profiles observed by MIPAS/Envisa>>, <<Intercomparison of ... with ...>> "The first title has been used."

Please use consistently either MIPAS-E or MIPAS, throughout the manuscript. "We have kept MIPAS everywhere for the Envisat instrument except when comparing with MIPAS-B and with MIPAS-STR in which cases MIPAS-E has been used after being defined."

Table 1: remove ACE "Done"

Table 2: please indicate latitude-longitude range of flights "Done"

Table 3,4: reformulate <<the statistics for coincidences ... is added>> "Done"

Period: <<Whole>>? Also indicate years (not only months) "Done"

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

Figures:

Check font sizes of labels and legends (see major remarks for a list). "Done"

Multi-panel figures (9, 10, 14-17) are in this form not adequate for publication and need to be improved in one way or another (e.g. showing only averages with standard deviation), or omitted. "Figures have been split"

Figure 1: pressure-scale? "Figure redraw with pressure scale"

Figures 15 and following: provide absolute differences rather than relative differences, for consistency with figures 1-14. "The various group involved in this validation exercise have their own convention for reporting their results. Homogenization was not possible everywhere. Conversion between relative and absolute values is given in the summary table at the end of the paper."

Figure captions: <<Validation ... of ...>> -> <<Comparison of ... with ...>> "Done"

Explain all lines and symbols shown in a plot in the caption, in particular since all the plots in this manuscript are different. Confusing! "Done"

Fig.1: <<... with twice the weight given to results from the polar winter case>> cannot be understood. Please explain further. "Details have been added in the text."

Fig.5: <<...trajectory transported profiles for a larger statistics.>> ? "Done"

Fig.11: <<validated>> -> <<compared>> "Done"

Fig.13: What is the shaded area? "Shaded area is the standard deviation of the profiles averaged. It has been précised in the legend."

Fig.15: Describe error bars. <<one>>? "Done"

Fig.26: <<red>>? "The red curve is below the yellow one for N2O vmr below than 280 ppbv. This comment has been added in the legend."

Abstract

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Suggest to start with <<The present paper ...>> and remove the first two sentences. "This paper is resulting from ESABC activities and we think it is fair to keep this idea."

I8: MIPAS/Envisat Acronyms need to be explained (e.g. <<MIPAS>>) "Done"

Provide quantitative summary of results, not only for the lower stratosphere. Abstract should be self-standing (summarise most important information for data users). "Done"

Introduction:

page 18046

I14: <<higher statistics>>? Check this throughout the manuscript. "Done"

I18: <<averaging kernels have to be used>>. Please explain in detail how this is <<Done>> in this study! "Details are given in section 3 and section 6. Thus this sentence has been removed"

I22: which <<specific constraints>>? "<<launch constraints>> has been used"

I24: <<optimising the coincidence ... possibilities>>? (rephrase) "Done"

I25: why <<smaller vertical coverage>>? "<<limited>> has been used referring to the maximum float altitude of research aircrafts."

I29: <<for some ... dataset>> (to be corrected) "Done"

Page 18047

I19: <<by Nett et al.>> "Done"

I25: the reader needs also to know what happened after October 2003, which data are available as version 4.61 and which data are validated in this paper. I would assume that a validation paper submitted in 2007 deals with the whole Envisat period (2002-2007). "This validation paper prepared as a result of the ESABC efforts is specifically dedicated to the validation of the full resolution mode of MIPAS which stopped in March 2004. This is acknowledged in the text. Future validation activities of the reduced

S9937

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



resolution mode are outside the scope of the present paper."

Page 18048

I5-9: explain <<decontamination events>> "Done"

I11 : <<in the>> -> <<on the>> "Done"

I16: <<then>> -> <<before>> "Done"

I18: temperature and pressure errors will typically lead to systematic errors and not only to random errors. Please correct or explain further. "We have quoted the paper by Piccolo et al. where a detailed discussion of the various errors is provided."

I20: -> <<is given in the covariance matrices>> -> <<can be found ...>> "Done"

Page 18049

I1: <<using>> "Done"

I3: define <<SD>> (or write standard deviation) "Done"

I12 <<so>> -> <<and>> "Done"

I14 explain further <<... with twice the weight given to results from the polar winter case>>. "Mention to Piccolo et al. is made here to avoid unnecessary details."

I21: when did the campaign take place? "Return to table 1 added in the text."

I24: pressure preferred: check Fig.1. Describe rather what has been <<Done>> in this paper, <<preferred>> doesn't seem to be the appropriate verb. "Rephrased"

Page 18050

I2: please explain in more detail how averaging kernels have been used in this paper, this is not so trivial and a typical source or error in intercomparison studies "Done"

I5-6: please reformulate (<<precision are given when smoothing is applied>>?)

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



"Done"

I7-8: expand on how trajectory calculations were used exactly (suggest to introduce short paragraph). "Since the technique is implemented slightly differently according to the different correlative experiments, we think it is fair to leave the details in each section where trajectories are used."

Page 18051

I9: suggest to remove <<a situation which ... (... below).>>. "Done"

I16: insert <<from>> before <<Kiruna>> "Done"

I19: <<yields>> -> <<leads to>> "Done"

I24-25: <<A Tikhonov-Philips regularisation approach constrained with respect to the shape of an apriori profile was adapted>>. Needs to be explained or removed. "Explaining the Tikhonov-Phillips approach is far beyond the scope of this paper and it is also not possible to do this in one or two sentences. We prefer to omit the corresponding sentence to satisfy the referee."

Page 18052

I1: define <<MIPAS-B proven micro-window>> or reformulate "Rephrased"

I3-6: check, rephrase? "The information given in the sentence is correct. May be that the referee is bothered by the shorthand-like listing of the flights in this sentence. We let this issue unchanged."

I7-9: <<Rec>>? "Rephrased"

I17-21: Besides that a quantitative description of the comparison results is missing, why isn't it possible that MIPAS-B is wrong at levels below 100hPa? "The quality of the MIPAS-B N<sub>2</sub>O/CH<sub>4</sub> retrieval has been assessed many times (e.g. in the recently published paper by Wetzal et al., ACP, 8, 1119-1126, 2008)."

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



I27: <<a larger statistics is achieved>> (rephrase) "Rephrased"

Page 18053

I1-4: provide quantitative results as well "Done"

I9-10: -> <<at mid-latitudes>>, <<at high-latitudes>> "Done"

I15: -> <<the vertical resolution of>> "Done"

I17: and following: quantitative description of comparison results is missing "Done"

I26: <<the tropics region>>, <<the polar region>> "Done"

Page 18054

I1: <<The origin of air masses ... is ... depending on latitude>> remove <<Then>> "Done"

I18: remove <<between>> "Done"

I22: -> <<in Fig. 7>> "Done"

I25: discuss quantitative bias "Done"

Page 18055

I13: indicate altitude of <<float>>. Which altitudes were measured by <<LPMA>>? "Done"

Page 18056

I10-13: describe results of comparison (quantitatively) "Done"

I14: remove <<simultaneous>> from section title "We did a lot off effort to achieve a very good coincidence in time and space. This is the big advantage of aircraft above balloon born measurements. We ask to leave the title unchanged."

I15- : suggest to move this to the introduction and summarise main findings of previous

S9940

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



intercomparison studies. See my general remark 2). "This was an error from the technical manuscript preparation department. This section was originally in section 7 and should be put back there."

Page 18057

I1, I23-29: the MLS N2O validation paper of Lambert et al. has been published in 2007 in JGR, not in ACPD "Done (text and reference)"

Page 18058

I9: The statement that retrieving vmr on tangent-altitudes makes regularisation unnecessary is certainly not generally correct, and the observed <<zigzagging>> suggests the opposite. Suggest to review and rephrase. "Rephrased"

I18: again, no quantitative discussion of the results in this section "Quantitative discussion added."

I26: <<the high degree of coincidence>> ? "Sentence modified"

Page 18059

I2: again, no quantitative discussion of the results in this section "Quantitative discussion has been added."

I24: <<The MIPAS off line ... considered.>> can be omitted "Done"

Page 18060

I4: <<in terms of>> -> <<for>> "Done"

I14: agreement doesn't look good at mid-latitudes (?) "Yes, it is. We are talking about the agreement above 30 Km,"

Page 18061

I27: define or explain <<the degrees of freedom for the signal>> "DOFS have been

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper





defined"

Page 18063

I6: describe applied smoothing procedure "Done"

I8: -> <<column>> "Done"

I12: <<will be>> -> <<are>> "Done"

I18: explain <<random error covariance matrix of the differences MIPAS -FTIR>> "Done"

Page 18064

I1: <<gives>> "Done"

I11 and following: Figure 14 unreadable (too small). Are standard deviations shown? "Figure 14 split in 6 figures. As mentioned in the legend, the relative differences between ground-based FTIR and MIPAS partial columns is plotted in the lower panel."

I20-25: move to figure caption "Done"

Page 18065

I6-8: Speculation! What about atmospheric variability, instrument noise, artefacts of smoothing procedure? "The DOFs are real and calculated in the same way as the other stations. Although it is true that a looser the constraint ( $S_a$ ) increases the calculated DOFs, we do not think that the resulting DOFs can be treated as non realistic. The sentence has been modified. The oscillations are more due to the smoothing procedure."

I10: <<same ones>> "Done"

I28: <<relaxed criteria>>? Reduced time period? "Rephrased"

Page 18066

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



I5-8: I speculate that the nice agreement is obtained through the applied smoothing, whilst at Ny Alesund something else went wrong. Please check your algorithms. "The bias obtained for the Ny Alesund retrievals were due to differences in the a-priori information and the relatively looser constraint applied to the Ny Alesund retrievals, and to the fact that above 20 km, the information content from the G-based FTS is very small and decreases significantly. "

Page 18067

I2: <<once another one>>? "Done"

I8: <<full stratospheric range>>? "Done"

I9: suggest to remove this, not important for this paper, except that you used HALOE version 19 data for the comparisons "Done"

I13: <<are>> -> <<is>> "Done"

I13: for which HALOE data version are these accuracy and precision values? "It is given for v17, but Dessler and Kim (JGR 104, p30605-30607, 1999) found out that the v19 CH4 data have an accuracy of +/- 5 to 10% similar to v17 data. Precisions have been given in the texte"

Page 18068

I4: Something is missing here? Results should be given quantitatively (also in ppmv, not only in %, for consistency). "The text has been corrected."

I6: explain acronym "This part has been removed from the paper"

I13: Version 1.2 is obviously old! Other studies use version 2.1. This will probably change the results of this section, since work of Lambert et al. and Strong et al. indicate a better agreement compared to what was found in this manuscript. "This part has been removed from the paper"

I25-27: please explain in more detail how the systematic errors were treated, or rephrase "This part has been removed from the paper"

Page 18069

I8: <<MRD>>? "This part has been removed from the paper"

I13-15: on a priori contamination: speculation? "This part has been removed from the paper"

I20-23: on spectroscopy: speculation. Can this be verified? "This part has been removed from the paper"

Page 18070:

I12: <<Spacelab>>? ATMOS was also flying on three ATLAS missions (instrument platform in the Space shuttle cargo bay). Please verify, the dates seem to confirm this. "This is right. The text has been corrected"

I21: <<Arctic>> "Done"

I29: Might this be due to a problem in the applied trend correction or a bias in the ATMOS data? "Text has been modified"

Page 18071:

I4: reformulate <<providing a new consistency test>> "Done"

I4-18: suggest to check, rephrase this paragraph. "Done"

Page 18072:

Generally I suggest strongly to summarise results in terms of both absolute and relative differences. "The various group involved in this validation exercise have their own convention for reporting their results. Homogenization was not possible everywhere. The conversions between relative and absolute values are given in the summary table at the end of the paper."

S9944

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



I3: <<self consistency check of CH4/N2O correlation>>? Rephrase "Done"

I7-11: indicate versions of satellite data "Done"

I18: <<...demonstrate the impact of remaining oscillations.>> What do you mean with this statement? "Rephrased"

I20: -> <<balloon>> "Done"

I23: -> <<The general ...>> "Done"

I20-25: Are results of this assessment consistent with the systematic error estimates (published elsewhere)? "See next point for a summary table. A sentence as been added for the consistency of the errors with previously published MIPAS-correlative measurement comparisons."

Page 18074:

A summary plot for the results obtained in the different sections of the paper is clearly missing. This would also simplify to summarize the results. Potential MIPAS data users would benefit a lot. Other general recommendations for MIPAS data users could be summarised here as well, for example considering the artefacts discussed in this section (and how to avoid them). " The various group involved in this validation exercise have their own convention for reporting their results. Homogenization was not possible everywhere. Only relative differences are given in the summary table at the end of the paper."

Acknowledgements: confusion between ACE team and Odin team? "Done"

Please check use of English language and style carefully (before submission). "Done"

---

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 18043, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

