

## ***Interactive comment on “MIPAS level 2 operational analysis” by P. Raspollini et al.***

### **Anonymous Referee #2**

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Review of Raspollini et al., “MIPAS level 2 operational analysis”, ACPD, 6, 6525-6585

General comments:

I think this is a useful paper for the scientific community and worthy of publication. I think, however, that the authors need to make some changes before the paper is suitable for publication in ACP:

- (1) The authors must clear up the order of figures 4-9. Figures 4-6 should be 7-9; Figs. 7-9 should be 4-6.
- (2) There should be more discussion of the chi-squared analysis (section 7). This is an important check on the error assumptions, and providing more details would help the reader.
- (3) There should be more plots of MIPAS level 2 data. In particular, given that the

authors show figures from the ozone hole split of September 2002, I suggest that the authors provide polar stereographic plots at, say, 10 hPa.

(4) The authors should address the specific comments below, many of which concern clarification of the text, or quantification of vague terms.

Specific comments:

P. 6526, lines 26-28: I find this confusing. Is it or is it not worthwhile to reduce the (random) errors?

P. 6527, lines 12-13: I understood that MIPAS had an on/off duty cycle between March 2004 and January 2005. MIPAS would be on for several days, and then off for a comparable amount of days; the cycle would then start again.

P. 6528, lines 1-2: Perhaps mention and quantify any degradation in the performance of MIPAS after the problem in March 2004.

Line 22: Perron -> Poulin

P. 6529, line 14: Does “extended range” refer to height? If not, to what?

P. 6530, line 18: I think it would be better to say that “xiter” is the required profile.

P. 6531, lines 1-3: I do not understand what is written. Do you mean at the solution, given the convergence criterion?

Line 8: What does “sufficiently” mean? Can this statement be quantified?

Lines 10-11: Reading the text suggests to me that there are three choices and a choice needs to be made. However, I see no information on what choice is made. Or have I misunderstood what is being said? Are these three “choices” the steps in an algorithm? I suggest the authors clarify this text.

P. 6532, line 20: Specify that this needs to be taken into account in the OFM.

P. 6533, lines 1-2. Why have NLTE effects not been included in the forward model?

Line 8: What is an “appropriate” sequence of operations?

P. 6534, lines 6-8: How did the forward and retrieval models perform in the AMIL2DA intercomparison study? I think a few lines on this would be helpful. The readers can then look up Clarmann et al. for further details.

P. 6535, lines 16-17: There are 5 standard atmosphere and 4 typical conditions. From later in the text, I think the authors have omitted to split the mid latitudes into day and night.

P. 6537, line 9: How are the “best microwindows” determined?

Line 27: What is the auxiliary data?

P. 6539, lines 4-9: Are the thresholds determined empirically, e.g., from experimentation?

P. 6542, line 10: I think the authors should quantify what they mean by “sufficiently large number” of iterations.

Line 16: What do the authors mean by “made more active”?

Line 23: Do the authors mean “bad” when they say “critical”?

P. 6543, lines 22-23 and other places: Figures 4-5 are Figs. 7-8. See also general comments.

P. 6544, lines 1-3: What are the implications, if any, of the total error being larger than proposed objectives of the mission, and significantly larger than what can be potentially obtained?

Lines 12-15: I do not understand what is written. One would have thought that information from the retrieval would provide information on the radiometric accuracy, if there is high correlation between these two quantities. Have I misunderstood something?

P. 6549, line 26: What do you mean by “un-decimated”?

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Line 27: What do you mean by “ghost”?

P. 6550, line 7: What is the structure of the propagation matrix E? Is it block-diagonal, is it sparse?

P. 6553, line 5: What do you mean by “non-LTE free”? Do you mean unaffected by NLTE?

P. 6556, lines 11-13: I find this a bit unclear. Can the authors provide more detail on how the “ensemble” of measurements that are being considered make the errors either random or systematic? Perhaps some examples would be useful.

P. 6558, line 15: What are “seeds”?

P. 6559, lines 8-9: There are also high chi-squared values for pT.

Line 15: Quantify the statement “does not differ much from unity”.

Lines 18-19: Another exception appears to be methane, where from Table 4 there is a factor of 2 between measured and estimated values.

As mentioned in the “general comments”, I think section 7 needs further discussion.

P. 6560, lines 17-18: As mentioned in the “general comments”, it would be useful to include sample polar stereographic plots showing the ozone hole split.

Line 23: Clarify what you mean by “denitrification”. How is nitrogen being removed? I think more explanation is needed.

P. 6570, Table 3: Some entries in the table do not have numbers, rather words such as “Climatological St. Dev.”. I think the authors should quantify these errors.

P. 6572, Fig. 1: Specify that A, AB, and so on are MIPAS bands.

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