

Interactive comment on “On the improved stability of the version 7 MIPAS ozone record” by Alexandra Laeng et al.

Anonymous Referee #2

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“On the improved stability of the version 7 MIPAS ozone record” by Laeng et al.

Opening Remarks

In this paper the authors have attempted to assess the stability of a new Level 2 MIPAS ozone data product. Two significant changes have been made to the Version 5 MIPAS processing chain to construct the new Version 7 MIPAS ozone data product. Detector nonlinearity corrections have been implemented at the Level 0 to Level 1 stage and modifications have been made to infer Level 2 ozone from the MIPAS Level 1 spectral radiance measurements. The paper concludes that comparisons with satellite data suggest that MIPAS Version 7 is more stable than MIPAS Version 5 and can be used within analyses that attempt to derive long-term atmospheric change. Although I believe the authors to be correct the paper does not provide near enough detail to make

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a definitive statement. The paper appears to have been rushed and is not complete.

Comments

Major detail is lacking from the paper. A full validation study does not need to be done within the scope of this paper, but this document needs to address, in a more systematic way, the impact of the changes made to the MIPAS processing chain.

1) Section 2 that addresses algorithmic changes needs to be expanded. Sensitivity studies need to be presented that detail the impact of each of the outlined changes. If the current author list does not consist of a member of the retrieval team, then the list should be expanded so this work can be presented within this paper. Without more detail in this section it should be removed, and the paper is already far too brief.

2) I assume that Figure 1 was included to indicate that diagnostics such as averaging kernels are available. The figure needs far more explanation to be useful.

3) Section 2 was far too rushed. I am not suggesting it needs to be the length of a full paper. However, it needs to be expanded by two or three pages, with figures, to allow the reader to assess the changes made in the new Level 1 to Level 2 retrieval.

4) Section 3 on bias estimation also needs more detail. I feel that Figure 3 is telling me that the V7R bias has been reduced with respect to that of V5R. However, I don't believe the statistics associated with the comparison have been reported. For example, how many profiles went into the sonde study? Is the comparison data set presented in Figure 4 global and if so how relevant are the results? How many profiles went into calculating the results in Figure 4 and are there latitudinal biases that cancel each other out?

5) I don't believe section 3 is a bias estimation. It can be more correctly categorized as a sanity check that no additional biases have been added by the new processing. There are two issues with this. If the section is meant to be a bias estimation it must be expanded with a more comprehensive set of comparisons. The second issue is a

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section titled bias estimation must be tied more closely to the title that is concerned with “stability”. If this is not possible the title should be changed, or the section should be dropped. However, as previously mentioned the paper is already too short.

6) Section 4.2.1 needs much more detail. The authors reference the work done by Hubert et al. (2016) and present some sort of network averaged summary of work that is patterned after that of Hubert et al.. The authors need to take the time to repeat and present the entirety of the Hubert work, or as an alternative, come up with some better way of doing and presenting the same work. Without more detail this section should be removed from the paper as it adds nothing.

7) Section 4.2.2 is a good start. For the reader to trust that MIPAS stability has improved this section needs to be expanded. It needs to include a sensitivity analysis that indicates the methods outlined within Eckert et al. are appropriate. It may be as simple as just showing some representative time series where the drift is clearly seen and is clearly linear.

8) Section 4.2.2 would be well served by a direct comparison between V7 and V5. The same plot shown in Figure 7, as well as supporting figures, should be made for a direct V7 to V5 comparison.

9) The last thing that is missing is a trend analysis. What have the changes made to the Level 1 and Level 2 data products done to trends derived from MIPAS data? Do these now fit better with the accepted values seen in works like Steinbrecht et al. (2017)?

Summary

This paper is far too short to be accepted with minor revisions. Should the authors choose to address all the comments listed above I would be happy to review the completed manuscript. I hope they choose to make the suggested changes as the MIPAS data set provides very important information to the international teams involved in the determination and attribution of long term atmospheric change.

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