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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Intercomparison of ILAS-II Version 1.4 and Version 2 target parameters with MIPAS-Envisat measurements" *by* A. Griesfeller et al.

Anonymous Referee #1

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Summary

Griesfeller et al.'s study provides a comparison between two versions of the level 2 retrieval algorithm of ILAS-II[1]. MIPAS profiles, retrieved by the scientific processor developed by IMK[2] and IAA[3], are used in a validation purpose. Target species of this study are O3, HNO3, ClONO2, CH4, N2O and H2O. Overall, I believe this kind of study is useful for the user community. However, an important improvement in the methodology

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and in the presentation is needed. To my opinion, these improvement require an effort too important to only revised the current paper. Maybe rewriting and resubmiting the paper would be a good move.

Major comments

1. Based on ILAS averaged profiles taken between May and October 2003 and correlative MIPAS data, differences between ILAS and MIPAS are presented for both ILAS versions. I found the discussion on these differences only approximative. In addition to the description of these differences, the reader would like to know if they are significant or not. How do these differences compare with the error of measurements and the uncertainties of the intercomparison method? Are the differences between ILAS and MIPAS comparable to the differences between MIPAS and other correlative data? These are the questions that the users of ILAS data are asking.

2. I found the description of ILAS version 2 confusing. It took me several readings of the paper to understand the differences between versions 2.0 and 2.1 (see below). It also seems that ILAS v1.4 is better than v2 in the Southern Hemisphere (SH). Why? While the new correction of the transmittance (v2.1) shows a clear improvement, I am not convinced by the improvement made in the version 2.0, i.e. the upgrade of the spectral parameters and the upgrade of the tangent height registration. I think the paper should first show how and why ILAS version 2.0 improves the previous version. Then, the discussion of version 2.1 and the related results can be presented.

3. I found the style of the text somewhat laconic. The paper also lacks precision and I found that the introduction as well as the conclusions are weak. Why do the authors not advice the user about the ILAS versions? Which ILAS version do you recommend? Where can the data be downloaded? These are other questions that the users are asking and to which the paper should answer.

Detailed comments

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1. Lack of precisions:

- Many times, the reader has to deduce information from the text. For example, the labels '2', '2.0' and '2.1' are used to point out the ILAS version 2 (as written in the title). After several readings of the paper, I deduced that the v2.0 is the one used for the SH retrieval, i.e. a version based on HITRAN 2004 and the new tangent height registration. The version 2.1 is the version 2.0 plus the new correction of the transmittance. Am I right? The versions 2.0 and 2.1 must be clearly presented.

- I understood the paper to be an intercomparison of two ILAS-II retrievals, MIPAS being used for validation. However, in the abstract and further in the text, this turned out like being a comparison between MIPAS and ILAS (e.g. P9320-L2, P9321-L27). Again, an increase of precision would be welcome.

- Another example of this type is found on P9325 (L11-12) where the LTE assumption is mentioned. Do the authors mean that one of the retrievals, ILAS-II or MIPAS, is based on this assumption, the other on non-LTE assumption?

- The differences between versions 1.4 and 2 (should I say 2.0 and 2.1) are too quickly presented. Why do not SH data need to be improved regarding the correction of the transmittance? For which reason does this problem arise only for the NH data? How was this correction improved? This could interest the data retrieval community. About the registration height, what kind of improvement have you made? On P9323 (L5), it is mentioned that "there are many differences between v1.4 and v2". Is there any paper or report which describes the v2? If no, an appendix describing these differences would be appropriate.

- As mentioned in sec. 2.2, MIPAS data are retrieved by IMK and IAA. This important information should be also given in the abstract in order to make quickly the

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difference with the ESA retrieval. About the same point, why not choose MIPAS-ESA? Is the MIPAS retrieval based on the HITRAN 2004? If no, what kind of differences between MIPAS and ILAS version 2 are to be expected?

- Differences between ILAS and MIPAS are given following von Clarmann (2006). Can you summarize this method? Why did you use this method instead of the classic one?

- The results section is mostly a description of what is shown on the plots. Most of the time, the differences between ILAS and MIPAS are not explained. When they are, this is often confusing. For example, in sec. 3.1.1, why v1.4 is wrong above 20 km? In the same section, why ILAS v2 is lower than MIPAS above 45 km (I would say 40 km)? In sec. 3.1.2., the authors find a good agreement between ILAS v2 and MIPAS for methane. I found that ILAS and MIPAS show different vertical structures on the averaged profiles around 20-25 km. Why? In sec. 3.1.6 you mention that the difference between the two ILAS versions can be due to the diurnal cycle of ClONO2. I do not understand this comment and further explanations are necessary.

2. The text is laconic, especially the results section and the conclusions:

- Can you drop the term 'Envisat' when you mention MIPAS? I think there is no possible confusion with the other MIPAS instruments.

- Each section 3.1.x has an identical introduction which gives the MIPAS versions and the related reference. Why not give this information in a Table? Also, it is not necessary to remind the number of coincidence in the text if it does not help the authors to explain the results. The readers interested by this information could find it in Tables 1 and 2.

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- The conclusions almost repeat what is written in the results section. The authors should try to be more concise.

3. The methodology is approximate:

- The differences between v1.4 and v2 are derived from the same kind of plots: (1) monthly average of profiles of each hemisphere, (2) global average over the period from May until October and (3) differences between ILAS and MIPAS based on this global average. The kind of plot chosen by the authors would be sufficient if the data were collected for the same physical conditions. This is not always the case, especially for the South Pole data. For example, the ozone evolves from values outside ozone hole conditions (May) to ozone hole values (October). Furthermore, HNO3 is perturbed in July by the production of mesospheric NOx transported downward in the upper stratosphere. Do the differences between MIPAS and ILAS remain the same when the conditions change? A plot of time series would help to show it. Another way to evaluate the ILAS versions could be done using tracer-tracer correlation plots. For example, is the CH4-N2O correlation compact? Is there an improvement from v1.4 to v2? How does it compare to MIPAS?

- In the SH, version 1.4 provides a better agreement against MIPAS than version 2. Why? If I correctly deduced the differences between v1.4 and v2.0 (see above) I would conclude that one of the changes (or both) degrades the results, either the new spectral parameters or the new tangent height registration, or both. This must be discussed. If necessary, a new version of ILAS should be built and based on that one, add the new transmittance correction that was implemented in version 2.1.

- The agreement between ILAS and MIPAS derived by the plots of differences are not explained. Why these differences? Are they significant with respect to the

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instrumental errors and the intercomparison method? Since MIPAS species are already validated, is the agreement between ILAS and MIPAS of the same order than the agreement between MIPAS and other correlative data?

- The chosen coincidence criterion is discussed very quickly. Can you develop on this? Above 25-30 km, the volume mixing ratio of ClONO2 presents a diurnal cycle. Is the intercomparison method still valid? Could other intercomparison methods help, using a photochemical box model or data assimilation for example?

4. In the introduction, the authors remind one the role of O3, H2O, CH4, N2O, HNO3 and ClONO2 in the global warming, the greenhouse effect and the ozone depletion. I find this is written in a very naive way. I suggest to the authors to be more pragmatic and address the paper on the validation issue. The questions that the introduction could address are: why to improve the ILAS retrieval algorithm? which study can benefit from these improvements? About the conclusion, I think the authors fail to answer the question they are asking (and which interests the user community): which version of ILAS do you recommend to use? I think the paper should be presented in order to answer this question.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 9319, 2007.