**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Technical Note: Continuity of MIPAS-ENVISAT ozone data quality from full- to reduced-spectral-resolution operation mode" *by* S. Ceccherini et al.

S. Ceccherini et al.

Received and published: 5 March 2008

article

General comments

Impact of the new measurement scenario vs. the modified processing algorithm.

The reduced-resolution observations presented here combine a different setting for the measurements with significant changes in the processing scheme. Both factors contribute to the overall quality of the new (post-January 2005) O_3 product. Hence 1) The title should clearly mention which processor is used since there are, apart from

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ESA's, other well established and documented scientific processors for MIPAS. I think the processor should also be mentioned throughout the paper when references to the new product are made (since the quality evaluation conducted here does not apply to other existing codes).

ANSWER: The authors believe that since MIPAS is an ESA instrument, whenever one refers to MIPAS products (with no further specification) it must be intended that they are those - and only those - officially distributed by the Agency. However, the authors are well aware that in previous publications - including the validation papers appeared in MIPAS ACP Special Issue - the ESA products have always been explicitly kept distinguished from those obtained by other scientific processors identifying them as "operational products". Therefore, the authors accept the recommendation of the reviewer to change the title into: "*Technical note: continuity of MIPAS-ENVISAT operational ozone data quality ...*" and to specify in the article which version of the processor is used for the new products.

2) The following request is probably beyond the scope of the submitted paper. However, I would find useful (if possible) to have some elements on how the changes in the data product can be attributed to either the new measurement scenario or to the upgraded retrieval processor. Have the reduced-resolution observations been partly processed with any MIPAS scientific code? If so, an internal consistency check (for the full- and reduced-resolution observations) might be useful for future users of the MIPAS data..

ANSWER: MIPAS error budget adequately accounts for the differences observed in the comparison with GOMOS for both the full- and reduced-resolution case. In particular, the systematic components that contribute to MIPAS total error are mostly due to microwindows-dependent terms. Only a small number of systematic uncertainties

depends on the dataset and no significant contribution comes from code-dependent error components, as shown by the tests and intercomparisons performed in the frame of the AMIL2DA study (where the ESA code has been compared with other scientific codes, see for instance: *T. Von Clarmann et al., A blind test retrieval experiment for infrared limb emission spectrometry, doi:10.1029/2003JD003835, 2003*). As a consequence, it is reasonable to assume that the difference of the spectral intervals adopted for the retrieval is the main reason determining the changes in the data products. The changes in the scenario (i.e., the different spectral resolution and the different vertical grid of the measurement) motivated the different choices of microwindows, that in their turn determined different retrieved profiles. In this sense, the changes in the scenario can be considered, at most, as an indirect cause of the change in the data products.

Statistical significance/representativeness of the reduced-resolution data.

As pointed out by referee #2 there are some questions on the usefulness of this limited sample of retrievals. Firstly, there are two quite different scanning sequences that are used indifferently here, when the different altitude spacings might impact the results.

ANSWER: As remarked in the reply to the suggestion made by referee #2 to show the results of different measurement scenarios separately, the authors decided not to implement this option because of the poor statistics available for the nominal scenario.

Secondly, could the authors give their appreciation on the statistical significance of an ensemble of 86 profiles for the reduced-resolution observations when compared with 1633 full-resolution limb scans? If anything, increasing the number of new profiles might show that the quality of the former is in fact greatly improved.

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ANSWER: The statistical significance of reduced-resolution dataset versus the full-resolution one can be evaluated by looking at Fig. 5 and Fig. 6, that show respectively the bias and the standard deviation for the two datasets. The difference in the magnitude of the bars reported on those curves provides a quantitative indication for the different statistical significance of the two datasets.

Lastly, although the present Technical Note does not aim at validating the new product, a few words on the other validation studies in which the reduced-resolution data were used would, I think, be helpful to the reader.

ANSWER: The authors accept the suggestion made by the reviewer to cite other validation studies in which the reduced-resolution data were used. For instance, the comparison made with MIPAS reduced-resolution ozone data for the validation of ACE-FTS will be cited in the final version of the paper.

Specific comments

p.798, l.12 (and p.799, e.g. l.13): The processor used for the retrievals evaluated here should be clearly mentioned.
ANSWER: The required information about the version of MIPAS processors will be added. The authors, however, prefer to insert it along with other technical details of the MIPAS dataset (i.e. in section 2) rather than in the abstract/introduction.

p.798, l.19-22: A few numeric values might be helpful for illustration.
ANSWER: in the abstract the authors provide a general statement summarising the outcome of the comparison, along with the quantitative information that can be succinctly expressed. Further quantitative details that require a more elaborated

discussion are reported in sections 5 and 6.

p.799, l.14-15: Please give a few words of explanation for the dates (July 2002 and March 2006).
ANSWER: July 2002 marks the start of the period for which MIPAS acquired nearly continuous limb scanning measurements. May 2006 is the end of the period for which ESA made available the reduced-resolution dataset for validation purposes. This information is given subsequently in section 2 and probably it does not need to be duplicated in the introduction.

p.802, l.11: To my knowledge the validated ESA profiles were retrieved with the off-line processor. I find it a bit confusing in terms of semantics: should not the "near-real-time" retrievals only be considered operational? I would welcome some clarification (not necessarily in the paper) on the terms near-real-time / operational / offline.
ANSWER: *Near-real-time* (NRT) are the products distributed by ESA within 3 hours from the measurement time. *Off-line* (OL) are the products obtained from the re-analysis of the measurements with improved geolocation and set up of the level 1 and level 2 chain. With the term *operational*, the authors intend to refer to the official products distributed by ESA, including both NRT and OL data (following the general understanding shared by the MIPAS validation community).

p.803, l.13-15: For this reason, I think the concern raised by referee #2 should be clearly answered. Do the settings used here reflect what might be publicly released?
ANSWER: The settings used here do not entirely reflect what will be publicly released, as the authors will explain in more detail, by adding a specific statement in the conclusion section.

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p.803, l.27: I do not understand how there can be only 86 profiles from 140 orbits. Also, I am currently aware of one study in which the reduced-resolution data are used (comparison with ACE-FTS) with a larger number of MIPAS profiles. It is difficult to believe that there would be less coincidences with GOMOS than with ACE-FTS. Please justify these low numbers.

ANSWER: The smaller number of coincidences between MIPAS and GOMOS compared to ACE-FTS is due to the reduced availability of GOMOS measurements for the period under investigation. As described in section 3, GOMOS did not acquire any measurement from January 2005 to August 2005 and operated with a number of stars decreased by 65% after August 2005.

p.805, l.28: Overestimated compared to what? Please provide a reference or some explanation.

ANSWER: A reference to *Influence of scintillation on quality of ozone monitoring by GOMOS* (Sofieva et al., 2007) will be added in the final version of the paper.

p.807, l.17-19: I do not completely adhere to this statement. Indeed, a discrepancy between the comparisons could well be attributed to altered instrumental performances, but could also be due to processing differences. Therefore, an internal check with other MIPAS processors might be very useful. Please comment on this or reword.

ANSWER: The authors agree with the reviewer and they will re-word the sentence.

p.810, l.15, and throughout: since the scanning sequences are given in kilometers and to help the reader, giving approximate altitudes corresponding to the mentioned pressures would be helpful.

and

p.817 to 825, figures and tables: the tables state only altitude ranges, while the figures use pressure levels. Here also, approximate pressure values in the tables or, alter-

nately, approximate altitude values on the right-hand axis of the figures, would help better link the scanning and microwindow ranges to the retrieved profiles levels.

ANSWER: In Table 2 and in Table 3, a column with approximate pressure values will be added.

Technical corrections

All the technical corrections indicated by the reviewer will be implemented in the final version of the paper.

References

Missing accent or accented letters will be checked and corrected throughout.

References with authorship reporting at least three names are accepted by the editor and should not be considered as incomplete.