

Interactive comment on “Retrieval of temperature, H₂O, O₃, HNO₃, CH₄, N₂O, ClONO₂ and ClO from MIPAS reduced resolution nominal mode limb emission measurements” by T. von Clarmann et al.

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The authors thank the reviewers for their helpful comments. Most of these are suggestions how to improve the clarity of the paper. These were easy to implement and have all been included in the revised version of the manuscript. There remain only a few questions which need some further discussion.

Rev. #1, Sect. 3.3 *It is not clear, why ‘optimal estimation method’ is mentioned as ‘formerly called optimal estimation method’*

We chose this wording because C.D. Rodgers has changed the name of this method in his book (C.D. Rodgers, Inverse Methods for Atmospheric Sounding: Theory and Practice, volume 2 of Series on Atmospheric, Oceanic and Planetary

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Physics, F. W. Taylor, ed. World Scientific, 2000). However, ‘formerly called...’ indeed sounds a bit funny, and we write ‘also known as...’ instead in the revised version of the paper.

Rev. #1, Sect. 3.5.2 *Vertical resolution*

The requested table has been included.

Rev. #2, Tables 1a-c *Nominal Mode Retrievals*

Table headers have been changed as requested.

Rev. #2, Sect. 2 *Horizontal Sampling*

This term is now defined when the horizontal measurement spacing is mentioned for the first time.

Rev. #2, Sect. 3.1 *Why is non-LTE not included...’*

For reasons of efficiency non-LTE is avoided by selection of analysis windows. This was also the case for the full resolution retrievals whenever possible. For certain species (e.g. NO, NO₂, CO) non-LTE has been considered in the full resolution retrievals and still is with the reduced resolution retrievals but these species are not included in this paper. For some further species (e.g. O₃) non-LTE retrievals are performed for particular measurement modes with a focus on higher atmospheric layers. In no case we have switched from non-LTE to LTE-processing. Some text has been added to make this clear.

Rev. #2, Sect. 3.5.2 *Maximum values...’*

This statement is now discussed in more detail to make it better understandable.

Rev. #2, Sect. 3.5.3 last line

The strong dependence of the horizontal resolution on the number of available tangent altitudes in some cases could not be reproduced, and it is not clear if these findings are representative at all. The related part of the text has been deleted which makes the wording correction obsolete.

Rev. #2, Sect. 4 *Please explain better the aliasing problem'*

Some text has been added.

Rev. #2, Table 4 *What is the reference for $tp?$...'*

Some explanation has been added to the table caption.

Rev. #2, Tables 5 to 11 *To calculate the error contributions in percentage values, what are the reference values at each altitude?*

Since we present both absolute and relative errors, the reference profiles are redundant information because they can easily be reconstructed by division of the absolute errors by the relative errors where relative errors are percentage errors divided by 100. We prefer not to change the tables in order not to overload the reader with redundant information and to avoid formatting problems with too wide tables.

Rev. #2, Fig 12 *Very sharp features in winter/early spring between 40 and 50 km altitude...* Rapid enhancements are attributed to final warmings (March/April 2005–2007) or a midwinter warming (January 2006, c.f. Manney et al., J. Geophys. Res. 113, D11115 doi:10.1029/2007/JD009097, 2008). At altitudes above 40 km, subsided air rich in N_2O produced in the mesosphere (c.f. Funke, ACP 8, 5787–5800, 2008) might also have contributed to N_2O enhancements. All this is now mentioned in the paper.

Technical corrections: All technical corrections have been applied.

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