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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simultaneous measurements of OClO, NO_2 and O_3 in the Arctic polar vortex by the GOMOS instrument" *by* C. Tétard et al.

Anonymous Referee #2

Received and published: 4 August 2009

This is a review of the paper "Simultaneous measurements of OClO, NO_2 and O_3 in the Arctic polar vortex by the GOMOS instrument" by Tétard et al.

The paper presents the retrieval of stratospheric minor species in the Arctic vortex stellar occultation measurements by the GOMOS instrument on Envisat. O_3 and NO_2 are already standard GOMOS products, and the focus in this paper is on the retrieval of OClO, which requires co-adding of measured transmittances to improve the detection.

The paper is well-written, and I recommend that it be published in ACP after the following comments are addressed.

Specific Comments

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1. Page 12709, Line 9: Could you expand on the use of OClO to constrain chemical models, or at least supply a reference?

2. Page 12709, Line 19: You list a number of measurements of OClO that have been made in the past, but you should highlight the shortcomings of these measurements in terms of global coverage and/or vertical information, i.e. the motivation for this work.

3. Page 12710, Line 20: I suggest that you remove the last sentence of this paragraph and replace it with a comment on the importance of these OClO measurements even if they are not validated (e.g. the limited amount of OClO data available).

4. Page 12711, Line 23: I am not clear about whether the OClO retrieval presented here is the same method used by Fussen et al. If it is indeed the method used by Fussen et al., this should be specifically stated. If not, some discussion about the differences in the approach should be added. Also, somewhere you should mention what the predicted accuracy of your measurement are.

5. Page 12711, Line 24: When averaging data over the period of one month, is interpolated onto an altitude grid sufficient to not introduce any artifacts in the data? You should consider interpolating in potential temperature, which should give a more consistent grid.

6. Page 12713, Line 3: Please specify the absorption cross sections that you used.

7. Page 12713, Line 7: Is there a reference for the GOMOS operational algorithm?

8. Page 12713, Line 4: Although you show that there is good consistency between your results and the GOMOS operational algorithm, I am not sure that this really says anything about the accuracy of the OClO results since the error sensitivities, etc. could be very much different.

9. Page 12713, Line 14: Again, did Fussen et al. use the same retrieval method as is presented here?

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10. Page 12713, Line 21: Rather than referring to a web site, please add some references to the literature about the 2007/2007 winter.

11. Page 12714, Line 8: I understand that the white circle in Fig 2 represents the GOMOS measurements, but why not plot the actual locations?

12. Page 12715, Line 9: You do not mention the role that dynamics might be playing in your interpretations of the retrievals. For example, to what extent is the decrease in ozone in Figure 5 due to dynamics rather than halogen activation?

13. Page 12716, Line 4: You mention errors bars here, but where do they come from and what is included?

14. Page 12717, Line 5: Again, please refer to papers in the literature about the 2004/2005 arctic winter.

15. Page 12717, Line 23: I am not sure that the behaviour of OClO that you are seeing in 2005/2006 is that different from what you have seen in other years, where OClO is fairly constant in mid to late January.

16. Page 12718, Line 1: Given the poor quality of the 2007/2008 data (very large error bars), I am not sure that you can conclude anything from this data. Is there any reason why you did not carry out any longitudinal discrimination here, perhaps by looking at the potential vorticity?

17. Page 12718, Line 24: I am not sure that you have shown that you can measure the degree of halogen activation with your measurements since you do not quantitatively relate this to what you measure.

18. Page 12719, Line 3: Perhaps you can elaborate a bit on how you will go about validating your OClO product. I assume that it will be complicated by the strong diurnal variation?

Typographical Errors, Etc.

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1. Page 12708, Line 3: This should say “GOMOS stellar occultation measurements”.

2. Page 12710, Line 9: SAGE III is no longer in operation, so you should say “. . .performed lunar occultations. . .”.

3. Page 12710, Line 10: It should say “no results concerning this have been published.”.

4. Page 12710, Line 10: I suggest you re-arrange the end of this paragraph, moving the sentence starting with “Preliminary results” to after the sentence ending with “measurements in the stratosphere” to make it clearer.

5. Page 12711, Line 2: Should be “sun-synchronous”

6. Page 12712, Line 4: I think you mean “. . .technique is then applied on each weighted mean spectrum”

7. Page 12712, Line 7: Should say “Even though the ozone absorption”

8. Page 12712, Line 9: Just say “we use measurements from the star Sirius”

9. Page 12713, Line 25: Should be “threshold”

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 12707, 2009.