Atmos. Chem. Phys. Discuss., 7, S8921–S8923, 2008
www.atmos-chem-phys-discuss.net/7/S8921/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Validation of ACE-FTS v2.2 methane profiles from the upper troposphere to lower mesosphere" *by* M. De Mazière et al.

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Received and published: 29 January 2008

Dear Authors,

We would like to comment on the bias found between ACE and MIPAS measurements at high altitudes (above 60 km) (Figs. 2 to 4 and the last two paragraphs on page 17990). As you mention this bias is rather high, up to -80% difference. Although the random error in MIPAS CH4 profiles grows very large (Raspollini et al., 2006) and that this bias looks compatible with the systematic uncertainty of the MIPAS profiles, we think it might be caused by other possible reasons, e.g., non-local thermodynamic equilibrium (non-LTE) effects and/or the truncation of negative values to 1.0e-10 which is performed in the operational MIPAS data for all species.

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Regarding the first, it has been shown (López-Puertas et al., 2005) that the emissions from the v4 band near 7.6 μm, which is used in MIPAS retrieval, are in non-LTE in the daytime at altitudes above around 50 km, reaching limb radiance deviations of 20% at 60 km and up to 60% at 70 km. Thus, the enhancement observed in MIPAS, which is of a similar relative enhancement as that shown in the paper, could be due to this effect since the absoprtion measurements of ACE are free of non-LTE. One easy way for checking this would be to divide the comparison with MIPAS day and MIPAS night measurements. If the non-LTE effects were responsible for the MIPAS-ACE bias we would expect it to be present in the ACE/MIPAS(Day) comparison and absent in ACE/MIPAS(Night). We suggest that the authors perform such an easy comparison and describe the results in the paper.

Concerning the second reason, the absence of the negative values in the retrieval would lead to a positive bias in the mean of the measurements of a certain emsemble if their magnitude is close to the error induced by the instrumental noise. We have shown this effect is present and significant in MIPAS operational for N2O at 60 km and NO2 above 60 km by comparison with independent retrievals were the negative values are not removed (Funke et al., in preparation) . An estimation of such an effect on the bias could be done by assuming a gaussian distribution of the noise and using the MIPAS noise values for the CH4 vmrs different from 1.0e-10. We suggest that either the author make such an estimation at the uppermost altitudes (60 and 68 km) or at least mention this effect as a possible reason for the positive bias in MIPAS CH4 at high altitudes. Alternatively, we could easily make such an estimation if the CH4 vmrs and noise values are provided.

We hope the authors migth want consider these sugestions which, in our opinion, would lead to a better understanding of ACE and MIPAS differeces.

Sincerely,

Bernd Funke and Manuel López-Puertas.

ACPD

7, S8921–S8923, 2008

References:

@article{LopezPuertas:2005p286, author = {Manuel L{\'o}pez-Puertas and M. E Koukouli and Bernd Funke and Sergio Gil-Lopez and Norbert Glatthor and Udo Grabowski and Thomas von Clarmann and Gabriele P Stiller}, journal = {Geophys. Res. Lett}, title = {Evidence for CH4 7.6 μm non-local thermodynamic equilibrium emission in the mesosphere}, pages = {04805}, volume = {32}, year = {2005}, month = {Feb}, }

Funke, B., López-Puertas, M., García-Comas, M., Stiller, G., von Clarmann, T., Höpfner, M., Glatthor, N., Grabowski, U., Kellmann, S., Linden A., Mesospheric N2O enhancements as observed by MIPAS on Envisat during the polar winters in 2003-2004, to be submitted to ACPD.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17975, 2007.