Atmos. Chem. Phys. Discuss., 5, S5523–S5526, 2005
www.atmos-chem-phys.org/acpd/5/S5523/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Retrieval of stratospheric ozone profiles from MIPAS/ENVISAT limb emission spectra: a sensitivity study" *by* N. Glatthor et al.

N. Glatthor et al.

Received and published: 17 February 2006

We thank referee 1 for encouraging us to work more thoroughly towards well argued conclusions. In order to avoid that the paper is rather a routine report, we will reorganize it as follows: All aspects of retrieval of more general importance (i.e. which are applicable also to other than our own data processor) will be covered in a dedicated section each. These are: 1) Assessment of the cloud index, 2) Assessment of the continuum treatment, 3) Assessment of the bias between retrievals based on microwindows in MIPAS band A versus AB. All other investigations which are of more technical nature or specific to our processing environment will be largely condensed and summarized in one section, which is of interest for the community of data users who may need a clear documentation of changes between data versions.

Further referee 1 as well as referee 2 are concerned that our dataset might be too small. Therefore we have investigated more Envisat orbits in order to better cover the variability of the atmosphere. This additional material will be included in the revised version.

Reply to the specific comments: 1. (old Section 3.2): We have assessed aerosol and cloud spectra from the literature and have made radiative transfer forward calculations. These help to justify the suggested treatment of the continuum and will be included in the revised manuscript. Comparison of retrieved continua is not considered helpful, because these do not only include physical continuum information but also compensate residuals of different origin.

2. (old Section 3.2): We have now tested the sensitivity of the ozone retrieval to various values of the cloud index, not only the two indices of the original paper. Further we performed a study, how the cloud index behaves when applied to forward-modeled spectra including typical cloud signals as found in the literature. Moreover, to obtain a more objective cloud threshold criterion, we accomplished model calculations to estimate the additional error component caused by cloud-contaminated spectra not rejected by a certain cloud threshold.

3. (old Section 3.3): We are currently trying, with a good chance of success, to find a more quantitative explanation for the band-dependent differences of ozone retrievals by correlation analysis. We hope that this assessment allows us to come to a conclusion on this point and will certainly be included in the revised manuscript.

3. (old Section 3.3): To present a more quantitative estimation of the reason of the band-dependent differences of ozone retrievals we performed a correlation analysis. The result is that the differences are rather caused by spectroscopic uncertainties than by band dependent calibration uncertainties. In more detail, the correlation analysis reveals the following: The differences between band A retrievals involving only nu2 lines and band A retrievals involving only nu3 lines are correlated to the differences found

ACPD

5, S5523–S5526, 2005

between the MIPAS bands, while differences between band A retrievals and band AB retrevals involving lines from the same band (nu3) do not correlate with the differences found. This more quantitative assessment allows us to come to a conclusion on this point and will certainly be included in the revised manuscript.

4. In the revised paper we will try to emphasize the reference to the results by Wang et al. more clearly in the sections where the updated retrieval setup choices are discussed. This will put the validation results better into context.

We thank Referee 2 for helpful comments but we do not agree with each single point. In particular, we wonder why the scope of the paper is an issue of the interactive reviewing process. The appropriateness of the scope for ACP should, to our understanding, be decided in the access peer reviewing process, while the interactive reviewing process should discuss the robustness and conclusiveness of the manuscript. Further, the referee seems to have missed that we do not discuss an ESA data product, so an ESA technical note certainly is not the appropriate way to communicate our results.

Reply to the specific comments: Although the original orbit chosen already covers a wide range of atmospheric situations, meanwhile further orbits have been considered which show similar results and which will be included in the revised manuscript.

As mentioned above, we will try to put the results of Wang et al. more into the context of discussion of differences between old and new retrieval setups in the revised manuscript.

In the revised manuscript, the differences between old and new retrieval setups will be related not only to the total estimated error but also to the total random error (i.e. spectroscopic uncertainties excluded). An End to end comparison will be included.

The issue of the occupation matrices is very technical because it depends on the particular processor setup. In our case the polar occupation matrix has been optimized for a cold atmosphere which makes retrievals more robust, because this particular

ACPD

5, S5523–S5526, 2005

occupation matrix includes transitions which have sufficiently large signal. We don't see anything wrong about this. However, since this issue is not of general relevance because it depends on the particular processing environment, and since no related change in data versions was implied which might be of interest for the data users, we will give this side aspect much less room in the revised manuscript.

Since we will re-organize the manuscript in reply to review 1 and will include additional assessment of many key aspects, we feel that the revised manuscript will contain sufficient new and robust scientific results to be interesting to a broader community.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 12031, 2005.