

Interactive comment on “Error budget analysis of SCIAMACHY limb ozone profile retrievals using the SCIATRAN model” by N. Rahpoe et al.

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Review of Rahpoe et al., “Error budget analysis of SCIAMACHY limb ozone profile retrievals using the SCIATRAN model”

This paper presents work associated with an attempt to analyze fully the total error budget for the SCIAMACHY limb scatter retrieval of the vertical number density profile of ozone. The paper investigates all possible sources of both systematic and random errors and then attempts to quantify the total error budget for the typical ozone retrieval in specific latitude bands. This paper is useful to the ozone measurement and data user communities and should be published after certain concerns are addressed.

General Comments

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The main issue I have with the work is that it relies on only a handful of simulated retrievals to estimate the total error for typical ozone profiles inferred from SCIAMACHY measurements. The assumption that these case studies reflect typical behaviour has to be justified. Once this justification is presented the reader will be far more inclined to trust the presented analysis and use the results in their estimate of SCIAMACHY ozone errors. Hopefully the authors can add a section to the paper to justify this hypothesis, as the alternative is to do an exhaustive set of simulations that cover all possible viewing geometries and scene conditions for each of the potential error causing parameters.

Minor issues

I found the figures hard to read when the paper was printed to hard copy. They were complete and well done but as presented within the document they were quite small. Care must be taken with the final version.

Section 3.1 needs more work. The correct parameter to vary is not albedo which is the fraction of light incident on the earth that is reflected back. The correct number is the absolute value of the radiation that is reflected. For instance if the solar zenith angle (SZA) is 89 degrees an albedo error of 0.1 will have far less impact on the total retrieval than the same albedo error if the SZA is close to zero degrees. This is because the absolute amount of upwelling radiation is vastly different for the two specific cases.

Along a similar line of thought it is my opinion that the stratospheric aerosol analysis in Section 3.2 requires more detail. Viewing geometries with different single scatter angles will result in different retrieval errors for the same aerosol uncertainty. This is because the scattering phase function can be very different for different single scatter angles. This needs to be addressed within this section.

Line 5 on page 4649 – there is a typo in the word ‘regularization’

Concluding Remarks

I think this is a very worthwhile paper but before I can accept it the authors must ad-

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dress my concerns. I was troubled by the lack of detail within the studies and I strongly feel that the assumption that a small set of case studies is representative of the whole must be justified. I also feel that the treatment of the albedo and the aerosol must be expanded in order to provide useful numbers to be used by the measurement and ozone data user communities. I have asked for major revisions but if my concerns can be addressed quickly and without much change to the paper I will also be happy to accept this outcome.

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