**Atmospheric
Measurement
Techniques
Discussions**

Interactive
Comment

Interactive comment on "How to average logarithmic retrievals" *by* B. Funke and T. von Clarmann

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We thank both Referees for helpful comments and suggestions. The "Referee's Comments" are noted first and then we give our "Reply:" to the comment.

Referee 1

The phrase "several ten percent" in the abstract is not a common English construction. Please consider rephrasing.

Reply: We will change the wording to ". . .can easily reach ten percent or more".

Also, the phrase "hardly predictable" appears in both the abstract and the conclusions

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and is also not typical. Maybe simply "unpredictable" would be better.

Reply: We will follow the suggestion of the Referee by using the term "unpredictable".

The idealized assumptions made in Equations 5 and 6 may not be completely obvious to some readers so a little explanation in the text might be helpful.

Reply: By Eq. 5 and 6 it is assumed that the a priori information and its variance are equal to the arithmetic mean and standard deviation, respectively, of the "true" (i.e., modeled) distribution in the logarithmic vmr domain. This would be the optimum condition for a maximum a posteriori retrieval (see Rodgers et. al., 2000). In real applications, however, this is difficult to achieve since the true state of the atmosphere is unknown and not necessarily represented by the climatological distribution. We will add some explanations in this sense to the text.

Legends for figures 2, 4, 5, 6, 7 and 8 are required.

Reply: Legends for Figures 2, 4, 5, 6, 7, and 8 will be included.

Referee 2

"..., I felt the title is misleading especially in the context of the last sentence in the abstract which essentially says that the purpose of the study is to illucidate the impact of various logarithmic averaging schemes and that there is no method found to "correct" for biases introduced. Therefore I think a better title would be something like "Biases introduced by retrieving and averaging of logarithms of trace gases."

Reply: We agree that the title in its present form is somehow misleading as it suggests that we provide a recipe how to average logarithmic retrievals. On the other hand, the title reflects the motivation of our study, i.e. the question how to average logarithmic retrieval in the most appropriate way, and the paper deals with finding an answer (even if this answer is not as straight forward as it was wished to be). Therefore we think that it is appropriate to stay with the original title, however, with the subtle difference to include a question mark at its end.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 7159, 2011.