**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Validation of remotely sensed profiles of atmospheric state variables: strategies and terminology" *by* T. von Clarmann

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I would like to thank the reviewer for his helpful comments. In the following, my reply to the specific points are listed.

p. 4974, l17-21: The text will be changed to make this clear.

p. 4976, eq(6): The smoothing error had intentionally been excluded here, first, because it is usually not reported, and second, because Eq. (11) would not hold for S_{total} with smoothing error included, since $S_{smooth,diff}$ here is added as an independent term. With S_{smooth} included in S_{total}, one would always need a more complicated formulation similar to Eq (12), and the smoothing error component would not appear explicitly in Eqs (11-12), which we consider confusing. However, to make the paper more consistent with established literature, the smoothing error will be included into the total error

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and an additional error term will be defined which is the sum of random and systematic errors.

p. 4976, eqs(7-9): agreed, but to be consistent with Eq. (5) the random and systematic components of the smoothing error have also to be quadratically added to the righthand sides of Eqs (8) and (9), respectively.

p. 4977 l 1-2: Elimination of the cause of the bias to me seems, strictly speaking, somewhat beyond validation. Nevertheless, I will mention that identification and removal of the cause of a bias are the desired final step.

p.4988 eq(11): The text will be re-ordered such that the definition of $S_{coinc.}$ follows immediately after Eq. (11), which should make Eq. (11) much easier to understand. In this definition there is a link to Sect. 3.2, where S_{coinc} is discussed in mathematical detail. The decomposition of the total error into its components is not included in Rodgers and Connor but in Rodgers (1980, JGR; 95, 5587) and (Rodgers 2000 "Inverse Methods for Atmospheric Sounding"), but not in the context of profile differences but single profiles. Thus, I consider such a reference confusing here. This work is referenced in other parts of the paper.

p 4977 eq(12): This is simply a generalized formulation of error propagation of a matrix difference with correlated terms. The elements of C will be defined: $c = r * \sigma_{val} * \sigma_{ref}$, where r is the correlation coefficient, and the σ terms are the related standard deviations.

p 4978 l15-19: agreed, this comment will be deleted.

p 4978 l15-19: will be rewritten anyway in reply to review #2, in order to simplify the statement.

p 4978 eq.13 For the original version of the paper, the simplified form as suggested by the reviewer may be simpler. However, in reply to review #2, Section 3.3 has been reworked, and now it is adavantageous to have an explicit difference in Eq. (13).

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p 4978 l23: we will replace "residual random term...matrix" by "residual random term of the coincidence error should be characterized by the covariance matrix S_{coinc}.

p 4982 Eq(20): in reply to review #2 the entire subsection will be rewritten, and the more general representation of a retrievals as a function of the true profile, the a priori profile, and the averaging kernel will be considered.

p 4975 l9: corrected;

p 4976 l10-11: we consistently use the following notation: scalar variable in italic font, subscript as part of variable name in roman font, then a subscript semicolon, then the indices in subscript italic, separated by a comma from each other.

p 4982 l2: obsolete after rewriting of this subsection.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4973, 2006.

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