

***Interactive comment on* “Technical Note:  
Variance-covariance matrix and averaging kernels  
for the Levenberg-Marquardt solution of the  
retrieval of atmospheric vertical profiles” by  
S. Ceccherini and M. Ridolfi**

**Anonymous Referee #1**

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In this paper a method for the calculation of variance-covariance matrices (VCM) and averaging kernels (AKM) of atmospheric parameter retrievals using the Levenberg-Marquardt method is presented. The paper is very well structured and clearly written. However, I'm a bit concerned about publishing in ACP because:

- (1) In my opinion such a study, even though it is declared as a technical note, would fit ideally into the scope of ACP's sister journal AMT, but much less into ACP.
- (2) Serious concerns have been raised about the validity of the presented retrievals,

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and thus of the methods, with respect to their convergence status in the short comment SC C9660: 'Gain function', Thomas von Clarmann, 13 Jan 2010. There it is stated that for all converged retrievals the standard methods for the calculation of VCMs and AKMs would still be valid. Thus, it is necessary to discuss clearly in the paper why the authors apparently accept non-converged retrievals for which adapted methods for the VCM and AKM determination are required.

(3) There should be a section where the implications of the study on the standard MIPAS retrieval products by ESA are discussed in more depth. (This would be a valuable step towards fitting the paper in the ACP scope: 'focused on studies with general implications for atmospheric science'.)

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 25663, 2009.

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