

Dear Adrian

Thank you for your suggestions. I have looked at the references you suggested to add to our paper:

1. K. Singh, A. Sandu, K.W. Bowman, M. Parrington, D.B.A. Jones, and M. Lee: "Ozone Data Assimilation with GEOS-Chem: a Comparison Between 3D-Var, 4D-Var, and Suboptimal Kalman Filter Approaches". Atmospheric Chemistry and Physics Discussions, 11, 22247–22300, 2011 <http://www.atmos-chem-phys-discuss.net/11/22247/2011/acpd-11-22247-2011.pdf>
2. K. Singh, M. Jardak, A. Sandu, K. Bowman, M. Lee, and D. Jones: "Construction of Non-diagonal Background Error Covariance Matrices for Global Chemical Data Assimilation". Geoscientific Model Development, Vol. 4, pp. 299–314, 2011.
3. E.M. Constantinescu, T. Chai, A. Sandu, and G.R. Carmichael: "Autoregressive Models of Background Errors for Chemical Data Assimilation". Journal of Geophysical Research, Vol. 112, D12309, 2007.

There are no doubt very nice papers relevant to chemical data assimilation. Some of which I really enjoyed and I think should be referenced more often, but I have some reserve as whether it should be included in this paper or not.

The objective of the paper is compare two well known "advanced" data assimilation systems running in their optimal configuration while using the same correlation modeling for \mathbf{B} for 4D-Var and \mathbf{Q} for the EnKF based on a spectral formulation. Our objective is not to compare an optimal assimilation system with a sub-optimal one, or to compare the effect of different correlation models on the assimilation. So our introduction, on purpose, does not contain such studies. Rather it focuses on any other comparison done between 4D-Var and EnsKF, were we refer for example

- Wu, L., Mallet, V., Bocquet, M., and Sportisse, B.: A comparison study of data assimilation algorithms for ozone forecasts, J. Geophys. Res., 113, D20310, 2008.
- Constantinescu, E. M., Sandu, A., Chai, T., and Carmichael, G. R.: Ensemble-based chemical data assimilation. I: General approach, Q. J. R. Meteorol. Soc., 133, 1229–1243, 2007a

Coherent with this approach, we did not referred the Ménard and Chang 2000 paper for the comparison it has between KF, sub-optimal KF (variance evolving) and statistical interpolation (equivalent to 3Dvar), but we referred it only for the chi2 diagnostic and its use to determine model error. In the same vein we don't feel we should include the paper #1 that is suggested. As far as papers #2 and #3 they fall into covariance modeling papers which is outside the scope of this paper and would be nice to have in a review paper.

Having said that I hope you understand our point of view, and if you have any hesitation please let us know.

Richard Ménard on behalf of the author and all co-authors.