

Interactive comment on “Using an extended Kalman filter learning algorithm for feed-forward neural networks to describe tracer correlations” **by D. J. Lary and H. Y. Mussa**

Anonymous Referee #2

Received and published: 15 July 2004

Summary: The authors introduce a new, efficient algorithm, based on Kalman-Filter trained neural networks, to allow estimation of one tracer, based on a model result for another. Reading the text I am convinced that neural networks can indeed be used to advantage for this purpose. However, the mathematics in this article is somewhat forbidding to a non-specialist, and it is not clear to me exactly what are the input data and the products of the algorithm. (A sentence in section 3 containing this information needs to be given more prominence by moving it to section 2). Furthermore, it seems that the example chosen by the authors to demonstrate their technique is perhaps an unfortunate one since N_2O and CH_4 are tightly related (or at least the authors' model data suggest this). Perhaps this is just a display problem. If instead of displaying CH_4 versus N_2O the authors chose to display CH_4 versus $\text{N}_2\text{O} - p_{20}(\text{CH}_4)$, where p_{20}

is the 20-th order Chebyshev polynomial best describing their relationship as a single functional dependence (see figure 1 of the article), then the skill of the algorithm might come through more clearly even though the correlation coefficient would suffer. Alternatively, the authors could apply the algorithm to tracer pairs that are less tightly correlated, such as N_2O and O_3 or N_2O and CFC-11.

I consider the topic interesting and worthy of publication in ACP, however I think it is necessary for the authors to take into account that ACP readers are broadly interested in numerical methods but are on the whole not experts in computational algorithms. The article will clearly benefit if the authors consider that ACP, as I understand it, is not the ideal forum to discuss computational algorithms, for which there are more suitable publications available. So the main motivation for their study needs to remain to understand atmospheric chemistry and physics and not the behavior of an algorithm. To achieve this goal, I suggest to refocus section 2 to make the link between state-of-the-art numerical methods and problems therein and stratospheric longlived tracers. Sections 2.1 and 2.2 would benefit if all variables were given a physical / meteorological / chemical meaning and a verbal description that goes beyond their mathematical role in the algorithm. Section 2.3 could form an appendix.

Details: The list of references, especially those of JGR and GRL articles, needs to conform to those journals' citation standards.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 3653, 2004.

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)