Atmospheric Chemistry and Physics Discussions

Interactive
Comment

Interactive comment on "Using neural networks to describe tracer correlations" *by* D. J. Lary at al.

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General comments

The manuscript describes the use of neural networks to reconstruct abundances of atmospheric tracers from known abundances of other tracers, exploiting the tight relationships between different constituents as found in the middle atmosphere. In the example given in the manuscript, a neural network is trained with modelled concentrations of CH_4 and N_2O. It is demonstrated that the neural network is then well able to reconstruct N_2O concentrations from CH_4 concentrations, even in the non-unique altitude-dependent regime.

This contribution is interesting to a wider community of atmospheric science. The relevance and the promising capabilities of the presented method are convincingly shown. The manuscript should be published after some revisions.

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Specific comments

In my opinion, the somewhat unusual structure of sections makes it a bit harder to grasp the message at first reading. I'd suggest to use the more common structure Introduction-Method-Results. Section 2 (Motivation) could just become part of the Introduction, with addition of an explicit statement what exactly you are going to do (reconstructing N2O from CH4). The Method section could then contain the first paragraphs of Section 3, the particular specification of the used network given in 3.1 (also mention there explicitly what the 4 inputs and the output are - this is only said later), and Section 3.2 (which seems to be a methodological detail). Then, the Results section would contain the main part of 3.1.

Introduction, lines 20-21: For readers not familiar with middle atmospheric chemistry, it would be helpful to add a short explanation how the tight correlations of even chemically unrelated species come about.

Motivation, lines 19-20: It is not clear to me what `self-consistent' means here.

Could you comment on why altitude has not been chosen as an input parameter, and why the neural network nevertheless manages to well reproduce the altitude-dependent regime?

Secion 3.1, lines 14-16, `Even though ...': Could you explain this statement a bit more in detail?

The figure caption mainly repeats the discussion of Section 3.1. A more descriptive text would be helpful here.

Technical corrections

-/-

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5711, 2003.

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