

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

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This paper presents a method for simulating abundances of one tracer in the middle and upper atmosphere given abundances of another tracer. The method uses a neural network; in effect a nonlinear regression. The network is trained with a dataset of the two tracers and the record of the second tracer can then be extended using that of the first tracer. The approach seems sound and the application interesting. I therefore recommend that the paper be published with some minor revisions as suggested below. At first read, the paper was significantly more confusing than necessary because of the frequent use of the term “tracer correlation” in the text. E.g. in the short and long titles and sentences like: “In this study a neural network using Quickprop learning and one hidden layer with eight nodes was able to reproduce the CH₄-N₂O correlation with a correlation coefficient of 0.9995.” Unless I am misunderstanding the figure this sentence is misleading since the output of the neural network is not, in fact,

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the tracer correlation but a tracer abundance. The quoted value presumably refers to the correlation between simulated and observed values. As an extra comment, one should not use the correlation coefficient here since it is independent of the amplitude of variation, that is, one could underpredict every excursion by 50% and still get a near perfect correlation. One should quote the slope and the correlation coefficient. I would like to see a general tidying of the language around this point. My only other concern is with the terse description of the neural network itself. Outside the remote sensing community, these techniques are still fairly novel in the atmospheric sciences, indeed this represents one of the best aspects of the paper. However it does leave authors with a slight educational role to play. I would like to see an explanatory paragraph on “quickprop learning”.

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