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Atmospheric Chemistry and Physics Discussions

Interactive comment on "An evaluation of the performance of chemistry transport models by comparison with research aircraft observations. Part 1: Concepts and overall model performance" *by* D. Brunner et al.

Anonymous Referee #1

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I wish to congratulate the authors on this paper. I feel that this paper is an important step forward in the important area of evaluating the capabilities of our Chemical Transport Models. The paper demonstrates a variety of methods to evaluate the model performance relative to observations. They present quantitative techniques (bias, skill score, Taylor plots, etc.) that collectively provide metrics upon which we can evaluate progress in CTMs. The skill score as defined shows the importance of considering performance in the context of apriori expectations (say Temperature), as well a standard deviation of obs and model. I think it is very important that we consider our expectation in terms of CTMs — meteorological parameters such as temperature are predicted

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with higher skill – not be accident, but due in large part to the extensive use of observational data and data assimilation techniques. To me this says that advances in CTM skill will require attention to data assimilation as well. I hope that everyone doing model evaluation will read this paper (I will certainly recommend it). The paper does not address all issues. The paper advocates comparing model predicts interpolated to the precise aircraft location (space and time) say. Indeed this is a logical way to proceed, but there remains the issue of representative ness of the aircraft obs, relative to the model grid. This is addressed in part by the standard deviation – but this issue remains an open question... The general findings that emerge as a result of these evaluations and comparisons provide ideas about deficiencies in present models. Not surprising is that model treatments of vertical movement of material (either up or down), and wet removal are in need of further improvement. Also the fact that we predict ozone and even OH with greater "skill" than CO and NOx,remind us of the challenge of representing the spatial and temporal variability in emissions (e.g., biomass burning, lightning, ships,...). Clearly we have a long way to go in the development of CTMs, but this paper demonstrates techniques that need to be used to assist us in our efforts.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 2499, 2003.

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Interactive Comment