Atmospheric
Chemistry
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Discussions

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comment**

Interactive comment on "Error apportionment for atmospheric chemistry-transport models: a new approach to model evaluation" *by* E. Solazzo and S. Galmarini

Anonymous Referee #1

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Comments

This is an interesting and well written paper that makes a meaningful contribution to model evaluation. A few comments and editorial suggestions are provided below.

Wavelet filters can provide better separation of components (i.e., reduced covariances among components).

The spatial support of the model (model grid average) is greater than that of the observations (point scale), and should therefore have a smaller variance, as should all the temporal components. The term σm will typically be less than rσo for this reason.

The model/observation agreement in the DU component is driven largely by diurnal

forcing (similarly, the LT component has a significant amount of annual energy). Model performance metrics for the DU component is misleadingly optimistic because it mostly reflects the 24 hour and annual forcings embedded in both the observations and model values. For periodic processes, metrics derived from the amplitude and phase can be more informative.

The variance of the ID term is very small. Therefore, although the paper shows both the fraction of variance due to each component and the error terms, it should be pointed out that the small errors in the ID component are quite large relative to the total amount of ID variability.

Model/observation correlation as a stand-alone metric can be informative as it shows whether the model can reproduce patterns seen in the observations. For example, the ID component, as noted, has small errors, but for individual monitoring sites (not spatially averaged), correlation between modeled and observed ID is often quite low and insignificant (there often appears to be no relationship between the two). On the other hand, correlation tends to improve as time and space scales increase, often leaving the LT component with the best agreement in terms of correlation.

âĂČ Editorial comments

There is some confusion in the text when discussing bias. Figure 2 actually shows squared bias, though the discussion seems to be referring to both bias and squared bias.

Line 263: should read "has little impact" or "has negligible impact"

Line 283: The statement ending on this line could use a reference.

Line 305: What is meant by "sparseness of the modeled values"?

Line 452: should have a period at the end

Line 457: should have a period at the end

Figure 1. Panels do not have 'a)' and 'b)' labels. Also, if it's not too much trouble, invert the legends so that the colors appear in the same order as they do in the bars.

Figures 3 and 4 are very difficult to look at. When error terms are small it is hard to tell where the intersection is. Zooming in would help with better image resolution.

Figure 8: Caption should read 'from right to left'.