

***Interactive comment on “Global chemical weather forecasts for field campaign planning: predictions and observations of large-scale features during MINOS, CONTRACE, and INDOEX” by M. G. Lawrence et al.***

**M. G. Lawrence et al.**

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We appreciate the overall positive review and constructive comments from the referee.

1) This is a really interesting comment. I've been thinking about it for a while now, and have come to the basic conclusion that a comparison that shows a high correlation with an offset should generally indicate a problem with the sources, rather than with the losses or transport. The reason I would argue this is because the tracer concentration (or mixing ratio) changes as  $dC/dt = P - L \cdot C + T(C)$ , where  $P$  is the production rate,  $L$  the loss frequency, and  $T$  is the transport operator.  $C$  is linear with respect to the production, but nonlinear with respect to the loss and transport terms (transport depends on the gradient of  $C$ ). Thus an error in the production will lead to an offset, but

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not disturb the correlation, while errors in the loss and transport will tend to reduce the correlations. I'll add a sentence of this nature to the conclusions, and also, since the correlations are definitely not perfect, I'll mention that other model deficiencies such as those suggested by the referee could also certainly contribute.

2) A section on INDOEX was in an earlier draft of the paper, but was cut following comments from a few colleagues that strongly recommended cutting the length of the paper. Since neither of the referees indicated problems with the current length, perhaps I went overboard in cutting out the INDOEX discussion entirely, and will include an abbreviated version of the original discussion, along with 2 figures, in the revised manuscript.

3) There is already some discussion relevant to this question in the conclusions, though apparently I did not bring out the point well enough, and will add a sentence like "Shorter-lived tracers will be a particular challenge for the future of chemical weather forecasting." I point out that none of these shorter-lived tracers are currently modeled well enough in our global model (and I presume in most global models) to be relied on heavily in campaign planning; mostly they give a "second opinion" to the CO forecasts. Improving this situation will parallel general improvements in chemistry-transport model development. I do not think that regional models by virtue of resolution alone will do much better in this aspect, but those that contain more extensive oxidation schemes or better emissions datasets will certainly have an advantage over typical global models for short-lived species (on the other hand, global models will have the advantage for any short-lived gases which depend strongly on long-lived tracers that are strongly affected by intercontinental transport).

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