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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Multi-model simulation of CO and HCHO in the Southern Hemisphere: biogenic emissions and model uncertainties" *by* G. Zeng et al.

Anonymous Referee #1

Received and published: 31 January 2015

The purpose of this manuscript is to investigate the causes of model biases for CO and formaldehyde in the southern hemisphere. Overall, this is a well written and very thorough manuscript, but I do have one major concern. I would like to see more discussion on the chemistry that, I believe, will significantly improve the presentation and overall impact of this manuscript.

1) It would be helpful to have tables clearly showing the southern hemispheric budgets for CO and formaldehyde for each model. A graphic showing how the budgets change monthly may be instructive.

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2) In the same vein, it would be helpful to show the major contributors to the chemical production and loss terms for CO and formaldehyde for each model and how they vary in time. How do the four models' Henry's Law constants for formaldehyde compare? My recollection is that formaldehyde is not highly soluble, so there could be some sensitivity to the choice of Henry's Law constant. Could one model do two simulations, one each using the high and low of the uncertainty range?

3) There is considerable measurement uncertainty associated with the isoprene oxidation scheme. You say that looking into this issue is "beyond the scope in this study" and cite Archibald et al. (2010). I recommend that you at least provide a paragraph or two discussing the current uncertainties in individual reactions reported in the literature and hypothesize how they may or may not be relevant to your model exercise.

Minor Comments

There are too many typos and grammar issues.

Why don't you use MOPITT CO data to constrain the models?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 2615, 2015.