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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Reactive nitrogen in Mexico City and its relation to ozone-precursor sensitivity: results from photochemical models" *by* S. Sillman and J. J. West

Anonymous Referee #1

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In this manuscript, Sillman and West apply the CIT model to study the sensitivities of ozone formation in the Mexico City area. This is done by conducting simulations at the base (though adjusted in prior work) emissions, and simulations with 50% decreases in NOx and VOC emissions. They find that the ozone has a mixed sensitivity. Also, when they plot ozone versus various potential indicator species, NOz appears to be the best correlated, particularly when considering sites other than Mexico City (i.e., NOz would appear to be the more universal indicator). The sensitivity results are in contrast to other studies, which they explain, in part, as possibly being because of the decrease in VOC emissions from 1997 to 2003.

The manuscript provides some interesting results: that NOz appears to work pretty well as an indicator across areas and that Mexico City ozone has a mixed sensitivity to emissions. The discussion provides chemical reasoning behind the results.

However, there are a number of issues that should be addressed if the manuscript is going to be published in ACP.

First, they have a model. They can very readily test some of their statements. They can see if using similar emissions as used in the Lei et al., study lead to more similar results. Given that one of the more interesting results from this paper is the difference between their sensitivities and those of Lei et al., this section needs to be greatly reinforced. They can look more specifically at how temperatures impact their results. They can look more directly at how vertical transport alters sensitivities. None of these calculations should take too long. They can, I would think, instrument the model to provide the relative radical sink rates between reactions.

There are other issues that need to be addressed going down the road as well. The model platform they use is getting dated, and is not seeing the constant improvement that others enjoy. The simulations are very short, suggesting they are going to be sensitive to either initial or boundary conditions, and this will affect (typical inhibit) sensitivities. This should be changed such that they can show the sensitivities to both initial and boundary conditions do not impact their analysis and interpretation of the results. Also, isn’t 50% a rather huge change in emissions? Might this run in to problems in locations where responses are more non-linear in that you could get a response to NOx reduction where the sensitivity is originally negative, that is then positive to a 50% reduction. I would also like to see how the sensitivity varies with NOz and ozone, quantitatively.

I was a bit taken aback by having Fig. 3. Fig. 1 demonstrates that NOz is probably the best indicator of the bunch, so I would just use NOz and trim the discussion down. Focus on what is new and works best.

ACPD

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Interactive Comment

Minor:

20517: line 4: temperatures 20521, line 27: Lei et al. (not Let)

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 20501, 2008.

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Interactive Comment