Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-496-RC1, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contributions to local and regional-scale formaldehyde concentrations" *by* L. Bastien et al.

Anonymous Referee #2

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General comments:

The manuscript is very well structured and written. The manuscript is very interesting, adding more information on the use of the adjoint technique, in this case to calculate the sensitivity of formaldehyde to emissions of NOx, formaldehyde, and VOC precursors. I think the article deserves publication. My only concern is related to the linearity approach as I explain in my comments below.

Specific comments:

1. Please identify the radicals in R1 and R3 with more conventional radical identifiers.

2. Pg 6. "These studies suggest that ozone responses vary nearly linearly with emissions of precursor species for perturbations up to about 15–20 % of the nominal value."

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Discussion paper

Could the authors discuss this a bit more? Does this apply also for NOx emissions?

3. Pg. 6. The authors assume that (for formaldehyde) the “responses investigated here also vary approximately linearly with precursor emissions for perturbations up to about 15–20 % “. Even considering a potential linearity in O3 response in the suggested range, the chemistry of formaldehyde is different. To support this second approach (similarity to O3), could the authors include (if possible and available) more discussion, based on other studies, chambers, etc.?

4. S 3.1. l-30 “The agreement is less satisfactory for perturbations in NO emissions”. This is in line with my previous comment, on the hypothesis of the linearity of the formaldehyde response to precursor emissions. The comparison with the brute force approach indicates that this assumption of linearity is not completely valid. The conclusion section should include some comments on this uncertainty, to help the reader to interpret these results and to figure out the aspects that could be affected by this assumption of linearity.

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