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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of aromatics on tropospheric gas-phase composition" *by* Domenico Taraborrelli et al.

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Taraborrelli et al. provide an updated mechanism for the oxidation of aromatics in the EMAC model and a summary of the impacts of this update on key trace gases in the troposphere.

This is a generally well written and well executed study but I have several minor comments in the attached pdf and a few more major comments before recommending publication.

Major comments:

Comparison to observations is lacking which limits the sense I get that the changes are in anyway in the right direction. For example, the changes in surface ozone and NO2 in

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Discussion paper

EAS are large and I would imagine significant. It would be good to see how these compare with observations. Whilst I agree with the previous reviewers comments about model resolution and whilst there may well be structural errors in EMAC that mean that even with a better representation of the chemistry the comparison to observations is worse, I feel some comparison to observations is warranted. I also feel this will help focus the paper as currently it reads as one in which aromatics vs no-aromatics is the focus, but given we know aromatics are important (and abundant in urban environments) shouldn't the focus be Arom vs OnlyMCM? At least I find this comparison more interesting than Arom vs NoArom.

It would be good if there were some figures (perhaps in an appendix) which compare the OnlyMCM and Arom scheme under idealised (Box model) conditions. Ideally this would be against laboratory data but I think even against some general scenarios it would be very useful to see how the differences implemented affect the results and then some sensitivity analysis could be performed I think quite straightforwardly to look at the impacts of some of these uncertain thermal-kinetic and photolytic processes.

Please also note the supplement to this comment:
https://acp.copernicus.org/preprints/acp-2020-461/acp-2020-461-RC2-supplement.pdf

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