

Interactive comment on “Global sensitivity of aviation NO_x effects to the HNO₃-forming channel of the HO₂ + NO reaction” by K. Gottschaldt et al.

Anonymous Referee #2

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This is an interesting and well performed study characterizing the potential effects of the water vapor dependency of the HO₂+NO=>HNO₃ reaction on various parameters such as ozone, OH, and related radiative forcing. Unfortunately the authors tend to discuss too many unnecessary details that are distracting from the main messages. The authors should ask themselves for each section, figure and table, what message needs to be brought out. Figures are nearly unreadable- except at very large enlargement using the pdf. Consider placing more material in an Appendices.

I therefore advise to have a fresh look at and a serious overhaul of the manuscript, reducing the size and removing unnecessary details to allow more people to read this otherwise excellent manuscript. I think this rigorous study warrants publication, but after major revisions outlined above.

Below are some detailed comments- the 2nd part of the paper needs in general to be reduced substantially.

p. 24288 l. 10 Make clear that without this reaction the effect would be positive. In my understanding relatively small changes in chemical mechanisms or other parametrization can turn the climatic effect from positive into negative; however the reader needs to understand that these effects are anyhow not so large compared to those of other emissions.

p. 24288 l. 15 Mention already in abstract what evidence from measurements there is corroborating these results. In the text I find that HNO₃, NO_x, CO profiles match equally well the observations- with or without these reactions, which means that the importance of this reaction remains somewhat hypothetical.

p. 24290 Would it be possible to give the reactions R1b; R2b already here? p. 24290 l.21 What did Hoor mention? This sentence doesn't give information, so either delete or tell why we need to know this. p. 24290 affected much ? little? p. 24291 l. 25 Explain more extensively why above 200 hPa no nudging was used. Briefly describe the characteristic of S2 setup p. 24292 was evaluated by : One sentence on what is the result of such evaluation. p. 24292 'high convective liquid and ice water contents' reader has no idea of what is going on, and what other consequences could be present. Is this detail needed?

p. 24292 l. 27 what is meant with transient? I guess you use multi-annual simulations and the biomass burning emissions where valid for that year p. 24293 scaling factors? up or down? How much?

p. 24293 ENSO is a tropical index and can not characterize the deviation from the climatology all over the globe. Maybe you want to focus on the tropics? Section 2.1 A lot of this description seems something for an Appendix, and not directly relevant for understanding the model results.

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24296, I.16: Here I am wondering wondering if your sensitivity studies are gearing up towards a study on additivity /linearity? I am wondering why you haven't chosen for a milder perturbation (i.e. 10 or 20 %) instead of switching off? p. 24297: QCTM Here I am confused; The model is nudged (upto 200 hPa); are you really to capture independently the effects on dynamics. At most partly. In line 20 I read that the feedback to dynamics was switched off, but then it is not clear why not to nudge directly all meteo data? I think the reasoning behind this procedure should be described clearer and earlier.

p. 24303 I. 10-15 To my opinion there are many processes not or not accurately included in this and other models; a good correspondance with OH should therefore not be the goal of this study. Why do we need to know the 'Tamborini' study?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 24287, 2012.

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