

Interactive comment on “Effects of temperature-dependent NO_x emissions on continental ozone production” by Paul S. Romer et al.

Anonymous Referee #2

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Romer et al. disentangles the impact of different processes affecting the O₃-T relationship in South Eastern US. The hypothesis and the arguments in the manuscript are well presented and provide robust evidence of the importance of soil-NO_x for continental O₃ production. Discussion of the results and their implications is scientifically sound. The manuscript should be published in ACP. I only have two minor comments that I would like the authors to address.

Minor comments

1. At page 9 lines 3-4 the loss of NO_x due to NO₂ + O₃ reaction is taken into account to extract the increase in NO_x due to soil emissions. I wonder how much of a change

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would accounting for the NO₂ + NO₃ reaction which has a five order of magnitude higher rate constant. I expect no NO₃ measurements for the CTR SEARCH network but for the SOAS measurements (Ayres et al. 2015) it should be possible.

2. The authors are only concerned with soil-NO_x emissions although it is now known that soil bacteria are a comparable source of HONO (Oswald et al. 2013). HONO was measured during SOAS (<https://data.eol.ucar.edu/dataset/373.037>) and its impact on PO₃-T is likely convoluted in the 60% contribution of PHO_x shown in Fig. 6. In the manuscript it is stated that PHO_x is mainly driven by increased solar radiation without showing (or explicitly pointing to) relevant data. However, soil-HONO emissions might also contribute to the PHO_x category in Fig. 6. Could the authors attempt a sensitivity analysis or at least discussion of the soil-HONO impact on the results?

References

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