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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-NOx 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 NOx due to NO2 + O3 reaction is taken into account to extract the increase in NOx due to soil emissions. I wonder how much of a change

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-NOx 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 PHOx shown in Fig. 6. In the manuscript it is stated that PHOx is mainly driven by increased solar radiation without showing (or explicitely pointing to) relevant data. However, soil-HONO emissions might also contribute to the PHOx category in Fig. 6. Could the authors attempt a sensitivity analysis or at least discussion of the soil-HONO impact on the results?

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