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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Worsening urban ozone pollution in China from 2013 to 2017 – Part 2: The effects of emission changes and implications for multi-pollutant control" *by* Yiming Liu and Tao Wang

Anonymous Referee #2

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The authors examined the effects of 2013-2017 changes in anthropogenic emissions on summertime ozone pollution over China, and they found that the emission controls for reducing aerosols have worsened urban ozone through the non-linear chemistry of ozone and the complex effects of aerosols. The current increasing trend of ozone in China is of great concern and this topic is well within the scope of ACP journal. The authors here present a very comprehensive study, and the manuscript is well structured. The estimated effects of emissions of individual chemical species on ozone are valuable for air quality planning in China. I would recommend it to be accepted after

addressing the following comments.

-Heterogeneous uptake of ozone. The simulated increases in ozone from this pathway (Fig.5h) are high over regions with high PM2.5 concentrations other than regions with high levels of mineral dust. I am wondering if you are applying this effect for all the aerosols or just on dust particles. The uptake of ozone by aerosols are only well documented for mineral aerosol. Bauer et al. (2004) also suggested that the lower limit of uptake coefficient (3x10-6) seems to be more appropriate for global modeling.

-The updated model will decrease NO2 concentration, and it compares better with surface NO2 in summer 2013. But the model also has low biases for summers 2014-2017 (in Table 2 of the companion paper). Please have more explanations on this.

-The simulated decreases in NO3 and N2O5 (Lines 185-195) could be also induced by decreased ozone in the updated simulation.

The Conclusion section needs to be rewritten. Currently the 9 lines of conclusion are not a good summary of what have been done in the manuscript. Quantitative conclusions should be given in both Abstract and Conclusion section.

The manuscript is not clear about the impact of boundary conditions of chemical species on simulated O3 in China. Ideally the chemical boundary conditions are different for 2013 and 2017, considering the differences in anthropogenic emissions and in meteorology outside the model domain. How would these differences at the boundary influence simulated changes in O3 in China over 2013-2017? Some discussions can be added in Conclusion section.

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