

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-675

Anonymous Referee #2

Referee comment on "Enhanced summertime ozone and SOA from biogenic volatile organic compound (BVOC) emissions due to vegetation biomass variability during 1981–2018 in China" by Jing Cao et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-675-RC2>, 2021

Overall, this paper has the potential to be a useful contribution to the body of literature after major revisions. My concerns are:

Section 2.1: I recommend that you show a spatial map of changes in BVOCs over time? Li et al. (2020) shows only 2008–2018.

In the introduction you say that your study uses "more accurate BVOC emissions". However, you don't provide evidence of this. Satellite data of formaldehyde could help in the evaluation over the satellite era. Do a literature search as there are a number of studies that use HCHO data to constrain BVOC emissions. How will you validate your emissions before the satellite era (e.g., 1981–2004)?

Table 1: Why do you use "Year 2008" for your "HISTORY" run, but "Year 2018" for the rest of your simulations?

Line 176: Can you show a map of the simulated VOC to NO_x ratio to help you make your point. Also, there are a number of papers discussing the VOC to NO_x ratio over China, including as observed from space. For example: Jin, X., T. A. Holloway (2015). Spatial and temporal variability of ozone sensitivity over China observed from the Ozone Monitoring Instrument. *Journal of Geophysical Research Atmospheres*, 120(14), 7229–7246, doi: 10.1002/2015JD023250. Please do a literature search to see what they've concluded and if those conclusions are consistent with your study.

It would also be helpful to show a spatial map of the simulated NO_x distributions.

Line 192: Can you mark (with boxes, for instance) the 5 regions on one of the maps, such as Figure 2?

Line 245: "N3"? Do you mean NO₃?

Line 275: You don't show the BVOCs emission changes for your study in "HISTORY". Why? A spatial map of the changes would be very helpful for the discussion.

Section 3.3.1: The discussion would be facilitated by maps (e.g., in supplementary material) of vegetation changes, leaf biomass changes, emission factors, etc.