

Interactive comment on “Ozone and haze pollution weakens net primary productivity in China” by Xu Yue et al.

Anonymous Referee #2

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This study explores the impact of air pollution on crop production, with a specific focus on China. This is a nice study and in many ways ambitious in scope, though it builds on a series of YIBs model developments described in previous literature. This is a great application of coupling atmospheric chemistry and biosphere modeling and in general I found the paper was well executed. I suggest a little more work to clarify the details behind these results, but after these minor corrections, the paper should be in good shape for publication in ACP.

Specific Comments

1. The paper would benefit from a clearer distinction/discussion of impacts attributed to meteorology feedbacks from PM & O₃ forcing vs. aerosol indirect effects. The former are referred to as “direct effects” though they are in fact meteorological feedbacks. In

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general, it would be helpful if the authors provided a clearer quantification of these specific effects and the model simulations used to assess them.

2. The meteorological & hydrological responses presented primarily in 3.3 should include some standard deviation numbers since multiple years of simulation were run to assess natural variability. Are the changes in soil moisture and precipitation significant?

3. The paper needs a more consistent time-scale. The overall results are presented as annual, however all the figures (except Fig 10) show summertime results only. The authors should either include evaluation for all seasons (or annual means), or present the final results only for summer. As is, the reader cannot judge model skill or response for other seasons.

4. The paper should discuss the potential implications of the high bias in simulated diffuse fraction and potentially in O₃ (the evaluation of simulated O₃ is mixed).

Details

1. Line 71: typo “meteorology, and clouds.”

2. Line 90: need to define the square brackets in [O₃]

3. Line 93-94: language “less well understood”

4. Line 149-150: not quite true, the CLM includes more PFTs, this should be clarified here.

5. Line 188: this is a large difference in NH₃ emissions, do the authors know why the inventories differ?

6. Line 202-203: do these changes in biomass burning emissions seem realistic?

7. Lines 205-207: are these natural emissions simulated online or specified? Are there appropriate references that could be cited for this?

8. Lines 208-209: Please explain why isoprene emissions increase and monoterpene

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emissions decrease (text later indicates that land cover is fixed)

9. Section 3.1.1 & Figure 1: Please discuss the spatial differences between observed and simulated GPP/NPP.

10. Line 282: Is $R=0.86$ a typo? Figure 1 suggests this should be 0.75

11. Figure 2 caption: should include years

12. Section 3.1.2 & Figure 2: Please briefly discuss where the model is too high and too low and what species might contribute to these biases. Also quantify the last sentence (line 298-299)

13. Line 308: “diffuse fraction agree” – this is incorrect. The simulation appears biased quite high in some regions. Please correct.

14. Section 4.2 should also acknowledge that the response of the hydrological cycle to aerosols is also a major source of uncertainty.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-1025, 2016.