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Atmospheric Chemistry and Physics Discussions

Interactive comment on "How emissions, climate, and land use change will impact mid-century air quality over the United States: a focus on effects at National Parks" *by* M. Val Martin et al.

Anonymous Referee #2

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This paper examines the impact of future emission scenarios, climate, and land use change on air quality over the U.S. with particular emphasis on the National Parks. The paper examines ozone levels, visibility, pm2.5 and the impact of ozone on ecosystems and crops.

The paper is very thorough, well written and provides a good concise analysis with appropriate figures and graphics. I recommend publication although the authors should address the minor comments below.

1) There should be somewhat more discussion concerning the response of VOC emis-

sions to CO2. It is my understanding that the consensus opinion is that there should be a CO2 response (at odds with the assumptions made in the simulations analyzed here). This seems a rather important point in interpreting the paper's results. Page 26501, line 28 states what VOC emissions respond to, but does not mention there is not a response to CO2. It should be explicitly stated the emissions do not respond to CO2 increases. I think there should be some more discussion about this up front. On page 26506, line 20 the paper states "our isoprene emissions are slightly overestimated", but on page 26511 the paper states "the offsetting effects of climate and CO2 inhibition substantially reduce the role of isoprene emission changes". These statements seem inconsistent. Is the role of CO2 inhibition really slight? At any rate the impact of not including a CO2 response needs to be addressed.

2) Page 26502, line 2. Are lightning emissions really held constant? This would seem difficult to do as lightning is usually computed interactively.

3) Page 26503, line 25. "somewhat overestimated". You don't really need the euphemism, "somewhat". The overestimate is almost a factor of 2.

4) Figure 5. It was not clear to me if the changes in dry-deposition velocity were solely due to landuse change or to landuse change and climate. Could you clarify?

5) Page 26506, line 18. Please give percentage increase of biogenic emissions.

6) Page 26506, line 28. Paragraph beginning with Land use changes. This is a somewhat strange paragraph as it involves a rather extensive discussion of the impact of dry deposition and land use change, discusses the contrast between this study and other studies, but ends with the fact that the results are not significant. If the results are not significant they should not be discussed at length.

7) Page 26507, line 16. What is a pm2.5 chemical species?

8) Page 26511, line 19. I presume the authors are comparing best days to best days and worse days to worse days in the two scenarios. Is this correct?

ACPD
14, C9911–C9913, 2014

9) Why did you not examine the impact of climate dependent forest fires on ozone? Is it not important?

10) Table 1. Is the globally area-averaged SST given here?

11) While the paper is very well written there are the occasional minor lapses. This could easily be remedied by the coauthors who speak English as a native language.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 26495, 2014.