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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Biomass burning related ozone damage on vegetation over the Amazon forest" *by* F. Pacifico et al.

Anonymous Referee #2

Received and published: 24 August 2014

This paper presents a modeling study where a chemical climate model (the HadGEM2 Earth System model) was used to examine the sensitivity of modeled ozone concentrations and resulting impacts on primary productivity in the Amazon. The authors first ran a current simulation of the model to compare to two data sites, and then ran the model with varying degrees of biomass burning emissions. The resulting ozone concentrations and net primary productivity from these simulations were summarized. The NPP did increase with reductions in biomass burning and ozone concentrations; and the NPP is reduced in the region by about 10% when biomass burning emissions are doubled. The results of this study highlight the important feedbacks of biomass burning on the biosphere and the climate system, and the need to get more data in the extremely important tropical rainforest ecosystems. Overall, this paper is well written,

presents a very interesting study, and is relevant for publication in AC&P. I recommend minor revisions to this paper before it is published.

Overall, this paper was very well written, the tools and methods explained, the results summarized and the uncertainties and shortcomings noted. I was interested to have a bit more information about the following included:

- The authors mention in the Introduction (page 19958, lines 1-5) that aerosols from biomass burning can impact the diffuse radiation and therefore, indirectly, NEE. Were these interactions included in the model simulations of this study? I would expect that some emissions from biomass burning (NOx, VOCs, CO) could impact ozone production in plumes, but that the aerosols could also impact this chemistry (by changing photolysis rates). Was this taken into account? Or any of the feedbacks to the meteorology? (e.g., boundary layer height, temperatures)? Along these lines, were the biogenic emissions changed with the different biomass burning scenarios, or were they kept constant?

- I would appreciate a bit more information about the fire emissions used in this study. Although the authors state the references from which they got the estimates, it would be helpful to include a bit more information about them here. For example, are they monthly emissions included constantly throughout a month, or is there a daily and/or hourly variation in these emissions? Wouldn't this make a difference in the modeled ozone production and results? Could this potentially also help explain the discrepancies between the model and the measurements?

- The figures (particularly Figures 1, 2, 6) are very difficult to read. It would be very helpful to have them enlarged or simplified so that they are easier to see.

Other comments:

Page 19958, line 8: "where" should be "were"

Page 19959, lines 18-21: Are biogenic emissions or anthropogenic emissions reduced

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due to deforestation, and why would this lead to an overestimation of ozone? This statement could include more details.

Page 19960, lines 12-14: How were monthly emissions temporally included in the model simulations?

Page 19962, line 24: Use “that” instead of “which”

Figure 5: Label the graphs “a”, “b”, “c”

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 19955, 2014.