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

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This is an interesting model study on the secondary impact of biomass burning emissions on vegetation via ozone using a couple vegetation atmosphere model. As the authors discuss, the potential impact could be as large as the direct impacts on carbon stocks, but this would be clearly an upper limit. Uncertainties in the modeling, O3-vegetation impacts, and very limited amount of O3 measurements preclude robust conclusions. There are some improvements of the paper possible- e.g. also run the 'low' sensitivity case (I expect a non-linear response), and better exploration of the uncertainties in the final presentation of the impacts. I endorse publication of this manuscript in ACP, after taking into account my comments.

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Detailed comments

p. 19956 l. 7 bias 5-15 ppb. The abstract should guide the reader to explain what that could mean for the calculated impacts.

p. 19956 l. 12 reduces ozone by how much?

p. 19956 l. 10-17 Something needs to be said about the time period of evaluation, and what emissions are considered (there are issues).

p. 19956 l. 10-17 Something on the type of biomass burning deforestation fires.

p. 19956 l. 10-17 More on implications in the abstract ('could be as large as the direct impact on the carbon cycle' but that is an upper limit). Would it be possible to present a more realistic range?

p. 19957 l. 9 40 ppb is kind of an arbitrary threshold- and it is not clear if it also holds for tropical vegetation- with different genotypes. It is picked up in the discussion, but could be alluded here.

p. 19957 Is Le Quere reference for 'current' budgets or missing processes?

p. 19958 l. 8 derived from ; where=>were

p. 19958 l. 19 describe shortly what this scheme is including (or refer to p. 19961)

p. 19959 l. 20 Is the possible bias of these emission discussed later? p. 19960 Where is ExtTC scheme evaluated, was it part of an chemistry intercomparison for example? Does it include state-of-the-art radical cycling and what does that mean for ozone?

p. 19960 l. 10 What are the uncertainties of the VOC emissions (see discussion)?

p. 19961 l 19 The use of the 'high' sensitivity mode seems quite critical and should at least be mentioned in the abstract and conclusions

p. 19961 l. 25 see earlier remark on 40 ppb as a threshold; indeed we know little about how ozone-vegetation interactions work in the tropics.

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p. 19962 l. 27 Can you evaluate which fraction of the emissions are deforestation?

p. 19962 To what extent was the landcover data adjusted to represent the recent conditions?

p. 19962 I understand that the model evaluates 9 years of ecosystem response. Can something be said about response on longer-time scales?

p. 19963 The availabity of ca. 1-2 years of ozone data is limiting the comparison. What is known about interannual variability? E.g. from Shadoz sonde network-http://croc.gsfc.nasa.gov/shadoz/Paramaribo.html

p. 19963 Figure 1/Figure 2 The figures are quite hard to read (font size of legenda, spaghetti of lines); if I understand it well the full dots are the monthly average measurements, and the individual lines are the single measurement days? It is not clear why the authors want to present these single days- since as expected the model standard deviation is much lower (monthly av. Emissions, coarse resolution). Perhaps the plots can be simplified and include an monthly average (or monthly daytime comparison of data in one additional panel, which would highlight the magnitude of seasonal bias.

p. 19964 l. 23 higher than other months? Higher than measurements?

p. 19965 l.5 l. 22 I am missing an evaluation of NPP. It would be good to know if 'current' NPP is of the right order of magnitude. Is there any field evidence that vegetation was damaged by ozone in plumes?

p. 19966 l. 6 which variability is discussed? Interannual or daily variability?

p. 19666 l. 10 Why is this low productivity threshold chosen. Do the authors mean, i.e. the analysis focuses on high productivity regions?

p. 19666 l. 17 It would be good to include in Figure 1 and Figure 2 a panel that shows this increase more clearly; it is hard to read the numbers.

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p. 19666 l. 23 ...not impossible...=> redundant sentence.

p. 19967 resolutions=>resolution.

p. 19967 There has been no evaluation of the isoprene/terpenes/OVoc in this paper. What are tentatively the uncertainties (specifically for this region) and how could it contribute to the O3 overestimate.

p. 19969 A recurring science is issue the re-cycling of HOx. How was this included in the chemistry scheme and how could it influence ozone?

p. 19969 l. 10 this is an interesting perspective, and could already be alluded to in the introduction motivating this study.

p. 19969 l. 16 mention that this is for the 'high' sensitivity case, and for the Amazonian (whole or only the 'box'?).

p. 19969 l. 27 It is not clear why the authors can use the +100 % case to estimate an 'maximum' effect, while earlier it was stated that even the 'current' emissions are probably overestimate since deforestation fires have declined. In my opinion these numbers, which also figure in the abstract are somewhat handwaving, the authors have the means to do better; e.g. explore the low sensitivity case, a range between -50 and 50 % of emissions.

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