

Interactive comment on “Impacts of future climate change and effects of biogenic emissions on surface ozone and particulate matter concentrations in US” by Y. F. Lam et al.

Anonymous Referee #2

Received and published: 13 March 2011

General Remarks:

The manuscript entitled "Impacts of future climate change and effects of biogenic emissions on surface ozone and particulate matter concentrations in US" discusses a vital subject, namely the evolution of air quality (in particular surface ozone and PM_{2.5}) with climate change. The impacts of potential changes in bVOC emissions resulting from changes in temperature and radiation as a consequence of changes in future climate are also discussed. Furthermore, the study seizes the opportunity and makes interesting comments about the importance of model resolution and use of different bVOC emission models on the results in a regional aq-modelling framework.

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The manuscript is written clearly and is easy to follow. It is clearly structured and provides useful information on the topic's background in form of the unusually detailed introduction (which is a definite bonus in my opinion). The methods and tools are presented in a concise fashion and (predominantly) include enough detail. The methodology appears sound and appropriate.

Both figures and tables provide good information. Captions are useful and sufficiently explain the data presented. I particularly appreciate the redundancy of figure/table description in text and captions which is usually missing but makes it so much easier to follow the arguments.

Overall, I find very little to comment on and I admit freely that I enjoyed reading this manuscript quite a bit during the review process. I find the science presented to be sound, important and very interesting. Consequently, I suggest publication of the manuscript in ACP after a few, very minor technical corrections have been applied.

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Specific Comments:

Introduction: - p. 2185/l. 11: no comma in sentence; "The issue has been reported in the regional model as well as..."

Methodolgy:

On p. 2209 it is mentioned that CMAQ does not account for lightning emissions. This important fact needs to be mentioned in the methodology and an attempt should be made to quantify the potential impact on the results (at least it should be stated whether this lack of lightning NO_x emissions could have a significant impact or not).

- p. 2191/l. 15-19: I would like a brief discussion of the treatment of SOA and their precursor-chemistry in CMAQ added to this paragraph to help the reader since several comments are made about this issue later on in the paper. One or two sentences should be sufficient.

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- p. 2192/l. 9-11: sentence is a stub; rephrase
 - p. 2192/l. 19-23: sentence needs to be untangled; possibly split into two sentences
 - p. 2193/l. 5-9: I assume that MEGAN is used here without its facility of emission factor distributions (as far as I know these exist only for present-day conditions). I would like to have a remark included here to clarify this aspect.
 - p. 2195/l. 15-23: The description of the simulation scenarios has obviously copied and pasted since it doesn't correspond to the table it references to. Also, reading the paragraph I get the impression we are dealing with 12 scenarios (4 + 8). Edit this entire paragraph to fit it into the manuscript.
- Discussions: - p. 2197/l. 8-9: sentence makes not much sense; rephrase sentence
- p. 2198/l. 15-18: sentence is a stub; revise
 - p. 2200/l. 22: replace "prediction" by "predicted"
 - p. 2200/l. 25-29: this section needs some revision and clarification
 - p. 2201/l. 12: replace "second" by "secondary"; also, clarify: CMAQ does not treat SOA formation from isoprene which accounts for 0.01 to 1.52 $\mu\text{g}/\text{m}^3$ in OTHER models
 - p. 2204/l. 6: replace "consistently" by "consistent"
 - p. 2204/l. 17-20: second half of sentence a stub; revise
 - p. 2205/l. 23: replace "inconsistence" by "inconsistent"
 - p. 2205/l. 24: remove "results"
 - p. 2205/l. 27: insert "a" between "not" and "major": "...not a major contributor..."
 - p. 2205/l. 27-28: should read: "...both models did not implement recycling of OH from..."; also OH is a radical, not an ion, so OH is enough.
 - p. 2207/l. 9: reverse order of sentence to increase readability

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- p. 2207/l. 28: replace "were" by "was"
- Conclusions: - p. 2208/l. 10-11: sentence is hard to follow; rephrase
- p. 2208/l. 21: replace "had" by "have"
- References: - p. 2185/l. 24: "Xiaoyan et al." appears to be missing in the list of references
- p. 2198/l. 28: "Mickley et al." appears to be missing in the list of references
 - p. 2211/l. 18-24: the two references "Hogrefe et al., 2007a/b" appear to lack a citation counterpart in the text.
 - p. 2212/l. 6-8: reference "Jiang et al." not cited in text

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 2183, 2011.

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