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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sensitivity of isoprene emission estimates to the time resolution of input climate data" *by* K. Ashworth et al.

Anonymous Referee #1

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Although this paper is quite short, it addresses an important and generally overlooked aspect of how the temporal resolution of the input temperature and radiation data influence isoprene emissions. The paper should be accepted for publication once the authors have made minor adjustments to the manuscript after having considered my comments.

General comments:

One major issue is there isn't any discussion of sub-hourly effects on the emissions, why? I think the paper would benefit from some discussion on this issue (after all the authors only have to resample the input data more frequently).

Page 23548, Line 23: Please quantify "high mixing ratios of isoprene", a reader may

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not know if you mean 1 ppm or 1ppb; please add references accordingly.

Page 23548, Line 25: Why do the authors write “particularly in NOx rich atmospheres”, the tropics have typically low NOx but high levels of OH which can initiate the photochemical oxidation of isoprene and of its subsequent reaction products.

Page 23549, Line 10: As pointed out by the Arneth et al (2008) paper, just because global isoprene emissions seem to be converging towards 450-600 Tg/yr it doesn’t mean that we have reached an ‘accepted’ global total. I think the authors should include a couple of sentences to mention this.

Page 23551, Section 2, Method: Please note that ‘MEGAN-EZ’ is not mentioned in the Guenther et al. (2006) paper. Do the authors mean the PCEEA model instead (i.e. they do not use a detailed canopy model)? This is slightly confusing, and will be more so to a reader who is unfamiliar with the historical development of the MEGAN model. I would like the authors to explicitly briefly state (possibly in appendix) which formulae they used to calculate the isoprene emissions.

Page 23554, Lines 4-15: I had to re-read this paragraph a few times to before I finally understood what the authors meant. The authors might consider revising this section of text to make it easier to understand. Also it would be interesting to include an extra plot, in the same format as Figure 2, for another region (e.g., southeast USA) and include some more discussion, by comparing and contrasting the two locations.

Page 23554, Lines 15-16: I have a slight issue when the authors state that “. . .the results cannot be considered robust.” Surely, this depends on the type of model simulation and its computational cost (i.e. a 1 year versus 1000 years model run). For detailed coupled Earth system models, I agree that high temporal resolution input data is very important. For model simulations that look at the isoprene emissions over several thousand years, then monthly data would probably adequate to determine past trends and would be less computationally expensive.

ACPD

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Page 23554, Line 25: The authors state that using daily averaged radiation (sampled hourly) appears to be adequate for simulating the emissions over the course of the year. I'm not convinced by this statement, especially if it is solely based on the global estimates provided in table 1. For example, isoprene emissions and their subsequent photochemical oxidation will be strongly influenced by the presence of clouds, which often build up in the afternoon and which vary considerably on a regional basis and also on sub-hourly timescales. Also, does the type of canopy model (used to simulates the light penetration into the under storey) affect the results from different radiation temporal sampling?

Page 23557, Line 4: In some ways I think this is an obvious statement to make (irrespective of the results presented here) since if computational power weren't an issue, then most models, would be adapted to using the best available spatial and temporal input data which would be implemented at each model time step.

Figure 2: Please add a sub-title to each of the six plots as this would make it easier (and quicker) than referring back to table 1.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 23547, 2009.