

Interactive comment on “BVOC-aerosol-climate interactions in the global aerosol-climate model ECHAM5.5-HAM2” by R. Makkonen et al.

Anonymous Referee #1

Received and published: 26 June 2012

General Comments:

The study calculates the first aerosol indirect effect from pre-industrial to present day, and present day to 2100, under a number of different BVOC and future anthropogenic emission scenarios. As such, I feel that the abstract requires some rephrasing , as the contribution of BVOC emission is included and the climatic response to its uncertainty is explored, but is not explicitly determined.

The paper includes extensive detailed discussions on the differences between various scenarios, mechanisms and locations but a more concise drawing together of the overall results and implications would be beneficial.

The paper is certainly within the scope of ACP and of interest to its audience; I would

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recommend its publication, following clarification of the below issues.

Specific Comments:

Is there any potential for discrepancy in using two different SRES emission scenarios (A1 and A2) to generate the BVOC emissions, and then actually running the model in the future with the three different RCP scenarios? This may be worth mentioning sooner in the discussion on p9203; how much of the behaviour described in lines 8-15 could be explained by the fact that the models have been driven by two quite different future emission scenarios (i.e. not a diverse response to climate change but a different amount of climate change to respond to?). Also need to specify, on p9203 line 18, which A1 scenario is used (i.e. A1B, A1T, A1FI), as they are quite different. I appreciate that the difference between the future emissions generated by the two models is not the point of the paper, but I think it's worth being clear about the potential causes for it.

- Page 9200, line 8: how is LCF value obtained? and how is the change in shortwave cloud forcing calculated? More details would be beneficial here
- Page 9211, line 3-6: true, but CN number is not just a reflection of nucleation rate
- Page 9214, Section 3.3: there is a lot of discussion on the past, present and future emissions in each location; I'm not sure that so much detail is required here.
- Page 9217, line 1: see previous comment about use of different emission scenarios to generate BVOC emissions for 2100
- Page 9217, line 24 onwards: are you talking about a particular time period? These trends don't appear to hold across the whole table (Table 3) i.e. MEGAN2 emissions do not always give higher CN concentration
- Page 9218, line 14-18: see previous comment about use of different emission scenarios to generate BVOC emissions for 2100
- Page 9221, line 21-24: I'm not sure it is possible to conclude this from Figure 10

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- Page 9220, line 13 onwards: can you include any Figures to support this?

Technical Suggestions:

- Page 9198, line 19: perhaps rephrase "made experiments"
- Page 9198, line 29: change "a location" to "one location"
- Page 9199, line 5: change "the other model" to "one model" (or even specify which model)
- Page 9204, line 21: remove "are also accounted for by MEGAN2" as this was said at the beginning of the sentence
- Page 9208, line 8: specify which "additional boundary layer nucleation scheme" i.e. SULACT?
- Page 9208, line 12: remove one "of"
- Page 9209, line 11: rephrase "seems to work best", be more specific
- Page 9213, line 17: change "panelss" to "panels"
- Page 9213, line 21: change "separated" to "separated"
- Page 9214, line 9: change "red dashed line" to "red dotted line", if that it is correct (or remove this sentence as it is explained in the caption)
- Page 9214, line 26: perhaps insert "In the future scenarios used here, wildfire emissions will either....."
- Page 9218, line 11: change "produce always" to "always produce"
- Page 9220, line 18: rearrange to give "the MEGAN2 BVOC emissions"
- Page 9222, line 24: remove "only"
- Page 9222, line 25: perhaps change to "gave the best agreement to observations"

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- Page 9223, line 6: the highest value (least negative) is -1.53 W/m2 in Table 4
- Page 9223, line 7: perhaps replace "reduction in cloud forcing" with "change in cloud forcing"
- Page 9224, line 3: insert "to the" between "sensitive" and "treatment"
- Page 9234, Table 1: state whether these are global averages and include units somewhere
- Page 9236, Figure 1: state which year these emissions are from
- Page 9238, Figure 3: are these annual means? Would help visually if numbering intervals were consistent either side of zero
- Pages 9239-9240, Figure 4 and 5: missing "-" sign from 5 on colour bar
- Page 9241, Figure 6: state which simulation (nucleation scheme) these plots are from in the caption
- Page 9243, Figure 8: state which simulation these plots are from (nucleation scheme) in the caption and define which lines are for LPJ-GUESS emissions (dashed?). Add note to highlight different y-axis scales.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 12, 9195, 2012.

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