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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of MEGAN-CLM parameter sensitivity to predictions of isoprene emissions from an Amazonian rainforest" *by* J. A. Holm et al.

Anonymous Referee #3

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In this paper the authors analyzed the contributions of 19 input parameters to the isoprene emission in an Amazonian rainforest with models MEGAN-CLM (Model of Emission of Gases and Aerosols from Nature-Community Land Model) 4.0 and MEGAN-CLM 4.5. By using linear regression analysis and Monte Carlo uncertainty simulations they found that the leaf temperature (Tleaf) and photosynthetically active radiation (PAR) are the two most significant driving forces of isoprene emission in the MEGAN-CLM models. And Tleaf along with other four input paramters (Cce, Tleaf_24, CT1, CT2) contributes more than 61% of the output emission uncertainty, followed by PAR parameters with 15% contribution. They also found that compared to MEGAN-CLM

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4.0, MEGAN-CLM 4.5 with 28% less LAI (Leaf Area Index) predicts a more accurate estimate of annually averaged isoprene emission rate.

In general, although the organization of the paper and the description in some parts are sometimes confusing, the conclusion and the results are helpful in future development of emission models.

1 Introduction:

P23997, L5: Does 'chemical compounds' here mean BVOCs, VOCs or all the chemical compounds emitted by human activity?

P23997, L16: 'biogenic VOCs' should be 'BVOCs' since it is already defined before.

P23997, L22: 'are' should be 'is'.

P23997, L23-25: The sentence 'because...ozone' is not quite clearly expressed.

P23998, L9-10: 'decreased temperatures associated with increased diffuse light', this is confusing. Although I understand the logic behind, but this may not be so straightforward.

P23998, L19-21: 'While...evaluate.' is not quite clearly expressed.

P23998, L28-P23999, L1: 'show...systems' is confusing.

P23999, L26-28: 'however...regions' is not clearly expressed.

P24000, L12: 'In addition to uncertainties in observational', the 'uncertainties of observational' is not mentioned before.

P24000, L21: 'are' should be 'is'.

P24000, L29: 'contributes' should be 'contribute'.

2 Methods:

P24001, L15: 'based off of', I am not sure if this phrase is used in English, maybe

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'based on' is better. The comment is also for the other cases in the paper.

P24001, L19-20: '471 Tg C' and '534 Tg', should the unit be 'Tg C yr-1' and 'Tg yr-1'?

P24001, L24: 'accounting' should be 'account'.

P24002, L6: 'know' should be 'known'.

P24002, L9: 'emissions activity factor' should be 'emission activity factor'. The comment is also for the other cases in the paper.

P24002, L11: 'photosynthetic active radiation', I think 'photosynthetically active radiation' is usually used in articles, and this is also used in 'P23998, L17'.

P24003, L21: 'Table 1' should be 'Table 2'.

P24004, L11-12: What is the difference between 'CLM-CN' and 'CLM-BGC'? How will they affect the results of CLM models? Should this be clarified to make the conclusion more robust?

P24003, L13-15: Why do you not use the average values over the Amazon region to compare with the observed data, especially when the observed data are obtained from different locations?

P24005, L9-11: What is the relation between the flux measurement and the model described above?

P24005, L14: If I understand correctly, 'Table 2' should be 'Table 3'.

P24005, L18-19: 'It...data.', why this sentence appears here, what does it mean?

P24005, L24: 'leafs' should be 'leaves'.

P24007, L21-P24008, L15: I think it is better and more clear to also include the measurement methods in Table 1. Then the text here can be simplified.

3 Results:

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3 Results: (1) When you use Tleaf or PAR, do you mean averaged, sunlit or shaded values? Since in MEGAN, they are considered separately. (2) Since MEGAN-CLM 4.5 shows better results than MEGAN-CLM 4.0, why do you use MEGAN-CLM 4.0 as the major model instead of MEGAN-CLM 4.5 to do this study?

3.2 Linear regression analysis: It is not quite clear how you get the data used for linear regression analysis.

P24008, L23: 'wet season', I think the definition of wet and dry seasons should be given before.

P24009, L26-27: 'Therefore...models.', this sentence is not quite clear and straightforward.

P24013, L17-20: 'As...studies' is not expressed clearly.

P24014, L26-P24015, L3: 'This...MEGAN-CLM 4.5', here the results from the modifications of Tleaf, Topt and Cce are not presented quite well, it is not quite clear.

4 Discussion

4 Discussion: The discussion part is more like introduction.

P24016, L10: I think if you give the model names, you should also give the full names when they first appear. And if they are not highly related to the discussion, you can also just give the references.

P24018, L17: 'PPFD' should be given its full name here, and why you talk about PPFD instead of PAR here?

5 Summary and concluding remarks

5 Summary and concluding remarks: (1) I think for the title of this section, 'Summary' or 'Conclusion' is OK. (2) You should clarify the versions of CLM models in this part.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 23995, 2014.