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Interactive comment on "Deforestation in Amazonia impacts riverine carbon dynamics" *by* F. Langerwisch et al.

Anonymous Referee #2

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The authors claim to have identified that deforestation in Amazonia impacts riverine carbon dynamics. This, of course, is unexpected and demands a sophisticated model to study.

The work is based on the river carbon model RivCM and was published in the same journal and reviewed. I agree with the critical points of the reviewers there. The model provides output for CO2-outgassing and lateral C-fluxes on a monthly basis.

The model represents a setup where PCO2 increases with increasing T and CO2-atmo or lateral C-export. So the result that in the future CO2-outgassing is increasing due increase in T, or PCO2-atmo or lateral C-export is surprising to some.

A bulk evaluation is given in Table 4 of the previous publication, where the authors

explain RivCM, with a view aggregated data, showing that the model cannot capture the measurements and estimates for outgassing.

The model simulates 1/6 of outgassing at present days. This is not too close to measurements and detailed extrapolative analysis in the literature.

The setup of the analysis opens some questions. How can the authors justify to ignore some important processes or factors influencing the water PCO2, without showing that this is legitimate?

The model is not including the carbonate system. Why? Basics from every hydrochemical text book are ignored. I would like to learn how this is justified.

In addition, it seems that in an advanced setup the pH-control on PCO2 can be ignored. It would be helpful to learn how?

Export of DOC and POC into the river system is not evaluated in a spatial explicit manner, despite the many published and available monitoring data from Brazil (e.g. Ore-Hybam).

But evaluation and justification for above points was skipped or aggregated, so it is not possible to assess the subroutines, subcatchments (e.g., white versus black river?) and if neglecting relevant factors is justified.

However, the statements are very precise: "The results suggest that, following deforestation, riverine particulate and dissolved organic carbon will strongly decrease by up to 90%"; "Mainly due to the higher atmospheric CO2 it leads to an increase in riverine inorganic carbon by up to 20%", and so on.

I personally would not support a publication either of the model or the results from the model as it is presented here. I am not sure why the manuscript was submitted with an obviously unfinished version of a river-carbon model, ignoring a lot of the recent insights into CO2-evasion and the carbon dynamics in rivers, as well as a thorough evaluation of subroutines with the available data?

Interactive comment on Earth Syst. Dynam. Discuss., 6, 2101, 2015.

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