

Interactive comment on

“ORCHIDEE-MICT-BIOENERGY: an attempt to represent the production of lignocellulosic crops for bioenergy in a global vegetation model” by W. Li et al.

Anonymous Referee #2

Received and published: 19 March 2018

Overall, this manuscript is a straightforward evaluation of a PFT parameterization in a well-established global biogeochemical model. The authors are adding parameterization of specific plants that are used in lignocellulosic biomass for biofuels. The study is motivated by need to connect a global land biogeochemical model, which typically do not have specific parameterization of biofuel crops, to Integrative Assessment Models that include extensive uses of biofuels in many scenarios for energy development.

I appreciate the authors documenting this model developing through a relatively short publication and that the parameters presented are commonly used across other global

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biogeochemical models. This will allow the manuscript serve as a resource for other modeling groups that add these bioenergy crops to their simulations.

My main critique of the manuscript is that it needs more analysis and discussion of causes of the model-data mismatch, specifically the role of management in the parameterization and the observation datasets.

The authors mention that there is considerable variation many of the parameters (e.g., Page 5, line 24). Is that variation related to management? Could there be a parameterization for high intensity management (nutrient additions, irrigation, advanced genetics) and a parameterization for lower intensity management? In general, it would be useful to provide more information about the drivers of variation in the parameters for each species.

The manuscript focuses on a global analysis, rather than comparing directly to individual field studies. By averaging the studies within a grid-cell, there is considerable variation in the observations within a grid-cell (Figure 3). I assume that much of this variation can be attributed to differences in management of the bioenergy crop. For example, there are likely different levels of nutrient fertilization, irrigation, and use of specific genotypes within a grid-cell. I recommend exploring this variation more. Do the simulations compare better to yields from specific types of management? Addressing this question will help set a path for future model development that includes management practices. For example, if the simulations compare better to the nutrient fertilization treatment trials, then including nutrient limitation will potentially help improve the simulations of the biofuel. I realize that the paragraph on page 11, line 9 address this issue but I found paragraph to be weak. Can the studies not be roughly categorized by management intensity? Furthermore, the final sentence "implying the model is able to capture at least some of the observations in these grid cells" does not give much confidence that the new parameterization is actually an improvement.

Also, these is an issue for the editors to provide input on, but the paper leans heavily on

a data paper that is submitted to another unnamed journal. Therefore, a reviewer of this paper is unable to comment on the quality and applicability of the observational dataset. Should this paper be allowed to be published before that data paper is available?

The spatial mapping of the model-bias is useful but it opened the question whether there are spatial differences in management that could explain the spatial variation in the mismatch.

Specific comments

The model evaluation and discussion sections blur together a bit at the edges (section 4.1 seems like a continuation of section 3). I recommend making the separation more clear.

Section 3.3 says that the model-observations results generally lie around the 1:1 ratio line but doesn't provide any statistics on the fit. What is the slope and intercept from the 1:1 fit?

Figure 6. It is hard to see the gridcells in the subboxes. For example, box 2 in Figure 6 has lower points that are impossible to see. Can the subboxes be bigger. I also recommend adding a histogram inset that summarizing the data across grid-cells for all the similar figures (Figure 6-9

Figure 10 stated that there is a 1:1 line that is not present in the figure

Minor comments:

Page 3 Line 25:Change "ORHCIDEE" to "ORCHIDEE"

Page 8, line 22: change 'through leaf falling off' to 'though leaf senescence' Page 9 Line 8: Change "corresponding" to "corresponds".

Page 11 Line 27:Change "after plantation" to "after planting"

Page 12 Line 13:It is unclear what is meant by "because of the large spacing of plan-

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tation the trial experiment which results in ...". Perhaps what was intended was something like: "because of the large spacing of the planting in the trial at that experimental site, which results in ...".

Page 13 Line 9: Change "US" to "the US"

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2017-313>, 2018.

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