

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

Anonymous Referee #1

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The present manuscript is a well written manuscript, which extensively describes the implementation of 4 bioenergy crops of the second generation into the DGVM ORCHIDEE. The methodology is comprehensively described and the module is validated as good as possible, that makes the manuscript more valuable. Only, it is not clear to me which ORCHIDEE model version is used here. It is not really transparent which version build on which development, as many development papers have recently been published. Could you add something like a development tree for a better understanding? How is the present version related to the version published by De Groot et al.,

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2015, which have already introduced a short rotation coppice poplar plantations. Secondly, it was not clear to me how parameters are derived. Some are derived from an observational mean, which is fine, but some I couldn't reproduce where these values come from. Is it a best guess or have you tried to match observational data, but with which method?

Specific comments:

page 4, line 7: Here again, how is the implementation of poplar related of an earlier implementation from De Groote et al., 2015?

page 4, line 26: "The non-harvested biomass goes to litter"-Should that be really the case? In reality you wouldn't plough or something like that to destroy roots respectively non-harvested biomass. Furthermore you would preserve root mass for a faster growth. Especially for woody plantation, growing out of the stump is a coppice management.

page 5, line 15: Doesn't you need the procedure again for the new implemented PFTs?

page 6. line 3: It is not clear to me how the parameters are adjusted and how have you evaluated the adjusted parameters?

Equation 3: Is $J_{max} = J_{max25}$? If not, for which equation you need J_{max} ? Or please do not confuse the reader by defining J_{max25} .

page 7, line 28: To allocate only 20 percent to roots seems to me quite small, as the root turnover leads to a higher loss of root biomass. How is root turnover parametrized?

page 7, line 30: I think not to account for growth out of the stump could cause a deceleration of biomass production which is not realistic, but it also causing to high carbon sequestration into the soil.

page 8, line 21: What is the reason for harvesting in winter at lower biomass harvest? Is that really nutrient recycling? I would assume that you can add nutrients in a managed

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system.

page 9, line 4: But isn't it less practical to harvest in nearly each age class? The harvester could harm other trees. I would assume that plantations consist of homogeneous age classes and are harvested at a certain age. But maybe I do not understand which practise you assume here.

page 9, line 15: Are there "real" plantations" already or are that more experimental sites?

page9, line 23: "Note that this dataset does not distinguish the utilization .." - But that makes a big difference.

page 10, line 21: It might be better to count the harvest events.

page 10, line 25: But this is of enormous importance if you like to estimate biomass potentials for BECCS. It is essential to balance the harvest and the soil carbon losses and the carbon needed for the establishment of a biomass plantation.

page 13, line 19: But it seems also that the model underestimates yields in dry regions. Blue rectangle tend to be more left sided for PFT15, 16, and 17.

page 14, line 14: "... different carbon dynamics in litter and soil and water and energy balance can be expected." That's why you need to take for the soil carbon balance as well. This is one of the main issue I have on that manuscript.

page 15, line 2: "... global dataset of soil organic carbon for bioenergy crops to our knowledge." At least you should try to represent the carbon cycle right.

De Groote, T., Zona, D., Broeckx, L. S., Verlinden, M. S., Luysaert, S., Bellassen, V., Vuichard, N., Ceulemans, R., Gobin, A., and Janssens, I. A.: ORCHIDEE-SRC v1.0: an extension of the land surface model ORCHIDEE for simulating short rotation coppice poplar plantations, *Geosci. Model Dev.*, 8, 1461-1471, <https://doi.org/10.5194/gmd-8-1461-2015>, 2015.

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

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