

Interactive comment on “Oil palm modelling in the global land-surface model ORCHIDEE-MICT” by Yidi Xu et al.

Anonymous Referee #2

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General comment: This paper presents an improved, oil palm specific plant functional type (PFT) to be incorporated into the ORCHIDEE-MICT global land surface model . The authors offer this as an improvement on the existing typical practice of approximation using the PFT of tropical broadleaved evergreen trees. Given the intensively managed, and specific, nature of palm cultivation and harvesting there is little doubt as to how unsatisfactory the utilisation of a generic plant functional type is in modelling physiological and environmental dynamics in these systems. The paper is generally very well written and presented (with some caveats, see details below) and the results suggest a significant improvement over previous model practice. Reviewer #1 has provided some excellent and comprehensive technical comments and suggestions and I have little to add to those. I would comment though, that peat and mineral soil based

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plantations are likely to be very different, yields will be lower and palm mortality higher on tropical peat soils and crop rotations significantly shorter (18 to 20 rather than 25 to 30 years). With around 25% of the South East Asian oil palm plantations being on converted peatlands, a discussion around the significant differences likely to be found in yield and palm mortality (disease incidence, palm root anchorage and failure) on the two soil types and whether they should be separately parameterised, and what work would be required to do so, in the PFT would be welcome.

Specific comments: In.20: “cause” should be “causes” (plural)

In.36: “crop” should be “crops” (plural)

In.48: citations in the brackets should be in chronological order

In.54-55: “do not allow to represent the land use change”, poor English, perhaps: “do not allow representation of land-use change...”

In.60-61: change “according to the genotypes and locations” to “dependent on genotype and locations...”

In.84: rotations of 25-30 years would be specific to mineral soil-based plantations, peat-based plantations are likely to be significantly shorter

In.148: change “corresponded” to “corresponding”

In. 158: “begin to flourish”

In.201: a space needed “accelerated (Corley and Tinker, 2015)

In. 222: delete “types”, already included in the PFT acronym

In.241: change “correspondingly” to “corresponding”

In.305: “we assumed that there is no natural mortality for the oil palm,”, this is unrealistic as there will be disease losses from the original planting density (with some replacement) and specifically in peatlands, losses and yield reduction due to leaning

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palms. These need discussing.

In.313: “Figure S3” should be “Figure 3”

In.369: “is reproduced of 1.7” Perhaps this should be “is calculated at..”?

In.376: this distinction between peat and mineral-based plantations, and its implication for scaling model output needs to be discussed further

In.408: change “characteristics” to “characteristic” (singular)

In.436: change “special” to “specific”

In.440: change “increasing” to “increase”

In.440-441: “To our best knowledge, age-based allocation dynamics for oil palm have not yet been...”

In.441: change “simulating” to “simulate”

In.452: change “phytomer” to “phytomers” (plural)

In.487-488: the authors mention the impact that planting density will have when scaling from palm to area, again this will differ between peatland and mineral and needs more discussion.

In.496-497: The authors state that “soil carbon change may take a long time”, they do not elaborate on what a “long time” is, but in peat systems there are huge carbon emissions observed in the first 5 years following conversion, likely a similar amount of time needed for forest residues to decompose which would disagree with the thrust of this sentence.

In. 499-500: change “,it is also in urgency to...” to “,there is an urgent need to...”

In.504: change “crops” to “crop” (singular)

Figure 3: change “prunning” to “pruning”. Also, please include full versions of acronyms

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used in the figures in their associated legends (e.g. CFT in fig.3). The legend for fig. 3 is generally inadequate and needs more detail. It should stand alone and not require recourse back to the text.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-252>, 2020.

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