

## ***Interactive comment on “A sub-canopy structure for simulating oil palm in the Community Land Model: phenology, allocation and yield” by Y. Fan et al.***

### **Anonymous Referee #1**

Received and published: 29 July 2015

This study developed a specific sub-canopy structure for simulating oil palm's growth and yield in the CLM considering phenology, carbon, and nitrogen allocation operated in different phytomers of oil palms. Model parameters were calibrated and validated with field measurements derived in Indonesian oil palm plantations including different ages. Now, deforestation due to expansion of oil palm plantations is one of the serious problems in Southeast Asia, thus, it is very important to understand how the expansions can impact on water and material cycling and hence interaction between land and atmosphere. The developed model in this study is valuable for the assessments. The methodology adopted in this study seems to be sound, in which I cannot find serious problems. On the other hand, the current MS is too long. Sometimes, model

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description (section 2) and discussion are overlapped, maybe you can decrease a lot of parts of discussion (section 5.1-5.3). Particularly, in my opinion, examining mechanism and processes of phenology, growth, carbon allocation etc in oil palm plantations are beyond the scope of this study. They must be discussed based on more intensive field measurements, and not with models shown in this study. I prefer to see some idea for application of the model here.

Specific comments P3 You should be more clear the concept of PFT and sub-canopy structure in the abstract for attracting many readers.

P5 L1-2 Why the models are not meant for studying carbon, water, and energy exchanges? It is hard to understand difference between yours and previous studies, here.

P6 L12 land-atmosphere fluxes of what?

P6 L17 “Structure” means sub-model?

P6 L7 simulating “oil palm plantation” of what? Growth and yields and anything else?

P10 L18 You showed “air temperature is the key variable or clock for the phenology”. That sounds reasonable in temperate regions. Is it applicable in tropical regions? How about moisture (such as dry and wet seasons)?

P10 L26 It is hard to understand concept of PFT level and sub-PFT level. Please define more clearly in section 2.2.1.

P26 L4-5 It is very hard to see “LAI development also matches well with field measurements” in the Figure 4. Please more explanation for the Figure 4, that is more reader friendly.

P27 L1 How did you determine “60-day” for the cumulative periods. 30-day is not enough?

P28 L15 Average LAI of what?

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Results section Some discussion are included in the results section (ex P29 L1-3). You should remove them carefully.

P29 L8 What is the meaning of the functionality here? Also, again, discussion concerning with processes in oil palm plantation should be removed from the MS, they must be done in intensive field measurement based studies, not modeling study. I rather want to see application of the model developed in this study, how the model contribute to understand impacts of oil palm expansions.

P34 Please include limitation of the model in the summary.

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Interactive comment on Geosci. Model Dev. Discuss., 8, 4545, 2015.