

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-93

Anonymous Referee #1

Referee comment on "Constraining a land cover map with satellite-based aboveground biomass estimates over Africa" by Guillaume Marie et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-93-RC1>, 2021

Marie et al. used a remote sensing above-ground biomass map to create a new cross-walking table (CWT), which was used to convert the ESA CCI land cover map into plant functional types map for a land surface model, ORCHIDEE. This analysis was performed in Africa. Using this Africa-specific CWT, they generate new PFT fraction maps constrained by remote sensing AGB data. This can give us more knowledge about the characteristics of forests, savannas, and cropland in Africa.

This is a very detailed case study, and the draft was well-written. But I still have two major comments and several minor comments.

Major comments:

First, the authors need to test if the posterior distributions are very dependent on the prior distributions. If yes, this suggested that the optimization probably has not really worked.

The land cover types associated with trees and shrubs, i.e., 100, 110, 120 have very low posterior wood fractions (0.14, 0.08, and 0.14). This is not feasible, for the tree- and shrub- LC type, the wood fractions should be larger than herbaceous and bare soil fractions. Could you please provide the posterior woody and herbaceous biomass?

Second, I am wondering if the uncertainty of the AGB reference map would have large

effects on posterior distribution? This is very important because different AGB products in some tropical regions have large differences.

Minor comments:

P2, Ln52: The first and second source of uncertainty looks the same, just interpreted in different ways.

P3, Ln65: Cannot find this reference in the reference list.

P4, Fig 1: "ABG simulated" => "AGB simulated"

P5, Ln 145: Please clarify the downscaling method.

P7, Ln170-171: Could you please show the locations of discarded and retained pixels? Are the retained pixels representative?

P10, Ln287: The first sentence is not completed.

P11, Ln306-307: The forcing data of the PFT map varied over time or not? If yes, the ESA CCI LC data starts with the year 1992. How to create the PFT maps before 1992?

P16, Ln396: What are the numbers in parentheses? Please clarify.

Section 3.2 and 3.3: I agree that comparing the percentiles of 2.5 and 97.5, which represent the lowest and the highest values, is very important. However, the mean and median values of distribution are important than the upper and lower bounds. I think the authors should add the comparison of mean (or median) values. Another reason for this is that generally almost modelling studies only use the mean (or median) values to do evaluation, attribution, or projection assessments.

P19, Ln 437-438: I don't really understand this. Using the PFT approach, we can set one type of forest PFT as 50%, and at the same time can set one type of grass PFT as 50%. Isn't it the coexistence of trees and grasses?