

Interactive comment on “The global forest above-ground biomass pool for 2010 estimated from high-resolution satellite observations” by Maurizio Santoro et al.

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We completely agree that the spatial variability of wood density (WD) and biomass expansion factors (BEF) is indeed critical and we acknowledge that in less sampled regions, like savannas, the estimates of AGB may be limited by the observations used to estimate WD and BEF. Patterns of biomass allocation between stem to total AGB should be different in drier regions, where plant investment would favour structural organs (stem versus leaf), but this difference would be substantially smaller than the above-to-below ground differences as is suggested. However, these above-to-below ground differences do not enter our estimates that focus on AGB retrievals. Figure S9

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shows that the contribution to the AGB standard deviation from the WD and BEF layers was between 25% and 40% in dry tropical environments, while Figure S19 shows that the WD estimates are unbiased at coarse scales across ecological zones. These results reflect the limitation in capturing the local variability in WD, and BEF, which may result from the limited observations, from the spatial mismatch between in situ data and covariates, or from the natural variability that is not captured by environmental factors. However, limited observations in dry tropical forests may imply a stronger generalization of the models used to predict WD and BEF in these regions and justify the slight underestimation of WD in these regions (between 0.05 and 0.1, Figure S19). Overall, the models to predict WD and BEF were developed to be globally unbiased (see Supplement A.5). This ensured that ensemble averages would be correct while accepting that some the predictions of the BCEFs (biomass conversion and expansion factor, i.e., the product of WD and BEF) could be locally erroneous.

Although we could not quantify the impact of local BCEF biases because GSV observations were unavailable for most of the inventory, our understanding of the retrieval errors (Table S8) indicates that the main contributors to the errors were the weak sensitivity of the input observations to biomass or the simplifications in the retrieval model. This interpretation, however, is affected by the opportunistic dataset of plot inventory measurements available to assess the AGB estimates. We agree that further research opportunities should focus on understanding the implications of local wood formation strategies to AGB estimates at local scales and across environmental gradients.

We acknowledge that the impact of the BCEF on the dataset was not discussed in the original manuscript and have added a short paragraph in Section 4 accordingly.

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