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Biogeosciences
Discussions

Interactive comment on "Closing a gap in tropical forest biomass estimation: accounting for crown mass variation in pantropical allometries" *by* P. Ploton et al.

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This is a very good manuscript that builds on an increasing body of work demonstrating that variation in canopy size is important to consider for understanding variation in the biomass of the largest tropical trees. The authors have assembled an excellent dataset and present a clear conceptual framework. The analysis are rigorous and the manuscript is well-written. The work represents a clear and valuable advance.

Main points

1. Practical recommendations: I was surprised given the effort the develop models

for canopy mass based on direct measurements of canopy size, and their improved performance compared to models based only on diameter and height (m3 compared to m2 in Table 2), that the final recommendation is only to implement model m2 (ie just measure tree height to the base of the canopy). To me, making a few additional measurements of canopy diameter for the few largest trees in a stand would not be particularly onerous, would improve accuracy, and would be important for linking field measurements to any LiDAR studies. Why is this option rejected?

2. Height definition: I agree that the definition of the canopy base needs to be carefully considered in the manuscript as it is an important parameter in the models. For example, it might be useful to set a minimum diameter for the lowest living branch to define these measurements (e.g. 5 cm). The authors of the manuscript involved in data collection would doubtless have valuable experience to define this carefully for tropical trees.

3. Collinearity. The potential problems of collinearity in biomass models has been a contentious issue in the literature, and could be raised in the context of this study as well. Personally, I agree with previous work by a linked group of authors (Picard et al., 2015), that these problems (defined by considering variance inflation factors) are secondary to evaluating model performance against data, particularly now that the datasets are increasingly representative of the full range in structure of tropical trees. However, I think it would be useful to refer briefly to this debate and the literature on this point (e.g. in section 4.3), so these points are clear to readers.

4. Scaling up: I like the comments in the discussion about how the effect of these findings will depend on the size structure of the forest (section 4.2). I think it would be useful to expand this slightly to reflect on how inclusion of canopy mass will improve our understanding of broad-scale differences in biomass among forests. For example, we know that African forests tend to have more large trees than Amazonian forests (Lewis et al., 2013), and that canopy size varies with seasonality in Amazonia (Barbier et al., 2010). What implications does this work have for detecting differences in biomass

among continents and along environmental gradients?

Small point

Equation 2: H should be Ht, I think.

References

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