Biogeosciences
Discussions

Interactive comment on "Predicting tree heights for biomass estimates in tropical forests" *by* Q. Molto et al.

Anonymous Referee #2

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Summary The authors have developed functions to predict tree height from dbh, stand structural variables and environmental variables for use in biomass equations for tropical species. They address three questions: 1) Which height model shape is most robust; 2) Do model parameters vary between sites and, if so, what is impact on biomass predictions; 3) Can the accuracy and precision of predictions be improved by including stand structural vaiable and environmental variables.

The data underpinning the analysis are from French Guiana, and include tree measurements in forest plots including dbh, stand data derived from dbh measurements, and environmental data. Species was known, but was not included in the analysis.

Tree height was reported to be important for AGB estimation. In the absence of plot measurements, AGB was predicted with known precision (but accuracy not given?)

using one (or more for that matter) of their height models. Stand variables were found to be important in explaining plot-to-plot differences, but environmental variables were not found to be important.

General comments i) This paper is narrowly focussed on one region, but otherwise largely duplicates a previously published paper on tropical forest height prediction by Feldpausch et al 2011 (work cited in this paper). Nevertheless, this paper would be useful if the these authors use the French Guiana study to test the Feldpausch et al model, as a basis for validating and improving their own height prediction methodology. The outcome may be that no improvement in height models is required, or alternatively, the development of functions that do not include species (which is acknowledged to be important determinant of height by these authors and Feldpausch) may be found to be fundamentally flawed when applied to specific regions. ii) The paper presents predictions of above ground biomass, based on the alternative height models they developed (Figure 2). The mean and error of above ground biomass predictions should be extended to include estimates based on actual height measurements. iii) If species is important (as acknowledged) what would the improvement be if species was included in their height models. There would need to be background provided in the Introduction to signal what requirements would need to be met to allow species (species appears to have been recorded for these 42 plots) to be included in their analysis of height models. It is currently not possible to tell how many tree height measurements are available per species and by plot and how well they cover the dbh range. If species can not be included in their height models (owing to data limitations), is the approach adopted (using stand and environmental variables) sufficiently robust to be useful. This is where comparisons with Feldpausch et al 2011 will be helpful. Have the new models improved predictions for this region, or are existing models sufficiently accurate. iv) The application of height models that include species may not be feasible at this stage in tropical forest inventories, owing to the diverstiy of species and practical issues) however, the improvement in accuracy of AGB predictions can not be assessed without comparing predictions with estimates based on actual height measurements. The latter

should be used to test the validity of Feldpausch et al 2011 models, both on a plot-specific basis and over all plots.

Specific comments A better title of a suitably revised manuscript would be- "Test of height predictions functions for biomass estimation of tropical forest in French Guiana".

Height measurement can be difficult in tropical forest. Was height to the top of the tree crown measured? Were height trees leaning (lean may not be an issue in tropical forests?), and if so, how was lean dealt with? Was dbh range covered adequately for each species? How were species with buttressing treated? It may be that validation will need to be restricted to a subset of the species.

The discussion around forest succession, and competition (stage of development) effects on height model parameter seems speculative. Will these arguments apply if species effects are included in height models? Will the well documented impacts of environmental variables become apparent after species effects are included in height models?

The methods state that AGB of the trees was obtained using 1 -measured heights, and 2 - predicted heights. Where are estimates based on measured heights given?

In conclusion, the paper has a lot of potential to be of high interest, but not in its current form.

The authors should ensure that their final paper is professionally editted before being submitted.

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