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

**Anonymous Referee #1**

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General comments Molto et al. develop height-diameter relationships for tropical forests in French Guiana. Their three main aims are clear and concise. They investigate different functional forms for the height-diameter relationship and test the effect of including forest structure and environmental predictors. They conclude that a Michaelis-Menten equation was the most appropriate functional type and that the basic height-diameter relationship can be improved by including forest structure variables, and to a lesser extent by adding environmental variables. Although the results are not particularly novel, the generation of accurate height-diameter relationships for tropical forests is an important area of research, especially in data-poor regions such as French Guiana.

I have four general comments that need addressing before this manuscript can be

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Interactive Discussion

Discussion Paper



published.

1. The introduction fails to mention some key references in tropical forest height-diameter relationships (e.g. Feldpausch et al. 2011, cited later on in the text) and as such fails to accurately place the current research within the context of existing work. Do height-diameter relationships exist already that can be applied to the study region? It would have been good for the authors to compare the accuracy of existing relationships with those generated from this particular study. 2. Methods are missing key relevant information. The authors should state how many stems were recorded in the dataset, and what the species distribution was like (if this was known). How many species or community types did the plots sample? Species identity is one of the key predictors of height-diameter relationships (as the authors mention in the discussion) and as such some sort of information on species distribution across plots is needed in the current study. Species traits and community composition will have very strong effects on maximum height reached within any plot (i.e. the alpha parameter). 3. Results are incomplete. I was expecting figures showing the raw distribution of the height-diameter data and the comparing the four different functional forms. This would visually show the reader how much difference the functional form had on the fit of the relationship, and how much scatter there was in the data. Many of the results statements are currently subjective and need to be backed up by hard statistics. For example “RMSEs being quite similar” (P8621); the results associated with Figure 4; and “part of the variability in the height-DBH relationship was mainly explained by the maturity of the stand” (Discussion, P8625). Without statistical tests or plots of the fitted relationships it is hard for the reader to judge if these differences (e.g. Fig 4) are significant or not. I was also expecting the model parameters of the best fitting model to be presented somewhere (e.g. supporting information or does Table 1 do this?) so that the models can be used by other authors working in this area. I would also have liked to see information of how the different height models affect the plot-level above-ground biomass estimate. 4. In places the language (mainly tense and grammar) is poor and needs significant (professional) editing. In places the language makes it difficult to

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Comment

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understand what the authors mean. Some examples are given below in the specific comments.

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10, C2456–C2459, 2013

Interactive  
Comment

### Specific comments

Title –I suggest narrowing the title to “Predicting tree heights for biomass estimates in tropical forests in French Guiana”

Abstract, lines 4-6. This is an example of a poorly worded sentence. Currently “Even if tree height is a crucial variable to compute the above-ground forest biomass tree heights are rarely measured in large-scale forest census because it requires consequent extra effort”. Could rephrase this to be “Tree height is a crucial variable for computing above-ground forest biomass. However, tree height is rarely measured in large-scale forest surveys because of the effort required.”

Abstract line 7 “10cm of diameter” delete “of”

Abstract, line 14-15. The wording here is strange and I suggest revision – what do you mean by “to affect the ABG predictions”

Methods page 8615, line 19-20 “Heights were measured with various methods, mainly lasers and ropes when climbers could approach the top of the trees” – this needs more elaboration and clearer wording.

Methods page 8616, line 6-7. “To avoid mathematical singularity, the proportion of stems between 20 and 40 cm was discarded from the data” – what do you mean here? Did you remove all stems between 20 and 40 cm from the data? Did you not use this size class in your models? This needs more explanation.

Methods, page 8618 line 11 – “5” needs deleting?

Methods, page 8619 line 2 – “7” needs deleting?

Discussion, page 8623, lines 13-15. How much of the variability among plots in model parameters was driven by species turnover? Do you have any information of species

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Interactive Discussion

Discussion Paper



composition that you can provide?

Discussion, page 8624, line 26. "clearly unexpected". Delete clearly as this is subjective and the result may not be clear to some readers.

Discussion, page 8626, lines 11-15. These claims (e.g. "mainly explained" and "did not find them crucial") need more statistical backing in the results section to be supported here. Hard numbers would be preferable.

Figure 2. It seems there is not much difference among models. Some statistics comparing these models and/or figures showing the fitted relationships are required.

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Interactive comment on Biogeosciences Discuss., 10, 8611, 2013.

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10, C2456–C2459, 2013

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