

## ***Interactive comment on “Tree height and tropical forest biomass estimation” by M. O. Hunter et al.***

### **Anonymous Referee #1**

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The study is one of several recent papers that attempts to determine how important height estimation is in the estimation of tropical forest biomass. Several similar papers have appeared in the journal, although in general these data are difficult to collect and the authors have focused on a critical issue currently debated in the tropical forest carbon community (i.e., contrast recent papers by Saatchi et al., Baccini et al., Chave et al., Asner et al. on this point). However, a number of major issues deserve added attention.

The methods of the study are extremely unclear, and this makes the results very difficult to interpret. I recommend that the authors make a simple declaration, in a single table, of all the site information; whether or not the site was used for biomass sampling and / or tree height sampling; what type of biomass sampling was applied; what type of height sampling was applied; etc. From a simple read of the methods it is not at all clear which sites were used for which type of sampling and which sites were used to

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test which hypotheses. The reliance on site names should be minimized and at minimum it should be standardized. The table should be separate from any computational analyses, which likely belong in a second table. For instance, the authors say that they used Lorey's height to determine mean canopy height (Page 10496, lines 18-22), yet they present LiDAR mean canopy height for some regions but not others. Lorey's height, LiDAR MCH, BA, and biomass estimates should be on a separate table and it should be made very clear which sites have LiDAR data and which do not.

The number of sites (four) is touted, but only two have LiDAR data. The authors need to justify why this low number of sites with both field data and LiDAR make this study convincing.

In the current "table 2" the authors present site names that are not compatible with Table 1. Are these TNF sites pseudoreplicates or subplots? This is unclear from both the text and the table captions. Please revise as recommended above.

None of the Figure captions or Table captions are clear. What, exactly, is being shown in Figure 1?

Figure 4 is highly confusing at looks like it contains an error of some kind. If I look at the "Pan-Tropical" Feldpausch model (the green line), I see that it is drawn differently in each panel. This makes no sense. Why doesn't the model appear consistently in all four panels?

The text is not concise. Paragraph one of the discussion is an example. Overall, manuscript length could be shortened by 25%.

The paragraph beginning on Page 10511 lines 24 is an exception that should be expanded. Over and over tropical forest studies recommend height measurements that will improve upon biomass estimates from diameter alone – yet the current authors say little about why this is the case except that D:H relationships vary. This was well known to Chave, yet they still provided a diameter-only model. It seems that the authors are

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arguing that such models are obsolete in the tropics yet they never become clear on this point. Based on their results, it would seem that diameter-only models are totally unreliable.

Minor issues:

Page 10493, lines 27-28: Very few field studies “measure” biomass by harvesting and weighing; field studies typically rely on allometric equations to link field measurements of diameter, height, etc. to biomass stocks – this is not fundamentally different from remote sensing studies (see extensive discussion in Asner et al. 2013 Carbon Balance and Management).

Page 10494, line 18: Feldpausch et al. 2012 made the 2011 study obsolete, replacing flawed power-law height models with more appropriate asymptotic models (i.e., weibull functions).

Page 10495, lines 17-19: It is not clear what is meant by this statement. If biomass is estimated from diameter alone, how could height measurements influence the corresponding output from allometric models that use diameter alone?

Page 10499, line 11: the number of living trees has already been mentioned.

Page 10503, line 23 – Page 10504, line 2: this information should be moved to the methods section.

Figure 3: consider coloring the points by site and adding additional detail to the figure caption.

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Interactive comment on Biogeosciences Discuss., 10, 10491, 2013.

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