

Interactive comment on “Do species traits determine patterns of wood production in Amazonian forests?” by T. R. Baker et al.

Anonymous Referee #1

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The subject addressed by this ms (the relationship between functional traits and wood production) is very topical and I believe there is potential for an interesting paper to be developed based on the data set presented. However, in its current form, the ms represents a poor attempt to address a relevant question.

The main failure of the ms is that it lacks a clear hypothetical framework from which predictive models can be constructed. The convoluted and inelegant model structure employed in the ms is hard to follow and the results drawn from it are cryptic. I found it very hard to understand why the authors adopted the approach they did and I really battled to interpret their results. Until a clear modelling structure is implemented, I am unable to assess whether the authors' conclusions are supported by their data.

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Below I offer some an example of how a model might be structured to more clearly address the relationship between functional traits and wood volume. This is not intended to be viewed as the optimal method for answering this question; rather it is an example of an alternative approach. In its present form there is no way I would accept this ms for publication in a peer reviewed journal, and I would hesitate to consider reviewing a major revision.

Model structure

The data lend themselves to a hierarchical model structure in that the plots are located in three regions. Each region may be expected to differ markedly in the functional traits present in the regional flora due differences in present and paleo-climates and biogeographic processes. It makes sense to account for these differences by testing for functional trait / wood production relationships within each area separately, rather than pooling data from different areas.

Secondly, we have the possible confounding effects of environmental heterogeneity to account for before we can assess the influence of functional traits on wood production. A solution to this problem would be to regress wood production on environmental variables (within each region), then take the residuals of the resulting regression models. The independent influence of functional traits on wood production could then be assessed by regressing these residuals on abundance-weighted trait means.

Of course, this might be viewed as an overly conservative approach and one could question the logic of assuming that co-variation between the environment and functional traits is not relevant for functional trait / wood production relationships.

One other option would be structural equation modelling. This might reveal a model structure where environmental variables influence wood production via their effect on functional traits.

Comparisons between regions are not relevant for the question at hand and should

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be downplayed or removed in a revised version. Also, I think the ms would be greatly simplified by concentrating on stand-level wood production and its relationship to stand level abundance-weighted trait means.

Presentation of results

The Tables and Figures presented do very little to convey the main messages of the ms. Table 1 and 2 are not necessary. Figure 4 is very unkind to the reader, with the number of panels (this is one of the drawbacks of the categorisation approach). The ms really falls down in comparing wood production between regions for separate functional groups. The authors go to great lengths to obtain functional trait values for as many species as possible, but then throw the majority of this information away by lumping species into categories. Not only does this cause loss in accuracy but it also needlessly clutters the modelling process (with the result being Figure 4). Further, analysing trends in different diameter classes adds unnecessary complexity and merely confounds the reader's attempts to see the paper's key points. I also question the relevance of this approach. What I'm interested in is stand level wood production and its relationship to stand level abundance weighted trait means.

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