

***Interactive comment on “Productivity of aboveground coarse wood biomass and stand age related to soil hydrology of Amazonian forests in the Purus-Madeira interfluvial area” by B. B. L. Cintra et al.***

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First of all, we thank the Dr. Lilian Blanc for all the time and his huge effort applied in revising our manuscript, both scientifically and in wording. We find the concern about the presentation and interpretation of the results fair, given the insights provided by all the comments of both referees. We believe the confusion related to terms of productivity will be clarified especially after making all the alterations suggested by the referee#3. Missing information and references are discussed in the comments below.

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Interactive Discussion

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Major concern 1: In the first version of the manuscript (submitted on 6 February 2013), information of the soil water saturation index was indeed not available for one of the plots. However, in the manuscript published in Biogeosciences Discussion (5 April 2013), this information was included, although caption of Table 1 still indicated that it is not available. This will be corrected. Figure 4 presents eight dots in each graphic, each one representing one sampling unit, which we believe is the minimum required to demonstrate a statistical relation between two variables.

Major concern 2:

a. We will rewrite the third paragraph of page 13 in the following way: We will only consider the current aboveground wood biomass productivity (AGWBPC) to avoid confusion between both terms. Furthermore, we will also add data on the turnover rates, as suggested by the referee#3. We think that this will improve the reading and interpretation of our results. We do not understand why the equations of page 13 are false. We rewrote them to make them easier to understand. b. The values of figure 6 represent the mean of the values obtained by the two allometric equations, which were used to perform the analysis. In a revised manuscript, we intend to use only one allometric equation published by Feldpausch et al. (2012) which we actually consider the most accurate model for biomass estimates in the Amazon region (also suggested by reviewer #3). c. We did not know the study of Ferry et al. (2010) and certainly its reading gave us some valuable insights. We also considered the possibility of shifts in floristic composition towards light demanding species (page 18, last paragraph). It is true that tree mortality may be a key process explaining our results. Our study area is very different from the well-known hilltop-bottomland terra firme forests mainly because the nearest drainage is vertically very close to the surface even in the driest areas. However, our results show that the same mechanism is valid for our study area and are maybe even stronger. We do not have mortality data to argue that mortality rates are higher where soils are saturated, but this hypothesis is supported by the strong trend we found between the soil water saturation index and stand age. Also,

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calculating the turnover rates as suggested by Referee#3, we observed that biomass turnover increased with the soil saturation index, which is also in accordance with this mechanism. The paper of Ferry et al. (2010) will surely be considered in our discussion since our results are indeed similar, but in very different environments, which is even more interesting.

Major concern 3: We do not understand why the objectives are vague and unclear, but we will reformulate them in a revised manuscript in a more specific way.

Major concern 4: Forest age is an ecologically very important parameter to interpret forest dynamics and successional development (Schöngart et al. 2010). It makes a huge difference if we relate high forest productivity to an old-growth forest or a young successional stage. Usually, stands with lower ages are dominated by light-demanding pioneer species with low wood densities and fast diameter growth, while old-growth forests are characterized by shade-tolerant tree species with high wood densities and slow diameter growth. This is very important for interpreting results. We changed the calculation for stand age, weighting each class by its total number of individuals in the plot. This gives more weight for trees with DBH between 10 and 29.9 cm and results in lower estimates for stand ages. However, the relationships between stand age and other variables remains unchanged. The ages of the plots calculated this way are presented in Table 1 (see supplement):

Major concern 5: Chave et al. (2004) (cited in the manuscript) recommends the use of more than one allometric equation when there are no specific allometric equations available for the study area. However, we agree that using only one allometric equation will make the analysis simpler to read and to understand. Therefore, we chose to use only one allometric equation recently published by Feldpausch et al. (2012) which result in reliable estimates for biomass stocks and productivity.

Minor Comments:

1. In the abstract mean productivity was presented as the average of all plots, while in

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the other sections productivity was presented separately for flooded and non-flooded plots. We will present this result in only in the second form, even in the abstract in a revised version. The value of 233 Mg ha<sup>-1</sup> was calculated as the average of the mean biomass of each plot obtained by the two allometric equations.

2. a. We agree and will change this in a revised version of our manuscript. b. We agree and will change this in a revised version of our manuscript. c. We agree and will change this in a revised version of our manuscript.

3. All equations reference number will be revised, especially after we decided to use only one allometric equation, which will change the reference numbers of most equations.

4. It refers to a given tree used in the calculation. This writing is incorrect and will be corrected in a revised version of our manuscript.

5. We agree and will split this sentence in two.

6. Flooding inhibits diameter growth due to the anoxic conditions in the soil limiting the uptake of water and nutrients (Worbes 1997, Schöngart et al. 2002). We discussed that tree growth might be favored during the dry season by water-logged, but not superficially flooded, soils. In soils with a characteristic plinthite layer, this could mean that trees would only grow during saturation, since they probably are not be able to reach the underground water under the plinthite layer during the dry season.

7. We will consider this. The indicated number refers to trees which were cored for tree-ring analysis.

8. We will change this.

9. The signification is the standard deviation. Will be clarified.

Please also note the supplement to this comment:

[http://www.biogeosciences-discuss.net/10/C3108/2013/bgd-10-C3108-2013-](http://www.biogeosciences-discuss.net/10/C3108/2013/bgd-10-C3108-2013-C3111)

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