Biogeosciences Discuss., 10, C1482–C1485, 2013
www.biogeosciences-discuss.net/10/C1482/2013/

Biogeosciences Discussions

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.

L. Blanc (Referee)

lilian.blanc@cirad.fr

Received and published: 3 May 2013

The main result is that Âń wood biomass productivity Âż, calculated as the whole productivity of the stand divided by the stand's basal area was positively related to soil water saturation. As the authors stated in the discussion, Âń this is a surprising result Âż. My major concern is about the presentation of this result and its interpretation. To convince the reader that this result is a surprise, authors should clarify and improve this questionable aspect. The point is very confusing for me mainly due to the use of unappropriate terms related to productivity. As a consequence, it's difficult to un-

derstand if the authors are dealing with tree productivity or forest (stand) productivity. More generally the reading of this paper is quite difficult due to missing informations and unjustified choices about variables calculation, erroneous sentences and formulas and errors in references (equation number).

Major comments 1. Before dealing with the major concern about forest productivity, I'd like to focus on the experimental design and consequently the statistical power of the relations between variables. Trees and soils data were collected on 8 x 1ha plots which is a great amount of field work (for one of these plots soil water saturation index was not available). But it represents just 7 samples units which is unsufficient to demonstrate statistical relations between two variables (figure 4). These results are therefore speculative.

2. About biomass productivity:

a. First of all, terms related to productivity need to be better explained and used in the text. The authors used two variables either AGWBPc and AGWBPmean. The first one refers to forest productivity estimated as the whole quantity of biomass produced on a given area for a given period. The second one also refers to forest productivity (but with an other estimation process) divided by basal area. This is my interpretation because the text (3rd paragraph p. 13) is very unclear and the formulas are false. The authors should : - rewrite this paragraph to define more clearly these 2 variables ; - avoid the uses of several terms in the whole text (Âń current total productivity of the plot Âż, Âń stand's AGWB production Âż, Âń above coarse wood productivity Âż, Âń wood biomass productivity Âż, etc.) and should be consistent with the use of two clearly and well-defined terms.

b. the AGWBPmean values presented in table 6 are different from the ones presetentd in figure 4. How were the values calculated for this figure and why are they different from the previous ones (table 6)?

c. The authors interpreted an increase of AGWBPmean with soil water saturation (fig-

ure 4a) which is one of the main result of this study. Given the definition provided by the authors, this variable can be considered as a proxy for tree productivity (term used by authors in the conclusion p16, 2nd paragragh). If forest productivity were used (AGWBPc, values from table 6), the pattern disappeared and we can even detect a slight trend decrease. So forest biomass productivity decreases with soil water saturation index whereas tree biomass productivity increases. These results are very similar to the ones presented by Ferry et al. (2010) in Journal of Ecology. These authors demonstrated that above ground biomass, basal area, tree height and wood density decreased from well-drained hilltop to poorly-drained and bottomland. They also showed a higher treefalls in bottomlands which favoured a shift of the floristic composition towards light-demanding species. This can explained a higher tree productivity in the most soil water saturated soil. Tree mortality could be a key process explaining the variability of forest structure and dynamics with changes in hydrological and edaphic conditions. I recommend that the authors include this work and its ouputs in the second hypothesis section of the discussion.

3. The objective is vague, unclear and needs to be clarified and to be related with the main results.

4. What is the ecological significance of forest age ? I wonder why the calculation of forest age gives a more important weight to big trees (over 30 cm dbh). Please justify.

5. Why the authors used 2 allometric models to estimate tree biomass ? There is no justification and the results of tree biomass estimations are not discussed.

Minor comments 1. Mean productivity value cited in the abstract (5.6 Mgha-1year-1) is not cited in the results section but only in the abstract section. Please explain how you calculated this value. Explain also how you calculated the mean value 233 mg ha-1 (2nd paragraph of the results section).

2. Wording :

a.Abstract section : - 3rd sentence is erroneous (p2) :

b.Introduction section : - Âń Giardin Âż to be replaced by Âń Girardin Âż (p3, idem in the references section p23) ; - Âń than Âż to be replaced by Âń then Âż in the last paragraph (p5);

c.Results section - Last sentence : Âń da Âż to be replaced by Âń the Âż.

3. Erroneous references : a.p11 Âń For allomteric models (4 to be replaced by 2) and (5 to be replaced by 3)... Âż. b.2nd paragrapgh of the results section : please verify all the equation reference number a s the first four are obviously false.

4.What indice i refers to in equation 9 (p13) ?

5. Please reword the 2nd sentence of the 1st paragraph (Disucssion section). It's too long and difficult to understand the message;

6. I don't understand the statement about the potential effects of water sturation and flooding on tree growth (the last 2 sentences of the 2nd paragragh in the discussion section). Please explain more clearly.

7. Table 3 : please explained in the legend what the trees were sampled for ?

8. Table 6 : Eq (5) to be replaced by Eq. (3)

9. Table 7 : what is the singification of the Âń $\pm$ term Âż associated with each estimate ?

Interactive comment on Biogeosciences Discuss., 10, 6417, 2013.