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Interactive comment on “Above- and below-ground net primary productivity across ten Amazonian forests on contrasting soils” by L. E. O. C. Aragão et al.

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Aragão et al. measured above and below ground net primary productivity for eight large forest plots throughout the Amazon and included data from two previously published other plots to determine patterns in the annual flux of carbon and whether they were related to nutrition. They found a two-fold variation in net primary production and that net primary production varied with soil phosphorus and leaf nitrogen. The fraction of NPP used belowground decreased as stemwood production increased, while the fraction of NPP used for foliage, flower and twig and for fine root production was constant across the productivity gradient. Foliage, flower and twig NPP was linearly related stemwood

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NPP.

This useful study dramatically increases the information available about dry matter production in the Amazon. In particular, the examination of the fine root and foliage, flower and twig NPP and how they vary across the productivity gradient is extremely helpful data for understanding process and for modeling. The paper is well written and the methods very thoroughly described.

Some suggestions for improvement.

1. I applaud the attempt to estimate statistical errors for all of the estimates. However, in this case, I think they give a false sense of precision. As the authors thoroughly discuss, the estimates for foliage, flower and twig NPP are likely biased low because decomposition in the traps was not considered (nor was retention in the canopy). The estimates for coarse root production are likely biased, as the fraction of biomass use for coarse roots decreases as resource availability increases (Stape et al. 2004 Forest Ecology and Management 193:219-234). Additionally, the fine root production estimates also likely have biases, because they disturb the soil, exclude some soil fauna, and do not cover the entire profile. I understand the reasons for all of the decisions made for the study, and for the methods used. However, in addition to the estimates of statistical precision, it would also be useful for the paper to attempt to quantify the size of the biases and report those as well. I suspect some of them could be quite important.

2. For some reason, I hate the term NPPlitter or Litter NPP. Litterfall is the imprecise means we use for estimating foliage, flower and twig NPP, but that is what we are trying to estimate! Probably a losing cause, just like trying to substitute soil surface CO₂ efflux for soil respiration. The problem with incorrect terminology is that we may focus on the wrong thing. In the case of "soil" respiration, people still insist on modeling it as if it were coming from a giant microbe when overwhelming evidence shows that much of it comes directly from plants. In the case of litter NPP, we focus on the litterfall, not on all

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of the things that make litterfall a biased estimate of foliage, flower and twig NPP-like decomposition, canopy retention, herbivory, etc.

3. I have a difficult time understanding why foliage, flower and twig NPP can be a constant fraction of total NPP, wood NPP and foliage, flower and twig NPP can be linearly related, but wood NPP is not related to total NPP. Seems like they cannot all be true.

4. Future studies should measure total belowground carbon flux (Litton et al 2007) to place the fine root NPP into the context of the total flux going belowground. It would also be fun to see if some of the ideas tested in Litton et al. (2007) applied across this productivity gradient.

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