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Biogeosciences Discussions

Interactive comment on "After trees die: quantities and determinants of necromass across Amazonia" *by* K.-J. Chao et al.

K.-J. Chao et al.

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Response to R. Houghton (Referee)

We thank the referee for the evaluation and for the positive remarks about the new information and method presented in this manuscript. The Referee mentioned that there are several potential areas of confusion in our manuscript, we will response them in turn.

1. The evaluation of field data and published data with environmental variables.

In this study, we did not relate environmental factors to the necromass measures. Rather, we focused on terra firma forests which are defined as humid, lowland forest, presumed not to have experienced fluvial flooding in at least 250 years in the Amazon Basin (page 2000, footnote a). Therefore, we are not sure what the referee meant

about the differences of the results between the field data and published data with the environmental variables.

2. The contradictory results between stem mortality and mass mortality.

Actually, they are not contradictory results, but two different terminology terms. In our manuscript, we found that forests with high stem mortality rate (i.e. number of dead trees) are not necessary have high mass mortality rate (i.e. amount of dead mass) (page 1988, lines 18-20). It is simply because more big trees die (amount of dead mass) in the low stem-mortality NE Amazonia than in the high stem-mortality NW Amazonia, (page 1988, lines 20-21). The same result was found in Chao et al (2008).

To avoid confusion, we will add quotation marks to the words stem and mass in the abstract (page1980, line13 and line 17) and discussion (page 1988, line 18-20) to emphasise that these are two different terms.

3. The arbitrary calculation of annual mass mortality.

The reasons why we used the arbitrary census period (i.e. about 4 years, page 1985, line 21) are based on three concerns. First, varied census period can influence mortality rate, since longer periods tend to lead to underestimation of mortality rates because the short-lifespan trees contribute less to the calculation (Lewis et al., 2004). Therefore, we need to choose a narrower standard period to reduce this effect. Second, recent census period can better reflect necromass in a plot than old, previous census data, due to the fact that old dead logs are likely to be decomposed. Therefore, we used recent census data in about 4 years prior to necromass measurement rather than old, previous census data (e.g., 10 years prior to necromass measurement). The third concern is the availability of dataset. The census period of our group (RAINFOR, Malhi et al., 2002) varied from 1 to 30 years, so we chose those are reasonably recent our necromass estimation and with more available data (i.e., 3.5 to 6 years, page 1990, lines 19-20).

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We think the word -short- might be confusing for the readers, so we will use the word: recent instead. Also, we will add above comments in our Discussion section 4.5 (page 1992) to address that our equation coefficients would change when using different census period data, but we are confident that the major trends will persist.

4. Is aboveground biomass rejected as a variable for predicting CWD?

We did not reject aboveground biomass as a predictor of necromass, but we emphasize that mass mortality input and living wood density are better predictors of necromass (see r square of equation 8, 9 and 10 in page 1987-1988). One of the questions we asked in this study is: can necromass be predicted from forest structural parameters (biomass) or dynamic parameters (mortality measures and decomposition estimates) of a stand (page 1982, lines 3-5)? We predicted (P1.1) that there is no relationship between stocks of biomass and necromass and (P2.1) that forests with high mass-mortality rates and slow decomposition rates have higher stocks of necromass (page 1982, lines 6-12). However, our results suggested that there is a weak correlation between aboveground biomass and necromass (page 1987, line 23), so the prediction P1.1 was not supported (page 1989, lines 3-5). In conclusion, necromass can be explained by both forest dynamic parameters (mortality measures and decomposition estimates) and forest structure parameter (biomass), but is better explained by forest dynamic parameters (page 1993, lines 8-9).

We will rephrase our abstract and discussion based on above comments to clarify our findings.

References Chao, K.-J., Phillips, O. L., and Baker, T. R.: Wood density and stocks of coarse woody debris in a northwestern Amazonian landscape, Can. J. For. Res., 38, 795-825, 2008.

Lewis, S. L., Phillips, O. L., Sheil, D., Vinceti, B., Baker, T. R., Brown, S., Graham, A. W., Higuchi, N., Hilbert, D. W., Laurance, W. F., Lejoly, J., Malhi, Y., Monteagudo, A., Núñez Vargas, P., Sonkė, B., Supardi, M. N. N., Terborgh, J. W., and Vásquez

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Martínez, R.: Tropical forest tree mortality, recruitment and turnover rates: calculation, interpretation and comparison when census intervals vary, J. Ecol., 92, 929-944, 2004.

Malhi, Y., Phillips, O. L., Lloyd, J., Baker, T. R., Wright, J., Almeida, S., Arroyo, L., Frederiksen, T., Grace, J., Higuchi, N., Killeen, T., Laurance, W. F., Leaño, C., Lewis, S. L., Meir, P., Monteagudo, A., Neill, D., Núñez Vargas, P., Panfil, S. N., Patiño, S., Pitman, N., Quesada, C. A., Rudas-Ll., A., Salomão, R., Saleska, S., Silva, N., Silveira, M., Sombroek, W. G., Valencia, R., Vásquez Martínez, R., Vieira, I. C. G., and Vinceti, B.: An international network to monitor the structure, composition and dynamics of Amazonian forests (RAINFOR), J. Veg. Sci., 13, 439-450, 2002.

Interactive comment on Biogeosciences Discuss., 6, 1979, 2009.