

# ***Interactive comment on* “Estimation of Coarse Woody Debris Stocks in Intact and Degraded Forests in the Brazilian Amazon Using Airborne Lidar” by Marcos A. S. Scaranello et al.**

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Response to anonymous reviewer #1, “Estimation of Coarse Woody Debris Stocks in Intact and Degraded Forests in the Brazilian Amazon Using Airborne Lidar”

We thank you for their helpful comments. We respond to all concerns and suggestions below. Reviewer comments are quoted in italics followed by our responses.

Reviewer #1.

Comment: I would have enjoyed to see a more hypothesis-based pre-selection of LiDAR metrics that should be related to CWD, rather than an exploratory analysis of all

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tested metrics. The authors may at least explain, why they chose the presented metrics out of the myriad of metrics available from LiDAR.

Response: We used an exploratory analysis (subset selection) for the lidar only models and a hypothesis-based approach for the historical models as discussed on page 7, lines 14-23 of the submitted paper. As requested by the reviewer, we will expand on the discussion of selected metrics in the hypothesis-based approach in the section of page 7 beginning with line 19. Following below is a draft text.

For intact forests, we selected canopy relief ratio as a measure of canopy structure and site factor for aggregating site-specific differences. Previous studies in intact forests suggested differences in CDW stocks, as well as the underlying mechanisms in the CDW input (Rice et al. 2004; Pyle et al. 2008). For logged forests, we selected age since the last disturbance because CDW diminish with time because of decomposition (Chambers et al. 2000). We also selected gap area because tree mortality and CDW stocks were closely related to gap area in intact forests at Tapajós National Forests, Pará (Espírito-Santo et al. 2013). For burned forests, we selected the number of fire events, in addition to age and gap area. A previous study conducted in Paragominas municipality, Para, and Alta Floresta, Mato Grosso, showed the gradual increase of CDW stocks from one to three fire events (Cochrane et al. 1999). In both logged and burned forests we included a measure of forest canopy height correlated to live above-ground biomass (Longo et al. 2016) because aboveground live biomass is significantly correlated with CDW across the Amazon (Chao et al. 2008).

We already have discussed the relevance of variables that were found through the subset selection process. But, as the reviewer suggests, we will provide additional insights to explain the relevance of selected metrics in the exploratory analysis.

Comment: To me, the RMSE are always fairly high. 51.6% (p.10 l.26) is a lot, even though the authors show that earlier models performed weaker even in boreal forest (78.8%). I therefore appreciate that the authors stated that their work may help “reduc-

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ing uncertainty”, rather than selling it as a highly accurate tool.

Response: We agree with the reviewer that a RMSE of 51.6% is not exceptionally good but we note that our models using only lidar data had smaller RMSE (between 33 and 36%). The cited value of line 26 at page 10 is related to the study of Pesonen et al. (2008). We suspect that the reviewer was confused with the RMSE of this study. In a revised manuscript, we would rewrite the sentence to clarify that the 51.6% RMSE belonged to the Pesonen et al., 2008 study as follows, “In the boreal forest the model for fallen coarse woody volume had a relative RMSE of 51.6% and is similar to the performance of the model for burned sites in our historical scenario.”

Comment: p.3 l.10: shouldn't it be “losses in aboveground” instead “of”?

Response: We feel that “of” is the proper usage here.

Comment: p.3 l.11: Shouldn't it be “at the forest floor” not “in”?

Response: “At the forest floor” is an acceptable change that we will implement.

Comment: p.6. 9 and 10: Would be nice to refer to Table 1 again, so the reader knows where to find the different metrics

Response: As suggested we will add appropriate references to Table 1 on these three pages.

Comment: p.8 l.3: It becomes obvious what the referee criticized: “CWD (including fallen and standing dead wood”. I agree the terminology may be revised as suggest by the other referee.

Response: Please see our response to reviewer #2.

Comment: p.8 l.14: coarse woody debris with “y”

Response: We believe that the descriptive “total coarse dead wood” is more valuable here than a generic independent variable “y”. I use therefore “total coarse dead wood”

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for our model.

Comment: p.8 l.27: “site-related”

Response: We will add the “-” as correctly suggested by the reviewer.

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-75>, 2019.

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