Dear Reviewer #2,

Thank you for your positive review and suggestions. We here address the different points you raised in your review.

Reviewer comments (in italics): *"In the manuscript the authors suggest that incorporation of the crown mass ratio into commonly used allometric equations could improve the accuracy of forest carbon estimates. So my suggestion is to incorporate this information into the analysis by comparing calculated estimates of aboveground biomass between the proposed models and to discuss different results regarding strategies of carbon allocation between stem and crown mass and its implications for tropical carbon storage. For instance, the authors could include a table stating respective forest carbon estimates for the investigated study sites and compare reported estimates to the results derived by their novel approach accounting for a crown mass proxy. This would allow for a more direct comparison between the biomass estimates derived from the respective models and could be used to discuss the importance of incorporating crown metrics in allometric models to account for potential alterations in carbon allocation in response to projected global changes."*

Our response (in plain text): Applying the different models to plot data in order to compare the resulting aboveground biomass estimates is obviously a good idea. However, it requires having measured crown metrics, which was not systematically done for the field plots we used here. For instance, we do not have this information for the 50-ha plot at Korup NP, where the influence of forest structure on the pantropical model error is most evident. Among the 80 1-ha plots of the IRD network, we possess information on trees crown depth in 46 plots. In each plot, crown depth measurements were made on a subset of trees (N=39.2 ± 15.8) distributed over all tree diameter classes (but ≥ 10 cm of diameter at breast height, D). Although we do not have crown metric information for all large trees in those plots, we used this dataset to dig into your suggestion (Fig. 1). In Figure 1 of this response, the X axis represents plot aboveground biomass derived from m_0, the pantropical model of Chave et al. (2014). On the Y axis, plot AGB was computed with the same biomass model for trees with no information on crown depth, or with our model m_2 for trees with information on total height and crown depth (Fig 1-A). We also restricted the subset of trees on which m_2 was applied to trees with D ≥ 100 cm, as recommended in our manuscript (Fig. 1-B). For

simplicity, plot AGB estimated from combined m_0 and m_2 predictions (as described above) are referred to as m_2 predictions. In Fig. 1-A, subtracting m_0 to m_2 predictions leads to an average difference of about +2 Mg. In the manuscript, we indeed showed that the averaged bias at the level of the plot network is fairly close between m0 (+6.8%, p. 19724 L. 1) and m_2 (+5%, p. 19724 L. 10). The spread of plot-level biases is also consistent with previous findings (see Fig. 5-B of the manuscript), with a tendency for m_0 to result in higher AGB estimates than m_2 (up to +20 Mg or +6% of m_0 AGB estimate), with the exception of some high-biomass plots where large trees AGB is underestimated by m_0 (up to -56 Mg, or -15.9% of m0 AGB estimate). Restricting the use of m_2 to trees with $D \geq 100$ cm leads to plots AGB estimates closer to those obtained with m_0 (Fig. 1-B), notably because the overestimation of small trees AGB is not accounted for anymore. High-biomass plots still depart from the 1-1 line. Despite the limited representativity of our data on crown metrics is (even for large trees), these preliminary results seem in good agreement with the trends presented in the manuscript. Yet, we do not think that those results would bring much to the manuscript and propose to keep them here, especially since this response will be associated to the article.

Let us also note that your suggestion to discuss "*the importance of incorporating crown metrics in allometric models to account for potential alterations in carbon allocation in response to projected global changes"* echoes the comment number 4 from Reviewer#1 ("scaling up"), which led to a slight expansion of this subject in paragraph 4.2 of our manuscript.

"Page 19714; Line 4: Consider stating: "…,which play a major role in the global carbon balance (REFs)."

Agreed.

"Page 19714; Line 8: Consider changing the sentence to: "However, local forest biomass estimations commonly represent the foundation for the calibration and validation of remote sensing models."

Agreed.

"Page 19724; Line 20: Consider stating: "This threshold was mirrored by a break point in the relationship between total tree mass and the compound predictor variable used in the reference allometric model of Chave et al. (2014)."

Agreed.

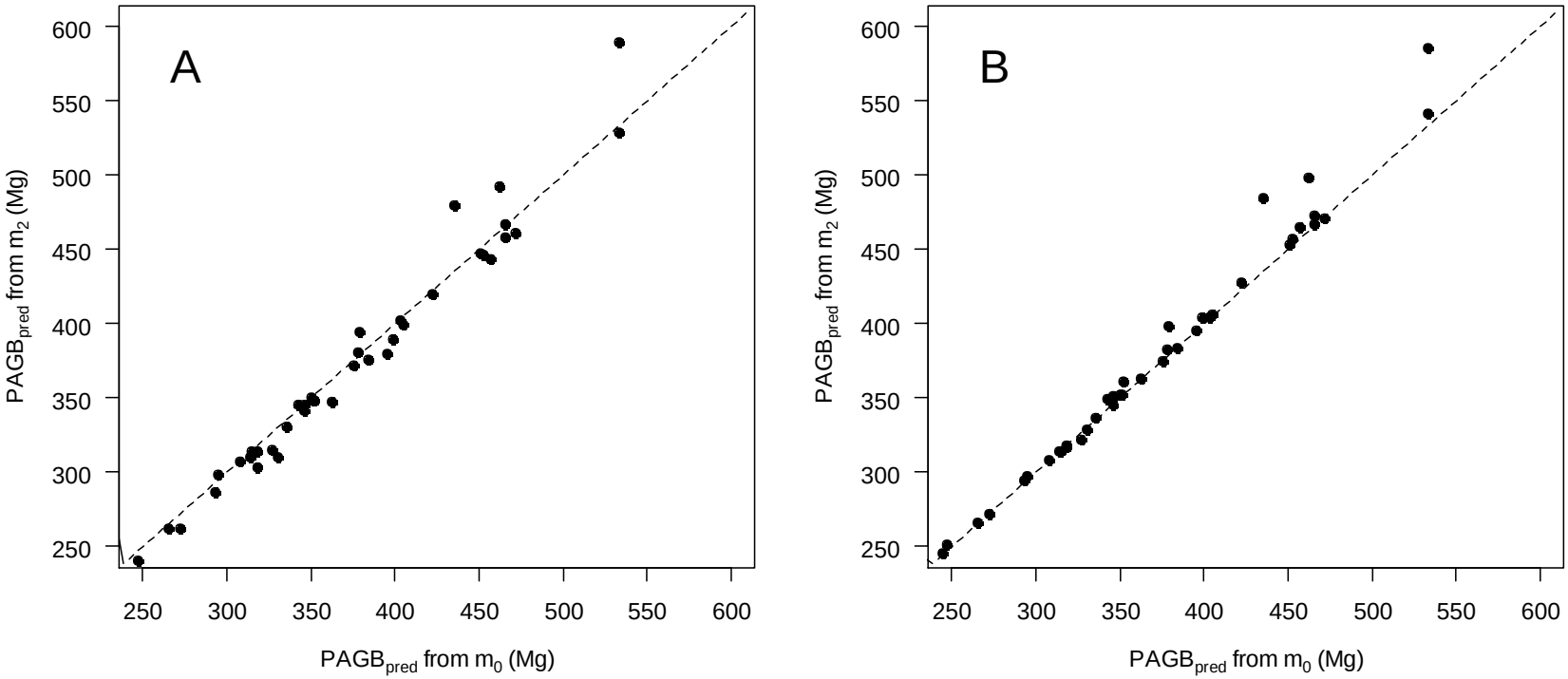

Figure 1. Above ground biomass estimation (in Mg) of 46 1-ha plots using the pantropical model m_0 (X axis) and a combination of m_0 (for trees without information on crown depth) and our model m_2 (for trees with information on crown depth) (Y axis). In plot A, we used m_2 to predict the biomass of all trees with information on crown depth, while we only used m_2 on trees with D ≥100 cm in plot B.