

## **Response to Referee Comment #2:**

The present paper addresses an important problem in model data comparisons, namely how to compare measurements at the plot scale with pixel level model predictions, given the well-known spatial heterogeneity in the measured variables. The authors propose a straightforward statistical framework that can take into account within pixel variations. The authors exemplify the use of this model using aboveground biomass (AGB) measurements and model predictions in the Amazon region. They show that by using the new metric for data variation it is easier to show whether the model predictions match the observed variability.

This core part of the paper is very clear and, in my opinion, very valuable for future modelling studies. The paper in general is very well written. There are however some parts of the paper that are not so well developed, in particular the model comparison with the other datasets. In my opinion, the authors can go one of two ways: either cut down to the core of their method and the AGB data, or extend the less well developed and explained parts of their paper.

*Response: Thank you very much for the positive feedback on our manuscript. We appreciate the suggestion for improving the part of the manuscript about the model comparison with other datasets and will expand more on that as elaborated in our response to your detailed comments below.*

### Detailed comments

Description of observed data (section 2.2.1) I find the data description in the main text of the paper extremely short. While the concept of AGB might be widely used and easily understandable, woody productivity and woody loss are not and a brief definition and description of how these were measured/calculated would greatly help the reader understand the subsequent analyses.

*Response: Yes, we agree and we thank the reviewer for pointing this out. We will describe the observational data in more detail in section 2.2.1, in particular how woody productivity and woody loss were measured and calculated. Brienen et al. (2015) derived "...forest woody productivity... from the sum of biomass growth of surviving trees and trees that recruited (that is, reached a diameter  $\geq 100$  mm), and mortality [=woody loss] from the biomass of trees that died between censuses. We will describe this accordingly in our methods section on p. 5, sect. 2.2.1*

Analysis of the woody productivity and loss. The AGB data and model predictions are analysed in detail and presented in four different figures, while the other two datasets have one figure each and one joint table. I would find it interesting to see a bit more detail about

these observations too, especially since one of the strong discussion points (section 4.3) revolves around the model's inability to predict productivity and loss.

*Response: Thank you for your comment. We agree that woody productivity and loss are also interesting. However, we decided to focus on mainly AGB in the main manuscript as an example to present our approach. We prefer to keep the detailed figures in the supplementary material.*

Different allometric models. While I fundamentally understand why the choice of allometric model is important for estimates of AGB, it does not feel like this additional dimension adds to the central message of the study. Most of the detail for the allometric models is buried in the supplementary material and, as far as I understand, the majority of the analysis has been done with only one of the allometric equations.

*Response: Thank you for pointing this out. However, we feel that the uncertainty introduced by allometric relations both in field data of AGB and in DGVMs is an aspect that needs to be part of the discussion of our paper. We are inclined to put even more details on this aspect in the revised version of the discussion of our manuscript, although some technical details we would keep in the supplementary information.*