Biogeosciences Discussions

Biogeosciences Discuss., referee comment RC2
https://doi.org/10.5194/bg-2022-24-RC2, 2022

Comment on bg-2022-24

Anonymous Referee #2

Referee comment on "A question of scale: modeling biomass, gain and mortality distributions of a tropical forest" by Nikolai Knapp et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2022-24-RC2, 2022

The paper "A question of scale: modeling biomass, gain and mortality distributions of a tropical forest" is an attempt to explore the relationship of forest dynamic main characteristics i.e. biomass stock, biomass growth and mortality, across spatial scales between 10m to 100m. The authors used different approaches based on multi-scale observation sources and they estimated scale factors to upscale or downscale the distribution of the forest dynamic characteristics. In addition, the authors make use of stochastic simulation forest models in order to retrieve the observed distributions of each scale based only on one of them with success.

This study is overall well crafted and the material and method is particularly well written with clear statements that will help readers to reuse their works in different forest ecosystems across the globe. Nonetheless, the limited range of scales that they really used in the study (10m – 100m instead of the full range 10m-500m) reduced the impact of the study.

I have few general comments :

- The introduction is somewhat difficult to follow because it looks like an enumeration of facts without any logical link helping the reader to follow the thinking of the authors. I would recommend using more linking words to structure the introduction and especially the first paragraph.

- The overall method is clear but why the authors didn't use higher scaling factors such as 200m, 500m and 1000m ? The lidar survey gives the authors a way to validate them, isn't it ? If I understand well, one can extrapolate (even if the lidar approach shows divergence) upscale distributions from the log/log scaling relationship for G and M. If not, the authors must justify their choice in section 2.3.

- In the result section, again, I found the figure 4 a bit disturbing since most of the study relates on a range of scale between 10m to 100m e.g. scaling factors are calculated for 10m, 20m, 50m and 100m. Modeling section is also made between 10m to 100m. I would recommend choosing between including the larger range in both modeling and scaling factor sections (which may lead to less clear results but will increase the paper's impact) or put the lidar analysis in supplementary material in order to clearer the message (but decrease the paper's impact).

- The discussion about the technical aspect is good but, at line 365, the sentence about the issue on the weak performance of simulations using 100-m reference gives no information at all on what would be the cause of this issue. Discussion is exactly the place where the authors can give their thoughts about it. So please, share with the readers otherwise it feels like the authors want to hide something.

- We wait for this section to lighten us on how the author's work will benefit others (modelers colleges but also no-modelers). I found the section a bit vague without practical examples. I also would like to read a perspective section in which the reader will know more about what the authors are planning in order to solve issues regarding the weaknesses they found during their study.