

Earth Syst. Sci. Data Discuss., referee comment RC1
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A strong and interesting ms on new root biomass data product

Anonymous Referee #1

Referee comment on "A global map of root biomass across the world's forests" by
Yuanyuan Huang et al., Earth Syst. Sci. Data Discuss.,
<https://doi.org/10.5194/essd-2021-25-RC1>, 2021

General comments

This manuscript describes a new high resolution, global map of root biomass—crucially, one generated by a different approach than most previous studies, that produces a very different (lower) result globally. This is an interesting and important topic, and the resulting dataset will be a valuable resource for a wide range of scientists. The text is generally clear and well written, methods clearly described, and uncertainty and cross-validation quantification comprehensive. I have not tried to rerun the code posted on Figshare but applaud its availability, which is crucial for scientific transparency and reproducibility. From scanning through, it looks clear and complete.

There are a few problems. I echo the previous reviewer's point about sampling depths—this should be more clearly described. There also is a key reference and comparison dataset that isn't cited but almost certainly should be: Spawn, S. A., Sullivan, C. C., Lark, T. J., and Gibbs, H. K.: Harmonized global maps of above and belowground biomass carbon density in the year 2010, *Sci Data*, 7, 112, 2020.
<http://dx.doi.org/10.1038/s41597-020-0444-4>. Finally, the text has a few unclear or awkward points (see short list below).

In summary, this is a strong and interesting manuscript documenting a valuable global dataset, and I think it will generate much interest in understanding the discrepancies between these and previous results. It needs minor to moderate revisions for clarity and to include the recent Spawn et al. paper and dataset.

Specific comments

- Line 31: perhaps "a key role"
- 37: here and elsewhere, I'm puzzled the exclusion of recent Spawn et al. 2020
- 65-66: I agree this (increasing with time) is interesting, but you never return to this point in the discussion...why do you think this occurred?
- 122: "precipitation and the"
- 180-181: this sentence is awkward and either out of place, or not well connected to the material around it. Rework, probably starting a new paragraph for readability
- 188-: the cross-validation step is crucial and I feel like this is a little light on the details. For example, the continental cross-validation is only described in the Figure 9 caption I think; should be here as well
- 262: probably start new paragraph here
- Table 1: see #2 above
- 333-: interesting!
- 347-348: this is a good and succinct point; include in abstract?
- Supplementary I. 96-97: this is crucial detail and should be included in the F7 and F8 captions as well