Review - 2nd revision

Combining canopy height and tree species map information for large scale timber volume estimations under strong heterogeneity of auxiliary data and variable sample plot sizes

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Reviewer 1:

Thank you for this extensive review and an interesting paper. In my opinion, some parts are almost a bit too detailed, but this is a matter of taste.

Comments:

1. *Abstract: 'entire forest area' vs. state and communal forest further down.*

   Has been corrected to 'state and communal forest area'.

2. *The data here are special in the way that almost all ALS data were collected **before** the field data. Therefore **no** influential observations with seemingly large timber volume but low mean vegetation heights due to harvests after field measurement but before laser scanning exist. Those influential observations may need special treatment.*

   We are not sure if the reviewer is suggesting any changes to our article here. He is right that the situation he explains does in fact not occur in our data set for the reason that all ALS acquisitions took place before or at the time of the inventory. We thus think that any revision or mentioning of the issue in our article is not justified.

3. *P6L58: Remind us: Regression model was the one for timber volume? Next sentence: Saved computation time compare to which alternative?*

   It is the timber volume regression model (we added this information). We changed the two sentences into 'Using explanatory variables of the timber volume regression model in the calibration model provided the advantage of reduced data storage compared to computing alternative variables for calibration'. We hope that this formulation depicts our line of thought more clearly.

4. *P7L18 (and other places throughout the text): I do not seem to understand why the maximum limiting distance of 38m results in a radius of 76m. Should it be a diameter of 76m?*

   Yes, it is the diameter. We corrected this accordingly.

5. *Eq. 3: consider replacing '*' with multiplication symbols.*

   Has been replaced.

6. *P8L17-40 part of the text is a bit hard to follow when reading just once or twice.*

   Thanks for the hint, it was indeed written very compactly. We rephrased the section and hope that the explanation is more easy to understand now.

7. *Fig. 4: Why is there a line for the 0% threshold in the 'Mixed' facet? 0% threshold means that there is no mixed class?*

   Under a threshold of 0%, the 'Mixed' class is assigned if two or more tree species share the same proportion (e.g. 50% spruce and 50% beech). We added this information in Section 2.3.2 'Prediction of main plot tree species' by changing the sentence *If this threshold was not **reached by any** of the five tree species, the respective sample plot was assigned the category 'Mixed'* into *If this threshold was not **exceeded by exactly one** of the five tree species, the respective sample plot was assigned the category 'Mixed'.*

8. *Fig. 6: consider mentioning in the caption that each point of the graph represents a model with different supports etc.*

   Good idea. We added this accordingly.

9. *P11L17: timber volume prediction functions instead of tree species prediction functions?*

   We changed the sentence into *'Figure 7 provides a visualisation of the timber volume predictions separated by the calibrated tree species and the ALS acquisition years'.*

10. *P13L49: more heterog... here or in the cited study?*

    In the cited study. We added this to make it more clear.

11. *P13L12: It also... What is it referring to?*

    We now repeat that 'it' refers to 'using the ALS acquisition years as categorical variables'.