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Interactive comment on "Relative contribution of stand characteristics on carbon stocks in subtropical secondary forests in Eastern China" *by* A. Ali et al.

Anonymous Referee #1

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Ali et al. present a study on an interesting and important topic: biomass estimation for subtropical forests in the East Asian monsoon region. The study is generally well introduced and clearly structured. The data set is most probably appropriate to tackle the research questions raised by the authors. The choice of analytical methods, however, needs considerable reconsideration in some regards.

1) measurements and calculations of carbon stocks

- There are no measurements of carbon stocks, just calculations based on allometric equations, so please adjust the section title accordingly.

- I was not able to find eqn 1 in Brown et al. 1989, please indicate exact reference or

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Discussion paper

modification if applicable.

- 14% of variance in tree height are not explained by diameter. This information could be used to improve allometric estimates, since the diameter-height-allometry varies with environmental conditions, and might provide valuable additional information.

- However, there is no way of validating your AGB estimates, since no yield data are available. In the same regard, the comparison of eqn 1 with other allometric equations is not useful, since you never know the true AGB for the plots. If this comparison shall be kept, then please change it into some kind of uncertainty estimate. Rˆ2 values do not help much here, since all equations are based on the same parameter (diameter), so please report RMSE values. Related: in fig. S3, please provide equidistant scaling of the axes.

- L191 ff: To me, it is unclear how to relate the DBH of a single tree to area-based basal area estimate. Please elaborate here.

- L197: You are not using a D-H model.

2) Calculation of structural diversity

- L210ff: Why do you optimise for a good correlation between H for DBH and height? If you so, you might as well use only one of these factors as a surrogate variable for general tree dimension diversity. I suggest comparing results for different discretisation cutoffs instead. This would also interesting for the SEM approach: stand age drives structural diversity, but the direct link between stand age and C-stocks is stronger than the indirect one. One reason for this might be a mismatch in classification resolution.

3) Statistical analysis

- You present a variety of linear modeling variants, when all you want to know is how a set of six parameters influences two response variables. The first set of analysis is contained in the second set, and the second set is a complicated way of doing an AIC-based stepwise procedure (under the assumption that collinearity in the design matrix

is manageable, which you suggest, but might want to reconsider given the explained variance of the single predictors sum up to > 160% (see L330ff)).

- The basic question, as I understand it, is: which set of variables is the best choice for predicting C-stocks. Following this logic, a validation approach would be suited to address the problem, either using a stepwise procedure, using explicit variants of multiple regression models (like already done for the second stream of analyses), or a learning routine that allows for inspection of relative variable importance (like random forests). 80 plots could well be enough for such a validation scheme.

The results are presented in a clear and concise fashion, and the discussion is consistent, comprehensible and linked to current literature, given the results based on the complex analysis scheme.

Some minor corrections:

- L339 "range“ instead of "ranged“

- L480 "which was also found“

- L537 "to increase C storage“

- L187 "using Brown’s“

- L190 why switch from DBH to D?

- L192 "using Brown’s“

- L194 "that Brown’s“

- L201 AGBt

- L247 "using equation 3“

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