

Biogeosciences Discuss., referee comment RC2
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Comment on bg-2022-80

Anonymous Referee #2

Referee comment on "Allometric equations and wood density parameters for estimating aboveground and woody debris biomass in Cajander larch (*Larix cajanderi*) forests of northeast Siberia" by Clement Jean Frédéric Delcourt and Sander Veraverbeke, Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-80-RC2>, 2022

The authors of Allometric equations and wood density parameters for estimating aboveground and woody debris biomass in Cajander larch (*Larix cajanderi*) forests of Northeast Siberia observed mean squared diameter and specific gravity. They developed allometric equations at 25 sites in the Republic of Sakha in Russia. They then make comparisons to allometric equations developed in other studies. Overall the methods appear rigorous. This study provides valuable information from an important yet remote region of the world from which little in-situ data is available and makes the case that further data collection efforts are needed. My major concern is that the claim that the allometric equations presented in the text are more generally applicable needs to be better supported or more nuanced. The equations and the comparison of them to other previously developed equations are not validated against in situ data or across a larger region of space. It seems that the equations from earlier work would be more applicable than those developed by the authors in some more northeastern regions or specific stand types, especially near where they were developed. This is very problematic given the manuscripts focus on providing generalized equations to improve our ability to estimate above-ground biomass in this region.

L95 introduction: I suggest highlighting some of the other roles that this data could play (previously mentioned around L35) to strengthen the introduction.

L140: Is there a citation for the two equations above. Also, some brief explanation of why the samples were dipped in paraffin could be useful.

L205-210: I suggest including a bit more information about this fitting method and selecting the exponent c , including references to other work that uses this method. It could also be useful to include these residual plots in the appendix.

Figure 3: It would be good to include the data points on this plot where possible and the

standard error envelopes for the fits. These lines are also somewhat difficult to distinguish when printed in black and white.

L206: I think table A1 is important and merits inclusion in the text. It could be interesting to see this comparison done differently. For example, calculating fuel loads at one of the study sites using these different parameters and then plotting the values could better illustrate their importance in percentage terms.

L310: The Magadan site has many more samples than the Yakutian site, although the size range of the available samples varies. Given the conclusion that allometry is somewhat region-specific, it could be interesting to see the result of a fit where this imbalance of samples is corrected using weighting.

Figure 4: For this box plot of the site observations, it would be good to explain the quantiles, etc. shown in the figure caption

L315: Some additional summary information for these 53 sites could be useful (i.e., the mean, sd, and range of dbh)

L315-320, 350-365: I suggest heavily revising these sections of the paper. The claim that the other allometric equations underestimate aboveground biomass or are more generally applicable seems too strong. The actual aboveground biomass of the 53 comparison sites is not truly known. From the text or maps, it's unclear where exactly these test sites are located and how close they are to the sites from Siewert 2015. The comparison to Siewert 2015 is not emphasized in the text. This point would be much stronger if some additional non-allometry-derived data sources, more information from the literature, etc., were included as validation. It could also be interesting to see this comparison done across multiple sites. I imagine these other two equations will perform better in certain areas or stand types. Such a comparison would add more depth to the point about how generalizable each set of equations is.

L330-340: Interpreting the fitted allometric parameters (i.e., as in Niklas 1994) here and further discussing the differences in climate and other properties between the sites could strengthen the conclusions in this section.