

Biogeosciences Discuss., referee comment RC3
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Comment on bg-2022-80

Anonymous Referee #3

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-RC3>, 2022

This manuscript describes the size-class-dependent characteristics of fine woody debris according to their detailed field experiment, and the new allometric relationship by using literature data, for the Cajander larch forest in Northeast Siberia. Since such data in this region (central Yakutia) is limited, this manuscript will contribute a lot to future modeling and remote sensing studies in this region. I've already seen the comments from the two reviewers and the author's replies, so I'd like to add some minor comments about what I'm still unsure about.

About fine woody debris:

The authors show the MSD and specific gravity of Cajander larch for each diameter size class.

On the other hand, they compared their single factor M with other species in different regions in Table A1, but it is shown in the percentage difference by size class, not the actual values of M . I think the single factor M and the fuel load W can be the important outcomes of this study, so I suggest the authors show these results.

Equation (1):

- Even though the final answer is correct, I strongly suggest you adopt the consistent units in the equation. Specifically, the unit of QMD should be [m], not [cm], and the equation should be multiplied by 10^4 to convert the unit from [Mg m^{-2}] to [Mg ha^{-1}]. This will avoid confusion by the readers and avoid careless mistakes in calculation.
- Secant (sec) should be in non-italic.
- Is G_i the arithmetic mean of G (specific gravity) within the diameter size class i ?
- Is h_i the arithmetic mean of h (piece tilt angle) within the diameter size class i ? If yes, is it mathematically correct to calculate the secant using the arithmetic mean value of h for obtaining the fuel load?
 - For example, If h takes 0 degrees and 180 degrees, the arithmetic mean of them can be 90 degrees.

- Besides, according to Fig. 2, h is always related to the diameter of each sampled piece, so I think the product of the diameter and $\sec h$ should be used for the statistical calculation.
- If N represents the (total) number of intercepts over the length of the transect line, what does N_i mean?

Equation (2):

- I suggest using a single character (e.g., a) instead of "slope" to represent the ground slope.
- $(\tan \alpha)^2$ is generally written as $\tan^2 \alpha$.

Equation (3) and L140:

- The authors use two characters to represent the specific gravity. One is G in equation (1) and L104 (kg m^{-3}), and another is S here (g cm^{-3}).

L158-159, equation (5):

- Does a single factor M represent the fuel loads per intercept (sample) on the transect line? Please explain this concept concisely since the reference (Nalder et al., 1999) was not accessible from my environment.
- If you share the same units with equation (1), G_i has the unit of $[\text{Mg m}^{-3}]$, and MSD_i might have the unit of $[\text{cm}^2]$. However, the author specified that M has the unit of $[\text{g cm}^{-1}]$. In this case, the units of the left and right sides of equation (5) are inconsistent. I suppose the unit of G_i in equation (5) would be $[\text{g cm}^{-3}]$, or it should be S_i according to equation (3).
- As pointed out in equation (1), I still wonder whether the use of "sec h_i " is mathematically correct if h_i represents the arithmetic mean of h in class i .

