Interactive comment on "When trees don't act their age: size-deterministic tree-ring standardization for long-tern trend estimation in shade-tolerant trees" *by* Rachel Dietrich and Madhur Anand

Anonymous Referee #1

Received and published: 12 July 2019

Dietrich and Anand present detrending methods for tree-ring width using the size of the tree (SDS) or both of size and age of the tree (COMB) to obtain better estimates of the long-term growth trend of trees (measured as tree-ring widths) for shade-tolerant species. The authors evaluated the new methods using simulated and observed tree-ring widths and compared them with commonly used approaches for detrending. I find the idea underlying the new methods and the methods themselves convincing. The limitations of conventional detrending methods is well-explained in Fig. 1. This being said, I'm afraid that the results are less persuasive to make the point that the growth-

trend of a tree should be formulized as a function of size rather than age. My major concerns are listed below:

1. The method should be better explained:

    (a) The reason why the observations are enriched with simulated trees for evaluating the method is only mentioned in the discussion. Move this explanation forward as it may avoid that readers loose attention because they wonder why the dataset is not enough to present the result.

    (b) It is written that chronologies from different methods were tested with logistic growth-trend for the correlation (L210). To my understanding, a growth-trend and chronologies from detrending are contradicting factors because after applying the method, the chronology would be interannual variations remained after removing th-term trend from tree-ring widths.

    (c) For the simulated trees, both shade-tolerant and shade-intolerant species were tested for different methods, but for the data, only shade-tolerant species were selected. What is the reason for this approach? How could it affect the results?

2. Some figures fall short of bringing a visual message.

    (a) Figure 2 is difficult to understand. Why is there no CD for the category 'All'? And in figure (a), it looks like BAI has the highest mean for all sampling thresholds but the text lists SDS has having the highest mean correlation (L254). Please, explain this apparent inconsistency.

    (b) Figure 4 needs to be improved, or the caption needs to be rewritten. What do individual lines represent? I need more explanations for the figures for COMB. I guess the right-hand figures were redrawn on the same X-axis as the left hand figures so they could be better compared.

(c) Are the boxplots left of the dashed line of Figure 5 needed? It seems that the difference between COMB and COMB.red or SDS and SDS.red are not dealt in the discussion.

3. The authors seem to push for the COMB method but

(a) The better performance of the COMB method is not prominent in the result (See figure 2 and 5). The fact that the figures are difficult to understand may have added to this conclusion.

(b) The title says 'trees don't act their age', which is a conflict with the best-resulted method that used both age and size to estimate the growth trend. When compared against data, RCS and SDS didn't show much difference. The main point of the title is confusing me.

(c) It would enhance the readability of the paper a lot if the same set of detrending methods were shown throughout. Now some methods presented in the results are not discussed.

4. To use COMB or SDS, the diameter of the tree at the time of samplingis needed. Hence, I doubt about the applicability of the method for existing huge datasets such as ITRDB because in this data set it is not indicated whether or not the record contains the pith. Could you elaborate on this issue in the discussion?

5. A few times, I felt the first sentence of the paragraph seems to be out of phase with the rest of the paragraph. See for example, L295 and L370.