



Interactive comment on “The motion of trees in the wind: a data synthesis” by Toby D. Jackson et al.

Anonymous Referee #2

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In the study, the authors present an analysis of tree motion based on a large sample basis that they collected from several sources (including both deciduous and coniferous trees). They found that the most important features for describing tree motion are the fundamental frequency (f_0) of a tree and the slope of the power spectrum (S_{freq}), and that S_{freq} is constant at medium-high wind speeds for all trees included in the study. This means that wind damage risk is simply related to wind speed. Moreover, they found that f_0 is strongly related to tree architecture.

In general, I found the study clearly written and that it presents a valuable contribution to existing research and motivation for further studies. I would like to note that I have read the already existing reviewer comments and the authors' responses. I had similar concerns about some of the issues mentioned in one review (e.g., large, heterogeneous database; increasing noise of the tree data at low wind speeds). However, I

appreciate the authors' clarifications, and can say that they have removed my doubts regarding these points.

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I only have a few remaining comments that I will list in the following.

1. lines 205-215: You conducted an analysis to predict tree size from the tree motion features and tree type and found that the factor "tree type" was the 9th most explanatory feature in the model of height and 6th in the model of dbh. What were the 1-8th/1-5th most explanatory features? Did you include tree age in your model? Why/why not? (see also my comment further below)
2. line 263: "The forest conifers covered the largest area..." - do you mean forest broadleaves?
3. line 278: The x-axis provides the best separation?
4. lines 325-333: is the wind environment affected by properties of the trees? e.g., might a canopy of a number of different tree types, different heights, etc. induce more turbulence than a rather homogenous forest?
5. lines 360-365: This also refers to the point above. If I understand correctly, wind turbulence may be influenced by the structure of the underlying canopy. (How) does this potential inter-dependency affect your analysis?
6. lines 385-387: Address here the raised issue of noise at low wind speeds.
7. lines 390-395: Can you explain why tree age is not included? Because it is correlated with tree height/size? I would expect that wind damage risk is increasing with increasing tree age.
8. General comment to future research directions: Are there any observations of deciduous and coniferous trees within the same forest available? This would (potentially) allow for a clearer study of differences between the tree types, as the trees would be exposed to more or less the same wind environment.

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9. lines 438-440: "However, we could not accurately distinguish between the motion of open-grown and forest broadleaves, despite the substantial difference in tree shape between the extremes of this gradient." This sentence is unclear to me, could you rephrase it?

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-427>, 2020.

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