

## ***Interactive comment on “Simulating damage for wind storms in the land surface model ORCHIDEE-CAN (revision 4262)” by Yi-Ying Chen et al.***

### **Anonymous Referee #2**

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The article entitles, “Simulating damage for wind storms in the land surface model ORCHIDEESS-CAN” is aimed to develop an earth system model using the sub-model, ORCHIDEESS-CAN, with focusing on storm wind damage in forests. In terms of wind damage, a mechanistic-empirical model, ForestGALES, was coupled with ORCHIDEESS-CAN. I understand that developing such models is really important to understand the environmental system and to make strategies for climate change. However, I think the scientific originality in this article seems weak partly due to the writing style. When using existed models in research, it is very important to show what the new ideas and findings are. At this moment, this article is not well organized. The structure of the method section need to be improved. The result section is hard to understand

C1

and some paragraphs should be located in Discussion. The results are not well discussed in Discussion. In addition, comparison between calculated and observed data requires some statistical analysis in order to show how much reliable what you did. Some ambiguous expressions were found in Results. Please find my comments as followed and I hope you will improve your article.

1. The section of Methods should be improved. I think the structure and components need to be modified. For example, first models used in the article are explained including the parameters and equations. Second, what your original ideas are explained. A figure (diagram or flowchart) would be helpful to show the process. Third, validation procedures can be explained including the input data of three regions with references. Also please explain why you chose the regions and different analysis were conducted for them.
2. Please explain what ORCHIDEESS-CAN can do and how to use the model with required inputs. Is ORCHIDEESS-CAN a grid-based model? Can we change the grid size (resolution)? Has the structural growth model been included in the model? How did you exactly integrate ORCHIDEESS-CAN and ForestGALES? Did you make new codes? I think a diagram would be helpful to understand how the models work and what you actually did in the study.
3. I suppose that you used some observed data such as satellite photos and forest damage data. But some of the data sources were not indicated in Methods.
4. In terms of the equations, I do not understand why 9h needs to be doubled in eq. 1. How did you calculate the average mean tree height and distance between trees? Are they averaged in a single grid? What data was used to calculate them?
5. In this article a term, actual wind speed, is quite often found. However, I do not think we can obtain actual wind speed data except maybe around an anemometer. The wind speeds used here would be “estimated” wind speeds.

C2

6. In results, some methods and terms such as spatio-temporal comparison, Beaufort wind scale, and root-mean-square error are not explained in Methods.
7. Please try to write the results as simple as possible. Some sentences and paragraphs seem to be unnecessary or better to move to Discussion. For instance, I do not think the first sentence on page 12 is important in Results. The second and fourth paragraphs on page 13 should be located in Discussion.
8. In Figure 1, the mean wind ratios of BWSs 8, 9, 10, and 11 should be explained. Although a fitting line was created, I am not sure how it is reliable. For example, if BWS 11 or BMS 9 are outliers, the line will become different. Why are wind speeds in BWS 10 lower than those in BWSs 8 and 9? To use the fitting line for the following analysis, it is important to justify how much statistically suitable the line is.
9. In terms of Figure 2, are there comparisons between the critical wind speeds calculated by ForestGALES only and those by ORCHIDESS-CAN + ForestGAELS? If so, are the differences only from input data to the models? In addition, to compare the speeds between stem breakage and uprooting, it is important to conduct some statistical analysis in order to show how statistically different or similar between the two outputs are. Which graphs are for the forest edges?
10. In Figure 3, I think the lowest critical wind speeds are more important to consider wind damage rather than the averaged critical wind speeds. Also, are these results for the current forest conditions?
11. In terms of the results from Les Landes, I do not understand why these indicators were chosen to represent the results although they seem to be interesting. It is important to clearly address in Methods what kind of analysis would be conducted in advance. Why 20 values were used in (A) and (B) in Figure 8? Where these values came from?
12. Please discuss your results in Discussion. Some of the discussions are found in

C3

Methods, so it is better to move the parts to the Discussion section. I am not sure whether the first paragraphs are necessary especially at the beginning of Discussion. For example, gusts are not directly analyzed in this research. Is 6.3 Salvage logging really important for your research, although there are no indications in the results? I think in the first parts of Discussion, using the same order of Results would help readers to easily understand your discussions.

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C4