

## **Review of the manuscript “Storm damage beyond wind speed – Impacts of wind characteristics and other meteorological factors on tree fall along railway lines” -egosphere-2024-120**

### **General comments**

The manuscript utilizes stepwise model selection to construct a logistic regression model, aiming to identify meteorological parameters, partially the wind and their combinations, and assess their impact on tree fall. The study proposes that high wind speeds (gust), especially in combination with wet conditions and a high air density, increase tree fall risk, and suggests relating meteorological predictors to local climatological conditions for the acclimation of trees to their local climatic conditions. The paper is the first time showing clearly that storm duration, gust factor and air density are important factors in calculating the risk of tree fall.

Anyway, I am not convinced the regression results by using the wind ERA5 hourly dataset. The use of ERA5 as observational data may not be sufficient, as previous studies have shown its limitations in capturing historical near-surface wind speed over land (e.g. Dunn et al., 2023, BAMS). I strongly recommend the performance of ERA5 could be validated by the actual data (time series obtained from meteorological institutes). Otherwise, this is just a theoretical exercise from the perspective of reanalysis, so anyone could do that in this aspect. Thus, I have to reject the publication of this paper.

### **Comments**

1. Overall, the English level of the manuscript is a little poor and makes it hard to fully understand all the results and discussion, I suggest inviting an English native speaker to revise it thoroughly. Also, the depth of the text is very shallow and reveals a lack of scientific and technical maturity from the authors to properly conduct this research.
2. The abstract needs to be rewritten, there exist so many grammar and logic errors. Defines gust and strong wind at the first instance.
3. The introduction section needs to be restructured. Modifications can be made on various places, including but not limited to I. the first to third paragraphs can be condensed into a single paragraph, II. the fourth paragraph is not quite relevant to the manuscript's topic, III. The correction method in the sixth paragraph can be moved to the data and methods section.
4. Line 62: What is high wind speed? A daily peak gust or maximum wind in a day or the biggest mean wind? Please clarify it at the beginning of the article to help readers understand.
5. Lines 70-72 missing a reference to support your point.
6. Line 74: 68%
7. Line 79: Please clarify your topic, what you are going to investigate in

this study.

8. Line 83: change “connection” to “relationship”.
9. Line 84: Have you done this in this study? If not, please remove these kinds of words.
10. Line 191: The method on how to introduce and calculate interaction terms seems unclear. I recommend further elucidation on the methodology or criteria used to establish the logistic regression model.
11. Line 203-204: Please give more details on what specifically the reference model is when combining the trained model with it.
12. Line 222: The rationale of the first criteria used for model selection appears unclear. I recommend further explanations.
13. Line 249: The relationship between the equation 9 and each grid cell is unclear. It’s uncertain whether the equation is derived from spatially averaged data or from data for each grid cell, and whether it’s adapted to individual grid cells. I suggest more detailed instructions.
14. Line 441-442: The manuscript suggests that incorporating additional information such as tree, soil, or stand data could significantly influence the model results, potentially raising concerns about the robustness of the conclusions. Please provide further clarification on whether the identification of parameters, their combinations, and their impact on tree fall would be altered significantly as a result.
15. Line 4: The term "gust speed" is used for the first time in the abstract and I suggest providing a definition.
16. Line 103: The symbols "t" and "T" are unfamiliar in the study, and I recommend a specific description.
17. Line 145: The statement "The majority of tree fall events occur in December, January and February" appears to be inconsistent with Figure 2. Please verify this discrepancy.
18. Line 172: The word "were" appears to be grammatically incorrect.
19. Line 193-194: The word "haven" appears to be grammatically incorrect.
20. Line 231: The word "ore" appears to be grammatically incorrect.
21. Line 250: The sentence "Table Fehler: Verweis nicht gefunden" seems to contain an error. The same error appears to be present in the later sections of the manuscript.
22. Line 281-282: The sentence "improved the model's BSS" is not significantly agree with the sentence "The BSS of this model remains 0.069" and may cause misunderstanding. I recommend reviewing and revising it.
23. Figure 4-7: For enhanced readability, I recommend adding the corresponding standardized coefficients separately to each figure.
24. Line 447: The line seems empty and unnecessary. Please remove it.
25. Line 449: The font of "maximum" in the definition of  $v_{max}$  seems irregular and warrants revision.