

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2022-159

Anonymous Referee #1

Referee comment on "Review Article: Wind and storm damage: From Meteorology to Impacts" by Daniel Glikzman et al., Nat. Hazards Earth Syst. Sci. Discuss.,
<https://doi.org/10.5194/nhess-2022-159-RC1>, 2022

Summary

According to the title, this manuscript addresses the topic of wind and storm damage from the genesis of meteorological conditions that lead to storms to the damage that storms can cause. In my view, the title of the manuscript is too general, as the authors focus on extra-tropical storms and their impacts over the North Atlantic-European region. One can clearly see that the review was written from a European perspective. Therefore, I suggest a title change that more closely reflects the focus of the manuscript and the spatial relevance of the summarized studies. An imbalance can also be observed concerning the five sectors studied. The text portions in which wind effects on forests and trees are described predominate. This is not unfavorable in principle but should be clarified in the introduction.

In the following, I list comments on peculiarities of the manuscript that I noticed during reading:

General comments

- I suggest providing definitions (e.g., based on numerical values, duration, ...) of "wind", "windstorm", "storm", "wind-related risk", "gust", "mean wind speed", ... early in the Introduction. In the context of "wind-related risk assessment" this is important. What is "wind-related risk"? Is this wind and storm damage risk? Not all wind speed values pose a risk and cause calamities.

- I suggest deleting "e.g." when citing other studies (e.g. P2L57 "e.g. Bittelli et al., 2008) throughout the text.

- I suggest homogenizing the citations style in the text. Please pay attention to the use of the comma and semicolon.

- Please homogenize and correct the order and formatting of all citations in the text. I found different formats and orders (by authors vs by year).

- Please check the formatting and grammar of all headings.

- Please insert a blank character between numbers and units wherever it is missing.

- Please add more line breaks where new trains of thought begin.

- I suggest a complete review of the formatting of abbreviations and symbols. Particular attention should be paid to the subscript of letters.

- It seems as if sections were written by different authors. There are discernable differences in the diction, and other inconsistencies:

- Please make sure that there are no repetitions of definitions or basic facts in different sections. For example, "wind load" sure be defined once at the very beginning, not in sections 4.3.

- The sections have a differing structure of subsections. I suggest using the same or a similar structure and contents in the sections. This considerably increases the readability of the long manuscript.

- I suggest moving all knowledge, facts, concepts, and descriptions (e.g., structure of the lower parts of the boundary layer, wind pressure, vertical wind profile, coherent structures, roughness, porosity, channeling, codes, terrain roughness, orography index vs topography index, ...) that are portable to all "environments" are provided in separate sections before presenting the specifics of the environments.

- Please check the entire text for the incorrect use of uncountable nouns such as damage and wind speed.

Specific comments

L43: What is the difference between wind damage and storm damage? What is the metric that is used to distinguish the two kinds of damage?

L50: I suggest using the correct technical term "air temperature" instead of "temperature".

L66: What is the difference between "strong winds" and "strong wind gusts"? I suggest providing clear definitions of both quantities.

L67-L75: At this point it would make sense to introduce the definition of risk. The storm damage risk is the product of hazard, exposition, and vulnerability.

L75: I suggest better structuring and formulating the list "wind, storm dynamics, and the ability ..." What is the meaning of "understanding wind"?

L81: Do you solely mean "wind damage"? Or also storm damage? I suggest replacing "wind-damage" with "wind damage".

L82-L86: I suggest deleting all repeated information that has already been provided in previous lines.

L92: Please replace "in the Earths'" with "of the Earth's".

L103: Please delete the superfluous "below".

L110: I suggest lower casing "Northern", "Southern" and "Hemisphere".

L117-L123: These lines are located between explanations about the jet stream. Therefore, I suggest moving these lines further down and to merge the information about the jet stream. It would also make sense with respect to the space and time scales that boundary layer processes dominate to move the lines downward.

L136-L144: It is not clear why these explanations are provided. I doubt that the entire readership knows how "vorticity" is defined. Where is the connection to air motion in the context of this paper?

L147: I suggest replacing "its" with "their".

L195: Please adjust the formatting of the heading to the formatting of the other headings.

L200-L201: I suggest deleting the lumped references. They are repeated in the following lines.

L206: "CMIP5" is undefined. I suggest providing a definition.

L211: Please correct the heading's formatting. Why are "Circulation Characteristics" capitalized?

L222: Please provide a definition of abbreviation "ERA5".

L223: Please homogenize the information on the geographical coordinates.

L230: I suggest lower casing "Sea Level Anomalies".

L232: Please insert a blank character between "250" and "hPa".

L234: Is it necessary to display the sequence of weather regimes (CL1-CL5)? I suggest deleting Fig. 1c. It does not provide information needed for this review.

L235: Is "red arrow" correct? I do not find a red arrow.

L235: What is "eXtreme WindStorms"? Is this an expression needed for this review?

L236: Please replace "storm track for storm" with "track for storm" or "storm track of Klaus".

L235: Please add the missing dot after "al".

L229-L256: Please homogenize the use of quotation marks when referring to winter storm Claus.

L244: Please replace "5" with "five".

L252: The citations "Liberato et al., 2011" can be deleted. It is used again in L256.

L254, L262: Is "jet-stream pattern" the same as "jet regime", as used on P6L232? If so, I suggest homogenizing the technical terms to minimize the load of specialized speech.

L258-L262: When looking at Fig. 1c, I find many CL4 regimes where no severe storm has occurred. In my opinion, this considerably relativizes the statements made here regarding specific weather regimes. I therefore suggest deleting or at least reformulating these lines.

L264: Please check the grammar. Is this the right case? Please lower case "Seasonal Variability".

L270-L271: What is a "wind interval"? Do you mean "wind speed interval"? Please clarify.

L272-L273: The reference of the relative pronoun is ambiguous. Please considering rephrasing this sentence.

L274: There is no definition of "WL3" and "WL4". Please provide more details.

L282-L283: Please provide correctly formatted tildes.

L286: Please homogenize the spelling of "intraseasonal". What is your definition of "intraseasonal"? For me, this is the variation of wind speed within one season, e.g., winter. Is this the same definition for you? Or do you mean "intra-annual", which is the variation of wind speed between seasons over the year. Please clarify.

L312: Why is "speeds" provided in km/h? Previous "speed" values were provided in m/s? Please homogenize. Which "speeds" do you mean? Wind speed or gust speed or anything else? Please clarify.

L314: Please check the double use of "from".

L316: What do you mean by "commonly". Can this be quantified?

L317: Which "type of convective activity" do you mean? And why is the reference Diffenbaugh et al. (2013) older than the references that refer to "more commonly reported". This is not stringent.

L328: What are "wind field" characteristics that are relevant for this review besides "speed". Please be more specific.

L329-L330: Please delete "caused by wind". It is redundant.

L335. Please homogenize the spelling of "earth" throughout the text.

L351: Please homogenized the spelling of "wind speed" vs "wind-speed" in the text.

L367-L377: There are still no generalizable findings on whether the effect of individual tree stability or that of collective stand stability better protects forests from storm damage. Kamimura et al. (2022, listed in the References) provide important insights in this regard. They should be mentioned here.

L404-L405: The mention of the five environments is redundant. They have been mentioned before. I suggest deleting them.

L409: Please homogenize the spelling of "winter-storm" vs "winter storm" in the text.

L472: I suggest replacing "asl" with "above sea level" or defining "asl".

L78: I suggest replacing "altitude" with "elevation". While altitude is the height above ground, elevation is the height above sea level.

L491: I suggest replacing "damages" with "damage" because it is an uncountable noun in this context.

L497, Figure 2: Please replace "usefull" with "useful" in the figure legend.

L503: Please provide more information on the critical wind speed. Is this the instantaneous wind speed as sum of mean wind speed and gust speed or is this the mean wind speed alone? If so, what is the averaging interval for CWS?

L510: The maximum bending moment at the stem base is also strongly dependent on the crown architecture and dimensions. Trees with large crowns dissipate large amounts of energy in the crown space before any moment can be measured at the stem base.

L519: Please define the abbreviation "DBH".

L525: Please define the abbreviation "NDVI".

L529: Please replace "drag coefficient" with "mean drag coefficient". The instantaneous drag coefficient of trees under wind loading is still largely unknown because it varies instantaneously.

L548: Here, you use "diameter of breast height" instead of "DBH". It would better to consistently used either the long name or the abbreviation.

L551: Here, you use "Critical wind speed". It would better to consistently used either the long name or the abbreviation.

L552-L553: Please correct the formatting of the citation.

L555-L564: How are these lines connected to wind-forest interactions? I suggest moving these lines into a more general statements section or deleting them.

L566: I suggest replacing "Urban" with "Urban areas". "Urban" is unspecific.

P15, section 4.3.:

- Why are the subsections not numbered? In the previous sections, the subsections were numbered.

- There is an inconsistency in the headings of the subsections. The heading of the first subsection in 4.2. was "4.2.1 Topographic indices" (à 4.2.2 Topographic indices). In this section, it is "The urban boundary layer". I suggest, adding a section something like "4.1.2. The forest boundary layer". This would strengthen the structure of the manuscript. Topographic indices are of a totally different quality when it comes to the assessment of "The small-scale interactions ..." (L568), in forest and urban areas.

L594-L598: Please replace "damages" with "damage". This is an uncountable noun in this context.

L608: What is the difference between "topographic index" and "orography index"? I guess, there is none. I nonetheless suggest homogenizing these technical terms. More semasiologically correct would probably be the use of "terrain index".

L611: Does "critical wind speed thresholds" correspond to "CWS"? If not, this should be made clear.

L621-L622: Before, it was stated that gust speed is the most essential factor for storm damage. Here, it is stated that the "maximum daily wind speed" is most influential. Is gust speed equivalent to maximum daily wind speed? If not, what is the difference? What is the period of maximum daily wind speed? Please clarify.

L645: Please replace ";" with ":".

L645-L652: Please match the variables and their definitions listed in Table 2 with variables mentioned elsewhere in the text. Otherwise, provide clearly distinctive definitions. For example: Does v_{crit} correspond to CWS? If so, does CWS have a daily resolution? In the text, you mentioned "maximum daily wind speed". Does it correspond to v_{max} , being the abbreviation for maximum daily gust speed? What is the definition of gust in this context?

L734: The agricultural sector is a crucial sector worldwide, not only in Europe.

L769-L778: I suggest deleting all information on climate indices that is not relevant for this review.

L780: This section is also subdivided into subsection without numbering. Please homogenize the numbering throughout the entire text.

L792: What kind of wind speed is mentioned here? Are these mean or instantaneous wind speed values? Please clarify.

L793: Of what kind are the mentioned "critical threshold values"? Do they correspond to CWS or v_{crit} or are they something different? Please clarify.

L805: Please check the citation formatting.

P22L823: Is suggest deleting "extreme wind events". Or do you mean something other than storms? If so, please elaborate.

L824: What do you mean by "stability"? Do you mean structural integrity? Please clarify.

L824-L826: What are "small-scale variations" in the wind field? Does this expression relate to the spatial wind speed pattern? Or does it also address the temporal wind field variability? Can "small-scale" be quantified? It does not sound to impact wind turbines a lot.

L828-L834: Please rephrase these lines completely. The sequence of the contents is not stringent.

L836: What is the meaning of "strong wind events" in this context? Does this refer to productive or destructive wind events? If it refers to productive wind events, then these events are an important part of the wind climate and should not be mentioned in this review.

L836-L843: How are these lines connected to the article's title? This is a list of wind indices that are related to wind turbine site assessment.

L849: I suggest replacing "high-impact" in this context. High-impact or severe weather is normally weather that causes wide-spread damage. What could possibly be the "positive effect on wind energy production"? During high-impact weather wind turbines are shut down and the production rapidly decreases to zero.

L867-L873: The definition of "compound event" is unclear. Can a compound event be related to a single hazard? If so, this should be made clear.

L886: Please replace "Temperature" with the technically correct term "Air temperature". You mention "freezing of soil" which is directly related to "soil temperature".

L897-L904: Your argument in these lines is not stringent. The statement "The impact of wind on drought is relatively small." cannot be backed by the statement "Wind is only included in some drought indices through evapotranspiration ..." This is not logical. This is a methodical aspect of wind impact assessment.

L936-P26L968: Why is only DWD mentioned here given the large number of national meteorological services? Given the scope of this review, it would be good to have more information from other weather services in the text as well.

L938-L940: More information about "some cases" would be useful. For example, how many and which weather services warn?

L942-L943: Previously, it was mentioned that the review was carried out for "five environments". Here, it is stated that threshold values were collected for "five sectors" and "five environments". The two expressions have different quality and scope. Which expression is correct? The correct expression should consistently be used throughout the text.

L946: Here, the definitions for WL classes are provided. I suggest providing them at the beginning of the manuscript, in any case before L274.

L961: Please correct the formatting of "WL 1-4". What kind of "speeds" do you mean? Mean or instantaneous wind speed values? Please clarify.

L962-L968:

- Is it correct that "wind speed" and "gust speed" values are compared in this figure? What is the importance of this comparison?

- Do the gust speed values correspond to 3 s values?

- What is the averaging interval of "mean wind"? Is the averaging interval for all displayed values the same?

- Is "mean wind" equivalent to "mean wind speed"?

- Is the y-axis label "Wind speed" representative for all variables displayed in the figure?

- In the figure the information "Wind in hub height" is provided. Does this correspond to "Wind speed in hub height"? In the figure caption "wind speed measured at the height of the wind turbines" is mentioned. Is this the same quantity? Please clarify.

- I suggest replacing "Critical thresholds" with "Critical threshold ranges". This seems to be shown by this figure.

L972: Please uppercase "central Europe".

L997-L1007: Please specify "indices" at every occurrence. Which indices do you mean? Wind indices? Storm indices? Storm damage indices?

L1004: Please define the abbreviations R^2 and AUC.