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Comment on nhess-2022-159

Anonymous Referee #2

Referee comment on "Review article: A European perspective on wind and storm damage – from the meteorological background to index-based approaches to assess impacts" by Daniel Gliksmann et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-159-RC2>, 2023

Summary:

The authors provide an overview of (1) the meteorological phenomenon wind (2) its processes in interacting with the surface from a physical as well as an impact perspective and (3) a large collection of indices that are structured based on five environments: forests, urban, transport, agriculture, and wind-based energy production. These environments represent different communities in scientific literature as well as different sectors of socio-economic impacts. The authors provide a synthesis, an outlook and discuss open research questions.

General Comments:

- The manuscript would greatly benefit, if the different environments could be more synthesized in the outlook sections. Many open research questions seem similar in the different communities and could be tackled synergistically in the future. Additionally more explicitly spelling out some generalized conclusions about the different indices in the different environments before the outlook would increase the usefulness of this review.
- This manuscript features damage, impact and risk throughout the manuscript, but it mentions the socio-economic literature community (especially regarding exposure and vulnerability) mainly when such elements are used in indices in section 4. Maybe it would be beneficial to more often link to this body of research also in other sections:
 - General introduction: How does this review position itself compared to reviews over different sectors in the impact modelling community (e.g. Merz et al. 2020 for windstorms and severe convective storms)?
 - g. L867ff/L1009ff How do the non-climatic drivers related to vulnerability and exposure mentioned in Zscheischler et al. (2018) play into the development of compounded indices?

Specific comments:

L1: is the word "damage" broad enough? The manuscripts also mentions positive or indirect effects of wind. Why not mention the word "indices" in the title?

L39: "Fortunately, simple indices and thresholds are as effective as complex mechanistic models for many applications." The "complex mechanistic models" are only mentioned in comparison with indexes but never fully defined, This term should be defined somewhere in the manuscript (e.g. in section 3).

L40: "Nonetheless, the multitude of indices and thresholds available requires a careful selection process according to the target environment". This "careful selection process" could be taken up and expanded upon with useful suggestions at the end of the manuscript e.g. after L1001.

L78: It would be important if the manuscript would include information about the applied methodology that lead to this manuscript, here is just one possible location in the text: From the acknowledgement, I assume that a group of experts formed in the project ClimXtreme. The selection of the papers and their categorization in this review is an outcome of many discussions or workshops within this group and of individual expert knowledge. If this is not the case: how where the studied papers selected? Where there any relevant decisions what overlapping/neighboring fields of literature to include or exclude (e.g. other types of indices, other environments)?

L623: shouldn't Koks and Haer (2020, already in References) also be mentioned here as an example of loss models

L940: National meteorological services do not only indicate the possible consequences, but take the consequences and the probabilities of these consequences as input into their warning decision (e.g. Neal et al. 2014) or they plan to do so in the future (Kaltenberger et al. 2020).

L942ff: This paragraph could be structured and phrased more clearly. It would also be helpful to include the references for the thresholds of the different environments in the main text and not only in the supplementary material.

L946: It is unclear how reaching a critical warning threshold in wind speed is related to the spatial extent. Mainly, it is unclear if the threshold is applied to each location (as it

normally is for warnings) or once per weather phenomena (e.g. for the maximum wind speed over the whole affected area of an event similar to a storm severity index). If it is applied to each location, can't a larger area (e.g. national area) have reached WL2? If it is about a localized damage having consequences for society on a larger spatial scale, then this needs to be said more clearly.

L961: The names of the different threshold ranges (e.g. local, regional, cut-in speed, cut-out speed) are only understandable using the supplementary material (S2). It would be better if these names would be explained in the caption or at least the previous paragraph of the main text.

L1001: "Such a methodology needs to be developed on a large spatial scale to evaluate in which regions certain groups of indices are useful." It would be nice if this sentence would be expanded so its meaning is made clearer. Also what else is needed to allow such evaluations on a large spatial scale? Could the "careful selection process" mentioned in the abstract be expanded on here?

L1002ff: Data on "given metrics" are often scarcely available, if the "given metric" is related to a socio-economic impact. This should be mentioned.

L1002ff: what about other possible solutions? E.g. the inclusion of user preference or expert knowledge in the development of indices using co-design (e.g. Gebhardt et al. 2019 cited in Merz et al. 2020)

L1016-1039: It would increase the usefulness of the manuscript if outlook and open research questions could be unified over the five environments. Would it be possible to combine these two paragraphs or to the split according to common questions? Surely, not only the forest setting is lacking damage data etc.

L1021-1030 and L1034-1038: In my understanding, better knowledge of the spatial variability of the environments (e.g. forests or urban) is important for two reasons: (1) it has an effect on the small-scale interactions of the wind field with the surface (2) it informs difference in vulnerability and spatial distribution (e.g. of the value) of the impacted entity (e.g. trees and buildings). These two reasons could be more clearly distinguished in this paragraph but also in the section 4.

References:

Gebhardt, O., Kuhlicke, C., Wolf, L., Vitolo, C., Duo, E., van Lanen, H., Rohrer, M., Sutanto, S., & Stoffel, M. (2019). Results of the co-evaluation of the ANYWHERE tools,

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Kaltenberger, R., Schaffhauser, A. & Staudinger, M. (2020) "What the weather will do" – results of a survey on impact-oriented and impact-based warnings in European NMHSs. *Advances in Science and Research*, 17, 29–38. <https://doi.org/10.5194/asr-17-29-2020>

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