

Interactive comment on “Modelling Vulnerability to Severe Weather” by Tobias Pardowitz

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Thank you very much for your time reviewing our manuscript. Your comments will certainly help improving the manuscript. Please find point to point answers to your specific points (“..”) below.

“The paper “Modelling Vulnerability to Severe Weather” exploits a dataset of fire brigade callouts in the metropolitan area of Berlin for the period of 2002-2012 to identify factors describing the local vulnerability and thus influencing the local risk for weather impacts. The paper is quite interesting and the research was well planned. The statistical elaborations of data are carried out in a rigorous way. The language is appropriate and fluent, except for some small imperfections listed in the following. Nevertheless, there are some points that could be improved: 1) I think that the paper should have a more appropriate title. Maybe the title should focus on the statistical model that is the

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basis of the research, more than on a concept as wide as vulnerability."

Following your comment we propose "A Statistical Model to Estimate the Local Vulnerability to Severe Weather" as an alternative title.

"2) The types of phenomena described by keywords could be more delineated by the Author. The sense of "Traffic obstruction", i.e., is not completely clear for me. In addition, a more detailed explanation of the sense of keywords could help the reader to understand the meaning of the different association of phenomena and their seasonality."

We added details on the usage of keywords in the data section. We hope to clarify the general understanding of the keywords.

"3) Personally, I think that "building density" is less significant than building coverage, and the analysis of this last one simply complicated the discussion without a clear usefulness. Nevertheless, this is a personal opinion and maybe I did not realise the actual importance of this parameter."

It is correct that the two parameters are highly correlated. However considerable differences are present when comparing central areas of Berlin (with a dense coverage of large houses) with the outskirts of Berlin where small houses are found. While the building density (number of buildings per unit area) might be similar the coverage is much higher in the central parts of Berlin. We thus consider it worthwhile to include both as potential predictors. What we found noteworthy is the fact that in most cases building coverage is a much better predictor. However in case of tree-related operations, the correlation with the building coverage is worse, however there is a particularly high correlation with the building density. We assume that this might be due to the fact, that particularly in the outskirts of Berlin (with a high number of small buildings) the vulnerability is increased due to the presence of trees in gardens (i.e. in vicinity to buildings). We tried to clarify this in Section 4.2 without giving this discussion too much weight.

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"4) There is a point that I ask to the Author because it is not clear for me. Damage to houses/roads (as obtained by insurance data) are used together with fire brigade callouts. In the first type of data, I think that only data of damage to "goods" are included. On the contrary, I can imagine that in the fire brigade database also callouts concerning people in difficulties are included (i.e. people in cars trapped by water or by trees hurled by wind). Did you take into account this difference?"

We added several details to the data section (particularly 2.2. describing the building loss data) to clarify on what is contained within the insured loss data. Particularly we are aware of the fact that the different datasets contain different types of impacts. We thus do not expect to find agreement between both datasets. Instead we aim to determine differences and common features to learn about the causes for different categories of fire brigade operations. We added clarification on this to the introduction as well as Section 3.1

"5) Because the paper seems quite long, I suggest, as general comment, to summarise some of the most important findings in a sketch or in a table. In fact, due to the multitude of variables analysed, the reader at the end of the paper is a little bit confused, even if interested."

We think that Table 4 can serve as such summary since it exactly describes what you suggest. By assessing the explained variance of individual predictor variables we hope that a reader can identify the most relevant predictors. To give more weight and guide the reader we added a paragraph on this to the Conclusion chapter.

"6) I suggest to the Author to introduce, in future development of the research, data on population density. I understand that the focus is not damage to people but it must to be taken into account that population density could better approximate a sort of "total value" of the different sectors of the territory, made of people+goods that are both an object of fire brigade operations. A certain number of calls to fire brigade can be often related to dangerous situations involving people and not goods. Actually, to

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be strict, one should take into account the number of floor of each building and the traffic volume on the different roads, but this great amount of parameters could be very difficult to manage. On the contrary, population density, assessed for sub sectors of the study area, is a single value, easy to asses and elaborate."

We agree to this point. However population density is not used since (to our knowledge) there is no freely available population density dataset on a high spatial resolution (1km) as required here. Freely available datasets include the CIESIN global gridded dataset (about 5 km) or from the German Federal Statistical Office (DESTATIS) which is available on district level. Both are not sufficient for the investigation. We added reference to this in the data section. We commented on that in Section 2.3.

"7) Legends of the figures could be simplified by putting "km per km. . ." in the caption of the figures and leaving simply the values of intervals in the figures."

We will try to modify the figures to be well readable!

"8) Page 2, line 7 eliminate brackets"

Done

"9) Page 4 line 10: As a first predictor, the number of houses per grid cell on a regular 1x1km grid is derived. I suggest to change houses with buildings."

Done

"10) Page 4 line 11: As discussed later, even though these quantities are highly correlated both predictors are valuable to be considered since enabling the distinction between high density city centre with very large buildings in comparison to suburban areas with high numbers of detached houses. Put comma after correlated."

Done

"11) Page 7 line 22: In general, a rather good agreement in the patterns of the number of operations per zip code area and the number of insurance claims. Please check this

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sentence: it seems that there is something lacking."

A verb was missing and is now added to the sentence.

"12) Page 8 line 3: For some events (Kyrill, Lothar07 and Aram) considerable correlation for water related operations while for the others there is no correlation at all. Please check this sentence: it seems that there is something lacking, and put a comma after events."

A verb was missing and is now added to the sentence. A comma was added after events.

"13) Page 8 line 6: change berlin in Berlin"

Done

"14) Page 8 line 30: ...or treefall are distributed rather different. Maybe "differently" instead that different"

Modified accordingly

"15) Page 8 line 35: This is not unexpected since major impacts due to treefall is not expected in wooden. Please, put a comma after unexpected."

Done

"16) Page 9 line 16: For the predictor variables listed in Table 3 the spatial. . . Please, put a comma after 3."

Done

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2017-326>, 2017.

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