Nat. Hazards Earth Syst. Sci. Discuss., 2, C2451–C2454, 2014
www.nat-hazards-earth-syst-sci-discuss.net/2/C2451/2014/

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Performance of storm damage functions: a sectoral impact model intercomparison" *by* B. F. Prahl et al.

Anonymous Referee #2

Received and published: 12 November 2014

The paper compares the performance of four damage functions for European windstorms over Germany, applied to the same underlying wind gust datasets. The paper points out that the physical arguments of the widely used cubic damage function are invalid due to the subtraction of a threshold, resulting in steeper increase in loss with gust speed, comparable to the slope found in the power law function. I believe the paper presents new and interesting results which are worthy of publication, although there are a few issues which should be clarified/corrected, outlined in the specific comments below.

Specific comments

1. Each model uses wind *gusts* as the meteorological variable (from either DWD or

ERA-Interim), yet throughout the paper they are referred to as winds. As these two terms have quite specific meanings I think it is important to maintain the distinction to avoid confusion.

2. Page 5836, line 22: According to 'Sigma: Natural catastrophes and man-made disasters in 2013' (Swiss Re, 2014), the largest loss European windstorm since 1980 was Daria in 1990 (although only slightly higher than Lothar). Perhaps it is worth mentioning this uncertainty.

3. Page 5840, line 6: It would be useful to refer to Figure 3 here, so the reader can see the size and location of the administrative districts.

4. Page 5841, line 15: Could you show the locations of the selected DWD stations (perhaps add to Figure 3)? This would help the reader understand how well each area is covered.

5. Page 5843, lines 1-2: Are the gusts from ERA-Interim the maxima over the 3 hourly periods, or 'instantaneous' values (maximum over a model timestep)? If the latter, this would mean in some areas the maximum gust is underestimated in some locations for some events, which could perhaps be another of the reasons for the higher variability with ERA-Interim (page 5854, lines 5–9)

6. Page 5843, line 17. For completeness and repeatability, could you state what the radius was?

7. Section 3.3: In the appendix for this section, equation A9 says the loss for $v < v_{98}$ is 0, although according to Donat et al (2011a) it should be K_2 (B in their notation). Also, this damage function is usually weighted by population density. I can see this is unnecessary for analysing single districts (if each district is fitted separately and you assume an even distribution of buildings in each district), and I assume you simply added the predictions from each district to get the predicted countrywide loss rather than recalibrate at the country level. Could you confirm if this is the case? I think it is

worth pointing out in the text why you do not need the population density in this study.

In addition, on page 5848, line 5 and Page 5867, lines 8–12, it is mentioned that the calibration of model K is performed by linear regression. Could you be more specific on the linear regression fitting method (least squares, etc)? To make the fits less weighted on the extremes and more comparable to the other calibration methods, wouldn't it have been possible to bin the loss data as for model X? It would be interesting to mention how this would change the results (especially in the robustness of the model fit in Section 4.3).

8. Page 5850, lines 14–19. Here it is mentioned that model H uses claims data in addition to loss data, therefore would be expected to perform as well or better than the other models. However, isn't this also the case for model P, where the claims ratio is needed to work out the occurrence rate?

9. Page 5883: On the right hand panel of Figure 2, is the occurrence rate the same as $C_H(v)$ in equation A14 and $p(v)$ in equation A4? If so, could you make the terminology consistent?

10. Page 5854, lines 15–18: As your loss data is daily, yet storms can do damage over more than one day, could you clarify if the number of days for each loss class given in Table 1 are all from different storms? If so, did you have to discard some days to make sure this was the case?

11. Section 4.3. Could you clarify whether you mean the six most severe storms as ranked by loss? Do these 6 storms correspond to the 6 extreme daily losses in loss class I?

12. Section 5: I am not sure I understand the argument on the 2nd and 3rd paragraphs of page 5858. If each building has roughly equal value, then LR(affected) is approximately equal to LR(all)/CR (which from Figure 6a appears to be the case), so the fact that LR(affected) remains roughly constant implies that for non-extreme gusts, as the

gust increases the number of buildings making a claim increases, but they each claim roughly equal amounts (which is consistent with the theory that there is a threshold value for claims). It is not until very extreme gusts that the loss for each building starts to increase with gust. However, if this is the case, how does the threshold explain the increase of CR as v^{10}?

Technical corrections/typos:

1. Page 5869, line 21: '...normal distribution describing the random fluctuation' (remove the 'by').

2. The term 'wind source' used on page 5851 (line 4), page 5867 (line 1) and page 5870 (line 1) is unclear. Perhaps change to 'wind data source' (or preferably 'gust data source').

3. Page 5838, lines 3–4 "Theoretical foundations and implications of each model are discussed in order to mainstream terminology and conceptual structure of storm damage functions." Missing two 'the's in front of 'theoretical foundations' and 'conceptual structure'.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 5835, 2014.