

Interactive comment on “The 21st Century Decline in Damaging European Windstorms” by L. C. Dawkins et al.

Anonymous Referee #1

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General Comments

The authors use spatial footprints of gusts from the XWS catalogue of extra-tropical cyclone events in the past 35 years to examine the decline in windstorms over parts of Europe in the past 15 years. The authors are to be commended for a very clear writing style. I recommend publication after some further analysis and revisions.

The main comment is that there is insufficient evidence that the A20 metric is valid for its purpose of documenting a recent decline in damaging European windstorms. The validation in the article consists of finding a value of X% containing 23 significant windstorms, and a lower value of X indicates a better metric. This metric analyses a subjective subset of individual severe windstorms, and is not robust to outliers. Further, the validation concerned an A25 rather than the A20 metric used in this article. How-

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ever, there is a much bigger validation problem: this article analyses annual integrated A20 rather than individual severe windstorms, hence the proposed validation has little relevance. The distinction between individual event damage and annual integrated values is very substantial here: we know that a single storm such as Daria or Lothar produced more damage than the long-term annual average, whereas the A20 estimate for Daria is 1 or 2% of long-term annual average and points to far too much weight on weak storms in A20. The authors have to choose a metric which has been validated as an annual integrated measure of damage. Articles such as Barredo (2010) can provide some data on annual integrated damage to help with such a validation. This is not viewed as a major change in direction since the authors use metrics such as Klawa and Ulbrich (2003) in this article - instead, it is a change in emphasis on the best metric.

In general, the article follows the paradigm 'large-scale climate patterns force weather events' with statements similar to 'NAO explains changes in A20'. However, the aggregate of the individual weather events contribute significantly to the large-scale pattern, see text and references within "Contrasting interannual and multidecadal NAO variability" by Woollings et al. (2014). Would the authors consider changing their description of climate-weather link to something like 'changes in NAO are consistent with annual damage metric variations', if they find such behaviour?

Specific Comments

Page 1, lines 18-22: Roberts et al. do not provide loss estimates for the four named storms, could the source of these losses be given?

Page 2, line 11: the loss function used five stations, rather than four.

Page 2, lines 17-19: the published work by Wallace would be a better reference for the NAO?

Page 6, lines 3-7: The statement "...number of very damaging windstorms has decreased in recent decades" is not supported by the evidence in Figure 3. Instead,

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the decline in total A20 is caused by reduced A20 per event (Fig 3b) and there is no evidence specific to the subset of very damaging storms in Figure 3.

Page 7, lines 8-9: this sentence is tautological: A20 counts number of occurrences of wind > 20 m/s, or put another way, is a measure of frequency of occurrence of winds > 20 m/s.

Page 7, lines 11-16: Figure 5 helps to explain A20 changes in Paris, but it also raises some major issues. First, the peak gusts never exceed 30 m/s, yet storm Lothar was measured above 40 m/s by multiple weather stations in and around Paris. Second, the top 10 or 20 storms in the period are responsible for the vast majority of damage at Paris, and the top 10 points in this plot show the recent period to have consistently higher gusts. This indicates the extreme gusts from XWS footprints are very different from observed behaviour. Do the authors if XWS wind values have been compared to actual weather station gusts, and if so, has a trend been found such that modelled hazard for older storms have more negative bias with respect to observed, compared to newer storms?

Page 8, lines 4-10: could the Scandinavia Pattern be included in analysis? The eastwards extent of the spatial pattern in Figure 6 suggests the SP.

Page 8, lines 20-21: the conclusion to be drawn from lower total A20 and higher number of events is the mean A20 per event is lower. No conclusion can be drawn about very damaging windstorms, since they are a very small part of this particular A20 metric (see comments about Paris above, where the q-q plot indicates more severe storms in past 15 years).

Page 8, lines 22-24: these two sentences are redundant.

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