

How important is serial clustering in seasonal losses from severe windstorms in Europe?

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Extratropical cyclones are the most damaging natural hazard to affect western Europe. Serial clustering is when many intense cyclones affect one area in a short period of time with potentially very large seasonal losses. Previous studies have shown how these cyclones are more likely to cluster with an increase in the intensity of these events during wintertime (DJF). We revisit this topic from an impacts perspective and aim to answer how important clustering is for windstorm related losses.

This question will be approached using a quantifiable loss-based metric (storm severity index (SSI)) based on near-surface meteorological variables that is used to convert wind gust values into specific losses for individual windstorms. This is investigated using 1000 years of high resolution climate model data from HiGEM, which is compared to ERA-Interim. The model is shown to be able to successfully reproduce the DJF North Atlantic/European circulation, and represent the large-scale set up associated with the occurrence of windstorms and windstorm clusters affecting Europe.

The amount of clustering in a season is inferred from the ratio of the single event loss (calculated over 72 hours) to the total season (DJF) loss. A low contribution of the single event loss to the total season loss implies an increase in the number of cyclone events and hence a greater importance of clustering. Our results indicate that with an increasing return period the importance of clustering decreases. While the length of the time series may also play a role, the reduction of clustering with increasing severity can be attributed to an increased importance of the single event to total seasonal loss; for example, the ratio of the two values increases from ~ 0.3 at a return period of 1 year, to ~ 0.8 at a return period of 200 years. The results from HiGEM are consistent with those from ERA-Interim for return periods up to 36 years.

This result appears to contradict previous results in the literature and provides evidence that the importance of clustering may decrease for longer return periods.