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# Possible changes in the return period of loss associated with European wind storms in a future climate

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Possible changes in return periods of European wind storms in a future climate are investigated based on transient GCM simulations. The intensity of a storm is quantified by the associated estimated loss, which is derived using the storm loss model originally developed by Klawa and Ulbrich (2003). We adapted this method to estimate losses for individual storms. With that aim, we use daily maximum wind speeds to compute the estimated loss for each storm considering exceedences of the local 98th wind percentile. If a storm affects Europe during more than one day, the largest daily loss is considered. The total estimated loss for a single storm is then given by the sum estimated loss values for all grid points affected by the storm. We focus our investigation on the European countries which are often affected by winter storms (Germany, France, Netherlands, Belgium, Denmark, United Kingdom and Ireland).

The method is first tested for wind storm losses based on ERA40 data. Results reveal that the method is able to estimate well the spatial extension and ranking of losses associated with historical storms. We use robust Extreme Value Analysis (EVA) techniques which fit an extreme value distribution to data above a high threshold to estimate the return periods of storm losses. In order to estimate possible changes in return periods of storm loss in a future climate, GCM data for recent (20C, 1960-2000) and future climate conditions (SRES A1B and A2, 2001-2100) is considered. Results of our study show that both the number and intensity of loss from wind storms increases under future climate conditions. In particular, several storms are detected with estimated losses exceeding three times the largest events for recent climate conditions. Consequently, a significant shortening of return periods of European wind storm losses is identified at the end of the 21st century. This implies higher risk of occurrence of damaging wind events over Europe.