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Extreme Wind Assessment over Europe in Regional Climate Models

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Every year extreme events cause vast amounts of damage across Europe. While flooding often causes the greatest loss of life, it is extreme winds that often cause the greatest financial losses, and these represent a major concern for numerous industries including insurance, construction, afforestation, energy and many others. A vital requirement for planning adaptation to climate change is to estimate how the magnitude and frequency of extreme events will vary in the future. Accurate projections of these changes will be invaluable to society, businesses, and decision makers.

Extreme winds were examined in regional climate simulations over Europe using extreme value analysis techniques. The peaks-over-threshold and block-maxima approaches are compared for a single location and for various timeframes of sampled data. The peaks-over-threshold approach was used to estimate the 50-year return wind from the Generalized Pareto Distribution (GPD) at all locations over Europe. This was repeated for a reference period and a future period, with the change by the end of the century being estimated with its associated uncertainties. The results of this analysis have been included in a multi-hazard assessment for Europe.

Over much of Europe, it was found that the future change in 50-year return wind speed was smaller than the uncertainty associated with estimating the event. Detailed results of this investigation will be presented, along with a discussion of the statistical methods employed. A new four-year project, EMULATE, is currently beginning in the Bjerknes Centre, Norway. This project will expand the extreme analysis presented here to include precipitation, and has a primary goal to link extreme events to large-scale structures and patterns in atmospheric flow. An overview of the project and the work planned will also be presented.