Geophysical Research Abstracts
Vol. 18, EGU2016-14752, 2016
EGU General Assembly 2016

Statistical uncertainty of extreme wind storms over Europe derived from a probabilistic clustering technique

Michael Walz and Gregor C. Leckebusch

School of Geography, Earth and Environmental Sciences, University of Birmingham, United Kingdom
(maw526@bham.ac.uk)

Extratropical wind storms pose one of the most dangerous and loss intensive natural hazards for Europe. However, due to only 50 years of high quality observational data, it is difficult to assess the statistical uncertainty of these sparse events just based on observations. Over the last decade seasonal ensemble forecasts have become indispensable in quantifying the uncertainty of weather prediction on seasonal timescales. In this study seasonal forecasts are used in a climatological context: By making use of the up to 51 ensemble members, a broad and physically consistent statistical base can be created. This base can then be used to assess the statistical uncertainty of extreme wind storm occurrence more accurately.

In order to determine the statistical uncertainty of storms with different paths of progression, a probabilistic clustering approach using regression mixture models is used to objectively assign storm tracks (either based on core pressure or on extreme wind speeds) to different clusters. The advantage of this technique is that the entire lifetime of a storm is considered for the clustering algorithm. Quadratic curves are found to describe the storm tracks most accurately. Three main clusters (diagonal, horizontal or vertical progression of the storm track) can be identified, each of which have their own particulate features.

Basic storm features like average velocity and duration are calculated and compared for each cluster. The main benefit of this clustering technique, however, is to evaluate if the clusters show different degrees of uncertainty, e.g. more (less) spread for tracks approaching Europe horizontally (diagonally). This statistical uncertainty is compared for different seasonal forecast products.