

Spatial modeling of peak wind speed observations

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The aim of this study is to assess a spatial statistical model for peak wind speed observations that provides an area-wide analysis of the occurrence probability of extreme peak wind speed. The analysis is based on wind fields from the ECMWF operational weather forecast system and point-wise peak wind speed observations at 139 weather stations in Germany.

In a first step, the response surfaces of the generalized extreme value distribution (GEV) parameters are modeled given the conditioning state of area-wide wind analysis of a numerical weather forecasts model. Although much of the spatial dependencies are explained by the large scale circulation, the peak wind speed observations at different stations are not conditionally independent.

In a second step, the concept of max-stable spatial processes is employed in order to account for the spatial dependencies that are not explained by the conditioning variables.