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Assessment of extreme wind speeds from Regional Climate Models – Part 1: Estimation of return values and their evaluation

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Frequency and intensity of gust wind speeds associated with severe mid-latitude winter storms are estimated by applying extreme value statistics to data sets from regional climate models (RCM). Maximum wind speeds related to probability are calculated with the classical peaks over threshold method, where a statistical distribution function is fitted to the reduced sample describing the tail of the distribution function. From different sensitivity studies it is found that the Generalized Pareto Distribution in combination with a Maximum-Likelihood estimator provide the most reliable and robust results.

For a reference period from 1971 to 2000, the ability of the RCMs to realistically simulate extreme wind speeds is investigated. For this purpose, data from three RCM scenarios, including the REMO-UBA simulations at 10 km resolution and the so-called consortial runs performed with the CCLM at 18 km resolution (two runs), are evaluated with observations and a pre-existing storm hazard map for Germany. It is found that all RCMs tend to underestimate the magnitude of the gusts in a range between 10 and 30% for a 10-year return period. Averaged over the investigation area, the underestimation is higher for CCLM compared to REMO. The spatial distribution of the gusts, on the other hand, is well reproduced, in particular by REMO.

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