Seasonal forecast verification of extreme events for the wind energy sector

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Severe and extreme winds and related destructive wind storms are the second highest cause of global natural catastrophe insurance losses after hurricanes. For this reason, a more accurate assessment of the probability of occurrence of these severe wind speed events is necessary to increase the protection and to minimize the risk of unexpected energy network unbalance.

In this study, we focus on the evaluation of the ability of the global seasonal climate prediction systems in forecasting extreme wind speeds. The climate forecast systems employed are the ECMWF seasonal forecast system 4 (ECMWF-S4) and Meteo-France's Systems 4 (METFR-S4). We consider extreme events based on the upper (90th percentile) or lower (10th percentile) thresholds of 6-hourly 10m wind speed within a month. Then 3-month averages of those events have been analyzed at 0-4 months lead time for the May and November start dates during the period 1991-2012.

We evaluate the performance of the seasonal climate prediction systems when predicting extreme wind speed at different forecast horizons, by means of deterministic and probabilistic skill measures, such as the temporal correlation coefficient (TCC) and the fair ranked probability skill Score (FRPSS). At the seasonal time scale, this investigation is a first step for providing better climate information to characterize the low and high wind speeds in a particular location.