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Accuracy of near real time updates in wind power forecasting with regard to different weather regimes

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Wind energy in Germany has been exceeding the level of 20 GW installed capacity last year. It has to increase far more so that the goal of 20 % renewable energies in Europe in 2020 can be reached. To keep the process running reliable wind power forecasts are essential.

The look ahead time of the forecast models mostly comprise up to 72 hours (short term). In this case wind velocity forecasts from Weather Services are needed as the most important input. Forecasts for the next approx. four hours (shortest term) can benefit from data of produced wind power if available near real time. Hence lower forecast errors are possible for this time period. This helps to provide Distribution System Operators (DSO) with a more accurate basis of decision making with regard to their dispatching.

Our approach to shortest term wind power forecasting therefore uses produced power of the last hours and estimates the further development (near real time updates). As well-established statistical tools, autoregressive models and neural networks are used to apply sophisticated curve fitting. Produced wind power is available for eleven wind parks evenly distributed in the north-western area of Germany comprising approximately three years, the time resolution is 15 minutes.

The prediction is expected to be more accurate if stable weather situations like stationary high pressure systems exist. On the other hand alternating low pressure systems with highly fluctuating wind speeds decrease the advantage of using produced wind

power data to appropriately describe the future development.

For the classification of weather regimes principal component analysis (PCA) in combination with cluster analysis is used. For a historical time period of at least one year the most relevant meteorological patterns are extracted by PCA. Based on this the weather situations can be clustered and classified. The influence of the weather regimes on the feasibility and accuracy of the near real time updates of wind power is studied.