



Wind energy resource assessment using NWP model data

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Modern and future wind turbines will have hub heights above 100 m and blades reaching 200-300 m above the ground. Meteorological measurements at heights above 80 m with sufficient quality and resolution are very limited and simulated meteorological time series are considered as a suitable substitute for wind energy resource assessments. In Vestas we have created a large data set of modeled time-series containing hourly values of relevant meteorological parameters at high spatial resolution and global coverage. Using the Big Data analysis tools, the simulated data set was used to produce wind energy assessments over a large area covering most of northern Europe. The energy assessment using Weibull parameters calculated from the modeled time series is compared to direct calculation from hourly wind values. The two estimates agree to within couple of percent, depending on the terrain complexity and season. Furthermore, vertical profiles of modeled Weibull A and k parameters are compared to met-mast, sodar and lidar measurements from the observation campaign during the Tall Wind project. Both vertical and temporal variation of the Weibull k parameters is well captured in the simulated time series and suggests that model data has promising use in wind energy estimates, particularly at heights above the typical met-mast measurements.