



Can wind turbine production data be used for the verification of wind field simulations ?

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Commonly wind field simulations with atmospheric numerical models are compared to anemometer measurements. Often measurements at the national synoptic stations are used. These measurements are taken at a height of 10 m and represent the local wind conditions in the very near surrounding. They rarely are comparable to the wind field on the scale of a grid cell of an atmospheric model. Tall meteorological research towers are rare and do not form a sound statistical basis for a verification. A third approach is the derivation of the geostrophic wind from pressure measurements. This method avoids the spatial scale mismatch between anemometer measurements and model grid cells but it does not allow verification of the model's surface parameterization which is crucial for surface layer winds.

Wind turbine production data in some way represent the atmospheric flow field. The hub height meanwhile reaches more than 100 m and wind farms often represent the area of a model grid cell. Thus overcoming some of the disadvantages of near surface anemometer measurements wind turbine production data show major drawbacks on the other hand.

Wind speed time series over Germany have been simulated with the NCEP/NCAR reanalysis data as boundary conditions and the mesoscale model MM5 over a period of 20 years. The spatial resolution is 5x5 km² and the temporal resolution 10 minutes. These time series have been combined with power curves to result in time series of wind turbine production data. A detailed study has been performed for a wind farm in Brandenburg in nearest proximity to the 100 m met tower of the Lindenberg observatory. Different methods have been tested to process the wind farm production data in order to be comparable to the model derived time series.