



Deployment and validation of the Weather Research and Forecasting (WRF) model on the German Grid for wind power prediction applications

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The aim of the German e-Science project WISENT (Wissensnetz Energiemeteorologie) is to optimize the cooperation of scientific organizations in the field of Energy Meteorology employing Grid technologies. A main work package of the project has been the local implementation of a mesoscale model (WRF) on a high performance computing cluster, comprising a total of 188 CPU cores, connected using Gigabit Ethernet and InfiniBand technology.

WRF is a mesoscale model, suitable for research and operations, having capabilities to run on a variety of platforms, either serially or in parallel, with or without multi-threading. Daily runs of WRF configured for a two-domain nested integration, have been used to provide high-resolution input fields for the ForWind's IWPPP (Integrated Wind Power Prediction Platform). IWPPP focuses on wind power prediction for individual wind farms (on & offshore) and on aggregated wind power forecasts over the entire Germany, utilizing different model inputs, mainly from ECMWF and NCEP.

WRF's outer (course) grid of 25 km covers the greater area of Northwest Europe, while the inner finer mesh of 5 km (high-resolution forecasts) covers the area of Germany and North Sea. In addition, WRF time-lagged ensemble forecasts out to 48 hours have also been used to estimate near-surface wind power prediction, while the variance among ensemble members has provided a measure of forecast uncertainty.

ForWind uses a continuous process which compares new model against existing model outputs. WRF higher-resolution forecasts have been compared against lower-resolution NCEP and ECMWF forecasts, while all model forecasts have been vali-

dated against observations. Final evaluation of the NWP models has been performed in two ways: i) model to observations and model to model intercomparisons (for getting a deeper insight into the models involved), ii) derivation of statistical parameters (i.e. forecast verification scores).