

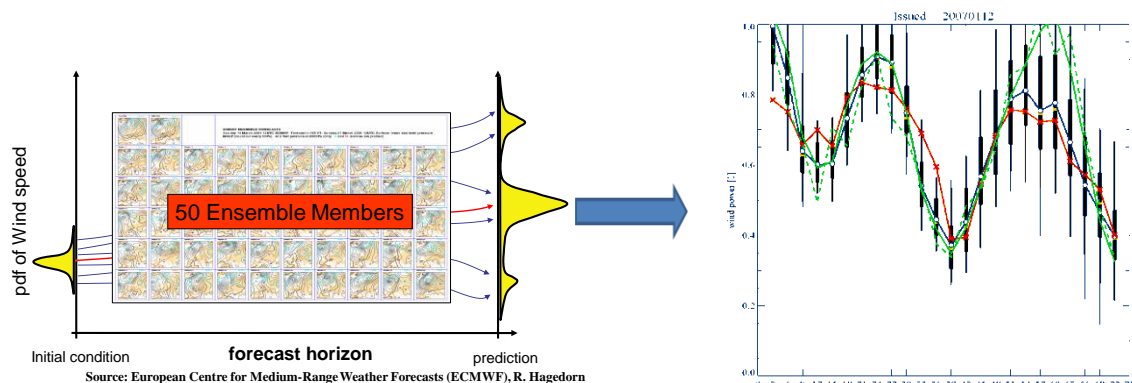
Master Thesis at ForWind in Wind Energy Meteorology

Topic

Rapid Wind Power Ensemble Prediction System for large-scale forecasting

For more than 10 years wind power forecasts are used for the safe integration of wind power in the power supply system. Skillful wind power forecast require accurate Numerical Weather Predictions (NWP) provided by Weather Services like ECMWF (European Center for Medium-Range Weather Forecasts) or DWD (German Weather Service). However, the quality of NWP is limited by various physical reasons, namely uncertainty in initial conditions and atmospheric modeling constraints. Thus, the recent development is to provide the level of certainty of wind power forecasts to the end-user. The most elegant way is to use a set of model runs (Ensemble members) that are initialized with slightly different initial conditions to gain information on the spread in forecast results (see Figure). Since daily several thousand model grid points needs to be processed for up to 50 ensemble members and several forecast steps, processing time becomes an issue. The aim of this Master Thesis is the improvement of an existing "light weight" large-scale wind power forecasting methodology that is designed for rapid wind power forecasting. The quality of the ensemble wind power forecast will be assessed using probabilistic skill scores. Finally, the results will be compared to wind power forecasts using another forecasting methodology to investigate the level of detail that is required for large-scale wind power forecasting.

The use of ForWind's new super-computer is envisaged for this master thesis.



A rapid wind power forecasting method (tool) is required to transform ECMWF's 50 Ensemble members into a probabilistic wind power prediction

Requirements

- enthusiasm for meteorology and/or wind energy; scientific and technical work and efficient handling of huge data volumes
- good knowledge in statistics, data processing and programming (preferably Fortran/C and/or IDL) is essential

Contact

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Group: Large-Scale Wind Power Simulation and Prediction