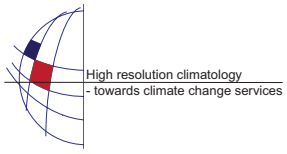
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-582, 2010
10th EMS / 8th ECAC



Global and Limited-Area Ensemble Prediction Systems deployed for Wind Power Forecasting

T.I. Petroliagis (1), M. Jacques (1), A. Montani (2), L.v. Bremen (1), and D. Heinemann (1)

(1) ForWind, Center for Wind Energy Research, Carl von Ossietzky University of Oldenburg, Germany (thomas.petroliagis@forwind.de), (2) ARPA-SIMC, Regional Meteorological Service, Bologna, Italy

The integration of wind generation into power systems is affected by uncertainties in the forecasting of expected power output. Misestimating of meteorological conditions or large forecasting errors (phase errors, near cut-off speeds etc.) has proved to be very costly for infrastructures (i.e. unexpected loads on turbines) and reduces the value of wind energy for end-users. The state-of-the-art in wind power forecasting has focused so far on the "usual" operating conditions rather than on extreme events. Thus, the current wind forecasting technology presents several strong bottlenecks. End-users urge for dedicated approaches to reduce large prediction errors or predict extremes from a local scale (gusts, shears) up to a European scale as extremes and forecast errors may propagate.

The aim of the new European FP7 Project, namely SAFEWIND, is to substantially improve wind power predictability in challenging or extreme situations and at different temporal and spatial scales. One of the areas that SAFEWIND concentrates on is the use of Global and Local Area Model (LAM) Ensemble Prediction System (EPS) forecasts for improved wind predictions on local to regional scales. More specifically, the ECMWF (European Centre for Medium-Range Weather Forecasts) EPS has been deployed as the backbone Global EPS platform for the SAFEWIND. The operational ECMWF EPS uses perturbations based on initial and evolved singular vectors. Model uncertainties are presented currently by the stochastic physics scheme that perturbs the parametrised physics tendencies by multiplicative noise. The current horizontal resolution of the ECMWF EPS is roughly 32 km while its corresponding "deterministic" IFS (Integrated Forecast System) forecast and analysis fields have a resolution of about 16 km.

On the other hand, LEPS (Limited-Area Ensemble Prediction System) components have been provided by the COSMO-LEPS. This system is based on the non-hydrostatic COSMO-model developed within the COnsortium for Small-scale MOdeling (COSMO), formed in October 1998. As designed and developed, COSMO-LEPS platform aims at improving upon the early and medium-range predictability of extreme and localized weather events, especially when orographic and mesoscale related processes play a crucial role. The present status of COSMO-LEPS, based on 16 integrations of the COSMO-model (7 km of horizontal resolution, 40 vertical levels, 132 hours of forecast range) is running operationally as a "time-critical application" at ECMWF.

Verification results for ECMWF EPS are valid for two periods, before and after 26 January 2010, when the latest upgrade of EPS (and IFS) took place. Same wise verification results for COSMO-LEPS are also referred to two periods: before and after 1 December 2009 (latest upgrade for COSMO-LEPS). Emphasis is given *o*n the performance of ECMWF EPS & COSMO-LEPS investigating cases of particular interest over Europe, such as extreme events. The additional information coming from COSMO-LEPS, complementing the coarser resolution ECMWF EPS is validated. Verification has been performed in both the wind and wind power mode.