A comparison between the ECMWF and COSMO Ensemble Prediction Systems applied to short-term wind power forecasting on real data

Wind power forecasting (WPF) represents a crucial tool to reduce problems of grid integration and to facilitate energy trading. By now it is advantageous to associate a deterministic forecast with a probabilistic one, in order to give to the end-users information about prediction uncertainty together with a single forecast power value for each future time horizon. A comparison between two different ensemble forecasting models, ECMWF EPS (Ensemble Prediction System in use at the European Centre for Medium-Range Weather Forecasts) and COSMO-LEPS (Limited-area Ensemble Prediction System developed within COnsortium for Small-scale MOdelling) applied for power forecasts on a real case in Southern Italy is presented. The approach is based on retrieving meteorological ensemble variables (i.e. wind speed, wind direction), using them to create a power Probability Density Function (PDF) for each 0-72 h ahead forecast horizon. A statistical calibration of the ensemble wind speed members based on the use of past wind speed measurements is explained. The two models are compared using common verification indices and diagrams. The higher horizontal resolution model (COSMO-LEPS) shows slightly better performances, especially for lead times from 27 to 48 h ahead. For longer lead times the increase in resolution does not seem crucial to obtain better results. A deterministic application using the mean of each ensemble system is also presented and compared with a higher resolution 0-72 h ahead power forecast based on the ECMWF deterministic model. It is noticeable that, in a deterministic approach, a higher resolution of the ensemble system can lead to slightly better results that are comparable with those of the high resolution deterministic model.

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