A multi-model application for wind prediction in Southern Italy

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Wind prediction is of great importance, since a good forecast for wind speed and direction allows a better prediction of power production from a wind farm.

Here, a multi-model experiment for the prediction of wind speed and direction is presented. The study has been conducted on a one year period of simulation: from 1 December 2012 to 30 November 2013. Three models are employed in this exercise: BOLAM, MOLOCH and RAMS.

The area considered for the comparison between multi-model results and observed values is Southern Italy, where RAMS forecast is made at 3km horizontal resolution, while BOLAM and MOLOCH horizontal grid spacing are respectively 10 km and 2.2 km. The measurement used for the verification are those of the GTS (Global Telecommunication System). For each day of forecast, comparisons are made hourly for the following two days.

For the multi-model application, 80% of the data are used as training period for the calculation of the regression coefficients, and the multi-model is applied to the remaining 20% of data.

To assess the statistical robustness of the results the methodology is applied 20 times randomly selecting the 80% of the data used for computing the multi-model coefficients, then applying the multi-model to the remaining 20% of the data.

Results are shown seasonally to account for the natural variability of the Mediterranean climate. The multi-model shows an improvement of the RMSE with respect to the forecast of each single model. This improvement is between 20% and 40%, depending on model and season considered.

Furthermore, multi-model forecast has been compared to the models' forecast after the application of the MOS (Model Output Statistics) technique. Multi-model shows better results for all seasons, when compared with each model forecast. The reduction of the RMSE is between 4% and 14% depending on model and season considered.