EMS Annual Meeting Abstracts
Vol. 12, EMS2015-435, 2015
15th EMS / 12th ECAM

Improvement of Solar and Wind forecasting in southern Italy through a multi-model approach

Elenio Avolio (1), Rosa Claudia Torcasio (1), Teresa Lo Feudo (1), Claudia Roberta Calidonna (1), Daniele Contini (3), and Stefano Federico (2)

(1) ISAC-CNR, UOS of Lamezia Terme, zona Industriale Comparto 15, 88046 Lamezia Terme, Italy (e.avolio@isac.cnr.it), (2) ISAC-CNR, UOS of Rome, via del Fosso del Cavaliere 100, 00133-Rome, Italy, (3) ISAC-CNR, UOS of Lecce, 73100 Lecce, Italy

An improvement in the Solar and Wind short-term forecasting represents a very critical goal for the weather prediction community and is of great importance for a better estimation of power production from solar and wind farms. In Southern Italy this issue is particularly significant, because there is a large availability of solar and wind energy in spite of a poor integration into the grid.
In this work we analyze the performance of two deterministic models operational at ISAC-CNR for the prediction of short-wavelength irradiance, wind and surface temperature, at two sites in southern Italy. The models considered in this work are the WRF (Weather Research and Forecasting Model) and the RAMS (Regional Atmospheric Modeling System); they were run for six months of 2013 (summer and fall) at 4 km horizontal resolution over Italy. Each forecast lasts three days, and initial and dynamic boundary conditions are given by ECMWF (European Centre for Medium Weather Range Forecast) model.
Verification is given against two surface stations located in Lamezia Terme and Lecce, and are based on hourly forecasts output and observations.
A post-processing technique, i.e the multi-model, is adopted to improve the skill of the two deterministic models. The multi-model is first trained using a dataset of past forecasts and observations to achieve linear multiple regressions; in the forecast these regressions and weights are used to determine the best estimate of the prediction. The 80% of the data are used as training period, and the remaining 20% are considered for the forecast; the methodology is applied 20 times randomly to assess the statistical robustness of the results.
The results show that the multi-model produces a significant error reduction with respect to the forecast of each model. Errors are mainly reduced by a sizeable fraction (up to 20%), depending on the parameter and model.