EMS Annual Meeting Abstracts
Vol. 14, EMS2017-241, 2017

Statistical short-term wind forecast at a buoy in the Bay of Biscay (Spain)

Sheila Carreño-Madinabeitia (1,2), Jon Sáenz (2), and Gabriel Ibarra-Berastegi (3)

(1) Meteorology Area, Energy and Environment Division, TECNALIA R&I, Basque Country, Spain (Sheila.Carreno@Tecnalia.com), (2) Faculty of Science and Technology, University of the Basque Country, Leioa, Spain , (3) School of Engineering, University of the Basque Country, Bilbao, Spain

In this study a vectorial prediction of wind at a buoy located in the Bay of Biscay (North of Iberian Peninsula) has been carried out. The forecasting horizon runs from 1 to 24 hours ahead. To that purpose, the following three techniques have been used: Linear regression, random forest (a machine learning algorithm) and analogs with different norms are developed.

The records used in this analysis are hourly wind values observed at the buoy at 00 and 12, as well as from ERA-Interim numerical weather prediction model (both reanalysis and forecast), between 2007 and 2014. The first half of the records is used for training period and the second one for test period (3793 cases in total). All models have been fitted on the set of training cases and performance has been evaluated using different skill metrics on the test dataset. The data are prefiltered by means of an Extended Principal Component Analysis (ExtEOFs), retaining only the leading components, that hold 90% of the variance.

Result show that the statistical methods used outperform the forecasts provided by ERA-Interim and also, the simplest prediction – Persistence – (at a 95% confidence level) from 4 to 9 hours ahead for both wind components u and v. Moreover, there are not significant differences among the results obtained with the different statistical methods that have been tested. In all the methods, the forecasts given by ERA are the most influential predictors and if not included as inputs in the different models, a notorious deterioration of forecasting error takes place.

The conclusion in this work is that using highly sophisticated techniques like random forest does not make a significant difference if the appropriate inputs are used to feed the models. Further research is currently being carried out in order to elucidate if this conclusion is valid only for this particular location or could be generalized if the same methodology were applied to other sea locations.