EMS Annual Meeting Abstracts
Vol. 15, EMS2018-657, 2018

Sensitivity of WRF simulated wind to land surface schemes and model-data comparison

Jorge Navarro (1), Elena García-Bustamante (1), Fidel González-Rouco (2), Etor Lucio-Eceiza (2), Cristina Rojas-Labanda (3), Andrea N Hahmman (4), and Björn Witha (5)

(1) CIEMAT, Renewable Energy, Madrid, Spain (jorge.navarro@ciemat.es), (2) Dpto. Física de la Tierra, Astronomía y Astrofísica, IGEO (UCM-CSIC), UCM, Spain, (3) Dpto. Física de la Tierra, Astronomía y Astrofísica, UCM, Spain, (4) Department of Wind Energy, DTU, Denmark, (5) ForWind, University of Oldenburg , Germany

The NEWA (www.neweuropeanwindatlas.eu) project targets to provide updated information of wind resources over the broad European domain by offering last generation observational and model simulation products. Within this frame a set of regional simulations have been done with the WRF model (Skamarock et al. 2008) over the northeastern Iberian Peninsula in order to evaluate the sensitivity of the regional model to different physical configurations that might have an impact on the simulated wind variability.

The predictability of the wind field is subject to a number of factors (horizontal resolution, the initial and boundary conditions, parameterizations of the model's physics, etc.) that go beyond the potential existence of biases or errors in the model. The different combinations of these factors may lead to different model results. The purpose of this work is to explore the sensitivity of the model to changes in some physical options and also to assess its degree of realism in comparison to observations. Such model evaluation will help selecting the most appropriate model configuration to provide reliable estimates of the wind field in the area of interest. We make use of various observational databases (gridded and no gridded and re-reanalysis) to evaluate the realism of the simulations.

Among other aspects of the configuration of the regional model, the land surface schemes and their influence on the wind field simulations is evaluated. The land surface interacts strongly with the atmosphere at all scales, so implications in the simulation of climatic variables are expected. Therefore, a correct selection of the land surface parameterization has become increasingly important. In this case, a sensitivity and validation study of the wind field for four different land surface parameterizations will be presented. Noah, Noah-MP, RUC and CLM4 land surface models are used in this analysis.

Results suggest that simulations reproduce realistically the wind climatology and variability over the region. However, positive biases tend to appear in all configurations over complex terrain. The effect of the land surface models decreases with height and the observational bias is near zero in all configurations. The maximum and minimum biases in the wind speed time series do not occur at the same time in all simulations explored.