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Validation of the mesoscale model MM5 in reproducing the wind variability in Turkey

A. Hidalgo (1), M. Marchante (4), P.A. Jiménez (1,3), E. García-Bustamante (1,3), J.P. Montávez (2), J.J. Gómez-navarro (2), M.C. Rico (1), S. Jerez (2), J. Navarro (3), and J.F. González-Rouco (1)

(1) Universidad Complutense de Madrid, Spain, (4) Vestas Mediterranean, A/S , (2) Universidad de Murcia, Spain, (3) CIEMAT, Madrid, Spain

The numerous studies assessing the evolution of climate and its potential change at the global scale evidence the need of estimating the impact of expected changes at the regional scale. Particularly interesting is the evaluation of the wind energy resource due to its involvement in the the development and sustainability assessment of alternative energies supply. Prior to a climate change impact evaluation the knowledge of the wind field spatial and temporal variability is required. Various techniques can be applied in order to analyze the surface circulations, their main synoptic forcings and their variability along the recent past climate.

A dynamical downscaling approach is applied for an evaluation of the wind resource over Turkey. The study leans on the high resolution simulation of the wind field over Turkey and its validation with an observational dataset. The high resolution climate simulation has been performed with the mesoscale model MM5, driven by the global model ERA40 reanalysis products, for a period of ten years at 10 km of horizontal resolution. In order to analyze the reliability of the simulations, an observational dataset of quality that spans the period from 1978 to 2008 and overlaps the simulation period has been prepared. Observations reveal the presence of a strong annual cycle for the wind field in the region, with maxima wind speeds and prevailing northern circulations appearing in Summer and minima wind speed and a larger variability of the wind direction in Winter. The evaluation of the model results, based on the assessement of the distribution concordance and temporal agreement between simulations and surface observations, revealed that the model reproduces the regional variability with a systematic wind speed overestimation and evidences accuracy in reproducing the monthly mean wind field and its variability, showing a certain degradation at daily timescales.