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Resolution Evaluation of the WRF Model with WindSim comparisons for the Short Term Wind Energy Prediction System of Turkey

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In this study, we evaluated the results of the short-term wind energy prediction system (SWEPS) that our research group has recently developed for Turkey. SWEPS uses the numerical weather prediction model (WRF), a CFD model WindSim, and a model output statistics method to improve the results of the models. Here, we present the WRF/WindSim coupled results without any statistical improvement. The study area is the wind farm İntepe located in the town of Canakkale where is the northwestern part of Turkey. The farm has 38 turbines scattered along a line extended for 6.5 kilometers in East-West direction. We evaluated the coupled model performance by using the hourly data for the year of 2010. Wind power of the farm has been estimated up to 3-day coupling with WRF and WindSim Models. The resulting estimates of 2010 are compared with observational wind power data in terms of error analyses namely root mean square error (RMSE) and normalized root mean square errors (nRMSE). Performance comparisons of the coupled model WRF and WindSim include the horizontal resolutions of WRF model 9km, 3km, and 1km . Wind power model results for each turbine was evaluated for 24, 48, and 72 hours and seasonally. Ultimately, both resolutions of the models show different advantages at different seasons for different turbines including the comlexity of the terrain of the interest. Moreover, our results also show that WRF/WindSim coupling system may be more advantageous to WRF/WAsP system that we also discussed its results in other study.