Wind Ensemble Forecasting Using Differential Evolution

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Abstract

Ensemble forecasting [1] is a methodology to deal with uncertainties in numerical weather prediction models (NWP). In this work we propose to apply ensemble methods to a local scale adaptive wind forecasting model [2]. This model interpolates an initial wind field from either experimental data or NWP results using a log-linear vertical profile. Then, it imposes mass consistency and terrain impermeability to this initial wind field. To achieve the forecasting capability of the model, we use the results of the HARMONIE meso-scale model [3], a Non-Hydrostatic Dynamic Forecast model used experimentally at the Spanish State Meteorological Agency (AEMET). The log-linear vertical profile depends on the roughness length and the zero plane displacement. The values of these two parameters are related to the land cover. Moreover, the mass-consistent wind field depends on the Gauss moduli parameter. To estimate the values of these parameters, we use the differential evolution method [4]. This estimation is the main source of uncertainties in the model; therefore we will estimate some of these parameters in several experiments considering them as perturbations for the ensemble method.

This work presents the results of the model applied in Gran Canaria island using HARMONIE data for the summer of 2015. To validate the results, we compare them with experimental data from AEMET meteorological stations.

References

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