

Application of a wind-wave-current coupled model in the Catalan coast (NW Mediterranean sea), for wind energy purposes

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This work shows the main results of the HAREAMAR project (including HAREMAR, ENE2012-38772-C02-01 and DARDO, ENE2012-38772-C02-02 projects), concerning the local Wind, Wave and Current simulation at St. Jordi Bay (NW Mediterranean Sea).

Offshore Wind Energy has become one of the main topics within the research in Wind Energy research.

Although there are quite a few models with a high level of reliability for wind simulation and prediction in onshore places, the wind prediction needs further investigations for adaptation to the Offshore emplacements, taking into account the interaction atmosphere-ocean.

The main problem in these ocean areas is the lack of wind data, which neither allows for characterizing the energy potential and wind behaviour in a particular place, nor validating the forecasting models.

The main objective of this work is to reduce the local prediction errors, in order to make the meteo-oceanographic hindcast and forecast more reliable.

The COAWST model (Coupled-Ocean-Atmosphere-Wave Sediment Transport Model; Warner et al., 2010) system has been implemented in the region considering a set of downscaling nested meshes to obtain high-resolution outputs in the region.

The adaptation to this particular area, combining the different wind, wave and ocean model domains has been far from simple, because the grid domains for the three models differ significantly. This work shows the main results of the COAWST model implementation to this particular area, including both monthly and other set of tests in different atmospheric situations, especially chosen for their particular interest.

The time period considered for the validation is the whole year 2012. A comparative study between the WRF, SWAN and ROMS model outputs (without coupling), the COWAST model outputs, and a buoy measurements moored in the region was performed for this year.

References

Warner, J.C., Armstrong, B., He, R., and Zambon, J.B., 2010, Development of a Coupled Ocean-Atmosphere-Wave-Sediment Transport (COAWST) modeling system: Ocean Modeling, 35 (3), 230-244.