



THE EXPECTED EVOLUTION OF THE WIND AND WAVE CONDITIONS IN THE BLACK SEA

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The research team of the DREAM project has already implemented a multi-level wave prediction system based on the SWAN spectral model. The first computational domain covers the entire sea level and after this the system was focused on the western side of the sea, considering computational areas with increasing resolution in the geographical space. In order to increase the wave predictions, some data assimilation schemes have been also implemented. These are based on satellite data for the large areas for which an optimal interpolation method has been applied in terms of significant wave height parameter. The results show a visible increase of the accuracy of the model predictions. Furthermore, for the high resolution coastal area covering the Romanian nearshore a multi parameter assimilation scheme based on the measurements that were made available at the Gloria drilling unit has been designed. Thus, besides significant wave heights, this time also the wave periods and mean directions have been assimilated considering a successive correction method to apply corrections to the boundary conditions of the computational domain. High resolution computational domains have been connected to this wave prediction system and a special attention was payed to the coastal area in front of the Danube mouths, where strong interactions between the waves and the currents induced by the Danube River outflow are usually noticed.

As a further step, considering the climatic winds provided by the Rossby Centre regional atmospheric model, version 4 (RCA4), simulations with the wave modeling system have been carried out until 2050 under the climate scenarios RCP4.5 and RCP8.5. This wind data is made available in the public domain by the Swedish Meteorological and Hydrological Institute (SMHI). The results show first that in the next years it is expected that the energy peak in the Black Sea to concentrate in the western side, close to the Romanian coastal environment. Furthermore, high winds are expected in the near future, with maximum wind speeds very often exceeding the value of 30m/s. On the other hand, these high winds will not be followed by an enhancement of the highest waves. This is especially because of the cyclonic form of the future extreme winds that do not allow very long fetches for the development of the high waves.

From this perspective, having as basis the previous results, in the framework of the DREAM project wave model simulations considering three relevant climate scenarios RCPs 2.6, 4.5 and 8.5. are going to be performed for the two 40-year intervals considered as reference. These are near future (2021-2060) and distant future (2061-2100). In this way a better perspective on the wave and wind conditions in the basin of the Black Sea, until the end of the 21st century will be provided.



Keywords: Black Sea, wave and wind, climate scenarios, wave models, extreme events

Acknowledgment: This work was carried out in the framework of the research project DREAM (Dynamics of the REsources and technological Advance in harvesting Marine renewable energy), supported by the Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding – UEFISCDI, grant number PN-III-P4-ID-PCE-2020-0008.

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