

An Overview of the Wind and Wave Climate in the Romanian Nearshore

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Abstract : The goal of the proposed work is to provide a more comprehensive picture of the wind and wave climate in the Romanian nearshore, using the results provided by numerical models. The Romanian coastal environment is located in the western side of the Black Sea, the more energetic part of the sea, an area with heavy maritime traffic and various offshore operations. Information about the wind and wave climate in the Romanian waters is mainly based on observations at Gloria drilling platform (70 km from the coast). As regards the waves, the measurements of the wave characteristics are not so accurate due to the method used, being also available for a limited period. For this reason, the wave simulations that cover large temporal and spatial scales represent an option to describe better the wave climate. To assess the wind climate in the target area spanning 1992-2016, data provided by the NCEP-CFSR (U.S. National Centers for Environmental Prediction - Climate Forecast System Reanalysis) and consisting in wind fields at 10m above the sea level are used. The high spatial and temporal resolution of the wind fields is good enough to represent the wind variability over the area. For the same 25-year period, as considered for the wind climate, this study characterizes the wave climate from a wave hindcast data set that uses NCEP-CFSR winds as input for a model system SWAN (Simulating WAVes Nearshore) based. The wave simulation results with a two-level modelling scale have been validated against both in situ measurements and remotely sensed data. The second level of the system, with a higher resolution in the geographical space ($0.02^\circ \times 0.02^\circ$), is focused on the Romanian coastal environment. The main wave parameters simulated at this level are used to analyse the wave climate. The spatial distributions of the wind speed, wind direction and the mean significant wave height have been computed as the average of the total data. As resulted from the amount of data, the target area presents a generally moderate wave climate that is affected by the storm events developed in the Black Sea basin. Both wind and wave climate presents high seasonal variability. All the results are computed as maps that help to find the more dangerous areas. A local analysis has been also employed in some key locations corresponding to highly sensitive areas, as for example the main Romanian harbors.

Keywords : numerical simulations, Romanian nearshore, waves, wind

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