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Simulation of the surface wind field and wind waves over the Oman Sea

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Surface wind field is one of the most important factors in the generation of the marine hydrodynamic phenomena such as wind waves that highly affected by the surface winds. Therefore, accessibility to the correct wind field is of great importance for accurate prediction and simulation of the hydrodynamic variables. Nowadays numerical mesoscale weather prediction models are widely applied as powerful tools to simulate wind and other atmospheric variables with predefined temporal and spatial resolution in desired areas. Despite appropriate results of the numerical models in many regions, there are still some complications in the simulation of the surface wind field in areas with complex orography since the surface wind field is highly affected by the local topography, land-sea discontinuity, temperature gradient etc.

Nowadays, with the development of high-speed processors the third generation spectral models are generally used for simulation of wind waves. Wind data are the main input parameters of the numerical spectral wave model. Therefore, the quality of the input wind data can be assessed by comparison of the wave model outputs with measured values.

The main goal of the current study is to simulate surface wind field over the Oman Sea using WRF modeling system. To verify the model results, the simulated wind speeds were compared with synoptic and buoy measurements and satellite observations. Wind-wave parameters simulated by the spectral model were also compared with wave measurements to verify simulated surface wind field as the input of the wave model.

The Comparison simulated wind speed and directions in coastal synoptic stations and QuikSCAT satellite shows sufficient results for both offshore and coastal areas.