Development of a system based on numerical models to provide the environmental conditions in the Black Sea basin

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Abstract

Despite the fact that the Black Sea was called "Black Sea the Friendly Sea" by the ancient romans, it is not the case today, when we know more about it. It's maximum wave lengths and heights, current velocities and wind speed may not have the biggest values observed for a sea, but when combined they can generate some fearsome storms, very dangerous especially for the ships located at the time near or in Bosporus strait or Sulina channel, an Danube navigable arm. The aim of this work is to establish a methodology, based on numerical models (SWAN and MOHID), for predicting the wave and current climate in the Black Sea basin. The main target is the Romanian near shore. Numerical wave models are currently used in the near shore to assess wave propagation and coastal transformations. The advantage here is that those numerical models can cover large coastal zones and provide operationally forecast products. Presently, the most accurate estimation of the wave parameters is given by the spectral phase averaging models and, among them, SWAN is being considered the top model for coastal transformations. The new features implemented in the SWAN model allow the implementation of the SWAN model for the entire Black Sea basin and then to focus the system on the Romanian near shore in a multilevel wave prediction system. Those features presents the major advantage that one single model covers the full scale of the modeling process although the physics is rather different from one level to another. The interactions with currents and the wave induced currents were also assessed. In the end of the paper a scenario of an environmental accident is presented and followed using the joint model system developed.

Keywords: wave forecast, current forecast, numerical models, coastal transformation

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