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On validation of regional atmosphere and wave models for the Black Sea region

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Mesoscale atmospheric models MM5 and WRF adapted to the Black Sea region in Marine Hydrophysical Institute (MHI, National Academy of Sciences of Ukraine) together with wave model WAM are widely using in the last decade. Black Sea meteorological and wave climate assessing, 3-5 days operational forecast, researches of various physical phenomena typical for the Black Sea coastal zone are examples of application of such regional model calculations. Therefore we made some inspection of their quality.

Results of operational regional forecast of catastrophic weather events in the Black Sea region are considered. Flooding of 6-7 July 2012 in the Krasnodar Region, Russia caused a loss of more than 170 lives and huge economic damage. Hazardous storm of 11 November 2007 near the Crimean coast caused accidents and sinks of many vessels including ones carrying fuel oil and sulfur, more than 20 members of the crews were missing and severe ecological damage was suffered. However, the forecast of rainfall intensity had appeared five days before the flood at free access on the Internet website http://vao.hydrophys.org and the forecast of the wave height appeared on the same website three days before the storm. Quality of the regional forecast and its advantages over the global forecast are discussed.

In situ wave data including 2D wave spectra obtained at the MHI Black Sea Research Platform in 2012-2013 over all seasons were compared with model calculations. The distance of the Platform to the shore is 0.5 km where the sea depth is 28 m. Only part of wave spectrum belonging to wave frequencies lower than 0.4 Hz was considered to filter out waves developing from the coastal line. It is concluded that scatter indexes for modeled significant wave height and mean frequency are about of 50% and 15%. Some systematic defects of model calculations are revealed but the use of the model-based forecasts could lead to significant reduction in human losses and economic damage from catastrophic weather events.

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