Analysis of storm waves on the Caspian Sea

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For the study of storm waves on Caspian Sea a spectral wave model of third-generation SWAN has been applied. With the NCEP reanalysis wind fields from 1948 to 2010 as a forcing input, the model simulates significant wave height every 3 hours, the height of the swell, the direction of wave propagation, its length and period, and the transfer of wave energy. At this step of the numerical grid in the x and y in the Caspian Sea was 5 km. Calculations are carried out for the whole year. Model output for the past time-step of one year represents the initial data for the next one. Calculations are made on supercomputers of Lomonosov Moscow State University. Such physical processes as quadruplet interactions, whitecapping, triads, bottom friction, depth-induced breaking and diffraction are considered. The simulation results are used to calculate the number of storms, their size and duration both for the whole period of calculations, and for each month. Climate variability of storms is assessed. Areas of the strongest wave storms are identified. Synoptic situations for extreme storm events are analyzed on the base of decomposition of atmospheric pressure fields to the empirical orthogonal functions. The simulation results are compared with ship observations for the waves. The work is done in Natural Risk Assessment Laboratory under contract G.34.31.0007.