



Multi-decadal storminess fluctuations of Black Sea due to North Atlantic Oscillation

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Storminess variability is of key importance for many marine applications, naval and coastal engineering. Studying the evolution of this phenomenon along with large scale atmospheric patterns and being able to predict them is crucial for in the context of rising sea level due to climate change what make the low-lying coasts in the Black Sea to become increasingly vulnerable to marine hazards. The aim of this work is to clarify the trends, statistics and reasons of variations of storminess in dependence of such climatic characteristic as NAO (North Atlantic Oscillation Index).

The analysis of Black Sea storminess activity was performed on the base of visual wave observations (Voluntary Observing Ship or VOS) for the period 1970-2011. Annual means and maximum heights of wind-driven seas and swell waves averaging over whole Black Sea area were investigated separately. The both wind-driven seas and swell demonstrate the decreasing in heights about 10% the same as their periods for the chosen time frame.

Parametric spectral analysis was performed. The periods of wave height fluctuations for wind-driven seas and swell were shown to coincide with each other and with periods of low frequency fluctuation of NOA: 14 and 4 year respectively. Correlation coefficients of wave height and NOA were 0.3 for swell and 0.4 for wind-driven sea.

Nonlinear regularities of NAO fluctuations were investigated using wavelet and spavlet (spectra of modules of wavelet coefficients) analyses. Their influence on variability of storminess in Black Sea is discussed.

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