

Wave climate of the White Sea

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The implementation of the SWAN spectral wave model for the White Sea with using unstructured grid was presented. The main area of the Barents Sea was added to calculation region because it produces swell which incomes to the White Sea from the outside. Spatial resolution of unstructured grid is 500 m-5 km for the White Sea and 10-20 km for the Barents sea. NCEP/CFSR ($\sim 0.3^\circ$) input wind forcing was used. The results of the numerical modeling include wind wave fields for the White Sea with time step of 3 hours from 1979 to 2010. Spatial extreme value analysis of significant wave heights was performed. The storm situations, when the significant wave height exceeded 3 and 4 meters, were identified for the 32-year period. It allowed to analyze the variability of wind wave climate in the White Sea. The storminess of the White Sea tended to increase from 1979 to 1991, then decreased to minimum at 2000 and increased again till 2010. This work showed the following results. For example, in the Voronka (part of the White Sea) the synoptic situations with a wave height of more than 2 m (50-60 cases) took place about three times more than in the Basin (part of the White Sea), with heights of more than 3 m (25-40 cases) five or six times more. Cases with wave heights greater than 5 m in the Basin is extremely rare, while in the Voronka they occur 10 times a year. The significant wave height of a possible one time in 100 years is up to 7 meters in the Basin, up to 13 m in the Voronka, up to 3 m in the Onega Bay. In May, the smallest wavelength occurs in the Onega Bay, and is only 25 m. In the Basin wavelength is increased to 50 m. The longer wavelengths observed in the Voronka - 100 m. In November in the Basin (especially in the western part) and in the Voronka wavelength greatly increased to 75 and 200 m, respectively. In May, in the Onega Bay, Basin and Gorlo (part of the White Sea) swell height does not exceed 1 m. Only in the Voronka, it increases up to 3 meters. By November, there is an increase of swell height up to 3 m in the western part of the Basin and up to 9 meters in the Voronka. In the central part of the Gorlo, swell height remains the same. This feature proves impossibility of swell transit through the Gorlo into the White Sea. The work performed was supported by the RSCF (grant № 14-37-00038).