



Changes of sea wave activity in the Arctic during the 21st century from climate model simulations

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Rapid climate change in the Arctic during the last decades is one of the most noticeable manifestations of global warming. Therefore, the model assessments of extreme storm events and associated sea wave activity have very important implications for the possible projection of the shelf exploration and marine navigation in the Arctic basin (including the navigation along the Northern Sea Route). Two-dimensional spectral numerical model of sea waves (WAVEWATCH III) has been applied to analyze sea wave activity in the Arctic basin in the 21st century using the regional climate model HIRHAM forced by anthropogenic scenario SRES-A1B. The significant wave heights in the Arctic basin for the 1980-1999 are compared to that simulated for the middle (2045-2064) and the end (2080-2099) of the 21st century. The spatial distribution of the changes in frequency of strong waves (with significant wave heights more than 2 meters) shows a complex structure. For the southern part of the Barents, Kara, and Chukchi Seas model results demonstrate an increase of the strong wave frequency up to 100% growth rate by the middle of the 21st century. In general, the Arctic sea ice reduction should facilitate strengthening the sea wave activity in the 21st century. However, for the areas with the predominant ice-free conditions for the present-day climate (the Barents Sea) the model simulates a weakening of wave activity in the 21st century mainly due to reduction in the surface wind speed.