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Wave climate change in the Gulf of Bothnia

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Wave climate change in the Gulf of Bothnia in 2030–2059 was investigated using regional wave climate projections. For the simulations we used wave model WAM. As the atmospheric forcing for the wave model we had three global climate scenarios (HADGEM2-ES, MPI-ESM, EC-EARTH) downscaled with RCA4-NEMO regional model. The ice concentration for the wave model was obtained from NEMO ocean model simulations using the same atmospheric forcing. We used both RCP4.5 and RCP8.5 greenhouse gas scenarios. The spatial resolution of the simulation data was 1.8 km, enabling detailed analyses of the wave properties near the coast. From the simulation data we calculated statistics and return levels of significant wave heights using extreme value analysis, and assessed the projected changes in the wave climate in the Gulf of Bothnia. The projected increase in the significant wave heights is mainly due to the decreasing ice cover, especially in the Bothnian Bay. Projected changes in the most prevalent wind direction impacts the spatial pattern of the wave heights in the Bothnian Sea.