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Kliwas – Climate Projections of Sea state for Coastal and Open Sea in the North Sea

J. Möller (1), R. Weisse (2), N. Groll (2), H. Heinrich (1), and G. Rosenhagen (3)

(1) Federal Maritime and Hydrographic Agency, BSH, Hamburg, Germany (Jens.Moeller@bsh.de), (2) Helmholtz Zentrum Geesthacht, HZG, Geesthacht, (3) National Meteorological Service, DWD, Hamburg

KLIWAS is a research program of the German Federal Ministry of Transport, Building and Urban Development to study the impacts of climate change on waterways and navigation and to provide options for adaptations. One specific aim of the project is to investigate potential changes in the wave fields in the North Sea. We have therefor analysed climate scenarios for the sea state, eg. significant wave height (SWH), wave direction and wave periods, for the North Sea. These scenarios together with the wave climate of the recent years will give an approximation of projected changes of the sea state in coastal and open sea areas.

Here we show first results for projected changes of sea state in the North Sea for the period 2000-2100 in comparison to 1961-2000, based on the wave model WAM4.5. The wave model is forced with wind data from two different regional atmosphere-ocean-models (DMI-HIRHAM and MPI-REMO) in the scenario A1B. The wind data have a horizontal resolution of about 20 km and a time resolution of one hour, while the wave model provides data of the calculated sea state with a horizontal grid of 5 km and the time resolution of one hour.

We analysed the annual mean SWH as well as the 90- 95 and 99-percentile of SWH. It can be seen, that there is a trend to a slightly increasing SWH in the North Sea ,especially in the German Bight, in particular for the DMI wind data. While the increase is with the natural variability for the time period 2000-2050, it exceeds the variabiality in the second half of the century and shows a significant increase of SWH. The comparison with wave model runs for the scenarios A1 and B1 shows a similar increase of SWH, but a run with the scenario B2 displays no significant increase in the area of the German Bight and North Sea.