



Expected future changes in North Sea wave conditions due to anthropogenic climate change

I. Grabemann and R. Weisse

GKSS Research Center, Geesthacht, Germany (iris.grabemann@gkss.de, ralf.weisse@gkss.de)

Anthropogenic climate change may cause long-term changes in the wind and wave conditions of the North Sea which could have significant impacts on human safety and activities. To estimate possible future changes in the wave conditions of the North Sea the effects of four climate realizations for 2071-2100 were analysed in comparison to control simulations presenting the wave conditions for 1961-1990. Regionalized wind fields (RCAO model) from the global climate realizations which consist of combinations of two scenarios of future emissions (IPCC A2 and B2) and of two global circulation models (HadAM3H and ECHAM4/OPYC3) were used to force the wave model WAM for the North Sea.

While for about 60 % of the North Sea area the long-term mean 99 percentile of the significant wave height shows an increase in all climate realizations, there are large uncertainties in the magnitude and the spatial patterns of the climate signals between the climate realizations. The strongest increase by up to 18 % occurs in the ECHAM4/OPYC3 driven simulations in the NE part of the North Sea. Generally the model caused differences between the climate signals are greater than the scenario caused differences.

Special emphasis is given to the German Bight (SE North Sea) for which a mean increase of up to 8 % in future extreme wave heights was found. This increase is associated with an increase in future frequency of extreme events and in their duration and intensity and the wave direction tend to shift to an increase in frequency for more westerly sectors.