

Dealing with impact of anthropogenic Climate Change
– the case of storm surges in the German Bight/Hamburg

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Storm surges are the dominant geohazard along the south-eastern parts of the North Sea. Since such storm surges are caused by strong winds, this risk may be subject future anthropogenic climate change. At the Institute for Coastal Research, we have dealt with this problem extensively.

First, we have examined to what extend recent multi-decadal changes of storminess have lead to unprecedented levels of storminess. We found that a multi-decadal trend towards more violent storms commenced in the 1960s. This ended for most parts of the NE Atlantic/N European region in the mid 1990s. Also, prior to the increase, a downtrend since about 1900 was detected in proxies derived from local pressure readings. In the few cases, when local pressure readings were available since the early 19th century and before, the storm climate appears remarkable stationary.

In a second step we have examined a large number of regional climate change scenarios done with SRES emissions scenarios A2 and B2, with two global climate models to force the 4 regional models. These scenarios all point to an increase of storminess in the southern part of the North Sea at the end of the 21st century, with a intensification of strongest winds of about 10%. These scenarios for the local weather were fed into hydrodynamical models of the North Sea, and an increase of wind-related water levels of the order of 20-30 cm was found for the end of the 21st century along the SE coast of the North Sea.

In a third step, these numbers were “localized” with an empirical downscaling step to the harbour of the city of Hamburg, connected with the North Sea through a some 130 km long estuary. For 2030 and 2085 scenarios were derived, of the order of 20±20cm for 2030 and 70±50cm for 2085. these number cover both changing weather and mean sea level rise. For 2030 such increases are well manageable with existing or presently prepared costal defence measures; if the anticipated 2085 situation really emerges, alternative adaptation strategies may be required.

The result of the analysis was communicated to the regional public, who responded with great interest. Some dramatization in the media as observed, but it we were to large extent successful in conveying the message of sufficient time and options for rationale adaptation.