

Expected Future Changes in North Sea Storm Surge Statistics 2070-2100

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Storm surges provide a particular threat for low-lying coastal areas. In the North Sea several devastating events have occurred such as the storm surge of 31 January - 01 February 1953 with the loss of hundreds of lives in the Netherlands and the UK, or the storm surge of 16-17 February 1962 that flooded large parts of the city of Hamburg, Germany. Although new water level records have been reported for parts of the German coast last winter, greatly improved and reinforced coastal protection has prevented the North Sea countries from similar disasters. In the course of anthropogenic climate change statistics of storm surges may change as a result of changes in the atmospheric forcing, rising sea level or changing bathymetry. Here we describe an ensemble of climate change storm surge projections that has been derived from a storm surge model driven by atmospheric boundary conditions from a high-resolution regional atmosphere model driven by different global climate models under different emission scenarios. It is found that although there remain considerable uncertainties regarding the details of the expected changes in the wind climate, there is a consistent signal in all storm surge projections that points towards an increase in frequency and height of the most severe storm surges along the German coast line. When compared to the variability observed over the past decades of years this signal appears to be outside the range of natural variability.