

Press release, 30. October 2005

The Calm before the Storm

Storm surges in the North Sea could become more dangerous from the middle of the century.

Scientists from the *Institute for Coastal Research of the GKSS Research Centre Geesthacht* in Germany have analysed the past history of storms and storm floods in the North Sea region, and used models to investigate future changes. Their result: human-induced climate changes will lead to higher storm surges along the German, Dutch and Danish North Sea coasts but current storm surges are not influenced by human-induced climate change.

Greenhouse gases such as carbon dioxide or methane exert an influence on the global weather and thus also on the development of storms. Particularly on the coast, storms can have catastrophic effects, as they bring with them destructive storm surges, or floods.

Therefore, the GKSS coastal researchers have used mathematical models to investigate the effect that the continuously increasing concentrations of greenhouse gases in the atmosphere could have on storm surges on the North Sea coast. They determined that between 2070 and 2100 an increase of the maximum storm surges in the range of 20 to 40 centimetres along the entire German North Sea coast is likely. In addition to the rise in water level caused by storms, the global temperature increase will presumably lead to an increase of the mean sea level of 30 to 40 centimetres, because of the thermal expansion of the ocean water and the possible melting of the Greenland and Antarctic Ice Sheets. "For Hamburg we calculated an increase in the storm surges for 2030 of approximately 20 centimetres, and for the year 2085 of up to 70 centimetres", explained geographer Katja Woth.

Current autumn storms are however not attributable to climate change. Analysis of the historical North Sea storm climate by GKSS researchers shows that an increasing storm intensity between around 1960 and the middle of the 1990s was preceded by an intensity decrease, and that a decrease is also now evident. When storm flood heights nevertheless show significant regional changes, this is due to a number of factors such as coastal protection measures, deepening of shipping lanes, and land subsidence, that allow floods, in particular those in the inner German Bight, to rise higher. "The view into the stormy past teaches us two things: there have always been strong storms, and since the 1970s the coastal engineers have effectively protected us from the storm floods. In the more distant future at the end of this century, the influence of man on the climate will probably have a marked effect on storm surges not only in northern Germany

but also along the Dutch and Danish North Sea coasts. Until 2030 however the present and currently planned coastal protection will however be sufficient; after this time the situation must be re-assessed by the coastal engineers; in the long term the necessity for new protection strategies may arise”, summarized Professor Hans von Storch, leader of the Institute for Coastal Research of the GKSS. The recent publications of his research group are published in international scientific journals such as Journal of Climate, Geophysical Research Letters and Ocean Dynamics.

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Printable/print quality pictures on the analysis of storm floods are available from the GKSS website under:

http://www.gkss.de/pages.php?page=10_2005.html&language=d&version=g

An **animation** of storm floods **suitable for use on television** is available from:

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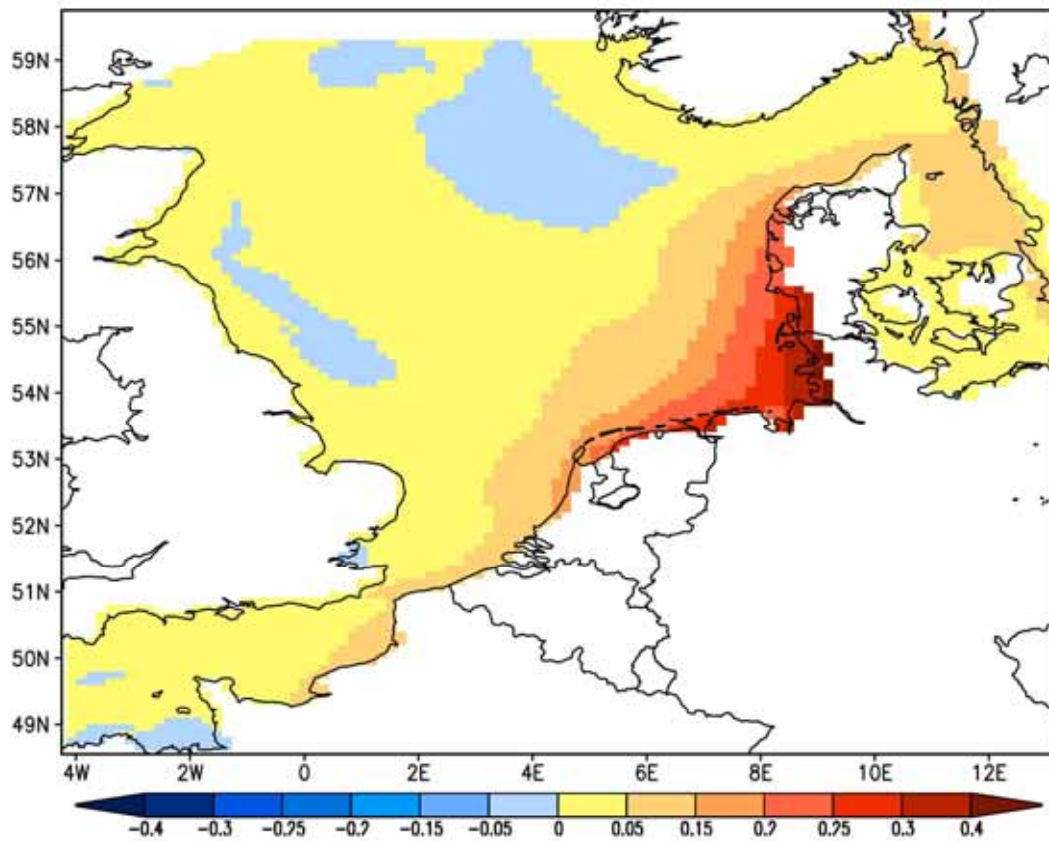
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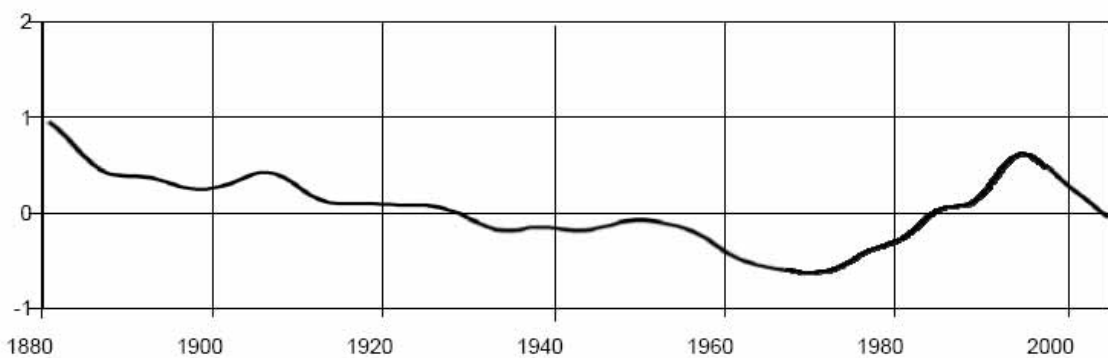
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The GKSS Research Centre Geesthacht, with centres in Schleswig-Holstein and Teltow (near Berlin) in Brandenburg is a member of the Helmholtz Society of German Research Centres. 750 employees are involved in collaboration with universities and industry in science and development in the areas of coastal research, advanced engineering materials, regenerative medicine and structural research with neutrons and photons.



Expected change in the annual maximum wind-induced water level (i.e., without the effect of mean sea level rise) between 2071 and 2100 under relatively strong increases in greenhouse gases. Unit: metres (Data from Woth 2005).
Diagram: GKSS Research Centre

NORDSEE: STURMINTENSITÄTEN



An index of storm activity in the North Sea region for 1880-2002. The time series is based on daily observations of air pressure fluctuations (Data kindly supplied by H. Alexandersson SMHI, Norrköping, Sweden)