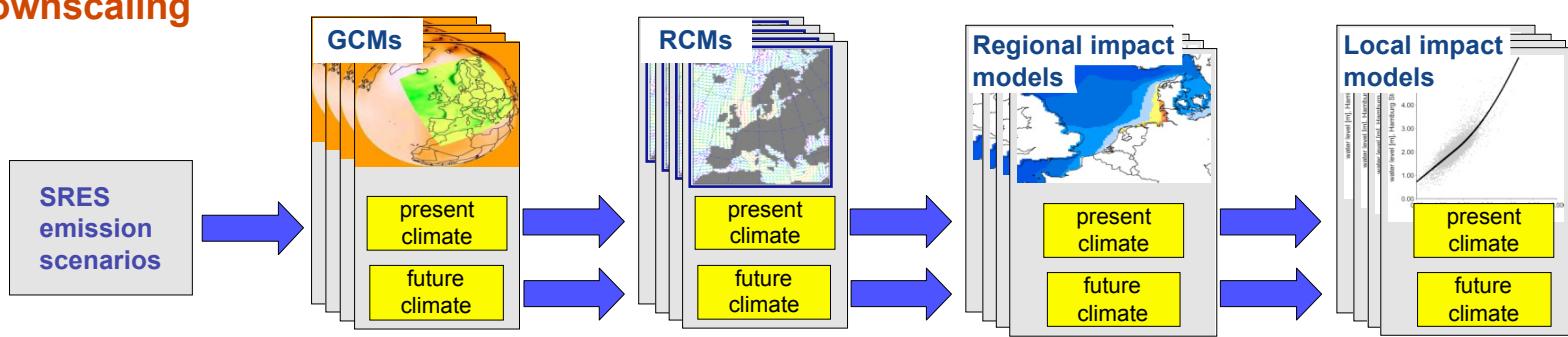


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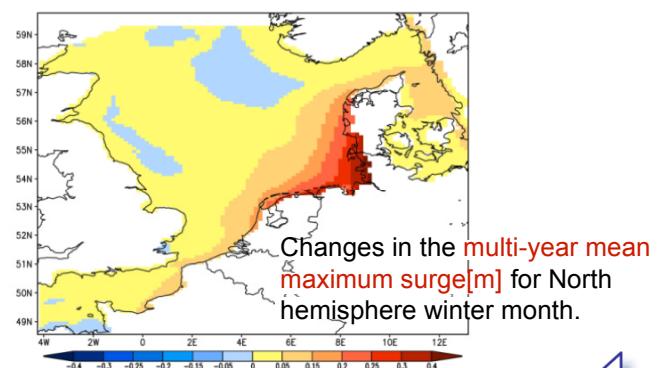
## Detailed projections of coastal climate change until 2100 in N Europe

In a concerted effort of a series of quasi-realistic models of the regional atmosphere, the hydrodynamics of the North Sea and of the wave conditions, global climate change scenarios prepared for IPCC are downscaled to a high-resolution grid presentation of storminess, water levels and wave heights in Northern Europe and particularly in the North Sea area. In this way, possible and plausible future developments are derived with an hourly time increment.

### The downscaling chain:



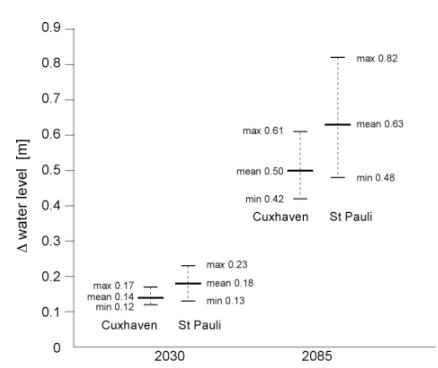
A series of downscaled atmospheric conditions (near surface winds and sea level pressure) was used to force a hydrodynamic model for the North Sea:



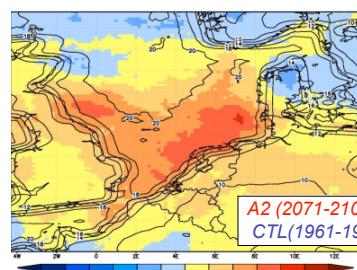
changes in local water level

Applying a statistical transfer-function upper bounds of plausible changes are provided for St Pauli:

In this case the increase in global mean sea level is considered (9 cm in 2035 for SRES A2/B2 and 29/33 cm in 2085 for A2/B2). Shown are the ranges of seven simulations.



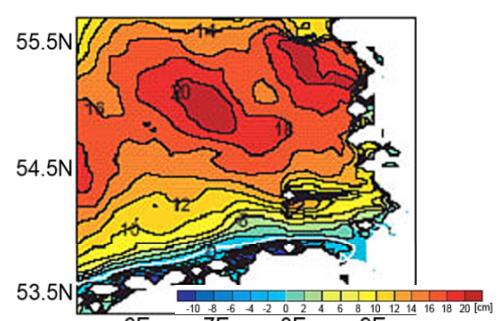
Changes in 10m wind speeds [m/s] (here i.e., 99%ile for westerly direction (CLM\_HadAM3H))



changes in significant wave height A2 (2071-2100) – CTL(1961-1990)

The wind and air pressure data were produced in the EU PRUDENCE project (Prediction of Regional scenarios and Uncertainties for Defining EuropeaN Climate change risks and Effects)

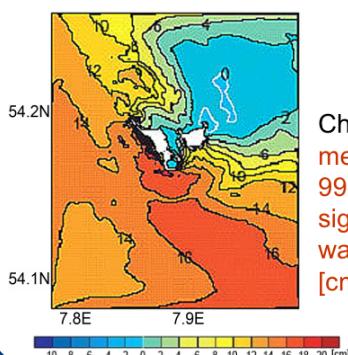
Wind conditions were used to force the wave model WAM to derive wave heights for the German Bight:



Changes in the mean annual 99 %ile of significant wave height [cm].

changes in local wave climate

An empirical transfer function was used to localize the data for the vicinity of Helgoland:



Changes in mean annual 99 %ile of significant wave height [cm].

Gaslikova,L., 2006: High-resolution wave climate analysis in the Helgoland area. PhD thesis, U Hamburg, Grossmann, I., Woth, K., and H. von Storch (2006): Localization of global climate change: Storm surge scenarios for Hamburg in 2030 and 2085. Submitted to "Die Kueste", Woth K. (2005):North Sea storm surge statistics based on projections in a warmer climate: How important are the driving GCM and the chosen emission scenario? J. Geophys. Res., vol.32, L22708, doi:10.1029/2005GL023762

Woth, K., R. Weisse and H. von Storch (2005):Climate change and North Sea storm surge extremes: An ensemble study of storm surge extremes expected in a changed climate projected by four different Regional Climate Models. Ocean Dyn., vol 56:1, p 3 - 15, DOI 10.1007/s10236-005-0024-3

The resulting hourly, high-resolution data set forms one of two major components of the data set **coastDat** which is provided by the Institute for Coastal Research at GKSS to a variety of clients dealing with changing ecological conditions, coastal defense and offshore activity in the North Sea.