Proudman Oceanographic Laboratory
NATURAL ENVIRONMENT RESEARCH COUNCIL

Project **STOWASUS-2100 – Regional Storm, Wave and Surge Scenarios for the 2100 Century**

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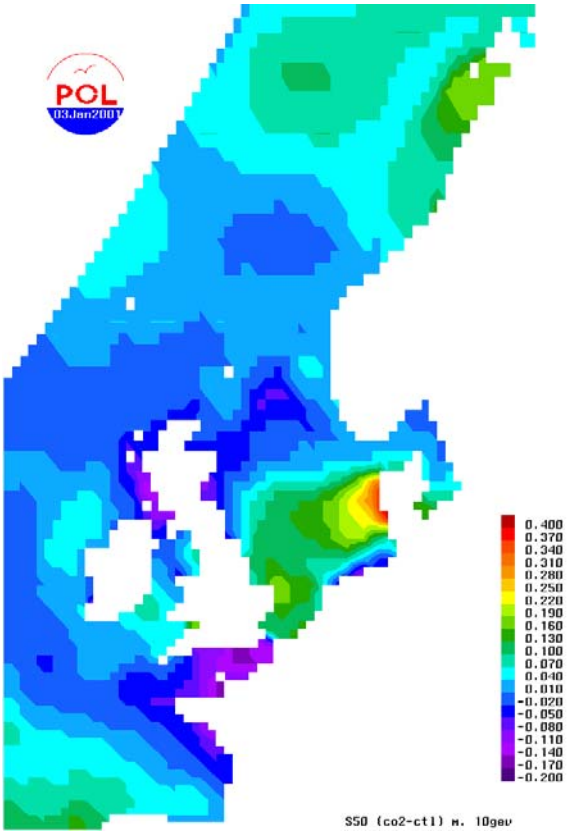
Partners Danish Meteorological Institute DMI (co-ordinator);
Det Norske Metorolgisk Institutt DNMI;
Rijkswaterstaat RIKZ; ISAO-CNR Bologna;
University of Padua; GKSS, Geesthacht, Germany

Summary

The project was a joint atmospheric/oceanographic numerical modelling effort aiming to construct and analyse storm, wave and surge climatologies for the North Atlantic/European region in a climate forced by increasing amounts of greenhouse gases and to compare these with present day conditions.



Difference (m), defined as ("2×CO_2" – "control"), in the 50-year return period surge elevation computed using the POL NE Atlantic surge model. Larger surge extremes are predicted in the North Sea and in northern Norway

POL's role was to generate climatologies of storm surges with the present climate and in a scenario with increased CO_2 and to attempt to understand and quantify changes. Wind and surface atmospheric pressure fields from the ECHAM4 climate model, run with present day and enhanced levels of CO_2, were used to force two 30-year surge model simulations. Hourly model fields were stored and analysed to derive storm surge statistics, in particular extreme values as used by coastal engineers for the design of coastal defences and for assessing changes in coastal flood risk.

Changes in surge statistics could be due to changes in "storminess"; i.e. shifted storm tracks or changes in the frequency of occurrence or intensity of storms, resulting from increased levels of atmospheric CO_2. These effects had to be distinguished from changes due to errors in extreme value analysis and from natural variability of the estimates.

POL also contributed to studies to assess the influence of model resolution on surges and surge statistics. These included investigations using fine-grid local tide-surge models and forcing from a regional climate model, HIRHAM, for selected storm events at high resolution in space and time.

The work extended similar analyses carried out in WASA (EV5V-CT94-0506) primarily by using longer climate model data sets with improved resolution, and hence producing more reliable results.