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The CoastDat project at GKSS – assessing ongoing change and projecting possible future changes in marine weather – winds, surges, waves and currents.

At the Institute for Coastal Research of the GKSS Research Center, a cascade of downscaling methods are implemented to construct recent and possible future developments of regional and local marine weather in NW Europe. The various spatially and temporally detailed data sets constructed in this way are assembled in the newly established “CoastDat” data bank. Three steps are taken

1. With a state-of-the-art regional atmospheric model the coarse-grid climate as given by decade-long global re-analyses or scenarios constructed by global climate models is transformed into a high-resolution (50 or 20 km grid) representation of marine weather (wind and air pressure); the resulting features are similar to the global re-analyses or scenarios on large scales, and an added value is obtained for smaller scales. These regional analyses of marine weather extend over more than 50 years.
2. Hydrodynamic models of the marginal North Sea and semi-enclosed Baltic Sea are simulated using the hourly data of wind and air pressure to simulate the details of (vertically averaged) currents and water levels (down to 100 m grid lengths near coasts). Similarly, ocean wave models are run to derive 2-d wave spectra and derived variables, in particular significant wave height and mean period, on a 5 km grid.
3. Even higher descriptions are obtained by using empirical models, which relate variables derived in step 2 to limited fine-grid simulations or derived from local observations.

The “CoastDat” cascade, consisting of steps 1-3, has been implemented for both NCEP re-analyses 1948-2005 and for a series of PRUDENCE scenarios (the successful EU project, which has constructed a variety of regional climate scenarios) representative for 2070-2100. The results have been used for a variety of purposes, ranging from assessing ongoing change, including first efforts of detection of anthropogenic climate change and attribution most plausible causes, ecological cause-and-effect studies, assessments of coastal hazards and implied construction requirements and to perspectives for changing risk. The data have also been used in analysis of changing regional transport and deposition of pollutants.

CoastDat is based on a series of significant scholarly papers published in peer-reviewed journals by a variety of authors, in particular Ralf Weisse, Frauke Feser, Heinz Günther, Katja Woth, Iris Grabemann, Andreas Plüß, Lidia Gaslikova, Iris Grossmann and Ulrich Callies, most of who are affiliated with the Institute for Coastal Research of the GKSS Research Center.

Presently, efforts are underway to examine the potential of implementing a similar approach for SE Asia. Dr. Feser will report first results of these efforts.