Marine data and its potential for coastal and offshore applications

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The coastDat data set is a compilation of coastal analyses and scenarios for the future from various sources. It contains no direct measurements but results from numerical models that have been driven either by observed data in order to achieve the best possible representation of observed past conditions or by climate change scenarios for the near future. One of the key objectives for developing coastDat was to derive a consistent and mostly homogeneous database for assessing marine weather statistics and long-term changes. Here, homogeneity refers to a data set which is free from effects caused by changes in instrumentation or measurement techniques. Contrary to direct measurements which are often rare and incomplete, coastDat offers a unique combination of consistent atmospheric, oceanic, sea state and other parameters at high spatial and temporal detail, even for places and variables for which no measurements have been made. The backbones of coastDat are regional wind, wave and storm surge hindcast and scenarios mainly for the North Sea and the Baltic Sea. Furthermore hindcast simulations are available for temperature, salinity, water level, u- and v-components for the North Sea for last 60 years. We will discuss the methodology to derive these data, their quality and limitations in comparison with observations. Long-term changes in the temperature, wind, wave and storm surge climate will be discussed and potential future changes will be assessed. We will conclude with a number of coastal and offshore applications (e.g. ship design, coastal protection, oil risk modelling and marine energy use) of coastDat demonstrating some of the potentials of the data set in hazard assessment. For example data from coastDat have been used extensively for designing, planning and installation of offshore wind farms. Return periods of extreme wind speed, surge and wave heights are used by a variety of users involved in the design and construction of offshore wind parks. Moreover, planning of installation and maintenance requires the estimation of probabilities of weather windows; that is, for example the probability of an extended period with wave heights below a given threshold to enable installation and/or maintenance. Data from coastDat were frequently used in such cases as observational data are too often too short to derive reliable statistics.
www.coastdat.de