



EFFECTS OF CLIMATE CHANGE ON WAVE HEIGHT AT THE COAST

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To make progress towards the ultimate objective of predicting coastal vulnerability to climate change, we need to predict the probability of extreme values of sea level and wave height, and their likely variation with changing climate. There is evidence of changes in sea level and wave height on various time-scales. For example, the North Atlantic Oscillation appears to be responsible for increasing wave height in the North Atlantic over recent decades. The impact of changes in wave height in the North Atlantic at the coastline in the North Sea, the Hebrides/Malin Shelf and the English Channel will be quite different. Three different, and contrasting areas are examined. The effect of changing sea levels, due to global warming and changes in tides and surge height and frequency, is combined with increases in offshore wave height. Coastal wave modelling, using the WAM and SWAN wave models, provides a useful tool for examining the possible impacts of climate change at the coast. This study is part of a Tyndall Centre project which is examining the vulnerability of the UK coast to changing wave climate and sea level.

These changes are likely to be especially important in low-lying areas with coastal wetlands such as the north Norfolk coast, which has been selected as a detailed case study area. In this area there are offshore shallow banks and extensive inter-tidal areas. There are transitions from upper marsh to freshwater grazing marshes, sand dunes, shingle beaches, mudflats and sandflats. Many internationally important and varied habitats are threatened by rising sea levels and changes in storminess due to potential climate change effects. Likely changes in overtopping of coastal embankments, inundation of intertidal areas, sediment transport and coastal erosion are examined. Changes in low water level may be important as well as high water.

The second area of study is Christchurch Bay in the English Channel. The English Channel is exposed to swell from the North Atlantic and a moderate tidal range. The coastline is quite developed with popular beaches. There are defended and undefended stretches of coastline. The waves reaching the coastline are modulated by the strong tidal streams in the Solent and shoal areas like Shingles Bank.

The Sea of the Hebrides is an area important for fishing and tourism, but is the part of the UK exposed to the most severe waves, being most directly connected with the North Atlantic. The UK's first wave power plant is in operation on Islay. Sea level changes are likely to be relatively unimportant but changes in wave climate could have a direct impact on local economic activity.