

## **Identify the past, present and future wave climate for the North Atlantic**

This research aims at understanding the likely changes in wave climate conditions for the North Atlantic for the forthcoming century. This will involve linking past, present and future climate contributions and assessing trends such as changes in wave height, wave direction and wave period in this context. This includes measuring present day seasonal and inter-annual variation and comparing these with predicted future wave climates. Furthermore to deal with the inherent bias of climate change predictions, methods of bias corrections will be tested and applied. From this data measures such as the North Atlantic Oscillation Index will be assessed to identify if these can be used to quantify the correlation and changes in wave climate condition and the associated interannual variability. The data sets produced will ultimately help to assess the increased risk to coastal structures and coastlines, and has application in areas such as offshore marine renewable energy, the oil and gas sector as well as servicing of ports, islands and trade routes.

To quantify these changes, a spectral wind-wave model has been designed using MIKE 21 SW to identify the past, present and future wave climate for the North Atlantic. The model has been calibrated and validated using hindcasted and observed wave climate data. ERA-Interim Reanalyses data, available from 1979 to present from the European Centre for Medium Range Weather Forecasting (ECMWF) has been used to calibrate the spectral wind-wave model of the North Atlantic (NAWM). Wave data from offshore wave buoys are used to validate the NAWM's results. Following model validation the model will be used to determine the future wave climate conditions based on meteorological forcing obtained from the most recent GCM simulations using the EC-Earth modelling framework. The future wave climate for the epochs of 2016-2045, 2046-2075 and 2076-2105 will be simulated using the wind data that is available from EC-Earth. This research will expand our knowledge in terms of identifying future vulnerable coastal areas and in determining the survivability of offshore and near shore coastal structures.