# Wales
Data Nation
Accelerator

X-band radar: A novel way to measure complex waves and currents around the Welsh coastline

Summary

Challenge

Wales has world-class tidal and wave energy resources and is a global leader in sustainable marine energy generation. However, the interplay between waves and tidal currents in Welsh waters complicates deployment planning.
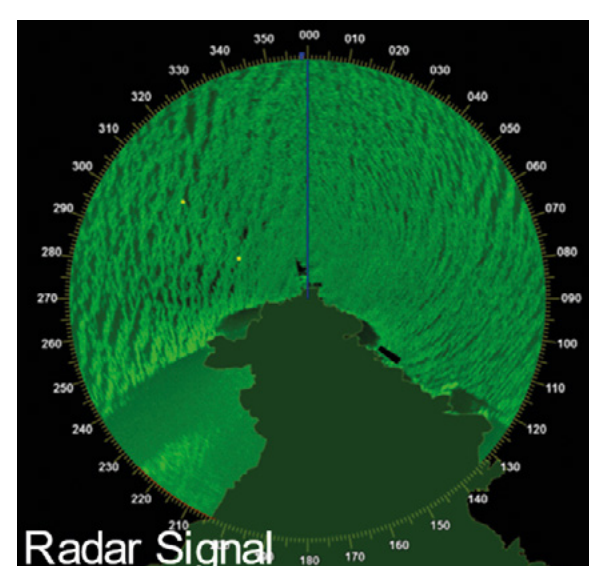

Conditions can vary significantly in a small region, but existing wave buoys and current sensors can only measure one point in the ocean. By contrast, **marine X-band radars** can, in principle, provide detailed waves and current data over a 3km area of sea. **We are pioneering this technology here in Wales**, and Bangor has invested in radar equipment, and computer facilities. However, radars generate huge quantities of raw backscatter data and turning this into useful information is a major challenge.

Radar Location
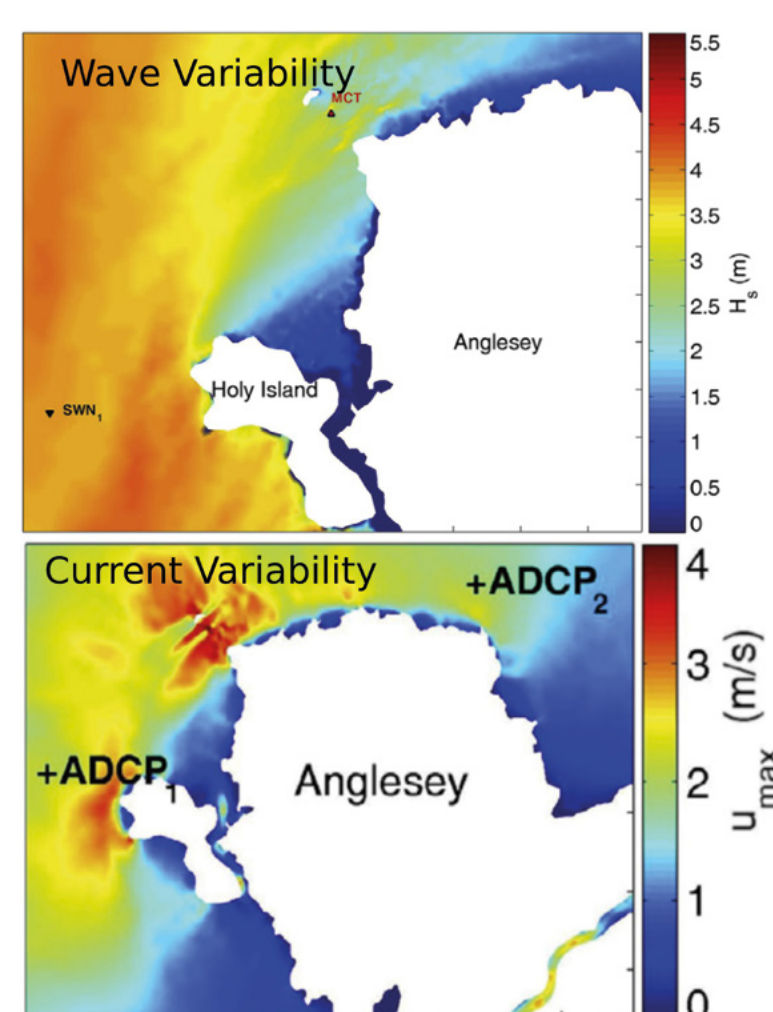
Intervention

This WDNA project has allowed us to recruit a computing specialist to work on a set of specimen radar data supplied by the Offshore Renewable Catapult.

Radar Signal

We have developed software tools, methods and workflows based on this data, testing new methods of analysis against real sensor data.

Authors:

David Christie, Bangor University d.christie@bangor.ac.uk
Simon Neill, Bangor University s.p.neill@bangor.ac.uk
Michael Ridgill, Bangor University mcr18crl@bangor.ac.uk

Benefits

The insights gained from the WDNA project have helped us plan a demonstration deployment of the radar at Amlwch Harbour, Anglesey. The software groundwork equips us to start making sense of the gigabytes streaming in from the sea, from the first day of deployment. The dataset will also improve modelling to better represent real conditions around the Welsh coastline.

The marine renewable industry, and anyone who uses coastal waters, need a detailed understanding of waves and currents. X-band radar can transform our capability for measuring these, broadening our view from a single point to a whole section of sea. The WDNA has accelerated our efforts to develop this exciting new technology here in Wales.

Further exploitation/next steps

Our Anglesey site aims to be one of the first globally to use X-band for combined individual wave and current measurements over a wide area, and the first location where a comprehensive set of large-area wave and current radar data will be freely available to scientists and stakeholders.

This test-bed site will place Wales at the forefront of efforts to develop and demonstrate innovative methods for estimating waveheights and currents using radar - especially Artificial Intelligence and machine learning.

Project group

Bangor University, Smart Efficient Energy Centre and Amlwch Harbour