An Operational Wave Model for the South West Approaches

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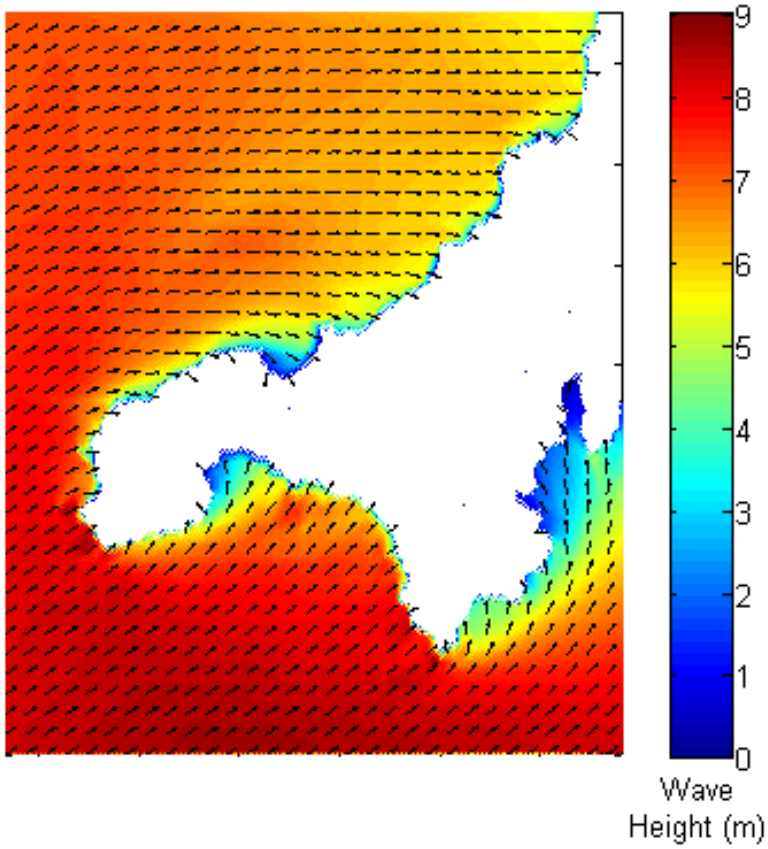
Overview

- Background
- Regional model
- Local model
- Sensitivity study
- Further development and research

Background: why is it needed?

- To gain a detailed understanding of the regional and local wave climate



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- To gain a detailed understanding of the regional and local wave climate
- To provide accurate data for devices deployed at the Wave Hub site
- To provide real-time data to support marine operations from Hayle and other locations

Background: why is it needed?

Example: Hayle Harbour

Access strongly dependent on:

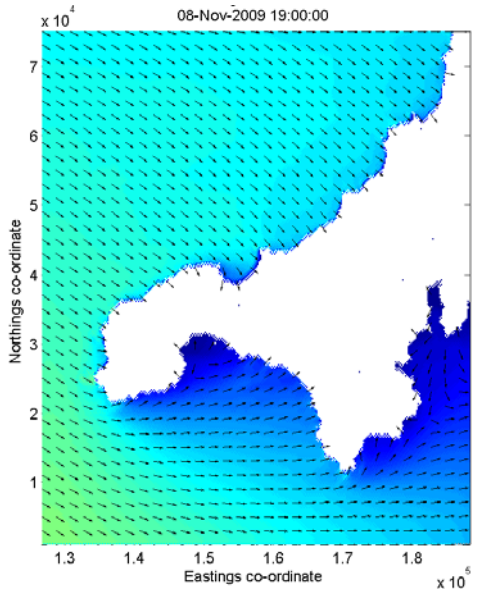
- State of tide
- Size of waves
- Wind
- Currents

Conventional forecasting tools can’t predict conditions at the river mouth with sufficient accuracy

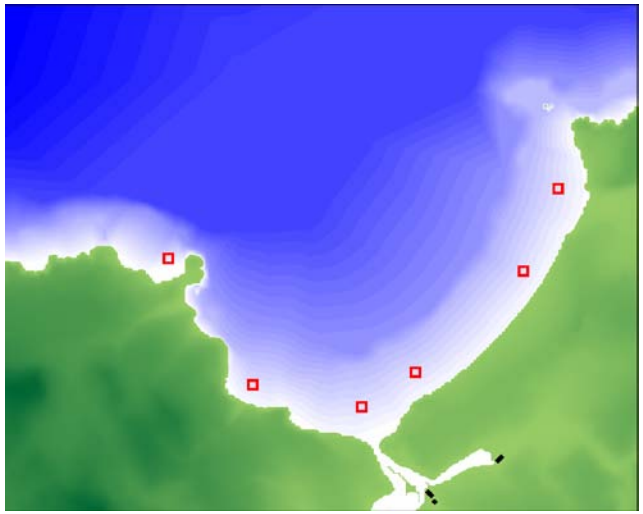
Specific aim

To use the SWAN nearshore model to propagate wave data from offshore locations to provide highly accurate predictions 1) on a regional level and 2) at specific localised sites.

Regional model



Local model



Regional model

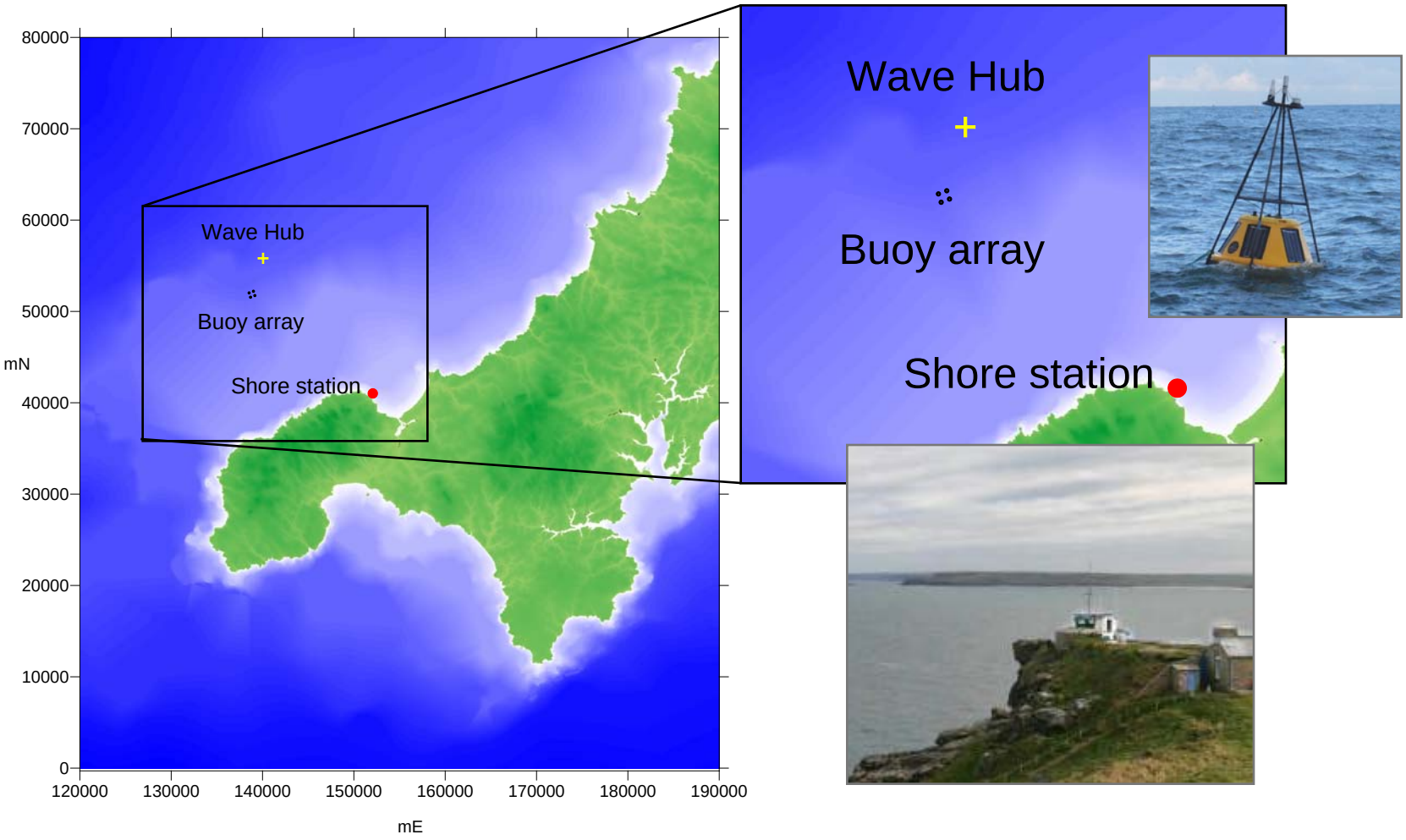
- Input data: Wave and wind fields supplied on a 24-hr basis by the Met Office.
- Used to predict wave heights and periods over the region at hourly intervals
- Allows the effect of particular weather systems to be monitored
- Illustrates variations in sea states across the region

Regional model link

Local model

- Input data from the PRIMaRE wave buoy array
- Transmitted half-hourly via shore station at St Ives, and input into nested model to produce output data at range of locations.
- Tidal data from TotalTide prediction software – deepwater and nearshore ADCPs will provide more accurate information on currents
- At present no source of real-time wind and current data
- Will eventually be available in ‘real-time’ via website
- Potentially valuable to users outside PRIMaRE and Wave Hub e.g. surfers

Local model


80000
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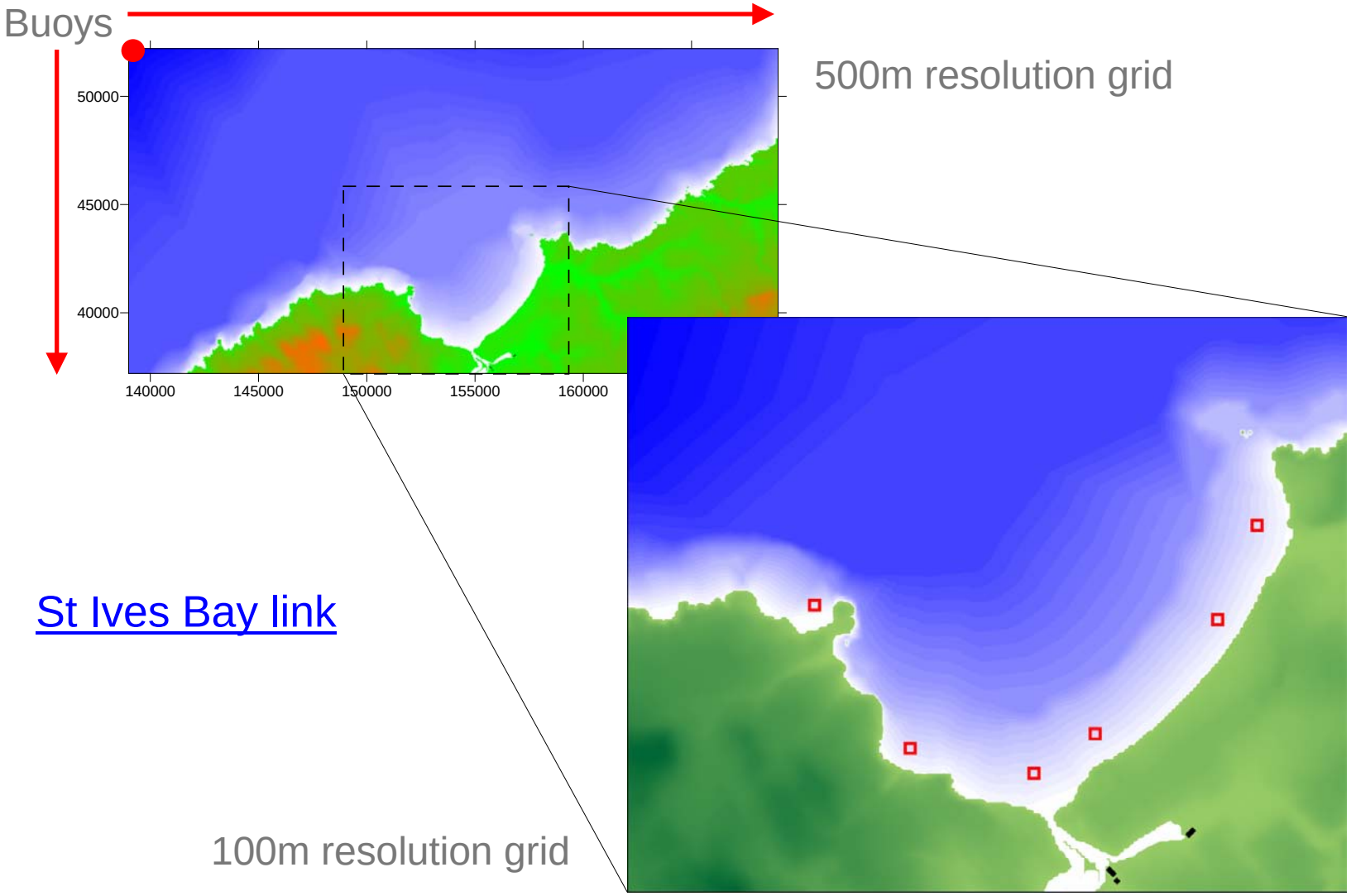
Wave Hub
Buoy array
Shore station
Wave Hub
Buoy array
Shore station

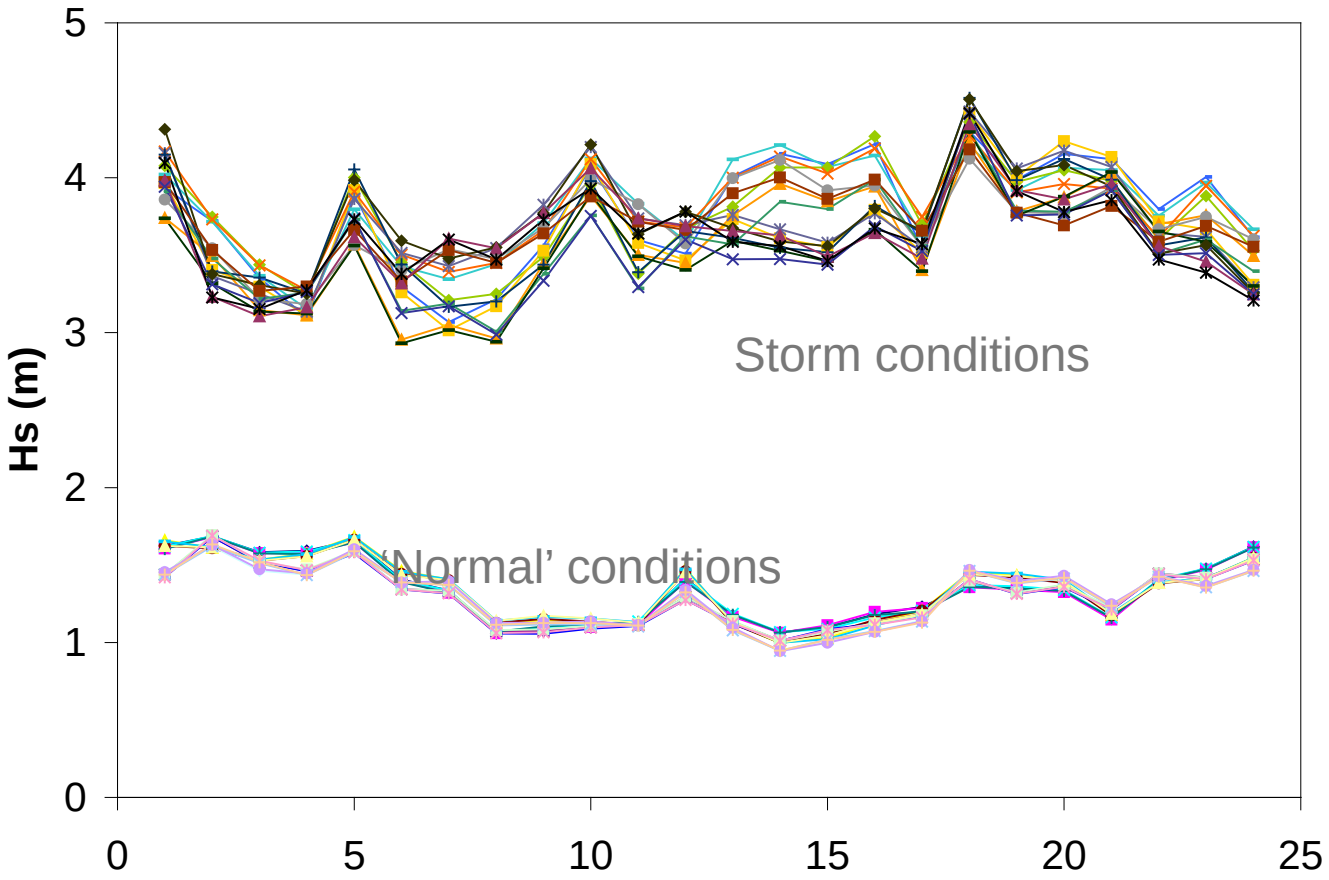
Local model


Buoys
50000
45000
40000
140000
145000
150000
155000
160000
500m resolution grid
St Ives Bay link
100m resolution grid

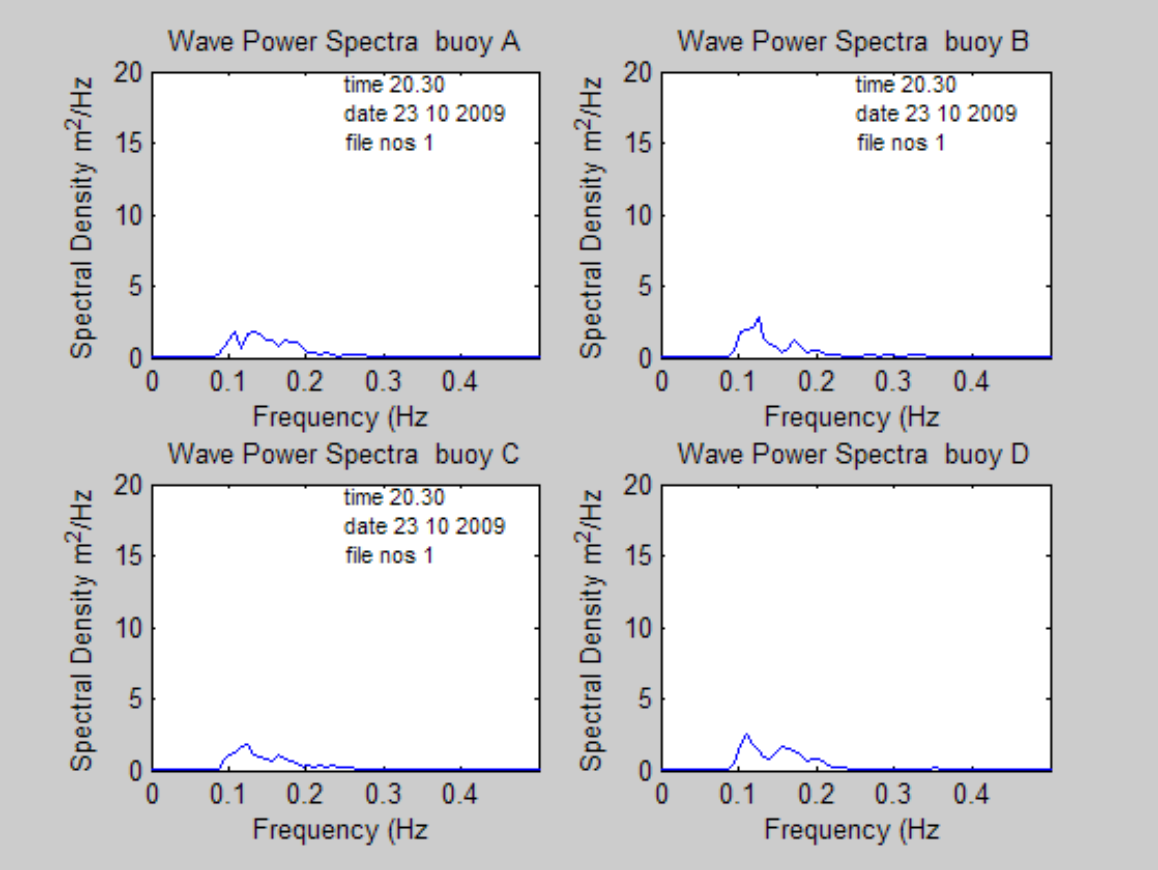
Sensitivity study

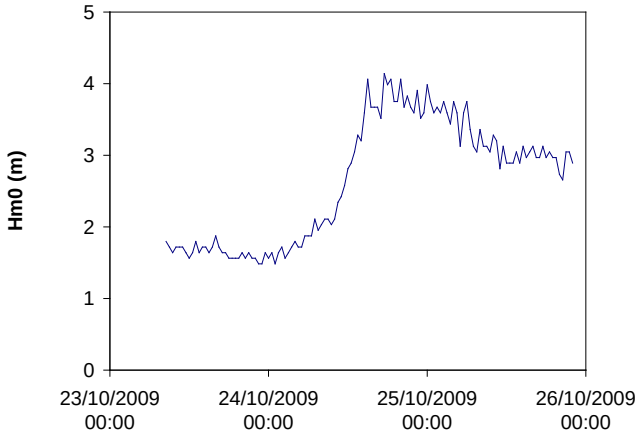
Model output can only be as good as the input data:

- Wind
- Currents
- Water level
- Type of wave input (spectral or parameters)



Spectral variation





Further development

- Impact of high resolution bathymetry
- Comparison of SWAN output with MIKE 21 model
- Use of deepwater and nearshore ADCPs for model calibration and validation
- Spectral input for regional model

Thank you

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