JERICHO TECHNICAL REPORT 17

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Modelling at Holderness

Run SWAN hourly, 1 Jan – 3 Jan 1996
The new site 'N11' with depth=12.7m
was included.

1. With Madsen bottom friction, triads off, uniform wind.

2. With changing water depths, uniform over grid taken at N1 from POL 2.4km hydrodynamic model

3. With changing currents and water depths

Comparison of the three runs

1. Run set takes about 10 hours on middle aged unix workstation, but 30 hours with currents included!

2. Comparison of significant wave heights.

3. Comparison of spectra.

4. Differences in mean direction and peak period are negligible.

Depth and current variation

1. Depth variation clearly seen in buoy and model results

2. Currents are alongshore, waves onshore

3. Currents at N2 and N3 are bigger than at N1.
   Run model with N2 currents?

A maximum currents example at Holderness.

- Flow and ebb currents 0.8 ms^{-1} alongshore.
- Waves at 45^{o} to the coast.
- Effect of currents larger at N2 than N1.

Conclusions

- The difference in model results between N11 and N1 is not negligible!

- The changing water depths due to the tide are important at Holderness

- The effect of N1 currents is not noticed by SWAN at Holderness.
  - The currents at Holderness are alongshore, while the waves are onshore.
  - The currents at N2 are bigger than the currents at N1.
  - SWAN does not include bottom friction due to currents.

'Methodology for inputting satellite data into Models'

- Got significant wave height (HS)! DCarter showed TOPEX = N3 for onshore waves. All maximum events will be onshore

- We need frequency/direction spectra for SWAN.
  Can be derived from Hs, Peak period and mean direction assuming maximum events are fully developed.

Possible options

- Satellite can provide period and direction ?!

- Cheat: Measure wind or wave direction or use an operational model.

- Use a known big storm and just bump up the energy

- Typical direction/fetch for maximum events for each site?
  Eg. 2 Jan 1995 vs. 19 Feb 1996

'Wave Climate Variability'

- WASA integrated parameters:
  "This consists of 21 integrated wave parameters + wind speed and direction from the WAM spectral wave model forced by DNMI met. data. The data are on a fairly coarse grid (0.5 * 0.75 degrees), 3-hourly, and cover the NW European Shelf (47 - 63 N, 15W - 13.5E) from 1955 to 1994 inclusive. "

'Predictions of Future Wave Climate Variability'

- Propagation confidence?
  - Comparison of model and buoy at Holderness can be completed
  - Effects of inaccuracies in bathymetry clearly demonstrated
  - Extra errors incurred by using satellite data and derived spectra?
  - Future unknown changes in bathymetry will effect waves, and, of course, waves change the bathymetry!
  - Investigation of possible significance of bathymetric change required?
    Eg. SWAN plus historic bathymetric surveys.

'Local Environmental Factors'

- Comparison of Holderness, Carmarthen Bay and Lyme Bay. Exposure of site, sensitivity to tidal currents/ water depth changes.