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The effect of high resolution winds on modelling surface waves

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The Irish Sea is a semi-enclosed basin and as such, waves in Liverpool Bay are mainly generated locally within the eastern Irish Sea so that long period swell is absent and the significant wave height is relatively low, and short in period. These short-period locally generated 'choppy' waves are as such heavily dependent on local meteorology. In order to model this kind of sea state accurately, high resolution meteorological models are needed.

To test the importance of local meteorology in this region we apply a the Weather Research and Forecasting model (WRF), coupled to a second generation spectral wave model (WAM). A nine day case study, covering a storm period (December 2006) is used to examine the impact of meteorological model resolution when used as a forcing to a wave model. The effect of ocean model resolution, and coupling to a hydrodynamic model (POLCOMS) will also be discussed. The coupling acts to increase both the surge elevation and significant wave heights at the peak of the storm event.

An improved wave direction is seen in both higher resolution ocean and atmosphere models, giving better agreement with near-shore buoys. Overall the models give too Northerly wave direction, but with better wind forcing, and higher resolution wave models these biases are significantly reduced.