

UCD School of Mathematical Sciences is tracking record extreme waves off the west coast of Ireland

The winter 2013/2014 will be remembered for its powerful waves in Europe and particularly in Ireland. On the 26th of January 2014, a wave with a crest-to-trough height of 23.44 m has been measured by the M4 buoy located off the west Irish coast, in Donegal Bay (9.992154°W, 54.9982°N). Roxana Tiron and Sarah Gallagher together with the PI Frédéric Dias provide further details on this monster wave thanks to data provided by Met Éireann ...



Extreme wave in Mullaghmore, Co Sligo, 06 January 2014

The buoy relays wave statistics hourly, the record wave being reported at 15:00 UTC. The significant wave height measured by the buoy in the same time window (Figure 1) was of 14.65 m (1.6 times smaller than the maximum individual wave height) while the mean wave period was of 13.24 seconds (Figure 2).

As it can be inferred from Figure 1, model data from the European Center for Medium-Range Weather Forecasts (ECMWF) slightly over-predict the maximum individual wave heights (although for the record wave the prediction is remarkably close).

In Figures 3 and 4 the significant wave height (four times the standard deviation of the surface elevation) and the maximum individual wave height from the ECMWF, Operational Archive, European Shelf model are displayed for 26th January 2014, at 12:00 UTC and 18:00 UTC, before and after the 23.44 m wave was recorded. (ECMWF archives model outputs at the standard 4 daily synoptic times, thus missing the time interval of interest.)

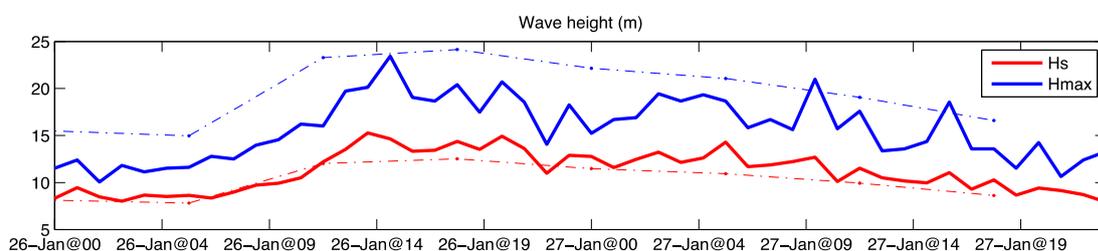


Figure 1: Red: Significant wave height (m) and blue: maximum individual wave height (m) at the M4 buoy (9.992154°W, 54.9982°N) during the 26-27 January 2014 storm. Continuous line: measured values (courtesy of C. Creamer and E. Murphy, Met Éireann), dashed line: European Centre for Medium Range Weather Forecasts, Operational Archive, European Shelf wave model.

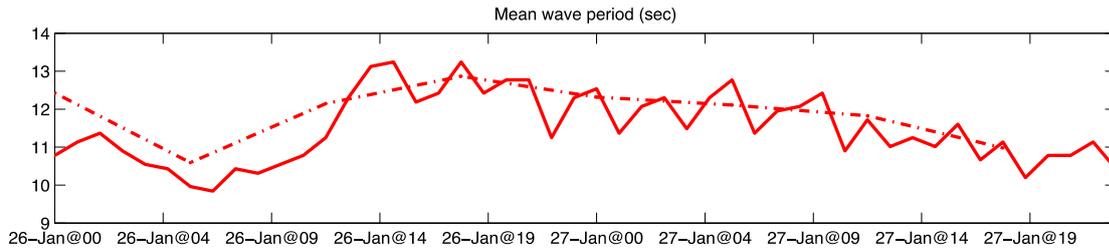


Figure 2: Mean wave period (sec) at the M4 buoy during the 26-27 January 2014 storm. Continuous line: measured values (courtesy Met Éireann), dashed line: ECMWF Operational Archive, European Shelf wave model.

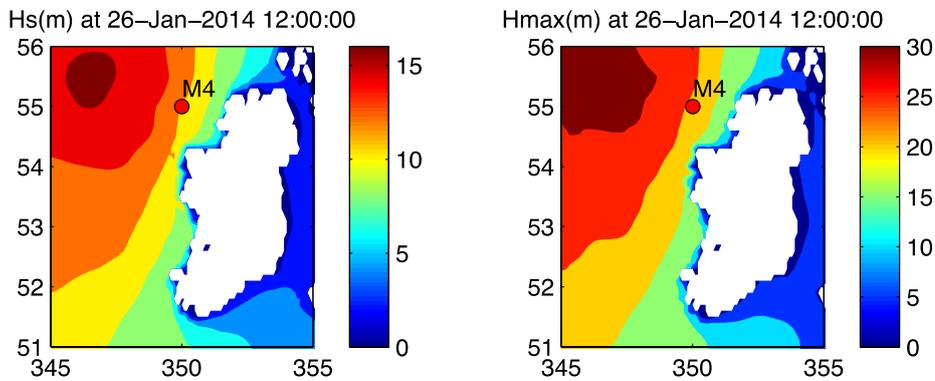


Figure 3: Left panel: significant wave height (m) and right panel: maximum individual wave height (m) from the ECMWF, Operational Archive, European Shelf wave model. Model outputs for 26 January 2014, 12:00 UTC (approximately 3 hours before the 23m wave was registered at M4).

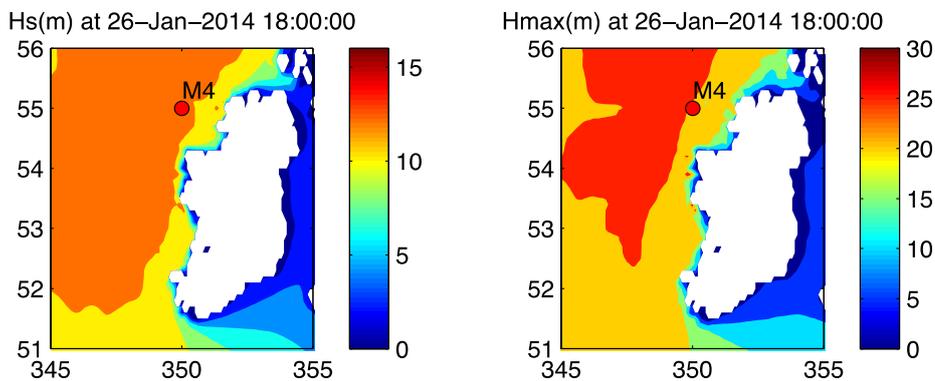


Figure 4: Left panel: significant wave height (m) and right panel: maximum individual wave height (m) from the European Centre for Medium Range Weather Forecasts, Operational Archive, European Shelf wave model. Model outputs for 26 January 2014, 18:00 UTC (approximately 3 hours after the 23m wave was registered at M4).

Professor Frederic Dias is a Senior Professor at UCD School of Mathematical Sciences on leave from ENS Cachan (France). Dr Roxana Tiron, postdoctoral fellow, and Ms Sarah Gallagher, PhD student, are both funded by SFI under the project "High-end computational modelling for wave energy systems". F. Dias is also funded by the ERC (Advanced Grant) under the MULTIWAVE project.

*Read also the weather news article on the Met Eireann website
<http://www.met.ie/news/display.asp?ID=237>*