

Story Board 3: Riding the Storm in the North Atlantic

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Figure SB3.1. Location of ship during storm.

Surprisingly large wave heights were recorded in the northern Rockall Trough during a UK research cruise in February 2000. Individual wave heights of up to 29.01 m and significant wave heights (SWH)¹⁶ of 18.5 m were observed by a ship-borne wave recorder on *RRS Discovery*. The measured SWH exceeds any previously recorded values, including those observed under hurricanes in the tropical North Atlantic. During a 12-hour period on 8–9 February, a total of 23 waves exceeded 20 m (peak-to-trough height), despite only severe storm force winds with speeds averaging 21 m/s. The extreme waves were generated by a long fetch and resonant conditions, during which the wave group travelled at the same speed as the storm itself across the North Atlantic.

SB3

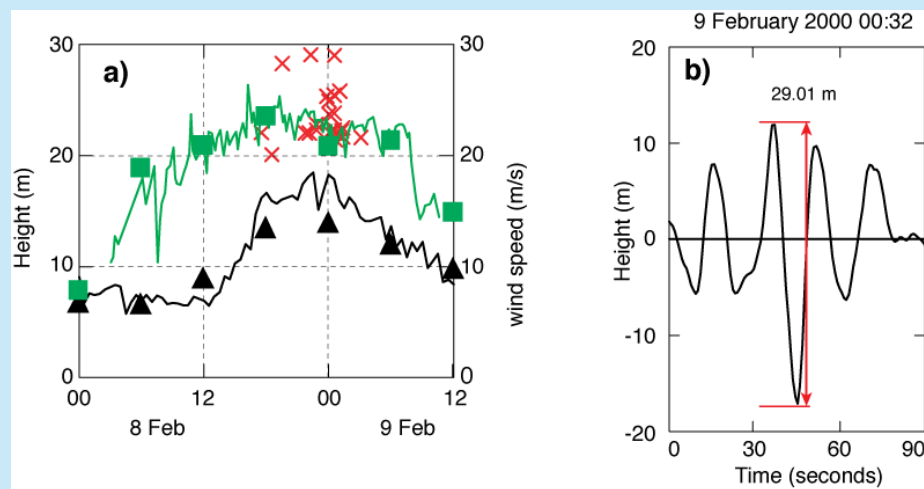


Figure SB3.2. Winds and extreme waves measured by *RRS Discovery* on 8–9 February 2000 at 57.5°N, 12.17°W (a). Black line is significant wave height, green line is wind speed (at 10 m above sea level), red crosses are individual wave heights that exceed 20 m. Wave hindcast model data shown as black triangles (significant wave height) and green squares (wind speed at 10m above sea level). The wave record showing the largest individual wave (b).

¹⁶ This is the average of the highest one-third of waves in a given period.

Wave-height climatologies developed largely from satellite data show that the sub-polar North Atlantic regularly experiences large wave heights. Particularly high waves develop under the storm track where winds are strong and the fetches can be very long. Yet the February 2000 measurements exceeded those expected according to the usual sources of wave-height information. Those subsequently predicted by a state-of-the-art wave hindcast model were lower because the resonating conditions were not replicated accurately ([Fig. SB3.2](#)). Simultaneous satellite records show only absent data at the time of the highest waves because data collected failed quality control limits during processing. The implication is that we would be unaware of the size of these waves if the ship had not been in this location at that time. This reinforces the need for *in situ* observations (on buoys and ships) to test wave models and improve climatologies.

Further Information

Holliday, N.P., Yelland, M.J., Pascal, R., Swail, V.R., Taylor, P.K., Griffiths, C.R., and Kent, E. (2006) Were extreme waves in the Rockall Trough the largest ever recorded? *Geophysical Research Letters*, Vol. 33, L05613, doi:10.1029/2005GL025238