

# 'Freak' ocean waves hit without warning, new research shows

December 15 2015

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Credit: Tiago Fioreze / Wikipedia

Mariners have long spoken of 'walls of water' appearing from nowhere in the open seas. But oceanographers have generally disregarded such stories and suggested that rogue waves - enormous surface waves that have attained a near-mythical status over the centuries - build up gradually and have relatively narrow crests.

New research from the University of Oxford in collaboration with the University of Western Australia, however, shows that the anecdotal evidence may not be so far from the truth. Rather than coming at the end of a series of increasingly large [waves](#), rogue (or freak) waves emerge suddenly, being preceded by much smaller waves.

The [mathematical modelling](#) also demonstrates that the crests of these rogue waves are longer than the smaller waves that surround them.

The research is published in the journal *Proceedings of the Royal Society A*.

Professor Thomas Adcock, of Oxford's Department of Engineering Science, said: "The waves we're dealing with here occur in [deep water](#) in the open ocean - very different from the waves you'll see if you go to the beach, which is what most people are familiar with.

"In deep water, where waves are much less regular, you expect a larger wave from time to time. Our paper shows that, in contrast to what was previously thought, if you're the observer on a ship, rather than seeing a gradual build-up of waves, the rogue wave will come seemingly out of nowhere.

"This happens because large waves tend to move to the front of the wave group."

The research made use of mathematical modelling based on non-linear physics. The investigators used hundreds of simulations of random waves to analyse the differences between linear and non-linear wave dynamics.

Professor Adcock said: "These findings fit the anecdotal evidence you hear from mariners. They often describe "walls of water" coming at

them in the [open ocean](#) that are impossible to steer around - an observation supported by our modelling, which shows that [rogue waves](#) tend to have a much broader crest than traditionally predicted by linear theory.

"All of this means that in a very rough storm, you can't simply assume you'll get a warning before a freak wave hits. Seafarers need to be aware that a large wave may appear out of nowhere."

**More information:** Non-linear dynamics of wave-groups in random seas: Unexpected walls of water in the open ocean, *Proceedings of the Royal Society A: Mathematical and Physical Sciences*, [rspa.royalsocietypublishing.org . . . .1098/rspa.2015.0660](https://royalsocietypublishing.org/doi/10.1098/rspa.2015.0660)

Provided by University of Oxford

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