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Are rogue waves really rogue?

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Since the 1990s, the modulational instability has commonly been used to explain the occurrence of rogue waves that appear from nowhere in open ocean, especially in experimental and mathematical studies. Unfortunately, the importance of this instability in the context of ocean waves is not well established. In this work, we question the oceanic relevance of this paradigm. As is well known, several other physical mechanisms can lead to rogue wave formation: frequency focusing, directional focusing, opposite current, bathymetric features. Like the modulational instability most of these mechanisms have been successfully studied in laboratory experiments. But again there is no consensus on what happens in the ocean. Here we analyze several sets of field data in various European locations with various tools and we come to the conclusion that rogue waves are not as ”rogue” as anticipated. In particular, in realistic oceanic seas we find that third-order nonlinearities and associated modulation instability play an insignificant role in the rogue-wave formation. In contrast, we find that second-order nonlinearities are dominant effects implying that rogue waves are likely to be rare occurrences of weakly nonlinear random seas.