



## Group characteristics of large waves

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Rogue waves are sometimes portrayed as “wall of water” occurring without any warning, “out of nowhere”. In previous work we defined “unexpected waves” as wave crests that are  $\alpha$  times as high as any of the preceding  $N_a$  waves, and found for  $\alpha = 2$  and  $N_a = 30$  such waves occur about every 1 to 2 days. However, our definition of “unexpected waves” is unconditional regarding the absolute crest height, and generally these waves are large compared to the immediate surrounding waves, but not necessarily extreme in terms of the entire wave record. Recently published simulations suggest that under non-linear evolution the largest crest within a wave group tends to occur toward the beginning of the group. Thus, extreme waves would indeed occur without precursors. Here we present the analysis of year-long wave records obtained from different sensors at locations in deep and shallow water. In particular, we examine the group structure of large waves and discuss the conditions leading to rogue unexpected waves. We find for long groups there is some tendency for the largest wave to occur toward the beginning of the group, but short wave groups are nearly symmetric. Generally, there is little evidence supporting the notion of waves occurring as a “wall of water”.