

Interactive comment on “An Analysis of Swell and Bimodality Around the South and South-west Coastline of England” by Daniel Thompson et al.

Anonymous Referee #1

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The aim of this work is to analyze how the bimodality of the waves along the UK coastline can influence on coastal flooding extreme events with significant damages and highlight the importance of re-defining the empirical formulation for the design of marine infrastructures (in this study, overtopping) to take it into account. Instrumental records from buoys along the south UK coast are analyzed to identify the probability of bimodality and the percentage of the swell components. Most of the analysis is focused in the exceptional winter 2013/2014 where severe coastal events with important damage occurred, especially in Dawlish location.

Although the historical characterization of the bimodality and swell percentage for 2011-2017 winters reveals exceptional conditions at Dawlish, this information is not enough to conclude that these conditions determinate the severe damages during

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the winter 2013/2014. There are some other aspects that should be considered: the coastal flooding is produced by the combination of different marine dynamics (also storm surge and astronomical tide), the previous configuration of the beach or the coastal protection due to the sequence of storms during that winter (the damages at the beginning of February could be the result of accumulated ones). Therefore, the magnitude of the damage might not be proportional to the magnitude of the coastal flooding event.

It could be interesting to apply the overtopping formulation (or a total water index) and compare the evolution of these time series during 1st-9th of February 2014 with the wave conditions and with the sea level (storm surge and astronomical tide) to analyze which is the percentage of influence of each component. On the other hand, to be sure that bimodality determines the magnitude of the coastal flooding event and the magnitude of the damage, this analysis should be done for another storm events in that area.

It is relevant to demonstrate that coastal engineering formulations should be updated because the characterization of a sea state as single parametric variable is too simplistic. However, identifying the wave conditions outside the limits of the parametric formulations does not prove how this affects the results of the overtopping. It might be interesting to compare the overtopping magnitude for different extreme events if an underestimation (or overestimation) is obtained due to wave bimodality and/or a significant swell component. Besides, it is not clear if wave conditions outside the limits of applicability of empirical formulation correspond with bimodality conditions.

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