



An assessment of the footprint of surges and extreme sea level events in the UK

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Extreme sea levels caused by storm surges and high tides have historically caused catastrophic losses to coastal communities, and are currently a global threat to society. Recent decades have seen advances in understanding sea levels and coastal floods, often by statistical analysis of return periods and risk. However, individual storms and associated extreme sea level events are not often assessed at national scale over long stretches of varying coastline. The UK is an island continent making it an ideal case study, through the use of tide gauge records along the full coastline, to determine: (1) a summary of the spatial variation in sea level components (i.e. mean sea level, astronomical tide and meteorological residual), (2) spatial-temporal clustering of sea level events across different time-scales, (3) the spatial footprint of the surge component and sea levels associated with specific large events. The results highlight the variable spatial and temporal impact that can be expected for different storm events; which are complex due to the characteristics of different storm, astronomical tides and surges. We include an assessment of the series of storms and extreme sea level events which occurred on the UK coast in late 2013 to early 2014.