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Shoreline responses to storm impacts: North Norfolk coast, southern North Sea

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Recent phases of enhanced mid-latitude storminess (e.g. NW European winter of 2013 – 14) have led to a growing awareness of the considerable impacts of storms on coastal landscapes and their communities. Using aerial photography, bi-annual cross-shore profiles, detailed alongshore ground survey, and offshore/inshore wave buoy and regional tide gauge datasets, this paper considers storm impacts on the barrier coastline of North Norfolk, UK. Firstly, at Scolt Head Island, we show that the barrier dune crest has been progressively set back landwards since 2006 in three storm-related phases, with each shoreline translation being of the order of 5-8 m. However, a fourth storm produced no significant shoreline change, demonstrating that the threshold for morphological change is a function of the combined effects of still water level and wave height at the shore, the magnitude and duration of these components, and the timing of their interaction. Secondly, we consider recovery times in the system against periods of quiescence and heightened storm activity on this coast. Thirdly, it has been argued that future changes in extreme water level will be governed by mean sea level rise. Long-term rates of North Norfolk barrier retreat (1.15 m a-1, 1891-2013) have occurred under a regional rate of relative sea level rise over the 20th century of 2.7 $\pm$ 0.4 mm a-1 (Lowestoft tide gauge, 1900-2014). If there is a broad correlation between rates of barrier retreat and sea level rise, then recent increases in the rate of regional sea level rise (4.4 $\pm$ 1.1 mm a-1, 1993-2011) imply a considerable acceleration in the rate of barrier migration over the remainder of the 21st century.