

Mesoscale barrier estuary behaviour in response to sea-level rise, storms and sediment supply.

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Future vulnerability and resilience of coastal landscapes, and their associated communities, infrastructure and nature conservation interests, is of increasing concern due to the combined effects of climate change and sea-level rise. The Suffolk coast, UK, characterised by gravel barrier beaches and a spit feature of international geomorphological interest, has changed dramatically. However, existing Holocene research in this respect is limited. Sediments preserved within the enclosed valleys and back-barrier wetlands of Suffolk provide an opportunity to improve understanding of the complex mesoscale (years-decades-centuries) behaviour of coastlines and their geomorphological response to changes in natural forcing. This research aims to reconstruct Holocene changes in coastline behaviour to develop reconstructions of coastal evolution relating to changes in relative sea level, sediment supply and storm incidence.

Litho- and bio-stratigraphic analysis (sedimentology, particle size, and diatom analysis) has been undertaken on three marsh and wetland sites in a 5 km section between Walberswick and Dunwich. Though intra-site sediment variability is high, a consistent pattern of interbedded intertidal and freshwater units separated by transitional marsh deposits is seen at all sites. Diatom analysis from two sites (Westwood Marsh and Oldtown Marsh) indicates increased marine and brackish conditions across the organic-minerogenic transitions. The diatom assemblage from Great Dingle Hill, a more seaward site, is dominated by brackish species, with an increase in marine conditions across the main organic-minerogenic stratigraphic transition. Freshwater and salt tolerant species are minimal in this assemblage, indicating a constant saltwater input.

The onset of peat deposition has been dated to 6950-6790 cal. BP at the base of the Westwood Marsh sequence. These results contrast with existing research from the Blyth estuary (5 km north) where peat deposition was dated to 7714-7479 cal. BP. Submitted radiocarbon analysis will provide further chronological constraint for the timing of the major coastal behavioural changes identified from the analysis.

Combined, these results indicate that this section of the Suffolk coast has been subject to periodic opening and closing during the Holocene. Though currently unresolved, longshore sediment supply, high magnitude-low frequency storm events, sea-level change, and the position of offshore banks are likely causal mechanisms for these changes. These results will improve understanding of the long term (Holocene) natural signal of coastal change and are significant given that the regional Shoreline Management Plan has recommended managed realignment for this section of the Suffolk coast.