

Bankline erosion processes and coastal retreat in the Severn Estuary, UK

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1 Introduction and Objective

- Temporal change of shoreline and bankline position is a topic that is increasingly the interest of the scientific community, primarily because of its relevance to the linked socio-economic, hazard and environmental management problems connected to the phenomenon.
- It is estimated that about 80% of worldwide coastlines are subject to net erosion, with ranges from 0.01 to 10 m/yr (Pilkey and Hume, 2001).
- It is hypothesised that mobility and retreat are particularly prevalent for systems subject to **tidal ranges exceeding 5/6 m** such as major estuarine environments worldwide (e.g. Severn Estuary, UK - Fig. 1).

FLUVIAL EROSION vs ESTUARINE EROSION

Unlike open-coasts and riverine systems, *estuarine susceptibility to bankline erosion is not well-researched* (Fig. 2).

Aim: improve bankline erosional process modelling in hypertidal estuarine systems

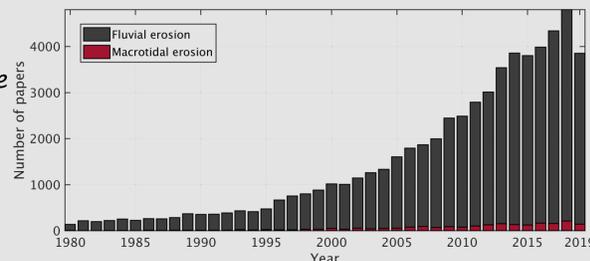


Figure 2. Comparison between fluvial and macrotidal erosion publications (Scopus)

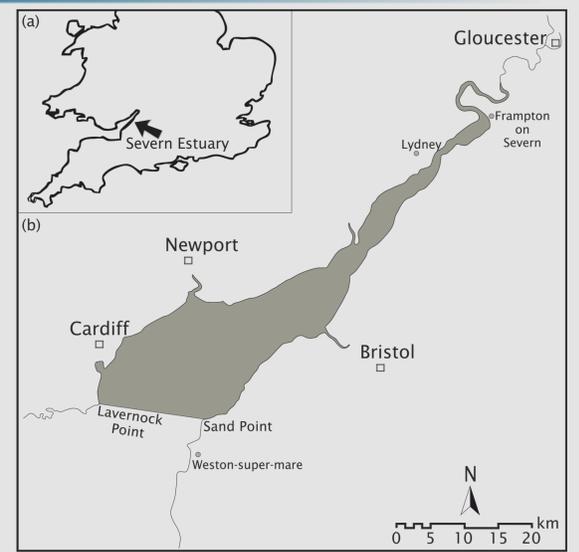
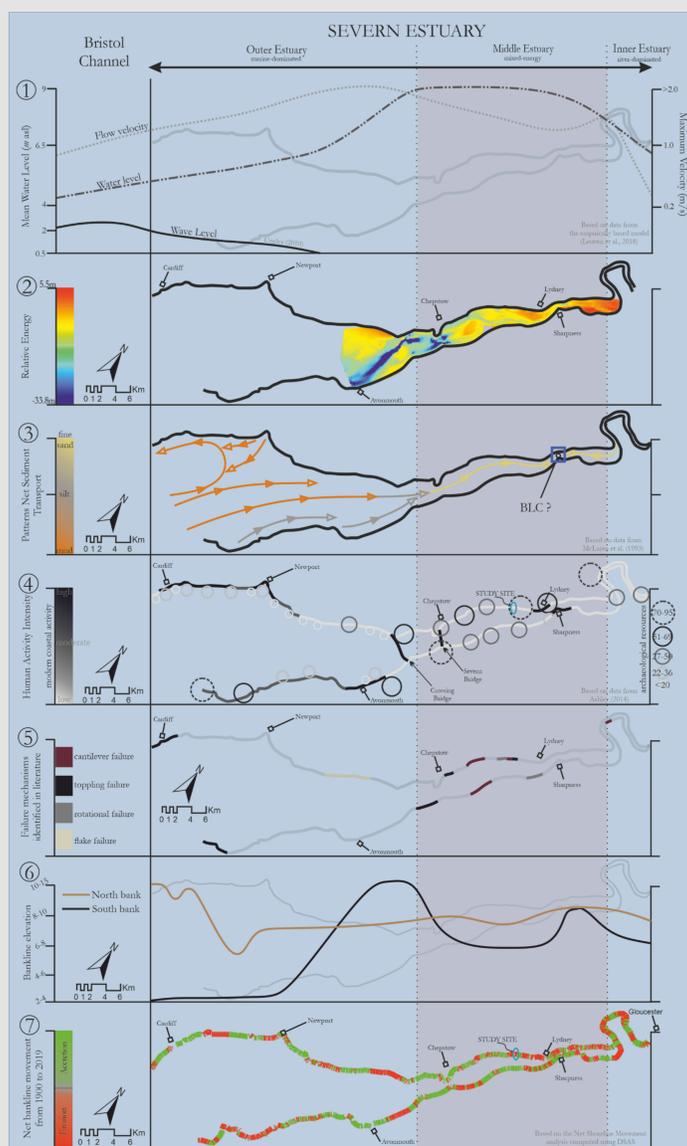


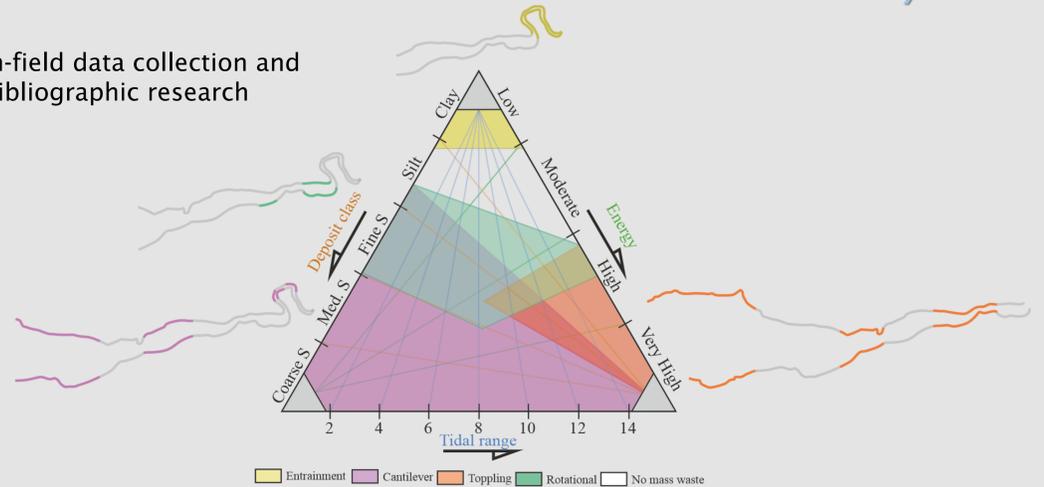
Figure 1. (a) UK, showing location of; (b) Severn Estuary

2 Historical analysis to inform data driven conceptual model



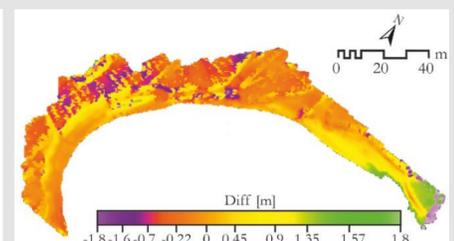
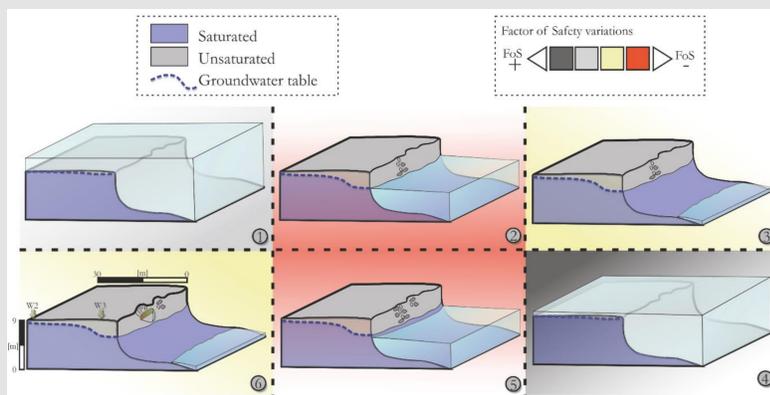
Potential bank erosion distribution in the Severn Estuary

In-field data collection and bibliographic research



Bank stability model (mid Severn Estuary)

We are deploying a geotechnical model, in conjunction with survey data, to be able to explain the driving factors causing bank collapse incorporating factors such as: groundwater fluctuations, seepage gradients, confinement pressure and tidal cycles.

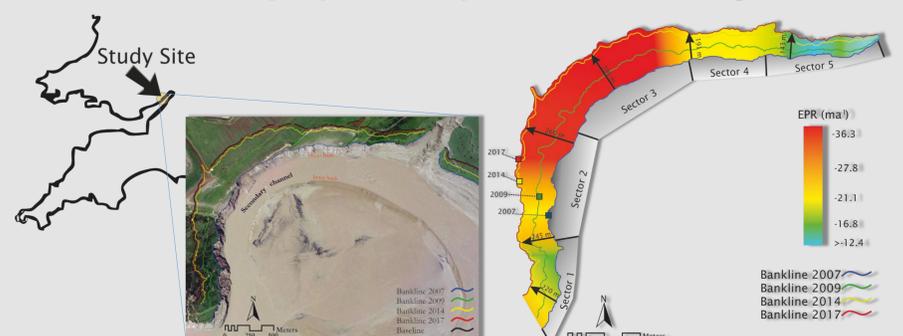


Repeat drone surveys of the study Site, producing high resolution point clouds to confirm bank collapse processes and quantify movement rates

3 Key points and Future work

- The data driven conceptual model reveals a complex combination of drivers which result in a range of failure mechanisms in the Severn estuary.
- Anthropogenic activities appear to play an important role in modulating rates and patterns of erosion through time.
- Current work seeks to elucidate the tidally controlled geotechnical controls on bank erosion at high temporal resolution.

Case-specific erosion process understanding



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