

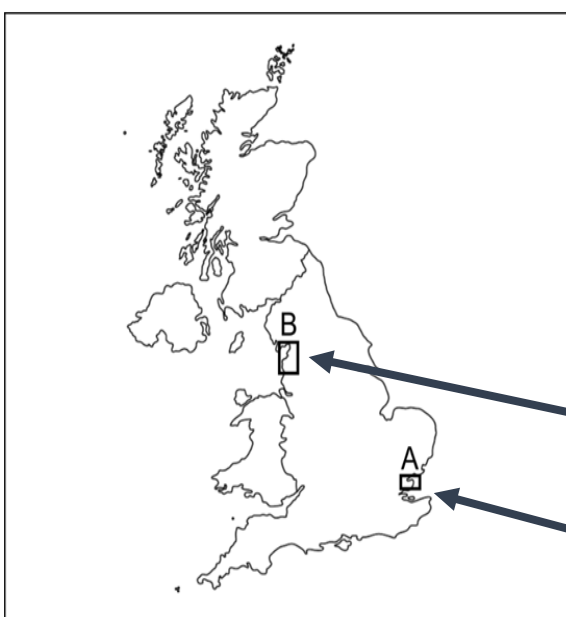
# Erosion responses of vertical salt marsh sediment sections in a field setting

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- Understanding erosion mechanisms at exposed marsh cliff faces is critical for prediction of long-term salt marsh persistence
- Properties within vertical marsh sections influence mm-scale erosion responses when exposed to in-situ tidal flat conditions
- Morphodynamic feedbacks induced by sediment/structural controls are shown through structure-from-motion imagery

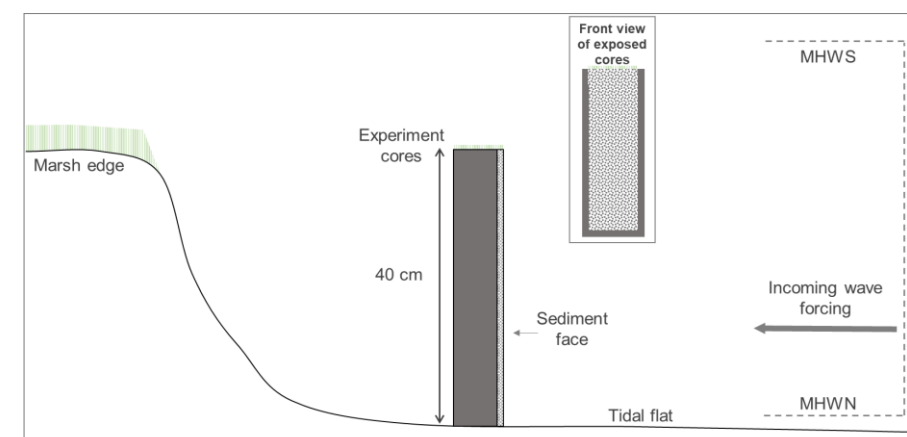
Cores extracted from 'natural' (NM) and 'restored' (MR) (i.e. managed realignment/de-embanked) sites at **Northey Island (NI)**, Blackwater Estuary and **Hesketh Out Marsh West (H)**, Ribble Estuary.



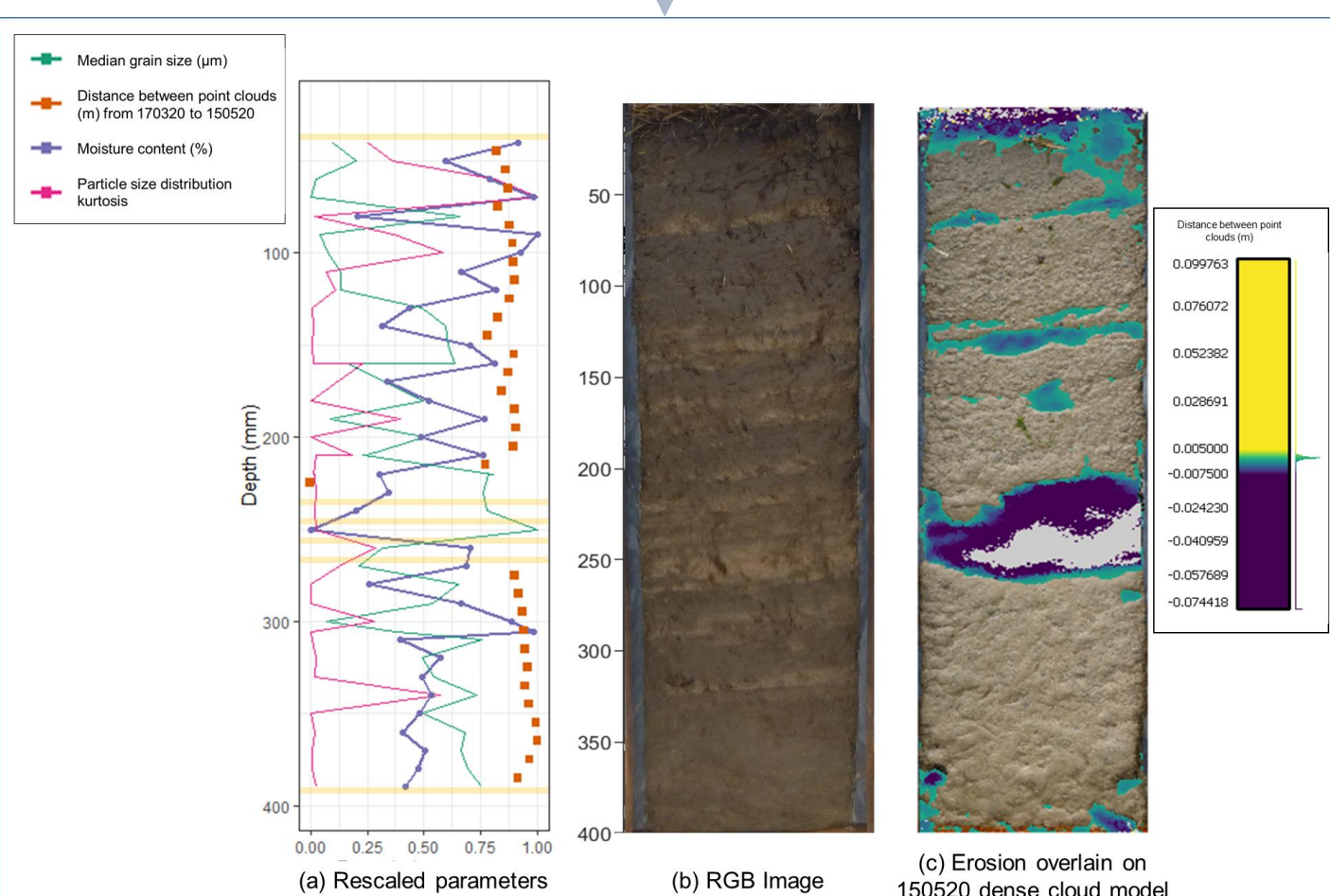
Emplaced on tidal flat fronting the marsh edge, at Tillingham Marsh, Essex, for 6-month period

Ribble estuary area marshes coarser grained, sand-dominated. South-East marshes finer grained clay-mud.

- **Hesketh Natural Marsh (H NM)** median grain size = 68  $\mu\text{m}$
- **Northey Island Natural Marsh (NI NM)** median grain size = 16  $\mu\text{m}$

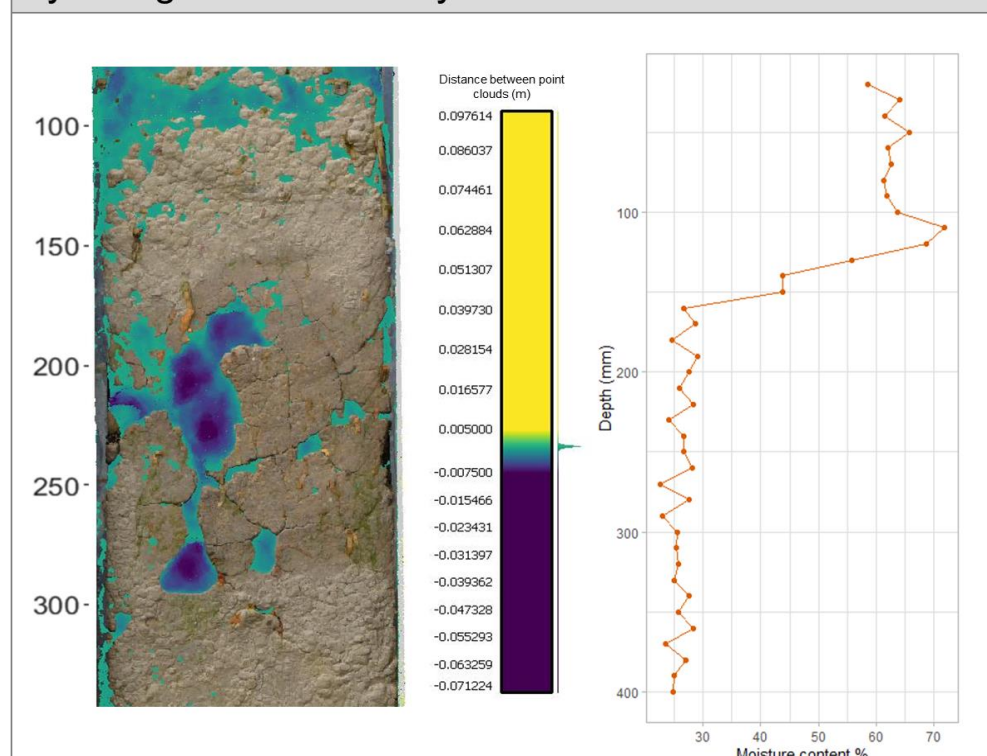


- Repeat in-situ digital image capture for SfM photogrammetry
- Water levels monitored by levellogger
- Lab analysis of downcore sediment characteristics



(a) Downcore profiles of sedimentological parameters, rescaled to interval 0-1 for visualisation. Orange lines indicate point cloud areas where material was completely removed. (b) RGB image of H NM. (c) Point cloud change profile overlain on H NM dense cloud captured on 150520.

Point cloud change profile overlain on NI MR dense cloud captured on 150520. Downcore profiles of moisture content (%) for NI MR core – highlighting transition to pre-de-embanked sediments and poor hydrological connectivity below 200 mm.



## Why is this important?

- Within-core and between-core variability in mm-scale erosion is linked to downcore sedimentology and structures:
  - Sandier/coarser layers
  - Structural 'weakness' features
- Natural and restored marshes have different vertical features
- Vertical variability may help to explain lateral erosion patterns at the marsh scale. **Next step to scale up to the m-scale marsh edge**