

Bed level changes at saltmarsh-mudflat transitions

B.W. Borsje¹, P.W.J.M. Willemsen^{1,2,3}, T.J. Bouma²,

¹ University of Twente, ² Royal Netherlands Institute for Sea Research (NIOZ), ³ Deltares

UNIVERSITY OF TWENTE.



Nature-based flood defence



- 1/3 of the dike rings do not meet the safety standard (> 1000 km)
- Increasing dike height is not a sustainable solution
- Need for innovative solutions

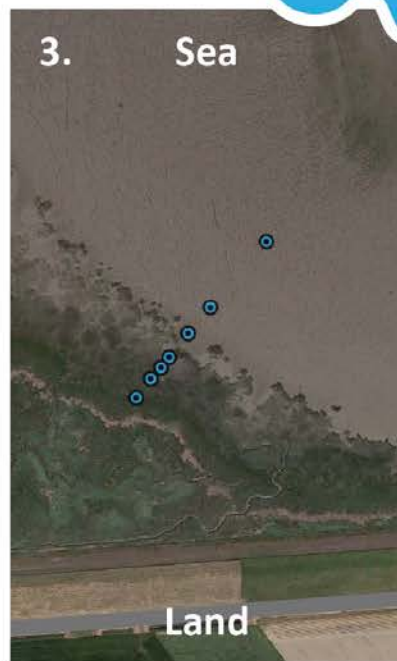
- 
- An aerial photograph showing a coastal defense system. A long, straight dike runs from the bottom left towards the top right, separating a large body of water on the right from a coastal area on the left. The coastal area is divided into several sections: a strip of marshes immediately adjacent to the dike, followed by a strip of agricultural fields, and then a larger area of marshes further inland. The water on the right is a deep blue, while the water in the marshes is a lighter, brownish-green. The sky is a pale, hazy blue.
- Marshes in front of dikes
 - Additional safety
 - Dynamic behavior (growth and decay)
 - Stability during extreme events?

The marsh width



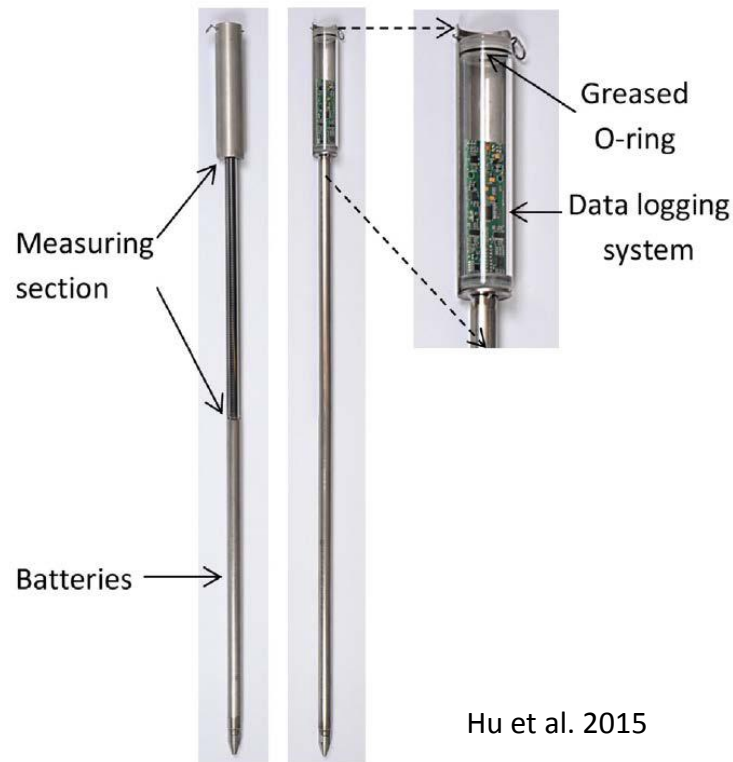
- What are the bed level dynamics of a marsh?
- Does this differ in sheltered and exposed sites?





Measuring bed level dynamics

- Sediment elevation dynamics (SED) - sensors: continuous measurements



SED data

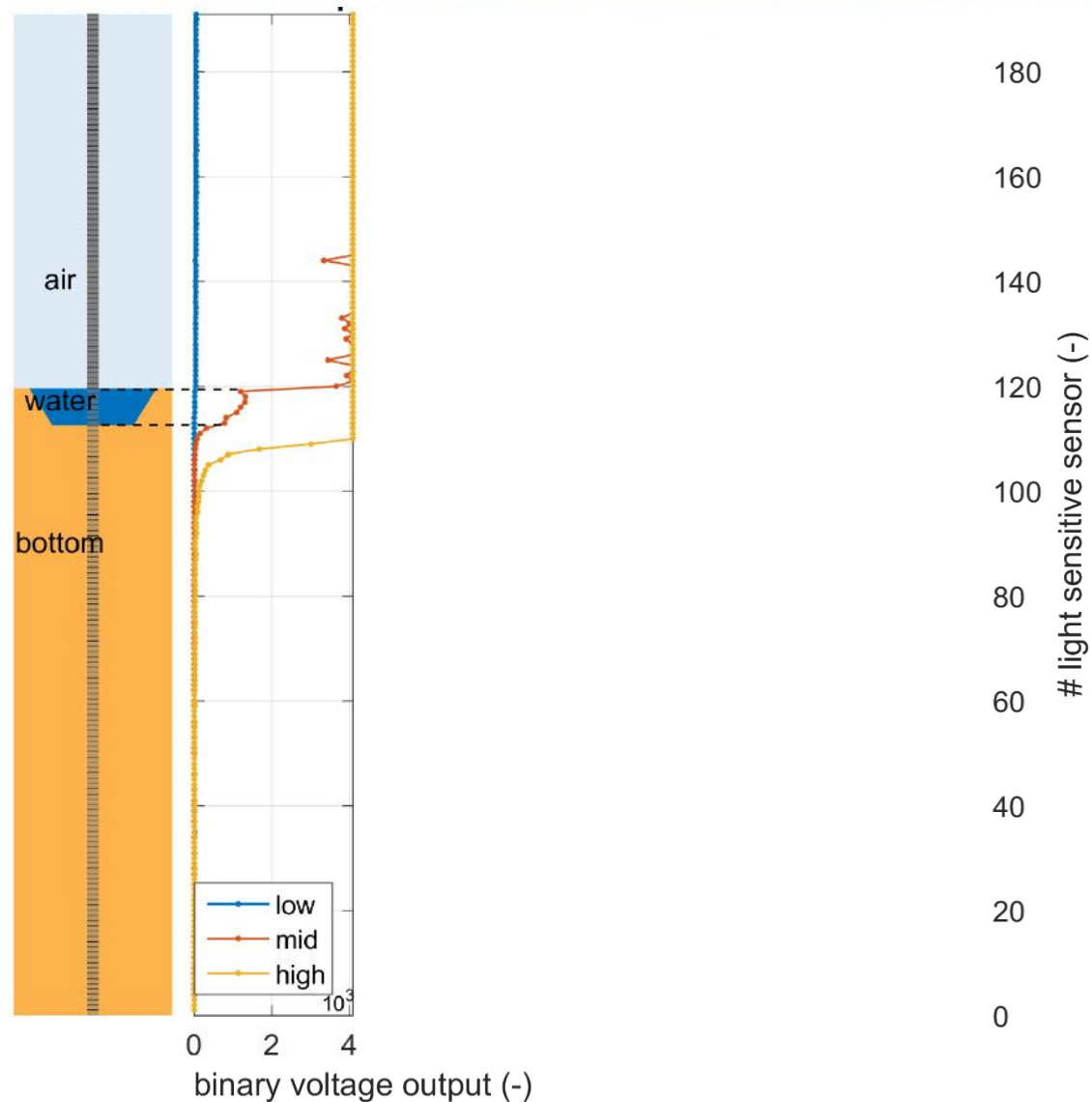


1. SED sensor



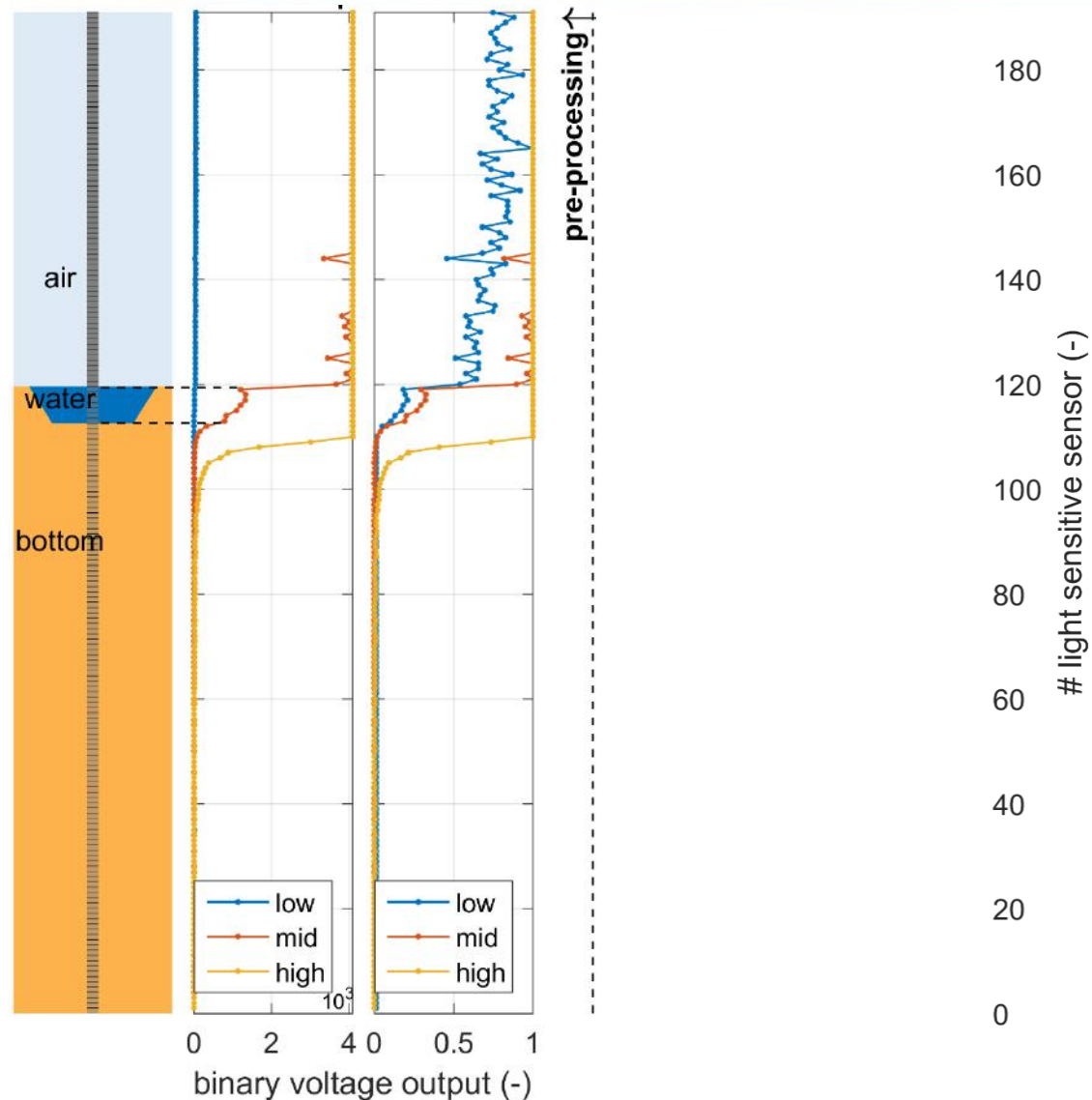
SED data

1. SED sensor
2. Raw data



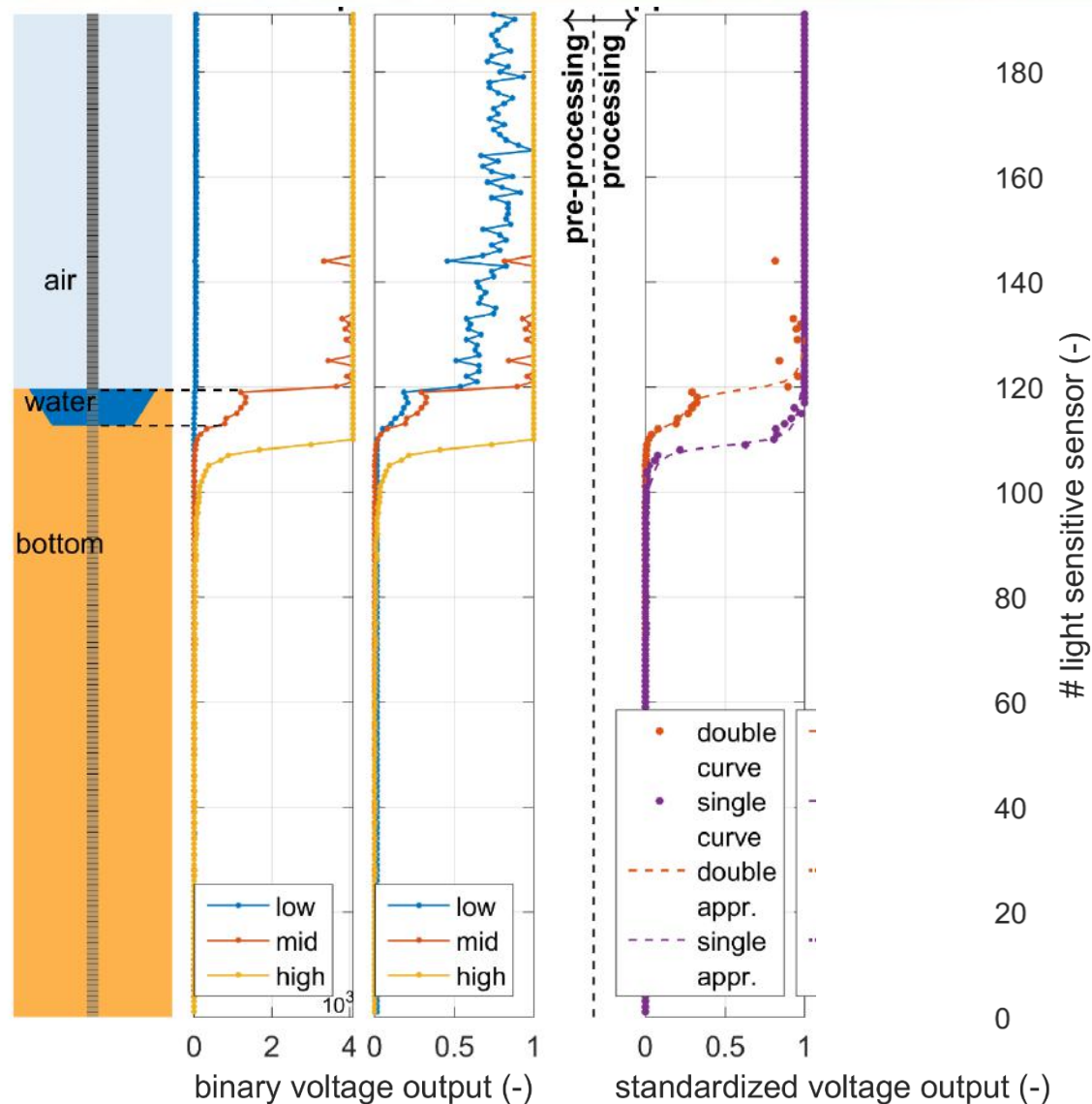
SED data

1. SED sensor
2. Raw data
3. Pre-processed data



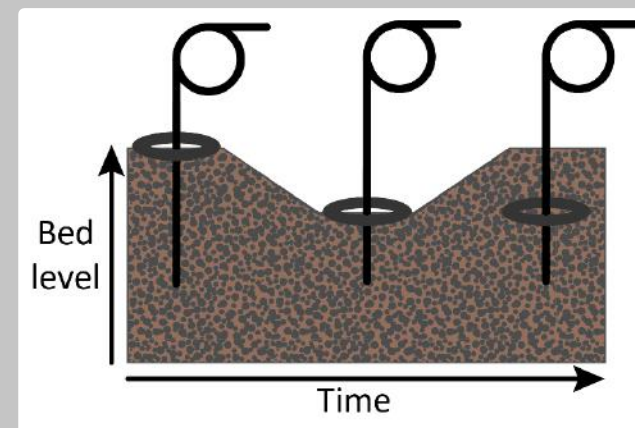
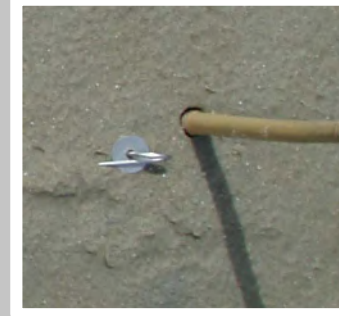
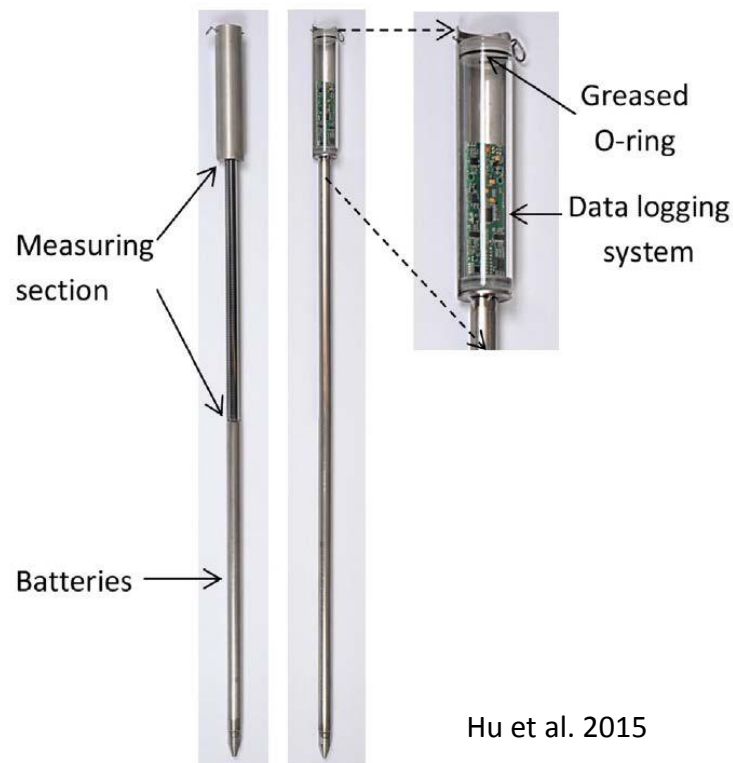
SED data

1. SED sensor
2. Raw data
3. Pre-processed data
4. Approximation



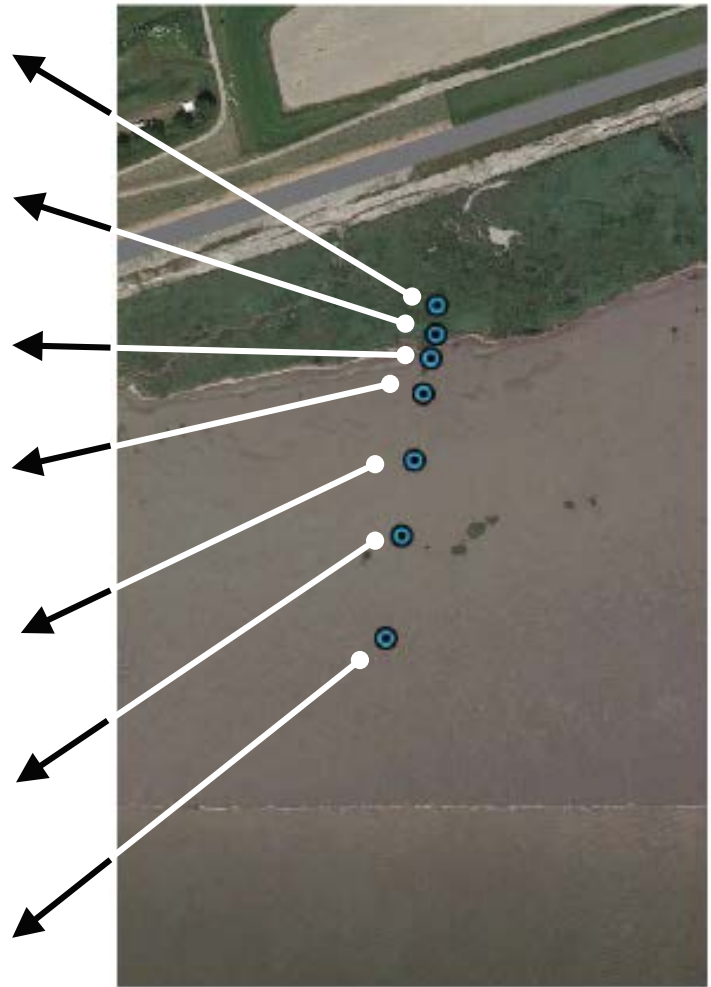
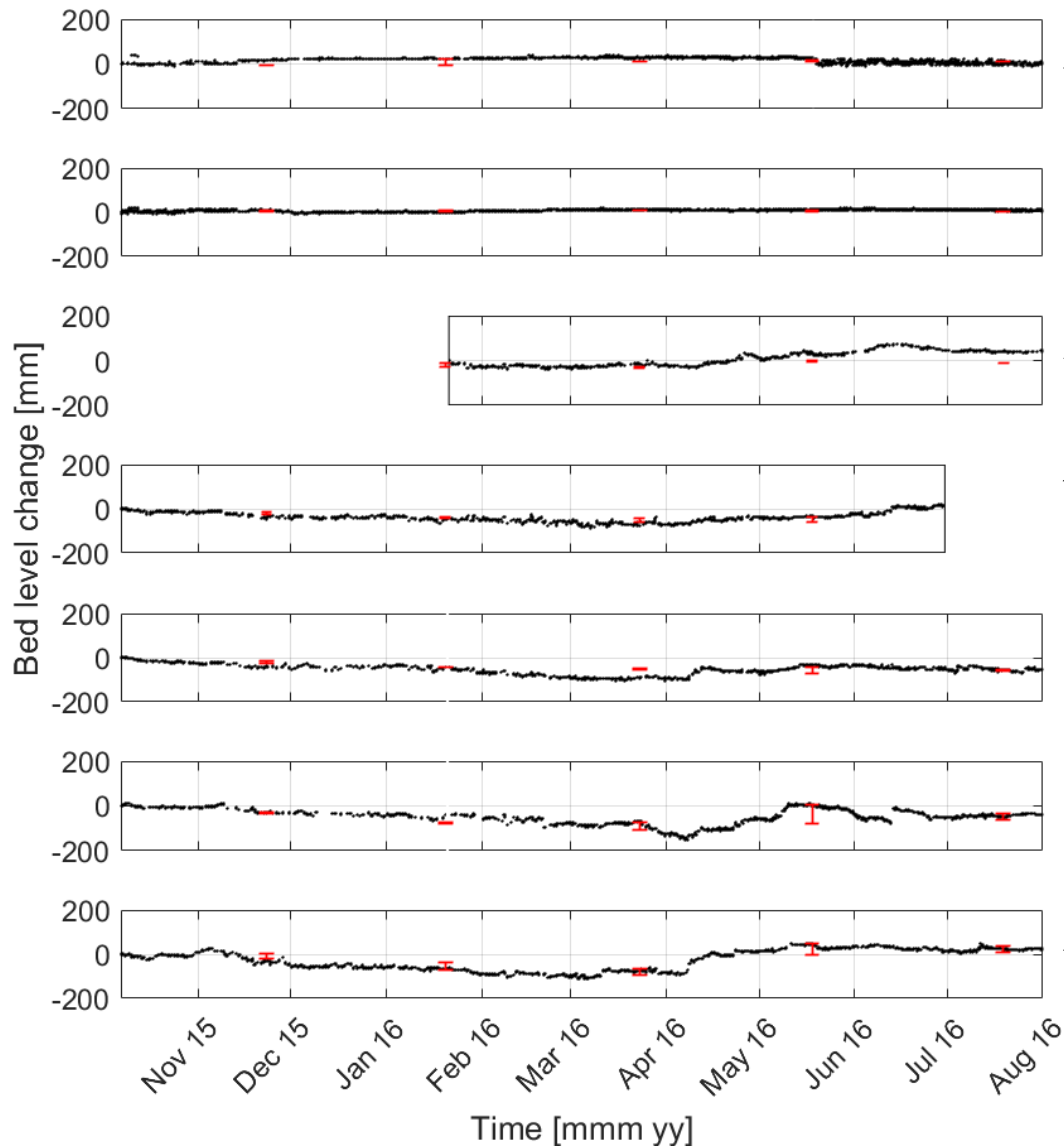
Measuring bed level dynamics

- Sediment elevation dynamics (SED) - sensors: continuous measurements
- Erosion pins: discontinuous

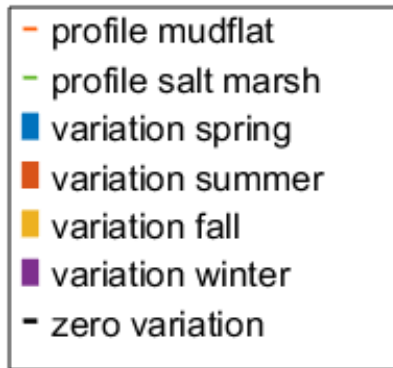
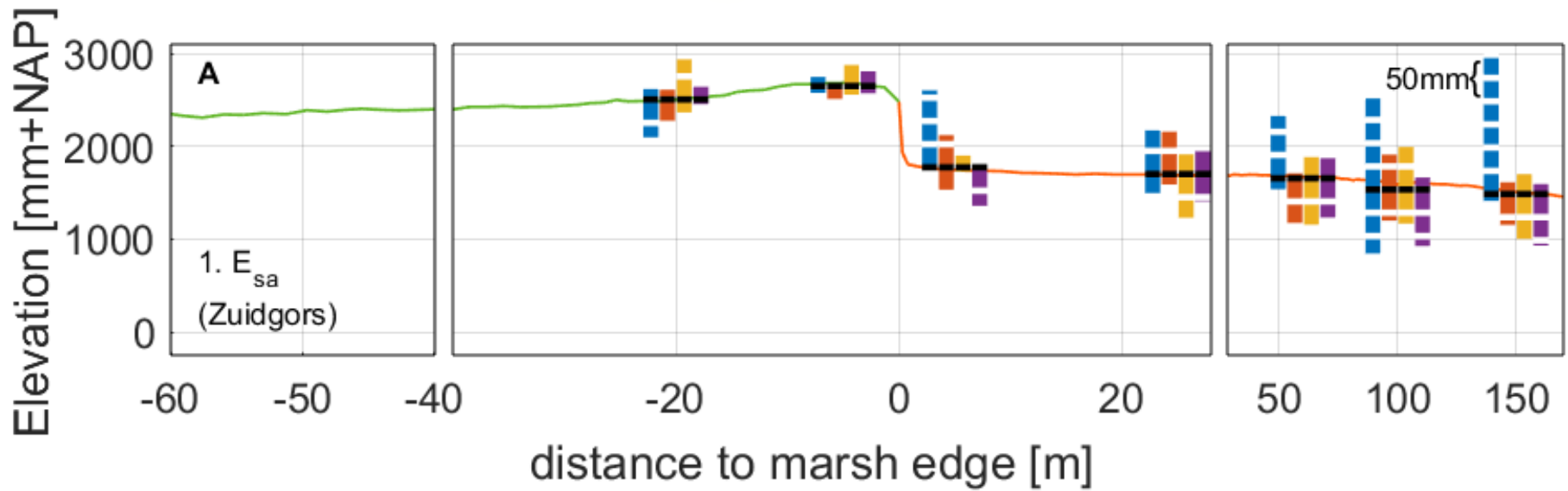


Hu et al. 2015

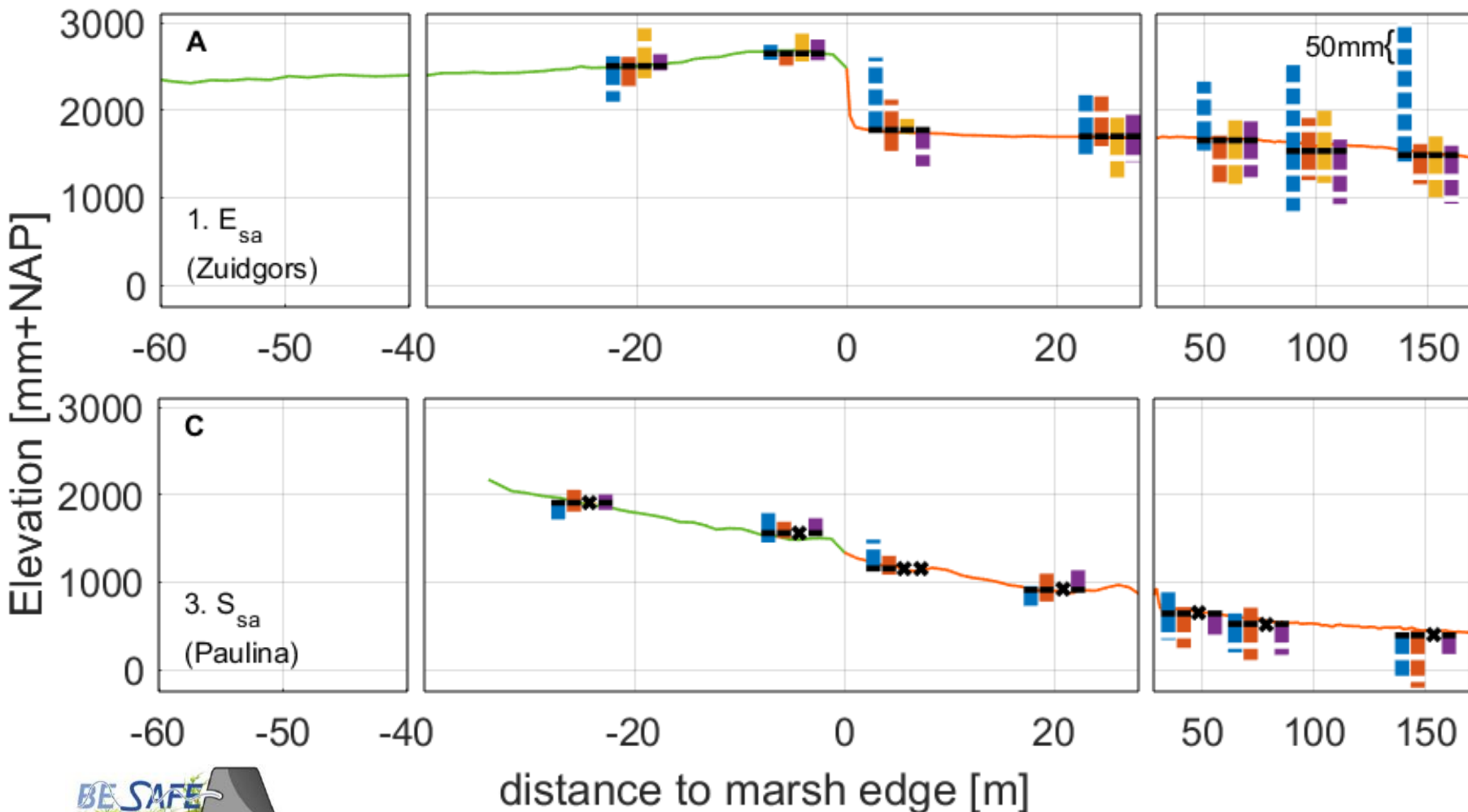
Spatial patterns *Esa*



Spatial & temporal patterns E_{sa}



Sheltered (S_{sa}) vs. Exposed (E_{sa}) sites



Discussion



- Clay vs. Sand
- Erosion is not the biggest during the largest storms
- Within vegetation vs outside vegetation
- Physics vs. Ecology



Thank you.



Questions and comments: b.w.borsje@utwente.nl