Bed level changes at saltmarsh-mudflat transitions

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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
Deltacommissie – Innovatie oplossingen

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- Klimaat wordt steeds grilliger
- 1/3 van de dijkringen voldoet niet aan de veiligheidsnorm (ruim 1000 km)
- Diaken verhogen is geen duurzame oplossing
- Behoefte aan innovatieve oplossingen

- 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

Hu et al. 2015
SED data

1. SED sensor
SED data

1. SED sensor
2. Raw data

![Graph showing binary voltage output with different levels: low, mid, high. The graph indicates transitions from air to water and bottom.]
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
Spatial patterns \textit{Esa}
Spatial & temporal patterns $E_{sa}$

- Elevation [mm+NAP]
- Distance to marsh edge [m]

Legend:
- Profile mudflat
- Profile salt marsh
- Variation spring
- Variation summer
- Variation fall
- Variation winter
- Zero variation

1. $E_{sa}$ (Zuidgors)
Sheltered (Ssa) vs. Exposed (Esa) sites

**Graph A:**
- Elevation [mm+NAP]
- Distance to marsh edge [m]
- 1. E_{sa} (Zuidgors)

**Graph B:**
- Elevation [mm+NAP]
- Distance to marsh edge [m]
- 50mm\n
**Graph C:**
- Elevation [mm+NAP]
- Distance to marsh edge [m]
- 3. S_{sa} (Paulina)
Discussion

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

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