Preservation of mud layers in tidal bars: Shoal of Walsoorden

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Objective
Mudflats and mud layers can have a large influence on the morphology of estuaries due to different erosion and deposition characteristics compared to sand. Over decades to centuries, mud deposits can confine the estuary and increase the height of intertidal bars (Braat, 2017; subm). However, the precise effects are hard to predict, because it is generally unclear how the sand-mud stratigraphy looks like and under what conditions mud is deposited and preserved.

Approach
We compare stratigraphy generated by morphological modelling of the shoal of Walsoorden, Western Scheldt, in Delft3D with stratigraphy build from field data. Field data is used to determine where the mud layers are and the model helps to identify under what conditions mud layers are deposited and preserved. (Fig. 1)

Stratigraphy from field data
- Mud (brown overlay) and vegetation (green) occurs most on the eastern part of the shoal (Fig. 2)
- Lateral migration is fast and vertical accretion is slow (Fig. 4a)
- Most of the vertical accretion is due to mud deposits (Fig. 4d)
- Mud preservation below the surface is rare on this scale (Fig. 4c-d)

Compared to estuary-scale mud distribution (Dinoloket)
- Mud layers and thicker and more abundant towards the flanks of the estuary and at the surface
- Only one core on Walsoorden in Dinoloket

Conclusions
- The model and field data both show dominant deposition in the East
- Mud deposition starts at the highest areas of the shoal
- Only a limited amount of mud at the surface is preserved in deeper layers
- Large-scale dino cores rarely indicate buried mud layers
- Own detailed cores show thin mud layers below the surface
- Mud seems only to be buried during extreme events (work in progress)

Future work: couple mud layers in the modelled stratigraphy to the environmental conditions under which it was deposited and buried.