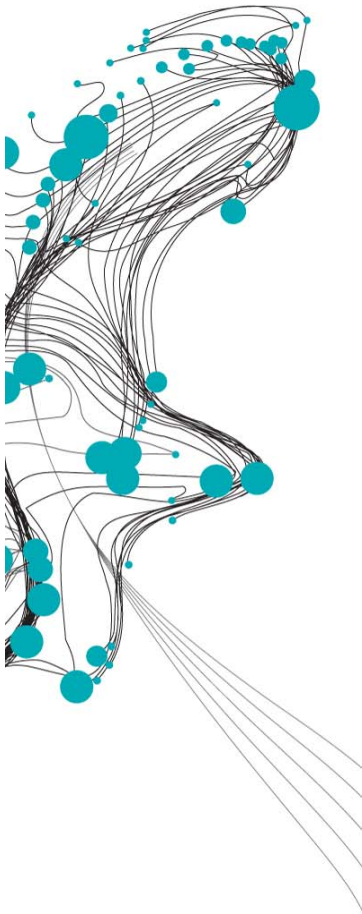


MODELLING THE INFLUENCE OF SAND-MUD INTERACTION AND WAVES ON SALT MARSH DEVELOPMENT



Sea level rise requires innovative solutions in flood protection. This results in more interest in adaptive ecological measures like salt marshes. Salt marshes are tidal-influenced ecosystems between land and sea (figure 1). Salt marshes attenuate waves and decrease fetch length. In addition, salt marshes are able to adapt to their surrounding making it optimal as flood protection. This recent interest leads to questions about processes influencing long-term salt marsh development.

For analysing long-term development of salt marshes FINEL2D is used. FINEL2D is a depth-average numerical model developed by Svašek Hydraulics. In addition, SWAN is used for implementing waves. SWAN is a wave model for obtaining realistic estimates of wave parameters in coastal seas, lakes and estuaries developed by Delft University. A test model is set-up based on dimensions of Paulinaschor.

Results show that the implementation of mud is essential for a salt marsh environment to arise (example result in figure 2). Mud leads to significant higher bed levels due to settling lag. Furthermore, the effect of vegetation is analysed. It turns out that vegetation determines the creek pattern as plants obstruct flow. This results in more creeks which are needed to discharge all water after high tide. The implementation of waves causes erosion of the marsh edge.

Validation of results shows similarities with Paulinaschor. The height of the marsh platform and the location of the marsh edge correspond well with Paulinaschor. However, there are also some differences. The simulations showed a larger marsh edge than Paulinaschor and no tidal mudflat in front of the marsh. This could be caused by only taking two sediment fractions into consideration or lack of waves during the whole simulation period. Waves are now implemented after 100 years of simulation as one-day storm events. Therefore is recommended to further study these effects.



Figure 1: Land van Saeflinghe, salt marsh in the Western Scheldt

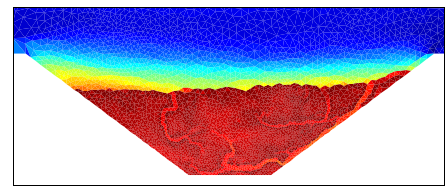


Figure 2: Top view of simulation with sand-mud interaction in combination with vegetation

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