



Effects of biological traits on saltmarsh species distribution and estuarine bar morphology

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The ability of vegetation to modify local conditions in fluvial and coastal environments has been extensively studied and widely acknowledged. However, in bio-geomorphological modelling effects of biological traits, i.e. growth properties, establishment strategies, and resilience to stress, have been widely neglected or simplified. Here we include species-specific strategies for establishment, growth and resilience against physical pressures in our numerical model to study whether we can produce more realistic patterns and thereby quantify the bio-geomorphological effects.

We coupled our new vegetation model to a two-dimensional hydro-morphodynamic model in Delft3D. To validate the vegetation zonation produced by the model we analysed a 2 km long tidal bar in the Westerschelde estuary, the Netherlands, where vegetation establishment has been mapped at 0.25 m spatial resolution since the mid 1990's and large parts are now covered by various saltmarsh species.

We show that mortality due to desiccation and inundation period determines the density of saltmarsh growth and hence reproduces zonation. Resilience against fast flow not only determines die-off at the bar margins but also on the tidal flat itself. The first model runs also suggest that seasonal variation in biomass modifies the morphological development of the flat as it directly affects sedimentation in winter. Ongoing runs for decadal development include mud and sensitivity to species traits.