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Small-scale sediment transport and deposition patterns within a salt-marsh basin, Paulinaschor, Western Scheldt

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During inundation of tidal marshes, fine-grained suspended matter is transported to and partly deposited on the marsh surface. In this research the complex spatial patterns of sediment transport and deposition are studied at the temporal scale of individual inundations and spatial scale of a small tidal creek basin (ca. 6 ha) within the salt Paulina marsh, Western Scheldt. Field measurements are used for the implementation and validation of 2-dimensional numerical models for tidal marsh sedimentation.

Near the mouth of the creek system, the incoming and outgoing sediment mass is estimated, by way of water level, flow velocity and suspended sediment concentration (SSC) measurements. Spatial variations in SSC, at the moment of marsh inundation, are measured at about 35 locations within the creek system and above the marsh surface, using siphon samplers. Finally the sediment that is deposited on the marsh surface is sampled with sediment traps on 50 sites, both during 4 individual inundations (about 4-5 hours) and 2 spring-neap tidal cycles (15 days).

First, it is investigated how the 2-dimensional pattern of SSC and sedimentation can be described by statistical models, incorporating detailed topographic information on the creek network, surface elevation and vegetation pattern. Secondly, the application of physically-based hydrodynamic models, coupled with sediment transport models, is explored and evaluated against the field data. Once validated, these models may be useful to simulate flooding and sedimentation patterns in other tidal marshes and controlled inundation areas in the Scheldt estuary.