Assessing the impact of macrobenthic species invasions on the erodibility of tidal mud flats – a case study in the Scheldt estuary

Maxime Laukens[1], Erik Toorman[1], Naveen Kassadi[1], Gunther Van Ryckegem[2], Frank Van de Meutter[2], Christian Schwarz[1]

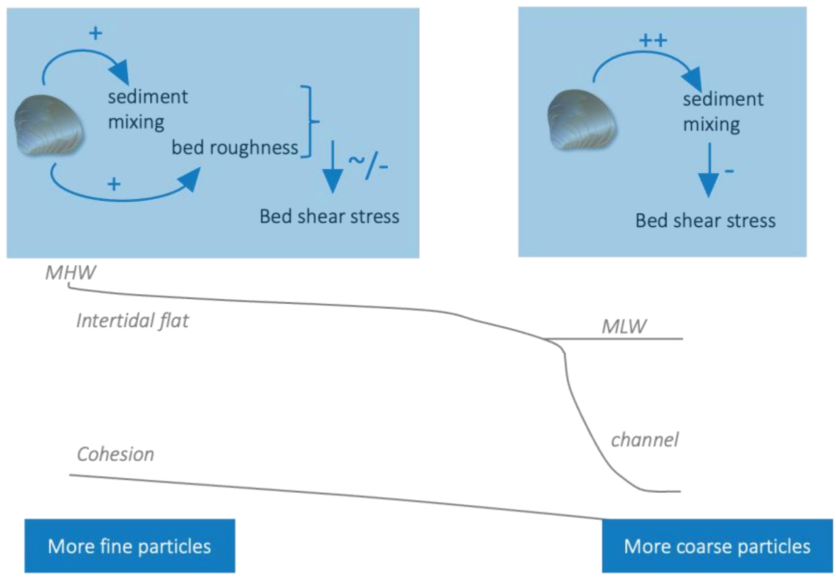
[1] Department of Civil Engineering, Hydraulics and Geotechnics, KU Leuven

[2] Research Institue for Nature and Forest, Estuaries

Fine sedimentary intertidal systems are characterized by mixtures of cohesive (e.g. mud) and non-cohesive sediments (e.g. sand) which are reworked, i.e. bioturbated, by benthic organisms. By redistributing inorganic and organic sediments benthic organisms create improved "engineered" environmental conditions for themselves and other organisms. However, benthic organisms are not only distributed locally through natural dispersal mechanisms but are also introduced as a byproduct of human activities. The benthic organism *Potamocorbula amurensis* commonly known as the Asian clam, a bivalve native to the Western Pacific Coast, was recently introduced in the Scheldt estuary through ballast water of marine vessels. Following its introduction the rapid growth of this invasive species can cause notable ecological disruption as previously observed in the San Francisco Bay, US. This study aims to understand whether the arrival of invasive benthic organisms aside from its ecological implications can also affect erodibility and consequently redistribution of fine sediments at intertidal mudflats.

Through field investigations and flume erosion experiments, we investigate if the presence of *Potamocorbula amurensis* can alter cohesive sediment erosion in comparison with the natural situation. Flume experiments compare natural sediment beds, in respect to bed composition and benthic communities, to "artificial" sediment beds with altered bed and macrozoobenthic properties. Initial results, show that these invasive benthic organisms are indeed able to alter mudflat erodibility, however that their effect is highly dependent on the environmental context.

The presence of *P. amurensis* reduces the critical shear stress of erosion particularly in less muddy, less cohesive sediments. The impact of biota on muddy sediments is a mix of changes in surface roughness and vertical mixing. We see that vertical mixing dominates bed shear stress reductions at less muddy sites whereas bed shear stress changes at muddy site effects are potentially caused by both changes in bed roughness and vertical mixing.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