Are plant life-history strategies able to shape bio-geomorphologic interactions?

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Previous studies on interactions between vegetation and their abiotic environment underlined the importance of bio-geomorphologic feedbacks in shaping landscape structures in for instance intertidal channel networks. Nevertheless until now, the ability of vegetation to influence geomorphologic structures was linked to properties of their physical structures such as stem stiffness, stem diameter or stem density, interacting with hydrodynamics and sediment transport. Yet the role of life-history strategies, i.e. the mode of plant proliferation such as sexual reproduction from seeds, non-sexual lateral expansion or a combination of the former two in shaping bio-geomorphologic interactions was hitherto ignored.

This study presents numerical experiments based on a wetland ecosystem present in the Western Scheldt Estuary (SW, the Netherlands) showing the importance of life-history strategies shaping bio-geomorphologic interactions. We specifically compare two extremes in life-history strategies, (1) one species solely establishing from seeds and relying on their mass recruitment (*Salicornia europea*); And a second species (*Spartina anglica*) that relies on a mixed establishment strategy consisting of seed dispersal and clonal lateral expansion through tillering, with a very low seed recruitment success per year.

Based on conducted numerical experiments using the hydro-morphodynamic modelling suite TELEMAC2D we show that the *Spartina*-case facilitates relative low channel densities with pronounced channel networks, whereas the *Salicornia*-case favours high channel densities with less pronounced intertidal channels. The conducted numerical experiments are the first indication showing that plant proliferation strategies exert a major control on emerging patterns in bio-geomorphologic systems. This provides a deeper understanding in the constraining factors and dynamics shaping the emergence and resilience of bio-geomorphologic systems.