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Site-specific features influence sediment stability of intertidal flats

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Abstract. The factors that influence the sediment stability and the transport of estuarine mudflats are not yet fully understood but knowledge of them is essential in coastal engineering applications and pollution ecology studies. The suggestion that variation in predictive models of sediment stability might be due to site-specific characteristics is investigated using data from four estuarine mudflats (Eden Estuary, Scotland, the Biezelingsche Ham, Zandkreek, and Molenplaat mudflats in The Netherlands). These estuaries differ in their environmental conditions, macrofaunal species composition and local features (e.g. *Enteromorpha* mats, migratory biofilms). *Stable* and *unstable* sediments were compared, and mean chlorophyll-*a* concentrations and granulometry of the sediments were significantly different between the two groups. Step-wise multiple linear regressions were applied to the sediment stability data of all sites to establish the influences on erosion threshold of microphytobenthic biomass, water content, granulometry, organic carbon content and the abundance of dominant macrofaunal species. The stability of each site was influenced by different factors. Sediment stability of the Eden Estuary was affected by the *Enteromorpha* bloom; Biezelingsche Ham was influenced by the highly migratory nature of the diatom biofilms and the abundance of *Corophium volutator*; the polychaete worm *Arenicola marina* had a net negative effect on sediment stability of the Zandkreek; and the Molenplaat was influenced by microphytobenthic biomass. This research highlights the need for site-specific calibration of models and suggests that a universal proxy parameter for sediment stability is unlikely to be obtained.

Keywords: sediment stability; erosion threshold; cohesive strength meter; microphytobenthos; *Enteromorpha* spp.

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