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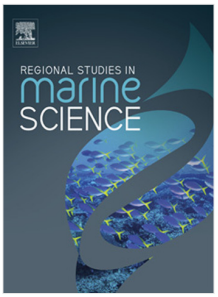

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Macro-tidal beach morphology in relation to nearshore wave conditions and suspended sediment concentrations at Mariakerke, Belgium

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This study relates changes in beach morphology to nearshore hydrodynamics and suspended sediment concentrations using in-situ measurements for a macro-tidal, sandy beach in Belgium. More than 1.5 years of data were collected and analyzed including wave characteristics, water level, monthly beach morphology, and 6 months of suspended sediment concentrations. The results indicate that the beach grows when the wave steepness is very small (< 0.010) and it erodes when wave steepness is very large (> 0.018). This trend is opposite for medium wave steepness (0.012-0.016) with beach erosion under small waves and accretion under large waves. An increment of the suspended sediment concentration follows wave steepness when it is medium, which is most likely due to the start of wave breaking over a sandbank in front of the coast. Flood dominant cross-shore currents transport the suspended sediment shoreward resulting in partial compensation of the erosion by waves. A conceptual model is established to demonstrate the relation between waves, suspended sediment supply, and morphological change. It shows that the morphodynamics of macro-tidal beaches is not only controlled by wave conditions, but also by the currents and sediment supply.