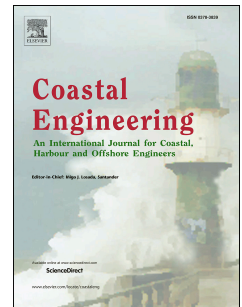


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The influence of wave groups and wave-swash interactions on sediment transport and bed evolution in the swash zone

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Abstract

Large scale laboratory measurements of sediment dynamics in the swash zone are presented. Two bichromatic wave group conditions were generated, having the same energy content but different wave group period ($T_g = 15.0$ s and 27.7 s). For the shortest wave group, due to bore focussing, the shoreline fluctuates predominantly at the T_g time scale, showing a large runup and the presence of wave-swash interactions with strong momentum exchange. In contrast, for the longer wave groups, the swash excursion is dominated by the individual waves. The uprush generally promotes onshore sediment advection with consequent erosion at the rundown location but accretion close to the runup. On the contrary, the backwash promotes seaward sediment advection and accretion at the rundown location. The presence of repeated wave-swash interactions modifies these patterns slightly. A wave overrunning a previous uprush promotes a reduction in onshore sediment advection while weak wave-backwash interactions reduce seaward advection. Consequently, the measured sediment dynamics shows stronger intra-swash cross-shore sediment advection for the swash events produced by the short wave groups. Measurements of the sheet flow layer near the shoreline show that for the shortest wave groups the vertical structure of the concentration

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