Variability of grain-size distribution, beach slope and wave action on the sandy beaches of Western coast of Sri Lanka

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On sandy beaches, the coastal erosion and sediment transport processes are greatly influenced by the wave action and sediment grain size distribution. This study involved a thorough investigation of beach sediment samples on the swash zone and berm crest along the coastal stretch between Beruwela and Chilaw in the Western coast of Sri Lanka. Moreover, the impacts of this intense reclamation, mega sand mining, and interventions on the prevailing sandy beaches were poorly known. The variability of grain-size distributions, beach slopes, and their connection to wave dissipation was assessed in order to fully grasp the implications. Altogether 60 beach samples were collected during two surveys conducted in October 2021 (summer profile) and March 2022 (winter profile). The study contrasts the median grain size values (D50) of beach samples, beach slopes and near-shore wave power. The corresponding wave power (KW/m) at 15 m depth was determined using SWAN based wave transformation model. In comparison to the winter profile, the beach slopes of the summer profile is narrower, steeper, and coarser in D50. In most of the transects, D50 values of the swash zone are coarser than the corresponding berm crest values. Indicating that the sand is coarser in the South than the North of Colombo, D50 values for the coastal stretches of Beruwela-Colombo and Colomo-Chilaw are, respectively, 0.8 to 1.6 mm (coarse-very coarse) and 0.2 to 0.8 mm (medium-coarse). This feature is found to be associated with the spatial variance of wave energy in the western coast of Sri Lanka. Consequently, the outcomes of this grain size distribution can be used to evaluate coastal morpho dynamics and the potential effects of intervention on the coastal environment.

Keywords: beach slopes, berm crest, grain-size, swash zone, wave power

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