Spatial variability of grain size parameters and depositional process in the coastal marshland of Orissa, India

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Spatial variability of bulk sediment properties enable us to understand the textural characteristics of sediments and decipher the sediment transport process. In the present study, grain sizes were measured from surface sediments collected in the tropical marshland of Chandipur, Orissa. Particle size analysis was performed on all sub-samples using a Horiba Partica mini LA-350 laser granulometer. Grain size distribution analysis was conducted for identification of sedimentary transport behaviours with different textural parameters such as mean, sorting, skewness, and kurtosis. CM diagram (C = one percentile in micron, M = median in micron) describes the mechanism of sediment deposition on the marsh happened from uniform, graded suspension and some amount of bottom suspension and rolling. End-member modelling analysis helps to unmix the grain sizes into six geologically meaningful populations. Six grain size end members corresponds to clay, silty clay, clay silt,silt,sandy silt and silty sand. These particle size distributions are influenced by sediment transport and depositional processes. Particle size analysis has been used to identify variation in the hydrodynamic processes of marsh environments. The lower saltmarsh is characterized by dominantly ‘fast tide’ Particle size distribution which indicates a relatively coarse grained, moderately sorted, fine-skewed, meso-to leptokurtic distribution. But, the uppermost saltmarsh deposits shows a relatively fine grained, poorly sorted, near symmetrical, meso- to platykurtic Particle size distribution. The regions near the tidal flat and lower marshland is relatively coarse grained and dominated by deposition through saltation and traction whereas the mean grain size becomes finer towards the eastern side of the marshland controlled by suspension and settling population.

Keywords: Marsh, Grain size distribution, End member modelling analysis, Laser granulometry

