

SEDIMENTOLOGICAL CHARACTERIZATION OF GIANT'S TANK CLAY DEPOSITS IN SRI LANKA: IMPLICATION FOR THEIR GENESIS

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Giant's tank clay deposits, which are interconnected with reddish-brown sandy soil (Red Earth deposits) and cover over 400 km² in the Mannar District of Northern Province, Sri Lanka. A comprehensive investigation into the genesis of the montmorillonite clay deposits at Giant's tank is necessary to elucidate their depositional environment. Thus, this study aimed to determine the origin and formation processes of montmorillonite clay deposit at Giant's tank using sedimentological analyses. Four 1 m-deep core samples were collected within and outside the tank, with sub-samples taken from each core at 0.2 m intervals used for the analyses. Particle size distribution (macro and micro) and grain morphology (skewness, kurtosis, roundness, mean size) analyses were conducted using Image J Java-based software. The roundness of weathering-resistant minerals (Quartz, Magnetite, Ilmenite, Zircon, Garnet, Spinel, and Sphene) and the polymodal grain size distribution indicated that the sediments had been transported for longer distances by both fluvial and aeolian processes. The results of grain morphology (positively skewed plot against mean size) indicated minimal influence from oceanic currents and lagoons, suggesting that the sediments have been deposited in a non-marine environment. Additionally, the polymodal distribution of sediment grain sizes, along with their morphological parameters (positively skewed grain morphology, plots of skewness vs kurtosis, and mean roundness of 0.71-0.76), indicated sediments from multiple sources implying a complex origin for the clay deposits. The results revealed that both aeolian and fluvial processes have significantly contributed to the sediment transport and deposition in the area of the deposit. Future studies would enlighten the sedimentary environment of these clay deposits.

Keywords: Giant's tank, Grain morphology, Microscopic analysis, Sediment, Shape descriptors