ABSTRACT

Extreme wave events generally leave a permanent record in sedimentary deposits. The main aim of the research work has been done to reveal the diagnostic features of tsunami deposits with other extreme wave event deposits, and to establish the recurrence interval of such extreme wave events with the aid of high resolution Ground Penetrating Radar (GPR) data. From granularity studies, we obtained landward thinning deposits indicating the repeated wave attack with different wave velocities that brought significant quantities of sediment from offshore regions to land. The presence of fine- to medium-sized sand, and moderately well to well-sorted sediments indicates the sudden winnowing action by the depositing agent, positive skewness signifies the unidirectional transport as well as deposition, and the platykurtic to leptokurtic nature of sediments indicates energy fluctuations of the depositing medium and sheds light on extreme wave events (tsunami). The presence of magnetite content in a good proportion provides strong evidence that the analyzed sediment was indicative of extreme high energy as the normal waves and storms are incapable of transporting such high-density material. Magnetic susceptibility analysis shows high values ranging from 200 to 600×10^{-5} SI units for quartz-rich sands, and reveals the severe reworking processes as well as the large scale transportation of the sediments. The combined geophysical, sedimentological and geochronological data suggests a recurrence interval of 900-1,200 years, with a high-frequency component of ~300 years. Prominent subsurface reflections from two GPR transects in Avis Island, Andaman region, marked four lithological anomalies below these coral reefs. These scarps dip 5-10° towards sea and they consist of sands with more than 30 - 40% heavy mineral concentrations that produce distinct subsurface reflections and make it possible to locate the buried erosional scarps. The presence of foraminifers and ostrocods signifies the source of origin of the sediments as shallow to deep marine environment and that they were brought to the onshore region by wave events in the Velankanni area.

Keywords: Ground Penetrating Radar, Extreme wave events, Magnetic susceptibility, Grain size, Tsunami