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Reconstruction of Quaternary Environmental Changes on Eastern Coast of Sri Lanka.

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Abstract

Coastal sedimentary archives are important to recognise the past dynamics of environmental changes and climate variability. The current study describes paleoenvironmental changes in the eastern coast of Sri Lanka. A core sample (length=10 m) was collected from a stagnant shallow water coastal body next to the Koddiiyar Bay. The sampling site is not presently connected to the Indian Ocean through the Koddiiyar Bay. Sediment samples were sliced into 5 cm intervals, and oven-dried at 60° C for 48 hours before geochemical analyses. Weight percentages of Total carbon (TC), total nitrogen (TN) and total sulphur (TS) were measured using CHNS/O elementary analyser. Mineral phases of the sediments were determined using X-ray diffractometry (XRD). In the lower sedimentary succession, TC (range from 0.25% to 0.32%) and TS (range from 0 to 0.54%) are low from the depth of 460 cm to 205 cm. These values can suggest a low productive and oxic depositional environment. However, TC and TS values are slightly increased in the regions of 415 cm to 375 cm. This organic matter rich brackish chronozone can probably indicate short-lived environmental changes such as paleo tsunami or saltwater intrusion. In the upper sedimentary succession, TC (range from 0.32% to 7.37%), TN (range from 0.1% to 0.37%), and TS (range from 0.54% to 3.19%) values are gradually increased in the depth from 210 cm to the Recent sediments. It can probably indicate anthropogenic activities in the watershed. In addition, this upper sedimentary succession is characterised by the deposition of organic matter rich sediment under the anoxic to oxygen-poor conditions. According to XRD results, clay minerals such as illite and smectite are abundant throughout the core. Pyrite can also be identified as an abundant mineral in upper sedimentary succession suggesting that bacterial sulphate reduction and formation of sedimentary pyrite. In conclusion, a clear unconformity can be identified for the major environmental change at 210 cm in depth may be due to land degradation in the region.

Keywords: Carbon burial, Sediments, Depositional environment, Paleo tsunami