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Geomorphological Evidence of Late Holocene Events of Extensive Uplift from West Coast of Andaman Island, Andaman & Nicobar Islands, India

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The study area located on the west coast of Andaman Island experienced marginal subsidence during 2004 Sumatra-Andaman (Mw 9.3) earthquake and subsequently inundated up to a definite extent towards inland. Sea notches, cliffs, wave-cut platforms and extensive beach constitute the major geomorphic landforms in the area along with beach ridges, marsh/lagoon, and swales on the coastal topography. Coastal landscape comprises signatures of a varied compositional complex of the calcareous rocks with resistive and degradable components. Since located in a tropical region, calcareous substrates of the area are vulnerable to removal of rock fragments due to the formation of deep-sea notches at the base of coastal cliffs along with the small-scale geomorphic features on the shore platforms. The site shows relicts of the previous rocky landscape in form of big notches and cliffs, which have survived long-term erosion under the influence of rising sea level during the phases of subsidence in the region. Study area witnessed three well-defined episodes of upliftment based on three major sea notches, where the region experienced significant downfall of sea level exposing underlying coastal tracts and submerged rocky cliffs and notches. As evidenced by notch morphology, a single episode is comprised of multiple phases of uplift and subsidence; however, cumulative uplift outweighs the cumulative subsidence, and thus the resultant vector during an episode indicates the uplift. Three episodes of major uplift are intercalated by two remarkable phases of subsidence, which reveal two potential earthquakes comparable to the recent 2004 event. It is inferred from the nature of earthquakes along the Sumatra-Andaman subduction zone that these two earthquakes had been far-source (most probably around the epicenter of 2004 earthquake), and thus caused similar land level changes in the Andaman Islands. Stratigraphic evidence of two conspicuous peaty horizons from a nearby site with alternation of thick silty to clayey deposits characterizes the cyclic pattern of land level changes, which is well correlated with Level-1 and Level-2 sea notches and also supported by closely located two levels of uplifted coastal terraces. We conclude that paleoseismic land-level changes (i.e. uplift and subsidence) inferred from the sediment stratigraphy shows a fine correlation with the geomorphology of the study area. We postulate that individual notches are formed during periods of no rapid climate change (no remarkable climatic sea level fluctuations), and the rate of sea level rise during meteorological phases or so ever was outpaced by the rate of tectonic uplift.