

Revealing the coastal event-history of the Andaman Islands (Bay of Bengal) during the Holocene using radiocarbon and OSL dating

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Abstract Earthquakes that trigger tsunamis are of great geological, ecological and socio-economic importance. The knowledge of the recurrence interval of these events will give information about the hazard for a region. Coastal sediments on the Andaman Islands located in the eastern Bay of Bengal were investigated to find evidence for palaeotsunamis and palaeoearthquakes. Fieldwork was conducted on Red Skin Island and North Cinque Island, south of South Andaman. Sediment material from event-layers was dated by optically stimulated luminescence and radiocarbon dating method. The results show evidence possibly for one earthquake at about 1,000 or 3,000 years before the present together with deposits from possible tsunamis and storms. The complex pattern of co- and post-seismic uplift and subsidence of the Andaman Islands is reflected in the investigated sections and made it possible to reconstruct an event-history for the last 3,000 years.

Keywords Palaeostorm · Palaeotsunamis · Palaeoearthquakes · Andaman Islands · OSL dating · Radiocarbon dating

Introduction

The Andaman Islands are located in the eastern part of the Bay of Bengal (Fig. 1) in a tectonically active area. Numerous strong earthquakes in the recent past give evidence for this high tectonic activity. The area of interest is affected by strong tropical storms and tsunamis altering the coastal area and causing serious damage. The most recent strong tsunami in December 2004 following the M_w 9.3 earthquake off the west coast of northern Sumatra caused severe damage along the coasts of the Andaman Islands and the whole Bay of Bengal. This historically unprecedented earthquake and tsunami suggest that the Indo-Andaman plate boundary ruptures in variable modes (Satake and Atwater 2007; Stein and Okal 2007). To evaluate the behaviour of this plate boundary, we need a more reliable chronology of earthquakes or the tsunamis they generate. The Holocene coastal deposits are thought to contain a detailed sediment archive of past cyclones and tsunamis. The Andaman Islands were chosen to study this sediment archive due to its proximity to the subduction zone west of the Indonesian Archipelago, which is the main driving force for the tectonic activity. Even weak tsunamis could have deposited or eroded sediments on the nearby Andaman Islands. No written records are known about ancient tsunamis, such as those recorded in Japan, but some evidence suggests that tsunamis do recur. For example, indigenous people living on islands off the coast of Thailand know about tsunamis from oral traditions and used that knowledge to escape from the 2004 tsunami (Arunotai 2006). Indigenous people live also on the Andaman Islands and behaved similarly. Historical tsunami events are recorded for the past 260 years along the coasts of the Bay of Bengal (Manimaran and Chacko 2006). Bilham et al. (2005) summarized historical records of earthquakes and

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