

Holocene crustal movement along the Rakhine coast of Myanmar deduced from the coastal terrace data

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The subduction boundary that ruptured by the 2004 Sumatra-Andaman earthquake continues to the north as the Arakan trench, offshore of the Rakhine coast of Myanmar. Based on recent GPS data (Socquet et al. 2006), current Indian plate moves north-easterly with the horizontal motion of 10 mm per year with respect to the Burma microplate. These data suggest high possibility of large earthquake to occur along the Arakan Trench in near future. To forecast the future activity, investigation of the past earthquake history of the Arakan Trench is necessary. We started paleoseismological study along the coastal area of the Rakhine coast of Myanmar from 2006.

In February 2006, we found three emerged steps of coastal terraces along the coasts of Phayonkar islands (Myengun and Tandin coasts) in the Rakhine coast of Myanmar, and the coral fragments obtained from the uppermost terrace showed about 3000 yrBP. They strongly suggest that three large earthquakes attacked this area during the last 3000 years. In January 2007, we revisited these areas to determine the lateral extension of the uplift areas and ages of each terrace. Nine survey sites distributing along the NNW-SSW about 130 km long the Rakhine coast of Myanmar were chosen based on observation of available geographic map and high resolution satellite images.

The Ramree Island is located about 100 km south from Sittway. We found four steps of marine terraces along the northwestern coast of the island. Each of them is composed of beach ridges and lagoons. Because terraces are covered by thick sandy sediments, we could not collect sample available to age determination except for peaty sediments from the uppermost terrace.

In west and middle Phayonkar Islands about 10 km south of Sittway, we identified three steps of terraces. They are underlain by wave-cut terraces which are covered by shell rich sandy and muddy sediments. Coral fragments are often observed in the sediments. Furthermore we also found several exposures of coral microatoll at the coast of middle Phayonkar island (south). These coral microatolls are useful tools for identification coastal land level changes associated with the past subduction-zone earthquakes.

Nearby coastal areas of Sittway city, gentle ridge and trough parallel to the coast at the wave length of about 2 km are observed on satellite images. We found beach deposits characterized by parallel lamination below one of the ridges about 3 km landward from the coast. Precise leveling survey indicated that the beach uplifted about 3 m.

We expected that these flights of coastal terraces distributing over a hundred kilometer long the Rakhine coast must be closely associated with the subduction-zone earthquakes occurred in the vicinity of the Arakan trench, one of them may be the correspondence of the oldest record, the 1762 event (Halsted 1841, Chibber 1934). Age and elevation data of uppermost steps of terraces at west and middle Phayonkar islands give 2-4 mm per year of uplift rate of the Rakhine coast. The elevations of the uppermost steps of the terraces, about 11-19 m, in coasts of west Phayonkar island were larger than those of middle Phayonkar island where the maximum elevation were about 5-11 m. Such decrease in elevation from seaward to landward suggests landward crustal tilting of the Rakhine coast. To tie the relation between the emergence period of each step of the terraces and past earthquake event may require age determination of each step of the terrace. We will fully report the details of the terraces with the dating results in the meeting.