Geological evidence of sea-level change: a preliminary investigation at Panag Tak area, Chumphon province, Thailand

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The changes in sea-level are accepted worldwide to have closely related to the evolution of the coastal plain (Choowong, 2004). Geological indicator such as sea notch, old sand barrier, beach ridge, relict strandlines, and former tidal flat have been employed to determine the position of the shoreline in the Quaternary. In Thailand, the literature and published papers (e.g. Somboon and Thiramonkol, 1992; Choowong, 2002) mentioned that the present coastal area from the Gulf of Thailand was flooded especially in the Holocene period mostly as a result of eustatic sea-level change. From the Middle to Late Holocene, sea level rose rapidly from about -12.75 m below mean sea level (MSL) to the maximum highstand about +3.5 m above the present MSL of at around 6,500 to 4,000 years ago (Choowong, 2002).

The evolution of Panang Tak coastal area was explained from the geological, geomorphological and sedimentological evidences. Panang Tak bay is part of the Chumphon coastal plain that is situated in the Gulf of Thailand side. We firstly used aerial-photo and satellite image to interpret the geomorphology of the area and then field work was performed to investigate and collect the sediment samples from specific location. We observed the area, made the core sampling by hand auger, also made the test pit to investigate the subsurface profile and collected the sediment samples. Core sampling from 10 areas revealed the paleo-environment of the Panang Tak coastal plain including former beach ridge, old sand barrier, paleo-lagoon, and also paleo-channel of estuary or tidal inlet. Shell’s fossils that indicate inter-tidal, mangrove, and swampy environment were also found in the area of non-sub aqueous zone. Sea-level change evidences such as old sand barrier, former beach ridge and paleo-lagoon can be obviously recognized from the satellite image and aerial-photo. The sand barrier and former beach ridge are located inland at 1.2 km from the present shoreline and their elevation is about 5 m above the present MSL. These evidences can inform us all about the paleo-environment of this coastal plain. Core samplings in paelo-lagoon showed some interesting features of sand sheets intercalated with sharp contact between mud layers. These sand sheets are characterized by fine-to-medium grained and composed mainly of quartz and shell fragments. Some sand layers show normal graded. The average thickness of each sand sheet is about 2-3 cm, but the thickest layer is of 35 cm. These sand layers are classified as the unusual deposit in a normal lagoon environment. The most possible process that can bring sand to be deposited here is storm surge that is caused by typhoon or tropical storm (Phantuwongraj et al. 2009).

From the preliminary investigation of evidence of sea-level change in Panag Tak area, we suggested that the inner beach ridge which was located 1.2 km from present shoreline might represent the highstand landform of the transgressive period possibly at the middle Holocene.

Choowong, M. 2004. 29th Congress on Science and Technology of Thailand, Khonkaen.
Phantuwongraj, S. et al., 2009. The 5th KAGI21 International Summer School, Kyoto, Japan.