

Progradation rate of the Soc Tran coast, Mekong delta, related to the winter monsoon fluctuations

Toru Tamura^{1*}, Yoshiki Saito¹, Mark D. Bateman², V. Lap Nguyen³, T.K. Oanh Ta³, Akio Sato⁴, Akiko Tanaka¹, Katsuto Uehara⁵

¹Geological Survey of Japan, AIST, ²Department of Geography, The University of Sheffield, ³HCMC Institute of Resources Geography, VAST, ⁴Graduate School of Frontier Sciences, The University of Tokyo, ⁵Research Institute for Applied Mechanics, Kyushu University

A unique sediment transport system caused by monsoons characterizes the South China Sea coast of the Mekong delta, southern Vietnam. In summer, under the relatively weaker southwesterly monsoon, sediments supplied from the flooded river is deposited and stored on the coast. These sediments are then drifted northwestwards by the longshore current driven by the stronger northeasterly winter monsoon. Mud is further transported to the end of the South China Sea coast, forming the prominence of the Camau Peninsula. Thirteen optically-stimulated luminescence (OSL) ages of cheniers and radiocarbon ages of a sediment core were obtained for the reconstruction of the progradation of the Soc Tran coastal plain, southwestern part of the Mekong delta. From this, we found remarkable changes of the progradation rate, which are thought relevant to fluctuations in the winter monsoon strength. The OSL ages are younger than 2770 yr, and become younger seawards concordantly with the coastal progradation that cheniers document. The sediment core, drilled in the inter-ridge swale between two chenier ridges of 1370 +/- 70 yr and 600 +/- 30 yr, reaches the basement at -20 m relative to the mean sea level. The core shows a regressive delta succession, of which radiocarbon ages become younger upwards from 4790-4640 BP (4850-4700 yr) to 1530-1420 BP (1590-1510 yr). These radiocarbon ages support estimates of OSL ages obtained in cheniers landwards, which contemporaneous of the subaqueous delta deposits in the succession. The progradation rate of the Soc Tran coast have changed drastically; it was 8 m/yr, 31 m/yr, and 5 m/yr during periods of 2770-1370 yr, 1370-590 yr, and 590 yr to present, respectively. The rapid progradation during 1370-590 yr did not form cheniers, resulting in an extensive inter-ridge swale. Cheniers are generally formed in relations to erosion of muddy coast. The chenier distribution and drastic changes in progradation rate were resulted from fluctuations in relative importance of longshore sediment removal to seaward sediment accretion. The architecture and chronology of beach ridges in the Tra Vinh coastal plain, northeast of the Soc Tran, also suggest similar fluctuations in the longshore sediment transport. The dominance of the longshore sediment transport after 590 yr is thought caused by the strengthened winter monsoon, which is possibly related to the beginning of the Little Ice Age.