Fluctuating accretion rates of shoreline compartments of the Mekong delta, Vietnam

*田村 亨[1]、齋藤 文紀[2,1]、Gugliotta Marcello[2]、Nguyen Van Lap[3]、Ta Thi Kim Oanh[3]
*Toru Tamura[1], Yoshiki Saito[2,1], Marcello Gugliotta[2], Van Lap Nguyen[3], Thi Kim Oanh Ta[3]

1. 産業技術総合研究所地質情報研究部門、2. 島根大学エスチュアリー研究センター、3. ベトナム科学技術院ホーチミン資源地理研究所
1. Institute of Geology and Geoinformation Geological Survey of Japan, AIST, 2. Estuary Research Center, Shimane University, 3. Ho Chi Min City Resource Geography Institute, Vietnam Academy of Science and Technology

Sufficient fluvial sediment supply is required for accreting or even just keeping delta shorelines that are affected by marine-induced sediment reworking processes, such as tides and waves. There are concerns about the long-term effect of the decline in the sediment supply on the Mekong delta shoreline evolution especially since the enhanced human activity in the late 20th century. However, the long-term sediment supply possibly fluctuated much and its quantification helps understanding the ongoing processes and mechanism behind. We present the detailed assessment of the accretion rates of multiple shoreline compartments in the Mekong delta over the last 2500 years based on fossilized shorelines and their OSL and radiocarbon chronologies. The Mekong River bifurcates in the upper delta plain into the main channel and Bassac River. In the northeastern part of the lower delta plain, the main channel further bifurcates three times into four distributaries, which then define sandy inter-distributary shoreline compartments. From the mouth of the Bassac River to Camau Peninsula, southwestern end of the delta, the longest and muddy shoreline compartment is defined. These shoreline compartments are affected by the southwestward longshore drift and fed sediments by their updrift distributaries. The northeastern sandy compartments show minor shifts of depocenter, but their total accretion rate is consistent ranging from 0.7 to 1.2 km^2/year in 400–2500 year BP. However, the total rate increased to 2 km^2/year in the last 400 years. The accretion rate of the southwestern muddy compartment was from 2 km^2 in 1400–2400 year BP and increased to 6 and 8 km^2/year at 1400 and 600 year BP, respectively. The Camau Peninsula was formed exclusively in the last 600 years. The accelerated accretion of the southwestern shoreline after 1400 year BP reveals the increase in the mud supply while the rise of the northeastern shoreline after 400 year BP implies additional sand supply. These separate trends in sand and mud may be linked to the difference in the shoreline trend in the northeastern and southwestern shorelines over the last 20 years. Especially, the ongoing remarkable erosion in the southwestern shoreline may reflect a rapid decline in mud supply that was overwhelming over the last 1400 years.

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