Sediment facies and environment in distributary channels of the Mekong River delta, Vietnam

*Yoshiki Saito[1,4], Marcello Gugliotta[1], Van Lap Nguyen[2], Thi Kim Oanh Ta[2], Rei Nakashima[1], Toru Tamura[1], Katsuto Uehara[3], Kota Katsuki[4], Seiichiro Yamamoto[5]

1. Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology, 2. HCMC Institute of Resources Geography, VAST, 3. Research Institute for Applied Mechanics, Kyushu University, 4. ReCCLE, Shimane University, 5. Fukui Commercial High School

The Mekong River delta is one of largest deltas in Asia, ranked world’ s third largest in delta plain area, and one of typical mixed wave- and tide-dominated deltas. River channels in the delta are strongly influenced by tides, up to Phnom Penh in Cambodia during the dry season. The coastal zone of the delta is strongly influenced by waves, resulting in the formation of beach ridges and alongshore sediment transport towards the Cape CaMau. Sediment sampling for sediment facies analysis and salinity survey were conducted in river channels in Vietnam from 2015 to 2016, and river morphology; channel depth, width, and sinuosity was analyzed.
The result shows clearly two main tracts in the river channels in Vietnam; an upstream, fluvial-dominated tract and a downstream, tide-dominated tract, and these tracts are divided into two subzones respectively. From upstream to downstream, the four subzones are identified: fluvial-dominated, tide-affected; fluvial-dominated, tide-influenced; tide-dominated, fluvial-influenced; and tide-dominated, fluvial-affected.
Tidally induced water-level changes affect the entire study area and extend into Cambodia. Salinity intrudes ~15 km upstream of the river mouth during the wet season, and ~50 km upstream during the dry season. Brackish water species of mangroves, mollusks, and diatoms, however, occur landward of these limits, suggesting that highly diluted brackish water may reach ~160 km upstream of the river mouth during the dry season. In the fluvial-dominated tract, channels are sinuous and show a seaward-deepening trend, whereas width is relatively constant. In the tide-dominated tract, channels are straight, and show seaward-widening and seaward-shallowing trends. Natural levees are present in the fluvial-dominated, tide-affected subzone, but are replaced by mangroves. In the fluvial-dominated tract, mud content is low, sand grain size fines seaward, and gravelly sand and sand are dominant facies. In the tide-dominated tract, mud content is high, sand grain size is constant, recycled sand is common, and tidal rhythmites are the dominant facies. Mud pebbles are common in sediments of a large part of the study area.

Keywords: distributary channel, tide-dominated delta, sediment facies, tidal river, backwater, tidal rhythmite

