

The Dynamics of Mahakam Delta - Indonesia, Based on Spatial and Temporal Variations of Grab Samples, Cores, and Salinity

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During year 2005 - 2009, observations on modern sediment of Mahakam Delta in the southern and the northern lobes were conducted using grab samples on the river bed in conjunction with echo sounding, shallow core sampling, and salinity measurements. The delta environments observed were head of passes, upper delta plain, lower delta plain, and delta front. The purpose was to try making as detailed analogues as possible to the Miocene/Pliocene deltas being explored and exploited in the area.

Decreasing grain size on the river bed from the head of passes to delta front were observed in the northern lobe. Similar pattern, however, was not apparent in the southern lobe, where there was a distinct anomaly of coarser grain size from lower delta plain to delta front area. This is indicating by-pass sedimentation or effect of relics of submerged previous lower delta plain sands which are now being transgressed. Most of the thalweg areas in the channels were devoid of sands; grab samples usually found semi-consolidated clay, instead. Active sand transportation and deposition locus were the slopes of the point bars and side bars. Shallow cores in the lower delta plain were generally characterized by clay drapes, both in the northern and the southern lobes, suggesting tidal processes were operational in almost the same intensity in both areas. Salinity measurements in the water and sediments both showed an increasing trend from upstream to downstream, with the northern lobe being more intruded by the seawater profiles. Variations of salinity with times were also observed being controlled by tidal activity periods.

The implication of this new observation to the subsurface mapping of the Miocene/Pliocene delta are very interesting ones. Updip shale-out trap of delta front mouth-bar sands maybe worth to pursue, as well as new model of fluvial in contrast to delta plain sand geometry with respect to clay-plugs and edge-of-channel. Tidal effect reservoir models may also be revisited in context with lobe relative positions and formation water salinity.