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Modelling Suspended Sediment Transport in Monsoon Season: A Case Study of Pahang River Estuary, Pahang, Malaysia

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Sediment transport based on 2-dimensional real time model was applied to Pahang River estuary, Pahang, Malaysia and has been evaluated and verified with time series of tidal elevation, flow and suspended sediment load. Period of modelling was during highest high tide and lowest low tide in Northeast Monsoon (NE) which happened in December 2010 and Southwest Monsoon (SW) in July 2011. Simulated model outputs has been verify using Pearson's coefficient and has showed high accuracy. The validated model was used to simulate hydrodynamic and sediment transport of extreme conditions during both monsoon seasons. Based on field measurement and model simulation, tidal elevation and flow velocity, freshwater discharge of Pahang River were found to be higher during NE Monsoon. Based on the fluxes, the estuary also showed 'ebb-dominant' characteristic during highest high tide and lowest low tide in NE monsoon and normal ebbing-flooding characteristics during SW monsoon. In the Pahang River estuary, inflow and outflow patterns were perpendicular to the open boundary with circular flow formed at the shallow area in the middle of estuary during both monsoons. Referring to sea water intrusion from the river mouth, both seasons show penetration of more than 9 km (upstream input boundary) during higher high water tide. During higher lower water tide, the water intrusion stated varies which 5.6km during NE monsoon and 7.8km during SW monsoon. Regarding to the times lap during high tide, the sea water takes 2.8 hours to reach 9km upstream during NE monsoon compared to 1.9 hour during SW monsoon. The averages of suspended sediment concentration and suspended sediment load were higher during Northeast monsoon which increased the sedimentation potentials.Total of suspended sediment load discharged to the South China Sea yearly from Pahang River is approximately 96727.5 tonnes/day or 3.33 tonnes/km2/day which 442.6 tonnes/day during Northeast Monsoon and 25.3 tonnes/day during Southwest Monsoon. Thus, Pahang River estuary found to be directly affected by the monsoon factors especially due to high amount of river discharge and surface erosion from catchment areas. This study provides several useful understanding on the hydrodynamic and sediment transport of Pahang River estuary and catchment area.

Keywords: Pahang River Estuary, hydrodynamic, sediment transport, MIKE21 MT