

Suspended sediment transport in distributary channel networks and its implication on the evolution of delta

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Abstract: Suspended sediment (SS) transport in distributary channels play an important role on the evolution of deltas and estuaries. Under the interactions between river discharge, tide, and bathymetry of Pearl River delta (PRD) in south China, the spatial and temporal characteristics of suspended sediment transport are investigated by using the field data of July 16 to 25, 1999 and February 7 to 15, 2001. The PRD, as one of the most complex tributary system in the world and composed of 324 transversal and longitudinal tributaries, with eight outlets to the three sub-estuaries, has higher suspended sediment load in middle delta including six outlets than in right and left tidal dominant channels of PRD, that is Humen channel and Yamen channel system. Under large river discharge of one flood in summer, the tidal averaged SS transport from channel to the estuaries, the SS concentration of middle delta is 10~20 times and the transport rate is 100~500 times of dry season. But the transport rate changes little between flood season and dry season in the upper channel system of Yamen and Humen, and in dry season the tidal averaged transport change direction from estuary to these channel systems. About 70~85% of total Pearl River SS load transport along the main channel of West River, then transport about 45~55% into the lower West river delta, about 30% of total SS load flushed into the Modaomen outlets. Under the bathymetry of branched channels, SS load which advected from the Pearl River and resuspended from bed, redistributed 4~8 times in the PRD and then cause the different changes of channels. It found that in flood season, the suspended sediment load from Pearl River including East, West, North River and Tanjiang, Liuxi River into the PRD is less than that discharged into the estuaries through eight outlets, which indicated the erosion in the channels of PRD especially in the lower part of PRD. Suspended sediment budget in dry season during neap-spring cycle indicated that more sediment transport into the PRD from estuary through Humen and Yamen outlets, and the net suspended sediment deposit into the PRD tributaries which cause a little deposition of the PRD.