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### **Morphodynamic evolution of the longitudinal profile in the Yangtze River Estuary in response to natural and anthropogenic interferences**

Ming Tang, Heqin Cheng

East China Normal University, China

#### **Abstract**

The evolution of the longitudinal riverbed profiles is a critical feature of morphological adjustments in fluvial systems and might have important effects on channel stability, navigation, and floods control. For getting a better understanding about channel adjustment processes of this large deltaic channel, this study assessed three decades of morphological changes of 35-km long channel thalweg and longitudinal riverbed profiles in South Channel (SC) in the Yangtze Estuary. Sediment sampling and longitudinal river-bottom surveys were conducted by the instrument assembly system including the Seabat 7125 multibeam echo sounder (MBES), a dual frequency acoustic doppler current profiler (ADCP), and an EdgeTech along the thalweg on the SC. Results showed that the average elevation of the thalweg in the SC exhibited a nonlinear growth trend, with the average elevation increasing by 1.4m. Natural factor and human intervention play an essential role in the changes of thalweg. An antisllope channel with about 20-kilometers length in the SC was developed and the longitudinal profiles of the antisllope channel changed from concave to convex significantly. In a whole, the morphology of the SC are still in the adjustment to the reduction of riverine sediment supply. Dunes with small superimposed dunes were developed well along the channel thalweg in the SC and the antisllope reach were normally covered by dunes on the entire bed. In general, dune wavelength increased with increasing water depth along the thalweg in the antisllope channel and dune wavelengths ranged from 4.25 to 21.86m. This work provides new insights into the long-term morphological adjustment of longitudinal riverbed profile of estuarine channel to natural and artificial forcing and their implications for deltaic channel exploitation.

#### **Keywords**

Channel thalweg, Longitudinal profile, Morphological adjustment, Yangtze River