A Mophodynamic Study on the Evolution of the Pearl River Delta of China Since 6000 aBP

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Abstract

Pearl River delta with the network system and estuarine bays is one of the most complicated large scale estuarine systems in China. In this study, a long-term morphological model is developed to simulate the evolution of the Pearl River delta and its estuarine system.   The underwater topography of the estuarine bay in the last transgression maximum about 6000 aBP is reconstructed and serves as an initial condition of this model. The driving forces and control factors considered in the long-term delta evolution include representative tides, sediment supply from the Pearl River system, sea-level variation, sediment condensation rates and neotectonic movement. Deposition rates and total deposition volume are investigated and determined and then used to calibrate the model. More than 2,000 cores collected are carefully analyzed to verify the model-simulated evolution processes. The local archaeological evidence is compared with the model output as circumstantial verification. The present study reveals new features during the Holocene delta evolution which indicate the chronological and spatial progress of the delta is different from previous studies in many aspects. The study also provides more details to the delta development originated from the effects of the morphodynamic structures, such as bi-direction jets. The model confirms that the complicated morphology, e.g. the rocky islands in the shallow estuarine bays is one of the most important control factors affecting the long-term delta evolution of the Pearl River delta.

Keywords   morphological modeling, Pearl River delta, evolution, long-term