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River discharge contribution to sea-level rise in the Yangtze River Estuary, China

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Abstract

Sea level changes in the Yangtze River Estuary (YRE) as a result of river discharge are investigated based on the monthly averaged river discharge from 1950 to 2011 at the Datong station. Quantification of the sea level contribution is made by model computed results and the sea level rates reported by the China Sea Level Bulletin (CSLB). The coastal modeling tool, MIKE21, is used to establish a depth-averaged hydrodynamic model covering the YRE and Hangzhou Bay. The model is validated with the measured data. Multi-year monthly river discharges are statistically calculated based on the monthly river discharges at Datong station from 1950 to 2011. The four characteristic discharges (frequency of 75%, 50% and 25%, and multi-year monthly) and month-averaged river discharge from 1950 to 2011 are used to study the seasonal and long-term changes of sea level. The computed sea level at the Dajishan and Lvsi stations are used to study the multi-time scale structure of periodic variation in different time scale of river discharge series. The results reveal that (1) the sea level rises as the river discharge increases, and its amplification decreases from upstream to the offshore. (2) The sea level amplification on the south coast is greater than that on the north coast. When river discharge increases by 20000 m³/s, the sea level

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