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Influence of seasonal runoff regulation by the Three Gorges Reservoir on saltwater intrusion in the Changjiang River estuary

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The Three Gorges Reservoir (TGR) is the largest water conservancy project in the world. It significantly regulates discharge of the Changjiang River on a seasonal scale. It stores water in autumn and drains it during the following dry season. Although the effects of the TGR on various processes in the river, estuary, and adjacent seas have been studied extensively, the TGR's influence on saltwater intrusion around the estuary and its impacts on vital freshwater reservoirs have not been quantitatively evaluated. In this study, we used a well-validated numerical model to simulate the seasonal-scale saltwater intrusion around the Changjiang Estuary under scenarios with and without the TGR regulation. Results showed that during the autumn season, the TGR advanced the timing of saltwater intrusion and slightly increased its intensity. In contrast, as the TGR supplemented river discharge during the dry season, saltwater intrusion around the freshwater reservoirs was significantly suppressed. Moreover, duration of saline water (salinity > 0.45, the standard for drinking water) at the Dongfengxisha, Chenhang, and Qingcaosha Reservoirs was shortened by about 16%, 73.1%, and 48%, respectively. The model results showed that overall, operation of the TGR is basically favorable for reducing the burden of freshwater supplement in the high-populated estuarine region.

Biography

Jian-Rong Zhu has completed his PhD from Ocean University of China and Post-doctoral studies from East China Normal University. He is a Professor of State Key Laboratory of Estuarine and Coastal Research. He has published more than 10 papers in reputed journals.

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