Impact of seasonality runoff variations on tidal current limit in the lower Yangtze River

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In the lower Yangtze River, tides propagate inland from the estuary and produce tidal currents and tidal level variations along the reach. The locations of tidal current limit depend not only on the fluctuation of upstream runoff but also on river topography. Understanding the location changes is essential for clarifying the flow patterns, sediment transport and fluvial processes in the tidal reach. Based on the measured data, a two dimensional (2D) numerical model, from Datong to Xuliujing (~500 km), is performed for analyses of the tidal behaviors. The model after calibration is also validated according to measurements. The results show that the estuarine tidal flood current decreases with the increase in river runoff and distance from the river mouth. Beyond a certain position, the variations of flood current disappear; the position is not fixed on a year basis and exhibit seasonal variations. During the dry and wet seasons, the furthest and nearest locations as well as the variation range are also examined. A quantitative relationship between the flow discharge and the tidal current limit is obtained. The findings provide a reference for the development and utilization of the lower reach and the analysis of the dynamic mechanism in similar scenarios.