



## **A study on river discharge and salinity variability in the Yangtze River Estuary, China**

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The Yangtze River Estuary (YRE) is the largest estuary in China, with three-order bifurcations and four outlets into the sea. In recent years, saltwater intrusion has been given more attention due to the increase in its level and frequency. Saltwater intrusion in the YRE as a result of the reduced river discharge are investigated based on the river discharge at the Datong station. The hydrodynamic and salinity transport model, MIKE21 is applied to quantify the influences of river discharge on saltwater intrusion in the YRE. The model has well been validated through observation data of tidal level and salinity. The 25%, 50% and 70% frequency of river discharges in the dry season at 18112, 16331 and 14832m<sup>3</sup>/s respectively and the multi-year averaged river discharge 27856 m<sup>3</sup>/s are used to simulate the salinity level change. The result reveals that (1) The salinity of the selected stations in the North Branch (NB) shows a slowly decreasing trend from upstream to downstream, and the salinity maintains above 20 ‰. The salinity of the South Branch (SB) is distributed as "high-low-high", and the change of salinity is greatly affected by the river discharge. There is a good correlation between salinity and discharge in the NB and SB: 0.917-1. (2) When the runoff is 27856m<sup>3</sup>/s, the ratio of salinity beyond the standard in SB is less than 10%. When the river discharge reduces to 16331m<sup>3</sup>/s, the ratio is more than 50%. (3) As the river discharge decreases, the amplification line (0.2PSU) decreases rapidly and the amplification lines (0.45PSU, 2PSU) increasing. Away from the entrance, the effect of runoff is weak, such as amplification lines gradually reduce. (4) The changes of river discharge have a significant impact on the freshwater reservoir water withdrawal. When the river discharge keep 27856m<sup>3</sup>/s, the salinities of Baogang, Chenxing, Qingcaosha reservoirs remain below 0.45PSU. However, the salinities of four reservoirs exceed the drinking water standard (0.45PSU) more than 23 days when 14832m<sup>3</sup>/s, and water supply of YRE was affected.