

Trapping effect of estuarine turbidity maximum on particulate organic carbon and its response to a typhoon event in a macro-tidal estuary

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Estuaries are key nodes of land-ocean interaction, the associated suspended sediment processes being crucial for global and regional material fluxes and environmental health. Within estuaries, there is commonly a reach where the water turbidity is markedly higher than both landward and seaward. This elevated suspended sediment concentration (SSC) is termed the estuarine turbidity maximum (ETM). The ETM has important influences on harbor siltation, ecological conservation, and biogeochemical dynamics. Jiulongjiang estuary is a small macro-tidal estuary in southeast China coastal area, which is a typical example for estuarine ecosystem conservation and its response to catchment management.

Observed results show that the tidal current is the main factor which control the variations of SSC in ETM under the normal condition. However, under the influence of typhoon event, the hydrodynamic action was strengthened and the salt water intrusion was also enhanced, and the fresh water and sediment discharged from river system increased, which led to the complicated variations of the ETM. Under the normal conditions, the maximum width of ETM was about 10 km in spring tide. However, before typhoon landed, the maximum width of the ETM was about 14 km; after the typhoon landed, the maximum width of the ETM was more than 20 km, and during the low tide stage, the width of the ETM was still 19 km which was induced by high turbidity water input from river system. The particulate organic carbon (POC) concentration reached 19.26 mg/L within the ETM at the next day after typhoon landed, which was much higher than that under normal weather condition (the maximum value was only 3.15 mg/L). During the low tide level, the POC concentration increased remarkably from upstream to the core of ETM and then decreased toward downstream, while the POC concentration decreased toward downstream during high tide level. Compared with normal weather condition, the POC concentration varied not obviously along the river channel except at the core of ETM. The existence of ETM plays a much significant role for POC trapping during the influence of typhoon event.

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