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Seasonal hypoxia and its impact on the coastal ecosystem off the large rivers in China

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The coastal hypoxia problem (i.e. DO$<$2.0 mg/l) off the large Chinese rivers was first found in the Changjiang (Yangtze River) Estuary in late 1950s and later reported in the Zhujiang (Pearl River) Estuary in 1980s. Similar hypoxia events are also observed in other coastal areas of China. The hypoxia water region off the Changjiang Estuary occurs in summer when the riverine effluent plume maximizes, covering an area of ca. 15×10^3 km^2 in August. The hypoxia phenomenon shows important inter-annual variability, depending upon on the coastal circulation and land-source input of fresh water and nutrients. Quite often, the hypoxia occurs in the area of eutrophication where phytoplankton blooms in surface water, and low dissolved oxygen (e.g. DO$<$1-2 mg/l) occurs in near bottom waters. Along with the depletion of dissolved oxygen in near-bottom waters, it is found that production of CH_4 and N_2O is promoted together with change of nutrient ratio, nutrient species are also remobilized in low DO waters. Moreover, dissolved trace elements, e.g. As and Se show changes in redox speciation when DO in near-bottom waters is low.