Physical-Biogeochemical Coupling Mechanisms of Deoxygenation Events in the East China Sea

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Under the influence of global warming and human activities, deoxygenation in coastal waters worldwide is intensifying, posing a persistent threat to marine ecosystem health. Deoxygenation events in the Yangtze Estuary and the East China Sea are consequences of the intricate interplay of multiple physical and biogeochemical processes. In this study, we employ the unstructured-grid hydrodynamic model SCHISM coupled with the biogeochemical model CoSiNE to investigate the direct and indirect effects of hydrodynamic processes and to reveal the mechanism of physical-biogeochemical interactions between shelf circulations and coastal pelagic ecosystem on deoxygenation in the East China Sea. The model simulations of historical hypoxia events are used to elucidate the combined influence of the Yangtze River diluted water, the Kuroshio subsurface water, and the Yellow Sea cold water mass and to quantify the key processes driving nutrient and oxygen budgets, which jointly regulate the deoxygenation in the East China Sea. The coupled framework will be used to predict future trends of deoxygenation associated with the projected climate change scenarios.