

A numerical model for separating nutrients with different origins in the ecosystem of the East China Sea

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The nutrients in the East China Sea (ECS) come from different sources, such as Kuroshio, Taiwan Strait, rivers, and atmosphere. To evaluate the roles of multi-source nutrients in the primary production over the continental shelf of the ECS, a tracking technique was applied to all the state variables (dissolved inorganic nitrogen (DIN), two types of phytoplankton (diatoms and flagellates), and detritus) in a low-trophic ecosystem model. This tracking method is able to separate the nutrients and chlorophyll *a* with different sources in a realistic simulation designed for reproducing the temporal and spatial variations of nutrients and chlorophyll *a* in the ECS. The distributions of the DIN from different sources depend closely on the currents and change seasonally. The DIN from Changjiang River concentrates in the inner shelf in winter but heads to the Tsushima Strait along with the diluted water in summer. In the upper layer of the middle and outer shelves in winter, the DIN mainly comes from the Kuroshio; in the lower layers from middle shelf to outer shelf, the DIN from the Kuroshio plays a dominant role all the year round, especially in summer. The Taiwan Strait currents are strong and shift a little offshore in summer, resulting in the distribution of the DIN from the Taiwan Strait in the surface layer over the middle and outer shelves in summer. The high concentration of the DIN from atmosphere mainly locates at the Bohai Sea and the Yellow Sea. The DIN input flux of the Kuroshio and the corresponding net primary production (NPP) are highest among all the sources. However, the ratio of the NPP to the input flux for each source of nutrient indicates that the nutrient with Kuroshio source is the least efficient while that with the river source is the most efficient.