



Nutrients seasonal variation and budget in Jiaozhou Bay, China: A 3-dimensional physical-biological coupled model study

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A 3-dimensional biological model was developed and coupled to a hydrodynamic model, i.e., Princeton Ocean Model, in order to simulate the seasonal variation and budget of dissolved inorganic nitrogen, phosphate and silicate, in Jiaozhou Bay. The modeled nutrients distribution pattern is consistent with observation. The nutrient concentration is characterized by consumption in spring, increase in summer and autumn, and accumulation in winter. Phytoplankton plays an important role in nutrient renewal by photosynthesis and respiration processes. During an annual cycle, 5.03×10^3 t N, 0.17×10^3 t P and 3.37×10^3 t Si are transported to the bay's outer sea, i.e., the Yellow Sea. The spatial distribution of nutrients is characterized by vertically homogeneous profiles, and high concentration inside the bay and low concentration toward the bay channel. These features are mainly governed by strong turbulent mixing, fluvial influx, water exchange with Yellow Sea and water exchange rate. Numerical experiments suggest that the government should pay more attention to proper layout for sewage drainage.

Keywords: seasonal variation, nutrients budget, 3-dimensional coupled model, Jiaozhou Bay