

Prediction of Nutrient Fluxes in an Eutrophicated Bay

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Abstract

In order to predict nutrient fluxes in a eutrophicated bay, we have developed an ecosystem model named the Sediment-Water Interaction Model (SWIM). The model consists of two sub models with a hydrodynamic model and a biological model. SWIM simulates the circulation process of nutrient flux between water and sediment systems, such as nutrient regeneration from sediments as well as ecological structures on the growth of phytoplankton and zooplankton. This model was applied to prevent eutrophication in Hakata bay, which is located in the western part of Japan. The calculated results of the tidal currents by hydrodynamic model showed good agreement with the observed currents. Moreover, the model simulated reasonably well the seasonal variations of water quality, and reproduced spatial heterogeneity of the bay, which was observed in the field. According to the simulation of nutrient budgets in the bay, it was predicted that the regeneration process of nutrients across the sediment-water interface had a strong influence on the water quality of the bay.