

沿岸生態系モデルによる東京湾の通年シミュレーション

堀口 文男

Abstract

In food webs between usual zooplankton and phytoplankton, an ecosystem model, which contains a microbial loop between bacteria and zooplankton, was developed. Numerical simulations of the ecosystem in Tokyo Bay were carried out for 1 year using this model.

The observation result for the time series fluctuation of 3 stations of the phytoplankton concentration in the bay was compared with the calculation result. The fluctuating range of simulated values is smaller than that of observed values in winter. Simulated results are in good agreement with order of phytoplankton cycle throughout 1 year the observations. Primary production in Tokyo Bay from June 1995 to May 1996 is estimated at 1,600 tonC/y from the simulations. Diatoms are about 1.4 times dinoflagellate in terms of biomass. This indicates that diatom accounts for about 58% of phytoplankton standing stock in Tokyo Bay. Carbon flow fluxes to zooplankton from phytoplankton are 550 tonC/y, and carbon flow fluxes to zooplankton from bacteria through protozoa are 990 tonC/y, and microbial loop are about 1.8 times grazing food webs. In addition, nitrogen flow fluxes to phytoplankton from nitrogen pool are 156 tonN/y, and nitrogen flow fluxes to bacteria from nitrogen pool are 480 tonN/y, and microbial loop are about 3 times grazing food webs. Thus results suggest that the role was great and very important in carbon and nitrogen cycle. The horizontal distribution of phytoplankton in the summer season from the classical type of the ecosystem model showed the stabilized distribution. However, daily variations of horizontal distributions of diatom concentration in the present model are revealed. It is considered that the effect by the advection is strong for the change of the horizontal distribution of phytoplankton.