

Behavior of Nitrogen of Tidal Flat in a Tide Time Scale

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Abstract

The sediment-water exchange flux of dissolved inorganic nitrogen was investigated in an estuarine tidal flat. To estimate the fluxes at shorter time scale than tidal period, the changes in NH₄-N and NO₃-N concentration in about 2 hours incubation were measured with small light and dark chambers. In the result, NH₄-N and NO₃-N concentrations of influent to this tidal flat continually changed with the mixing ratio of river water to seawater, and controlled both benthic microalgal uptake and diffusion from sediment to water. In high tide time, at high salinity and low NH₄-N and NO₃-N concentrations, NH₄-N and NO₃-N rapidly transferred from sediment to water. In this case, the diffusion dominated the fluxes. In low tide time, at low salinity and high NO₃-N concentration, dissolved inorganic nitrogen, especially NO₃-N, rapidly transferred from water to sediment. It was indicated that uptake by benthic microalgae dominated the sediment-water exchange. Therefore, we considered that estuarine tidal flat was a source of nitrogen during high tide, then changed to a sink during low tide. This function at tidal flat delays the discharge of nitrogen from river to sea area and increases the potential of biological productivity.