

Estimation of Wet and Dry Deposition of Gaseous and Particulate Ammonia and Nitric Acid Using Buoy in Mikawa Bay, Japan and Evaluation of Its Effect on Eutrophication by Fluid Dynamic-Ecological Model

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Wet and dry deposition of ammonia-N and nitrate-N were directly observed on a buoy in Mikawa Bay, Central Japan, connecting to the Pacific Ocean and were compared with those at nearby coastal monitoring site. No significant difference of wet deposition between the buoy and the coastal site was found. However, dry deposition on the buoy was by about 30% smaller in molar base than that on the land site. Ratio of concentration of gaseous species such as NH_3 and HNO_3 to that of particulates of NH_4^+ and NO_3^- was 3.7 at the coastal site and 1.7 on the buoy also in molar base, indicating importance of gaseous species in dry deposition. Based on the 6 months observation from April to September, 2009, N-loading by wet and dry depositions were estimated as about 6% and 6~12% of the loading through river, respectively.

Hydrodynamic-ecological model (CE-QUAL-W2) simulations in Mikawa Bay for the 6 months showed the wet and dry deposition can increase Chl-a (chlorophyll-a) by about 2 mg m^{-3} which is 10% of the maximum Chl-a concentration during the simulation period. By the simulations, importance of strength of the N-loading rate was demonstrated. In that sense, it was estimated that steady but not strong loading rate of dry deposition may not lead to rapid algae blooming but may serve as a part of basic nutrient N-supply to the estuary.

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