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EVALUATION OF THE IMPACT OF WET/DRY DEPOSITION OF NITROGEN OXIDES AND AMMONIA ON EUTROPHICATION IN MIKAWA BAY, JAPAN

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Mikawa Bay with its area of 365 km^2, located in Central Japan on the Pacific Ocean, is enclosed by two peninsulas of Chita and Atsumi, and the outlet of the bay water to the Pacific is very narrow, thus forming one of the enclosed coastal seas with the most severe environmental problem in Japan. Alga bloom events in the bay area frequently occur in spring and summer seasons, and are thought to be caused by a combination of large nutrient loading associated with increased human activities in the area and long residence time of the water in the bay. In the previous study (Anggara and Kitada, *Hydrological Processes*, **18**, 3037-3059, 2004) we evaluated impacts of two types of control measures of europhication on the alga bloom; one is reduction of nutrient flux into the bay through rivers and discharges of waste water treatment plants, and the other is reduction of nutrient re-suspension from sediment at the bay floor. In this model simulation study it was demonstrated that the nutrient input reduction by the control of sediment re-suspension is more effective for prevention of alga bloom in the current Mikawa Bay situation.

The previous study, however, did not consider input of nutrient, i.e. nitrogen compounds, through precipitation and dry deposition from the atmosphere. In this study we first estimated amounts of these inputs and then evaluated their relative importance in the eutrophication and alga bloom in Mikawa Bay.

Based on both precipitation data including chemical analysis and dry deposition data at sites around Mikawa Bay, we evaluated direct nutrient input to the bay surface water from the atmosphere as about 400 ton-N/y with precipitation and about the same amount by dry deposition in the year of 2000. In the same year, the other N-compounds inputs were 1700 ton-N/y through rivers, and 250 ton-N/y from discharges of waste water treatment plants (WTPs). Thus the aerial N-inputs are potentially very important nutrient sources to the bay water. It may be also noted that they are introduced to the bay surface-water over large area but with relatively small flux at each point; that is different from the other two sources of rivers/WTPs-discharges and sediment re-suspension.

The model CE-Qual-W2 was used again for the evaluation of effects of the aerial N-inputs on the eutrophication and alga bloom in Mikawa Bay. The model can simulate both hydrodynamic fields such as flow, temperature, salinity, and turbulence and biological/chemical fields such as N- and S-compounds, alga, DO, etc. Detailed results on the relative importance of the aerial nutrient inputs will be presented at the conference.