

## Effects of environmental factors on production of dissolved N<sub>2</sub>-a product of denitrification. A case study in Tama River

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In aquatic ecosystems, denitrification, the nitrate (NO<sub>3</sub><sup>-</sup>) reduction to dinitrogen gas (N<sub>2</sub>), is considered as the important process to remove nitrogen to improve water quality. However, the denitrification also contributes to the emission of N<sub>2</sub>O – a greenhouse gas. Many studies of N<sub>2</sub> production in river were conducted to estimate the removal of nitrogen under natural condition via the denitrification. To gain more information of key factors for the N<sub>2</sub> production, we explore the relationships between dissolved N<sub>2</sub> and environmental factors in Tama River.

Water samples in Tama River from eight stations (from stn 1 near the mouth of the Tama River (in Kawasaki City) to stn 8 – Mid-Tama River (in Ohme City)) were collected on 13th November, 2014. Environmental parameters as temperature, pH, EC, concentrations of DO, NH<sub>4</sub><sup>+</sup>, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, DIN, DON, TDN, TOC were analyzed. Dissolved nitrogen gases through N<sub>2</sub>/Ar ratios were analyzed by Membrane Inlet Mass Spectrometer (MIMS) system.

Types of the river water were divided two groups. Upstream stations (stn 6 to 8) located in Mid-Tama River showed low concentrations (TDN: 51.36 – 78.09 μM/L, NH<sub>4</sub><sup>+</sup>: 0.26 – 1.78 μM/L, NO<sub>2</sub><sup>-</sup>: 0.24 – 0.47 μM/L, NO<sub>3</sub><sup>-</sup>: 45.33 – 67.84 μM/L, DON: 3.94 – 11.35 μM/L). Downstream stations (stn 1 to 5) showed high concentrations (TDN: 261.63 – 590.75 μM/L, NH<sub>4</sub><sup>+</sup>: 5.23 – 155.87 μM/L, NO<sub>2</sub><sup>-</sup>: 5.53 – 22.08 μM/L, NO<sub>3</sub><sup>-</sup>: 185.93 – 403.00 μM/L, DON: 14.56 – 64.09 μM/L). Nitrate dominated and accounted for 90.8 ± 11.7% of DIN, 82.4 ± 11.8% of TDN. Station 2 had the highest concentrations of nitrogen compounds except NO<sub>3</sub><sup>-</sup> concentrations. Water quality of this site was affected by sewage of plants which were in upper near this site. TOC values were also divided two groups as groups of nitrogen compounds (0.41 – 0.50 mg/L for upstream stations, while 1.71 – 2.21 mg/L for downstream stations).

Measured average N<sub>2</sub>/Ar ratio (37.36 ± 0.45) was lower than the theoretical average N<sub>2</sub>/Ar ratio (38.05 ± 0.25). Unfortunately remarkable excess in N<sub>2</sub>/Ar was not observed in our samples. We will present our preliminary isotopic results on NO<sub>3</sub><sup>-</sup>, NO<sub>2</sub><sup>-</sup>, NH<sub>4</sub><sup>+</sup> and TDN in the presentation to discuss the occurrence of denitrification in the presentation.