

Effects of environmental factors on production of dissolved N₂-a product of denitrification. A case study in Tama River
Effects of environmental factors on production of dissolved N₂-a product of denitrification. A case study in Tama River

NGUYEN CONG, Thuan^{1*} ; KOBAYASHI, Keisuke¹ ; YANO, Midori¹ ; MAKABE, Akiko¹
NGUYEN CONG, Thuan^{1*} ; KOBAYASHI, Keisuke¹ ; YANO, Midori¹ ; MAKABE, Akiko¹

¹Tokyo University of Agriculture and Technology, Japan

¹Tokyo University of Agriculture and Technology, Japan

In aquatic ecosystems, denitrification, the nitrate (NO₃⁻) reduction to dinitrogen gas (N₂), is considered as the important process to remove nitrogen to improve water quality. However, the denitrification also contributes to the emission of N₂O – a greenhouse gas. Many studies of N₂ 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 N₂ production, we explore the relationships between dissolved N₂ 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, NH₄⁺, NO₂⁻, NO₃⁻, DIN, DON, TDN, TOC were analyzed. Dissolved nitrogen gases through N₂/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, NH₄⁺: 0.26 – 1.78 μM/L, NO₂⁻: 0.24 – 0.47 μM/L, NO₃⁻: 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, NH₄⁺: 5.23 – 155.87 μM/L, NO₂⁻: 5.53 – 22.08 μM/L, NO₃⁻: 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 NO₃⁻ 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 N₂/Ar ratio (37.36 ± 0.45) was lower than the theoretical average N₂/Ar ratio (38.05 ± 0.25). Unfortunately remarkable excess in N₂/Ar was not observed in our samples. We will present our preliminary isotopic results on NO₃⁻, NO₂⁻, NH₄⁺ and TDN in the presentation to discuss the occurrence of denitrification in the presentation.