12. Dissolved N₂O and CH₄ in seepage and stream water in Yakutsk

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Abstract

We measured water quality and dissolved nitrous oxide (N₂O) and methane (CH₄) concentration in twelve stream waters (from upper to lower stream of a tributary of River Lena) and two seepage waters. The sampling was done twice (May and August 2005). All sampling sites located eastern side of River Lena. In situ headspace equilibration was used for the determination of dissolved N₂O and CH₄ concentration. Temperature of the seepages was about 1 °C in May and August, and that in the stream waters was about 11 and 17 °C for May and August, respectively. pH and EC of all samples ranged 7.6–8.5 and 0.18–0.57 mS cm⁻¹, respectively. Dissolved N and P conc. in the stream waters ranged 1.8–2.8 mg N L⁻¹ and 0.12–0.33 mg P L⁻¹, respectively, almost all of which was organic forms. Dissolved C conc. in the stream waters ranged 69–104 mg C L⁻¹, about half of which was organic forms. These concentrations in the

seepages were lower than those in the stream waters, but the ratios of organic forms were lower.

Dissolved CH₄ conc. ranged 0.10–0.69 and 1.2–23 _g CH₄-C L⁻¹ for the seepages and the stream waters, respectively. These values are extremely higher than the ambient conc. (0.05 for 0°C, 0.03 for 15°C) (i.e., super-saturated), suggesting that CH₄ emission from stream surface occur. Quantification of this emission should be needed. Dissolved N₂O conc. ranged 0.09–0.17 and 0.14–0.29 g N₂O-N L⁻¹ for the seepages

and the stream waters, respectively. These values are the same as or lower than the ambient conc. (0.51 for 0°C, 0.29 for 15°C), suggesting that indirect N₂O emission through N leaching does not occur. Nitrate conc. ranged 0.06–0.11 and <0.02 mg NO₃-N L^{-1} for the seepages and the stream waters, respectively. In comparison with reviewed data, both N_2O and NO_3^- conc. are remarkably lower level (see Figure). N cycling, including denitrification process in the soil and the ground water, would be related with these results, which will be discussed in the symposium.



Fig. Relationship between NO_3^- and N_2O conc. in Yakutsk and reviewed paper (Sawamoto et al. 2005).