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Nitrous oxide emissions from wastewater treatment processes: Better footprint through national inventory development

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iological Nitrogen Removal (BNR) processes can Doptentially contribute to overall nitrous oxide (N2O) emissions from wastewater treatment plants (WWTPs). To ensure that BNR systems minimize both aqueous and gaseous nitrogen discharges, it is necessary for us to understand the inherent variability of N2O emissions from various BNR configurations and how these emissions are affected by WWTP operating parameters. The mechanisms of such emissions also need to be elucidated. Using a newly developed standardized protocol, reviewed and endorsed by the United States Environmental Protection Agency (USEPA), field scale studies were conducted across the US, which characterized the spatio-temporal variability in N¬¬2O. Based on these measurements, it was estimated that 0.01 to 1.80 % of the influent total kjeldhal nitrogen (TKN) was emitted as N¬¬2O. Additionally, based on data mining, it was determined that factors leading to inadequate nitrification and denitrification were highly correlated with N¬¬2O emissions. In contrast to previous thinking, minimization of gaseous and aqueous nitrogen discharges can be accomplished in cooperation, rather than in competition. It is anticipated that the full-scale measurements and lab-scale studies described here will guide the development of environmentally sustainable engineering designs that minimize both aqueous and gaseous nitrogen discharges to the environment.



Biography

Joon Ho Ahn is an Associate Research Scientist in the Earth and Environmental Engineering department at Columbia University. His current research focuses on biological investigation of wastewater treatment processes. Previously, at New York University, he conducted research on human diseases from the view point of chemical engineering. It is his interest to understand and manage, in a holistic way, environmental impacts on human health. He received his PhD in Environmental Engineering from Columbia University.

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