

Methane Ebullition from a Boreal Beaver Pond

Anne Schreck

Department of Geography, McGill University, Montréal (Québec) Canada

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Supervisor: Professor Nigel Roulet

Reader: Professor Tim Moore

Abstract

Beaver ponds contribute to natural greenhouse gas emissions through the release of methane (CH₄) to the atmosphere. The dominant transport mechanism for CH₄ in aquatic environments is through the release of gas bubbles, or ebullition. Episodic bubble fluxes and a minimal understanding of the relationships between environmental variables and ebullition make it difficult to estimate global CH₄ emissions from beaver ponds. This study aimed to quantify the summer and fall rates of CH₄ ebullition for a boreal beaver pond and describe the relationship between ebullition and factors that have been shown to influence CH₄ production and bubble release. Average CH₄ ebullition ranged from 4.1 ± 4.5 to 61.0 ± 57.0 mg CH₄ m⁻² d⁻¹ with high variation across space and time. No significant relationships were identified between the rate of ebullition and the environmental variables analyzed, but the results highlight the need for large, long-term studies of wetland CH₄ fluxes in order to better understand this dynamic and highly-variable process.