Methane Ebullition from a Boreal Beaver Pond

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Abstract

Beaver ponds contribute to natural greenhouse gas emissions through the release of methane (CH$_4$) to the atmosphere. The dominant transport mechanism for CH$_4$ 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 CH$_4$ emissions from beaver ponds. This study aimed to quantify the summer and fall rates of CH$_4$ ebullition for a boreal beaver pond and describe the relationship between ebullition and factors that have been shown to influence CH$_4$ production and bubble release. Average CH$_4$ ebullition ranged from 4.1 ± 4.5 to 61.0 ± 57.0 mg CH$_4$ 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 CH$_4$ fluxes in order to better understand this dynamic and highly-variable process.