

Interactive comment on “Modeling the impediment of methane ebullition bubbles by seasonal lake ice” by S. Greene et al.

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This paper proposed the novel effects of methane bubbles trapped seasonal ice-cover on methane emission to the atmosphere from lakes. The authors found an ideal observation site, Goldstream Lake in Alaska, as a microcosm of all types of the polar lakes. There are both older (perhaps) inactive zone (the western area) and very active thermokarst zone (the eastern area). Additionally, there are all ebullition classes of seep, A to C and Hotspot in the thermokarst zone. This makes simultaneous and continuous observations of several processes at the same station possible. Every model in the methane balance processes was carefully established based on these observations. For example, the spikes of atmospheric methane concentrations in early April are very impressive measured data. In a few specific processes, the proposed models

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might be revised in order to reduce uncertainties in the future. Since all processes of annual methane cycle in the seasonally ice-covered lakes are fully illustrated, however, this is one of the most useful results for the next step. The observations of continuous period of such high activities (methane ebullition) of the seeps in the thermokarst zone will be required to estimate long-term emissions.

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