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

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Not long ago (about 20 years), permafrost was not in a list of important nature reservoirs of carbon, and thermokarst lakes were not in a list of main atmospheric methane sourses. Now the situation has changed. Permafrost is found the biggest terrestrial source of carbon (about 1700 Gt, Tarnocai C. et al. 2009). Permafrost thawing under thermokarst lakes was a main reason of rising of the atmospheric methane concentration during Pleistocene-Holocene transition and can be a cause of the future increase (Zimov S, Zimov N, 2014). A thousand investigations and publications is dedicated to methane emission from various wetlands, and only few publications are dedicated to methane emission from thermokarst lakes. I think the results of the manuscript are the most detail investigations on the theme. Ice is almost impenetrable for gases. Winter

methane emission from thermokarst lakes in cold regions is unexpected. That is a complicated phenomen. Methane flux throuth ice is very not uniform and this is very difficult to measure it by time and by space. The most first publications have very rough evaluation of the flux. The submitted manuscript is a big step on the way of winter methane flux investigations. The authors use mainly data from one of Alaska's lake. But mechanism gas pennetrating through ice is the same on any lakes. Therefore, the results could be expand to the most lakes of boreal regions. I see that the authors understand physics of the phenomen very clear. Therefore, methods of investigations have been choosen correctly and results are reliable. The authors divided the complicated process on more simple elements, which can be simulated and described by formulas. Convergence is high not in all cases. But taking into account that field measurements is not ideal such convergence is acceptable. The investigation in whole confirms conclusions made in previous publications on the theme, i.e. considerable part of the methane flux penetrates through the ice. The only thing I would like to suggest to the authors - to add some photos. For big part of science community, thermokarst lakes are unfamiliar.

Interactive comment on Biogeosciences Discuss., 11, 10863, 2014.