PARTITIONING ECOSYSTEM-SCALE CH4 FLUXES IN A SUBARCTIC LANDSCAPE SHOWS THE RELATIVE IMPORTANCE OF LAKE EMISSIONS ACCORDING TO SEASONS (# 28)

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Lakes and ponds are abundant features of northern landscapes where the presence of permafrost and peat prevents water drainage. Lakes are thought to be globally significant emitters of methane, offsetting partly the vegetation carbon sink. Yet few studies have been published on full year Arctic lake carbon dynamics, and fewer took an integrating ecosystem approach, comparing vegetative area and open-water system within the same catchment. The eddy covariance (EC) method allows a continuous monitoring and an integration of all surface emissions pathways (ebullition, diffusion, plant-mediated transport). We present here 16 months of ecosystem-scale data from the Stordalen mire near Abisko in Northern Sweden, where an eddy covariance system is used in an innovative way to quantify the importance of methane emissions from a shallow lake in a palsa mire landscape. This dataset is one of the first presenting a full year of methane emissions from a high latitude lake using the EC method. The summer seasons showed low background emissions from the lake, compared to five-fold higher emission rates at the fen quadrant. At spring thaw, however, the lake clearly dominated methane dynamics as a high degassing was captured in response to gradual ice-out. Methane release likely originated from bubbles stored in the lake ice but also in surface sediments, as a sediment turnover seemed to explain the highest emission rates. The fen, which continuously emitted CH4 during the winter, didn’t show such a pattern. Spring represented 51% of annual lake CH4 emissions. Annually, fen fluxes still dominate total lake emissions. However, upscaling cumulated values considering the aerial extent of each surface cover clearly amplifies the role of the lake as a CH4 emitter within the palsa mire landscape.