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High-resolution CO_2 flux measurements on a boreal lake

David Rudberg (1), Thanh Duc Nguyen (2), Jonathan Schenk (2), Jan Karlsson (1), and David Bastviken (2)

(1) Umeå University, Department of Ecology and Environmental Science, Sweden, (2) Linköping University, Department of Thematic Studies - Environmental Change, Sweden

Inland waters are generally supersaturated with CO_2, and studies have shown that the contribution of lakes to the global carbon budget is significant. CO_2 fluxes from lakes are often measured with floating chambers, representing a cost-efficient direct measurement method. However, the method is labor intensive, making high-resolution studies of temporal dynamics challenging and rare. This has led to fluxes in lakes traditionally being estimated only for short term deployments. At the same time, recent studies indicate that CO_2 fluxes within lakes are highly heterogeneous, and that failure to account for variability is likely to result in erroneous estimates when upscaling. In this study several Automatic Flux Chambers (AFCs) were deployed for CO_2 flux measurements in a northern Swedish lake. Fluxes were assessed with an unusually high frequency of every two hours over a one month period in late summer, providing insight into the dynamics of CO_2 emissions. Questions regarding temporal variability (diel variability and longer time periods) of CO_2 fluxes and its correlation with pCO_2 and climate variables will be in focus. Preliminary data indicate striking and consistent patterns regarding diel and longer temporal scales. Spatial variability in fluxes will also be presented.