Geophysical Research Abstracts
Vol. 13, EGU2011-11914-8, 2011
EGU General Assembly 2011

Eddy-covariance measurements of methane fluxes from a Swedish lake

Erik Sahlée (1), Anna Rutgersson (1), Eva Podgrajsek (1), and David Bastviken (2)

(1) Uppsala University, Dept. of Earth Sciences, Uppsala, Sweden (erik.sahlee@met.uu.se), (2) Linköping University, Dept. of Thematic Studies - Water and Environmental Studies, Linköping, Sweden (david.bastviken@liu.se)

Lakes are major but poorly constrained natural source of methane. Previous measurements of methane fluxes from lakes have mainly been made using a floating chamber technique. These measurements have shown high temporal and spatial variability partly due to episodic bubble fluxes (ebullition).

In this study we try to further investigate this variability by using the eddy-covariance technique. For methane fluxes these kinds of measurements have previously been unusual due to the lack of suitable instrumentation. Here we utilize a recently developed open path gas analyzer, LI-7700 (Licor), which allows for long term measurements.

The measurements started September 2010 from a 6 m tall tower situated at a small island in lake Tämnaren (Sweden) with long open water fetch in all wind directions. Besides instrumentation for flux measurements, the tower holds several sensors measuring the mean meteorological conditions. Automated measurements of the water properties are made at a nearby float.

This site will be operating during one year, before moving to a different lake. It will be a long term study aiming at addressing three important areas which currently present uncertainties when making global estimates of the air-lake methane exchange:

1) Identification and quantification of processes in the water and atmosphere which may influence the methane exchange
2) Quantification of the large but sporadic ebullition CH4 flux and identification of processes that may onset this flux
3) Quantification of the CH4 efflux during spring ice melt i.e. the release of CH4 accumulated in the lake during winter.

We will also present results from a method comparison between the eddy covariance and floating chamber method. This type of method comparison is relatively rare, especially for methane fluxes. A comparison with simultaneous CO2 fluxes will also be shown.