



## **Methane in a Swedish sill fjord - Benthic fluxes, inventory and atmospheric emission**

Tobias Rütting (1), Anders Stigebrandt (2), Loreto de Brabandere (3), Leif Klemedtsson (1), and Per Hall (4)

(1) Department of Plant and Environmental Sciences, University of Gothenburg, Sweden (tobias.rutting@dpes.gu.se), (2)

Department of Earth Sciences, University of Gothenburg, Sweden, (3) Institute of Biology, University of Southern Denmark,

(4) Department of Chemistry, University of Gothenburg, Sweden

Methane (CH<sub>4</sub>) is a potent greenhouse gas, which has the second largest radiative force after carbon dioxide. Oceans, including their coastal areas, contribute to the natural CH<sub>4</sub> budget in the atmosphere, but measurements are still sparse, and no measurements of CH<sub>4</sub> in Swedish fjord systems have been made. For this purpose we measured CH<sub>4</sub> concentrations in the water column as well as benthic CH<sub>4</sub> fluxes by using in-situ chambers on four occasions during 2009. The study area, the By Fjord, is a sill fjord on the Swedish west coast. Benthic flux measurements were done on a depth transect in the fjord and included both sediments with overlying oxic and anoxic water.

The collected data were used to calculate the total fjord integrated net CH<sub>4</sub> release from sediments, the transport through the water column, and finally the exchange between water and atmosphere. Moreover, we used modeling to estimate the total CH<sub>4</sub> emission to the atmosphere from the By Fjord, which could be used as proxy for similar Scandinavian fjord systems. We will furthermore discuss our findings on CH<sub>4</sub> in relation to simultaneous measurements of oxygen, NO<sub>3</sub><sup>-</sup>, Fe, Mn and H<sub>2</sub>S, and the extent of CH<sub>4</sub> oxidation in the water column. The presented results are of special importance even on a European scale, as they fill a gap in CH<sub>4</sub> investigations according to a recent review of CH<sub>4</sub> in European coastal waters.