

## Synoptic approaches to scale CH<sub>4</sub> flux in boreal landscapes

P. DÖRSCH<sup>1\*</sup>, H. LANGE<sup>2</sup>, B. THOMAS<sup>3</sup>, H. SILJANEN<sup>4</sup>,  
S. JENSEN<sup>5</sup> AND L. BAKKEN<sup>1</sup>

<sup>1</sup>Norwegian University of Life Sciences, 1432 Ås, Norway  
(\*correspondance: peter.doersch@umb.no)

<sup>2</sup>Norwegian Forest and Landscape Institute, 1431 Ås, Norway

<sup>3</sup>Leibniz Center for Agricultural Landscape Research, D-15374 Müncheberg

<sup>4</sup>University of Eastern Finland, Kuopio, Finland

<sup>5</sup>University of Bergen, Norway

Boreal wetlands are an important source of atmospheric methane (CH<sub>4</sub>) and susceptible to future climate change. Typically, boreal wetlands form microtopes embedded in complex landscapes, posing a challenge to scaling CH<sub>4</sub> source strength to greater areas. Here we report on an analysis of air borne (LiDAR, hyperspectral scanning) and ground based (chamber measurements, molecular analysis) approaches to characterize and scale CH<sub>4</sub> fluxes in a highly stratified mountainous landscape in Southern Norway (60°22' N 9°39'E, 510-750 m, 3°C, 850 mm). We investigated relationships between peat depth, porewater CH<sub>4</sub> concentrations and CH<sub>4</sub> emission fluxes and found a significant correlation between CH<sub>4</sub> pore water concentration and VNIR reflectance spectra. Spectral separation was further tested in predefined vegetation/wetland types. We used molecular markers and *in vitro* CH<sub>4</sub> uptake kinetics to infer the abundance and activity of type I and type II methanotrophs in different landscape units. Synoptic approaches to scale CH<sub>4</sub> flux in heterogeneous landscape by means of molecular and biophysical signatures will be discussed.

## Investigation of the precision and accuracy of isotope ratio measurements for atmospheric sampling for laser ablation multi collector-ICPMS

LADINA DORTA, ROBERT KOVACS, JOACHIM KOCH AND  
DETLEF GÜNTHER\*

ETH Zürich, Laboratory for inorganic Chemistry, Zurich,  
Switzerland (\*correspondence:  
guenther@inorg.chem.ethz.ch)

Laser ablation ICPMS is a powerful method for solid sample measurements. The sample size is however limited by the ablation cell size. Many efforts were made in developing ablation cells with different volumes and shapes for large samples. However the coupling of a gas exchange device (GED) [1] to the ICPMS allows to get rid of the ablation cell. The laser ablation process takes place in air environment. The aerosol is sucked into the GED by a membrane pump through a tube located directly at the ablation site. In the GED, the air is exchanged to Argon. The aerosol is then transported to the ICP in an Argon atmosphere. The figures of merit for atmospheric laser ablation were determined and similar accuracies as for conventional laser ablation were reported [2].

Laser ablation coupled to a multi collector-ICPMS (MC-ICPMS) allows precise isotopic information of a sample, used for e.g. age determination. These samples are mostly archeological and do not always fit into an ablation cell. The isotope ratio determination with LA-GED-MC-ICPMS would therefore be a method of choice for large and precious samples.

The precision and the accuracy of the atmospheric sampling for isotope ratio measurements were investigated with a Ti-Sapphire based femtosecond laser (Legend, Coherent Inc., Santa Clara (CA), USA) coupled to a gas exchange device and a Nu Plasma (Nu Instruments, Wrexham, UK). The measurements were done on pure lead, galena, brass and zircon. Even if a loss in sensitivity is observed, similar precision and accuracy were obtained comparing the atmospheric ablation with the conventional laser ablation set up.

[1] Nishiguchi K., Utani K., Fujimori E. (2008), *J. Anal. At. Spectrom.* **23**, 1125-1129. [2] Kovacs R., Nishiguchi K., Utani K., Günther D. (2010), *J. Anal. At. Spectrom.* **25**, 142-147.