Carbon dioxide and methane exchange of a patterned subarctic peatland by eddy covariance and chamber methods

Lauri Heiskanen (1), Juha-Pekka Tuovinen (1), Aleksi Räsänen (2), Tarmo Virtanen (2), Sari Juutinen (2), Timo Penttilä (3), Tuomas Laurila (1) and Mika Aurela (1)

(1) Finnish Meteorological Institute, Helsinki, Finland, (2) Department of Environmental Sciences, University of Helsinki, Finland, (3) Natural Resources Institute Finland (LUKE), Helsinki, Finland

Keywords: greenhouse gas, eddy covariance, manual chamber, peatland

Current global warming is causing arctic regions to warm two to three times faster than the rest of the world. The northern peatlands form one of the largest carbon pools in the biosphere; little is known about how these peatlands will react to projected warming. The ecosystem-atmosphere exchange of CO_2 and CH_4 were measured using both eddy covariance and chamber methods in a subarctic peatland in Kaamanen, northern Finland, during 2017 and 2018.

The measurements were conducted as part of CAPTURE-project (Carbon dynamics across Arctic landscape gradients: past, present and future). The objective of the continuous eddy covariance flux measurements was to assess the mean greenhouse gas (GHG) balances of the peatland in an ecosystem scale, while the manual chamber measurements were used for estimating the growing season GHG exchange separately for the ecosystem's four main plant community types.

The Kaamanen peatland is a mesotrophic flark fen with varying hummock and hollow microtopography that comprises of four main plant communities: 1) *Ericales-Pleurozium* community grows on top of the dry hummocks and 2) *Betula nana-Sphagnum* grows on the hummock margins. The wet hollows are dominated by 3) *Trichophorum* tussocks and 4) *Carex-Scorpidium* communities. These four plant communities vary in their appearance due to the differences in moisture conditions and nutrient availability, and they also vary notably in their GHG exchange.

By utilizing the chamber results together with high-resolution vegetation mapping and footprint analysis the eddy covariance based ecosystem scale GHG exchange will be partitioned into the plant community type specific fluxes.