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Impacts of experimental warming and water level drawdown on GHG exchange in two boreal fen ecosystems

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Peatlands are carbon (C) rich ecosystems, which hold potential as climate regulators. Climate change impacts, through changes in temperature and hydrological conditions, may induce drastic changes in the sink/source functions of these ecosystems.

To test the impacts of warming, water-level drawdown, and their interactions on GHG sink/source functions in boreal peatlands, two experimental sites, one in the south boreal and one in the north boreal zone in Finland, were set up in 2008. These fen sites include a pristine plot, and a plot with a slight, experimental drainage impact. The warming of the surface air and soil is realized passively using small open-top chambers (OTC). Weekly or biweekly measurements of net ecosystem exchange (NEE) on various levels of PAR, total ecosystem respiration (RE), soil respiration (RS), and heterotrophic soil respiration (RH), and monitoring of leaf area index (LAI), ground water level, and air and soil temperatures were carried out from early summer till late fall in 2011. We also measured CH₄ and N₂O fluxes from the NEE plots. These data will be used for parameterizing the PG (Gross Photosynthesis), RE, RS and RH models and for estimating the seasonal gas fluxes including the various components of CO₂ exchange (NEE, PG, RE, RS, and RH), separately for the different water-level and temperature treatments in the two study sites. In this presentation we will show the initial results of the warming and drainage experiment on GHG fluxes in fen ecosystem by using the data from summer 2011.