



Land use and climatic responses of GHG balances of natural and managed peatlands in the boreal zone

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Natural mires have been sources of methane and long-term continuous sinks of CO₂. One third of the land area of Finland is covered by organic soils. In populated regions, most wetlands have been drained for agriculture, forestry and energy production purposes. In Finland 5.7 million ha (60%) of peatlands have been drained for forestry and 0.7 million ha for agriculture. Draining, liming and addition of nutrients are common practices for making the soil more fertile changing the GHG budgets profoundly. Generally, drained peatlands are sources of CO₂ but small sinks of CH₄. Agricultural organic soils are significant sources of N₂O. Draining of mires for forestry may either turn them to high sources or sinks of CO₂ to the atmosphere. However, emissions and uptake rates of GHGs vary greatly depending on land use and local environmental conditions and are highly dependent on vegetation, hydrology, nutrient status and temperature.

In this presentation, we will use multiyear micrometeorological CO₂ flux measurements on mires in the boreal zone to show the effect of variations of climatic factors on annual CO₂ balances. Additional micrometeorological measurements of CH₄ fluxes will be used to estimate carbon balances between the three natural mires and the atmosphere. Flux data from an organic soil cropland, an afforested cropland and a drained pine bog sites will be used to demonstrate the consequences of land use change on GHG balances of managed peatlands.