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Boreal mire Green House Gas exchange in response to global change perturbations

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High latitude boreal peatlands contribute importantly to the land-atmosphere-hydrosphere exchange of carbon and GHG, i.e. carbon dioxide, methane and dissolved organic carbon. High latitude biomes are identified as most vulnerable to changing climate. High latitudes are also characterized by a strong seasonality in incoming solar radiation, weather conditions and thus also in biogeochemical processes. The strong seasonality in incoming solar radiation, not to change in response to a changing climate, constitute firm constraints on how changes in air temperature, evapotranspiration and precipitation will affect biogeochemical processes underlying the land atmosphere and land hydrosphere exchange of green house gases. In this presentation I combine data from long-term monitoring, long-term field manipulations and detailed chemical analysis to understand how changes in atmosphere and weather conditions influence the major carbon fluxes of a boreal mire Net Ecosystem Carbon Balance. The long-term monitoring data contains >12 years of continuous Eddy Covariance CO_2 data, growing season chamber CH4 data and continuous measurements of discharge export of DOC, CO_2 and CH4. Data from long-term field snow removal manipulations and growing season temperature increase manipulations are used to further understand the impact of climate on mire carbon and GHG fluxes. Finally we uses Nuclear Magnetic Spectroscopy (NMR) to reveal how century scale changes in atmospheric CO_2 from $\sim$300 to 400 pm CO_2 and temperature have influenced the net photosynthetic capacity of Sphagnum mosses, the single most important plant genus for boreal mire carbon sequestration.