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# Can we distinguish autotrophic respiration from heterotrophic respiration in a field site using high temporal resolution $CO_2$ flux measurements?

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The processes behind C-cycling in peatlands are important to understand for assessing the vulnerability of peatlands as carbon sinks under changing climate conditions. Especially boreal peatlands are likely to underlie strong alterations in the future. It is expected that C-pools that are directly influenced by vegetation and water table fluctuations can be easily destabilized. The $CO_2$ efflux through respiration underlies autotrophic and heterotrophic processes that show different feedbacks on changing environmental conditions. In order to understand the respiration fluxes better for more accurate modelling and prognoses, the determination of the relative importance of different respiration sources is necessary. Earlier studies used e.g. exfoliation experiments, incubation experiments or modelling approaches to estimate the different respiration sources for the total ecosystem respiration (Reco). To further the understanding in this topic, I want to distinguish autotrophic and heterotrophic respiration using high temporal resolution measurements. The study site was selected along a hydrological gradient in a peatland in southern Ontario (Canada) and measurements were conducted from May to September 2015 once per month. Environmental controls (water table, soil temperature and soil moisture) that effect the respiration sources were recorded. In my study I used a Li-COR 6400XT and a Los Gatos greenhouse gas analyzer (GGA). Reco was determined by chamber flux measurements with the GGA, while simultaneously $CO_2$ respiration measurements on different vegetation compartments like roots, leaves and mosses were conducted using the Li-COR 6400XT. The difference between Reco and autotrophic respiration equals heterotrophic respiration. After the measurements, the vegetation plots were harvested and separated for all compartments (leaves, roots, mosses, soil organic matter), dried and weighed. The weighted respiration rates from all vegetation compartments sum up to autotrophic respiration of the whole plot. I anticipate that heterotrophic processes contribute more to total Reco than the autotrophic ones and that they become more important with increasing water table.