CH_4 and CO_2 Emissions from Covered and Exposed Peat Stockpiles in Drained Peatlands undergoing Harvesting

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Industrial peat extraction involves removal of surface vegetation and lowering of water table that is known to shift the system from a carbon sink to a source of atmospheric carbon. Peat stockpiles are an important yet understudied component of the landscape of harvested peatlands. In particular, the effect of management styles on stockpile greenhouse gas emissions are poorly understood. The goals of this study are to 1) compare the carbon dioxide (CO_2) and methane (CH_4) emitted from tarp-covered stockpiles and exposed ones; 2) examine how physical factors (height; aspect; peat quality; temperature and moisture) influence the greenhouse gas emissions of the stockpiles. We collected trace gases fluxes and temperature measurements from two companies that manage their peat stockpiles differently. For Premier Tech stockpiles, the mean CH_4 flux is 1.33±2.05 mg C m^{-2} d^{-1}, over four times bigger than last year's result, but five times smaller than the fields. The mean CO_2 flux is 2.88±2.22 g C m^{-2} d^{-1}, slightly smaller compared to last year's result but still four times larger than the fields. CO_2 flux is found to increase with higher heights on the stockpile as CO_2 is speculated to mostly diffuse upwards through the peat rather than evenly spread outwards. For Berger stockpiles, the effect of factors like height, aspect and peat grade is overrun by the existence of tarp cover, which effectively hinders gas exchange between the stockpile and the atmosphere. No significant correlation is found between temperature and greenhouse gas flux for stockpiles from both companies. Both CO_2 and CH_4 data suggest the existence of hotspots for peat decomposition in the stockpile, possibly constrained by water availability.

Actively harvested peatland in Rivière-du-Loup, QC.
Credit: Kaiyuan Wang