

## Organic carbon dynamics in soils of different boreal forest types in relationship with perturbations induced by forest fire in the Eastmain River watershed

Boreal forest soils store important amount of carbon as the forest ecosystem covers 560 000 km<sup>2</sup> which represents 35% of Québec territory (Anseau et al., 1996). While mainly composed of evergreen, the boreal forest also includes deciduous and mix (evergreen and deciduous) tree stands. In this boreal biome, forest fires represent the main element in mature forest regeneration. Forest fires play a significant role in the net carbon budget of the boreal forest, as the amount of carbon lost during and after those fire events represents an important aspect for global carbon quantification (SFC, 2006). Therefore, it is imperative to understand the forest soil carbon dynamics in relationship with the different stand types and their succession after the perturbations. In the framework of the Eastmain-1 project, which aims at estimating the net green house gas emissions from a hydro-electric reservoir, the objectives of the soil organic carbon axis are: 1. to evaluate the amount of organic carbon stored in the forest soils and 2. identify the controls influencing the organic carbon accumulation in forest of different regeneration stage, for stands containing different species. The results will be used to estimate the volume of carbon from forest flooded following the creation of the hydro-electric reservoir.



Figure 1 : 19 years old burned site

To do so, 45 sites were selected using a 2005 composite SPOT-4 satellite image (9 sites for each stand type). The stand types are mature black spruce forest (*Picea mariana*) with moss and lichens, grey pin (*Pinus banksiana*) stand, secondary succession stage composed of deciduous such as aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*), and burned forest of 1, 4 (recent burned) and 19 years (old burned) (Figure 1). Soil and vegetation description was done for all 45 sites using a method based on the Canada's National Forest Inventory (NFI, 2003). Soils were sampled at each site and their organic and mineral horizons were measured and analyzed for pH and C/N (Carbon/Nitrogen) ratio. C/N ratio analyses allow establishing carbon content for each of the soil samples. Baskets were installed in 5 control sites (1/stand type) to collect the annual litterfall from trees, this element being considered as an important ecological parameter, giving information on the carbon cycle in forested ecosystems (Gelhay et al., 2003).

Results from litter accumulation in the baskets show important variations between the different stand types (Figure 2). The recent and ancient burned stands have the smallest contribution to soil carbon, vegetation being sparse especially in the recently burned stand. Close canopy evergreen (*Picea mariana*) and deciduous have the highest litterfall values.

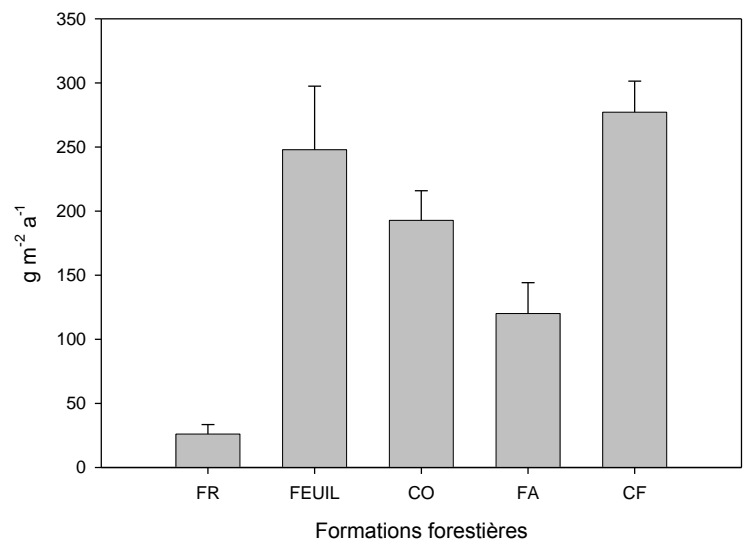


Figure 2 : Annual litter fall in grams per square meter for the different stands in the Eastmain-1 area FR: recent fire, Feuill: deciduous forest, CO: gray pine forest, FA: old burned sites, CF: black spruce forest

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[https://nfi.nfis.org/documentation/ground\\_plot/Gp\\_guidelines\\_v4.0\\_f.pdf](https://nfi.nfis.org/documentation/ground_plot/Gp_guidelines_v4.0_f.pdf)

SFC : Service forestier du Canada,

*Comptabilisation du carbone forestier, Ressources naturelles Canada*

[http://carbon.cfs.nrcan.gc.ca/index\\_f.html](http://carbon.cfs.nrcan.gc.ca/index_f.html)

