

Changes in the Lignic Portion of the Organic Layer Following Harvesting in the Boreal Forest

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1. Context

- Forest harvesting periodically removes lignic materials that would eventually, if not harvested, contribute to the soil organic matter (SOM) pool.
- The long term effects of modifying the quality and quantity of lignic material inputs to the soil, specifically on SOM storage and soil fertility, are poorly known.
- Recent studies suggest that this material has a modest contribution to stable soil pools. Nevertheless, as this material decays slowly it may contribute to the SOM pool for a certain period and provide water retention capacity as well as to anion and cationic exchange sites as well as habitat.



Orthic humo-ferric podzol (Haplorthod in US soil taxonomy) is the typical soil profile found in the study area.

2. Goal

- Gain knowledge on the short- (1 yr) and mid-term (17 yrs) effect of the harvest of lignic material on carbon (C) pools in boreal forest sites of eastern Canada.

3. Method

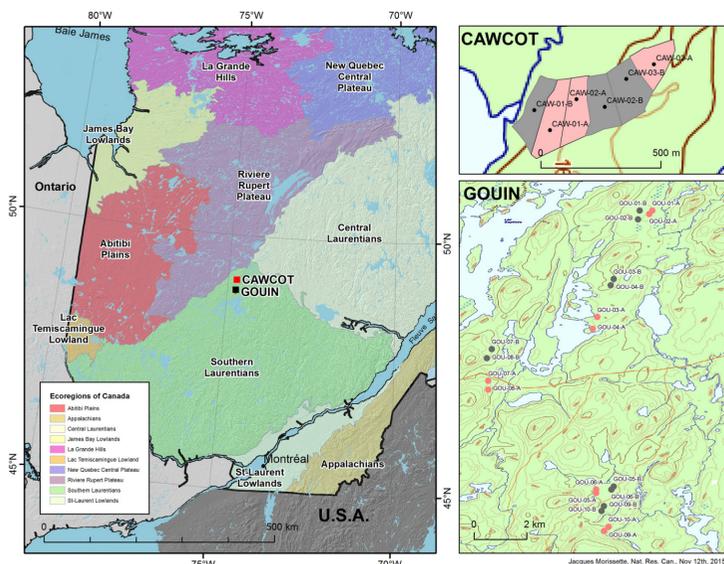
Chronosequence approach

- Pairs of plots under similar ecological conditions for which historical management and disturbance have created different inputs of lignic material were studied.

CAWCOT sites → 1 yr after harvesting (3 paired-plots)
GOUIN sites → 17 yrs after harvesting (7 paired-plots)

Two treatments

Treatment A: Stem-only harvesting (SOH)
Treatment B: Whole-tree harvesting (WTH)

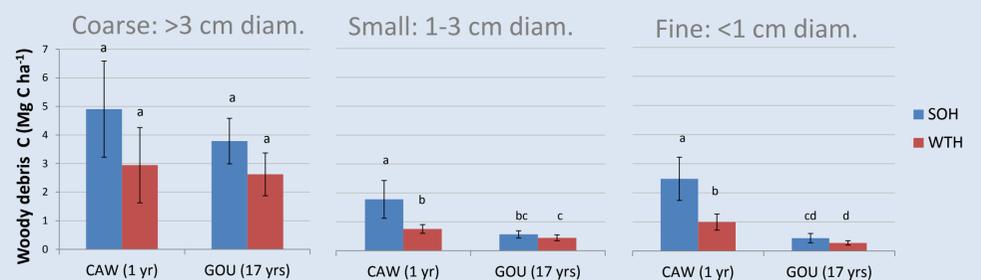


Analysis

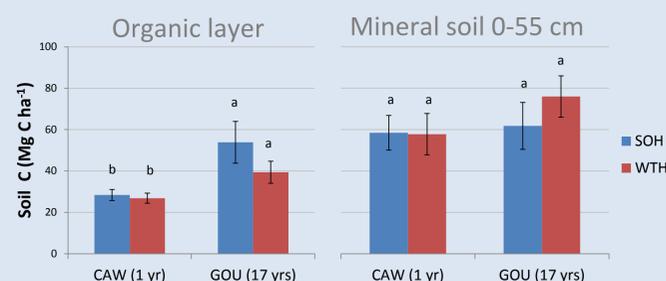
- Paired-plots were sampled and analysed for dead carbon pools (woody debris and soil) and significant differences between treatments were assessed using ANOVAs.

4. Results

The amount of C stored in small and fine woody debris was higher in treatments that received more inputs (i.e. treatment A → SOH) but C stored in larger debris was not significantly different between treatments.



The difference in woody material between treatments lasted only for a short period of time (<17 yrs)



No significant reduction in C stored in organic layer and mineral soil 1 yr and 17 yrs following WTH

Conclusion

- These results suggest that the recent history of woody inputs (SOH vs. WTH after 17 yrs) in these forests has little impact on C accumulation in woody debris, organic layer and mineral soil pools.

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