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Effect of community vertical structure and composition on soil carbon dynamics of young white spruce pure stands versus aspen-white spruce mixed-woods stands in western Alberta, Canada.

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Climate change can affect forest structure and composition in the long term, which will result in a change of the carbon dynamics in the whole ecosystem. We require more information about how this dynamics can be affected. For instance, it is very important to understand now how this climate change might affect the carbon dynamics in different forest structures scenarios. Most studies of carbon in forest are focused in the aboveground dynamics, and there are scarce studies considering the underground component. Studies on how the soil carbon might change depending in the structure and composition of the forest are needed to further understand what is going on in the belowground environment.
The objective of this investigation is to examine the effect of community vertical structure on soil carbon dynamics. We compared young withe spruce pure stands versus aspen-white spruce mixed-woods stands in the boreal forest of western Alberta, Canada.
The "Judy Creek Mixedwood Study" research site is located in Western Canada and was established in 2002. The included treatments are: 1) removal of woody broadleaf vegetation (BW), 2) removal of both woody broadleaf and herbaceous vegetation (BC), 3) removal of herbaceous vegetation (BH), and 4) untreated planted plots (BN). These treatments have provided us with a unique opportunity to explore the influence of different forest structures and compositions on soil carbon content and dynamics.
The results of this research provide evidence on how the carbon soil dynamics is affected under different forest structures/compositions. We consider organic carbon soil, mineral soil carbon as well as litterfall inputs into the soil system. We measured the carbon stock on mineral soil using soil core samples. The fraction of carbon contained in the forest floor was analyzed considering the leaf litter (L horizon) and the organic soil carbon (F-H horizons) separately. Carbon content of litter was sampled using a plastic square while the organic soil carbon contained in F and H horizons was obtained through soil core samples. The total carbon content of the forest floor compartment was calculated summing the carbon from the litter with the carbon from the F-H horizons. Litterfall measurements were collected using plastic litter traps set out systematically.