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# Consequences of acclimating/adaptive tree C-N resource balance on soil and forest carbon stocks under climate change

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Elevating $CO_2$ and temperatures imply profound changes to the growth environment of trees. Changing supplies of $CO_2$ from atmosphere and N from soils also suggest changes to the structure of trees. According to functional balance hypothesis, the phenotypic structure of a tree is an outcome of optimal use of balancing growth resources. We investigated the potential changes and consequences of acclimating/adaptive resource allocation of trees to stocks of carbon in soils and forests under changing climate. We applied OptiPipe model that optimally co-allocates growth resources (photosynthesised C and N acquired from soils) to tree structures so as to yield a maximal NPP for a tree. To do this, we first estimated potential C supply for the optimal allocation model with a simple stand $CO_2$ and water flux model PRELES. Under the assumption of maximal biomass production, the OptiPipe found an optimal stand carbon stock and biomass growths and turnover to litter. Litter was decomposed with Yasso07 model to obtain steady state soil C stocks. We further assessed the sensitivity of steady state soil and forest carbon stocks to assumptions of N availability and release from soils, based on model estimates of temperature sensitivity of decomposition and expert assumptions.
The results will show the consequences of acclimating/adaptive resource allocation to soil and stand carbon stocks under difference climate scenarios overlaid on a map of Finland, under different assumptions of N availability and release. The results emphasise the role of acclimation/adaptation of structural-functional features of trees as components of forest C balances under changing climate.