



Effects of thinning on soil and ecosystem carbon fluxes in a semi-boreal pine and spruce forest

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Disturbance by management or natural causes such as wind throw or fire are believed to be one of the main factors that are controlling the carbon balance of vegetation. In Sweden more than 95% of the forest area is managed with clear cutting and thinning as the main silvicultural methods. Here we study the effect of thinning on soil and ecosystem carbon fluxes in a mixed pine and spruce forest in Central Sweden, the Norunda forest, located in the semi-boreal zone at 60.08°N, 17.48 °E. The CO₂ fluxes from the forest were measured by eddy covariance method and soil effluxes were measured by automatic chambers. Maximum canopy height of the ca. 100 years-old forest was 28 m. The stand was composed of ca 72% pine, 28% before the thinning while the composition after the thinning became 82% pine and 18% spruce. The thinning was made in November/December 2008 in a half-circle from the tower with a radius of 200 m. The LAI decreased from 4.5 to 2.8 after the thinning operation. Immediately after the thinning, we found significantly higher soil effluxes, probably due to increased decomposition of dead roots. The stand level flux measurements showed no effect on total ecosystem respiration, probably because of reduced autotrophic respiration from canopy layer. Initially the GPP was slightly reduced as compared to the non-thinned sector. The thinning effects will be compared with pre-thinning conditions and the results will be put in a general context of management effects on carbon fluxes.