The influence of tree thinning on understory carbon budget in a larch forest on the northern foot of Mount Fuji

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Forest ecosystem is the major carbon stock in terrestrial ecosystems. Elucidating the mechanism of the response of forest carbon budget against the global climate change is critical for predicting future carbon budget. Forest understory is very important component of forest carbon cycle, and it is vital to obtain detailed information about the dynamics of understory carbon budget to understand the whole response of forest carbon cycle to climate change. Forest management is thought to cause drastic change of understory environment, and we examined the influence of tree thinning on understory carbon budget using long-term chamber measurement data.
Multi-channel automated chamber measurement system was installed in a larch forest on the northern foot of Mount Fuji in 2006. We set 16 soil chambers (90 cm ×90 cm ×50 cm) for soil CO_2 flux measurement. The half of those soil chambers were trenched with root cut chainsaw to the depth of 30 cm to measure heterotrophic respiration (Rh). The remaining 8 chambers were used to measure soil respiration (Rs). We set 8 of plant chambers (90 cm ×90 cm ×100 cm) that included understory vegetation to measure understory net CO_2 exchange (NUE). From the NUE data, understory respiration (Ru) and understory gross primary production (GPP_u) were calculated. Stepwise tree thinning was applied to this larch forest in 2014 and 2015, and 30% of larch trees were cut down in March of 2015 in the end.
When we compared the data before (2006 to 2013) and after (2015 to 2016) tree thinning, the change of understory light environment and soil temperature resulted in increase of GPP_u and Ru, respectively. As a result, NUE did not changed remarkably.

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