

Influence of natural and human disturbances on long-term CO₂ exchange over larch forests

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Larch forest is an important research object for evaluating ecosystem response against future global warming because it is a representative vegetation type for high latitudinal northeast Eurasia where greater temperature rise due to climate change is anticipated. In Japan, Larch is a common tree type of plantation that has been planted widespread over northeastern Japan especially after World War II. However, many larch forests have been left unmanaged because of the sluggish lumber demand. Quantifying the influence of the forest management on carbon budget in larch forests has significance on the securement of forests as a source of CO₂ absorption.

Thus, National Institute for Environmental Studies (NIES) has implemented long-term monitoring program of CO₂ exchange over three domestic larch forests in association with Hokkaido University. We established the Fuji Hokuroku Flux Observation Site in the foothills of Mt. Fuji as an alternative base for monitoring, and began observations in January 2006. The site is dominated by larch trees of more than 50 year-old. 30% thinning was conducted at the site in spring of year 2014. Tomakomai Flux Research site was established in 1999 to carry out integrated monitoring on the carbon budget in a mature larch forest. However, the site was devastated by the typhoon in 2004. Flux observation at the site is ongoing after the typhoon disturbance.

We began observations of the effects of canopy opening on a larch forest ecosystem structure in 2001 at a mixed forest in Teshio experimental forest of Hokkaido University. The forest was clear-cut and planted with larch trees in 2003. We monitor and evaluate the changes in carbon budget and forest ecosystem structure. Those three observation sites were affected from different kinds of natural and human disturbance. We will introduce the comparison results of carbon fluxes and related parameters for the sites.

Keywords: CO₂, flux, disturbance, larch, monitoring