Spatial and vertical variations of carbon and nitrogen isotopes of larch forest and NDVI in Eastern Siberia

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Under a global climate change, taiga forest ecosystem is expected to change. Tree ring data obtained at northeast Siberian Taiga indicated tree growth decrease during warm climate (Tei et al., 2014), consequently primary production may decrease in the future. As tools for monitoring ecosystem changes, stable isotope of carbon $\delta^{13}C$ and nitrogen $\delta^{15}N$ are widely applied in ecological research. The $\delta^{13}C$ is a common proxy for water use efficiency in plants, and the $\delta^{15}N$ is for nitrogen availability that is important because boreal forest on permafrost is usually poor in the nitrogen (Popova et al., 2013).

Observations were conducted at Spasskaya Pad forest station (62°25’ N, 129°62’ E) near Yakutsk, Russia. The forest is usually dry, but after the extreme wet event in 2007, wet sites were distributed in the forest. Transect (60m x 510m) with 30m x 30m plots, in total 33, was set including dry sites and wet sites, to obtain needle samples from 104 trees at the height of 5-6 m were obtained in order to investigate spatial variations in $\delta^{13}C$, $\delta^{15}N$, and N contents. These spatial variations were compared with satellite-derived Normalized difference vegetation index (NDVI) using Landsat images with the resolution of 30 m. Lower NDVI and lower foliar N content were observed at wet sites than those at dry sites. A high $\delta^{13}C$ and high $\delta^{15}N$ were also observed at a wet site. After extreme wet event happened, ecosystem (and N availability) changes and NDVI also changes. We also obtained the needles from two trees at different heights in a jungle gym to investigate the vertical variations in $\delta^{13}C$ and $\delta^{15}N$. There were large differences in $\delta^{13}C$, $\delta^{15}N$ and N contents vertically.

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