学位論文内容の要旨

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学位論文題名

Effects of snow manipulation on larch trees in the taiga forest ecosystem in northeastern Siberia

（積雪量変化が北東シベリアのカラマツタイガ林生態系に及ぼす影響）

Changes in winter precipitation (snow) may greatly affect vegetation by altering hydrological and biochemical processes. To understand the effects of changing snow cover depth and melt timing on the taiga forest ecosystem, a snow manipulation experiment was conducted in December 2015 at the Spasskaya Pad experimental larch forest in Eastern Siberia, which is characterized by a continental dry climate with extreme cold winters and hot summers. Variables including soil temperature and moisture, oxygen and hydrogen isotope ratios of soil moisture and stem water, foliar nitrogen and carbon contents and their isotopes, phenology, and soil inorganic nitrogen were observed at snow removal (SNOW−), snow addition (SNOW+), and CONTROL plots. After snow manipulation, the soil temperature at the SNOW− plot decreased significantly compared to the CONTROL and SNOW+ plots. At SNOW− plot, snowmelt was earlier and soil temperature was higher than at other plots during spring because of low soil moisture caused by less snowmelt water. Despite the earlier snowmelt and higher soil temperature in the SNOW− plot in the early growing season, needle elongation was delayed. Leaf chemistry also differed between the CONTROL and SNOW− plots. The needle nitrogen content in the SNOW− plot was lower in the middle of July, whereas no difference was observed among the three plots in August. The soil inorganic nitrogen content of each plot corresponded to these results. The amount of soil ammonium was lower in the SNOW− plot than in the other plots at the end of July, however, once production started at the end of August, the amount of soil ammonium in the three plots was comparable. Extremely low soil temperatures in winter and freeze-thaw cycles in spring and dry soil condition in spring and early summer at the SNOW− plot may have influenced the phenology and production of soil inorganic nitrogen.