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EVAPOTRANSPIRATION AND CARBON DIOXIDE FLUXES OVER LARCH FORESTS WITH DIFFERENT SOIL WATER CONDITION AT EASTERN SIBERIA

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This study investigated evapotranspiration and CO_2 exchange, observed by the eddy covariance method, over two larch-dominated forests mixed with birch and willow, in the southern and middle parts of the Lena basin, eastern Siberia. One is the Spasskaya Pad station (SP) on alluvial terrace near Yakutsk (62° 15´N, 129° 14´E). The other station named Elgeeii (EG) (60° 0´N, 133° 49´E) is located at erosional plain, 300 km southeast of Yakutsk. Average of annual precipitation during last two decades is 290mm and 230mm at Ust-Maya, which is the nearest station at a distance of 60km from Elgeeii, and Yakutsk, respectively, while difference of the other meteorological values such as air temperature and humidity is small. Reflecting different geographical location, these two sites have contrastive soil characteristics; sandy-loam soils at SP has less water retention compared to clay-loam soils at EG.

A decadal observation at SP forest shows inter-annual variability including extreme environmental conditions such as unusually wet active layer, which was maintained for a few years. This caused inhibition of a part of larch leaves growth and would change water and carbon flux over the forest (Ohta et al., 2014). On the other hand, forest at EG have not suffered damage by wet soil condition although frequently soil water content is close to saturation during growing season. Evapotranspiration in three growing seasons at EG was inside decadal variability at SP, while the CO_2 exchanges at EG were always larger than SP. The total evapotranspiration during the growing season was almost identical at the two sites although plant biomass soil water content is always larger at EG than SP. It is likely that the level of forest transpiration is commonly optimized to the similar meteorological conditions through a difference in contribution of evapotranspiration from the floor vegetation and the soil water availability.

Ohta et al., Effects of waterlogging on water and carbon dioxide fluxes and environmental variables in a Siberian larch forest, 1998–2011, Agricultural and Forest Meteorology, 188, 64-75, 2014.