RR2. Eddy fluxes observed in East Siberian larch forest, cutover and alas during the growing season of 2005

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Abstract

Eddy fluxes of energy, water vapor and carbon dioxide were measured by means of open path eddy covariance systems above and below an intact larch forest canopy and a adjacent cutover five years after deforestation near Yakutsk in East Siberia, Russia during the growing season of 2005. Eddy fluxes of energy and water vapor in an alas with a pool near the larch forest were also measured using a thin wire thermocouple psychrometrer and a sonic anemometer mounted above the top of a pingo.

The growing season of 2005 was characterized by hot spring and autumn, and wet and cool summer. Monthly air temperature in May, June and September 2005 was the highest among the recent five years, however that in July and August was the lowest. Monthly rainfall in July and August and also five-month total rainfall in 2005 were remarkably large among the five years. The needle development of larch trees began in early May and was about two weeks earlier than the average years.

Evapotranspiration of the larch stand in July and August was large in spite of the small available energy, and average Bowen ratio was small in these months. However in the cutover, the small available energy decreased evapotranspiration that was about half of that in the larch forest, which raised soil water storage of the cutover more than the forest. The contribution of understory vegetation on evapotranspiration of the larch forest is large in June exceeding the half, however, it decreased in the wet months of July and August. Albedo of the alas was higher than the cutover and than the larch forest in mid summer, and the available energy was consequently smaller in the alas. Latent heat flux in the alas depended on the rainfall and soil moisture as well as on the available energy, and the fraction of latent heat flux to the available energy was small in June and was large in July.

Monthly net ecosystem carbon dioxide exchange (NEE) of the larch forest was negative (absorption) from June through September. High negative NEE was recorded in the wet month of July and August, which was probably because of the fewer drought limitation on the assimilation and of the lower respiration caused by the low temperature. Vegetation of the cutover was in a quick succession stage after deforestation in five years ago, and the growth of birch coppice and grass coverage was significant. Monthly NEE in the cutover was negative in June, July and August. NEE of the larch forest floor was positive throughout the observation period.