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CO₂ and heat fluxes in a recently clear-cut spruce forest in European Russia

Ecosystem carbon dioxide, energy and water fluxes were measured using eddy covariance and portable chambers in a fresh clear-cut surrounded by a mixed spruce-birch-aspen forest in the boreal zone of European Russia. Measurements started in April 2016 following harvest and continued for five months. The clear-cut was a permanent source of CO₂ to the atmosphere. Total ecosystem respiration (TER) and gross primary production (GPP) were about 7.4 gC m⁻² and 4.1 gC m⁻² per day respectively. Eddy covariance data showed a reasonable accordance with the chamber measurements. During the mid-spring the mean daily latent (LE) and sensible (H) heat fluxes were similar and the Bowen ratio (Bo=H/LE) averaged about 1.0. During the late spring and summer months the net ecosystem exchange of CO₂ (NEE) remained slightly positive following onset of vegetation growth, while Bo was changing in the range from 0.3 to 0.5. There was strong diurnal variability in NEE, LE and H over the measurement period that was governed by solar radiation and temperature as well as leaf area index (LAI) of regrown vegetation. This study was supported by a grant from the Russian Science Foundation (14-14-00956).