



## **Effect of a small clear-cut on soil surface temperature patterns of a spruce forest ecosystem**

K. Radler (1), A. Olchev (1,2), O. Panferov (1), D. Fellert (1), and G. Gravenhorst (1)

(1) Dept. of Bioclimatology, Buesgen-Institut, Georg-August University, Goettingen, Germany (kradler1@gwdg.de) , (2) A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow, Russian Federation (aoltche@gmail.com)

Rational forest management demands complex study to quantify effects of clear-cutting and windthrows on forest microclimate and soil hydrology. Within the framework of this study microclimate of a small clear-cut (about 2.6 ha) in a spruce forest was investigated using results of continuous microclimatological measurements. Selected study area is located in central part of Germany about 60 km northwest of Goettingen in the Solling highland at 51°46'N and 09°27'E, and about 300m above sea level. Most attention in the second phase of the study was focused on analysis of spatial and temporal patterns of soil surface temperature, which strongly influences the growth and development of most plant species as well as the activity and survival of all invertebrates living on and near the ground surface in forest ecosystems. Although surface temperature is ecologically a most relevant parameter, there are very scarce data available describing the soil surface temperature profile between forest and such openings.

Soil surface temperature was continuously measured by digital infrared pyrometers (type IN510, Newport Electronics) along a transect from the clear-cut centre to the forest interior perpendicularly to the forest tree line of a south-east facing forest edge during vegetation period 2007. Sensors were installed on a tripod 1m above ground. Data were recorded by mobile meteorological stations providing also continuous measurements of air and soil temperature, solar radiation, air humidity, wind speed and direction with 5 minute temporal resolution.

Results of the field measurements show that the surface temperature varies tremendously within a stripe of  $\pm 25\text{m}$  around the tree line. The seasonally averaged daily course of the surface temperature along the transect revealed a maximum of  $32^{\circ}\text{C}$ , which was observed exactly at the tree line shortly before noon. It was by  $13^{\circ}\text{C}$  higher than surface temperature measured 25m away within the forest and also higher than at clear-cut centre. For a sunny day in July the corresponding range was  $33^{\circ}\text{C}$  with values of  $62^{\circ}\text{C}$  at tree line versus  $29^{\circ}$  within the forest.

During nighttimes there was an average surface temperature of  $14\text{-}15^{\circ}\text{C}$  within the forest. It continuously decreased by  $3^{\circ}\text{C}$  along a stripe of  $\pm 25\text{m}$  around the tree line, and it was only  $9^{\circ}\text{C}$  at the centre of the clear-cut.

This study was supported by the DFG (Gr 738/16-2).