



## **Spatial and temporal variability of soil physical properties on legacies of historic charcoal production**

Anna Schneider (1), Florian Hirsch (1), Alexander Bonhage (1), Alexandra Raab (2), and Thomas Raab (1)

(1) BTU Cottbus-Senftenberg, Geopedology and Landscape Development, Cottbus, Germany (anna.schneider@b-tu.de), (2) BTU Cottbus-Senftenberg, Research Center Landscape Development and Mining Landscapes (FZLB), Cottbus, Germany

The spatial variability of soil physical properties on the landscape scale is often increased by anthropogenic land occupation, not only by current land use but also through the legacies of past land use systems. The remains of historic charcoal hearths are an example for such a disturbance of the soil landscape by former forestry. Such relict charcoal hearths (RCH) exhibit a clearly altered soil stratigraphy, most prominently characterized by a technogenic substrate layer on the soil surface, and their soil physical properties can considerably differ from those of surrounding forest soils.

The aim of our study is to characterize the soil water and temperature regime on RCH in a pre-industrial charcoal production area in Brandenburg, Germany, as compared with the surrounding sandy forest soils. Soil properties were analyzed in profiles on and around hearth sites and are monitored in a sensor transect equipped with soil moisture sensors and pF-meters.

Results of soil sample analyses show differences in density and porosity between the RCH soils and surrounding forest soils, not only in the technogenic layer but also in the buried soil layers on hearth sites. The soil water characteristic curves determined in the laboratory indicate a modified pore size distribution and lower plant available water contents in the RCH soils. Preliminary results of the ongoing soil water monitoring, however, show increased soil wetness in the RCH soils, along with lower soil moisture tensions. Furthermore, the measurements show higher variations of soil temperature in RCH soils.

The results affirm that the legacies of historic charcoal production can increase the spatial variability of soil physical properties and therefore also of ecological site conditions in forest areas. The results of soil moisture monitoring suggest that a determination of soil physical parameters in the laboratory is not sufficient to characterize the spatio-temporal variations of the soil water regime.