



Assessing the legacy effects of historic charcoal production in Brandenburg, Germany

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Charcoal produced in kilns or hearths was an important source of energy in many regions of Europe and Northern America until the 19th century, and charcoal production in hearths is still common in many other regions of the world. The remains of charcoal hearths are therefore a widespread legacy of historic land use in forest areas. Soils on charcoal hearth sites are characterized by a technogenic layer rich in charcoal and ash on top of the soil profile, and by a pyrogenic modification of substrates below the former hearth.

The aims of our study are to examine how these alterations to the natural soil profiles affect the soil water regime and other soil physical properties, and to assess the relevance of these effects on the landscape scale. We present first results of a mapping of hearth site occurrence in forest areas in the state of Brandenburg, Germany, and of a characterization of the infiltration behaviour on hearth sites as compared with undisturbed forest soils.

Results of mapping small-scale relief features from LIDAR-based digital elevation models show that charcoal hearths occur in a high density in many large forest areas throughout Brandenburg. In the areas studied so far, up to almost 3% of the soil surface were found to be affected by the remains of historic hearths. First analyses of soil physical properties indicate differences in the infiltration characteristics of hearth site soils and undisturbed forest soils: Hood infiltrometer measurements show a very high spatial variability of hydraulic conductivity for hearth site soils, and water-drop-penetration-time tests reflect extremely high hydrophobicity of the technogenic layer on the sites. Results of dye tracer experiment show considerably strong preferential flow and therefore a higher spatial variability of soil wetness below the hearth remains. Overall, our first results therefore indicate that the legacy effects of historic charcoal production might significantly affect overall site conditions in forest areas with a high density of charcoal hearth remains.