Geophysical Research Abstracts
Vol. 16, EGU2014-2557, 2014
EGU General Assembly 2014

Influence of charcoal burning induced pyrolysis on soils

Florian Hirsch (1), Alexander Nicolay (1), Bastian Pötzsch (1), Marie Fritzsche (1), Alexandra Raab (2), and Thomas Raab (1)

(1) Chair of Geopedology and Landscape Development, Brandenburg University of Technology Cottbus - Senftenberg, Cottbus, Germany, (2) Research Centre Landscape Development and Mining Landscapes (FZLB), Brandenburg University of Technology Cottbus – Senftenberg, Cottbus, Germany

In Lusatia, Northeastern Germany, the production of ironware between the 16th and 19th century left behind a remarkable amount of charcoal kilns in the forests north of Cottbus. Remote sensing surveys, underpinned by archaeological studies, show that charcoal was gained around Cottbus from several thousand charcoal kilns which had internal diameters up to 20 m. For the study site with 35 km2 area, the until now prospected total ground area below the charcoal kilns which was potentially affected by the pyrolysis is about 0,5 km2. Historic data indicates that the pyrolysis in the charcoal kiln took up to several weeks, for the kilns with a diameter of 20 m about 20 days. To characterize the depth of thermal alteration of soils below the kiln our current focus is on the differentiation of the iron hydroxides by small-scale vertical analysis of soil profiles.

The study site is situated 16 km northeast of Cottbus at the opencast mine Jänschwalde. Field work was done during the archaeological rescue excavation of a charcoal kiln in a 50 m long trench crossing an about 15 m wide charcoal kiln. One vertical profile outside the charcoal kiln and two vertical profiles below the charcoal kiln were chosen for analysis. The magnetic susceptibility was measured in situ on the undisturbed profile and ex situ on stepwise heated samples (105, 350, 550, 750 and 950°C). The total iron content was quantified ex situ by x-ray fluorescence.

Our first results indicate a change in the magnetic susceptibility in the contact area of the mineral soil and the charcoal kiln. The influence of the pyrolysis on the soil is restricted to areas where the soil was not shielded against the heat by ash or organic material.