



## **Effects of long term atmospheric deposition of lignite fly ash on soil physical properties of forest soils**

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Lignite fly ash enriched soils occur widely throughout the industrial regions of Eastern Germany and in other heavily industrialized areas. A limited amount of research has suggested that lignite fly ash enrichment alters soil physical properties of forest soils. We want to present the influence of lignite fly ash enrichment on soil physical properties (porosity, hydraulic properties, water repellency) of forest soils in Saxony and Saxony-Anhalt (Germany).

The enrichment of fly ash particles could be proven directly by texture analyses and by scanning electron microscopy and indirectly by changed soil physical properties of the fly ash enriched forest floor horizons. Besides organic lignite residuals, mainly mineral fly ash particles were found. These mineral particles are characterized by spherical morphologies partially with hollows and a decreasing grain size with increasing distance to the emission sources. In both study areas, the effects of fly ash enrichment on soil physical properties were similar. Close to the emission sources (where there was an accumulation of sandy fly ash), particle density, air capacity, and saturated hydraulic conductivity were increased, whereas the water available to plants and water repellency was decreased. With increasing distance from the emission source of the fly ash, corresponding with less accumulation of ash of decreasing size (silt), coarse pores (air capacity) and saturated hydraulic conductivity were comparatively reduced, whereas plant available water and soil water repellency increased. The investigated properties are partially highly correlated with each other and indicate that the enrichment of fly ash changed the total functionality of forest floor horizons. No impact of fly ash was found for the top mineral horizons.