



Mapping of ferrimagnetic susceptibility for screening of fly ash deposition

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The proposed presentation introduces a case study in the Dübener Heide, industrial triangle Leipzig-Halle-Bitterfeld in Saxony, whose purpose was (a) to assess the current fly ash load in forest soils and (b) to test if ferrimagnetic susceptibility can be used for a fast and cost efficient screening of deposited elements. Ferrimagnetic susceptibility was mapped in a raster of 1x1 km² and correlated with selected nutrients metals, heavy metals and Black Carbon.

The predictive value of ferromagnetic magnetic susceptibility was tested on the basis of linear regression models. The correlation between ferrimagnetic susceptibility, base saturation and the contents in Ca, Mg, Fe, Al and Cd (humus layers) was comparably high. The correlation with the content in Mn was weaker and the correlation with Black Carbon (humus layers) showed no clear trend. Linear regression based models with sufficient precision could be found for Ca, Mg and Mn, with lower precision for Cd and Black Carbon. No prediction was possible for Fe and Al.

Furthermore, multiple-regionalization techniques were used to model the spatial variation of historical fly ash deposition. This includes an analysis, which environmental parameters are most important for the spatial model. The multiple regression based modeling of the spatial variation of fly ash deposition was possible with a very high precision. A slightly differing set of model parameters was selected for different depth levels in the humus layer and mineral soil, comprising topographical and soil parameters and to a much lesser extend stand parameters.

In conclusion, the usability of the proxy indicator ferrimagnetic susceptibility for screening of the deposited elements was proved.