Delineation of polluted areas by evaluation of magnetic susceptibility maps - comparison of different background definitions

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In the last two decades, magnetic susceptibility measurements have developed to a fast and low-cost method to map heavy metal pollution. Magnetic susceptibility of soils can be used as a proxy for anthropogenic dust pollution because ferrimagnetic minerals are produced during combustion processes together with different heavy metals. Low-priced instruments can be employed to quickly evaluate the situation in a study area. High spatial resolution can therefore be reached. Magnetic susceptibility is a reliable proxy for anthropogenic pollution. It can not totally replace chemical measurements as it does not yield information about the elemental composition of the pollutants. But it gives detailed information about their distribution and thus allows us to restrain costly chemical measurements to some selected sites.

The interpretation of the maps obtained by magnetic susceptibility measurements of soils is until now only possible by experts who know about the geology and soil types in the study area. Susceptibility does not only depend on the input of anthropogenic dusts. There are also lithological and pedological contributions. Therefore a major problem in the evaluation of the maps is the definition of the respective background values which should include these other contributions. In this study we compare three different approaches of background definition which can be applied to surface magnetic susceptibility maps obtained by field measurements: Median Absolute Deviation Method, Boxplot Method and Population Modelling Method. These methods may be applied to any univariate environmental database. It is shown that they act as increasingly strong filters for the data values. The study area which was used for this comparison is the Eastern part of Austria with the provinces Carinthia, Styria, Burgenland,

Lower and Upper Austria.