Geophysical Research Abstracts
Vol. 17, EGU2015-2534, 2015
EGU General Assembly 2015

The Magnetic Properties of Lichens Exposed Around a Cement Plant in Slovakia

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A cement industry is a source of dust pollution, from quarrying and grinding of the raw material to kiln operations. Airborne pollutants related to combustion processes are also emitted, especially during kiln operations and power generation. The use of biomonitors can provide valuable information about the impact of airborne pollutants released during cement production and lichens are suitable bioindicators of air pollution, providing reliable information on the quality of the environment.

We investigated the magnetic hysteresis properties and the elemental concentrations of epiphytic lichens from selected sites (a cement mill, two quarries, agricultural areas, and villages) in SW Slovakia; in particular, both transplanted and *in situ* lichens, bark, soil and rock samples from the sampling sites, as well as pre-transplant samples have been characterized. *Evernia prunastri* transplants, exposed up to 180 days, showed excellent correlations between the saturation magnetization (Ms) and saturation remanent magnetization (Mrs) values and the Fe concentrations; the analyzed samples were magnetically homogeneous, with marked differences only for the sample from a basalt quarry. *Xanthoria parietina* autochthonous samples have also a similar magnetic mineralogy; anyway their Ms and Mrs values were two orders of magnitude higher with respect to those from the transplants, implying increased concentration of magnetic particles according to the different lichen species and to the prolonged exposure.

Magnetic methods can be valuable for discriminating various natural and anthropogenic sources of dust. In this study, we point out that the magnetic properties may also reflect the influence of the basalt quarry activity, of the soil and of the bedrock. For a proper evaluation of the pollution related to human activities, it is thus essential to verify the nature of the substrate and to select suitable and homogeneous pre/post lichen transplant sites.