Geophysical Research Abstracts
Vol. 13, EGU2011-2124, 2011
EGU General Assembly 2011

Do epiphytic lichens reflect agriculture-related depositions?

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Lichens are natural monitors of our changing environment: the sensitivity of particular lichen species and communities to a very broad spectrum of environmental conditions, both natural and unnatural, is widely appreciated. Lichens are therefore used increasingly in evaluating threatened habitats, in environmental impact assessments, and in monitoring environmental perturbations, particularly those resulting from a disturbingly large and growing number of chemical pollutants. In recent years, besides research of nitrogen concentrations in lichen thalli, research on isotopes in lichens increased. A lot of studies proved that it is possible to use isotope signatures for estimating different nitrogenous sources. In the present study we tested whether epiphytic lichens are useful indicators for reflecting nitrogen affected areas and detecting different kind of nitrogenous deposition by dint of nitrogen concentrations and δ^{15}N signatures in lichen tissues.

In winter 2008/09 epiphytic lichens (*Hypogymnia physodes* and *Xanthoria parietina*) were sampled from 18 sites located in Germany (permanent grid established by Federal Environment Agency). Samples were collected within a radius of 2 km around field stations for deposition measurement, from trees that met the requirements for bioindication with lichens. Besides, bark samples were collected at the same sites and furthermore characteristics of carrier trees (e.g. circumference in 1,50 m height, tree height, crown diameter and characteristics of bark) and other parameters (e.g. land use, altitude and traffic influence) were registered.

As a result of being present and absent, lichens have the ability to reflect deposition circumstances at different sites. The sensitivity of epiphytic lichens is also shown in this study. Upon investigation, we also used the function of lichens as bioaccumulators. We found ranges between high N-concentrations in *Xanthoria parietina* under high N-deposition and lower N-concentrations in *Hypogymnia physodes* in unpolluted areas. As expected, the δ^{15}N ratios are in both lichen species more negative under high ammonia deposition, where N-deposition is from agricultural origin, especially from animal husbandry.

In this study we could underline that lichens can be used for monitoring atmospherical characteristics and that their ability of accumulation shows nitrogenous situation at different nitrogen affected areas. By comparing different δ^{15}N-signatures in lichens we could highlight that source attribution is possible.