

Tracking metal aerosols and natural radioactivity in Northern Ontario, Canada: tales told by lichens

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Lichens are a symbiotic association of a fungus (mycobiont) with an algal or cyanobacterial partner (photobiont). These organisms do not have a root system; they acquire nutrients almost exclusively from the atmosphere through wet or dry deposition. Lichens capture, accumulate and store elements for their metabolic needs and potentially beyond and can retain many contaminants within their tissues for a long time. This contaminant storage capacity, and because lichens are found in almost all climate zones, they are a potentially useful tool for environmental monitoring of atmospheric contaminants.

Large industrial projects such as development of new mines or siting a nuclear reactor for energy and heat production require a thorough multi-contaminant monitoring program prior to, during, and after the project completion. Monitoring normally uses multi-elemental analysis techniques such as Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and/or neutron activation analysis (NAA): both of which have advantages and shortcomings. In a recent study^[1] from the Sudbury and Elliot Lake mining regions in Northern Ontario (Canada), we have analyzed the concentrations of approximately 30 elements using ICP-MS. Given that we covered a large geographical area in our sampling, the lichens show different response patterns and hence they can tell different stories.

In this presentation, we will update the study on the use of lichens for monitoring a selection of elements and potential contaminants using NAA as a complementary technique. The presentation will provide a discussion of the common and complementary information obtained by ICP-MS and NAA, in the context of the on-going case study.

[1] Anderson et al., (2022), <https://doi.org/10.1016/j.heliyon.2022.e11863>