Geochemical information and isotopic ratios in pinpointing the rates of contamination processes generated at mine sites

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The isotopic composition of water is an important fingerprinting method for tracing recharge sources, distribution processes and possible hydraulic connections of mine waters. However, since, the isotopes alone do not indicate the contamination derived from mining activities; also a set of geochemical analysis of harmful substance in water is acquired. This complex approach will allow a detailed insight in migration of potentially harmful substances, their reactions, mixing and dilution in ground and surface waters. The data can be applied also when comparing geogenic and anthropogenic emissions.

Isotopic methods are rather new approach to estimate mining related emissions in Finland and thus, a novel approach of isotopic methods for investigation and monitoring of migration of harmful substances from mine sites are tested in two mine sites in Finland. The aim of this study is to assess the emission sources, flow paths and interaction between mine waters, groundwater and surface waters. A set of isotopic data, including S, Li, Mg, U, Sr, Pb, O, and H, will be combined with chemical information and physical parameters of water in order to assess the source and extent of possible contamination as well as the rates of processes that generate or at best attenuate the contamination. The results obtained from water analyses and field measurements will be used in hydrogeochemical modelling for the prediction of chemical transformation and long-term impacts of mining at study site and its surroundings.