Combination of REE and Sr/Nd isotopes to study soil/water/biomass interactions in a former U mining area

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Even 27 years after mine closure in the U mining area Ronneburg, Germany, mining affected water with multi element contamination discharges into the isolated riverbed of Gessenbach. Such environments are well suited to study trace element transfer mechanisms at the soil/water/biomass interfaces. We use here REE distribution patterns and Sr/Nd isotopes as process indicators for trace element transfers between river water, soil and biomass (*Glyceria fluitans*, *Hypholoma subericaeum*, *Fraxinus excelsior*).

Sr isotopic compositions of discharge and biomass were identical within the error limits suggesting that plants absorb Sr (and by analogy also Ca), directly from discharge water. In contrast, the Nd isotopic compositions showed no differences between soil, water and biomass, suggesting an inseparable REE and Fe uptake from soil solution which is enhanced by a positive REE/Fe correlation in plants.

The PAAS-normalized REE patterns of the discharge water show enrichment of middle (Sm-Dy) and heavy REE (Ho-Lu). This basal pattern is also transferred to the bioavailable soil fraction and to biomass, whereas positive Ce anomalies are limited to the soil (Fig. 1).

Concluding, REE patterns and Sr/Nd isotope ratios are well suited tools to trace the environmental impact of mining affected water in Gessental into biogeochemical systems.

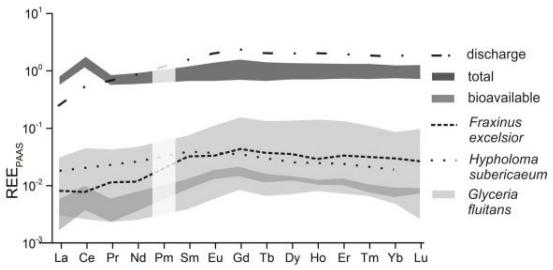

Figure 1 REE_{PAAS} patterns of total and bioav. fraction of soil, discharge, and biomass samples.