Rare earth elements (REE) are a group of heavy metals having a high potential for environmental studies. Normalization to a suitable standard as e.g. the Post Archean Australian Shale (PAAS; McLennan, 1989) yields in smooth patterns which can show anomalies, enrichments or depletions. Based on possible changes in these features, REE can be used as "tracers" for water-rock-interactions for heavy metals in general (Johannesson and Xiaoping, 1997; Worrall and Pearson, 2001).

Acid mine drainage (AMD) caused by leaching or mining is a common problem worldwide. Generally, in such environments acidic pH, high sulphate concentrations as well as a high metal load result from mining operations. Since REE concentrations are elevated in acidic systems (Miekeley et al., 1992; Smedley, 1991), REE can be well applied to study sources of contamination and secondary processes in AMD-influenced habitats.
The AMD-influenced basement area of a former uranium leaching heap situated in Eastern Thuringia (Germany), is most suitable for studying REE behaviour in the system solid/ aqueous, because of high abundance of up to 8.15 mg REE/l in acidic Mg-(Ca)-SO$_4^{2-}$-rich groundwater. Normalization of REE concentrations in groundwater to PAAS shows besides an enrichment of middle REE (Sm to Dy) and heavy REE (Ho to Lu), a site-characteristic positive Ce-anomaly as well as a slight positive Gd-anomaly.

This work aims on the behaviour of REE in an AMD-influenced area. In combination of both, field and laboratory studies, the factors leading to changes in groundwater REE pattern will be studied. The focus is laid on processes in partitioning and mobilization between solid and aqueous phase resulting in today's REE groundwater pattern.
References


