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Transfer of rare earth elements from natural metalliferous (copper and cobalt rich) soils into plant shoot biomass of metallophytes from Katanga (Democratic Republic of Congo)

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The geochemical behavior of rare earth elements (REE) is generally assessed for the characterization of the geological systems where these elements represent the best proxies of processes involving the occurrence of an interface between different media. REE behavior is investigated according to their concentrations normalized with respect to the upper continental crust. In this study, the geochemical fingerprint of REE in plant shoot biomass of an unique metallicolous flora (i.e., *Crepidorhopalon tenuis* and *Anisopappus chinensis*) was investigated. The plants originate from extremely copper and cobalt rich soils, deriving from Cu and Co outcrops in Katanga, Democratic Republic of Congo. Some of the species investigated in this study are able to accumulate high amounts of Cu and Co in shoot hence being considered as Cu and Co hyperaccumulators. Therefore, assessing the behavior of REE may lead to a better understanding of the mechanisms of metal accumulation by this flora.

The data obtained in this study indicate that REE uptake by plants is not primarily controlled by their concentration and speciation in the soil as previously shown in the literature (Brioschi et al. 2013). Indeed, the REE patterns in shoots are relatively flat whereas soils patterns are Middle REE enriched. In addition, it is worth noting that Eu enrichments occur in aerial parts of the plants. These positive Eu anomalies suggest that Eu^{3+} can form stable organic complexes replacing Ca^{2+} in several biological processes as in xylem fluids associated with the general nutrient flux. Therefore, is is possible that the Eu mobility in these fluids is enhanced by its reductive speciation as Eu^{2+}. Eventually, the geochemical behavior of REE illustrates that metals accumulation in aerial parts of *C. tenuis* and *A. chinensis* is mainly driven by dissolved complexation.

Brioschi, L., Steinmann, M., Lucot, E., Pierret, M., Stille, P., Prunier, J., Badot, P., 2013. Transfer of rare earth elements (REE) from natural soil to plant systems: implications for the environmental availability of anthropogenic REE. Plant and Soil, 366, 143-163.