

The influence of soil organic matter on the distribution of rare earth elements under different land uses in a typical karst area, Southwest China

GUILIN HAN¹, FUSHAN LI², YANG TANG², QIU TAN³

¹School of Water Resources and Environment, China University of Geosciences (Beijing), Beijing 100083, China

²The State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China

³School of Geographic and Environmental Sciences, Guizhou Normal University, Guiyang 550001, China

The rare earth elements (REE) are a chemically similar group of elements that have been used extensively to trace geochemical processes in natural systems. Basing on the storage of REE and SOM in soil, the competition of them may lead to the redistribution of REE in vertical soil profiles. The different land use and land cover of a given region can provide an environmental gradient of soil organic carbon (SOC) content to elucidate REE vertical transporting processes. The results indicated that there were significant and important differences of REE behavior with respect to the different types of vegetation cover. The fractionation pattern, in addition to a strong positive correlation between the middle REE enrichments and SOC, was consistent with soil organic matter (SOM) acting as a REE host phase. Samples under different land uses were unique: (1) a stronger enrichment of total REE concentrations in C4 plants dominated sites than that in C3 plants dominated sites; (2) the significant correlation between the magnitude of the positive $\delta^{13}\text{C}$ and the magnitude of MREE enrichment revealed that the organic functional groups to adsorb REE changed with the stable isotope compositions of SOC. This observation demonstrates the utility of REE as tracers for natural influences in organic-rich soil profiles.

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