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Isotope Tracer Insights into Metal Mobility and Partitioning in Contaminated Soils

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Understanding metal mobility in soils through refractory phase formation is essential for linking geochemical phase stability, particularly refractory phase formation and solid–solution partitioning, with observed leaching behavior. However, the role of refractory metal phase formation in controlling mobility remains insufficiently quantified, as previous studies have primarily focused on methodological comparisons between batch and percolation tests rather than mechanistic controls.

Standardized leaching tests are widely applied in environmental risk assessment to estimate the release of metals from contaminated soils to groundwater [1]. Persistent trace metals such as Pb, Hg, and Cd accumulate in soils and pose long-term risks to ecosystems and human health [2,3]. Despite standardized procedures, uncertainties remain regarding the geochemical processes and solid-phase transformations that govern metal mobility.

In this ongoing study, we investigate the geochemical controls governing metal mobility in contaminated soils from Skellefteå, Sweden. The study focuses on refractory phase formation and solid–solution partitioning behavior (Kd), supported by isotopically enriched tracer experiments that enable differentiation between newly introduced metals and ambient soil pools, thereby providing insight into transformation and exchange processes. Operational leaching behavior is evaluated in parallel to assess metal release under controlled laboratory conditions. Preliminary results will be presented at the conference.

[1] Löv, Å.; Larsbo, M.; Sjöstedt, C.; Cornelis, G.; Gustafsson, J. P.; Kleja, D. B. Evaluating the Ability of Standardised Leaching Tests to Predict Metal(Loid) Leaching from Intact Soil Columns Using Size-Based Elemental Fractionation. *Chemosphere* **2019**, *222*, 453–460.

[2] Li, Q.; Wang, Y.; Li, Y.; Li, L.; Tang, M.; Hu, W.; Chen, L.; Ai, S. Speciation of Heavy Metals in Soils and Their Immobilization at Micro-Scale Interfaces among Diverse Soil Components. *Science of The Total Environment* **2022**, *825*, 153862.

[3] Zhao, D.; Wang, P.; Zhao, F.-J. Toxic Metals and Metalloids in Food: Current Status, Health Risks, and Mitigation Strategies. *Curr Envir Health Rpt* **2024**.