Application of the diffusive gradients in thin films induced fluxes in soils (DIFS) model to assess resupply kinetics of uranium: effects of organic matter and iron oxides

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Diffusive gradient in thin films (DGT) has been widely used as an in situ measurement technique for labile metal concentration because of its simplicity for deployment and measurement. The goal of this study was to evaluate fundamental kinetics and equilibrium parameters for uranium accumulation in artificially polluted soils (10 mg U/kg dry soil) of different peat moss (0-30%) and iron oxide (0-10%) contents. The DGT units were inserted into the soil samples of 80% water holding capacity during 48 hours. The performance of DGT in uranium accumulation was simulated using a dynamic numerical model of diffusive gradient in thin films induced fluxes in soil (DIFS). DIFS provided uranium depletion patterns in soil solution as a function of time and distance from the diffusive layer surface. The time-dependence of R, distribution coefficient (K_D), and response time (T_C) of uranium were also estimated for each soil sample using the DIFS. In general, the DIFS model was successfully used to provide quantitative interpretation of DGT measurements in terms of fundamental kinetics and equilibrium resupply parameters