Evaluating the Bioavailability of Radionuclides in Contaminated Soil Using the Diffusive Gradients in Thin Films (DGT) Technique

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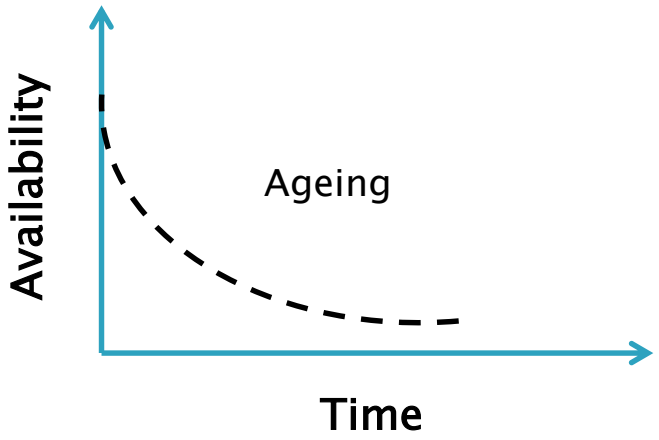
Objectives and approach

Can short-term DGT measurements of radionuclide availability predict long-term availability?

- Soil incubation – investigate 'ageing' effect in spiked soils.
  - ^{77}Se, ^{99}Tc and ^{238}U
  - Systematic DGT deployments over ~2.5 years e.g. 1,3,5,7,10,15…etc. weeks following spiking



- DGT deployments in 'aged' contaminated lysimeter soils.
- Plant uptake experiments to compare DGT and plant concentrations.

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Rationale

- ^{79}Se, ^{99}Tc and U isotopes – significant in the context of long-term nuclear waste disposal.
- Plant uptake is a major transfer route for radionuclides into the biosphere – need to assess availability for accurate prediction of plant uptake.
- No work to date looking at Tc availability in soil using DGT technique, only a small handful of studies that consider Se and U.

DGT technique

- In-situ concentrations and fluxes of kinetically-labile species in soils, sediments and solutions.
- Need to consider solid phase resupply flux when assessing availability
- Significant linear correlation reported between plant uptake and DGT concentration reported for a range of trace elements.