Conference or Workshop Item - Abstract

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Description and reduction of radionuclide K_d variability in soil and aquatic systems: the way to a smart database

Miquel Vidal[a], Anna Rigol[a], Patrick Boyer[b], Brenda J. Howard[c], Daniel Kaplan[d] and Oriol Ramírez-Guinart[a]

[a] Department of Chemical Engineering and Analytical Chemistry – University of Barcelona, Barcelona, Spain
[b] Institute of Radioprotection and Nuclear Safety, Cadarache, France
[c] Centre for Ecology & Hydrology, Lancaster Environment Centre, Lancaster, United Kingdom
[d] Savannah River National Laboratory, Aiken, South Carolina USA

Models for risk assessment rely on input data that often have a high associated variability, which affect the uncertainty of the predictions. Solid-liquid distribution coefficient (K_d) is a key radioecological parameter to describe the radionuclide liquid-solid fractionation that conditions radionuclide mobility and biological availability in the environment, and doses to wildlife and humans. However, there is not a single K_d value for a given radionuclide-geological material combination, but K_d variability can be up to 5-6 orders of magnitude under the effect of the methodology followed for its determination, radionuclide speciation and characteristics of the geological material affecting radionuclide sorption. The relative weight of each variability source is radionuclide-dependent. Besides, variability sources are difficult to be reduced because they are not univariate and are not independent among them. Therefore, K_d variability jeopardizes its relevance in risk assessments.

K_d datasets, with agreed data acceptance criteria and critically reviewed, have been recently constructed and updated for soils and freshwater systems, with a high number of entries, which may lead to the estimation of more reliable K_d values and improve model performance. These datasets permit not only to calculate a best estimate for the K_d value for a given combination of radionuclide-geological material (*i.e.,* soils; sediments; suspended matter), but they are also an opportunity to express K_d values with their inherent variability, through the use of the statistical tools to describe K_d population (such as cumulative distribution functions), and to decrease K_d variability by grouping data on the basis of those key factors governing radionuclide interaction.

In this work, the case of soil K_d dataset is used to develop this approach, by showing a few study cases for relevant radionuclides (e.g., radiocaesium, uranium, and americium) in which K_d variability is described and reduced. Implications for the construction of a smart database, in which the end-user modeller may obtain K_d best estimates for target scenarios, with a decreased variability by using available information, will also be discussed.