# ABSTRACT FORM

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## C3MI: CEA-CNRS CODE OF MIGRATION, INTERCOMPARAISON

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Early prediction of radioelement migration often used a partition coefficient, so called $K_d$, to account for the chemical and sorption reactions. The $K_d$ was assumed to be constant; but this is usually incorrect. Recent models include more realistic descriptions of these phenomena: experimental validation of transport model predictions is now needed. The aim of the C3MI exercise is to test such codes.

For this, a set of experimental data of the transient transport of radioelements is proposed in significantly different chemical conditions. Experimental data are obtained for strontium transient transport in a clayey and calcareous sandy soil. Sr concentration is injected at trace (nM) to macro (mM) concentration. In some experiments, it precipitates just after its injection. Its sorption on clay usually induces significant retention. It is less important, when $[Ca^{2+}]$ is increased in the eluting solution. This is consistent with $Sr^{2+}/Ca^{2+}$ cationic exchange. The hydrodynamic properties (RTD) of the porous medium are deduced from the response to a $CaCl_2$ step. The cationic exchange capacity is usually measured from the response to a $^{45}Ca$ impulse. In the IMPACT code the convective and dispersive flow is described by the chemical engineering model of cells of uniform composition in series. Chemical and physico-chemical reactions are introduced in each cell. It was used by the CEA (SGC)-CNRS groups, that performed the experiments. CEA (SGE) group has now written the needed physico-chemical reactions in the TRIO code. Both codes give correct predictions (no curve fitting is needed) and consistent simulations.

All the experimental results used for the TRIO simulation are here published so any other code can easily join the C3MI exercise. Sr and Ca are chemical analogues, which simplifies the modelling of their competitive sorption. More complicated test cases (Cs, Np(V)) should follow.

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