**The distribution of Sr in the calcium-rich soils in the Arabian Peninsula**

**Ján Mihalík,1, 2\* Ahmed AlKaabi,1,2**

*1Department Mechanical and Nuclear Engineering, College of Engineering and Physical Science, Khalifa University of Science and Technology, PO BOX 127788, Abu Dhabi, United Arab Emirates*

*2Emirates Nuclear Technology Center (ENTC), Khalifa University and Technology, PO BOX 127788, Abu Dhabi, United Arab Emirates*

\* *e-mail: jan.mihalik@ku.ac.ae*

The subtropical environment presents new challenges for radioecology research. The mineral soils are formed of silicate, calcite and gypsum. The specific characteristics are high salinity and high concentration of strontium. Typical local soils are poor in organic matter. Due to the high contents of Ca and Mg, it is interesting to investigate their relationship to Sr behavior in soil. The solubility of Ca/Mg minerals, high salinity, and high concentration of stable Sr, which overwhelmed the potential contamination by radiostrontium, are key parameters for modeling 90Sr migration.

To reveal the Sr behavior in this complex system, we employed the column experiments and Tessier’s sequential extraction (SE). The results of the SE are in Figure 1. Sr showed a similar distribution among soil fractions as Ca. However, there are some differences in the detailed analyses. The availability of elements decreases from the water fraction to the organic matter. The most available Sr is present in Sandstone, followed by Gypsum. Sr in Calcareous Sand is mainly associated with carbonates. Carbonates could still be considered as a relatively available fraction. The least available Sr is in Limestone. Noteworthy, Mg has the most similar distribution to Sr in Limestone. The highest quantity of Sr was released from 1 g of Gypsum, i.e. 0.26 mg, followed by Sand 0.096 mg, Limestone 0.042 mg and Sandstone 0.023 mg. The mass ratio of Sr and Ca in the Sand (0.0096) approaches the most to the stable ratio in the sea water (0.02).



Figure 1: Tessier’s sequential extraction. F1 – water-soluble fraction, F2 – ion-exchange fraction, F3 – carbonate fraction, F4 – Fe/Mn oxides, F5 – organic matter.

Conclusion: To understand the Sr behavior in specific soils, it is necessary to reveal it is distribution in soil fractions. Especially when the soil matrix is formed by relatively soluble calcium minerals, potential contamination of 90Sr will remain highly mobile in the local soils.