Cs-137 Geochemical partitioning in highly weathered tropical soils

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Tropical soils differ from those of temperate regions in both, mineralogy and surface chemical properties. The Ferralsol, together with Nitisols and Acrisols, represent the classical humid tropical weathered soils. These soils present low activity clay mineralogy, dominated by Iron-Aluminium oxide-hydroxides and 1:1 layer silicate minerals (kaolin). The fate of inorganic pollutants in soils is dominated by the interfacial reactions in the soil-water system, i.e., chemistry, bioavailability and transport of pollutants depend on the degree of partitioning between solid and solution phases. The main objective of the present paper was to investigate the geochemical partitioning results of Cs-137 in some typical weathered Brazilian soils. In this context, the age of the experimental contamination and also the soil properties were considered during the discussion in order to evaluate the potential threat of Cs-137 mobility in these highly weathered soils. The geochemical partitioning of Cs-137 showed that large amount of its content on freshly contaminated soils was considered readily bioavailable (up to 40% of total concentration). However, in all cases, the main sink of Cs-137 was the iron oxide-hydroxides. Since these minerals have variable surface charge that depends upon soil pH, this result suggests that Cs-137 mobility behavior could easily change. Thus, this demonstrates that tropical soils are vulnerable to Cs-137 contamination.

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