

Comparison of Solid-Water Distributions of Radiocesium in River Waters between Fukushima and Chernobyl Areas

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Adsorption of radiocesium (RCs) on particulate matters in aquatic environment is important to understand its mobility, transportation, and bioavailability. In this study, factors controlling partition of RCs on particulate matters and sediments in Fukushima and Chernobyl watersheds were investigated based on its solid-water partitions in Kuchibuto (Fukushima) and Pripjat (Chernobyl) Rivers coupled with cesium speciation and organic matter-clay mineral interaction studied using extended X-ray absorption fine structure (EXAFS) and scanning transmission X-ray microscope (STXM), respectively. EXAFS spectra showed larger contribution of outer-sphere (OS) complex of Cs on particulate matters in Chernobyl than in Fukushima (Fan et al., 2014), while SXTM revealed larger association of humic substances on particulate matters in Chernobyl which may be related to the larger OS complex fraction. Consequently, RCs is more soluble in the Pripjat River (Chernobyl) due to the weaker interaction of RCs with particulate matters caused by the adsorbed natural organic matters (NOM), whereas particulate matters and sediments in the Kuchibuto River in Fukushima have larger adsorption affinity. The difference is governed by the characteristics of provenance of the soils or rocks surrounding both catchments (Fukushima: weathered granite; Chernobyl: peat wetland). The association of humic substances and clay minerals is enhanced in the presence of larger concentration of Ca^{2+} in river water.

Reference:

Fan, Q. H., Takahashi, Y., Tanaka, K., and Sakaguchi, A. An EXAFS study on the effects of natural organic matter and the expandability of clay minerals on cesium adsorption and mobility. *Geochim. Cosmochim. Acta* 135, 49-65 (2014).