Consideration of the marine K_d and the exchangeable fraction: the case of ^{90}Sr and ^{137}Cs

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Sediment-seawater distribution coefficient (K_d) for radionuclides based on field observations are limited because number of radionuclides found in the natural environment are limited. IAEA provided K_d data derived from stable element data in sediment and seawater concentrations, assuming that exchangeable fraction in sediment was 20% for ocean margin for all elements [1]. This assumption may be acceptable; however, it is still necessary to check the exchangeable fraction of important radionuclides for more precise modeling of dose assessment. In this study, therefore, we focused on global fallout ^{90}Sr and ^{137}Cs data obtained coastal area in Japan and compared the data with stable elements.

Sediment and seawater were collected from 19 coastal sites from 2007 to 2011. Details have been reported elsewhere [2]; Kds were obtained considering that 20% of the total concentration in sediment was exchangeable. We also surveyed ^{90}Sr and ^{137}Cs data in coastal area in Japan for samples collected in 2000-2010. For this case, total ^{90}Sr and ^{137}Cs concentrations in sediments were used to calculate K_ds. The obtained K_d values are summarized in Fig.1. The geometric mean (GM) of ^{90}Sr was 40 times higher than that of stable Sr, while GM of ^{137}Cs was 5 times smaller than that of stable Cs. Probably, applying fixed exchangeable fraction percentage to all elements would be sometimes overestimated and underestimated the real values.
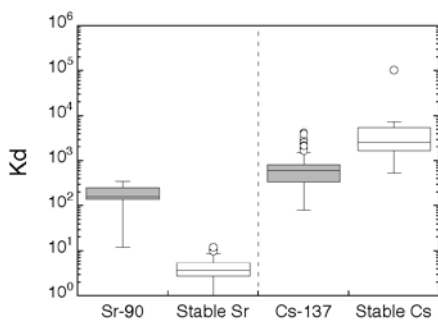

Figure 1: K_d of ^{90}Sr, stable Sr, ^{137}Cs and and stable Cs.

[1] IAEA (2004) Technical Report Series No. 422.
[2] Takata et al. (2016) *Sci. Total Environ.* **543**, 315-325.