

Interactive comment on “Spatial variability and the fate of cesium in coastal sediments near Fukushima, Japan” by E. Black and K. O. Buessler

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General comments Quantifying Fukushima signal in the bottom sediments are of paramount importance to complete the missing part of the reconstruction of radionuclides emitted from the stricken Fukushima Daichi Nuclear Power Plants (FDNPP). Therefore this manuscript is very much welcomed. The authors employed natural radioisotopes to constrain sediment accumulation and mixing and to estimate inventory of FDNPP-derived radio cesium present in the bottom sediment. This approach is very much useful if the steady state can be approximated for sediment accumulation, hence, radiocesium-laden sediment particles settling from the water column to the sea floor.

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We may observe 2 types of delivery of radio cesium to the bottom sediment. One (Sts.1-9) is the radiocesium activity is located left hand side of the 210Pb (ocean type) and the other one (Sts. 12-20.) is the radiocesium activity is located right hand side of the 210Pb (coastal type). The coastal type is strongly influenced by the depleted excess 210Pb laden particles from the adjacent landmass (terrestrial environment). Therefore, in the coastal type sediment, the radio cesium activities in the bottom sediment appear to be largely controlled by the particle input from the land. Therefore the bioturbation model may hold in the ocean type sediment only.

Grain size is certainly one of the factors determining radio cesium concentration in the bottom sediment, however, the mode of association of 137Cs on the sediment grain would be more strongly related to the mineralogy and chemistry of the host sediment grains. Therefore, bare sediment grain may have limited information.

Specific Comments

Line 256, 257, 258 - “oS” appears to be typing error.

Lines 290-291. The sentence is difficult to follow. I suggest rewriting as follows. The values of D50, percent fines, and percent clay of sediment texture (or sediment grain size) results reflected wide variations in grain size over the coastal to offshore regions and relatively invariant consistent vertically in distributions with each core. (if it correctly delivers the authors’ message.)

Line 289: the usefulness of this sentence is questionable in the context of manuscript, such as mineral composition, adsorption coefficient of Cs.

Line 400. If the zones are not divided based on the any variable affecting Cs concentration, the intra-zonal variability estimation would be meaningless.

Line 512-513: Inventory dependency on the water depth may be fortuitous and the authors may arrive the same conclusion as the inventory is plotted against the distance from the FDNPP.

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