

Geochemical Behavior of Fukushima-derived Radiocesium in estuarine water: Transport processes from land area to open ocean

SHOTA KAMBAYASHI¹, JING ZHANG¹, AND
HISASHI NARITA²

¹ Graduate School of Sci. and Eng., University of
Toyama, 3190 Gofuku, Toyama, 930-8555, Japan
(Correspondance: jzhang@sci.u-toyama.ac.jp)

² School of Marine Sci. and Tech. Tokai Univ., 3-20-
1 Orido, Shimizu-ku, shizuoka, 424-8610, Japan
(hisashin@scc.u-tokai.ac.jp)

The accident of the Fukushima Dai-ichi Nuclear Power Plant has contaminated a vast area with radionuclides including radiocesium (Cs). It is urgent to reveal the environmental translocation of Cs deposited on the land because particle-bound radiocesium was transported through rivers and ultimately to the Pacific Ocean. To explore the transport and flux of Cs from land to ocean, we chose brackish Lagoon Matsukawa-ura and feeder rivers, Japan, as a model area for the system of river – estuary – ocean.

Suspended matters normalized dissolved Cs showed excess from low to intermediate salinity in the brackish water relative to the conservative mixing line. This inferred that two possible processes can be considered: 1) biogeochemical processes (i.e. desorption from suspended matters), and 2) input from other sources.

1) Biogeochemical processes

The desorption rate of Cs in natural environment was calculated, which increased rapidly and reached a plateau at about 35% in the low salinity range (0 ~ 5). These results indicate that Cs is likely bonded to an exchangeable fraction which is easy to leach into the water caused by ion exchange.

2) Input from other sources

The enrichment of O-18 between fresh river and offshore seawater evidenced the possibility of another water mass, which could be submarine groundwater discharge (SGD). Cs and O-18 analysis results of groundwater collected near the lagoon indicate that another Cs source in lagoon is from recirculated SGD. Thereby, multiple geochemical tracers (e.g. Ra and O-18) will be used to clarify the contribution of recirculated SGD. This study implies that the land-sourced Cs will be continuously adsorbed in brackish water and transported to open ocean.