Distribution of dissolved and particulate radiocesium from the downstream of rivers to the costal waters off Fukushima.

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Distribution of radiocesium in dissolved and particulate phases in the downstream of seven rivers (Tomioka, Kido, Asami, Natsui, Fujiwara, Same, and Binda Rivers), and adjacent shoreline and offshore has been studied in order to investigate the reasons why dissolved ^{137}Cs concentration in the shoreline was still high even eight years after the Fukushima Dai-ichi Nuclear Power Plant (FDNPP) accident (March 2011). Observations undertaken during the pre-typhoon period of June-September 2019 and the period of October 2019 immediately after the Typhoon Hagibis 2019 indicated that seawater with relatively high particulate and dissolved radiocesium concentrations in the shoreline, compared to rivers and offshore, was extending as long as about 60 km south of the FDNPP along the shoreline. This cannot be explained simply by the on-going release of highly contaminated water from the facility of the FDNPP, followed by the southward transport of the high radiocesium water along the shoreline. Desorption of radiocesium from riverine suspended particle while traversing of the particles on the shoreline could contribute to the heightening dissolved radiocesium concentration. This assumption is also supported by the evidence that steep reduction of the distribution coefficient, K_d (L/kg) from rivers to seawater in the shoreline. Our estimation showed that contribution of desorption to the dissolved radiocesium to shoreline waters increased after the typhoon. This study revealed that the distribution, especially the dynamics of the suspended particles bearing radiocesium along the shoreline, the importance of desorption process for the evaluation of the mass balance between run-off of radiocesium from land and its dispersion in the marine environment.

Keywords: Shoreline, Riverine suspended particle, Desorption

