

Nearshore transport of suspended radiocesium In the Fuksima Coast derived from Niida River induced by Typhoon Wipha

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The Fukushima Nuclear Power Plant (FNPP) accidentally leaked substantial amount of radiocesium to the environment in March 2011. The radiocesium is known to have three input pathways to the marine environment: atmospheric deposition, direct discharge from the FNPP, and river discharges. The last process has lagged behind the accident by occasional floods that have delivered terrestrial deposition through hydrological processes, while the other two processes occurred immediately after the accident. Therefore, the local coastal seas have suffered from continuous contamination due to riverine suspended radiocesium inputs that must be assessed carefully. Niida River, Fukushima, has been a source of riverine suspended radiocesium even after the FNPP accident, as its watershed was prominently covered with the atmospheric deposition at the accident.

In this study, we examined the oceanic dispersal and inventories of the sediments and suspended radiocesium deposited in the ocean floor derived from Niida River by using a quadruple nested JCOPE2-ROMS 3D oceanic circulation model in a high-resolution configuration at the lateral grid spacing of 50 m. This model is coupled with a 3D multi-class sediment transport model along with a two-layer stratigraphy model of the marine bed, the iRIC-Nays 2DH river sediment transport model, the SWAN spectral wave model, and a static radiocesium absorption model. A particular attention was paid to the storm and subsequent flood event associated with Typhoon 201326 (Wipha) passed off the Fukushima Coast in October 2013, which provoked an enormous amount of precipitation, subsequent increase of the riverine freshwater discharge, and associated sediment and suspended radiocesium fluxes to the ocean. The model results were diagnosed with a guide of several in situ observed data collected in the Fukushima Coast after the storm. We found that the modeled and observed lateral and vertical distributions of sediment grain sizes and attached radiocesium concentrations were reasonably well correlated and consistent each other. We then investigated the accumulation and erosion of the sediments and resultant suspended radiocesium distribution around the river mouth and nearshore areas along the Fukushima Coast.

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