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Time changes in radiocesium concentration in aquatic systems affected by the Fukushima Daiichi NPP accident

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Due to Fukushima Daiichi Nuclear Power Plant accident, radioactive materials including Cs-134 and Cs-137 were widely distributed in surrounded area. The radiocesiums have been transported in river networks. The monitoring started at 6 sites from June 2011. Subsequently, additional 24 monitoring sites were installed between October 2012 and January 2013. Flow and turbidity (for calculation of suspended sediment concentration) were measured at each site, while suspended sediments and river water were collected every one or half month to measure Cs-134 and Cs-137 activity concentrations by gamma spectrometry.
Also detailed field monitoring has been condcuted in Yamakiya-district, Kawamata town, Fukushima prefecture. These monitoring includes, 1) Radiocesium wash-off from the runoff-erosion plot under different land use, 2) 2. Measurement of radiocesium transfer in forest environment, in association with hydrological pathways such as throughfall and overlandflow on hillslope, 3) Monitoring on radiocesium concentration in soil water, ground water, and spring water, 4)Monitoring of dissolved and particulate radiocesium concentration in river water, and stream water from the forested catchment, and 5)Measurement of radiocesium content in drain water and suspended sediment from paddy field.
Our monitoring result demonstrated that the Cs-137 concentration in eroded sediment from the runoff-erosion plot has been almost constant for the past 3 years, however the Cs-137 concentration of suspended sediment from the forested catchment showed slight decrease through time. On the other hand, the suspended sediment from paddy field and those in river water from large catchments exhibited rapid decrease in Cs-137 concentration with time. The decreasing trend of Cs-137 concentration were fitted by the two-component exponential model, differences in decreasing rate of the model were compared and discussed among various land uses and catchment scales. Such analysis can provide important insights into the future prediction of the radiocesium wash-off from catchments from different land uses. The decerasing trend of river system vaired with catchments. Our analysis suggest that these differences can be explained by upstream landuse with different decreasing trend.