Seasonal change of radiocaesium and its factor in the forest catchment contaminated by the Fukushima Dai-ichi Nuclear Power Station Accident

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A huge amount of radionuclides such as radiocaesium were dispersed and deposited on the territorial area of Fukushima Prefecture, Japan, after the accident at the TEPCO Fukushima Daiichi Nuclear Power Station (FDNPS) on March 2011. Since Fukushima prefecture is covered by about 70% of forest area, it is important to investigate the distribution, behavior and runoff process of radiocaesium in this area. In this study, we collected stream water from forest catchment and river water in mainstream within evacuation zone in vicinity of the FDNPS from December 2017 to February 2019 in order to assess the distribution, biogeochemical behavior and fluxes of dissolved radiocaesium in these areas. Regarding the analysis results and discussion, we reached the following findings.
1) Activity concentrations of dissolved ^{137}Cs collected in Takase River and Saruta River ranged from 10.3 to 37.2 mBq L^{-1}, 44.3 to 322.9 mBq L^{-1}, respectively. These results indicate that the activity concentration of dissolved radiocaesium (DRCs) is depended on the air does rate around catchment area in the river. Also, the DRCs collected in Takase River and upstream of Saruta River related to water temperature. This result suggests that the influential source of DRCs for these two rivers are due to desorption from litter.
2) Calculation results of dissolved ^{137}Cs (DCs-137) flux in Saruta River show that radiocaesium input form tributary streams have a great influence on DCs-137 flux of main stream. Moreover, DRCs activity concentration in pore water collected in reservoir was much higher than in overlying water, suggesting that a significant amount of radiocaesium in sediment desorb into pore water. The ^{137}Cs flux between the sediment and overlying water was comparable to fluxes from tributary streams. DCs-137 flux of Saruta River contribute to that of Takase River was also estimated to be about ten percent. This result indicates that dissolved radiocaesium input from forest catchment have a small influence on main river.

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