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Factors controlling dissolved ^{90}Sr and ^{137}Cs concentration in stream water in the Chernobyl exclusion zone.

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Dynamics of radionuclides, ^{90}Sr and ^{137}Cs, are still of great interest for mitigating radiological risks in the Chernobyl Exclusion Zone (CEZ) and its downstream area. Previous studies showed positive relationship between dissolved ^{90}Sr concentration and water discharge rate and it suggest that hydrological characteristics affects the ^{90}Sr transfer. For understanding such variations of water chemistry of river water, several hydrological studies attempted to evaluate spatial-temporal variations of element of interest in a catchment and discussed relationship between catchment characteristics and the behavior of the element. Such approaches can improve our understanding of radionuclides dynamics. The aim of this study is to clarify the factors controllingradionuclides dynamics in the river water system in the CEZ and we evaluated spatial-temporal variations in dissolved ^{90}Sr and ^{137}Cs concentration in a small catchment. The study site was the Sakhan catchment, locating at approximately 7 km northwest from the Chernobyl Nuclear Power Plant. Water samples were taken at main stream, tributaries and water spring points. The discharge rate was determined by crosssection survey of flow velocity and water height simultaneously to water sampling. Mean ^{90}Sr and ^{137}Cs inventory of each sub-catchment were determined by DEM data and distribution maps of radionuclide. In laboratory, samples were analyzed for dissolved ^{90}Sr and ^{137}Cs, dissolved anions and cations, organic carbon and Si concentration. Discharge rate at the main stream was the highest in snowmelt season and the lowest in summer. The concentration of dissolved ^{90}Sr and ^{137}Cs concentrations at the main stream was, as like water discharge rate, high in snowmelt season and low in summer. Dissolved ^{90}Sr concertation in tributaries and spring were not correlated with water discharge rate. However, the positive relationship between the occupation ratio of peat bog On the other hand, the response of dissolved ^{90}Sr concertation to discharge rate is not clear at the spring and stream water in some headwater catchments. We also found that the positive relationship between the area of peat bog and dissolved ^{90}Sr and ^{137}Cs concentration in the snowmelt season. Previous studies showed that the possibility of “organic boggy soils” and “high water level in the floodplain” effect to high ^{90}Sr discharge. However, the relationship is not clear during the summer. From these results, the tight coupling between hydrological processes and the ^{90}Sr and ^{137}Cs concentration formation processes is suggested, and further study is necessary to elucidate the mechanisms that control the ^{90}Sr and ^{137}Cs concentration in the river water systems.