

Variation of ^{137}Cs dynamics from 2013 to 2017 and its analysis with GeoWEPP in Fukushima, Japan

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A large amount of radiocesium, ^{137}Cs and ^{134}Cs , were released and deposited on the soil surface due to the accident at Fukushima Daiichi Nuclear Power Plant, FDNPP, due to the Great East Japan Earthquake that occurred on March 11, 2011. Radiocesium are redistributed to waterways, rivers, lakes and coastal areas by rainfall-runoff process. ^{137}Cs has a half-life of about 30 years, so long-term influences on residents' lives and agricultural, forestry and fishery products in the area surrounding the accident are concerned. Therefore, it is necessary to continuously monitor the dynamics of ^{137}Cs in watershed scale.

In this study, river monitoring was conducted on two rivers, Hiso river and Mano river, in Iitate village, Fukushima Prefecture from 2013 to 2017. We investigated the temporal variation of radiocesium export which has been rarely studied using continuous monitoring values up to the present. We also conducted laboratory experiments of soil erosion to identify the soil erodibility for the Water Erosion Prediction Project, WEPP, by using three representative soils in this area. Combining these monitored ^{137}Cs concentration of suspended sediment, SS, and calculated sediment discharge using GeoWEPP, the amount of ^{137}Cs export was estimated.

The ^{137}Cs concentration of SS dropped drastically after the extreme large flood due to Typhoon Etou in 2015, and the concentration remained low until 2017. This decrease was probably related to the changes of soil erosion processes due to heavy rainfall and the effects of removing the contaminated soil in agricultural lands as decontamination works in 2015. The soil erodibilities obtained in laboratory experiments slightly improved the accuracy of the sediment discharge rather than the estimated erodibilities calculated by WEPP. Meanwhile, the calculated sediment discharge and ^{137}Cs export tended to overestimate in the large rainfall event, such as the event with Typhoon Etou in 2015.