Seasonality of Cs-137 concentration of sediments eroded from an undisturbed slope in Fukushima

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Long-term temporal variations of Cs-137 wash-off should be understood for predicting the fate on terrestrial environment. However, only a few studies presented long term observation of slope scale Cs-137 wash-off and its seaonality. This study presents a three years' Cs-137 wash-off observation and morphological surveys on a soil erosion plot establised in Fukushima area to describe processes and seasonality of Cs-137 wash-off.

The soil erosion plot with length of 22.13 m and width of 5 m was established on an uncultivated tobacco farmland in Kawamata town on July 2011. Eroded sediments from the plot had been collected until August of 2014 for measuring Cs-137 concentration. Soil surface had been scanned for ten times using a 3D laser profiler during the observation. Based on scan data, changes of height of soil surface in the plot were calculated. The positive and negative values mean rise and lowerig of soil surface, respectively .

Mean concentration of Cs-137 in eroded sediment was 13 kBq kg^{-1}. No sginificant decreasing trend of Cs-137 concentration was found due to enormous fluctuation through the obsravation. However, Cs-137 concentrations tended to decrease gradualy from spring to autumn and increase again after winter. Based on the scan data, the expansions of a rill from spring to summer and rise of soil surface from winter to spring were found. Although Cs-137 concentrations of sediment tended to be correated with changes of heights of soil surface except for data obtaied in winter 2013 which showed high Cs-137 concetration and high rise of soil surface. These results suggest that the rill was dominant source of sediments of low Cs-137 concentration. Intensive rainfall events washed off the sediment with high Cs-137 concentration from interrill area in warm season, whereas freezing and thawing cycles during winter provided sediments of high Cs-137 concentration.