Effects of radiocesium transfer from the canopy to forest floor on its accumulation in litter and soil layers.

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Radiocesium deposited on forest area is initially intercepted by forest canopy and subsequently deposits on forest floor in association with rainwater and litter-fall. The intercepted radiocesium by the canopy acts as a source of secondary radioactive contamination of forest floor, however those effects on the accumulation of radiocesium to litter and soil layers have not been assessed quantitatively.
We investigated the transfer of canopy-intercepted radiocesium to the forest floor during 4 years following the Fukushima Daiichi Nuclear Power Plant accident. The cesium-137 (^{137}Cs) contents in throughfall, stemflow, and litterfall were monitored in two coniferous stands (plantation of Japanese cedar) and a mixed deciduous broad-leaved forest stand (Japanese oak with red pine). We also measured the gamma count rate of radiocesium at the forest floor using a portable Ge gamma-ray detector.
Total Cs-137 deposition flux from the canopy to forest floor for the mature cedar, young cedar, and the mixed broad-leaved stands were 166 kBq/m^2, 174 kBq/m^2, and 60 kBq/m^2, respectively. These values correspond to 38%, 40% and 13% of total atmospheric input after the accident. The spatial pattern of radiocesium at the forest floor have not changed during monitoring period, suggesting that radiocesium partitioning and leaching by the forest canopy is rather constant over time. We investigated temporal change of radiocesium inventory in litter and soil layer in the study site (Takahashi et al., 2015; NRA, 2015), which was later compared with the radiocesium depositional flux onto forest floor. The radiocesium inventory in litter layer decreased with time in all the forest sites, although the radiocesium continuously deposited on the forest floor (~ 400 Bq/m^2 /day). The radiocesium migration rate from the litter layer to the underlain mineral soil layer was estimated based on the analysis of the measured temporal changes of depositional flux to forest floor and inventory in litter and soil layers.

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