

Effect of Radiocesium Transfer on Ambient Dose Rate in Forest Environment

KATO, Hiroaki^{1*} ; ONDA, Yuichi¹ ; LOFFREDO, Nicolas¹ ; HISADOME, Keigo² ; KAWAMORI, Ayumi³

¹Center for Research in Isotopes and Environmental Dynamics, University of Tsukuba, ²Asia Air Survey Co., LTD., ³Masters Program of Environmental Sciences, University of Tsukuba

We investigated the transfer of canopy-intercepted radiocesium to the forest floor following the Fukushima Daiichi nuclear power plant accident. The cesium-137 (Cs-137) contents of throughfall, stemflow, and litterfall were monitored in two coniferous stands (plantation of Japanese cedar) and a deciduous broad-leaved forest stand (beech with red pine). We also measured an ambient dose rate at different height in the forest by using a survey meter (TCS-172B, Hitachi-Aloka Medical, LTD.) and a portable Ge gamma-ray detector (Detective-DX-100T, Ortec, Ametek, Inc.).

In decreasing order of total Cs-137 deposition from the canopy to forest floor were the mature cedar stand, the young cedar stand, and the broad-leaved forest. The ambient dose rate in forest exhibited height dependency and its vertical distribution varied by forest type and stand age. The ambient dose rate showed an exponential decrease with time for all the forest sites, however the decreasing trend differed depending on the height of dose measurement and forest type. The ambient dose rates at the canopy (approx. 10 m-) decreased earlier than physical attenuation of radiocesium, whereas those at the forest floor varied among three forest stands. These data suggested that an ambient dose rate in forest environment can be variable in spatially and temporally reflecting the transfer of radiocesium from canopy to forest floor.

Keywords: Fukushima Daiichi NPP accident, Cesium-137, Forest environment, Canopy interception, Transfer, Ambient dose rate