

原子力発電所事故によって森林生態系に沈着した¹³⁷Csの移行ダイナミクスについて Migration dynamics of ¹³⁷Cs deposited on the forested ecosystem in Fukushima after the nuclear power plant accident

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A massive amount of radioactive substances, including cesium-137 (¹³⁷Cs), emitted from the disabled nuclear power plant, has been deposited on the forested areas in the northeastern region of Honshu Island, Japan after the Fukushima Daiichi nuclear power plant accident. Forest ecosystems in these regions are particularly important, not only for the forest products industry but also for source areas of drinking water and for residential environments. To clarify the migrating mechanisms of ¹³⁷Cs deposited on the forested ecosystem, we initiated intensive field observations in a small catchment that included forest headwaters and farmlands in the northern part of Fukushima Prefecture. The following expected major pathways of ¹³⁷Cs export and diffusion were investigated: 1) transportation of dissolved and particulate or colloidal forms via hydrological processes within a forested catchment and export dynamics through the stream, and 2) diffusion through the food web in terrestrial and aquatic organisms of forests. Preliminary findings indicated the following: 1) Most of the ¹³⁷Cs was discharged as suspended matter. High water flow generated by storm acted to accelerate the transportation of ¹³⁷Cs from the forested catchments. Thus, the estimation of ¹³⁷Cs export requires precise evaluation of the high flow acceleration during storm events; 2) Because litter and its detritus may form the biggest pool of ¹³⁷Cs in the forested ecosystem, ¹³⁷Cs diffusion occurs more rapidly through the detritus food chain than the grazing food chain. Most predators have already ingested ¹³⁷Cs, particularly in aquatic environments. An urgent question that needs to be addressed is when and how ¹³⁷Cs diffuses through grazing food chains and how rapidly this process occurs. To elucidate or to be able to predict these phenomena, the mechanisms of ¹³⁷Cs release from litter and soil organic matter need to be clarified.

キーワード: ¹³⁷Cs 沈着, 森林生態系, 水文過程, 食物網

Keywords: ¹³⁷Cs deposition, forested ecosystem, hydrological process, food web