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Evidences for regional radioactive contamination in mountain forests of East Japan due to fogwater deposition during the Fukushima Daiichi Nuclear Power Station accident

Naohiro Imamura (1), Genki Katata (2), Mizuo Kajino (3,4), Masahiro Kobayashi (1), Yuko Itoh (1), and Akio Akama (1)

(1) Forestry and Forest Products Research Institute, (2) Ibaraki University, (3) Meteorological Research Institute, (4) University of Tsukuba

Although the importance of fogwater deposition onto mountain forests during the Fukushima Daiichi Nuclear Power Station (FDNPS) accident has been suggested, its impact on regional-scale radiological contamination is still unclear due to very limited environmental monitoring data. Here we show the first observational result of radiocesium of fogwater and its deposition at a Japanese mixed forest (1264 m asl.) during the early stage of FDNPS in March 2011. Monthly fogwater sampled by a passive sampler in March 2011 was analyzed above the canopies, whereas monthly throughfall and stemflow of radiocesium were also measured under the canopies of *Fagus crenata*, *F. japonica*, *Tsuga sieboldii*, and *Cryptomeria japonica* during the same period. In addition, the available data of the ratio of ^{137}Cs concentration of throughfall to that of bulk precipitation obtained at various mountains was analyzed with use of the deposition map of fogwater calculated by an atmospheric dispersion model and the available data of cloud base height. Observed ^{137}Cs concentration in fogwater was 45.8 Bq L^{-1}, two times higher than that in bulk precipitation. The ratio of ^{137}Cs concentration in bulk precipitation to that in throughfall was ranged from 1.0 to 2.5. Both results indicated that the high ratio value of ^{137}Cs concentration could be caused by the high concentration of fogwater deposition. The available data and model results also revealed the evidence of fogwater deposition as a large area of mountain forests located over approximately 300 m in altitude in East Japan were contaminated. Since the impact of fogwater deposition is apparent during the accident, a role of fogwater deposition process should be carefully considered for understanding the radiocesium cycling in forest ecosystems in East Japan.