



Dynamic and Spatio-temporal variability of leachable ^{137}Cs by throughfall and stemflow in Japanese forest canopies after Fukushima Daiichi Nuclear Power Plant accident

Nicolas Loffredo, Yuichi Onda, Jeremy Patin, Ayumi Kawamori, and Hiroaki Kato

Center for Research in Isotopes and Environmental Dynamics, University of TSUKUBA: Department of Environmental Radionuclide Transfer

In the context of Fukushima Daiichi Nuclear Power Plant Accident (FDNPPA), this study focuses on the mobility of leachable Caesium by throughfall and stemflow mechanisms in forests canopies, for the period going from June 2011 (four months after the accident), and until April 2013. In this period, ^{137}Cs and ^{134}Cs activity has been periodically measured, in an area located at 40 km from the power plant, in rainfall, throughfall and stemflow for broad-leaf and cedar forests. Specifically, our study deals with the seasonal effect, the dynamic and the spatio-temporal variability on leachable Cs in these forests.

Except for rainfall intensity, no weather impact (wind velocity and snow fall episodes) was observed for the Cs loss. Concerning the seasonal effect, two periods for which Cs significantly increased could be identify: autumn and spring.

During the period of investigation, compared to stemflow, the main flux of Cs was induced by throughfall mechanisms, whereas for rainfall, no Cs was detected. By using a double exponential model, the Cs loss by throughfall and stemflow was estimated from the initial deposition to 2 years after the accident. Since the accident, the total Cs loss by leaching was estimated to 35-70%, 31-62% and 49-99% of the total deposition for respectively mature cedar, young cedar and broad-leaf forests.

In term of qualitative spatial variability no variation was observed in throughfall collectors with time. However, a high quantitative variability can be observed, due to the difference of leaf density above each throughfall collectors.