Radiocesium Deposition and Migration in Fukushima Forests: Data Review and Modeling

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The spatial distribution and time evolution of radiocesium (rCs) contamination in the densely forested territories of the Fukushima area have been efficiently characterized by Japanese scientists, thanks to regional (in situ/airborne) surveys of gamma-ray radiations and monitoring of rCs contents in contaminated soil, water and vegetation samples at several forest sites. Unlike after Chernobyl, these surveys, some of which started in the days or months following the accident, provided valuable insights into the short to mid-term dynamics (i.e. months to years) of rCs in forest ecosystems contaminated by atmospheric deposits.

The purpose of our research project (2013-2019), funded by the French Agence Nationale de la Recherche and Electricité de France, is to develop a comprehensive understanding of: interception of dry/wet atmospheric fallouts by forest canopies, dissemination within the soil-tree subsystem (e.g. depuration of canopies, migration into soil profiles, root uptake, translocation within trees) and the impact of these mechanisms on ambient dose rates inside and above forests. The project relies on a review and process-based analysis of field observations in Japanese forests, including data acquired by IRSN at monitoring sites in Kawamata town (cf. Coppin et al., same issue). The analysis is performed with the help of selected assessment models that were originally designed for western European forests in the course of international research programs (RODOS, 1995-1999; BIOMASS, 1997-2001; EMRAS, 2003-2007) and further customized to deal with the specificity of Fukushima forests.

After giving an overall view of noteworthy monitoring surveys, we propose to evaluate to what extent the selected models explain the variability of the observations and to analyze the sensitivity of model predictions to the atmospheric deposition conditions and the characteristics of the forest stand.