

## 森林に降下した放射性セシウムのモデルを用いた動態予測

### Predicted spatio-temporal dynamics of radiocesium deposited onto forests following the Fukushima nuclear accident

橋本 昌司<sup>1\*</sup>, 松浦 俊也<sup>1</sup>, 南光 一樹<sup>1</sup>, 鶴川 信<sup>2</sup>, 志知 幸治<sup>1</sup>, リンコフ イゴール<sup>3</sup>, シャー ジョージ<sup>4</sup>, 金子 真司<sup>1</sup>

Shoji Hashimoto<sup>1\*</sup>, MATSUURA, Toshiya<sup>1</sup>, NANKO, Kazuki<sup>1</sup>, UGAWA, Shin<sup>2</sup>, SHICHI, Koji<sup>1</sup>, LINKOV, Igor<sup>3</sup>, SHAW, George<sup>4</sup>, KANEKO, Shinji<sup>1</sup>

<sup>1</sup> 森林総合研究所, <sup>2</sup> 鹿児島大学, <sup>3</sup> アメリカ軍事技術研究開発センター, <sup>4</sup> ノッティンガム大学

<sup>1</sup>FFPRI, <sup>2</sup>Kagoshima University, <sup>3</sup>US Army Engineer R&D Center, <sup>4</sup>University of Nottingham

Radiocesium (<sup>134</sup>Cs and <sup>137</sup>Cs) released from the Fukushima Dai-ichi nuclear power plant to the atmosphere contaminated a large area of Japan's land surface, the majority of which is covered by forest (Hashimoto et al. 2012b). The availability of countermeasure options for forest areas is limited to restriction of access and removal of contaminated materials (Hashimoto et al. 2012a). Even considering only the most heavily contaminated forests ( $>=$  <sup>134</sup>, <sup>137</sup>Cs 1000 kBq m<sup>-2</sup> in 2011), however, the total volume of radioactively contaminated materials is estimated to be 33 million cubic meters and 21 Tg (dry matter) (Hashimoto et al. 2012b). To develop effective countermeasures to mitigate the impacts of radioactive contamination of forests, detailed monitoring of the radiocesium migration and re-distribution is essential. In addition, it is useful to be able to predict the future dynamics of the radiocesium between forest components; modelling is the best tool for this prediction. Here we simulated the dynamics of radiocesium deposited on Japanese forest ecosystems in 2011 using a model that was developed for tracking radionuclides in forest ecosystems after the Chernobyl accident in 1986 (RIFE1 model). The fate of the radiocesium was simulated using the initial conditions observed following the Fukushima accident. In addition, the simulation results were incorporated with a spatial distribution map of deposited radionuclides that was based on an air-borne survey. The simulation demonstrated that in the first two years after initial deposition radiocesium is retained primarily in the soil surface organic layer. Over a period of five to ten years radiocesium is predicted to move from the surface organic soil to the mineral soil, which will eventually become the largest reservoir of radiocesium within forest ecosystems. Spatial analysis clearly shows the reduction in the extent of contaminated areas which will occur as a result of natural decay of radiocesium, as well as the spatial distribution of radiocesium in each forest component. Considering the heavier rainfall and warmer conditions in Japan than in the countries contaminated by the Chernobyl accident, migration of radiocesium from organic to mineral soil may be faster than predicted. Although the uncertainty of our simulations should be taken into account, they provide a basis for understanding and anticipating the future dynamics of radiocesium in Japanese forests following the Fukushima accident.

Hashimoto, S., I. Linkov, G. Shaw, S. Kaneko (2012a) Radioactive contamination of natural ecosystems: seeing the wood despite the trees. *Environmental Science and Technology*, 46, 12283-12284  
<http://pubs.acs.org/doi/abs/10.1021/es304145n>

Hashimoto, S., S. Ugawa, K. Nanko, K. Shichi (2012b) The total amounts of radioactively contaminated materials in forests in Fukushima, Japan. *Scientific Reports*, 2, 416, doi:10.1038/srep00416  
<http://www.nature.com/srep/2012/120525/srep00416/full/srep00416.html>

キーワード: 森林, 放射性セシウム, 除染, モデル, 広域評価, 土壌

Keywords: forest, radiocesium, decontamination, model, regional prediction, soil

MAG35-19

会場:国際会議室

時間:5月21日 15:45-16:00

