Radioactive Cs distribution of litter and soil in forests in each kind tree for 5years after Fukushima Dai-ichi Nuclear Power Plant accident

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The Fukushima Dai-ichi Nuclear Power Plant fall-out contaminated the surrounded areas with high levels of radioactive materials in march 2011. We have been investigated based on soil samples as part of a cooperative pilot survey involving both government and academia since May 2011. The surveys detected widespread radioactive contamination throughout the forested areas in Fukushima prefectures, where approximately 71% of the land area is forested. And, there is an artificial forest more than 35% in Fukushima forest. Usually, artificial forest is made with a specific kind tree. They are processed to plant mushrooms and/or to build houses. Mushrooms are cultured on *Quercus serrata*. It's a deciduous tree. It means that Quercus serrata had not put leaves in the accident. Another hand, houses are built of *Cryptomeria japonica*. It is an evergreen tree. It means that fall-out was contaminated canopy of *Cryptomeria japonica*. Radionuclides deposited in forested areas by either wet or dry processes encounter the canopy. Most radioactive Cs (>90%) deposited onto the canopy is intercepted and retained by tree leaves and branches and subsequently transferred to the forest floor as a result of weathering by rainwater and wind.
The fall-outed radioactive Cs contaminated any kind tree forest. It is important to know the distribution of radioactive Cs in each kind tree forest for decontamination of forests.
Therefor we studied to know radioactive Cs distribution of litter and soil in the forest floor in each kind tree from 2011 to 2016.
Forests were separated for *Pinus densiflora* forest (PDF), *Pinus densiflora* Mix forest (PD Mix), decicuous tree forest (DTF), *Cryptomeria japonica* forest (CJF) and other coniferous tree forest (OCF). Air dose rate measured 3 times in 2011, 2014 and 2016. The number of samples were each 26, 56, 153, 71 and 52 in 2011, each 7, 28, 88, 52and 33 in 2014, and each 7, 13, 24, 33 and 9 in 2016. The litter and soil radioactive Cs measured in 2011 and 2016.
Each kind tree forests air dose rate was positive correlated an initial deposition radioactive Cs. And, each forests air dose rate decreased with time. 2011-2014 air dose rate decrease was faster than 2014-2016 decrease in PDF, PD Mix, DTF and OCF. Another hand, 2014-2016 air dose rate decrease was faster than 2011-2014 decrease in CJF. It means that the timing of air dose rate decrease was delay in CJF. Each forests air dose rate decrease was faster than the physical decay of radioactive Cs. Another hand, each radioactive Cs inventory of litter and soil decrease was slower than the physical decay of radioactive Cs. CJF's radioactive Cs inventory of litter and soil increased significantly faster than PDF's and DTF's. It means that each forest air dose rate was negative correlated radioactivity of the litter and soil from 2011 to 2016. The litter's radioactive Cs inventory decreased faster than radioactive Cs physical decay in PDF, PD Mix, DTF and CJF. DTF's rate of decrease was significantly faster than PD Mix's and CJF's. The soil's radioactive Cs inventory decrease slower than radioactive Cs physical decay in PDF's and OCF's. And, the radioactive Cs of soil of PD Mix, DTF and CJF in 2016 were more than the radioactive Cs inventory of soil in 2016. And, CJF's rate of radioactive Cs inventory of soil increased significantly higher than PDF's. It means that radioactive Cs distributed from litter to soil in each forest.
Therefore, air dose rate of forest was decreased faster than radioactive Cs physical decay from 2011 to 2016. And, litter's radioactive Cs inventory decreased from 2011 to 2016. Soil's radioactive Cs inventory increased from 2011 to 2016. It was thought that radioactive Cs distributed from litter to soil in every forest from 2011 to 2016.

