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The Project on the distribution of fallout radionuclide and their transfer through environment by Fukushima Daiichi NPP accident

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Radioactive contamination has been detected in Fukushima due to the nuclear accident at Fukushima Daiichi Nuclear Power Plant (NPP) following the earthquake and tsunami on 11 March 2011. Following comprehensive investigation (FMWSE project funded by MEXT, Japan; http://fmwse.suiri.tsukuba.ac.jp/) was conducted to confirm migration of radionuclides through natural environment including soils and rivers. Experimental catchments have been established in Yamakiya district, Kawamata Town, Fukushima prefecture, located about 35 km from Fukushima power plant, and designated as the evacuated zone. Approximate Cs-137 fallout in this area is $200 - 600$ kBq/m^2.

(1) Migration study of radionuclides in natural environment including forests and rivers:
1) Depth distribution of radiocaesium in soils within forests, fields, and grassland,
2) Confirmation of radionuclide distribution and investigation on migration in forests,
3) Study on radionuclide migration due to soil erosion under different land use,
4) Measurement of radionuclides entrained from natural environment including forests and soils.

(2) Migration study of radionuclides through hydrological cycle such as soil water, rivers, lakes and ponds, ground water:
1) Investigation on radionuclide migration through soil water, ground water, stream water, spring water under different land use,
2) Study on paddy-to-river transfer of radionuclides through suspended sediments,
3) Study on river-to-ocean transfer of radionuclides via suspended sediments,
4) Confirmation of radionuclide deposition in ponds and reservoirs.

The main finding is as follows:
1) Migration of radionuclides to soil water, stream water and ground water was confirmed low at present. On the other hand, concentration of radiocaesium was found approximately 50 kBq/kg in the suspended sediments flowing down the river.
2) Amount of sediments deposited in the tank placed at the end of downstream within the USLE plot was confirmed together with the concentrations of radiocaesium.
3) In forests, distribution of radiocaesium was able to be confirmed to a certain extent by placing towers in the Japanese cedar forest and broad-leaved forest. To date, since a large amount of radiocaesium is considered to be found in coniferous tree canopies, these data are expected to be applied to future decontamination. Moreover, further investigation is necessary on the chemical state of radiocaesium which falls down to the forest floor as through fall and on the actual condition of downward migration from forest floor to deeper soil layers.