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Radioactive Cesium in Forests is Limited to the Soil's Surface Layer

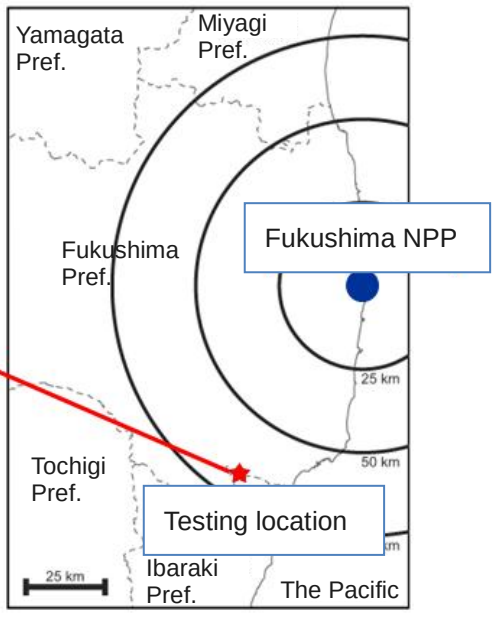
It has been determined that almost all of the radioactive cesium which fell on fallen leaves and other material in forests due to the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station migrated to the soil and is limited to the surface layer. Therefore, going forward, it is thought to be unlikely that radioactive cesium deposited in forested regions will flow out into surrounding areas.

This survey was conducted by Takahiro Nakanishi of the Japan Atomic Energy Agency (JAEA). For more than two years starting in May 2011, Nakanishi and his colleagues conducted observations of the broad-leaved deciduous forests in northern Ibaraki Prefecture, to determine how radioactive cesium which fell on fallen leaves of deciduous trees and other material migrated to the soil, and behaved after that.

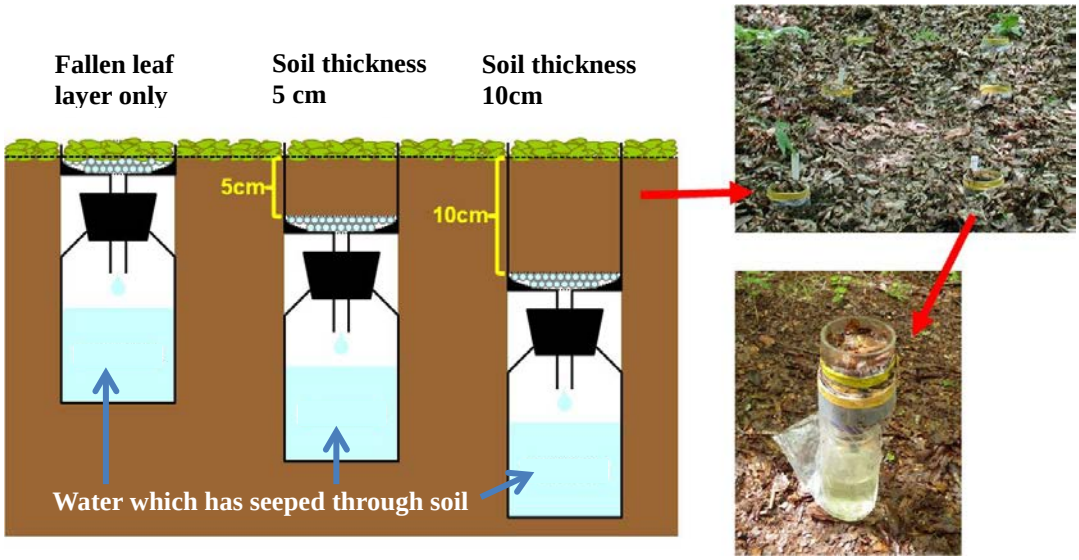
The results showed that most of the radioactive cesium deposited on fallen leaves and other material immediately after the accident migrated to the soil due to rains within a few months after the accident. The radioactive cesium also penetrated into the ground due to the permeation of rain water, but was almost all limited to within 5cm of the ground surface. The amount which reached a depth of 5cm was 0.5% of the total in FY2011 and 0.2% in FY2012. Almost no change was seen subsequent to December 2011.

The radioactive cesium emitted into the environment due to the accident at the Fukushima Daiichi Nuclear Power Station was deposited widely in forested regions of eastern Fukushima Prefecture and neighboring areas. Observing and predicting how the radioactive cesium with long half-life which fell in forests will move and behave in the future is a key factor when deciding on decontamination, evaluating the effect on forest products, and assessing the dose to nearby residents.

Broad-leaved deciduous forest in northern Ibaraki Prefecture where the survey was conducted



Measuring devices called lysimeters were used in this survey. These devices, made of cylindrical containers, can collect and store water which seeps through soil. They were buried at three different depths—under the fallen leaf layer, 5cm under the ground surface, and 10cm under the ground surface, and the water which seeped through was collected. In addition, the collected water was filtered, and the radioactive cesium concentration was measured by analyzing nuclides with a germanium semiconductor detector.

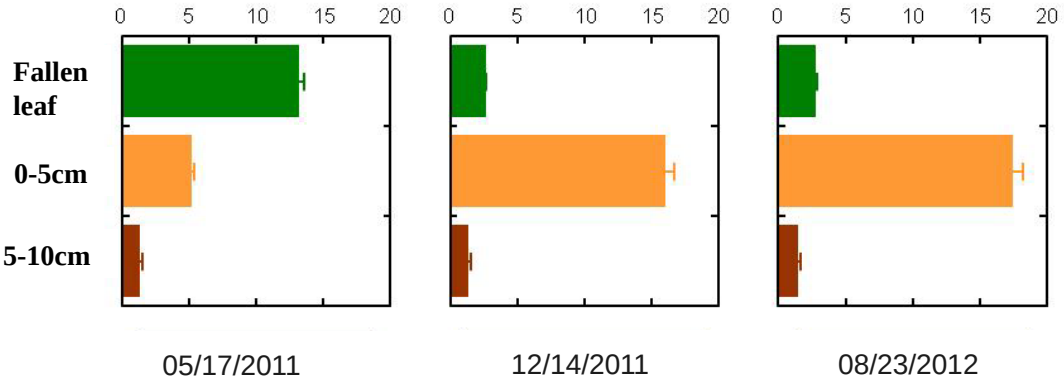


Lysimeters are used to collect water which has seeped through soil

The results showed that the majority of radioactive cesium on fallen leaves covering the ground surface immediately after the accident migrated by December 2011 into the soil, from the soil surface to a depth of 5cm. It is presumed that the migration from fallen leaves into the soil was due to rainwater.

Radioactive cesium which migrated to a depth of 10cm during the period from May 2011 to March 2012 was 0.2% of the total amount, and this decreased to 0.1% in FY2012. It was found that the amount and rate of migration decrease as time passes. This result is consistent with the results of a monitoring survey by the national government.

These results suggest that the radioactive cesium which has migrated from fallen leaves into the soil does not move easily within the soil, and it will be difficult for it to flow out from forested zones to surrounding areas. On the other hand, the research group believes it will be necessary to watch how the radioactive cesium which has accumulated in the surface layer of the soil is incorporated into the internal cycles of forest ecosystems.



Changes over time in cumulative amount of ^{137}Cs per 1m^2 The total cumulative amount of ^{137}Cs from the fallen leaf layer to a soil depth of 10cm was about 20kBq/m^2 throughout the observation period, and showed no great change. However, from May to December 2011, the majority of the ^{137}Cs in the fallen leaf layer migrated to the surface layer of soil, at a depth of 0-5 cm. No change in the distribution was seen subsequent to December 2011.