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Fukushima- Daiichi: High Levels of Cesium Radioactive Material Migrating Down into Soil Around Fukushima

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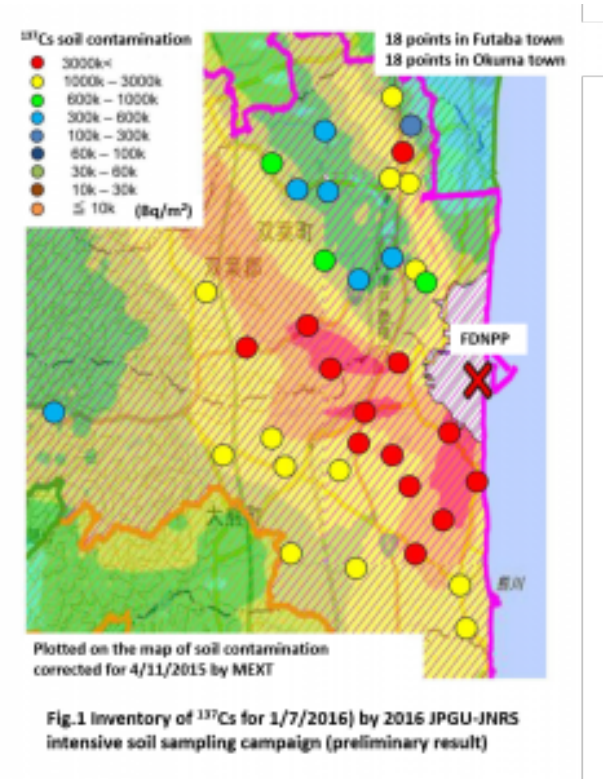
High levels of radioactive cesium remain in the soil near the Fukushima Daiichi nuclear power plant and these radionuclides have migrated at least 5 centimeters down into the ground at several areas since the nuclear accident five years ago, according to preliminary results of a massive sampling project being presented at the JpGU-AGU joint meeting in Chiba, Japan.

In 2016, a team of more than 170 researchers from the Japanese Geoscience Union and the Japan Society of Nuclear and Radiochemical Sciences conducted a large-scale soil sampling project to determine the contamination status and transition process of radioactive cesium five years after a major earthquake and tsunami caused a nuclear accident at the Fukushima Daiichi plant.



Source: Kazuyuki Kita

The team collected soil samples at 105 locations up to 40 kilometers (25 miles) northwest of the Fukushima Daiichi nuclear power plant in the “difficult-to-return” zone where entry is

prohibited. The project seeks to understand the chemical and physical forms of radionuclides in the soil and their horizontal and vertical distribution.

The Japanese government has monitored the state of radioactive contamination in the area near the plant since the 2011 accident by measuring the air dose rate, but scientists can only determine the actual state of contamination in the soil and its chemical and physical forms by direct soil sampling, said Kazuyuki Kita, a professor at Ibaraki University in Japan, who is one of the leaders of the soil sampling effort.

Understanding the radionuclides' chemical and physical forms helps scientists understand how long they could stay in the soil and the risk they pose to humans, plants and animals, Kita said. The new information could help in assessing the long-term risk of the radionuclides in the soil, and inform decontamination efforts in heavily contaminated areas, according to Kita, one of several researchers will present the team's preliminary results at the JpGU-AGU joint meeting next week.

Preliminary results show high levels radioactive cesium are still present in the soil near the plant. The levels of radiation are more than 90 percent, on average, of what was found immediately following the accident, according to Kita.

Most of the radiocesium in the soil was found near the surface, down to about 2 centimeters, immediately following the 2011 accident. Five years later, at several sampling points, one-third to one-half of the radiocesium has migrated deeper into the soil, according to Kita. Preliminary results show the radiocesium moved about 0.3 centimeters per year, on average, deeper into the soil and soil samples show the radiocesium has penetrated at least 5 centimeters into the ground at several areas, according to Kita.

The team plans to analyze samples taken at greater depths to see if the radiocesium has migrated even further, he said.

> "Most of the radioactive cesium remains after five years, but some parts of the radioactive cesium went from the surface to deeper soil," he said.

Knowing how much radioactive contamination has stayed on the surface and how deep it has penetrated into the soil helps estimate the risk of the contaminants and determine how much soil should be removed for decontamination. The preliminary results suggest decontamination efforts should remove at least the top 6 to 8 centimeters of soil, Kita said.

The preliminary data also show there are insoluble particles with very high levels of radioactivity on the surface of the soil. Debris from the explosion fused with radiocesium to form small glass particles a few microns to 100 microns in diameter that remain on the ground, according to Kita. The team is currently trying to determine how many of these radiocesium glass particles exist in areas near the nuclear plant, he said.

> "We are afraid that if such high radioactive balls remain on the surface, that could be a risk for the environment," Kita said. "If the radioactivity goes deep into the soil, the risk for people in the area decreases but we are afraid the high radioactive balls remain on the surface."

Nanci Bompey is the manager of AGU's public information office. This research is being presented Thursday, May 25 at the JpGU-AGU joint meeting in Chiba, Japan.

Featured image: Environmental ScienceBites
