[EJ] Evening Poster | H (Human Geosciences) | H-CG Complex & General

[H-CG26]What scientists should do for reconstruction after Fukushima Daiichi Nuclear Power Plant Accident

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Seven years have passed since the Fukushima Dai-ichi Nuclear Power Plant accident on March 2011. Some local villagers have started returning their own home. Most of suspension on shipment of agricultural products from Fukushima has been released. Scientists temporarily concentrated on Fukushima-related issues are returning to their own research topics although we still need to solve various problems from application levels to pure scientific topics. For example, it is critical for farmers in Fukushima how to recover productivity of decontaminated agricultural lands. Radiocesium (Cs)-bearing microparticles having relatively high specific radioactivity (Bq/kg) had recently been discovered; however, the fate of the Cs-bearing microparticles, e.g., inert or not, is not well understood to date. It is about time for rural planning scientists to propose their own opinions rather than reporting case studies. We had preliminary discussion at ASA, CSSA and SSSA International Annual Meeting in Tampa, USA 2013 by driving a session of "Battles of Soil Scientists in Fukushima, Japan". In addition, we had "Battles of soil scientists for recapturing Fukushima land from Nuclear Power Plant accident. What can we do then?" last year. In this session, we are looking forward to presentations from soil and water sciences to social and agronomic sciences related to interaction of human and nature under the condition of post-nuclear power plant accident.

[HCG26-P05]Radiocesium transport processes and their temporal variation in Fukushima, Japan

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Huge amounts of radionuclides, especially radiocesium (^{137}Cs and ^{134}Cs) and radioiodine (^{131}I), were released to the atmosphere by the accident at the Fukushima Daiichi Nuclear Power Plant (FDNPP) in March 2011. The FDNPP accident resulted in considerable deposition of radiocesium on the soil in and around Fukushima Prefecture. Residents within the seriously contaminated area were forced to move. Intensive decontamination efforts, including removal topsoil and vegetation around houses and agricultural lands, were conducted between April 2013 and March 2017. However, a large amount of radiocesium remains in forests, which were not the target of decontamination efforts. The remaining radiocesium has been redistributed with water and sediment transport. In this study, rediocesium transport processes and their temporal variation were investigated from the results of our river monitoring and the review of some literatures.

Radiocesium transfer involves two main forms of radiocesium: dissolved and particulate. Radiocesium was transported mainly by the particulate radiocesium bound to suspended sediments, SS during rainfall events. Radiocesium is selectively adsorbed onto fine particles such as clay, silt, fine sand, and organic matter.

Generally, radiocesium transportation occurs during the rainfall from March to April which is the snowmelt period, the rainy season from June to July, and the typhoon period from August to October. At these times, radiocesium-containing soil is eroded and flows down, but a part of sediments containing radiocesium deposits at the water's edge such as floodplains. If greater flooding occurs than the previous runoff, the deposited radiocesium is resuspended. It is supposed that the amount of radiocesium deposits increases until the rainy season and flushes radiocesium deposited by typhoons accompanied by high rainfall intensity. It is also considered that the sedimentation increases remarkably during the snowmelt period, because the topsoil was eroded easily due to the freezing and melting action.

Riverine particulate ^{137}Cs concentrations of SS decreased rapidly after the flooding of Typhoon Roke in September 2011. Similar abrupt change was detected after the flooding of Typhoon Etau in September 2015. These two events flushed a large amount of particulate radiocesium out from easily erodible sites, such as the headcut of gullies, river floodplains, and bared agricultural lands just before removing top soil as the decontamination works. The result of this exhaustion of easily erodible radiocesium source would have decreased abruptly subsequent radiocesium export.

As cesium dynamics in the future, it is conceivable that radiocesium remaining in the forests is slowly and long-term transported as a dissolved component. Dissolved radiocesium are thought to be highly incorporated into crops and it is necessary to pay attention to the trend.