Mechanism of resuspension of radiocesium in summer and autumn

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.Radionuclides emitted in the Fukushima dai-ichi nuclear power plant (FNDPP) accident in March 2011 have been deposited on the soil, ocean and vegetation. Re-suspension of radioactive cesium from the soil and vegetation to the atmosphere may be one of significant path in the diffusion of radionuclides after the accident.
We have measured the concentration of atmospheric Cs-134/137 radioactivity at Namie, Fukushima, where deposition amount of Cs-134/137 is relatively high. Atmospheric suspended particles have been collected on a sheet of quartz fiber filter with high-volume air samplers mounted at a playground site and forest site, and gamma-ray emission from them were measured with Ge detector to obtain the atmospheric activity concentration of Cs-134/137. A small part of each filter was used to measure chemical composition and microscope particle observation.
The atmospheric Cs radioactivity concentration increased from late May to September, summer and autumn. It was higher in the forest than that at the playground in these season. The measured concentration of atmospheric Cs-134/137 was positively correlated with amount of carbonatious particles in these seasons. Bioaerosol sampling and analyses showed that major coarse particles in these seasons were spores of fungi and stain. We counted the spores collected on the sample filters to evaluate their number density, and found the number density was positively correlated with the atmospheric Cs radioactivity concentration. We collected fungi at Namie to sample its spores. About half of Cs-137 in the spores was removed by pure water, being consistent with similar experiment for the atmospheric particle samples. These results indicated that spore emission from fungi significantly contributes to the resuspension of radioactive Cs to the atmosphere in summer and autumn. However, Cs-137 radioactivity in the collected spores may be too small in comparison with atmospheric Cs activity concentration by considering atmospheric spore particle concentration. Other process may contribute to the re-suspension.

Keywords: radioactive cesium, atmospheric resuspension, bioaerosol, fungi spore

