

3.043 Bioaerosol emission and its role in re-emission of radioactive cesium from forest in Fukushima.

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Abstract:

Primary bioaerosols have recently been remarked by their possible roles in the environment, such as ice-nuclei formation and health influence. In this study, we show another role of bioaerosol in the environment: re-emission of radioactive cesium (radiocesium) from forests polluted by radiocesium.

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/emission of radiocesium from the soil and vegetation to the atmosphere may be one of significant paths in the diffusion of radiocesium after the accident. We have measured the concentration of atmospheric radiocesium activity at a heavily-polluted area in Fukushima, by sampling aerosols with high-volume air samplers. This observation showed that major part of the sampled coarse particles were carbonaceous, probably biogenic particles, such as spores and bacteria in summer and autumn, between June and October, indicating that a large amount of bioaerosol could be emitted from forest around Fukushima.

The atmospheric radiocesium activity concentration significantly increased in this period, and was positively correlated with amount of carbonaceous particles in these seasons. Bioaerosol sampling and genome analyses showed that major coarse particles in these seasons were probably 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 radiocesium activity concentration. We collected fungi near observation site to sample its spores to measure radiocesium activity per one spore. These results indicated that atmospheric radiocesium activity could be attributed to spores in the atmosphere. Water solubility of atmospheric radiocesium in

these seasons suggests possibility of its circulation between the atmosphere and biosphere.