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Seasonal variation of the atmospheric 137Cs & 134Cs - Concentration and aerosol size transporting radioactive Cs ?

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By the FDNPP accident on March 2011, large amounts of radioactive cesium (radiocesium) were released to the atmosphere. Total release amount of ^{137}Cs is estimated to 1.3×10^{16}(Bq) by Chino et al.(2012) and were deposited on the ground, vegetation and ocean. A half-life of ^{137}Cs and ^{134}Cs is 30.2 and 20.6 year respectively , and for the radioactive cesium which was diffused and deposites to repeat resuspention. The influence on a polluted area is expected for an extended period and also feared of risk to health

But the physical and chemical form of radiocesium have a lot of undefined , the resuspention system for now and the seasonal variation of the concentration and aerosol size transporting radioactive Cs is not understood enough. The purpose of our research is to understand the seasonal variation of the concentration and aerosol size transporting radioactive Cs with a long term monitoring atmospheric radiocesium.

We observed at 4 sites , Site-A(Kawatmata ceder forest) , Site-B(Tsushima school play ground) , Site-C(Tsushima broad leaf forest) , Site-D(Tsushima decontaminated playground). Site-A and Site-D was decontaminated in August to December 2012 and December 2011 to February 2012 respectively , therse sites are lower spatial dose. But Site-B and Site-C is not decontaminated, spatial dose is higher. This report used the date from December 2012 for research resuspention of radiocesium.

Sampling of techniques in Site-A and Site-C was mainly size distribution by impactor , sometimes only total concentration by High volume air sampler(HV). In Site-B observed size distribution and total concentration(short time cycle) at the same time.In site-D observed only total concentration.

Seasonal variation of total radiocesium have the same trend in all sites, lower concentration in winter and high concentration in summer. Thus in summer, there is 2 peaks , high concentration in May to July and August to September.

There is the seasonal variation of size distribution of transpoating radiocesium. Particles of 10.3˜0.69μm is mainly in summer and august , particles on backup filter(0.39μm and bounced larger particles) was high in winter and spring. This result suggests the change of process for resuspention in each seasons.

The spatial dose between site-A and site-B have a big difference , but the distance is very close, only about 0.75km departed. From this difference , we can expect the scale of broadness. Fraction(site-B divided site-D) is 1.33 in summer and august and 2.16 in winter and spring respectively. This result indicates the transpoting scale is larger at the season of high concentration and large particles are dominant (in summer and august). Oppositely at the seasons of low concentration and large particles are not dominat (in winter and spring) , transporting scale is very local .

Keywords: radioactivity, cesium, atomosphere, resuspention, FDNPP, ISET-R