



Hourly atmospheric concentrations of Cs-134 and Cs-137 at monitoring stations for suspended particulate matter in and south of Fukushima after the Fukushima Daiichi Nuclear Power Plant accident

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No data has been found of continuous monitoring of radioactive materials in the atmosphere in Fukushima area after the Fukushima Daiichi Nuclear Power Plant (FD1NPP) accident on March 11, 2011, although it greatly contributes to accurate evaluation of the internal exposure dose, to reconstruction of emission time series of released radionuclides, and to validation of numerical simulations by atmospheric transport models. Then, we have challenged to retrieve the radioactivity in atmospheric aerosols collected every hour on a filter tape of Suspended Particulate Matter (SPM) monitoring system with beta ray attenuation method used at air pollution monitoring stations in east Japan. A test measurement for hourly atmospheric concentrations of Cs-134 and Cs-137 was successfully performed with a Ge detector for the used filter tapes during March 15-23, 2011, at three stations in Fukushima City 60 km northwest of the FD1NPP and four stations in southwest Ibaraki prefecture more than 150 km southwest of the FD1NPP. The data in Fukushima City revealed high Cs-137 concentrations of 10-30 Bq m⁻³ from the evening of March 15 to the early morning of March 16, when a large amount of radioactive materials was simultaneously deposited on the land surface by precipitation according to the measurement of radiation dose rate. Higher Cs-137 concentrations of 10-50 Bq m⁻³ were also found from the afternoon of March 20 to the morning of March 21, and which could not be detected by the radiation dose rate due to no precipitation. In contrast, much higher concentrations with the maximum of 320 Bq m⁻³ in southwest Ibaraki than in Fukushima City were found on the morning of March 15 and 21 under strong temperature inversion near the surface. The polluted air masses with high radioactive materials were passed away within a few hours as a plume in southwest Ibaraki, while the high Cs-137 concentrations lasted for 10-16 hours in Fukushima City where the polluted air masses after their transport from the FD1NPP across Abukuma Mountains were trapped in the Fukushima basin during the midnight with calm condition. This significant difference in the magnitude of high Cs-137 concentration and its duration between the two areas was controlled mainly by meso-scale meteorological conditions coupled with topography.