Comprehensive retrieval of spatio-temporal distribution of atmospheric radionuclides just after the Fukushima accident by analyzing filter-tapes of operational air pollution monitoring stations

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After the Fukushima Daiichi Nuclear Power Plant (FD1NPP) accident on March 11, 2011, we collected the used filter-tapes installed in Suspended Particulate Matter (SPM) monitors with beta-ray attenuation method operated by local governments in the air pollution monitoring network of eastern Japan. By measuring radionuclides in SPM on the filter-tapes at 40 stations in the Fukushima prefecture (FP) and the Tokyo metropolitan area (TMA) located more than 170 km southwest of the FD1NPP, we firstly retrieved hourly atmospheric Cs-134 and Cs-137 concentrations during March 12-23, 2011 [1]. Until now, we measured hourly radiocesium at around 100 SPM sites in the southern Tohoku (ST) region including the FP and in the TMA [2]. By analyzing the new dataset, we found more than 10 plumes/polluted air masses which were transported to the ST region including the FP or to the TMA. Furthermore, it partially suggests from which reactor unit radioactive materials were released into the atmosphere. Many peaks of radiation dose rate were already observed at all the monitoring stations for radioactive materials, and a one-to-one correspondence could be identified between a peak of radiation dose and a plume/polluted air mass of radionuclides. Many case studies on the spatio-temporal distribution of plume/polluted air masses were also performed, and which clearly demonstrates that local meteorological conditions such as land and sea breezes, precipitation, and temperature inversion layers near the surface coupled with topography could greatly affect the transport pathways of radioactive materials, their maximum concentrations, and their deposition to the land surface.

[1] Tsuruta, H. *et al*. (2014) *Sci.Rep*. **4**, 6717; DOI: 10.1038/srep06717. [2] Oura, Y. *et al*. (2015) *JNRS*, **15**, 1-12.