

Comprehensive analysis of atmospheric radionuclides just after the Fukushima accident

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Even six years passed after the Fukushima Daiichi Nuclear Power Plant (FD1NPP) accident, we still have large uncertainty for atmospheric transport and deposition models, the estimate of release rate of source terms and of internal exposure from inhalation. For our better understanding and to reduce the uncertainty, we thoroughly analyzed all the published data of radionuclides such as Cs-137, I-131 and Xe-133, and of radiation dose rates at many monitoring sites in eastern Japan. We also retrieved the spatio-temporal distributions of Cs-137 just after the accident by using the unique dataset of hourly radionuclides in atmospheric aerosols collected on the used filter-tapes installed in the suspended particulate matter (SPM) monitors operated at more than 100 stations in the air pollution monitoring network of Japan. The most important findings are summarized as follows. Analyzing the hourly Cs-137 concentrations at two SPM stations located within 20 km from the FD1NPP, we revealed the complicated behavior of plumes and atmospheric radionuclides near the FD1NPP just after the accident. The transport pathways to the northwestern and northern areas from the FD1NPP are clarified especially on March 12-21, 2011. Analysis of the published data clearly shows that atmospheric ratio of I-131/Cs-137 (=R) was mainly divided into two groups, one ($R \leq 10$) is for the plumes before March 21, 2011, and the other ($R > 100$) is after that day. These two groups are consistent in all the measured sites, whether the sites are in the Fukushima prefecture or in the Tokyo Metropolitan area. These results are expected partially to identify the source term for each plume.