[EJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-AG Applied Geosciences

[M-AG33]Dynamics of radionuclides emitted from Fukuchima Dai-ichi Nuclear Power Plant in the environment

convener:Kazuyuki Kita(Faculty of Science, Ibaraki University), Yuichi Onda(Center for Research on Isotopes and Environmental Dynamics, University of Tsukuba), SHINOHARA ATSUSHI(大阪大学, 共同), Daisuke Tsumune(Central Research Institute of Electric Power Industry)

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The Great East Japan Earthquake caused the severe accident in TEPCO Fukushima dai-ichi nuclear power plant (FDNPP), leading to emission of huge amount of radionuclides to the environment. They have been transported and diffused by atmospheric motion, depositing them to soil and vegetation. Deposited radionuclides are dynamically shifted in the earth environment; atmosphere, soil, inland water, ocean, and ecosystem. To understand this dynamic shift in the environment and for the long-term prediction of the disaster by the radionuclides, investigation and discussion based on not only the earth sciences including ecology but also on the radiochemistry and other related sciences.

In this session, various efforts to understand the dynamic behavior of radionuclides emitted from FDNPP accident in the earth system as well as to predict their influences on the environment. It is expected that this session will offer a good opportunity to discuss radionuclides in the earth environment from wide aspect and to exchange information in various research fields.

[MAG33-P09]impact of observed precipitation on the simulation of diffusion/deposition process of the radioactive nuclides from the Fukushima Daiichi Nuclear Power Plant

*yutaro okumura[1], Akiyo Yatagai[1], Mizuo Kajino[2] (1.Hirosaki University, 2.compiled by Japan Meteorological Agency (JMA).)

On March 11, 2011, Tohoku Region Pacific Coast Earthquake occurred, and the resulting tsunami hit the Fukushima Daiichi nuclear power plant. Large amounts of radioactive materials were discharged into the atmosphere, transported, and deposited on the surface. Meteorological variables such as pressure, temperature, wind, humidity, and precipitation, are actively involved in the transport and deposition processes of the radioactive materials. Atmospheric Transport Models (ATMs) are used to predict their behavior. However, uncertainty remains in the predicted meteorological variables, especially regarding the precipitation process. In this study, in order to reduce uncertainty in the prediction of the precipitation process, we compared two sets of simulations: One with normal run, the other with the same but only compare the output precipitation was replaced by an observation.

In this study, we used an ATM called the Lagrangian Model (LM; Kajino et al., 2016). It has a feature that it is light and easy to run for non-specialists of modeling research who may not have large computational resources, or for the computationally expensive analysis such as ensemble forecasts and sensitivity simulations. For the meteorological variables as input of LM, we used the Japan Meteorological Agency's Grid Point Value Meso Scale Model (MSM). This data is obtained every 3 hours. Data such as pressure, geopotential height, temperature, humidity, wind, and precipitation amount are used as the input. Among them, only precipitation was replaced with an observation data. The Radar - Automated Meteorological Data Acquisition System (RA) was used for the observation data. Katata et al. (2015) was used for the emission scenario. The simulation data was compared with an observation data of surface air activity concentration of ^{137}Cs. The observation data was obtained from Suspended Particulate

Matter (SPM) tapes by Oura et al. (2015). SPM refers to an aerosol having a diameter of smaller than 10 μm.

The simulation result was better with RA than the normal run in terms of the comparisons against the actual measurement values of ^{137}Cs surface activity concentrations. Since the time interval of MSM outputs was every 3 hours, it is difficult to reproduce precipitation events shorter than 3 hour. On the other hand, since RA outputs has a shorter interval, 30 minutes, it could reproduce details of the precipitation process more such as cloud breaks and sudden precipitation. The difference of the time interval caused difference in simulated wet deposition amount and a surface concentrations. Therefore, in the ATM, it was found that the distribution and the timing of precipitation process were more important, than the amount of precipitation. Through this study, the importance of the precipitation process in the ATM for the ^{137}Cs simulation was reconfirmed.