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Radioactive contamination processes during 14-21 March after the Fukushima accident: What does atmospheric electric field measurements tell us?

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Ionizing radiation from the radioactive material is known to increase atmospheric electric conductivity, and hence to decrease vertical downward atmospheric DC electric field at ground level, or potential gradient (PG). In the past, the drop of PG has been observed after rain-induced radioactive fallout (wet contamination) after nuclear tests or after the Chernobyl disaster. After the nuclear accident Fukushima Dai-ichi nuclear power plant (FNPP) that started 11 March 2011, the PG also at Kakioka, 150 km southwest from the FNPP, also dropped a by one order of magnitude. Unlike the past examples, the PG drop was two-stepped on 14 March and 20 March. Both correspond to two largest southward release of radioactive material according to the data from the radiation dose rate measurement network.

We compare the Kakioka's PG data with the radiation dose rate data at different places to examine the fallout processes of both on 14 March and on 20 March. The former turned out to be dry contamination by surface wind, leaving a substantial amount of fallout floating near the ground. The latter turned out to be wet contamination by rain after transport by relatively low-altitude wind, and the majority of the fallout settled to the ground at this time. It is recommended that all nuclear power plant to have a network of PG observation surrounding the plant.

Takeda, et al. (2011): Initial effect of the Fukushima accident on atmospheric electricity, Geophys. Res. Lett., 38, L15811, doi:10.1029/2011GL048511.

Yamauchi, et al. (2012): Settlement process of radioactive dust to the ground inferred from the atmospheric electric field measurement, Ann. Geophys., 30, 49-56, doi:10.5194/angeo-30-49-2012.