1. Introduction

- To evaluate the environmental impacts and resultant radiological doses to the public due to the accident, the source term of radioactive materials discharged into the atmosphere was estimated and updated in a series of research[1] conducted by Japan Atomic Energy Agency (JAEA).
- The source term was reversely estimated from environmental monitoring data with an analysis method using an atmospheric dispersion simulation model WSPEEDI[2] developed by JAEA.

2. Method of source term estimation

**Atmospheric dispersion simulation**

- Wind direction
- Turbulence diffusion
- Radioactive plume
- Gaseous
- Particulate
- Surface effects
- Heat flux by solar radiation
- Surface deposition

**Reverse estimation method**

- Calculation
  - Unit release (1 Bq/h)
  - Dilution factor
- Monitoring
  - Concentration
  - Air dose rate
- Release rate
- Monitoring
  - Concentration
  - Air dose rate

**Simple method:**
- Release rates at times corresponding to monitoring data were obtained by dividing measured air concentrations into calculated ones under the assumption of unit release rate (dilution factors).

**New method:**
- Combination of ensemble meteorological calculations and the Bayesian inference.
- Improve not only the source term but also meteorological field by selecting the optimum case from ensemble members of meteorological calculations.

Processes considered in WSPEEDI:

- These processes are simulated by numerically solving the equations for meteorological conditions and atmospheric dispersions.

3. Results

**Estimated source term**

- Terada et al. 2012: simple method
- Used in UNSCEAR 2013 report
- Terada et al. 2020: new method with new model and data

**Simulation results**

- Improved

**Formation process of deposition**

- 137Cs concentration
  - Successfully reproduced air concentrations at monitoring points and surface depositions by airborne monitoring.
  - Elucidated formation process of land surface contamination.
  - Used in the dose estimation project[3].

- 137Cs deposition by airborne monitoring & formation process