Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # yy

Name

Haruyasu Nagai

Title

Dr.

Affiliation

Japan Atomic Energy Agency

Email

nagai.haruyasu@jaea.go.jp

Country

Japan

Additional Authors (names only)

Hiroaki Terada

Session

What happened

Abstract Title (English, limited to 300 characters)

Estimation of the source term of radioactive materials discharged into the atmosphere during the Fukushima Daiichi Nuclear Power Station accident

Abstract (English)

The Fukushima Daiichi Nuclear Power Station (FDNPS) accident in March 2011 released significant amounts of radioactive materials into the atmosphere. In order 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 conducted by Japan Atomic Energy Agency (JAEA). In these studies, the source term was reversely estimated from environmental monitoring data with an analysis method using atmospheric dispersion simulations. The atmospheric dispersion model mainly used in these studies was the Worldwide version of System for Prediction of Environmental Emergency Dose Information (WSPEEDI) developed by JAEA.

The source term was estimated by coupling environmental monitoring data with atmospheric dispersion simulations under the assumption of unit release rate (1 Bq/h). Release rates at respective times corresponding to monitoring data were obtained by dividing measured air concentrations into calculated ones under the assumption of unit release rate (dilution factors). Some release rates were estimated by comparing measured air dose rate due to radionuclides on the ground surface with calculated ones, assuming the composition of radionuclides. In the recent study, the source term was further refined with a new optimization method with combination of ensemble meteorological calculations and the Bayesian inference method. The method improved not only the source term but also the wind field in meteorological calculations by selecting the optimum case from ensemble members of meteorological calculations based on comparison results between the dispersion calculations and measurements of radionuclides.

As the result of source term estimation, the atmospheric dispersion simulation successfully reproduced both the air concentrations of ^{137}Cs and ^{131}I at monitoring points and their surface depositions by airborne monitoring. Then, the database for spatiotemporal distribution of major radionuclides in the air and on the surface were constructed by using the simulation results. It was used for comprehensive dose assessment coupled with behavioral patterns of evacuees from the FDNPS accident in the Japanese dose assessment project.