Geophysical Research Abstracts
Vol. 20, EGU2018-19211, 2018
EGU General Assembly 2018

Inverse modelling method to analyze detections of radionuclides within Europe: illustration on an actual case

Olivier Saunier, Anne Mathieu, Damien Didier, and Olivier Masson
IRSN, Fontenay-aux-roses, France

In case of an accidental situation involving radioactive material, the Institute for Radiological Protection and Nuclear Safety (IRSN) uses atmospheric dispersion models to assess radiological consequences for human health and environment. The accuracy of the models results is highly dependent on the source term assessment, including the location, the duration, the magnitude and the isotopic composition of the release.

Inverse modeling methods, which combine environmental measurements and atmospheric dispersion models, have proven to be efficient in assessing source term due to an accidental situation. IRSN developed a tool based on a variationnal approach. It has been applied to the Fukushima accident by using dose rate measurements (Saunier et al., 2013) and air concentration measurements (Winiarek et al. 2012 , Winiarek et al. 2014 and Saunier et al. 2016). The approach is suitable when the source location is known as usually would be the case for severe nuclear accidents.

In the past few years, several radionuclides detections events have been reported in Europe (I-131 in 2011, 2012, 2015 and 2017, Cs-137 in 2015 and Ru-106 in 2017). These accidental situations involved small amounts of radionuclides released in the environment. Although the concentrations levels measured were too low to have an impact on human health and environment, the knowledge on the location and the magnitude of the release are required to accurately assess the potential consequences close to the source. However, all these events were characterized by the fact that the source location was not known at the time when the first detections were reported. Therefore, the inverse modelling method of IRSN has been extended to identify the most reliable source location in addition to its magnitude. The method has been applied to several radionuclides event detections in Europe. The results of the source term obtained by inverse modelling are presented. The relevance of the source term is investigated using several statistic indicators coupled with Monte-Carlo simulations.