Geophysical Research Abstracts
Vol. 21, EGU2019-18767-2, 2019
EGU General Assembly 2019

Scientific lessons learned from the understanding of the Fukushima deposit to be implemented in operational atmospheric transport models

Denis Quélo (1), Arnaud Quérel (1), Anne Mathieu (1), and Yelva Roustan (2)

(1) IRSN, PSE-SANTE, SESUC, BMCA, Fontenay-aux-Roses, France (denis.quelo@irsn.fr), (2) CEREA, Joint Laboratory École des Ponts ParisTech and EDF R&D, Champs-sur-Marne, France

Deposition is a key process in atmospheric transport modelling of radionuclides consecutive to an accidental release. Following the emission and the atmospheric transport, it is the final step to obtain a map of deposit, on which relies a long-term crisis management.
The Fukushima Daiichi Nuclear Power Plant accident of 11th March 2011 led to a significant release of radionuclides in the environment. Most releases were dispersed over the Pacific Ocean whereas about 20% were deposited on the Japan main island causing areas of significant deposit.
Numerous radiological measurements taken in the Japanese environment enabled the scientists to substantially reconstruct the main sequences of release to identify the probable trajectories of the radioactive plumes, and to link them with precipitation data to explain the areas of deposition. Fortunately, measurements are all available together at certain location and can be compared to each other: 137Cs hourly air concentrations retrieved from filter tapes of air quality monitoring sites, hourly gamma dose rate and meteorological data from the AMEDAS monitoring network which provides rain-gauges, rain radars and visibility detection. This multiple point of view permitted to establish some lessons about the wet deposition process in case of a nuclear release.
The measurements were supplemented by modelling techniques. The most significant progress come from the quantification of the atmospheric releases, the improvement of meteorological data to better take into account the influence of the complex orography on the plumes trajectories and the modelling of deposition processes.
The analysis shows some necessary improvements to be done for wet deposition modelling. Several factors are of importance: scavenging of plumes in altitude, impact of light rains in particular before rainfalls. These features are now taken into account in the IRSN operational atmospheric transport model.