



Cloud diagnosis impact on deposition modelling applied to the Fukushima accident

Arnaud Quérel (1,3), Denis Quélo (1), Yelva Roustan (2), and Anne Mathieu (1)

(1) IRSN, PRP-CRI / SESUC, Fontenay-aux-Roses, France (denis.quele@irsn.fr), (2) CEREAs, Joint Laboratory École des Ponts ParisTech and EDF R&D, Champs-sur-Marne, France, (3) Strathom Energie, Paris, France

The accident at the Fukushima Daiichi Nuclear Power Plant in Japan in March 2011 resulted in the release of several hundred PBq of activity into the environment. Most of the radioactivity was released in a time period of about 40 days. Radioactivity was dispersed in the atmosphere and the ocean and subsequently traces of radionuclides were detected all over Japan. At the Fukushima airport for instance, a deposit as large as 36 kBq/m² of Cs-137 was measured resulting of an atmospheric deposition of the plume. Both dry and wet deposition were probably involved since a raining event occurred on the 15th of March when the plume was passing nearby.

The accident scenario have given rise to a number of scientific investigations. Atmospheric deposition, for example, was studied by utilizing atmospheric transport models. In atmospheric transport models, some parameters, such as cloud diagnosis, are derived from meteorological data. This cloud diagnosis is a key issue for wet deposition modelling since it allows to distinguish between two processes: in-cloud scavenging which corresponds to the collection of radioactive particles into the cloud and below-cloud scavenging consequent to the removal of radioactive material due to the falling drops.

Several parametrizations of cloud diagnosis exist in the literature, using different input data: relative humidity, liquid water content, also. All these diagnosis return a large range of cloud base heights and cloud top heights. In this study, computed cloud diagnostics are compared to the observations at the Fukushima airport. Atmospheric dispersion simulations at Japan scale are then performed utilizing the most reliable ones. Impact on results are discussed.