



Simulation of the atmospheric deposit consecutive to the Fukushima accident: variability of response due to several wet deposition schemes

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The emergency response centres had placed emphasis afterwards on reproducing the deposit consecutive to a major nuclear release by operating their atmospheric transport models with various source terms and meteorological data. The outcomes are mixed and the simulation of the deposited activity remains a delicate exercise. The simulated deposited activity results from a modelling chain whose meteorological data and source term are undoubtedly the most visible and the most questionable. Beyond this, we show that to improve the operational response of models, it is also important to progress on the modelling of wet deposition processes.

This conclusion is based on a detailed sensitivity analysis considering, in a common modelling framework, a set of wet deposition schemes implemented by emergency atmospheric transport models. The focus of this work is the deposit following the Fukushima NPP accident in March 2011 when a massive release of radionuclides were injected into the atmosphere and contaminated the Japanese territory. The long-range atmospheric transport model IdX serve as a basis for all these simulations. It is part of the emergency response modelling platform of the IRSN (Institute for Radiological protection and Nuclear Safety), named C3X.

Given a selection of wet deposition schemes used in operational atmospheric transport models, an attempt of determining their proximity judged by criteria reflecting the main features expected in an emergency response context. Relative impact on the simulated deposit is thereby assessed for each of these schemes from many input data.

When comparing to the measured deposit, the performance remains unsatisfactory and the wet deposition scheme cannot explain these differences alone. The improvements made on meteorological fields and on the reconstructed source term do not yet appear sufficient to allow an objective classification of the wet deposition schemes.

This sensitivity analysis, however, confirms the importance of choosing carefully the wet deposition scheme. The lack of consensus in the literature on a best wet deposition scheme therefore indicates the need to make progress on this point, even though the Fukushima case is not a suitable case study at this point.