



Design of a monitoring network in case of a radiological accidental release

R. Abida, N. Bocquet, N. Vercauteren, O. Isnard

(1) CERE, Joint Laboratory ENPC / EDF R\&D Paris-Est University and INRIA (abida@cerea.enpc.fr, Fax: +33(0)164152170), (2) CERE, Joint Laboratory ENPC / EDF R\&D Paris-Est University and INRIA (bocquet@cerea.enpc.fr), (3) CERE, Joint Laboratory ENPC / EDF R\&D Paris-Est University and INRIA, (4) Institute of Radiation Protection and Nuclear Safety, France (olivier.isnard@irsn.fr)

The Institute of Radiation Protection and Nuclear Safety (France) is planning the set-up of an automatic nuclear aerosol monitoring network over the French territory. Each of the stations will be able to automatically sample the air aerosol content and provide with activity concentration measurements on several radionuclides. This should help monitor the French and neighbouring countries nuclear power plant park. It would also help evaluate the impact of a radiological incident from this park.

We will show how to spatially design such a monitoring network. In this study, any potential network is judged on its ability to extrapolate activity concentrations measured on the network stations over the whole domain. The performance of a network is quantitatively assessed through a cost function that measures the discrepancy between the extrapolation and the "true" concentration fields. These "true" fields are obtained through the computation of a database of dispersion accidents over one year of meteorology and originating from twenty French nuclear sites thanks the Euleria CTM Polair3D. A close to optimal network is then looked for using a simulated annealing optimisation.

The results emphasise the importance of the cost function in the design of a network aimed at monitoring an accidental dispersion. Several choices of norm used in the cost function are studied and give way to different designs. The influence of the number of stations is also studied. A comparison with a purely geometric approach which does

not involve simulations with a chemistry-transport model is performed.