In the early phase of a nuclear accident, two large sources of uncertainty exist: one related to the source term and one associated with the meteorological data. Operational methods are being developed in AVESOME for quantitative estimation of uncertainties in atmospheric dispersion prediction resulting from uncertainties in assessments of both the release of radionuclides from the accident and their dispersion. Previously, due to lack of computer power, such methods could not be applied to operational real-time decision support. However, with modern supercomputing facilities, available e.g. at national meteorological services, the proposed methodology is feasible for real-time use, thereby adding value to decision support.

In the recent NKS-B projects MUD, FAUNA and MESO, the implications of meteorological uncertainties for nuclear emergency preparedness and management have been studied, and means for operational real-time assessment of the uncertainties in a nuclear DSS have been described and demonstrated. In AVESOME, we address the uncertainty of the radionuclide source term, i.e. the amounts of radionuclides released and the temporal evolution of the release. Furthermore, the combined uncertainty in atmospheric dispersion model forecasting stemming from both the source term and the meteorological data is examined. Ways to implement the uncertainties of forecasting in DSSs, and the impacts on real-time emergency management are described.

The proposed methodology allows for efficient real-time calculations. Accordingly, the computer-resource demanding calculations should be carried out at the high-performance computing facilities available e.g. at the national meteorological services, whereas less demanding post-processing could be carried out at the computer hosting the DSS. The former tasks include the atmospheric dispersion model calculations; the latter includes interactive communication with the supercomputer as well as presentation of final results.