

Operational modelling of atmospheric transport at meteo-france

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Meteo-France has developed an emergency response system in case of an accidental release of radionuclides in the atmosphere. It is based on dedicated tools available at the operation centre (SCEM) which forecast pollutant plumes and air parcel trajectories. Two models can be operated on request, an air mass trajectories model and a complete Atmospheric Transport Model (ATM). Both models are off-line and use meteorological data issued from the french numerical weather prediction model (NWP) ARPEGE (for a global view) or ALADIN (for a limited area centered over France). The air mass trajectory describes the evolution of a neutrally buoyant particle in the three dimensional wind field forecast by the NWP. Forward and/or backward trajectories can be requested by the operator. The ATM is a complex Eulerian model which takes into account different physical processes included in the diffusion equation. Assuming conservation of the mass of the pollutant in the atmosphere, the model is able to link time evolution of the concentration of pollutant with advection by the wind, diffusion by the turbulent processes in the atmosphere, the emission and the depletion by inetraction with precipitations, roughness of the surface and radiological decay. The model provides information about air concentration and ground deposition at regional and long range. The development of a two-way nested ATM is curently undertaken. The idea is to use within one simulation the maximum of resolution available over the emission area, starting for instance with the ALADIN resolution (0.1 degree by 0.1 degree) and then using the ARPEGE resolution (0.5 degree by 0.5 degree) over Europe. A validation of the nested model against the Chernobyl accident (data base ATMES) is done. Tests and evaluation of the system within the operational framework is now in progress. The complete integration of the new model at the operation center is scheduled for spring 2001. Another development targeted for local scale modelling is forecasted for integration at the operation center by autumn 2001. It consist in coupling a lagrangian particle model with a non-hydrostatic meteorological model in order to issue a short-term forecast of the dispersion (up to 30 km and up to 3h).