



Integrated air quality assessment and forecasting with the modelling system SILAM

M. Sofiev (1), P.Siljamo(1), J.Soaes (1), I.Valkama (1), M.Prank2 (1,2), J.Vira (1,3), R. Vankevich (4), M. Kaasik (2), A.Karppinen (1), J.Kukkonen(1)

1. Finnish Meteorological Institute, Finland
2. University of Tartu, Estonia
3. Helsinki University of Technology, Finland
4. Russian State Hydrometeorological University, Russia

This paper presents the Air Quality and Emergency Modelling system SILAM and its applications to AQ assessment and forecasting at various scales. SILAM is a dual-core Lagrangian-Eulerian system built to support a wide variety of atmospheric composition studies. At present, the system incorporates 8 physico-chemical modules: (i) basic SO_x, NO_x, NH_x, CO, NMVOC, O₃ transformations, (ii) linearized SO_x chemistry, (iii) radioactive decay of up to 500 nuclides, (iv) release and transport of natural pollen and (v) sea salt, (vi) inert aerosol of arbitrary size distribution, (vii) persistent toxic compounds, and (viii) passive tracer that facilitates probabilistic computations of area of risk. The model is equipped with both forward and adjoint dynamics, which allows solving the inverse dispersion problems and perform variational data assimilation.

More detailed information about the system, code of the operational version and the results of the daily updated forecasts can be found at <http://silam.fmi.fi>.

A few examples of the SILAM applications will be presented. These include operational multi-scale forecasting of air quality over Europe and Finland, its long-term re-analysis, the model applications to analysis and interpretation of observational campaigns, and inverse problems.