SILAM - System for Integrated modeLling of Atmospheric composition

SILAM is a meso-scale-to-global chemical transport model developed for a wide range of applications. It includes Eulerian (Galperin, 1999, 2000; Sofiev, 2002, Sofiev et al, 2008) and Lagrangian (Sofiev, 2006) transport routines. The model possesses eight chemical transformation modules including gas-phase reactions in the troposphere and the stratosphere (CB4 with updated coefficients), for secondary inorganic aerosol formation (Sofiev, 2000), linearized sulphur oxides chemistry, radioactive nuclides decay, two schemes for aerosol processes (condensation, coagulation, nucleation in progress) computed from thermodynamic equilibrium or as dynamic processes, transformation of biological aerosols (in progress). Aerosol size spectra are described with sectional approach with user-defined bin distribution. Optical properties of aerosols and a selection of gaseous tracers are calculated following (Prank, 2008). Dry deposition scheme for aerosols is described in (Kouznetsov & Sofiev, 2012). SILAM model has been extensively evaluated against air quality observations over Europe and the globe (http://www.gmes-atmosphere.eu, Solazzo et al., 2012, Huijnen et al, 2010, etc).


The model is equipped with variational data assimilation tools for both 3D- and 4D-VAR, for which the adjoints to the main chemical routines (CB4 and linearized sulphur oxidation chemistry) and all dynamic modules of SILAM have been developed (Vira & Sofiev, 2010).

Silam was constructed at the Finnish Meteorological Institute and transferred to my group in the beginning of 2015. Currently CSC (IT Center for Science in Finland), Dr Sofiev’s (the SILAM group leader at FMI) and my group are working jointly together on the optimisation of the SILAM code for Xeon architectures. This activity will enable the implementation of more computational expensive modules into SILAM. This initiative will give us the opportunity to study SOA formation, growth and transformation processes with a focus on the anthropogenic impact with high temporal-spatial resolution for large areas like Southern Finland.

References


