



ILMATIETEEN LAITOS
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Towards integrated modelling of atmospheric composition in Finnish Meteorological Institute

approach of SILAM system

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Content

- System outlook
- SILAM structure and application scales
- Research directions
- SILAM network

- **SILAM = System for Integrated modeling of Atmospheric composition**



SILAM v.5: outlook



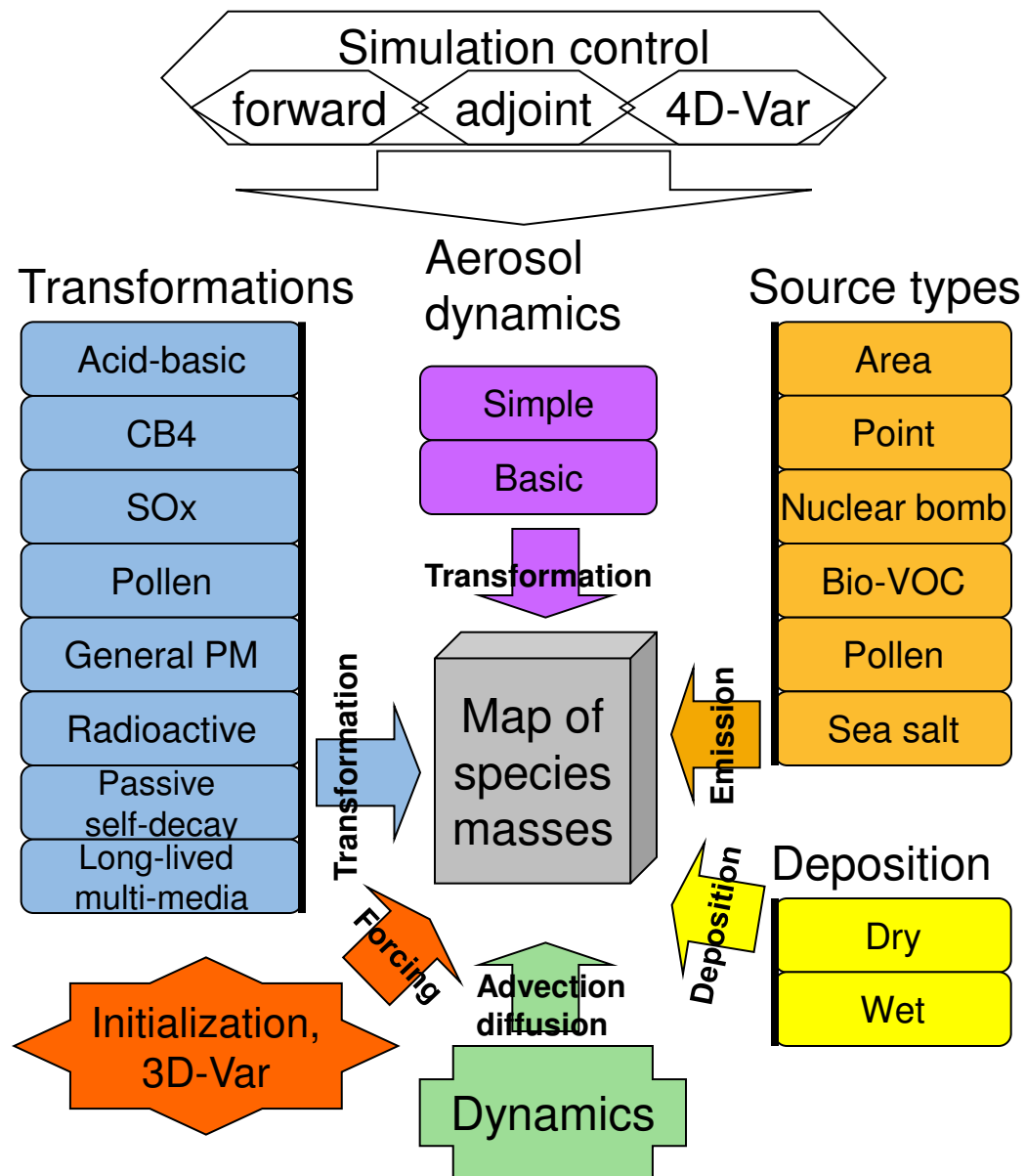
• Modules

- 8 chemical and physical transformation modules (6 open for operational use),
- 6 source terms (all open),
- 2 aerosol dynamics (one open)
- 3D- and 4D- Var

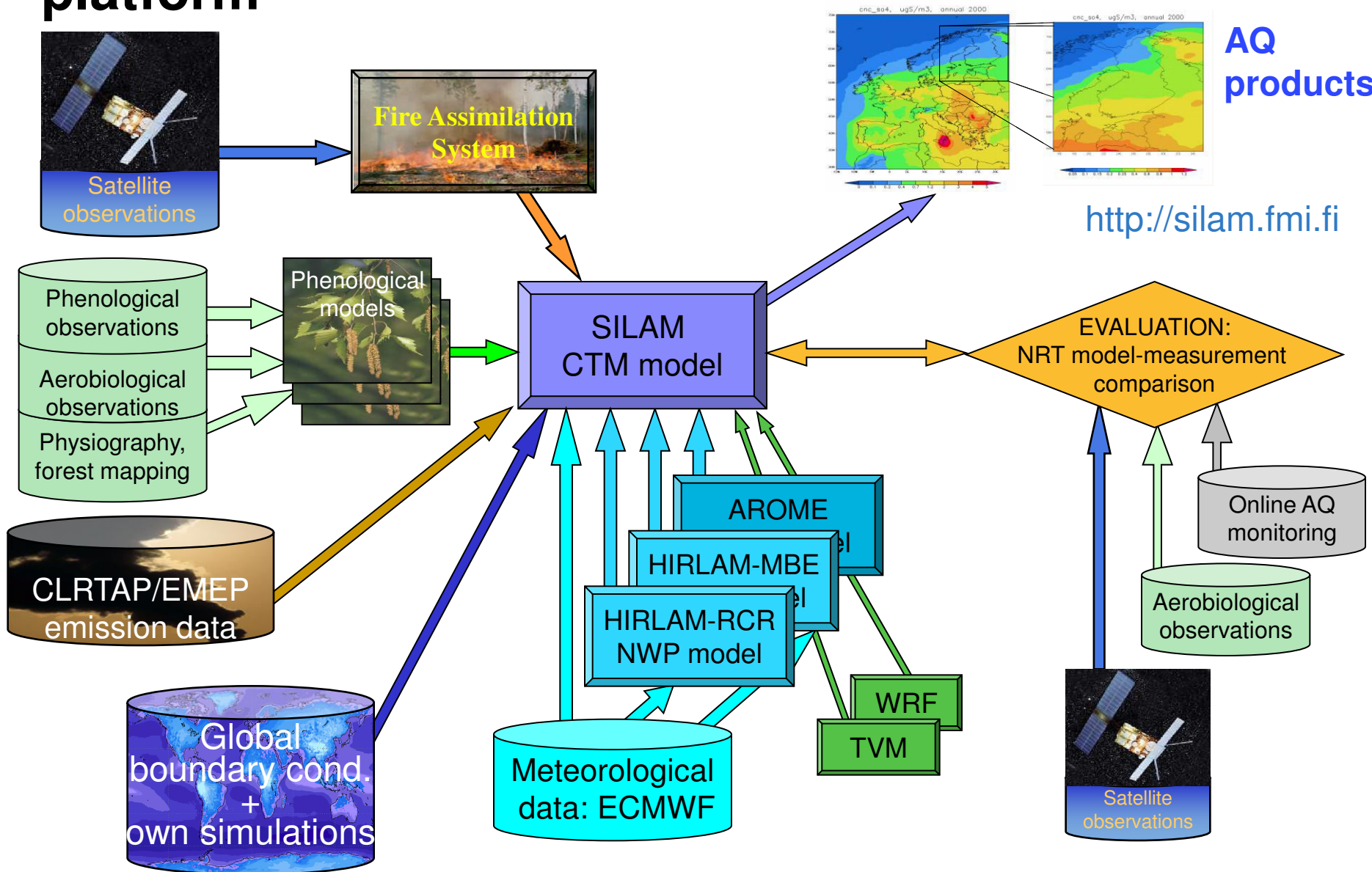
- Domains: from global to beta-meso scale (~1km resolution)

• Meteo input:

- ECMWF
- HIRLAM, AROME, HIRHAM, ECHAM, and any other who can write GRIB-1 or GRIB-2
- WRF



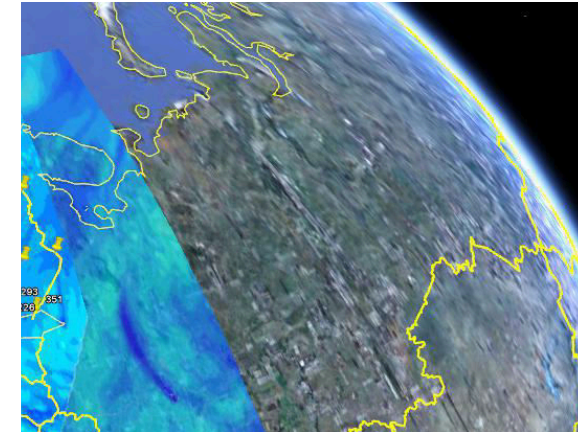
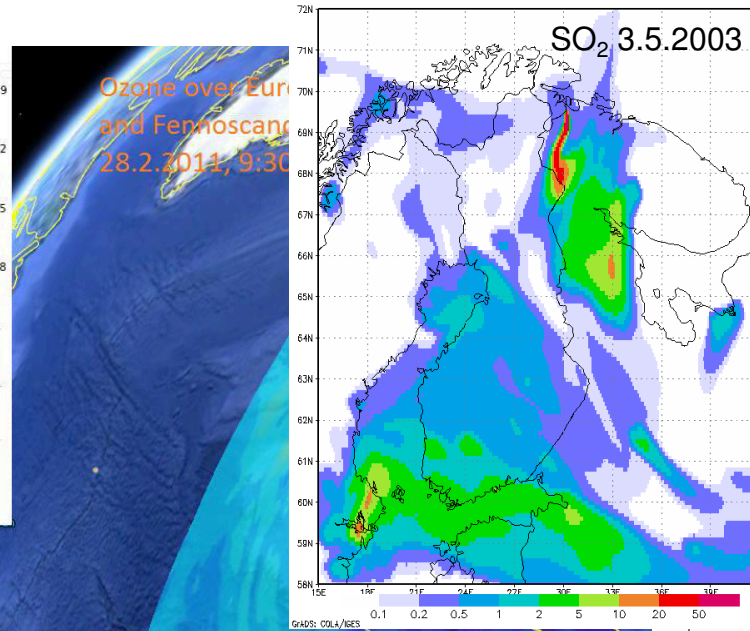
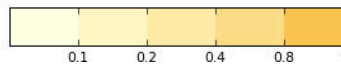
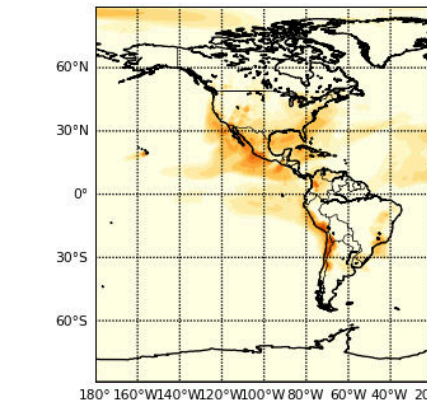
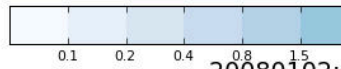
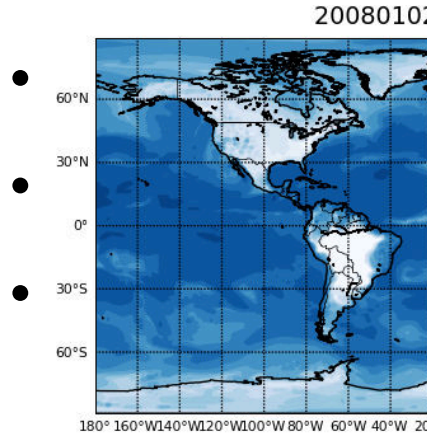
FMI regional AQ assessment and forecasting platform



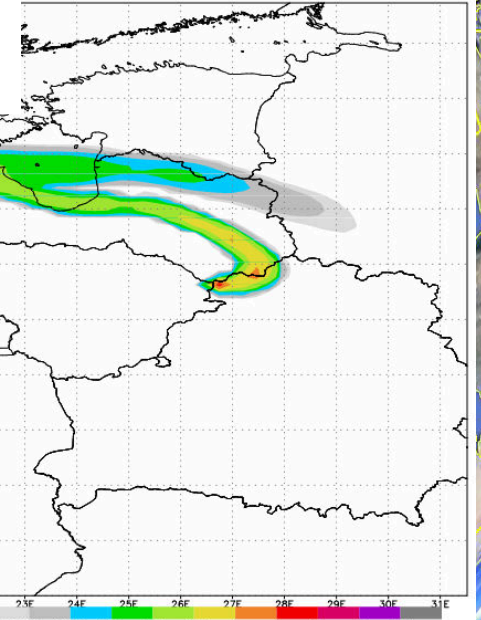
SILAM scales



- Global



I131 concentration





On-going research (alphabetic order)

- Aerosol dynamics
 - Parameterization of the dynamic processes
 - Model for semi-volatile organics
- Allergenic pollution ([basic](#); [adv](#))
 - Parameterization of the flowering seasons
 - Allergen behaviour in the atmosphere
- [Chemical mechanism development](#)
- Climate forcing and climate change impact
- [Data assimilation](#)
 - Error covariance matrix of the observations and the model
 - Adjoint to non-linear processes
- Emergency-type applications: [volcanoes](#), accidents
- General system developments: advection, diffusion, [deposition](#)...
- Meteorological processes
 - Turbulence parameterization
- Non-anthropogenic sources: biogenic emission, [wild-land fires](#), [sea salt](#), wind-blown dust ...
- Probabilistic forecasting: [modelling ensembles](#)
- Scale interactions
 - Spatial and temporal averaging of non-linear processes under the limited-information constraints
 - Direct and perturbational downscaling approaches
- Stratospheric processes
 - Turbulent exchange
 - Chemistry

SILAM network



- SILAM is a open-code system
 - Available from Web: ~40 downloads, over 15 countries
 - Known working installations: Estonia, Russia, Lithuania, Spain (2)
- SILAM system is a joint effort of
 - Finland: FMI, University of Helsinki, University of Turku, VTT Energy
 - Russia: Main Geophysical Observatory, Hydrometeorological University
 - Estonia: University of Tartu
 - Austria: Medical University of Vienna
 - Israel: Ben Gurion University
- SILAM algorithms in:
 - sea salt emission: EURAD (Germany), WRF-Chem (US)
 - pollen emission: GMES MACC-2 modelling ensemble (CHIMERE, EMEP, EURAD, LOTOS-EUROS, MATCH, MOCAGE)
- SILAM users
 - Finland: Helsinki Metropolitan Area Council, University of Turku (forecasts)
 - Estonia: University of Tartu (boundary conditions)
 - Lithuania: EPA (forecasts), Vilnius city (boundary conditions)
 - European Aeroallergen Network (forecasts)