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METEOROLOGISKA INSTITUTET  
FINNISH METEOROLOGICAL INSTITUTE

# Regional-scale PM modelling at FMI

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# Regional dispersion computations: list

- **KOPRA**
  - Europe-wide and Finnish regional nested studies of PM, its emission, dispersion, source-receptor relations and health impact
- **POLLEN**
  - Europe-wide study of emission and dispersion of natural allergenic pollen
- **GEMS**
  - global studies of aerosol *et al.* emission due to forest fires



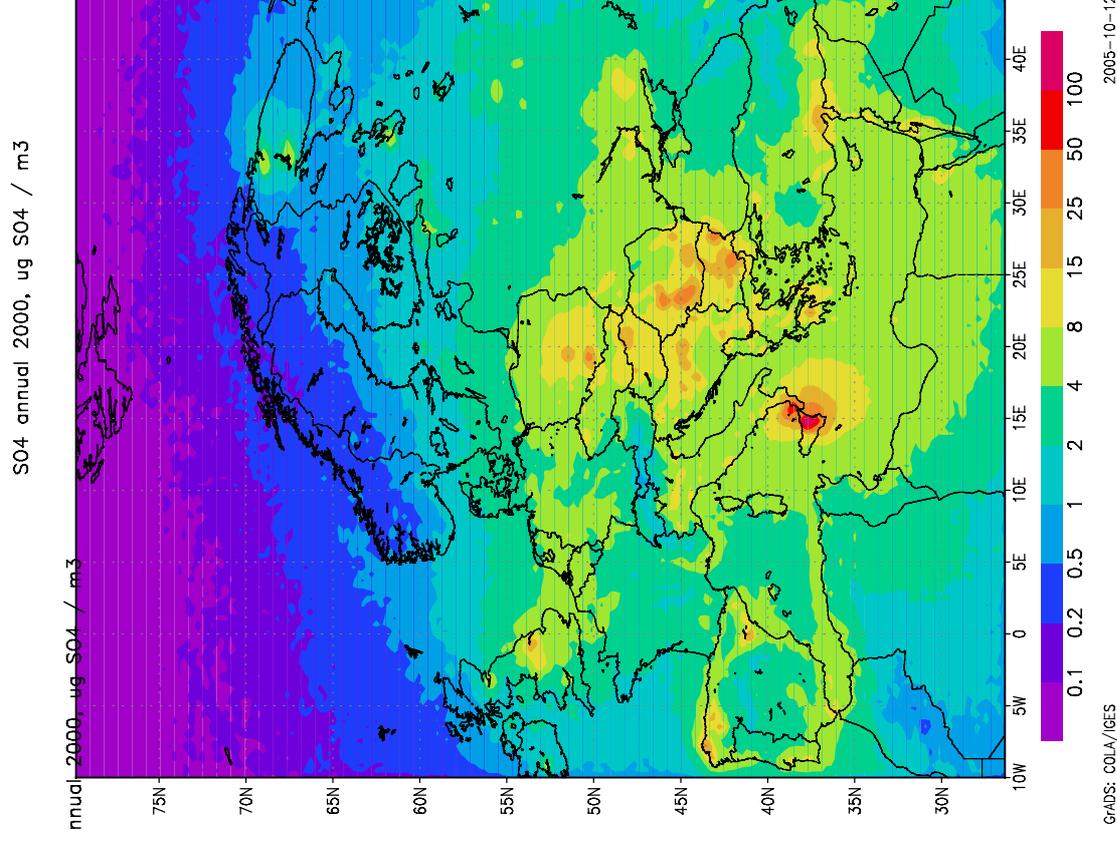
# KOPRA regional computations

	European scale	Regional scale
Species	PM 2.5; PM 2.5-10; SOx; desert dust; sea salt; NOx; secondary organics	PM 0.1; PM 0.1-1; PM 1-2.5; PM 2.5-10; PM >10; SOx; NOx; secondary organics
Resolution	30 km; 1 day / 1 hour (observ. campaigns)	5 km; 1 day / 1 hour (observ. campaigns)
Period, metadata	2000 (HIRLAM & ECMWF); 2001 (ECMWF), 2002 (ECMWF)	2000 (HIRLAM & ECMWF); 2001 (ECMWF), 2002 (ECMWF)
Emission	split: 46 regional sources (EMEP merged with Finnish national)	Split: 4 sectors & 150 point sources & unit-emission source-receptor matrices
Time variation and vertical	GENEMIS-95; EMEP SNAP-related vertical distribution	GENEMIS-95; area sources assumed under 100m, point sources determine the height explicitly



# Sulphate concentrations, 2000

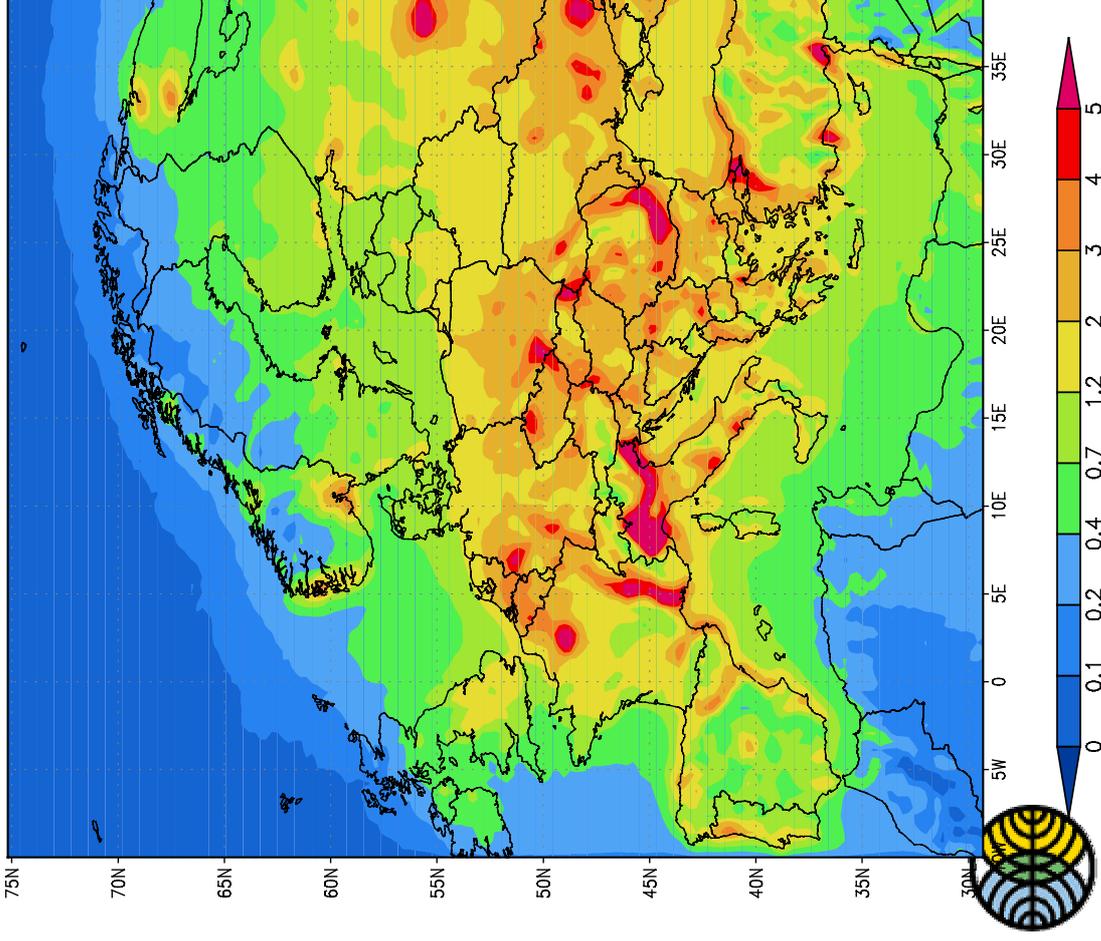
Emission: EMEP,  
meteorology: HIRLAM  
dispersion: SILAM with  
DMAT chemistry  
unit:  $\mu\text{g SO}_4 / \text{m}^3$



# European PPM concentrations, 2000

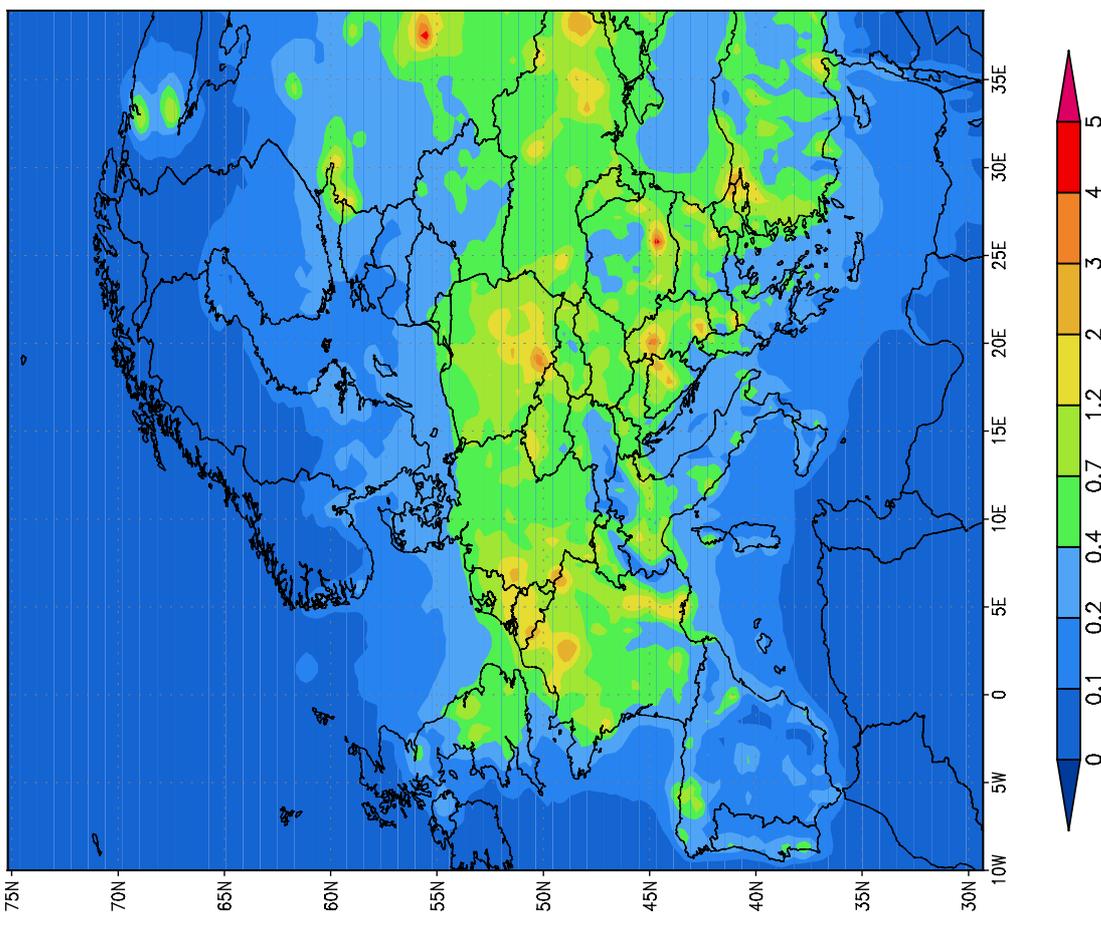
PM 2.5,  $\mu\text{g}/\text{m}^3$

conc\_PM2\_5, [ $\mu\text{g}/\text{m}^3$ ], annual 2000



PM 2.5-10

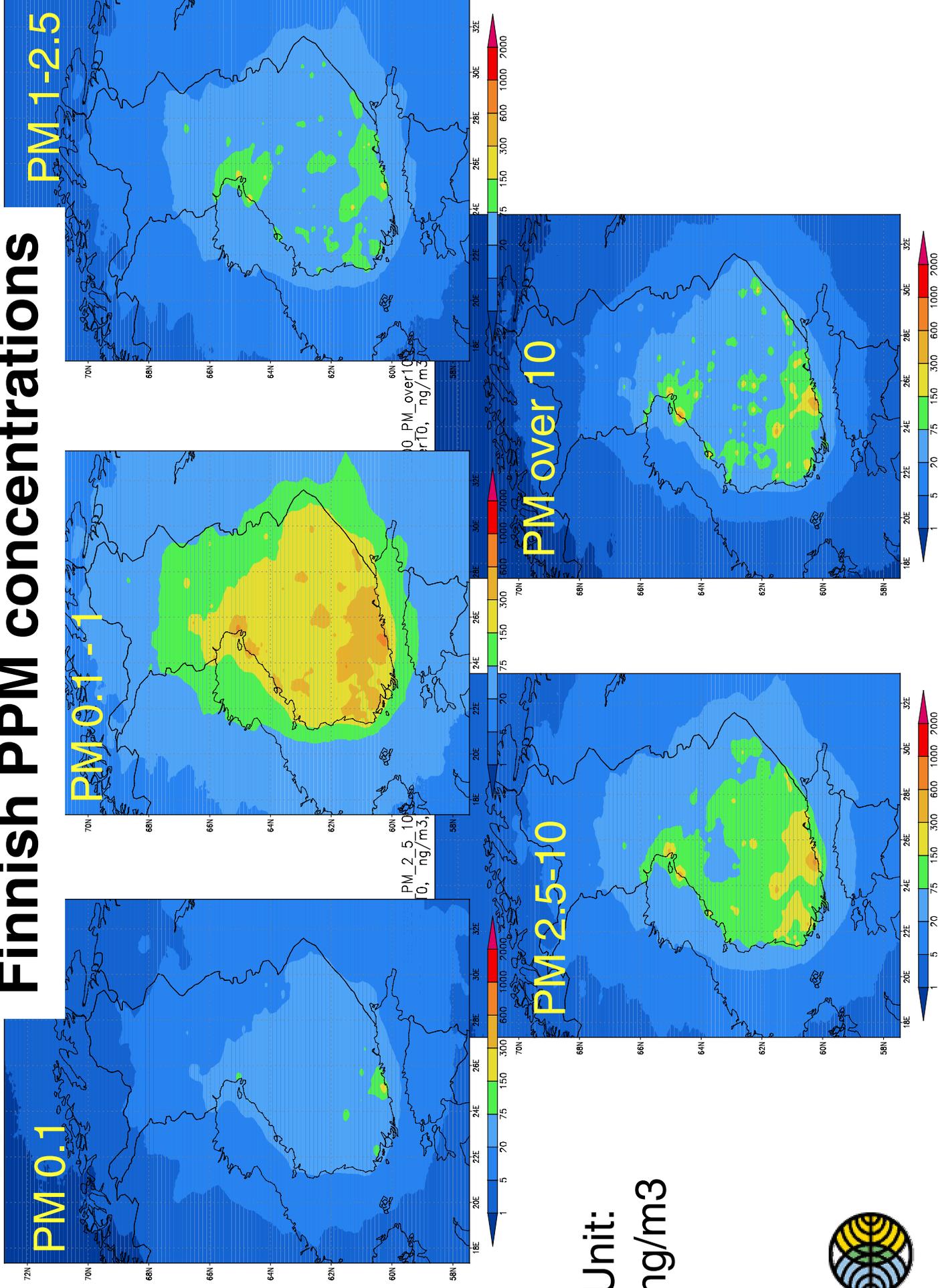
conc\_PM2\_5\_10, [ $\mu\text{g}/\text{m}^3$ ], annual 2000



Fin 2000 PM\_0.1\_all:  
conc\_PM0.1, \_ng/m3, \_ann

PM\_1\_2.5\_all\_srcs  
ng/m3, \_annual 2000

# Finnish PPM concentrations

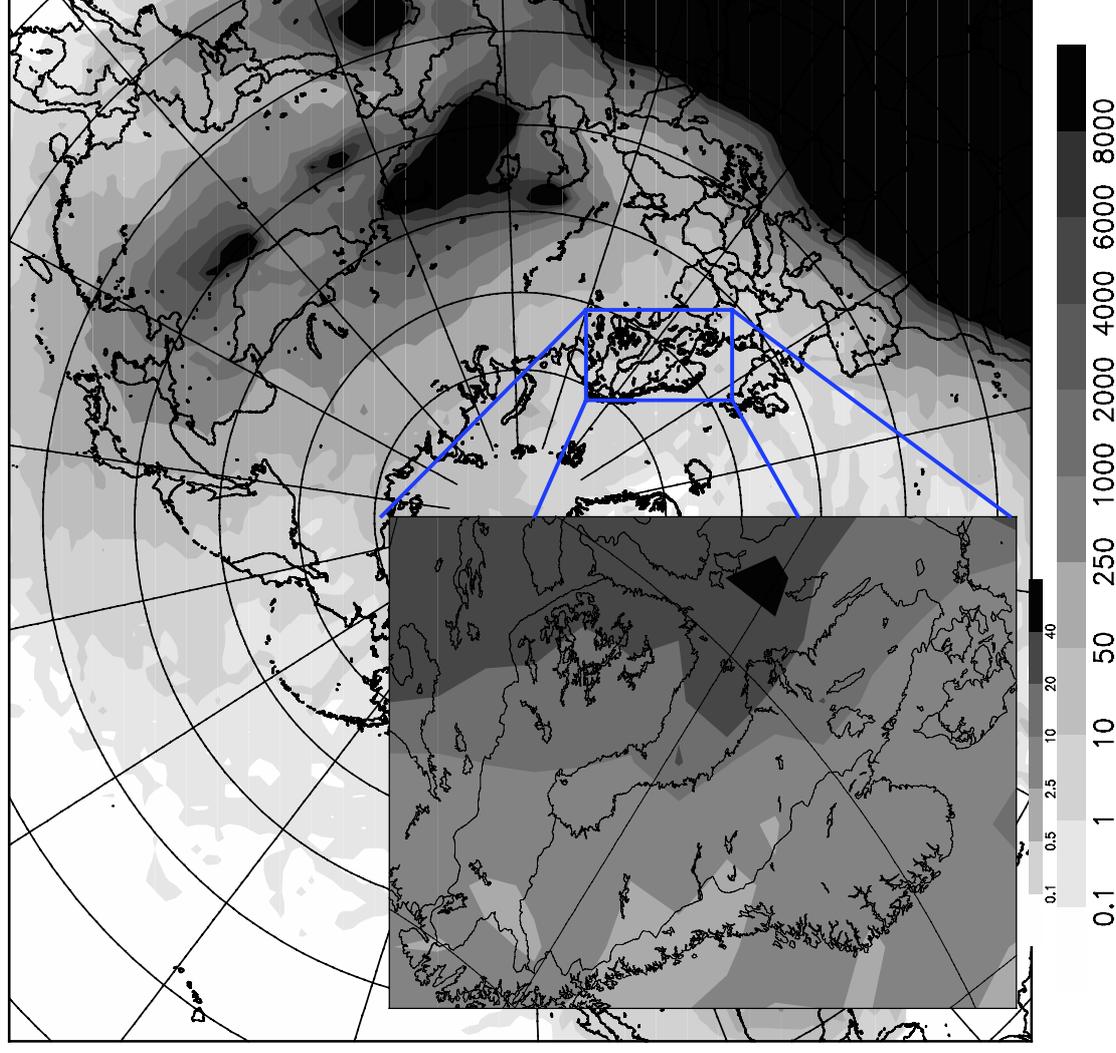


Unit:  
ng/m3



# Wind-blown dust computations

Mean dust column  
burden, mg/m<sup>2</sup>, mean  
1967-1988  
(*obs. different scale for  
enlarged area*)



# Verification and processing the results

- **Observational data: EMEP, Finnish national (long-term and campaigns)**
- **Completing computations**
  - Sea salt particles
  - Years 2001, 2002 (HIRLAM is not usable)
  - Evaluation of uncertainty due to omitted aerosol dynamics (MONO-32 integrated and/or stand-alone control runs)
- **Consider inter-comparison and, possibly, unification / nesting of urban model into the regional one**



## **POLLEN, GEMS: common features**

- **At current stage the main attention is paid to emission processes and near-source dispersion**
  - **Aerosol processes and “fine-tuning” of the PM physical models is minor as the corresponding uncertainties are much smaller than those of emission**
- **Fine-tuning of aerosol-related modules is expected later (both projects started in 2005)**
- **The models are deemed to be operational, so no major complexity is allowed**

