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NORPAC DATABASE - HELSINKI DATASETS - 2003/2004

Luukki (bg)
NO_x, O_3, PM_{10}

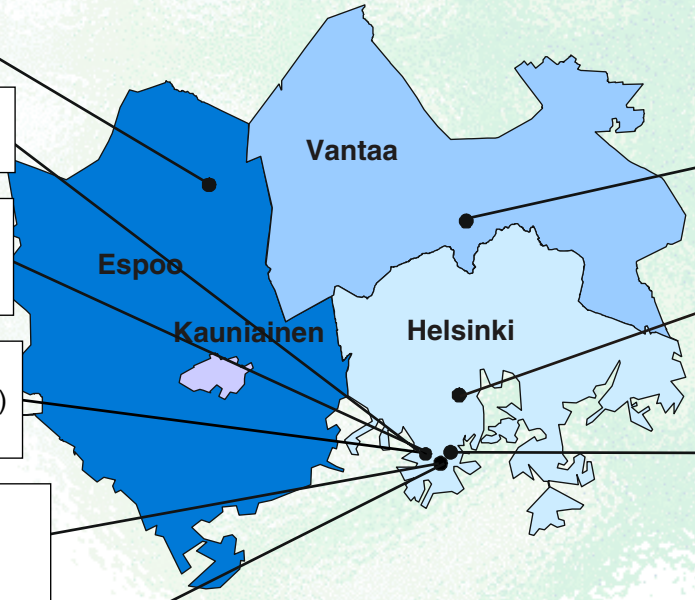
Runeberg Street (sc)
NO_x, PM_{10}, $PM_{2.5}$

Runeberg Street
Traffic volume and speed

Runeberg Street
(Sept. 2003– April 2004)
WS, WD

Kaisaniemi (urban bg)
(January – April 2004)
NO_x, PM_{10}, $PM_{2.5}$, O_3

Kaisaniemi
Meteorological data



Helsinki-Vantaa
Meteorological data

Vallila (open str.)
NO_x, PM_{10}, $PM_{2.5}$

Kallio 2 (urban bg)
NO_x, O_3, PM_{10}, $PM_{2.5}$

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+ information about traffic volumes, speeds, and fleet composition in Helsinki

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Meteorological data: P, T, WD, WS, RH, Prec, CL, GR

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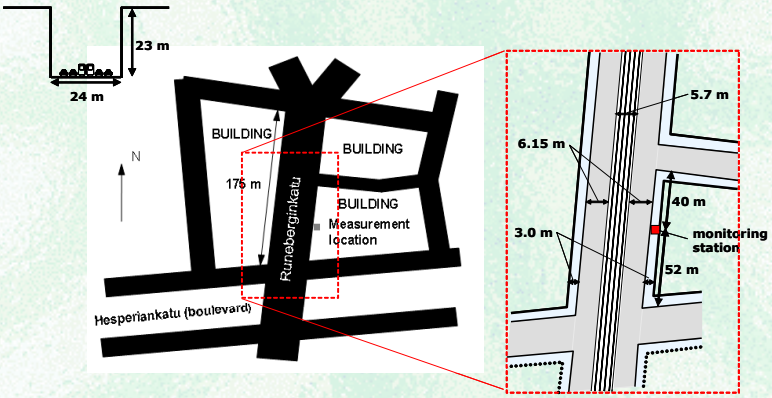
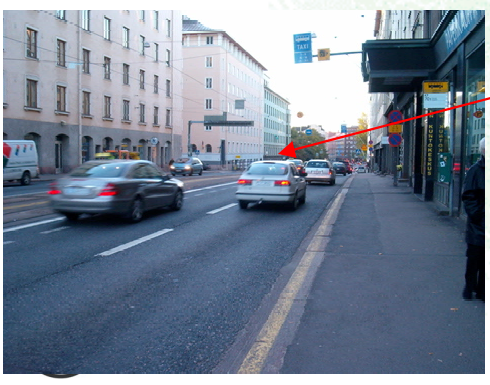
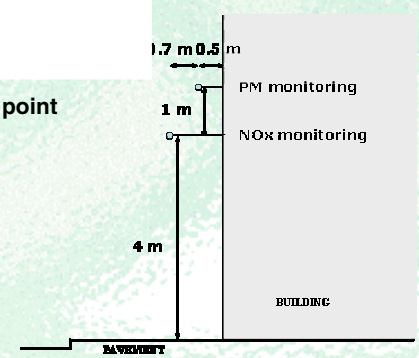
RUNEBERG STREET – STREET CANYON

Wind monitoring





AQ Monitoring point



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VALLILA – URBAN OPEN STREET

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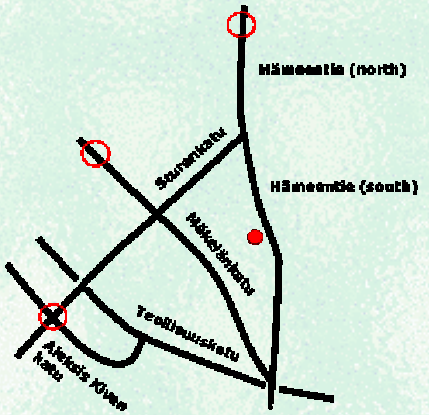

Manual traffic monitoring points

Vallila air quality monitoring station

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KAISANIEMI – URBAN BACKGROUND

NO_X AND O_3 inlet

PM_{10} AND $PM_{2.5}$ monitors

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KALLIO 2 – URBAN BACKGROUND

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LUUKKI – BACKGROUND

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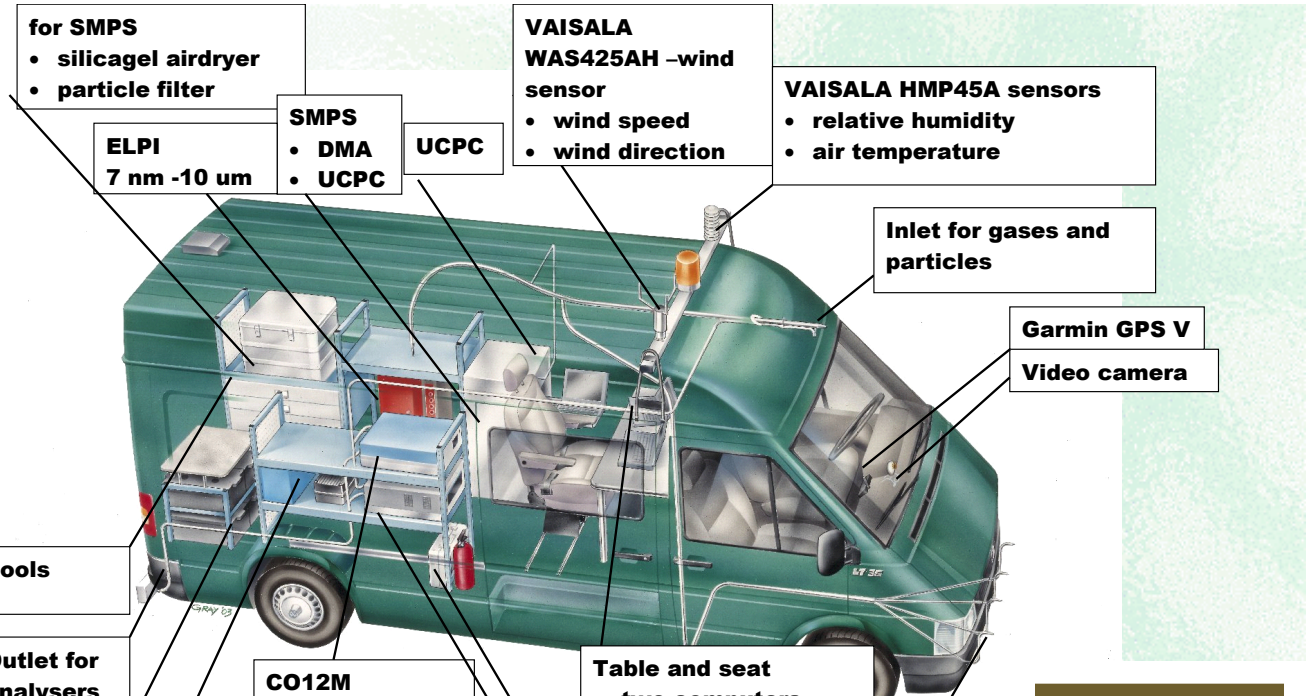

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HELSINKI POLYTECHNIC

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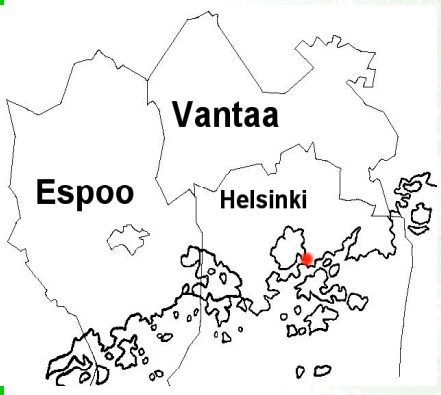
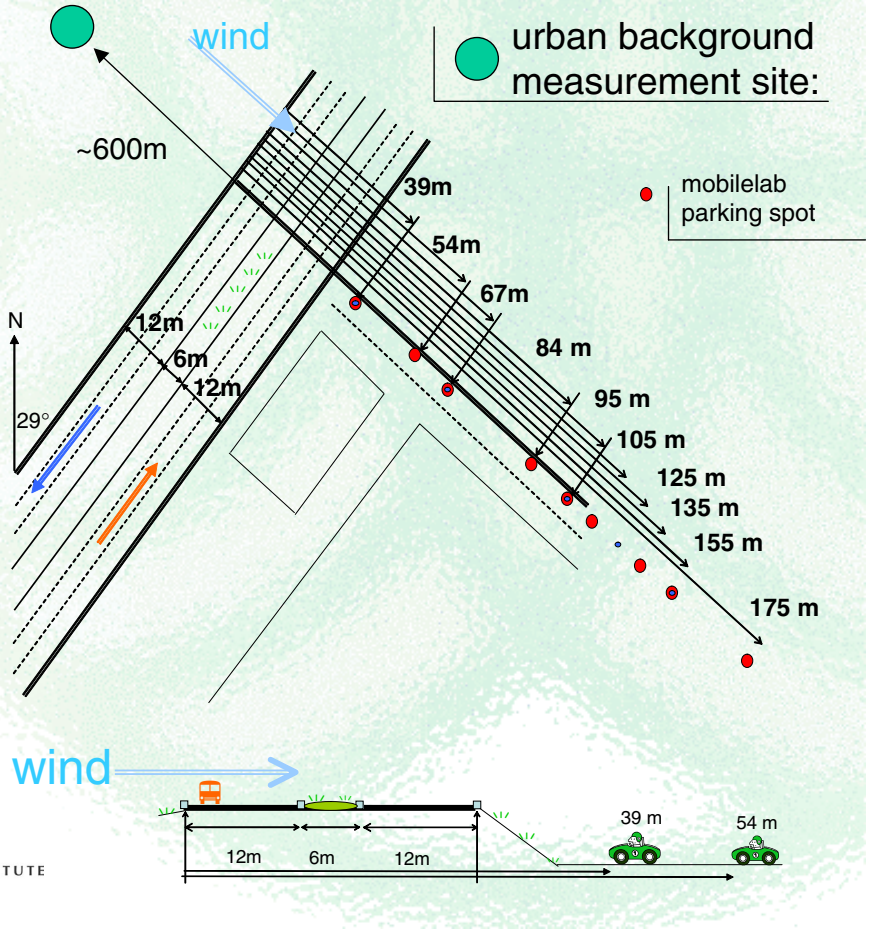
Itäväylä 1/2





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Itäväylä 2/2

- Particle size distribution measurement at a height of 2.4 m:
  - Electrical Low Pressure Impactor: 7 nm – 10 µm (12 channels) (aerodynamic diameter)
  - Scanning Mobility Particle Sizer: 3 – 50 nm (mobility diameter)
  - Condensation Particle Counter: total number concentration of particles larger than 3 nm
- Meteorological measurements at a height of 2.9 m:
  - Relative wind speed & direction
  - Temperature, relative humidity
- Global Positioning System:
  - Van speed, driving route

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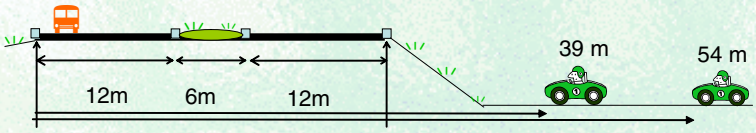
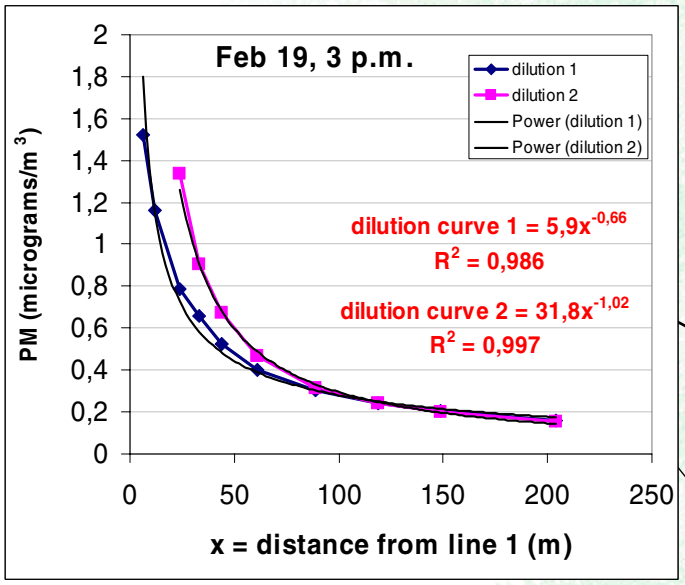
Description of dilution from CAR-FMI





to MONO32:

- Emission for 12m,
- then 6 m of dilution only (curve 1)
- then 12 m of emission,
- followed by dilution (curve 2).

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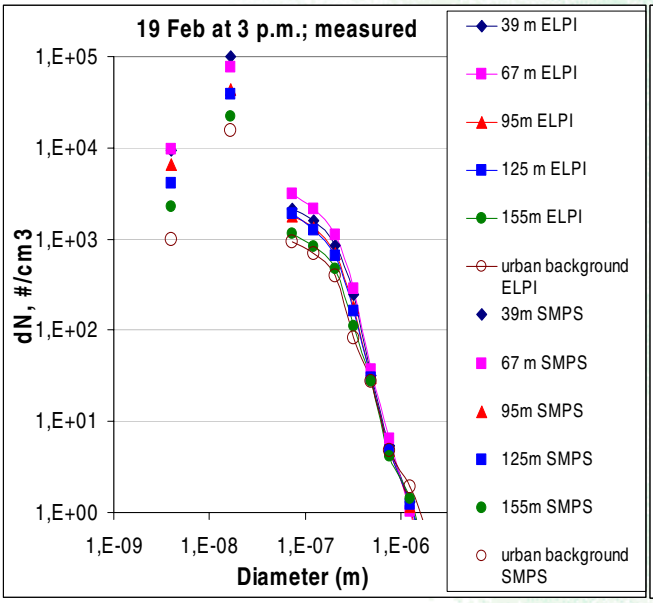
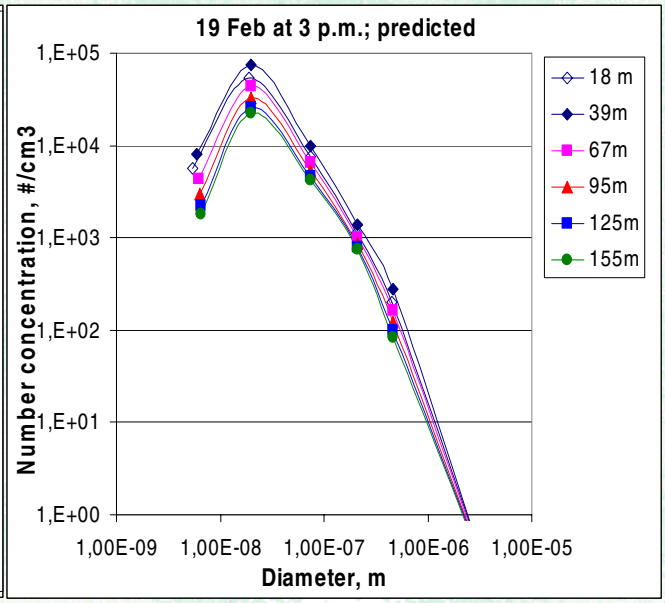
Results: predicted evolution of particle size distribution: 19 Feb at 3 p.m.





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concentration of condensable organic vapor: 10^{10} molecules/cm^3

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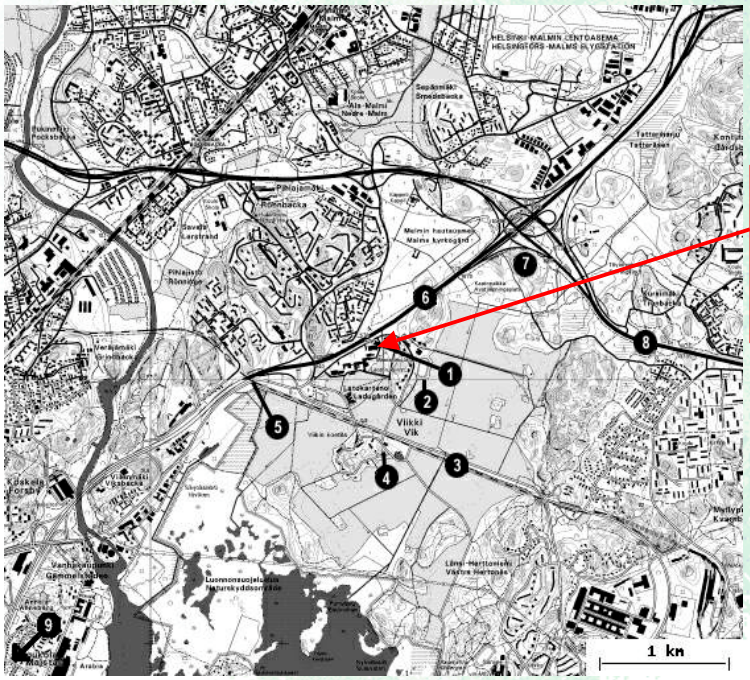
Monitoring sites



(1)
70 m from the motorway

(9) urban background station (Siltavuori)

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Materials

- Measurement campaign near a motorway during summer 15 May – 30 Jun 2000, in Helsinki
- 2 Mobility particle size monitors (DMPS) for:
  - Nucleation mode (Nu) 7-25 nm
  - Aitken mode (Ai) 25-90 nm
  - Accumulation mode (Ac) 90-600 nm

=> definitions(for this study) /cutoff at **90 nm**

- Ultrafine particles (UFP): the size range 7-90 nm
- Accumulation mode particles (ACP): 90-600 nm

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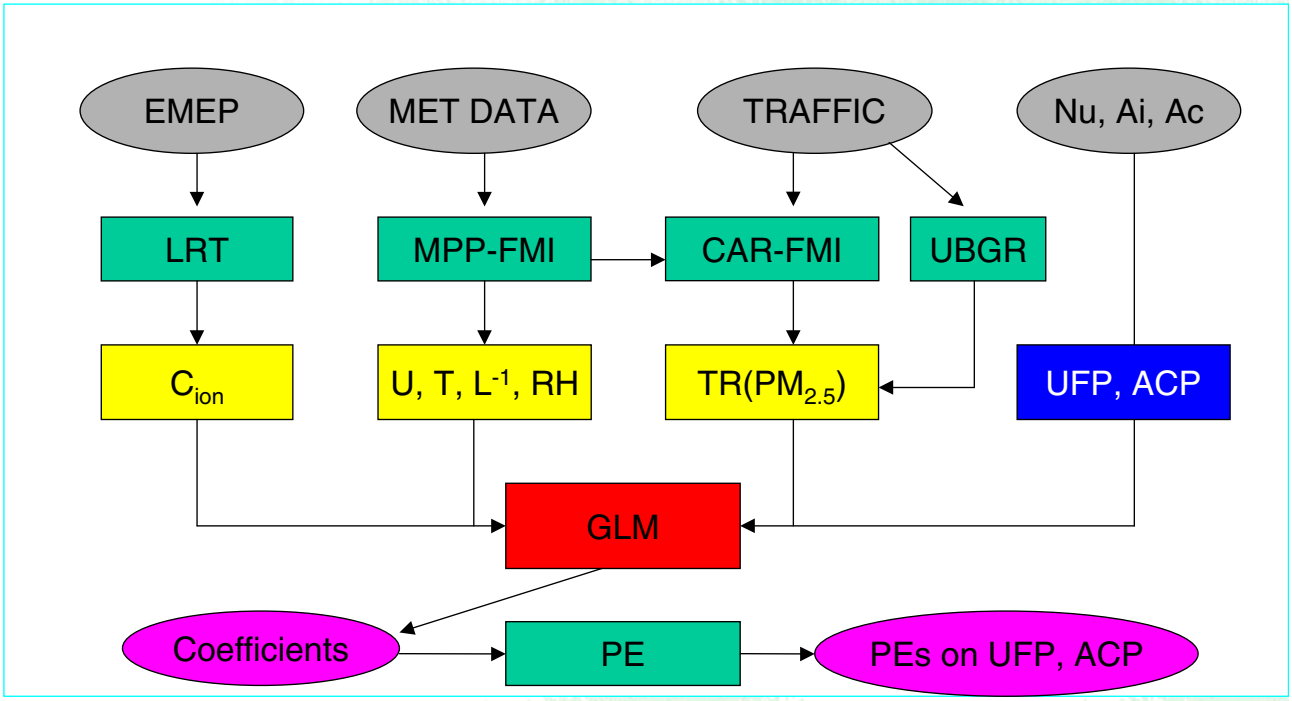
The structure of the study



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Statistical analyses

(with lower and upper 95 % confidence limits and p values)

	Log(ACP)				Log(UFP/ACP)			
N	291				291			
R^2	0.765				0.668			
	coeff	L 95%	U 95%	p	coeff	L 95%	U 95%	p
Const	6.215	5.978	6.451	0.000	3.511	3.208	3.813	0.000
C_{ion}	0.175	0.149	0.200	0.000	-0.319	-0.345	-0.278	0.000
TR	0.104	0.084	0.125	0.000	0.039	0.012	0.065	0.004
U	-0.116	-0.140	-0.092	0.000	0.047	0.017	0.078	0.002
RH	0.009	0.007	0.011	0.000	-0.006	-0.009	-0.003	0.000
1/L					2.099	1.246	2.953	0.000

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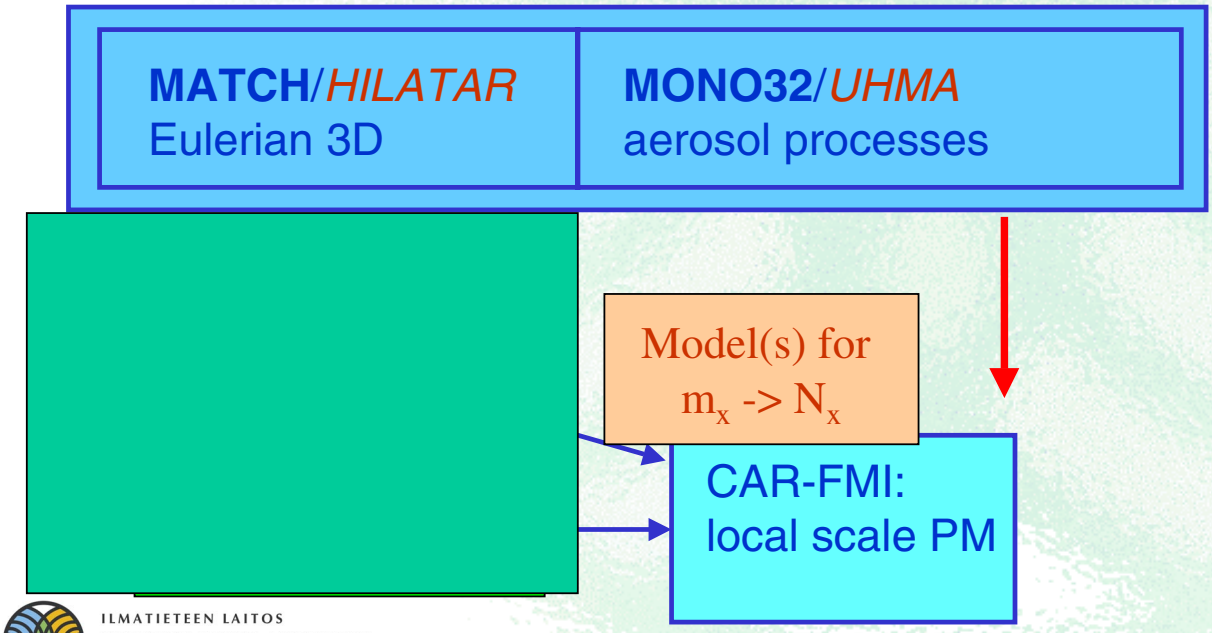
Modelling of primary and secondary PM, and combining the models



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Regional dispersion computations

- Primary particles
  - Finnish regional runs
    - SYKE emission data
    - resolved PM 0.1, PM 0.1-1, PM 1-2.5, PM 2.5-10, and PM over10
    - 6 emission source categories (domestic combustion, transport, agriculture, other, large point combustion, other large point sources)
    - 2 emission altitudes: area sources are low-level, while point sources are taken with actual stack height
    - hourly emission time resolution (modified GENEMIS -1995)
    - output: 5 km spatial resolution, 1 day output time step

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ToDo (=>2005)

- Model evaluation
- Completing computations
  - European and Finnish-regional secondary 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)
- ”MATCH-MONO32” – evaluation runs
- Consider inter-comparison and, possibly, unification / nesting of urban model into the regional one
- Joint publications

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