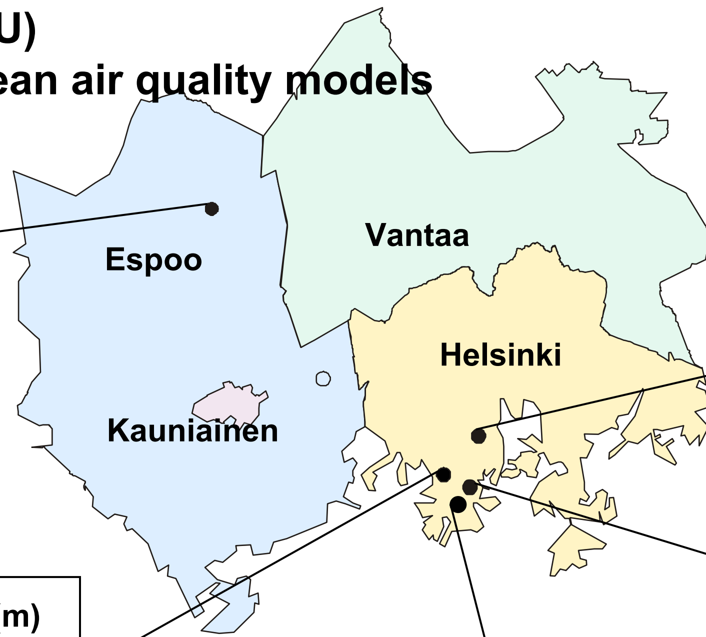
NORDIC Database, Available Validation Data on PM10/PM2.5

- Validation exercise within an EU OSCAR project:
  - CAR-FMI
  - OSPM (DMU)
  - EPISODE (NILU)
  - 6 other European air quality models

YTV and FMI air quality monitoring in 2003/2004



Luukki
- rural bg
- NOx, **PM10** (-2003), **PM2.5** (2004-) O3, SO2, deposition

Vallila
- open road, traffic
- NOx, **PM2.5** (-2003), **PM10**, TSP, CO, SO2

Kallio2
- urban bg
- NOx, **PM10, PM2.5**, O3

Runeberginkatu (m)
- street canyon, traffic
- NOx, **PM10, PM2.5**
- wind (at roof top)

Kaisaniemi (campaign)
- urban bg, roof top
- NOx, **PM10, PM2.5**, O3

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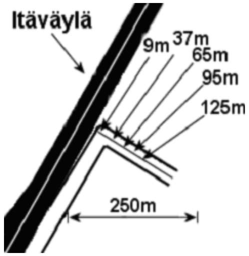
Ultrafine Particles: Emission Factors / Aerosol Dynamics Modelling (Pohjola et al.)

Title of the study: Influence of aerosol processes in vehicular exhaust plumes

- **Objectives:**
  - **Importance of various aerosol processes within the distance scale of 200 m from a road**
  - **Evaluation of model predictions with measurements**
- **Methods:**
  - **MONO32 aerosol process model**
  - **CAR-FMI roadside dispersion model → dispersion factors**
  - **Mobile laboratory van measurements: aerosol number concentrations at various distances from a major road for model evaluations**
  - **Literature: number concentration and chemical composition of emissions**



STADIA
HELSINKI POLYTECHNIC

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Continues…

- Results:
  - In a street scale, atmospheric dispersion is the most important factor regarding both number and mass particulate matter concentrations (e.g. Pohjola et al., 2003)

  - The predicted concentrations showed the same dependencies as the measured data (in terms of the distance and the relative concentration values); however, the measured total number concentrations were substantially overpredicted in most cases; (e.g. Pohjola et al., 2004)

- Work to do:

  - Particulate matter emissions – no up-to-date emission data of simultaneously measured number concentration and chemical composition → mobile laboratory measurements ($\#/cm^3$)

  - A more detailed study on the dispersion of pollution originated from the two lanes to both directions

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Local/Urban Scale PM Modelling

No satisfactory emission factors for non-exhaust PM emissions available yet but statistical models for regulatory use are developed:

- **$PM_{10} = a*NO_x^{tr,e} + b$ (Kukkonen et al. 2001)**

  $a = 0.11$ (3 stations, 3 years in Helsinki)
  $b = 12\ \mu g/m^3$ (3 stations, 3 years in Helsinki)

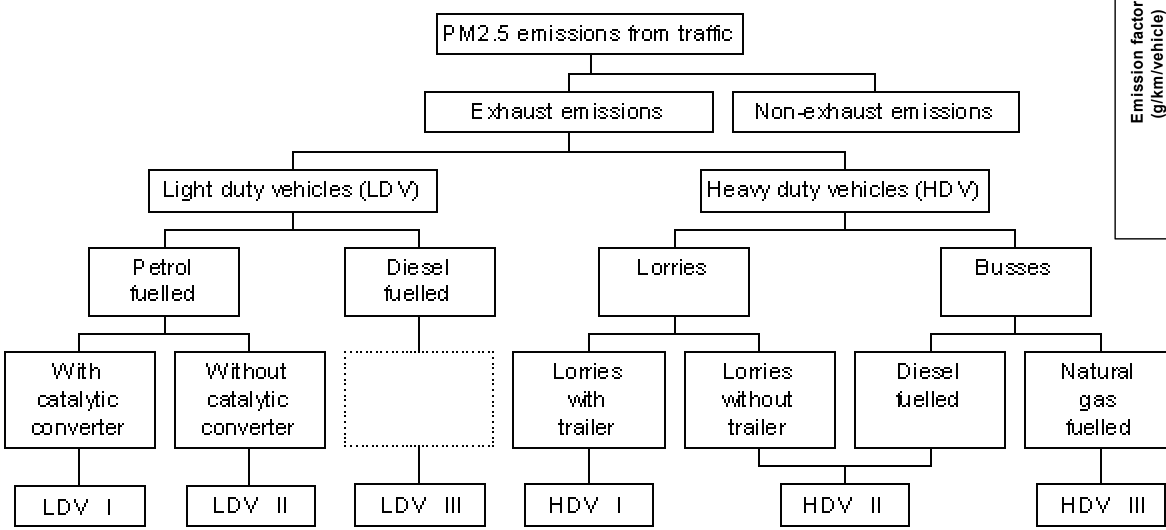
- **$PM_{2.5} = (1 + c + cs_t)\ PM_{2.5}^{tr,e} + dC_{ion}$ (Tiitta et al., 2002, Karppinen et al. 2004)**

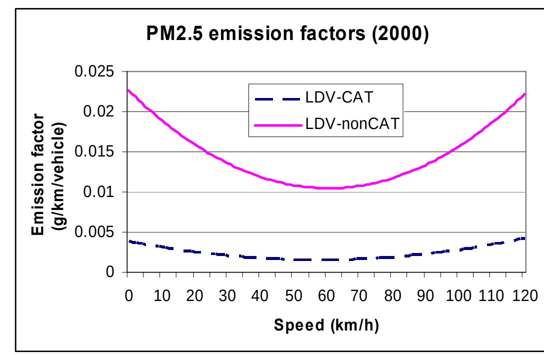
  $c = 1.81 \pm 0.43$
  $d = 1.56 \pm 0.27$
  $cs_t = 0.17 – 0.48$
  $PM_{2.5}^{tr,e} = PM_{2.5}$ concentration originated from local exhaust emissions

Discussion: In the model, the share of non-exhaust emission (factor c) compared to exhaust emissions is relatively high. However, this is a statistical model for regulatory use, which does not explain the actual emissions.

$PM_{2.5}$ Emission Factors for Exhaust Emissions

- Vehicle emission model for NOx, CO, and PM2.5 (only exhaust!)
- Based on nationally conducted laboratory measurements (Laurikko, 1998)
- Latest update 2003
- Polynomial or exponential fittings of the average vehicle travel velocity





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