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Air Quality Modelling System

A method for selecting monitoring stations for model validation in Flanders

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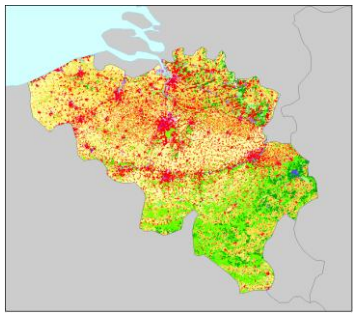
Classification monitoring station

- Method of Spangl et al., based on:
  1. emissions (per **pollutant**) of important sources:

→ We have considered pollutants NO_x and PM_{10}

  2. land usage (dispersion)



Corine Land Cover

30 CLC classes → 3 classes
(open, closed, half-open)

Requirements for the emission data?

» Road traffic:

Table 14: Approximations for road traffic emissions.

Level	Approximation of emissions
0	Total vehicle number, uniform emission factor
1	Vehicle numbers for passenger cars and HDVs, emission factors for each of them
2	Vehicle number for passenger cars and HDVs, specific emission factors for different traffic situations (motorway, stop&go, ….)
3	Complete high resolution emission inventory

» VMM has a detailed traffic model called MIMOSA (Copert IV methodology)

→ Level 2

Requirements for the emission data?

» Domestic heating:

Table 17: Approximations for domestic heating emissions.

Level	Approximation of emissions
0	Population within administrative units
1	Population within 1 km derived from GIS data
2	Population within 1 km and 10 km derived from GIS data, emission factors for specific heating structure and fuel use
3	Complete high resolution emission inventory

» VMM has info from a 2003 socio-economic survey (totals per municipality)

» Scaled by detailed population data GIS layer

→ Level 2

Requirements for the emission data?

- Industrial emissions:

3.2.5 Industrial emissions

The contribution of industrial (commercial) emissions can be assessed either by modelling or by expert judgement. There seems to be no appropriate way to assess the industrial contribution by surrogate information, since industrial sources cover a wide range of different configurations, in terms of e.g. spatial distribution and the number of sources (single stack vs. fugitive emissions) of a certain plant as well as the height of emissions; further external parameters include dispersion and wind conditions.

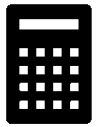
- VMM's emission inventory for NO_x is very detailed → modelling
- VMM's emission inventory for PM10 is not detailed enough → expert judgement

Classification monitoring stations

» Histograms are divided into classes (low, medium or high) expressing the emission source influence

emission sources

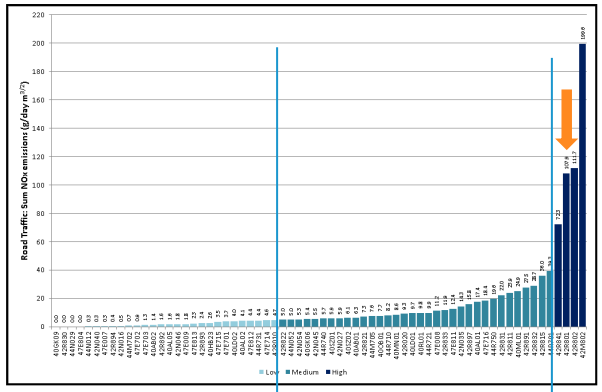
(pollutant specific)



parameter

(i.e. RT)

i.e. TEP NO_x



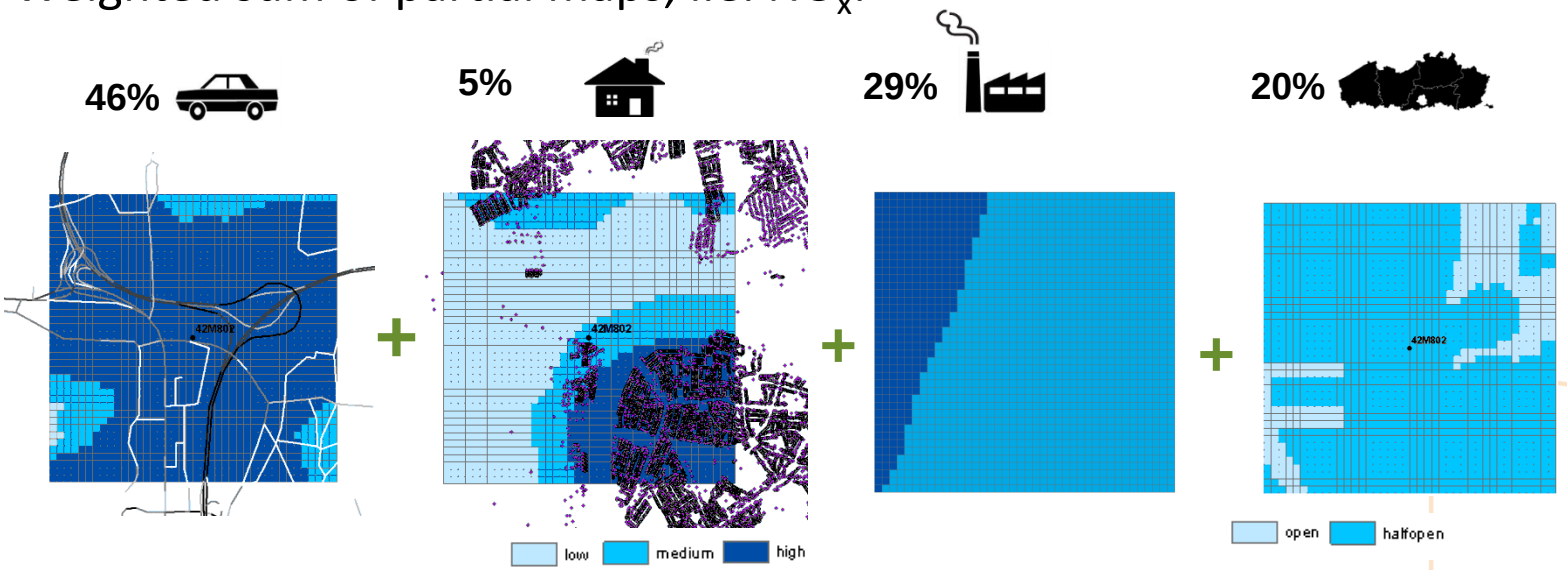
histogram of parameter
(all monitoring stations)

monitoring station (RT)

103,5 g/day·$m^{3/2}$ → high

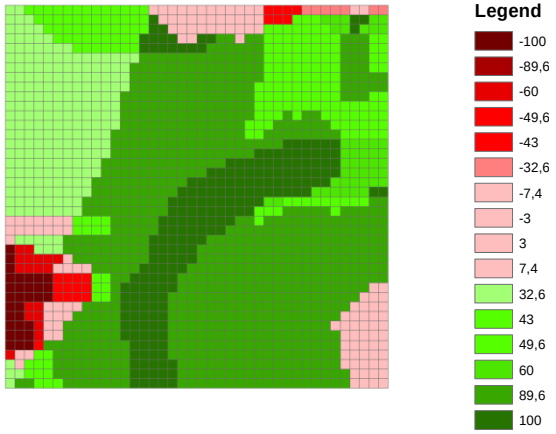
Spatial representativity maps

» Weighted sum of partial maps, i.e. NO_x:



Monitoring station class.:

- RT: high
- DH: medium
- IE: medium
- CLC: halfopen



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Conclusions

- Spangl's classification method is dependent on emission data.
- The emission data detail (level) influences distributions (histograms) and class boundaries.
- VMM's experience:
  - *Road traffic:* Level 2 data available (both NO_x and PM_{10})
  - *Domestic heating:* Level 2 data available (both NO_x and PM_{10})
  - *Industrial emissions:* detailed inventory for No_x (modeling), but not for PM_{10} (expert judgement)
- Final result is spatial representativity (similarity) maps, useful for i.e. monitoring stations selection for validation & data assimilation.

Thank you for your attention!

- *More information:*
  - Life+ ATMOSYS: http://www.atmosys.eu
  - E-mail: d.roet@vmm.be

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