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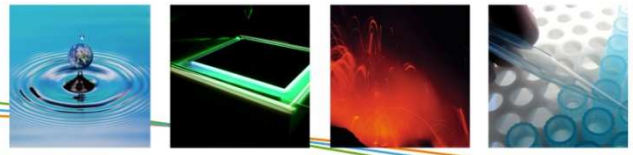
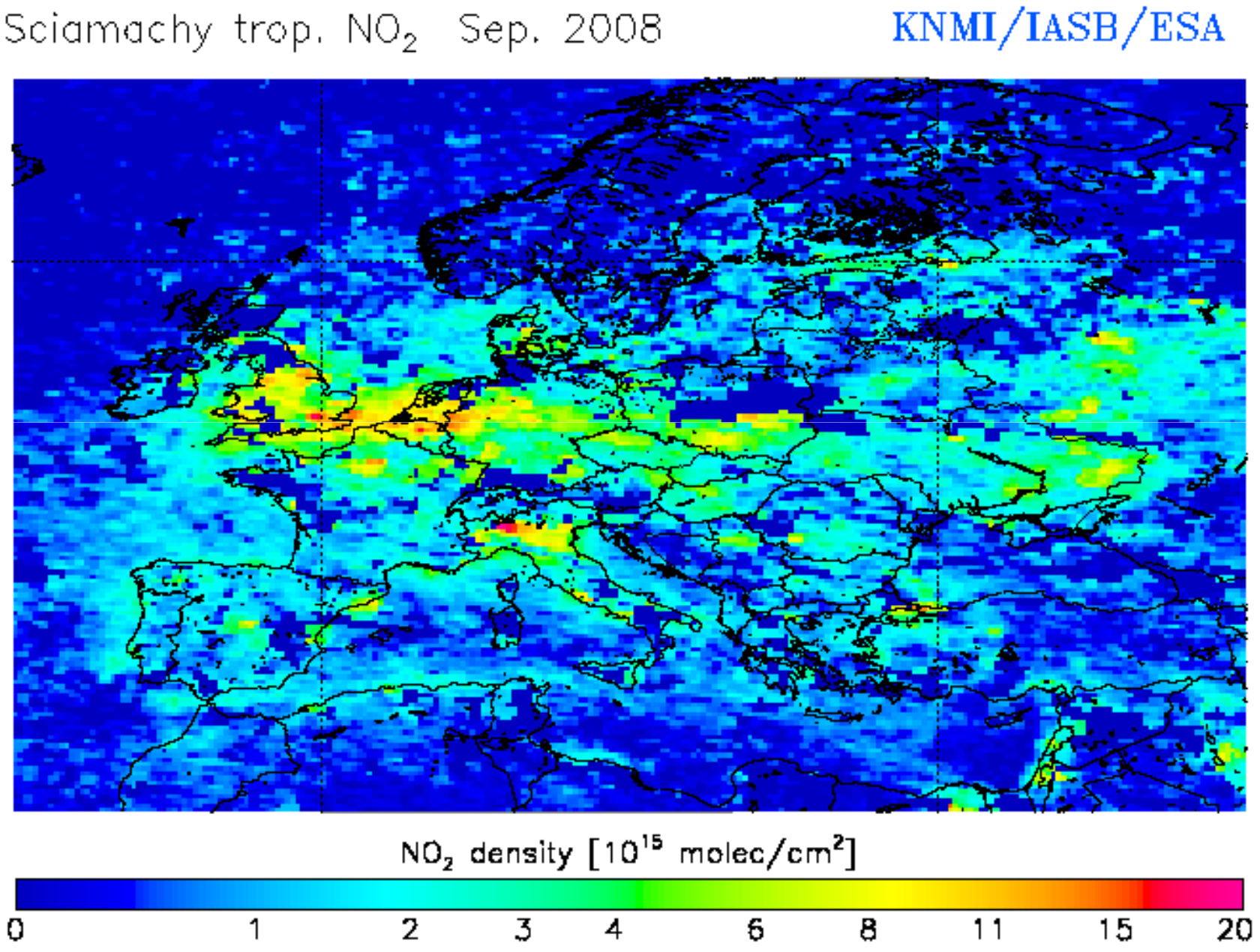


23/07/2010

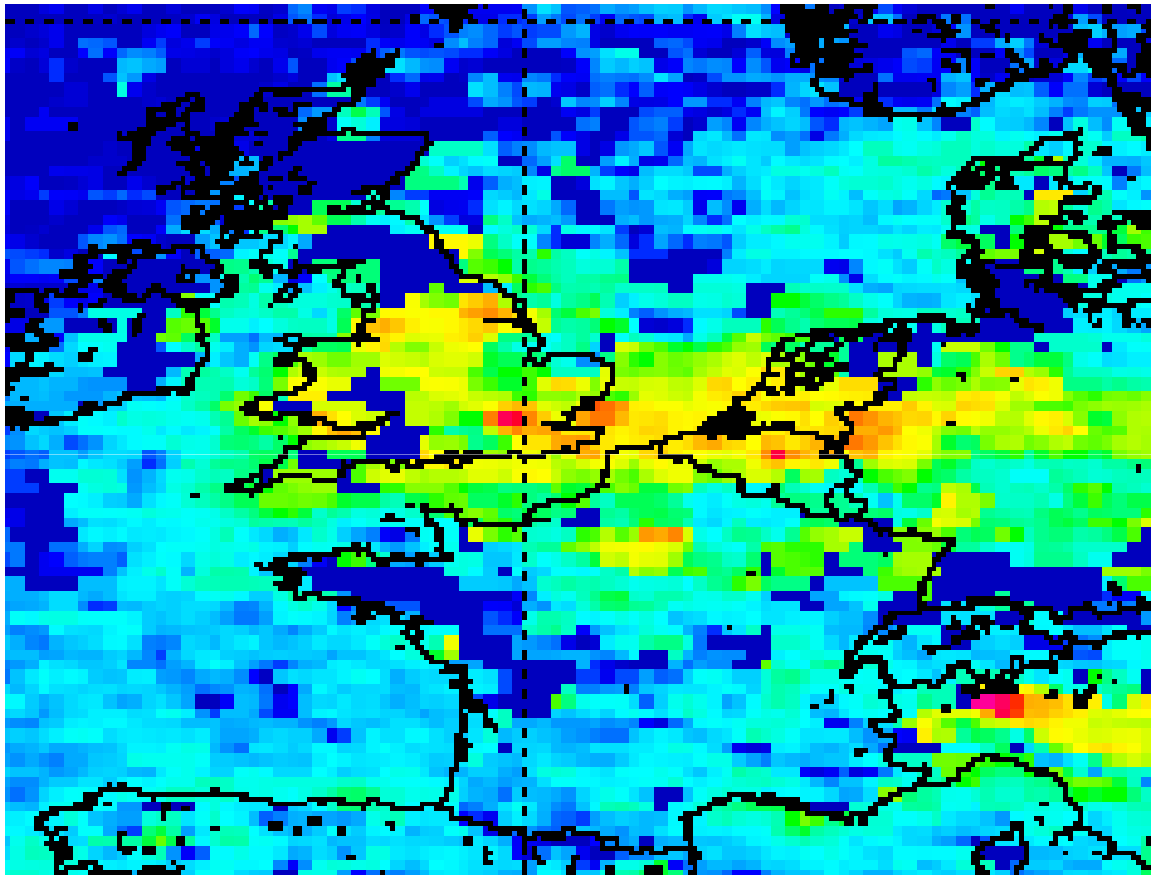
Making high resolution air quality maps for Flanders, Belgium

W. Lefebvre, S. Janssen, J. Vankerkom, F. Deutsch,
N. Veldeman, F. Fierens, W. Peelaerts, S. Van Looy,
N. Claeys, T. Van Mierlo, F. Lefebre

Presentation of the study area

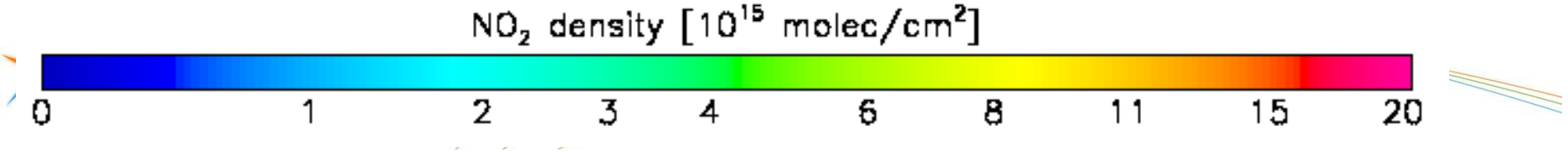


Flanders : northern part of Belgium

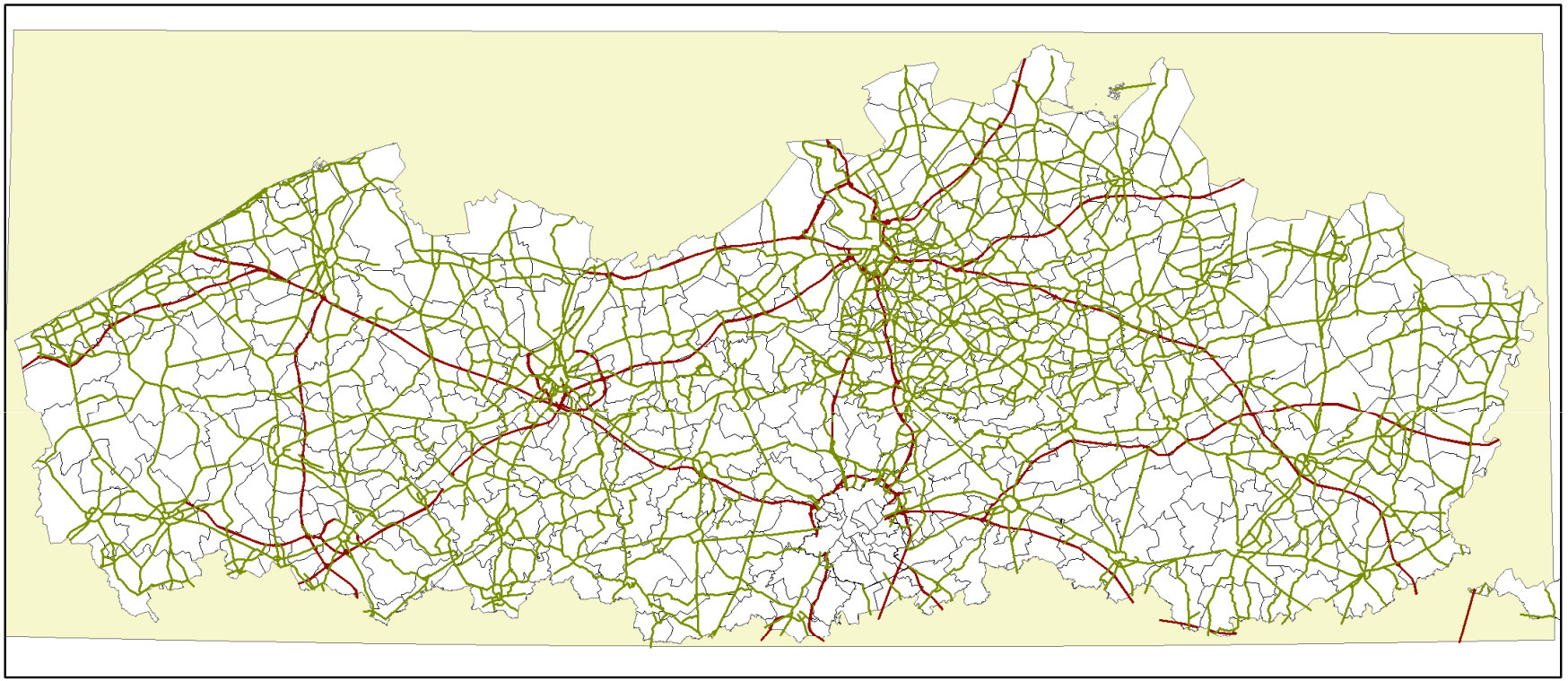


Densely populated area

- 6.000.000 people
- density of 454 persons/km²).



Flanders



Wegen

Gewestwegen

Snelwegen

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Goal

- Create concentration maps for several pollutants, based on available information:
  - Emissions:
    - Emission inventory of the Flemish Government
    - MIMOSA traffic emission model
  - Eulerian dispersion models
    - BelEUROS for large-scale background concentrations
    - AURORA for local concentrations
    - IFDM: bi-gaussian model
  - Measurements: RIO-corine interpolation tool
- Meteorology, emissions and measurements for the year 2007.

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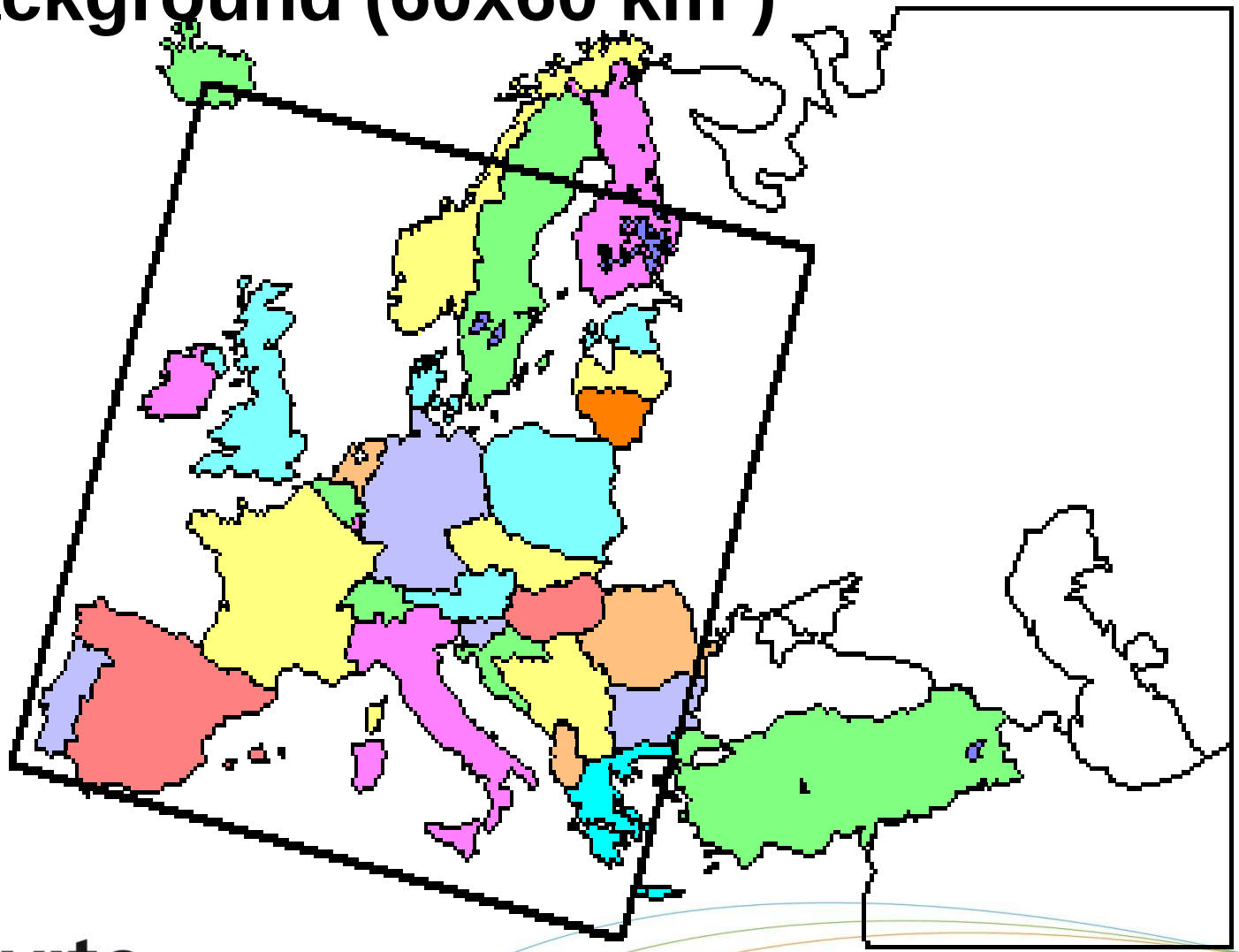
Methodology: BelEUROS: background (60x60 km²)



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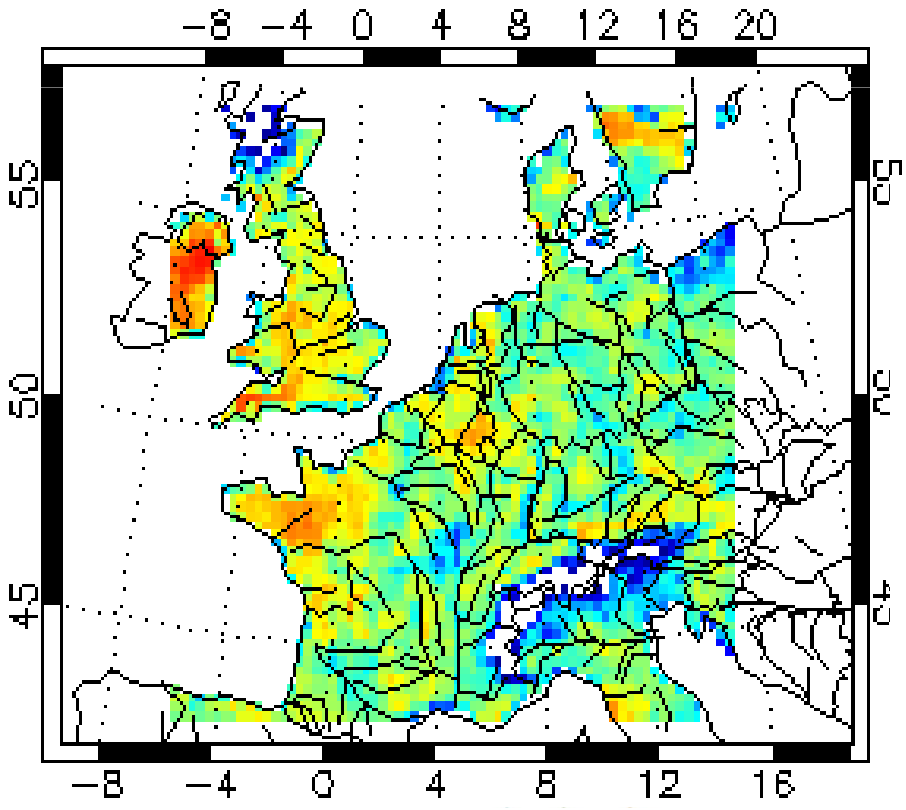
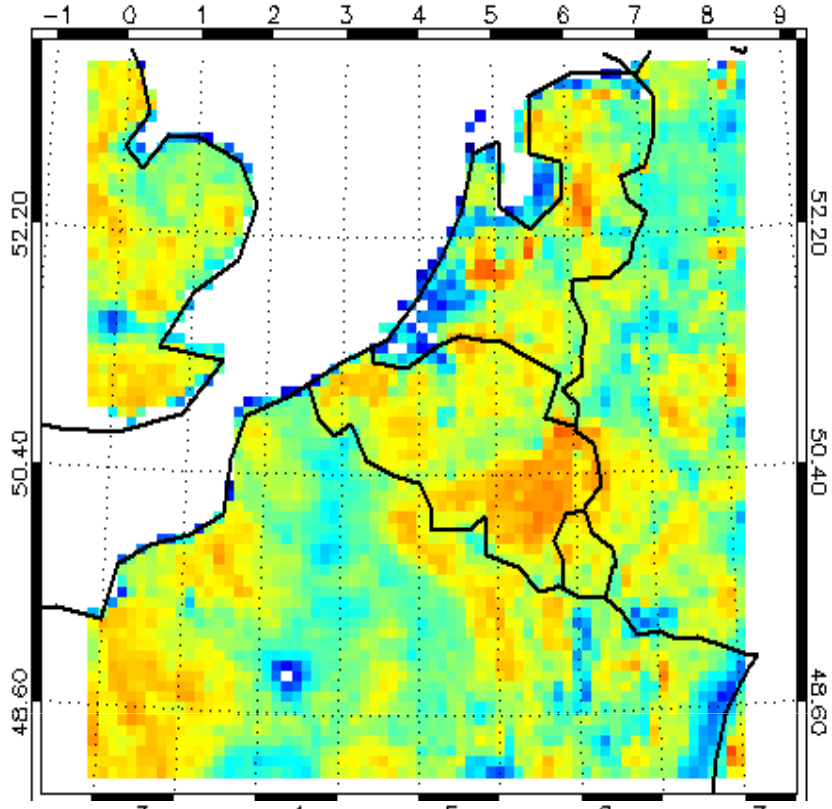
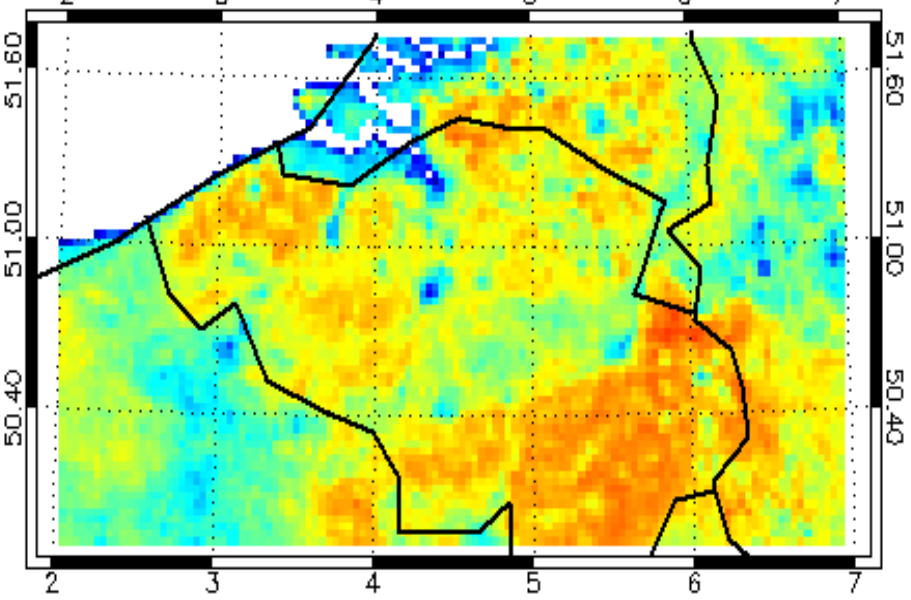
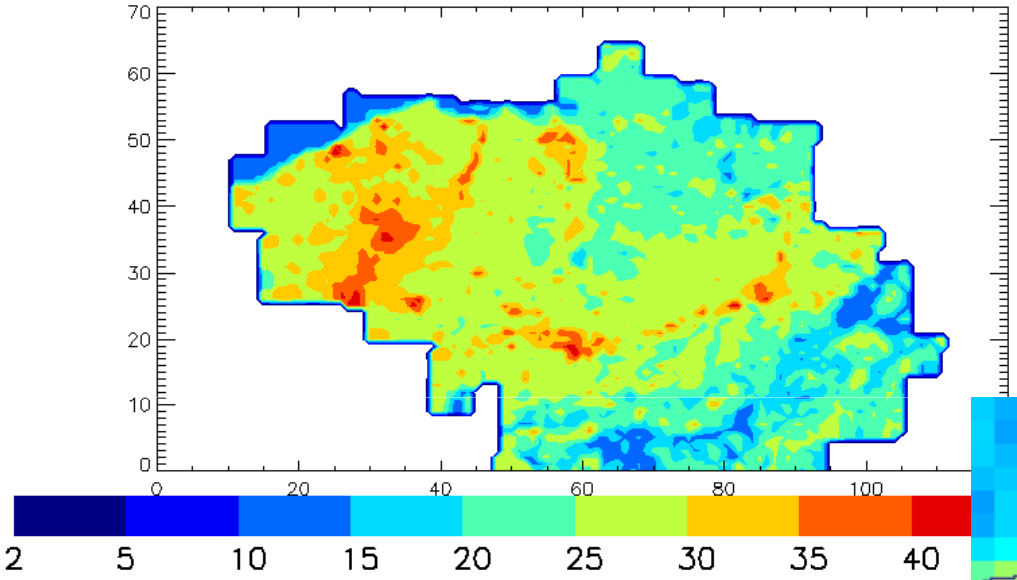
Methodology:
AURORA:
25x25 km²;
9x9 km²;
3x3 km²

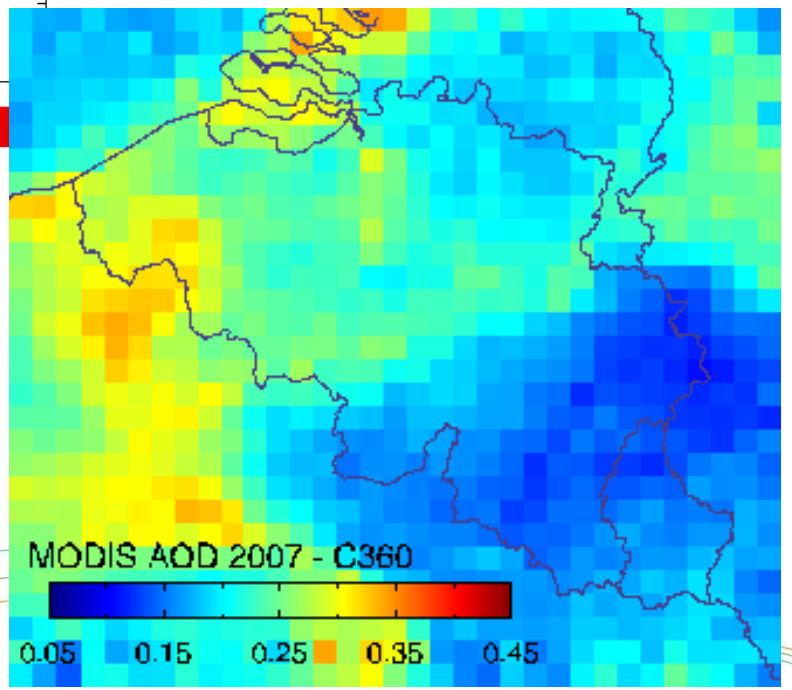






Measurements: interpolation using the RIO-corine tool (3x3 km²)





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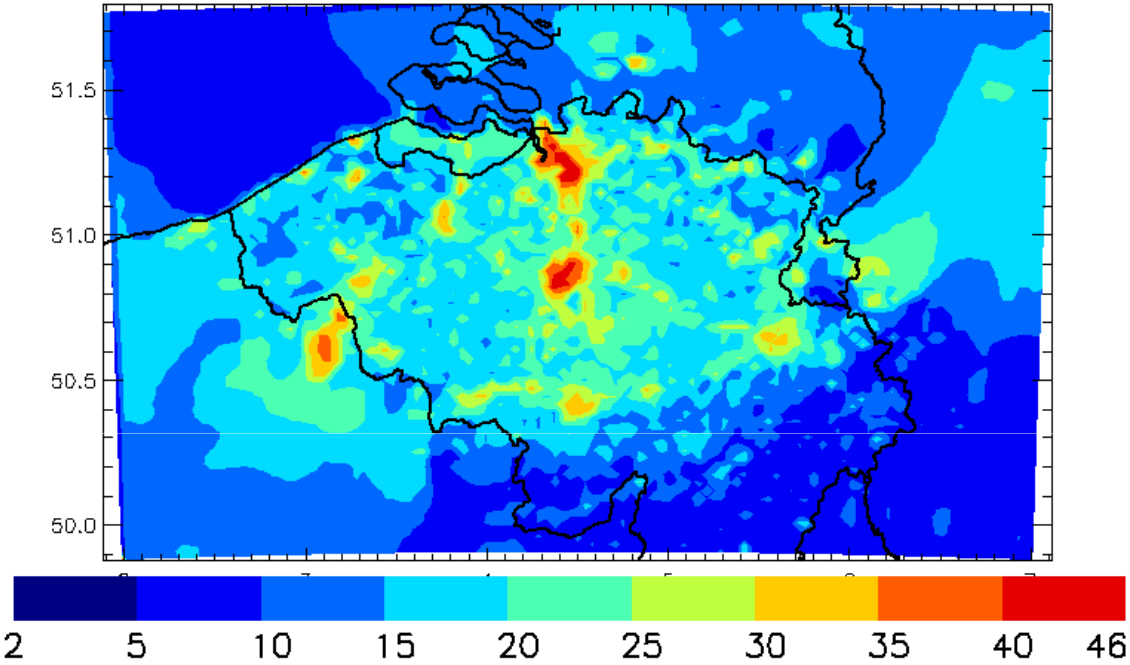
Calibration of model on interpolated measurements



RIO-corine:
Janssen et al., 2008

Calibration for
NO_2, O_3 : linear regression of model on measurements for every point
For PM_{10} : replacement of model values by measurement values
For $PM_{2.5}$: regression equation of $PM_{2.5}$ on PM_{10} applied on PM_{10}
For EC : no calibration (not enough measurements)

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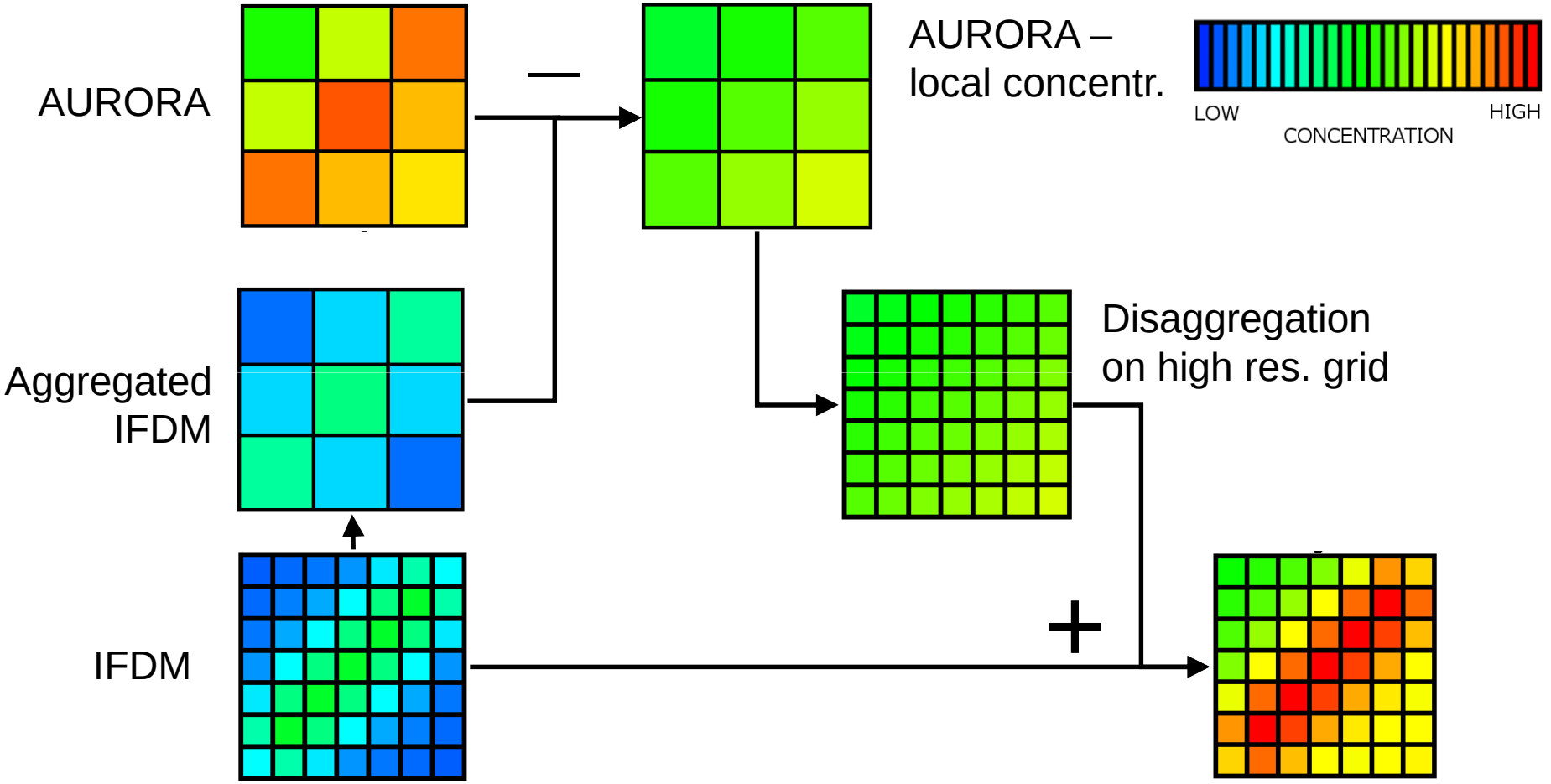
AURORA-IFDM



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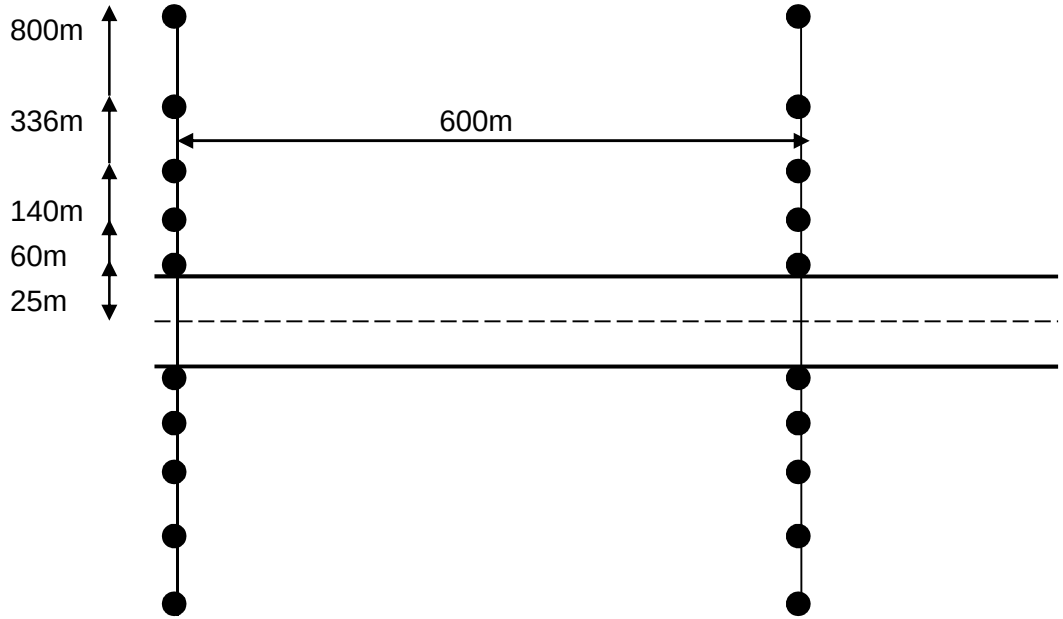
IFDM: grid

» Combination of a regular grid (1x1 km²) and an irregular grid to account for large gradients



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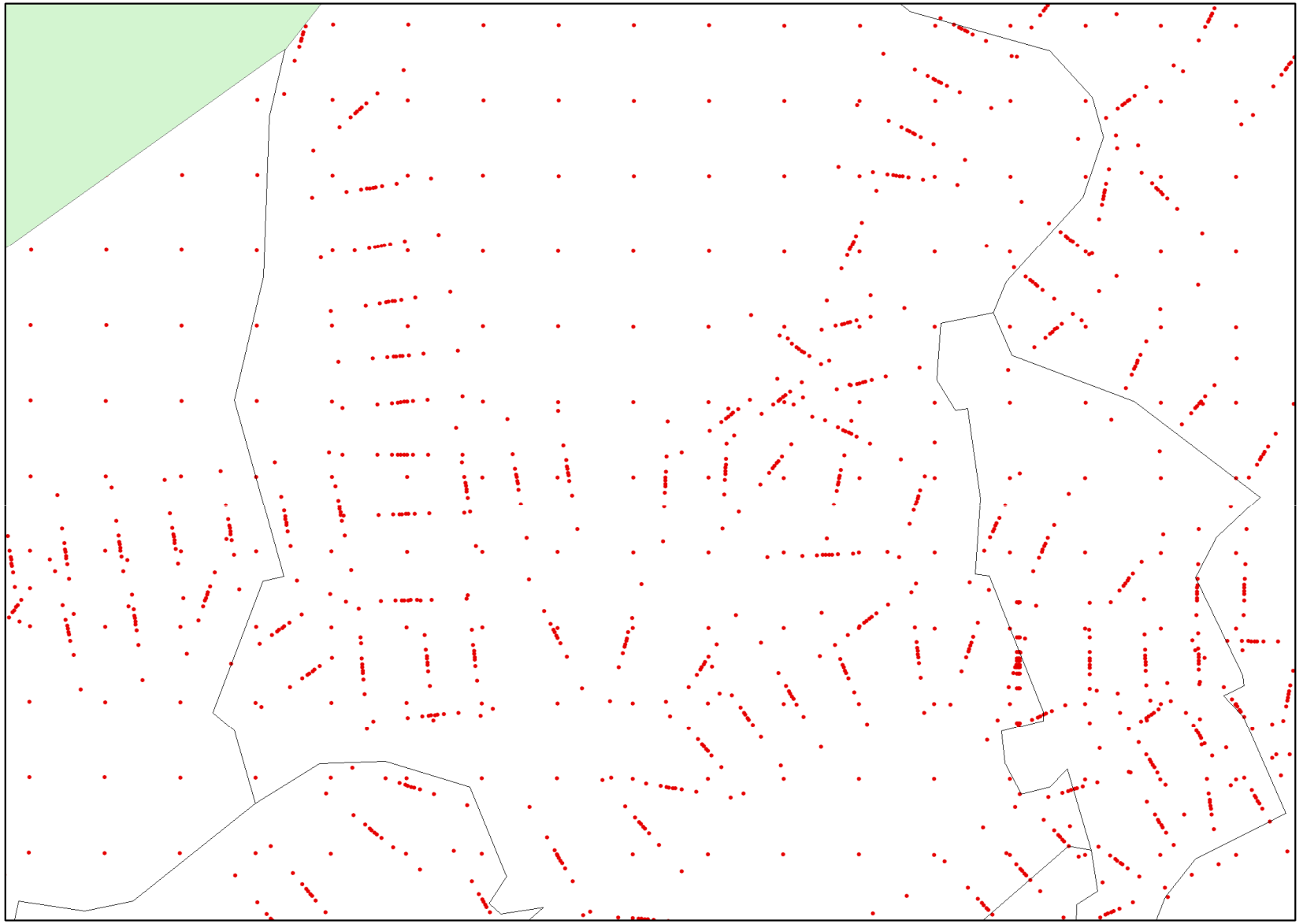

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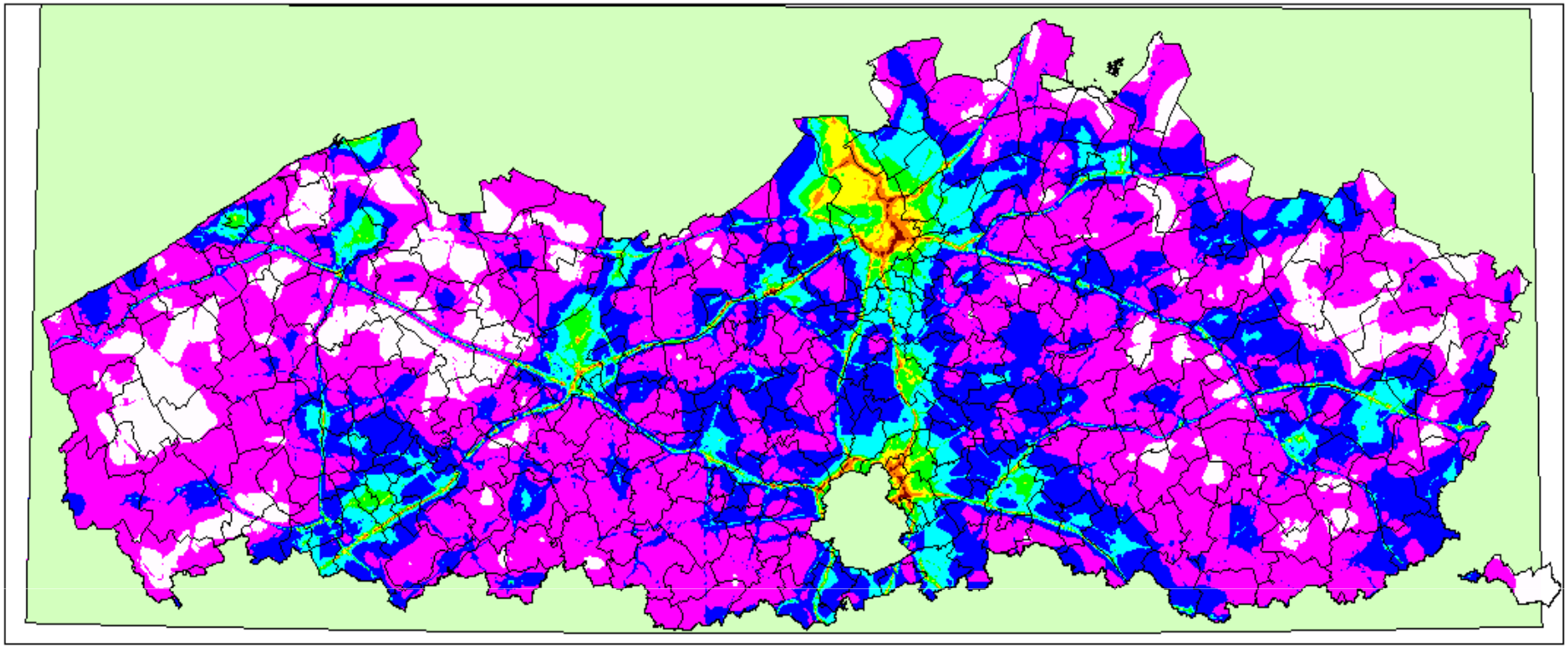

2007
Jaargem NO2 (µg/m³)

- 0 - 14,99
- 15 - 19,99
- 20 - 24,99
- 25 - 29,99
- 30 - 34,99
- 35 - 39,99
- 40 - 49,99
- >=50

NO2

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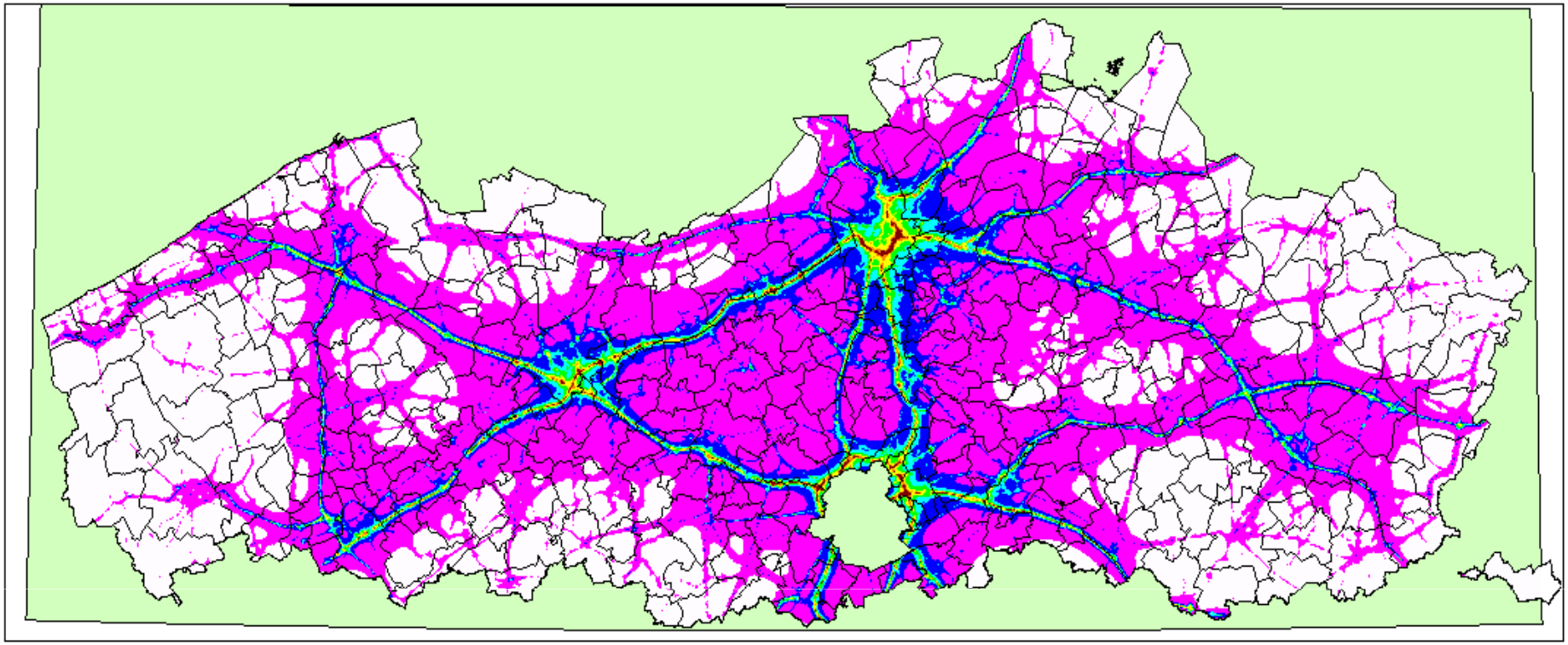

2007
Jaargem EC aw (µg/m³)

- 0 - 0,099
- 0,1 - 0,299
- 0,3 - 0,499
- 0,5 - 0,699
- 0,7 - 0,999
- 1 - 1,499
- 1,5 - 1,999
- >= 2

EC

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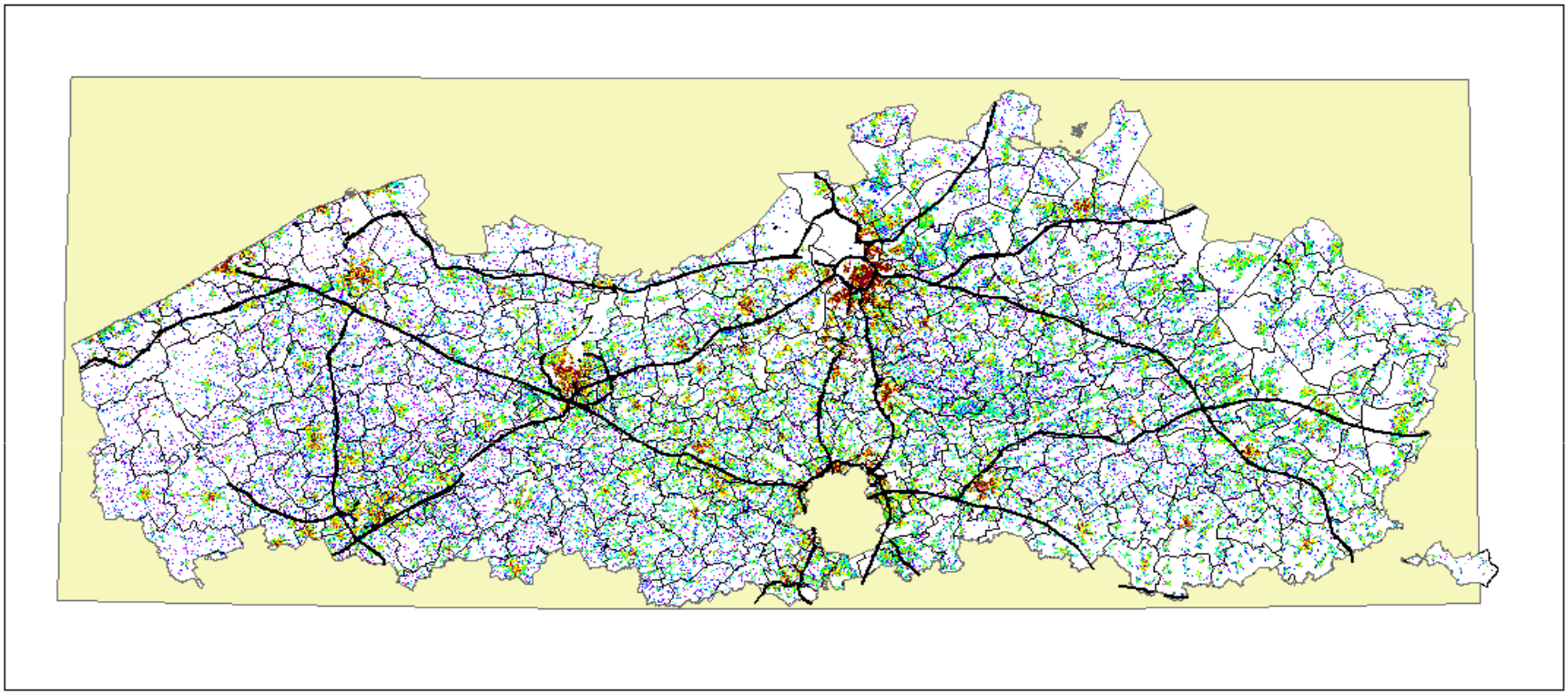
Detailed population data



Inwoners per cel van 0,01 km²

- 1
- 2
- 3 - 5
- 6 - 10
- 11 - 20
- 21 - 40
- 41 - 60
- 61 - 2.925

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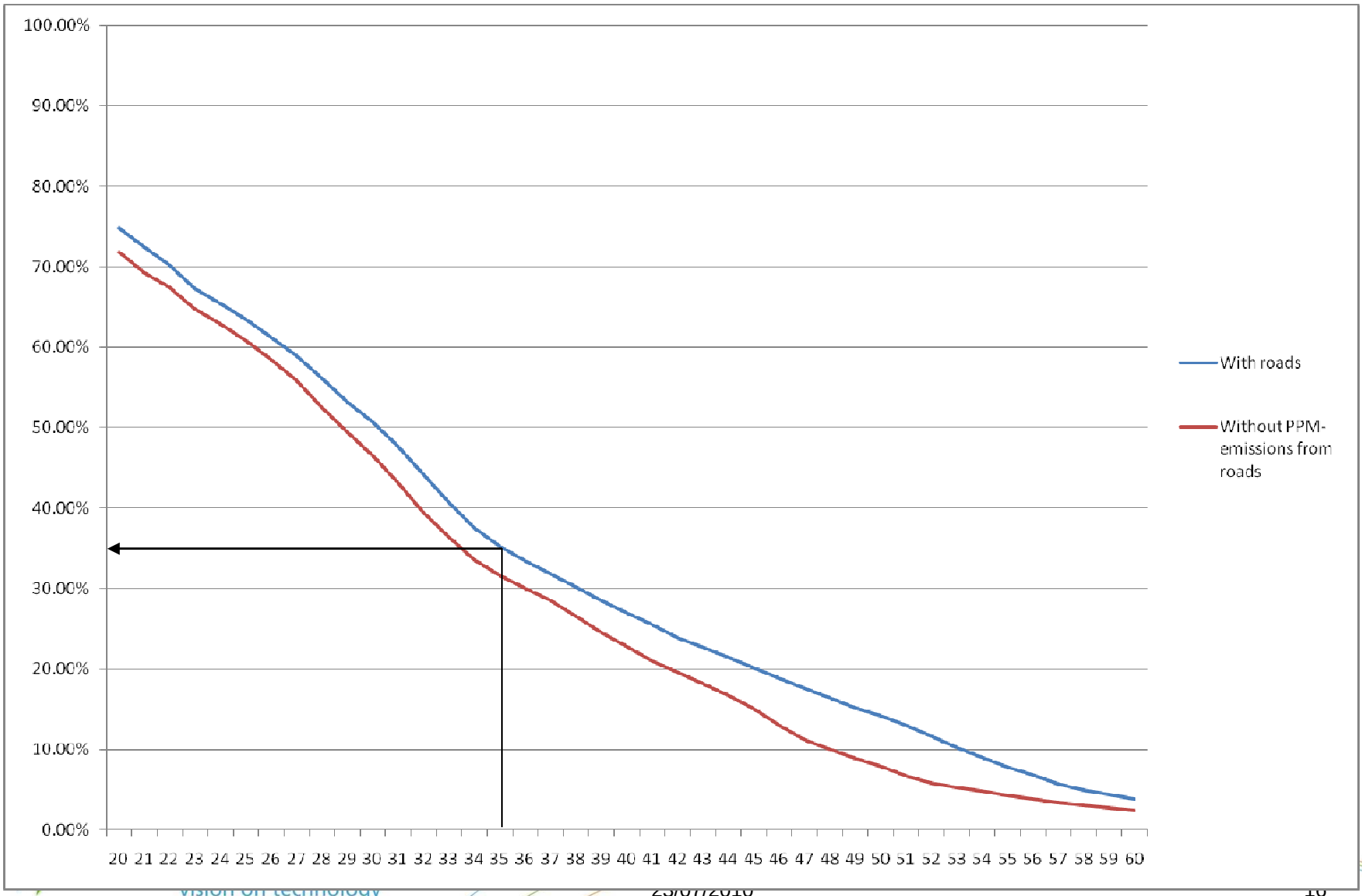
Exceedances of PM10 daily average of 50 µg/m³



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Conclusions

- Combining available data on emissions, measurements, … leads to high resolution air quality maps
- Combining this with population maps leads to high quality exposure data
- By extending calibration methodology into the future, future air quality can be estimated. This is done by simulating with AURORA future years, calibrating (assuming constant calibration factors) and then applying IFDM.
- Exceedances of European norms can thus be estimated for both the present and the future in great geographic detail.
  The effect of emission changes can be represented, by recalculating AURORA/IFDM.

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