

CURIEUZE NEUZEN

(CURIOUS NOSES)

Obtaining a large validation dataset with the help of citizens

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VLAAMSE
MILIEUMAATSCHAPPIJ



Modelers paradox

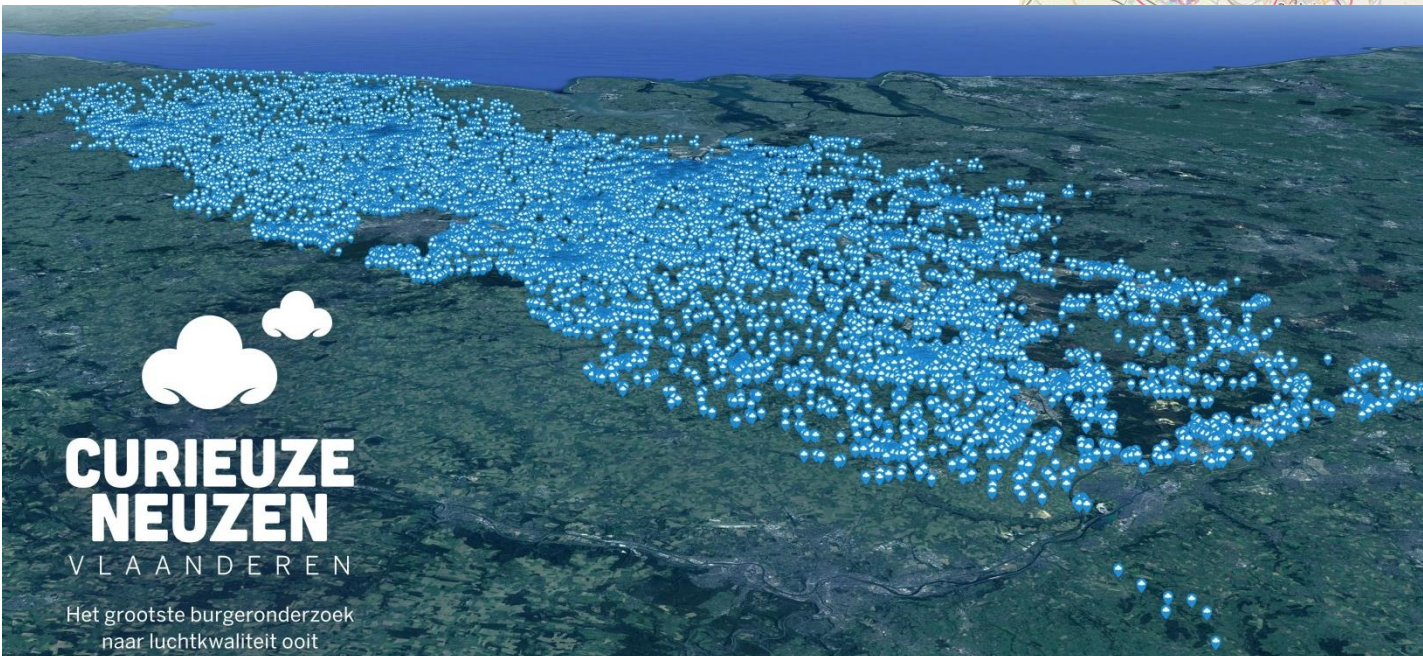
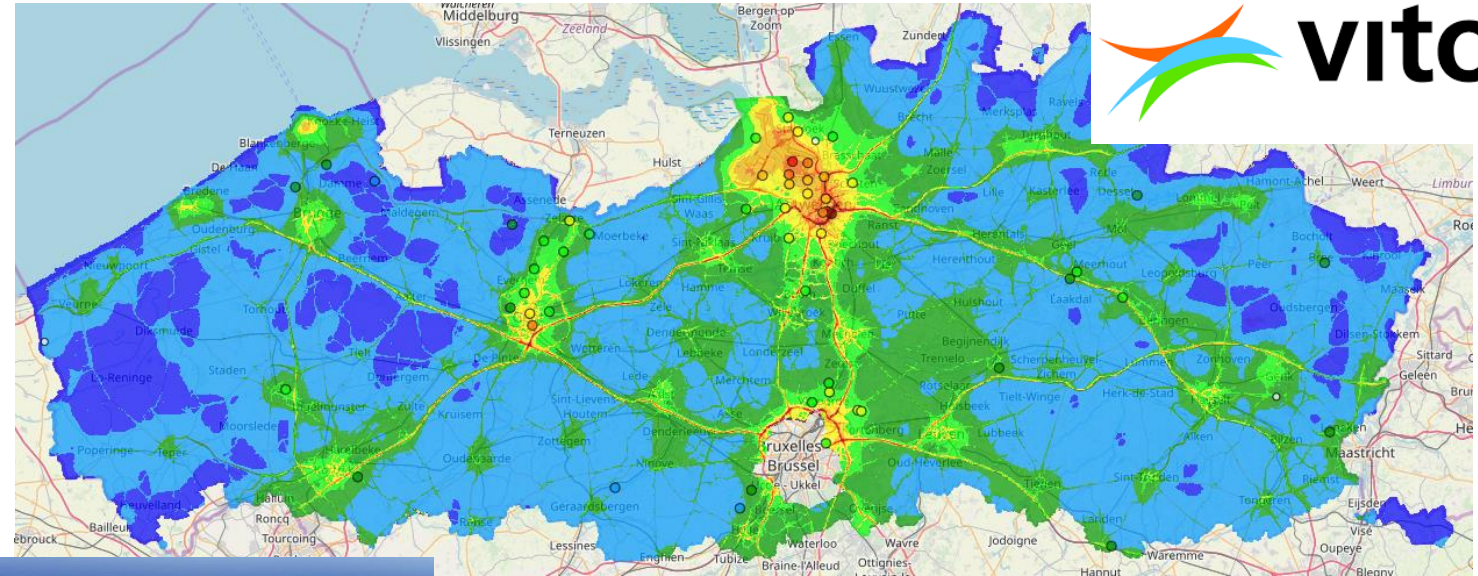
Flanders: 5km road/km², 58 measurement stations (NO₂)

Network does not capture all spatial trends

ATMO-Street model chain used due to sparse measurement set

Test all possible situations =>

Dense measurement set needed to validate model



CurieuzeNeuzen: main goals



20,000



Citizen
Outreach
Inform
Sensibilize

Science
Quality data
Model validation

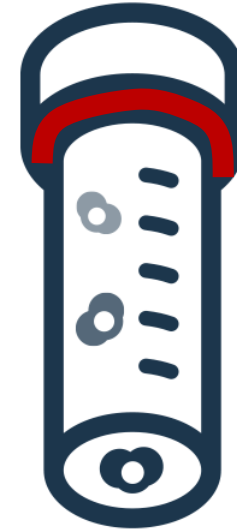
Nitrogen dioxide and palmes samplers



NO₂ is an important traffic pollutant and indicator



Diffusive Palmes sampler



filter with triethanolamine selectively adsorbs NO₂

Simple and robust method

Measurement setup



Real estate panel at façade window

- Standardize setup
- Limit wind effects
- Extra outreach

Duplicate tubes

- Average used: higher precision
- Useful for quality control

May as predictable month

- Relatively reproducible weather
- Set amount of holidays

Receive setup => measure in May => send samplers to lab

Recruitment: multi-mediacampagne



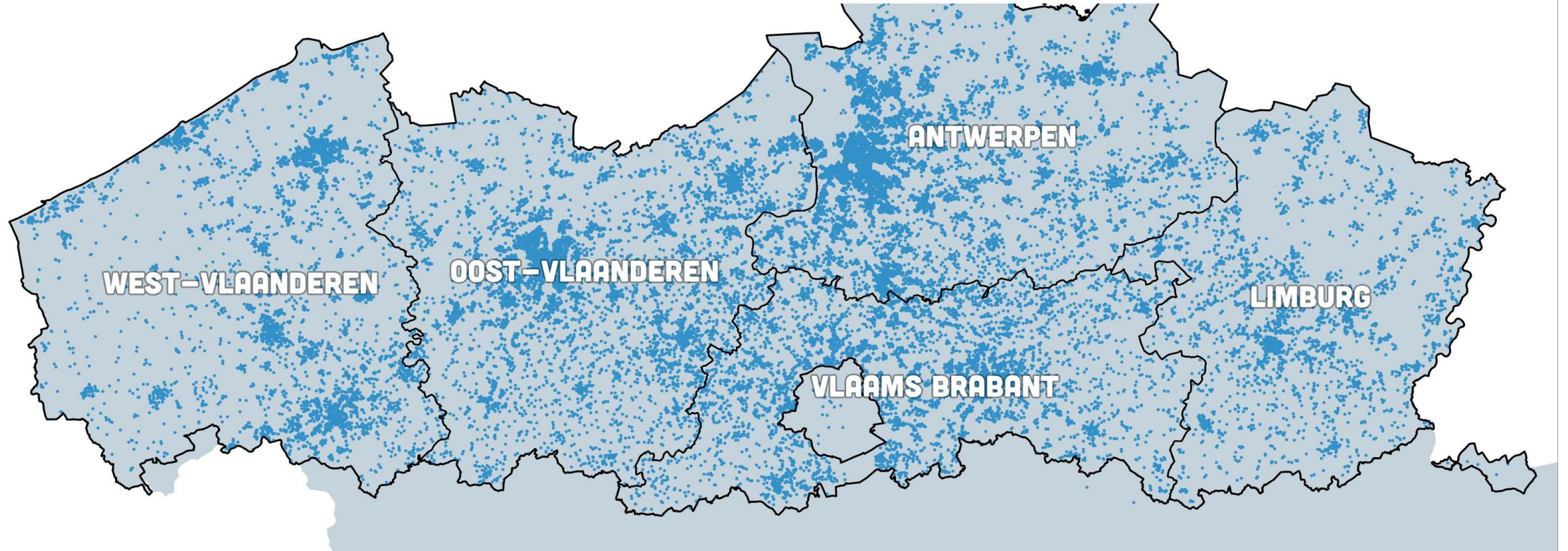
- Print media
- Film theaters
- Nationale Radio
- Nationale TV
- Publiek domein (bussen...)
- Sociale media

Website => questionnaire

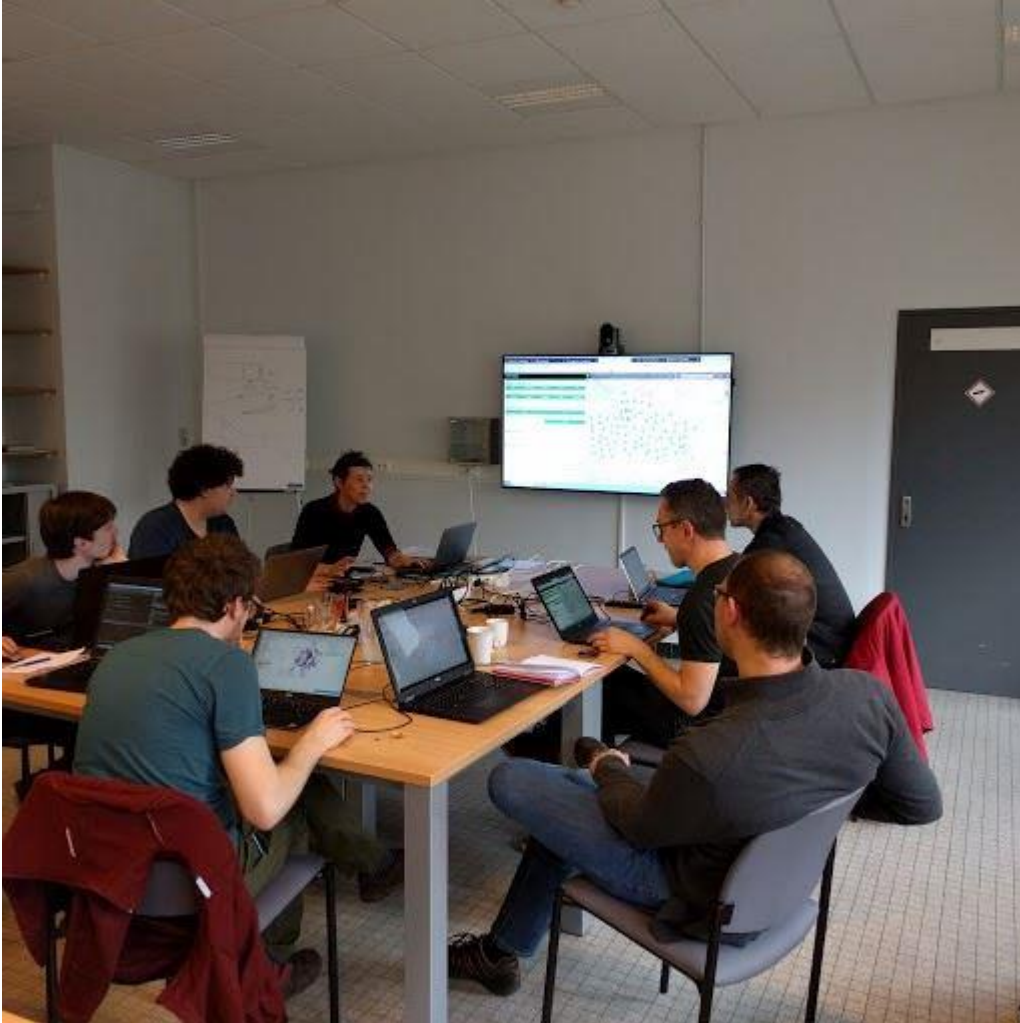
- Curiosity: How healthy air in your street?
- Community: Participate the largest CS AQ project
- Simplicity: It is simple



967 schools
597 government
920 companies and organisations
49.778 families

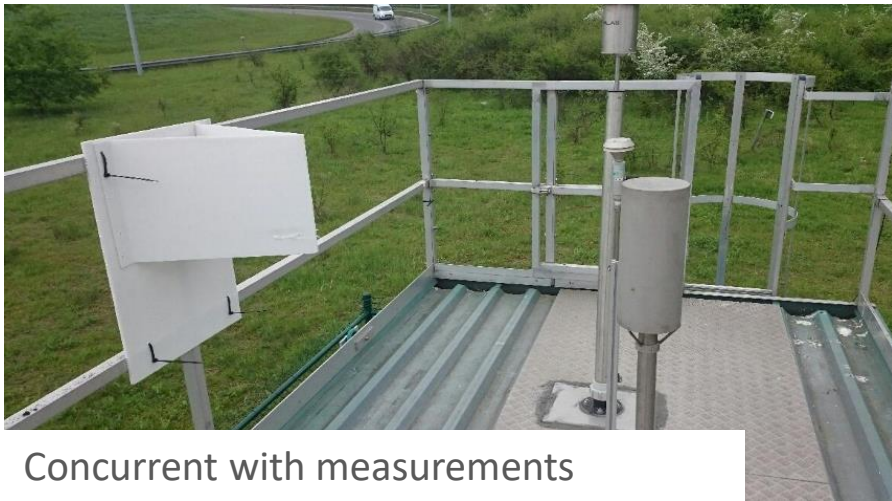


Selection procedure, main points

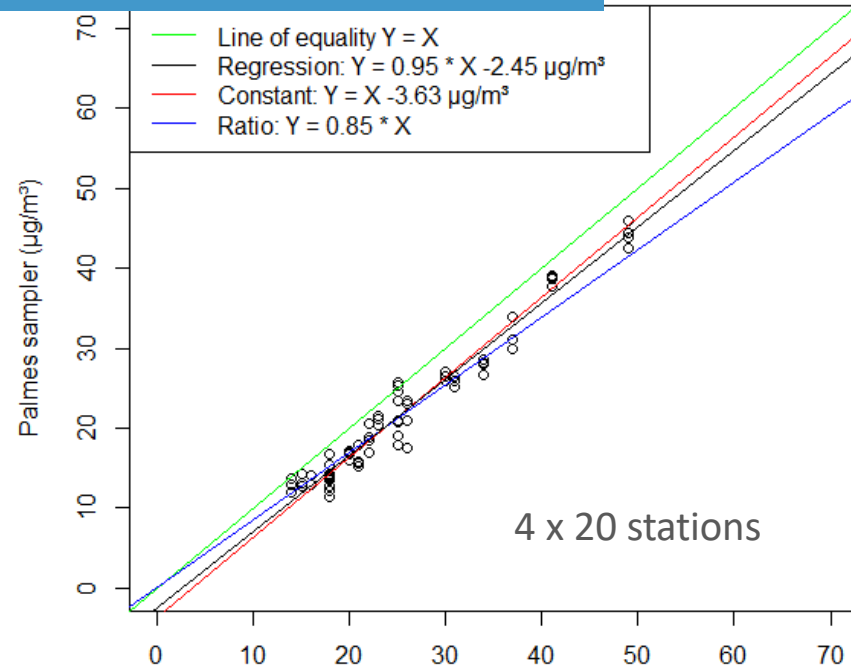


- Include schools and government buildings
- Prefer street side first floor
- Geographical spread
- Distribute over different types of locations, linked to model application
 - Background
 - Traffic, no street canyon
 - Street canyon
- With and without traffic intensity

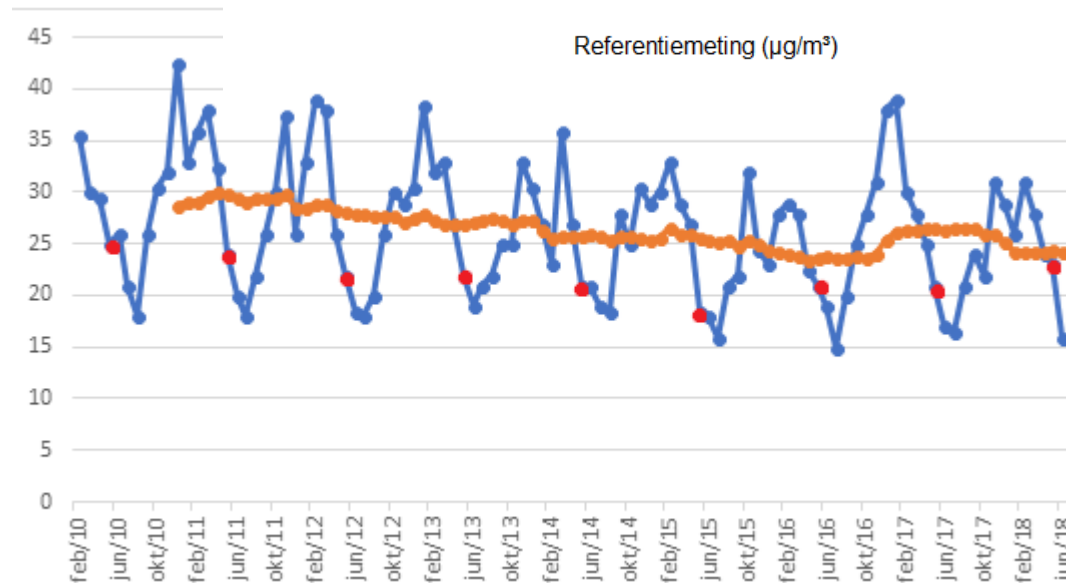
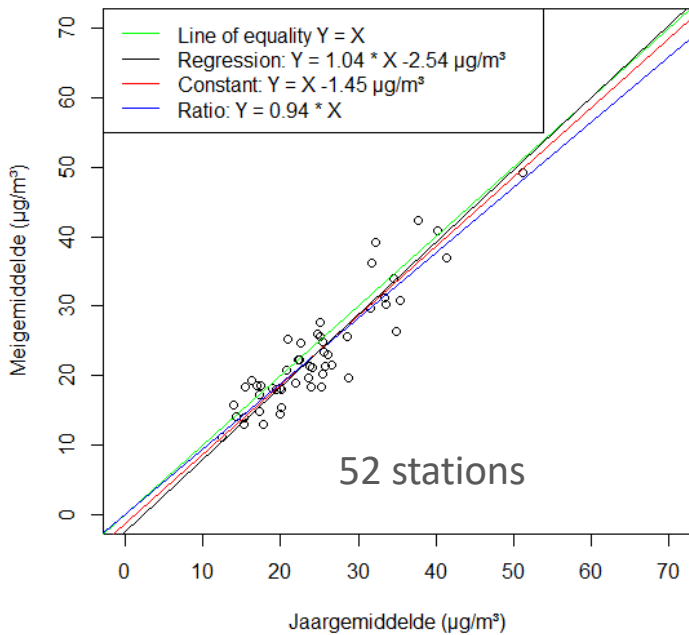
Data handling: calibration and extrapolation



Concurrent with measurements



Calibrated May C Model comparison



Data quality

Bias: calibrated to monitor

Error of a measurement (1 sigma):

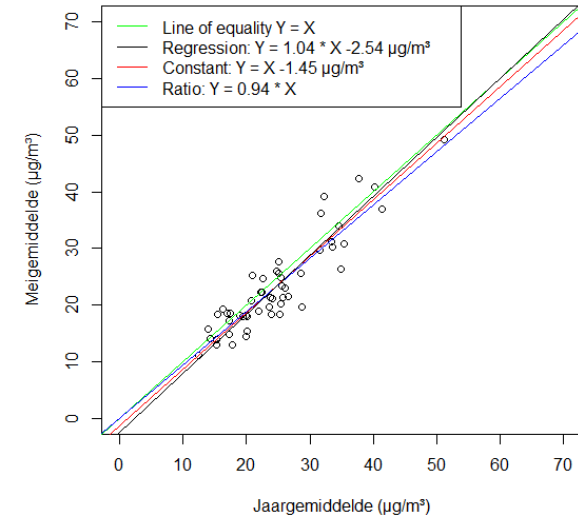
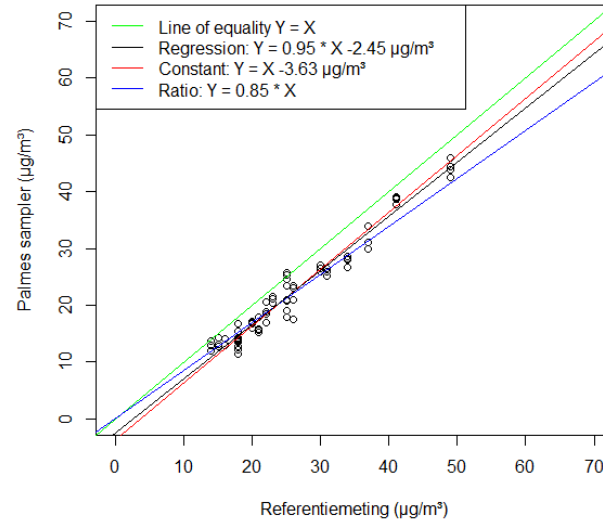
Calibrated value: $2,2 \mu\text{g}/\text{m}^3$

Indicative yearly average: $4,0 \mu\text{g}/\text{m}^3$

Errors not included

Expert mounting vs. citizen mounting

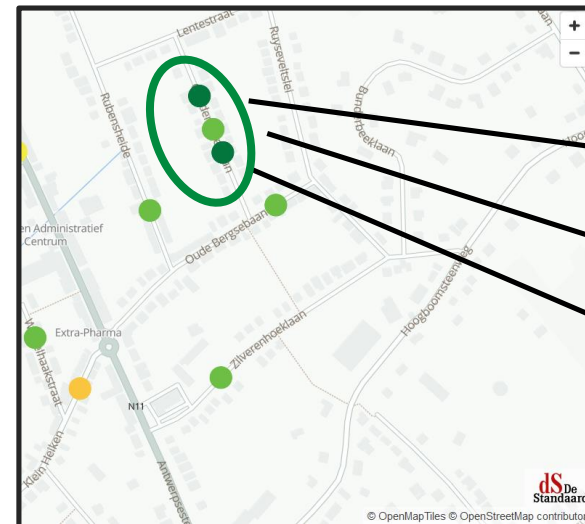
Differences station vs facade



Sample quality control

Exclusions for model validation:

- Model comparison dataset (17,886 of 20,000 remaining)
 - Missing crucial data
 - >4 day deviation from measurement period
 - One duplicate missing or compromised
 - Big duplicate deviation

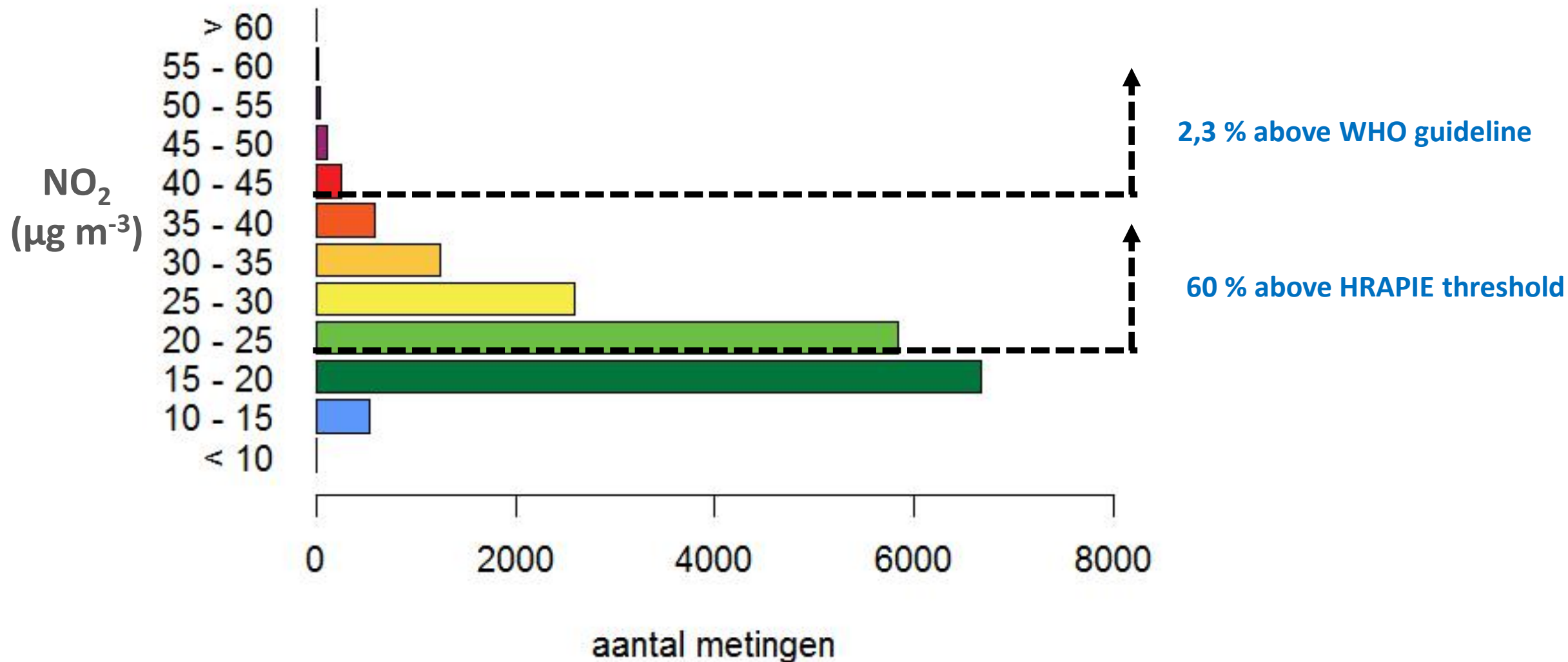


$19.9 \mu\text{g m}^{-3}$

$20.2 \mu\text{g m}^{-3}$

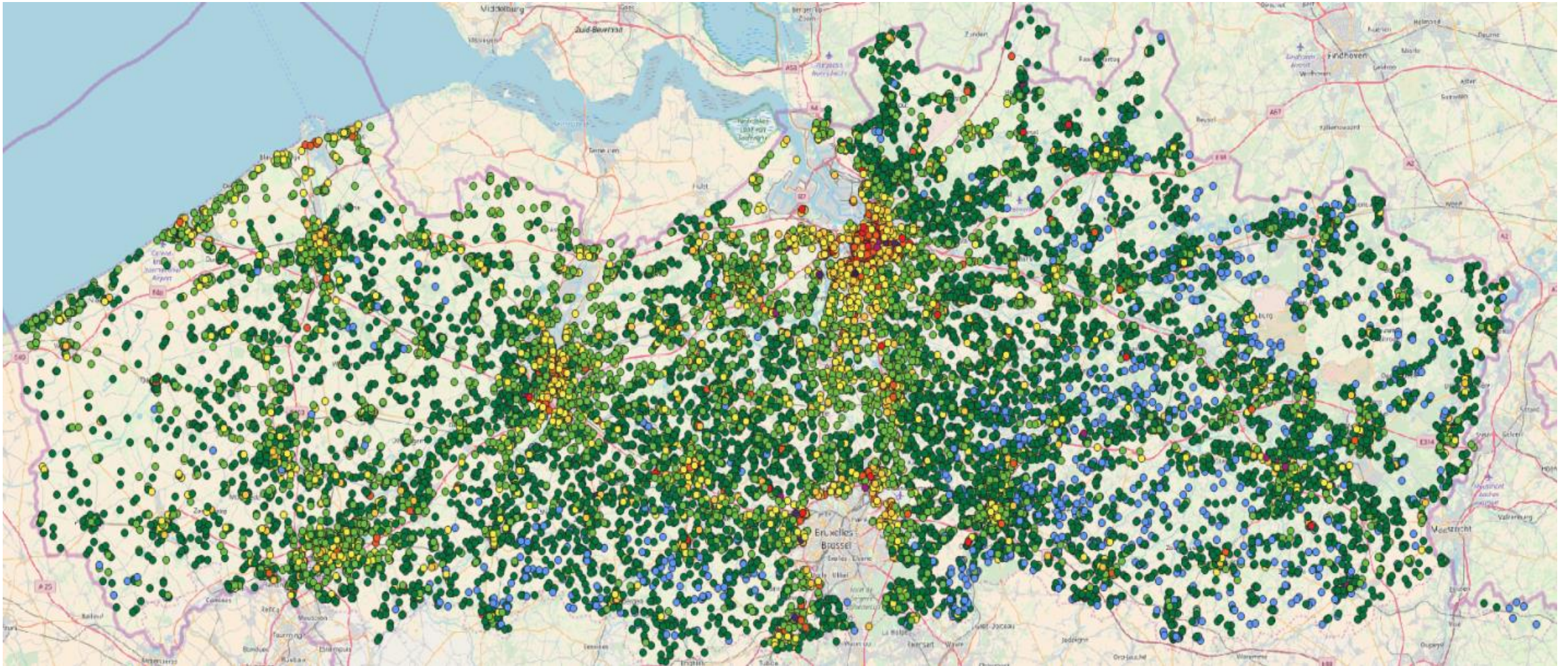
$18.5 \mu\text{g m}^{-3}$

Results: Big variation in NO₂ concentrations

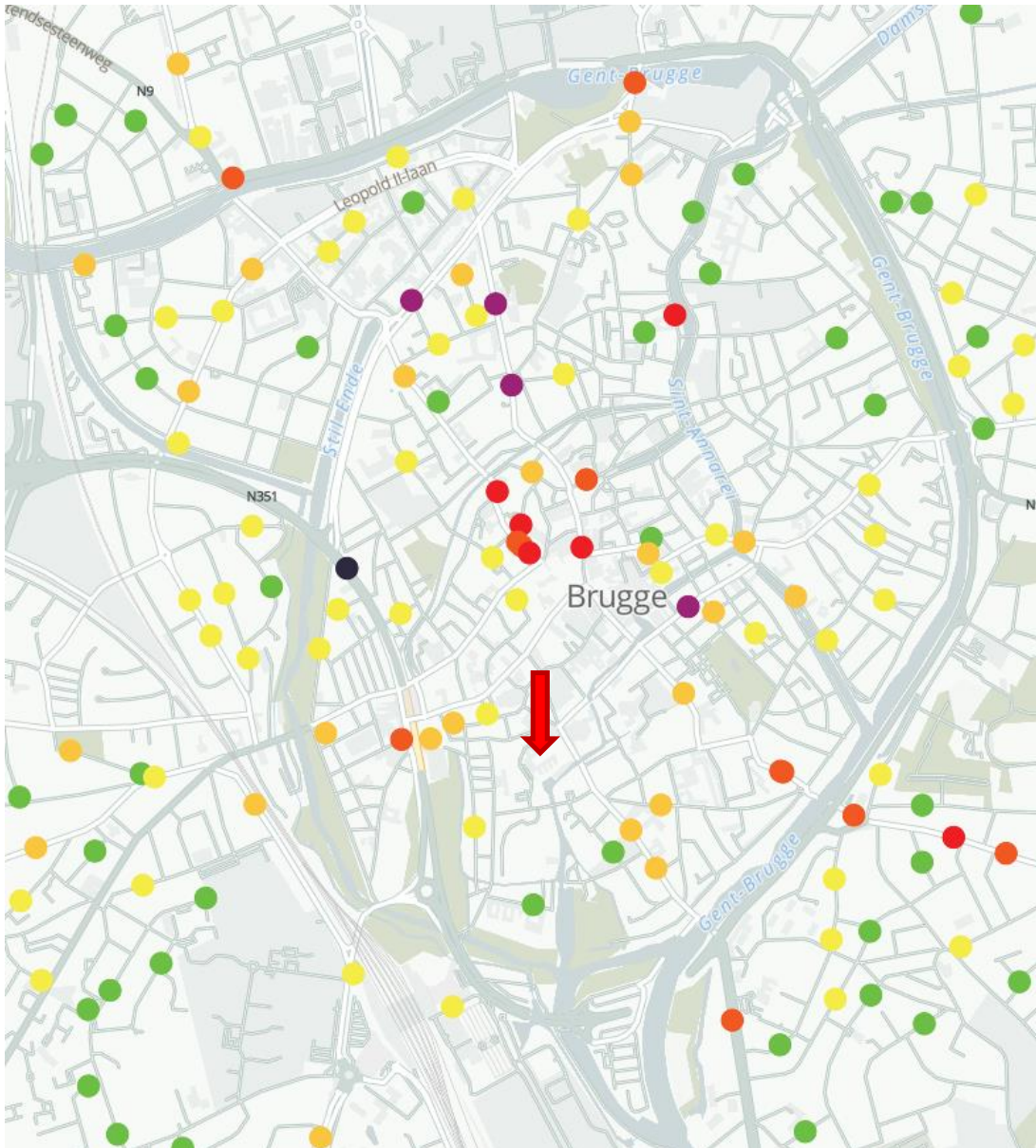


Representative for concentrations at Flemish facades weighed by inhabitant

The CN map



Some direct messages gleaned from the data



Debunk some misconceptions

- Traffic as important polluter
- High variability
 - Tips for Route choice
- Exceedances not only in cities
- No winners and losers: air quality impacts all

Perspectives

- HIVA: Follow-up studies on societal impact
- Dynamic exposure estimate coupling commute questionnaire-model
- Generalize approach for wider applicability (EU)
 - Harmonized validation approach
 - Support model use for AQ policy

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