

# Spatial representativeness

Application of the definition in Flanders

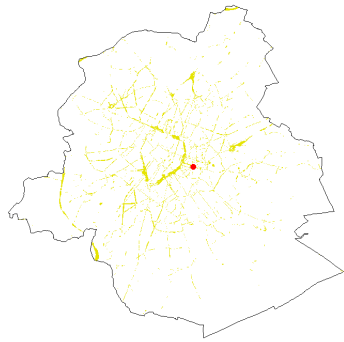
Bart Degraeuwe, [Stijn Vranckx](#), Stijn Janssen

# Spatial representativeness Area of a station over time

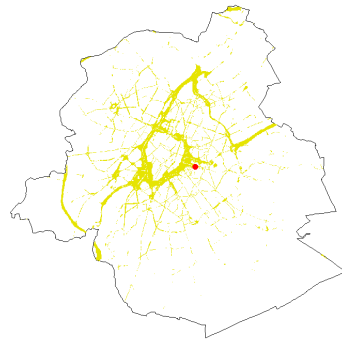


- For NO<sub>2</sub> the area can vary considerably from one year to the next
- Station Belliard Street (canyon) in Brussels

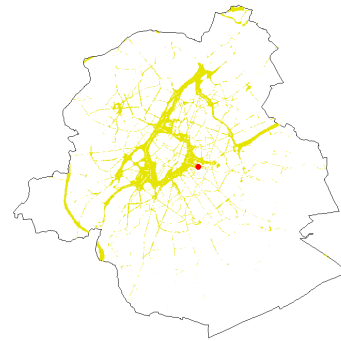
Spatial Rep. Area for NO<sub>2</sub> in 2015 of BETB008 41B008 - Brussel (Beliardstraat) in ZON-BEB10A Brussels-City



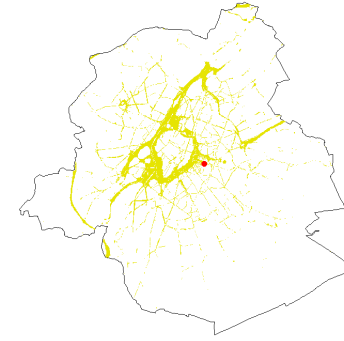
Spatial Rep. Area for NO<sub>2</sub> in 2016 of BETB008 41B008 - Brussel (Beliardstraat) in ZON-BEB10A Brussels-City



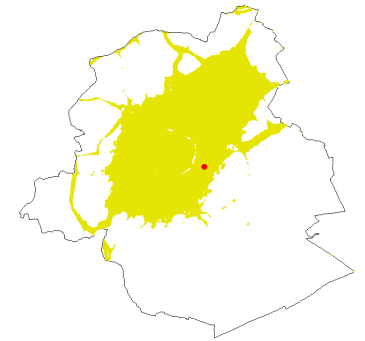
Spatial Rep. Area for NO<sub>2</sub> in 2019 of BETB008 41B008 - Brussel (Beliardstraat) in ZON-BEB10A Brussels-City



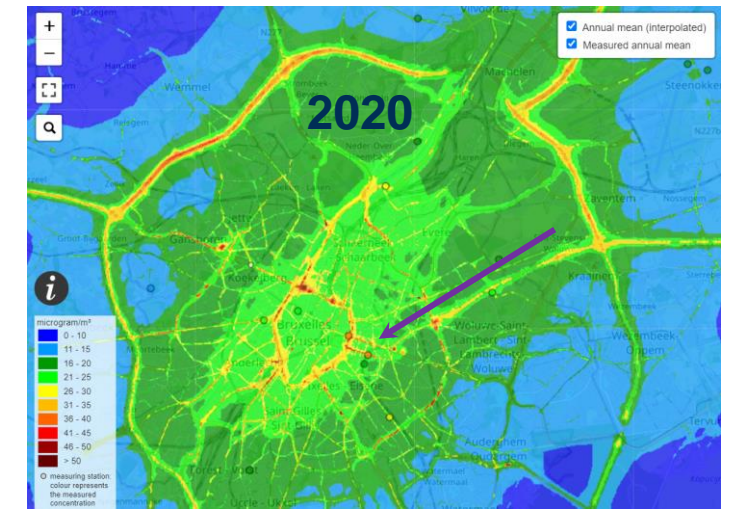
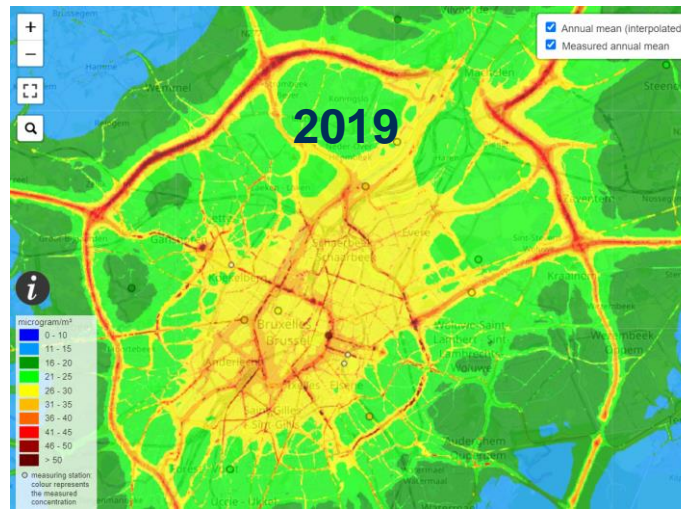
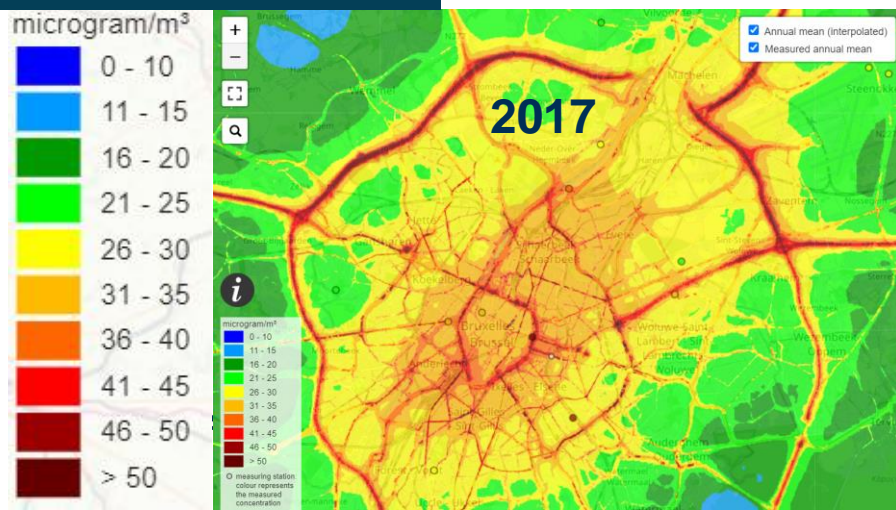
Spatial Rep. Area for NO<sub>2</sub> in 2020 of BETB008 41B008 - Brussel (Beliardstraat) in ZON-BEB10A Brussels-City



Spatial Rep. Area for NO<sub>2</sub> in 2021 of BETB008 41B008 - Brussel (Beliardstraat) in ZON-BEB10A Brussels-City



## ATMO-STREET

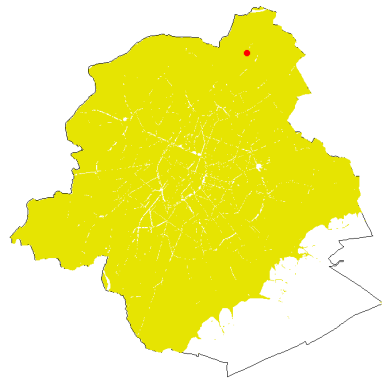


# Spatial representativeness Area of a station over time

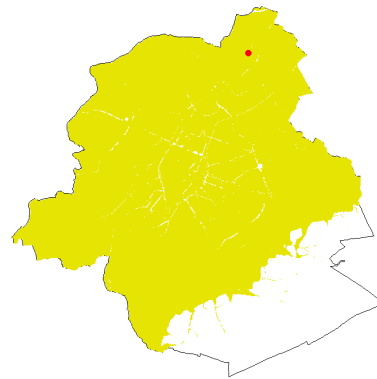


- For  $O_3$ ,  $PM_{2.5}$  and  $PM_{10}$  the coverage is high and less variable
- Example  $PM_{2.5}$  in Meudon (Brussels)

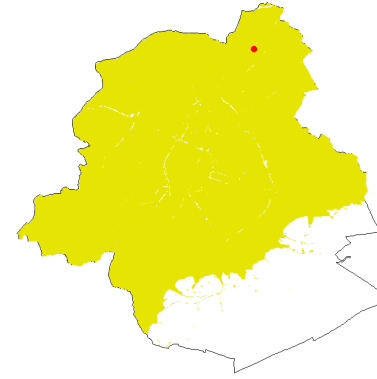
Spatial Rep. Area for  $PM_{25}$  in 2015 of BETMEU1 41MEU1 - MEUDON in ZON-BEB10A Brussels-City



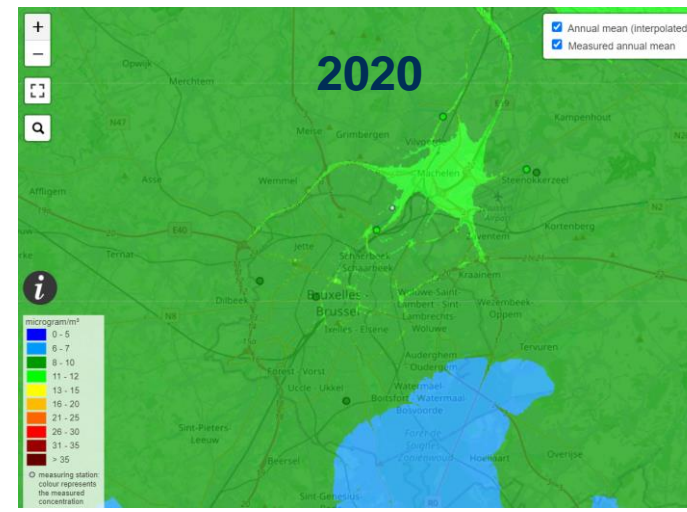
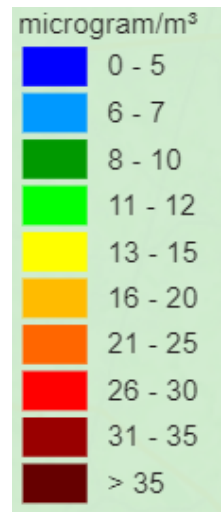
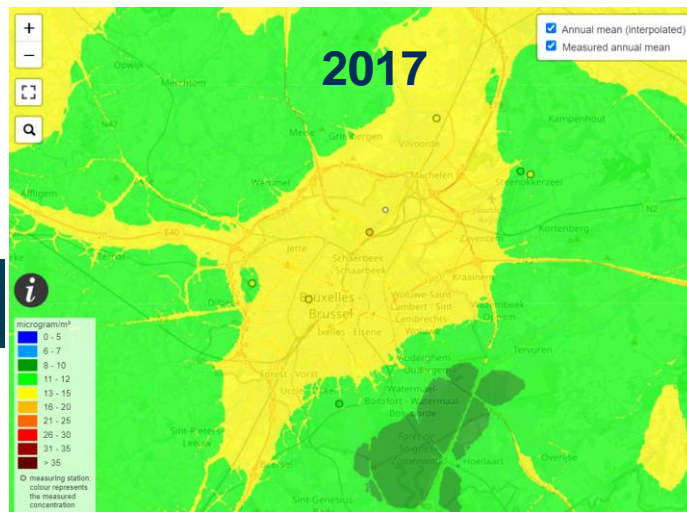
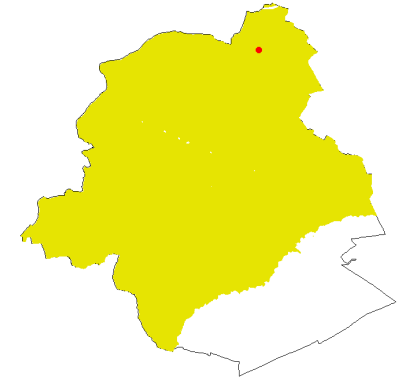
Spatial Rep. Area for  $PM_{25}$  in 2016 of BETMEU1 41MEU1 - MEUDON in ZON-BEB10A Brussels-City



Spatial Rep. Area for  $PM_{25}$  in 2018 of BETMEU1 41MEU1 - MEUDON in ZON-BEB10A Brussels-City



Spatial Rep. Area for  $PM_{25}$  in 2021 of BETMEU1 41MEU1 - MEUDON in ZON-BEB10A Brussels-City

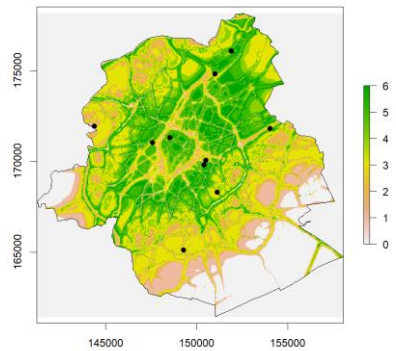




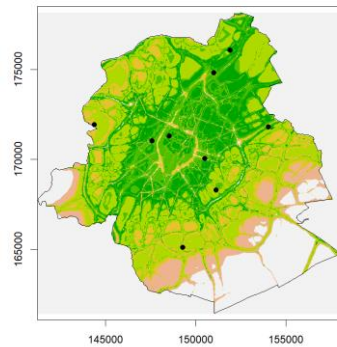
# Coverage of the Spatial representativeness Area

- Do the stations cover the whole area?
- NO<sub>2</sub> in Brussels, 0 to 6 stations

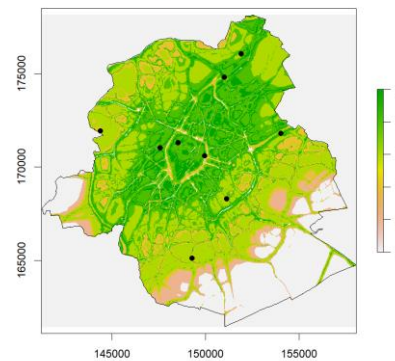
Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2015



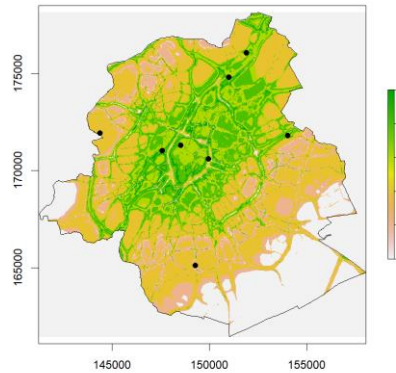
Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2016



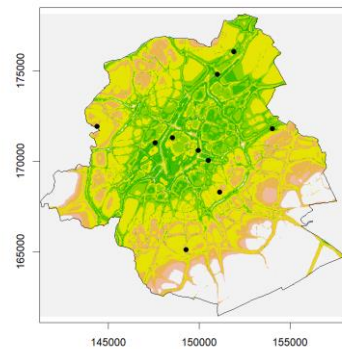
Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2017



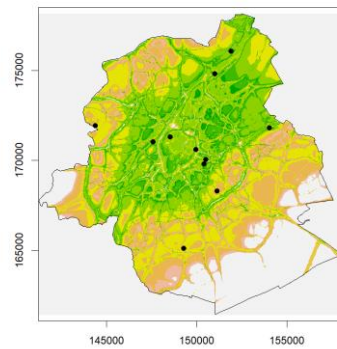
Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2018



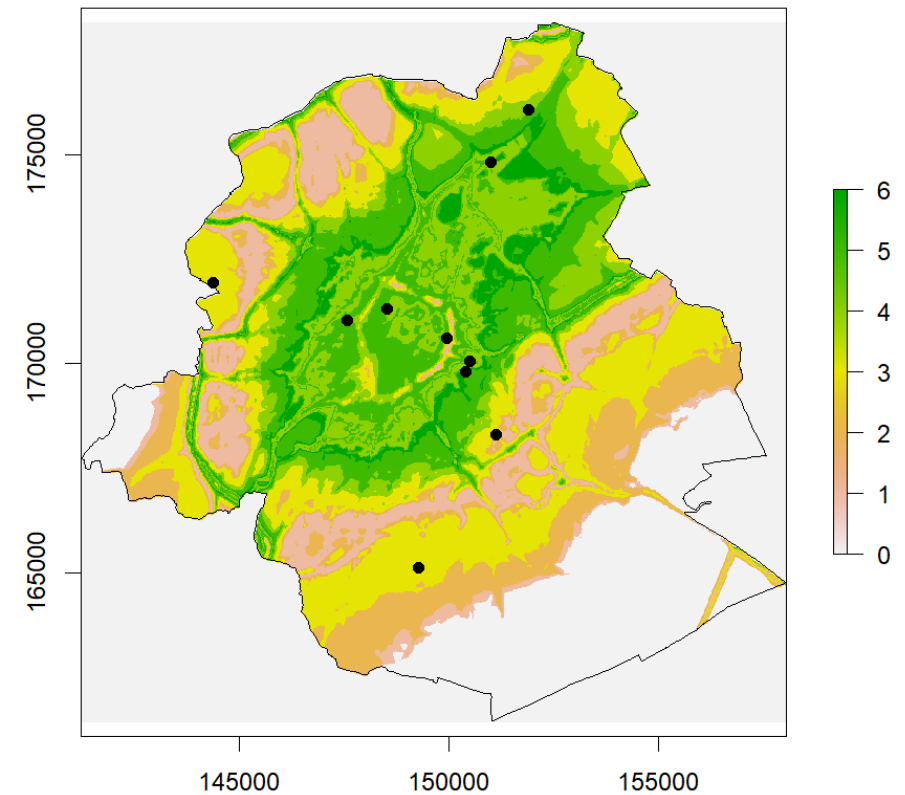
Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2019



Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2020



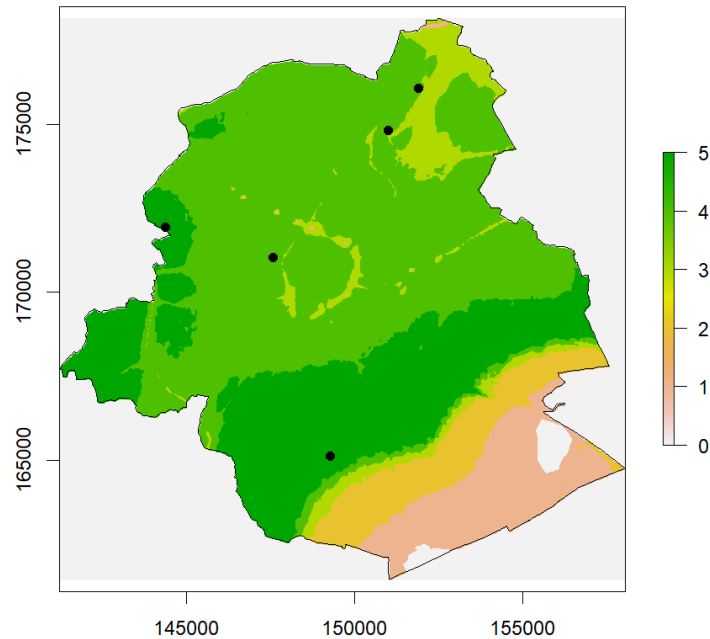
Coverage of AQZ ZON-BEB10A for NO<sub>2</sub> in 2021



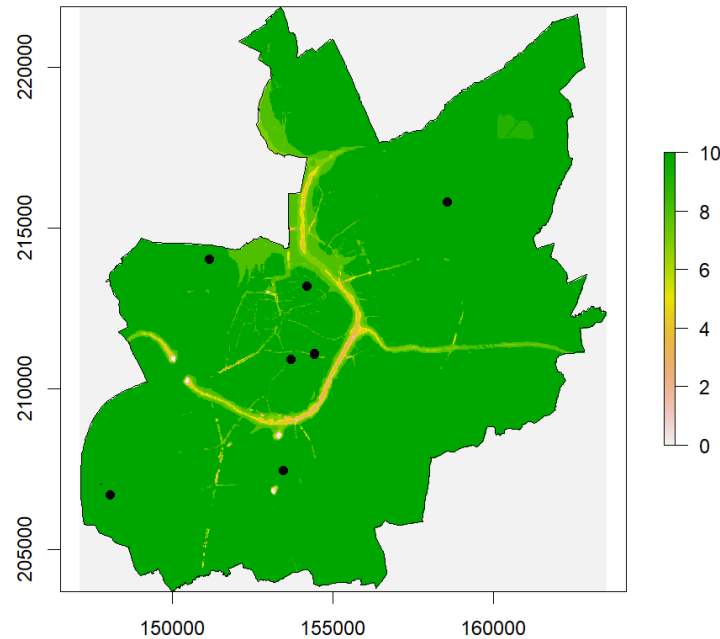
# Coverage of the Spatial representativeness Area

- High coverage for PM<sub>2.5</sub> in Brussels, Antwerp and Ghent

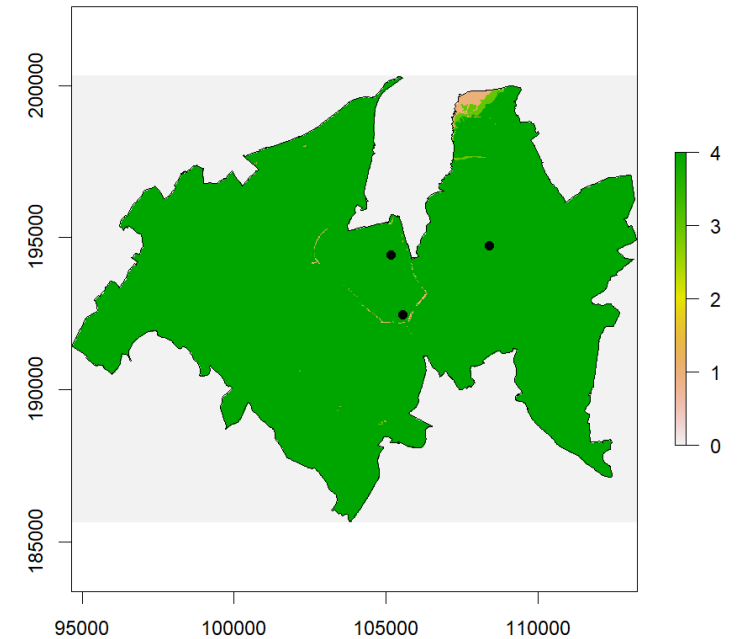
Coverage of AQZ ZON-BEB10A for PM25 in 2021



Coverage of AQZ ZON-BEF02A for PM25 in 2021

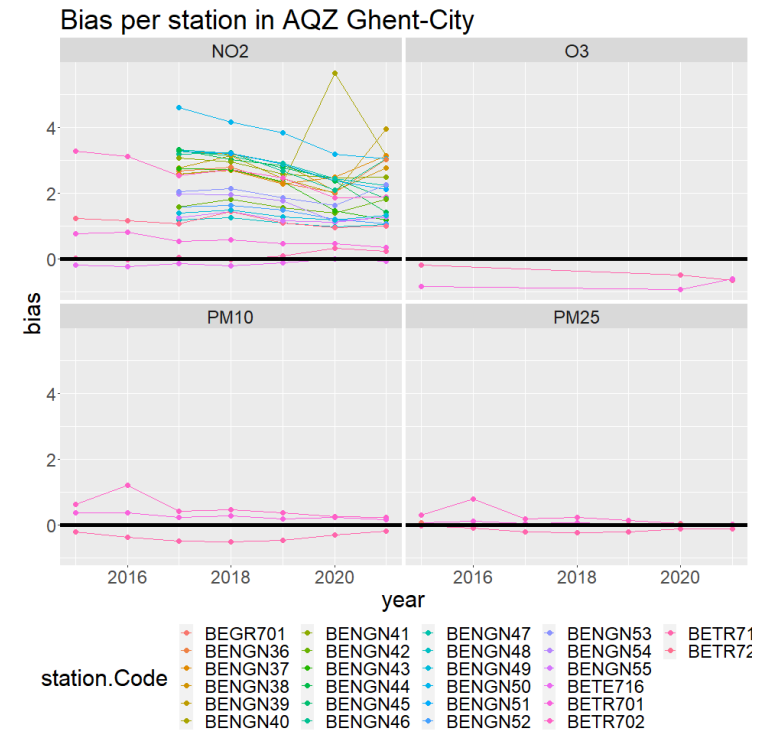
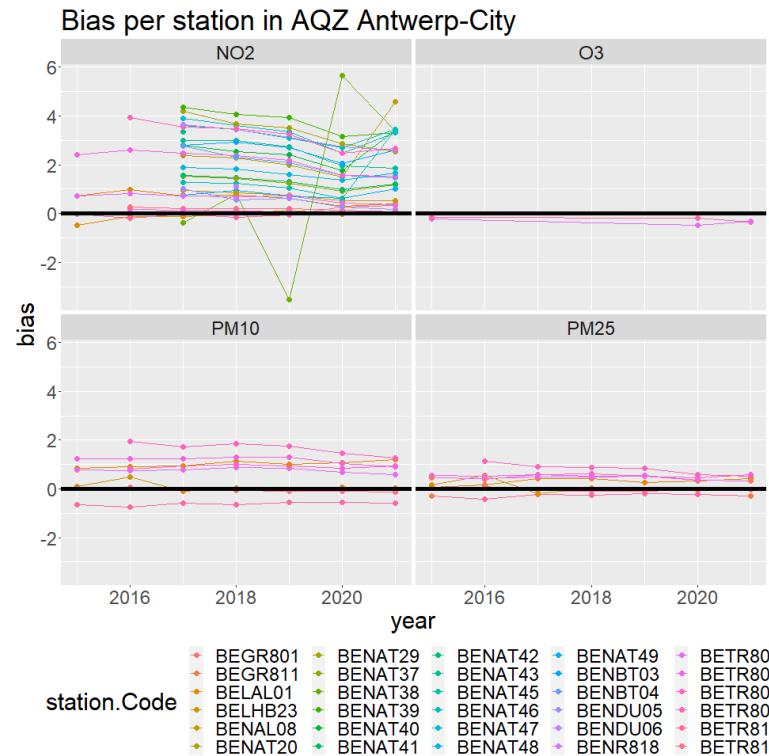
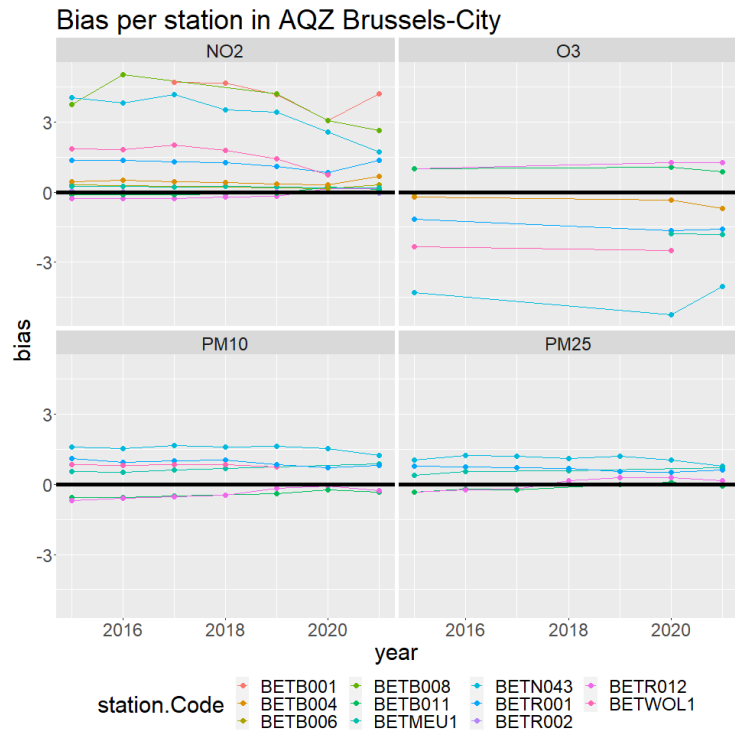


Coverage of AQZ ZON-BEF04A for PM25 in 2021



# Bias: Concentration at station – Avg. over its SRA

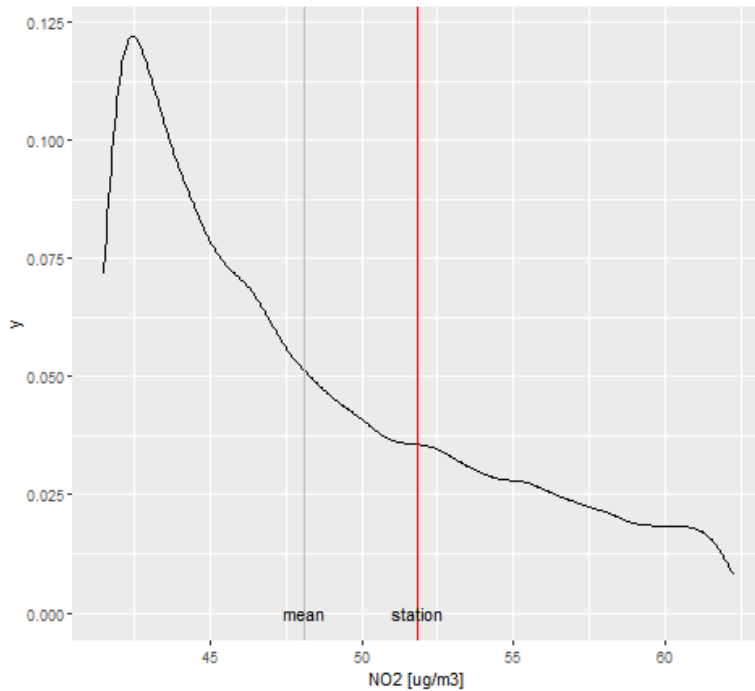
- Bias is positive for NO<sub>2</sub> (~+2ug/m<sup>3</sup>), and small for other pollutants.
- Relevant for exposure and model validation



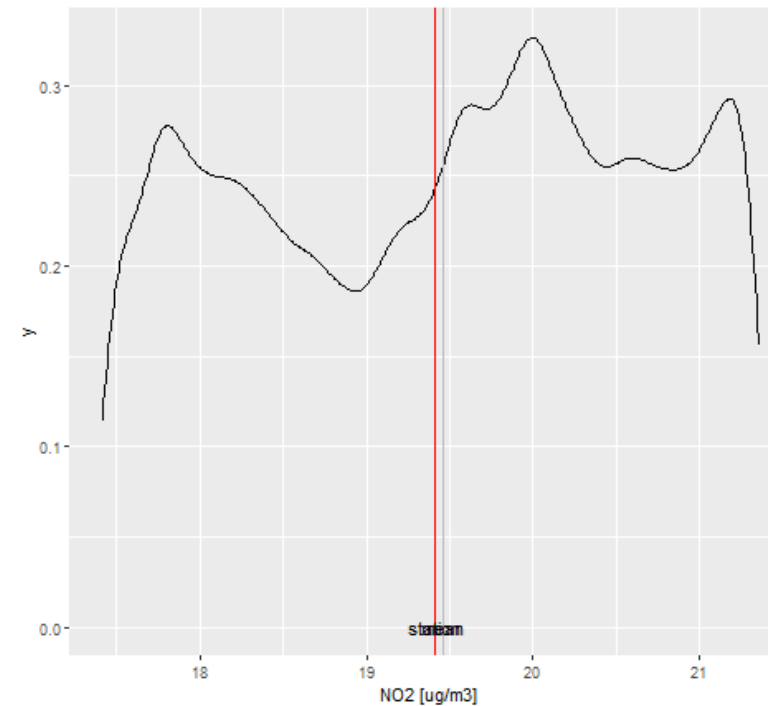
# Bias: Concentration at station – Avg. over its SRA

- The concentration of NO<sub>2</sub> in the Spatial representativeness area (SRA) can be skewed  
➔ concentration at the station is often slightly higher than the average over the SRA

NO2 PDF in Spat. Rep. Area of station BETB008 (41B008 - Brussel (Beliardstraat)) in AQZ ZON-BEB10A (Brussels-City)



NO2 PDF in Spat. Rep. Area of station BETB011 (41B011 - BERCHEM S.A) in AQZ ZON-BEB10A (Brussels-City)



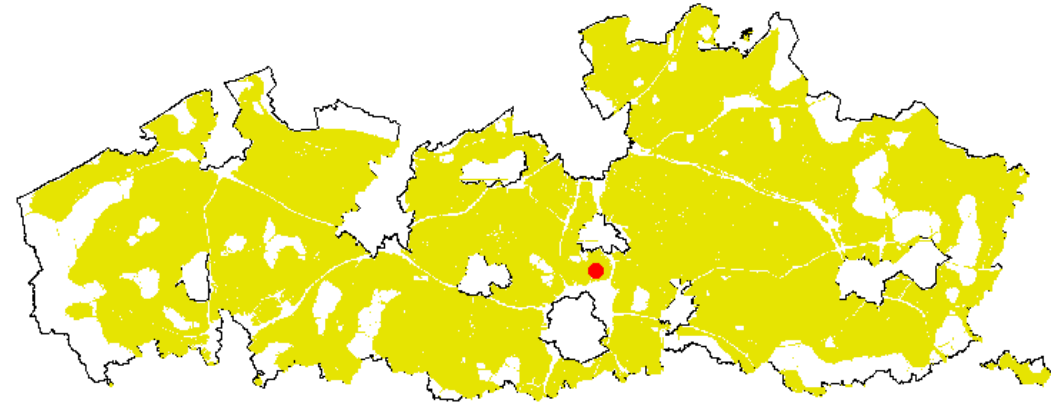


# Representativeness of suburban and rural stations

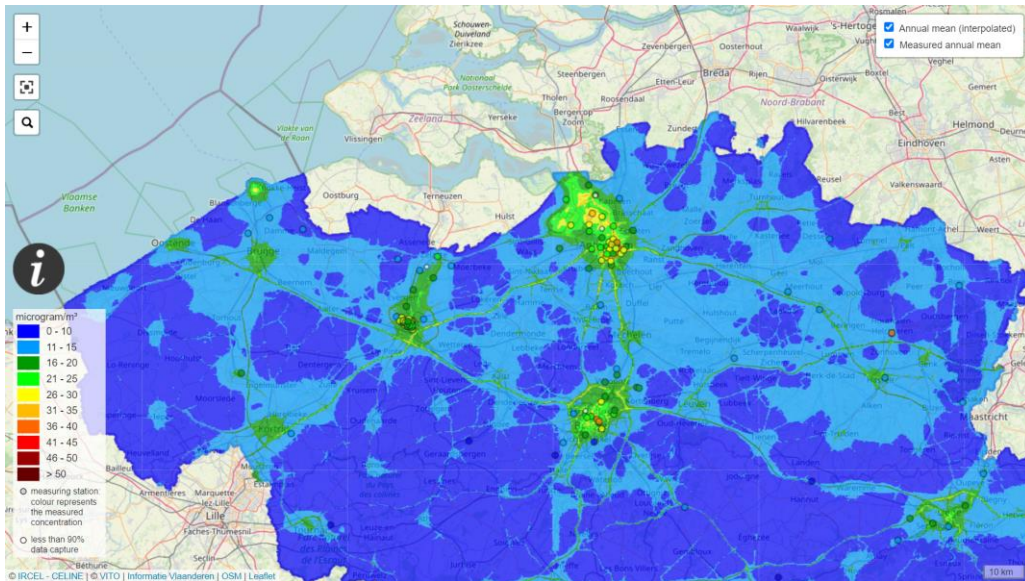
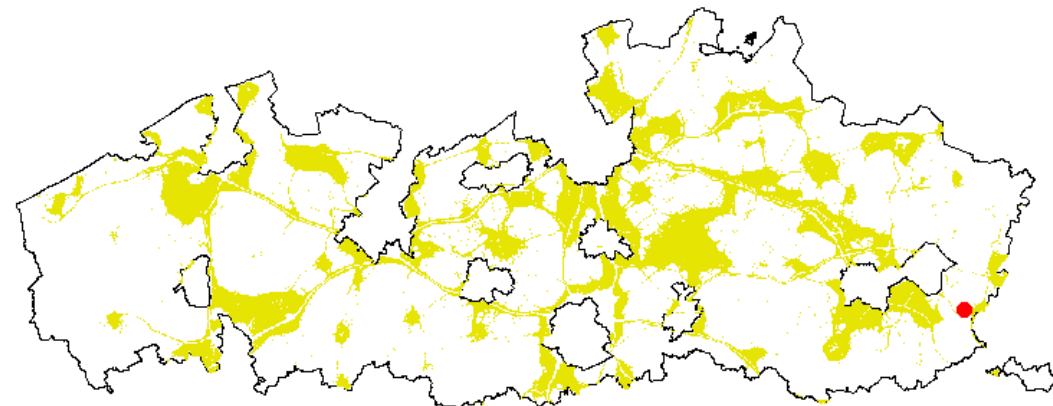
## Mechelen - Suburban



## Zemst - Rural



## Gellik - Rural



# Q&A

- Station representativeness (SR): is the guidance achieved satisfactory and useful? How do we consolidate its use in reporting under AAQDs? What are the remaining open issues that have to be tackled?
- 2  $\mu\text{g}/\text{m}^3$  is rather large as cut-off making large SR (see  $\text{PM}_{2.5}$  and  $\text{PM}_{10}$  examples)
- Split between traffic/industry  $\Leftrightarrow$  rural, urban background is quite artificial (except for  $\text{NO}_2$  maybe?)
- Are we aware of 'mismatch' between, station value vs. histogram of SR?
- ~~Exceedance and exposure indicators: Is the proposed timing of the reporting of the indicators more realistic and in line with current practices in Member States? Can we propose better ways to report the exceedance situations indicators under the AAQD? What additional guidance is needed for the estimation of the indicators? Do we need additional intercomparison studies?~~

# Q&A

- Monitoring network design linked to SR: what intercomparison studies are necessary to provide guidance for the optimization of network design? What can be learnt from a network cluster analysis?
- SR areas prove a very useful analysis for the network design
  - Does the network cover the AQ zone?
  - Where are the gaps?
  - Which areas are 'over-represented' or 'under-represented' by the monitors?

■ — Is there a use for FAIRMODE composite mapping under CT8?