

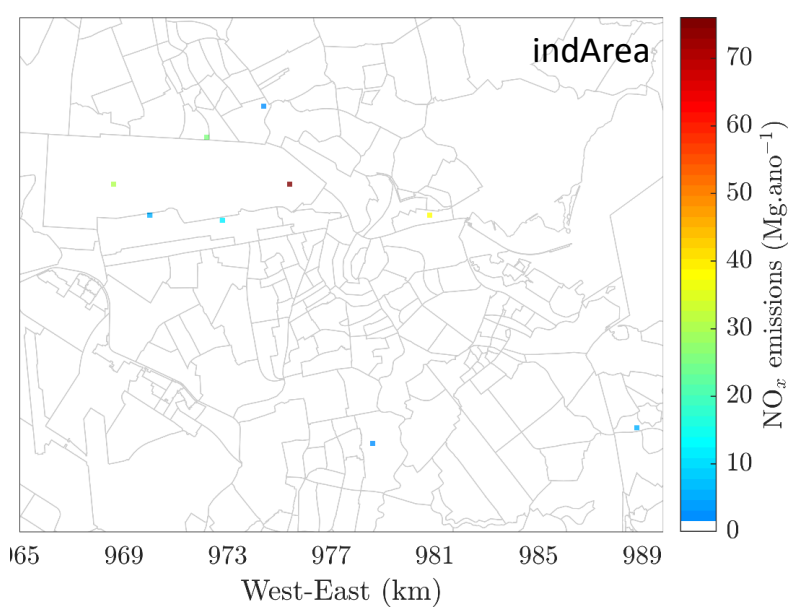
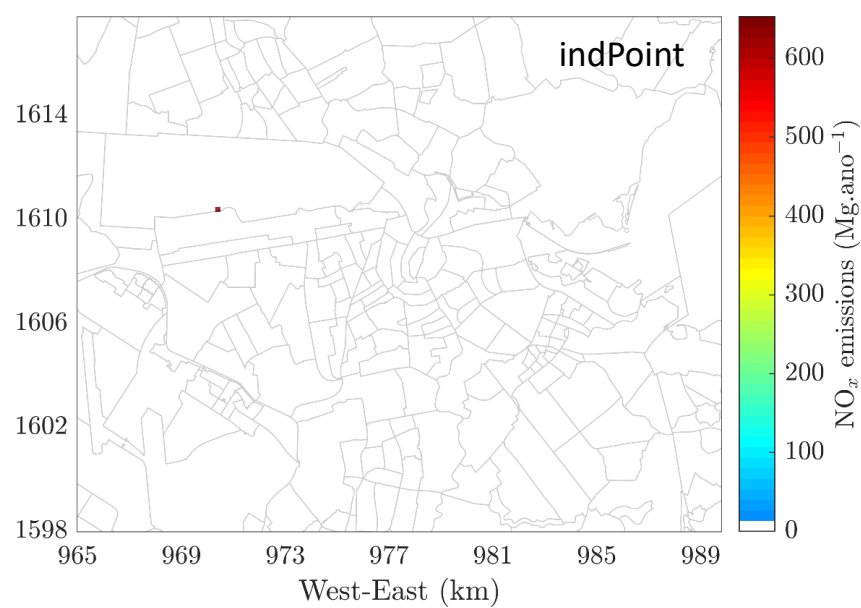
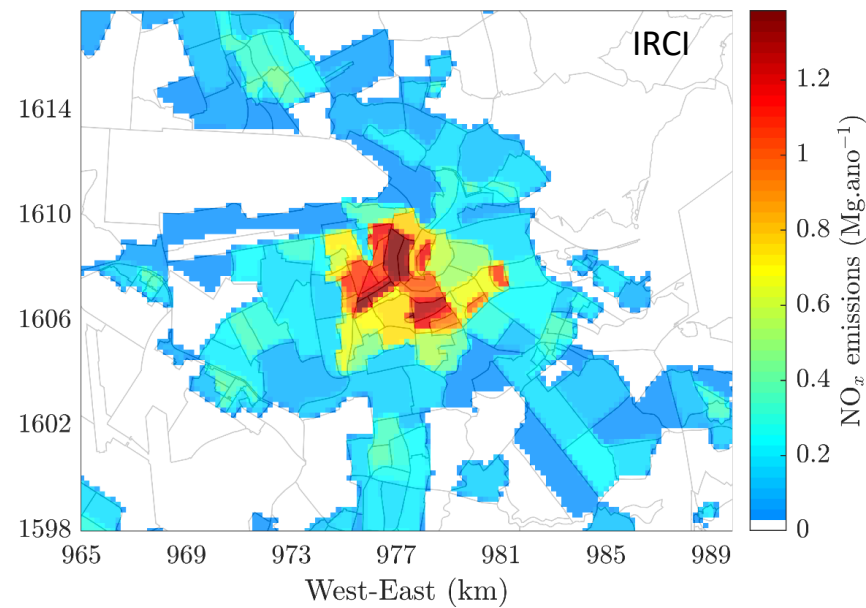
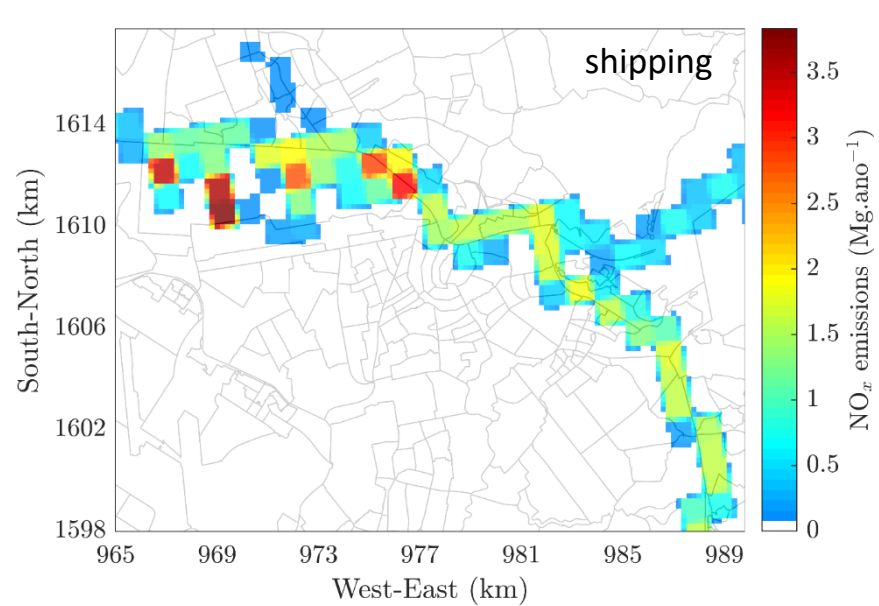
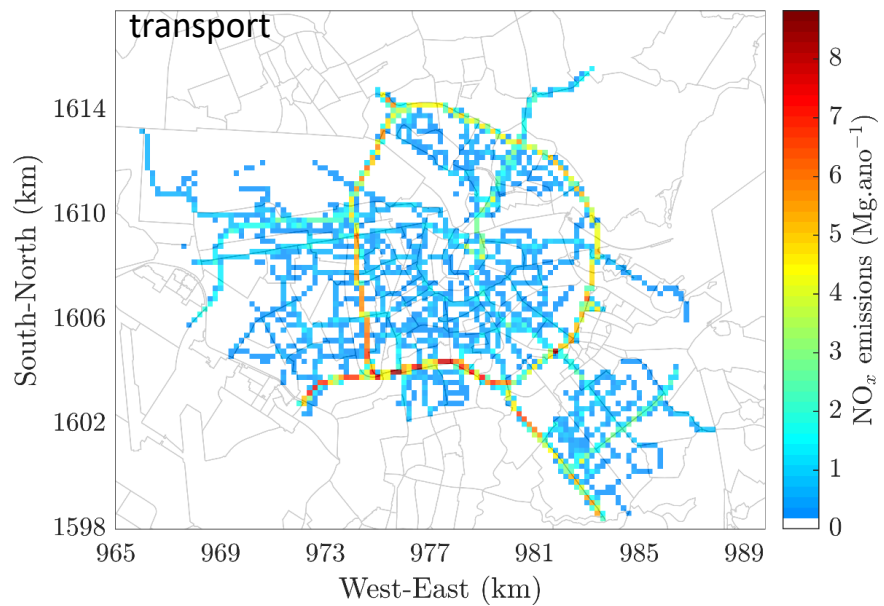
Amsterdam

Air quality summary results

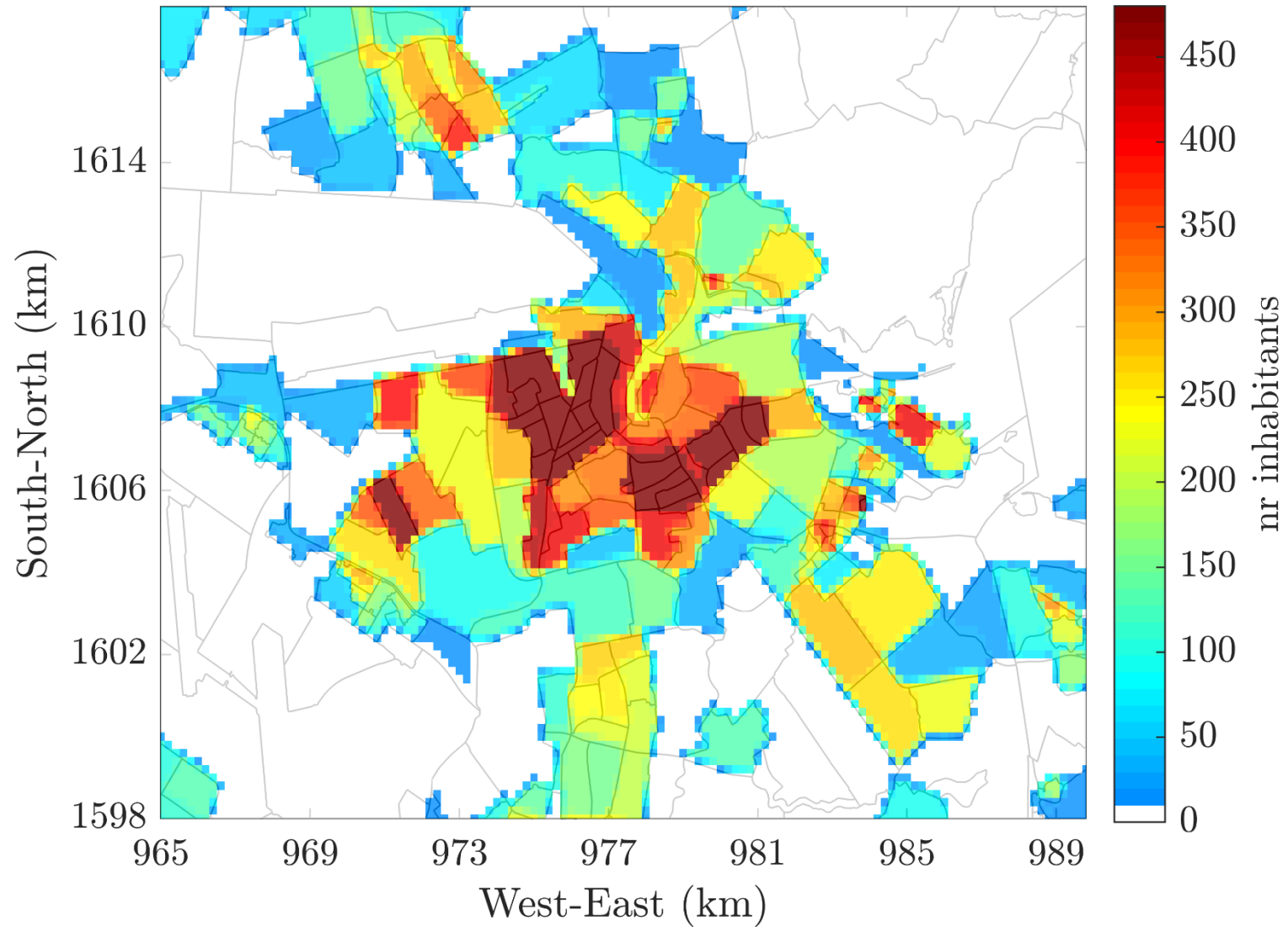
Approach

- Based on the AQ stations type we calculated different adjustment factors to be applied to each sector individually (transport, industrial, residential and commercial, shipping).
- Therefore, we apply specific adjustment factors to each simulated sector, keeping shipping sector as it is (no factor is applied)
- The background concentrations were obtained from GCN; (For the sector contribution we didn't account the background)

NO₂ emissions

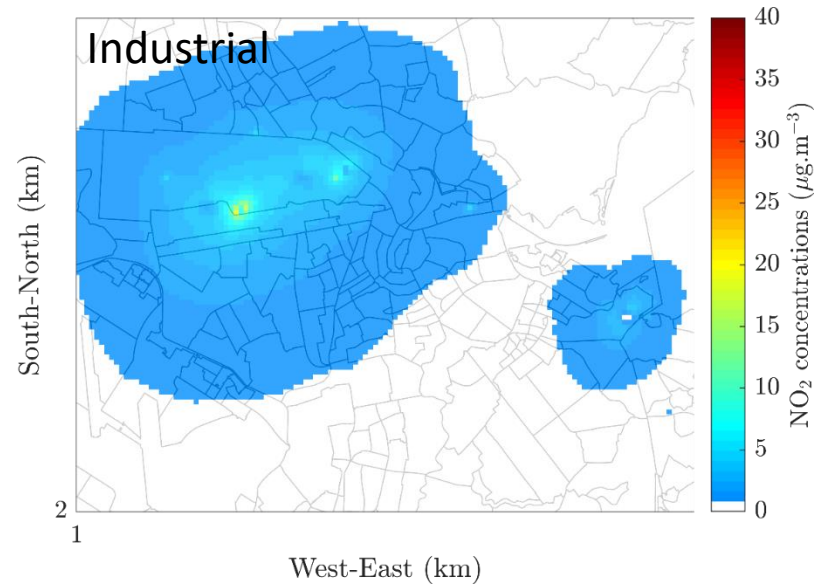
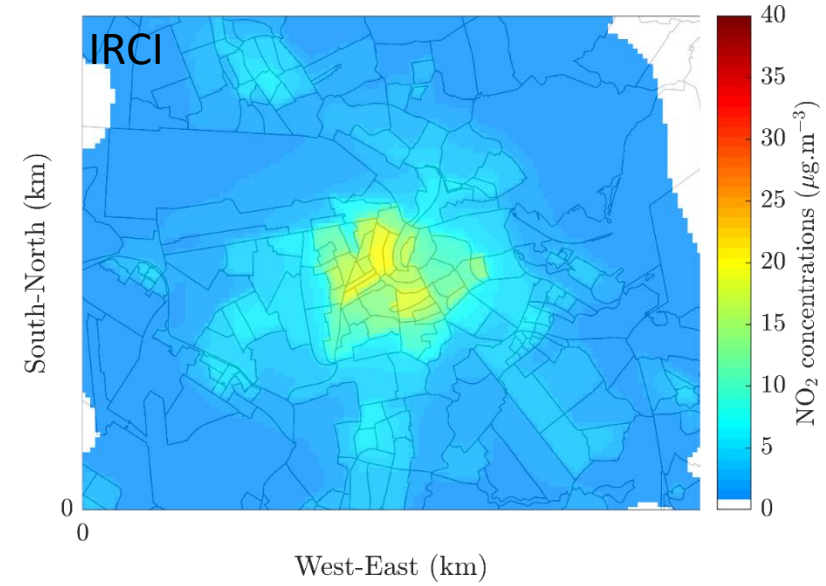
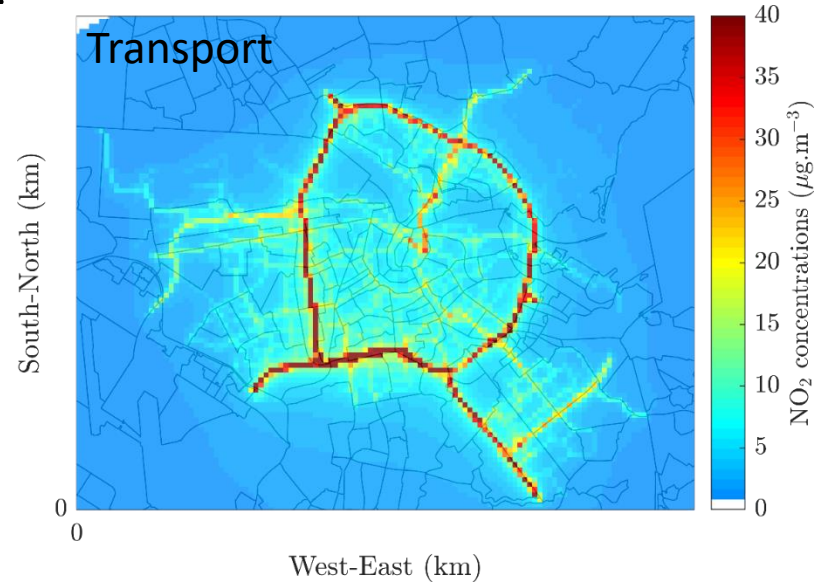


Amestardam Population



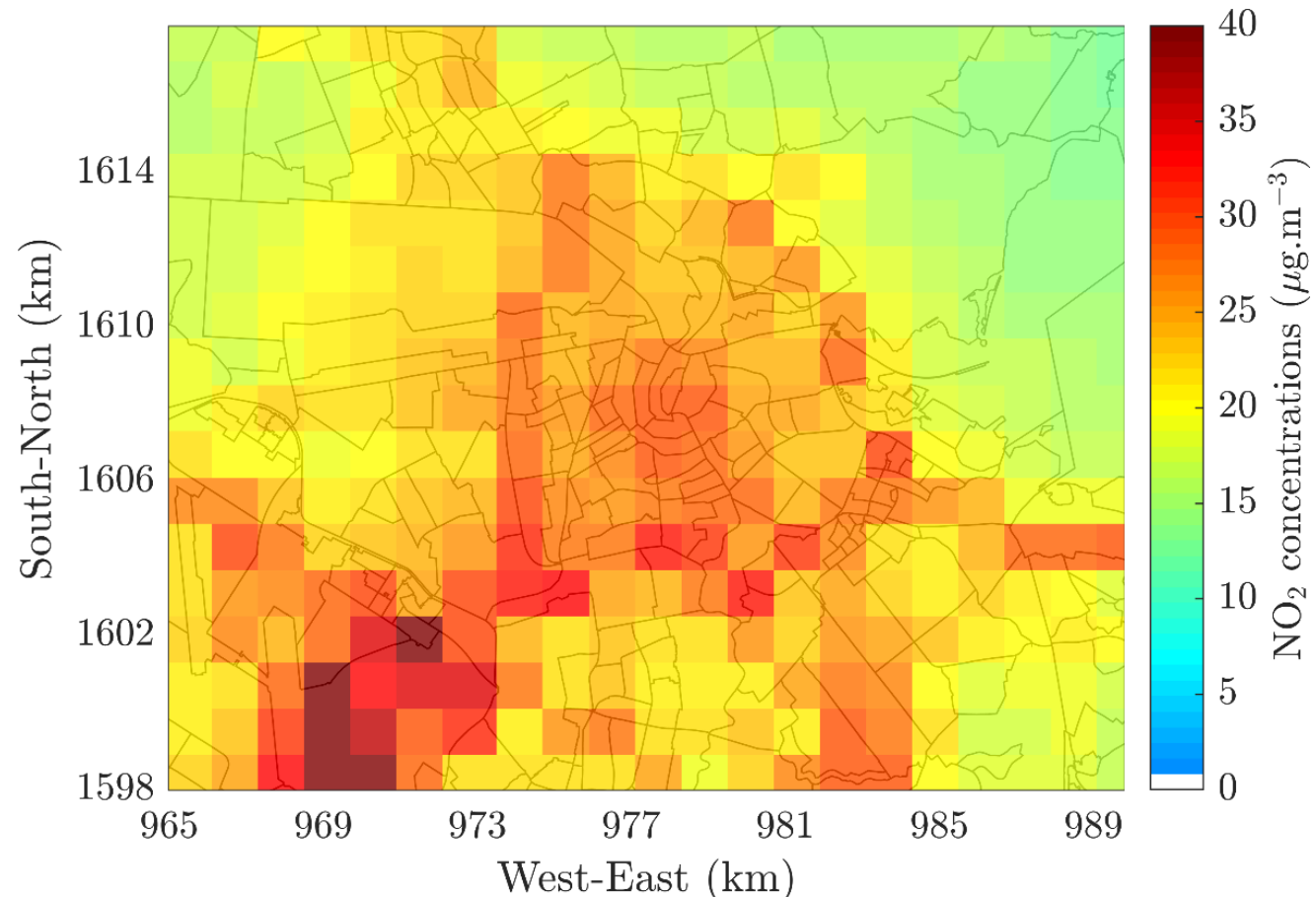
NO₂ concentrations

Outputs from URBAIR: NO₂ concentrations by each sector



Background concentrations obtained from GCN model added to URBAIR outputs

A procedure was defined to **account for the background concentrations**, considering the transboundary contribution and other remaining sources, based on the background concentration maps for 2015 (available on <http://geodata.rivm.nl/gcn/>) published by the National Institute for Public Health and the Environment of the Netherlands (RIVM). The background air pollution maps made available by RIVM are the total annual mean concentrations based on modelled data on 1 km x 1 km grid squares.

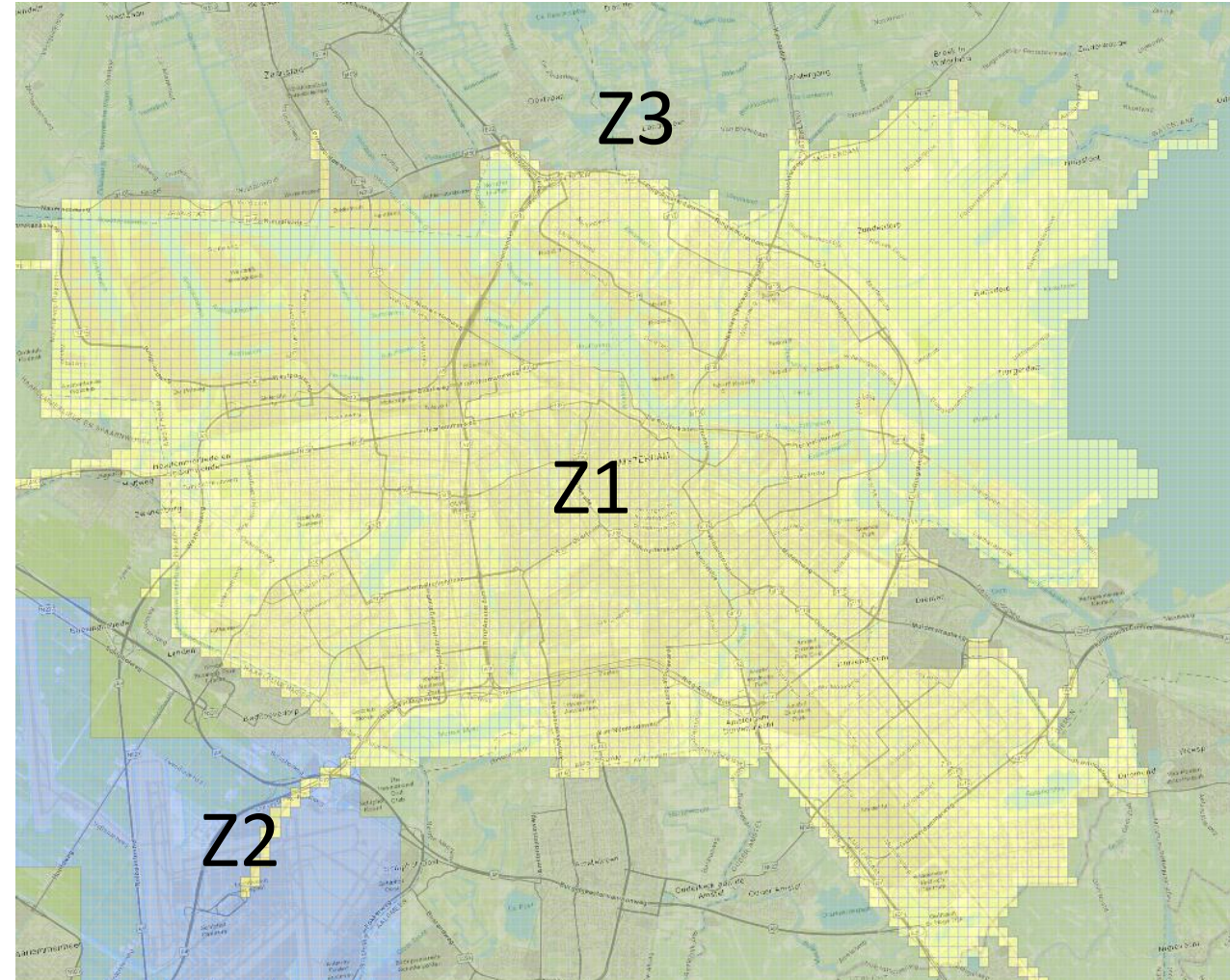


Annual NO₂ concentrations simulated by GCN model for 2015

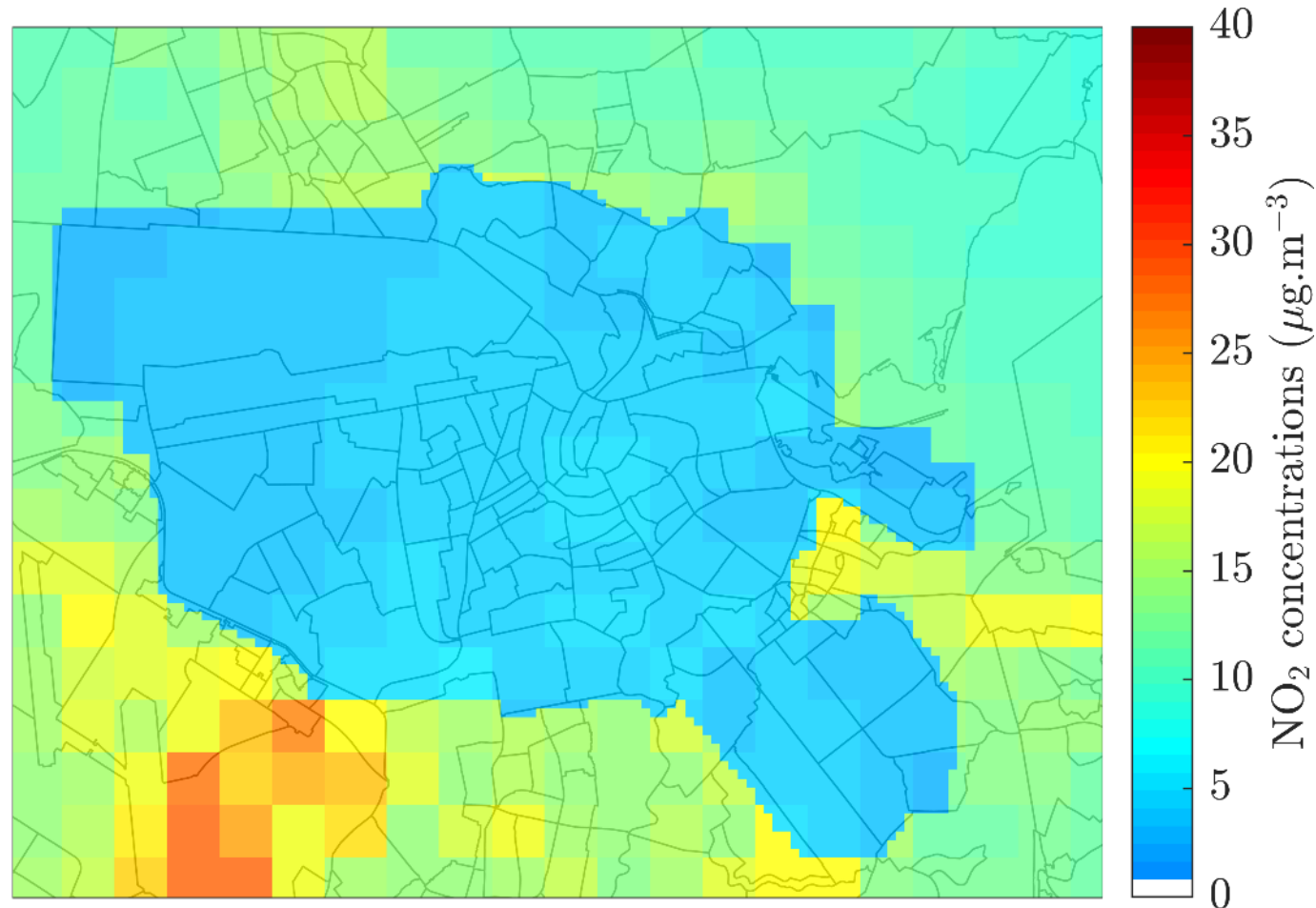
Background concentrations obtained from GCN model added to URBAIR outputs

Based on the source apportionment data made available by GGD Amsterdam using GCN data from 2017 (specific data for Amsterdam), the background concentrations added to the NO₂ concentrations simulated with URBAIR model included the contributions from the following categories:

Categories	Central zone Z ₁	Airport zone Z ₂	Peripheral zone Z ₃
Foreign sources	✓	✓	✓
Traffic/incineration		✓	✓
Traffic/ wear		✓	✓
Mobile tools		✓	✓
Aviation		✓	
Agriculture	✓	✓	✓
Waste processing	✓	✓	✓



Background concentrations obtained from GCN model added to URBAIR outputs



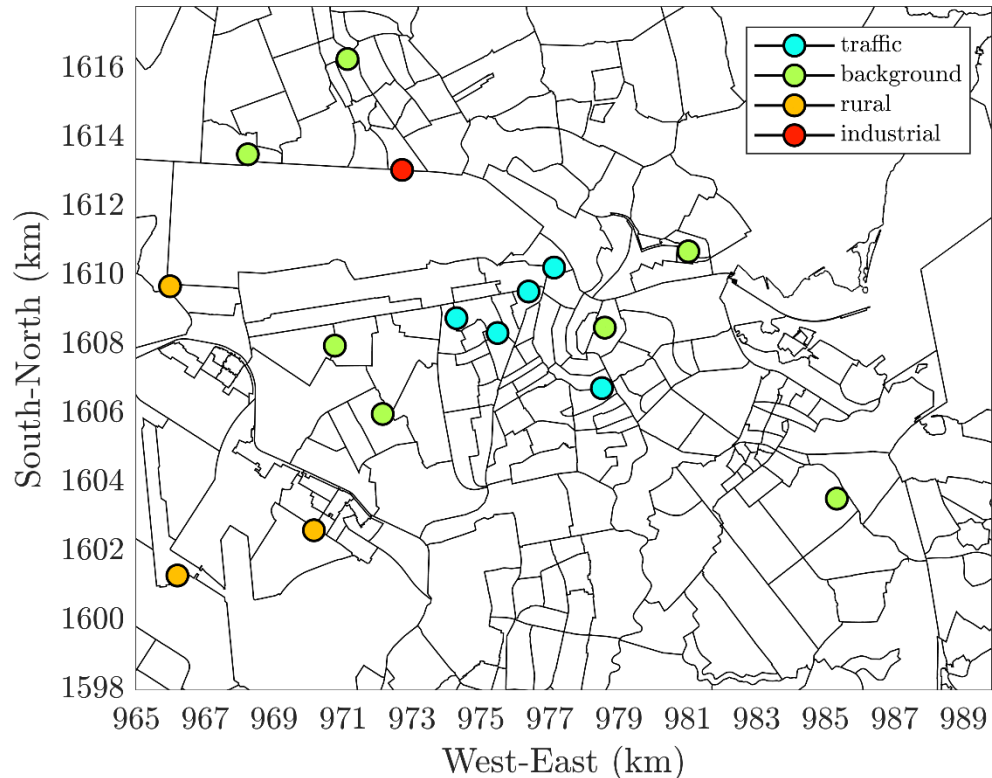
The background concentrations added to the NO₂ concentrations simulated with URBAIR model

Summary of the calculated adjustment factors

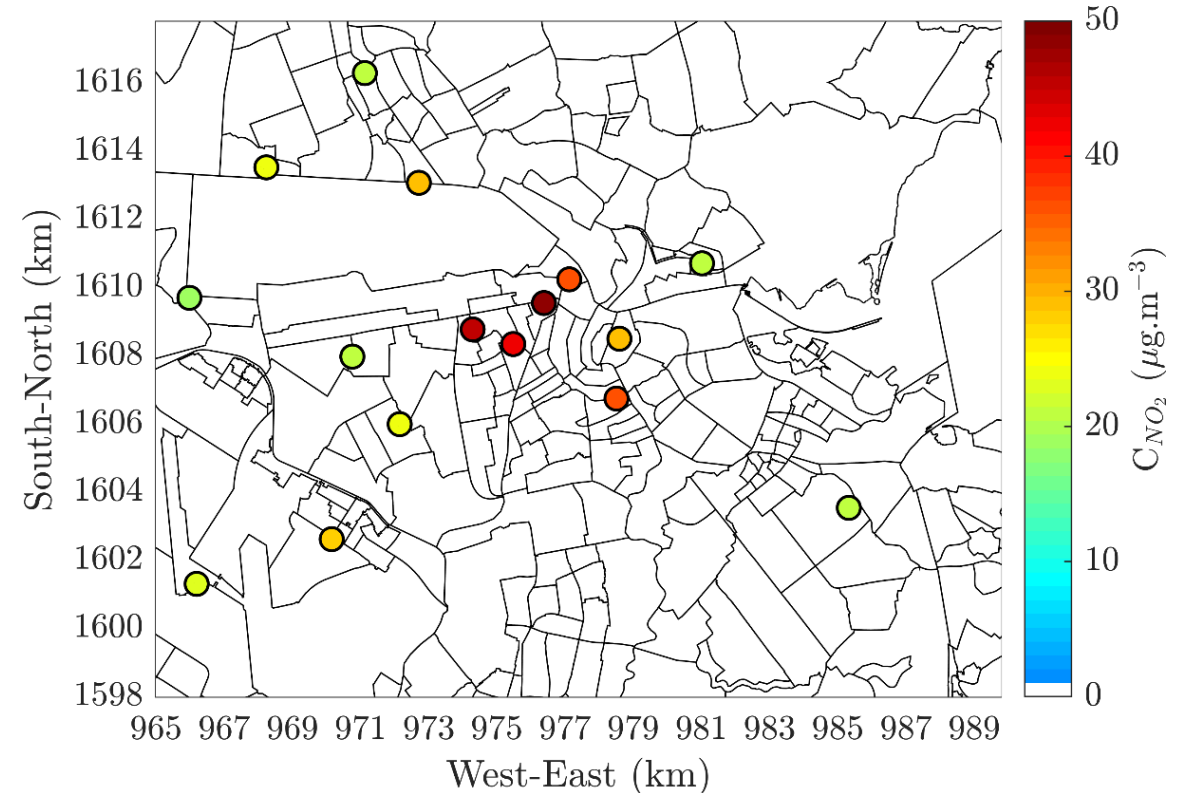
URBAIR outputs together with the added background concentrations were calibrated against the **measurements** through the adjustment procedure. For NO₂ concentrations, the table below presents the slope obtained from the linear correction.

Factor	Factor value
No separation between station type	1.4
Background stations	1.2
Traffic Stations	1.6
Industrial stations	1.3

Summary Data for Air Quality Station measurements in 2015

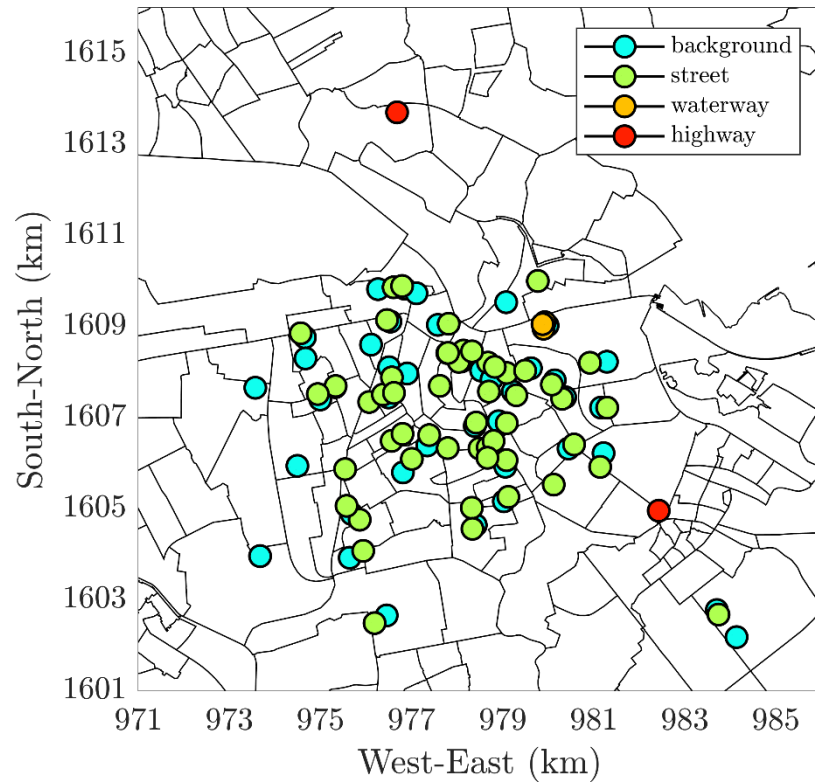


Location of the diffusion tubes with information about the site type

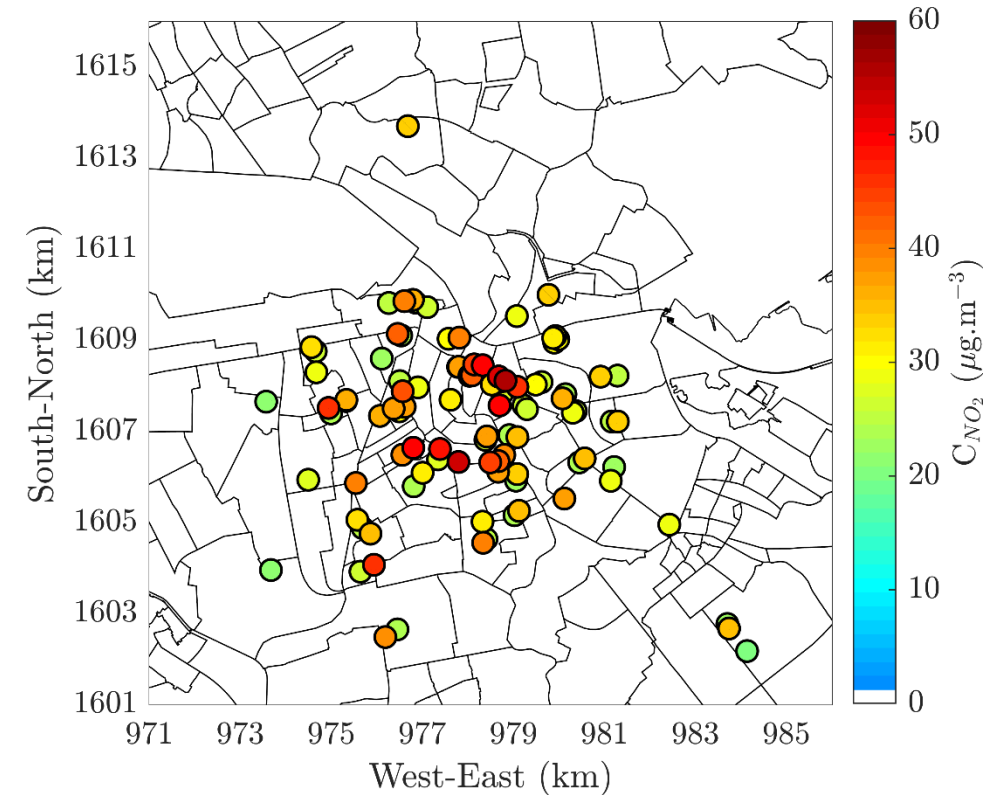


Annual mean NO₂ concentrations measured by each diffusion tube in 2015

Summary Data for palm tubes Sites in 2015



Location of the diffusion tubes with information about the site type



Annual mean NO₂ concentrations measured by each diffusion tube in 2015

Annual NO₂ concentrations simulated by URBAIR model under Claircity

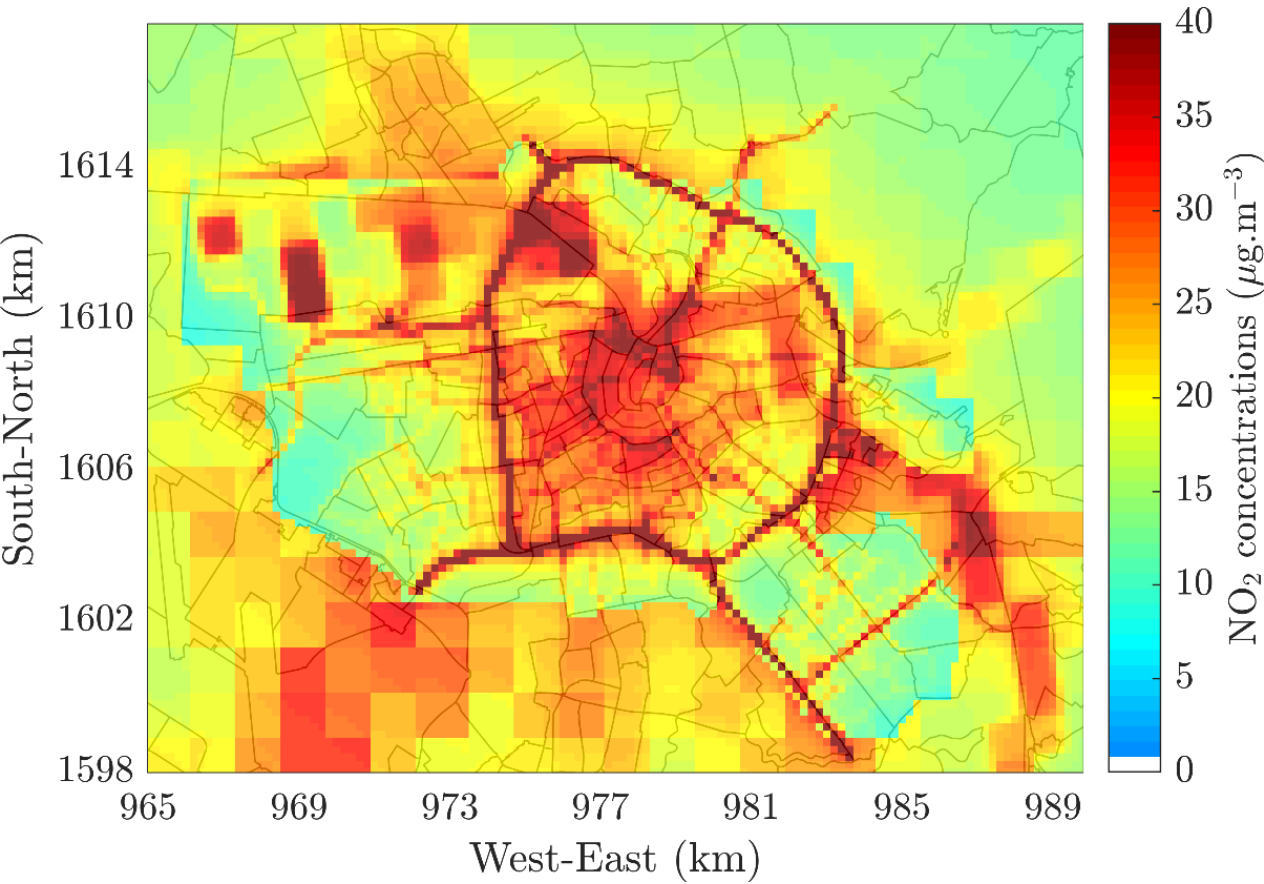


Figure 1: Annual NO₂ concentrations using a standard colorbar (including background concentrations and adjustment factor)

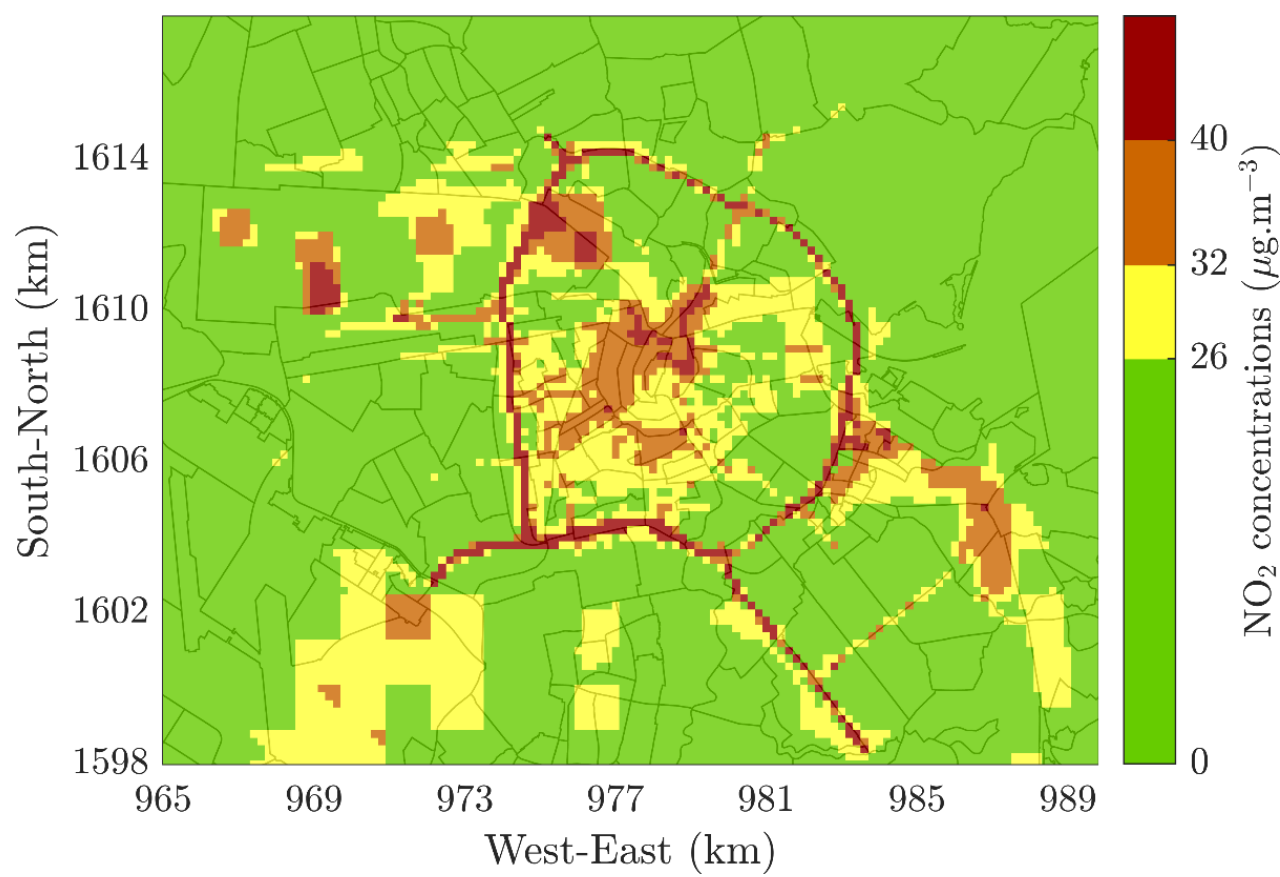
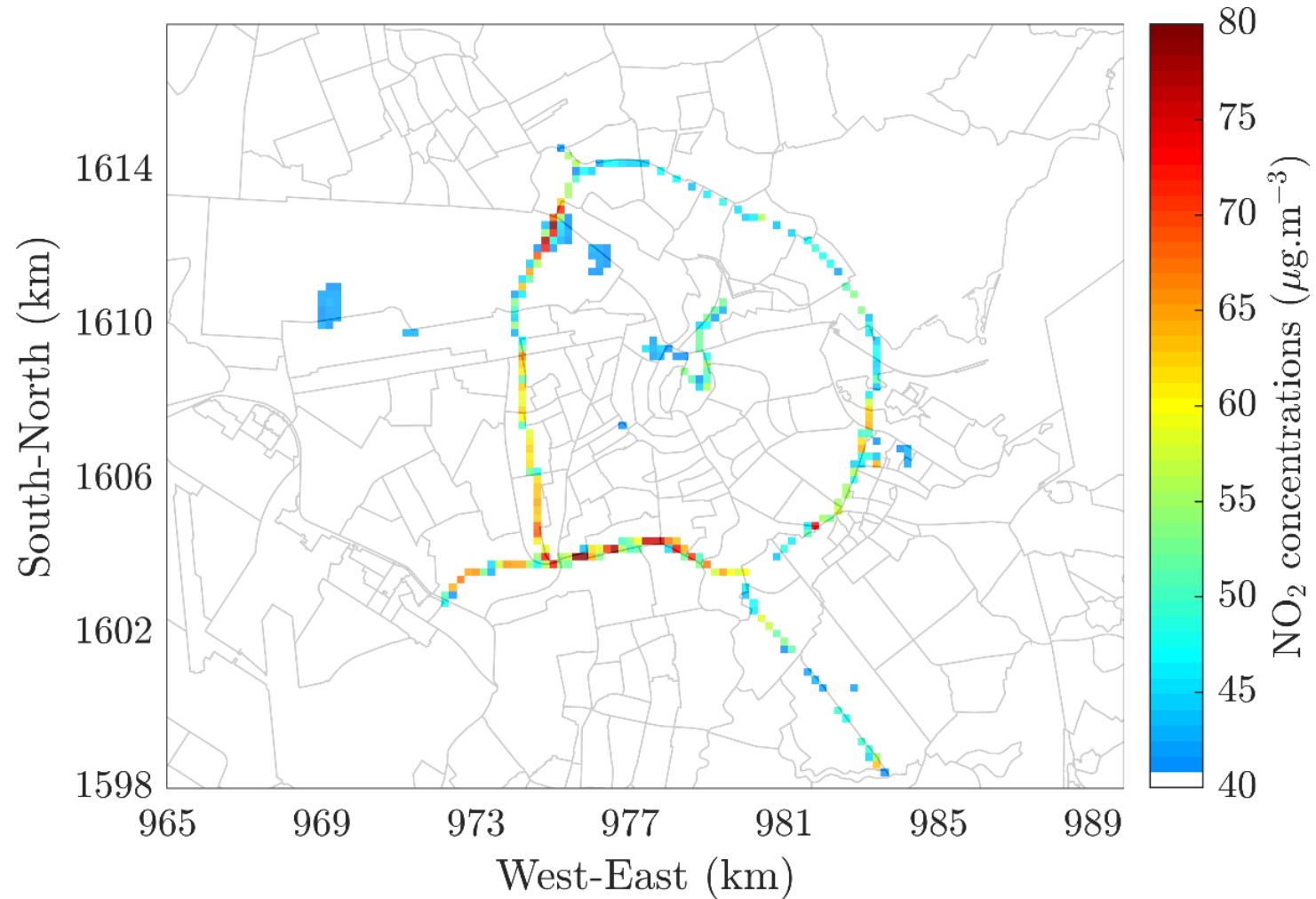


Figure 2: Annual NO₂ concentrations using a customized colorbar based on the EC upper and lower assessment thresholds

Annual NO_2 concentrations over $40 \mu\text{g.m}^{-3}$



Source apportionment analysis – contribution by sector in average over all the domain

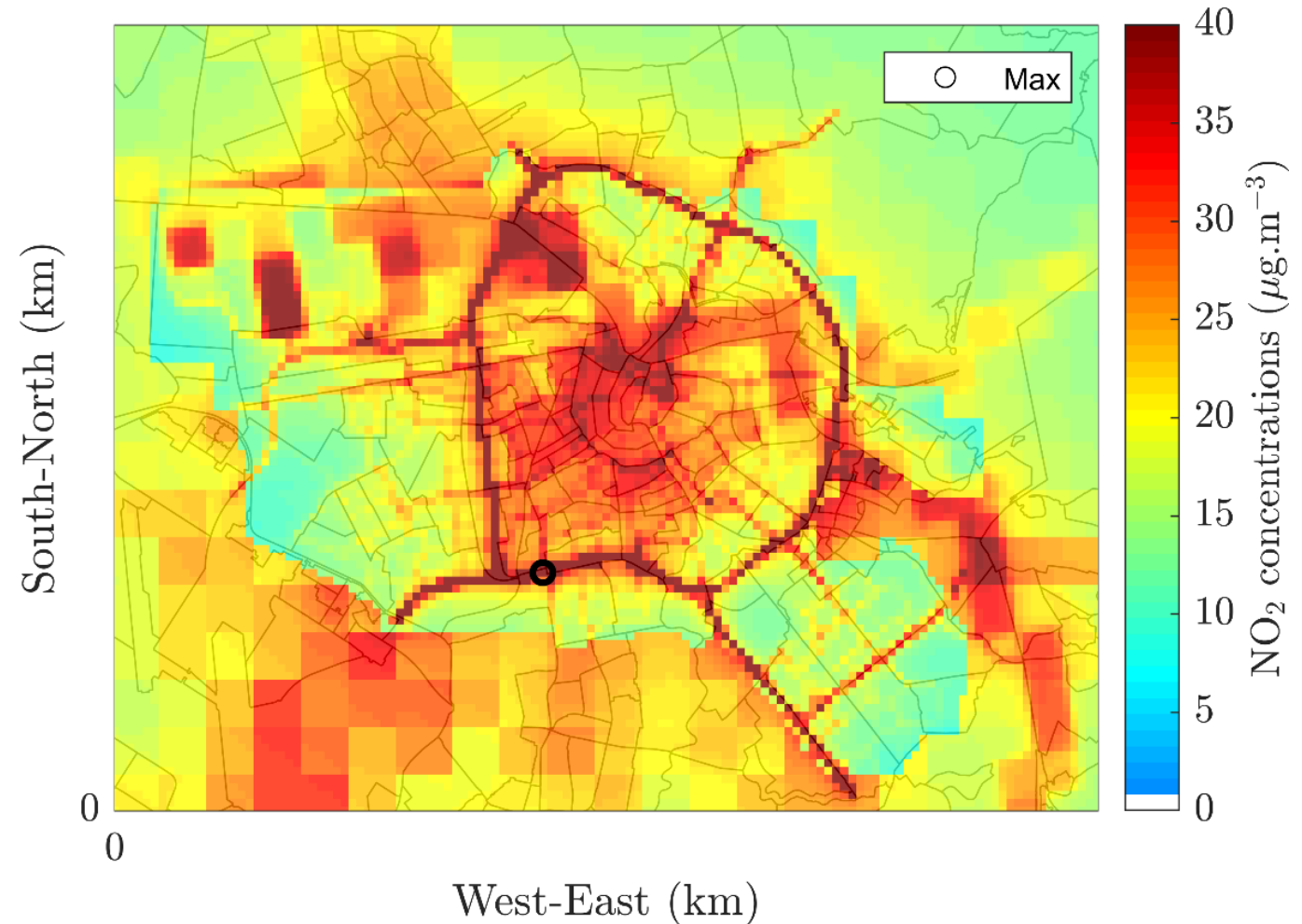
Sector	(%)
Transport	37.62
Shipping	29.16
Industrial	8.97
Residential and commercial	24.25
Total	100

Maximum, minimum and average concentrations over all the domain

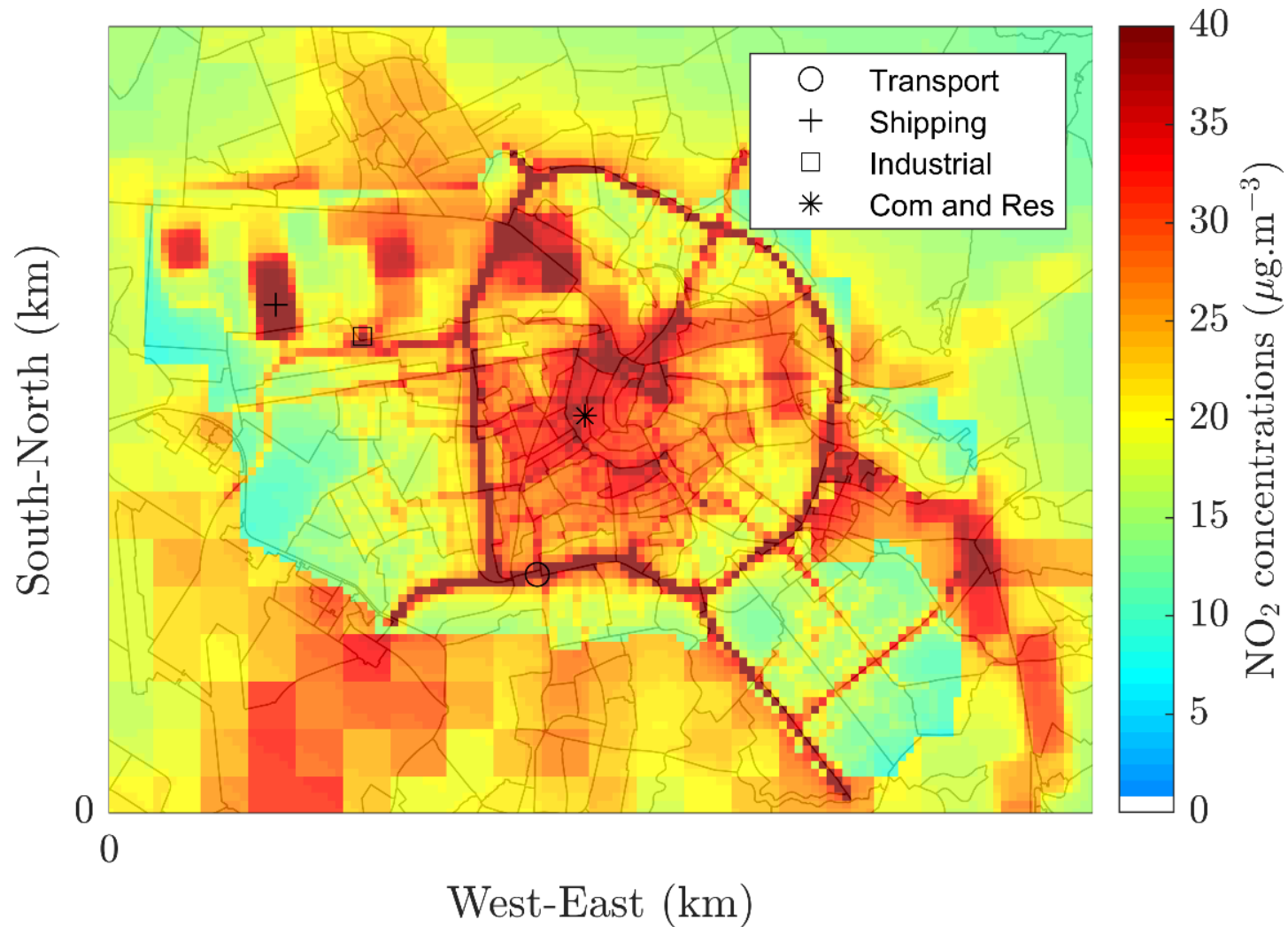
	($\mu\text{g}\cdot\text{m}^{-3}$)
MAX	82.7
MIN	8.6
MEAN	21.7

Contribution by sector for the cell where the maximum concentration was simulated

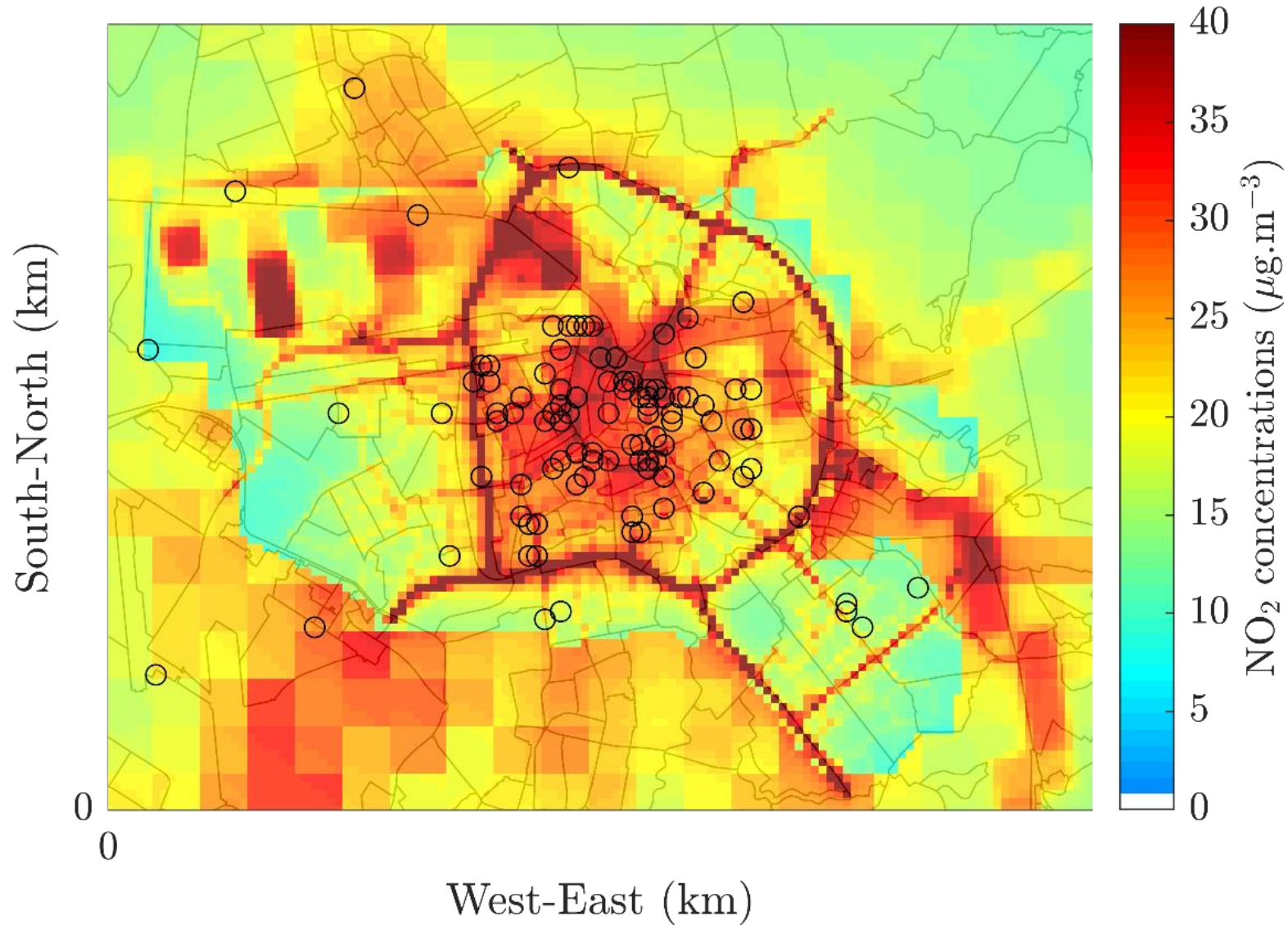
Sector	Contribution by sector for the cell (%)
	Max
Transport	89.8
Shipping	2.3
Industrial	1.1
Commercial and residential	6.8



Location of the maximum value by sector



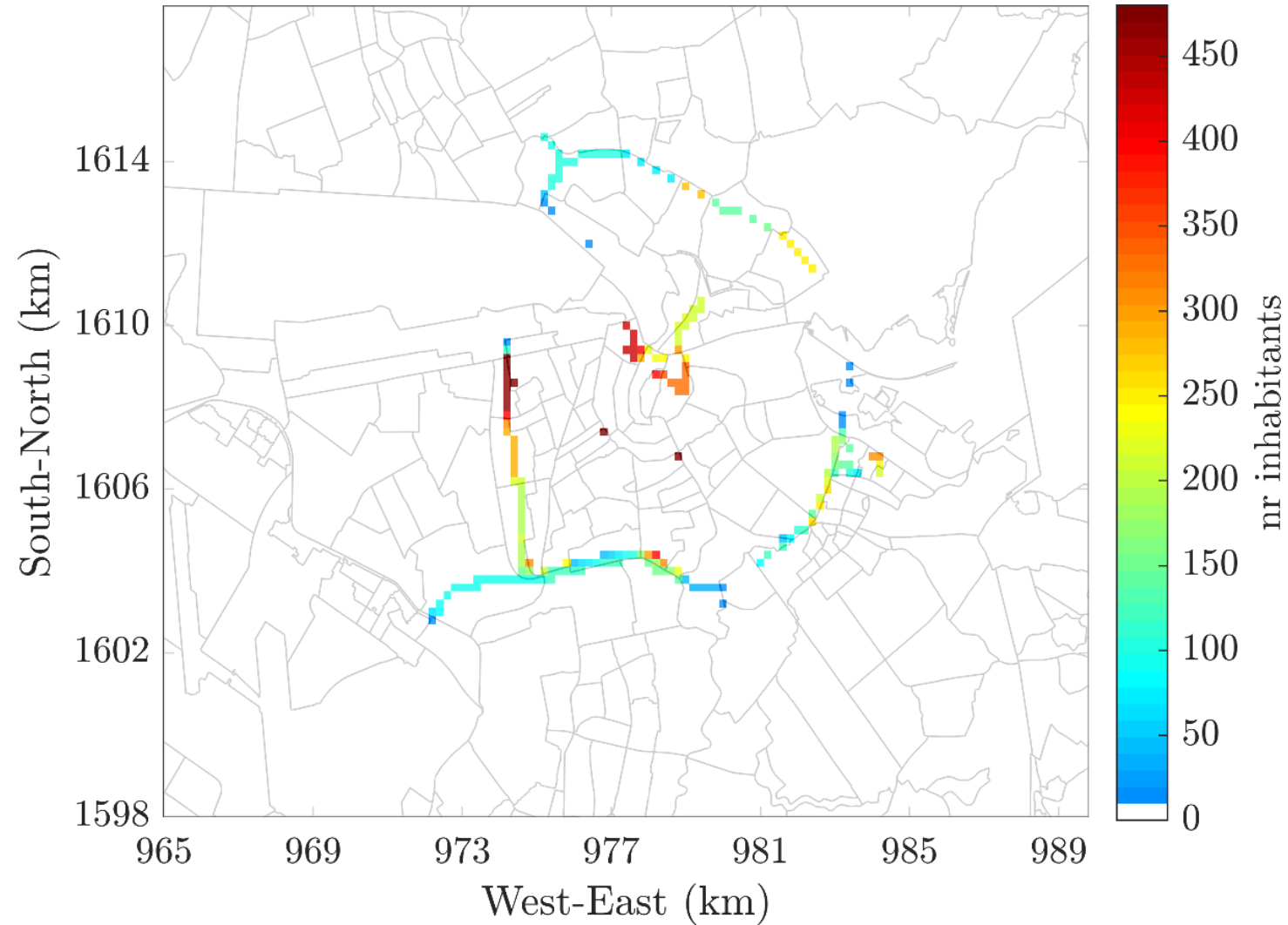
AQS and tubes locations



Comparison between measured and modelled concentrations

Station	Concentration		Sector contribution for the location of the station (%)			
	Measured	Modelled	Transport	Shipping	Industrial	Commercial and residential
NL00002	49	33.9	28.7	13.4	5.8	52.1
NL00003	21.9	23.7	21.4	47.7	5.9	25.1
NL00007	45.7	60.9	79.6	4.5	3.7	12.2
NL00012	36.4	36.6	27.3	40.2	4.8	27.6
NL00014	24.5	18.8	55.1	9	5	30.8
NL00017	37.1	38.3	37.1	6.4	2.5	54
NL00019	29.1	51.4	55.7	17.9	2.2	24.2
NL00020	42.9	28.1	28.8	10.2	6.5	54.5
NL00021	21.1	13.1	35.9	26	9.8	28.3
NL00022	21.2	16.6	36.4	16.7	20.4	26.5
NL00546	29.8	26.6	8.8	73.2	10.9	7.1
NL00561	28.9	26.3	32.1	19.4	14	34.4
NL00565	23.5	21.4	29.1	26.2	18.8	25.9
NL00701	21.7	24.3	11.6	26.2	9.7	52.5
NL00703	19.2	8.8	24.2	37.4	19.7	18.7
NL00704	24.4	18.9	7.7	77.8	7.7	6.8

Population exposed to values above EU limits and WHO guidelines



PM10

Summary of the calculated adjustment factors

URBAIR outputs together with the added background concentrations were calibrated against the **measurements** through the adjustment procedure. The table below presents the slope obtained from the linear correction.

Factor	Factor value
No separation between station type	3.2
Background stations	2.9
Traffic Stations	2.97

Annual PM10 concentrations simulated by URBAIR model under Claircity

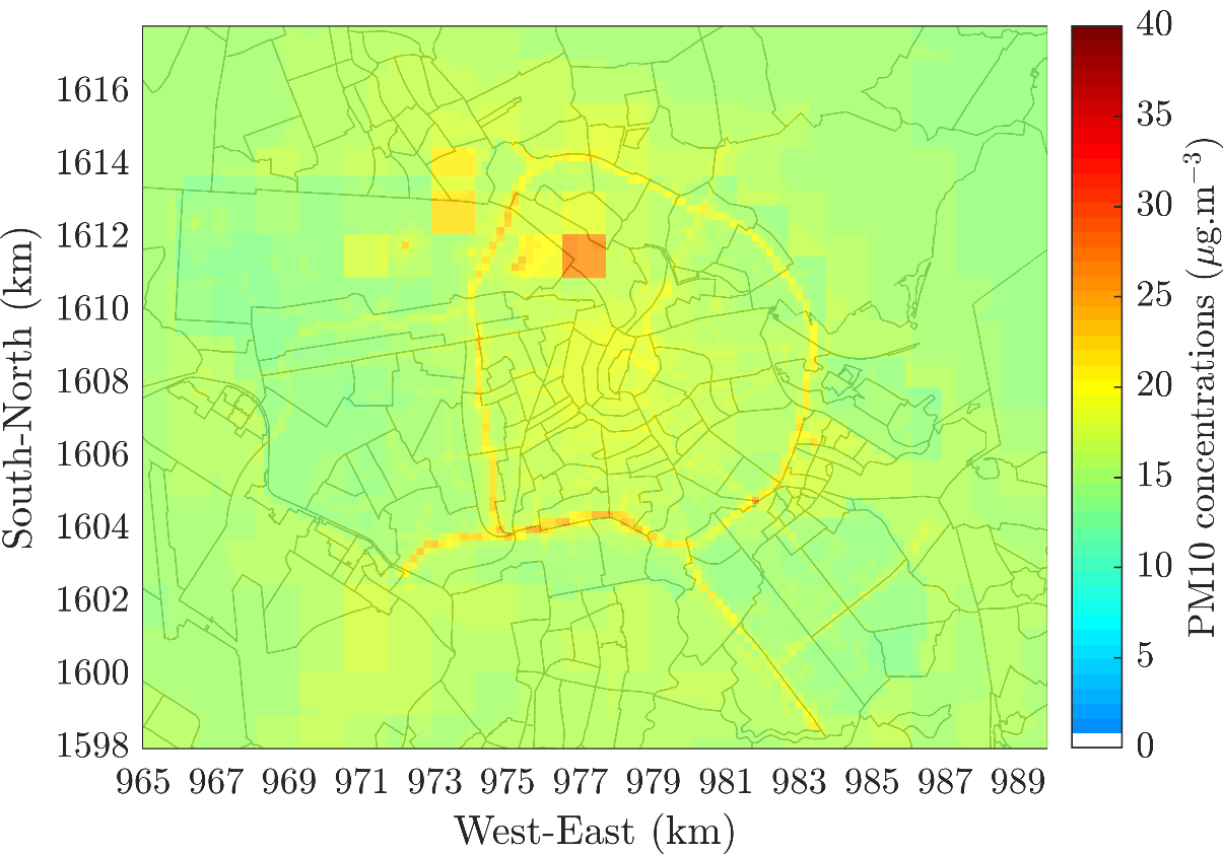


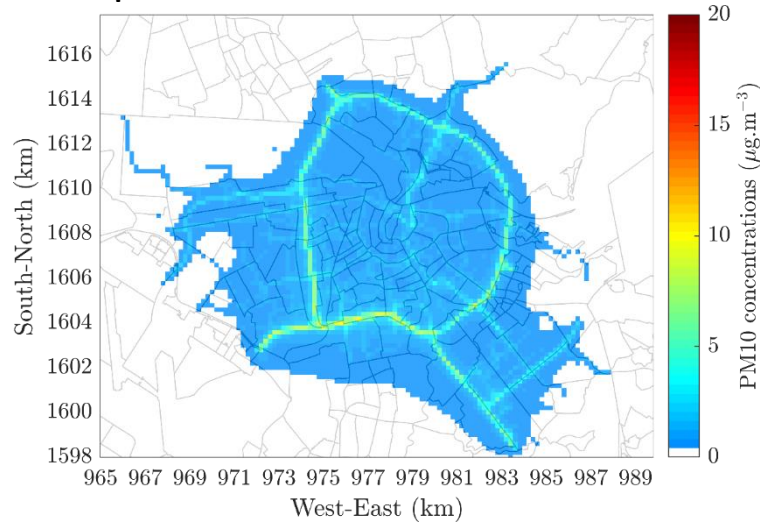
Figure 1: Annual PM10 concentrations using a standard colorbar (including background concentrations and adjustment factor)



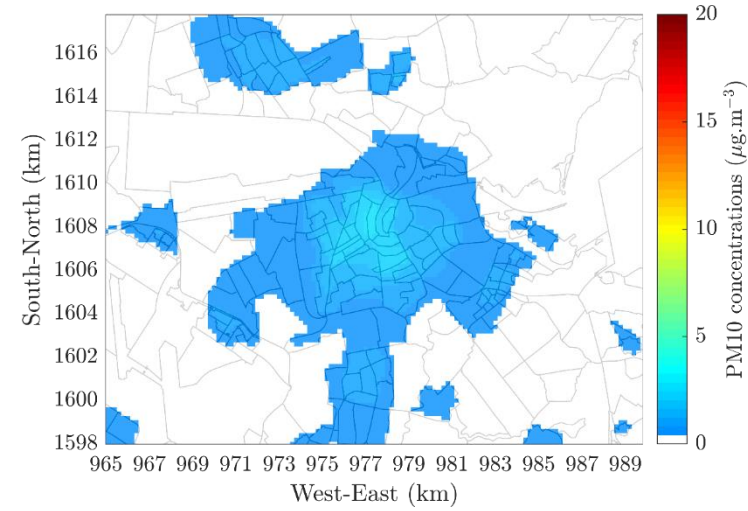
Figure 2: Annual PM10 concentrations using a customized colorbar based on the EC upper and lower assessment thresholds

Outputs from URBAIR: PM10 concentrations by each sector

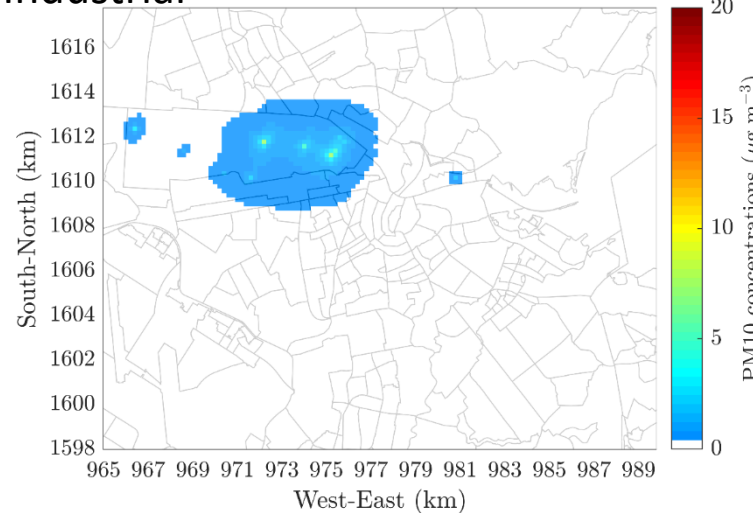
Transport



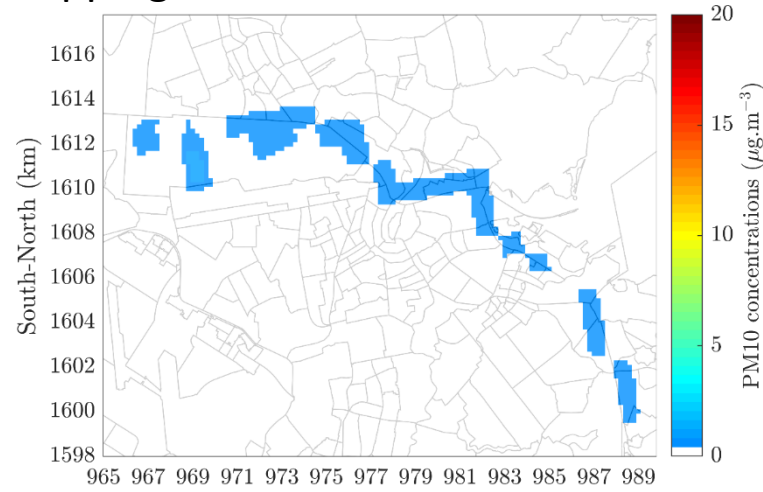
IRCI



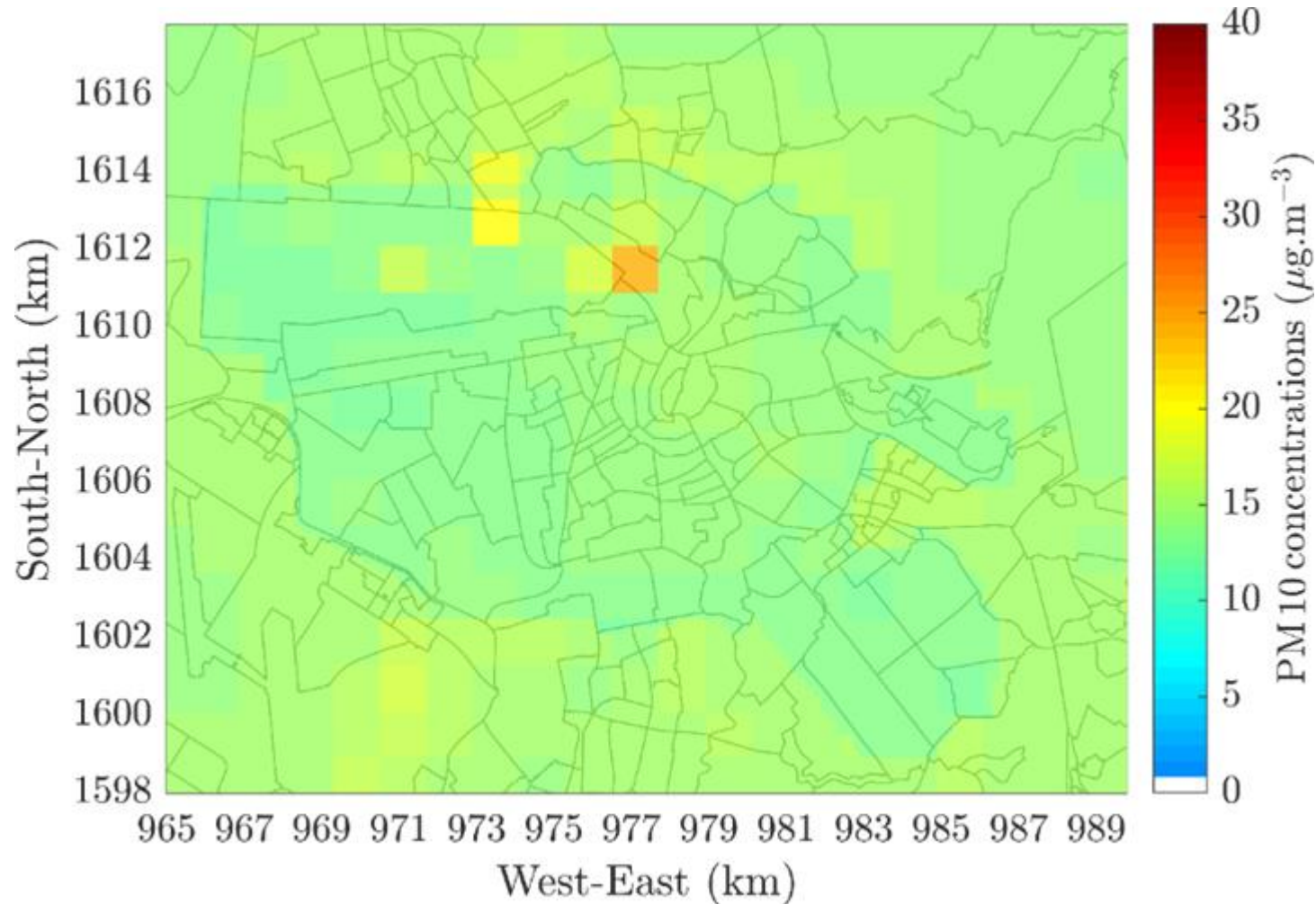
Industrial



Shipping



Background concentrations obtained from GCN model added to URBAIR outputs



Source apportionment analysis – contribution by sector in average over all the domain

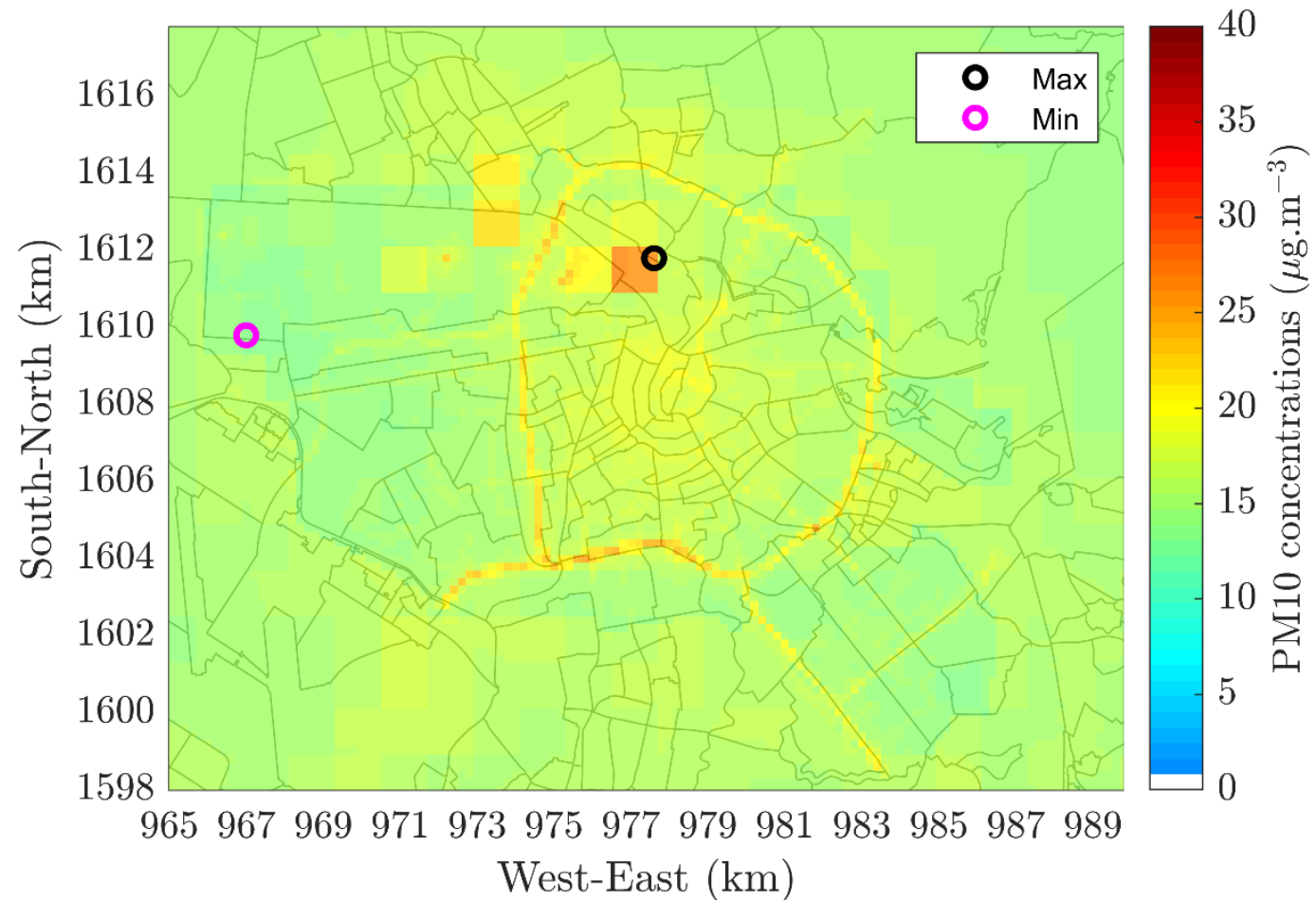
Sector	(%)
Transport	46.2
Shipping	7.9
Industrial	14.5
Residential and commercial	31.4
Total	100

Maximum, minimum and average concentrations over all the domain

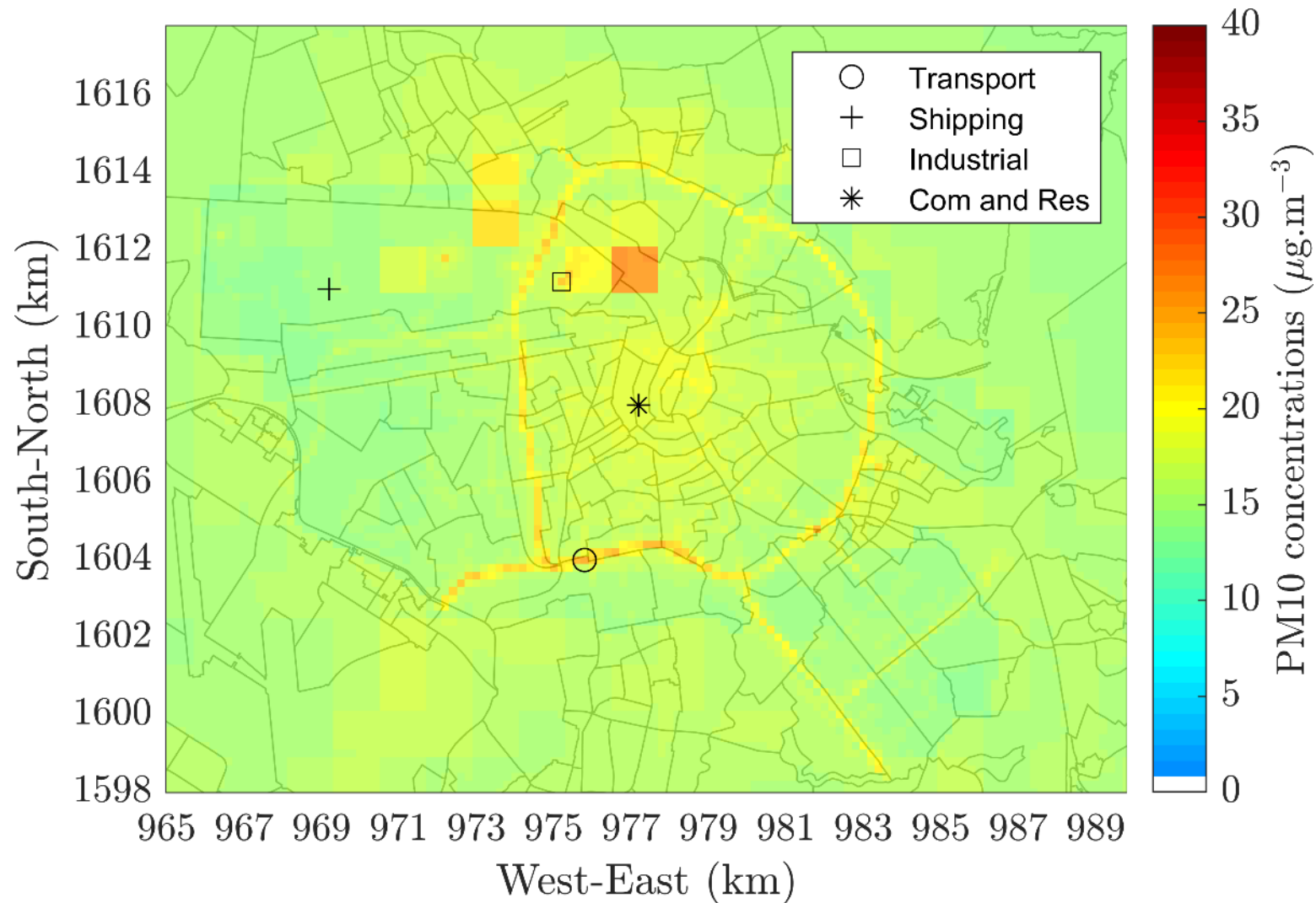
	($\mu\text{g}\cdot\text{m}^{-3}$)
MAX	26.4
MIN	13.3
MEAN	15.8

Contribution by sector for the cell where the maximum concentration was simulated

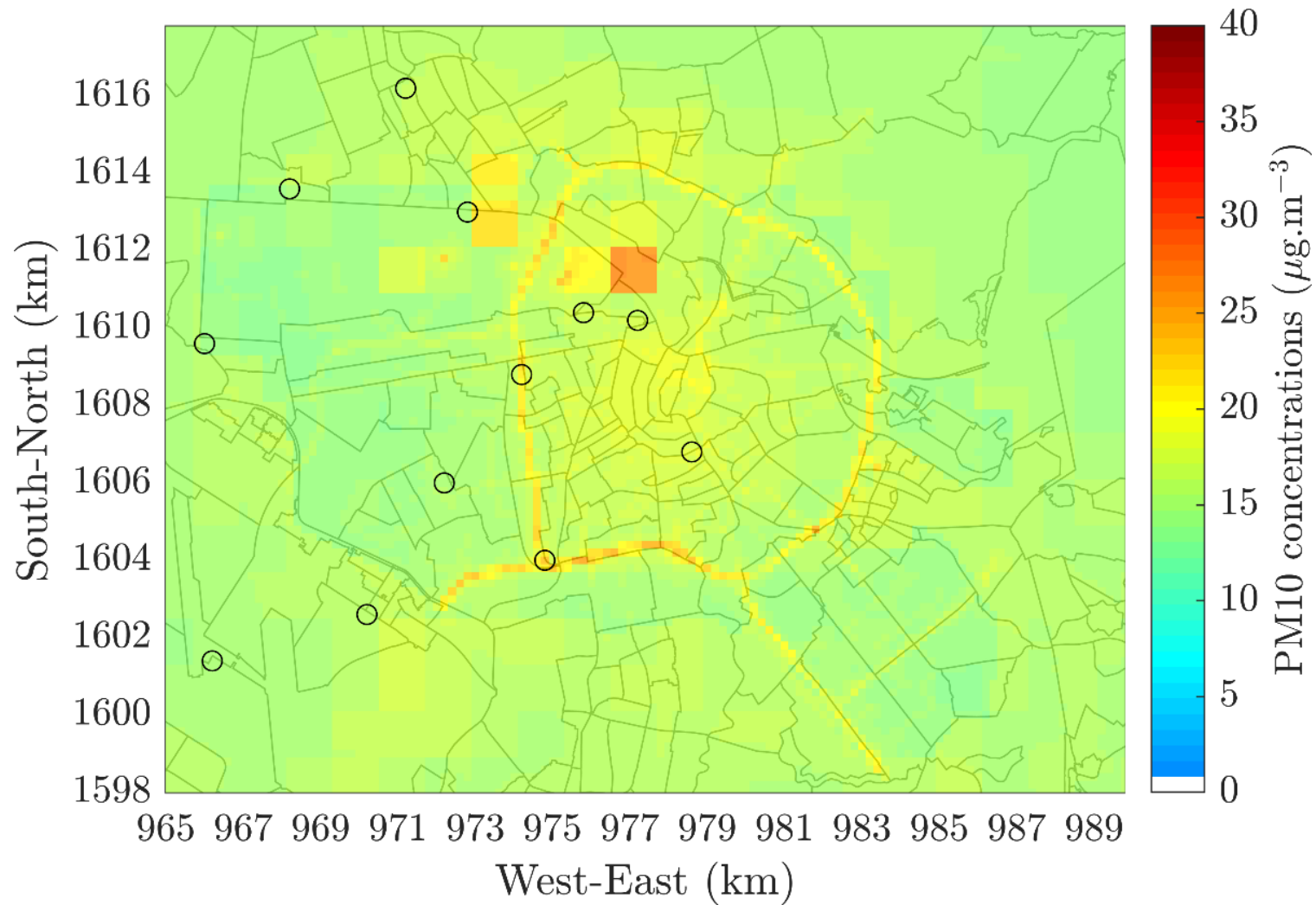
Sector	Contribution by sector for the cell (%)
	Max
Transport	54.7
Shipping	9.6
Industrial	16.2
Commercial and residential	19.6



Location of the maximum value by sector



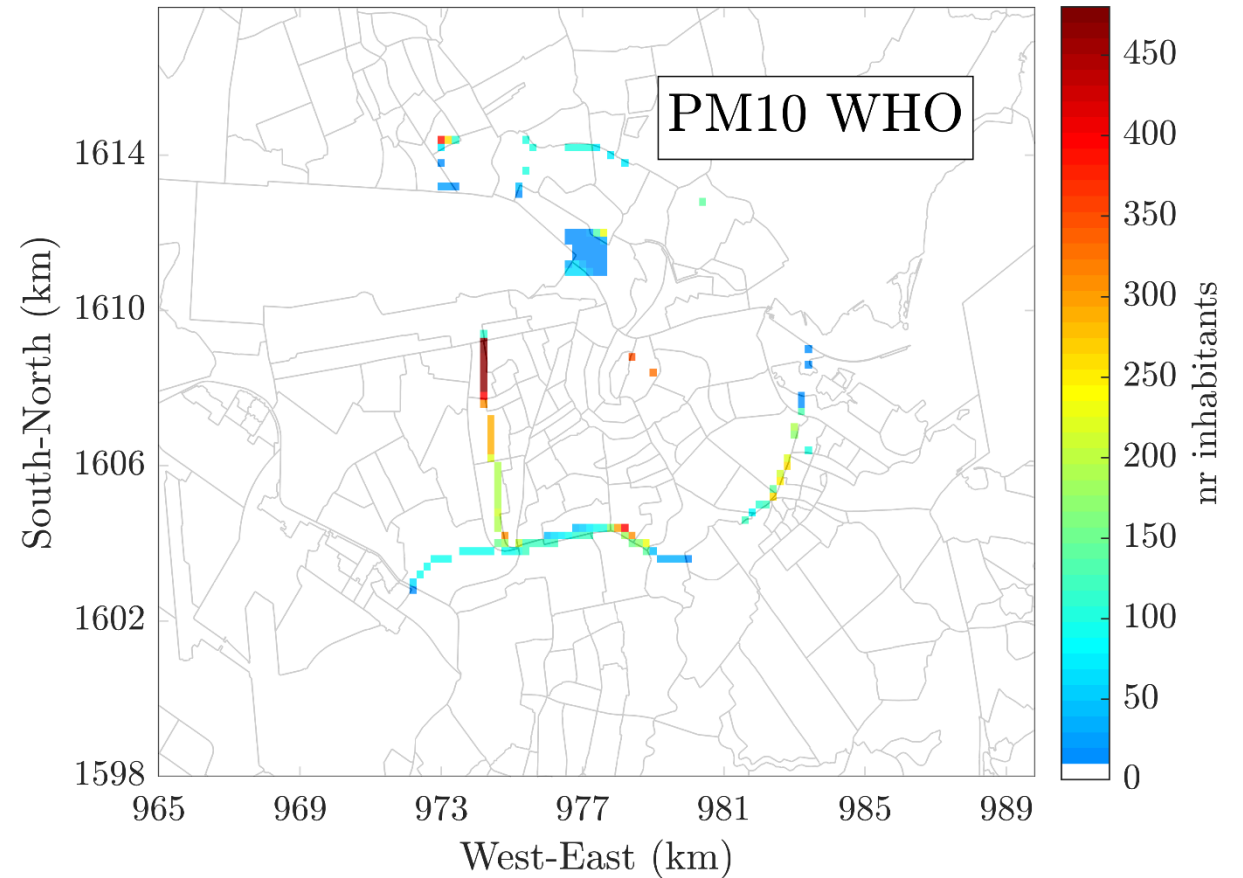
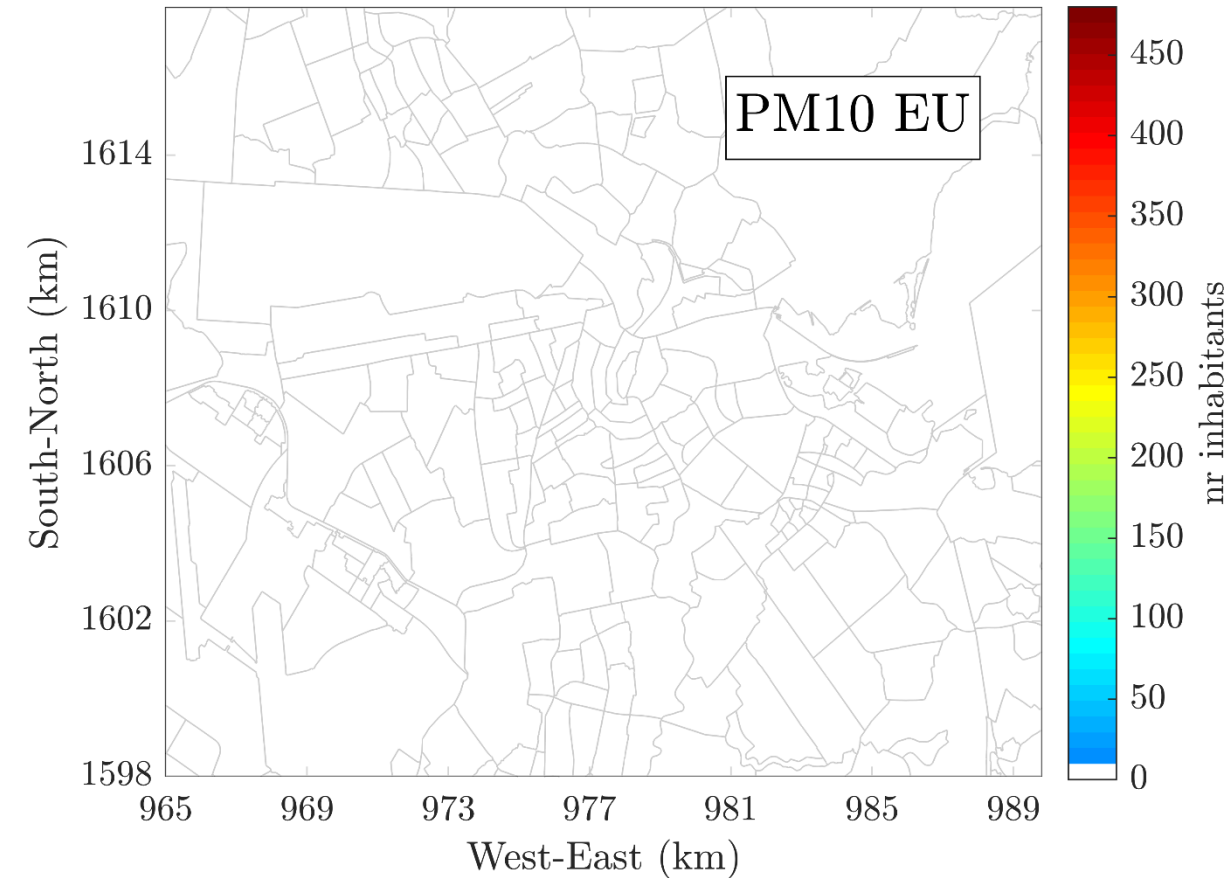
AQS and tubes locations



Comparison between measured and modelled concentrations

Station	Concentration		Sector contribution for the location of the station (%)			
	Measured	Modelled	Transport	Shipping	Industrial	Commercial and residential
NL00007	21.4	21.1	81.3	1	5.8	11.9
NL00012	22.7	17.5	37.3	12.9	11.4	38.3
NL00014	17.2	14.9	40.6	2.9	14.5	42
NL00016	17	17.7	44.8	4.2	23.7	27.3
NL00017	21	18.5	40.8	1.4	3.6	54.2
NL00545	21.4	23.1	90.5	0.4	1.7	7.4
NL00546	20.3	15.1	15.2	32.4	37.9	14.4
NL00561	21.6	15.7	35.5	4.7	18.3	41.5
NL00565	17.2	14.8	34.4	7	25.6	33
NL00701	19.5	16.3	10.5	3.9	12.8	72.8
NL00703	17.2	13.9	29.8	10.7	31.3	28.2
NL00704	17.4	14.9	16	41.5	26.5	16

Population exposed to values above EU limits and WHO guidelines



PM2.5

Summary of the calculated adjustment factor

URBAIR outputs together with the added background concentrations were calibrated against the **measurements** through the adjustment procedure. The table below presents the slope obtained from the linear correction.

Factor	Factor value
No separation between station type	4.3

Annual PM2.5 concentrations simulated by URBAIR model under Claircity

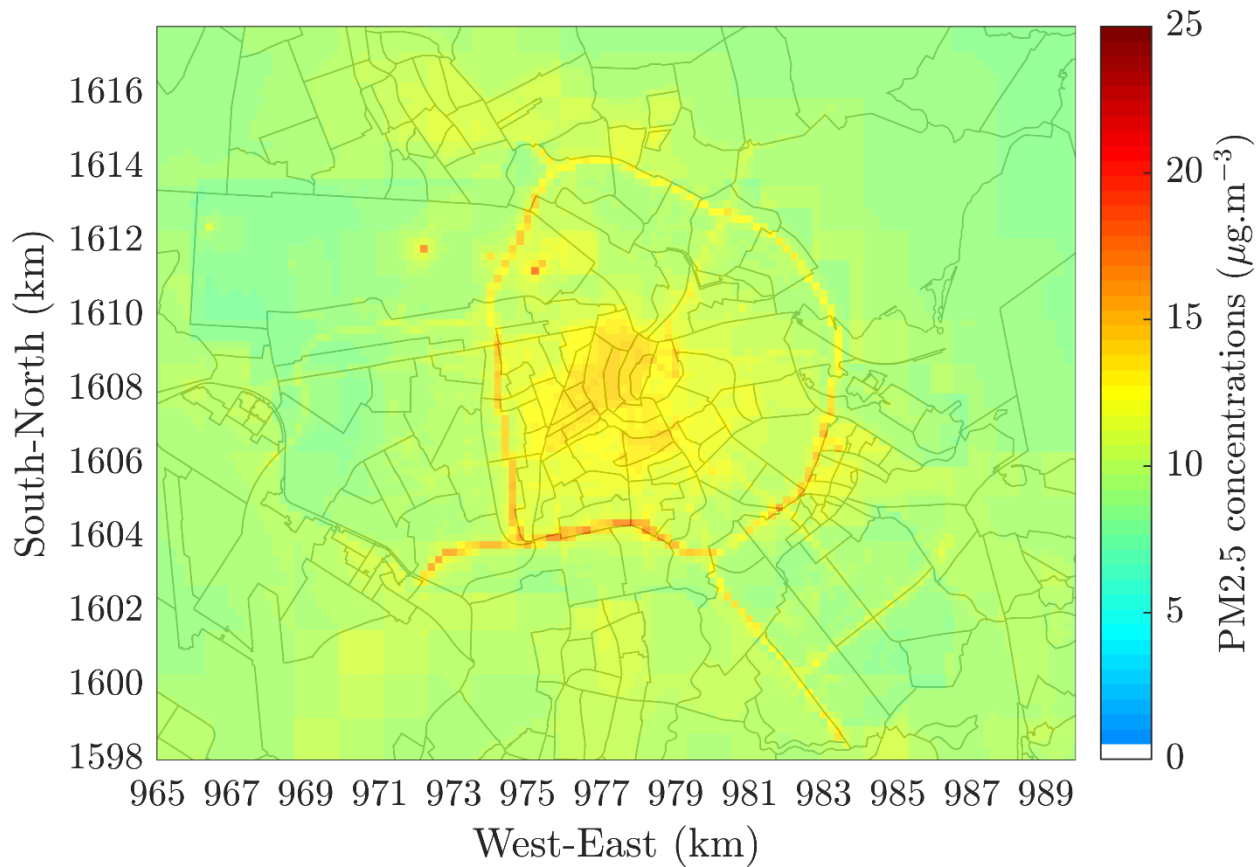
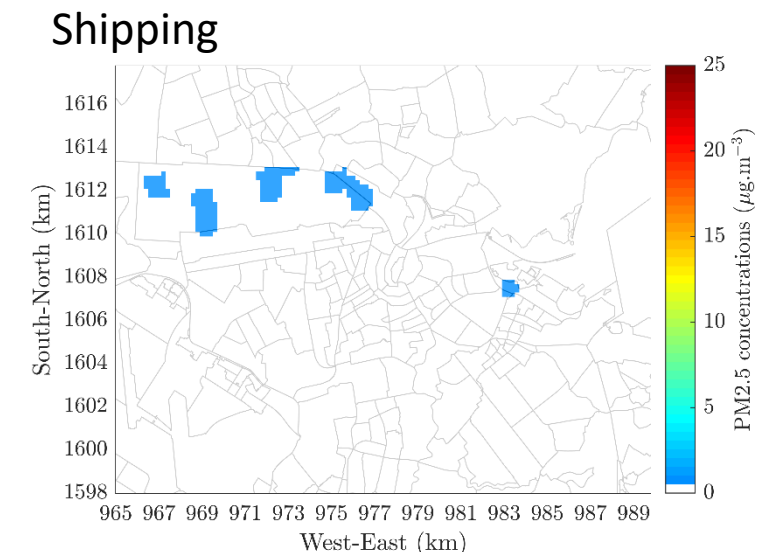
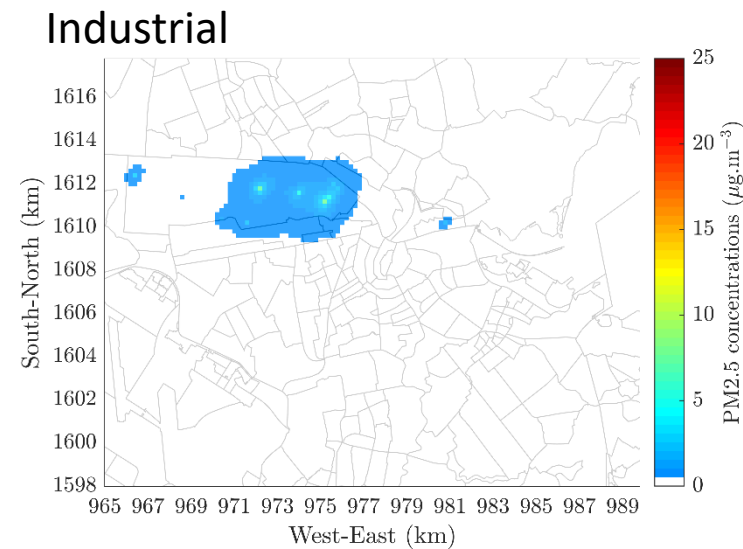
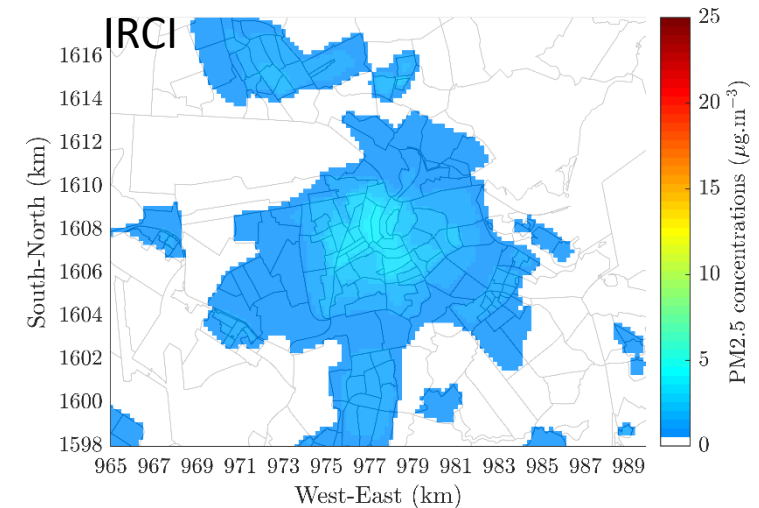
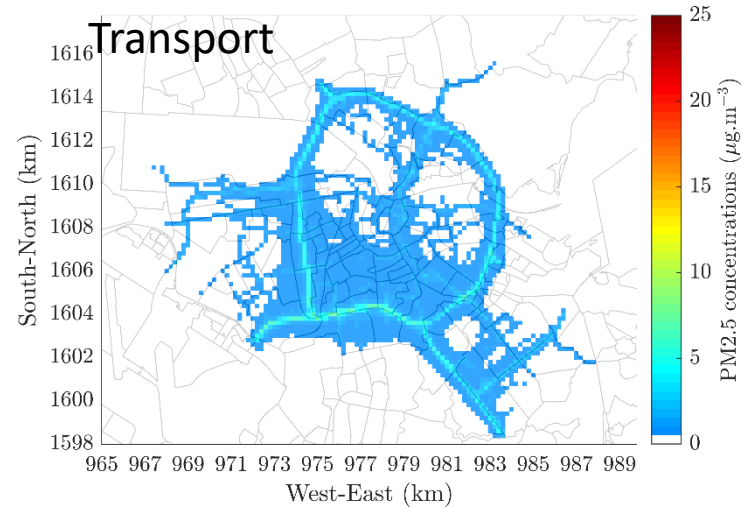


Figure 1: Annual PM2.5 concentrations using a standard colorbar (including background concentrations and adjustment factor)

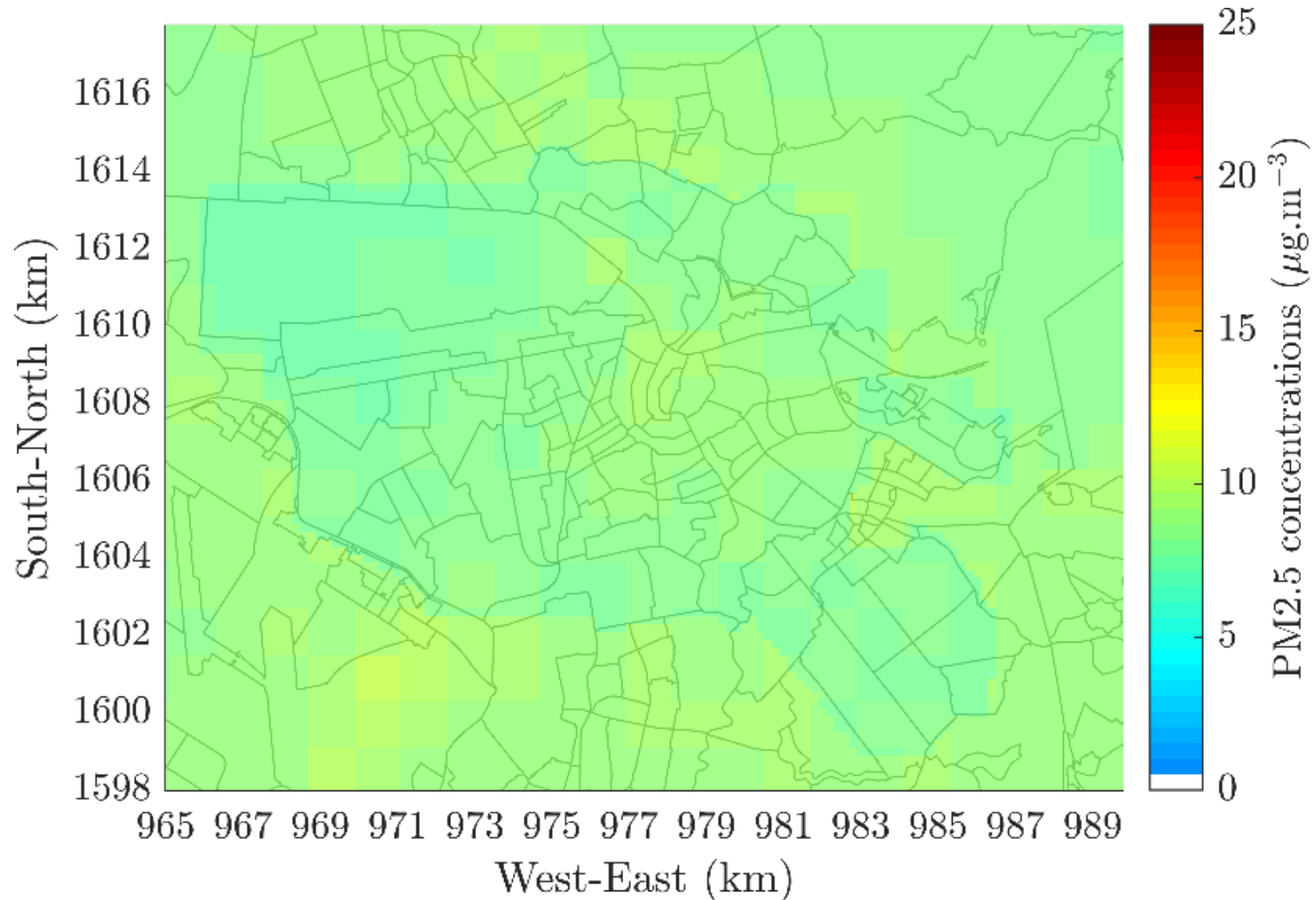


Figure 2: Annual PM2.5 concentrations using a customized colorbar based on the EC upper and lower assessment thresholds

Outputs from URBAIR: PM2.5 concentrations by each sector



Background concentrations obtained from GCN model added to URBAIR outputs



Source apportionment analysis – contribution by sector in average over all the domain

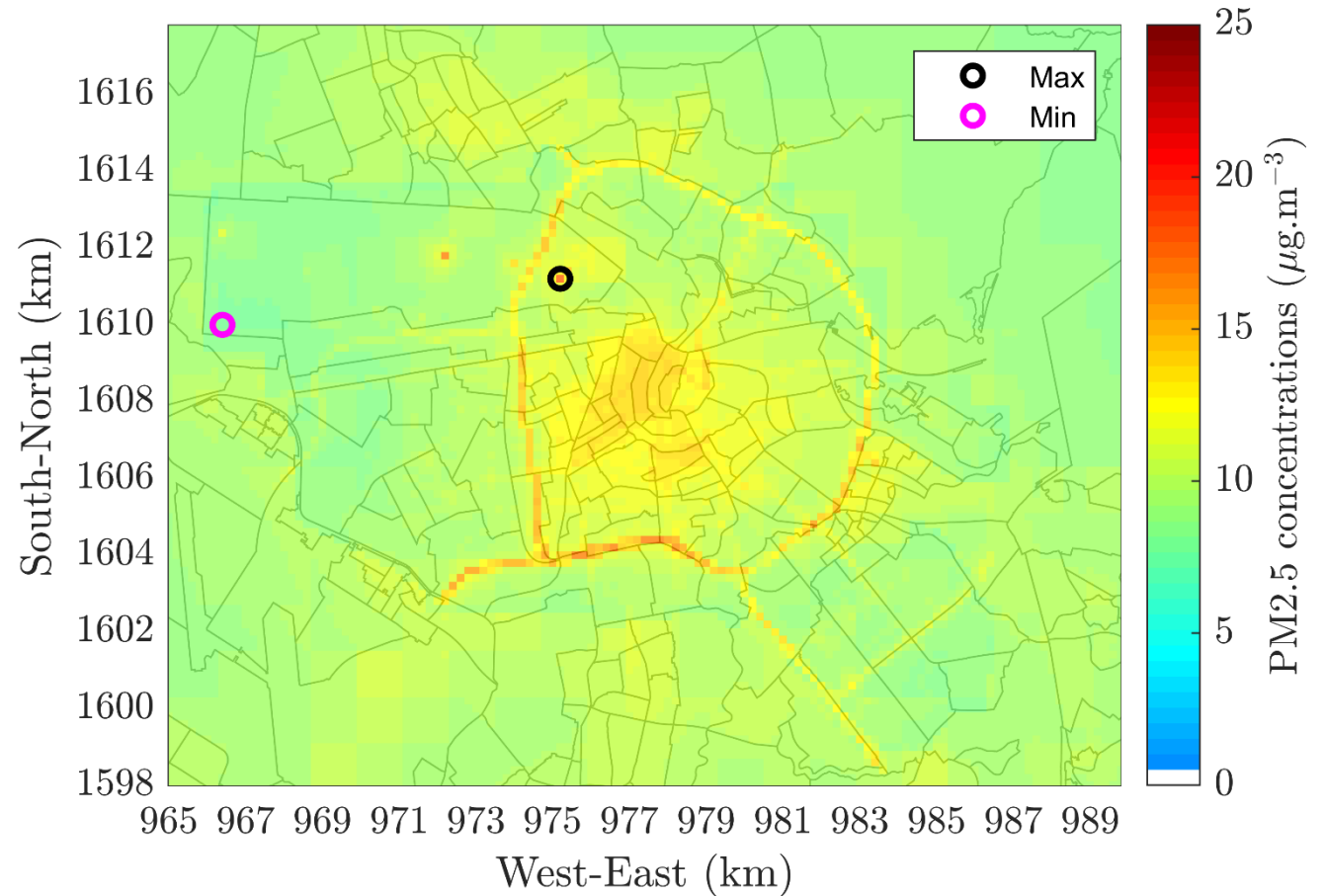
Sector	(%)
Transport	32.7
Shipping	7.7
Industrial	14.1
Residential and commercial	45.4
Total	100

Maximum, minimum and average concentrations over all the domain

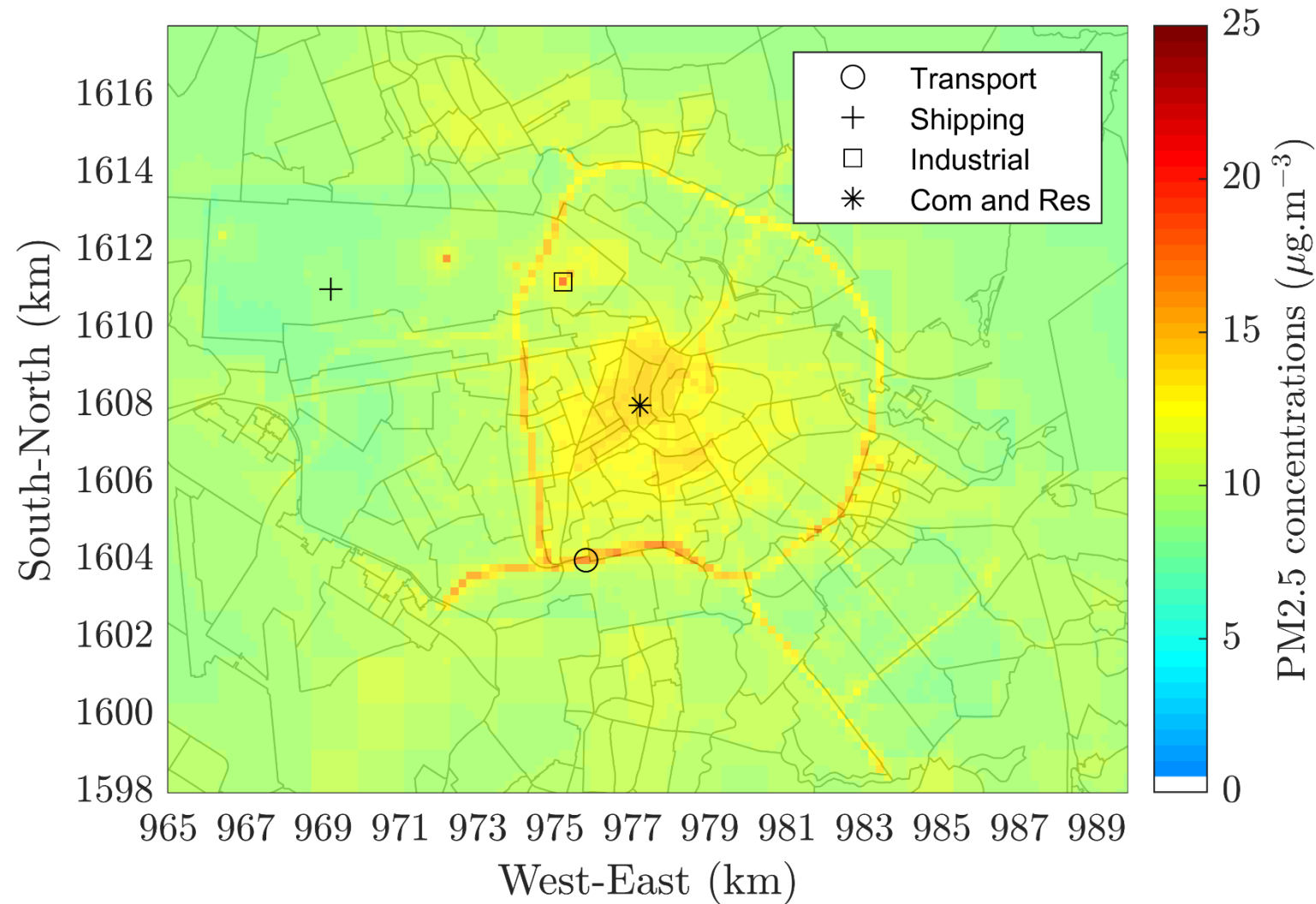
	($\mu\text{g.m}^{-3}$)
MAX	17.4
MIN	8.0
MEAN	9.9

Contribution by sector for the cell where the maximum concentration was simulated

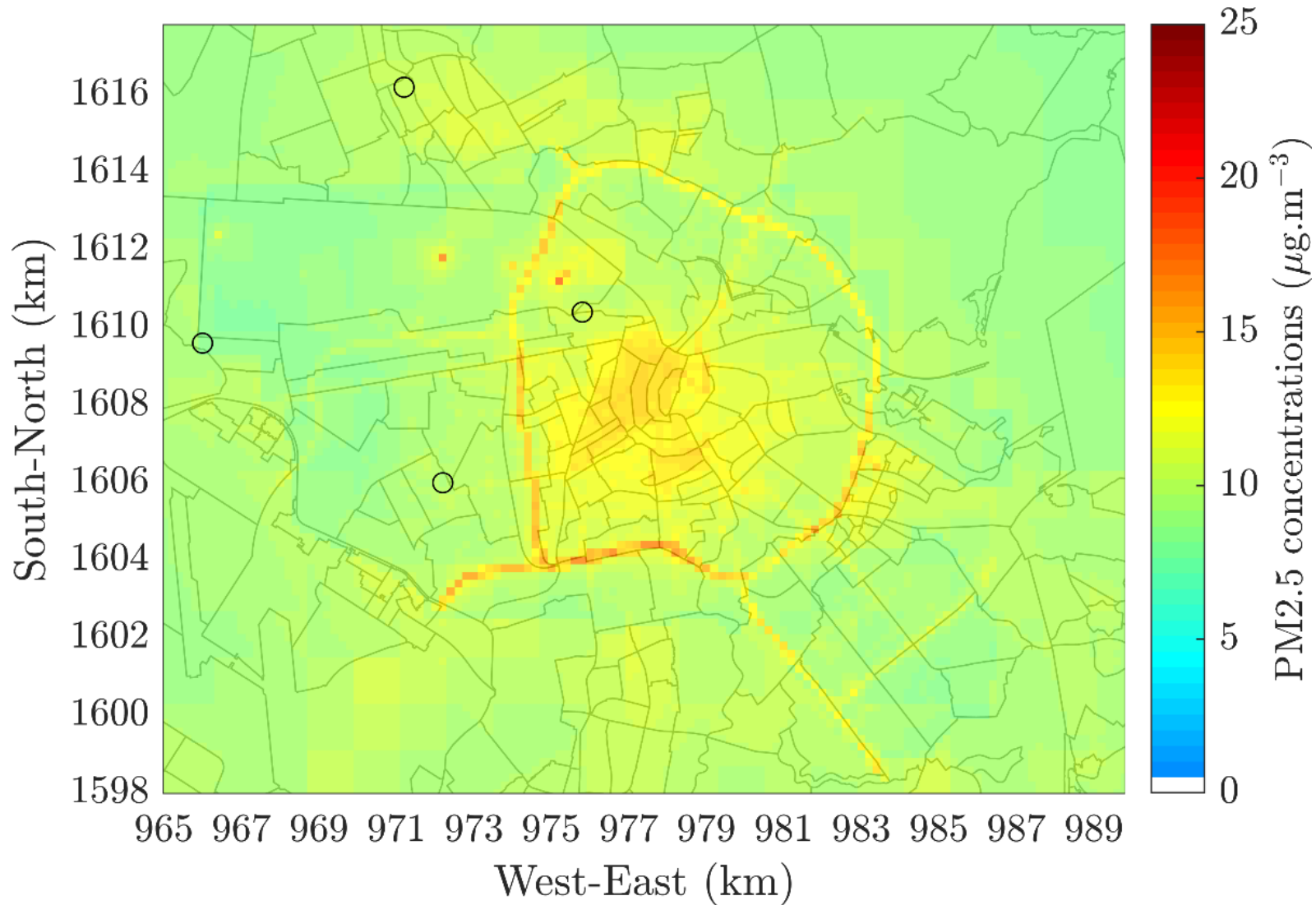
Sector	Contribution by sector for the cell (%)
	Max
Transport	4.5
Shipping	3.6
Industrial	87.1
Commercial and residential	4.9



Location of the maximum value by sector



AQS and tubes locations



Comparison between measured and modelled concentrations

Station	Concentration		Sector contribution for the location of the station (%)			
	Measured	Modelled	Transport	Shipping	Industrial	Commercial and residential
NL00014	12.4	9.7	27	2.7	13.3	57
NL00016	11.5	11.1	32.3	4.2	23.5	40
NL00701	12.8	10.6	5.8	2.9	9.7	81.6
NL00703	12	8.5	20.5	10.1	29.7	39.7

Population exposed to values above EU limits and WHO guidelines

