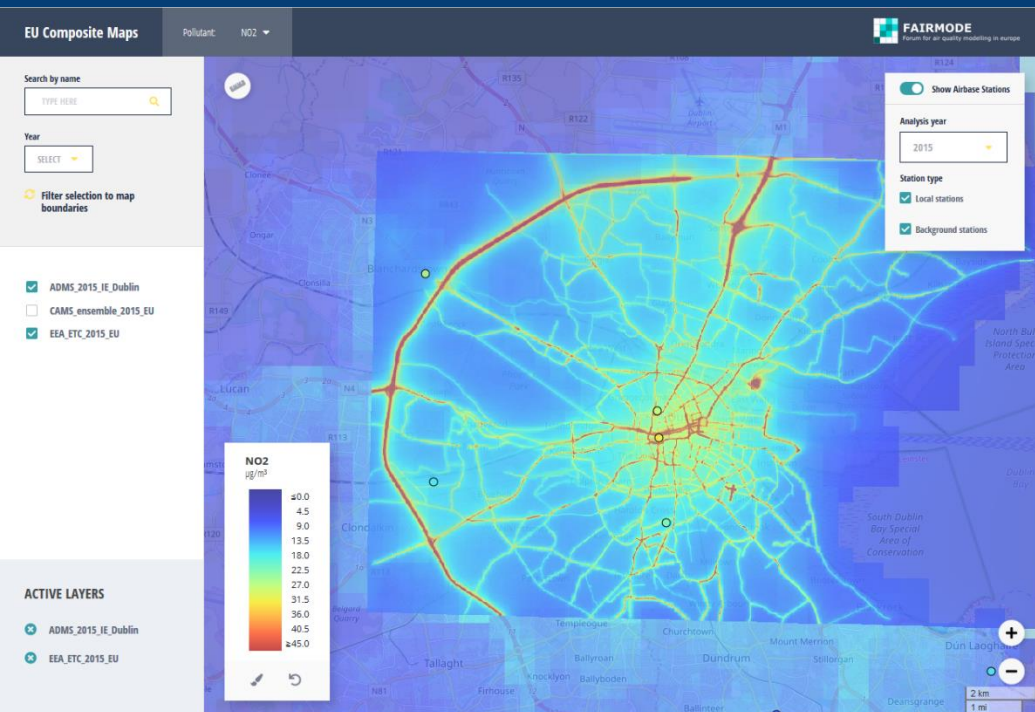


Base case air quality modelling for Dublin: context and results



Kevin Delaney (Irish EPA)
Jenny Stocker,
Matthew Williams,
Charlotte Aves (CERC)

FAIRMODE
October 2019
CIEMAT-Madrid

Contents

- Context
- Monitoring Sites
- Dispersion model (ADMS-Urban) inputs
- Verification
 - DELTA Tool
- Results
 - Contour plots
- Pilot study progress summary

Monitoring Sites

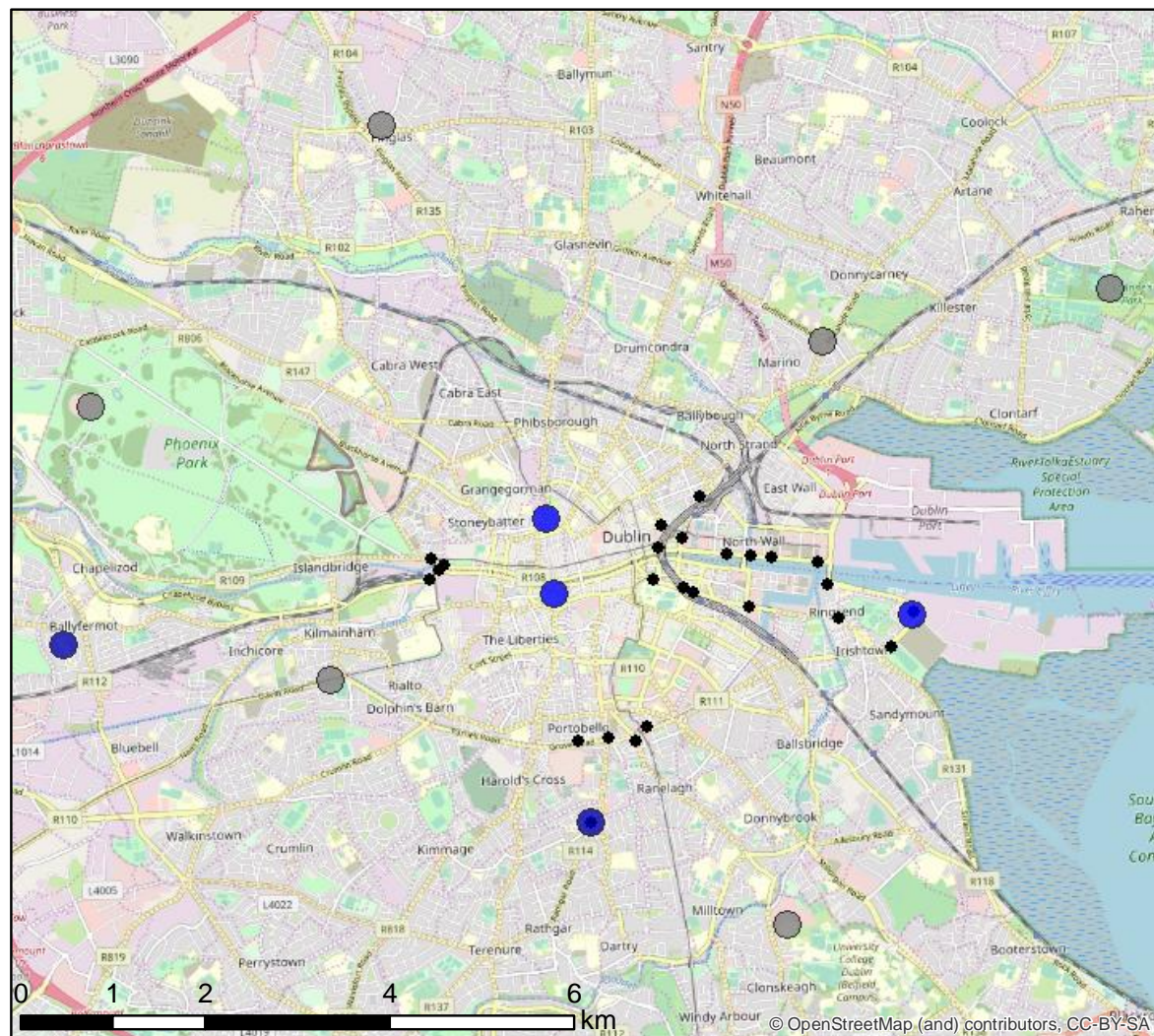
Automatic Monitoring Sites and Diffusion Tubes in Dublin, 2015 & 2017

- Type:
 - 4 roadside
 - 2 suburban
 - 5 urban background
 - 25 diffusion tubes (2017 only)
- Temporal data capture:
 - Mostly hourly
 - Some daily PM

National
Ambient Air
Quality
Network

Annual Average NO_2 ($\mu\text{g}/\text{m}^3$), 2017

- No Data
- < 18
- 18 - 28
- Diffusion Tubes

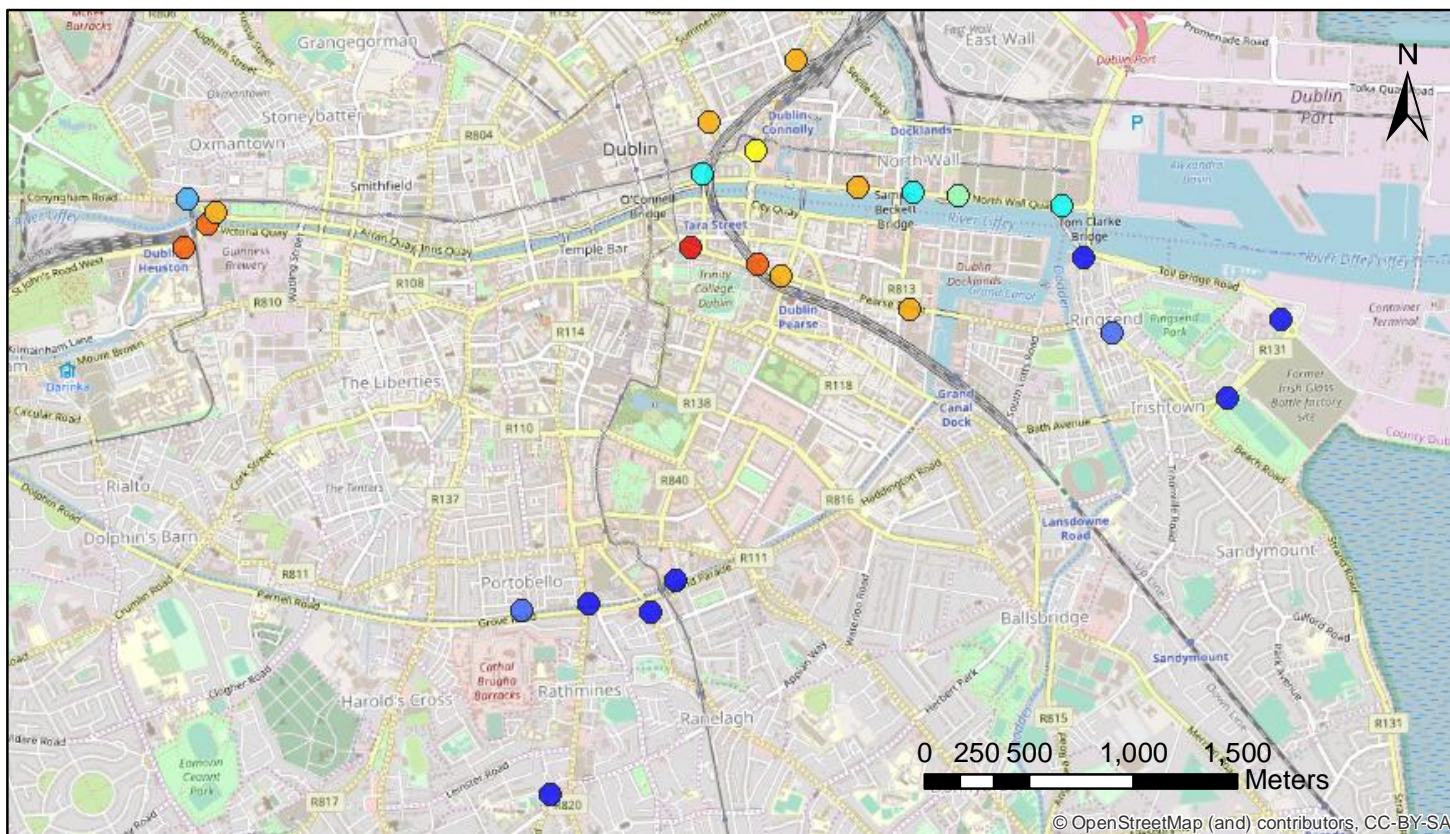
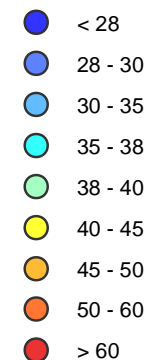


Monitoring Sites

Diffusion Tube Sites, 2017

EPA data

Annual Average NO₂ (µg/m³)



Dispersion model (ADMS-Urban): Inputs

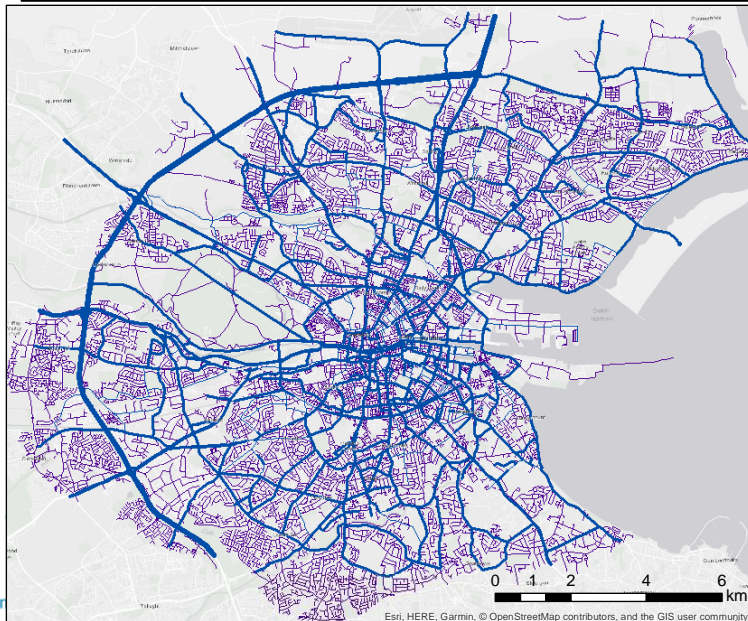
- **Emissions:**

- Road traffic emissions
- Industrial emissions
- National Emissions mapping model

- Meteorological data

- Background pollutant data

Modelled traffic (as used by noise model)



Roads < 2500 AADT

Roads > 2500 AADT

AADT

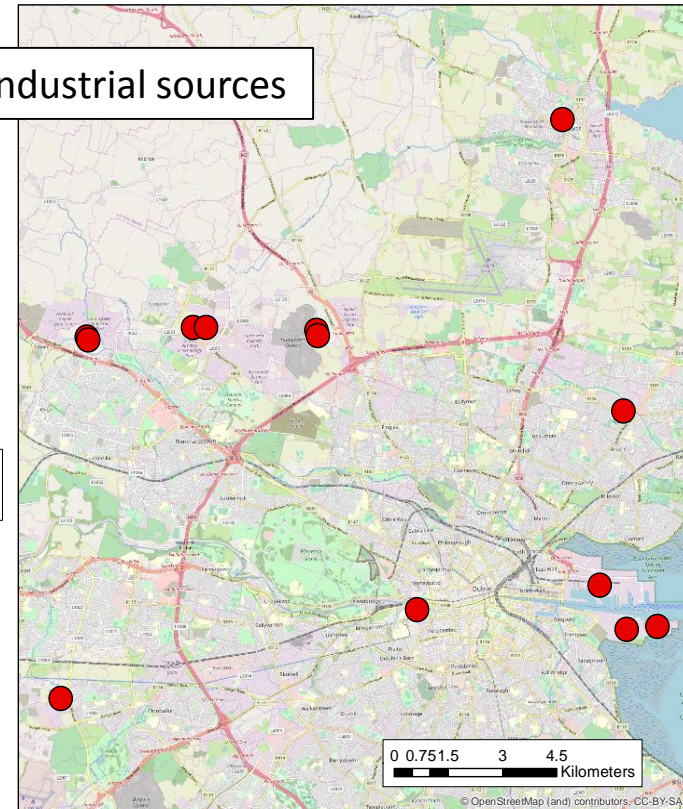
- 2,500 - 10,000
- 10,000 - 50,000
- 50,000 - 75,000
- > 75,000

DCC SCATS
traffic
management
system

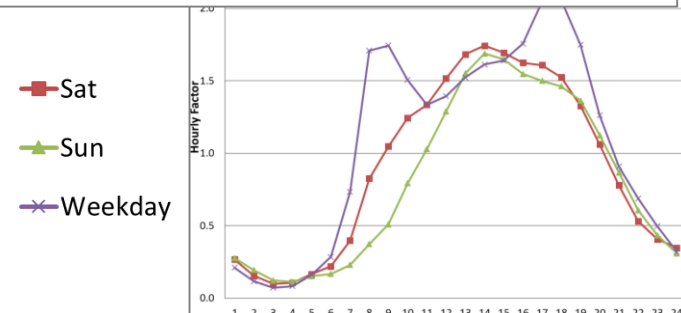
Explicitly modelled industrial sources

EPA

Industrial Sources



Diurnal profiles for road traffic emissions
(data from Transport Infrastructure Ireland)



Dispersion model (ADMS-Urban): Inputs

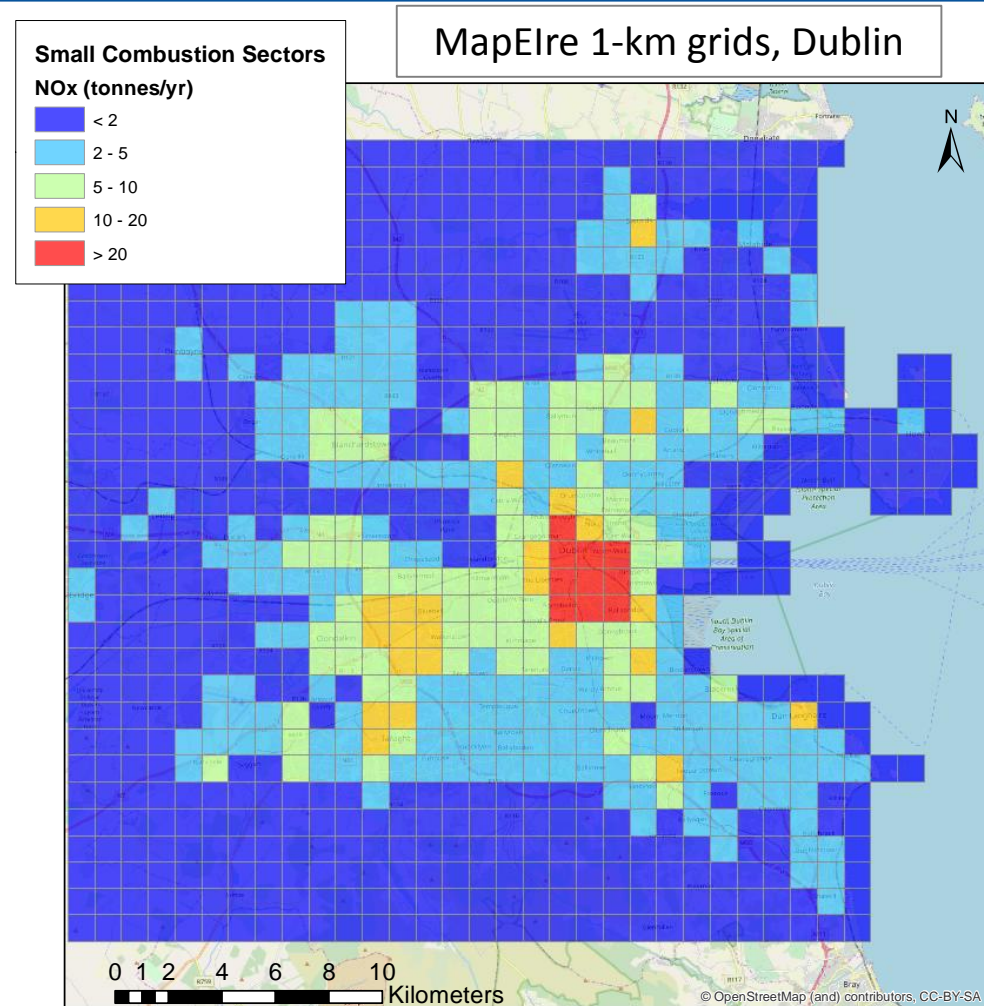
- **Emissions:**

- Road traffic emissions
- Industrial emissions
- **National Emissions mapping model**

- Meteorological data

- Background pollutant data

1 km data for all sectors (power, industry, other stationary combustion, solvents, road transport, off-road transport, fugitive emissions, waste, aviation, shipping, livestock, other agriculture, land use)



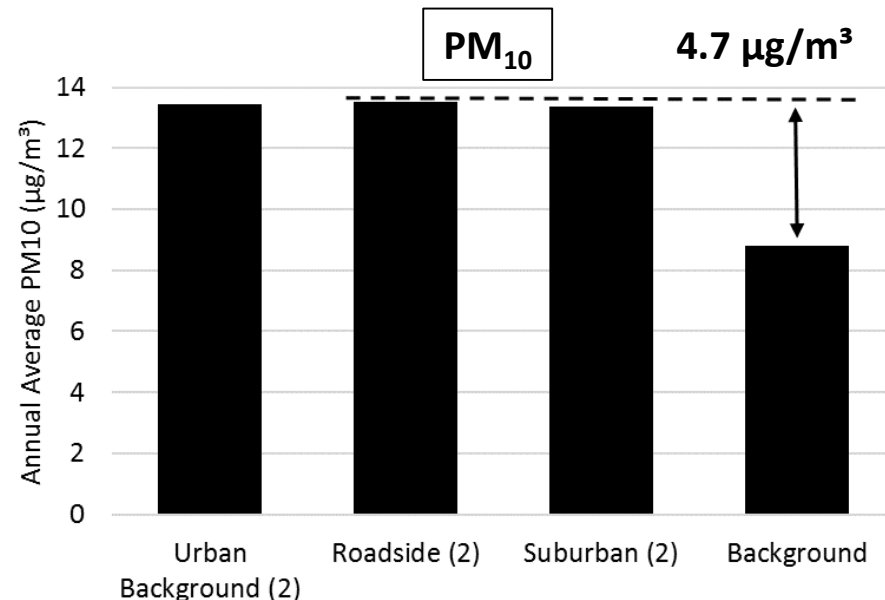
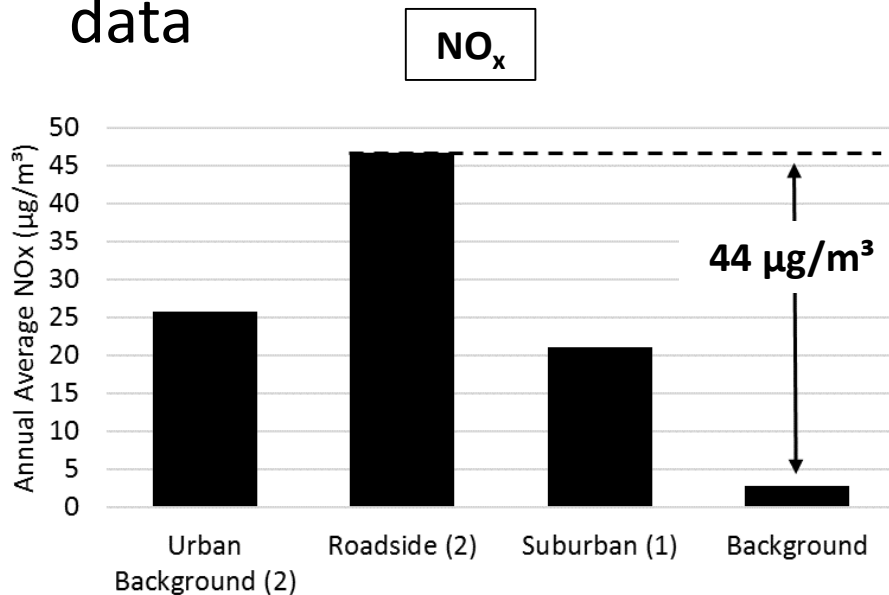
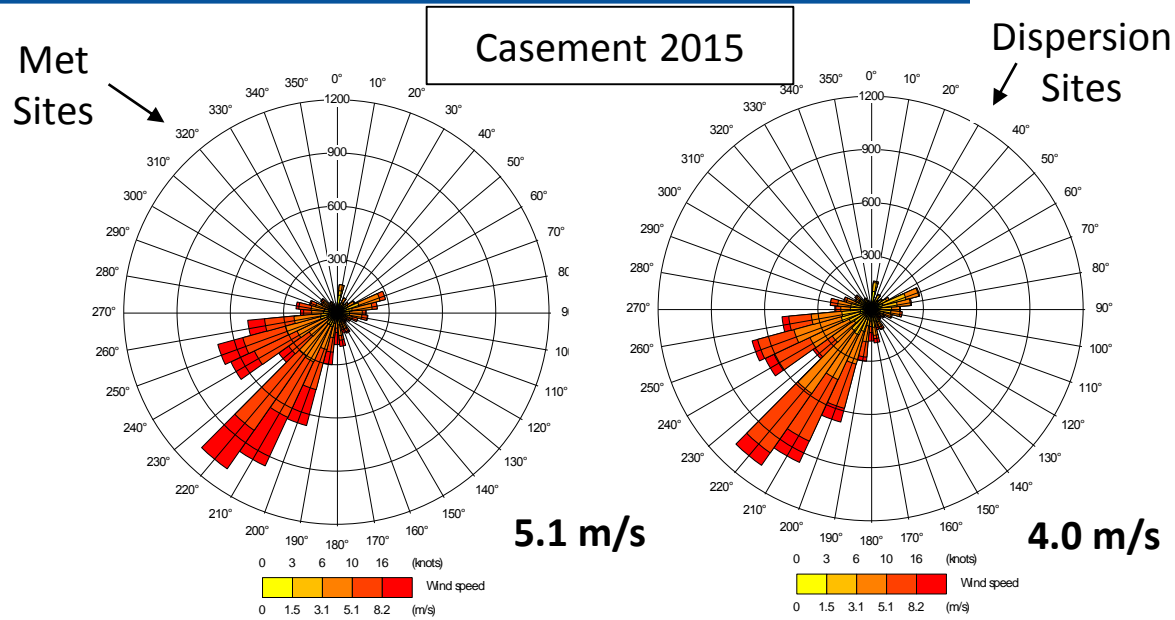
Aarhus University - MapElre:

<https://projects.au.dk/mapeire/>

Dispersion model (ADMS-Urban): Inputs

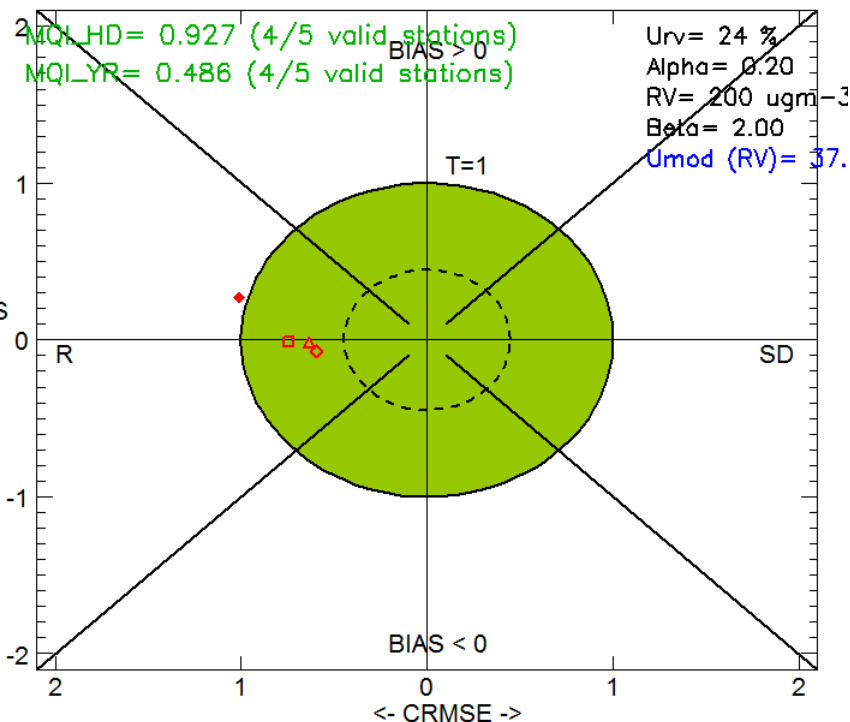
- Emissions
- **Meteorological data:**
 - Casement Airport

- Background pollutant data



Model verification: Delta Tool

ASSESSMENT TARGET PLOT NO₂

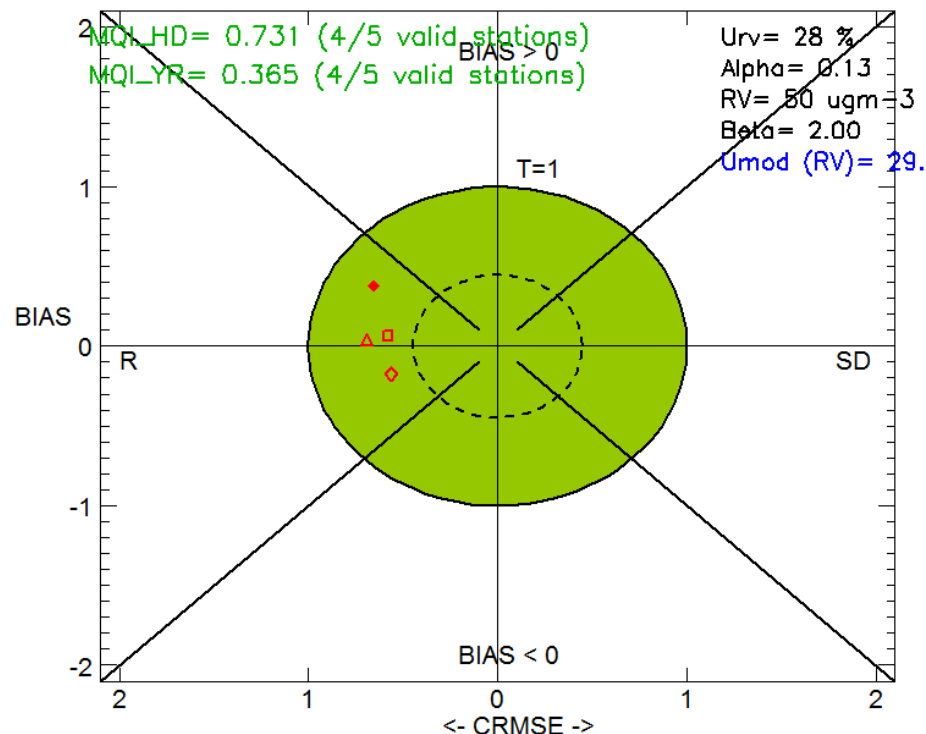


♦ Ballyfermot
 ♦ ColeraineSt
 ▲ Rathmines
 ♦ WinetavernSt

Strt/end Ind: 1-8760
 Model (s): ADMS
 Parameter: NO₂
 Scen: 2017
 Extra Values: No
 Season: Year
 Day hours: All 24h
 Time Average: Preserved
 Daily stats: preserved

NO₂

ASSESSMENT TARGET PLOT PM₁₀

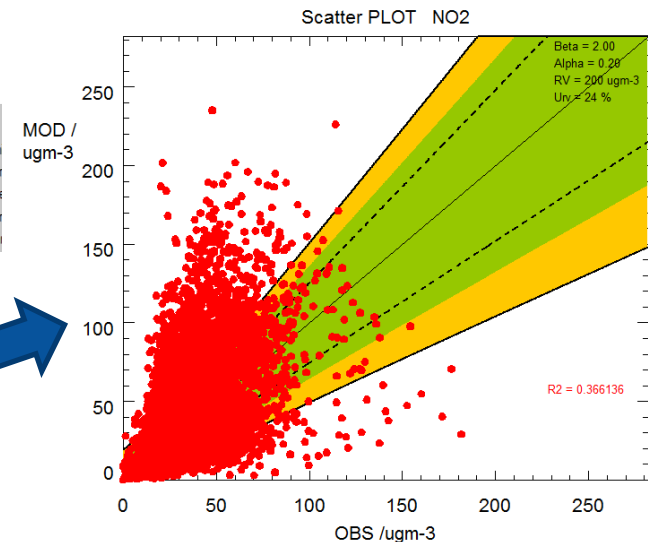
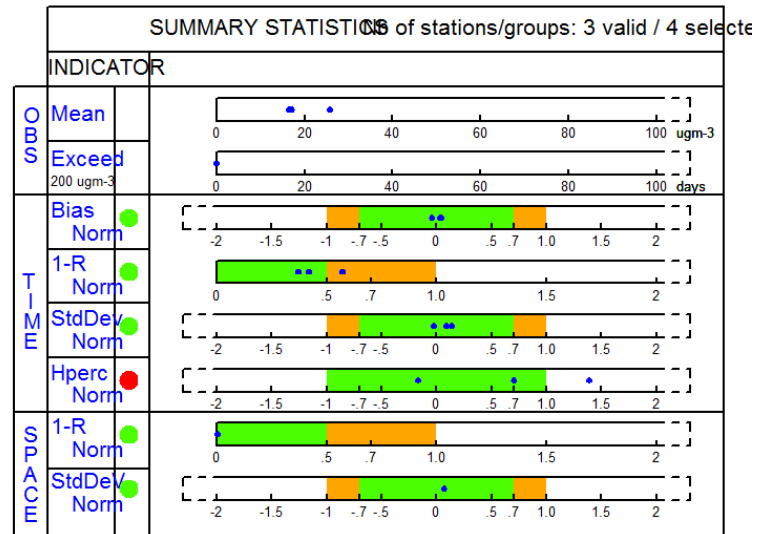
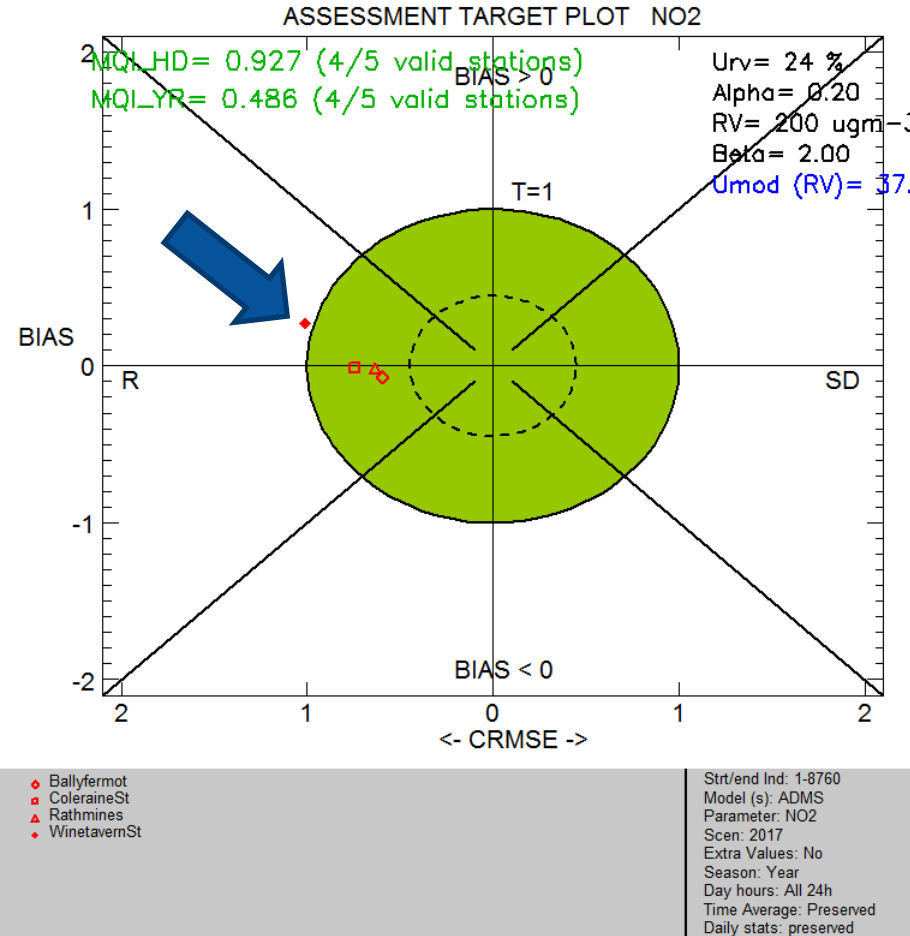


♦ Ballyfermot
 ♦ PhoenixPark
 ▲ Rathmines
 ♦ WinetavernSt

Strt/end Ind: 1-8760
 Model (s): ADMS
 Parameter: PM₁₀
 Scen: 2017
 Extra Values: No
 Season: Year
 Day hours: All 24h
 Time Average: Preserved
 Daily stats: Mean

PM₁₀

Model verification: Delta Tool



Winetavern Street records the highest NO2 out of the reference monitors; poor correlation likely related to diurnal traffic flow uncertainty

EU Composite Map showing results

EU Composite Maps

Pollutant: NO₂

FAIRMODE
Forum for air quality modelling in Europe

Search by name

TYPE HERE



Year

SELECT

Filter selection to map boundaries

- ☐ ADMS_2015_IE_Dublin
- ☐ CAMS_ensemble_2015_EU
- ☒ EEA_ETC_2015_EU

ACTIVE LAYERS

EEA_ETC_2015_EU

2015 NO₂

☒ Show Airbase Stations

Analysis year

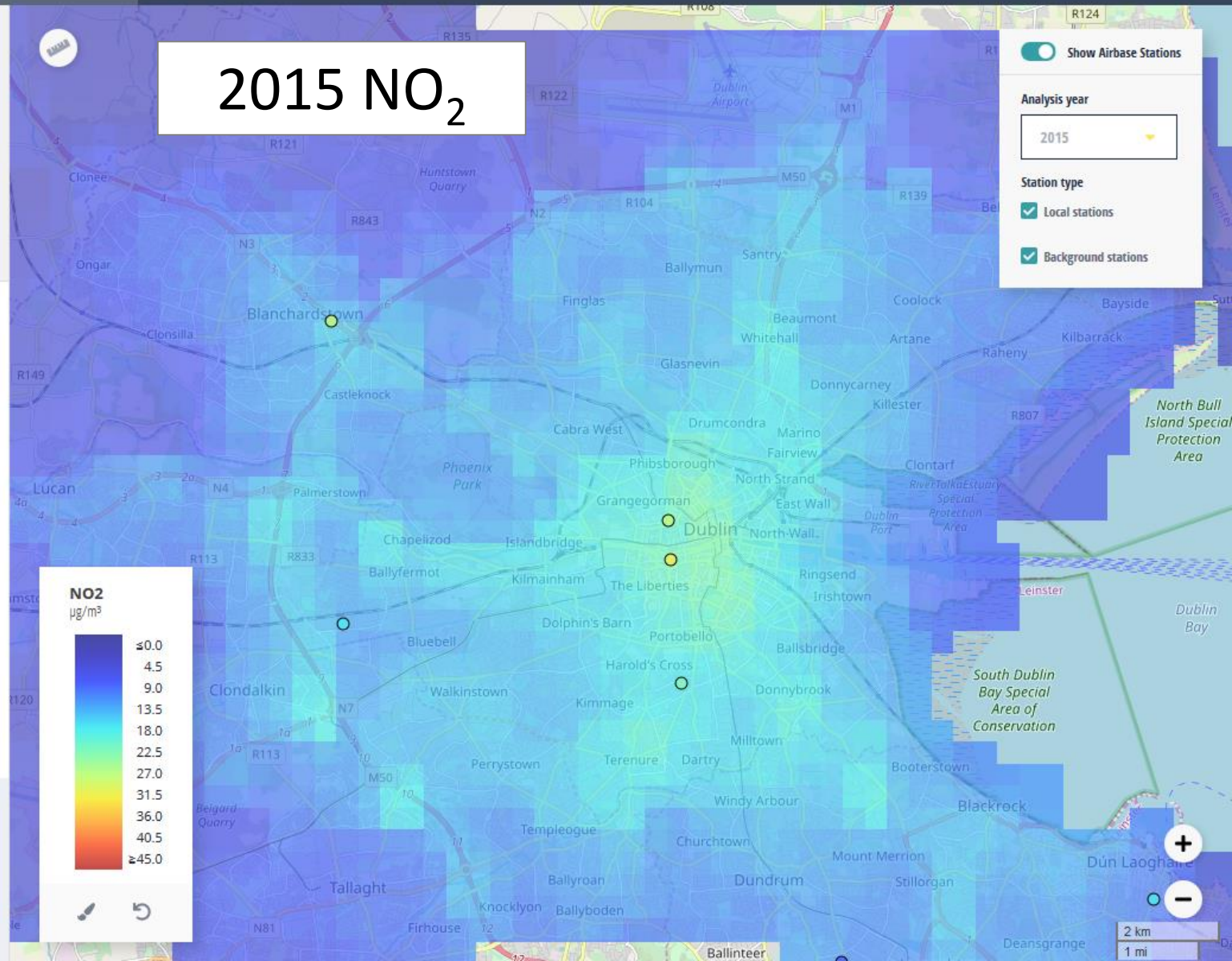
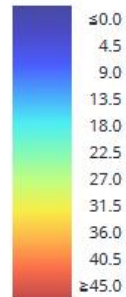
2015

Station type

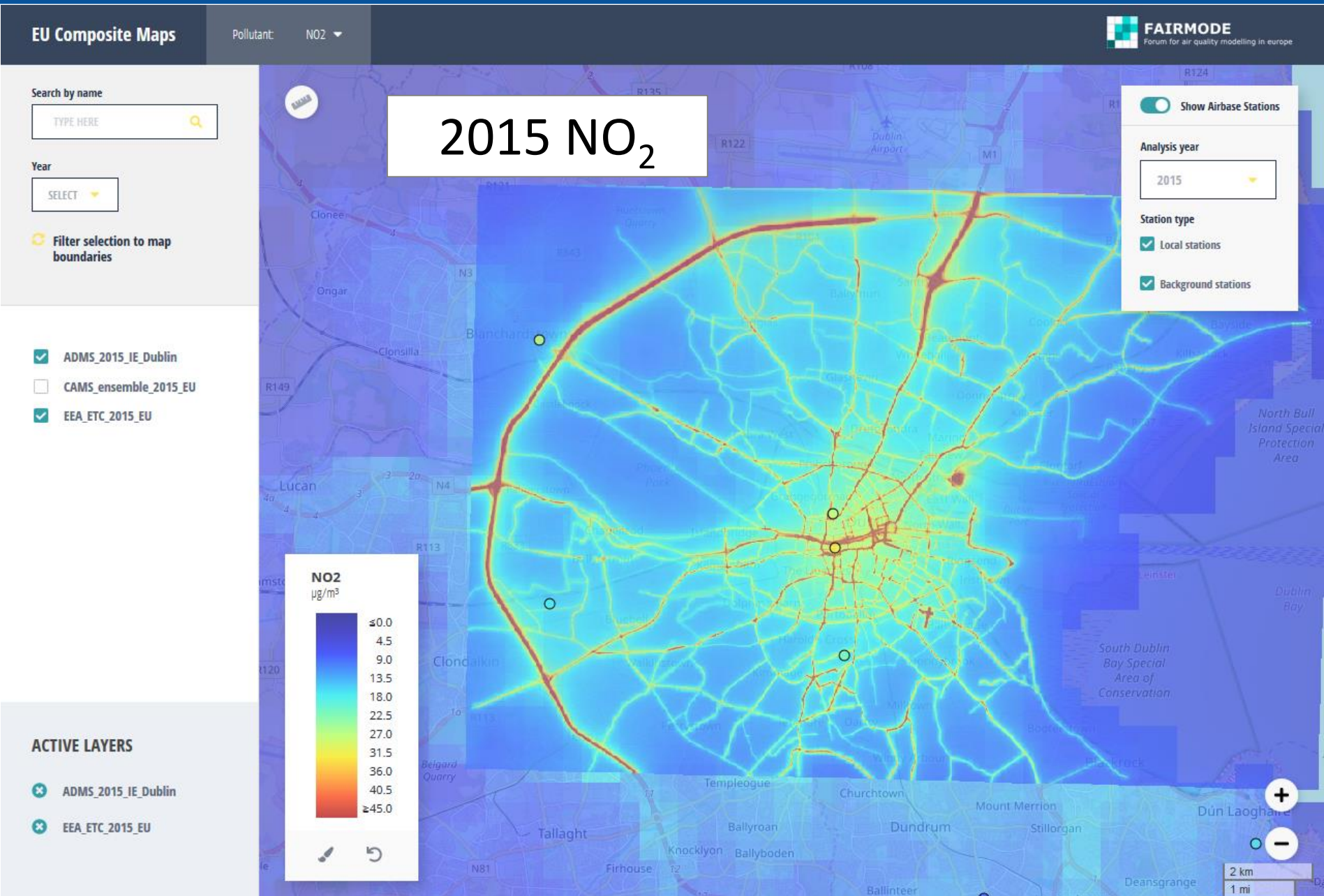
☒ Local stations

☒ Background stations

NO₂
µg/m³

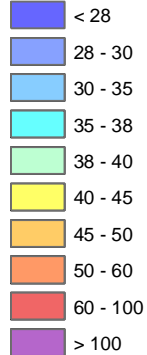


EU Composite Map showing results

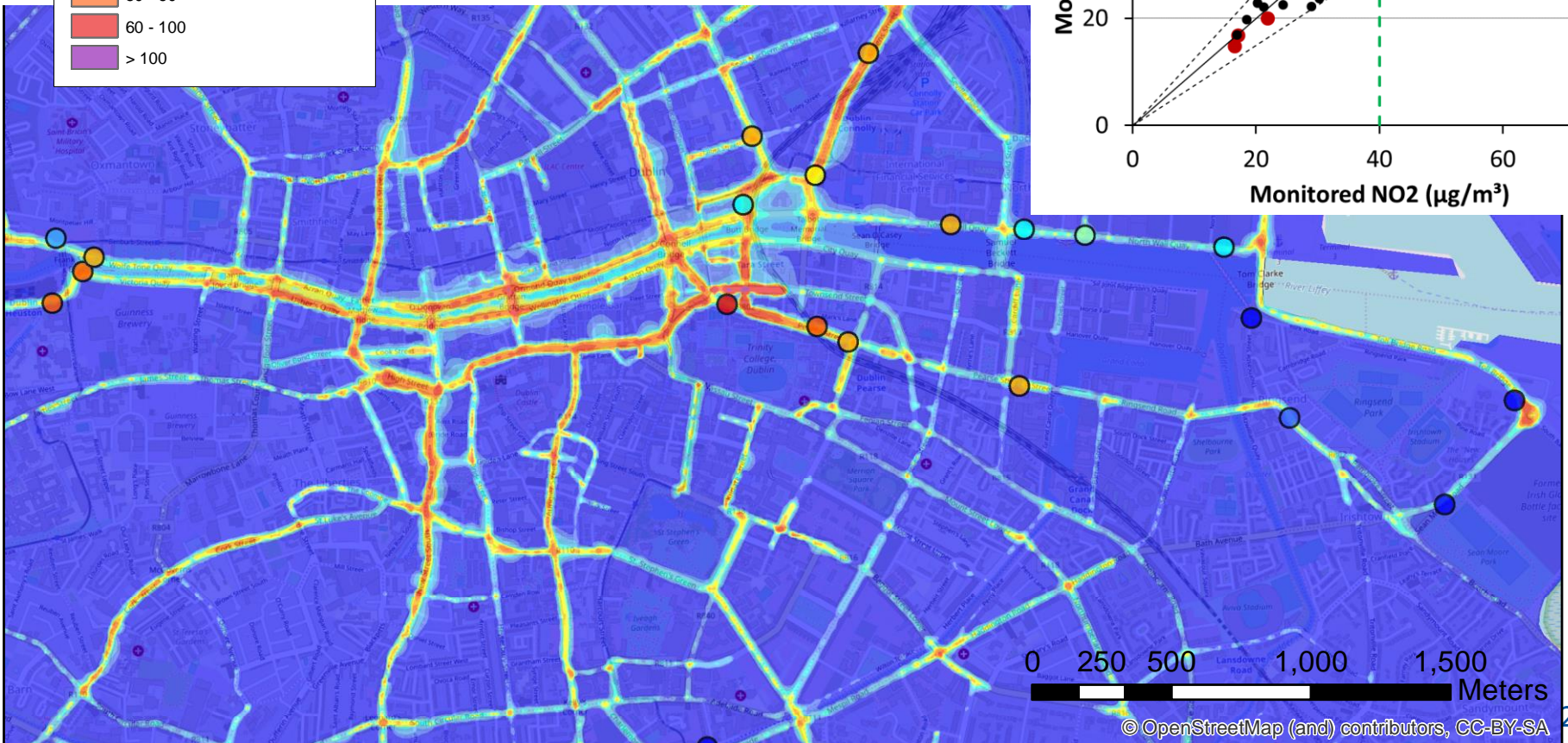
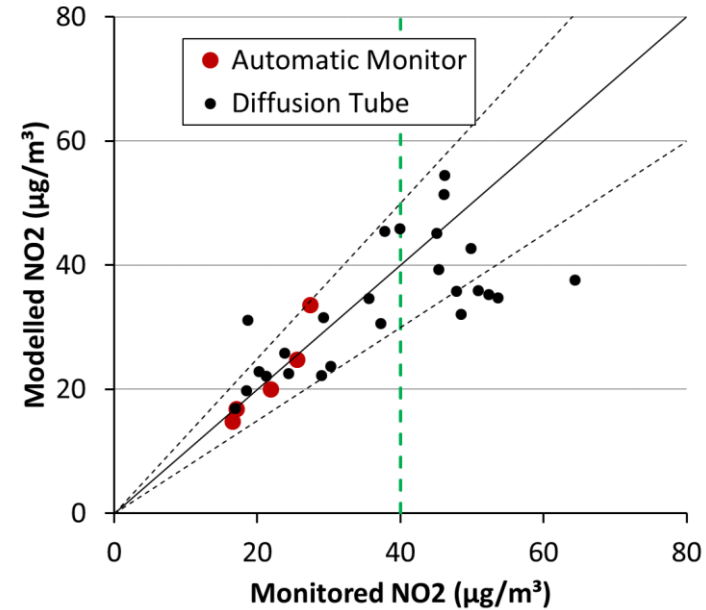


Model comparisons with diffusion tubes

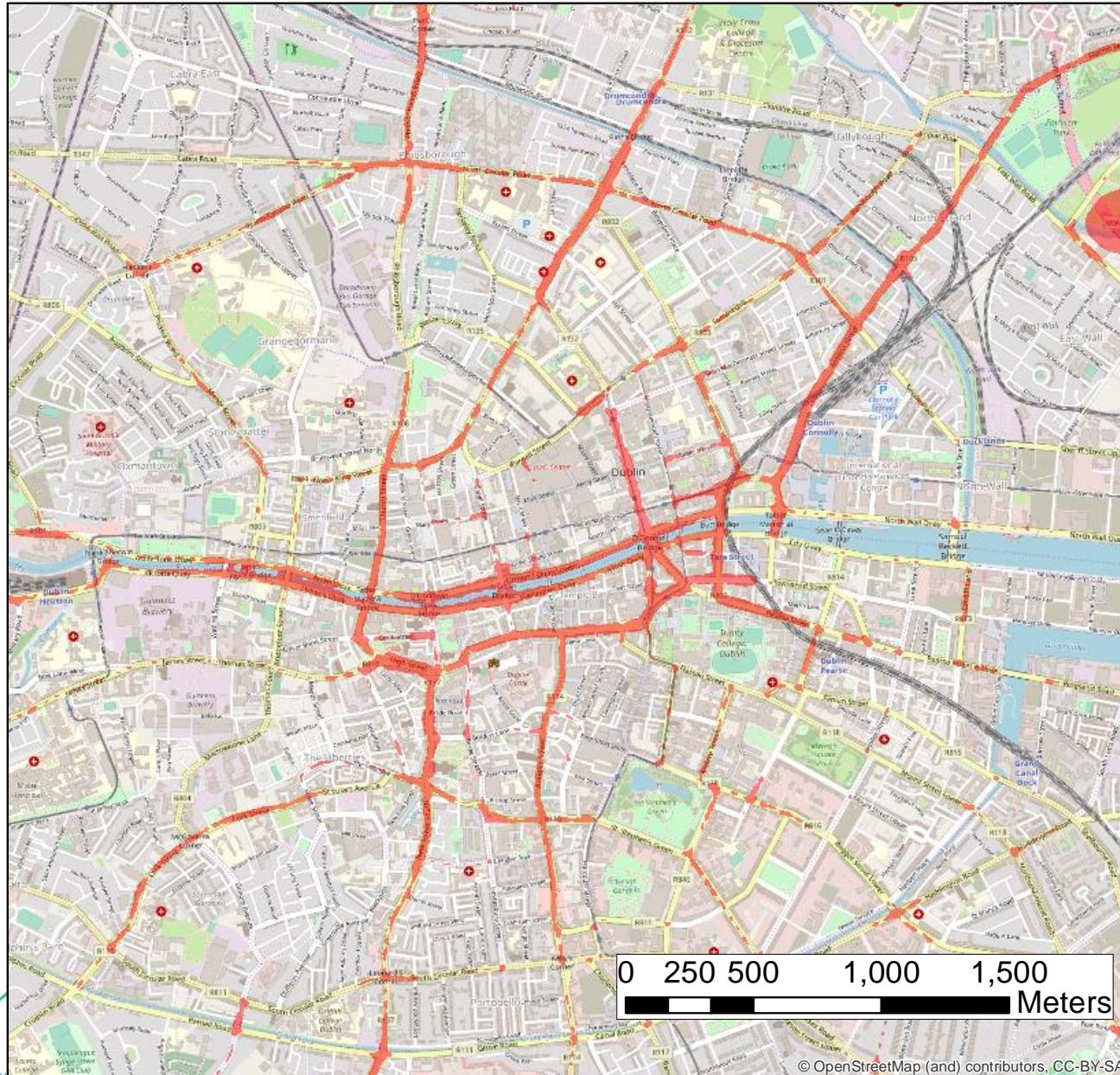
Annual Average NO₂ (µg/m³)



2017 NO₂: model and diffusion tubes



Modelled exceedance areas



2017 NO₂:
modelled
areas of
exceedence

Annual Average NO₂ (µg/m³)

< 40

> 40

FAIRMODE, October 2019

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Progress in relation to pilot exercise

Assessment phase

The assessment phase consists in checking the quality of the air quality modelling chain by:

1 Ensuring that the model applications fulfill the modeling quality objectives (WG1);



2 Participating in the air quality composite mapping exercise to check consistency with neighboring AQ maps or other maps for the same area (WG1);



3 Participating in the emission composite mapping exercise to check consistency with neighboring emission maps, other maps for the same area and top-down EU wide emission maps (WG2);

3 Benchmarking the emission totals via the methodologies developed in WG2.