

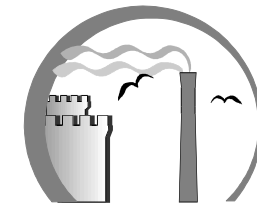


# Urban air quality estimates and projections made easy

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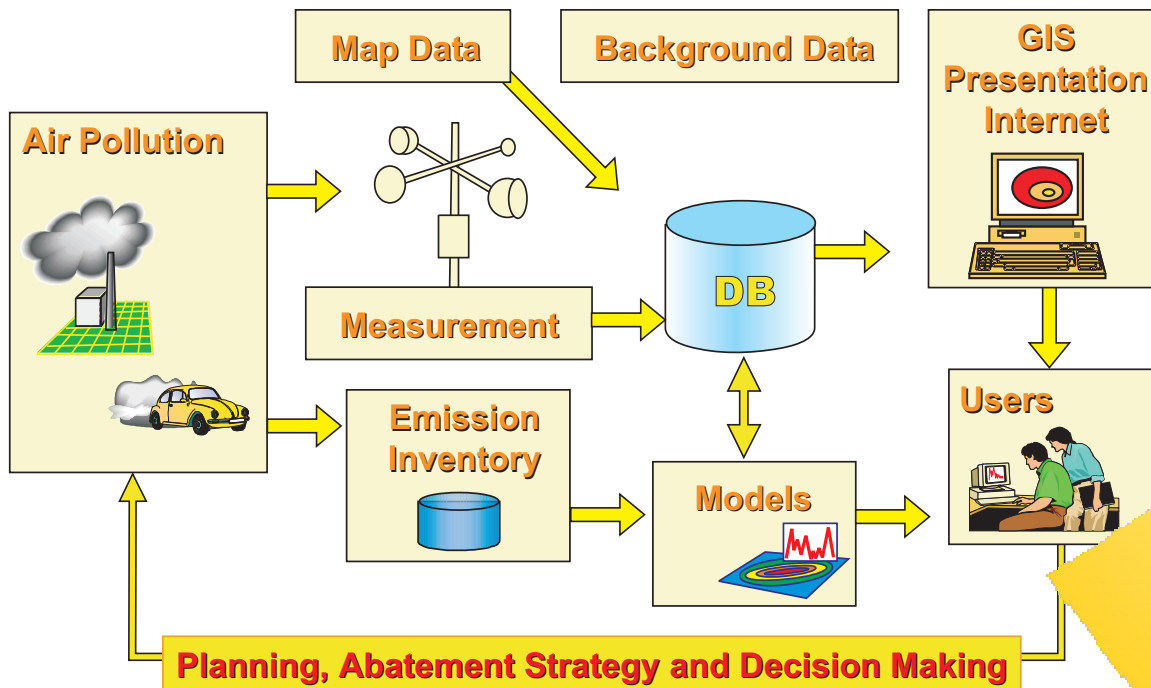
AUTH  
LHTEE



# Introduction



## A modern system for Air Quality Management



Accuracy depends on:

- Traffic data (loops/models)
- Fleet composition
- Speed/driving patterns



**SIMPLIFY**  
WHAT LESS IS MORE

# The IntelAir tool



**intelair**

knowing the air we breathe

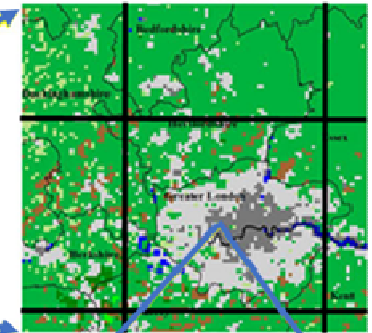
## What it does

- Evaluate AQ
- City / street level
- Identify hotspots
- All major pollutants
- Impact assessment of policy measures
- Customised coverage for each EU Region, City and individual street

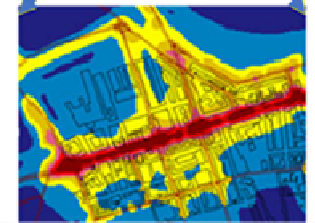
Regional



Urban



Street



KNOWING  
THE AIR  
WE BREATHE

# How does it work



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Approximation algorithm

Street Increment

Near roads and other local sources

Urban Increment

Throughout the city, caused by all sources in the city

Regional Background

Throughout the city, caused by sources outside the city (national and international)

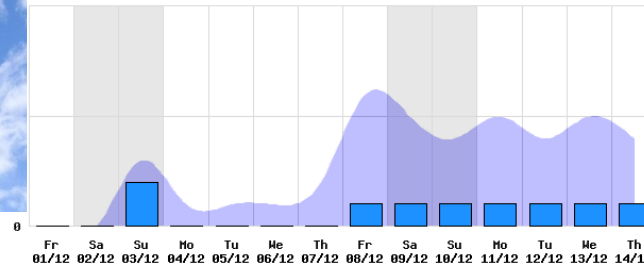
Traffic hotspots

City-as-a-whole emissions

# How does it work

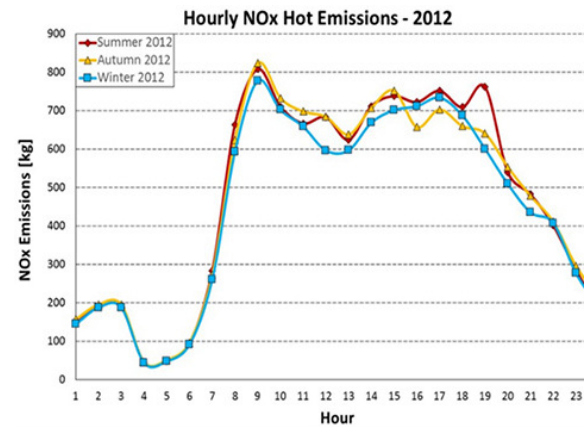


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Precipitation quantity (mm) Confidence interval (mm)

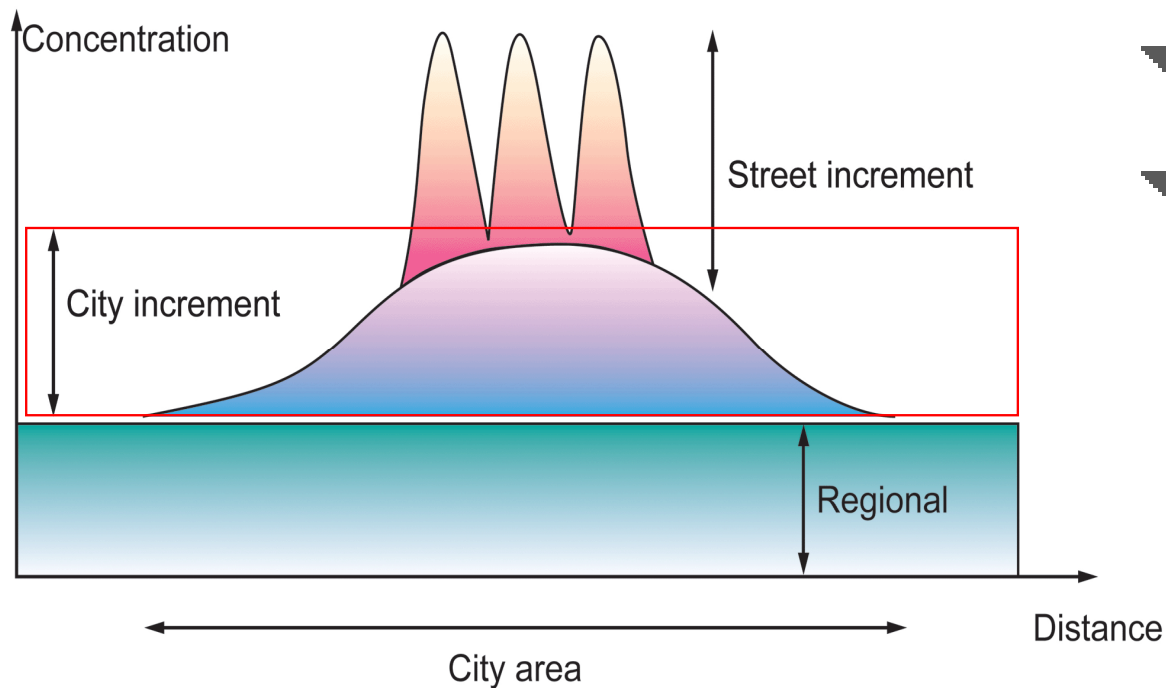
www.meteo.be



# How does it work



## City scale



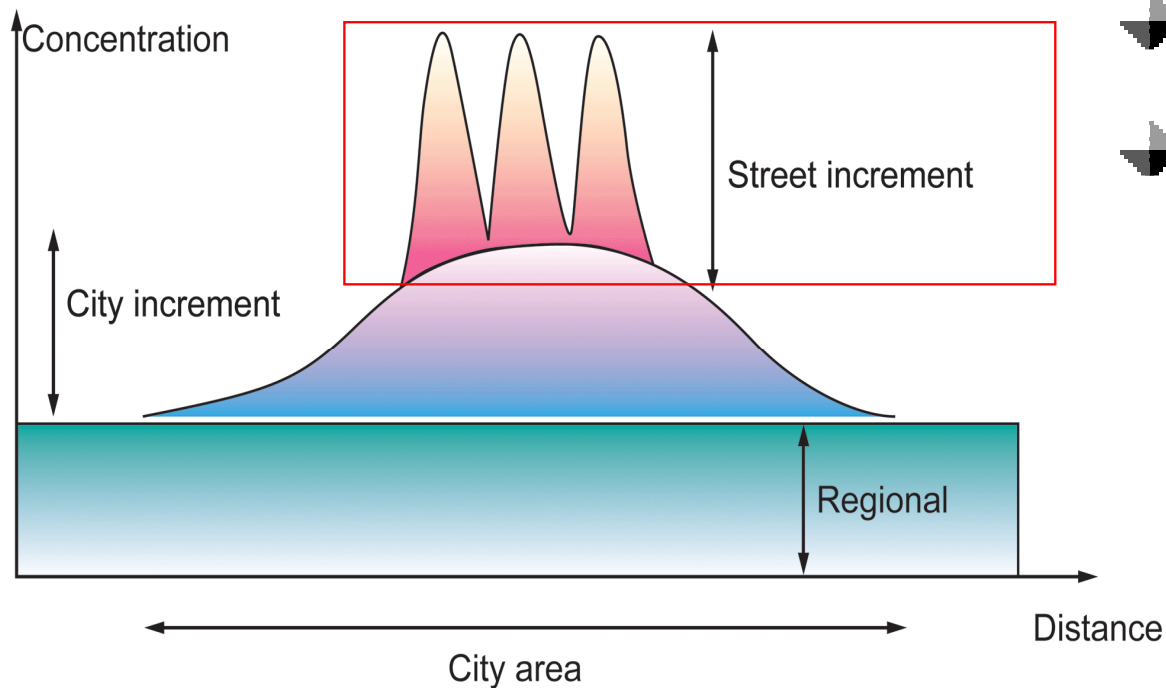
- Goal = urban increment
- 3 steps
  - Spatial sampling
  - Multiple regression analysis
  - Generalization



# How does it work



## Street scale

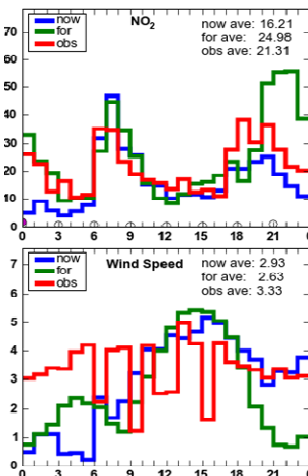
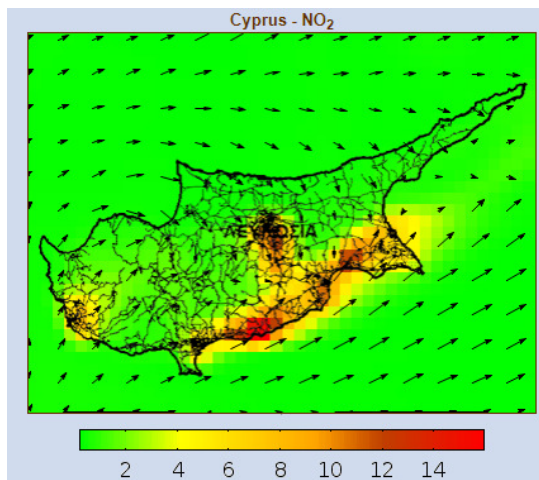


➤ Goal = street increment

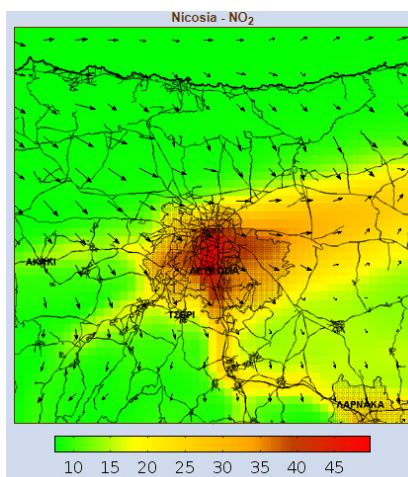
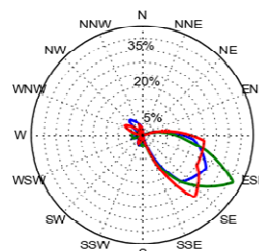
➤ 3 steps

- Selection of urban background pairs
- Multiple regression analysis
- Implementation of calculation

# Application: Cyprus



Statistical Index	Nowcasting	Forecasting
BIAS	-5.11	3.00
Ave. Norm. BIAS	-0.24	0.17
Fract. BIAS	-0.27	0.15
RMSE	6.67	12.35
NMSE	0.23	0.29
CC	0.70	0.59
IA	0.77	0.67



Monday 20 Nov. 2017  
Air quality assessment  
for 13:00

Domain: Nicosia

Concentrations Field  
 Meteorological Field  
 Display wind field

NO<sub>2</sub>  
Temperature

Display

Statement about air quality status in Nicosia for: NO<sub>2</sub>

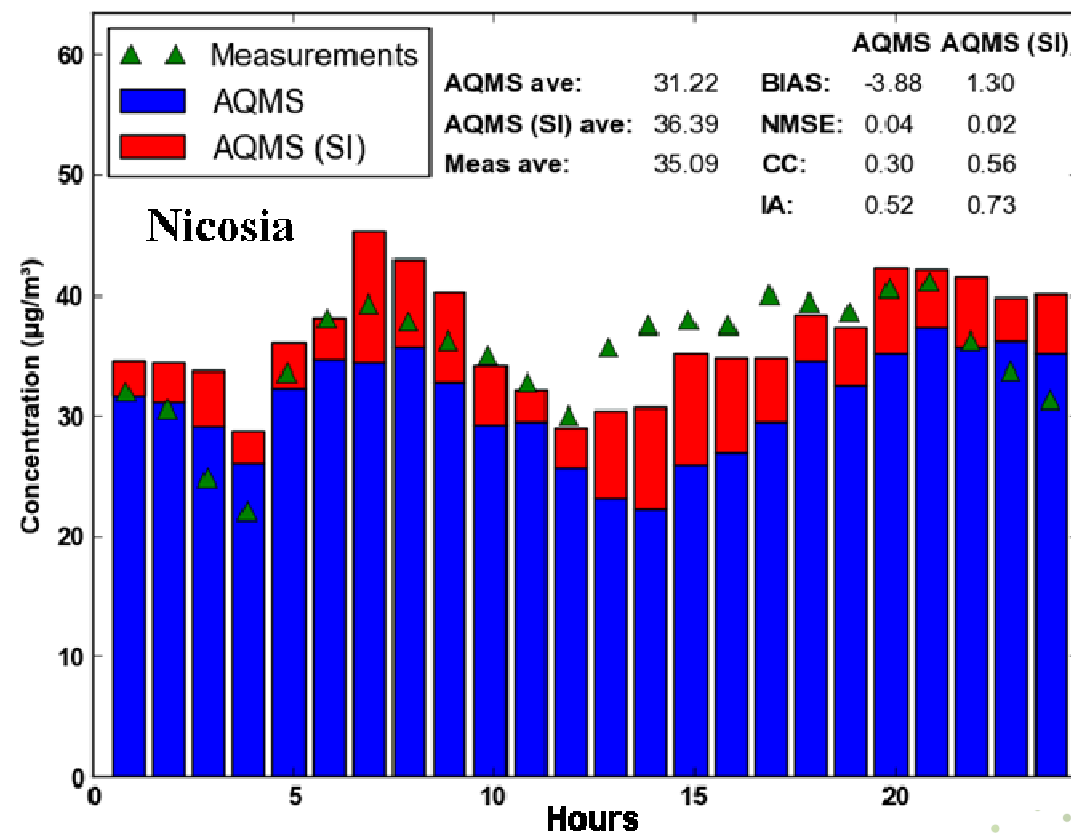
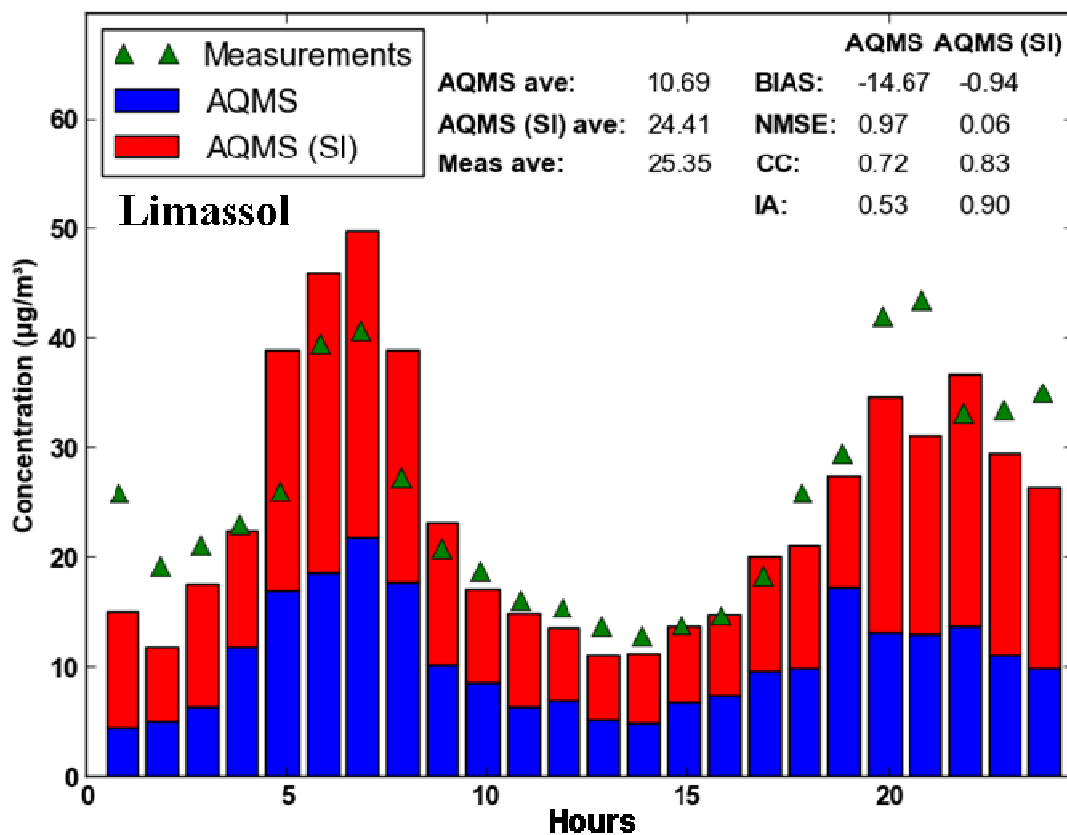
Air quality regarding NO<sub>2</sub> is good and presents no risk, even for the vulnerable groups of the population.

## Cyprus

- 2-month pilot
- 2 urban locations
- AQMS Enhancement
- Comparison with monitoring network



# Application: Cyprus



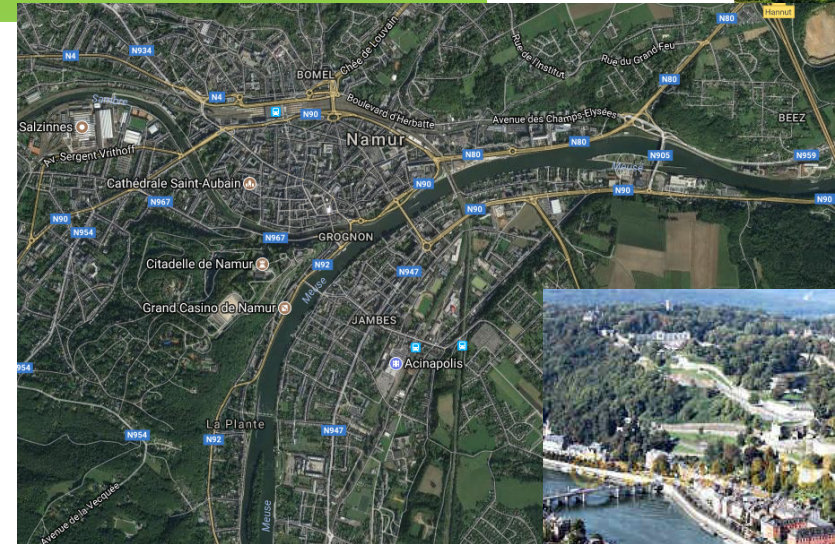
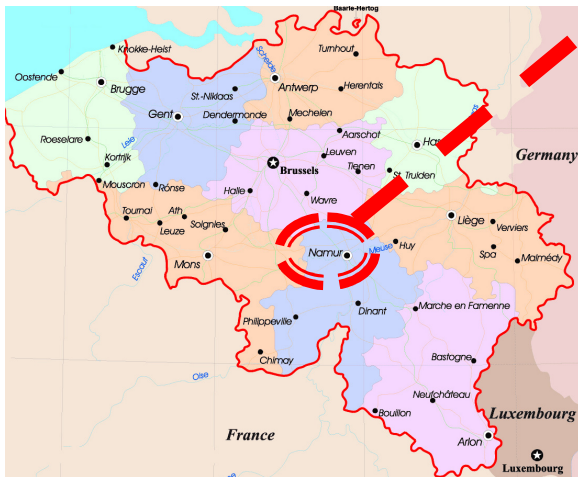
Clear improvement!

# Application: Namur



## Methodology Validation of

- Applicability
- Transferability



## Namur (Belgium)

- Small EU city
- No traffic model
- Different from Cyprus



# Application: Namur



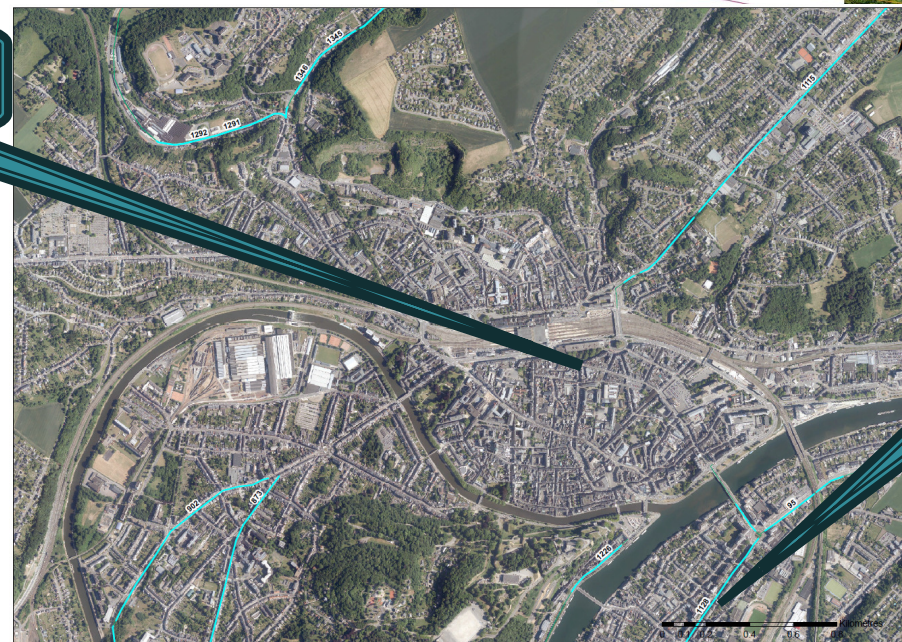
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## Input:

- Local meteo data
- City & road geom.
- Rural background
- City-wide emissions
- Diurnal patterns
- Annual average concentrations

Measuring station  
"train station"



Measuring station  
"Jambes"

Pollutant	Jambes	Train Station	UB estimate
NO <sub>2</sub>	26	46	30
PM <sub>10</sub>	18	16	14

# Application: Namur



Locations of the traffic loop used and the application area



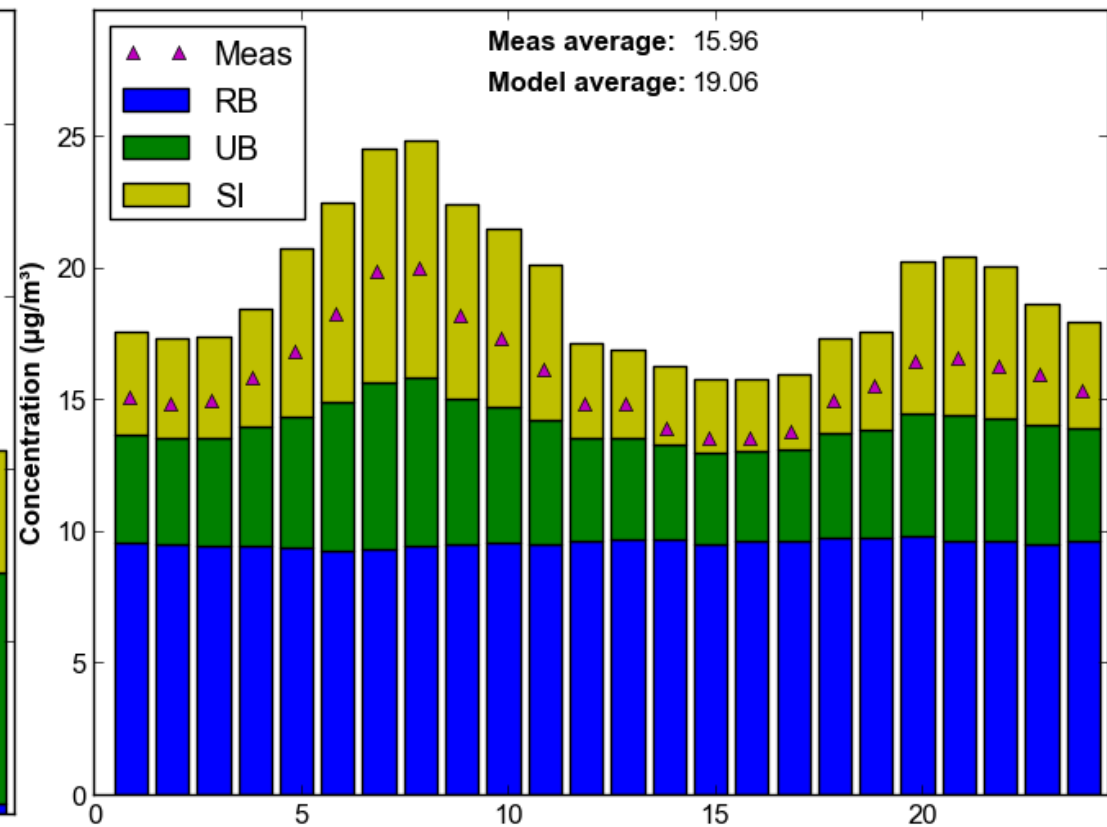
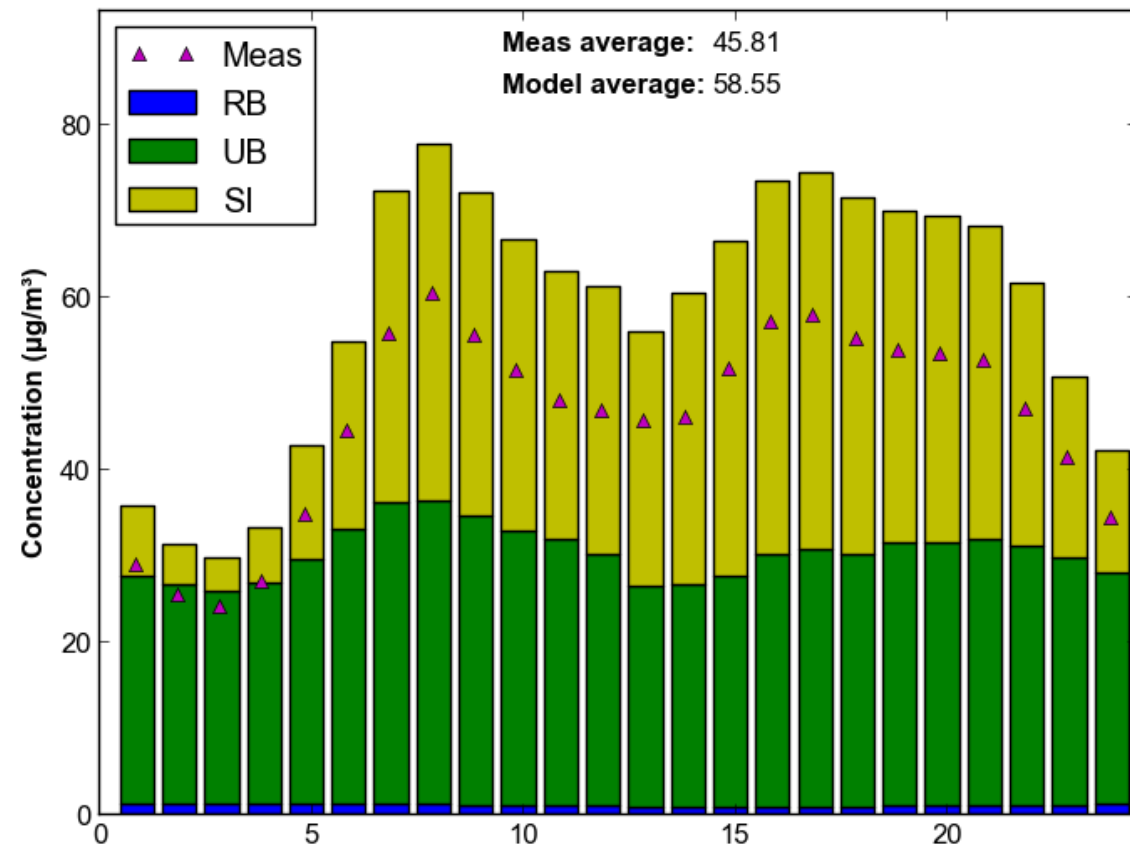
Location and geometry of the Train Station



# Application: Namur

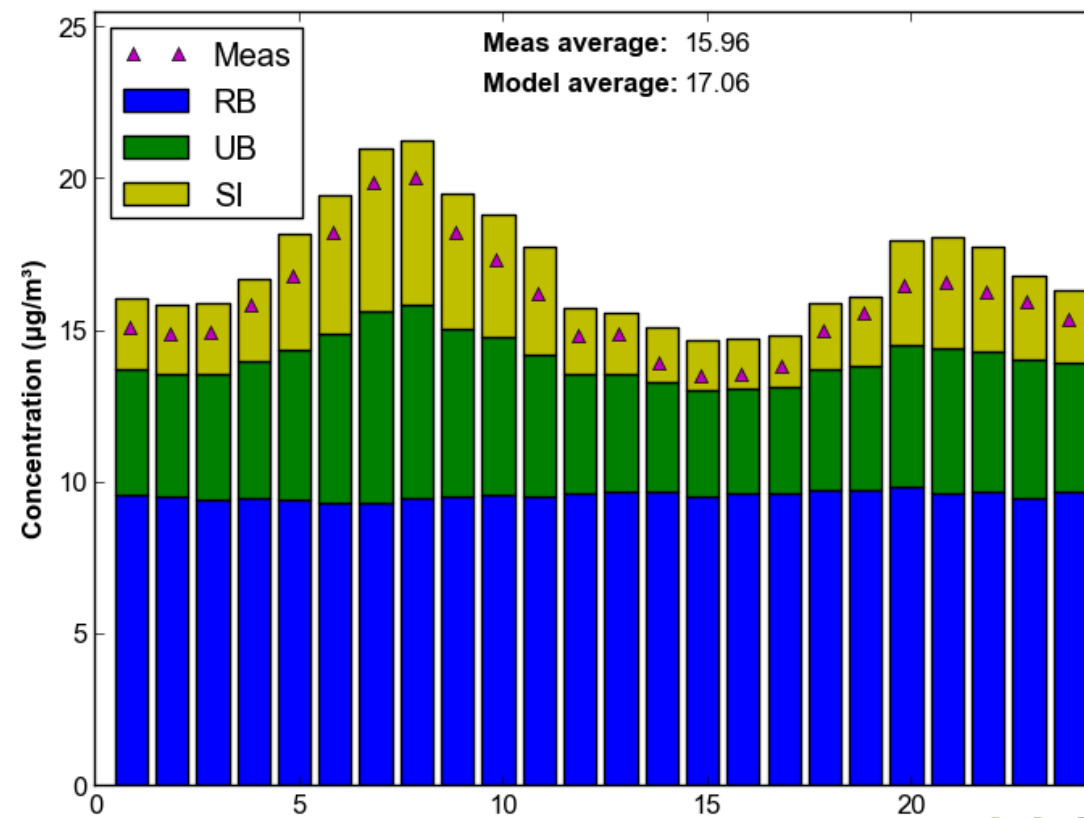
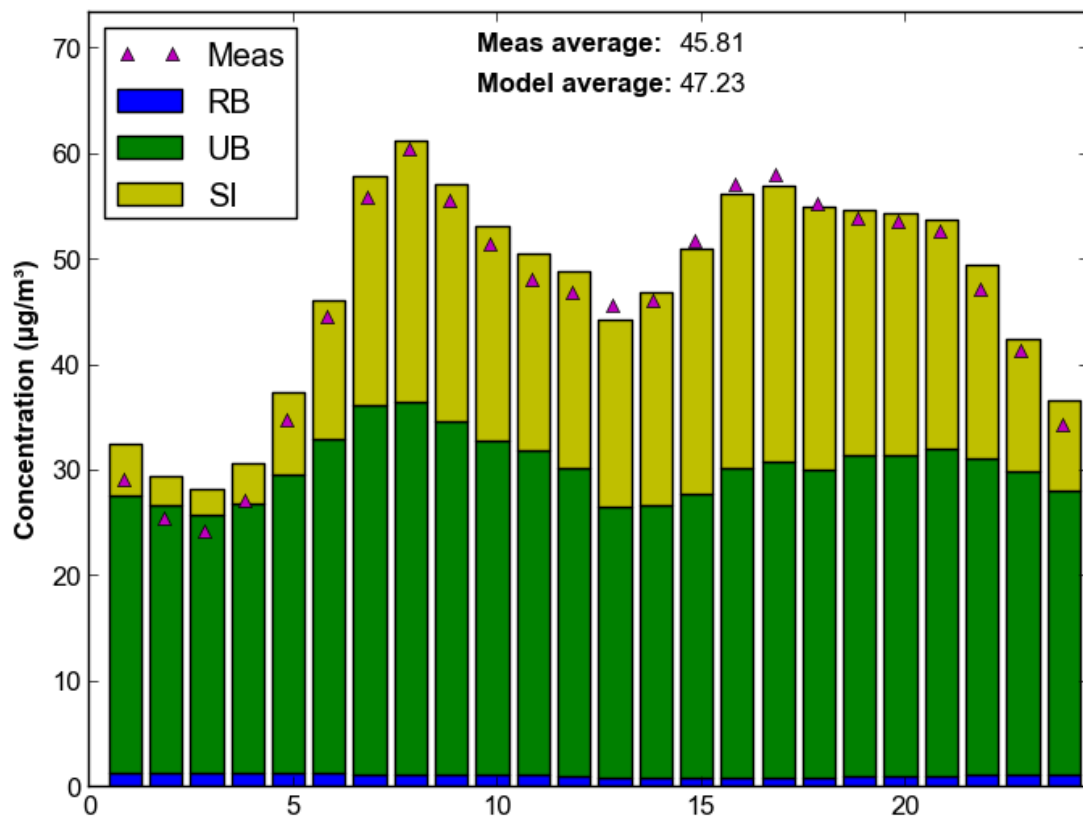


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# Application: Namur



# Conclusion



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THE AIR  
WE BREATHE

- ▶ Efficient & flexible tool
- ▶ Assess urban AQ with
  - ▶ Minimal resources
  - ▶ Widely available input data
- ▶ Validated on small-scale urban situation

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# Thank you for your attention!

For more information:

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Aristotle University Thessaloniki,  
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## *Main Research Topics:*

- Air Pollution
- Waste Management
- Energy Systems & Technology

