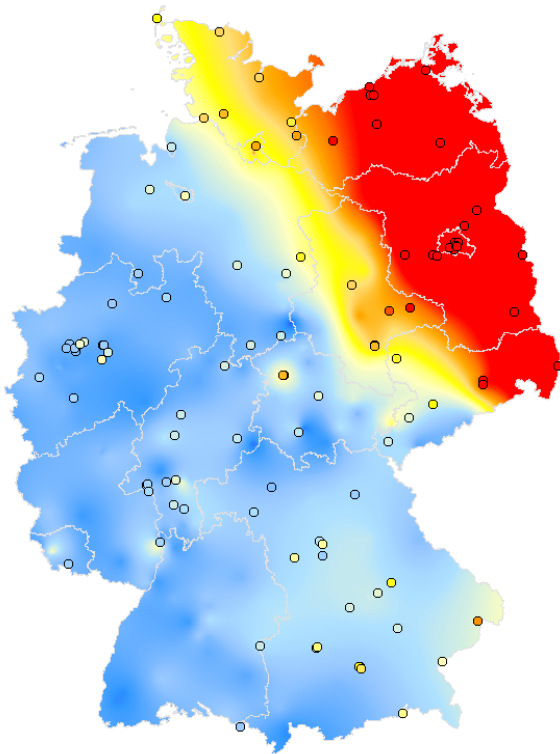


Air quality **monitoring** and **modelling** in Germany

Tagesmittelwerte der Partikelkonzentration



Die vom Umweltbundesamt zusammengestellten Karten und Daten zur aktuellen Immissionssituation dienen der orientierenden Information der Bevölkerung. Auf Grund der weiträumigen Betrachtung ist eine kleinräumige Interpretation nicht zulässig.

Martin Lutz

Senate Department for Urban Development
and Environment
Berlin

- ⊠ **Why** AQ monitoring & modelling?
- ⊠ AQ **monitoring** in Germany and Berlin
- ⊠ **Model** applications supporting **AQ management**
- ⊠ **Examples** from Berlin's AQ planning exercise
- ⊠ **Conclusions** & emerging **recommendations**

Air Quality Plans

👉 Structural template

Requisite issues to be dealt with in an Air Quality Plan

Scope/need for
AQ monitoring

- **Is there a problem with air pollution?**
 - ↪ **assessment** of the air pollution against the AQ limit values
 - 👉 Area of non-compliance, trends
- **Where does it come from, who's to blame & for how much?**
 - ↪ **source analysis**
 - 👉 scales: local, urban, regional, continental
 - ↪ **source apportionment**
 - 👉 source sectors: transport, industry, domestic, ...
- **Are current measures sufficient for compliance ?**
 - ↪ **Estimate impact of current measures and legislation**
 - 👉 includes effects of national and EU-wide measures
- **If not, which extra measures to take? Will limit values be met?**
 - ↪ **Forecast the effect of additional measures**
- **Further possible long-term measures & their impact**

Scope/need for
AQ modelling

why measure?

👉 **reasons** for AQ monitoring

- air quality assessment for **checking compliance** with the AQ standards
 - ↳ supplemented by modelling and objective estimation techniques
- underpinning the **development** of **action** plans
 - ↳ analysis of the **man-made** sources of air pollution
 - ↳ analysis of other **external** factors on pollution levels, like
 - 👉 meteorology and air chemistry
 - 👉 **natural** sources (biogenic PM & VOC)
 - ↳ analysis of the **impact** of control measures
 - 👉 **trend** analysis
- **validation** of dispersion models
- basis for **granting** operation **permits** to larger installations

Germany's federal structure

➡ 16 “Länder”



who needs to measure ?

☞ AQ monitoring in Germany

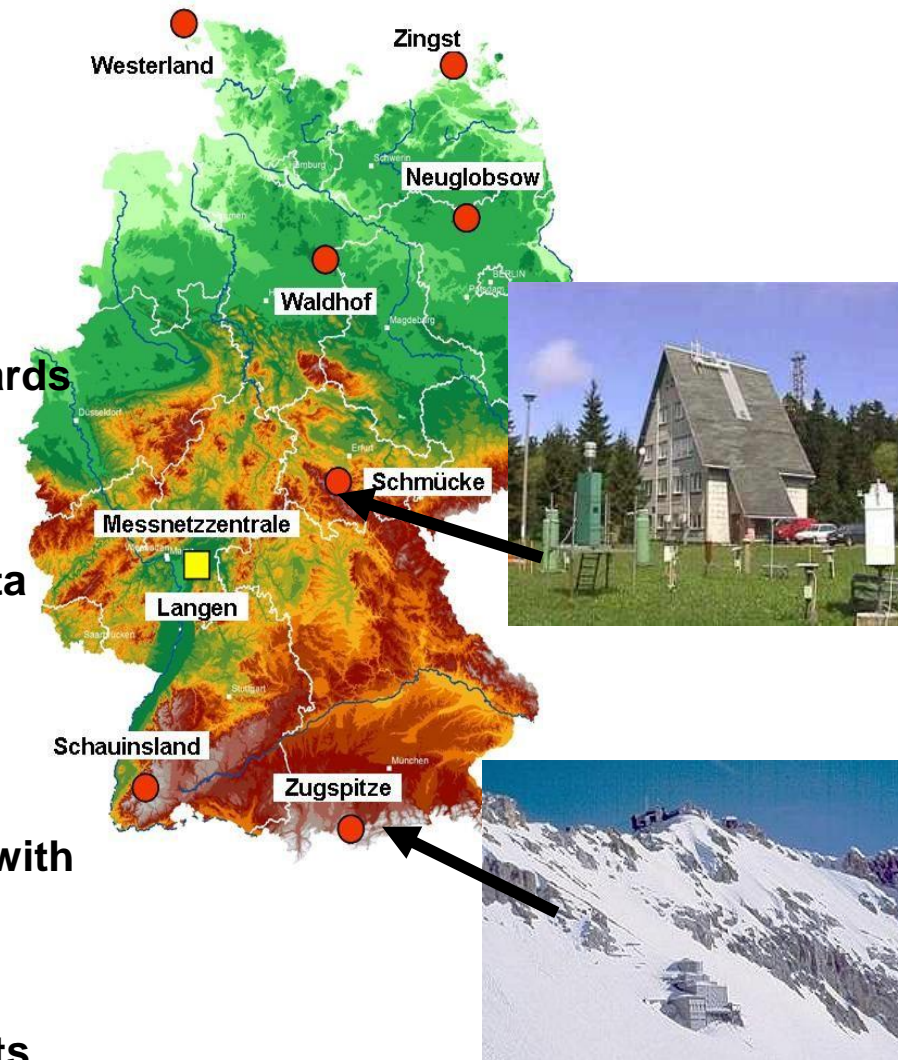
■ the Federal Environment Agency (UBA)

☞ operates monitoring sites **only** in **remote areas**, aimed at...

- ☞ capturing the **large scale background** concentration
- ☞ compliance **assessment** with AQ standards to protect **ecosystems & vegetation**
- ☞ contribute to **international** monitoring programmes (EMEP, GAW)
- ☞ Routinely **collects** all AQ monitoring data

☞ operates one of two national **reference laboratories**

- ☞ Maintains the **national calibration standards**, takes part in EU-wide comparisons of the national standards with the EU-standard
- ☞ organises **regular comparisons** with the calibration standards of the „Länder“ networks and their reference instruments



who needs to measure ?

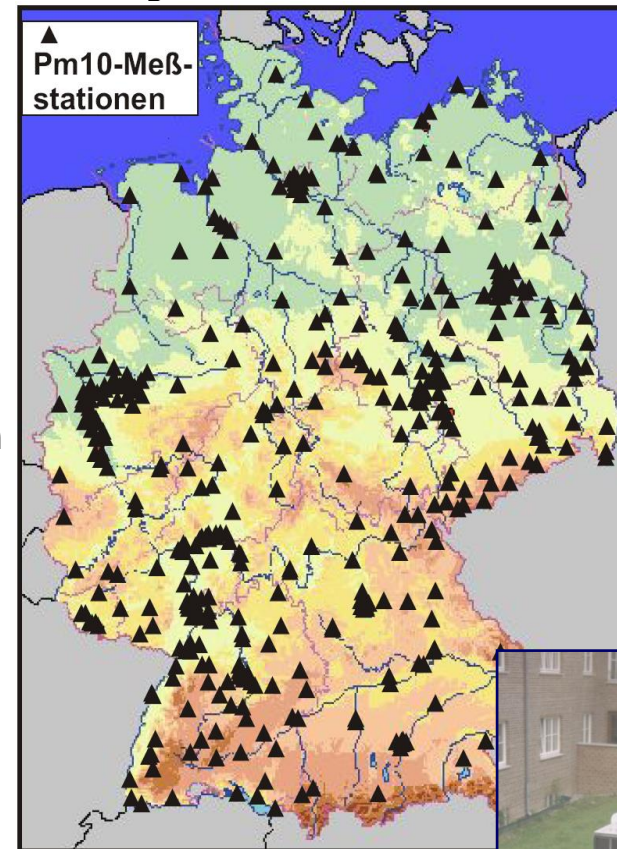
☞ AQ monitoring in Germany

■ The **Federal States** („Länder“)

- ☞ run monitoring networks in rural, suburban & urban areas for ...
 - ☞ **AQ assessment** according to EU legislation
 - ☞ **Compliance assessment** with AQ standards, with focus on human health
 - ☞ underpinning local air quality planning with **source analysis**
- ☞ Operate the second national reference laboratory (North-rhine Westphalia)

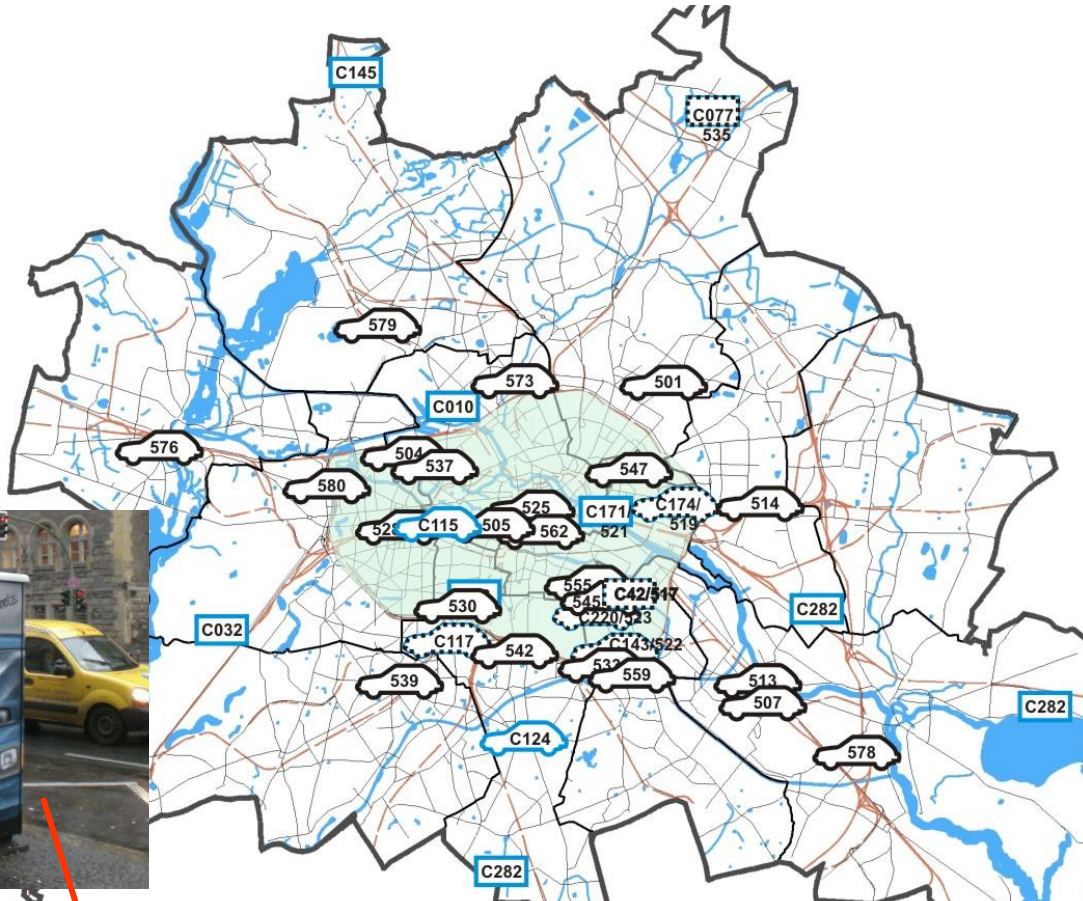
■ **municipal** authorities

- ☞ conduct additional measurements for their own purpose and as a basis for granting permits for operation of larger installations



AQ monitoring in Berlin

☞ Focus on hot spots & urban exposure & source analysis



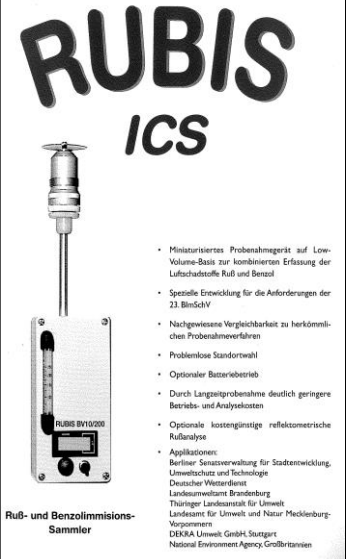
 Low emission zone

 Automatic monitoring site in residential areas and at the cities' periphery

 Automatic monitoring site in busy roads at the kerbside

 monitoring site with miniaturised sampling devices

☞ passive samplers for NO₂
☞ active PM₁₀ mini samplers for EC/OC analysis

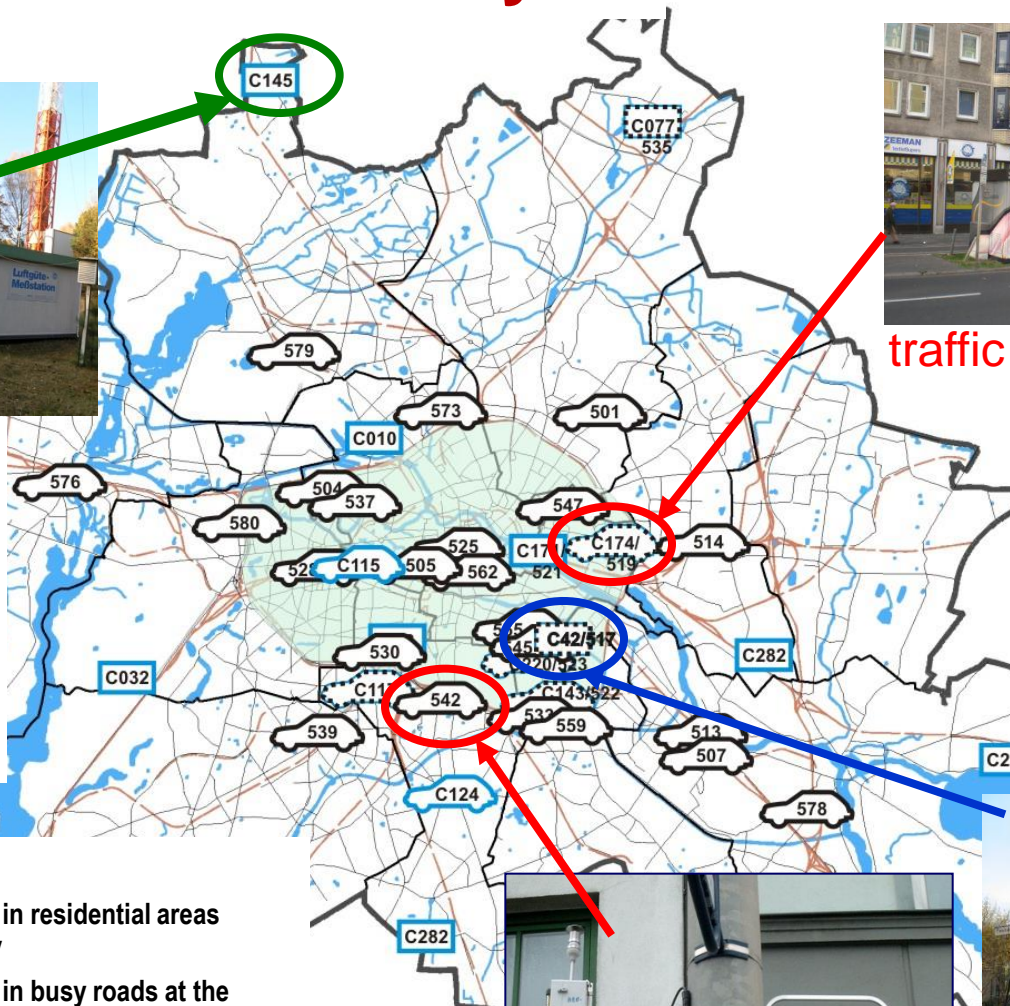


AQ monitoring in Berlin

👉 Focus on **source analysis** ¹⁰



regional
background site
on bottom and
top of tower
324m above
ground

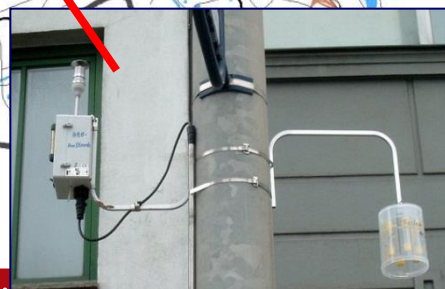


traffic site

40 km
regional
background site
in rural area



urban background site

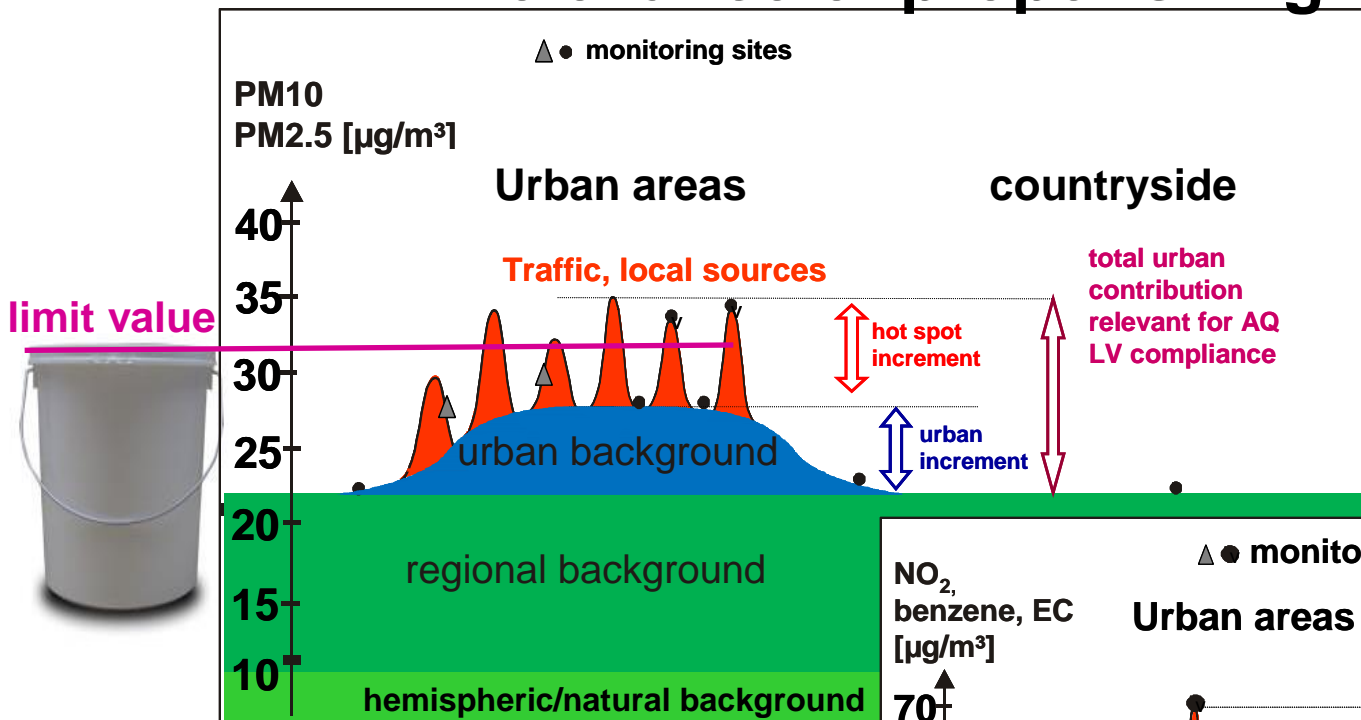


traffic mini-sampler

- Low emission zone
- CXXX Automatic monitoring site in residential areas and at the cities' periphery
- CXXX Automatic monitoring site in busy roads at the kerbside
- 5xx monitoring site with miniaturised monitoring devices for traffic related pollutants in busy roads

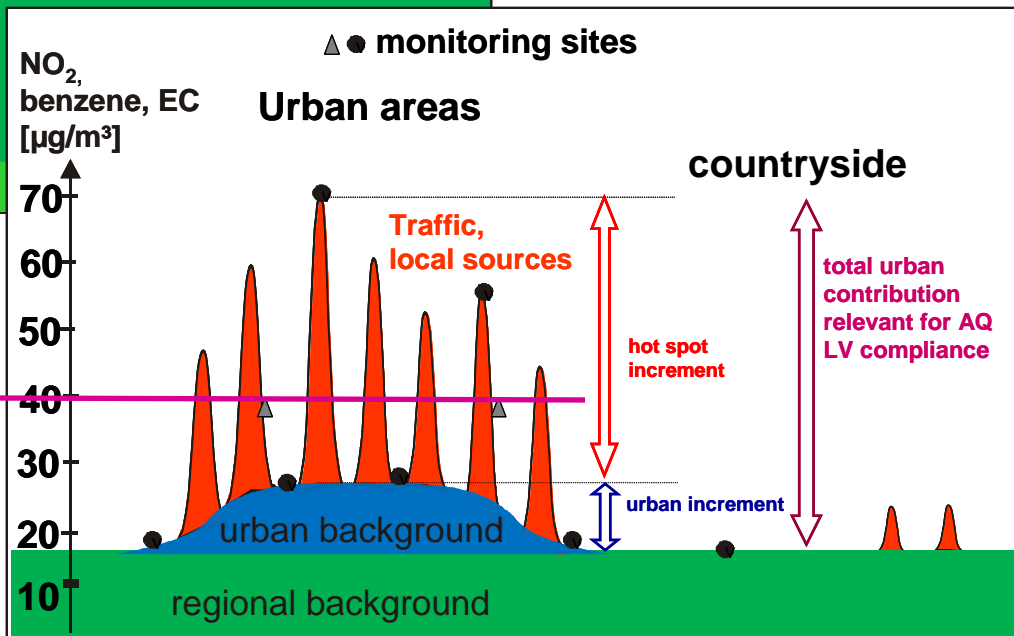
AQ assessment based on monitoring

relevance of proper siting



particulate matter

traffic related
pollutants like
 NO_2 , benzene, EC



Where to measure?

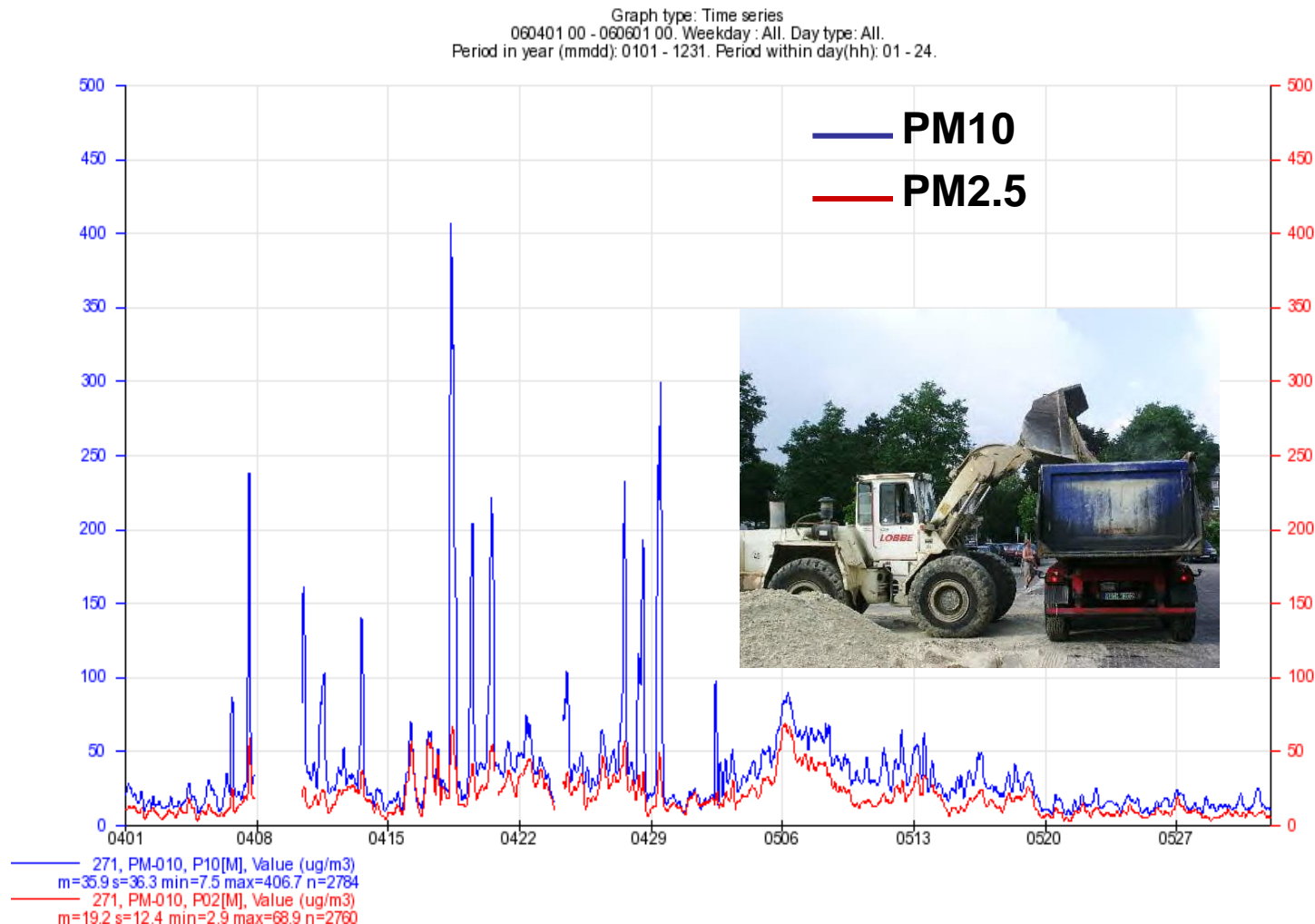
☞ Example Berlin: typical **urban background** station

- located at the margin of a kindergarden
- in a densely populated residential area close to the city centre
- in a dead end road with **little traffic**
 - ☞ used as reference site for comparison with other roadside stations
- pollutants
 - ☞ SO₂ (stopped), CO (stopped 2007)
 - ☞ NO, NO₂, NO_x
 - ☞ automatic & passive
 - ☞ PM₁₀, PM_{2.5}
 - ☞ **β-gauge & LowVol sampler**
 - ☞ **speciation analysis (SO₄, NO₃, NH₄, HM, EC, OC, Na, Cl, K, Mg, Ca)**
 - ☞ EC/OC by mini-sampler
 - ☞ heavy metals, PAH
 - ☞ benzene, toluene
 - ☞ automatic with GC
 - ☞ ozone



using AQ data for **source analysis**

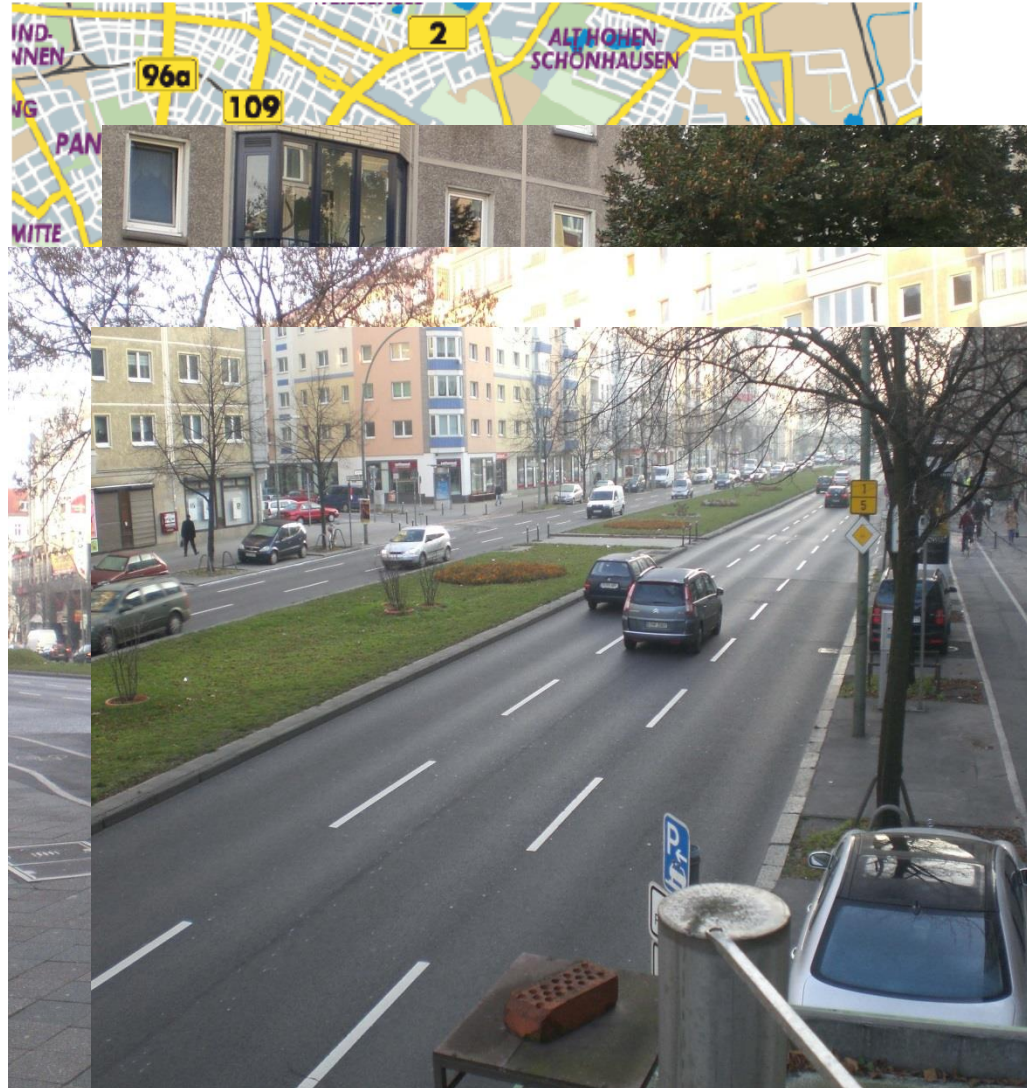
👉 impact from construction works



Where to measure?

Example Berlin: ☞ typical urban roadside station

- located on the paveway of a **busy arterial road** (65.000 veh/day)
 - ☞ used as reference traffic site with extended monitoring programme
- in a densely populated area close to the city centre
 - ☞ house with flats
 - ☞ shopping
 - ☞ small businesses
- pollutants
 - ☞ SO₂, CO
 - ☞ NO, NO₂, NO_x
 - ☞ automatic & passive
 - ☞ PM₁₀, PM_{2.5}
 - ☞ β -gauge & LowVol sampler
 - ☞ speciation analysis (SO₄, NO₃, NH₄, HM, EC, OC, Na, Cl, K, Mg, Ca)
 - ☞ EC/OC by mini-sampler
 - ☞ heavy metals, PAH
 - ☞ benzene, toluene,
 - ☞ automatic with GC



Where to measure?

☞ examples from Saxony Anhalt

industrial site



Aktuelle Messstandorte im LÜSA



Komponentenausstatt

Mit einem **MouseClick** auf die erhalten Sie weitere Informati Foto, Lageplan und gemessen

- Stadtgebietsstation
- Verkehrsstation
- Hintergrundstation
- Industriebezogene Station
- Kleinmessstation



traffic site

remote background site



on mountain top

Where to measure?

☞ examples from Mecklenburg-Vorpommern






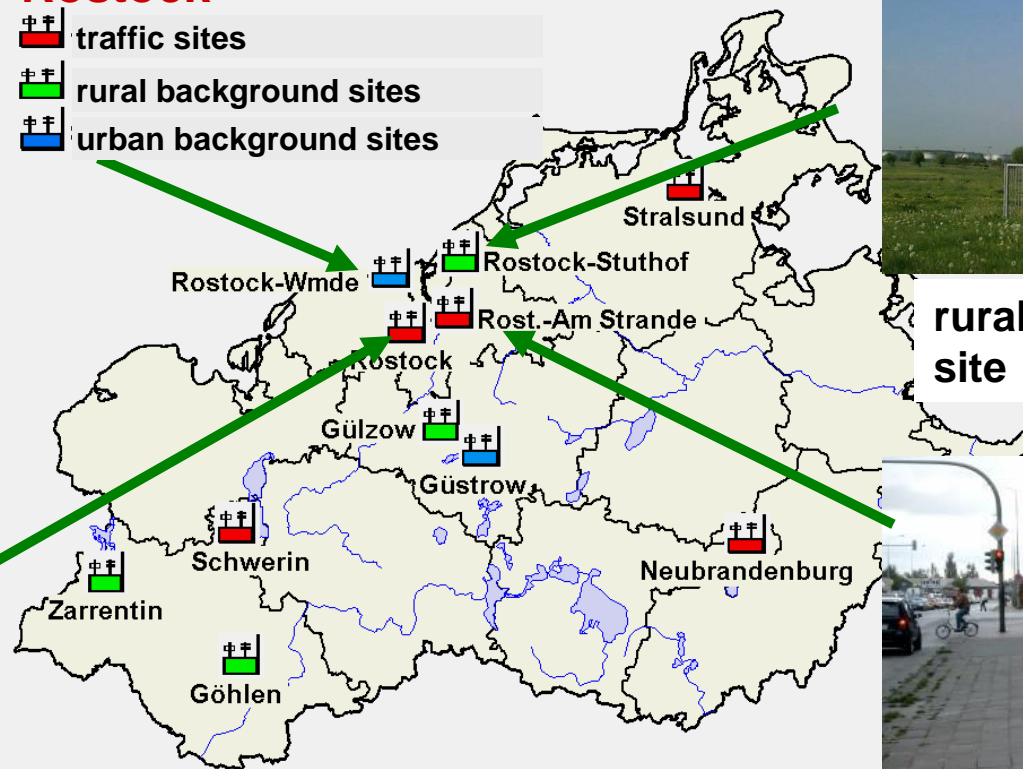
urban background
site in residential
area



traffic site

Example: monitoring sites in Rostock

-  traffic sites
-  rural background sites
-  urban background sites



rural background
site



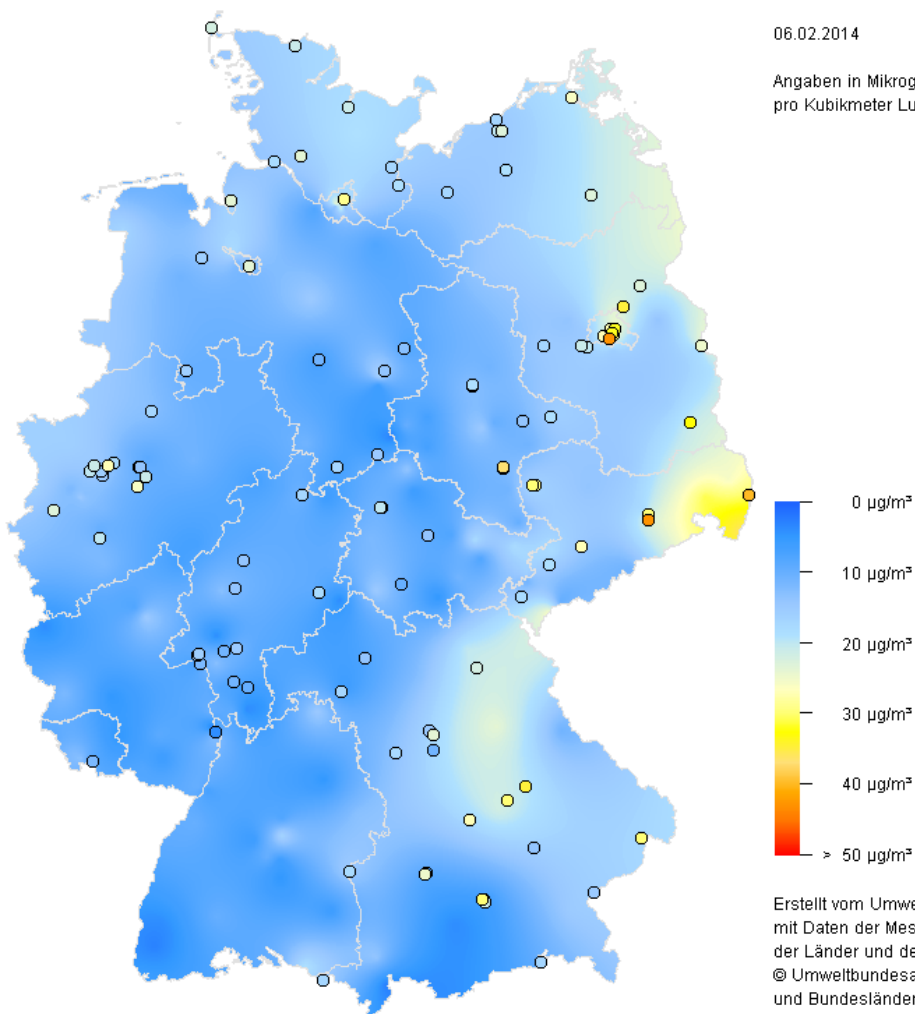
traffic site

AQ monitoring in Germany

☞ data collection & mapping by UBA

use AQ data for **source analysis** ☞ regional scale transport of PM₁₀

Tagesmittelwerte der Partikelkonzentration



Episode Jan/Feb
2014 with high PM
concentration in
Germany

Die vom Umweltbundesamt zusammengestellten Karten und Daten zur aktuellen Immissionssituation dienen der orientierenden Information der Bevölkerung. Auf Grund der weiträumigen Betrachtung ist eine kleinräumige Interpretation nicht zulässig.

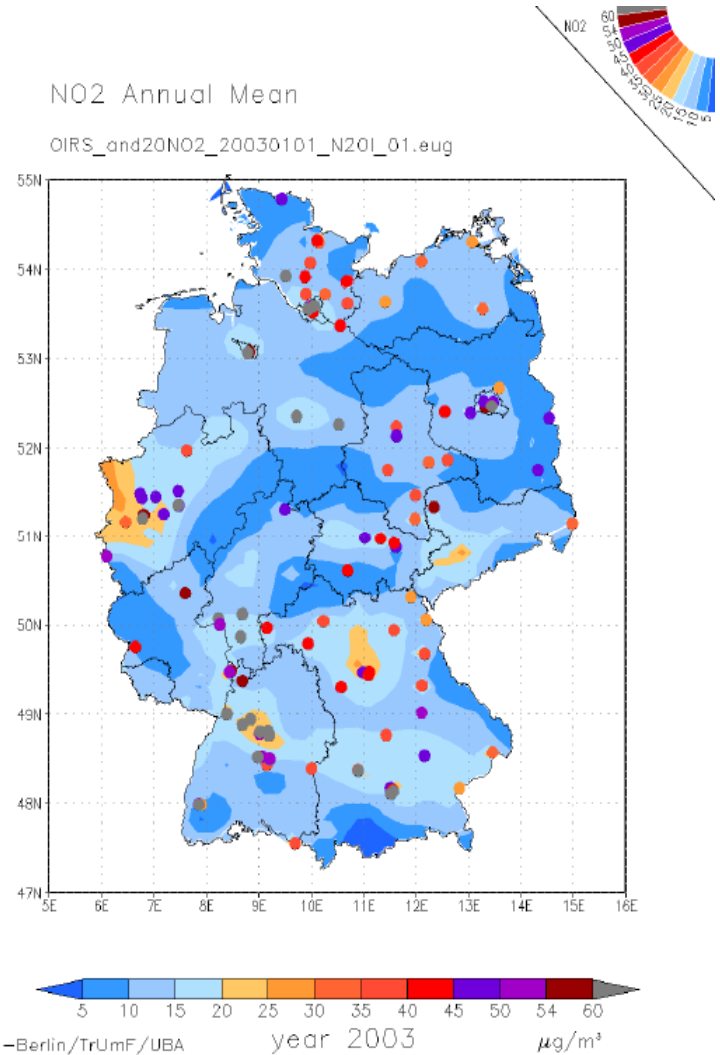
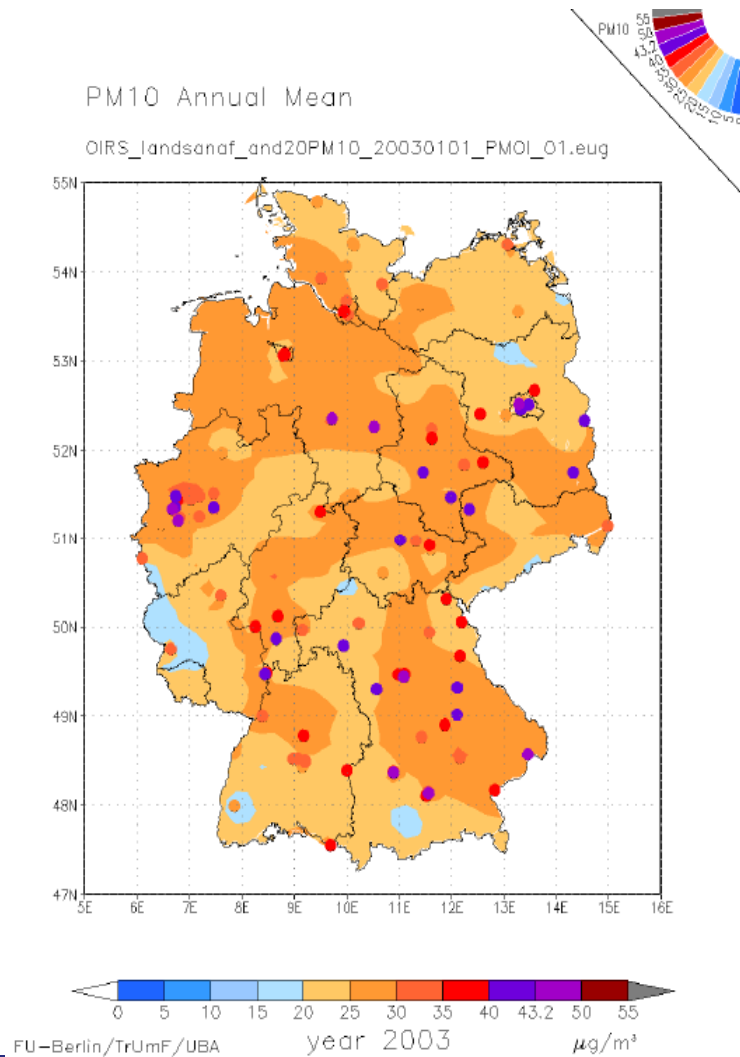
Air quality monitoring & assessment in Germany

👉 conclusions and recommendations

- AQ monitoring is the main tool for successful AQ management
 - ↪ **compliance** assessment with AQ standards
 - ↪ **source** analysis
 - ↪ **information** & awareness raising of the **public**
 - ↪ **impact** analysis of control **measures**
- important pre-condition is **proper siting**
 - ↪ **representative** recording of pollution exposure of the (urban) population
 - ↪ includes **roadside** monitoring, urban background
 - ↪ includes **rural background** stations for source analysis
 - 👉 common siting criteria needed
- use of simple und **cheap indicative** measurement supplementary to automatic continuous measurements
 - 👉 passive samplers, mini-samplers
 - 👉 random measurement with mobile units
 - 👉 comparisons with standard technique important for QA/QC

using AQ data & fitted results of a complex model

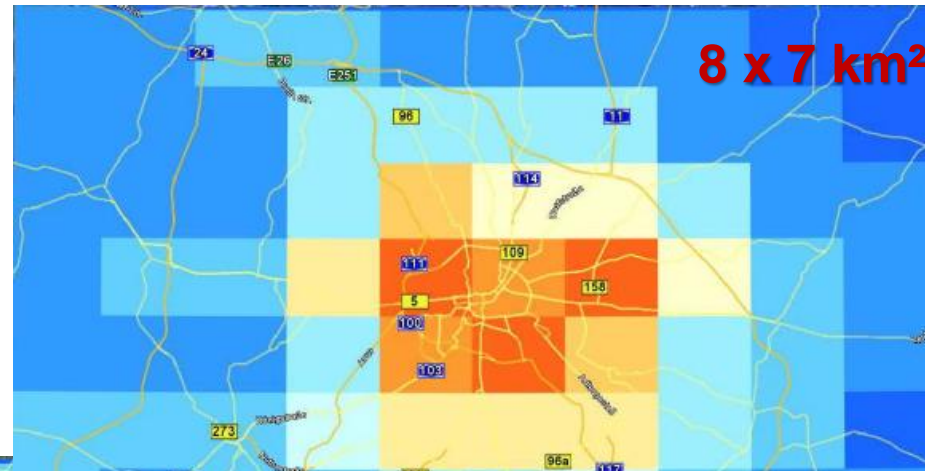
👉 compliance assessment



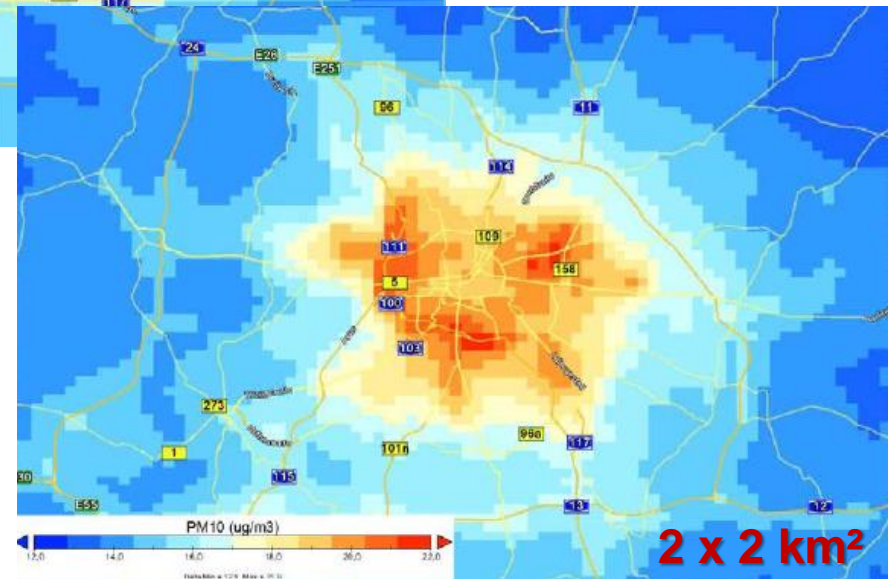
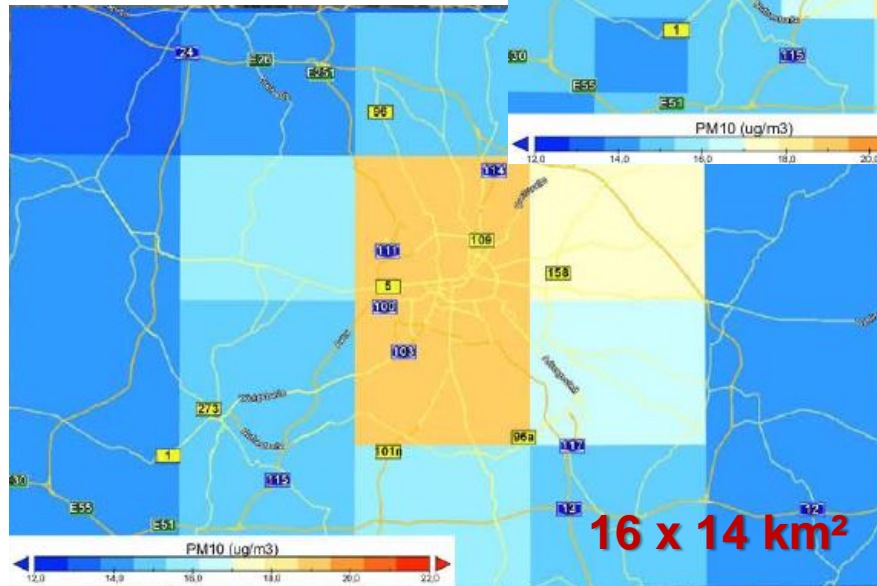
Model application

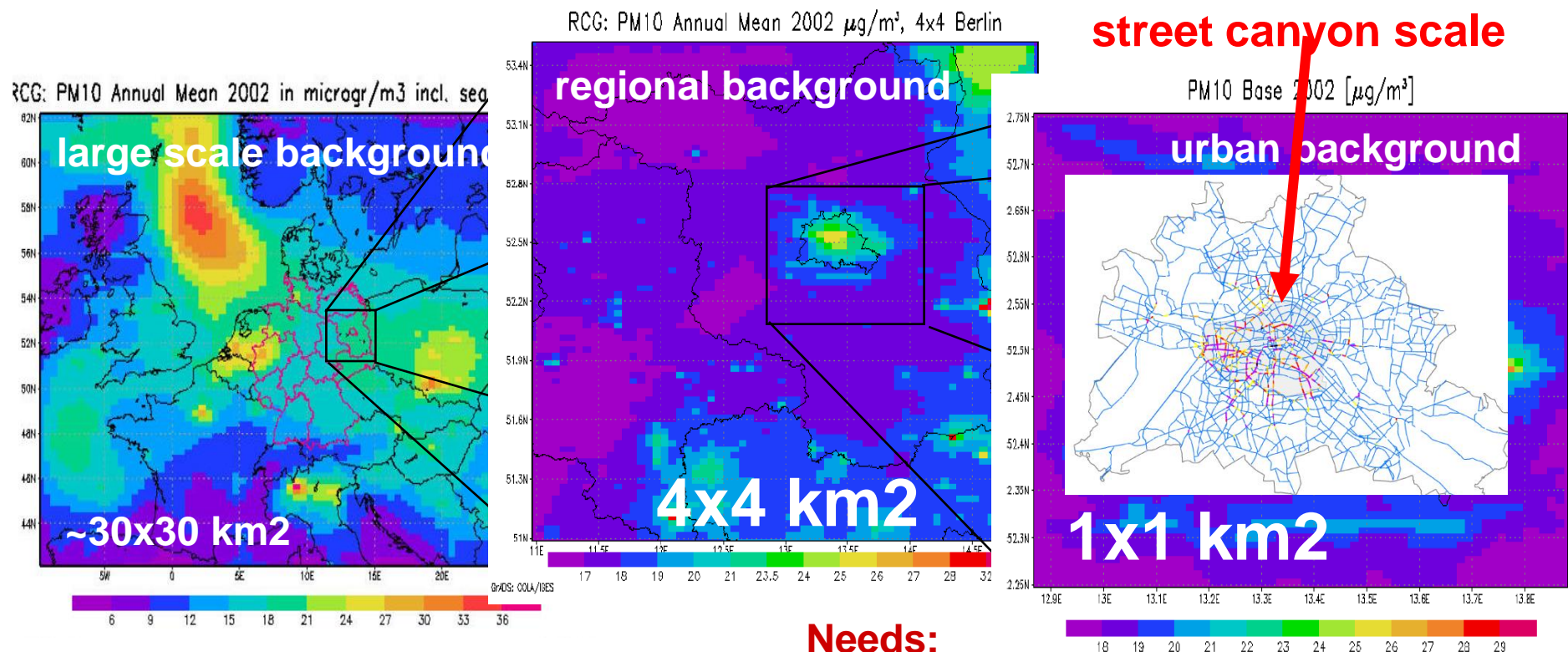
☞ Relevance of model resolution for **urban scale**

☞ Example **Berlin** **agglomeration**



Source: PAREST
final report,
Bultjes et. al,
2010





street canyon scale

RCG: PM10 Annual Mean 2002 $\mu\text{g}/\text{m}^3$, 4x4 Berlin

regional background

large scale background

PM10 Base 2002 [$\mu\text{g}/\text{m}^3$]

urban background

4x4 km2

1x1 km2

Objectives:

- **AQ assessment**
- **Source apportionment**
- **Scenario analysis**

☞ Will AQ limit values be met in the future?

Needs:

- **Reliable projections** into the future
 - ☞ polluting activities, specific emissions
- **Robust forecast** of the **impact** of current legislation & extra **measures**
- ☞ **EU, national and local**

dispersion models

☞ **classification** according to spatial scales

■ **regional – continental** scale (1000 x 1000 km²)

☞ application **purposes**

- ☞ get **large-scale background** levels for assessment & projections
- ☞ assessment/quantification of **interregional/transboundary** pollution transport
- ☞ source apportionment for **distant** emission sources

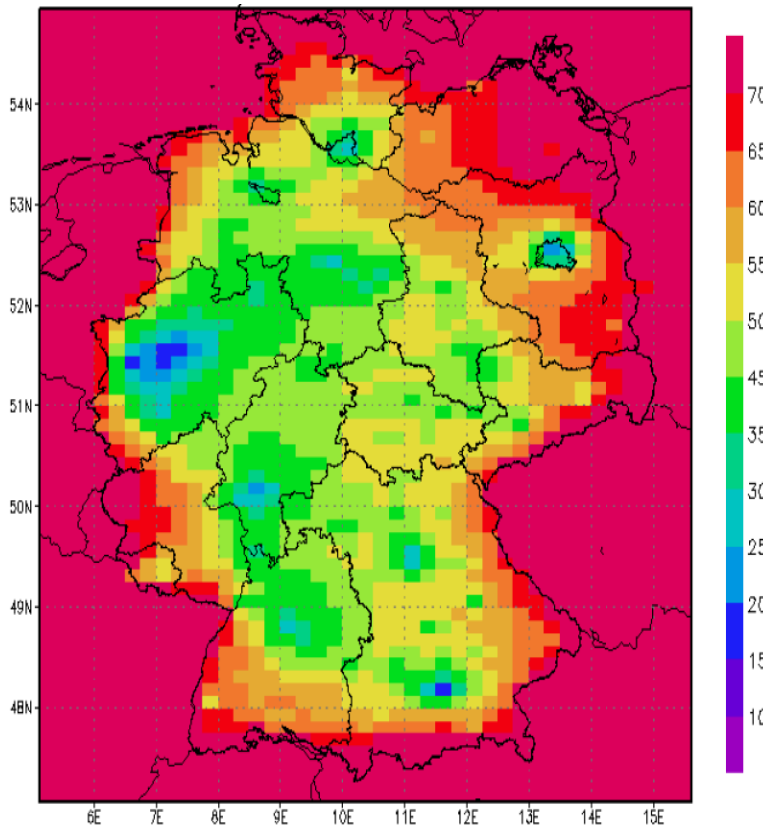
☞ requisite **features** of such models

- ☞ treatment of major chemical/physical atmospheric processes
 - ☞ photochemistry, secondary aerosol formation, wet/dry deposition
- ☞ full-scale 3-dimensional simulation of pollution transport
- ☞ large-scale emission inventory, incl. natural emissions

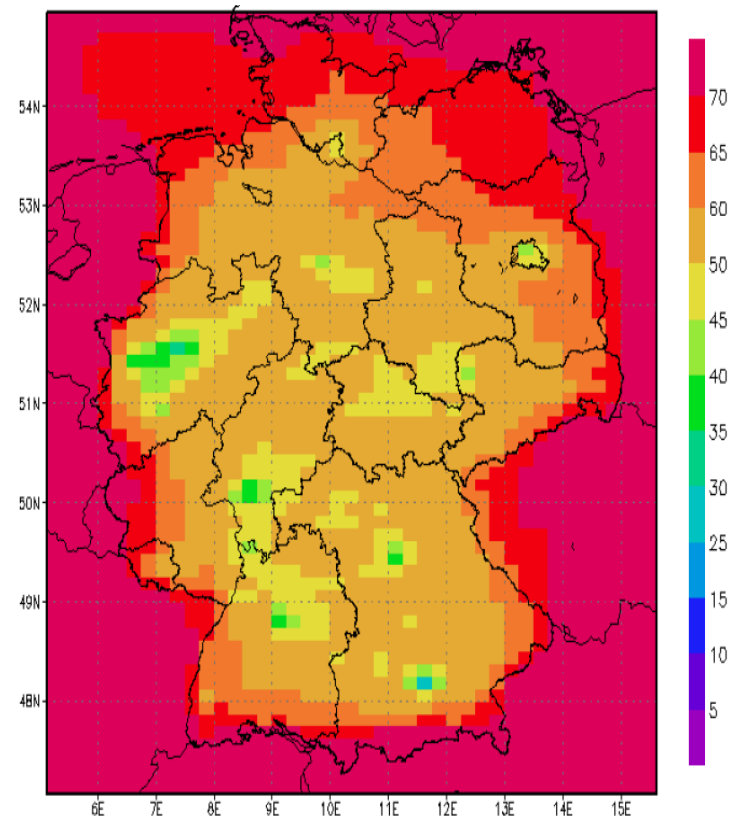
☞ **output:** NO, NO₂, NO_x, SO₂, NH₃, O₃, VOC, PM_{xx}, secondary PM

estimating the share in **primary** PM of domestic and external sources

% share of German sources of **primary** PM: zero emissions of surrounding countries



% share of German sources of **total** PM: zero emissions of surrounding countries



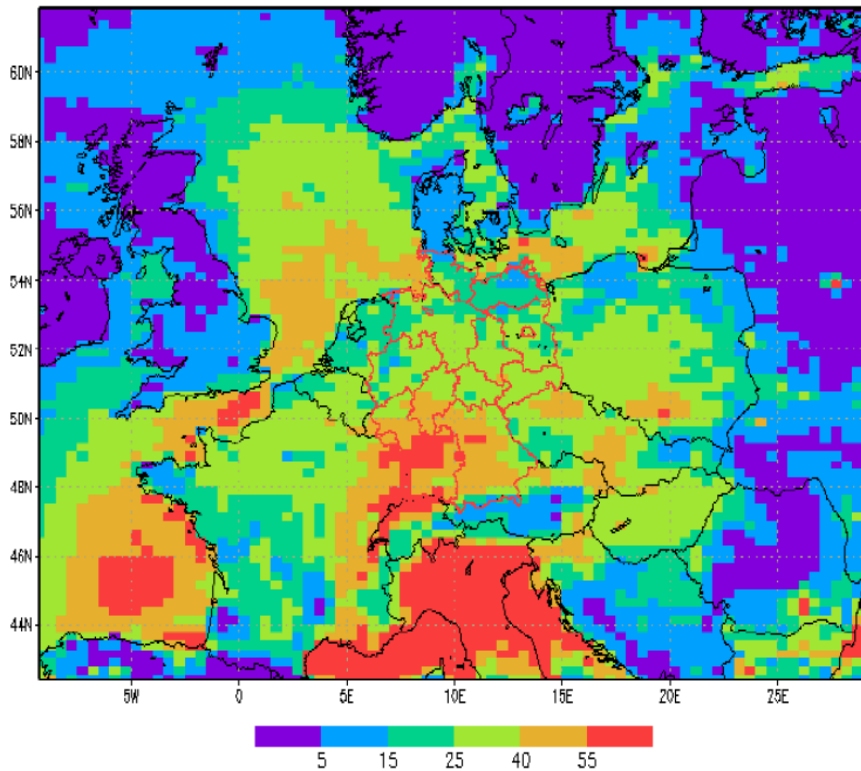
Source: UBA/R.Stern

regional scale models

scenario runs

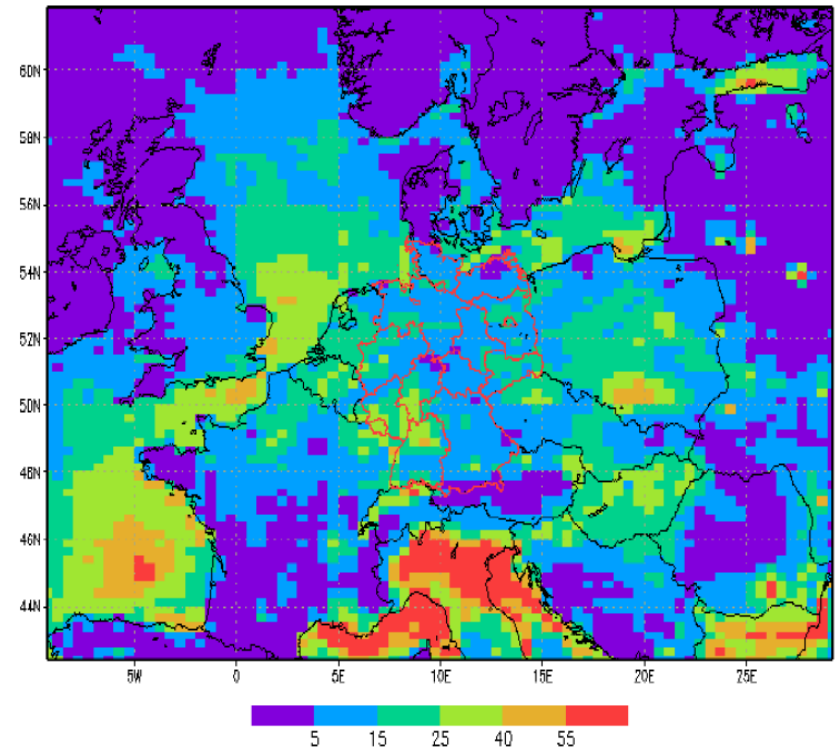
Ozone exceedances 1999

RCG: No days max 8hmean >120 microgr/m³, 1999



Ozone exceedances 2010

RCG: No days max 8hmean O₃ >120 microgr/m³, 2010



Source: UBA/R.Stern

dispersion models

☞ **classification** according to spatial scales

■ regional – continental scale (1000 x 1000 km²)

☞ exemplary **models** used in Germany

☞ EURAD (www.eurad.uni-koeln.de)

☞ REM/CALGRID developed by FU Berlin for German EPA

☞ requisite **conditions** for application

☞ need significant computer resources

☞ handling needs specific expertise


☞ input data (emissions, meteo, land use, etc) required on a European scale

⇒ predestined for National Environment Agencies to
operate such models as a support for local authorities


or

⇒ use MACC-II services

Monitoring atmospheric composition & climate



Monitoring atmospheric composition & climate



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Air Quality & Atmospheric Composition

Verification of Global Services

Scientific Field Campaign Support

Verification of Regional Services

Today's Forecasts

Reactive Gases

Aerosols

European Air Quality

UV Index

Ozone Layer

CO2

Latest Analyses

Fire Monitoring

Reactive Gases

Aerosols

European Air Quality

MACC-II for Policy Use

The MACC-II Policy Interface provides an overview of the information available from the MACC-II services that can be of interest for policy users.

Information, products and tools on this webpage are intended to identify the contribution of different sources to exceedances of air quality limit values and to help in the design of policy responses to prevent severe air pollution episodes.

European Air Quality and Pollution Episodes

MACC-II produces annual assessment reports with validated information on the state and evolution of background concentrations of air pollutants in Europe. The reports are based on best available information from the MACC-II model ensemble combined with observations through data assimilation techniques. They include a number of regulatory indicators for policy use and detailed information on the origin of specific pollution episodes.

- [2011 Air Quality Assessment Report](#)
- [Validation report](#) for the 2011 Air Quality Assessment Report
- [2010 Air Quality Assessment Report](#)
- [Validation report](#) for the 2010 Air Quality Assessment Report

European Air Quality Forecasts

MACC-II produces regional air quality forecasts every day, accompanied with quarterly verification reports. In addition, model performance is monitored on a daily basis for the past 7 days and for the past 3 months.

- [Regional Air Quality Forecasts](#)
- [Quarterly verification reports](#)
- [Model performance monitoring](#)

Source allocation

The [source allocation](#) products from MACC-II are intended to support national authorities to identify the origin of exceedances of air quality limit values. MACC-II products may be used for the assessment of the long-range transboundary component of an air pollution episode, in regard to anthropogenic emissions (the contributions from natural dust, sea salt and forest fires to the episodes will be added). The MACC-II services can provide on demand calculations of the long-range transboundary vs the indigenous contribution to any given background air pollution episode. *An alert system for natural contributions to air pollution episodes in Europe is presently under development.*

Green Scenarios

Daily air quality forecasts from MACC-II are currently used as boundary conditions for the operational air quality forecasting services at several European cities. The MACC-II [green scenario products](#) are intended to help policy users in the design of policy responses to prevent severe air pollution episodes. The green scenarios provide daily regular information on the expected effect that short term measures on either traffic and residential emissions may have on the forecasted pollution episodes.

In addition, [long-term scenarios](#) (2015, 2020, 2030) applicable at the European scale, have been

User Support

Documentation

Validation

E-learning u'

Mailing Lists

Operational Info

Services

Air Quality & Atmospheric Composition

Climate Forcing

Ozone Layer & Ultra-Violet Radiation

Solar Radiation

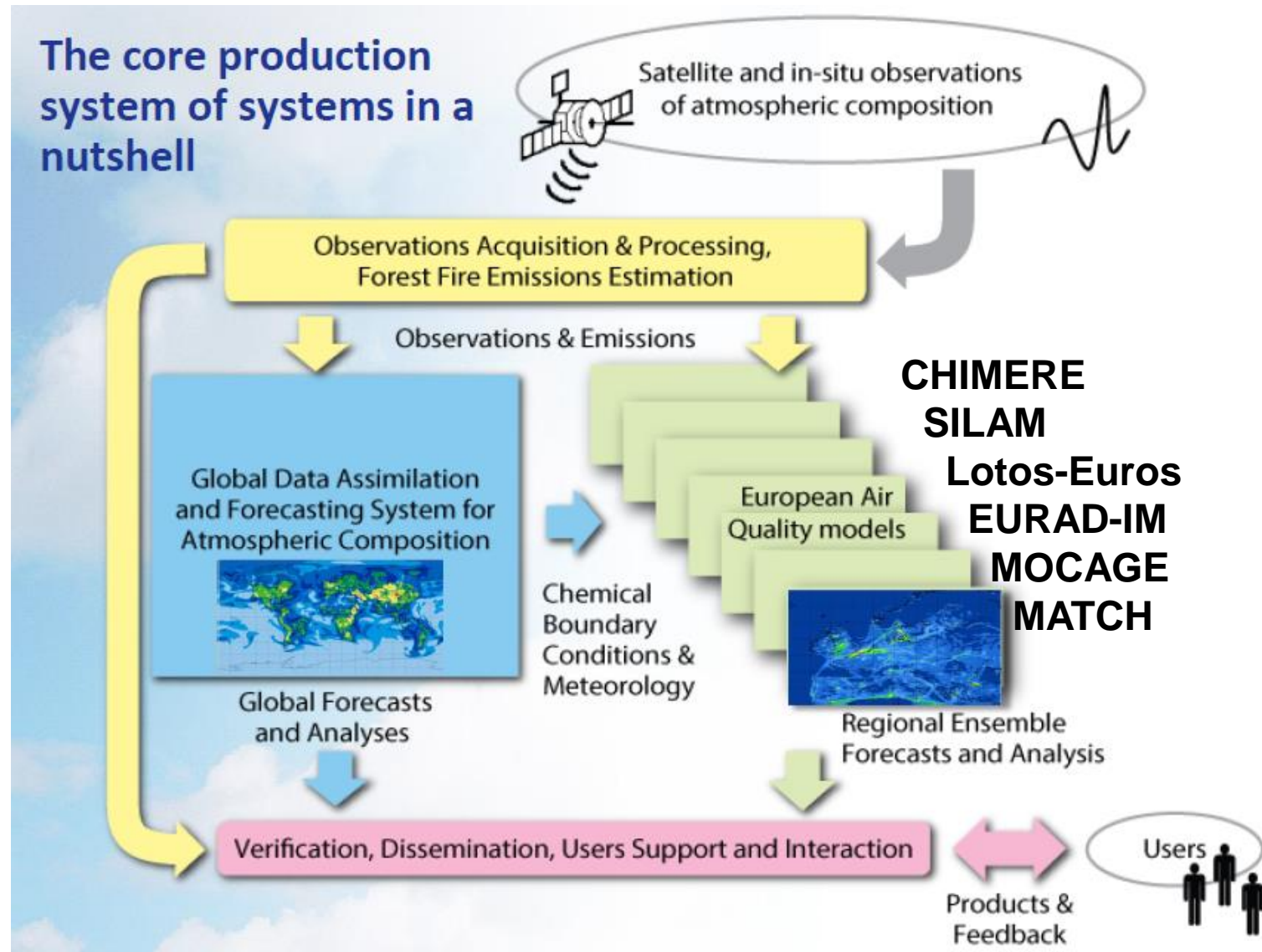
Emissions & Surface Fluxes

ACCESS CATALOGUE

The MACC Services: Routine operation of several European Chemical Transport Models

The MACC-II Services

➡ Routine **operation** of several European **Chemical Transport Models**



Source:
Vincent-
Henri
Peuch

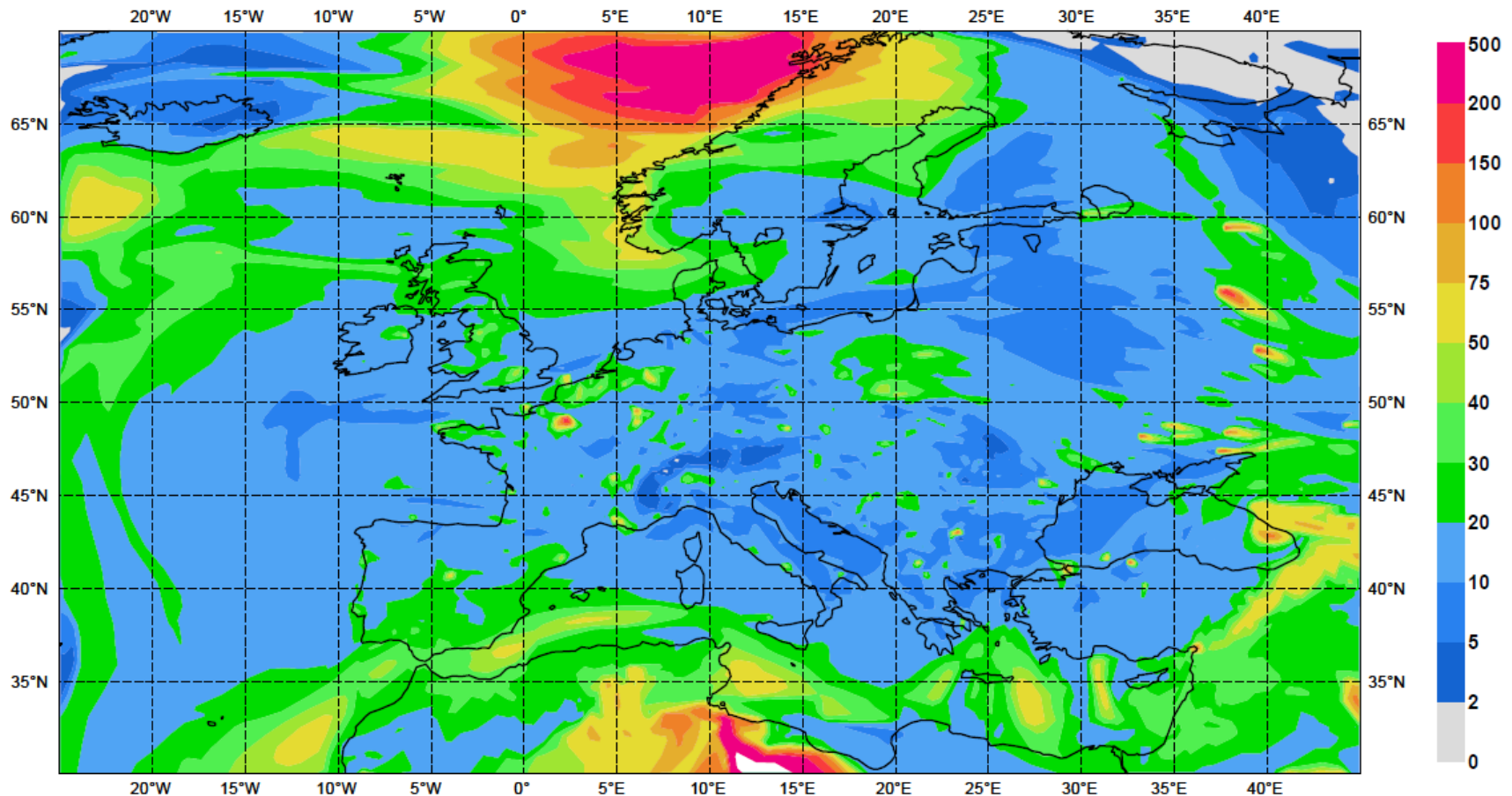
The MACC-II Services

➡ Routine **operation** of several European **Chemical Transport Models**

Example: Smog-Episode in February 2014

Saturday 15 March 2014 00UTC MACC-RAQ Analysis t-024 VT: Friday 14 March 2014 00UTC

Model: MATCH Height level: Surface Parameter: PM10 Aerosol [$\mu\text{g}/\text{m}^3$]

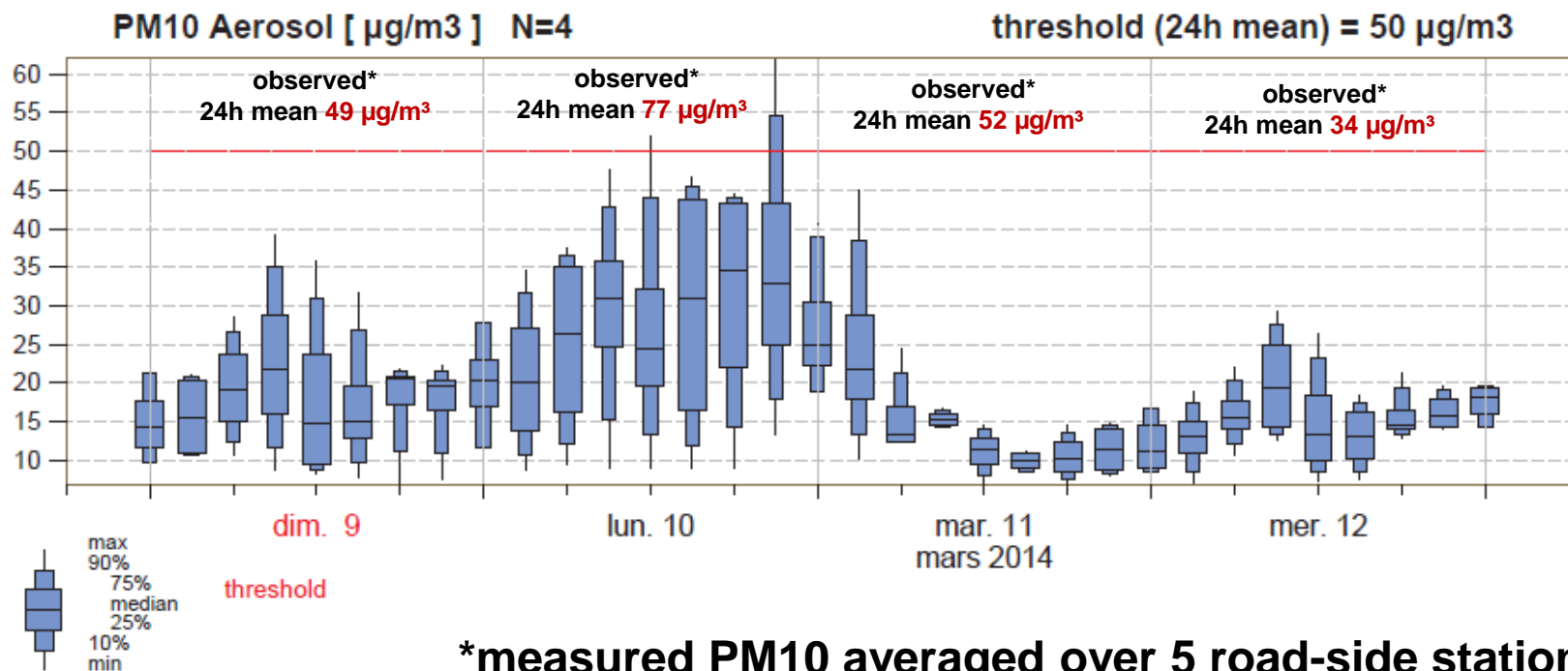


The MACC-II Services

➡ Routine **operation** of several European **Chemical Transport Models**

➡ Example: EPSGrams of the model ensemble results for **Berlin**

👉 **Note:** Urban scale not yet well resolved,
roadside levels grossly **underestimated**

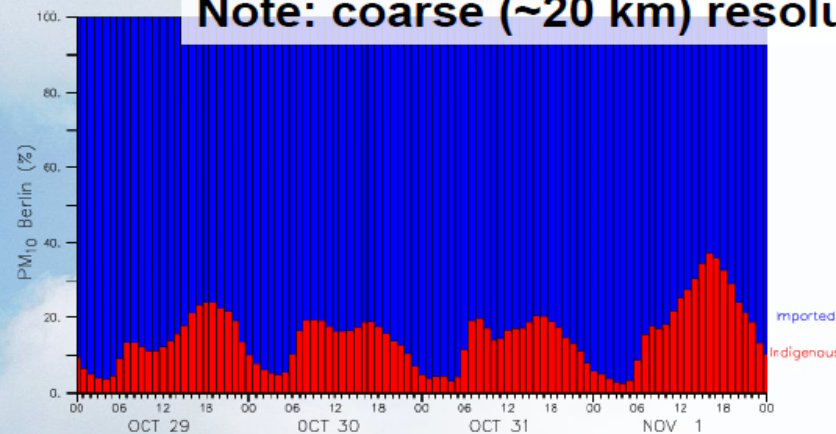


MACC-II model simulations

👉 application for source analysis

Example: MACC-II simulation of *City Contribution*

Note: coarse (~20 km) resolution!



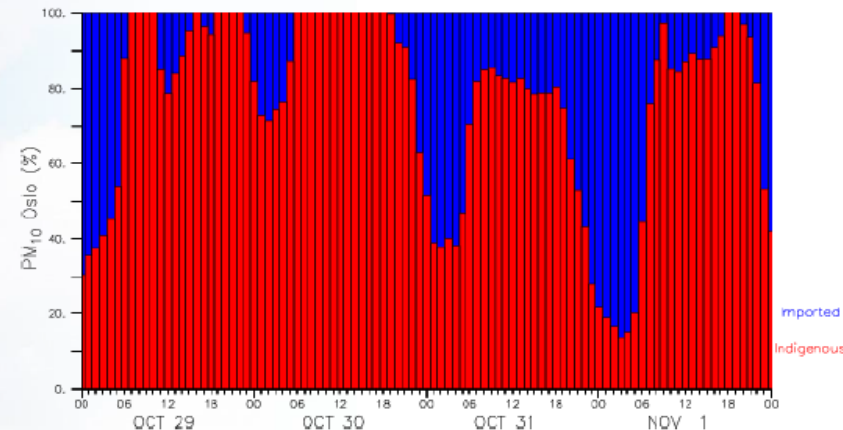
PM₁₀ over Berlin

imported
indigenous



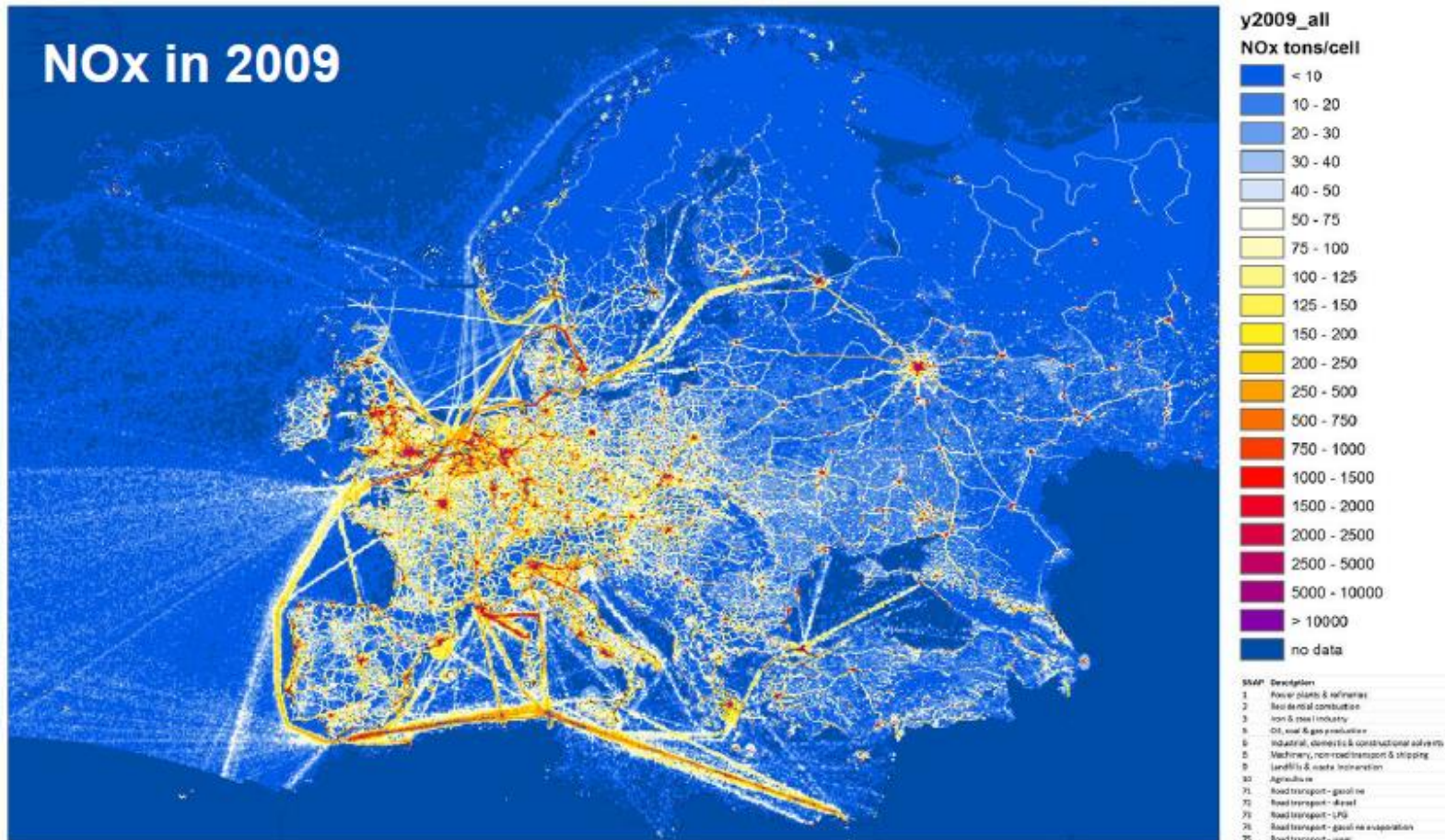
City contribution underestimated, because model does not yet resolve urban scale

PM₁₀ over Oslo



Source: Michael Gauss 2013

Resulting emission maps



Source:
Hugo Denier
van der Gon,
TNO

dispersion models

☞ **classification** according to spatial scales

■ **urban scale** (area $\sim 100 \times 100 \text{ km}^2$, resolution $\sim 1 \times 1 \text{ km}^2$)

☞ **application** purposes

- ☞ urban background levels for AQ assessment & projections
- ☞ urban background levels as **boundary conditions** for local/micro-scale or street canyon modelling
- ☞ **source** analysis/apportionment on an **urban** scale
- ☞ calculation of the impact of **single** stationary sources for licensing purposes
- ☞ environment impact assessment of infrastructure and **development projects**

☞ **features** of such models

- ☞ treatment of atmospheric **chemistry** only for reactive species with short life-time (ozone, reactive VOC, NO, NO₂)
- ☞ simplified 3-dimensional simulation of pollution transport

dispersion models

☞ **classification** according to spatial scales

■ urban scale

☞ exemplary **models** used in Germany

simple:

- ☞ AUSTAL 2000 developed by German EPA for issuing permits to operators according to German TA Luft 2002
- ☞ TALBO, IMMISnet: Gaussian multiplume-models

complex:

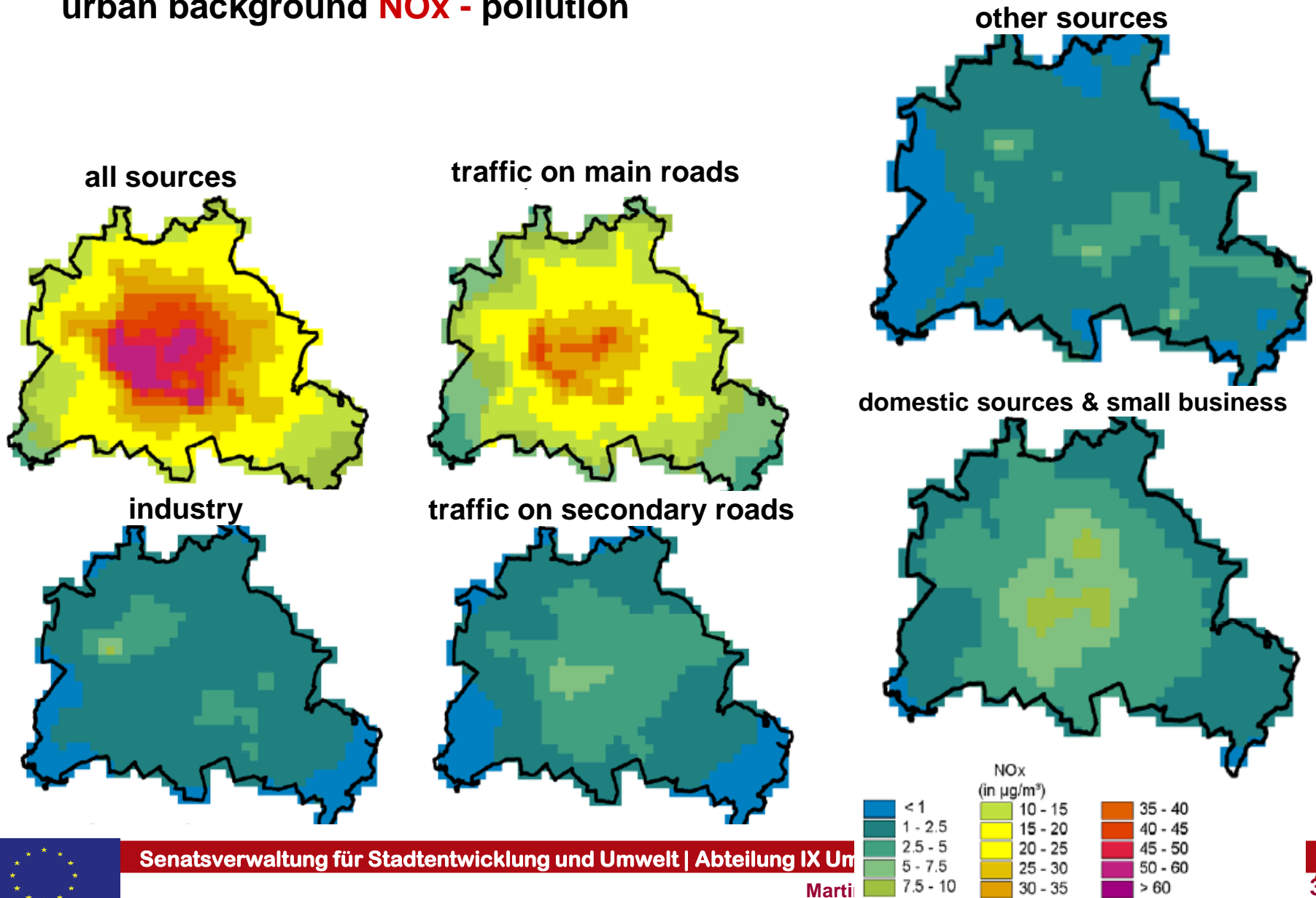
- ☞ CALGRID developed by FU Berlin for German EPA
- ☞ EURAD (Nest 4 with 1x1 km resolution)

☞ requisite **conditions** for application

- ☞ PC sufficient for simple models
- ☞ limited expertise, but depending on the complexity of the model
- ☞ detailed emission data matching the model resolution
- ☞ 2-D wind, vertical temperature profile or stability class, 3-D wind for complex chemical transport models

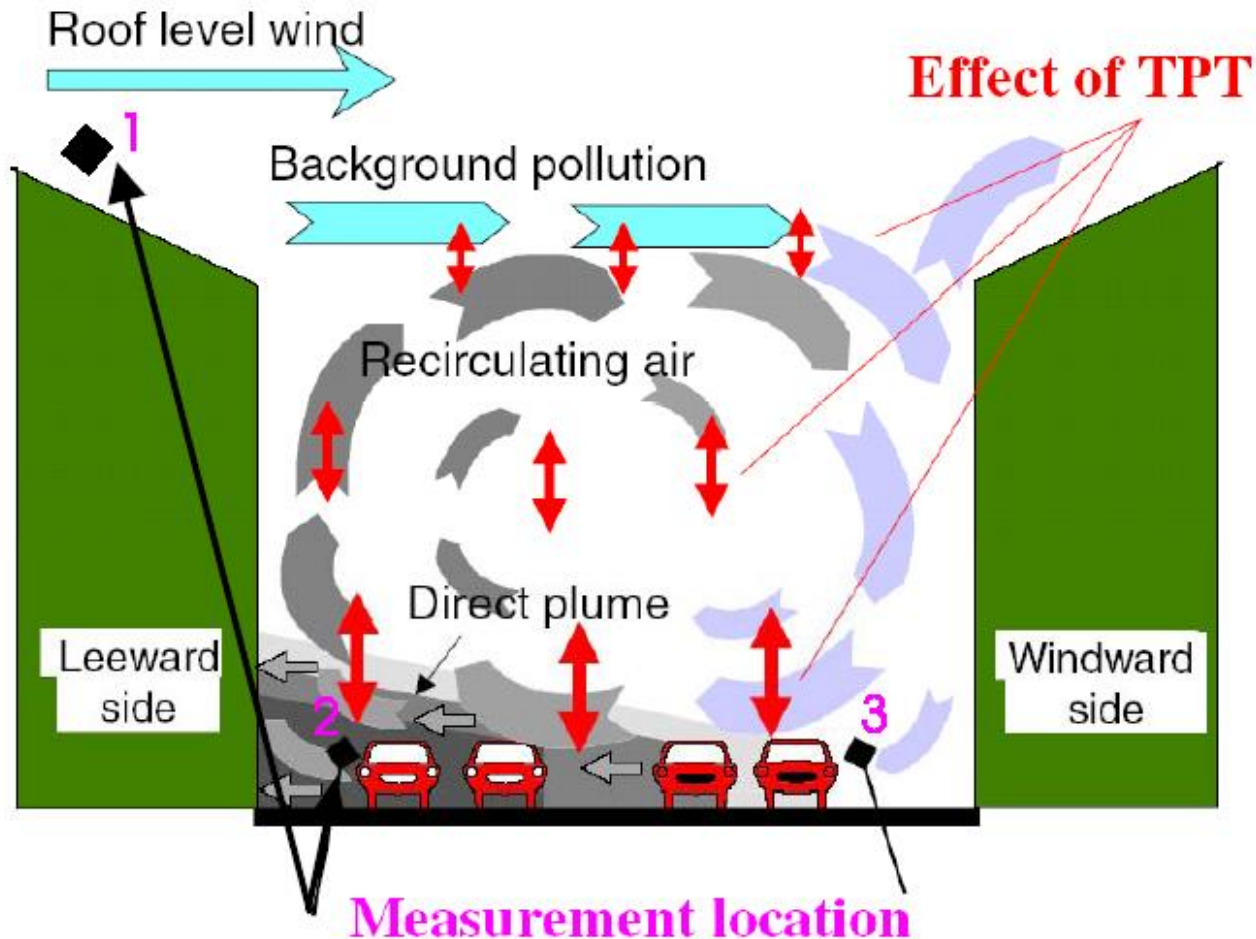
Air Quality Assessment & SA in Berlin

👉 **applying models:** simulated
urban background **NO_x** - pollution



street canyon scale

☞ schematic of pollution distribution



source: Plamgren 2003)

dispersion models

☞ **classification** according to spatial scales

■ **local/street canyon** scale (extension ~100m – 1000m)

☞ **application** purposes

- ☞ screening of hot spot pollution (with simple models)
- ☞ AQ assessment & projections of hot spot concentrations (traffic)
- ☞ source analysis/apportionment of local sources
- ☞ environment impact assessment of infrastructure and building projects

☞ requisite **features** of such models

- ☞ parametrisation of chemical processes for reactive species with very short life-time (ozone, NO, NO₂)
- ☞ **simple**: parametrisation of the dispersion in a street canyon
- ☞ **medium** complexity: simplified simulation of the wind flow in a typical street canyon
- ☞ **high** complexity: detailed modelling of the air flow around complex building structures

dispersion models

☞ **classification** according to spatial scales

■ local/street canyon scale

☞ **exemplary models** used in Germany

- ☞ IMMIS_{luft}, PROKAS-B simple screening models for street canyon
- ☞ IMMIS_{cpb}: simplified version of a canyon plume box model
- ☞ MISKAM: air flow model for complex situations

☞ **requisite conditions** for application

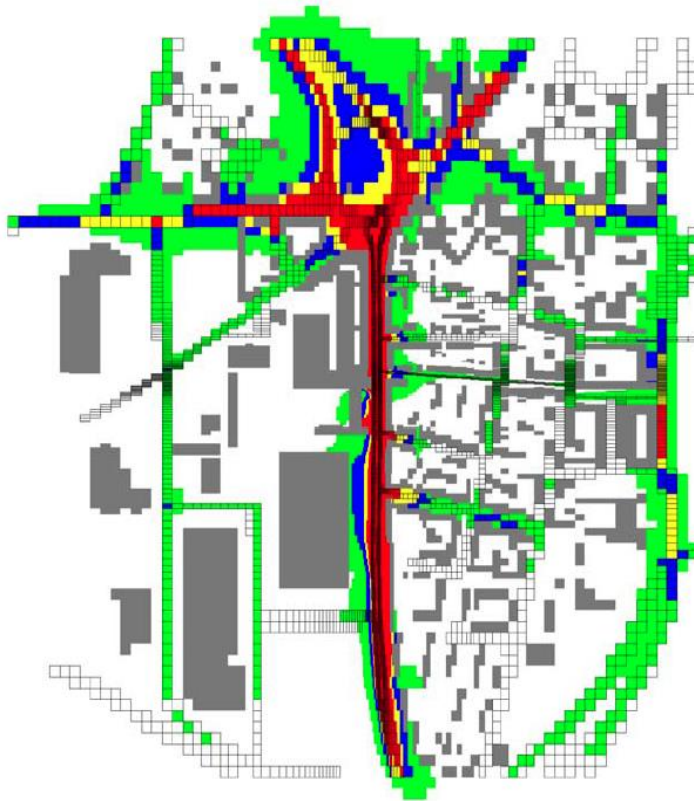
- ☞ Personal Computers sufficient
- ☞ limited expertise depending on the complexity of the model
- ☞ Data on **traffic** volumes, traffic quality, vehicle fleet composition
- ☞ vehicle **emission** factors (e.g. Handbook Emission Factors HBEFa 3.2)
- ☞ Street **geometry**
- ☞ 2-D wind, vertical temperature profile or stability class

exemplary application of an **air flow model** (MISKAM) for a detailed calculation of a HDV ban scenario

WinMISKAM, 1.97j
MISKAM 4.22a (Stand 04.08.2004)
R01_NOx Ist2002_GB_HRSW_imGebiet.s
Gebietsgröße:
1156.8 m x 1146.0 m
Level: 3 (1.2-1.8m)



NO₂, Jahresmittelwert, Einheit: [µg/m³]



base case

NO_x-concentrations

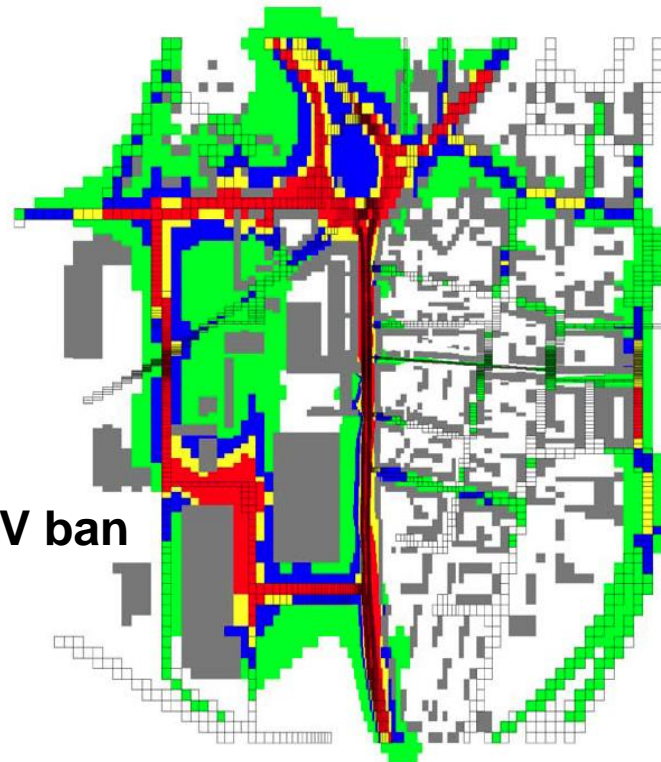
WinMISKAM, 1.97j
MISKAM 4.22a (Stand 04.08.2004)
R03_NOx_M01_GB_HRSW_imGebiet.skw
Gebietsgröße:
1156.8 m x 1146.0 m
Level: 3 (1.2-1.8m)



NO₂, Jahresmittelwert, Einheit: [µg/m³]



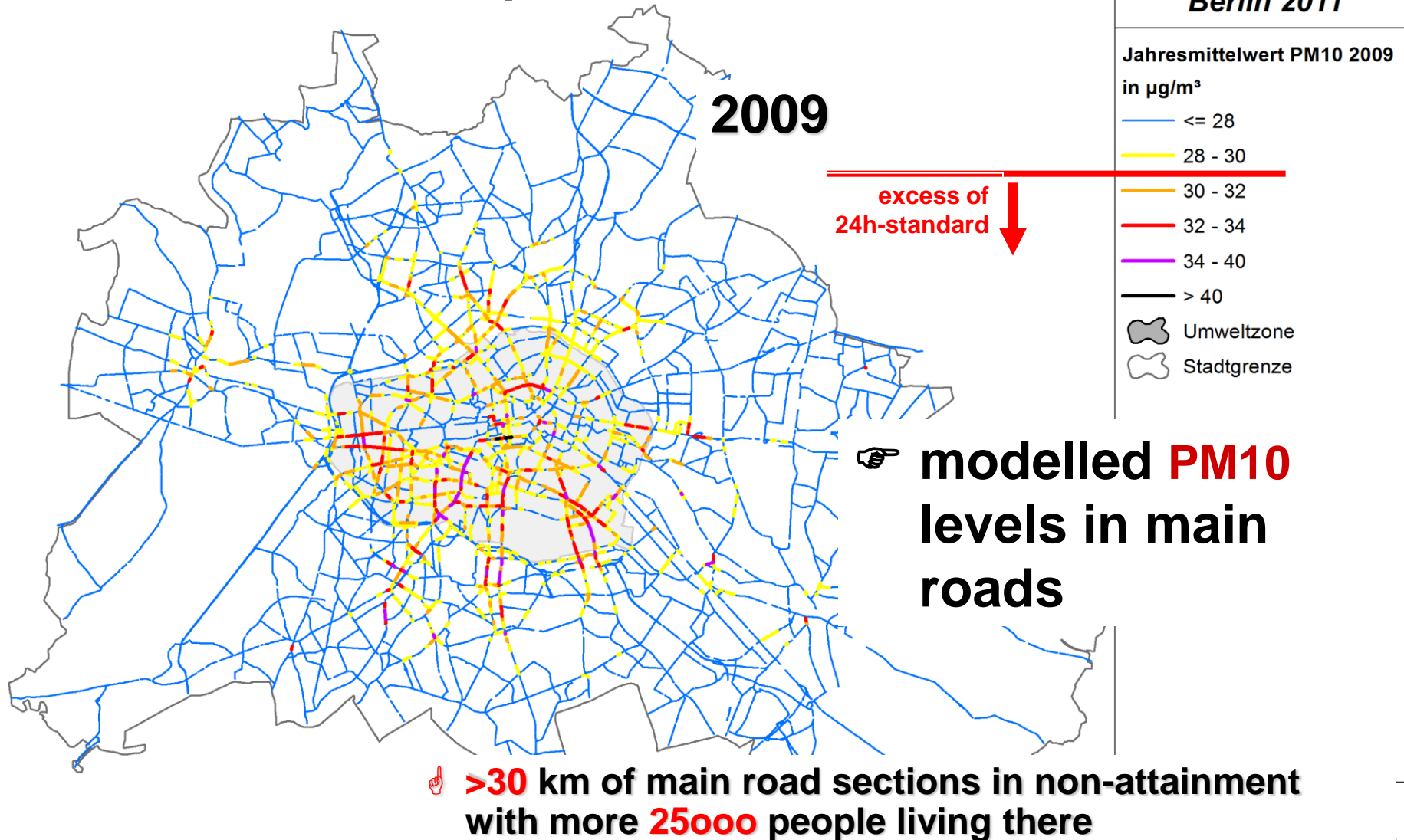
HDV ban



Source: W.
Müller,

Exemplary application of a street canyon model

👉 simulated **PM10** - pollution in Berlin



Exemplary application of a street canyon model

👉 simulated **PM10** - pollution in Berlin

*Luftqualitätsplan
Berlin 2011*

Maßnahmenbündel 3

Jahresmittelwert PM10 2

in $\mu\text{g}/\text{m}^3$

— ≤ 28

— 28 - 30

— 30 - 32

— 32 - 34

— 34 - 40

— > 40

Umweltzone

**Trend scenario
2015**

excess of
24h-standard

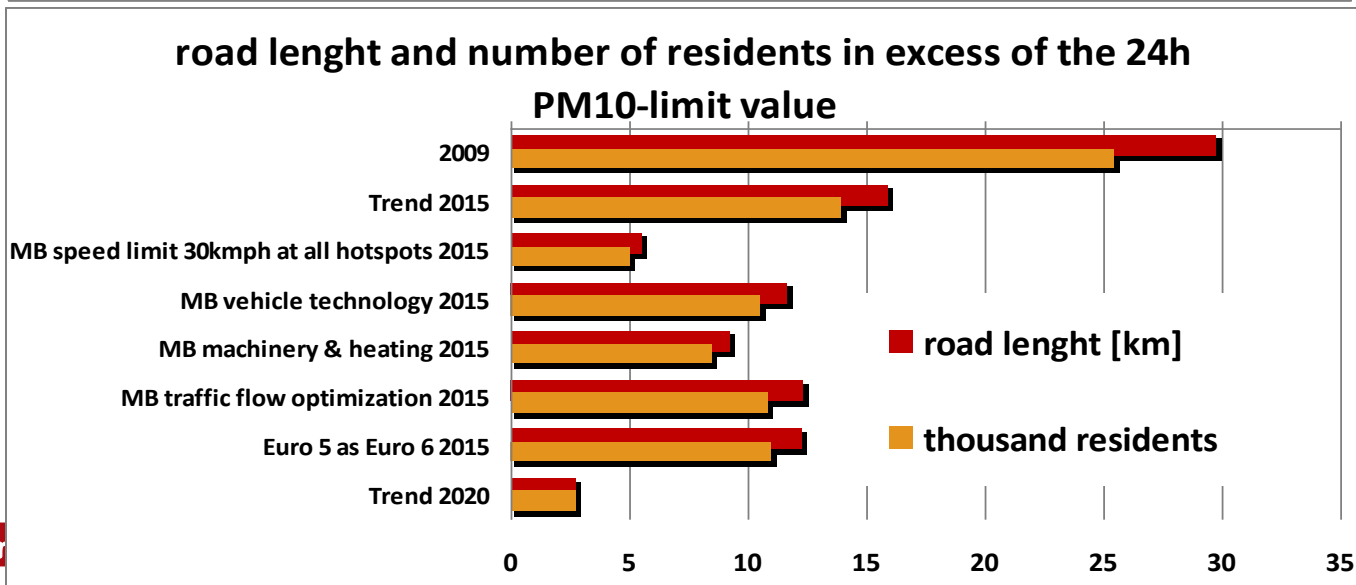
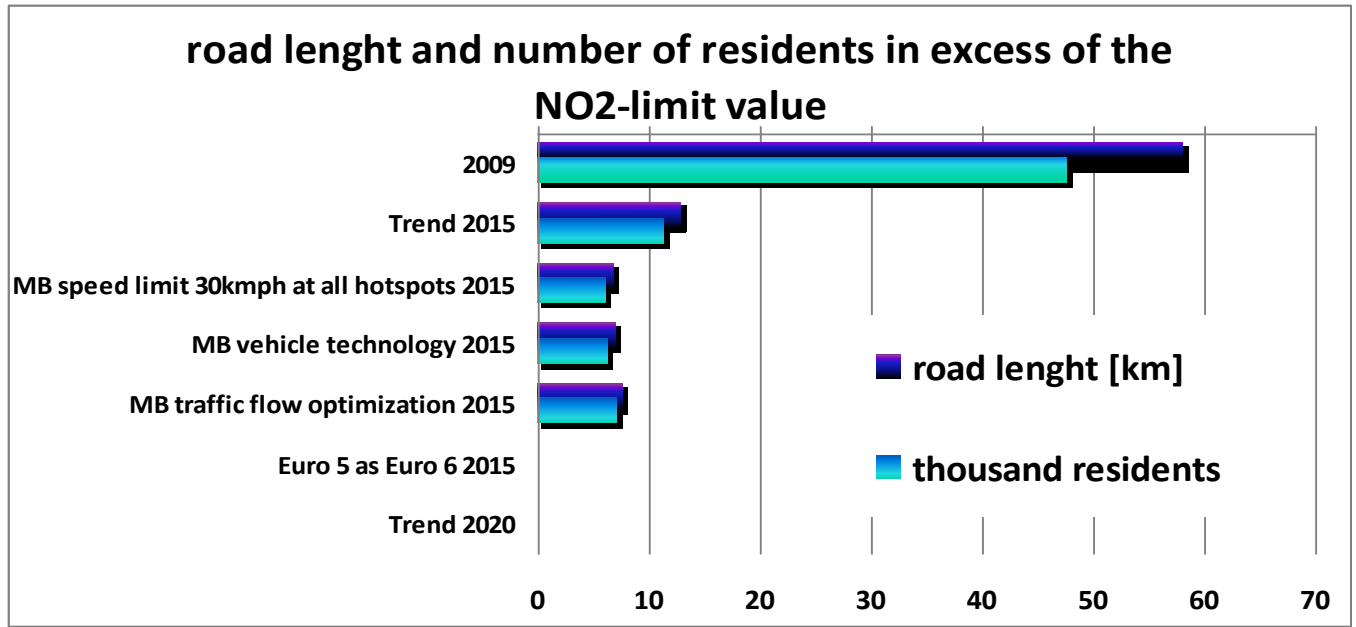
trend scenario plus:
ban of solid fuel for
house heating &
retrofit of mobile
machinery

👉 **>9 km of main road sections in non-attainment with
more 8500 people living there**

scenario analysis

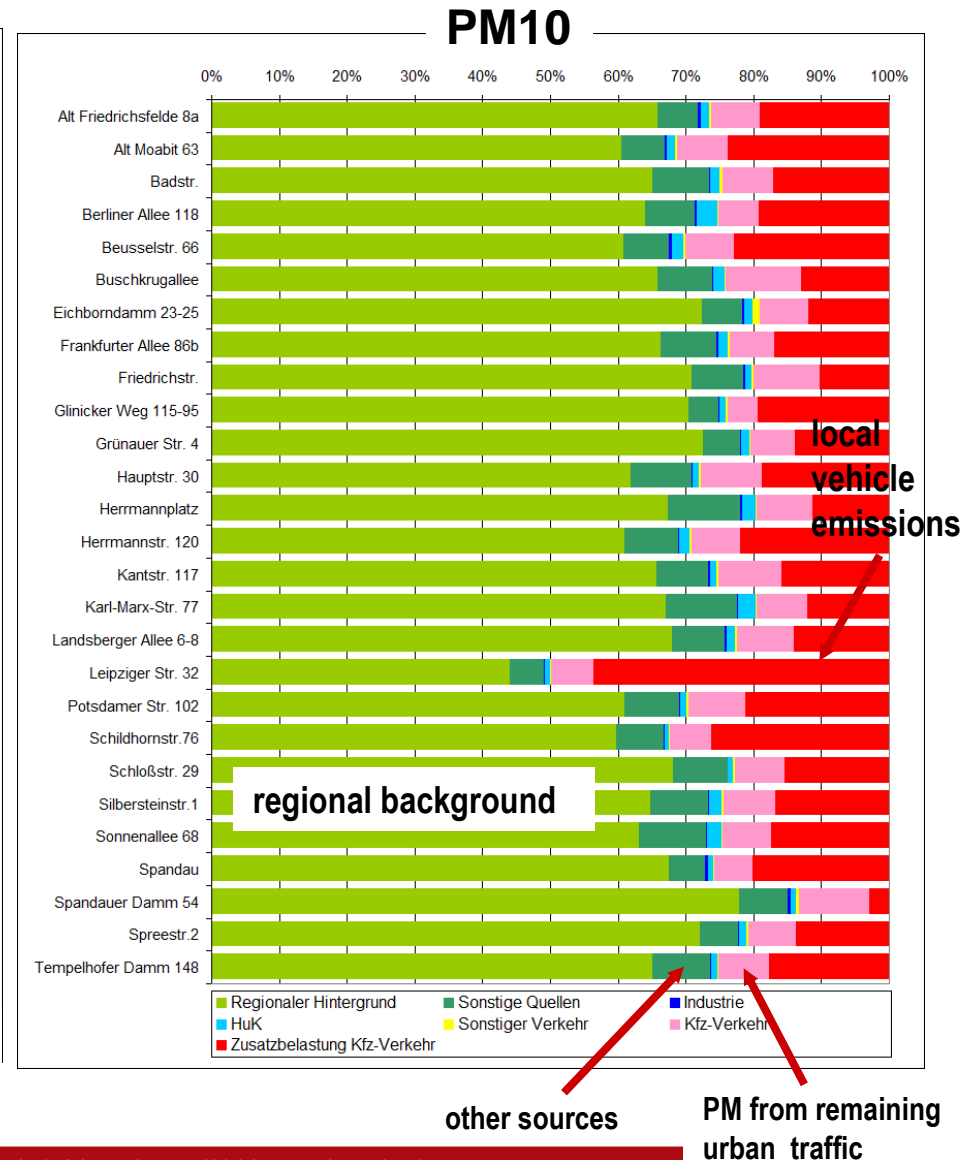
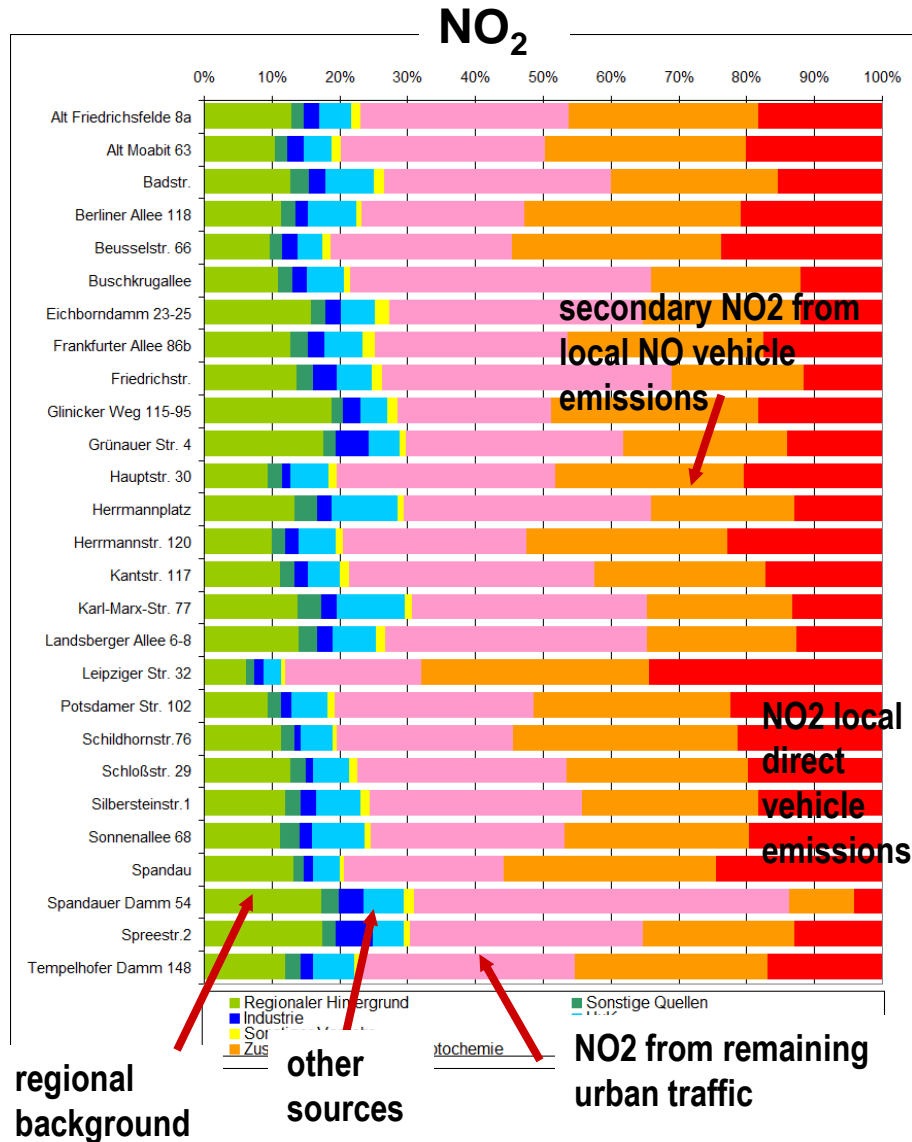
👉 impact of various measures on AQ in Berlin

impact of
different bundles
of measures (MB)
on **NO2** and **PM10**
pollution



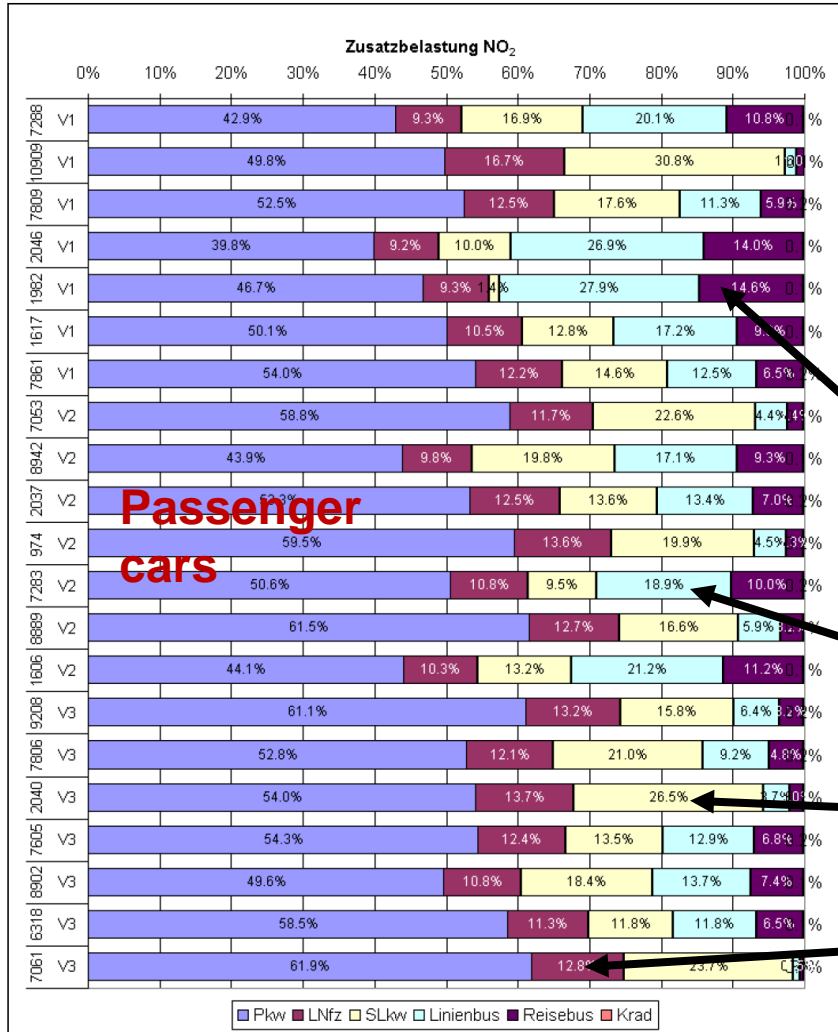
source apportionment with models

☞ NO2 & PM10 source contribution at AQ roadside stations 2009



scenario analysis

👉 relevance of different vehicle types for NO₂



Share of various **vehicle categories** in the incremental traffic-related **NO₂**-pollution polluted road sections in 2015 assuming a **trend scenario**

Coaches

Busses

Heavy trucks

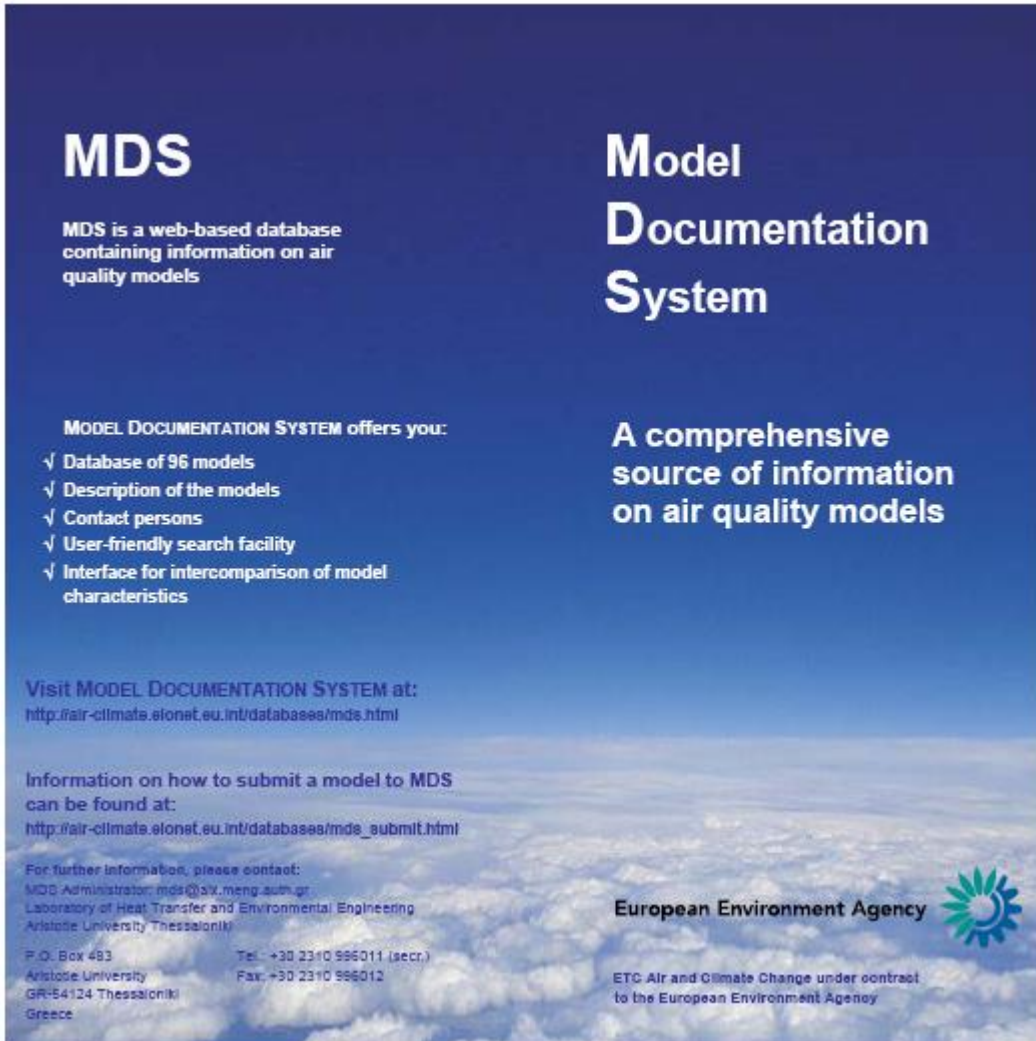
Light goods vehicles

AQ modelling

☞ Résumé and a few **recommendations**

- AQ modelling is an **indispensible** tool for full scale compliance assessment, source apportionment and AQ projections
- **Regional** scale modelling:
 - ☞ use **MACC-II** products for background level simulation
- **Urban** scale: As a starting point ...
 - ☞ Set up a proper **emission** inventory data base
 - ☞ use **simple** models without complex chemistry
- **Street** canyon scale: As a starting point ...
 - ☞ Collect traffic volumes & street geometry data for most trafficked roads
 - ☞ Use HBEFa emission factors database & fleet data
- Build a **national competence centre** on modelling to support development of national strategies and local air quality management

model documentation system by the EEA



MDS

MDS is a web-based database containing information on air quality models

Model Documentation System

A comprehensive source of information on air quality models

MODEL DOCUMENTATION SYSTEM offers you:

- ✓ Database of 96 models
- ✓ Description of the models
- ✓ Contact persons
- ✓ User-friendly search facility
- ✓ Interface for intercomparison of model characteristics


Visit MODEL DOCUMENTATION SYSTEM at:
<http://air-climate.eionet.eu.int/databases/mds.html>

Information on how to submit a model to MDS can be found at:
http://air-climate.eionet.eu.int/databases/mds_submit.html

For further information, please contact:
MDS Administrator: mds@ix.meng.auth.gr
Laboratory of Heat Transfer and Environmental Engineering
Aristotle University Thessaloniki

P.O. Box 483
Aristotle University
GR-54124 Thessaloniki
Greece

Tel.: +30 2310 996011 (secr.)
Fax: +30 2310 996012

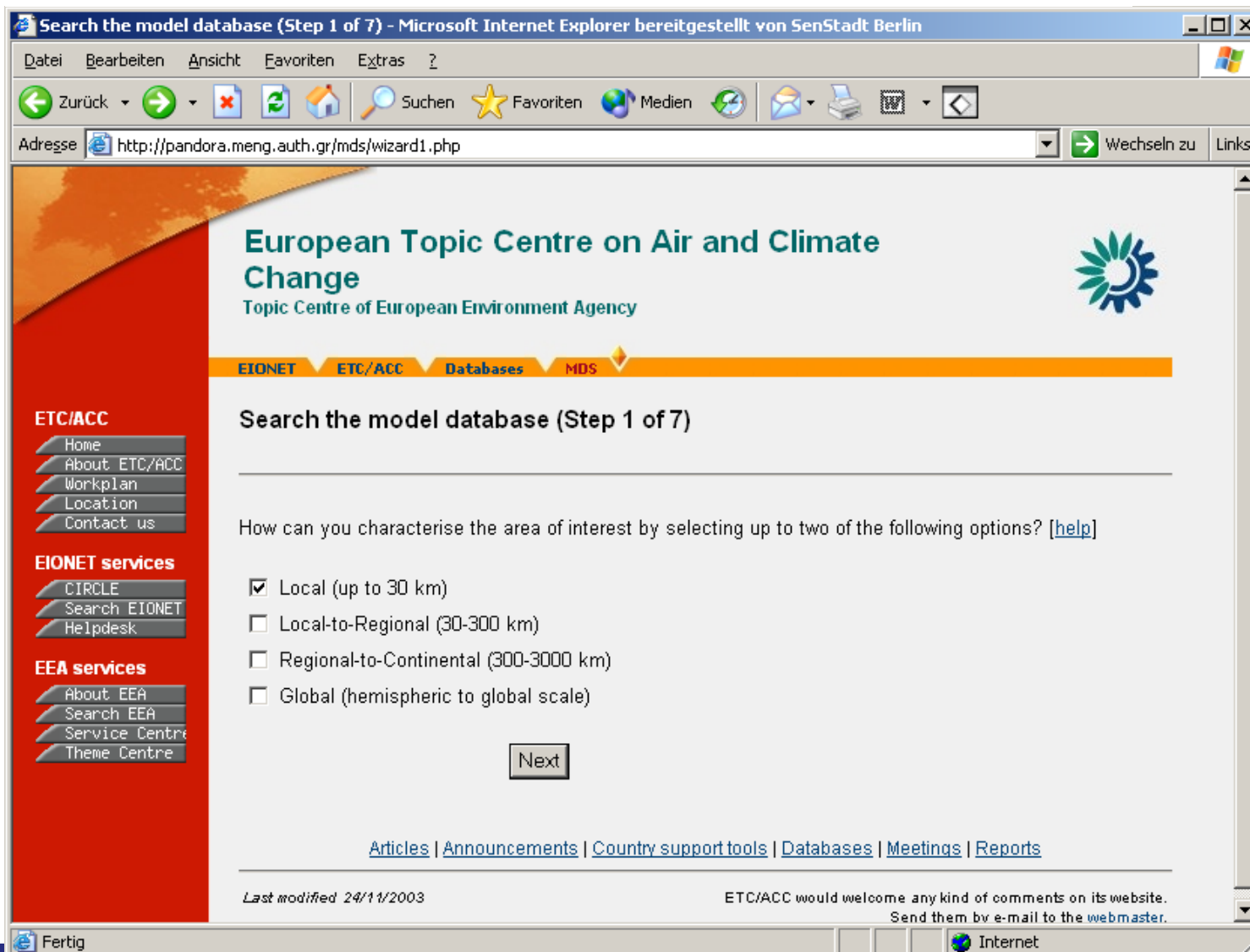
European Environment Agency 

ETC Air and Climate Change under contract to the European Environment Agency

MDS



select model scale



Search the model database (Step 1 of 7) - Microsoft Internet Explorer bereitgestellt von SenStadt Berlin

Adresse <http://pandora.meng.auth.gr/mds/wizard1.php> Wechseln zu Links

European Topic Centre on Air and Climate Change
Topic Centre of European Environment Agency

EIONET **ETC/ACC** **Databases** **MDS**

Search the model database (Step 1 of 7)

How can you characterise the area of interest by selecting up to two of the following options? [\[help\]](#)

- ☒ Local (up to 30 km)
- ☐ Local-to-Regional (30-300 km)
- ☐ Regional-to-Continental (300-3000 km)
- ☐ Global (hemispheric to global scale)

[Next](#)

[Articles](#) | [Announcements](#) | [Country support tools](#) | [Databases](#) | [Meetings](#) | [Reports](#)



Last modified 24/11/2003

ETC/ACC would welcome any kind of comments on its website.
Send them by e-mail to the [webmaster](#).

Fertig Internet

MDS select specific models from the list

Search results - Microsoft Internet Explorer bereitgestellt von SenStadt Berlin

Adresse  <http://pandora.meng.auth.gr/mds/wizresults.php>  Wechseln zu Links

ETC/ACC
[Home](#)
[About ETC/ACC](#)
[Workplan](#)
[Location](#)
[Contact us](#)

EIONET services
[CIRCLE](#)
[Search EIONET](#)
[Helpdesk](#)

EEA services
[About EEA](#)
[Search EEA](#)
[Service Centre](#)
[Theme Centre](#)

Search results

70 model(s) matched your selections.

	Model Name	Short description	Long description
<input type="checkbox"/>	ADMS 3	Show	Show
<input type="checkbox"/>	ADMS-Airport	Show	Show
<input type="checkbox"/>	ADMS-Roads	Show	Show
<input type="checkbox"/>	ADMS-Urban	Show	Show
<input type="checkbox"/>	ADREA	Show	Show
<input type="checkbox"/>	ADREA-HF	Show	Show
<input type="checkbox"/>	AERMOD-HNS	Show	Show
<input type="checkbox"/>	AIPOC	Show	Show
<input type="checkbox"/>	AUTOMOD	Show	Show
<input checked="" type="checkbox"/>	BoxSTREET	Show	Show
<input type="checkbox"/>	BUO-FMI	Show	Show
<input type="checkbox"/>	CALINE4	Show	Show
<input type="checkbox"/>	CAR-FMI	Show	Show
<input type="checkbox"/>	CAR-International	Show	Show
<input type="checkbox"/>	CFX-TASCflow	Show	Show
<input type="checkbox"/>	CPB3	Show	Show
<input type="checkbox"/>	DIPCOt	Show	Show
<input type="checkbox"/>	DISPERSION21	Show	Show
<input type="checkbox"/>	DISPLAY-2	Show	Show

Internet

MDS



select type of desired information

Search results - Microsoft Internet Explorer bereitgestellt von SenStadt Berlin

Adresse <http://pandora.meng.auth.gr/mds/wizresults.php>

<input type="checkbox"/> STACKS	Show	Show
<input type="checkbox"/> STOER.LAG	Show	Show
<input type="checkbox"/> SYMOS97	Show	Show
<input type="checkbox"/> THOR	Show	Show
<input checked="" type="checkbox"/> TNO-Traffic	Show	Show
<input type="checkbox"/> UDM-FMI	Show	Show
<input type="checkbox"/> VADIS	Show	Show
<input type="checkbox"/> WinMISKAM	Show	Show

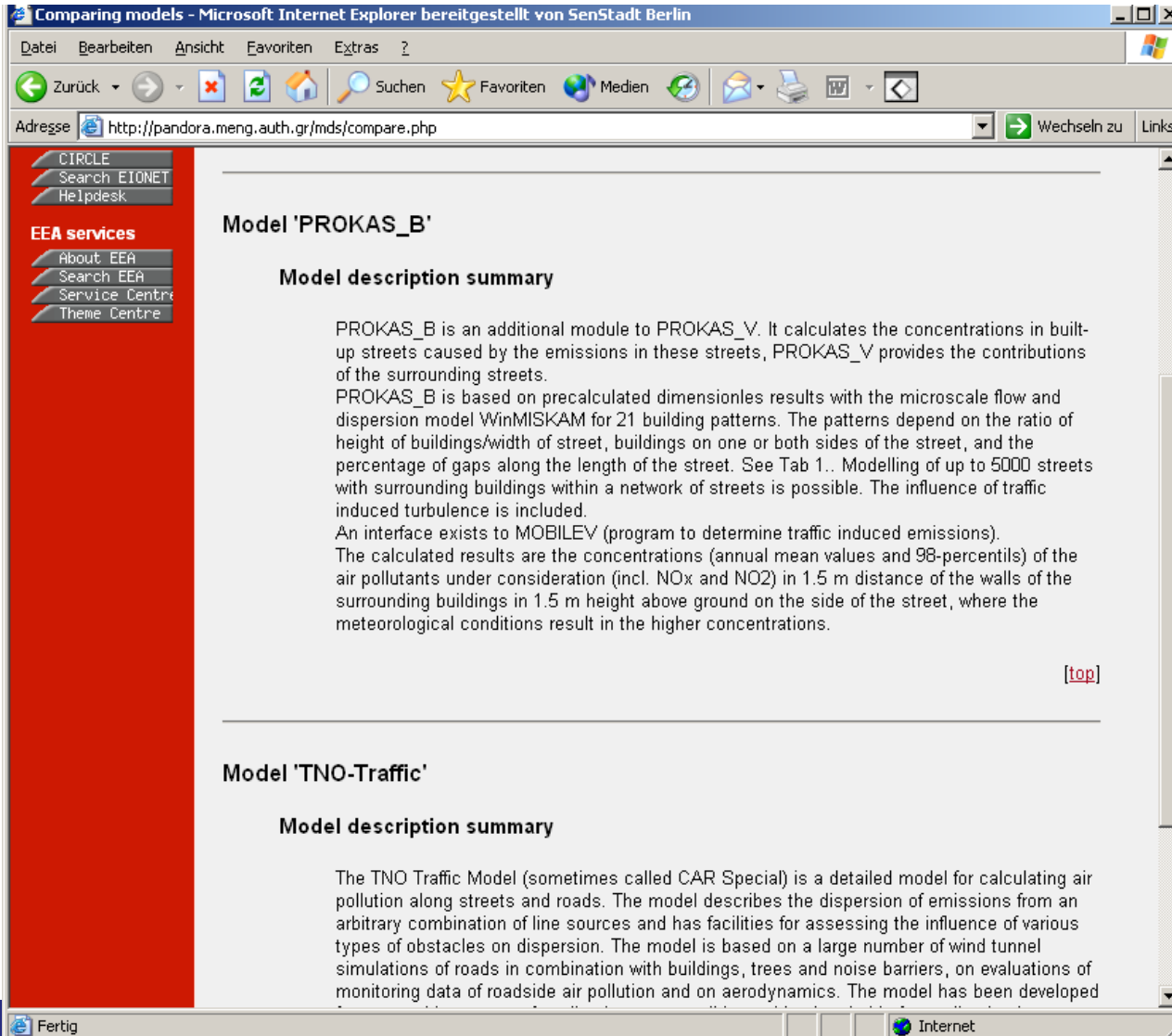
In order to compare one or more of the above presented models, select the preferable one(s) and then select one or more of the following fields listed in the "Long description" of each model.

Long description fields for model comparison

<input checked="" type="checkbox"/> Basic information	<input type="checkbox"/> Intended field of application
<input checked="" type="checkbox"/> Model type and dimension	<input checked="" type="checkbox"/> Model description summary
<input checked="" type="checkbox"/> Model limitations/approximations	<input checked="" type="checkbox"/> Resolution
<input type="checkbox"/> Schemes	<input checked="" type="checkbox"/> Solution technique
<input checked="" type="checkbox"/> Input	<input type="checkbox"/> Output quantities
<input type="checkbox"/> User interface availability	<input type="checkbox"/> User community
<input type="checkbox"/> Previous applications	<input type="checkbox"/> Documentation status
<input type="checkbox"/> Validation and evaluation	<input type="checkbox"/> Frequently asked questions
<input checked="" type="checkbox"/> Portability and computer requirements	<input type="checkbox"/> Availability
<input type="checkbox"/> References	

MDS

 **obtain requested model description**



The screenshot shows a Microsoft Internet Explorer browser window with the title bar "Comparing models - Microsoft Internet Explorer bereitgestellt von SenStadt Berlin". The address bar shows the URL "http://pandora.meng.auth.gr/mds/compare.php". The browser window displays a web page with a red sidebar on the left containing navigation links: "CIRCLE", "Search EIONET", "Helpdesk", "EEA services", "About EEA", "Search EEA", "Service Centre", and "Theme Centre". The main content area is titled "Model 'PROKAS_B'" and contains a "Model description summary" section. The text describes PROKAS_B as an additional module to PROKAS_V, calculating concentrations in built-up streets. It mentions that PROKAS_B is based on precalculated dimensionless results with the microscale flow and dispersion model WinMISKAM for 21 building patterns. The text also mentions an interface to MOBILEV (program to determine traffic induced emissions) and that the calculated results are the concentrations (annual mean values and 98-percentils) of the air pollutants under consideration (incl. NOx and NO2) in 1.5 m distance of the walls of the surrounding buildings in 1.5 m height above ground on the side of the street, where the meteorological conditions result in the higher concentrations. A "[top]" link is visible at the end of the text. Below this, the "Model 'TNO-Traffic'" section is partially visible, also with a "Model description summary" heading. The browser window has a taskbar at the bottom with the "Fertig" button and the "Internet" icon.

Model 'PROKAS_B'

Model description summary

PROKAS_B is an additional module to PROKAS_V. It calculates the concentrations in built-up streets caused by the emissions in these streets, PROKAS_V provides the contributions of the surrounding streets.

PROKAS_B is based on precalculated dimensionless results with the microscale flow and dispersion model WinMISKAM for 21 building patterns. The patterns depend on the ratio of height of buildings/width of street, buildings on one or both sides of the street, and the percentage of gaps along the length of the street. See Tab 1.. Modelling of up to 5000 streets with surrounding buildings within a network of streets is possible. The influence of traffic induced turbulence is included.

An interface exists to MOBILEV (program to determine traffic induced emissions). The calculated results are the concentrations (annual mean values and 98-percentils) of the air pollutants under consideration (incl. NOx and NO2) in 1.5 m distance of the walls of the surrounding buildings in 1.5 m height above ground on the side of the street, where the meteorological conditions result in the higher concentrations.

[\[top\]](#)

Model 'TNO-Traffic'

Model description summary

The TNO Traffic Model (sometimes called CAR Special) is a detailed model for calculating air pollution along streets and roads. The model describes the dispersion of emissions from an arbitrary combination of line sources and has facilities for assessing the influence of various types of obstacles on dispersion. The model is based on a large number of wind tunnel simulations of roads in combination with buildings, trees and noise barriers, on evaluations of monitoring data of roadside air pollution and on aerodynamics. The model has been developed

ON AIR QUALITY MONITORING"



Source WHO newsletter,
M. Wagner

**Thanks
for
listening !**

martin.lutz@senstadt.berlin.de

Information Sources:

EEA Model Documentation System: http://acm.eionet.europa.eu/databases/MDS/index_html

MACC-II Services: http://www.gmes-atmosphere.eu/services/aqac/policy_interface/?op=get

German monitoring network database: <http://www.umweltbundesamt.de/tags/luftmessnetz>

