



Introduction to SHERPA

A tool to support air quality plans

SHERPA简介

空气质量计划的支持工具

Methodology overview

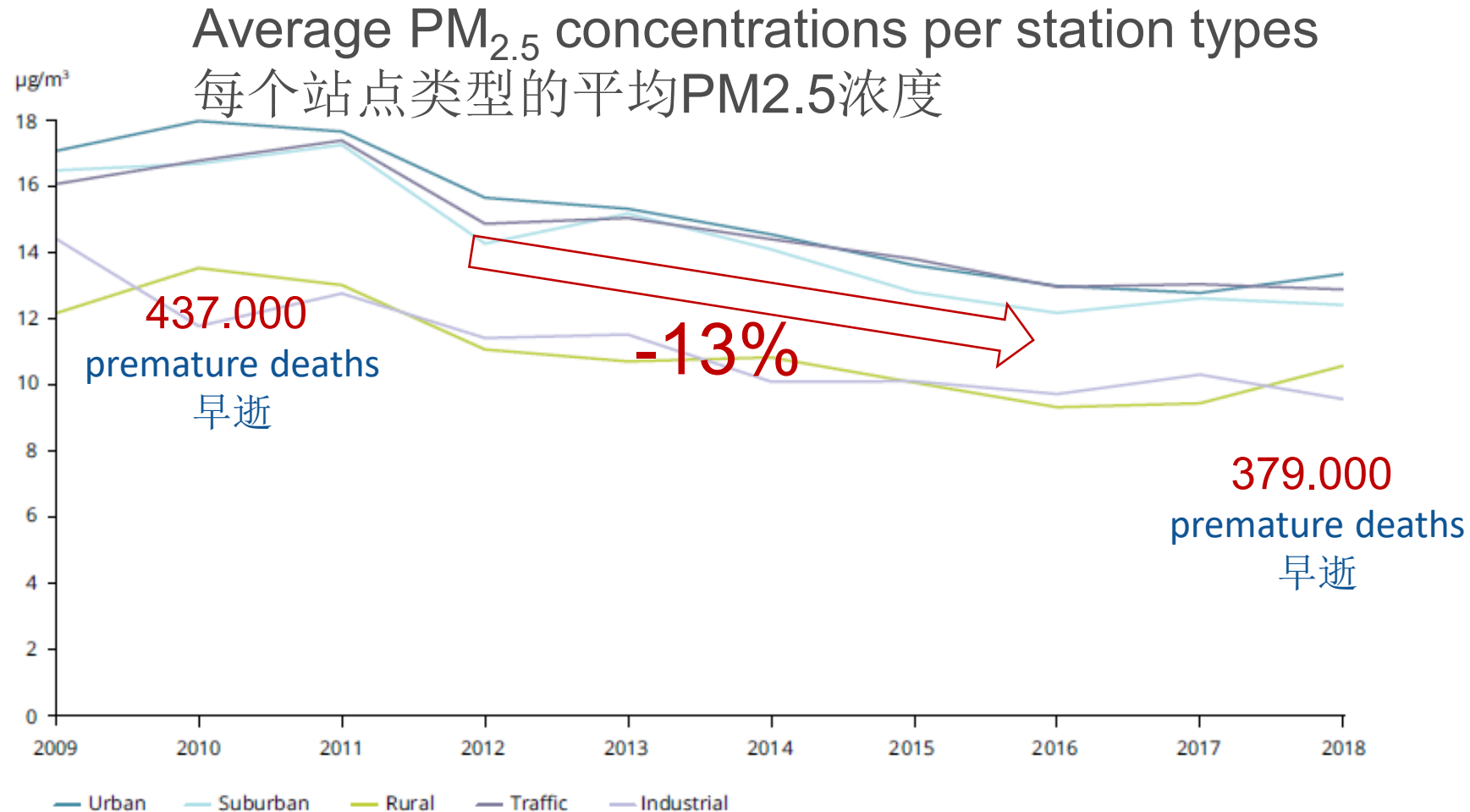
方法概述

P. Thunis, EC-JRC

March 04, 2021

2021年3月4日

Europe's air quality is slowly improving... 欧洲的空气质量正在缓慢改善...



Source(s): EEA Air Quality in Europe (2020)

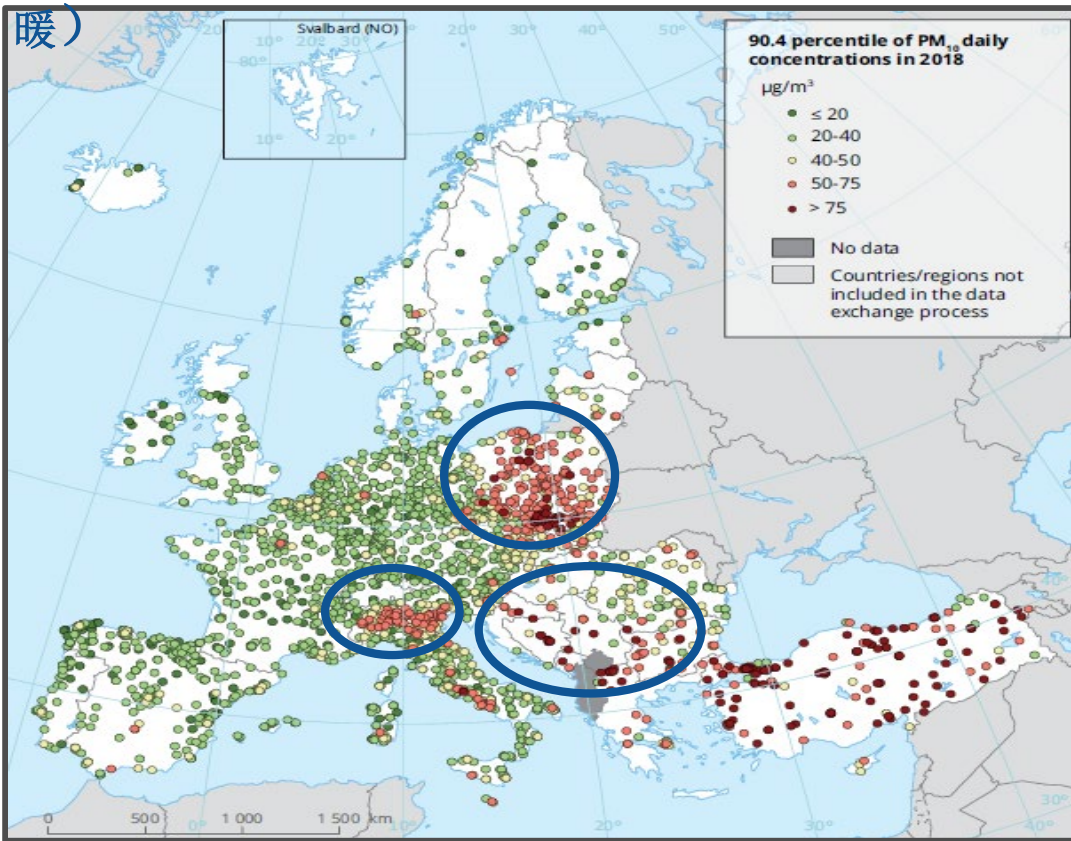
来源: 欧洲经济区的空气质量 (2020)

Different pollutants originate from different sources and lead to different challenges

不同的污染物来自不同来源，也带来了不同的挑战

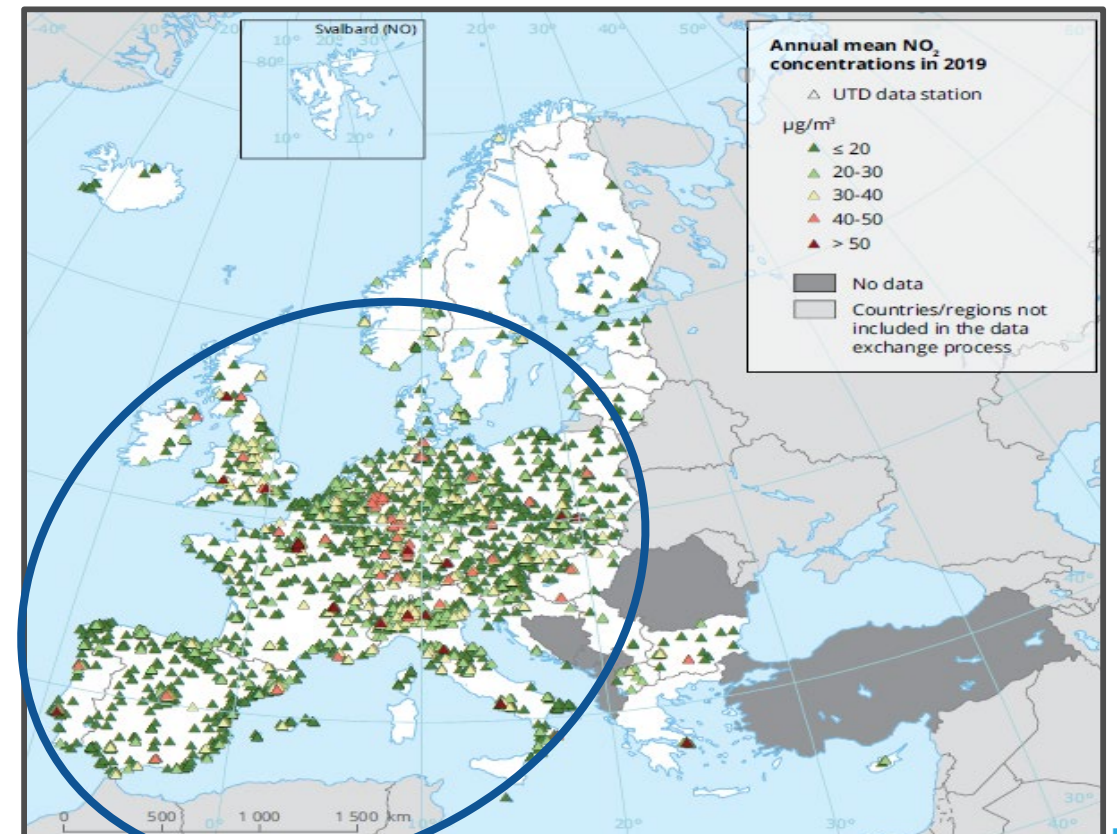
PM10 exceedances: often linked to fuel combustion (i.e. energy, heating)

PM10超标: 通常与燃料消耗相关 (例如: 电力、供



NO2 exceedances: often linked to traffic, in more than 130 cities in EU.

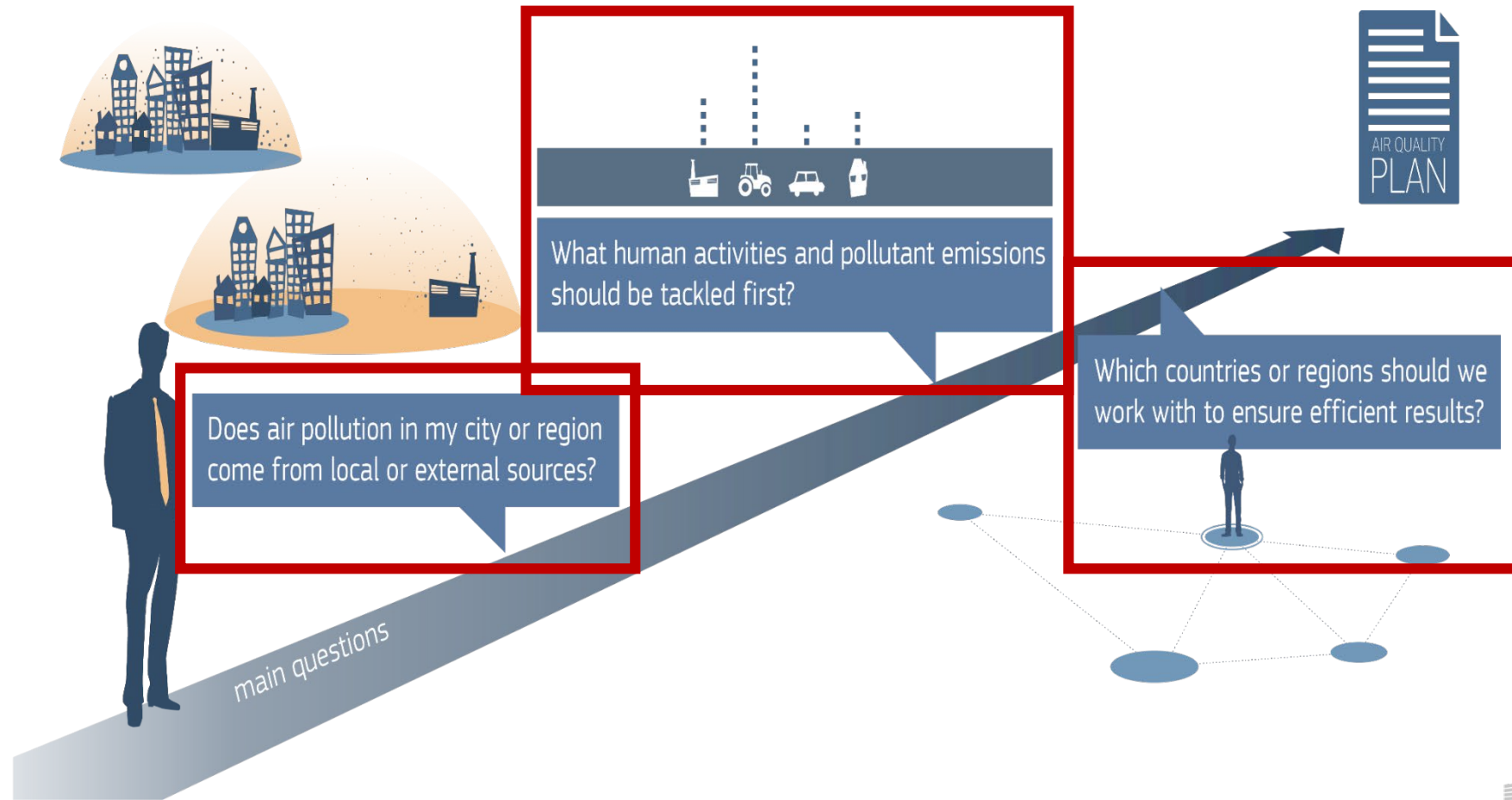
NO2超标: 在欧盟超过**130**个城市中，通常与车辆排放相关。



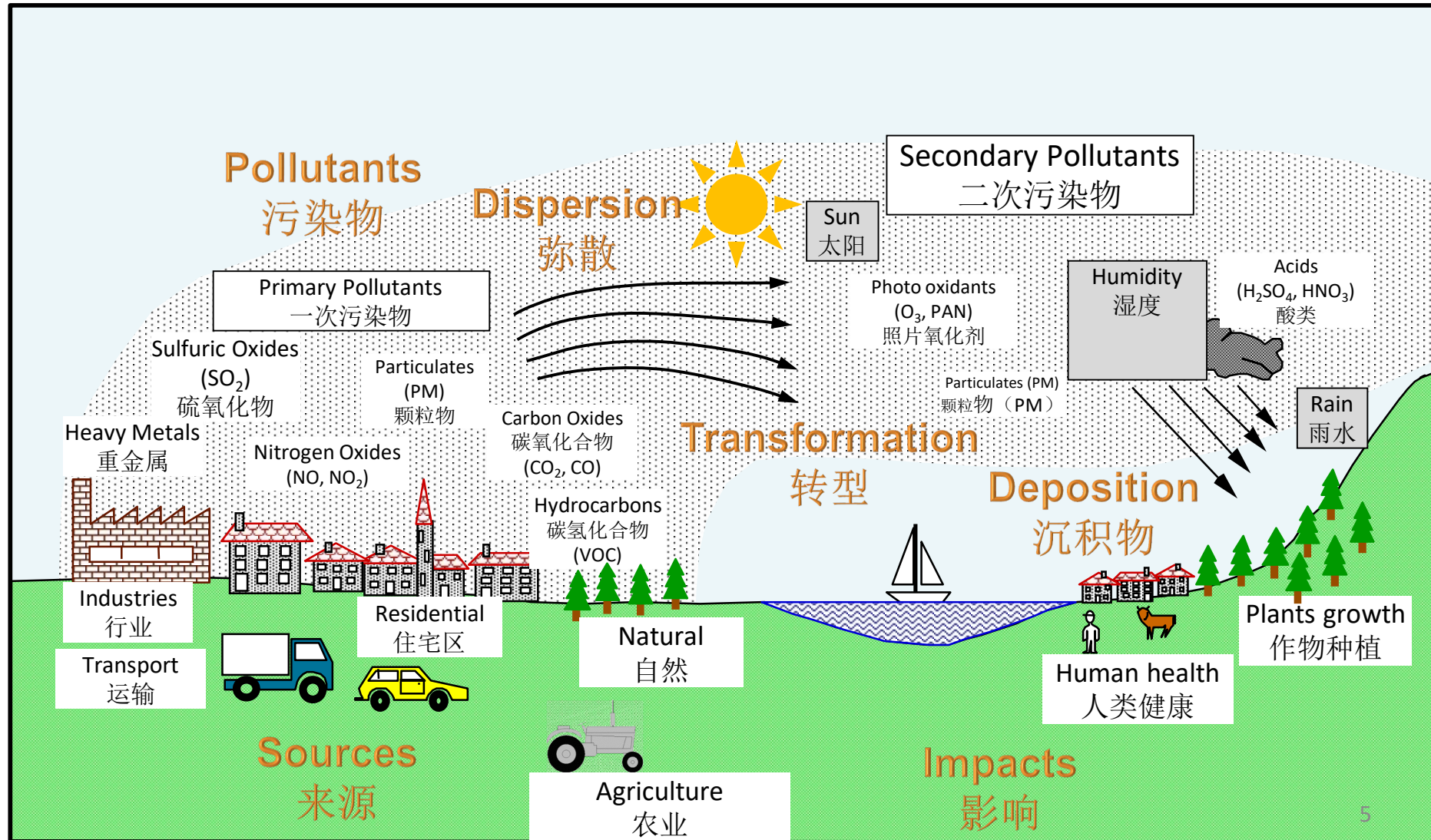
Source(s): EEA Air Quality in Europe (2020)

来源: 欧洲经济区的空气质量 (2020)

A tool to support the design of air quality plans 一款设计用于支持空气质量计划的工具

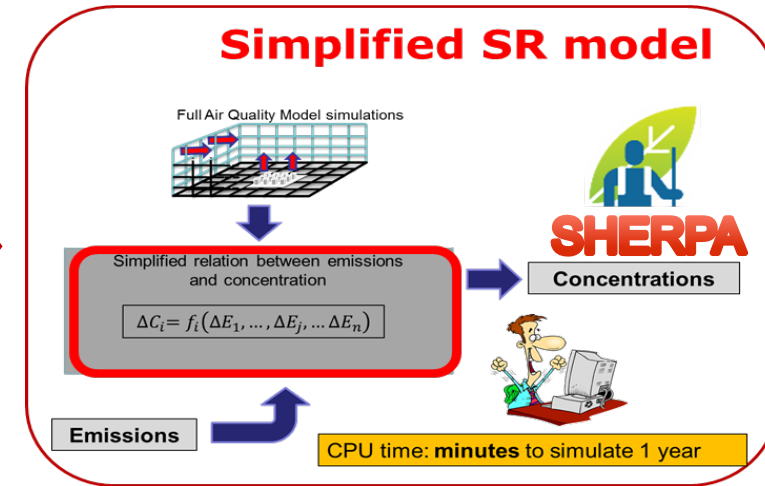
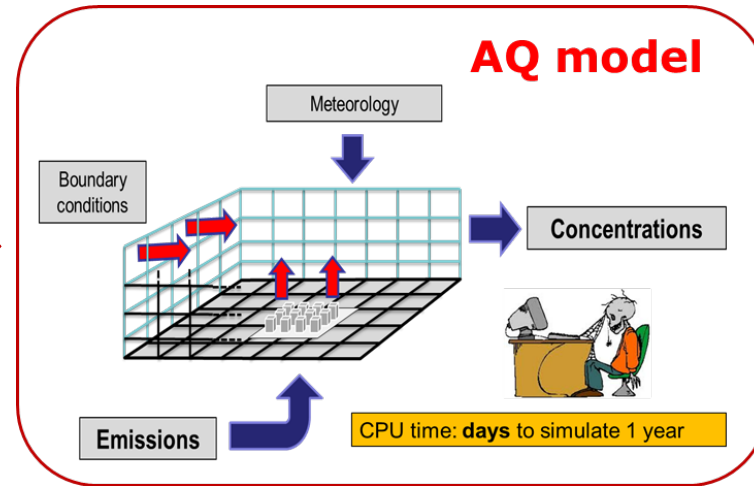
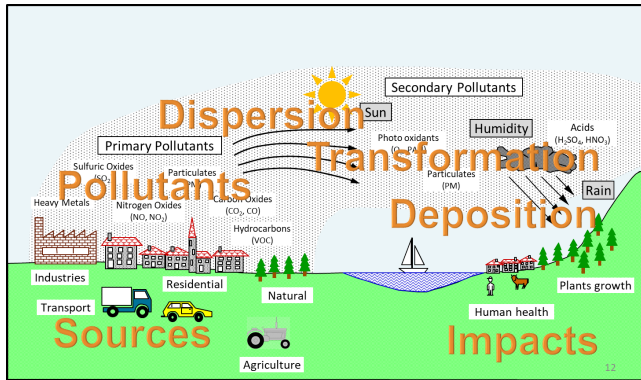


Air Quality is a complex issue 空气质量是一个复杂的问题



Main challenges and dedicated tools

主要挑战和专用工具



Screening for High Emission Reduction Potentials on Air quality
 筛查影响空气质量的潜在高排放减排项目

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Research article

On the design and assessment of regional air quality plans: The SHERPA approach

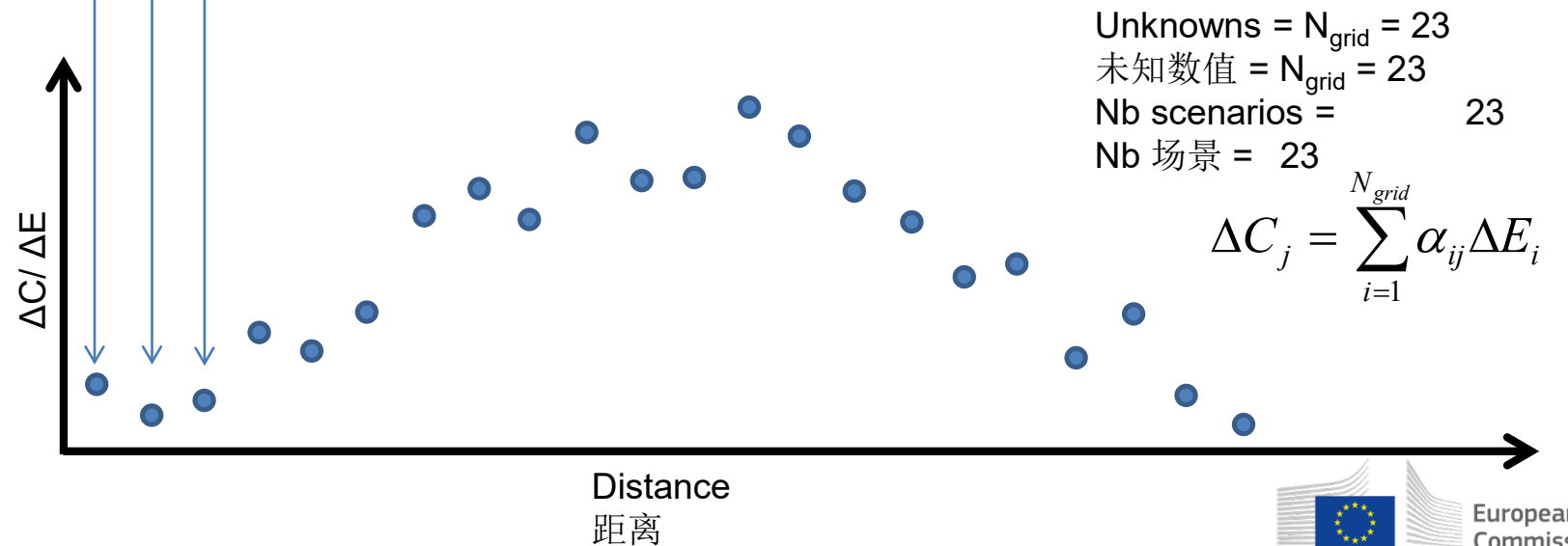
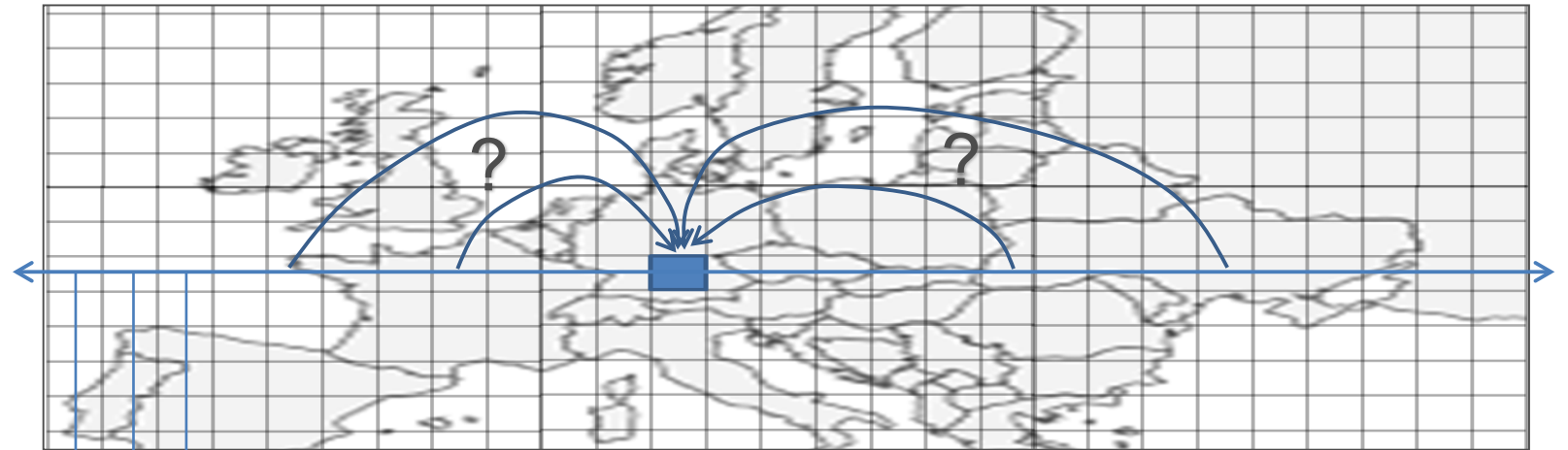
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^c Université de Strasbourg, Laboratoire Image Ville Environnement, Strasbourg, France

Source receptor relationships (I)

源受体关系 (I)

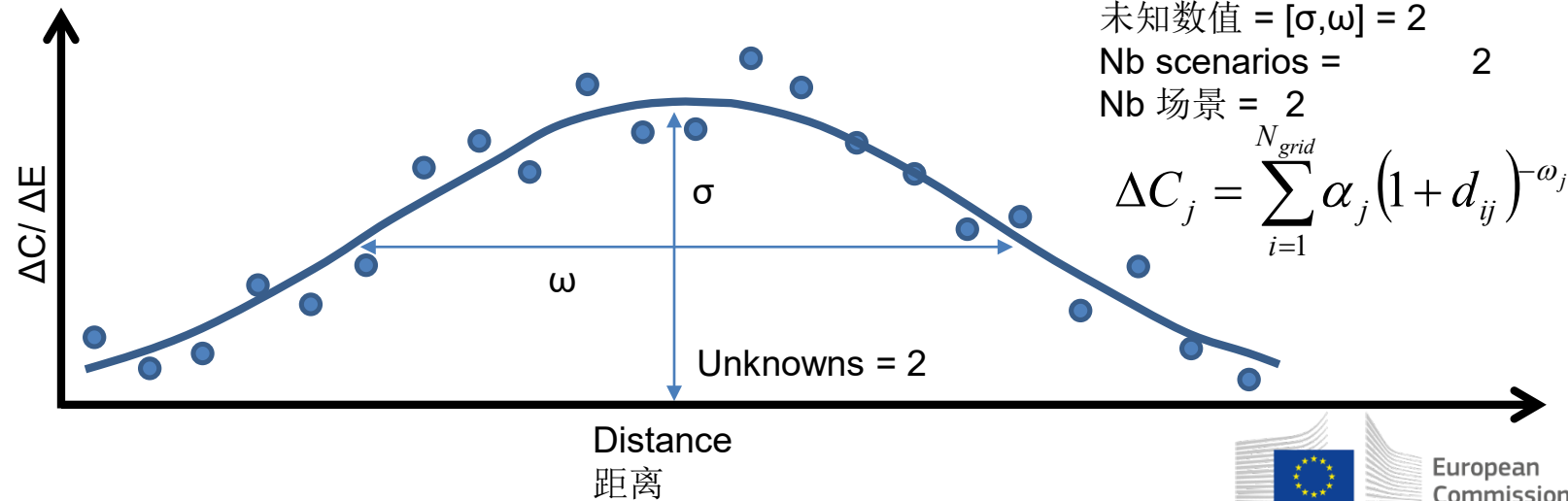
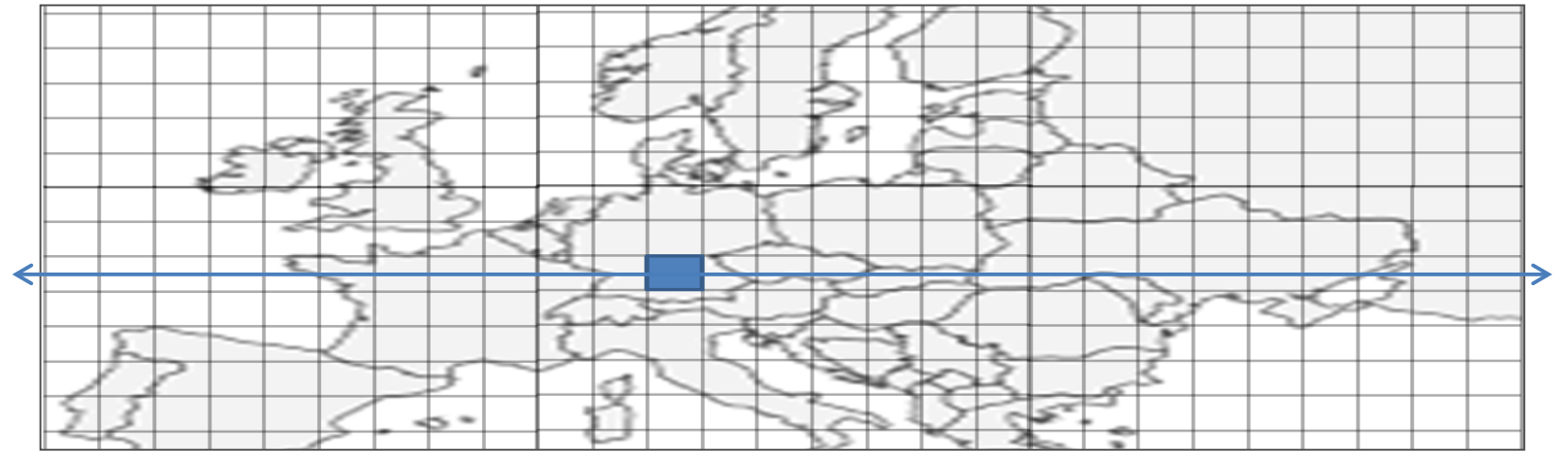
Grid-to-grid SRR 网格到网格SRR



Source receptor relationships (II)

源受体关系 (II)

SHERPA grid-to-grid SRR
SHERPA网格到网格SRR



Unknowns = $[\sigma, \omega] = 2$

未知数值 = $[\sigma, \omega] = 2$

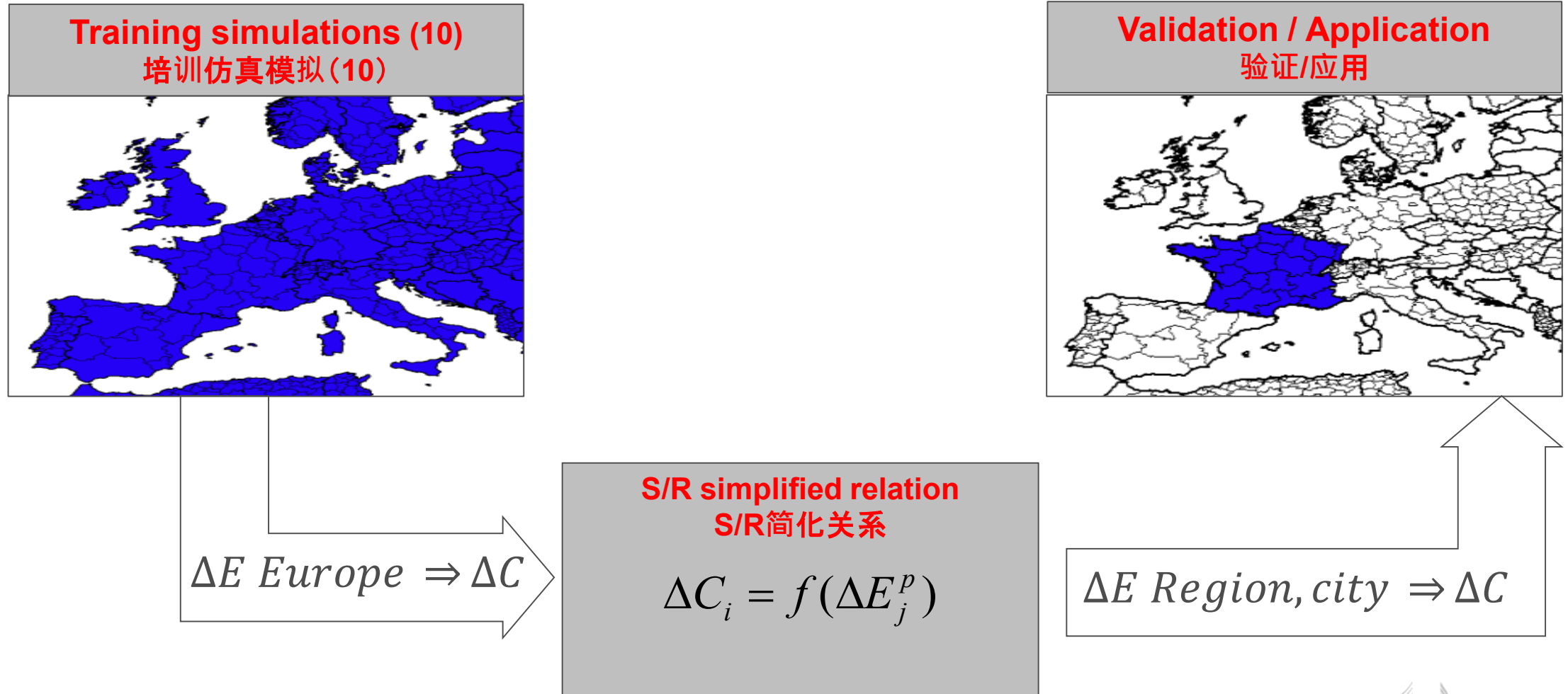
Nb scenarios = 2

Nb 场景 = 2

$$\Delta C_j = \sum_{i=1}^{N_{grid}} \alpha_j (1 + d_{ij})^{-\omega_j} \Delta E_i$$

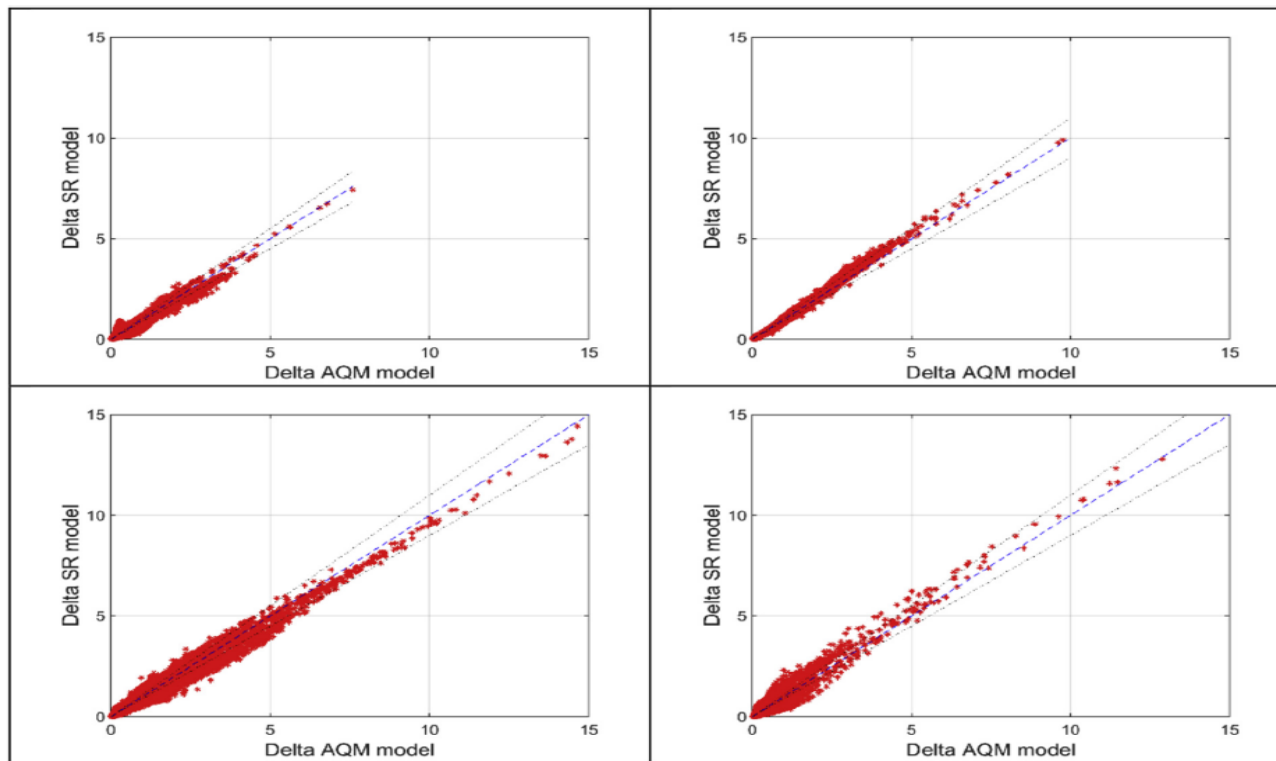
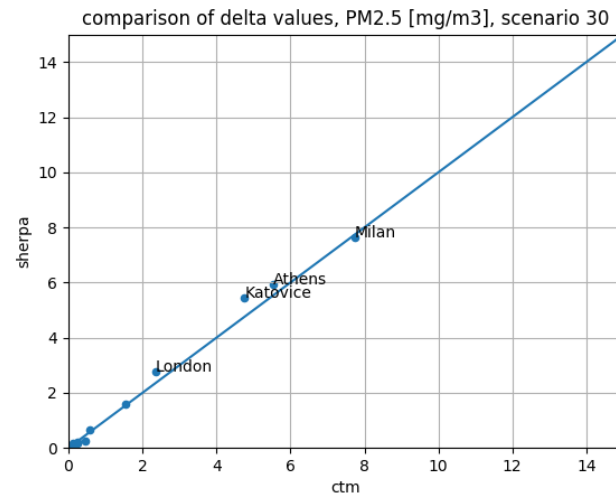
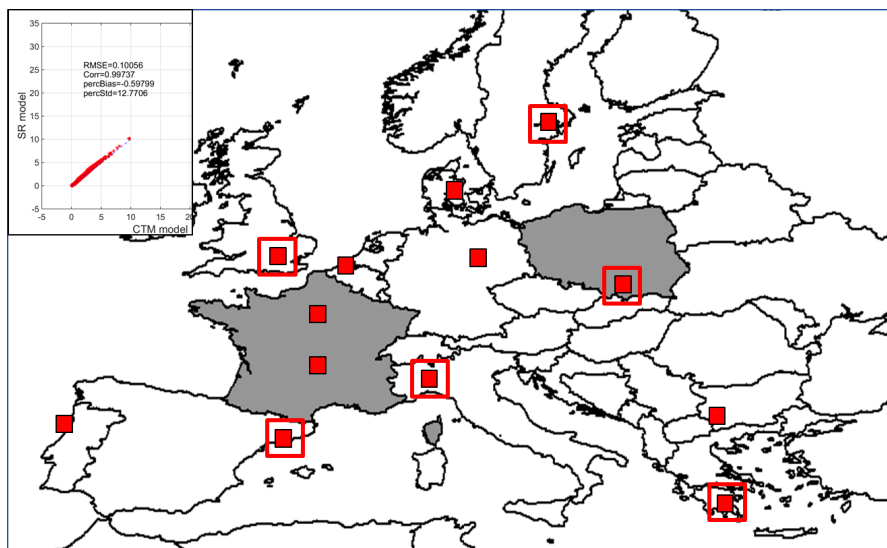
Source receptor relationships: validation

源受体关系：验证



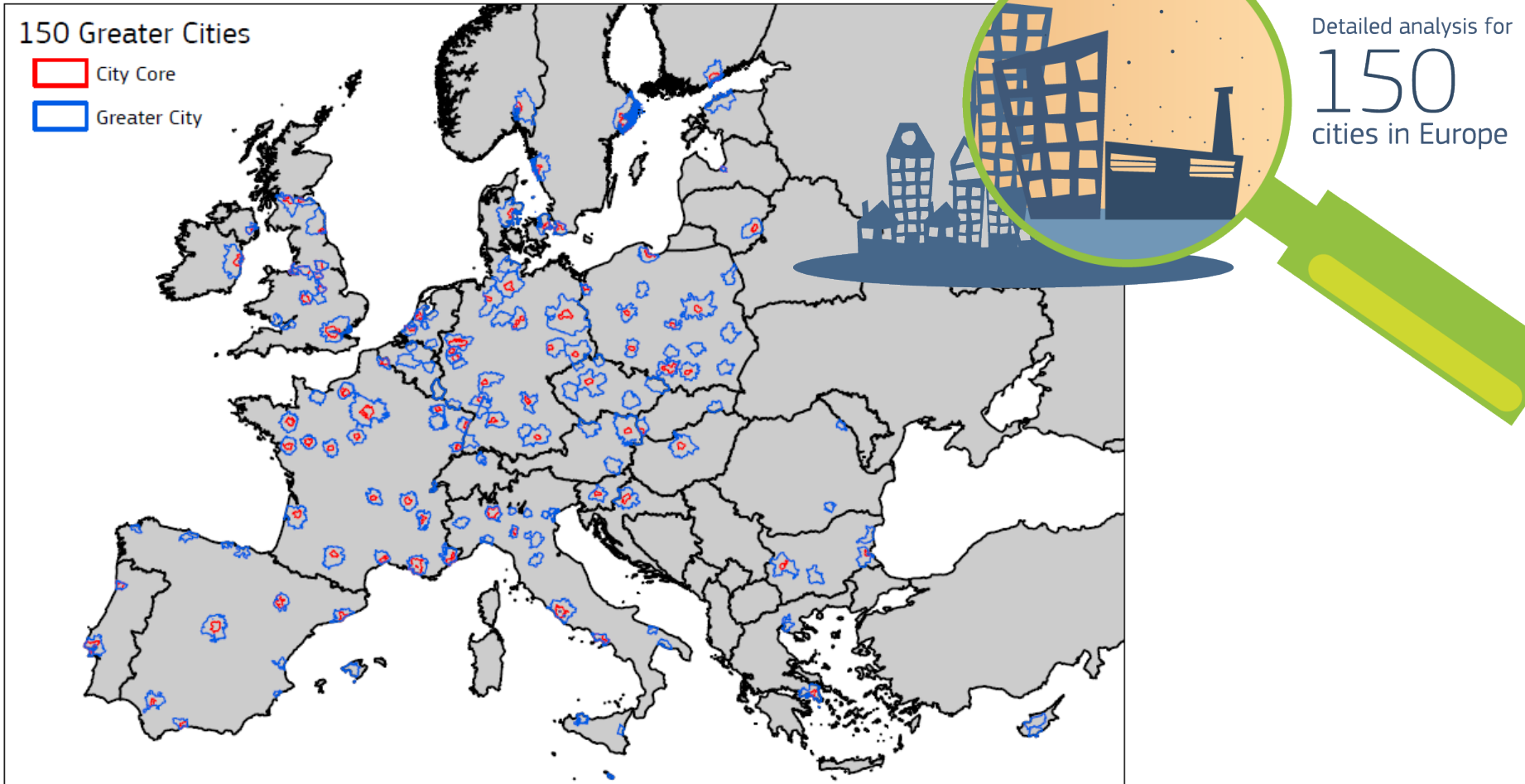
SHERPA validation

SHERPA验证

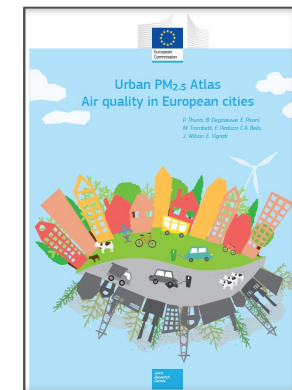
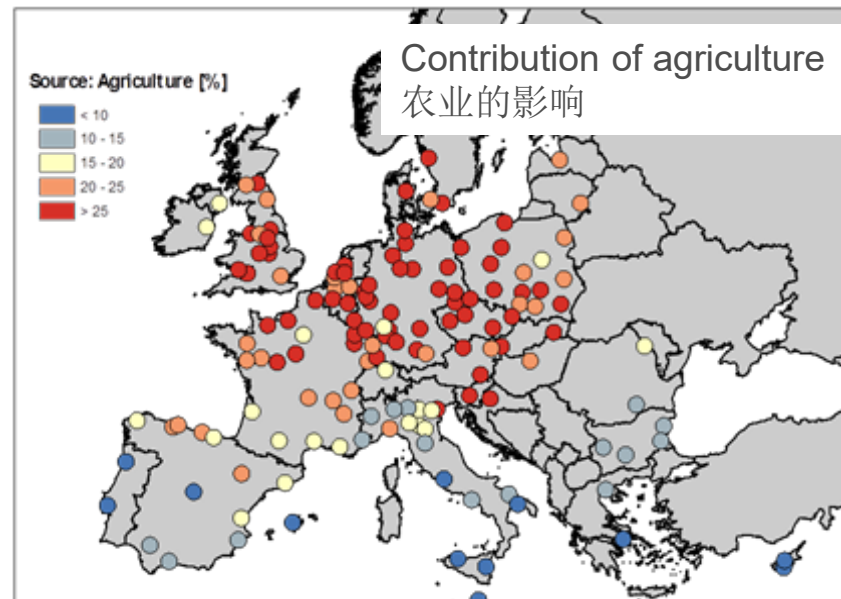
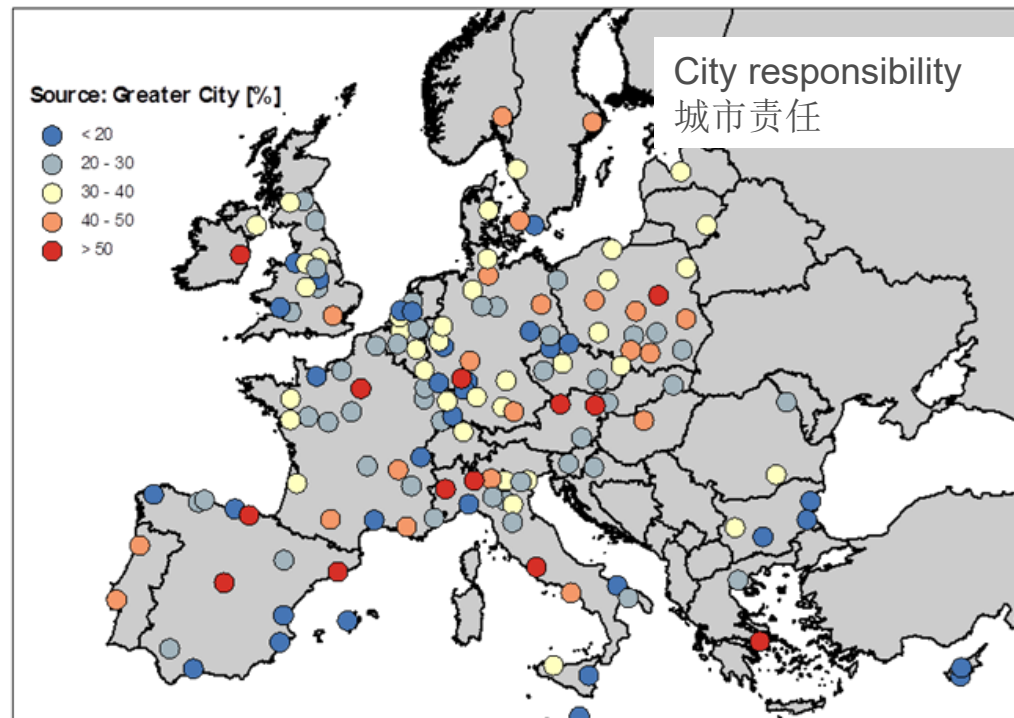
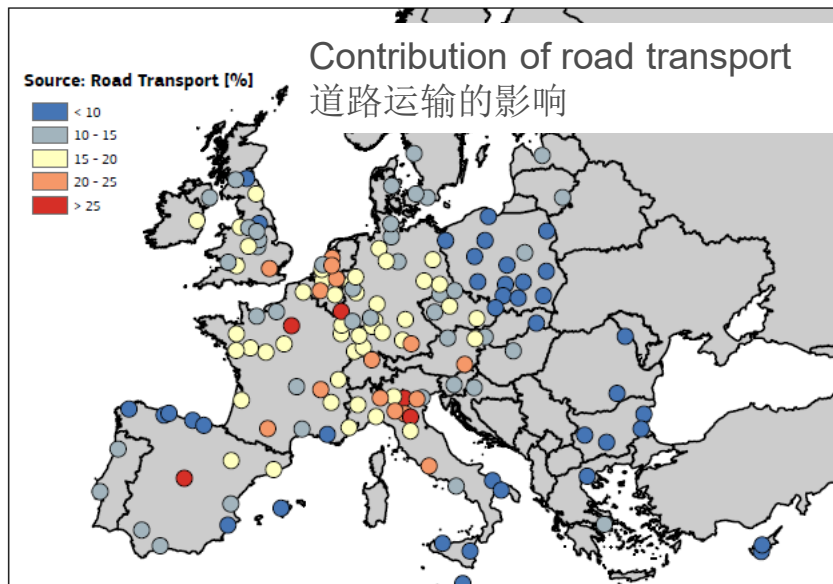


Mapping the source of PM2.5 in the EU (Urban Air Quality Atlas, JRC-C05)

映射欧盟PM2.5的来源（城市空气质量图集，JRC-C05）

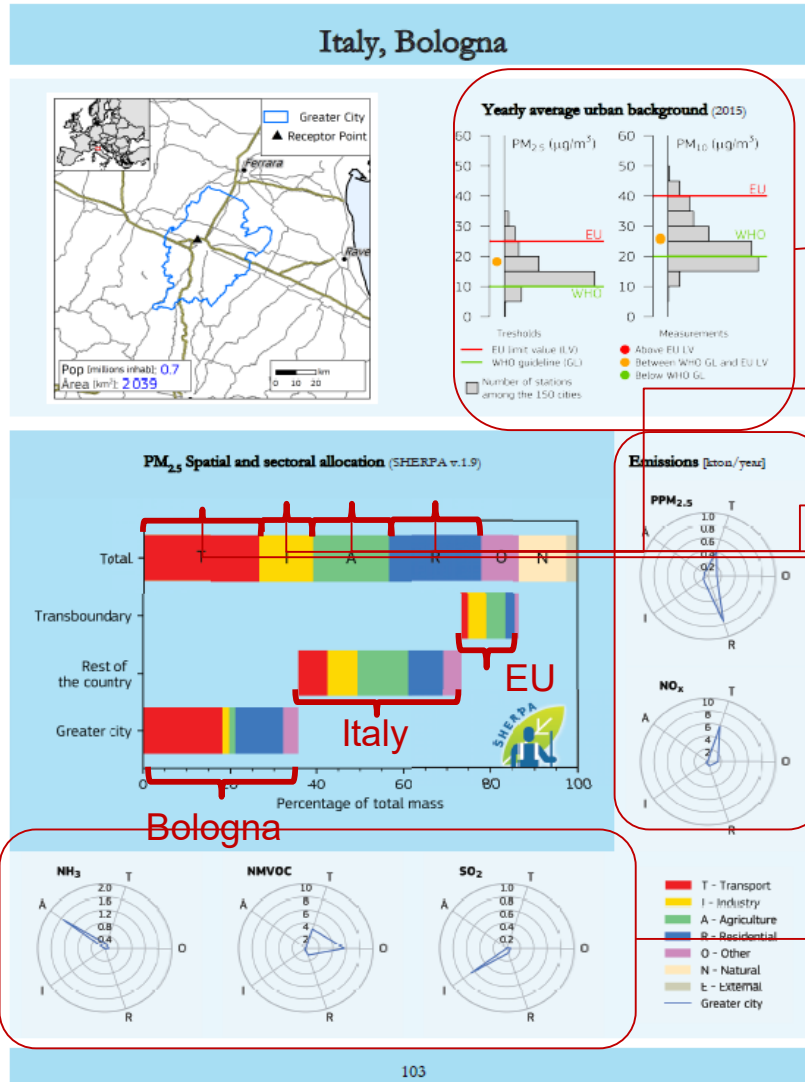


Overview maps 概览图



Mapping the source of PM2.5 in the EU (Urban Air Quality Atlas, JRC-C05)

映射欧盟PM2.5的来源 (城市空气质量图集, JRC-C05)



Measurements
测量

Transport
运输

Industry
行业

Agriculture
农业

Residential
住宅区

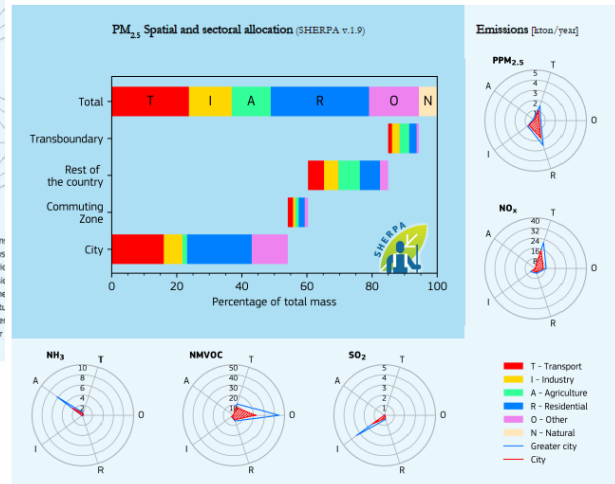
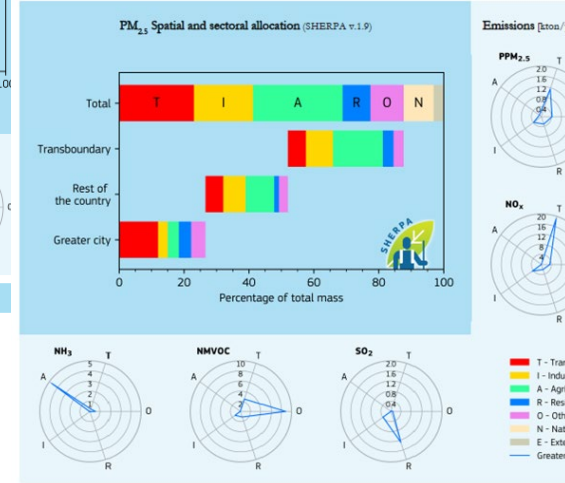
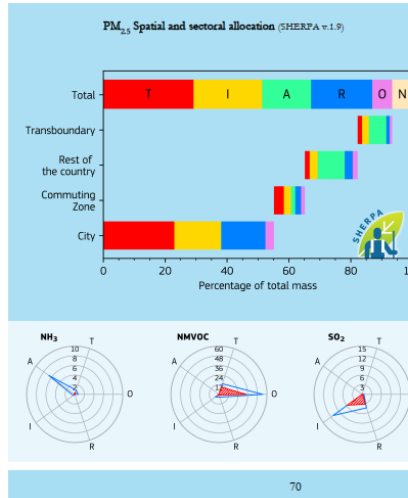
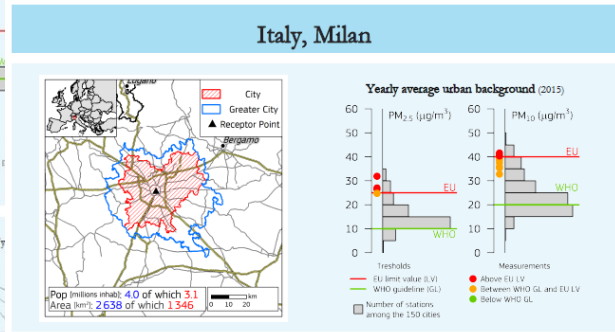
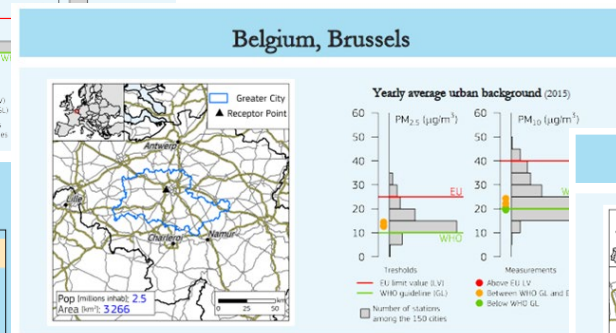
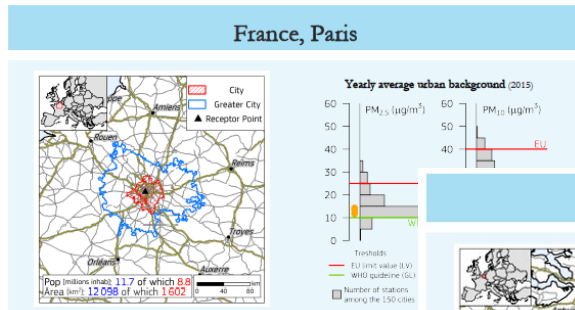
Emissions
排放量

Information for additional cities & regions can be produced with the JRC SHERPA air quality integrated tool (freely available)
其他城市和地区的信息可通过JRC SHERPA空气质量集成工具（免费提供）获取



Mapping the source of PM2.5 in the EU (Urban Air Quality Atlas, JRC-C05)

映射欧盟PM2.5的来源 (城市空气质量图集, JRC-C05)



Cities ID data-sheet 城市ID数据工作表

Conclusions | 总结

- ❑ SHERPA is a **screening tool** to support local policies on air quality.

SHERPA是一款用于支持当地针对空气质量政策的筛选工具

- ❑ Sherpa mimics the behavior of a CTM with an **accuracy of 5 to 10%**.

SHERPA可模仿CTM的行为，且准确度为5%至10%。

- ❑ Simulation time for one scenario is **1-2 minutes** (vs. days for a CTM)

一个场景的仿真模拟时间为1-2分钟（而CTM的时间为数天）。

- ❑ SHERPA is provided with **default EU data** but it can be fed by other AQ model /emissions. Effort ~ 10 CTM runs

SHERPA拥有默认的欧盟数据，但是可输入其他AQ空气质量模型/排放数据。效率是CTM的10倍左右。

- ❑ It currently works for **yearly averaged PM10, PM2.5 and NO2** concentrations. The approach is not valid for episodes.

其当前用于测算年平均PM10、PM2.5和NO2浓度。此方法不适用于分段测量。

- ❑ Work is on-going to **downscale** SHERPA at city level to capture local scale features

我们正在努力在城市层面实施SHERPA测算，以捕获当地的规模特性。

Available documents and tools

可用的文件与工具

- The urban Air Quality PM2.5 Atlas is available at:
可从以下网址查阅城市空气质量PM2.5图集：

<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/urban-pm25-atlas-air-quality-european-cities>

- The SHERPA Air Quality integrated tool is available at:
可从以下网址下载SHERPA城市空气质量集成工具：

<http://aqm.jrc.ec.europa.eu/sherpa.aspx>

Thank-you
谢谢！