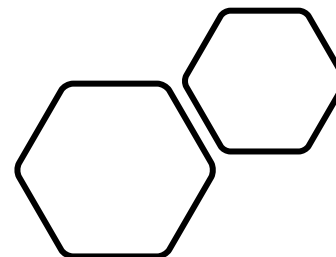


# Urban air pollution mapping towards protecting human health: from **SMURBS** practice to e-shape pilots

SMART URBAN SOLUTIONS



Eleni Athanasopoulou  
National Observatory of  
Athens (NOA), Greece

# Structure of Lecture

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## Background - Motivation

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### **SMart URBan Solutions for air quality, disasters and city growth**

*Evangelos Gerasopoulos, NOA (PI)*

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The UrbEm tool

The SDG 11.6.2 EO platform

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Moving forward: **e-shape** (EuroGEO Showcases:  
**Applications Powered by Europe**)

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Pilot 2. 3 EO-based pollution-health risks  
profiling in the urban environment

*Evangelos Gerasopoulos, NOA (PI)*

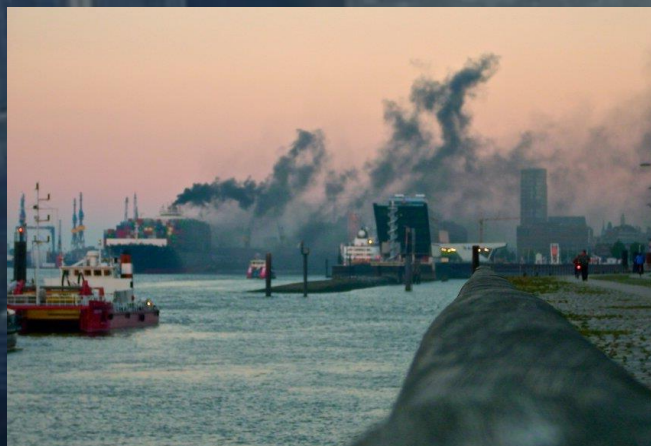
# Background - Motivation

## The problem:

AQ standards being exceeded in urban areas

## The need:

AQ issues & Concentration gradients in proximity to emitters and large agglomerations  
finer scales and more advanced modeling



Air quality studies

Exposure assessments

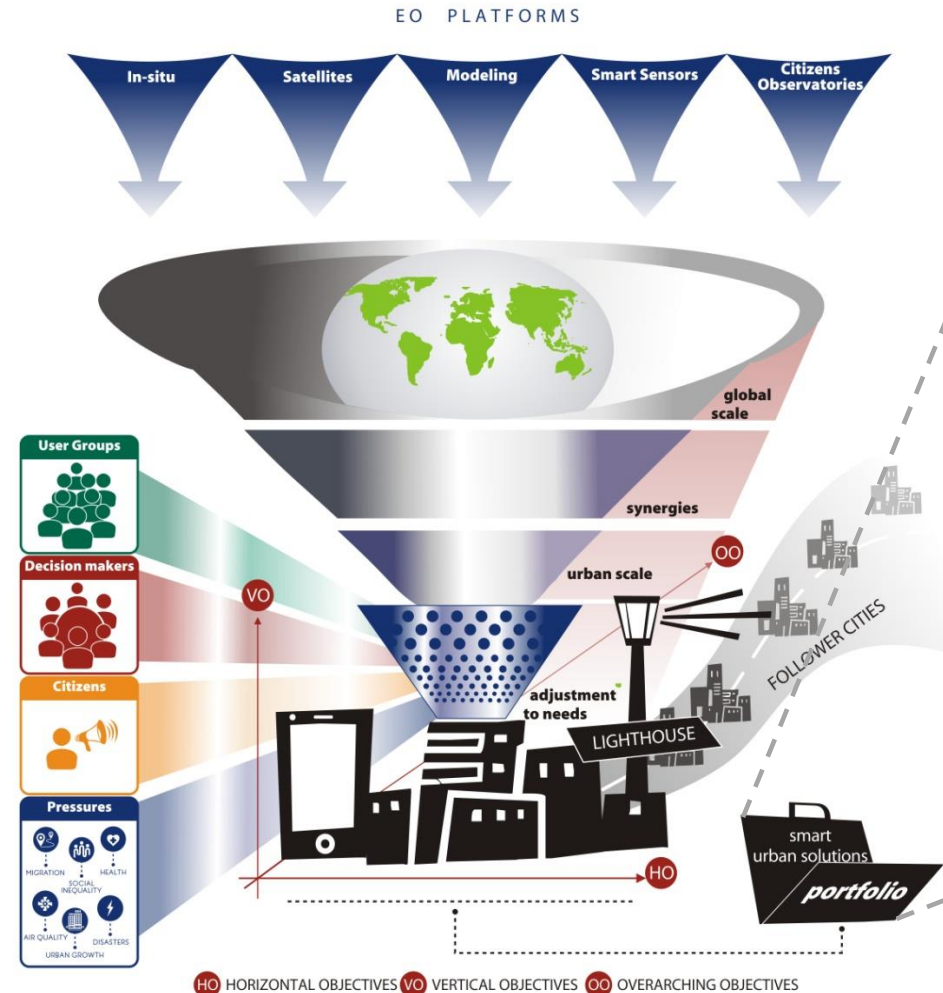
Health effect Studies

# SMart URBan Solutions for air quality, disasters and city growth



<https://smurbs.eu/>

- develop **synergies** between EO platforms
- converge under the “**smart city**” banner
- take **user needs** on board
- tailor **solutions** to the thematic areas
- deliver a **portfolio** of smart urban solutions
- test and showcase in **pilots**
- let the **followers** amplify the impact



Portfolio of

Themes:

- ☐ Air Quality
- ☐ Disasters
- ☐ Health
- ☐ Migration
- ☐ Urban Growth

EO Platform(s) utilized:

- ☐ Copernicus
- ☐ COs
- ☐ In Situ
- ☐ IoT
- ☐ Mobile app
- ☐ Models
- ☐ Satellites

Urban

in serv

resolu

mappe

A hybrid app

regional emi

creating an a

high-resoluti

emissions.

Inv

HZG (DE)

Cop

Flood

monit





Two SMURBS  
solutions of  
European coverage

- SMURBS/ERA-PLANET YouTube Channel:  
<https://www.youtube.com/watch?v=PlfklOg5Xil&t=3s>

# UrbEm: A tool in service of urban air pollution mapping

**Helmholtz-Zentrum Geesthacht**  
Centre for Materials and Coastal Research

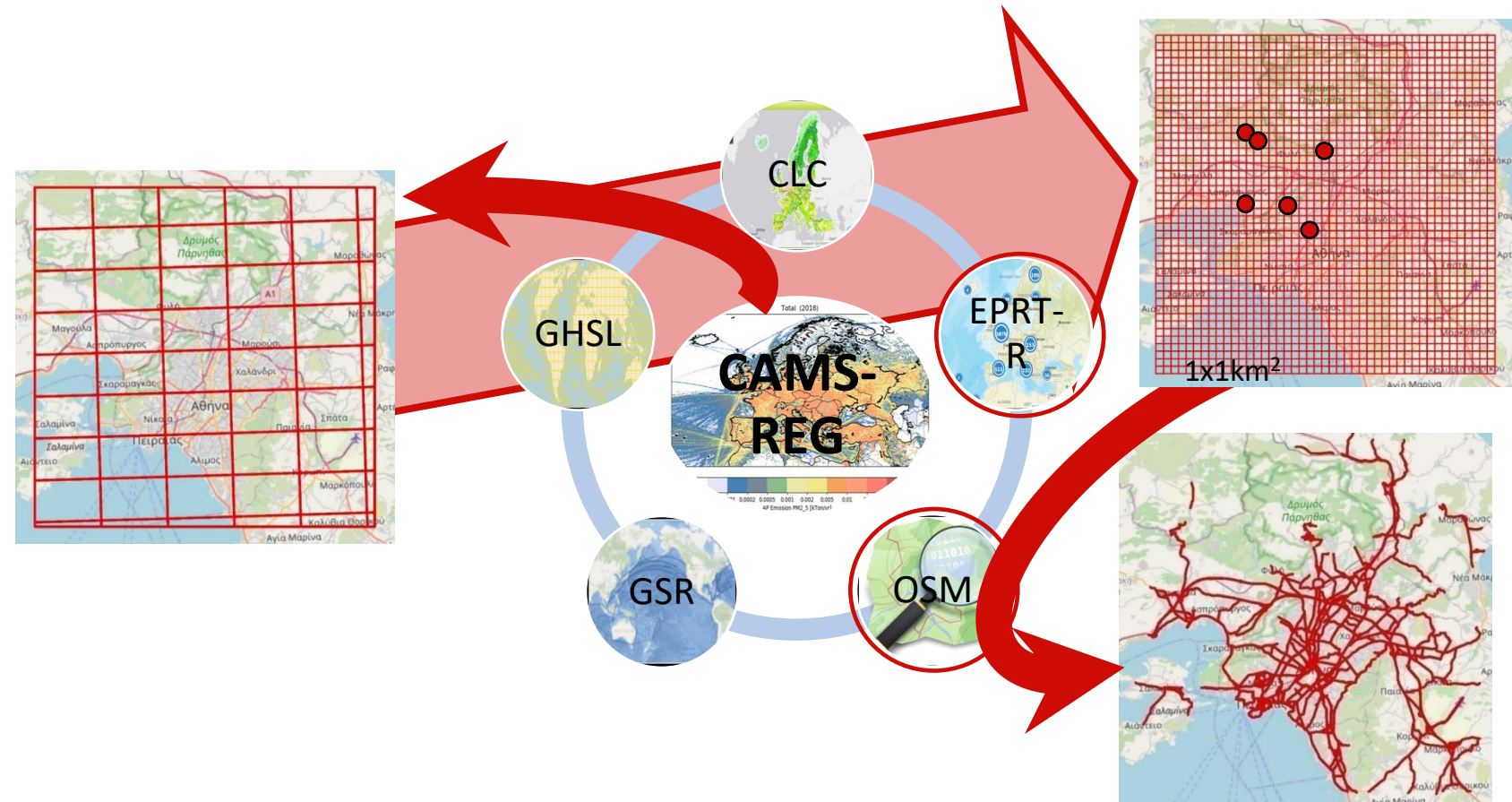
**The UrbEm Hybrid Method to Derive High-Resolution Emissions for City-Scale Air Quality Modeling**

by Martin Otto Paul Ramacher<sup>1</sup>, Anastasia Kakouri<sup>2,3</sup>, Orestis Speyer<sup>2</sup>, Josefine Feldner<sup>1</sup>, Matthias Karj<sup>1</sup>, Renske Timmermans<sup>4</sup>, Hugo Denier van der Gon<sup>4</sup>, Jeroen Kuenen<sup>4</sup>, Evangelos Gerasopoulos<sup>2</sup> and Eleni Athanasopoulou<sup>2,\*</sup>

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<sup>3</sup> Department of the Environment, University of the Aegean, 81100 Mytilene, Greece  
<sup>4</sup> TNO, Department of Climate, Air and Sustainability, Princetonlaan 6, 3584 CB Utrecht, The Netherlands  
 \* Author to whom correspondence should be addressed.

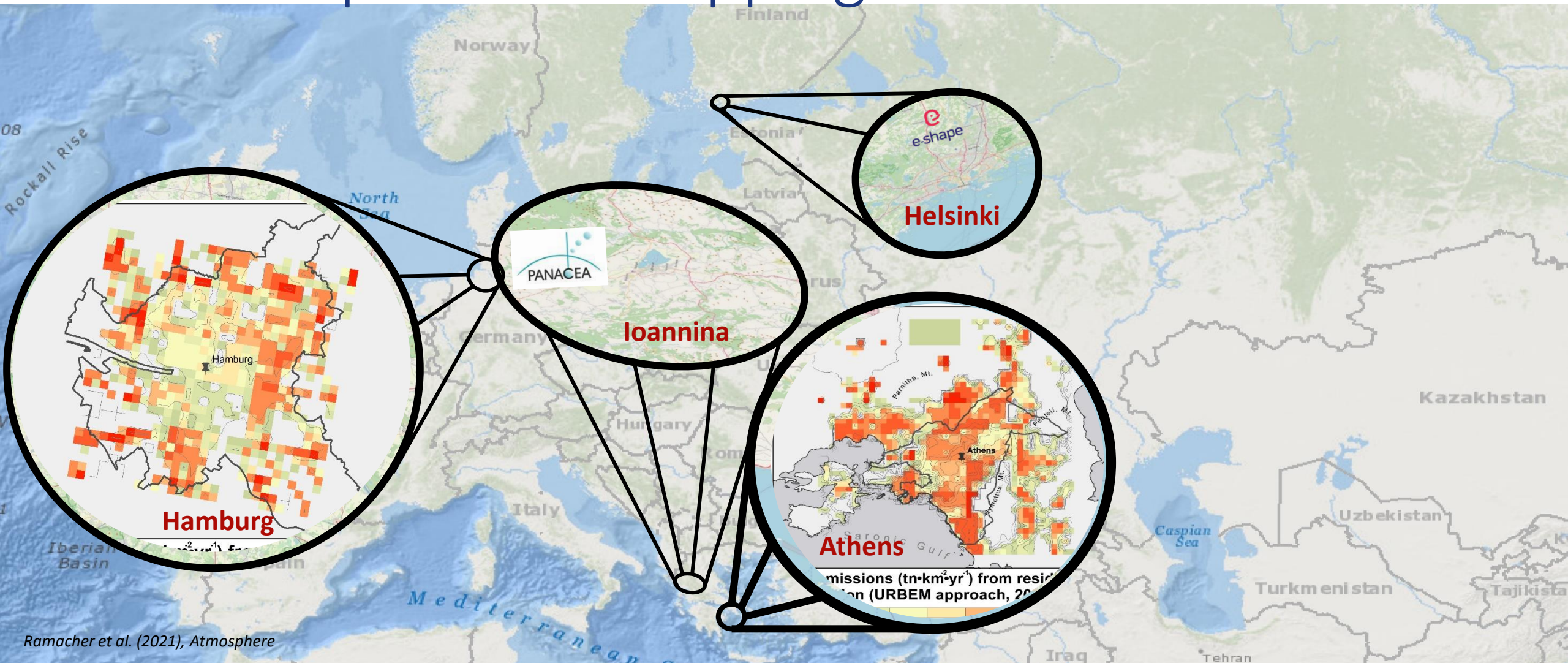
Academic Editor: Ashok Kumar  
 Atmosphere 2021, 12(11), 1404; <https://doi.org/10.3390/atmos12111404>  
 Received: 10 September 2021 / Revised: 19 October 2021 / Accepted: 22 October 2021 / Published: 26 October 2021  
 (This article belongs to the Special Issue Advances in Air Quality Data Analysis and Modeling)

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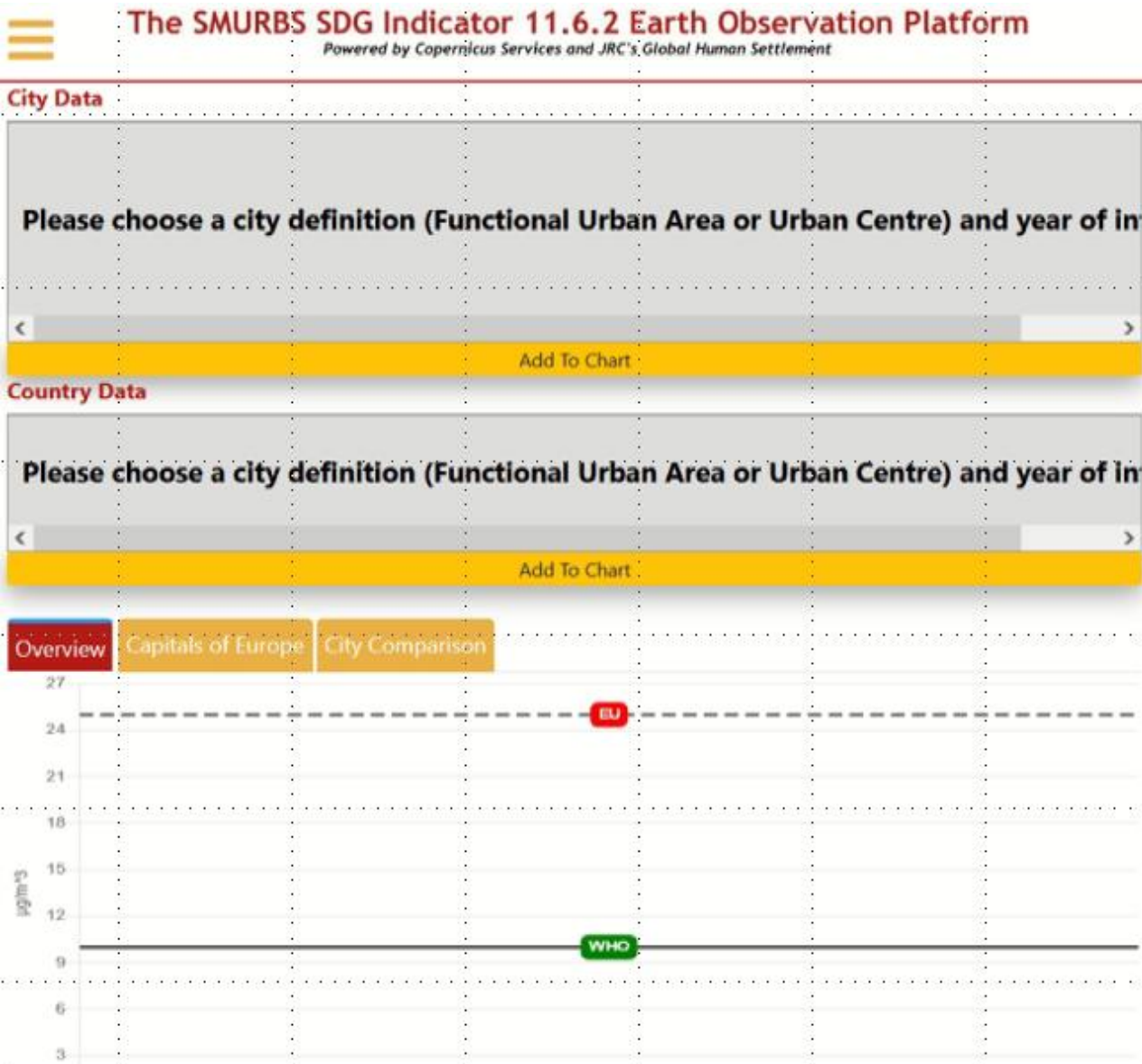
# UrbEm: A tool in service of urban air pollution mapping



Ramacher et al. (2021), Atmosphere



<http://apcg.meteo.noa.gr/sdg1162/>





[need help ?](#)

# We e-shape EuroGEO

e-shape is the flagship European project bringing together key European actors to ensure the optimal implementation of EuroGEO and, eventually, the delivery of EO-based benefits to a wide range of stakeholders in key societal areas

[Know Who We Are](#)

<https://e-shape.eu/>





## The **e-shape** urban footprint !

### Pilot 2.3 | EO-based pollution-health risks profiling in the urban environment



**Partners:** NOA, DLR, FMI, CNR, IIASA, DRAXIS

- Air pollution data and land use/health/socio-economic features of cities
- Public health assessment and urban planning
- Citizen science integration with official measurements
- Pollution mitigation scenarios and provision of alerts
- Awareness on AQ implications on public health

<https://e-shape.eu/>



# Showcase 2 Pilot 3 | Health Surveillance Air Quality (HSAQ) Pilot

## AIM

*Enhance urban resilience through timely and informed decision making with respect to air quality (AQ) and it's relevance to health and urban planning*

## HOW

Combine geographical/temporal scales of EO tools to provide visualization to **mitigate air pollution co-designed w users**

Spans **global to city-scale** - delineate **interactions between AQ & socioeconomic factors**, resulting in usable **health indicators specific to cities**

Exploit synergy btw **EO AQ platforms & urban development**

Address **data quality** issues - citizen science & low cost sensors

Identify **city & industry specific** AQ/health issues

### Pilot cities:

Helsinki, Porvoo & Turku, Finland  
Vienna, Austria  
Munich, Germany  
Athens, Greece  
(**replicability** in cities, if lack detailed AQ monitoring)

## OUTCOME

Create a service combining EO platforms & AQ, health, and socioeconomic data to be used for effective health risk reduction decision-making

# Pilot 2.3 | Health Surveillance Air Quality (HSAQ)

## Global Service:

Blend existing platforms using satellite data to look at AQ

### Athens, Greece:

City-scale AQ modeling data + local health, land use, socioeconomic data



### Helsinki / Porvoo / Turku, Finland:

Satellite derived emissions data for oil refinery in peri-urban areas



### Vienna, Austria:

Existing citizen science platform + AQ functions (perceived AQ & health & local AQ data)



### Munich, Germany:

Testing satellite derived AQ data at the city-level

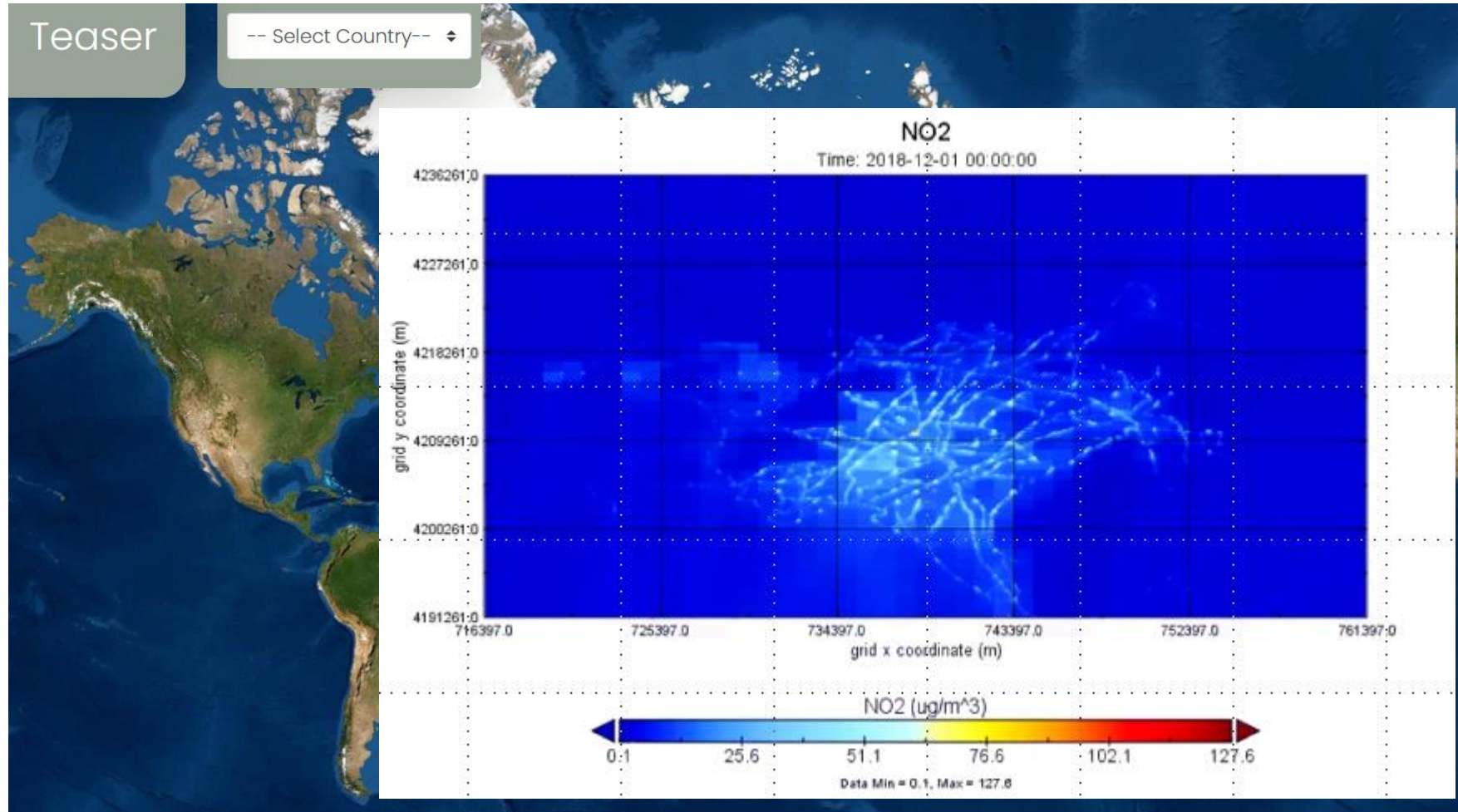




# Pilot 2.3 | Health Surveillance Air Quality (HSAQ)

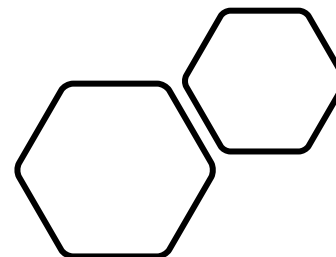


# Pilot 2.3 | Health Surveillance Air Quality (HSAQ)





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