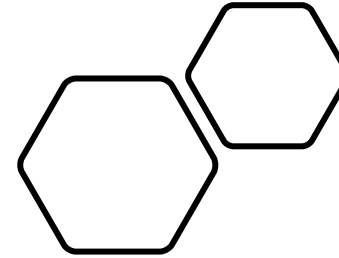


Urban air pollution
mapping towards
protecting human
health: from **SMURBS**
SMART URBAN SOLUTIONS
practice to e-shape
pilots



Eleni Athanasopoulou

National Observatory of
Athens (NOA), Greece



Structure of Lecture

Background - Motivation

SMart URBan Solutions for air quality, disasters and city growth

Evangelos Gerasopoulos, NOA (PI)

The UrbEm tool

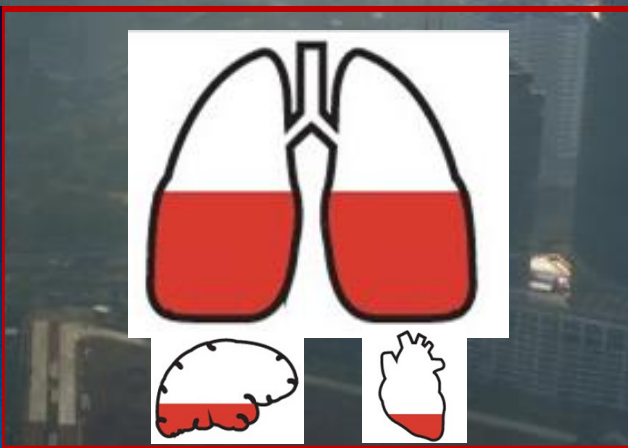
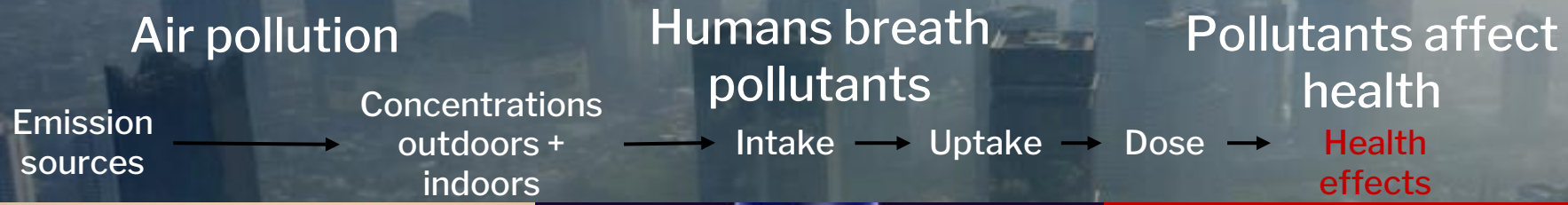
The SDG 11.6.2 EO platform

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

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

Evangelos Gerasopoulos, NOA (PI)

Background - Motivation



Air quality studies

Exposure assessments

Health effect Studies

The problem:

AQ standards being exceeded in urban areas

The need:

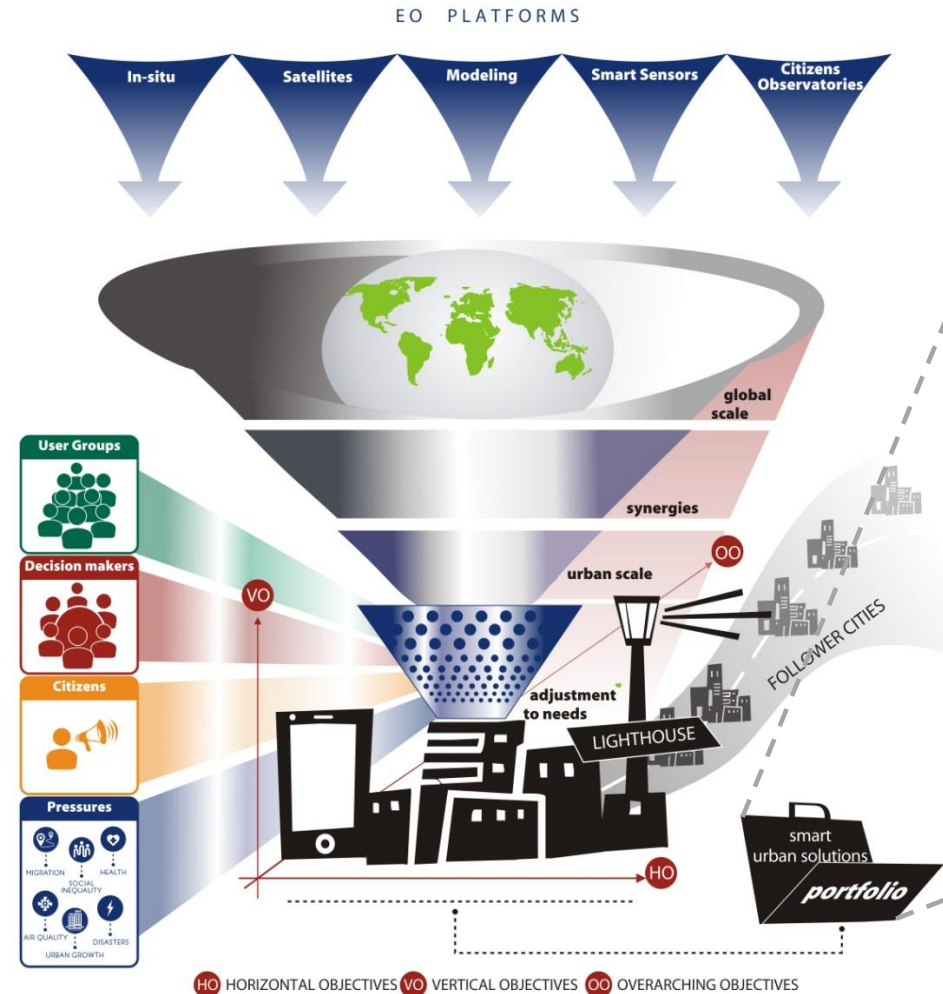
AQ issues & Concentration gradients in proximity to emitters and large agglomerations
finer scales and more advanced modeling

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



Two SMURBS
solutions of
European coverage

- SMURBS/ERA-PLANET YouTube Channel:
<https://www.youtube.com/watch?v=P1fklOg5Xil&t=3s>

UrbEm: A tool in service of urban air pollution mapping

Helmholtz-Zentrum Geesthacht
Centre for Materials and Coastal Research

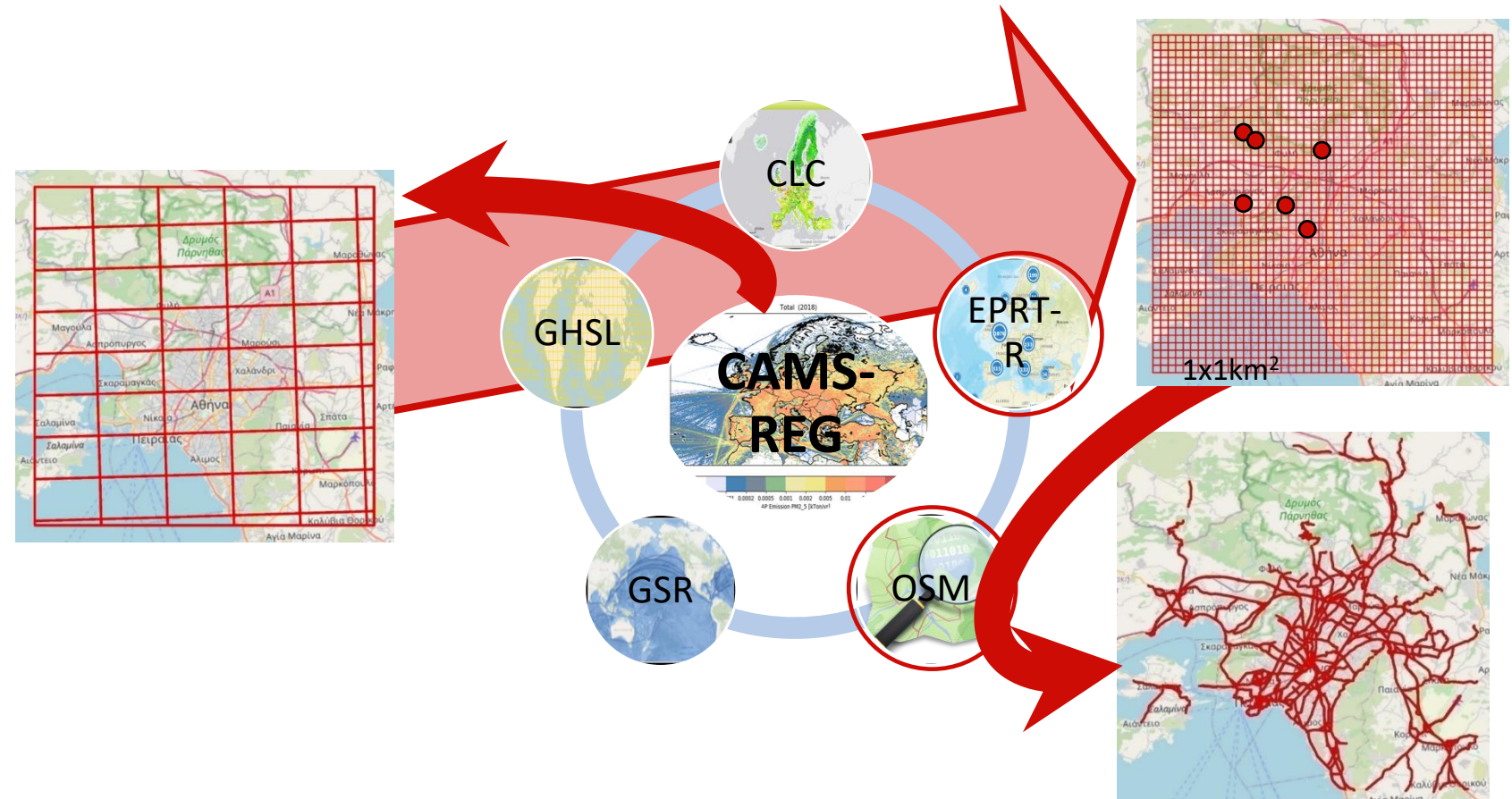
The UrbEm Hybrid Method to Derive High-Resolution Emissions for City-Scale Air Quality Modeling

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

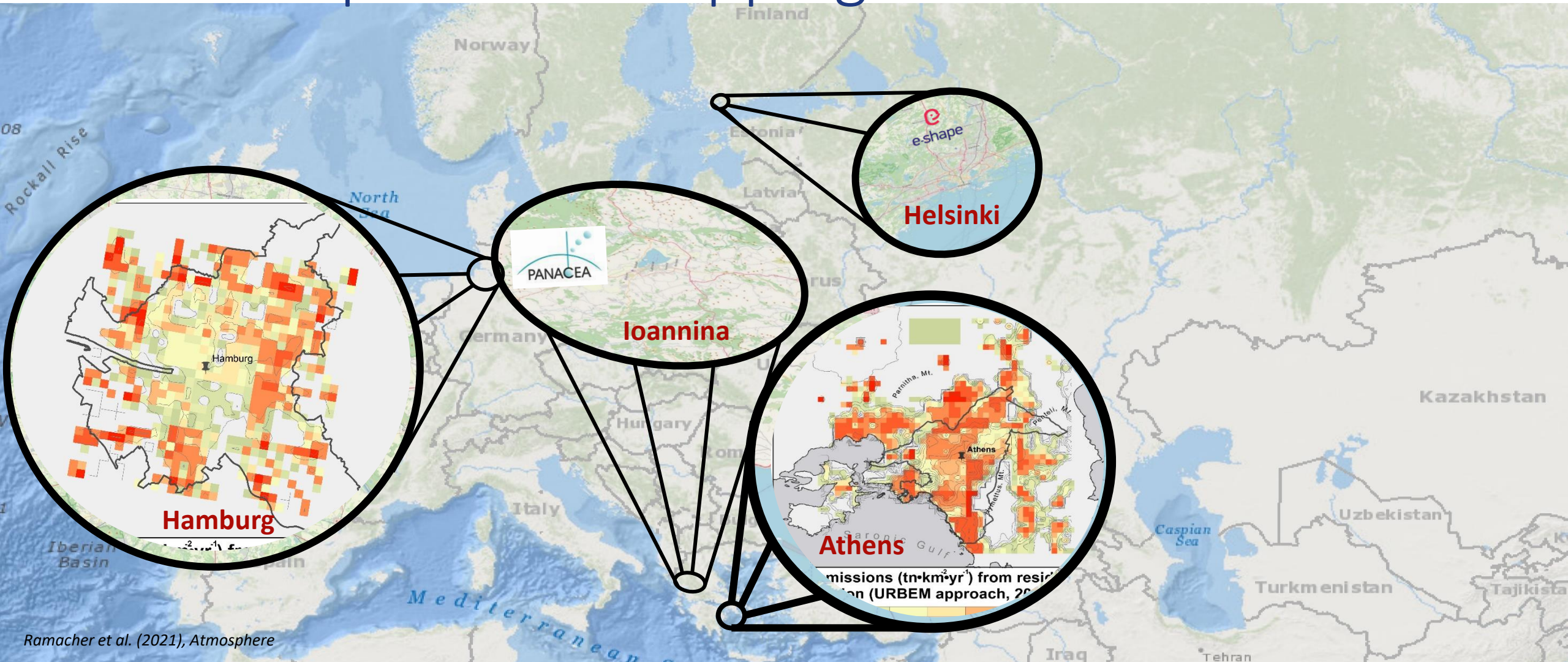
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² Institute for Environmental Research and Sustainable Development, National Observatory of Athens, 11810 Athens, Greece
³ Department of the Environment, University of the Aegean, 81100 Mytilene, Greece
⁴ TNO, Department of Climate, Air and Sustainability, Princetonlaan 6, 3584 CB Utrecht, The Netherlands
 * Author to whom correspondence should be addressed.

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 (This article belongs to the Special Issue Advances in Air Quality Data Analysis and Modeling)

[View Full-Text](#) [Download PDF](#) [Browse Figures](#) [Review Reports](#) [Citation Export](#)



UrbEm: A tool in service of urban air pollution mapping



Ramacher et al. (2021), Atmosphere

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

The SMURBS SDG Indicator 11.6.2 Earth Observation Platform
Powered by Copernicus Services and JRC's Global Human Settlement

City Data

Please choose a city definition (Functional Urban Area or Urban Centre) and year of in

< [dropdown] >

Add To Chart

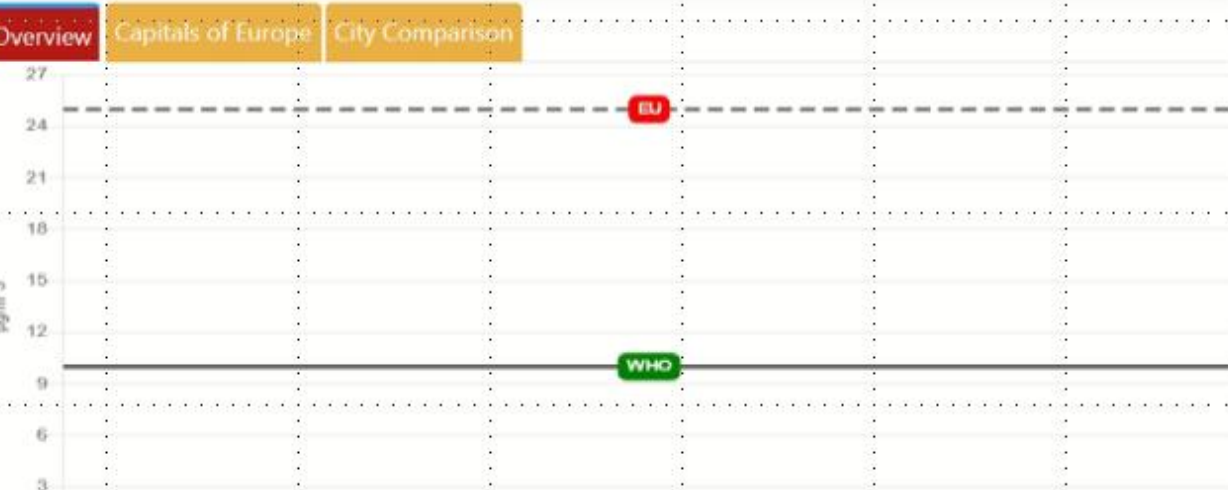
Country Data

Please choose a city definition (Functional Urban Area or Urban Centre) and year of in

< [dropdown] >

Add To Chart

Overview | Capitals of Europe | City Comparison



Entity	PM _{2.5} Level (µg/m ³)
EU	~25
WHO	10

SMURBS ERA-PLANET | EuroGEO | Atmosphere Monitoring Service | Land Monitoring | JRC | need help?

11 SUSTAINABLE CITIES AND COMMUNITIES

Indicator 11.6.2: Annual mean levels of fine particulate matter (PM_{2.5}) in cities, population-weighted

Select Dataset and Year



Functional Urban Area (FUA) | Urban Centre (UC)

2014 | 2015 | 2016 | 2017 | 2018

Show/Hide Countries layer | Opacity

e-shape

f t in

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](#)

e-shape

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

EO4GEO Workshop on Air quality monitoring and management- 17 Dec. 2021



health



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



health

<https://platform under development/>

Pilot 2.3 | Health Surveillance Air Quality (HSAQ)



DRAXIS
ENVIRONMENTAL TECHNOLOGIES

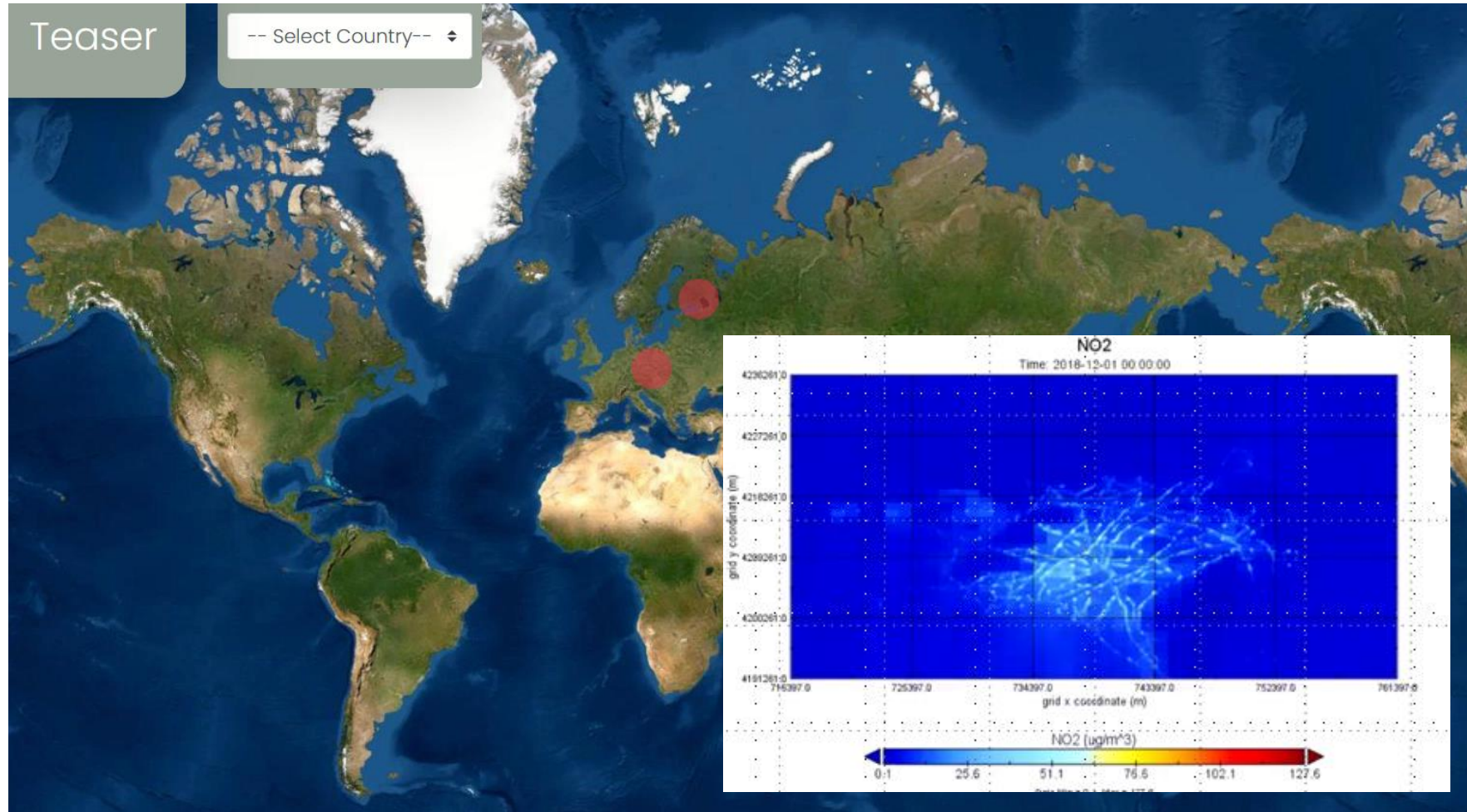


<https://platform under development/>



health

Pilot 2.3 | Health Surveillance Air Quality (HSAQ)



DRAXIS
ENVIRONMENTAL TECHNOLOGIES

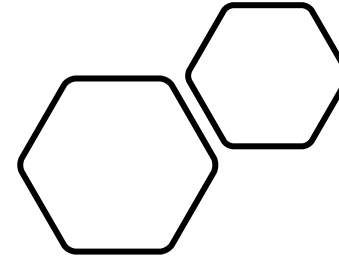


<https://platform.underdevelopment/>



health

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Thank you

