



CURE: Copernicus for Urban Resilience in Europe

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Learn more here:

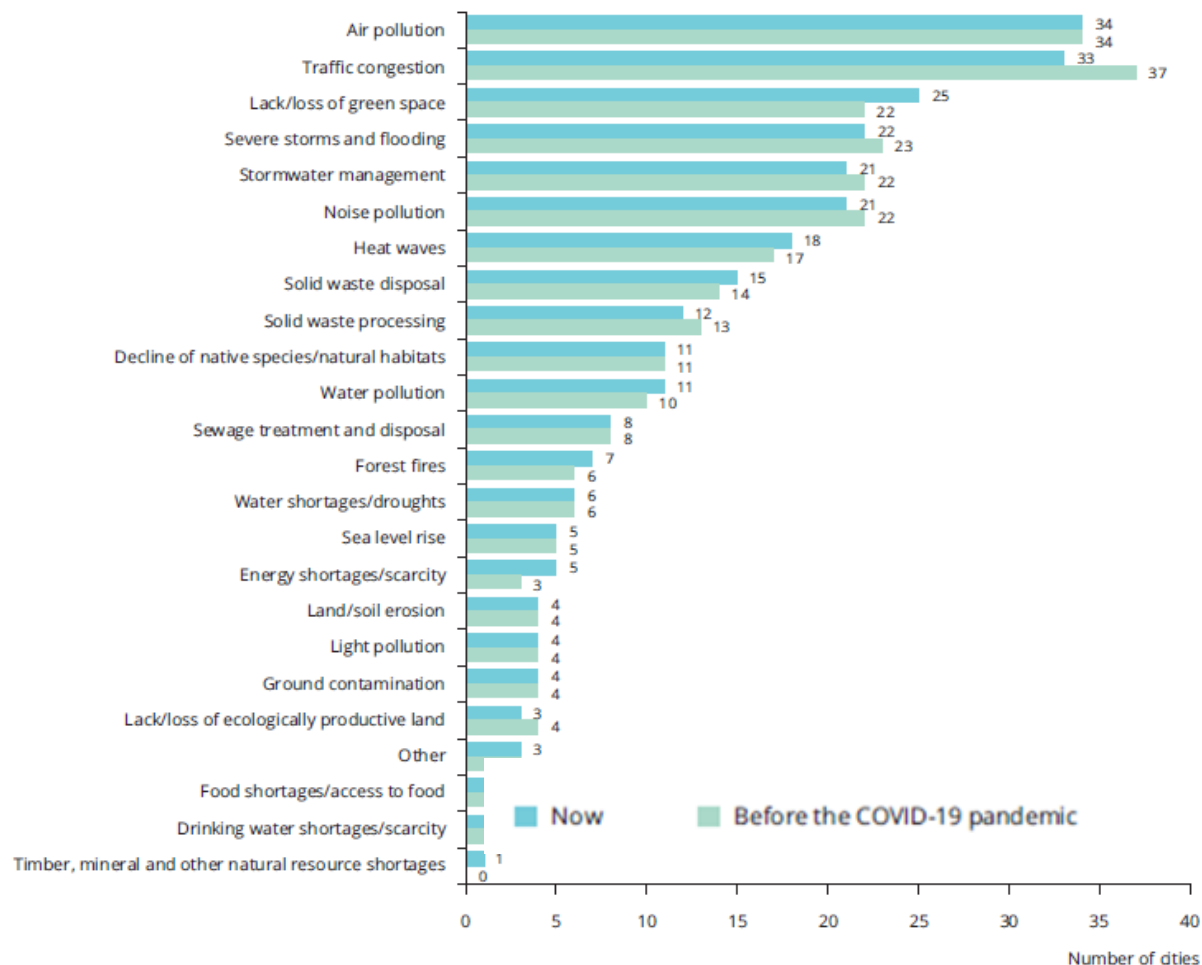


ATHENS 7-9 DECEMBER 2022





Urban Sustainability in Europe: Challenges & Responses



🧩 Climate Change Mitigation

- 15 Minute City Solutions
- 30 Minute City Region + Transit-oriented Development

🧩 Climate Change Adaptation

- Nature-Based Solutions
- Urban Flood Risk / Subsidence

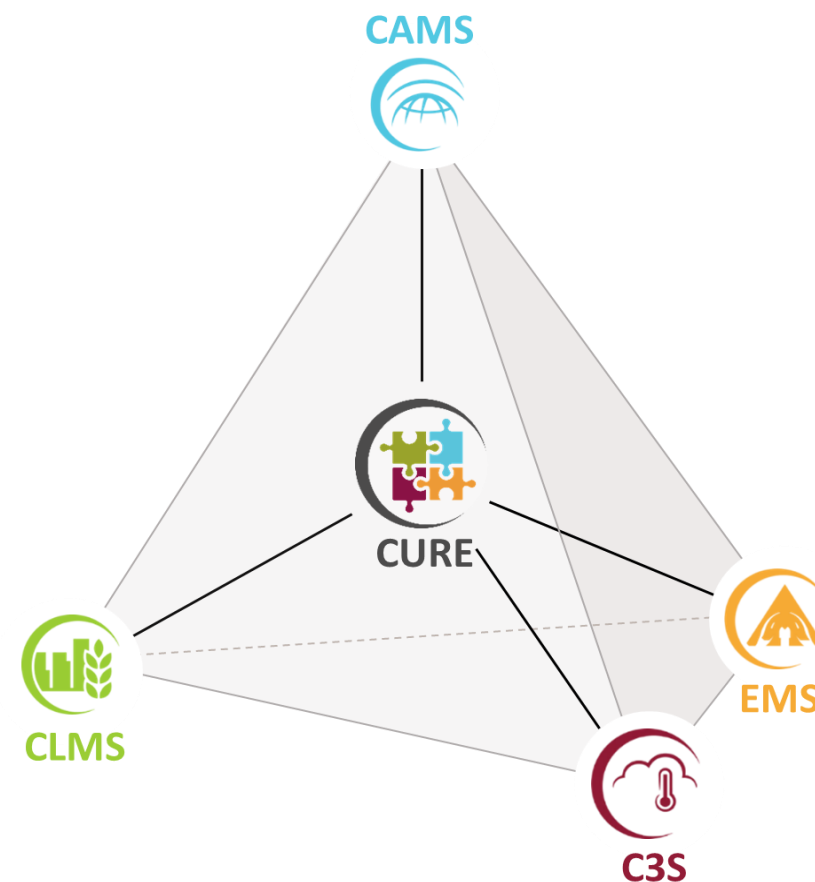
🧩 Healthy cities

- Reducing Car Use and Promoting Active Travel
- Promoting Teleworking



The CURE Concept

- 🌐 H2020-Space
- 🌐 Provides the means to cope with the EO data under-exploitation in the domain of **sustainable and resilient urbanization**, by combining products from CAMS, CLMS, C3S and EMS.
- 🌐 Introduces novel ideas on how to **develop applications** across CCS in the domains:
 - **climate change adaptation & mitigation**
 - **healthy cities and social environments**
 - **energy and economy**





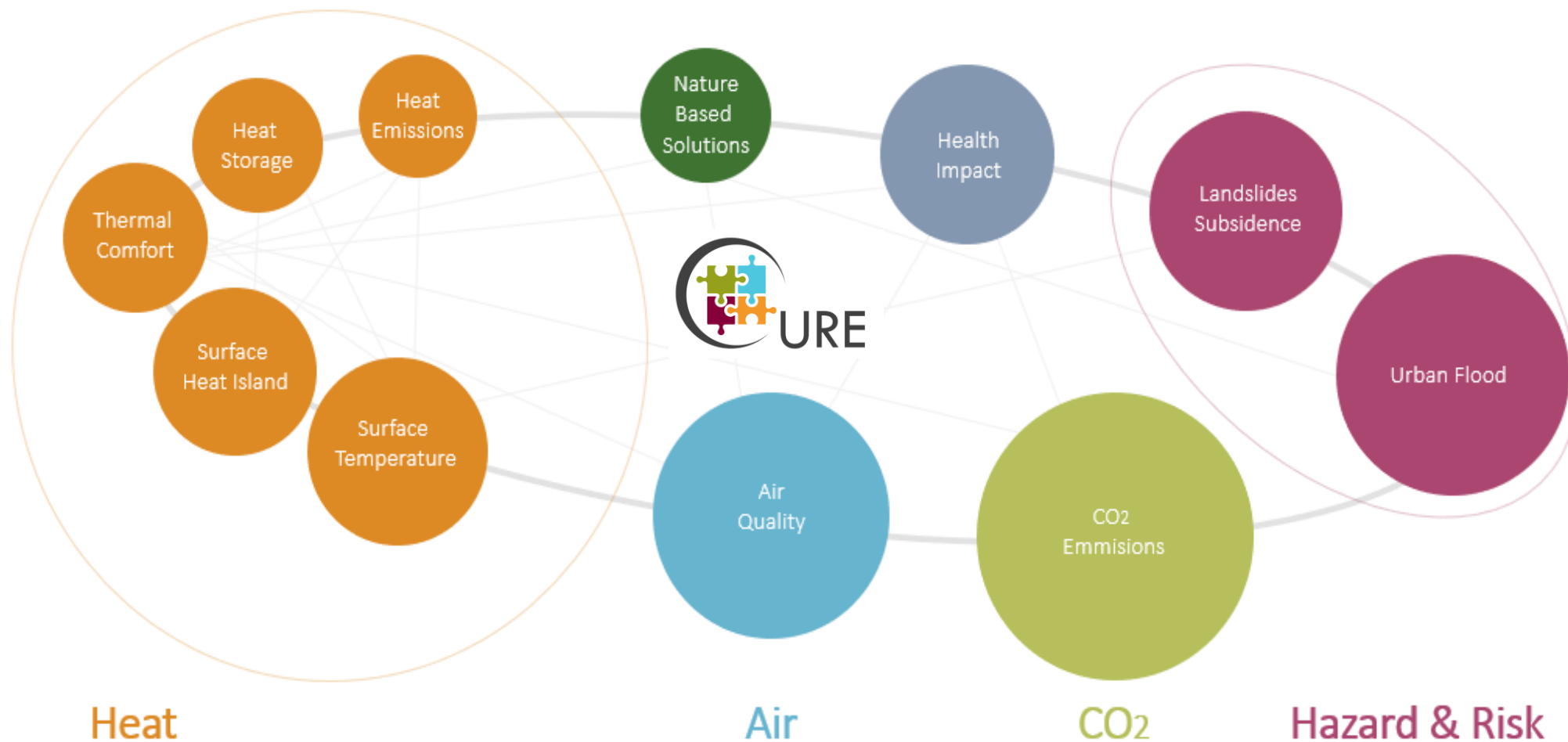
Why CURE?

- 🌐 Urban environment is **multidimensional**: information from more than one Copernicus Core Services is needed.
- 🌐 To address urban resilience **spatially disaggregated** information at local (**neighbourhood**) scale is necessary.
- 🌐 Such information **is not yet available** from Copernicus Core Services.
- 🌐 **CURE: Cross-cutting applications among Core Services**, capable of coping with the required **scale**, exploiting also **third-party** data, *in-situ* observations and **modelling**.



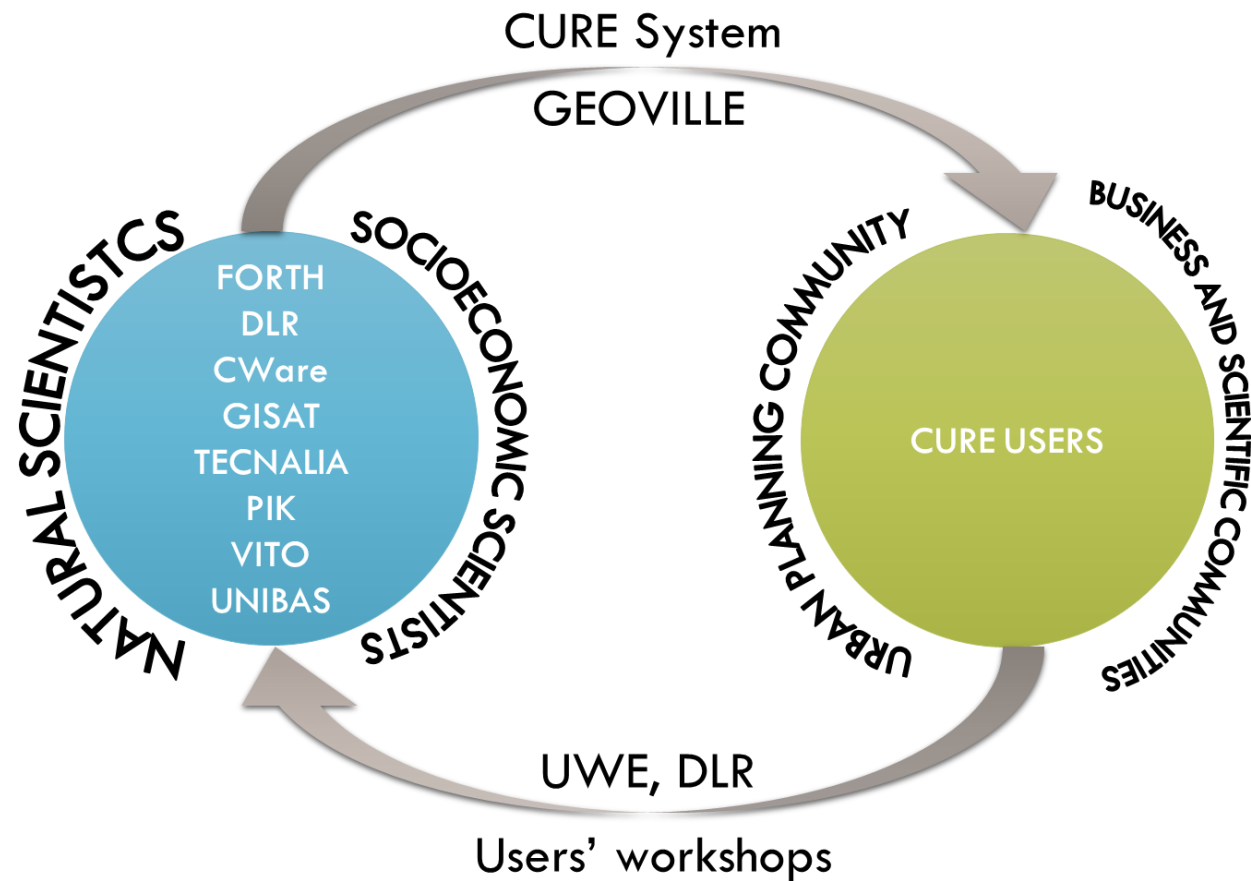


CURE Applications Constellation



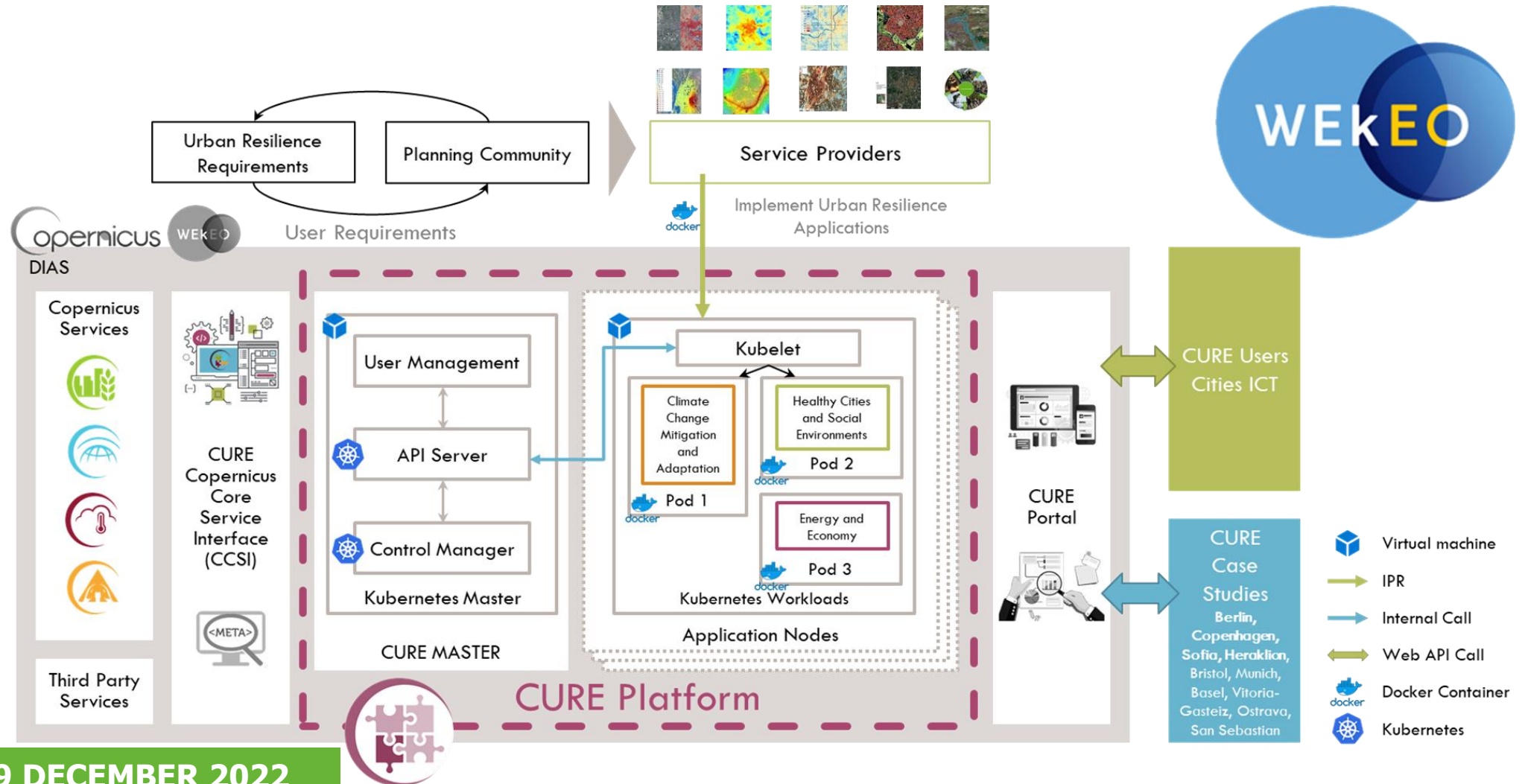


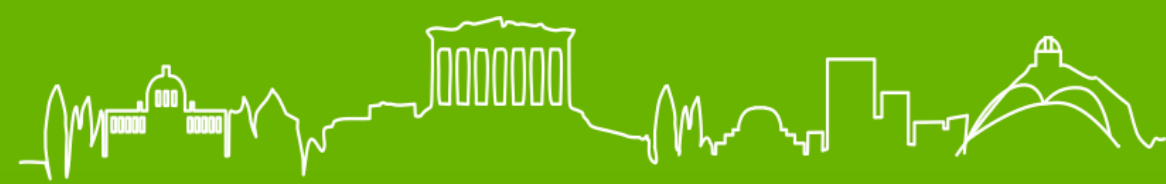
Users Engagement





Results: The CURE System





Results: The CURE Portal



<http://portal.cure-copernicus.eu>

CURE PORTAL

CURE provides services for urban resilience through the CURE System implemented in Wekeo of the Copernicus DIAS (Data and Information Access Services).

The CURE project has developed 11 cross-cutting applications among the Copernicus Services, addressing the multi-dimensional nature of urban resilience:

- [Local Scale Surface Temperature Dynamics](#)
- [Urban CO2 Emissions Monitoring](#)
- [Urban Flood Risk](#)
- [Nature Based Solutions](#)
- [Urban Air Quality](#)
- [Urban Thermal Comfort](#)
- [Socioeconomic perspective of Health Impacts](#)
- [Urban Subsidence, Movements and Deformation Risk](#)
- [Urban Heat Emissions Monitoring](#)
- [Urban Heat Storage Monitoring](#)
- [Surface Urban Heat Island Assessment](#)

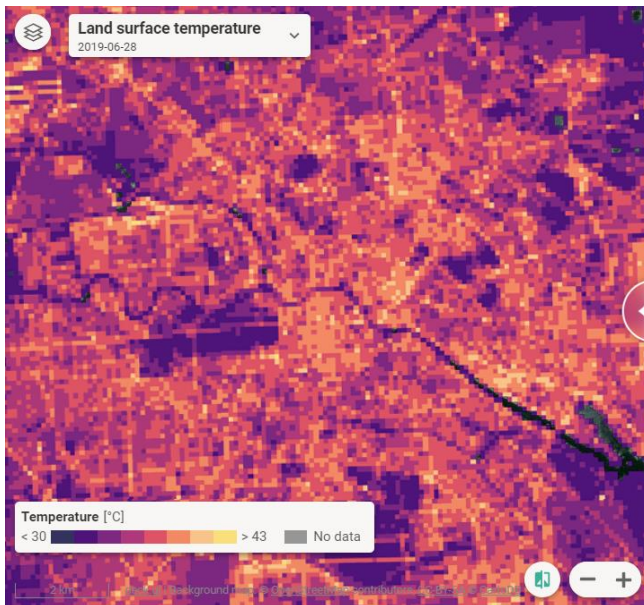
The CURE data products, linked to the CURE System, are open and available for demonstration and evaluation through this portal.

CURE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870337
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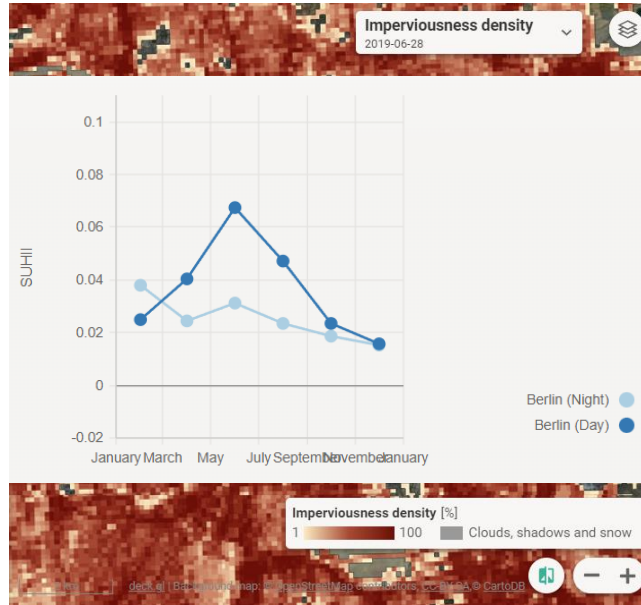
Results: Urban Heat

Surface Temperature



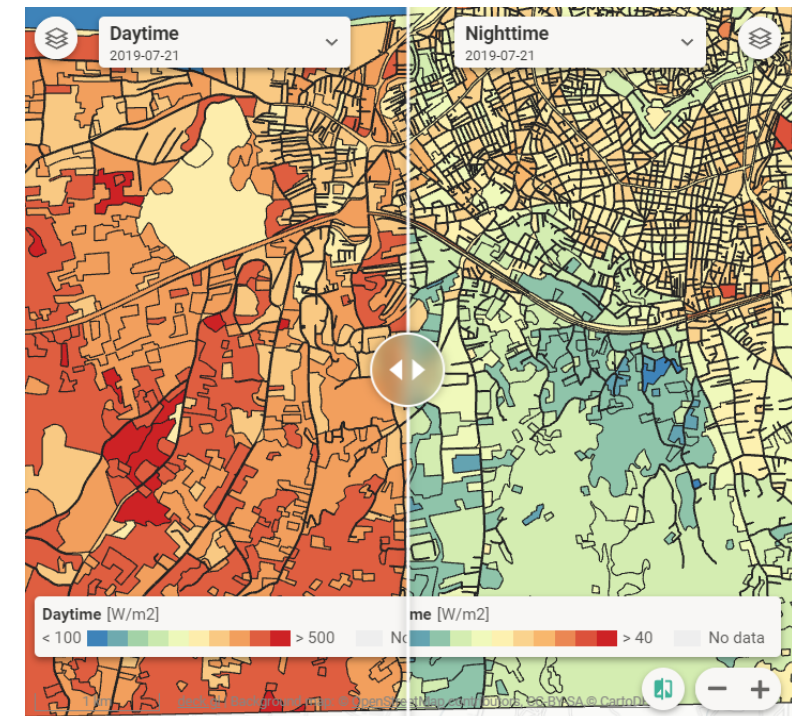
Skin temperature of the surface elements at the time of the satellite acquisition.

Surface Heat Island



Differences between “urban” and “non-urban” surface temperatures.

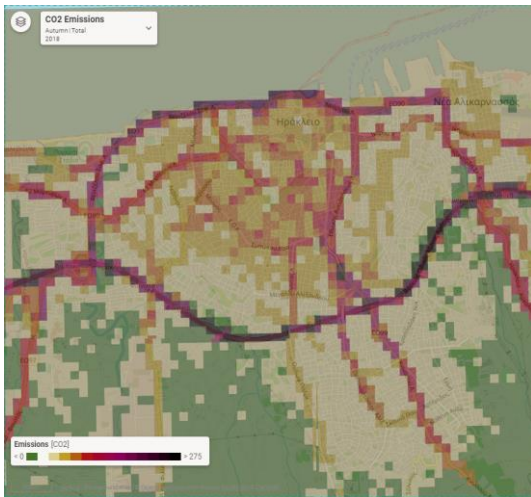
Heat Emissions



Heat emitted by the surface tending to increase the air temperature, therefore deteriorating the thermal comfort of people.




Results: Urban CO₂ Emissions






CO₂ emissions from different sources/sinks for a year, season or week.

Products: mean daily and hourly CO₂ emissions for urban areas at 100 m × 100 m.



CURE Applications / **Urban CO₂ Emissions Monitoring** / Heraklion

Service Rationale

Partitioning of CO₂ emission sources/sinks

Urban CO₂ emissions have a spatial dimension due to the heterogeneous nature of urban land use/land cover and urbanization. In this CURE application, the CO₂ emissions are partitioned into an anthropogenic (traffic, heating/cooling) and a biogenic component (urban green space):

- Anthropogenic source from fossil fuel combustion by cars
- Anthropogenic source from fossil fuel combustion through heating/cooling
- Biogenic source from human respiration
- Biogenic source/sink from plant/soil respiration and photosynthesis

Eddy Covariance measurements

A very fast and simultaneous measurement of vertical wind and CO₂ concentration provides the base for calculating the vertical exchange of CO₂ (CO₂ flux).

Intra-urban CO₂ emission dynamics

Interactive maps help the user to assess, analyse and compare the CO₂ emissions from different sources/sinks for the area of investigation. Choose a map for the respective city, year, season and week days (working days/weekend). Hoover on the map to show the values for total CO₂ emissions as well the respective values for the individual contributions.

Urban CO₂ Emissions Monitoring

Monitor and analyse the CO₂ emissions in your city

Emissions

Climate Change Mitigation

Energy Consumption

Green Areas

CLMS

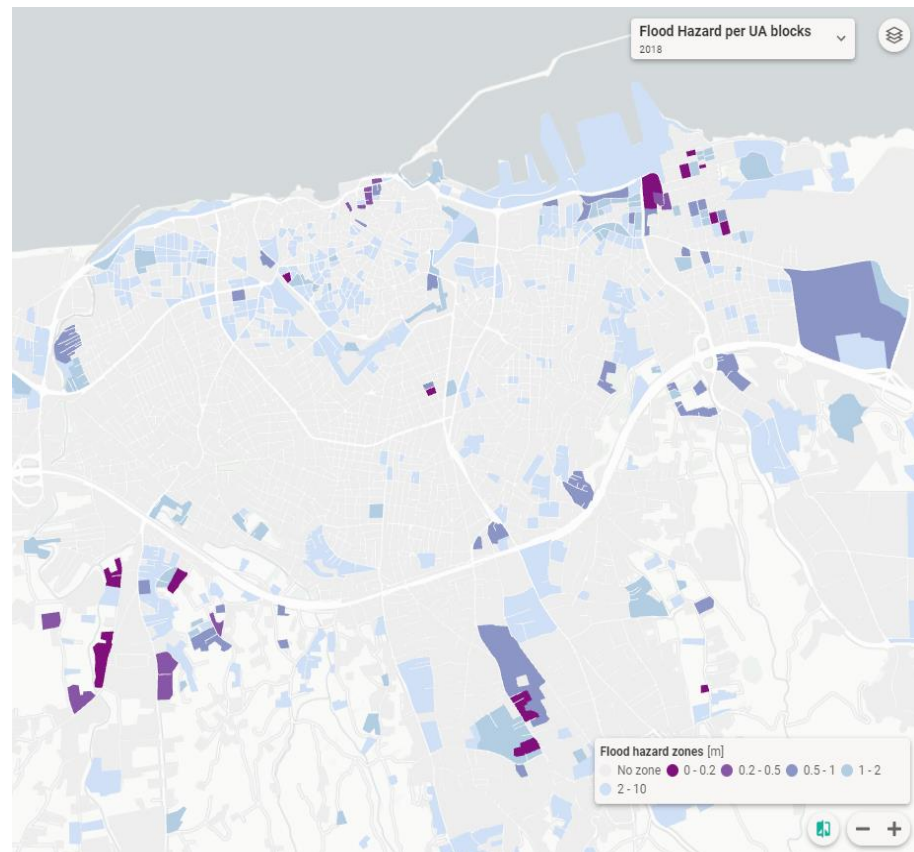
Traffic

CAMS



Results: Urban Hazard and Risk

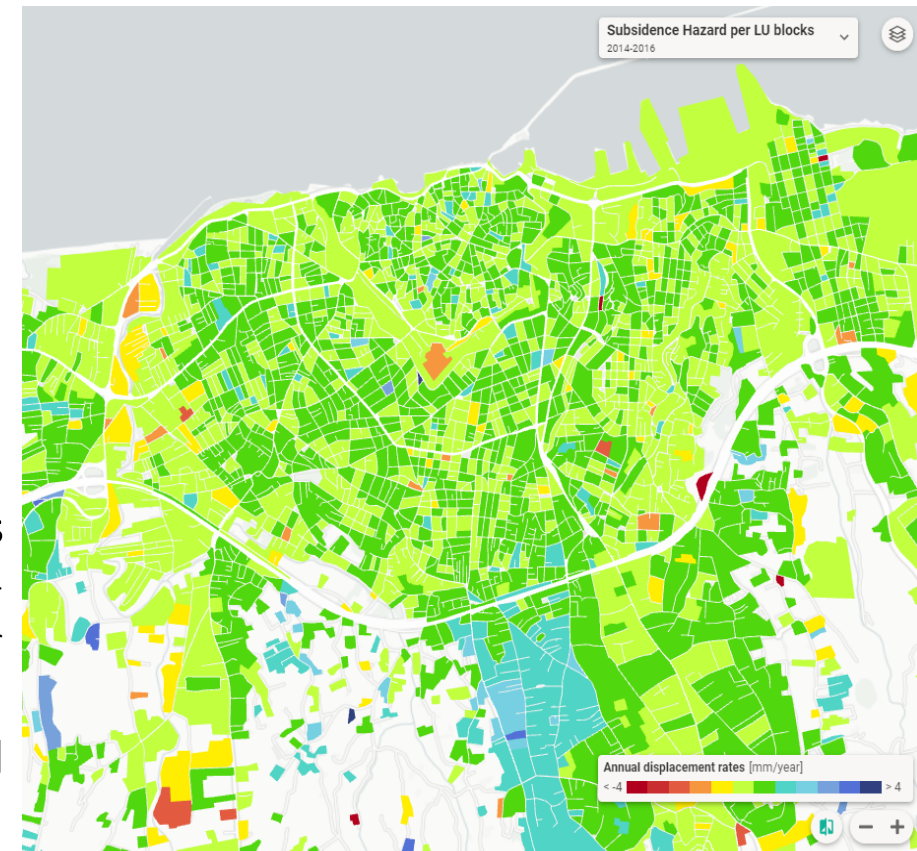
Urban Flood



Quickly flood hazard zones (inundation depth zones) contributing to streamlining, efficient flood risk management and emergency response activities.

Subsidence patterns monitoring in multi-temporal manner for any area of interest, including trends and their dynamic.

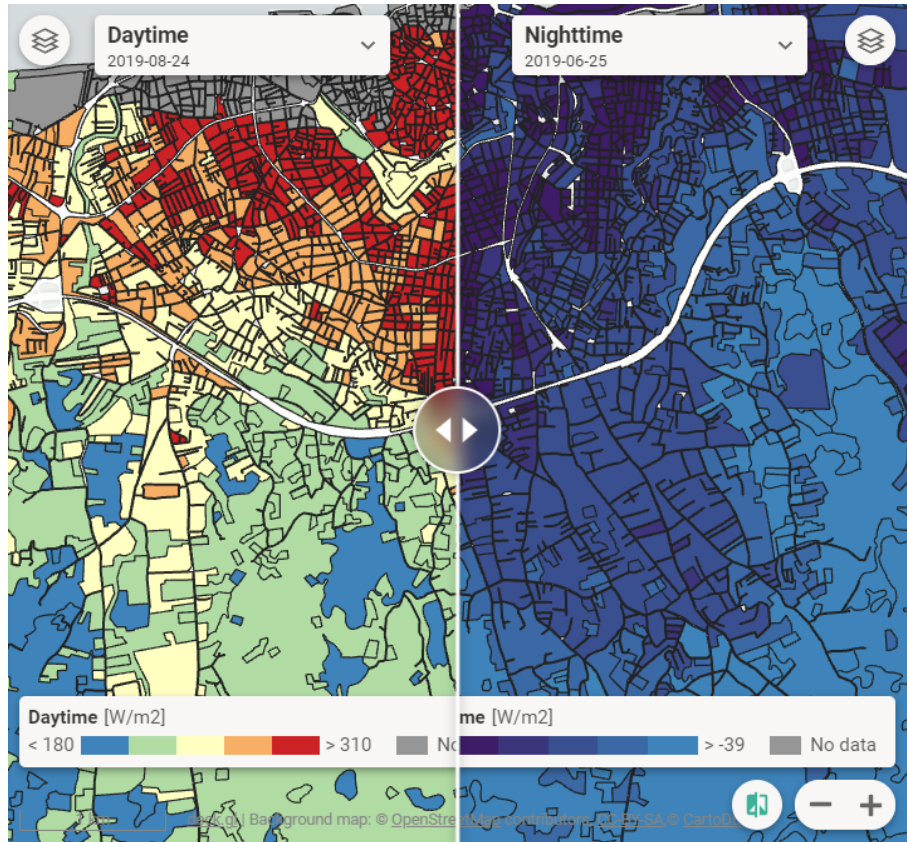
Landslides, Ground Movement





Results: Energy Storage & NBS

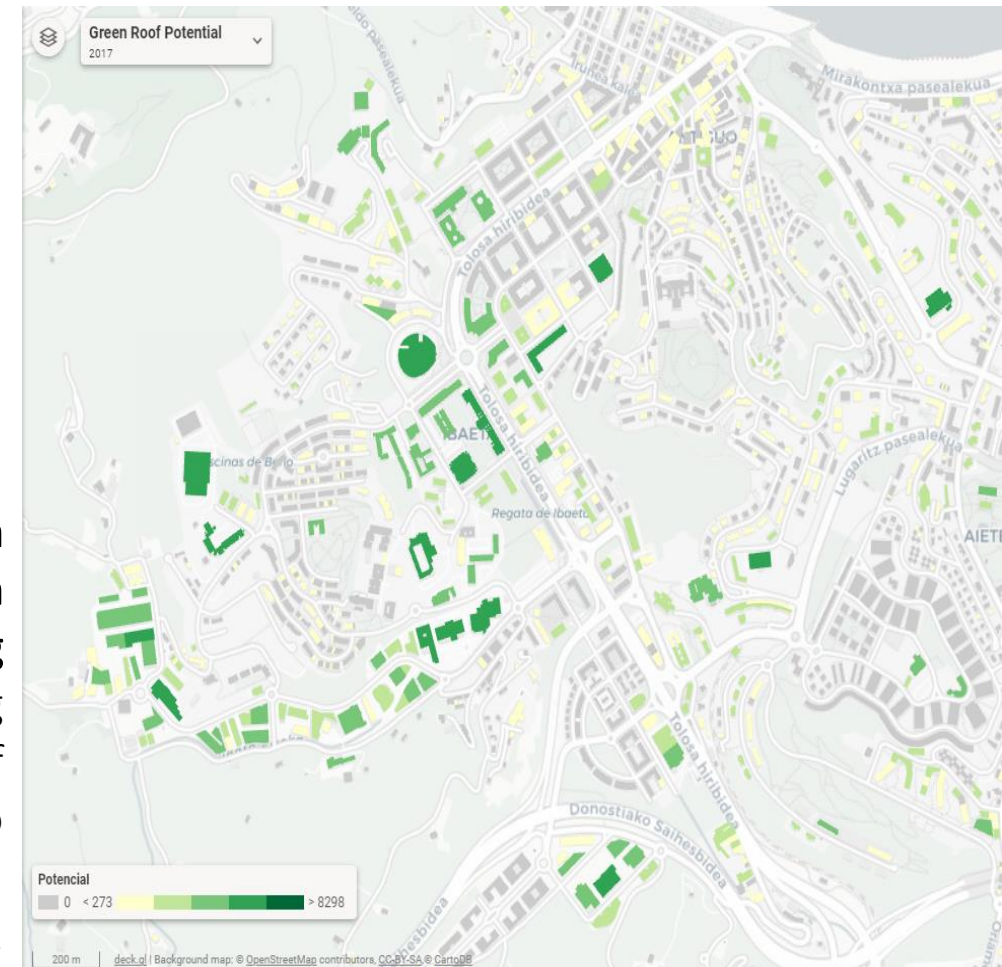
Heat Storage



Monitoring heat stored during the day and emitted to the air during the night.

Already existing green roofs and areas with high roof retrofitting potential by quantifying potential green roof installation according to specific installation conditions.

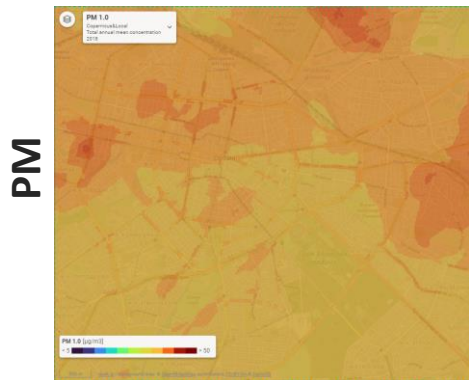
Green Roof Potential





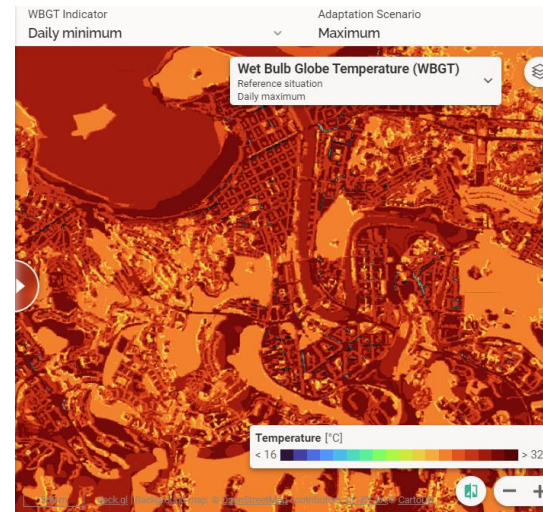
Results: Air Quality, Thermal Comfort, Health

Air Quality



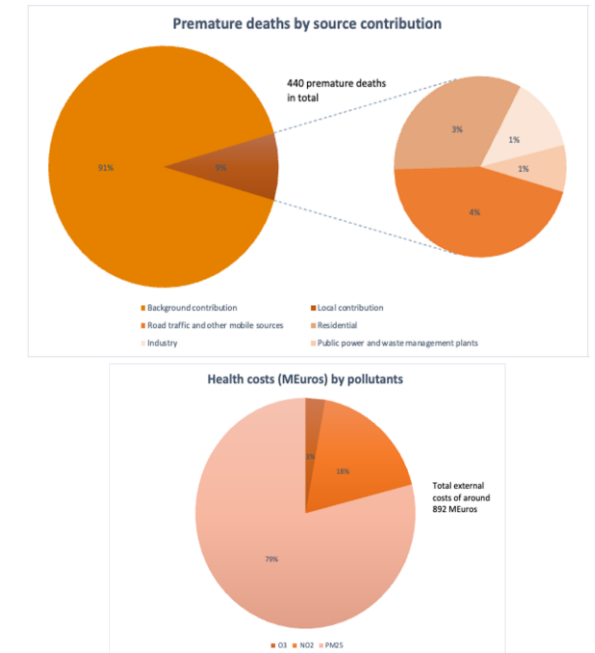
Street-level air pollution maps and data, providing info on pollution hotspots in the city center and the most important local sources for the **air pollution** for NO₂ and PM, allowing stakeholders to develop adequate air quality plans to reduce pollution.

Thermal Comfort



Indication on **human thermal comfort** by analyzing air temperature, radiation load, humidity and wind speed data.

Socio-economic Aspects



Health effects and costs of exposure to air pollution, using the **Economic Valuation of Air pollution (EVA)** model.



Main Outcomes

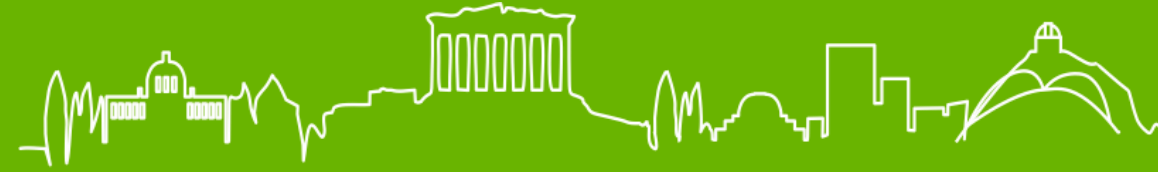
- 🌐 **Online platform** for combining CCS to support urban resilience.
- 🌐 **Uniform data** for large samples of urban areas across Europe.
- 🌐 **Consistent measurements** across European cities, including synergies between Copernicus core products and third-party data.
- 🌐 **Different approaches and models** for better information on **urban form** and **function** at different spatial and temporal scales.
- 🌐 **Assimilation of users' knowledge** with technical data and benchmarking.





Conclusions

- 🌐 Cities need data, models, simulation tools to make the right decision vis a vis investments into climate adaptation and mitigation; **these investments are huge and urgent.**
- 🌐 Providing **cross-cutting European data sets that can be tailored for local urban decision making** makes good economic, environmental, social and strategic sense.
- 🌐 CURE applications are optimized and automatized into scalable **pre-operational services.**
- 🌐 The CURE application portfolio is not an ultimate solution, but **robust information contribution** to the crucial aspects of city solutions support.
- 🌐 The overall CURE concept is **extendable** to additional apps to cover even more services, to find even more synergies.



Link with Horizon Europe Missions

AP	Cross-cutting applications	Berlin	Copenhagen	Sofia	Heraklion	Bristol	Ostrava	Basel	Munich	San Sebastian	Vitoria-Gasteiz
01	Local Scale Surface Temperature Dynamics (FORTH)	•	•	•	•	•	•	•	•	•	•
02	Surface Urban Heat Island Assessment (DLR)	•	•	•	•	•	•	•	•	•	•
03	Urban Heat Emissions Monitoring (UNIBAS)				•			•			
04	Urban CO ₂ Emissions Monitoring (UNIBAS)				•			•			
05	Urban Flood Risk (GISAT)				•		•				
06	Urban Subsidence, Movements and Deformation Risk (GISAT)				•		•				
07	Urban Air Quality (VITO)			•		•	•				
08	Urban Thermal Comfort (VITO)		•	•			•			•	
09	Urban Heat Storage Monitoring (FORTH)				•			•			
10	Nature Based Solutions (TECNALIA)			•						•	
11	Health Impacts (socioeconomic perspective) (CWare)		•	•		•					



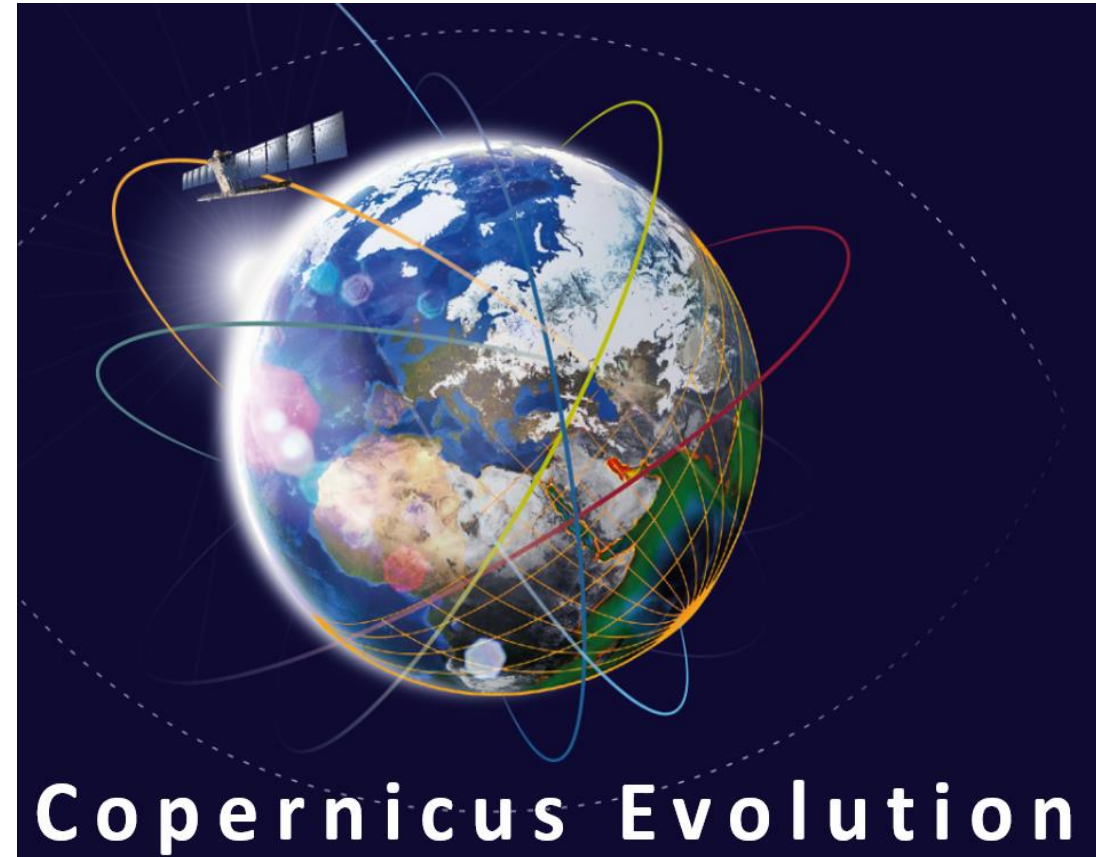


The Vision

Become a focused **evidence-based toolkit** for assisting current and future policy making in the field.

- 🌐 **Short term**: integrating specific CURE products into the Copernicus Operational Service Portfolio
- 🌐 **Long term**: developing a **Copernicus Urban Service**

<http://cure-copernicus.eu>





JURSE 2023

Heraklion - Crete

17 - 19 May 2023

<http://jurse2023.org/>



Thank you for your attention



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