Proceedings of the Second European Workshop

“Urban Heat Island and Heat Resilience: Networking for Future Strategy”

14 October 2020

The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

Introduction

LIFE ASTI Second European Workshop *"Urban Heat Island and Heat Resilience: Networking for Future Strategy"* was hosted online on 14th October 2020, due to COVID-19 restrictions.

The Workshop aimed to bring LIFE ASTI's network together, exchange knowledge and expertise, and continue to build-up constructive synergies. In addition, the Workshop was relevant with the replicability, transferability and integration perspectives of technologies, tools and good practices developed within LIFE ASTI and other related projects.

More than 170 participants from 10 countries, representing Universities, research centers, stakeholders and policy-making authorities, attended the three Sessions that composed the Workshop.

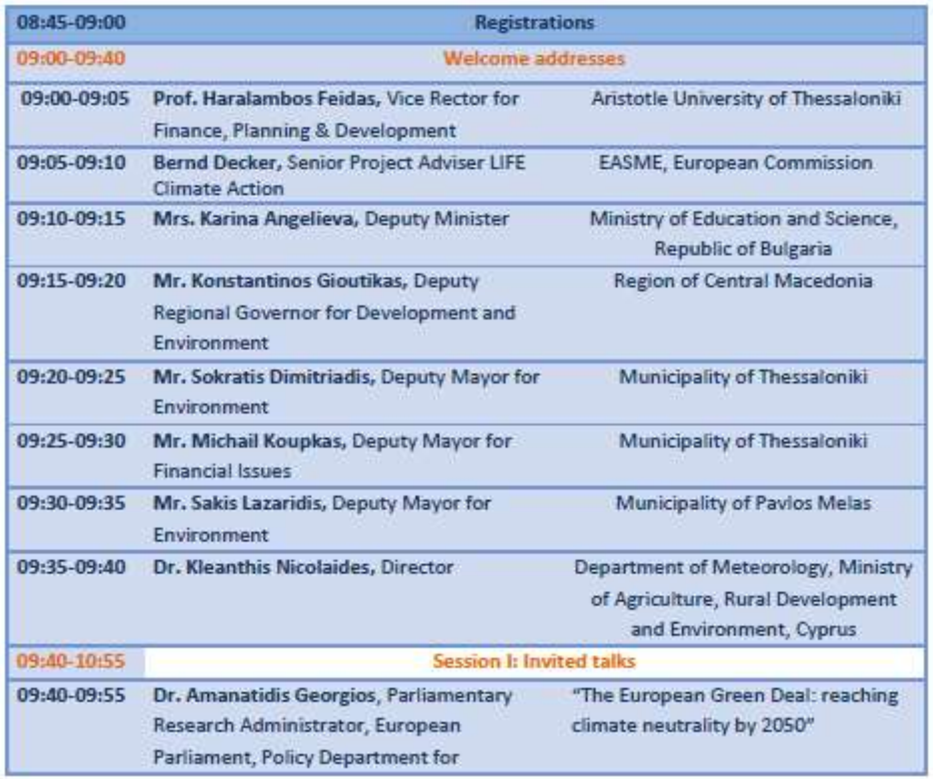
After brief addresses from local, regional and national authorities, Session I of Invited talks followed, with dedicated presentations from invited speakers.

Session II was devoted to LIFE ASTI project, with special focus on how to achieve weather-ready communities. Session III included presentations from LIFE projects that belong to LIFE ASTI network and the networking among them was favored.

Overall, the Second European Workshop brought stakeholders and LIFE projects together and the necessity of such collaboration was highlighted, in order to provide services that improve living conditions in modern cities.

LIFE ASTI organizing committee

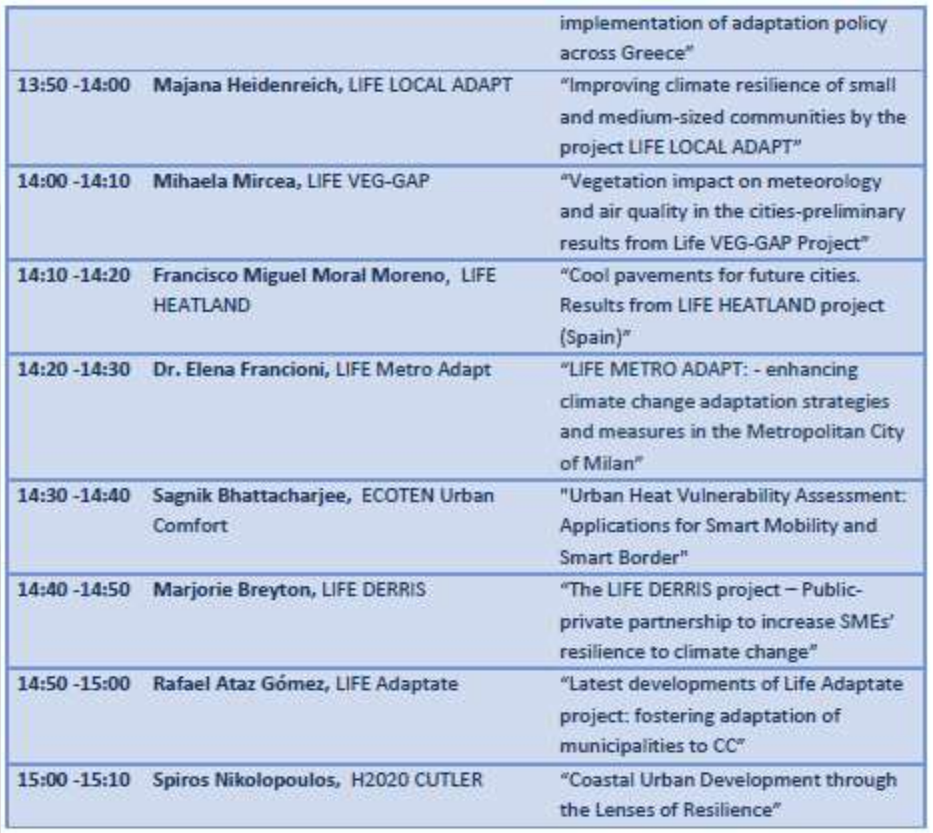
2nd EW agenda



08:45-09:00	**Registrations**	
09:00-09:40	Welcome addresses	
09:00-09:05	**Prof. Haralambos Feidas,** Vice Rector for Finance, Planning & Development	Aristotle University of Thessaloniki
09:05-09:10	**Bernd Decker,** Senior Project Adviser LIFE Climate Action	EASME, European Commission
09:10-09:15	**Mrs. Karina Angelieva,** Deputy Minister	Ministry of Education and Science, Republic of Bulgaria
09:15-09:20	**Mr. Konstantinos Gioutikas,** Deputy Regional Governor for Development and Environment	Region of Central Macedonia
09:20-09:25	**Mr. Sokratis Dimitriadis,** Deputy Mayor for Environment	Municipality of Thessaloniki
09:25-09:30	**Mr. Michail Koupkas,** Deputy Mayor for Financial Issues	Municipality of Thessaloniki
09:30-09:35	**Mr. Sakis Lazaridis,** Deputy Mayor for Environment	Municipality of Pavlos Melas
09:35-09:40	**Dr. Kleanthis Nicolaides,** Director	Department of Meteorology, Ministry of Agriculture, Rural Development and Environment, Cyprus
09:40-10:55	Session I: Invited talks	
09:40-09:55	**Dr. Amanatidis Georgios,** Parliamentary Research Administrator, European Parliament, Policy Department for	"The European Green Deal: reaching climate neutrality by 2050"

	Economic, Scientific and Quality of Life Policies	
09:55-10:10	**Dr. Tomáš Halenka,** Charles University, Faculty of Mathematics and Physics, Department of Atmospheric Physics	"Urbanization of Weather Forecast, Air-Quality Prediction and Climate Scenarios - Project URBI PRAGENSI"
10:10-10:25	**Prof. Nikos Mihalopoulos,** Institute for Environmental Research and Sustainable Development of National Observatory of Athens	"CLIMPACT: The Greek Initiative for studying the Climate change and its impacts"
10:25-10:40	**Prof. Kostadin Ganev,** National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences	"Numerical simulations of the summer bio climatic indices for the city of Sofia"
10:40-10:55	**Dr. Panos Hadjinicolaou,** Climate and Atmosphere Research Centre, Cyprus Institute	"Heat extremes in the eastern Mediterranean and the Middle East"
10:55-11:25	**Break**	
11:25-12:40	Session II: The LIFE ASTI project/ Making community weather-ready	
11:25-11:40	**Prof. Dimitris Melas,** Aristotle University of Thessaloniki	"LIFE ASTI general presentation"
11:40-11:55	**Dr. Giampietro Casasanta,** Institute of Atmospheric Sciences and Climate, National Research Center	"A citizen science network to make cities weather ready"
11:55-12:10	**Serafeim Kontos,** Aristotle University of hessaloniki	"Modeling the Urban Heat Island effect: Operational UHI forecasting system"
12:10-12:25	**Dr. Panos Symeonidis,** Geospatial Enabling Technologies	"Monitoring the Urban Heat Island effect with the LIFE ASTI application platform "
12:25-12:40	**Dr. Francesca de'Donato,** Department of Epidemiology of the Regional Health Service – Lazio	"Heat health warning systems in Rome and Thessaloniki"
12:40–13:40	**Break**	
13:40 -15:10	Session III: Other LIFE projects, Networking with partners	
13:40 -13:50	**Aggelos Sotiropoulos,** LIFE-IP AdaptInGR	" LIFE-IP AdaptInGR - Boosting the

2nd EW agenda



		implementation of adaptation policy across Greece"
13:50 -14:00	**Majana Heidenreich,** LIFE LOCAL ADAPT	"Improving climate resilience of small and medium-sized communities by the project LIFE LOCAL ADAPT"
14:00 -14:10	**Mihaela Mircea,** LIFE VEG-GAP	"Vegetation impact on meteorology and air quality in the cities-preliminary results from Life VEG-GAP Project"
14:10 -14:20	**Francisco Miguel Moral Moreno,** LIFE HEATLAND	"Cool pavements for future cities. Results from LIFE HEATLAND project (Spain)"
14:20 -14:30	**Dr. Elena Francioni,** LIFE Metro Adapt	"LIFE METRO ADAPT: - enhancing climate change adaptation strategies and measures in the Metropolitan City of Milan"
14:30 -14:40	**Sagnik Bhattacharjee,** ECOTEN Urban Comfort	"Urban Heat Vulnerability Assessment: Applications for Smart Mobility and Smart Border"
14:40 -14:50	**Marjorie Breyton,** LIFE DERRIS	"The LIFE DERRIS project – Public-private partnership to increase SMEs' resilience to climate change"
14:50 -15:00	**Rafael Ataz Gómez,** LIFE Adaptate	"Latest developments of Life Adaptate project: fostering adaptation of municipalities to CC"
15:00 -15:10	**Spiros Nikolopoulos,** H2020 CUTLER	"Coastal Urban Development through the Lenses of Resilience"

Session I: Invited talks

- **The European Green Deal: reaching climate neutrality by 2050.**

Dr. Amanatidis Georgios, Parliamentary Research Administrator, European Parliament, Policy Department for Economic, Scientific and Quality of Life Policies

- **Urbanization of Weather Forecast, Air-Quality Prediction and Climate Scenarios - Project URBI PRAGENSI**

Dr. Tomáš Halenka, Charles University, Faculty of Mathematics and Physics, Department of Atmospheric Physics

- **CLIMPACT: The Greek Initiative for studying the Climate change and its impacts**

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- **Numerical simulations of the summer bio climatic indices for the city of Sofia**

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- **Heat extremes in the eastern Mediterranean and the Middle East**

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The **European Green Deal:**
Reaching climate neutrality by 2050

Transforming the EU’s economy for a sustainable future

Designing a set of deeply transformative policies

Mainstreaming sustainability in all EU policies

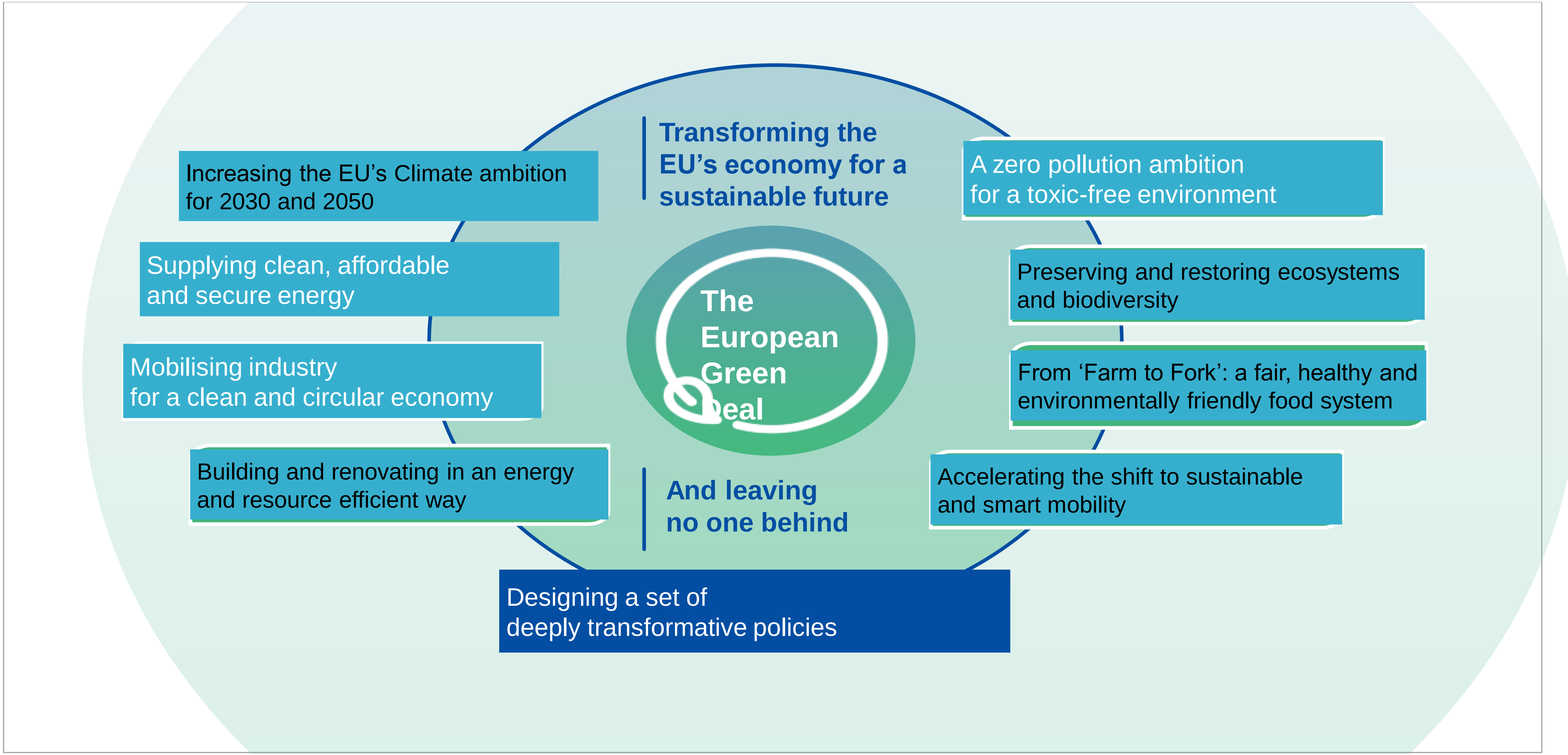
The European Green Deal

And leaving no one behind

Financing the transition

Leave no one behind (Just Transition)

The **European Green Deal:**
Reaching climate neutrality by 2050



Transforming the EU's economy for a sustainable future

The European Green Deal

And leaving no one behind

Increasing the EU's Climate ambition for 2030 and 2050

Supplying clean, affordable and secure energy

Mobilising industry for a clean and circular economy

Building and renovating in an energy and resource efficient way

A zero pollution ambition for a toxic-free environment

Preserving and restoring ecosystems and biodiversity

From 'Farm to Fork': a fair, healthy and environmentally friendly food system

Accelerating the shift to sustainable and smart mobility

Designing a set of deeply transformative policies

The European Green Deal: Reaching climate neutrality by 2050

Increasing the EU's Climate ambition for 2030 and 2050

- European '**Climate Law'** enshrining the 2050 climate neutrality objective in legislation – 4 March 2020
- Stepping up Europe's 2030 climate ambition: increase the **EU's climate target for 2030 to at least 55%** compared to 1990 – 17 September 2020
- Review and revise where needed all **relevant legislative measures to deliver on this increased ambition** by June 2021
- Proposal for a **revision of the Energy Taxation Directive** by June 2021
- **Carbon border adjustment mechanism** for selected sectors by 2021
- A new EU **Strategy on Adaptation** in 2021

Designing a set of
deeply transformative policies

The **European Green Deal:**
Reaching climate neutrality by 2050

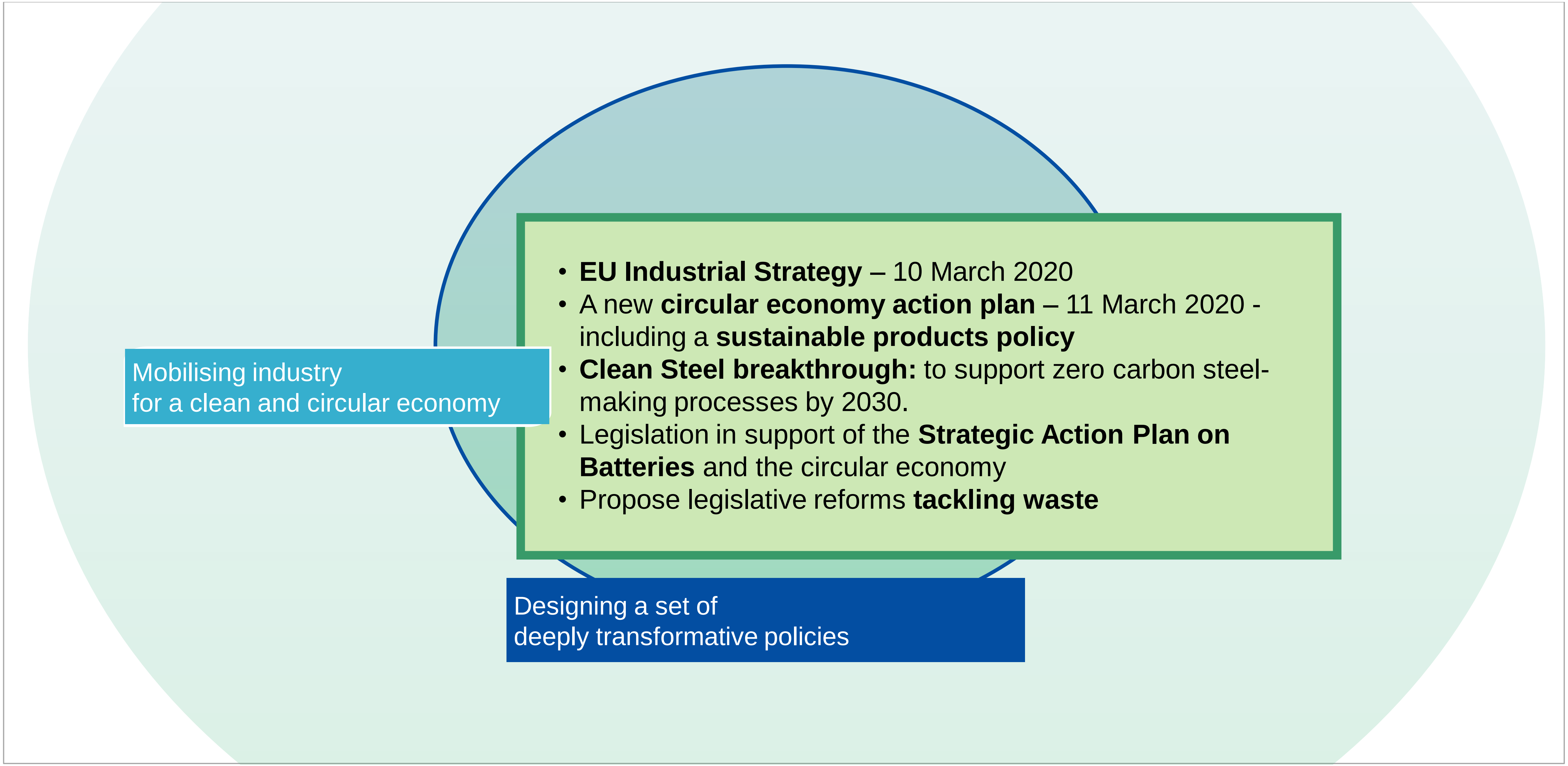
Supplying clean, affordable and secure energy

Building and renovating in an energy and resource efficient way

- Assess the ambition of the final **National Energy and Climate Plans**
- Strategy for **smart sector integration**
- **Renovation wave** for the building sector - doubling the renovation rate
- Review and revise where needed the **Renewable Energy and Energy Efficiency Directive** by June 2021
- **Offshore wind** initiative
- Review the **TEN-E Regulation** for trans-European energy infrastructure

Designing a set of deeply transformative policies

The **European Green Deal:**
Reaching climate neutrality by 2050



Mobilising industry
for a clean and circular economy

- **EU Industrial Strategy** – 10 March 2020
- A new **circular economy action plan** – 11 March 2020 - including a **sustainable products policy**
- **Clean Steel breakthrough:** to support zero carbon steel-making processes by 2030.
- Legislation in support of the **Strategic Action Plan on Batteries** and the circular economy
- Propose legislative reforms **tackling waste**

Designing a set of
deeply transformative policies

The **European Green Deal:**
Reaching climate neutrality by 2050

- Strategy for **sustainable and smart mobility**
- Revise the **CO2 emissions performance legislation** for light duty vehicles by June 2021
- **Extend EU emissions trading** to the maritime sector, and to reduce free allowances for airlines
- Support **public charging points: 1 million by 2025**
- Boost the production and supply of **sustainable alternative fuels** for the different transport modes
- Review the **Alternative Fuels Infrastructure Directive** and the TEN-T Regulation in 2021
- More **stringent air pollutant emissions standards** for combustio engine vehicles

Accelerating the shift to sustainable and smart mobility

deeply transformative policies

The **European Green Deal:** Reaching climate neutrality by 2050

- **Farm to Fork Strategy** – 20 May 2020
- Measures, including legislative, to significantly **reduce** the use of **chemical pesticides, fertilizers and antibiotics**
- Examination of the **draft national strategic plans**, to meet the ambitions of the European Green Deal and the Farm to Fork Strategy

From ‘Farm to Fork’: a fair, healthy and environmentally friendly food system

Designing a set of
deeply transformative policies

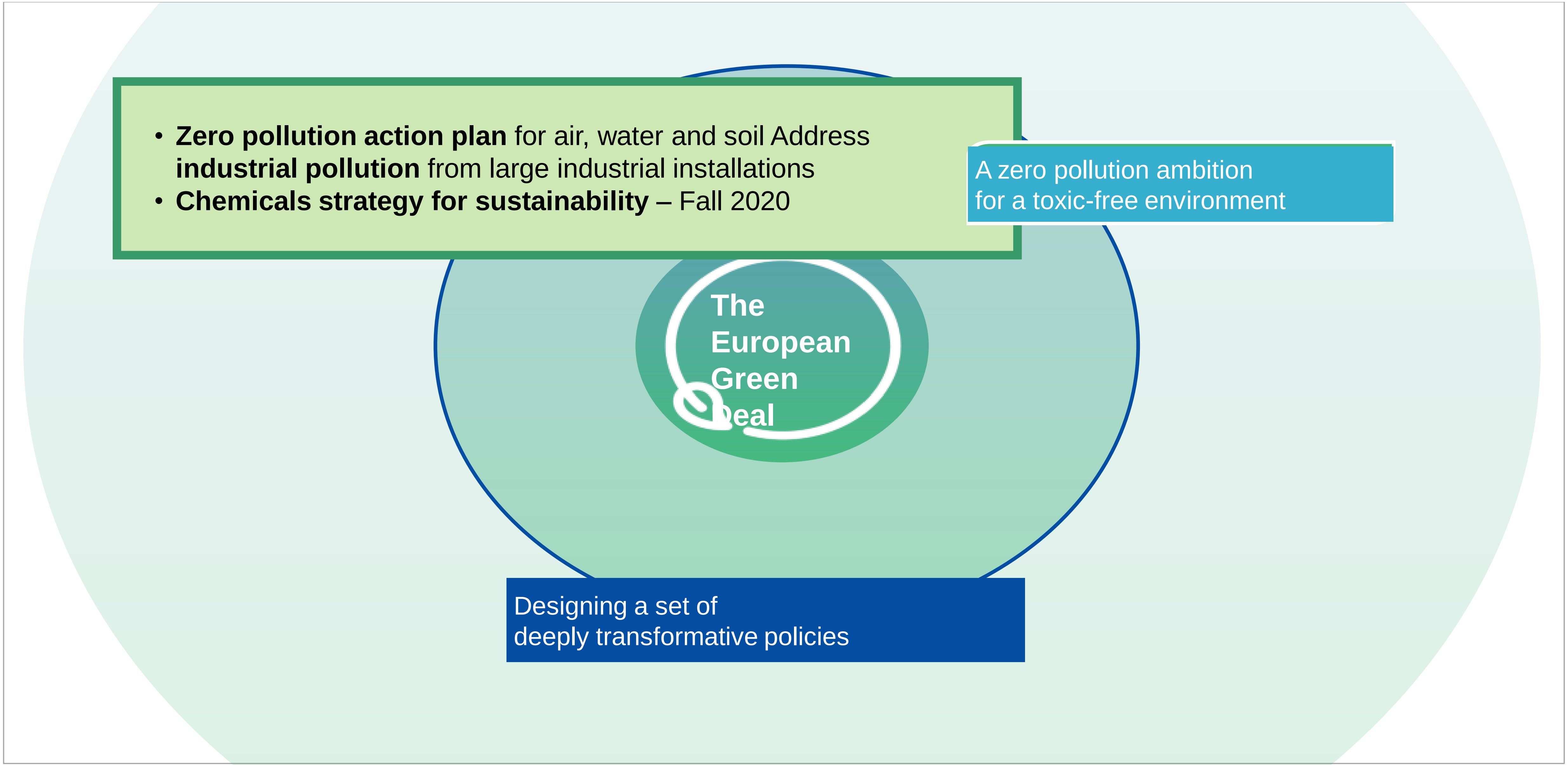
The European Green Deal:
Reaching climate neutrality by 2050

- **EU Biodiversity Strategy** for 2030 – 20 May 2020
- Follow up with concrete measures in 2021 to **address the main drivers of biodiversity loss**
- A new **EU Forest Strategy**
- Measures to support **deforestation-free value chains** from 2020

Preserving and restoring ecosystems and biodiversity

Designing a set of
deeply transformative policies

The European Green Deal:
Reaching climate neutrality by 2050



- **Zero pollution action plan** for air, water and soil Address **industrial pollution** from large industrial installations
- **Chemicals strategy for sustainability** – Fall 2020

A zero pollution ambition
for a toxic-free environment

The European Green Deal

Designing a set of
deeply transformative policies

The European Green Deal:
Reaching climate neutrality by 2050

Pursuing
green finance and investment
and ensuring a just transition

- Meeting the **additional investment needs**
- **Sustainable Europe Investment Plan** and a **Just Transition Fund –** 27 May 2020
- **Climate mainstreaming target** across all EU programmes within Next Generation EU and revised MFF 2021-2027
- Proposed **new revenue streams** (“Own resources”)
- Mobilisation of **InvestEU** in support of the Green Deal objectives
- Work with the **EIB group** and other financial institutions
- **Taxonomy,** the regulation on the establishment of a framework to facilitate sustainable investment

no one behind

Mainstreaming sustainability in all EU policies

Financing the transition

Leave no one behind
(Just Transition)

The European Green Deal:
Reaching climate neutrality by 2050

Transforming the
EU’s economy for a

Mobilising research and
Fostering innovation

- **Horizon Europe: at least 35% funding** for climate-friendly solutions
- Four “**Green Deal missions**” (related to climate change, oceans, cities and soil)
- **Partnerships** with industry and Member States
- Role of **European Institute of Innovation and Technology**
- Role of **European Innovation Council**
- **Data and digital infrastructure** in support of ecological transition

Mainstreaming sustainability in all EU policies

Financing the transition

Leave no one behind
(Just Transition)

The **European Green Deal:** Reaching climate neutrality by 2050

Transforming the EU's economy for a sustainable future

Activating education and training

- **European Competence Framework**
- EU networks of **teacher-training programme**
- Leveraging **€3 billion** for investment in **schoo infrastructure**
- Pro-active **re-skilling and up-skilling** through the proposed European Social Fund+

And leaving no one behind

Mainstreaming sustainability in all EU policies

Financing the transition

Leave no one behind
(Just Transition)

The **European Green Deal:** Reaching climate neutrality by 2050

Transforming the EU's economy for a sustainable future

- **Align all new Commission initiatives** with European Green Deal objectives
- Use of **better regulation tools**
- **Invitation of stakeholders** to use available platforms to **simplify legislation and identify problematic cases**
- **Improve better regulation guidelines** and supporting tools to **address sustainability** and innovation issues

A green oath: 'do no harm'

Mainstreaming sustainability in all EU policies

Financing the transition

Leave no one behind (Just Transition)

The **European Green Deal:**
Reaching climate neutrality by 2050

- EU to continue to **lead the international climate and biodiversity negotiations,** further strengthening the international policy framework
- Strengthen the EU's **Green Deal Diplomacy** in cooperation with Member States
- Proposal to make the **respect of the Paris Agreement an essential element** for all future comprehensive trade agreements

EU as a global leader

The European Green Deal:
Reaching climate neutrality by 2050

Thank you for your attention!

Dr. Georgios Amanatidis
Parliamentary Research Administrator

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V Holešovičkách 2, Prague
Czech Republic

URBANIZATION OF WEATHER FORECAST, AIR-QUALITY PREDICTION AND CLIMATE SCENARIOS

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PROJECT URBI PRAGENSI

Tomáš Halenka, and URBI PRAGENSI team (CUNI, ICS, CHMI)

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Motivation

World:

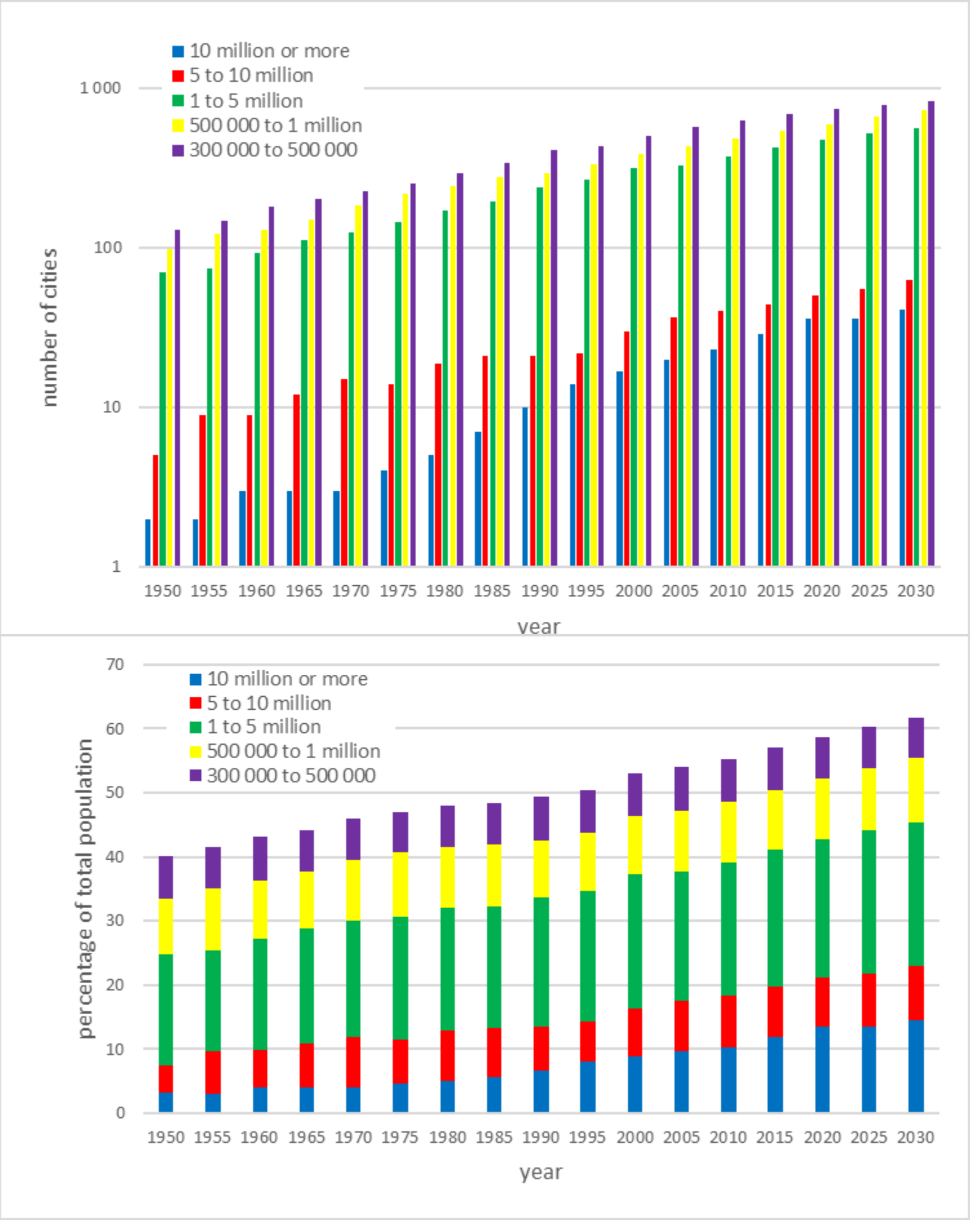
- From 2009 - more than 50% of the world's population living in cities (UN, 2009)
- Adaptation committee UN FCCC – $1.8 trillion investment in 2020-2030 benefit of $7.1 trillion, cities one of critical issues

Europe:

- 2008 - 73% of the population in cities
- mid 21th century - 84%, representing a rise from 531 to 582 millions (UN, 2008)
- in the Czech Republic, a similar change from 73.5% to 83% is projected by the Czech Statistical Office.

Clearly:

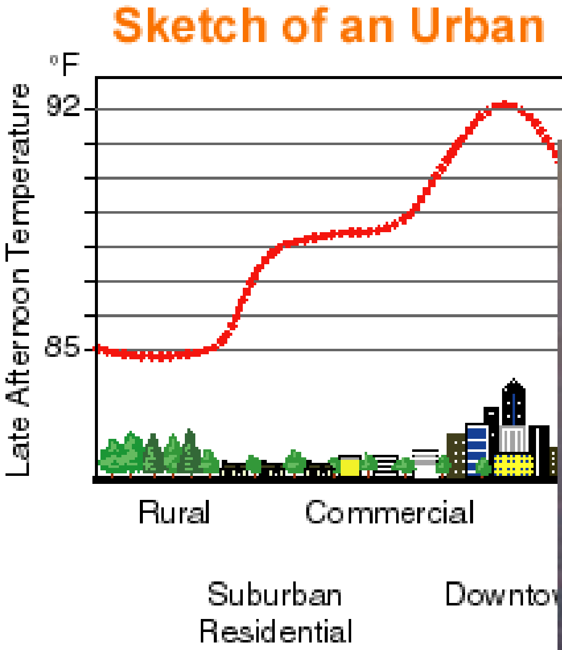
- Quite many atmospheric effects on population through the urban environment
- Especially thermal extreme weather effects like heat wave and air-quality threshold exeedances



Recent challenges in modeling of urban heat island ☆ Sustainable Cities and Society, Volume 19, 2015, 200–206

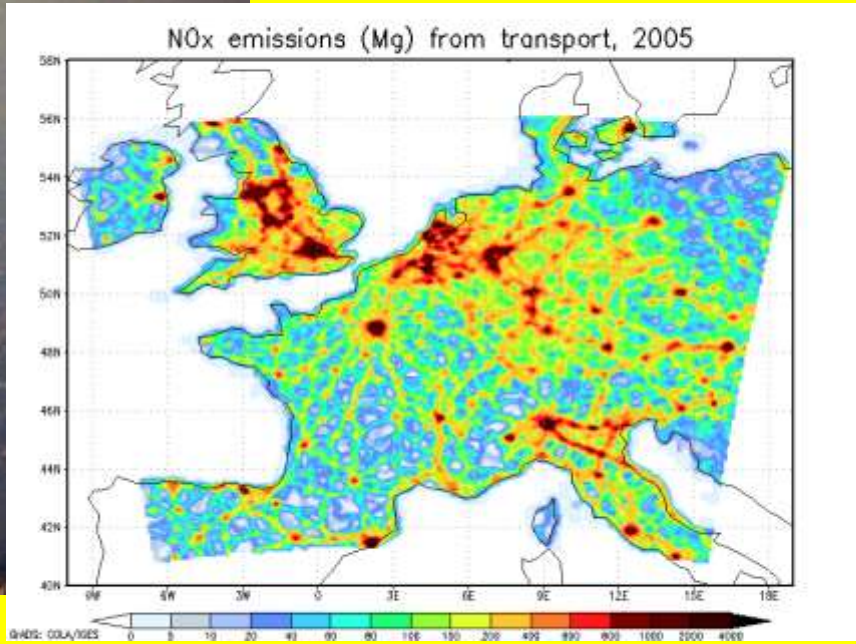
http://dx.doi.org/10.1016/j.scs.2015.04.001

What we are talking about …



Solecki et al ., 2004

Los Angeles smog and California climate
change policy



MEGAPOLI TNO NOx emissions [Mg], 2005 from transport (S7)

UHI Project - Development and Application of Mitigation and Adaptation Strategies and Measures for Counteracting the Global Urban Heat Island Phenomenon

- Within framework of EC Operation Programme Central Europe (3CE292P3)
- 18 partners, coordinated by ARPA, Italy (Paolo Lauriola)

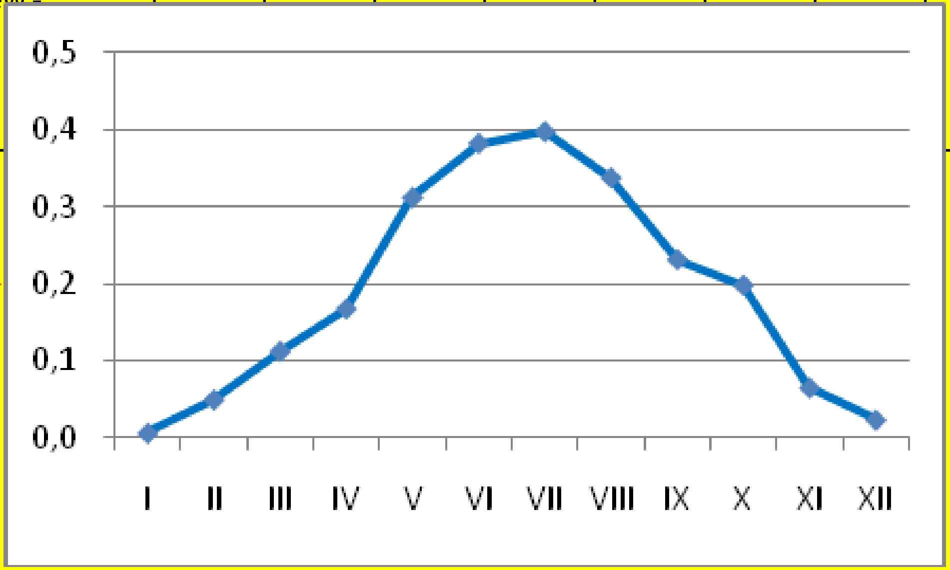
8 of the most relevant metropolitan areas and Metropolitan European Growth Areas (MEGAs) of CE area

CENTRAL EUROPE
COOPERATING FOR SUCCESS.

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

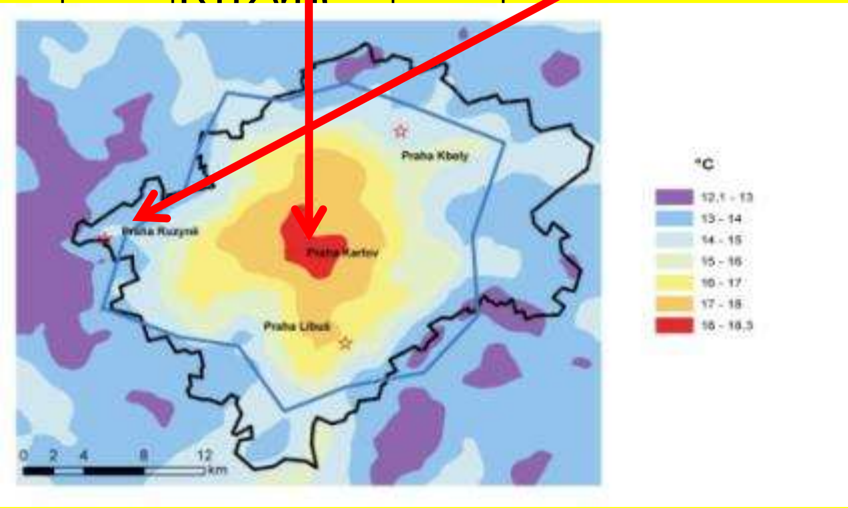
Prague heat island

period	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	YEAR
1961-2009	2,2	2,3	2,2	2,2	2,2	2,4	2,3	2,2	2,0	2,0	2,2	2,2	2,2
1961-1990	2,2	2,3	2,2	2,1	2,1	2,2	2,2	2,0	1,9	2,0	2,2	2,2	2,1
1991-2009	2,2	2,3	2,3	2,3	2,4	2,6	2,6	2,4	2,1	2,2	2,2	2,2	2,3
Difference new - standard								0,34	0,23	0,20	0,07	0,02	0,19



Pretel (2010)

Klementinum vs. Ruzyne

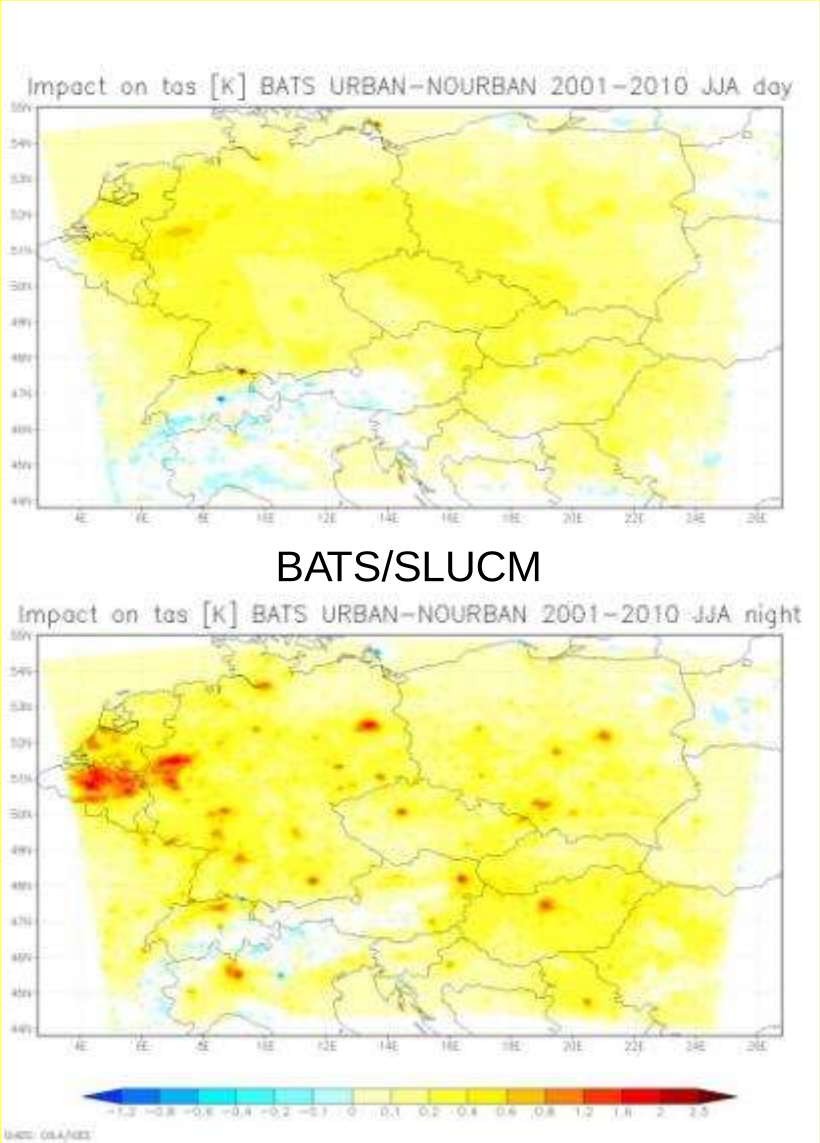


Near surface temperature RegCM4

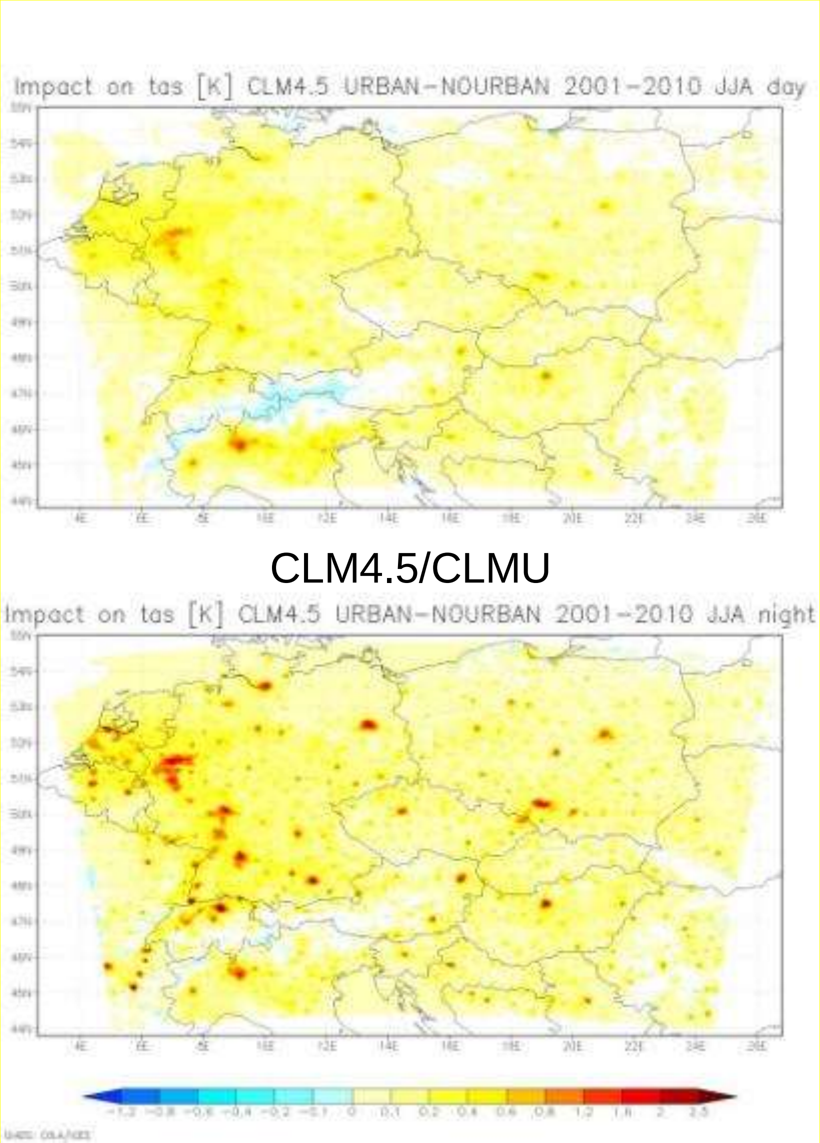
summer

day

night



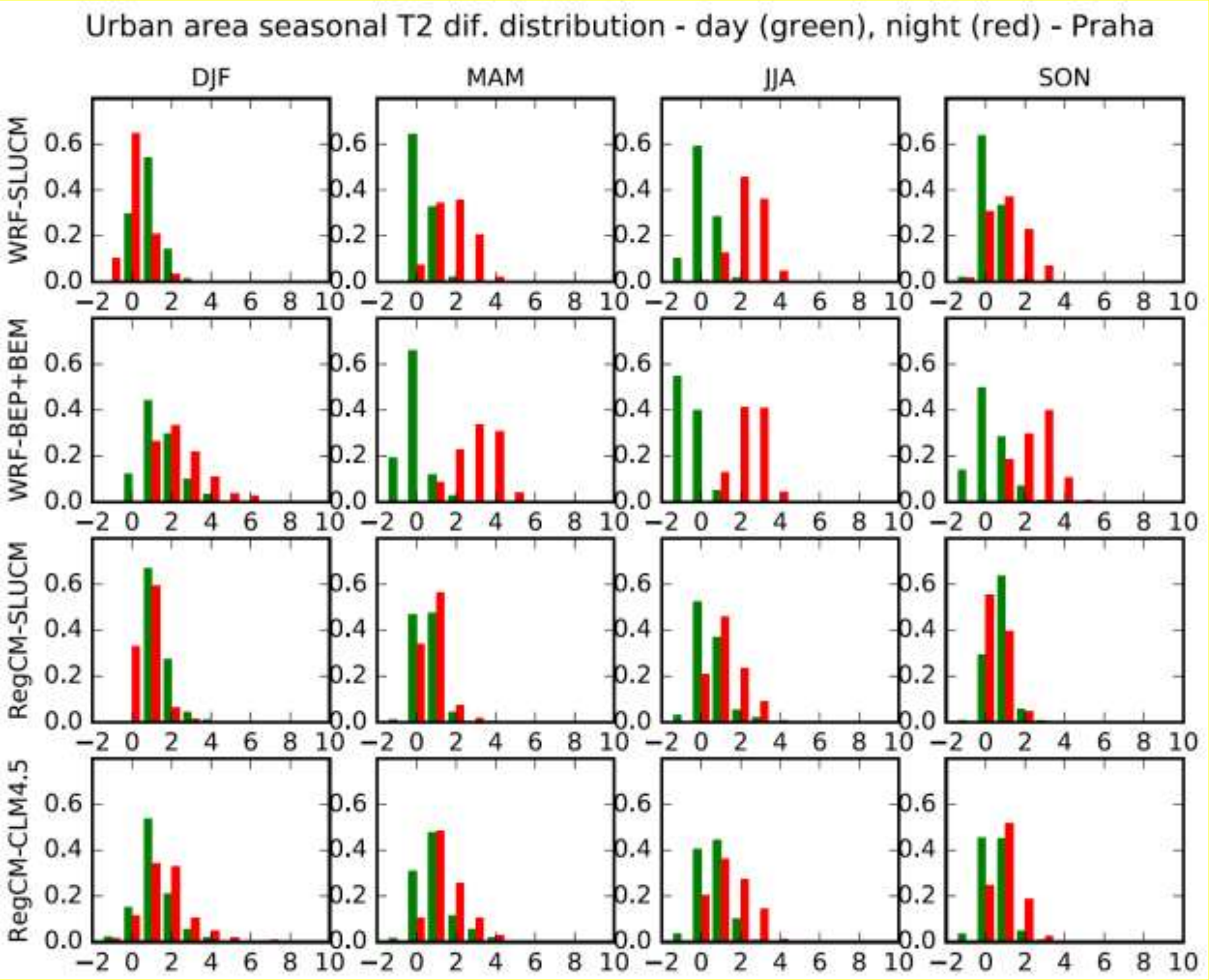
BATS/SLUCM

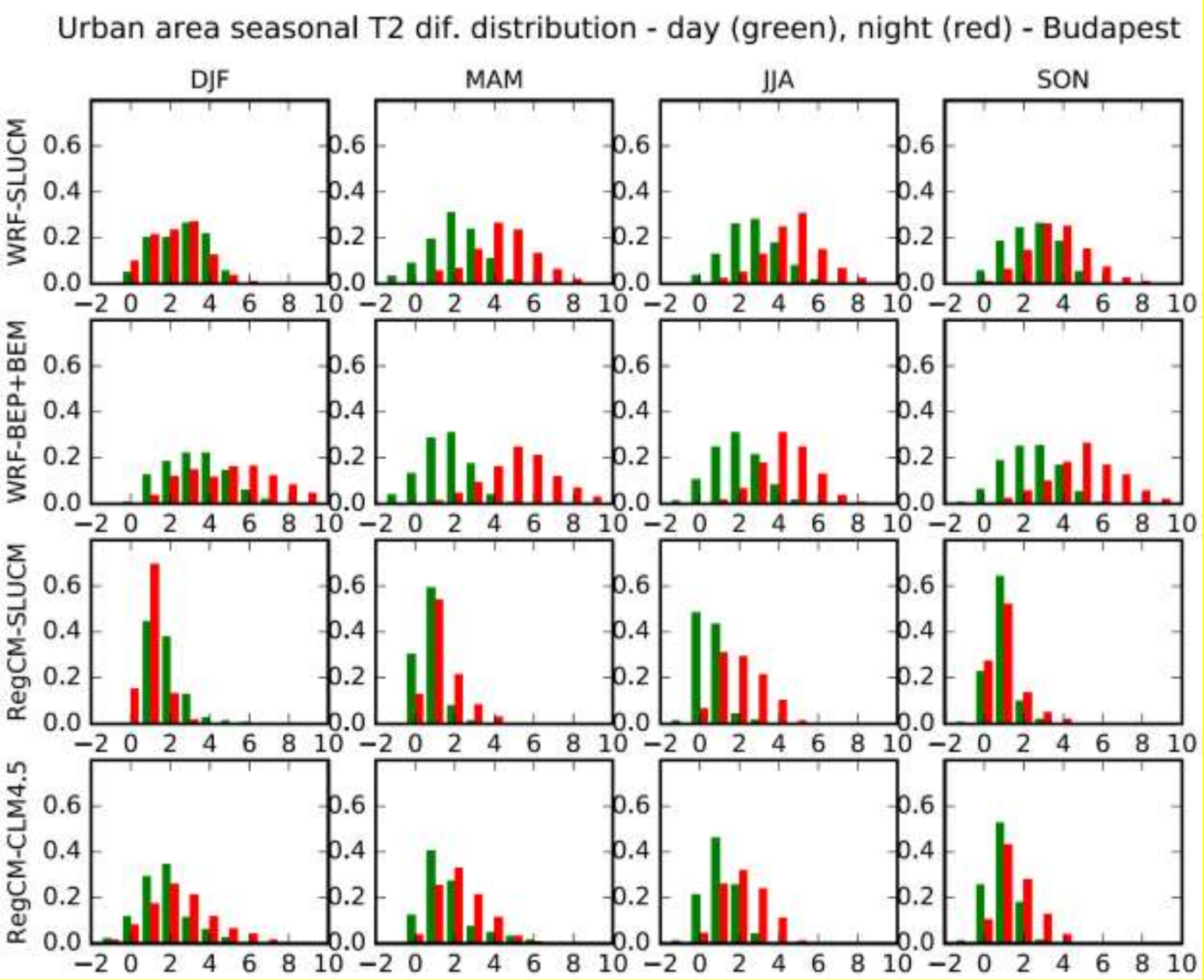


CLM4.5/CLMU

Huszar et al. (ACP,

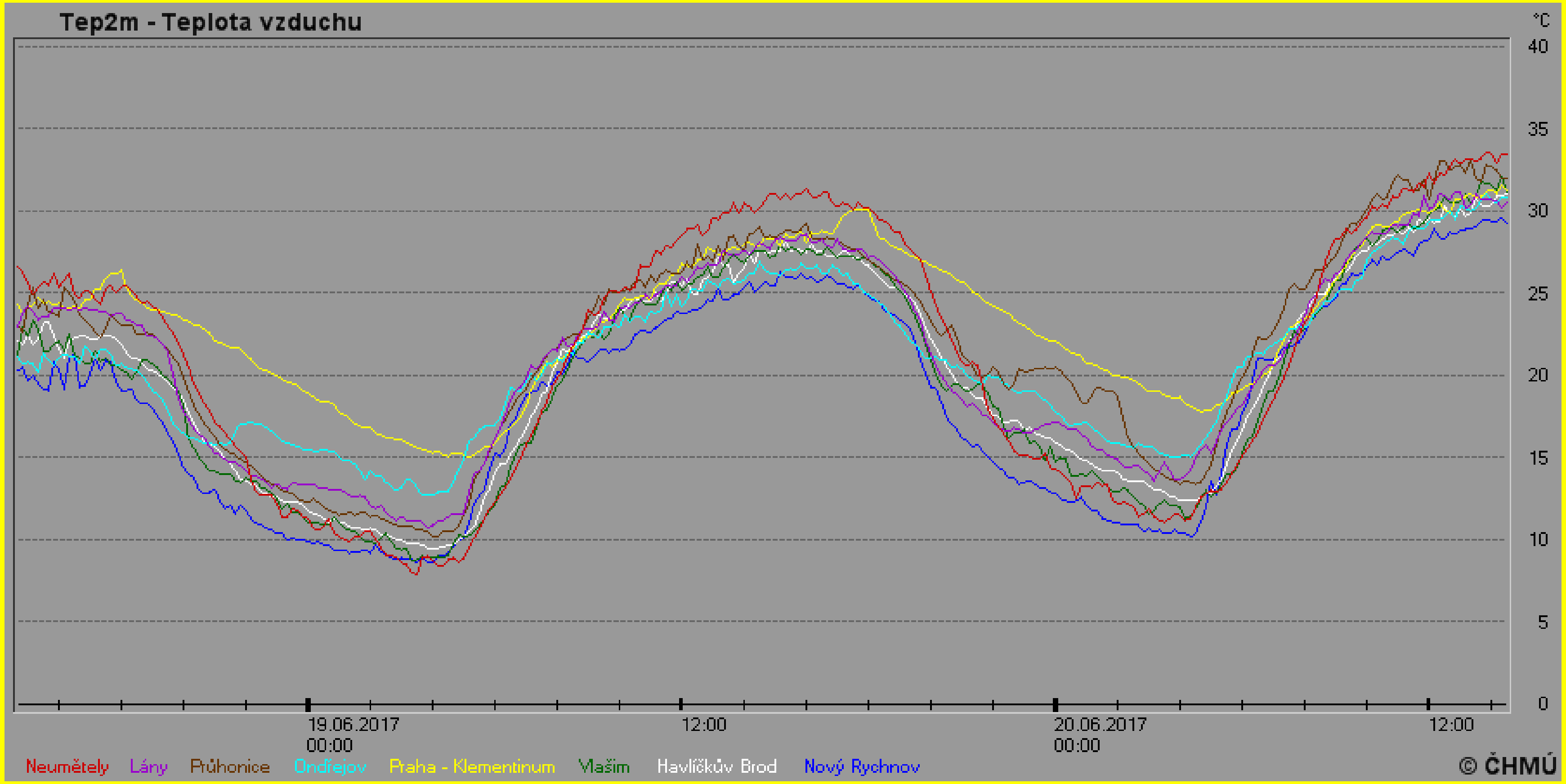
UHI intensity for Prague and Budapest (day vs. night)





Karlicky et al. (ACP, 2018), you can see our poster here as well (Halenka et al., A21L-2878, this morning)

Example June 18-21, 2017



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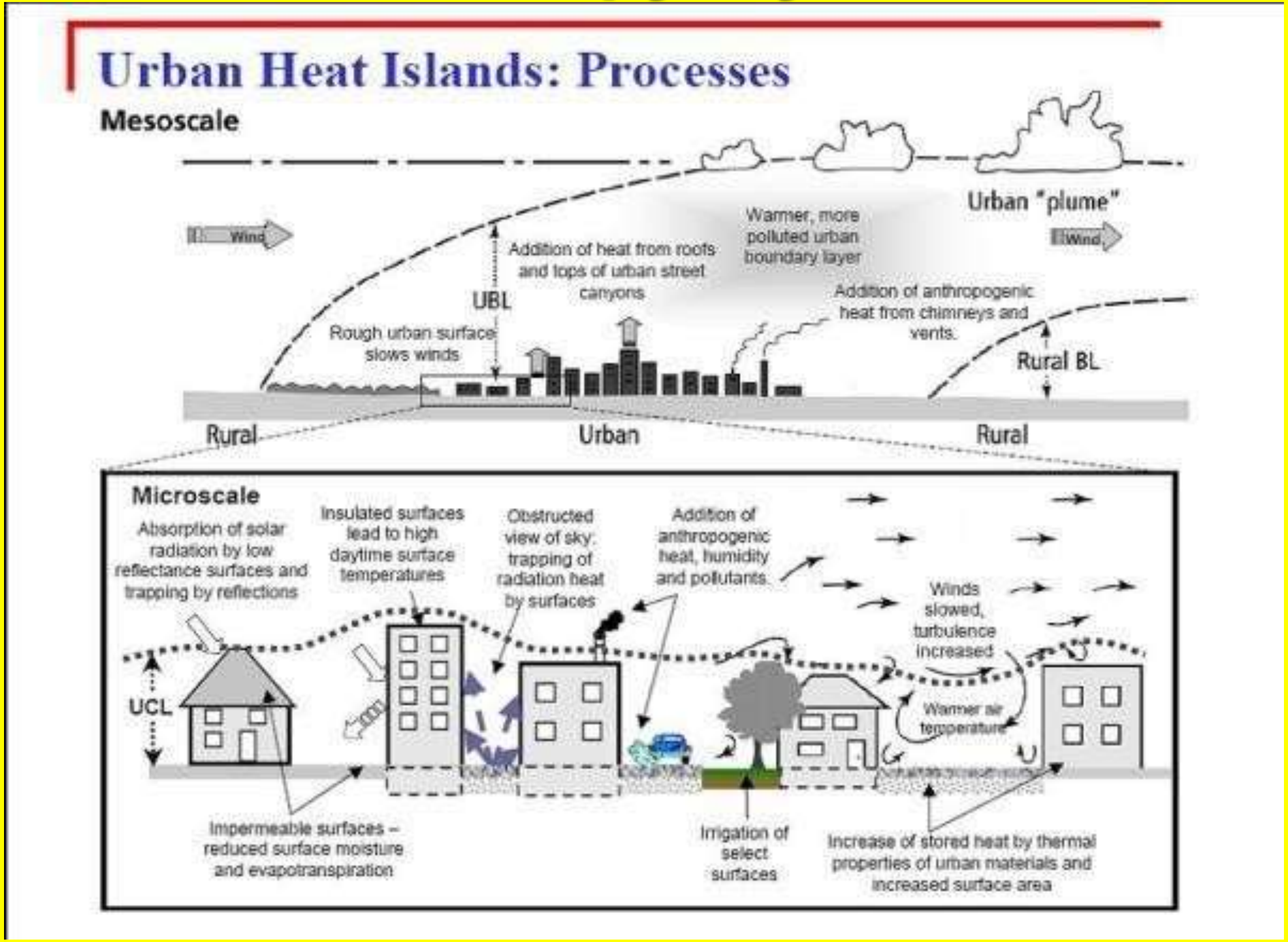
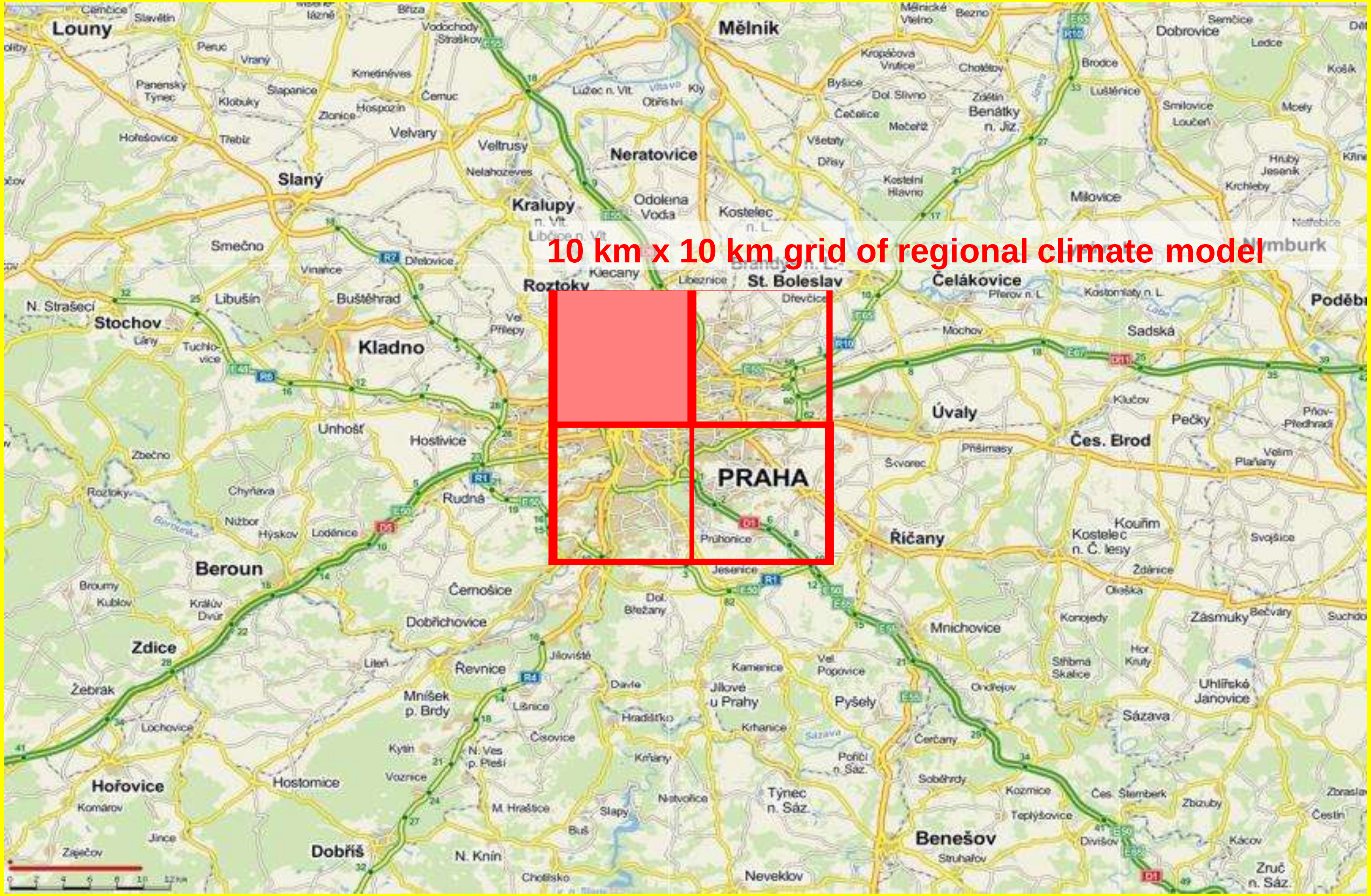
Atmospheric processes in urban canopy layer

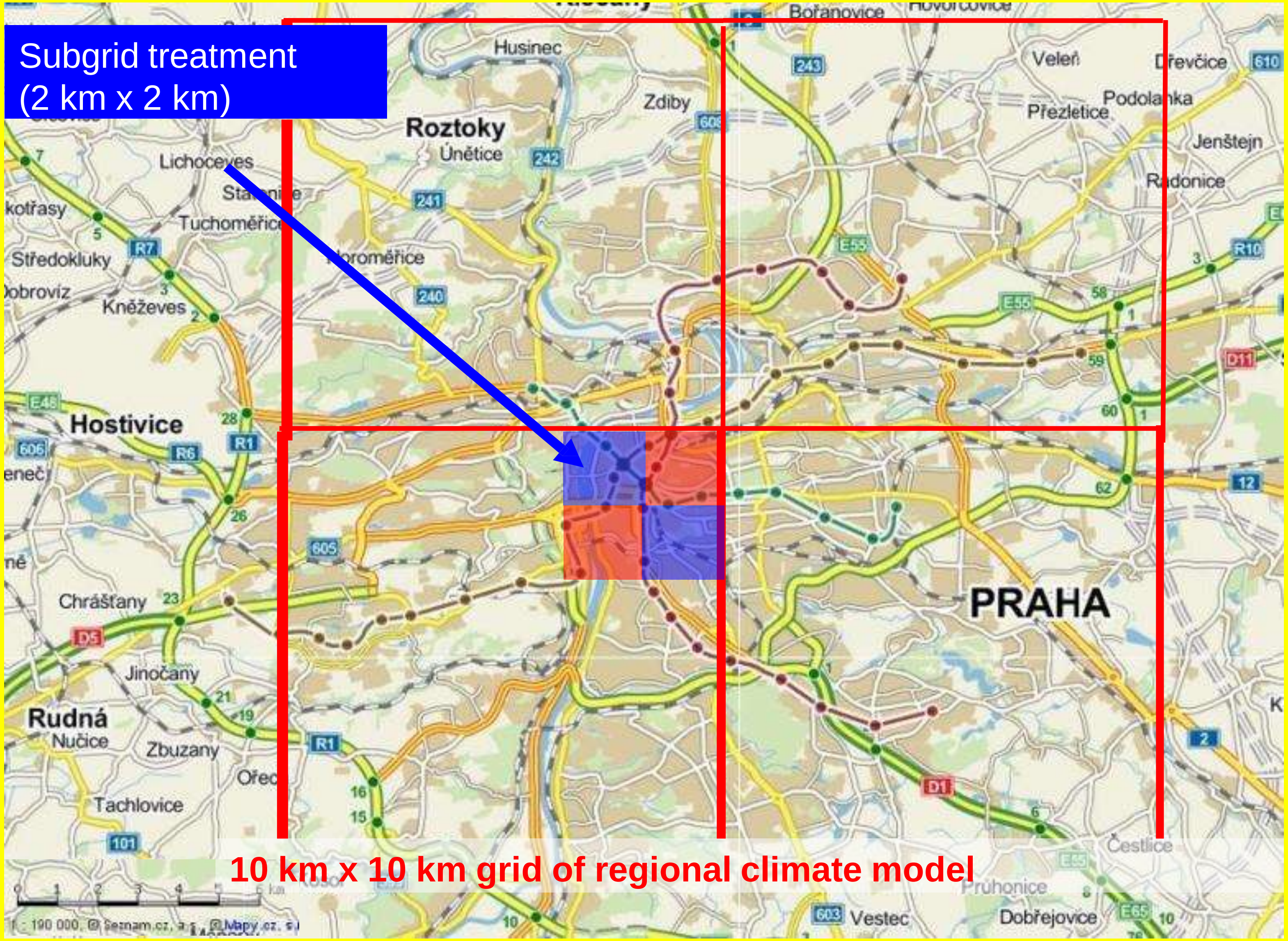


Why urban parameterizations



10 km x 10 km grid of regional climate model

Even further in very high-resolution


Subgrid treatment
(2 km x 2 km)

10 km x 10 km grid of regional climate model

1 km resolution for weather and air quality forecast in URBI PRAGENSI

Project URBI PRAGENSI

- Urbanization of weather forecast
- Urbanization of air-quality forecast (connected to the above)
- Urbanization of climate change scenarios, the tool for efficiency assessment of adaptation or mitigation measures in strategic development plans
- Hot-spots simulations

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Urbanization of weather forecast

URBI PRAGENSI

- urbanized weather prediction based on very high resolution simulations (WRF, 1 km) with localised urban parameters for individual parts of the city
- to provide more detailed information for warnings, planning of the activities of population, planning of the services to adapt and mitigate the effects of urban heat island
- to provide the tool for the assessment of the potential of measures for adaptation and mitigation adopted in Strategic City Development Plan in selected case studies

http://libuse.urbipragensi.cz/

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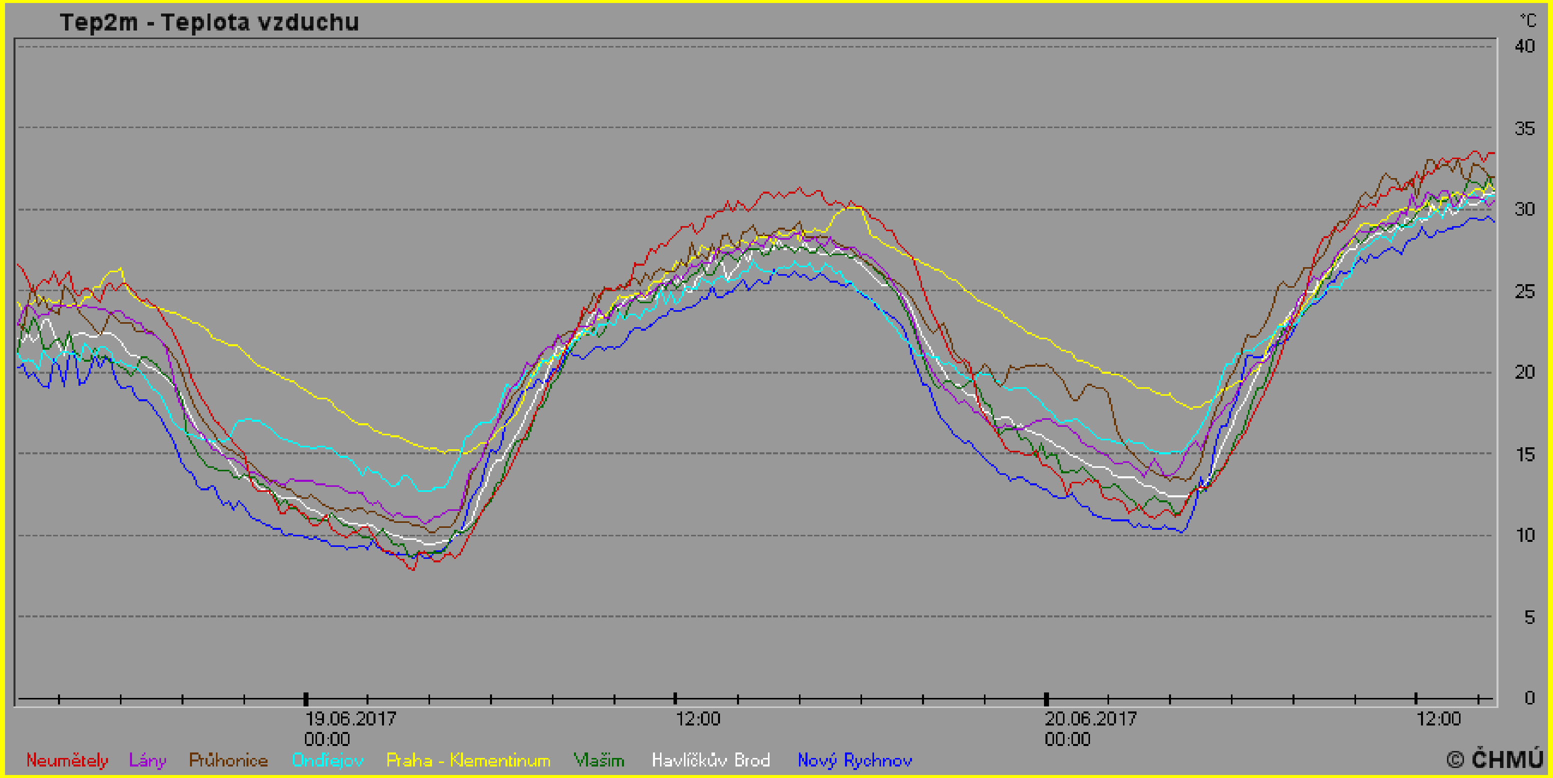
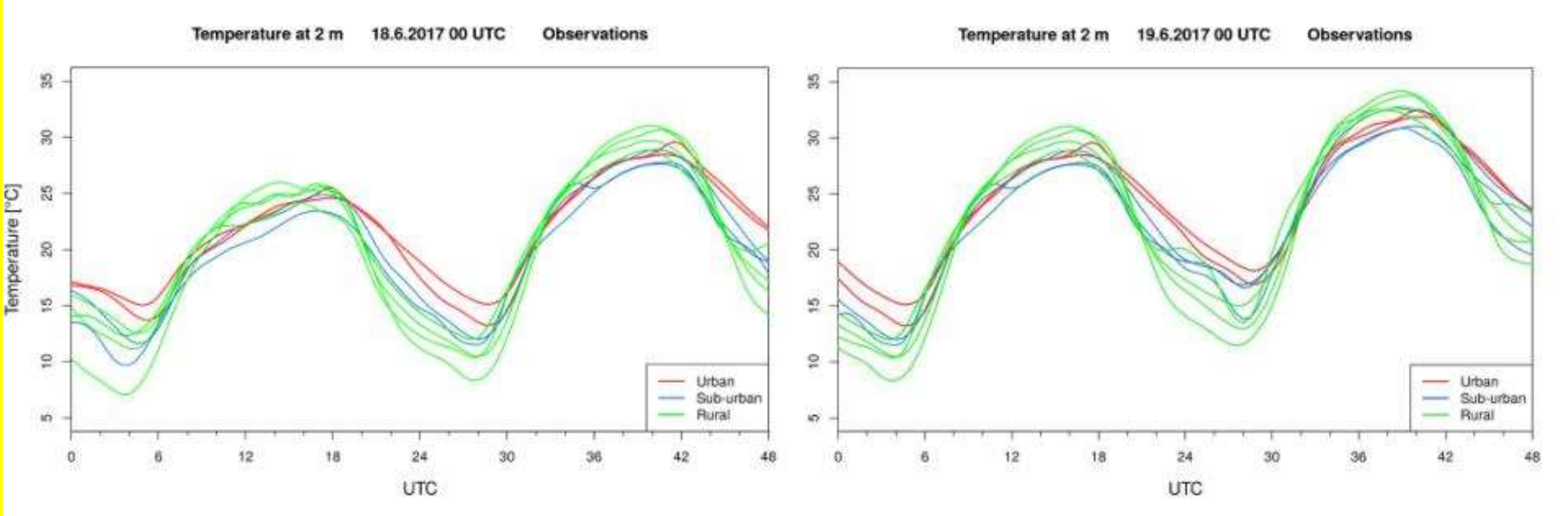
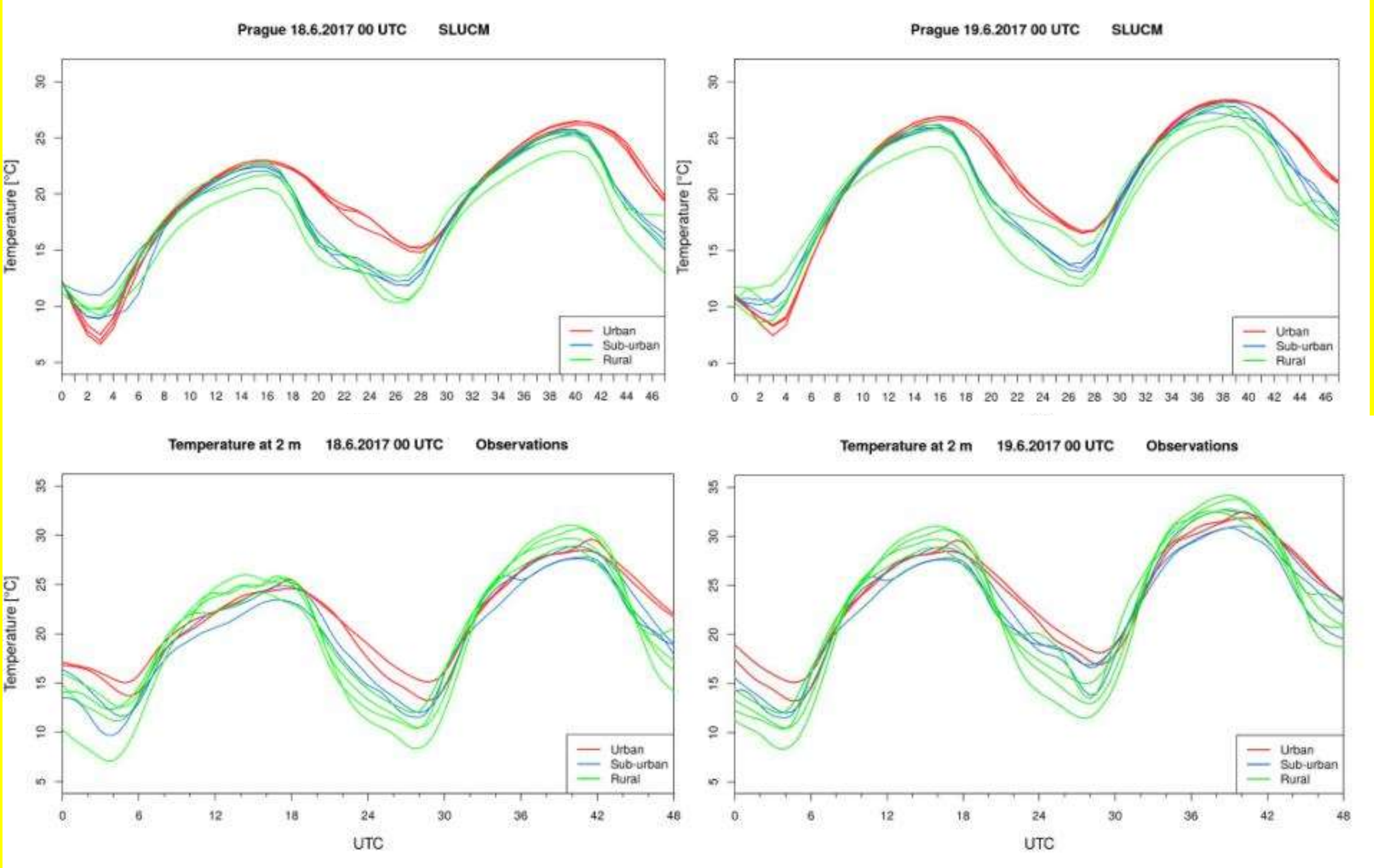
WRF forecast mode with SLUCM (3km)



WRF forecast mode with SLUCM (3km)



WRF forecast mode with SLUCM (3km)



Urbanization of air-quality forecast

URBI PRAGENSI

- air quality prediction based on urbanized weather forecast (role of mixing layer height, wind velocity, temperature, etc) using coupled simulations of WRF and CTM in very high resolution simulations of 1 km with localised urban emissions
- to provide more detailed information for warnings, planning of the activities of population, planning of the services to adapt and mitigate the effects of urban environment
- to provide quasi-operationally the tool for the assessment of the potential of regulatory measures, esp. for transportation, for mitigation of concentration exceedances

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URBI PRAGENSI

Urbanization of climate change scenarios

- urbanization of climate change scenarios results from CMIP and EuroCORDEX available simulations
- urbanized simulations for dynamical downscaling of selected climate change scenarios simulations in very high resolution simulations (3 km) with localised urban parameters for individual parts of the city
- to provide the tool for the assessment of the potential of measures for adaptation and mitigation adopted in Strategic City Development Plan in long term perspective, together with air-quality issues

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Hot-spots simulations

- LES tools for more detailed assessment of selected hot-spots in the city (PALM), at scale of individual streets, blocks, …
- connected with air-pollution transport, option to run quasi-operationally connected to urbanized weather and/or air-quality prediction
- to provide the tool for the assessment of the potential of measures for adaptation and mitigation the harmfull effects at selected locations

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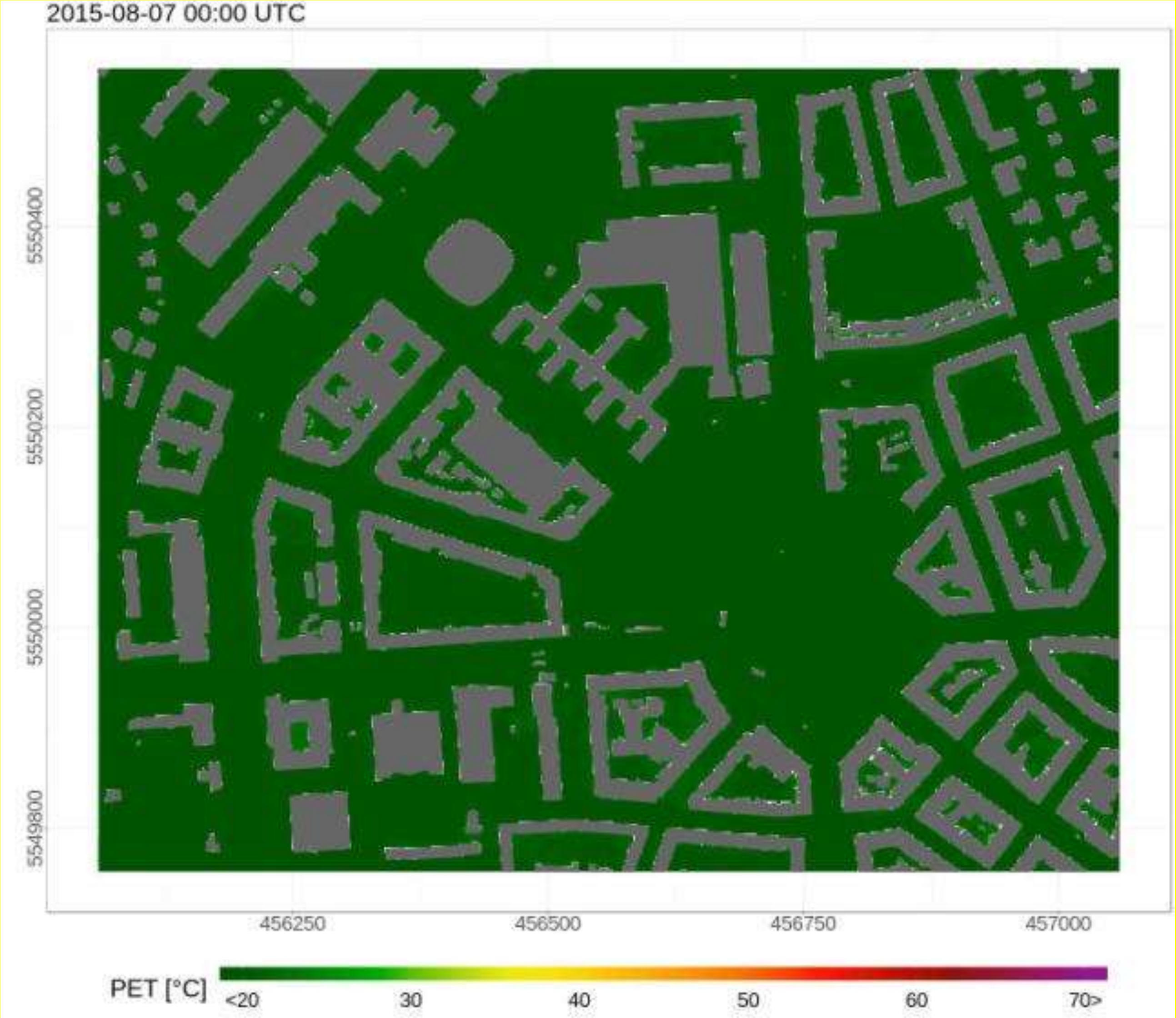
PET – PALM simulation



Resler et KK4 team

Conclusions

- Urban surfaces have significant impact on the meteorological conditions and climate in Central Europe, with increasing effects on population and up-to-date science can to catpture it
- Urban heat island effect clearly identified in simulations as well, mainly during summer and nighttime, especially significant under extreme weather like heat wave
- High-resolution achieved the city’s scale, no excuse to neglect it, localized simulations, weather prediction for cities, with extreme events for adaptation or mitigation options can be done
- Higher complexity parameterization necessary to capture the effects fully, which might be important e.g. for air-quality issues

Proof of concept and further more detailed assessment within the project URBI PRAGENSI, topic taken to CORDEX activity platform – planning FPS

EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Praha – pól růstu ČR

UHI

Acknowledgement

URBI PRAGENSI

The work recently supported within OP-PPR URBI PRAGEN ation of weather forecast, air
quality prediction and climate scenarios for Pragu .0/0.0/16_040/0000383, OP-PPR
project Proof of Concept UK, CZ.07.1.02/0.0/0.0/1 , Ověření proveditelnosti a komerčního
potenciálu výsledků výzkumu Univerzity Ka under support by UHI project “Development
and Application of Mitigation and Ad egies and Measures for Counteracting the Global
Urban Heat Island Phenomenon” amework of EC Operation Programme Central Europe
(3CE292P3), using the previ ent achieved under EC FP6 STREP CECILIA, later under
support by EC FP7 Proj (Megacities and regional hot-spots air quality and climate), grant
agreement no.: 21

THANKS FOR YOUR ATTENTION !

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Operační program Praha – pól růstu ČR

PRAHA
PRAGUE
PRAGA
PRAG

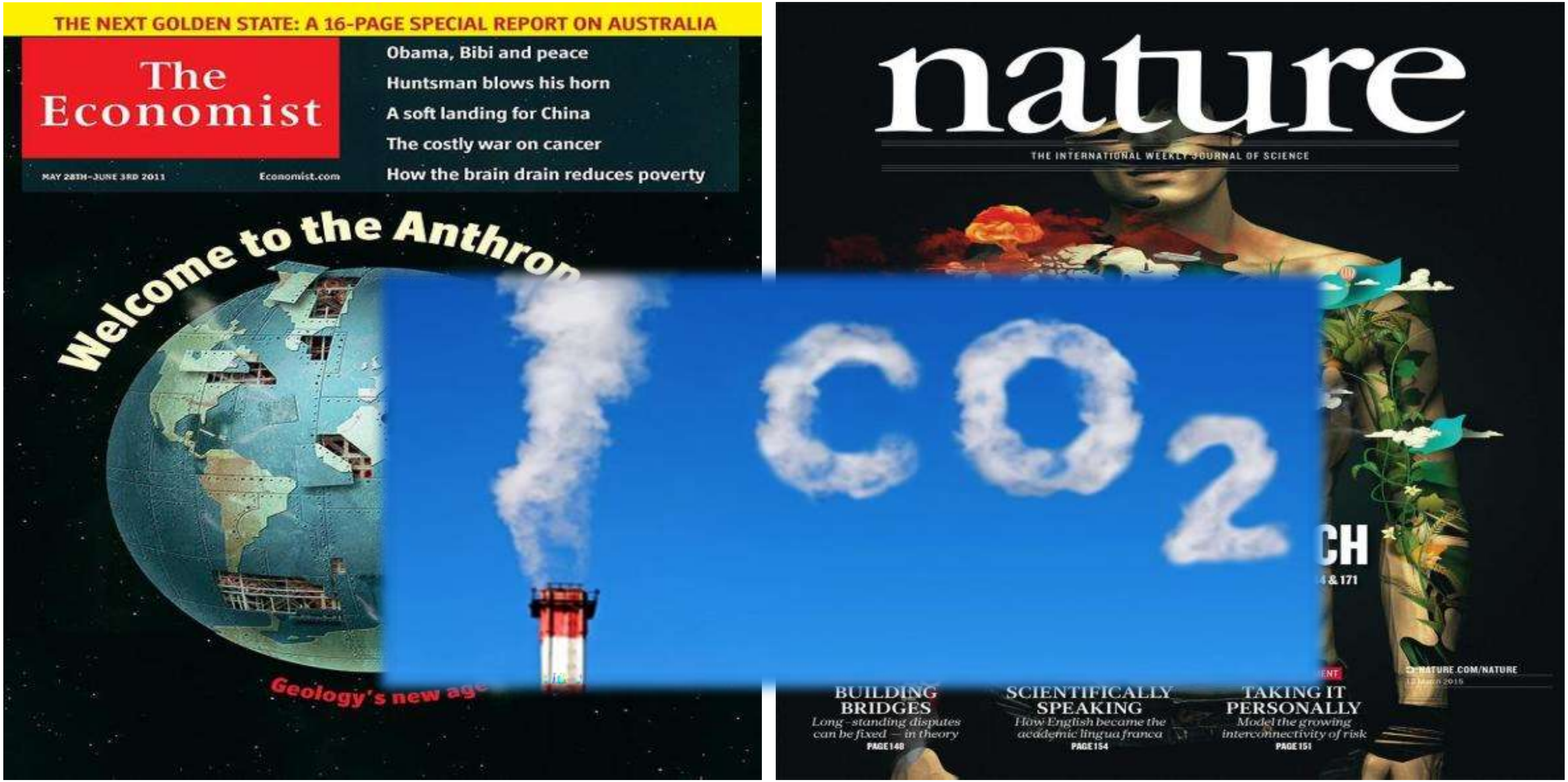
CLIMPACT

ΕΘΝΙΚΟ ΔΙΚΤΥΟ ΓΙΑ ΤΗΝ ΚΛΙΜΑΤΙΚΗ ΑΛΛΑΓΗ

“CLIMPACT: The Greek Initiative for studying the Climate change and its impacts”

N. Mihalopoulos
National Observatory of Athens
University of Crete

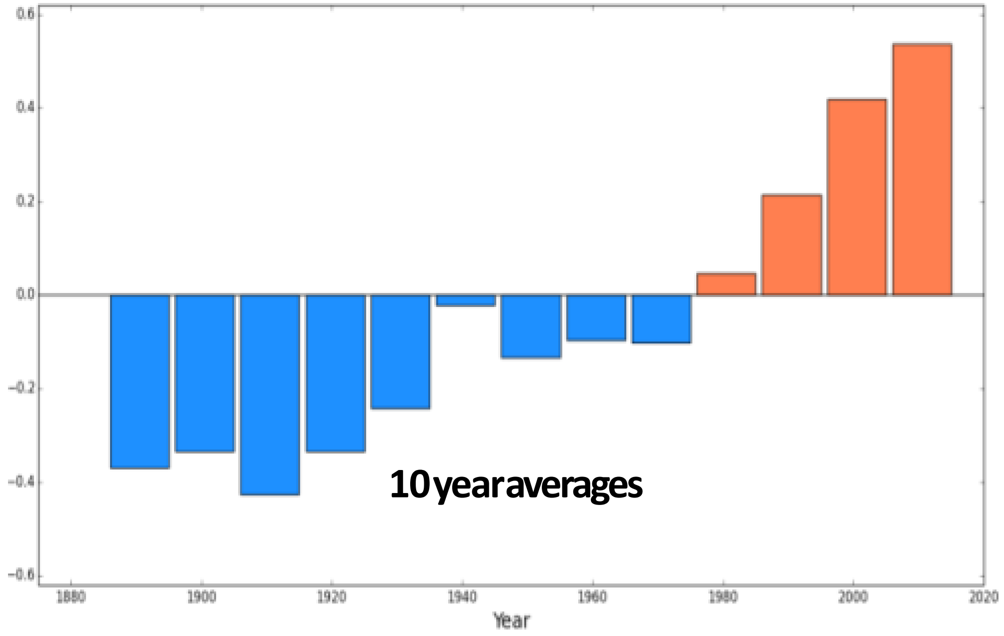
Το ζργο χρηματοδοτείται από το ΠΔΕ του Υπουργείου Ανάπτυξησ και Επενδ



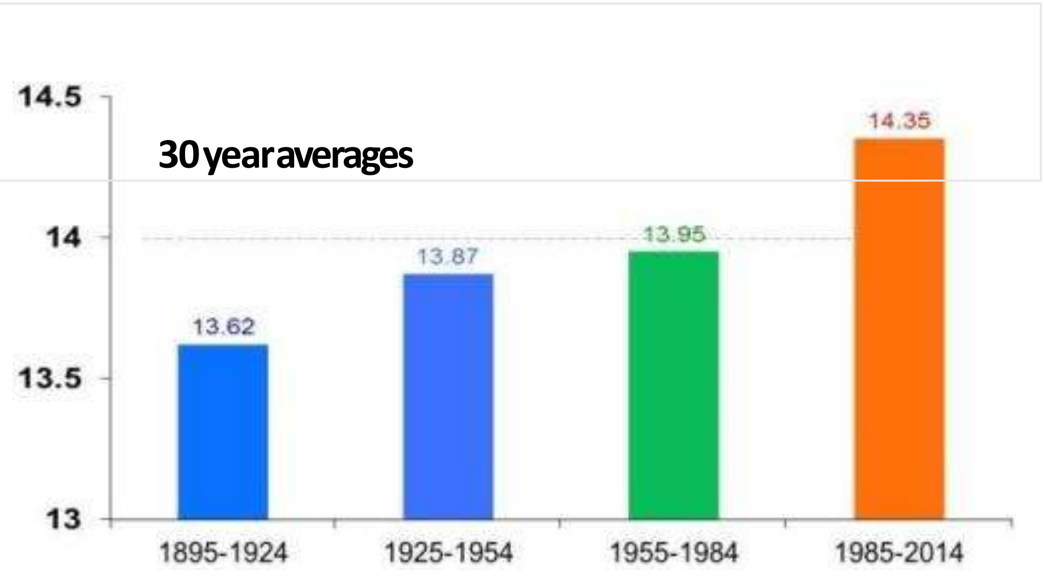
The **Anthropocene** is proposed as the new geological epoch where **human-influence will dominate the fossil records**. There is overwhelming global evidence that atmospheric, geologic, hydrologic, biospheric and other Earth system processes are now modified by human activity.

- IPCC: “warming of climate system is unequivocal”.
- “Human influence on the climate system is clear”

Global surface temperature anomalies 1880-2015



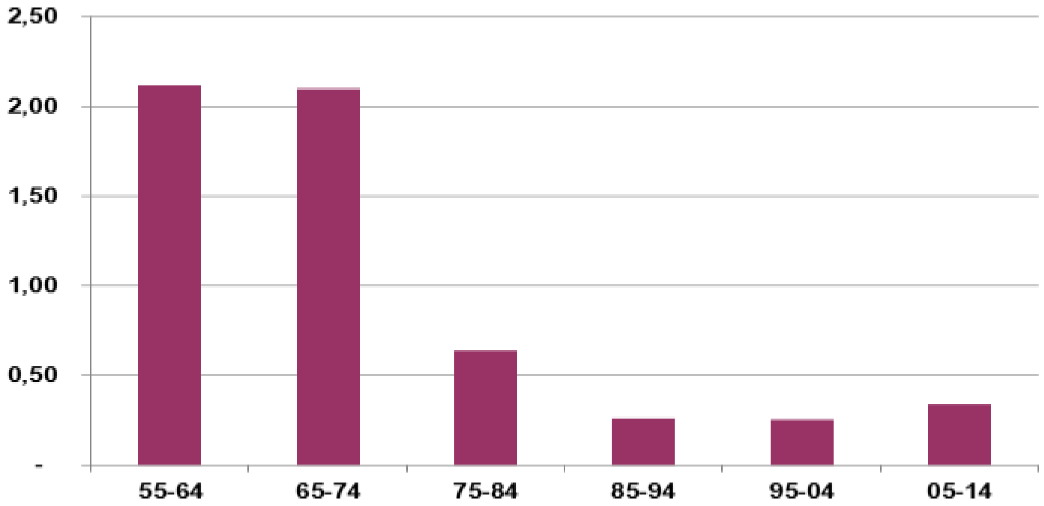
10 year averages



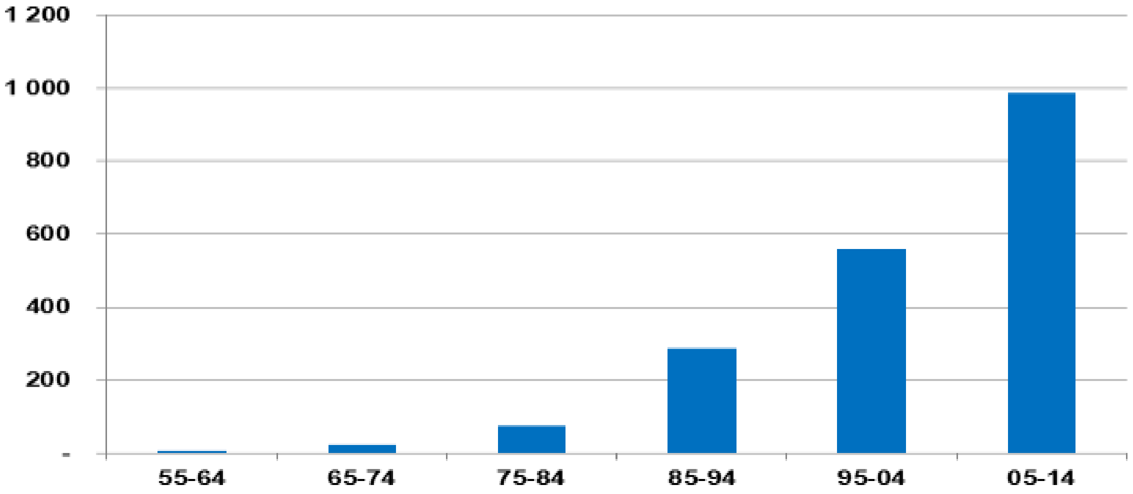
30 year averages

21st Century: The context

Weather and climate disasters



Deaths per decade (millions)



Economic losses per decade (Billion US$)

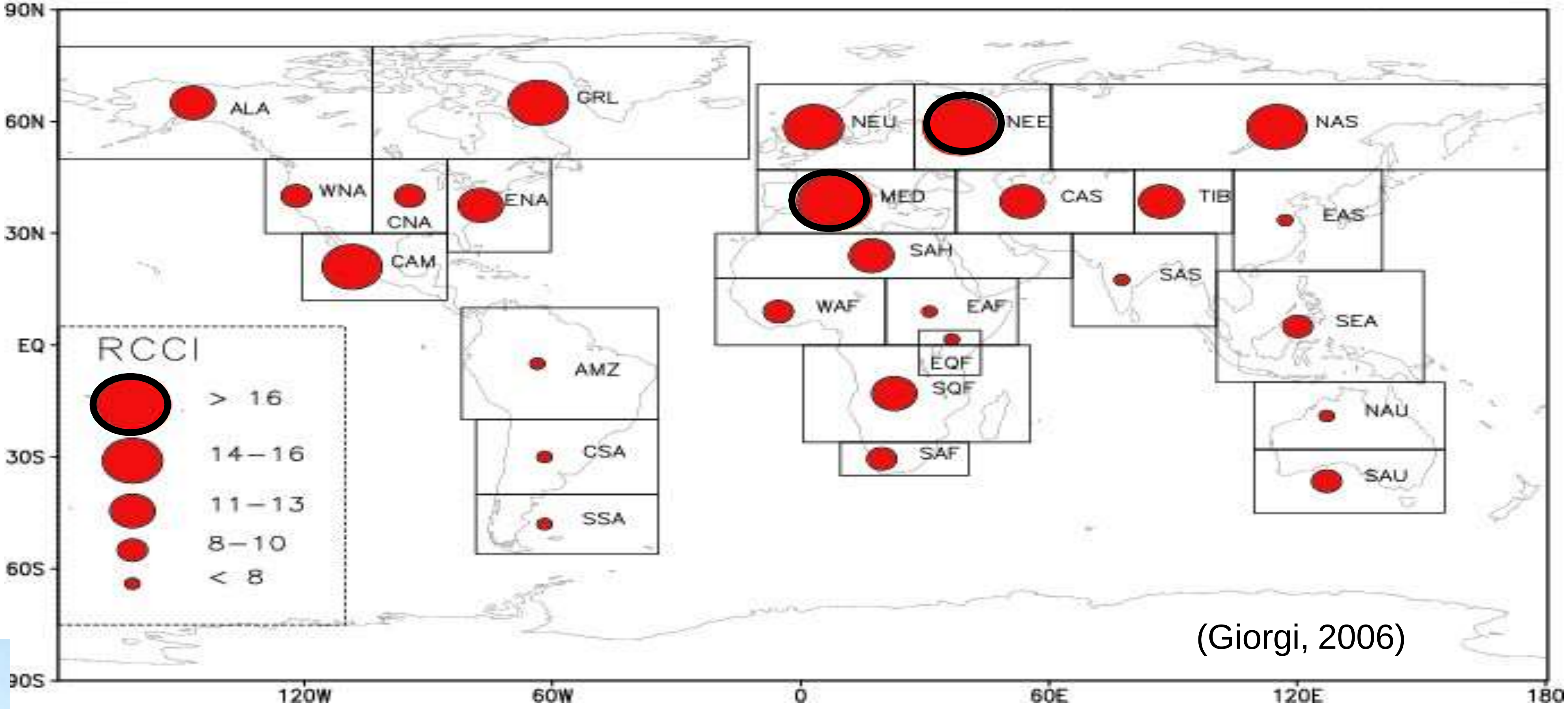
Developing countries affected much more, relative to their economic size

Source: WHO

Air pollution & Climate Change in the Mediterranean

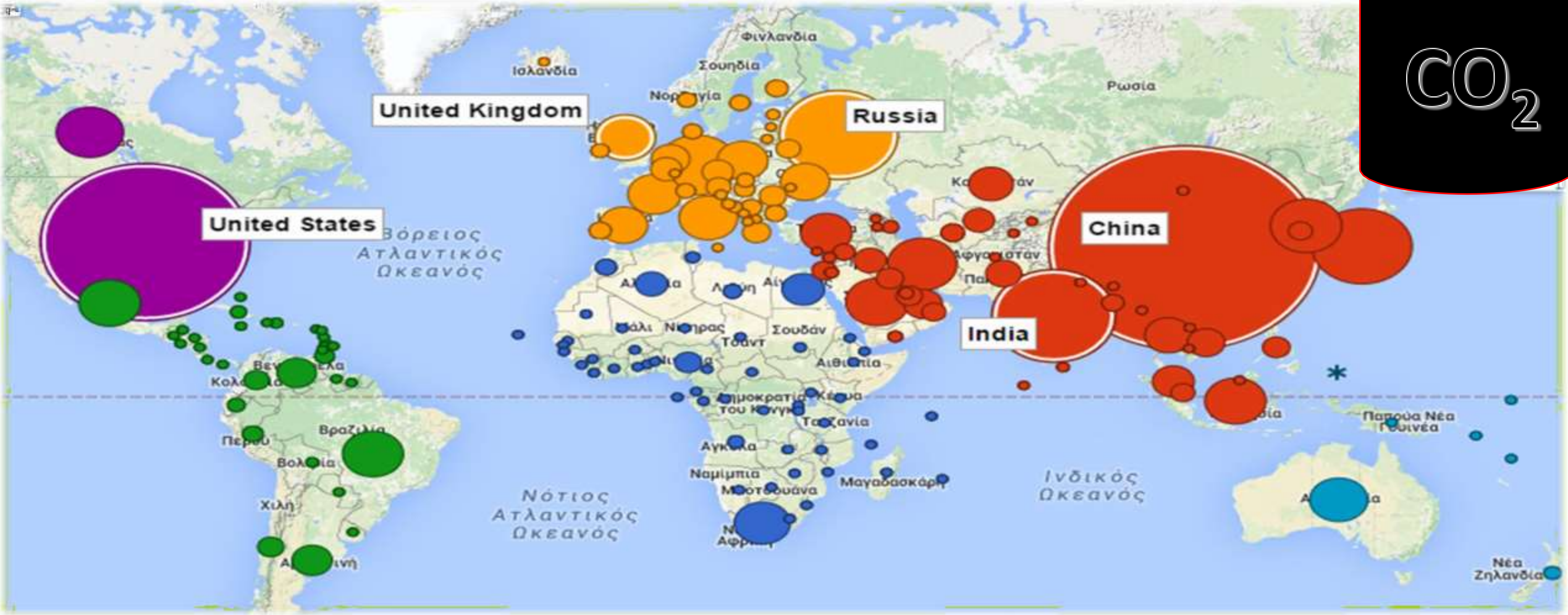
The Mediterranean: *A major climate Hot Spot region*

Regional Climate Change Index, 20 models, 3 scenarios

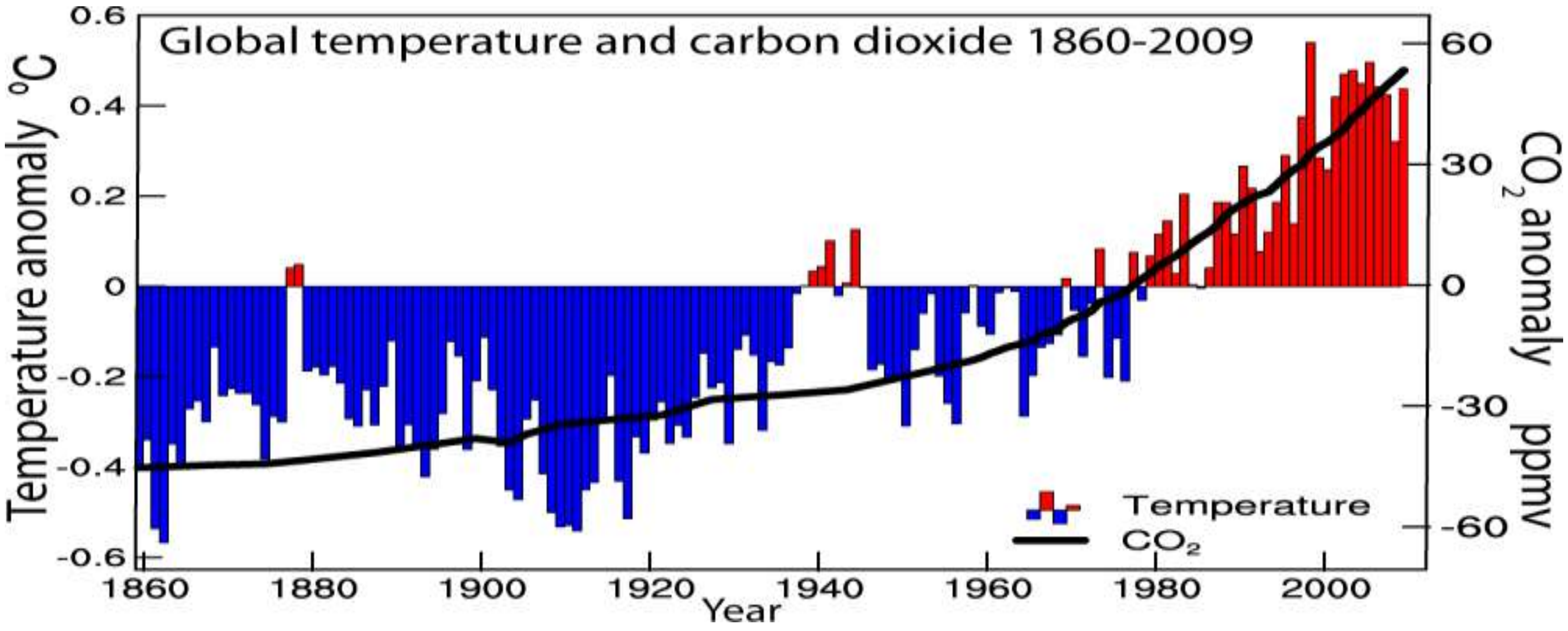


(Giorgi, 2006)

CO_2


United Kingdom
Russia
United States
China
India
Ισλανδία
Φινλανδία
Σουηδία
Νορβηγία
Ρωσία
Βόρειος Ατλαντικός Ωκεανός
Μάλι
Νίγηρας
Σουδάν
Τσαντ
Αιθιοπία
Κένυα
Τανζανία
Ναμίμπια
Μποτσουάνα
Μαγαδασκάρη
Βραζιλία
Περού
Βολιβία
Χιλή
Νότιος Ατλαντικός Ωκεανός
Ινδικός Ωκεανός
Παπούα Νέα Γουινέα
Νέα Ζηλανδία

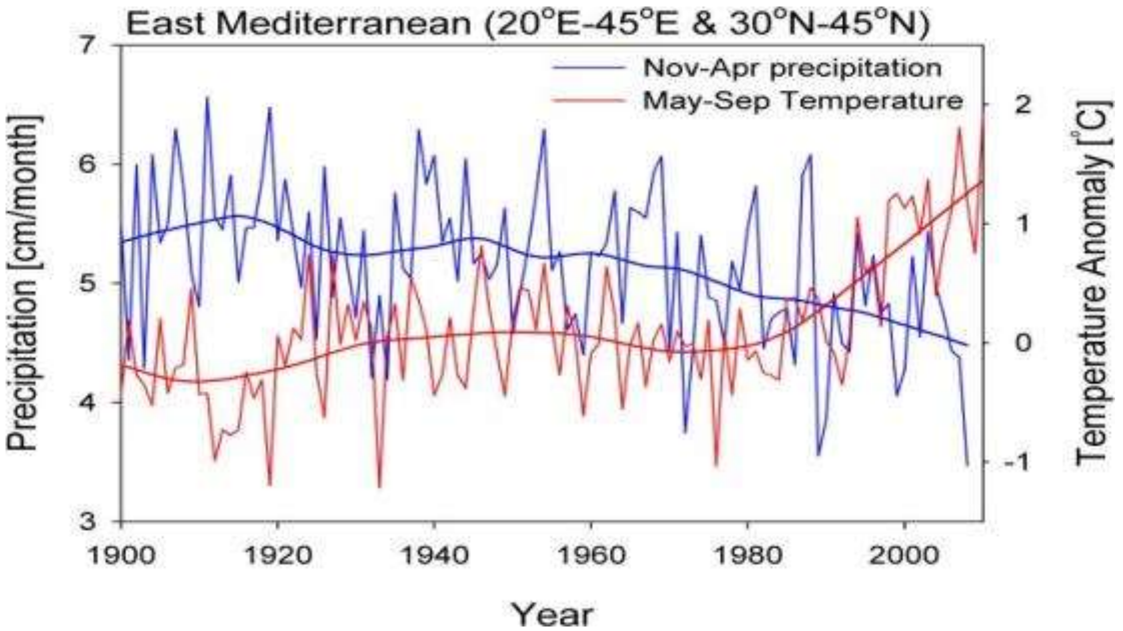
Climate Change & Air pollution in the Mediterranean



Climate Change between 1980-2010

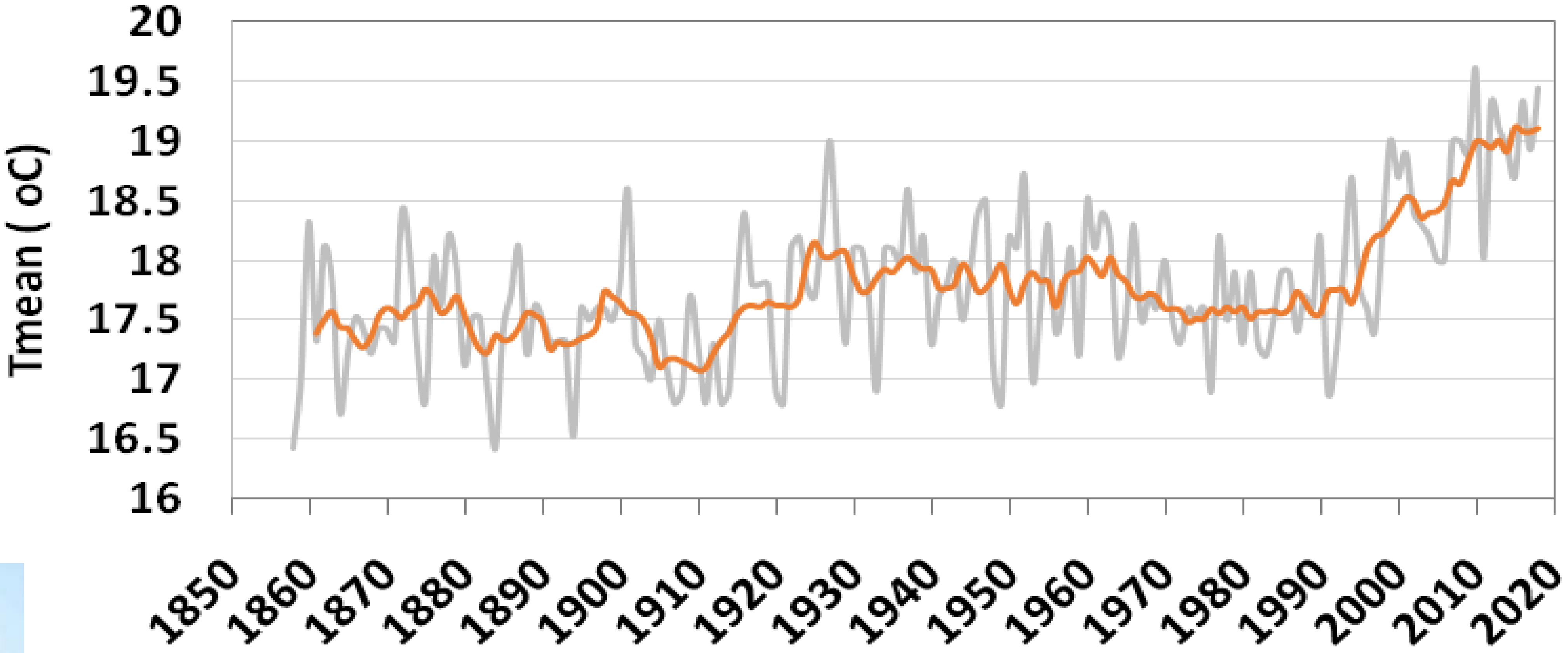
World : = +0.7degree C

Eastern Mediterranean = +1.5 **degree C** !!!



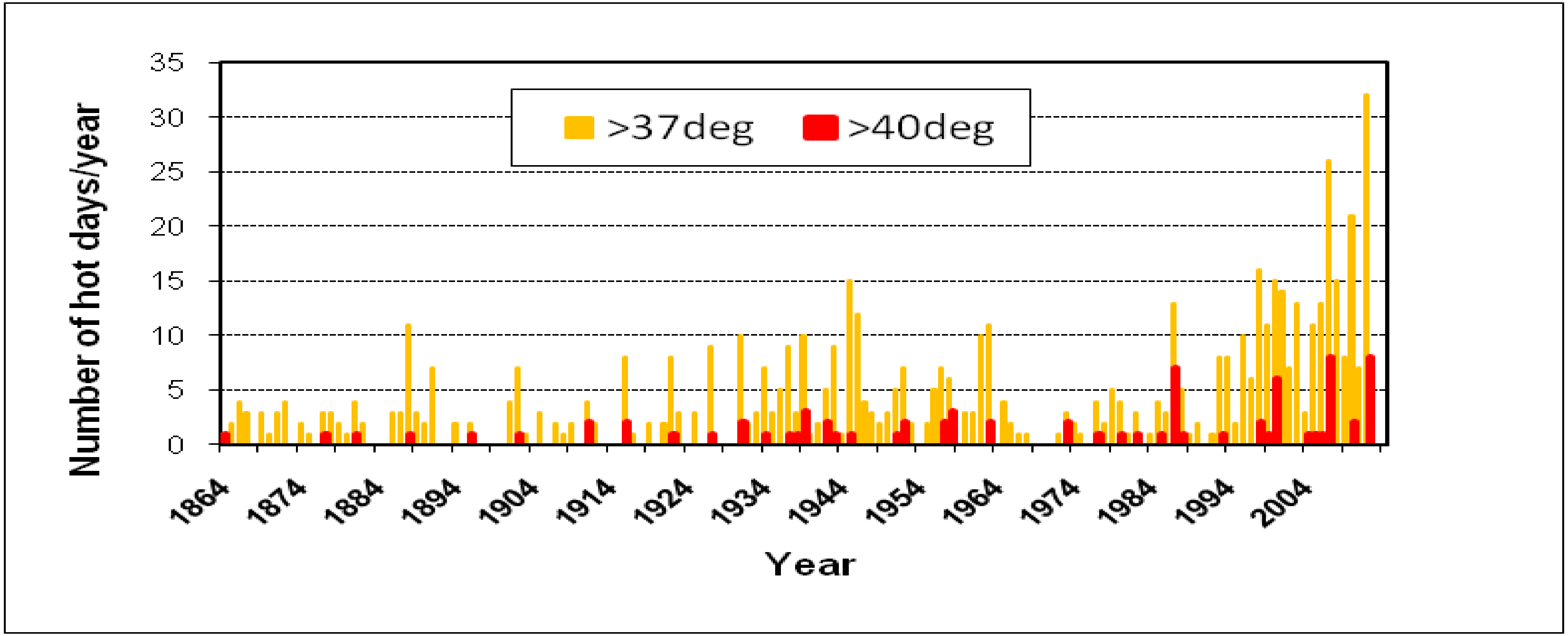
High Impact region: trends in temperature and precipitation go in different directions
(The World Bank, 2012)

Annual mean temperature in Athens
(1858-2018)



CLIMPACT

Frequency of hot days since 1860

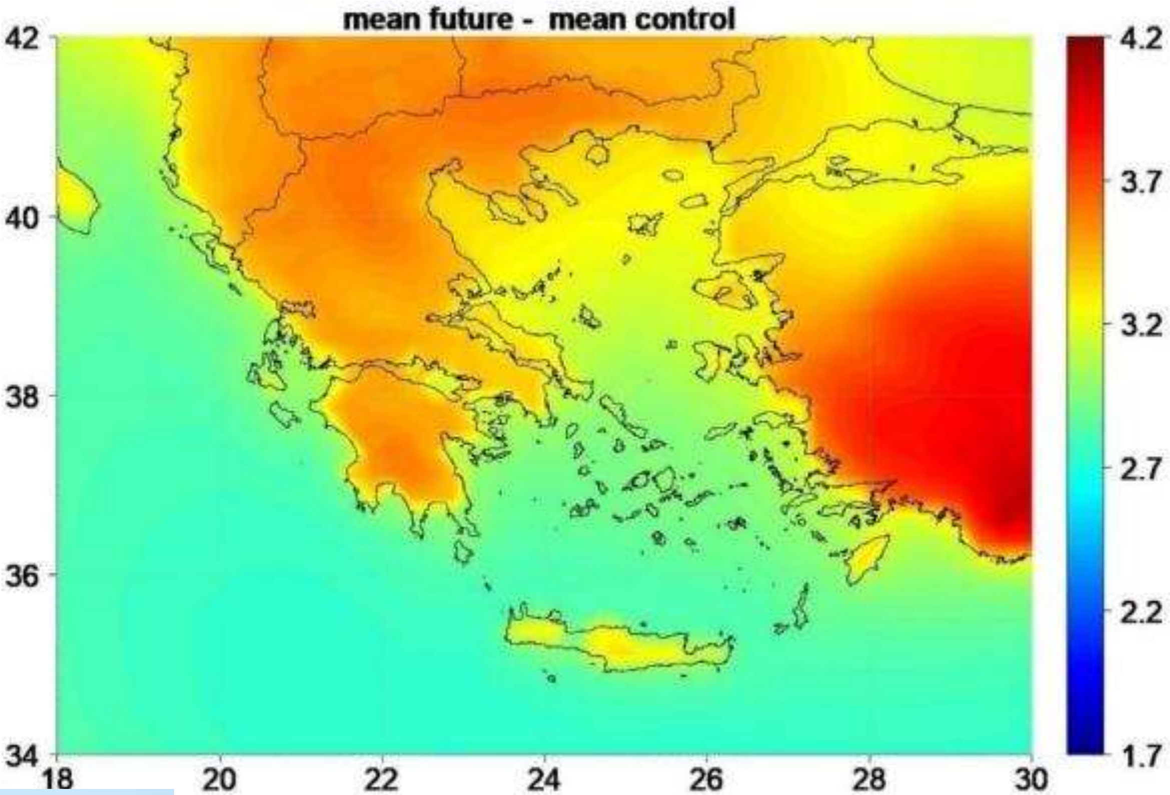


Source: Founda & Giannakopoulos 2009 (Global&Planetary Change)

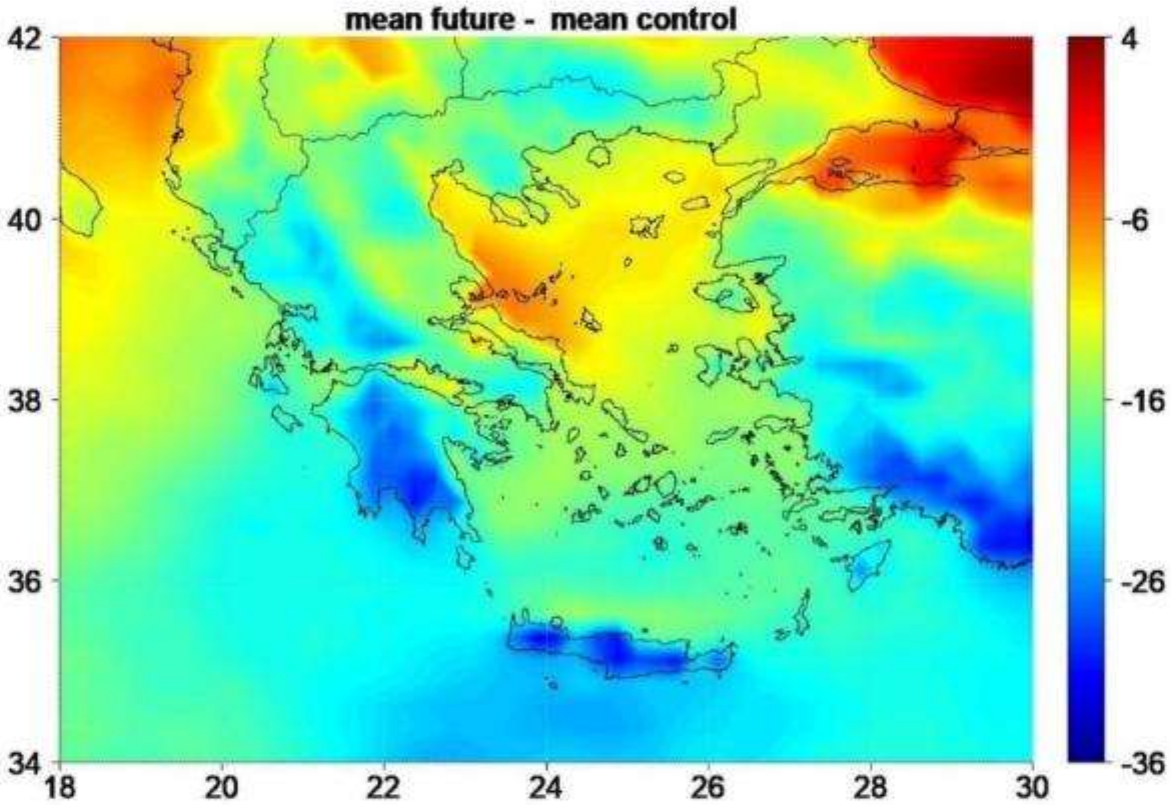
This increase was accompanied by a striking increase in the hot days frequency

Impacts of Climate Change

Mean Temperature



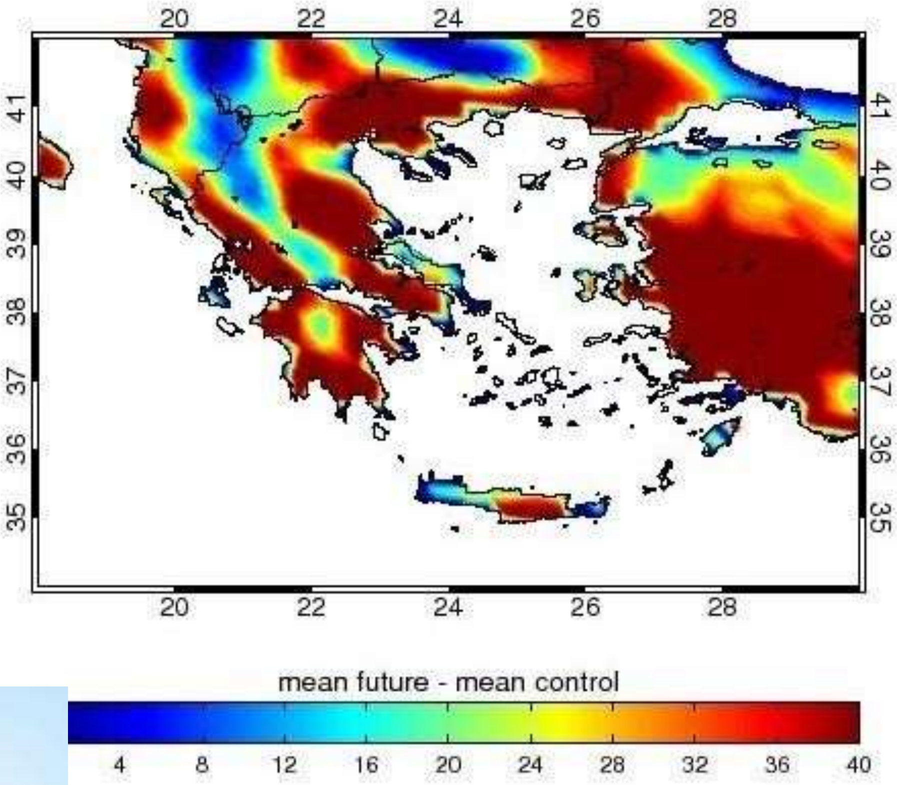
Mean precipitation height



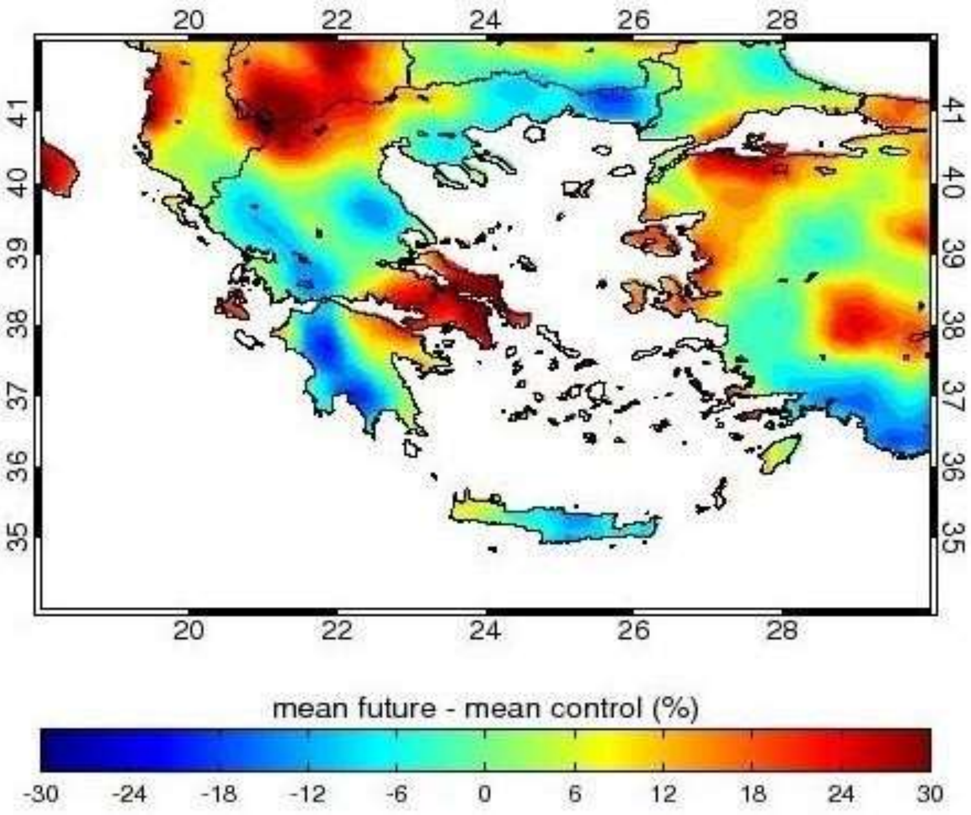
Period 2071-2100 relative to 1961-1990/ scenario A1B

Impacts of Climate Change *Extreme Events*

Number of dates T>35^{o}C



Total Rain, 3 consecutive days



Period 2071-2100 relative to 1961-1990/ scenario A1B

CLIMPACT: The Greek Initiative for studying the Climate change and its impacts”

- The proposed initiative aims to create a scientific core of excellence in research, to produce new knowledge on climate change, as there is currently a core of Greek scientists actively involved on climate change issues.

  Our country can utilize the significant number of terrestrial measurements (EMY, METEO), the current infrastructure of the road map (PANACEA, HIMIOFoTS) as well as the satellite data, producing innovative information necessary for the more accurate quantification of climate change and its effects.

Aims of CLIMPACT

- The optimization of the existing climate services and early warning systems for natural disasters in Greece, including the supporting observations from terrestrial networks, aerial platforms and satellite Earth observation systems collected in the relevant national infrastructures

- Utilization of new research results and methodologies in the production of original climate services and innovative early warning systems for natural disasters related to climate change.

Aims of CLIMPACT

- The creation of a national database through the systematic collection, control and archiving climatic and environmental parameters, data from satellite earth observation systems, models and products, and their free and open use by the Greek and international scientific community.

- Valid and timely dissemination of information to decision-making bodies, cross-sectoral policy design (with emphasis on tourism, agriculture, forests / ecosystems, and civil protection), shielding of citizens, society and economy in general from the effects of Climate Change.

Pillars of CLIMPACT

Pillar 1: Science and High quality data related to Climate Change

Pillar 2: Climate Change: Impacts on agriculture, tourism and energy consumption – adaptation – mitigation – financial impact

Pillar 3: Hazard and risk estimation from Climate Change

Participants

- National Observatory of Athens (NOA, Co-ordiantion)
- Academy of Athens
- Aristotle University
- University of Athens
- National Technical University of Athens
- Hellenic center of Marine Research (HCMR)
- Demokritos Research center
- University of Crete
- National technical University of Crete
- Research Center Athena
- National Center for Social Studies
- The initiative is open to other Greek Institutes and Universities

Ευχαριστώ για τη προσοχή σας

Thank you very much for your attention

Numerical simulations of the summer bio climatic indices for the city of Sofia

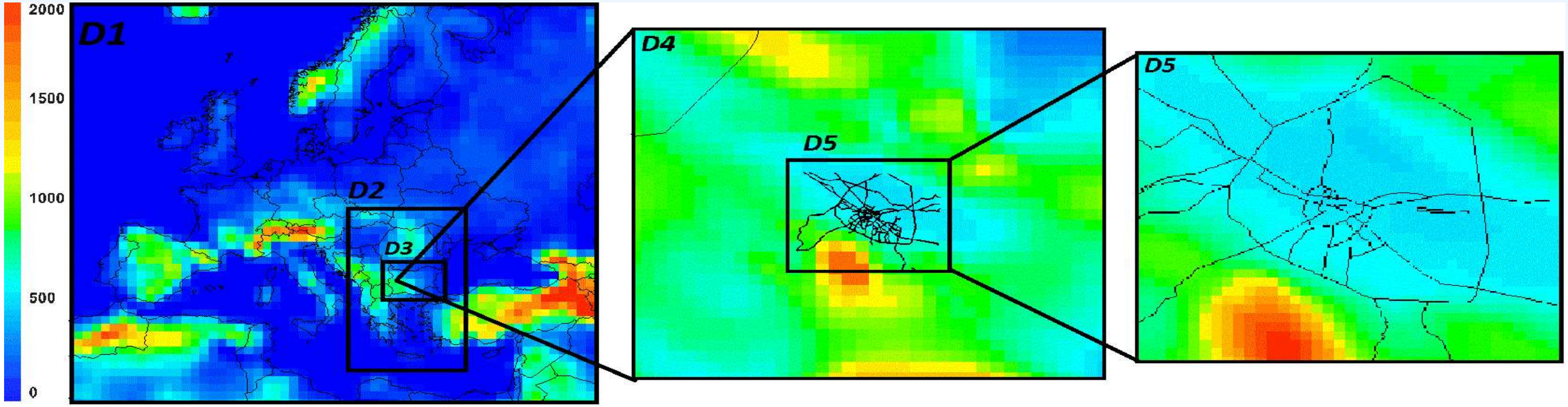
Vladimir Ivanov, Georgi Gadzhev, Ivelina Georgieva, Kostadin Ganev and Hristo Chervenkov

National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences,

National Institute of Meteorology and Hydrology

Numerical simulations of the summer bio climatic indices for the city of Sofia – modeling tools, domains and nesting

- mesoscale numerical simulation model: **WRF**
- Meteorological background: **NCEP Global Analysis Data with 1ºx1º resolution**
- Model domains: **D1 81x81 km (Europe), D2 27x27 km (Balkan Peninsula), D3 9x9 km (Bulgaria), D4 3x3 km (Sofia region) and D5 1x1 km (Sofia city).**



Numerical simulations of the summer bio climatic indices for the city of Sofia – Heat Index calculation

The computation of the heat index is a refinement of a result obtained by multiple regression analysis carried out by Lans P. Rothfusz and described in a 1990 National Weather Service (NWS) Technical Attachment (SR 90-23). The regression equation of Rothfusz is:

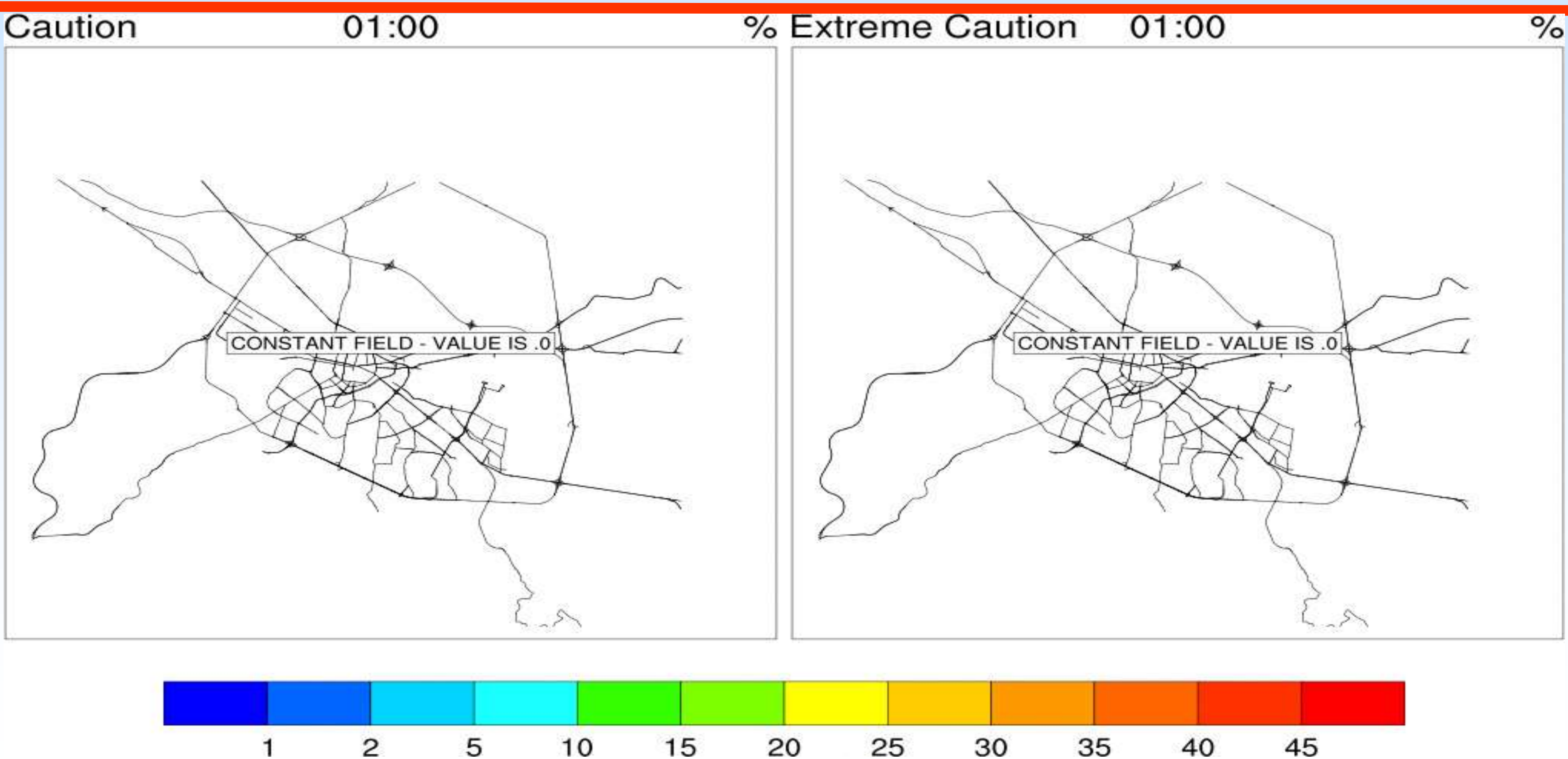
$$HI = -42.379 + 2.04901523*T + 10.14333127*RH - .22475541*T*RH - .00683783*T*T - .05481717*RH*RH + .00122874*T*T*RH + .00085282*T*RH*RH - .00000199*T*T*RH*RH,$$

where **T** is temperature in degrees F and **RH** is relative humidity in percent. **HI** is the heat index expressed as an apparent temperature in degrees F.

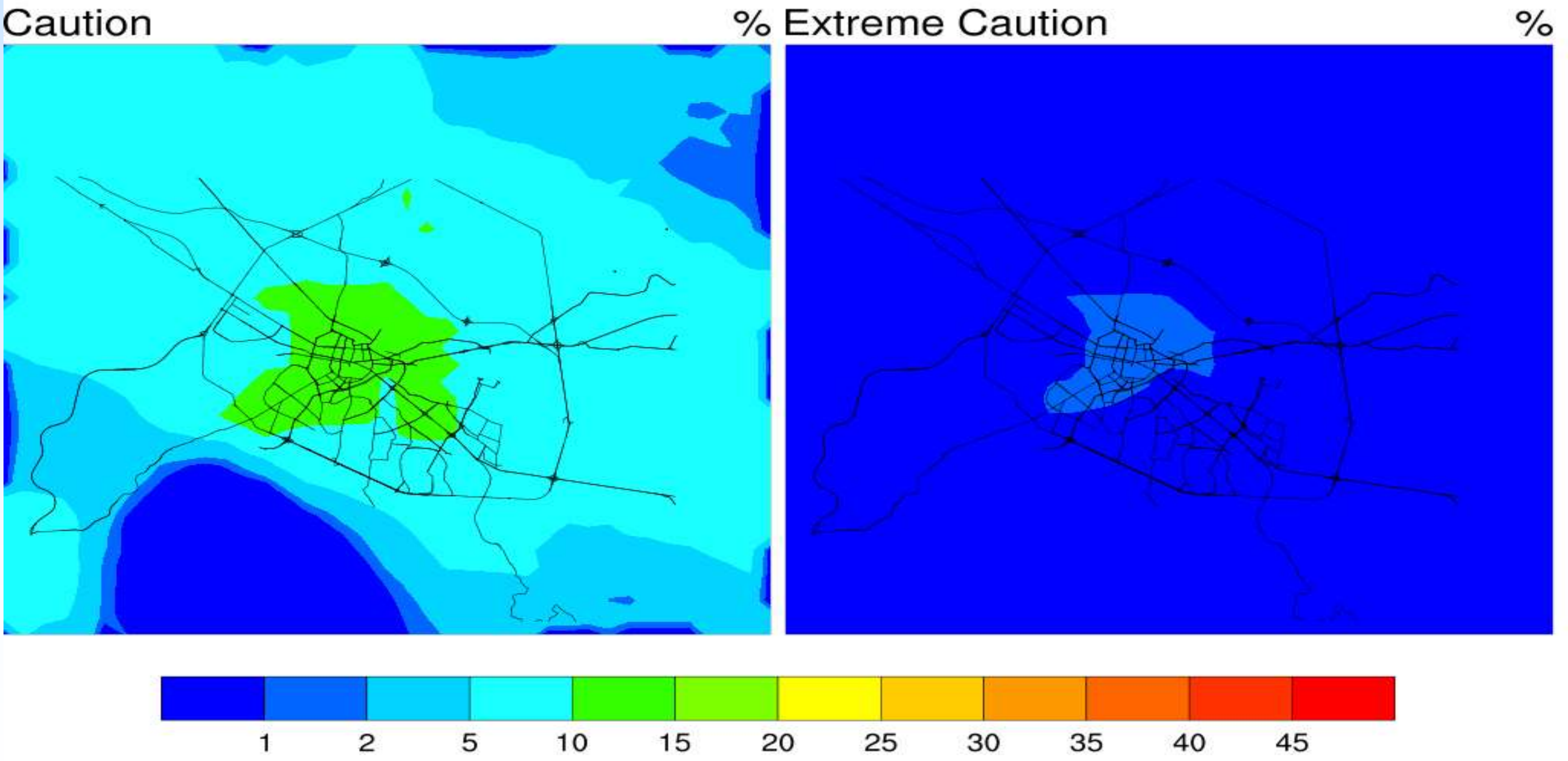
Numerical simulations of the summer bio climatic indices for the city of Sofia
– Heat Index categories

Heat Index	Heat Index category	Environment Risk
27°C ÷ 32°C	Caution	Fatigue & cramps possible with prolonged exposure and activity.
32°C ÷ 41°C	Extreme Caution	Cramps, heat exhaustion & heat stroke.
41°C ÷ 54°C	Danger	Cramps, heat exhaustion are likely; heat stroke is probable.
54°C ÷	Extreme danger	Heat stroke is imminent.

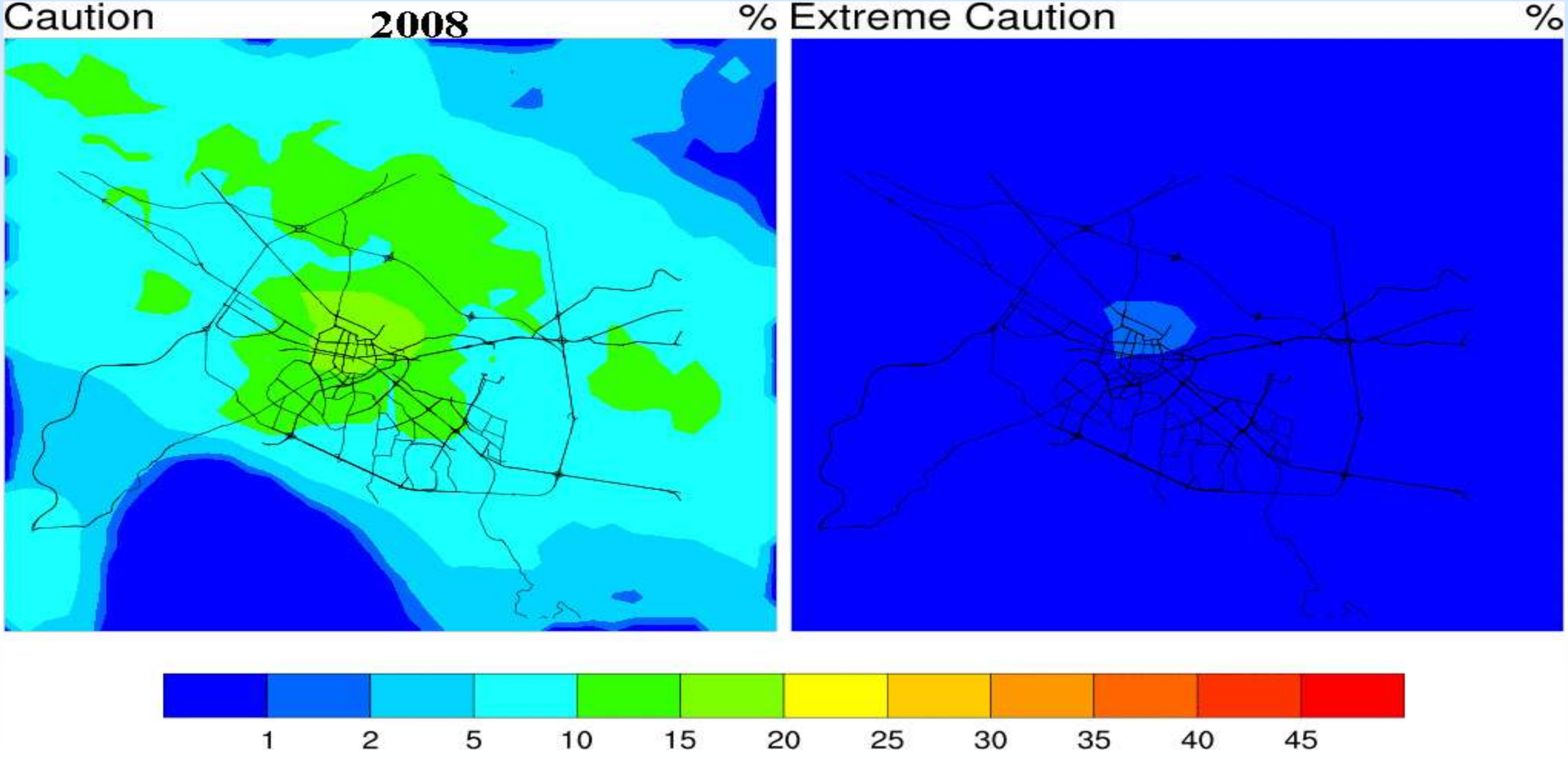
Numerical simulations of the summer bio climatic indices for the city of Sofia
– Heat Index probability diurnal evolution



Numerical simulations of the summer bio climatic indices for the city of Sofia
– Heat Index overall probability

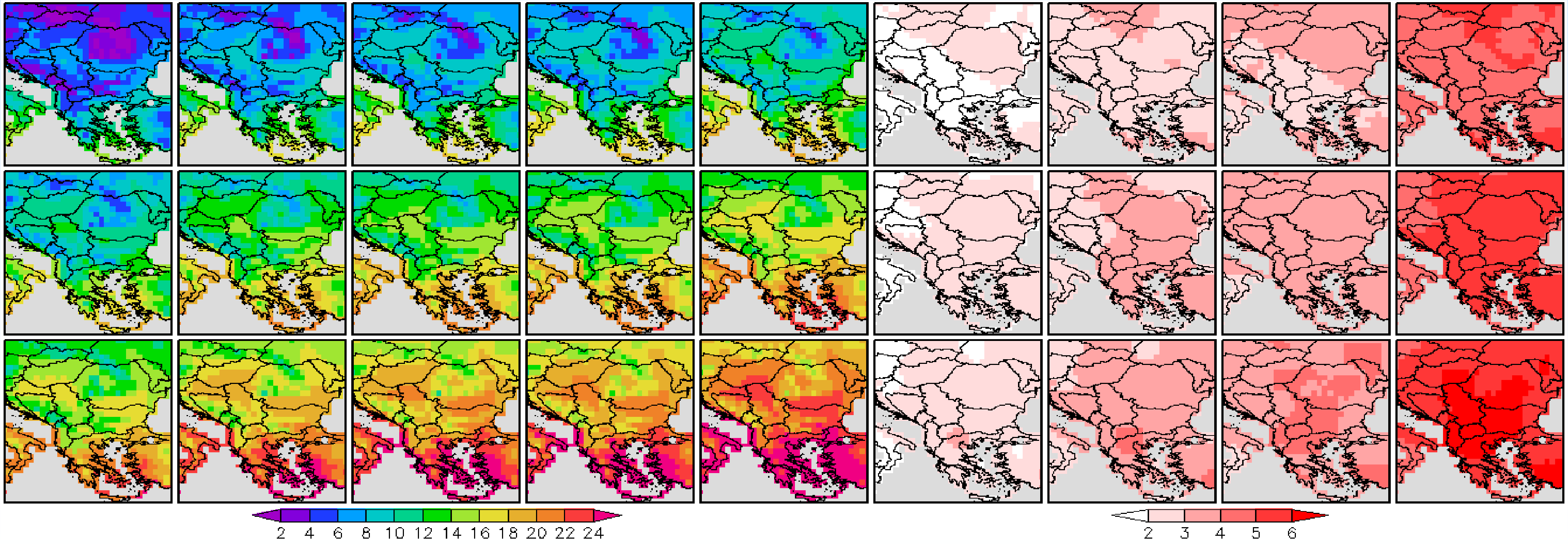


Numerical simulations of the summer bio climatic indices for the city of Sofia – variability of the Heat Index probability



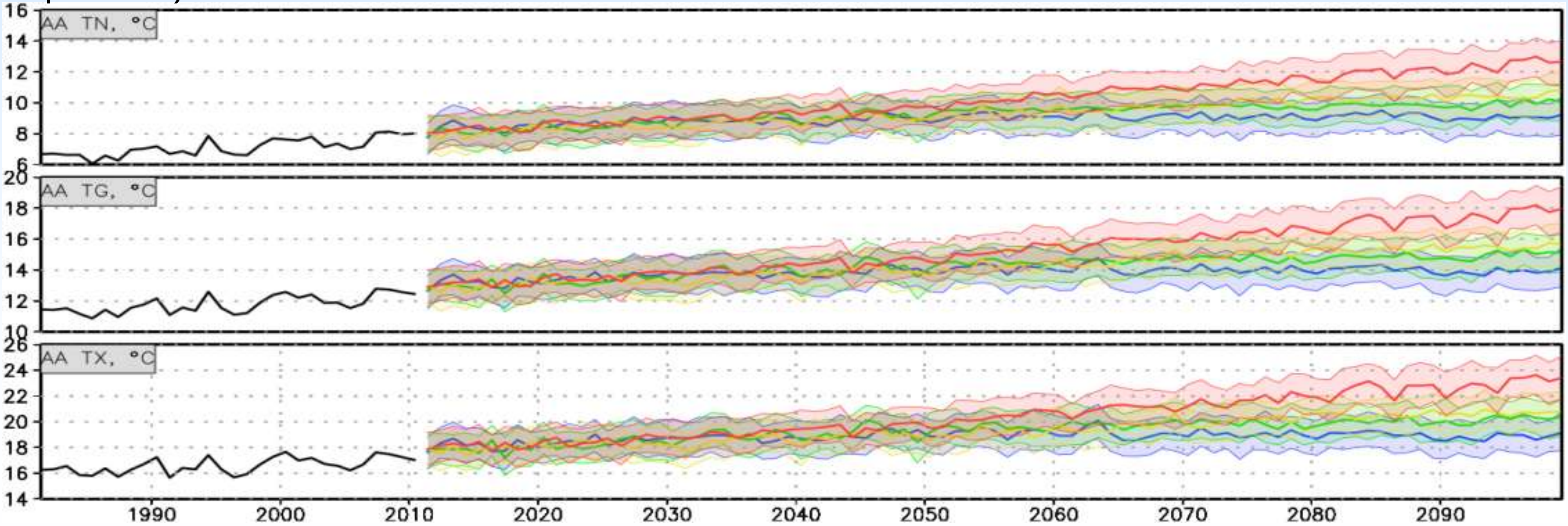
Numerical simulations of the summer bio climatic indices for the city of Sofia
– future climate projections (1)

MMX50 of the multiyear means of the TN (first row) TG (second row) and TX (third row) for the reference period (1981-2010) in the first column and multiyear means for 2070-2099 for RCP2.6, RCP4.5, RCP6.0 and RCP8.5 in the second, third, fourth and fifth column correspondingly. The absolute changes of the RCP2.6, RCP4.5, RCP6.0 and RCP8.5 relative to the reference period are shown in the sixth seventh eight and ninth column correspondingly. The units are ºC.



Numerical simulations of the summer bio climatic indices for the city of Sofia
– future climate projections (2)

Area-weighted regional averages (index and unit according subplot title) for the reference (solid black line) and simulated by the CMIP5 ensemble for the RCP2.6 (blue), RCP4.5 (green), RCP6.0 (yellow) and RCP8.5 (red). Solid lines indicate the ensemble median (i.e. the 50th quantile) and the shading, respectively the thin lines, indicates the interquartile ensemble spread (25th and 75th quantiles).



Numerical simulations of the summer bio climatic indices for the city of Sofia – Acknowledgments

- This work has been carried out in the framework of the National Science Program "Environmental Protection and Reduction of Risks of Adverse Events and Natural Disasters", approved by the Resolution of the Council of Ministers 577/17.08.2018 and supported by the Ministry of Education and Science (MES) of Bulgaria (Agreement DO-230/06-12-2018).
- We acknowledge the provided access to the e-infrastructure of the Centre for Advanced Computing and Data Processing, with the financial support by the Grant No BG05M2OP001-1.001-0003, financed by the Science and Education for Smart Growth Operational Program (2014-2020) and co-financed by the European Union through the European structural and Investment funds.
- Deep gratitude to the organizations and institutes (NCEP-NCAR, ECA&D, Unidata, MPI-M and all others), which provide free of charge software and data. Without their innovative data services and tools this study would not be possible.

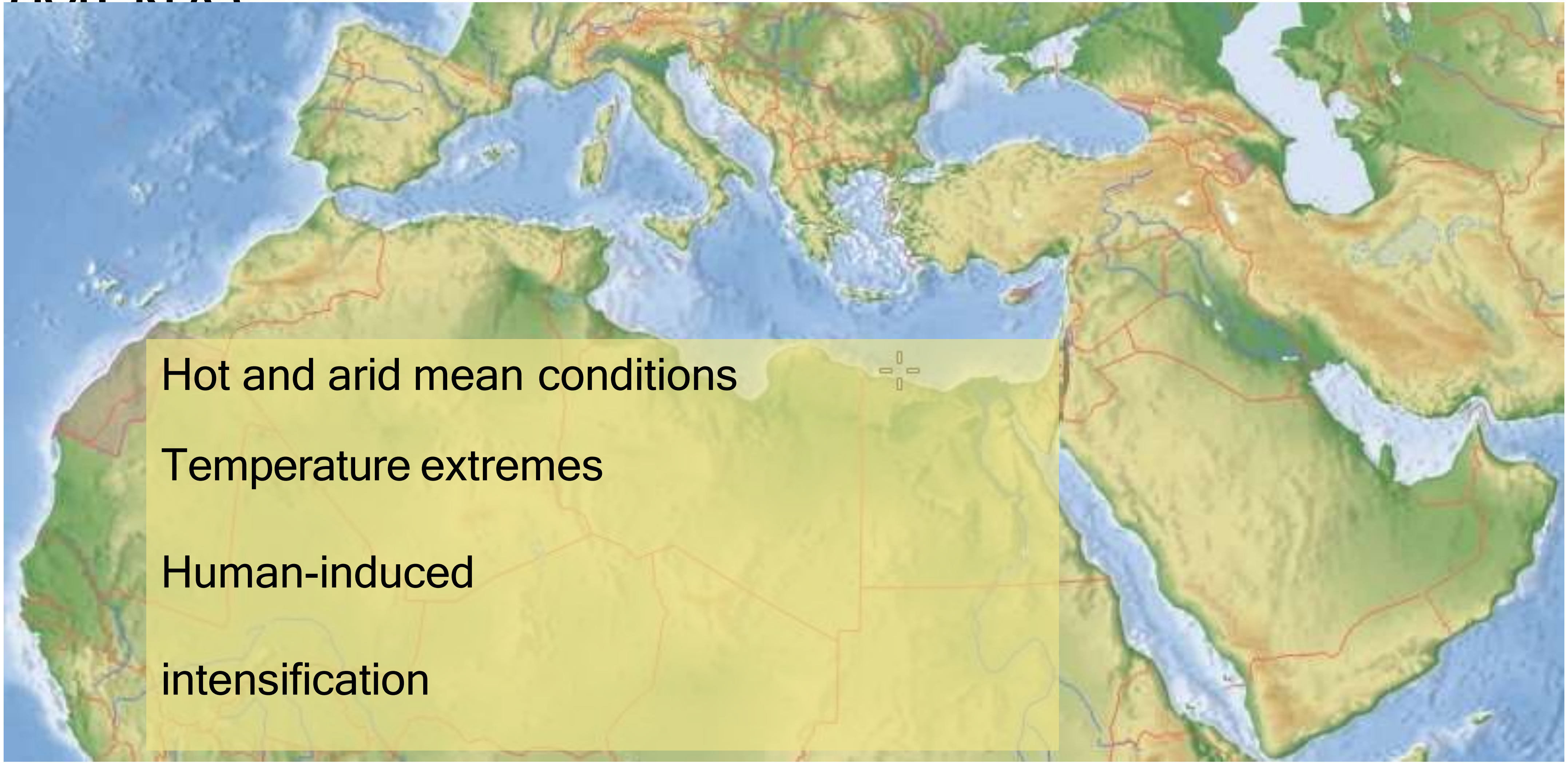
Heat extremes in the eastern Mediterranean and the Middle East

Panos Hadjinicolaou

LIFEASTI 2nd European Workshop
"Urban Heat Island and Heat Resilience: Networking for Future Strategy"

Online 14/10/2020

Mediterranean, Middle East & North Africa (MENA)



Hot and arid mean conditions

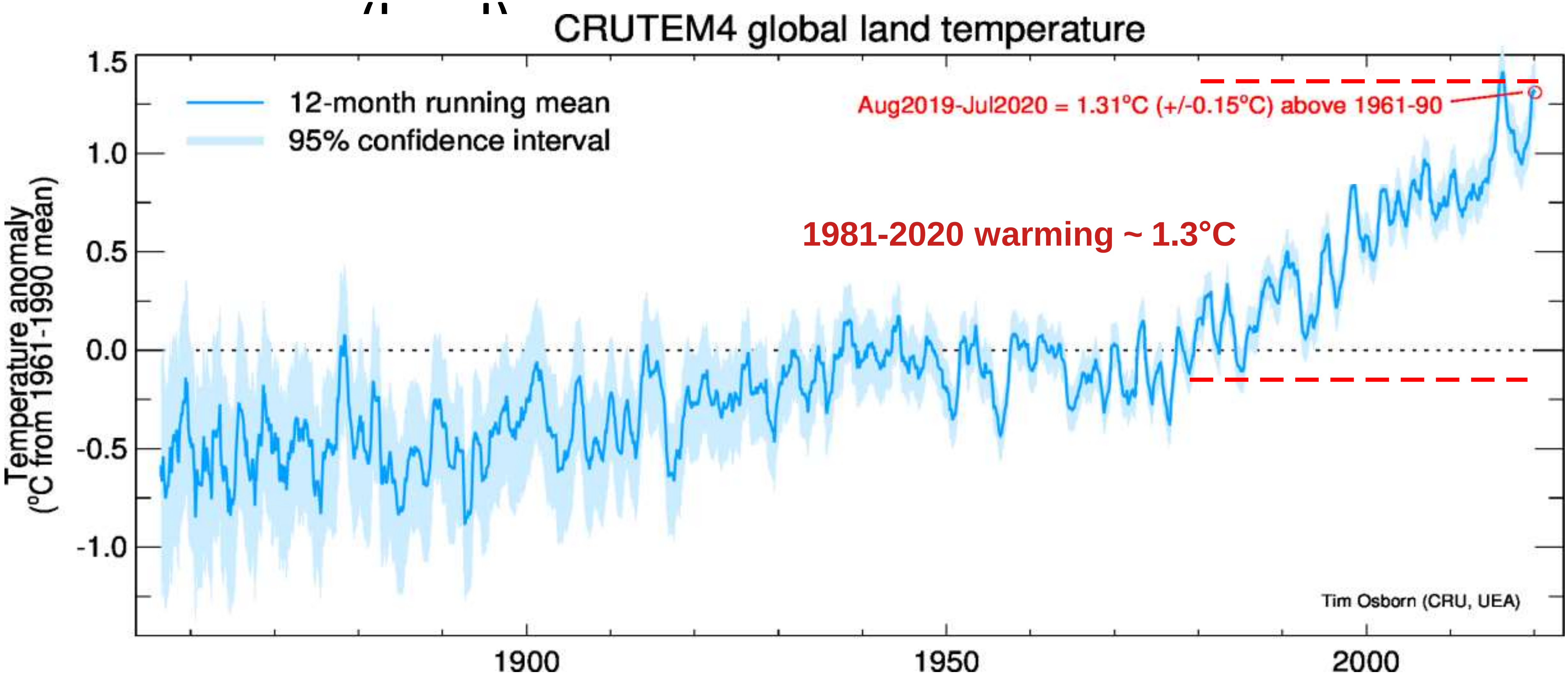
Temperature extremes

Human-induced

intensification

Adverse impacts (health, water/energy nexus)

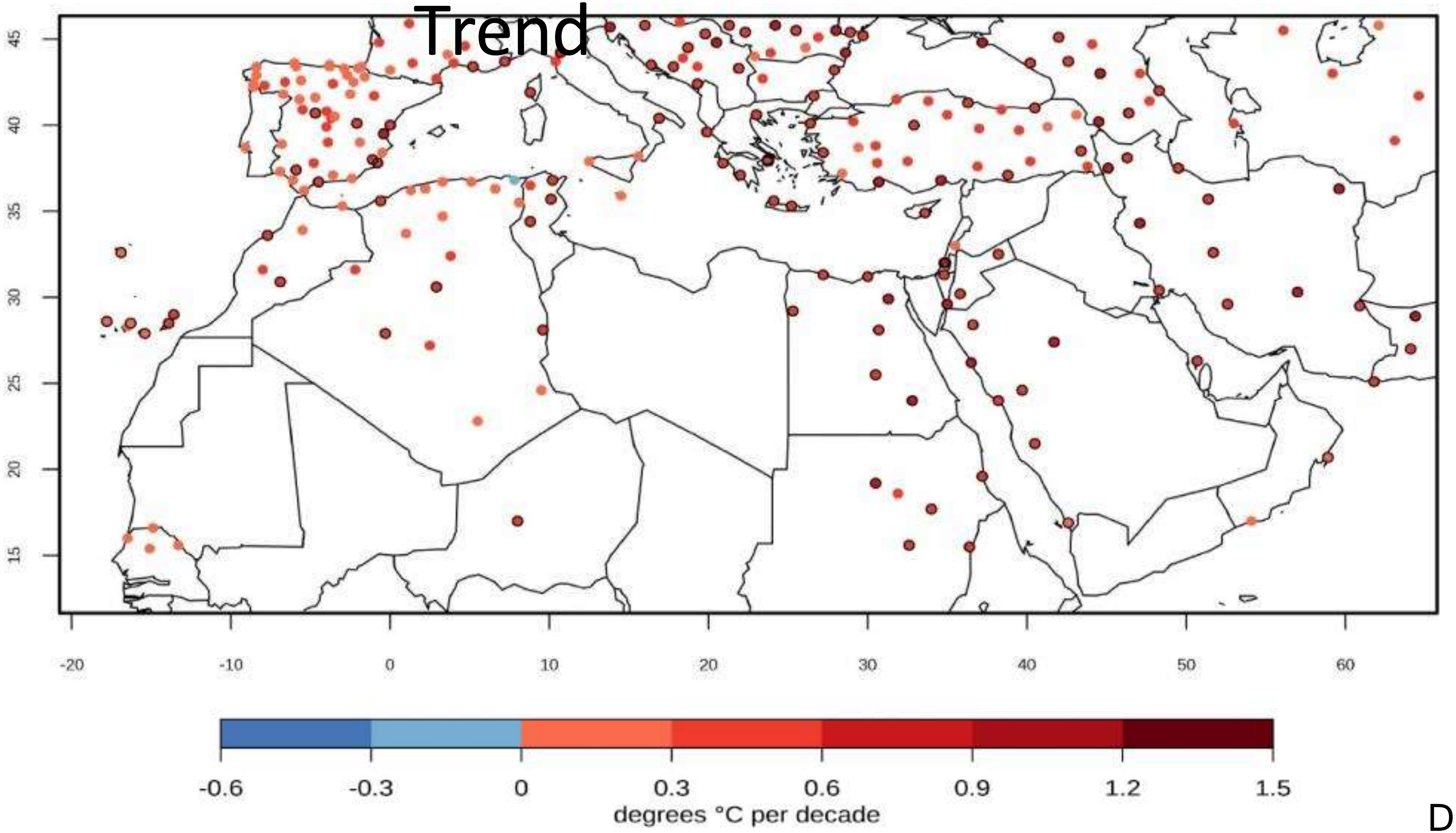
Observed global warming



1981-2020 warming ~ 1.3°C

https://crudata.uea.ac.uk/~timo/diag/temptsland_12monrunning_global.png

Mean Temperature Annual Trend



1981-2019

Median trend:

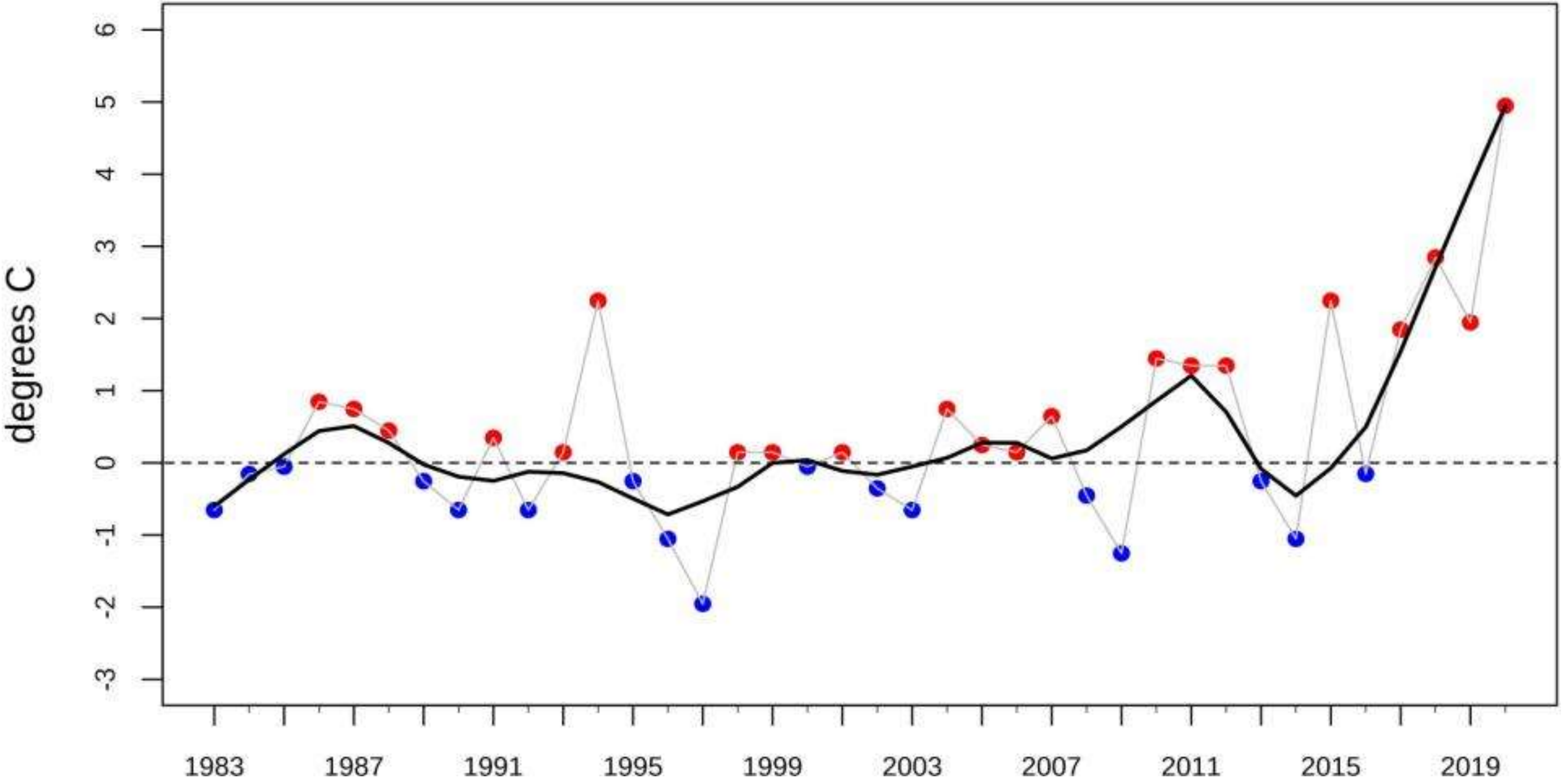
~ 0.4°C/decade

= +1.6°C

0.3°C larger than global average

Data: CRUTEM 4.6

Nicosia Tmax 1983-2020 September



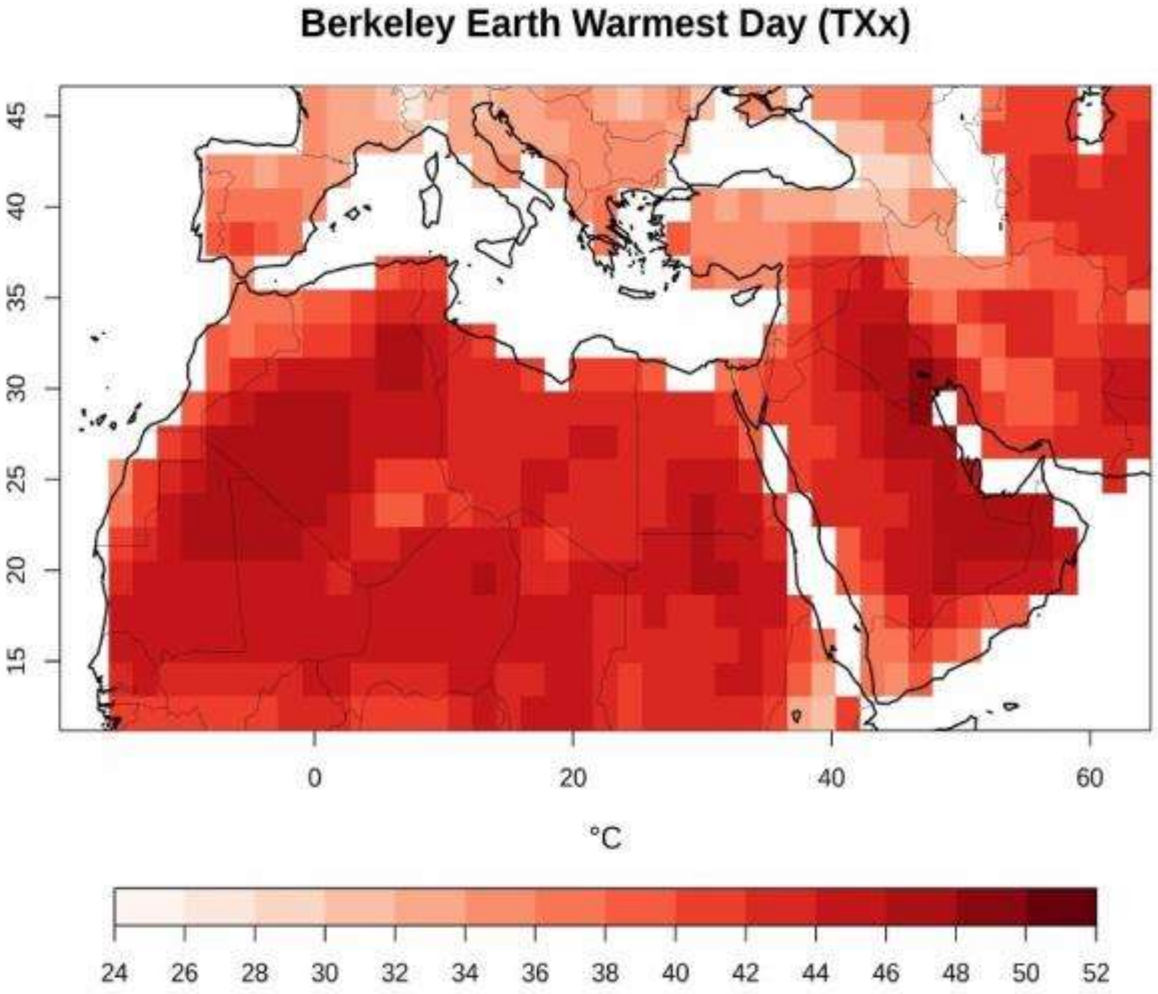
2020:

No. days > 40°C

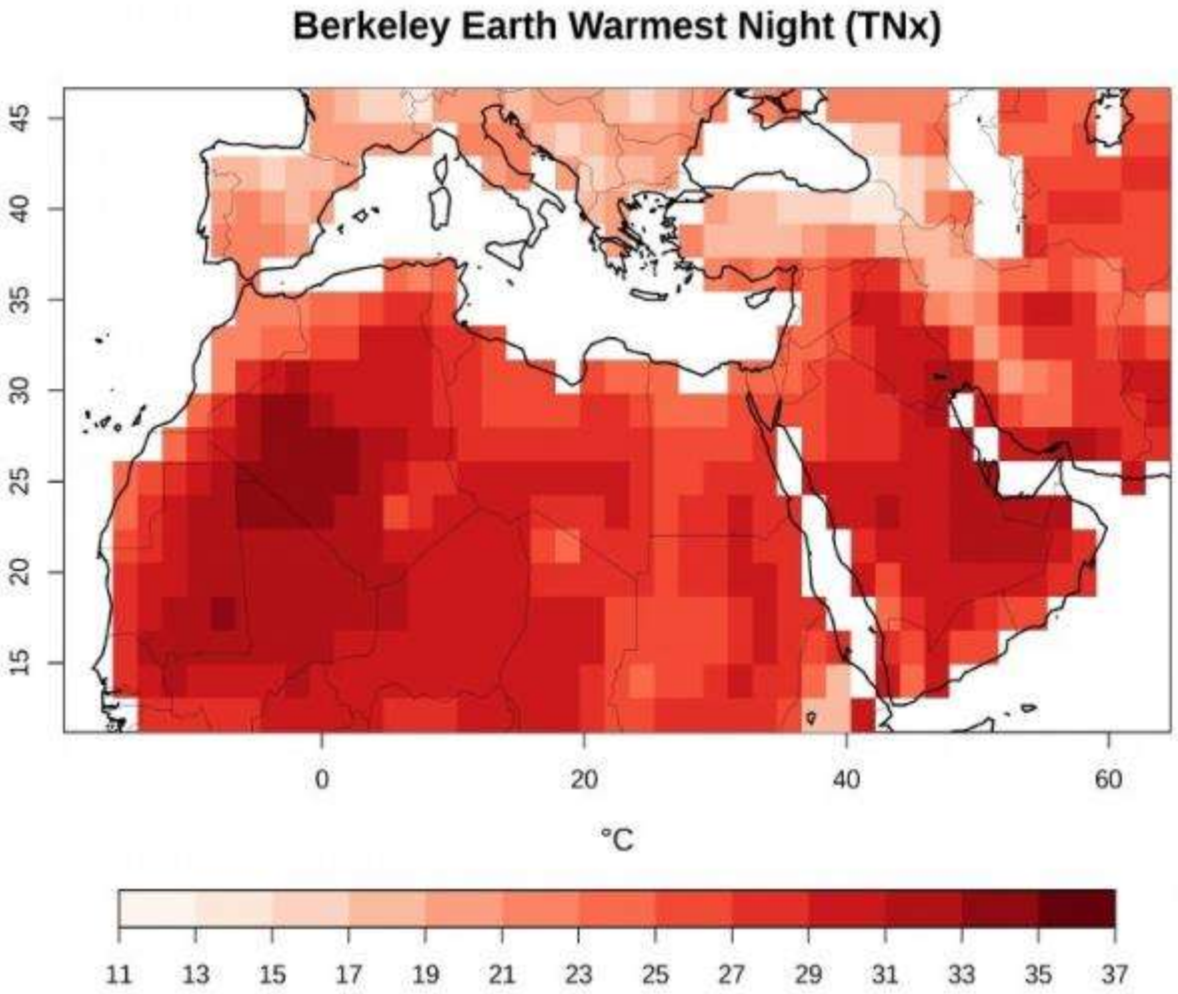
May:	6
June:	2
July:	18
August:	12
September:	9
October:	1
Total:	48

Data: Cyprus DoM

Temperature extremes 1981-2019 Obs Climatology

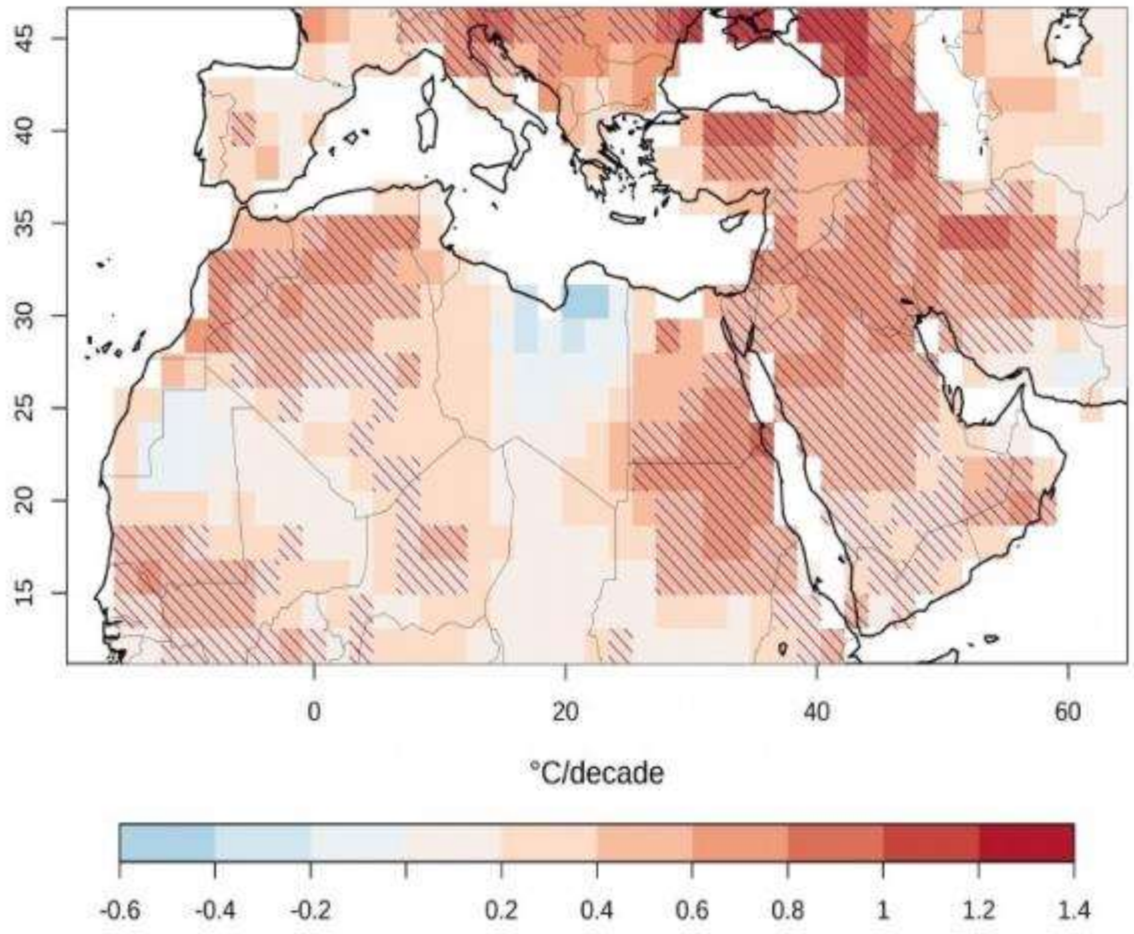


Berkeley Earth Warmest Day (TXx)

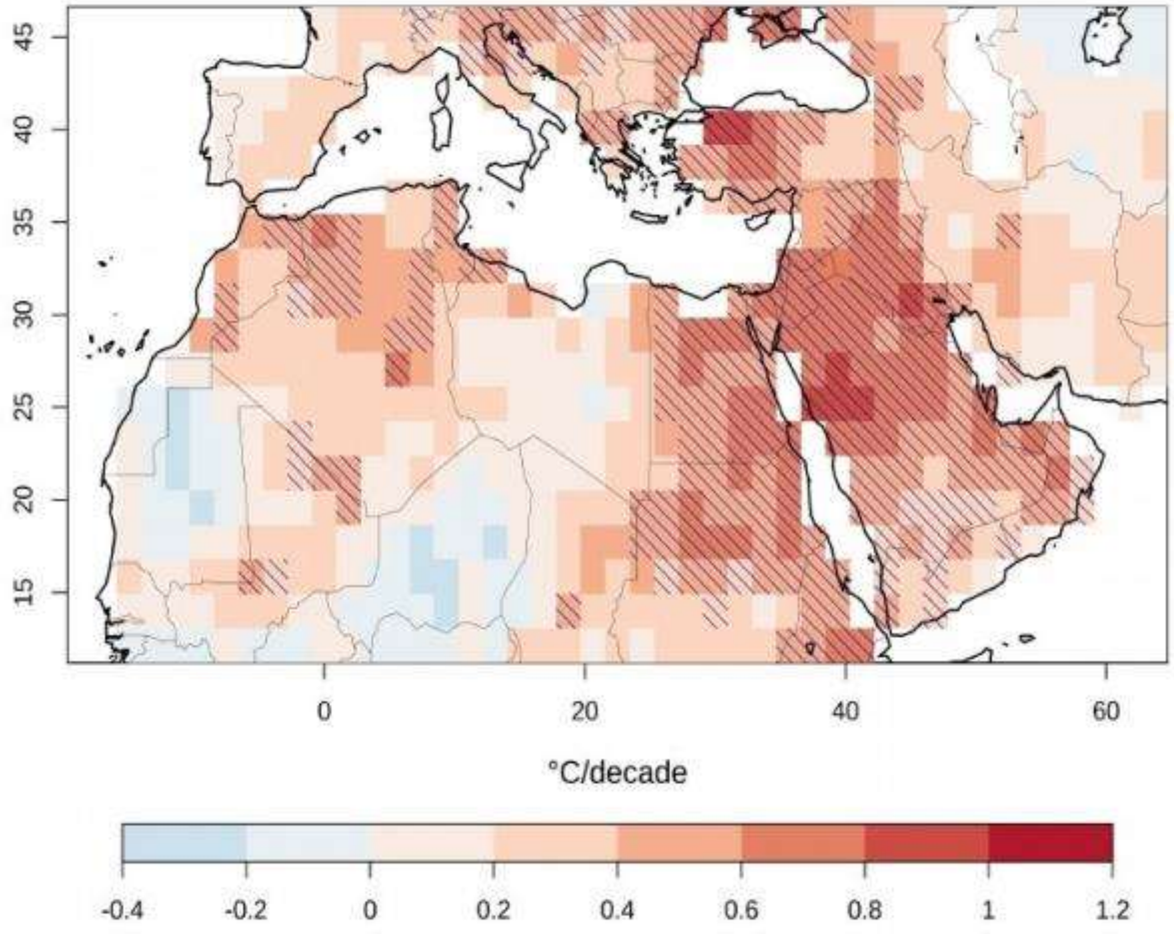


Berkeley Earth Warmest Night (TNx)

Temperature extremes 1981-2019 Trend Obs

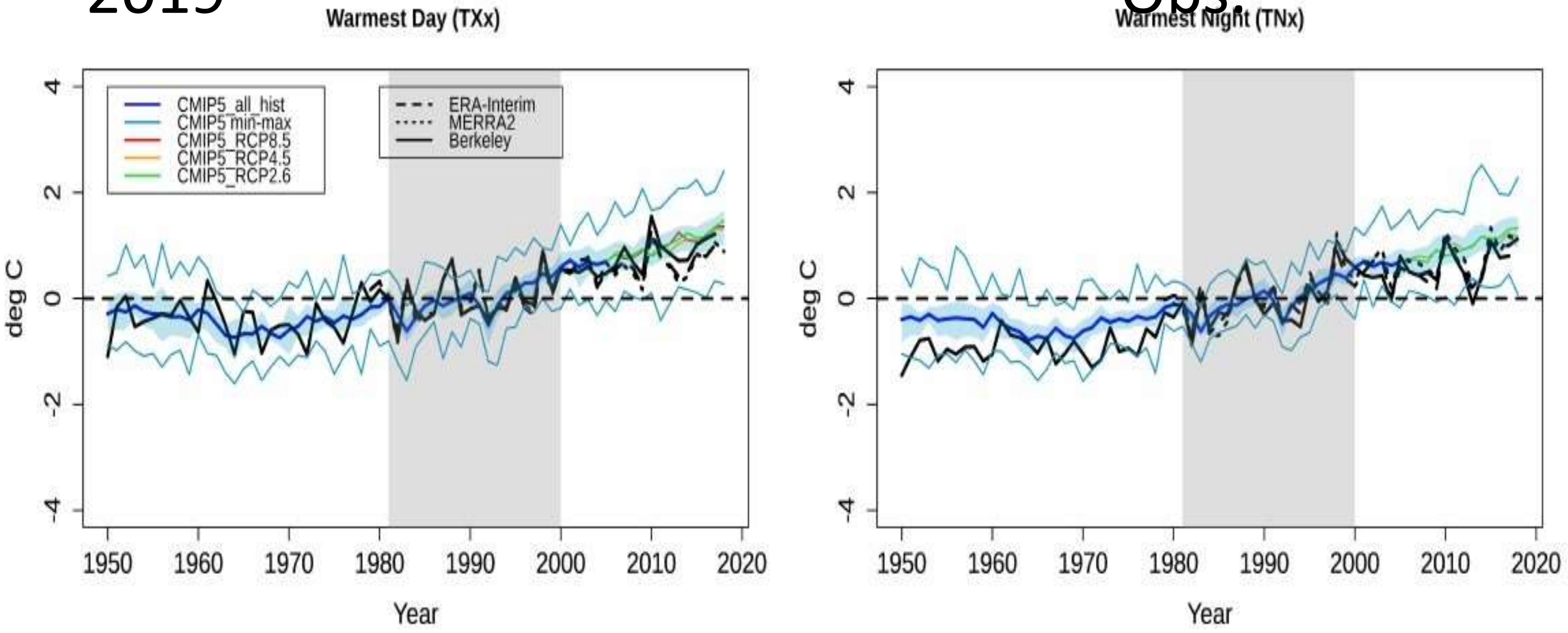


Berkeley Earth Warmest Day (TXx)

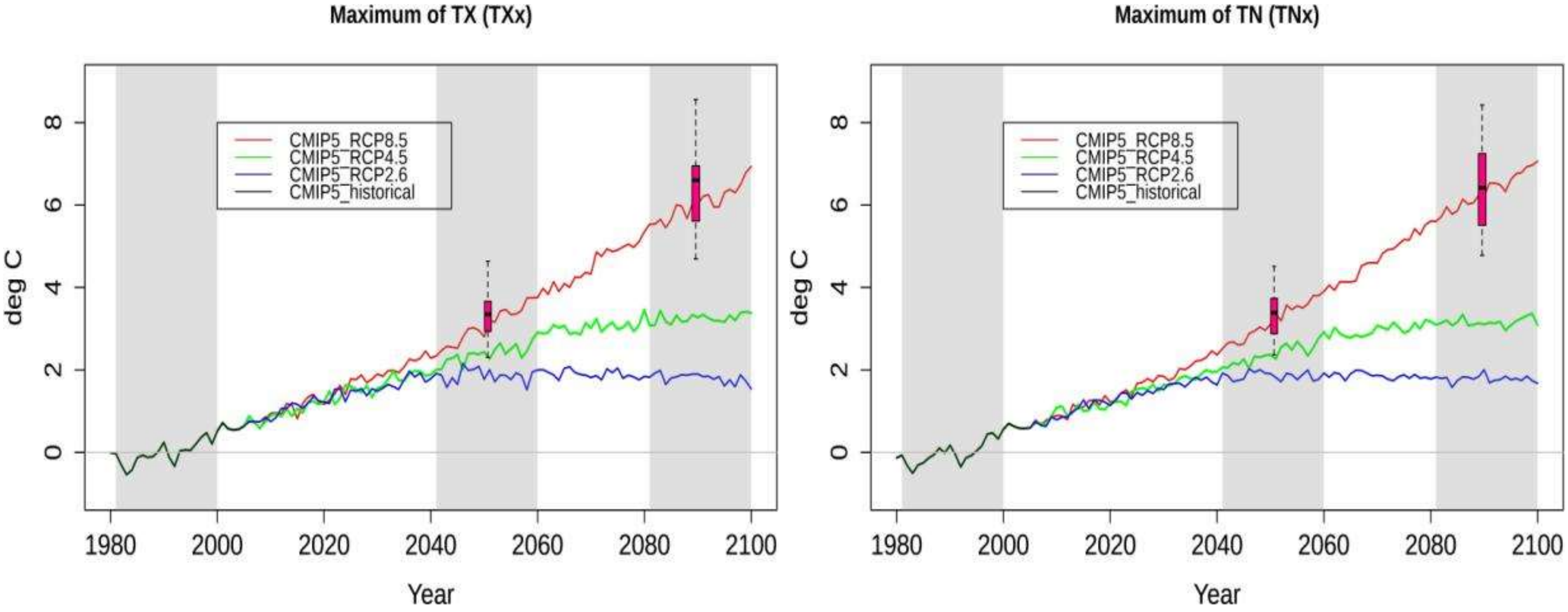


Berkeley Earth Warmest Night (TNx)

Temperature extremes 1951-2019 Models + Obs.

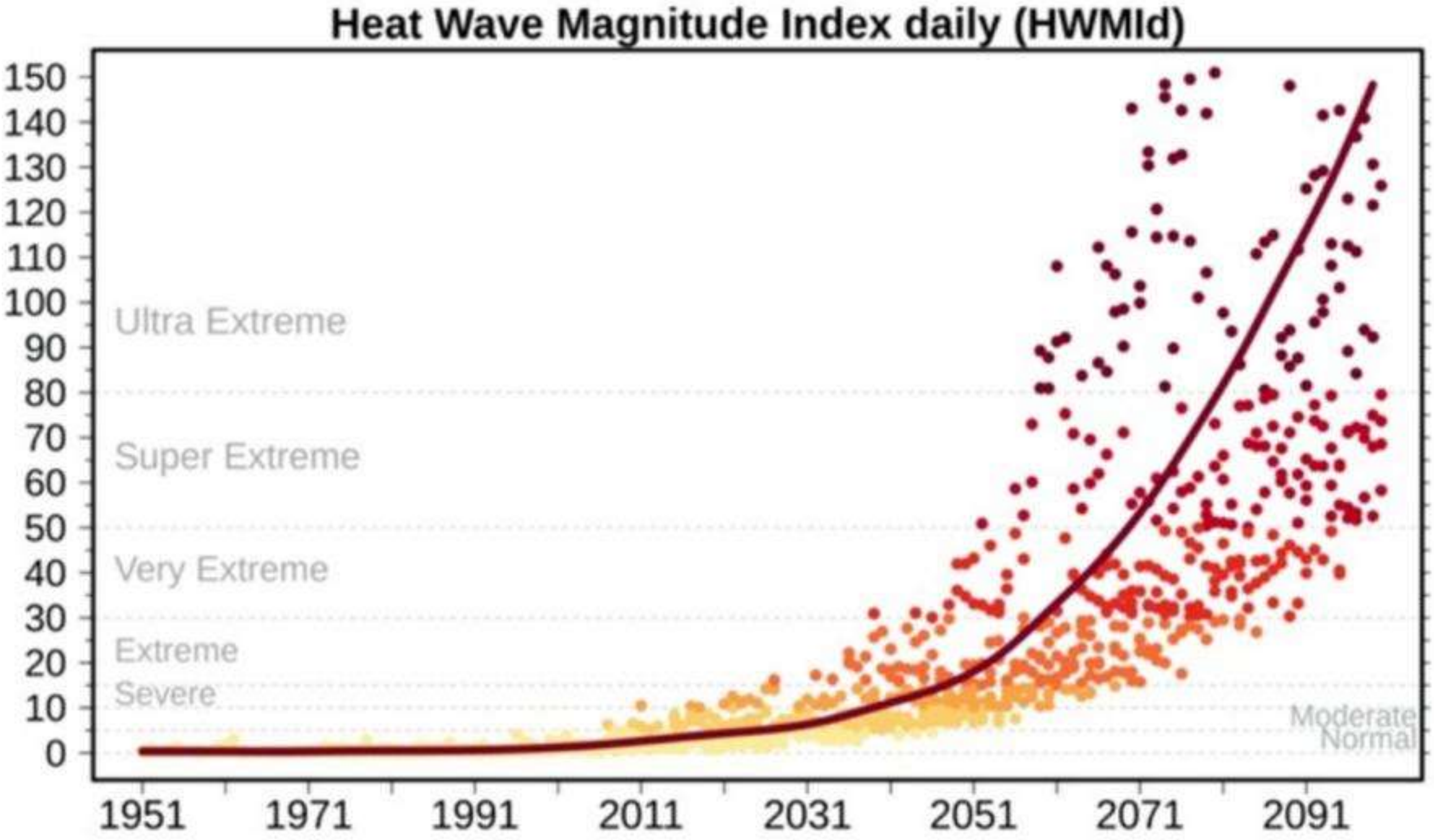


Temperature extremes 1981-2100 Models



Heatwave magnitude to 2100

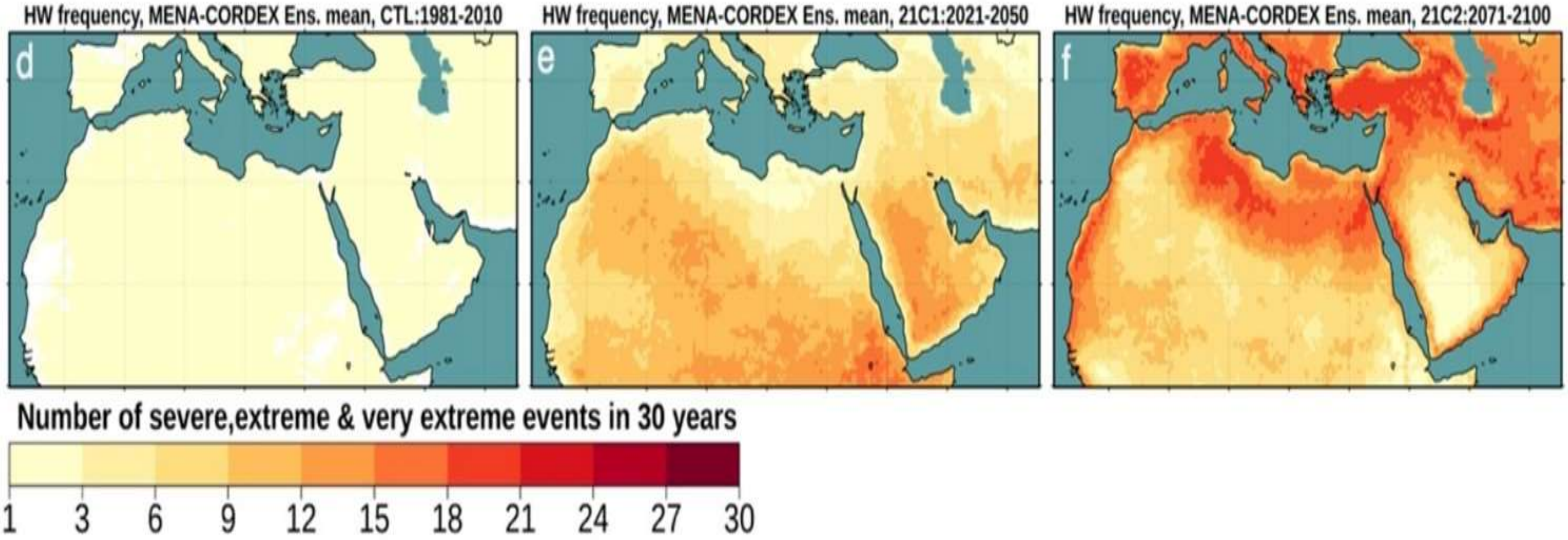
Models



Data: MENA-CORDEX

Heatwave frequency to 2100

Model s



Data: MENA-CORDEX

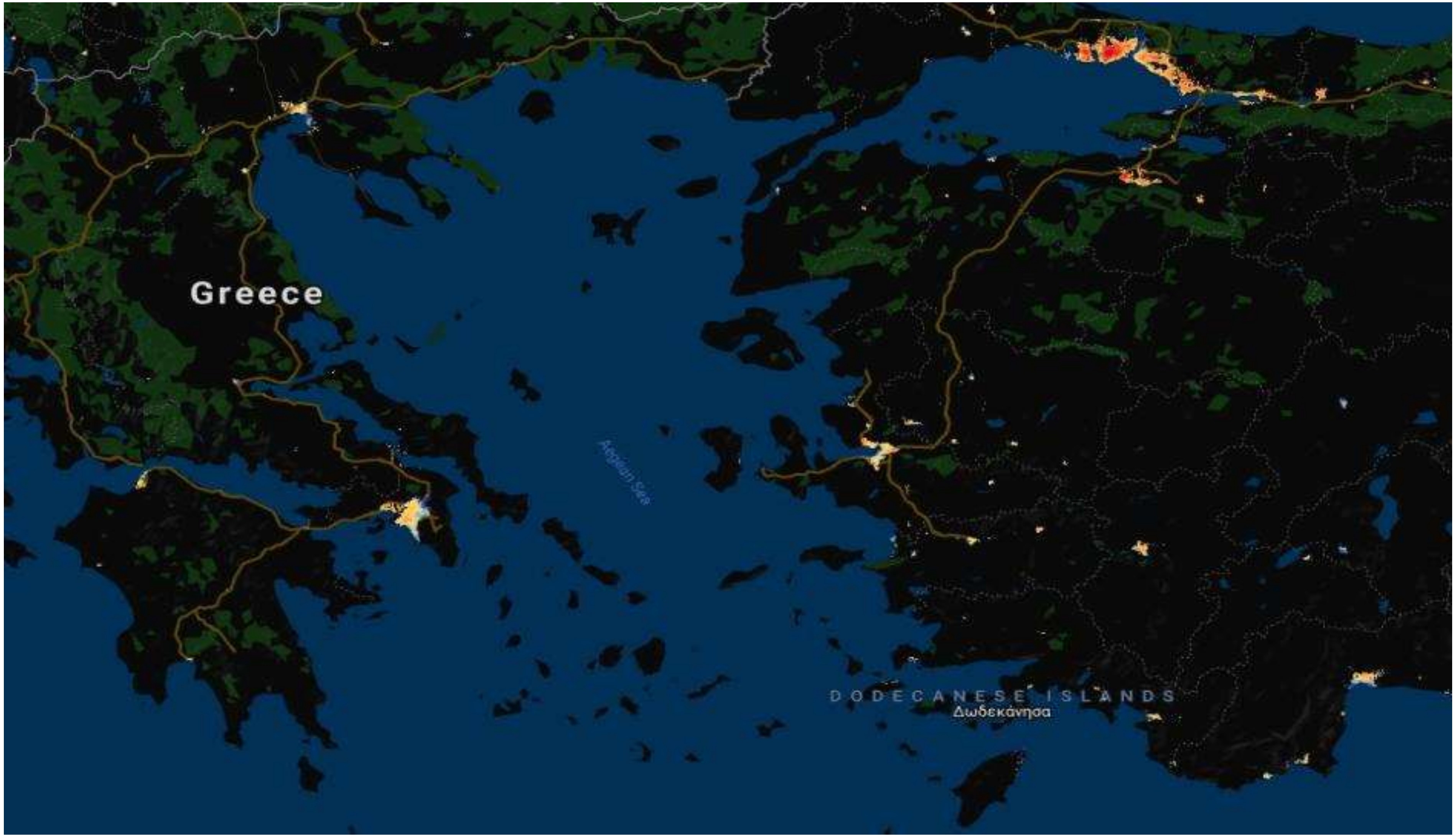
Land Urban Heat

Not included in model projections!

🟦 <-1.5
🟦 -1.5 to 0
🟨 0 to 1.5
🟧 1.5 to 3
🟧 3 to 4.5
🟥 4.5 to 6
🟥 6 to 7.5
🟥 >7.5

https://yceo.yale.edu/research/global-surface-uhi-explorer

Land Urban Heat



Not included in model projections!

https://yceo.yale.edu/research/global-surface-uhi-explorer

For urban inclusive climate projections

→ Explicit consideration in high-resolution GCM/RCM runs by incorporation of urban parameterizations:

e.g. Katzfey, J, Schlünzen, H, Hoffmann, P, Thatcher, M. How an urban parameterization affects a high-resolution global climate simulation. Q J R Meteorol Soc. 2020; 1– 22. https://doi.org/10.1002/qj.3874

→ Urban correction of existing resolution GCM/RCM output by statistical methods:

e.g. van der Schriek, T.; Varotsos, K.V.; Giannakopoulos, C.; Founda, D. Projected Future Temporal Trends of Two Different Urban Heat Islands in Athens (Greece) under Three Climate Change Scenarios: A Statistical Approach. Atmosphere 2020, 11, 637 https://www.mdpi.com/2073-4433/11/6/637

Contributors:

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K. Constantinidou, G. Lazoglou,
Y. Proestos, J. Lelieveld

Related projects:

EMME-CARE
EASTERN MEDITERRANEAN
MIDDLE EAST - CLIMATE &
ATMOSPHERE RESEARCH CENTRE

https://emme-care.cyi.ac.cy

CELSIUS
Projecting temperature extremes

https://emme-ca

Thank you for your attention!

p.hadjinicolaou@cyi.ac.cy

Session II: The LIFE ASTI project/ Making community weather-ready

- **LIFE ASTI general presentation**

Prof. Dimitris Melas, Aristotle University of Thessaloniki

- **A citizen science network to make cities weather ready**

Dr. Giampietro Casasanta, Institute of Atmospheric Sciences and Climate, National Research Center

- **Modeling the Urban Heat Island effect: Operational UHI forecasting system**

Serafeim Kontos, Aristotle University of Thessaloniki

- **Monitoring the Urban Heat Island effect with the LIFE ASTI application platform**

Dr. Panos Symeonidis, Geospatial Enabling Technologies

- **Heat health warning systems in Rome and Thessaloniki**

Dr. Francesca de'Donato, Department of Epidemiology of the Regional Health Service – Lazio

LIFE ASTI general presentation

LIFE ASTI Second European Workshop

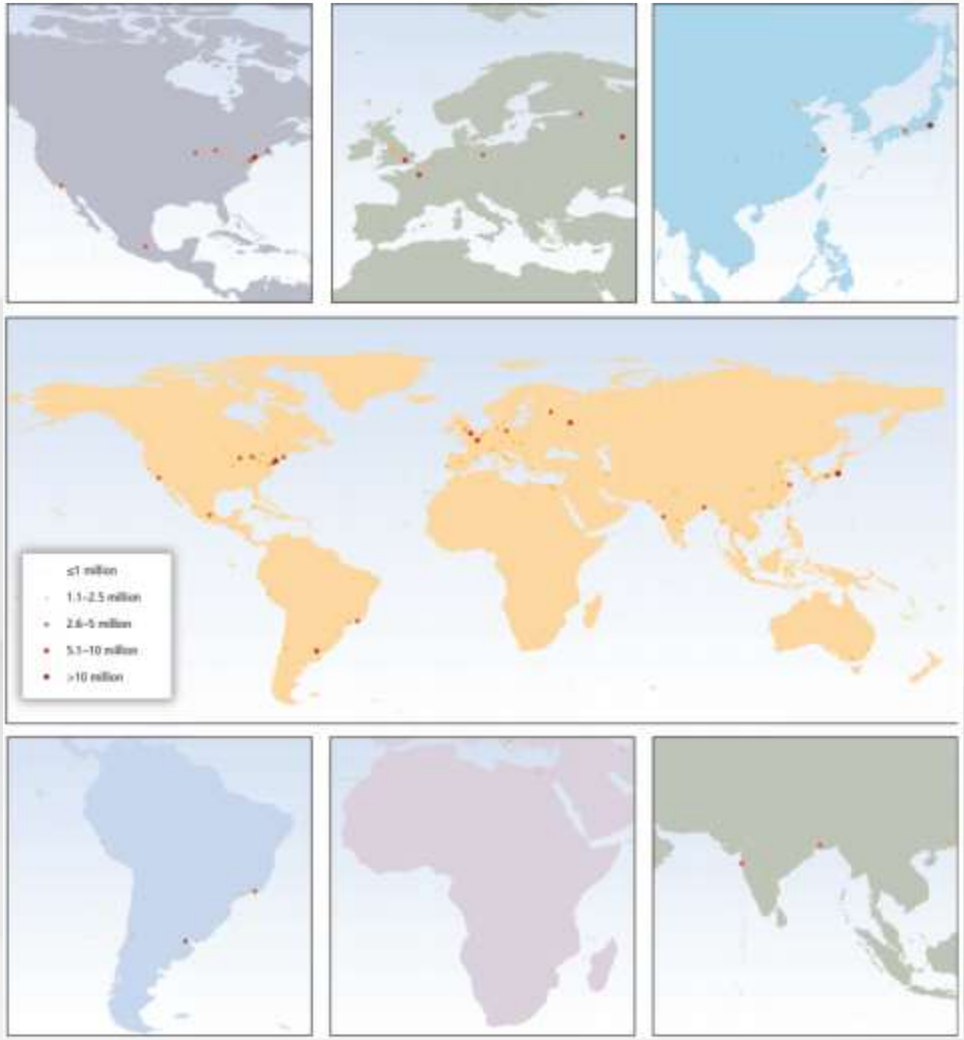
14 October 2020

Professor Dimitris Melas
Aristotle University of Thessaloniki
Laboratory of Atmospheric Physics

The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

An urbanizing world

1950: 30% of the population was urban
2018: 55%
2050: 68%

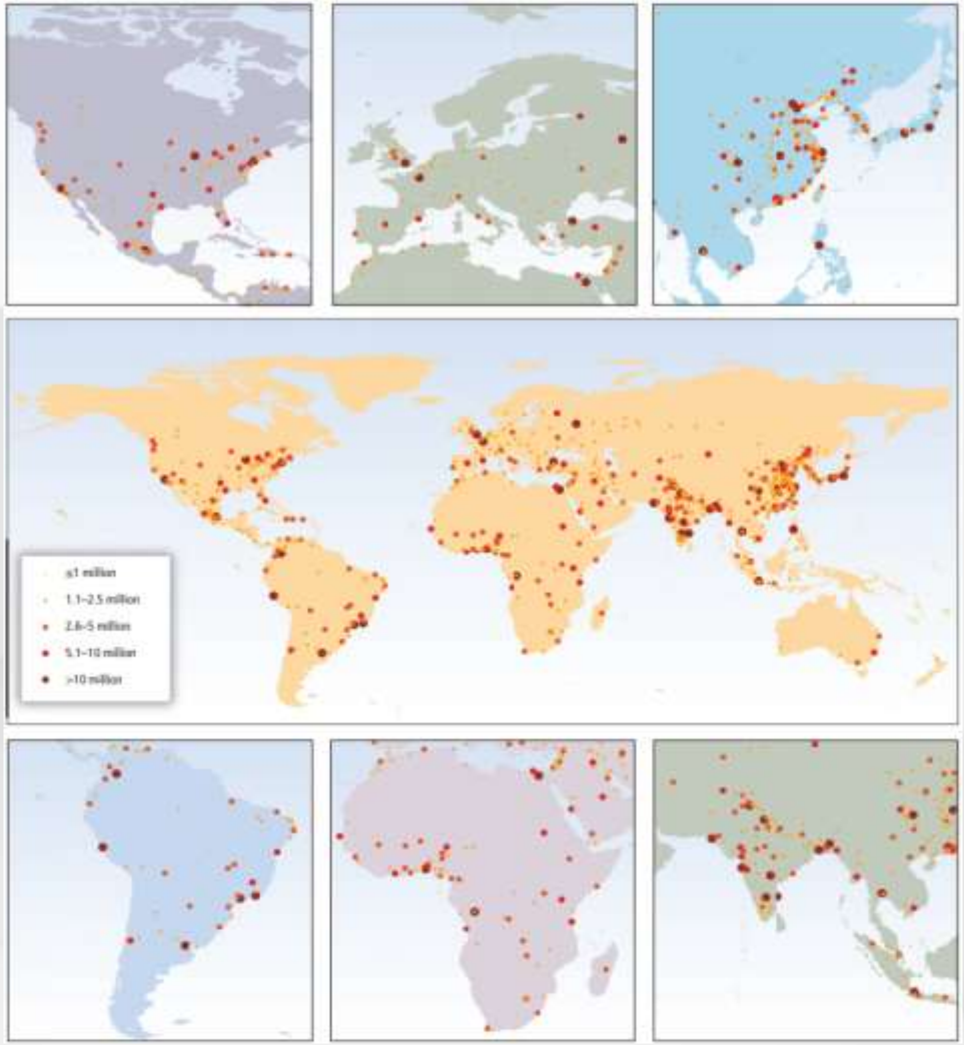


Urban agglomerations with 750,000-plus inhabitants in 1950/2025 (derived from statistics in UN DESA Population Division, 2012)

- Urban populations:
  - Northern America 82 %
  - Latin America and the Caribbean 81 %
  - Europe 74 %

An urbanizing world

1950: 30% of the population was urban
2018: 55%
2050: 68%



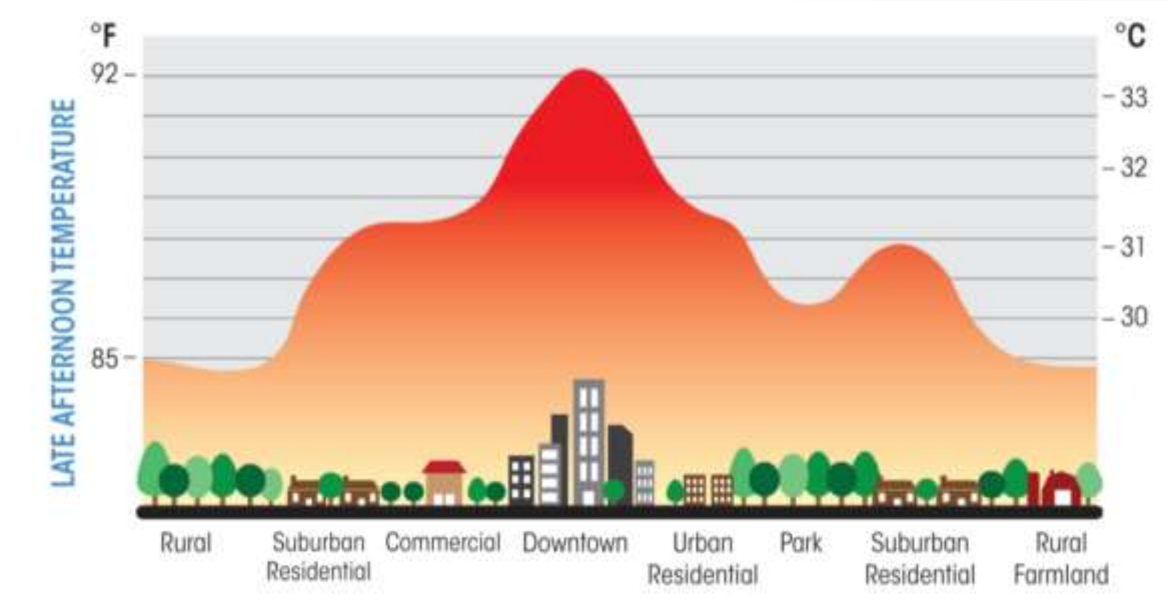
Urban agglomerations with 750,000-plus inhabitants in 1950/2025 (derived from statistics in UN DESA Population Division, 2012)

- Urban populations:
  Northern America 82 %
  Latin America and the Caribbean 81 %
  Europe 74 %

Urban heat island effect (UHI)

Urban Heat Island (**UHI**)

Temperature contrast between a city and its rural surroundings



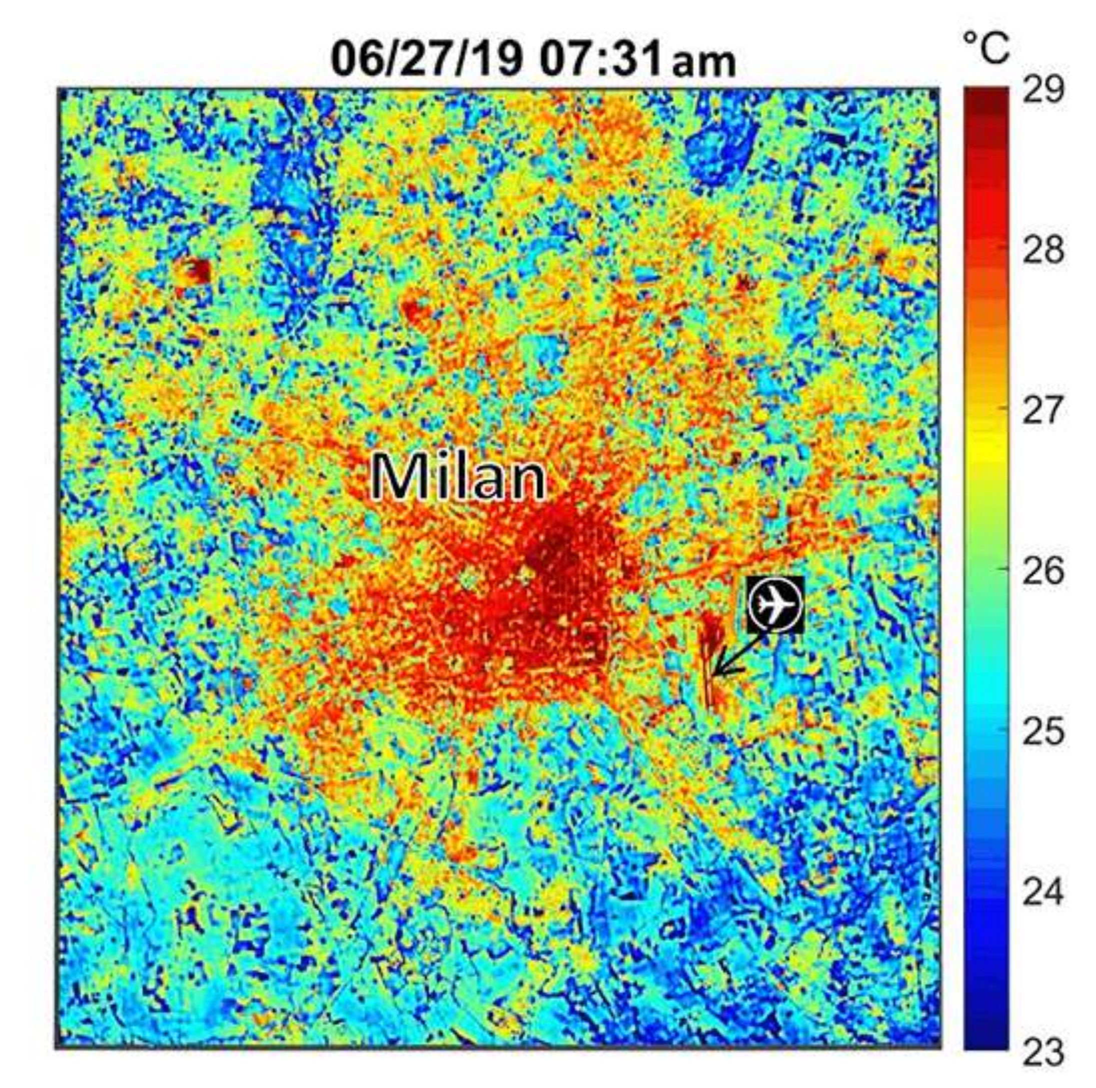
UHI can be **attributed to** …

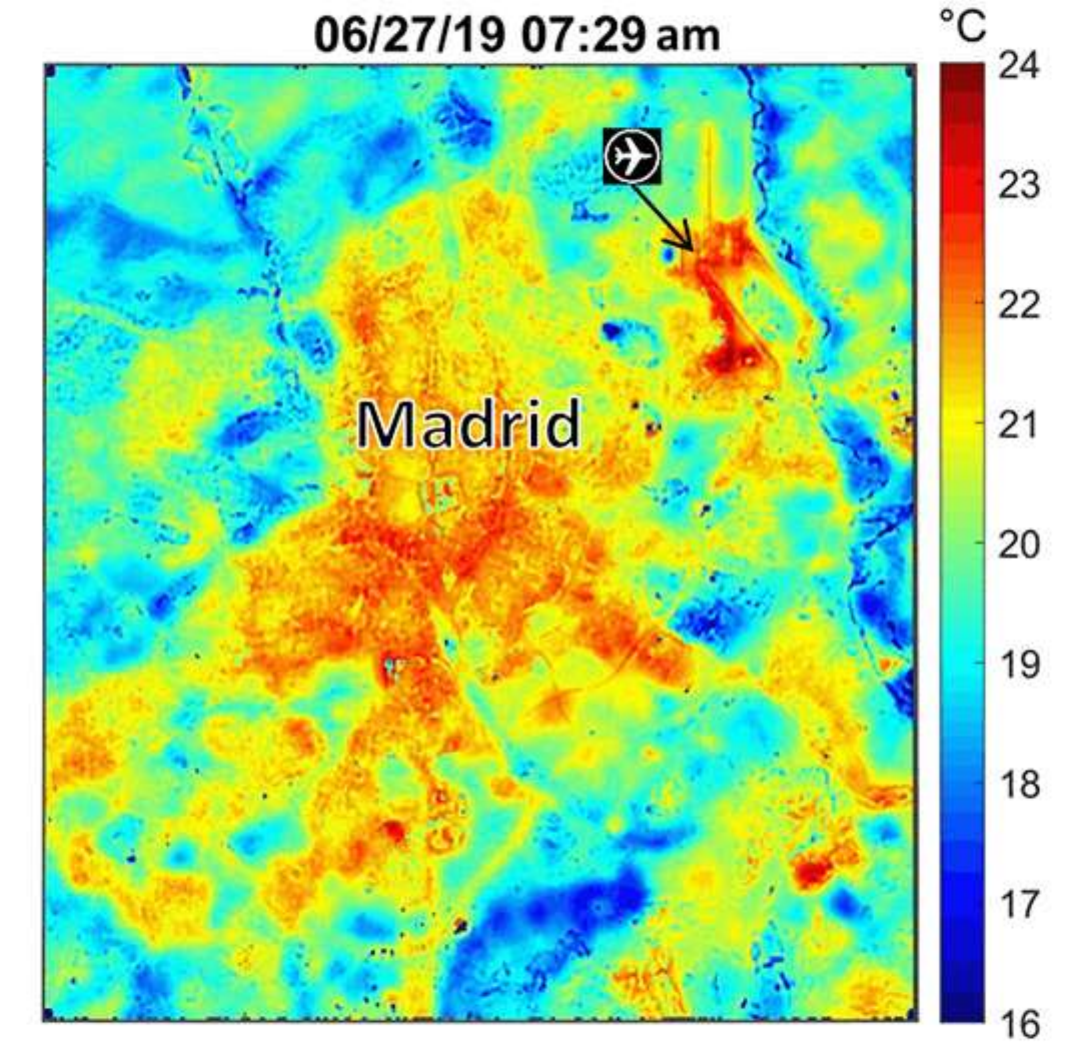
- Anthropogenic heat release
- Geometric impact of buildings
- Thermal properties of urban surfaces
- Absence of vegetation

→

Interaction of **controllable** (i.e. anthropogenic heat) and **uncontrollable** (i.e. solar radiation) factors

The NASA Ecostress map for European cities during the June 2019 heatwave

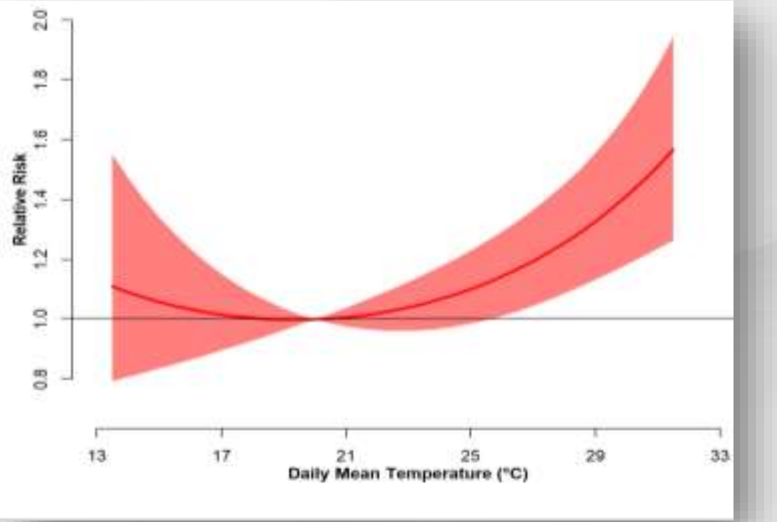


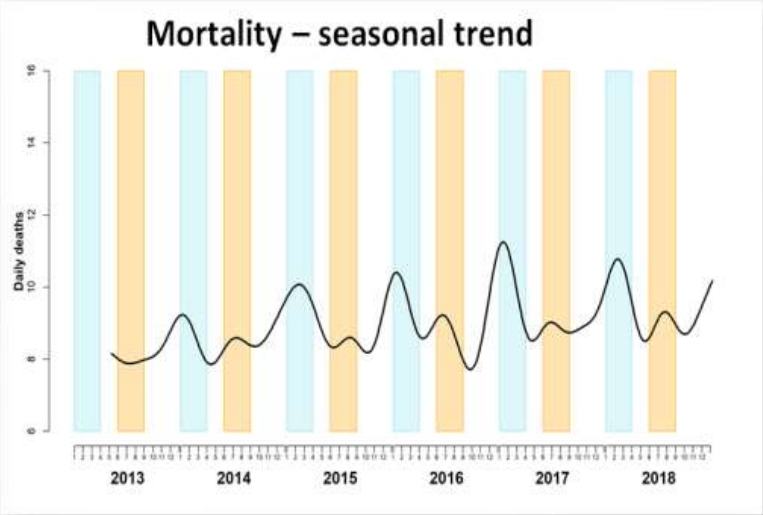


UHI: Why do we care?

- A living environment that is significantly degraded.

i. Increased thermal stress on residents and the public. **A significantly increased level and risk of morbidity and mortality due to heat**.




Mortality – seasonal trend

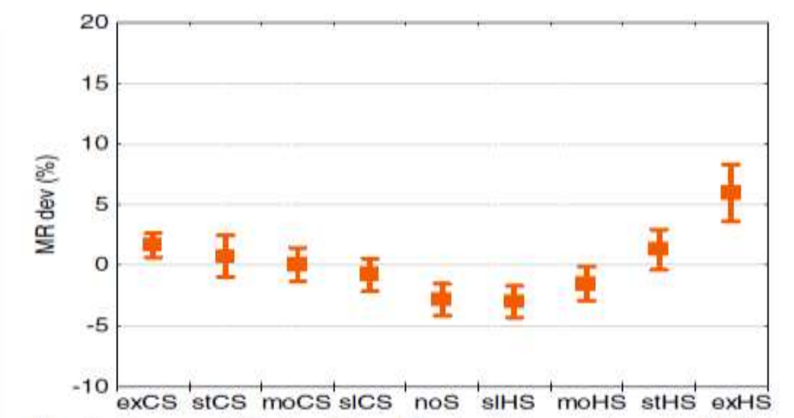


Fig. 6 Mean mortality for different levels of thermal stress for PET at 2.00 p.m. with the inclusion of short-term adaptation, Zagreb, period 1983–2008. *ex* Extreme, *st* strong, *mo* moderate, *sl* slight, *HS* heat stress, *CS* cold stress, *noS* no thermal stress

Francesca de'Donato , Matteo Scortichini, 2019

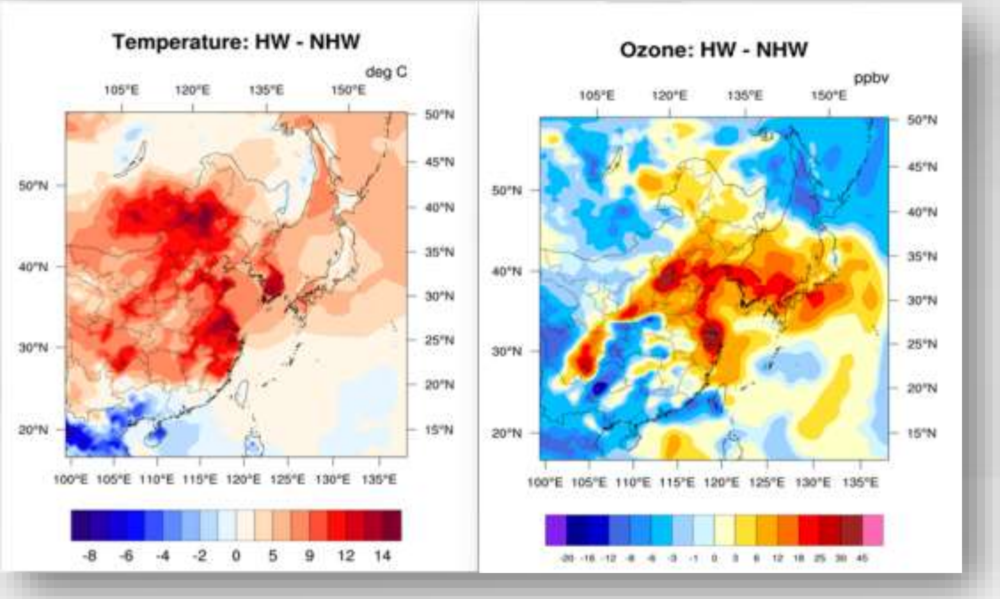
Impact of heat waves on mortality in Croatia, Zaninovic et al. Int J Biometeorol (2014) 58:1135–1145

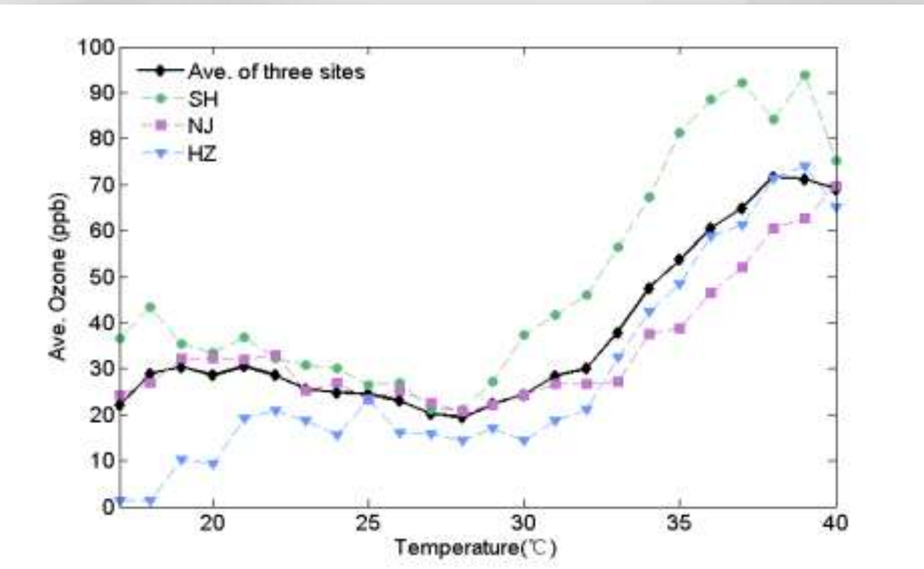
UHI: Why do we care?

- A living environment that is significantly degraded.

i. Increased thermal stress on residents and the public. A significantly increased level and risk of morbidity and mortality due to heat.

ii. Formation of large amounts of smog and air pollutants, and a resulting degradation in the quality of air.



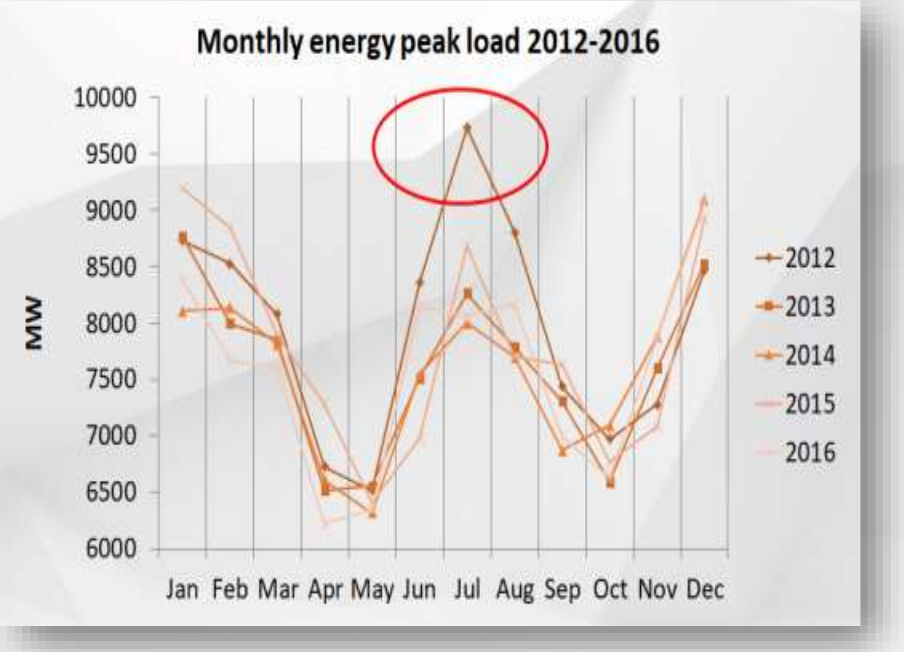


Pu, X., Wang, T.J., Huang, X., Melas, D., Zanis, P., Papanastasiou, D.K., Poupkou, A. (2017) Enhanced surface ozone during the heat wave of 2013 in Yangtze River Delta region, China. Science of the Total Environment, 603-604, pp. 807-816.

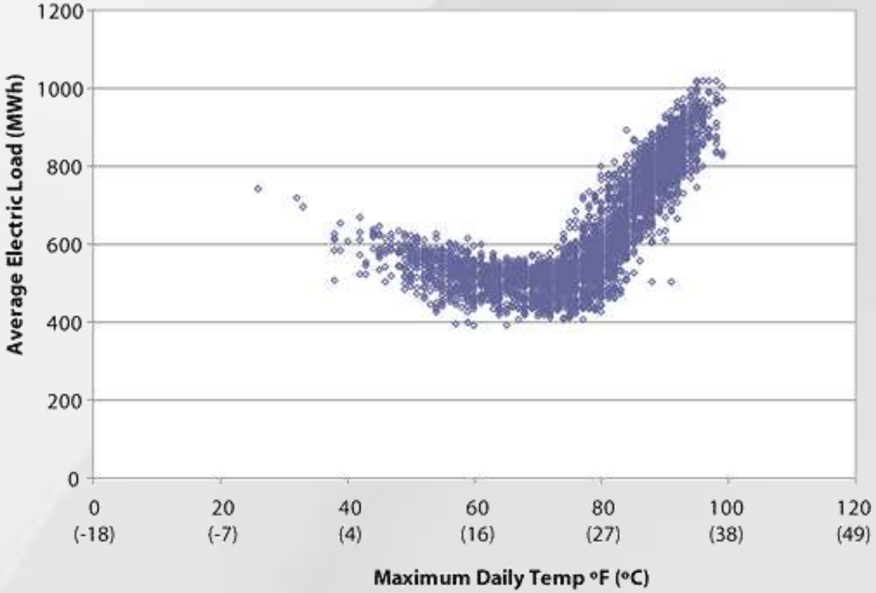
UHI: Why do we care?

- A living environment that is significantly degraded.

iii. Increased cooling energy usage and associated costs. Significant increases in peak energy demand.



As shown in the example from New Orleans, electrical load can increase steadily once temperatures begin to exceed 20–25°C.



Sailor, D. J. 2002. Urban Heat Islands, Opportunities and Challenges for Mitigation and Adaptation. Sample Electric Load Data for New Orleans, LA (NOPSI, 1995). North American Urban Heat Island Summit. Toronto, Canada. 1–4 May 2002.

On the consequences – Increased economical costs

The total economic costs of climate change for cities this century could be 2.6 times higher when heat island effects are taken into account than when they are not.

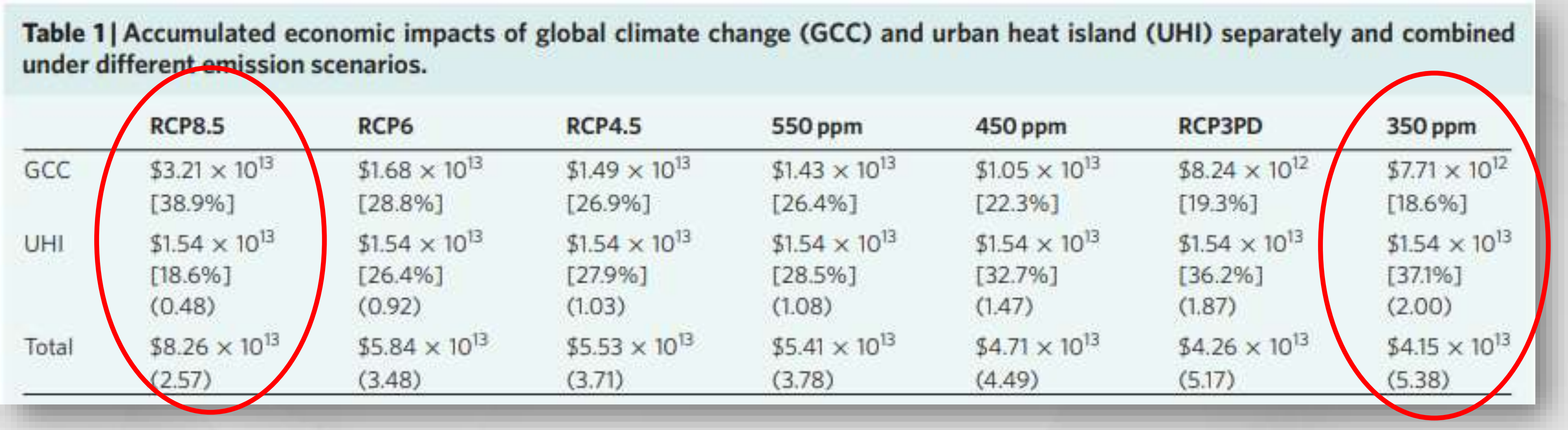
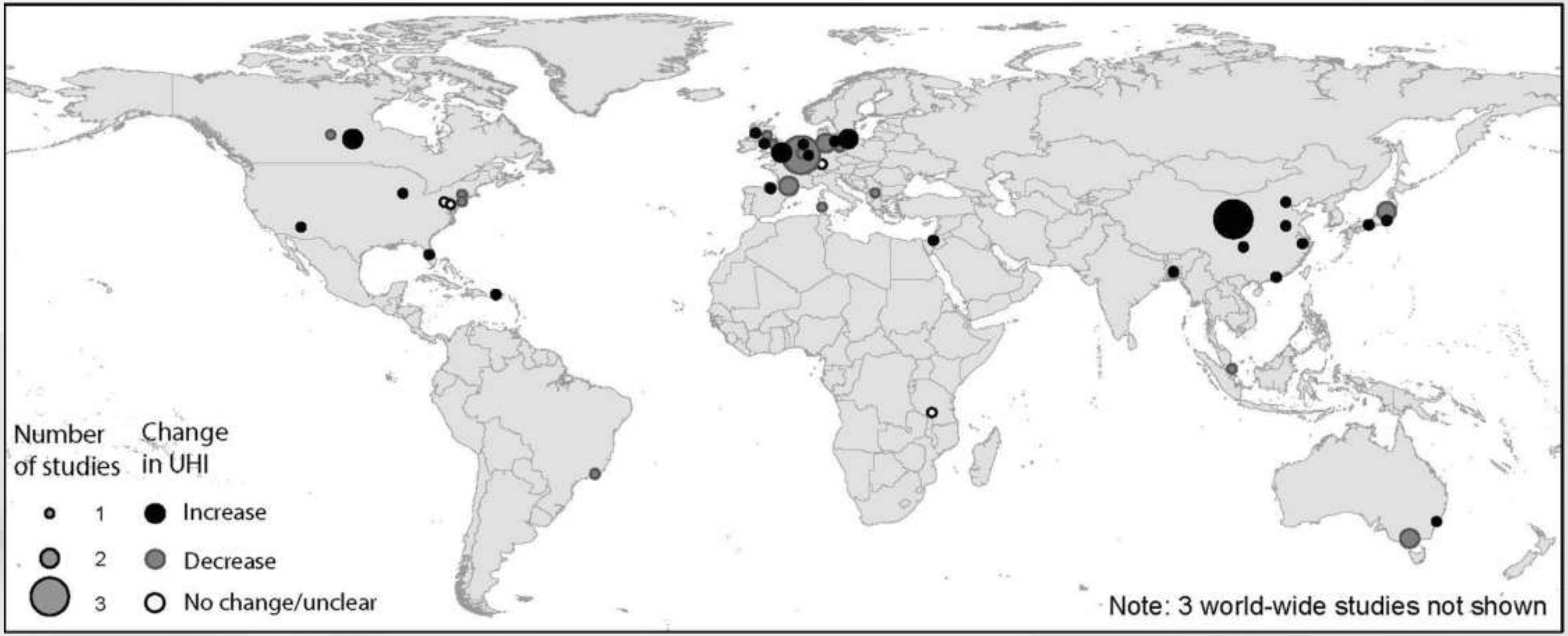


Table 1 | Accumulated economic impacts of global climate change (GCC) and urban heat island (UHI) separately and combined under different emission scenarios.

	RCP8.5	RCP6	RCP4.5	550 ppm	450 ppm	RCP3PD	350 ppm
GCC	$\$3.21 \times 10^{13}$ [38.9%]	$\$1.68 \times 10^{13}$ [28.8%]	$\$1.49 \times 10^{13}$ [26.9%]	$\$1.43 \times 10^{13}$ [26.4%]	$\$1.05 \times 10^{13}$ [22.3%]	$\$8.24 \times 10^{12}$ [19.3%]	$\$7.71 \times 10^{12}$ [18.6%]
UHI	$\$1.54 \times 10^{13}$ [18.6%] (0.48)	$\$1.54 \times 10^{13}$ [26.4%] (0.92)	$\$1.54 \times 10^{13}$ [27.9%] (1.03)	$\$1.54 \times 10^{13}$ [28.5%] (1.08)	$\$1.54 \times 10^{13}$ [32.7%] (1.47)	$\$1.54 \times 10^{13}$ [36.2%] (1.87)	$\$1.54 \times 10^{13}$ [37.1%] (2.00)
Total	$\$8.26 \times 10^{13}$ (2.57)	$\$5.84 \times 10^{13}$ (3.48)	$\$5.53 \times 10^{13}$ (3.71)	$\$5.41 \times 10^{13}$ (3.78)	$\$4.71 \times 10^{13}$ (4.49)	$\$4.26 \times 10^{13}$ (5.17)	$\$4.15 \times 10^{13}$ (5.38)

Estrada, F., Botzen, W. J. W., & Tol, R. S. J. (2017). A global economic assessment of city policies to reduce climate change impacts. Nature Climate Change, 7(6), 403–406. doi:10.1038/nclimate3301

Geographic spread of studies focusing on the interaction between climate change, urban growth and the UHI



Chapman, Sarah & Watson, James & Salazar, Alvaro & Thatcher, Marcus & Mcalpine, Clive. (2017). The impact of urbanization and climate change on urban temperatures: a systematic review. Landscape Ecology. 10.1007/s10980-017-0561-4.

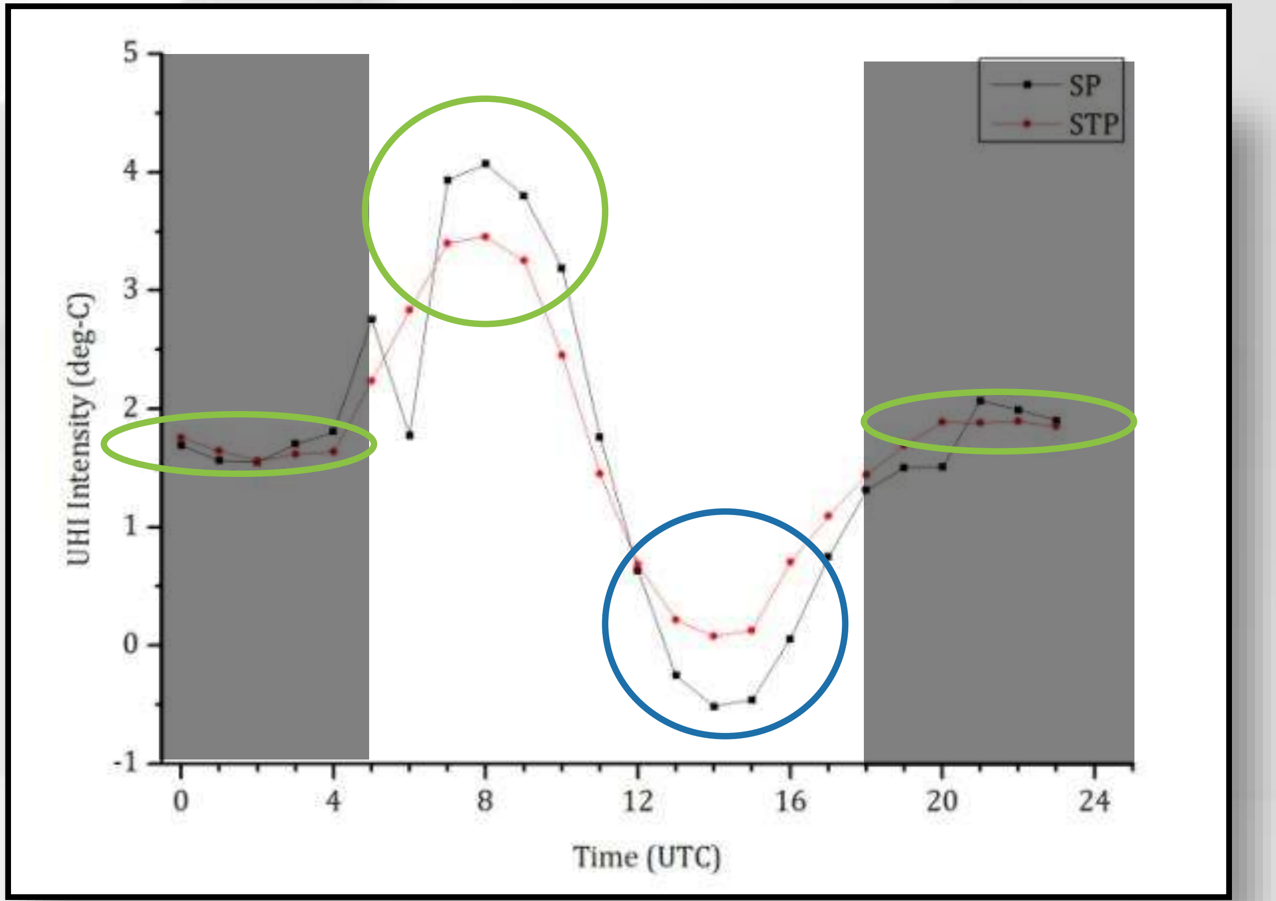
The case study of Thessaloniki

Results – UHI Intensity

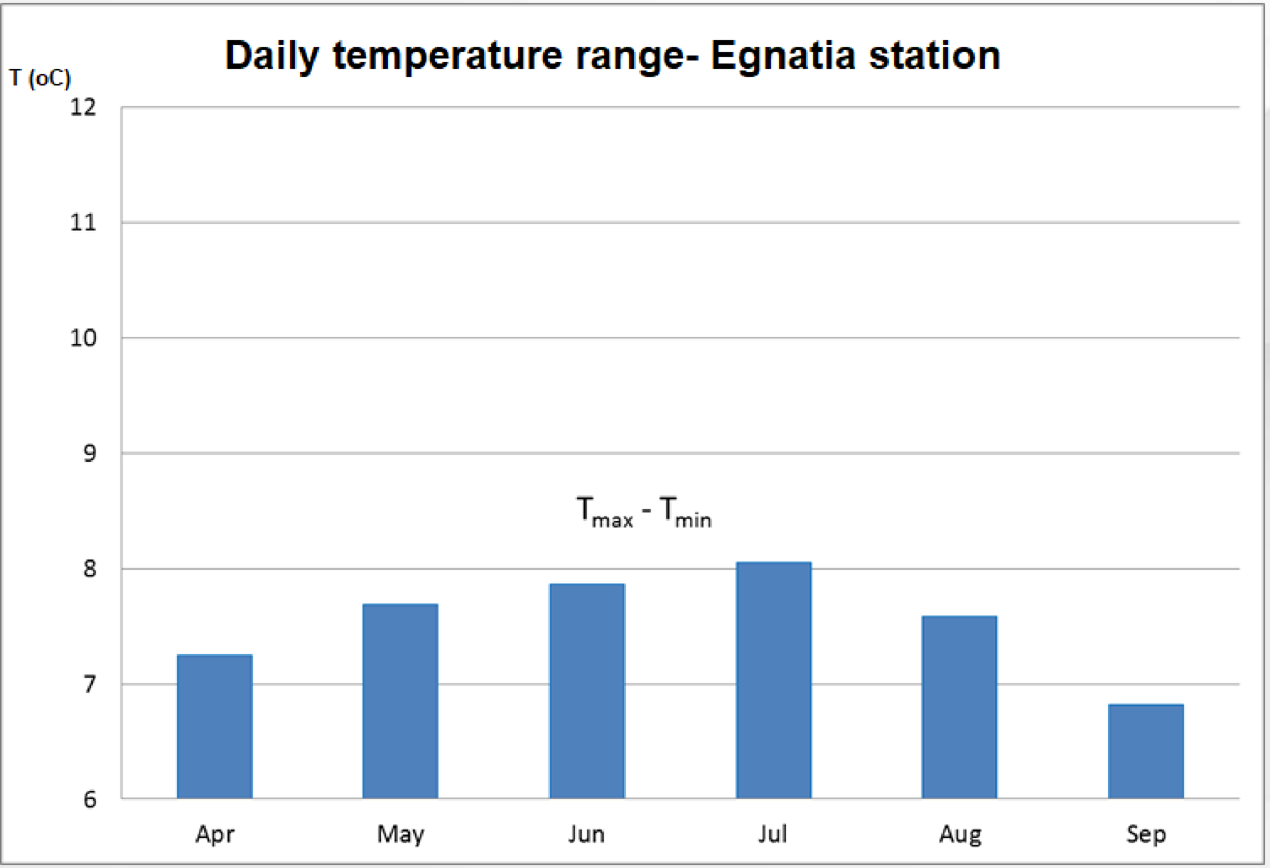
$$UHII = T_{urban} - T_{suburban}$$

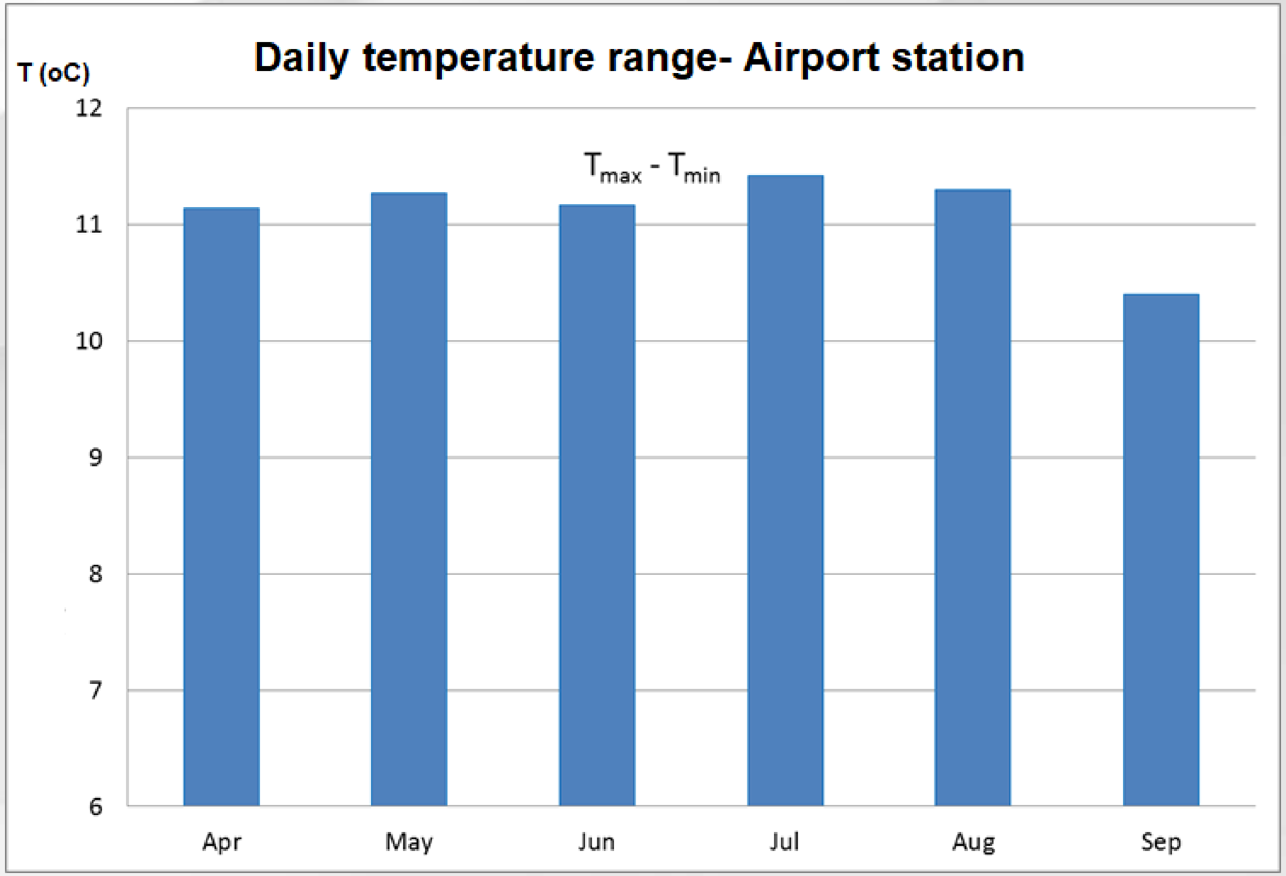
Summary

- ✓ "Background ΔT" ~ 2 oC
- ✓ Heat island is more consistently observed during the nighttime hours
- ✓ Heat island is stronger in early morning hours, weakening and almost vanishing in early evening



Results – Urban vs Rural
Daily temperature range

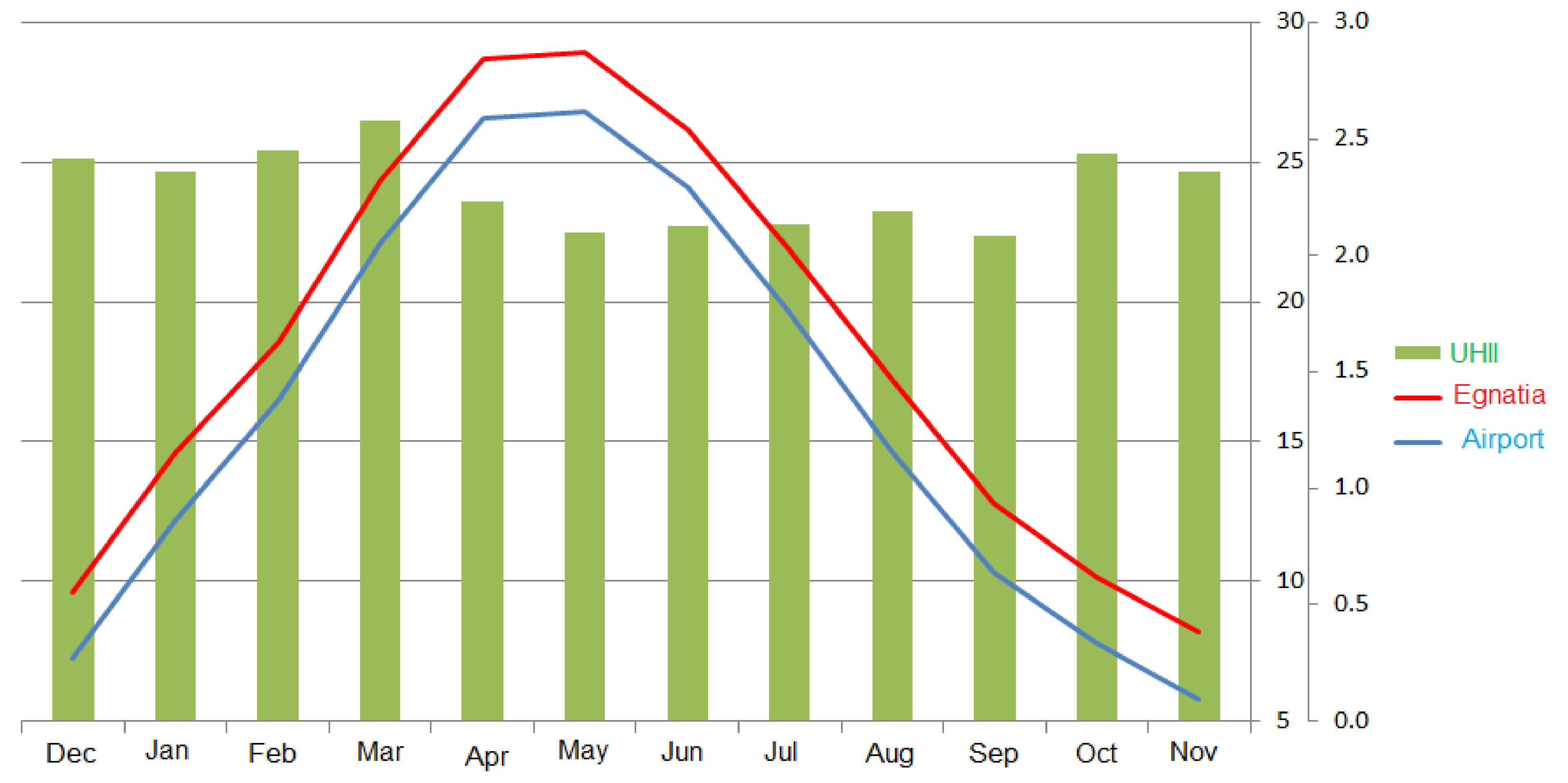




Sarras, 2019

Results – Urban vs Rural

Daily averaged temperature and daily averaged UHII per month



Sarras, 2019

Making community weather-ready - LIFE ASTI

Communities that are prepared and appropriately responsive to extreme temperature events.

- ✓ Reliable and detailed weather information, including **forecasting systems** with high resolution and a dense **Weather station network** to provide observations.
- ✓ Contemporary dissemination tools like online **toolkits** (website and mobile app) to make the scientific information immediately available to end users with **clear-cut guidelines**.
- ✓ Connection to **local policy makers** (local administration, hospitals, civil protection agencies etc.) to establish emergency plans.
- ✓ Communities are prepared for and respond appropriately to these events.

Making community weather-ready - LIFE ASTI

Communities that are prepared and appropriately responsive to extreme temperature events.

In recent years, the significant societal losses resulting even from well forecast extreme events have shifted the attention from the forecast alone toward ensuring the societal response is equal to the risks that exist for communities.

LIFE ASTI: General information

Location: Thessaloniki, Greece + Rome, Italy

Replication: Heraklion, Greece

Duration: 01/09/2018 - 31/08/2021

forecAsting System for urban heaT Island effect

Project implementors:

- **Aristotle University of Thessaloniki (coordinator)**
- Institute of Atmospheric Sciences and Climate, National Research Council of Italy
- Municipality of Thessaloniki
- Azienda Sanitaria Locale Roma 1
- Geospatial Enabling Technologies Ltd.
- Sympraxis Team P.C.

Short-term adaptation tools for Rome and Thessaloniki

✓Pilot UHI forecasting systems and monitoring stations in the two cities

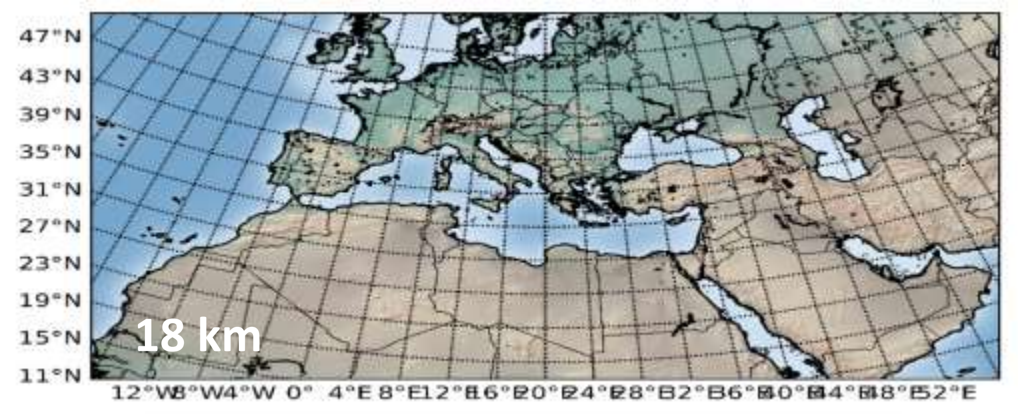
  ✓High-resolution (**250 m**) numerical model forecasts of UHI-related products (meteorological variables and related indices).

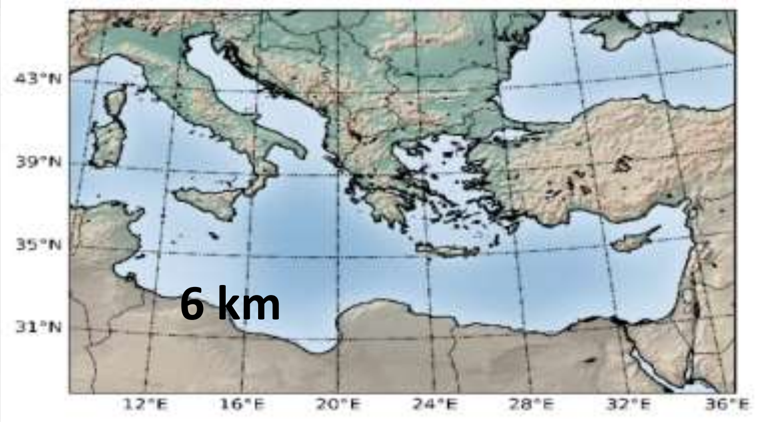
  ✓**Dense network** of meteorological stations (8 additional meteorological stations in Rome and 2 in Thessaloniki, 33 new nodes for temperature, humidity, pressure in Thessaloniki).

  ✓Heat Health Warning systems providing differential **alerts** within each involved city and the potential **effects on health** at high spatiotemporal resolution.

LIFE ASTI study areas

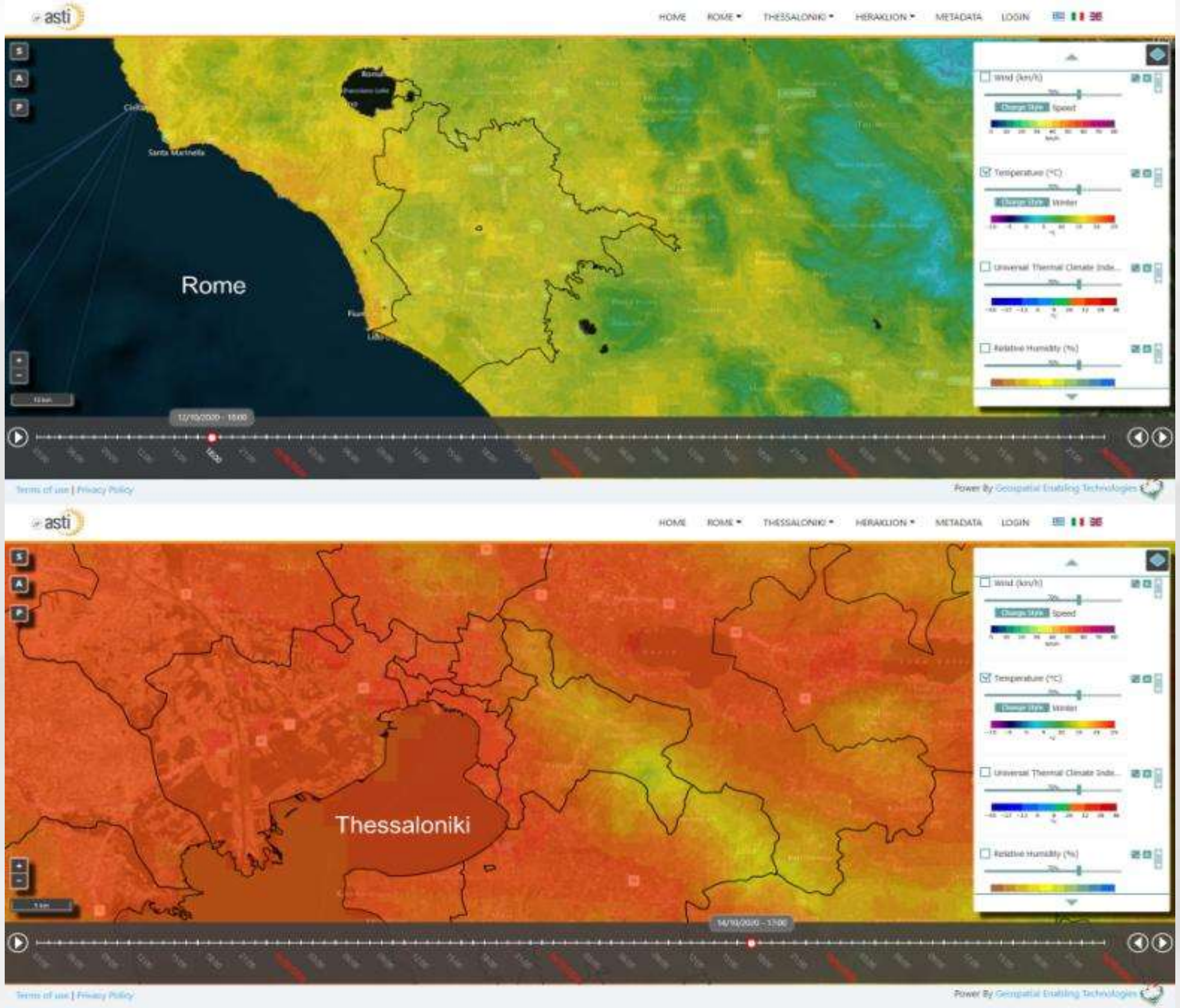
High resolution WRF simulations (6 km over Mediterranean area and 2 km over Thessaloniki, Heraklion and Rome)





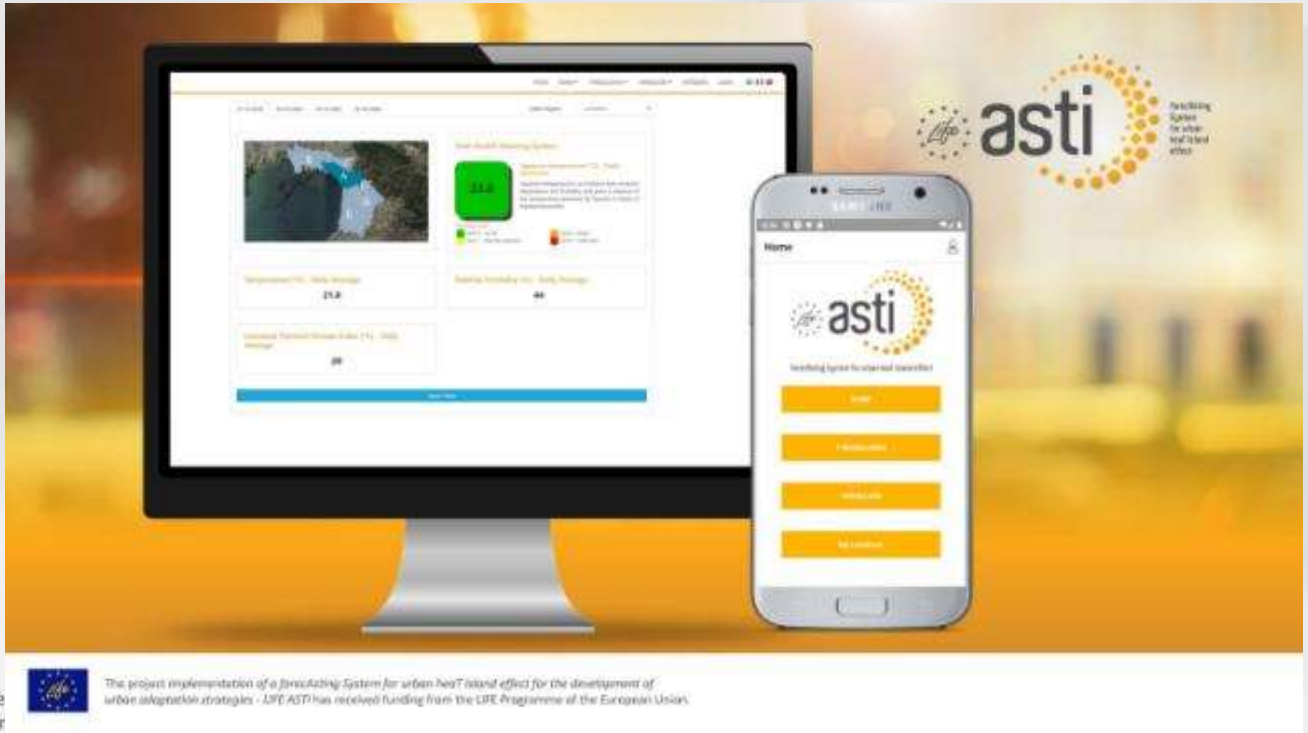
Downscaling technique are applied for producing the high-resolution (250 m) urban forecasts.

LIFE ASTI study areas



Short-term adaptation tools for Rome and Thessaloniki

✓A web-based open access portal and a mobile application to **disseminate** the above-mentioned forecasting products to authorities, stakeholders and the general public.



Short-term adaptation tools for Rome and Thessaloniki

✓**Replicability and transferability** activities that will increase the potential of LIFE ASTI results to be utilized by authorities and stakeholders of other regions in Europe

Long-term mitigation tools for Rome and Thessaloniki

- ✓ Assessment of the impact of future **climate change** scenarios on UHI.

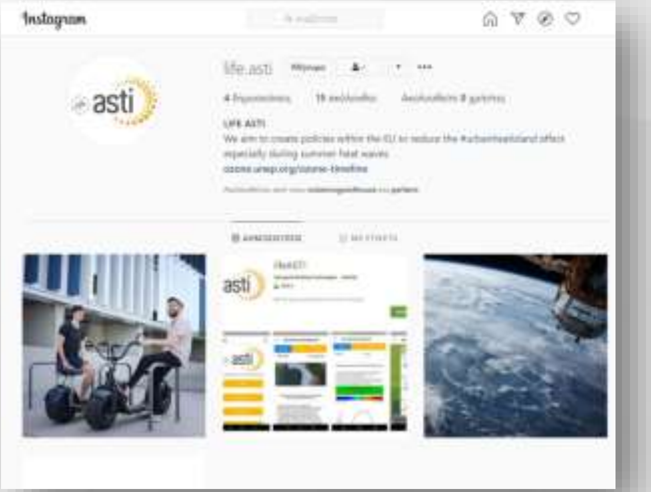
- ✓ Sensitivity studies for assessing the impact of **adaptation and mitigation** strategies (e.g., green infrastructure).
  - UHI Adaptation Actions Plans Portfolios for each city.

- ✓ Good Practice Guidebook for combating **UHI** and increasing resilience to heat.

Making community weather-ready
LIFE ASTI


Life Asti

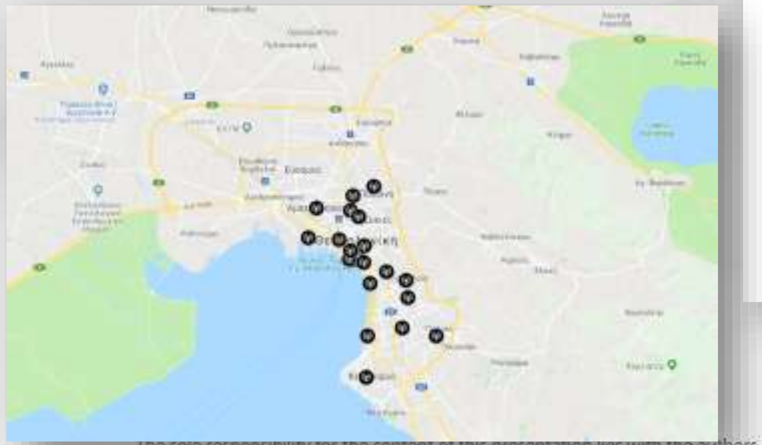
@lifeasti · Επιστήμη, τεχνολογία και μηχανική

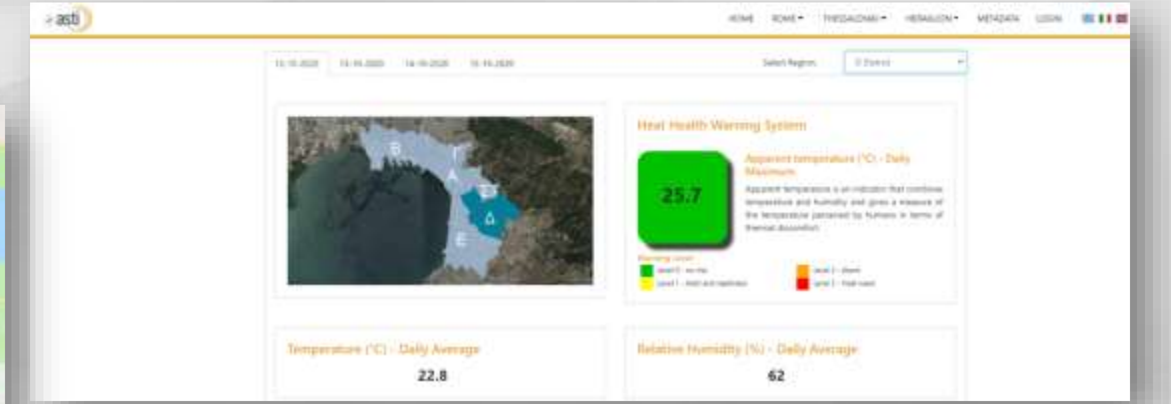


LIFE ASTI

We aim to create policies within the EU to reduce the #urbanheatisland effect especially during summer heat waves

ozone.unep.org/ozone-timeline





Heat Health Warning System

Apparent temperature (°C) - Daily Maximum

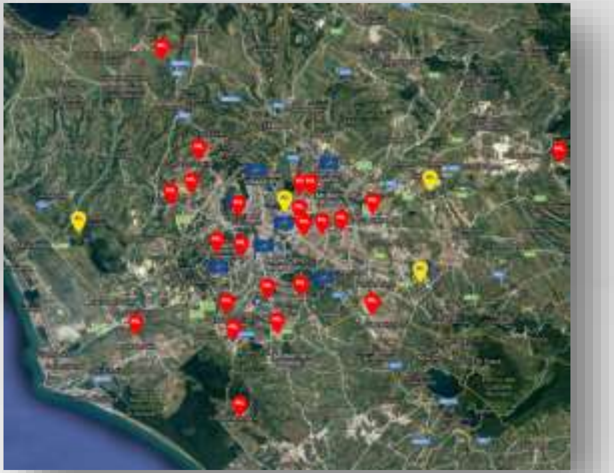
25.7

Temperature (°C) - Daily Average

22.8

Relative Humidity (%) - Daily Average

62



Follow **LIFE ASTI**

https://lifeasti.eu/

/Life-Asti-366183620887655

@asti_life

LIFE ASTI

A citizen science network to make cities weather ready

A. Cecilia, G. Casasanta, I. Petenko, A.Conidi, S. Argentini
CNR - ISAC

The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

Scientific background

Motivations

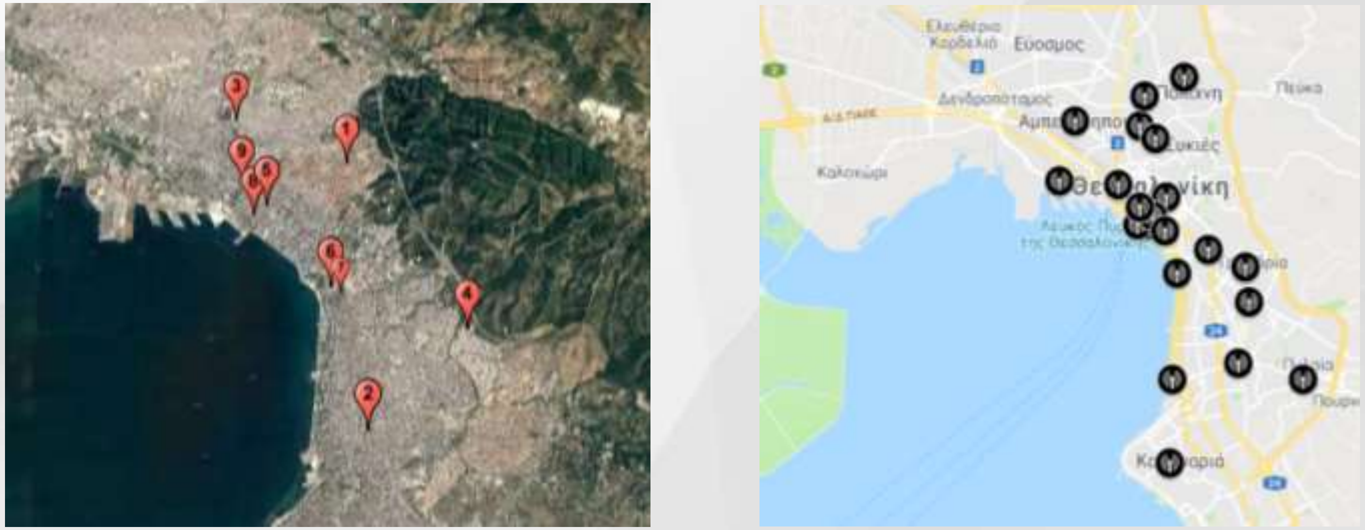
- UHI is strongly related to health issues and can affect everyday activities
- Satellite measurements does not provide UHI measurements – they provide SUHI measurements
- Deploy and maintain observational networks is still a challenge

Goals

- Merge local existing citizen's meteorological stations in a single, synergistic network
- Provide high quality, WMO standard compliant measurements
- Cover a city with high spatial and temporal resolution

LIFE ASTI areas

Rome area – 34 stations



Thessaloniki area – 31 stations

Focus on Rome

- **LIFE ASTI** - 8 new Davis Vantage Pro 2
- **Arpa Lazio** - 4 research stations
- **Meteo Lazio** - 22 citizen stations

Most of the stations belong to the community itself, i.e. citizens

Weather stations

Most of them are Davis weather stations, installed at schools, public institutions, and private people's.

Davis

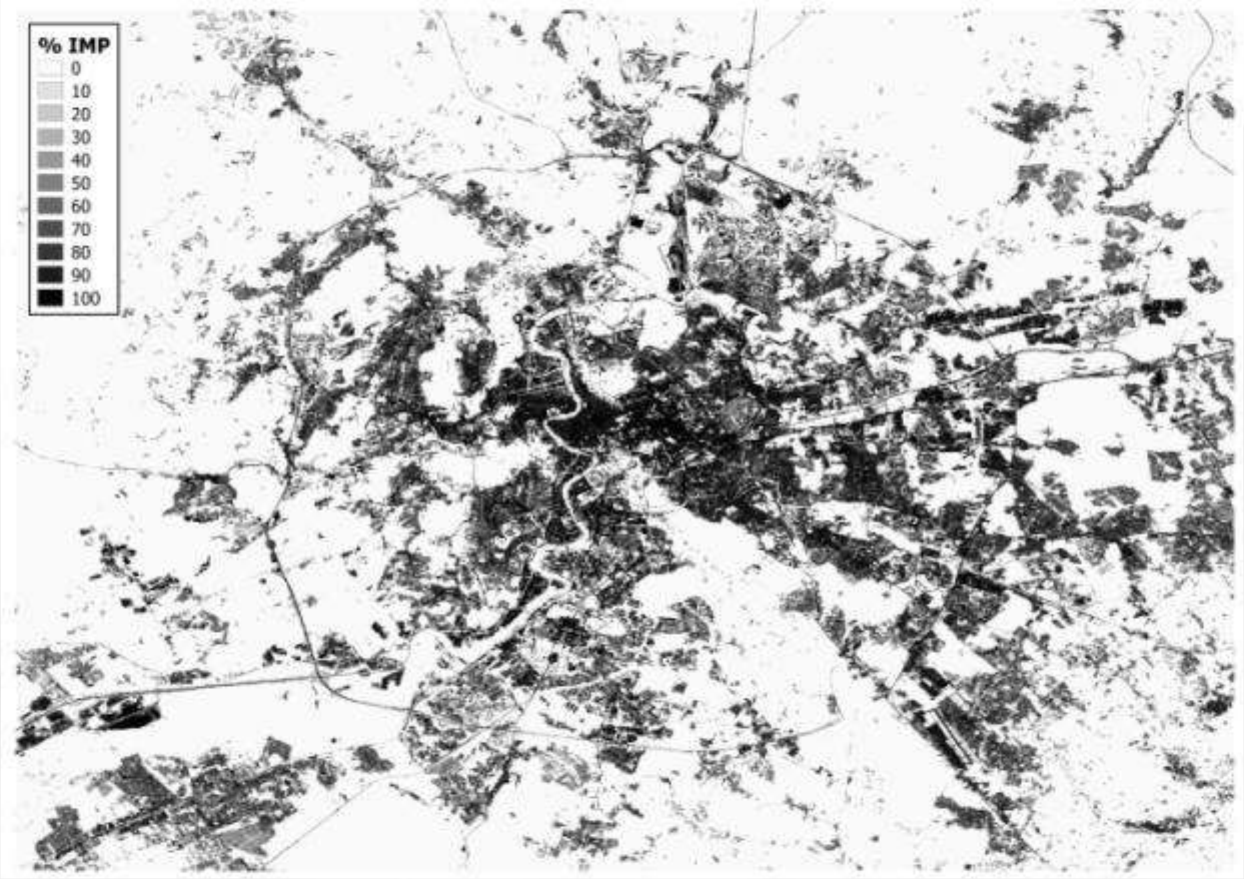
- Temperature
- Relative humidity
- Wind speed & dir
- Rainfall

Acquisition system

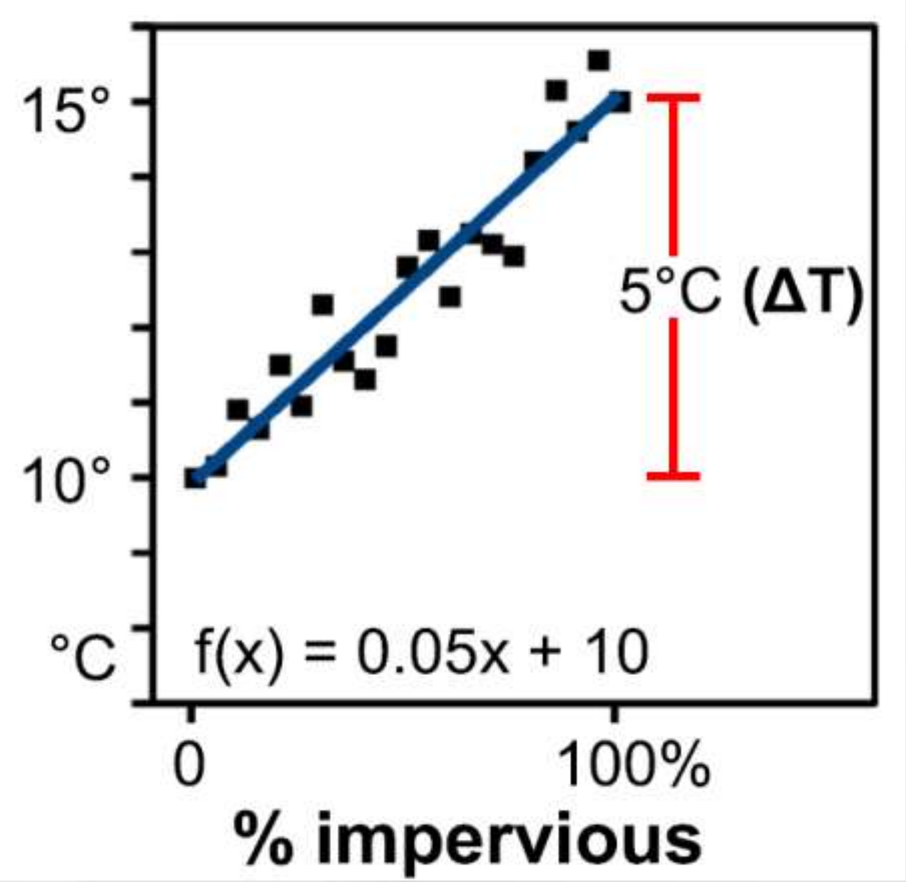
- Data receiver
- Datalogger
- Online submission to a central database

Parameter	**Resolution**	**Accuracy**	**Sampling time**
Temperature	0.1°C	± 0.3 °C	10 s
Relative Humidity	1%	± 2%	50 s

Characterize UHI intensity

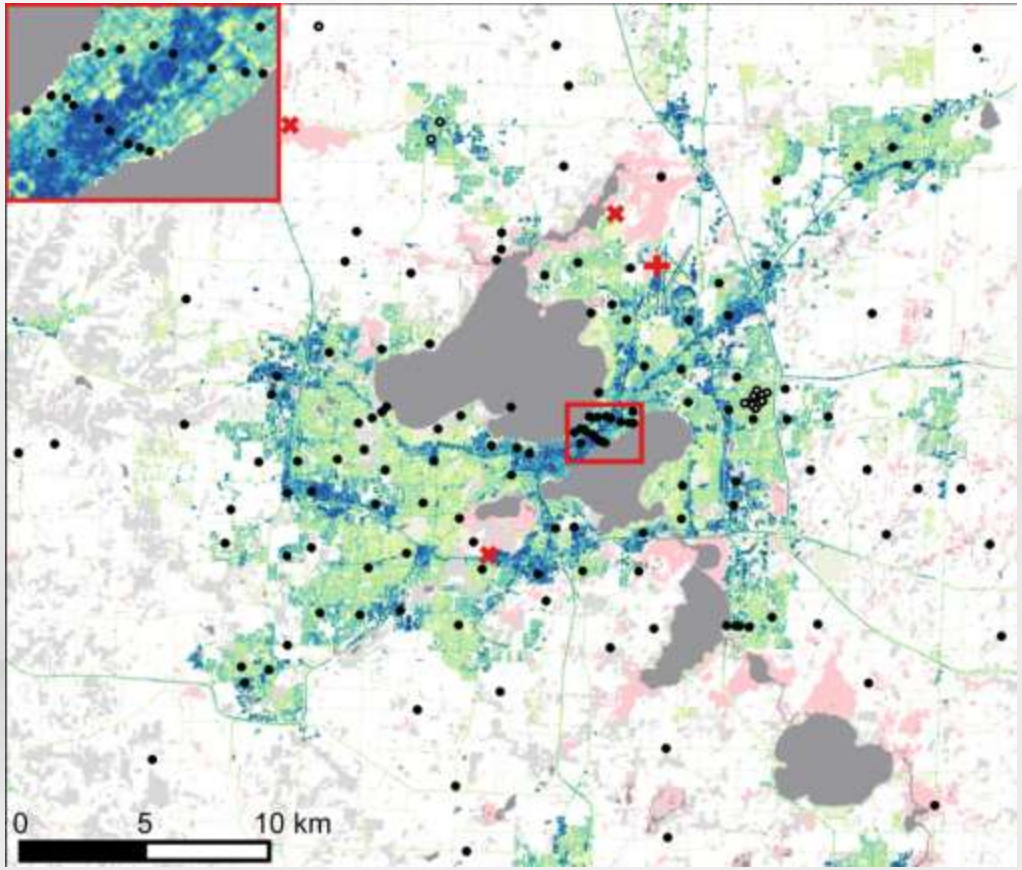


Copernicus Land Monitoring Service
Rome appears to be greener than expected…



New methodology by Schatz at al. (2015), temperatures vs IMP

Looking for the optimal radius



Map of study area in Madison, Wisconsin, USA (Schatz at al., 2015)

We need the average of the imperviousness around each station.

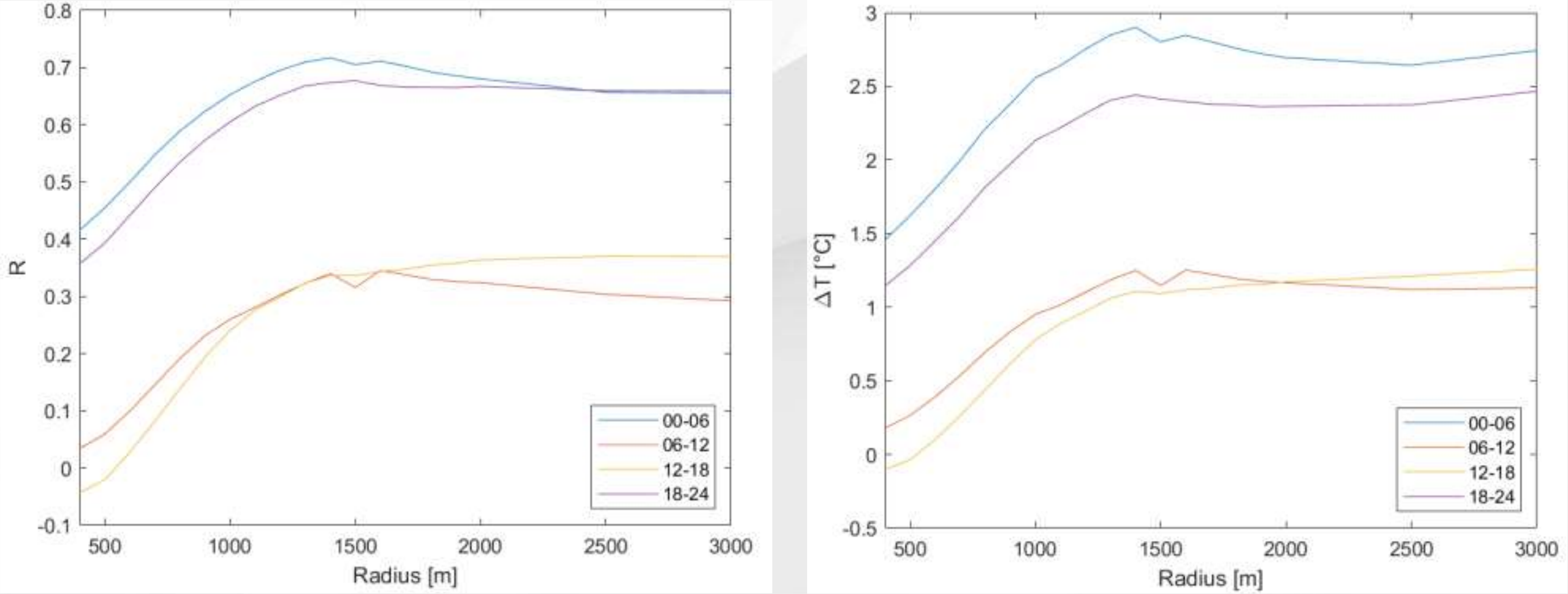
How do we define "around"?

The optimal radius in Madison is 600 m, but Rome does not have three lakes in the city center.

Maximize the correlation coefficient R between IMP and T

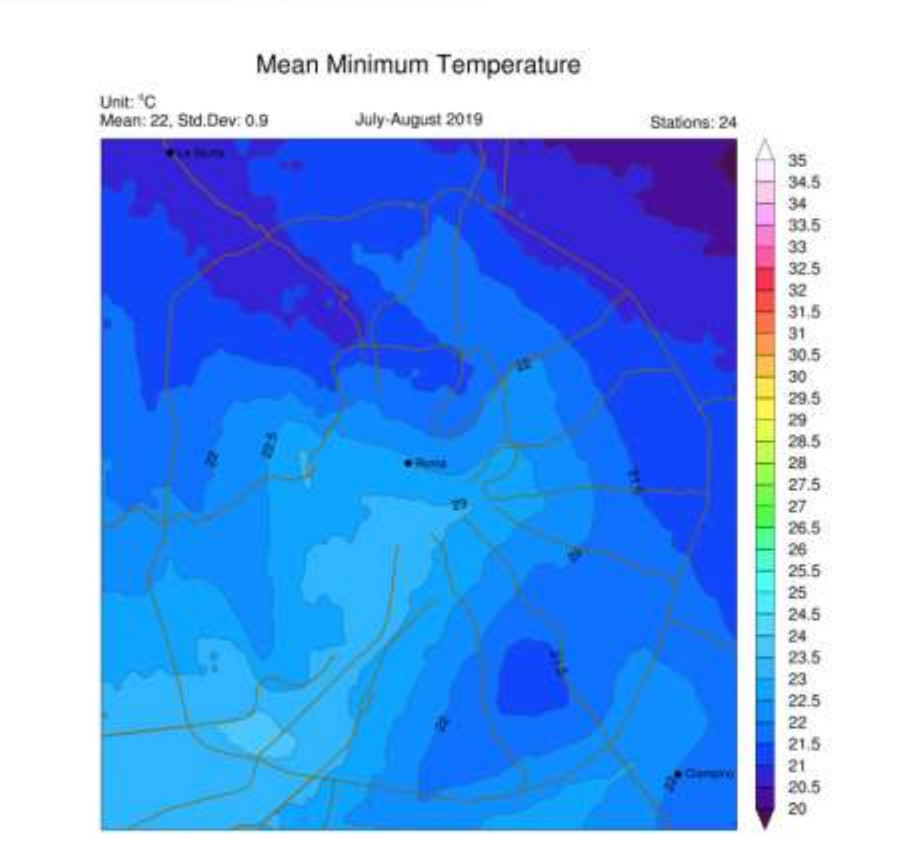
Optimal radius in Rome

Optimal radius: 1400 m

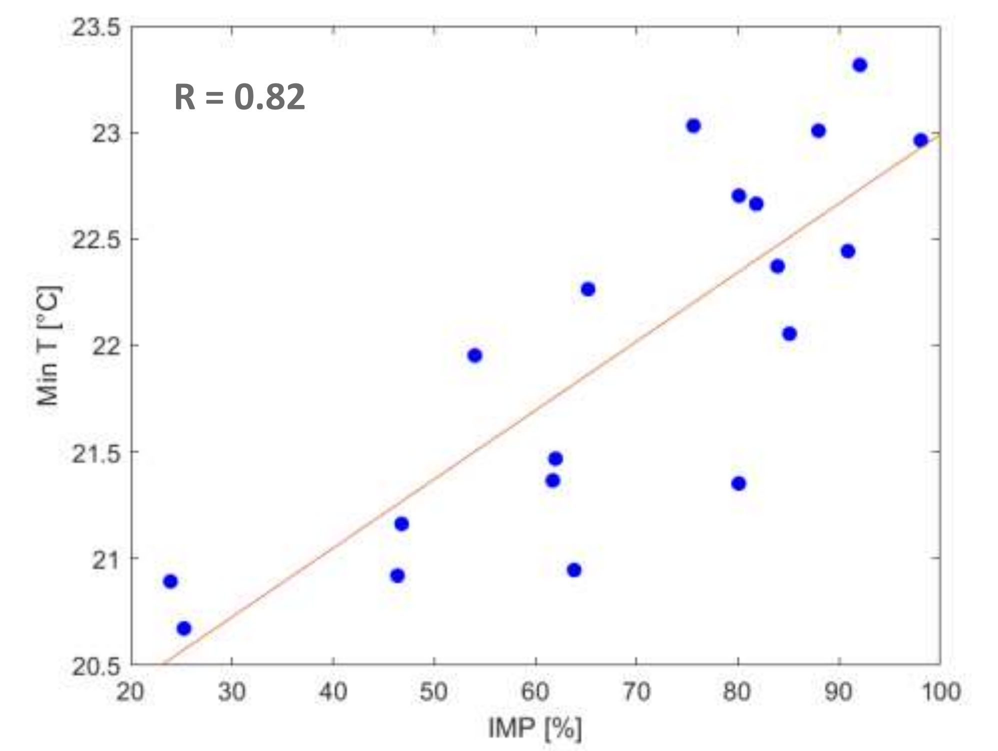


UHI ΔT and R as a function of impervious surface radius (July-August 2019)

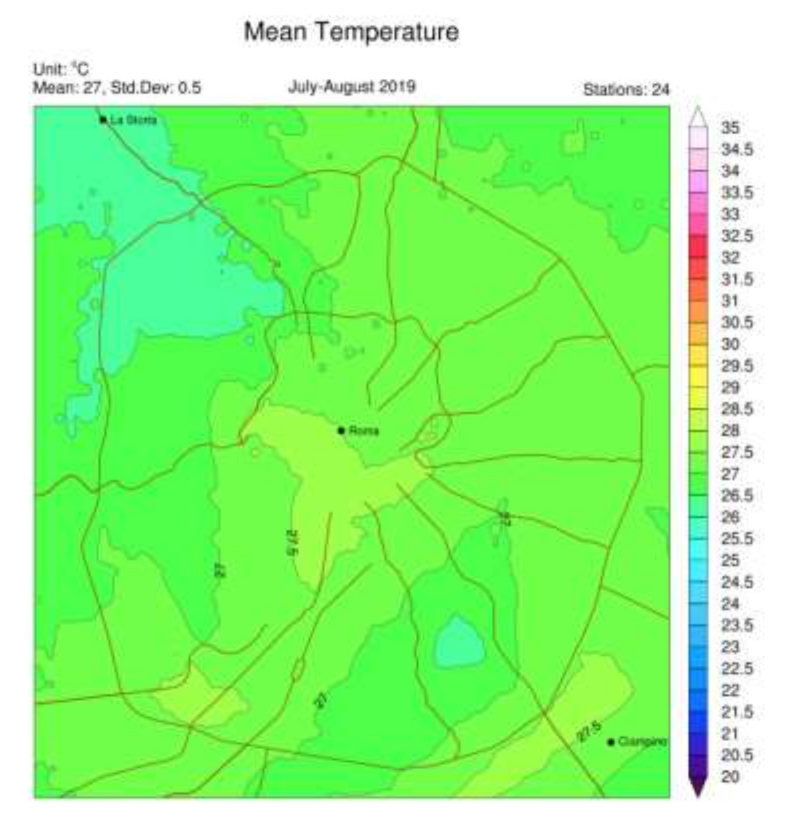
Daily temperatures



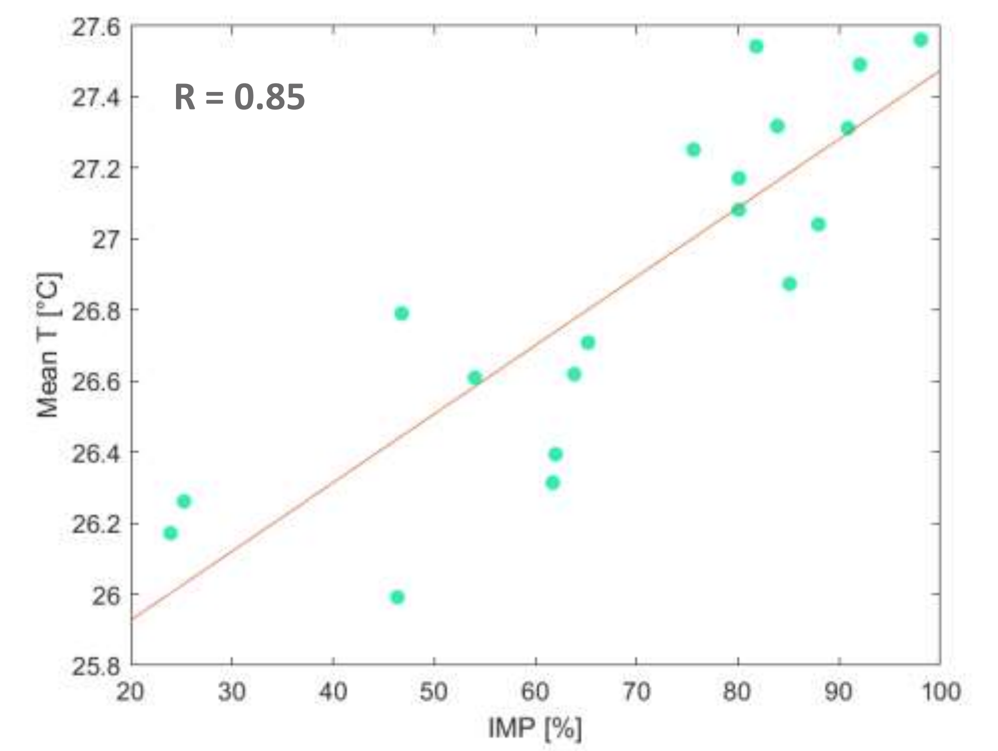
Daily minimum temperature



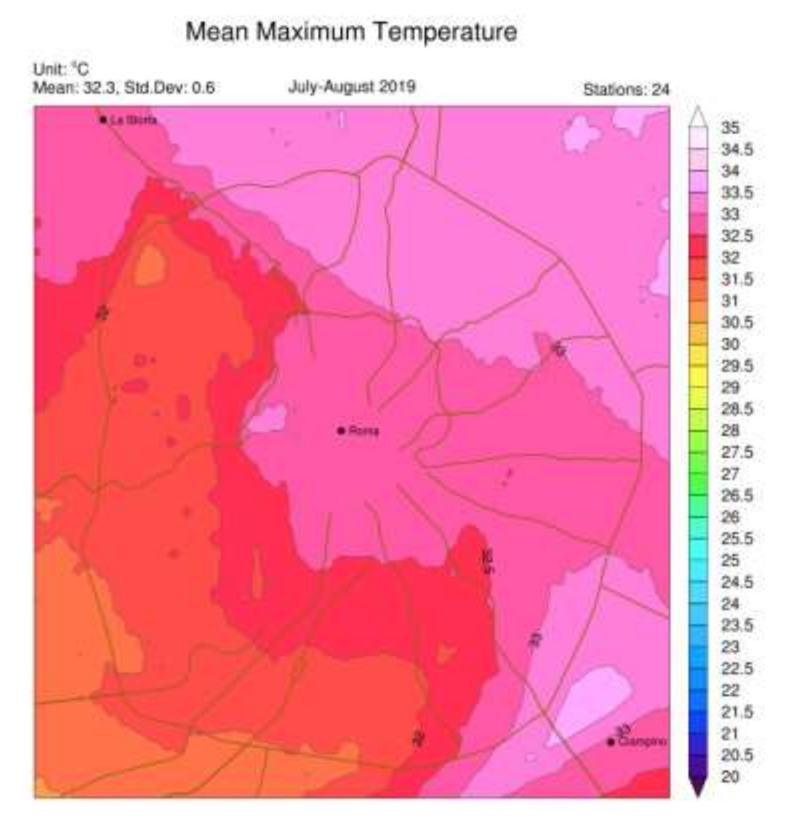
Daily temperatures



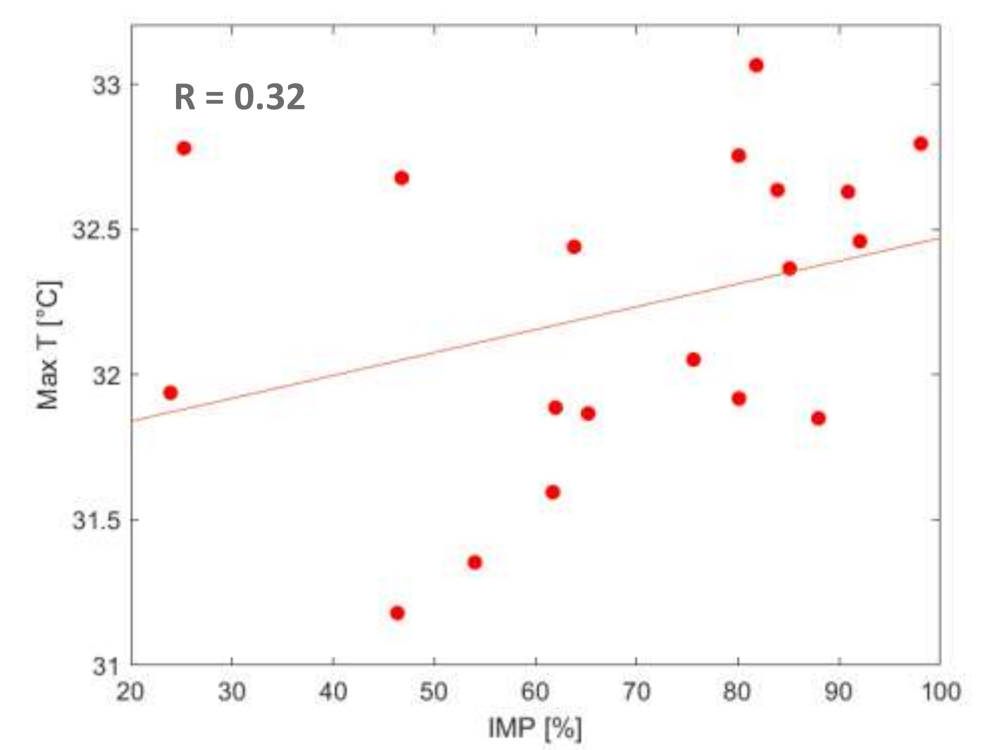
Daily mean temperature



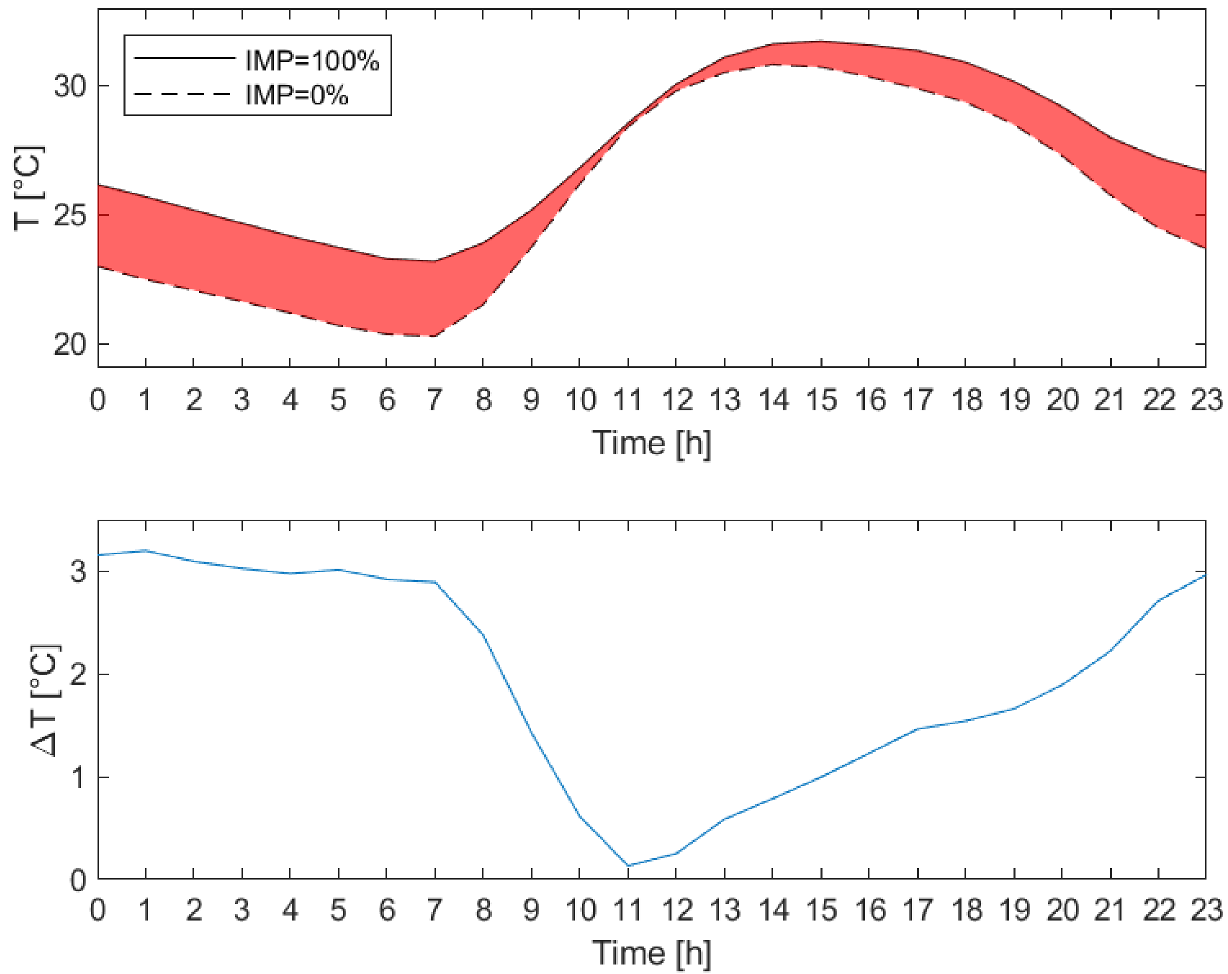
Daily temperatures



Daily maximum temperature



UHI diurnal cycle



- **Period:** July-August 2019
- **Peak:** 3.2 °C – 01:00 UTC+1
- **Minimum:** 11:00 UTC+1

Final remarks

- We integrated citizen weather stations into a WMO compliant synergistic network
- The network is capable of characterizing the UHI with high spatial and temporal resolution
- It also an example of how a community can help itself - with scientists in the middle !

Modeling the Urban Heat Island effect: Operational UHI forecasting system

Thessaloniki, October 14 2020

Serafim Kontos Aristotle University of Thessaloniki

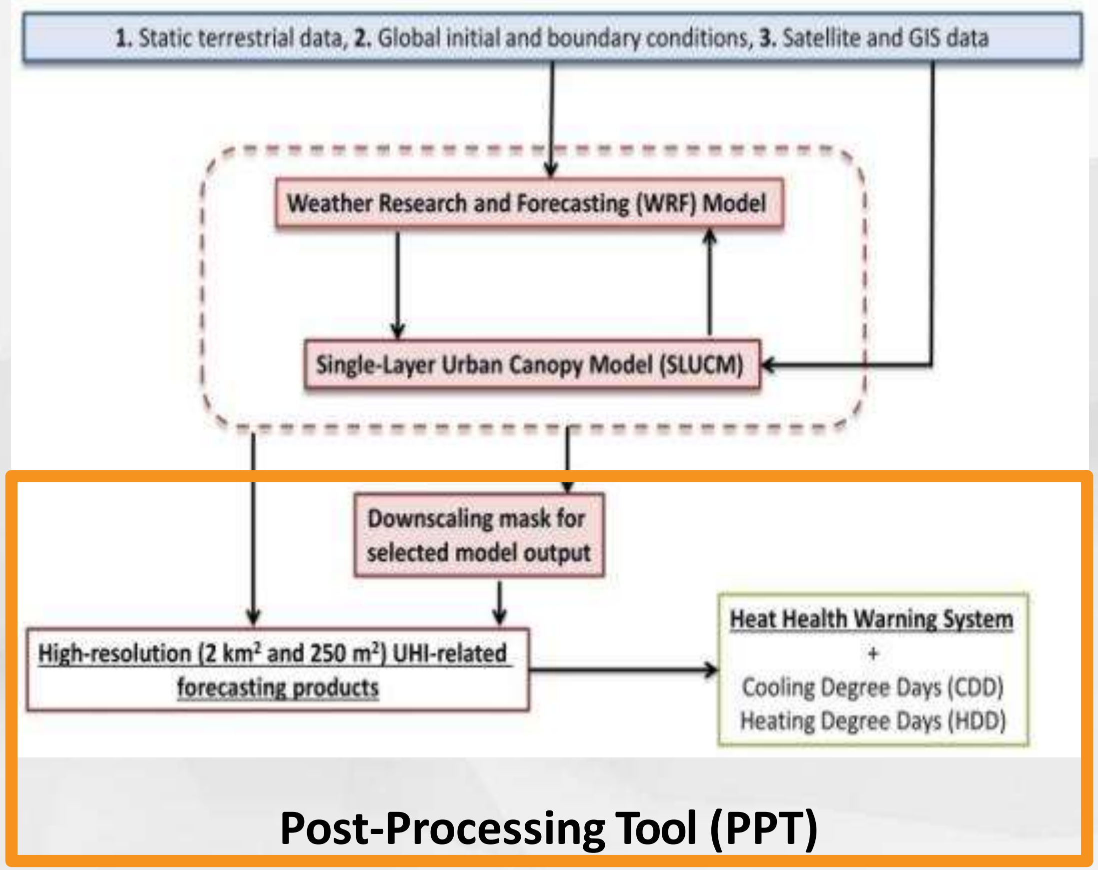
The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

Outline

- Brief Description of the operational Urban Heat Island forecast system
- Examples of evaluation and products
- Operational UHI forecasts to end users.
- Summary

General structure

- Weather Research and Forecast system coupled with the Single Layer Urban Canopy Model SLUCM (WRF+SLUCM)



1. Static terrestrial data, **2.** Global initial and boundary conditions, **3.** Satellite and GIS data

Weather Research and Forecasting (WRF) Model

Single-Layer Urban Canopy Model (SLUCM)

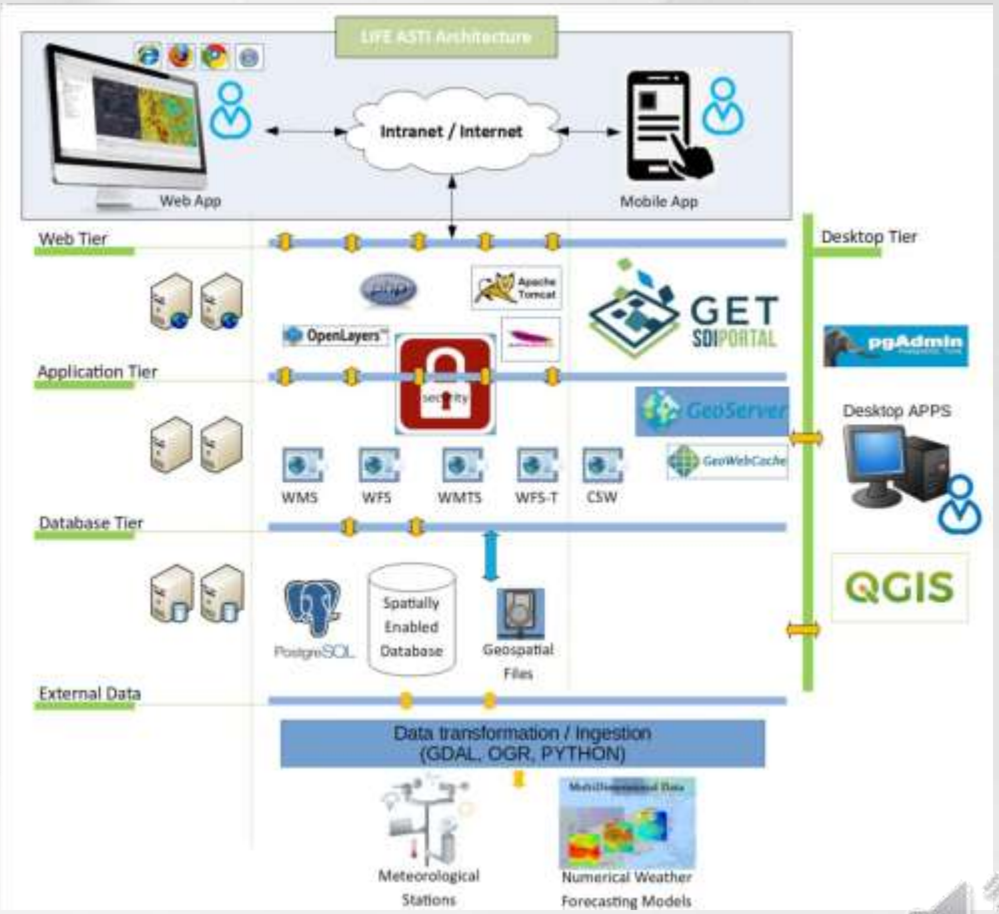
Downscaling mask for selected model output

High-resolution (2 km² and 250 m²) UHI-related forecasting products

Heat Health Warning System
+
Cooling Degree Days (CDD)
Heating Degree Days (HDD)

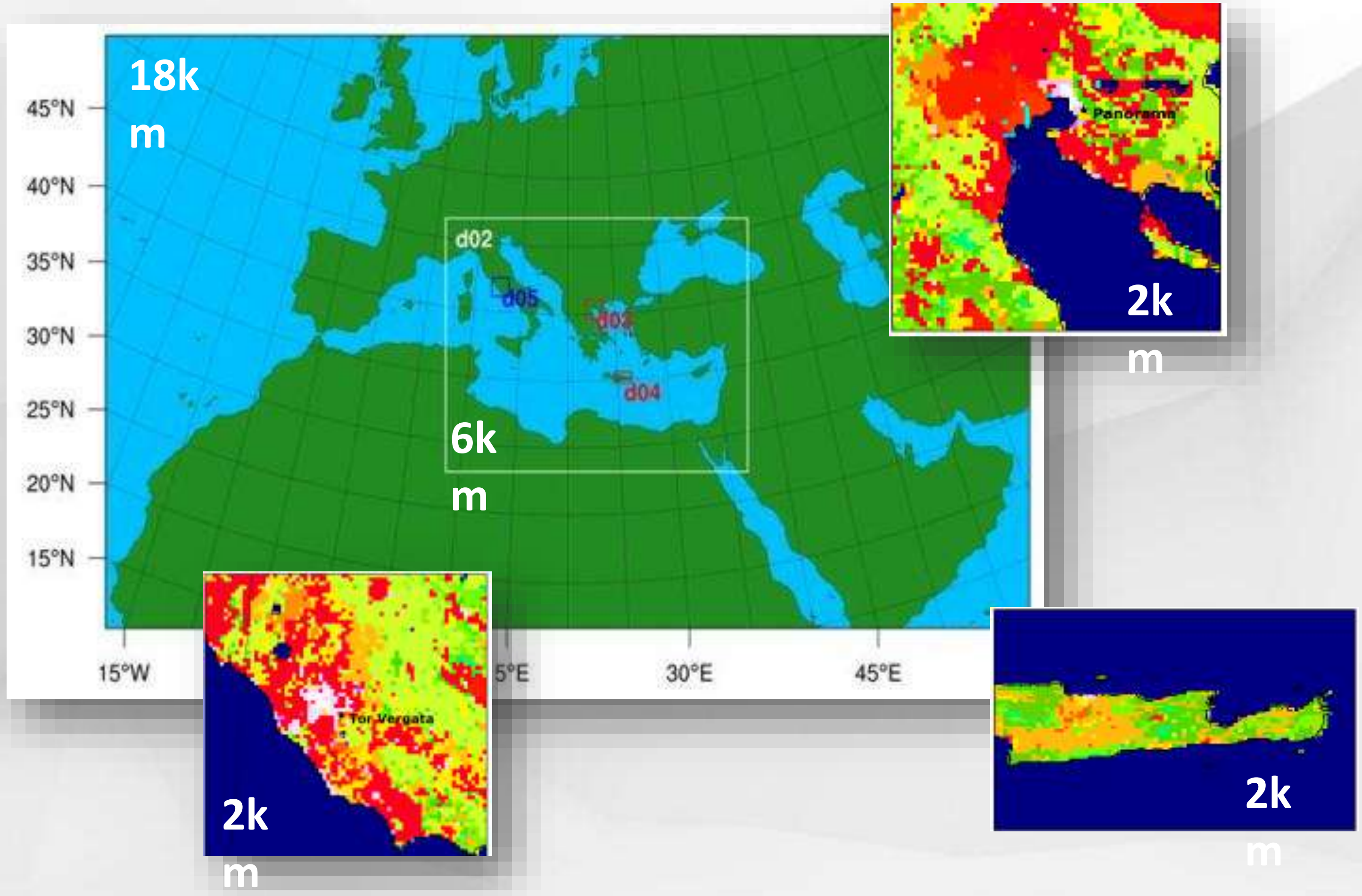
Post-Processing Tool (PPT)

- LIFE-ASTI Platform



Implementation of the WRF+SLUCM modeling system

- Daily operation of the UHI forecasting system



Launch operational script-8 a.m. local time every day

Download data

Download GFS meteorological of data-00 UTC forecasting hour day Download SST data-00 UTC the previous

Run WRF+SLUCM system (11 hours,2 Intel Xeon Gold 6125)

Output temporary saved in LIFE-ASTI Database, in netcdf Format

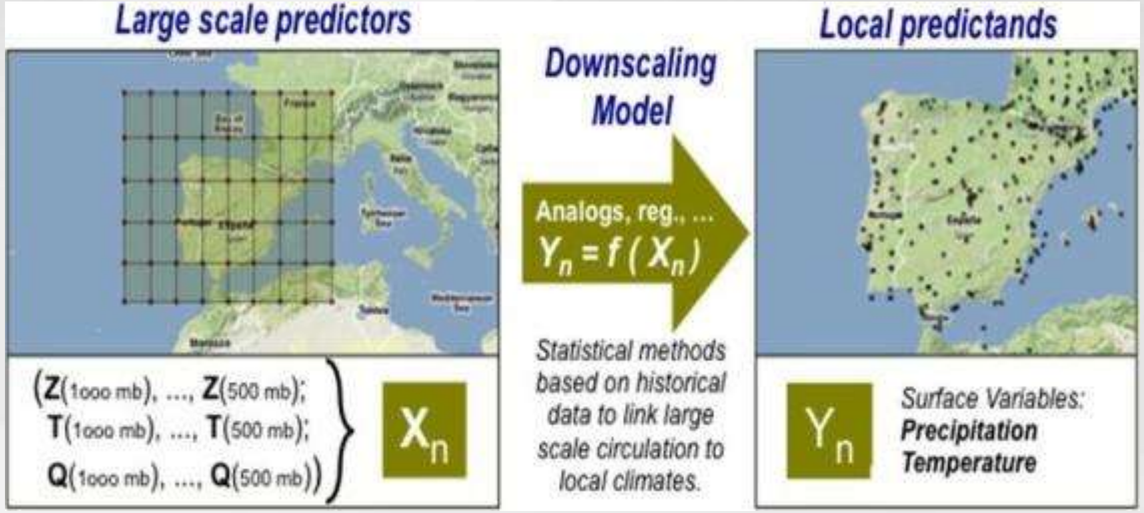
Post-processing Tool (PPT)

Tasks:

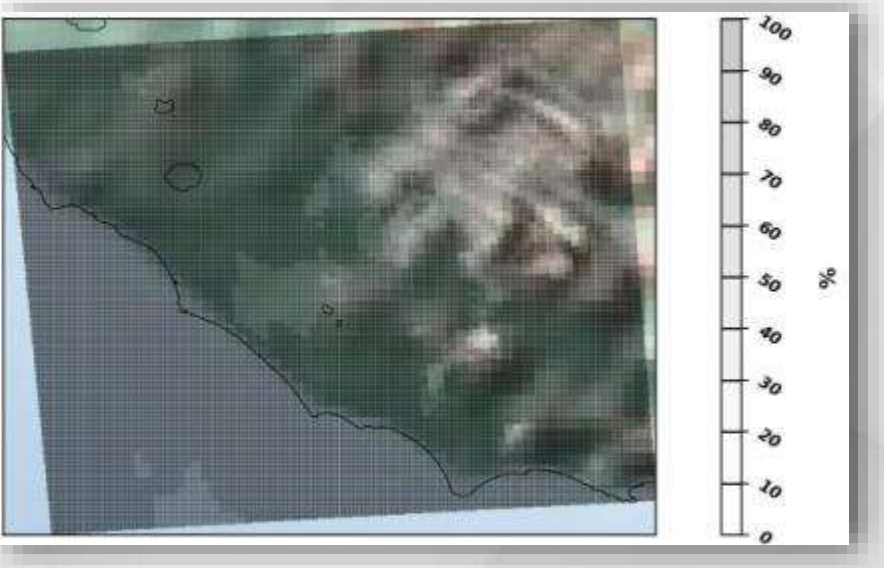
- Retrieving WRF-SLUCM surface meteorological parameters at 2km
- Downscale to 250m
- Produce UHI related products
- Execution of the Heat Health Warning System.
- Reformat to GeoTIFF for dissemination to end-user-visualization to LIFE-ASTI platform

- **Developed from A.U.Th. To produce UHI related products at human representative scale (250m).**

- Example of a downscaling process (adopted from https://meteo.unican.es/downscaling/intro.html#)

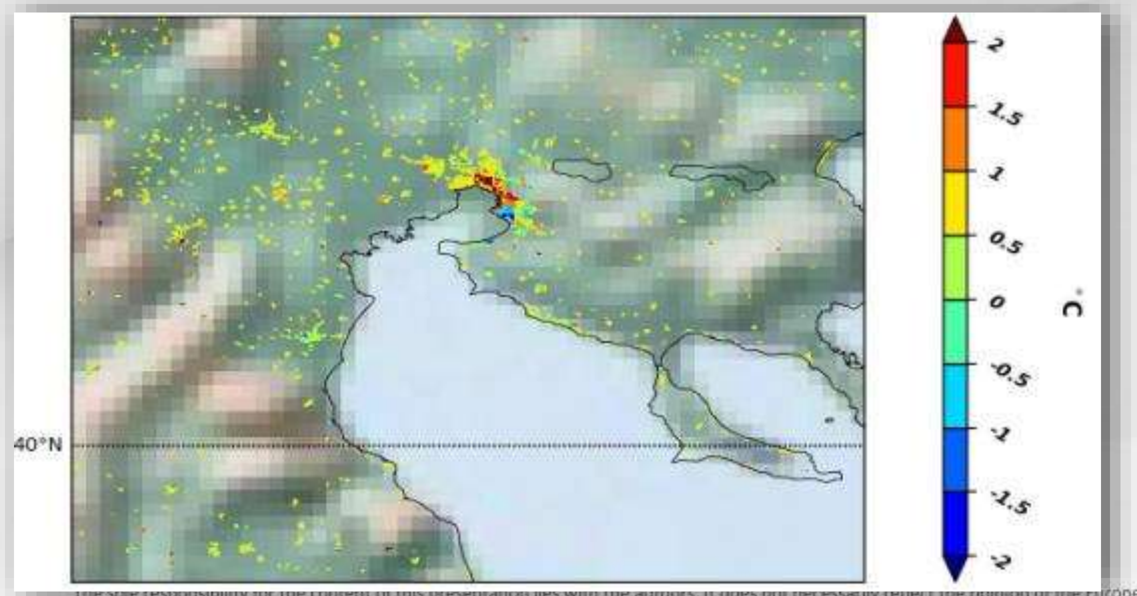


Operational UHI-related Products



Downscaled by-products (from temperature and rel. humidity) at 250m res.:

- Apparent and dew temperatures
- Discomfort Index (DI)
- Urban Heat Island Intensity (UHII)
- Universal Thermal Climate Index (UTCI)
- Cooling/Heating Degree Days (CDD/HDD)



Raw products at 2km res.:

- Short/Long-wave radiation
- Wind speed and Wind direction at 10m a.g.l.
- Total Cloud Fraction

* All data are stored in .Tiff Format

Example of the UHI forecasting system evaluation in Thessaloniki (29/6-3/7 2017)

Temperature

Station	LCZ	MBE	MAE	NMSE	R	IoA
Dimarheio	Sparsely built	2.01	2.51	0.009	0.86	0.82
Egnatia	Compact mid-rise	0.95	1.92	0.006	0.88	0.88
Eptapurgio	Open low-rise	1.44	1.94	0.006	0.89	0.88
Lagkada	Open low-rise	0.83	1.82	0.005	0.87	0.90
Malakopi	Sparsely built	1.56	2.10	0.006	0.90	0.91
Martiou	Open low-rise	0.48	1.52	0.003	0.90	0.94

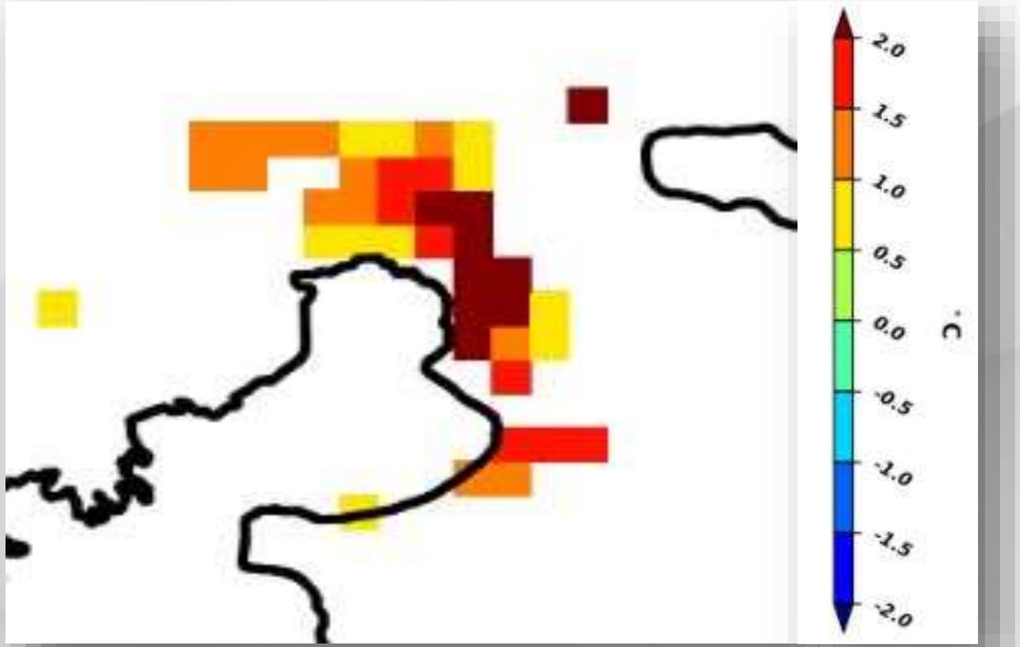
IoA > 0.7

MAE < 2 ^{o}C

Emery C., Tai E., Yarwood G. (2001). Enhanced meteorological modeling and performance evaluation for two Texas ozone episodes. Final Report prepared for the Texas Natural Resource Conservation Commission

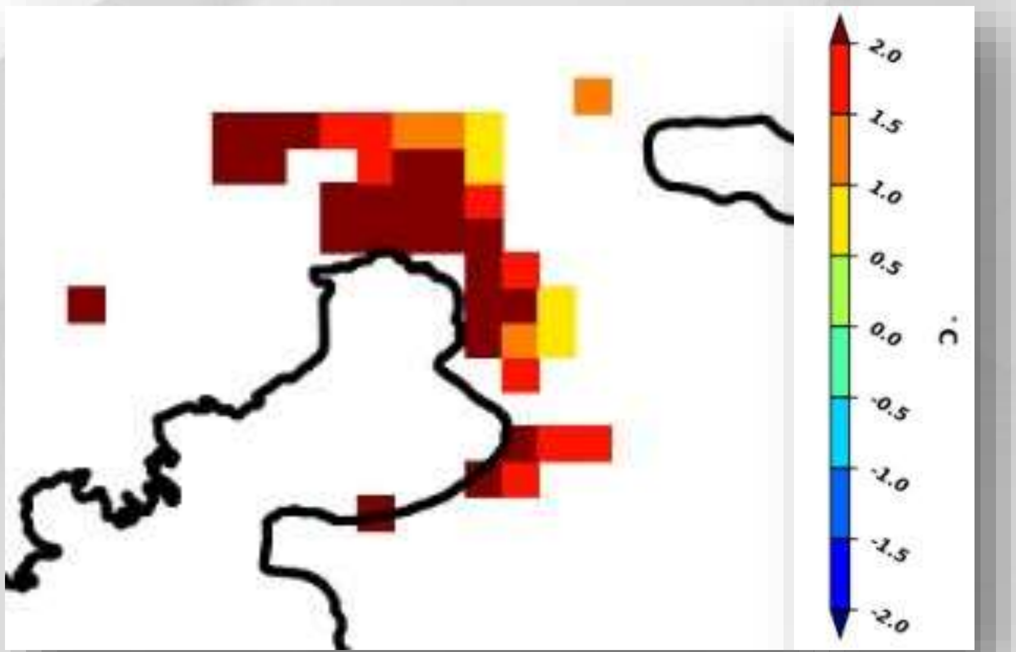
Example of UHI Intensity product in Thessaloniki – Case 2017

UHII during the heat wave (29/06-03/07 of 2017)



Domain Mean=1.25^{o}C
Domain
Median=1.36^{o}C

UHII after the heat wave (03/07-07/07 of 2017)



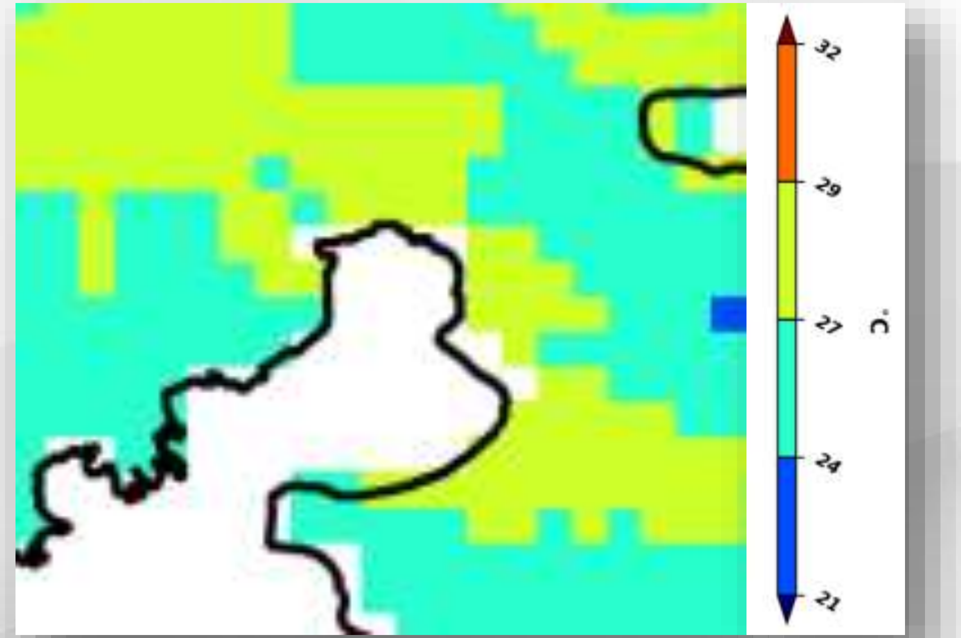
Domain Mean=1.82^{o}C
Domain
Median=2.08^{o}C

UHII=T2_urban-T2_rural

UHI effect more intense under normal summertime conditions -> smaller temperature differences between heat and non-heat wave conditions

Example of ASTI results – Bioclimatic Indices in Thessaloniki – Case 2017

Discomfort Index

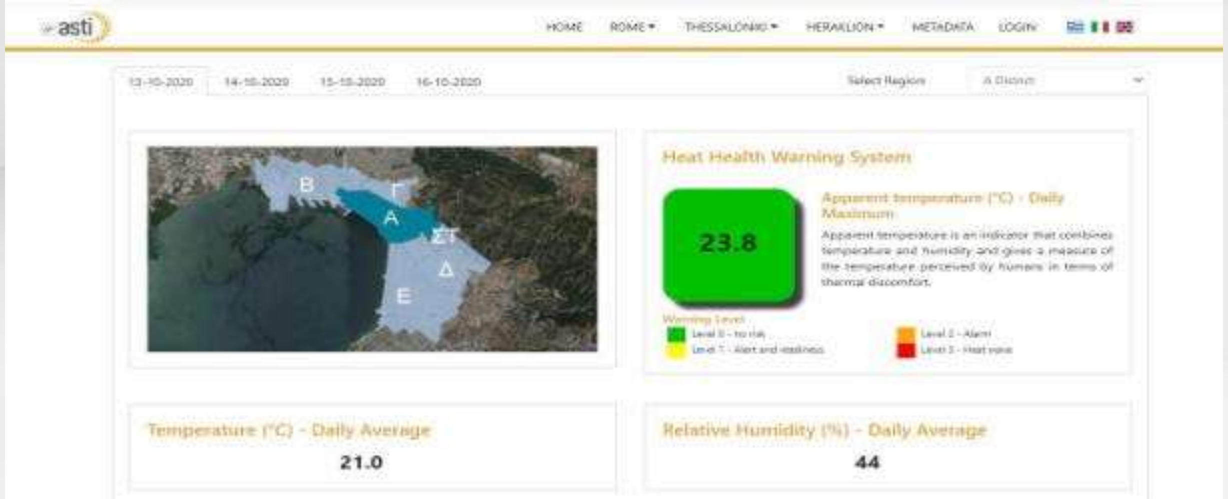


DI value	Discomfort conditions
DI ≤ 21 °C	No discomfort
21 °C < DI ≤ 24 °C	Under 50 % of the population feels discomfort
24 °C < DI ≤ 27 °C	Above 50 % of the population feels discomfort
27 °C < DI ≤ 29 °C	**Most of the population feels discomfort**

Operational UHI data to end users

LIFE-ASTI platform and mobile applications:

- Direct information of the current and future (4 days) conditions at your place
- Preview of meteorological conditions of the city and by district.
- Heat Health Warnings, important for immediate actions from stakeholders.
- Downloading of data for any place in the cities.



Heat Health Warning System

Apparent temperature (°C) - Daily Maximum

Apparent temperature is an indicator that combines temperature and humidity and gives a measure of the temperature perceived by humans in terms of thermal discomfort.

Warning Level

🟩 Level 0 - no risk

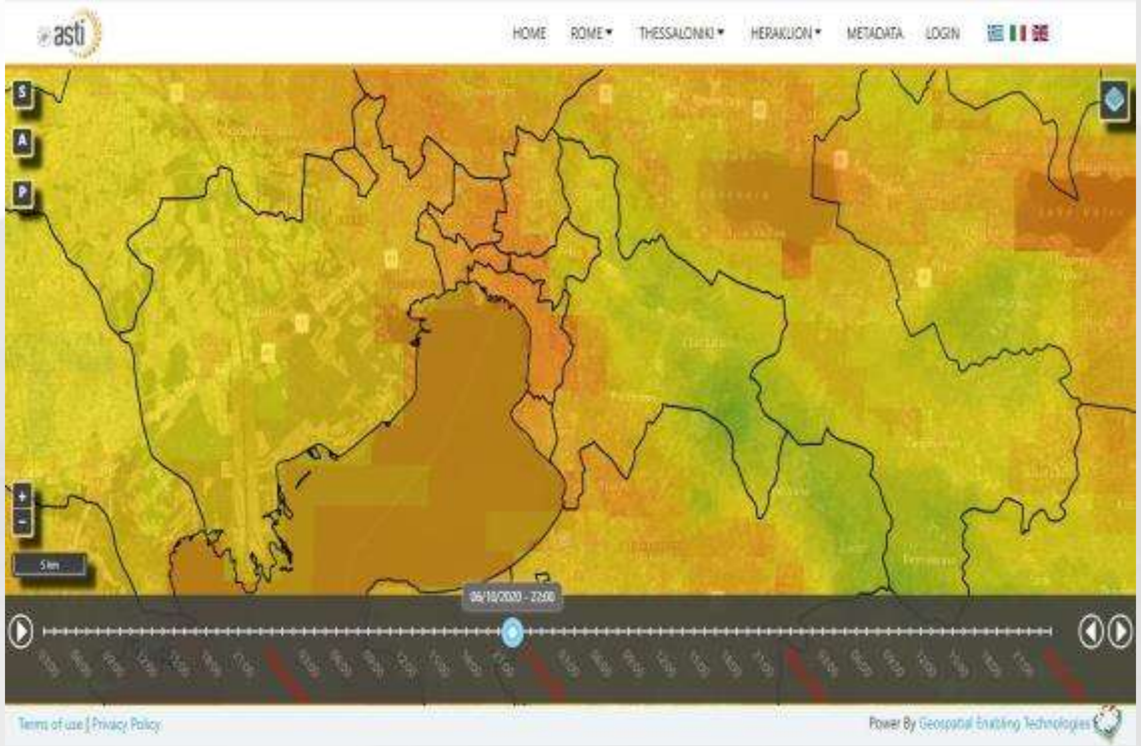
🟨 Level 1 - Alert and readiness

🟧 Level 2 - Alarm

🟥 Level 3 - Heat wave

Temperature (°C) - Daily Average: 21.0

Relative Humidity (%) - Daily Average: 44



*UHI related products can be download under request by A.U.Th. team.

Summary

- Development of high resolution, sustainable operational UHI forecasting system.
- Advanced Post Processing Tool with flexibility-can be extended to additional fields of interest if needed
- Transferability and replicability to other cities of Europe-facilitating possible synergies with other LIFE projects
- Easy access to simplified and effective information for civilians, stakeholders and policy-makers

LIFE asti forecAsting System for urban heaT Island effect

Thank you for your attention

The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

asti
forecAsting
System
for urban
heaT Island
effect

Monitoring the Urban Heat Island effect with the LIFE ASTI application platform

Be informed about thermal stress and extreme heat events

Dr. Panagiotis Symeonidis
Geospatial Enabling Technologies

LIFE ASTI 2nd European Workshop:
“Urban Heat Island and Heat Resilience: Networking for Future Strategy”
Thessaloniki, 14 October 2020

The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

Geospatial Enabling Technologies (GET)

Making Location Matter

GeoInformatics
Open Data
Business Intelligence
Environment
Earth Observation

Geo ICT

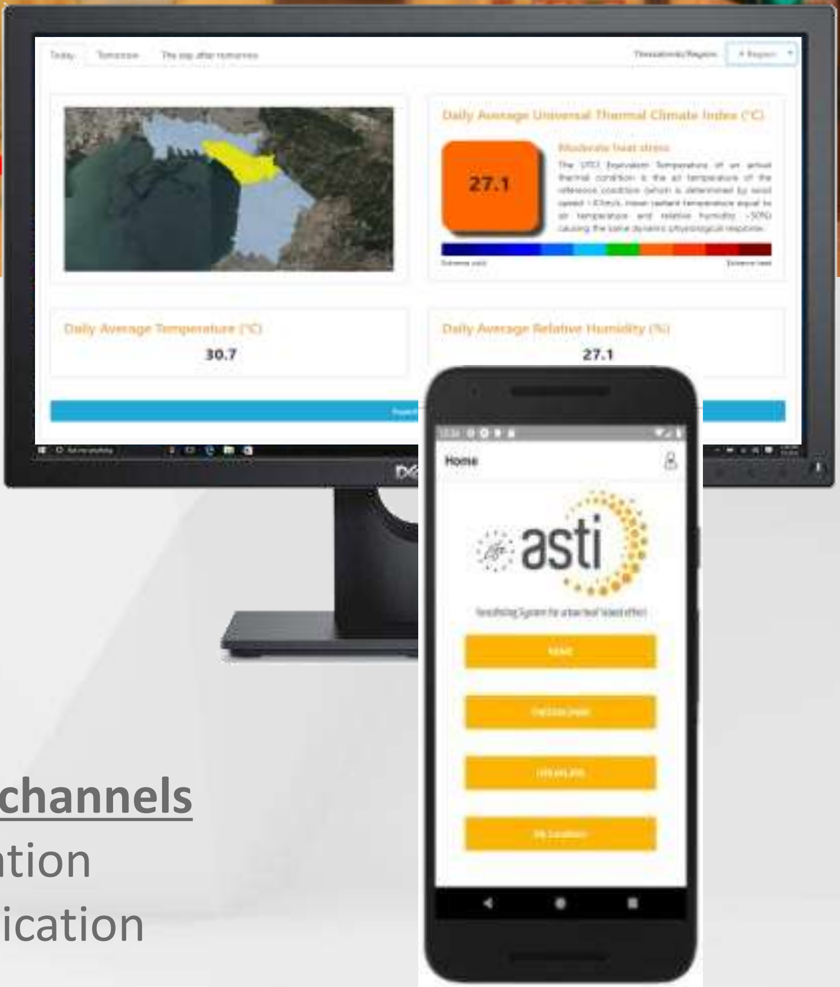
Open DATA

GeoBI
Business Intelligence

Environment

EARTH OBSERVATION

The LIFE ASTI platform



Objectives

- To inform **citizens** and **Authorities** for **extreme heat events** as well as for the impacts of **Urban Heat Island**
- To disseminate complex scientific information like the outputs of mathematical weather forecasting models in a simple, user friendly way

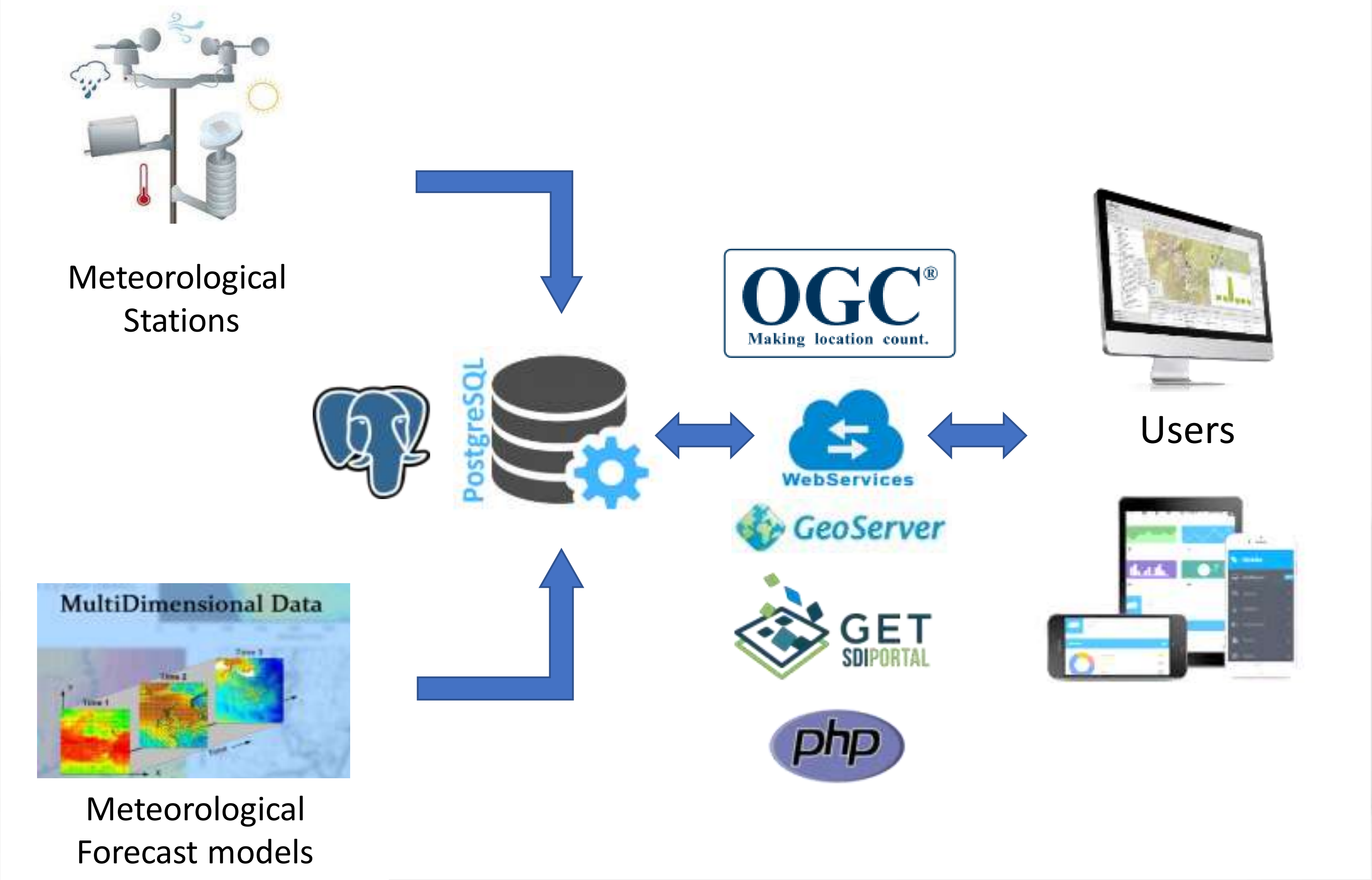
Technologies

Web technologies based on **open standards** and **free / open source** software

Dissemination channels

- Web application
- Mobile application

Data Flow and system architecture



Meteorological Stations

Meteorological Forecast models

Users

netCDF
D3
GDAL
NumPy
React JS
OpenLayers™
React Native
iOS
Android

The LIFE ASTI web application

Presents the data from the forecasting models and the meteorological stations for the three pilot areas:

- **Rome (IT)**
- **Thessaloniki (GR)**
- **Heraklion (GR)**

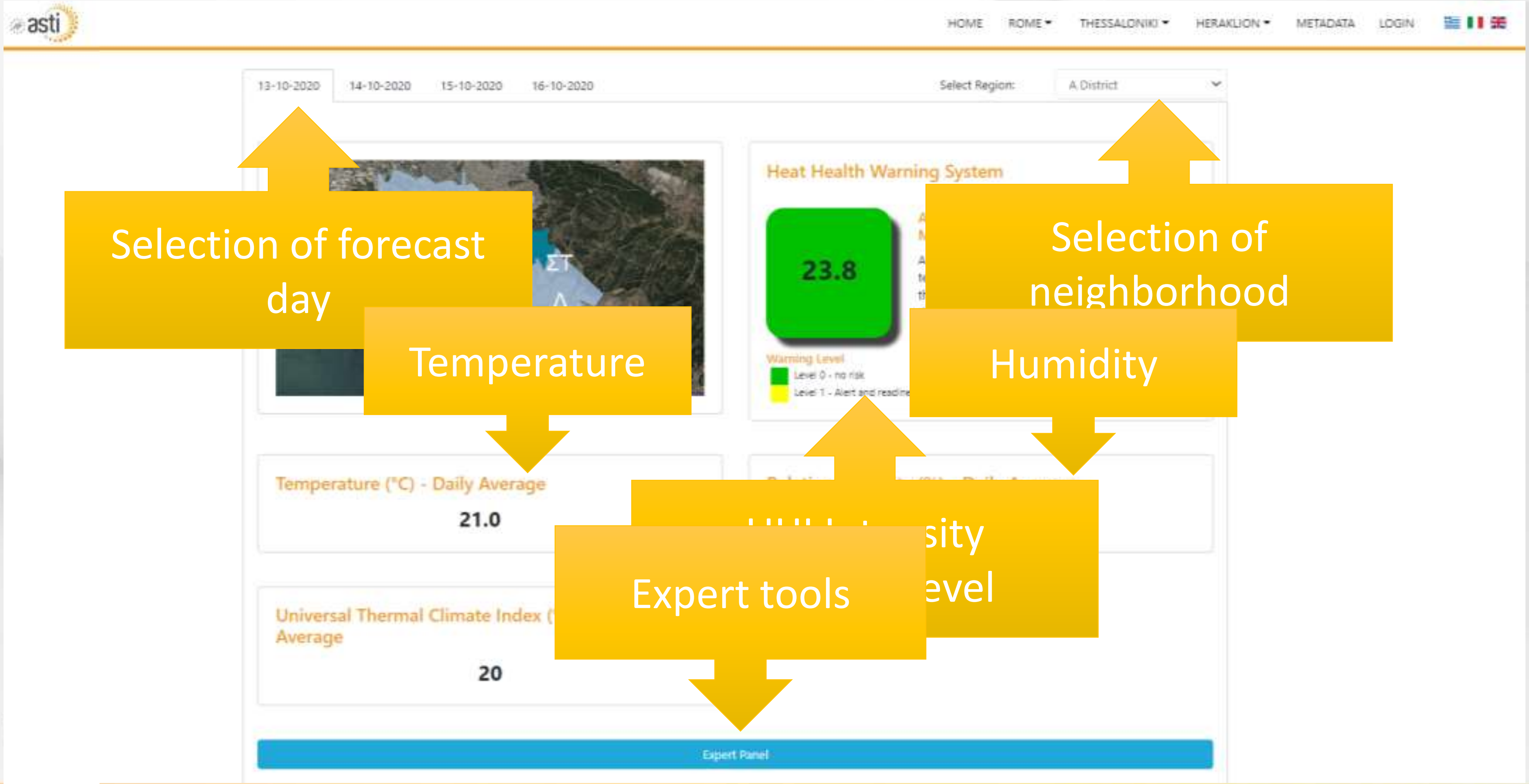
Functionalities

- Overall presentation of UHI status in neighborhood level (**UHI dashboard**)
- Detailed presentation of UHI characteristics using graphs and maps (**expert panel**)
- Dynamic map for data visualization in city block level (**map view**)

https://app.lifeasti.eu/

UHI Dashboard

Overall presentation of UHI status in city neighborhood level



Temperature (°C) - Daily Average

21.0

Universal Thermal Climate Index (

Average

20

Selection of forecast day

Temperature

Selection of neighborhood

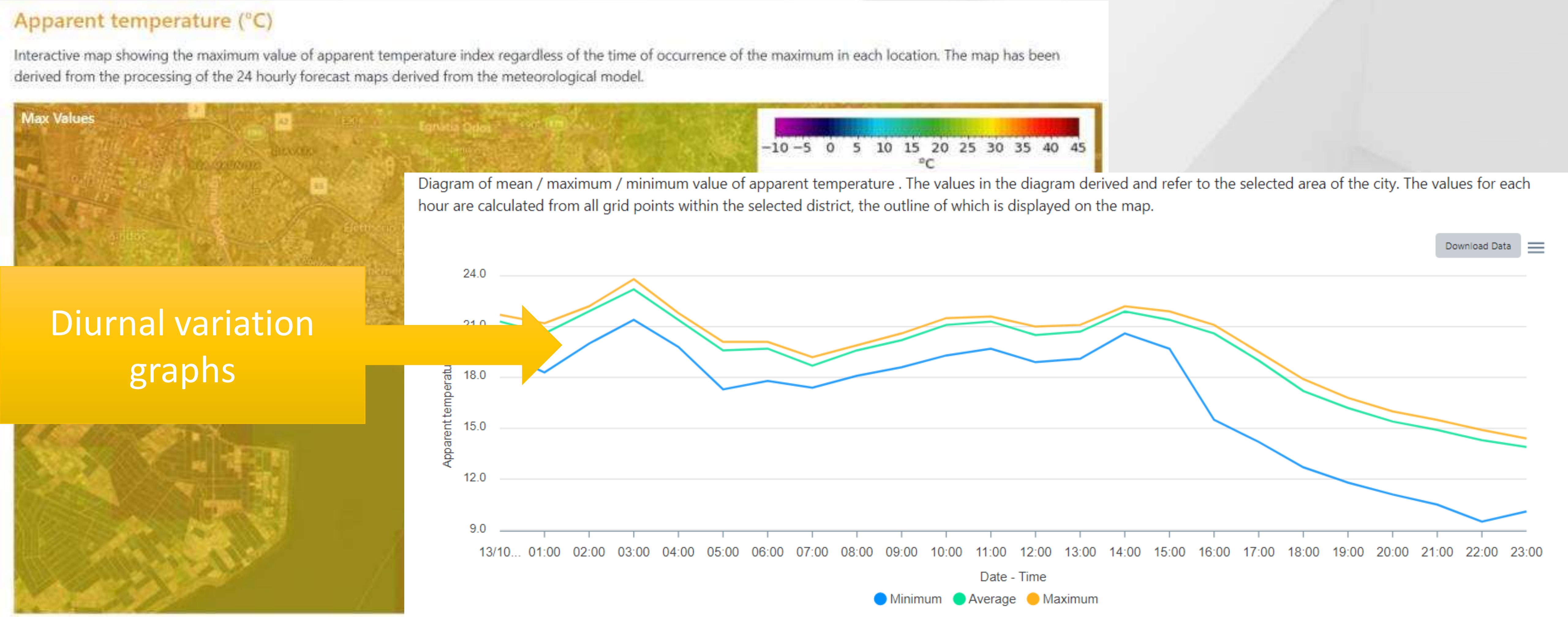
Humidity

sity
evel

Expert tools

Expert Tools

Present the spatiotemporal variation of the UHI phenomenon using graphs and maps



Apparent temperature (°C)

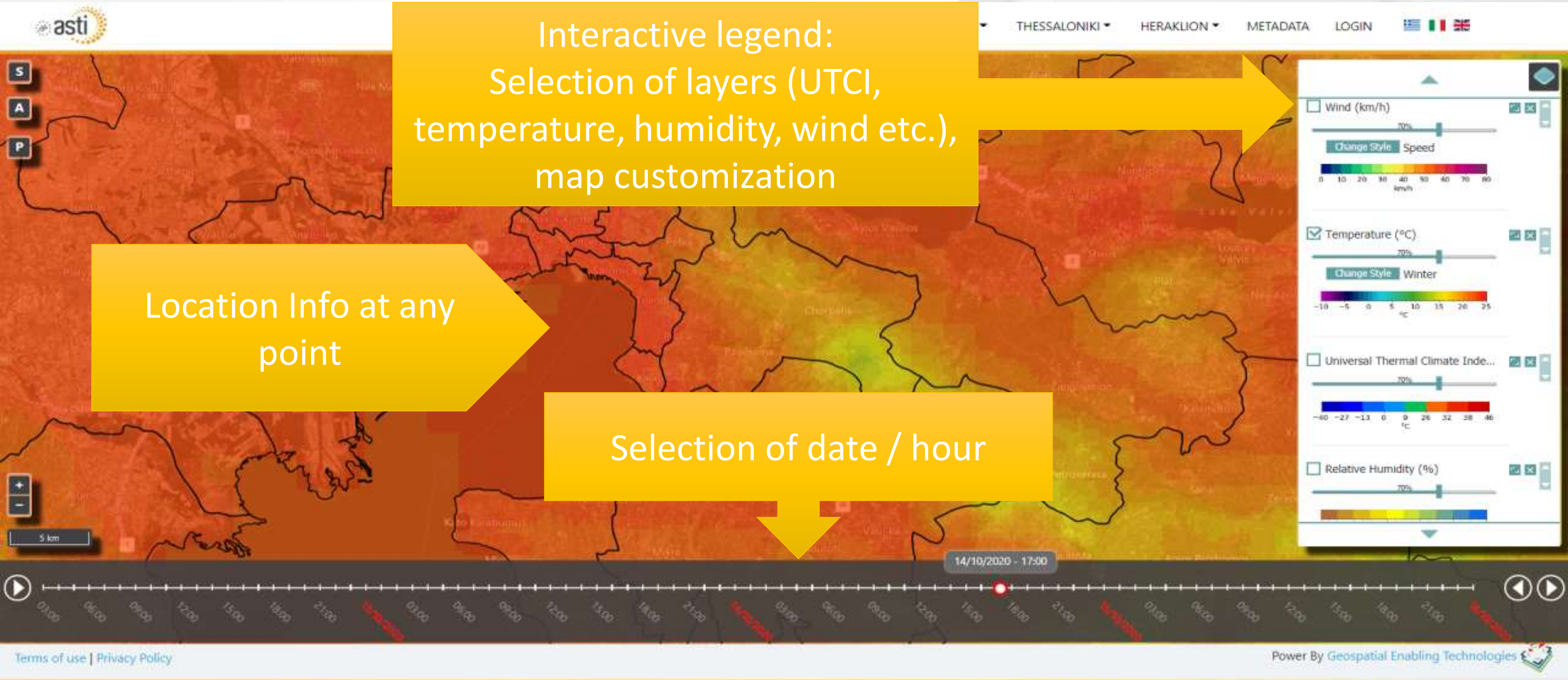
Interactive map showing the maximum value of apparent temperature index regardless of the time of occurrence of the maximum in each location. The map has been derived from the processing of the 24 hourly forecast maps derived from the meteorological model.

Diagram of mean / maximum / minimum value of apparent temperature . The values in the diagram derived and refer to the selected area of the city. The values for each hour are calculated from all grid points within the selected district, the outline of which is displayed on the map.

Diurnal variation graphs

Dynamic map

Dynamic map for data visualization in city block level



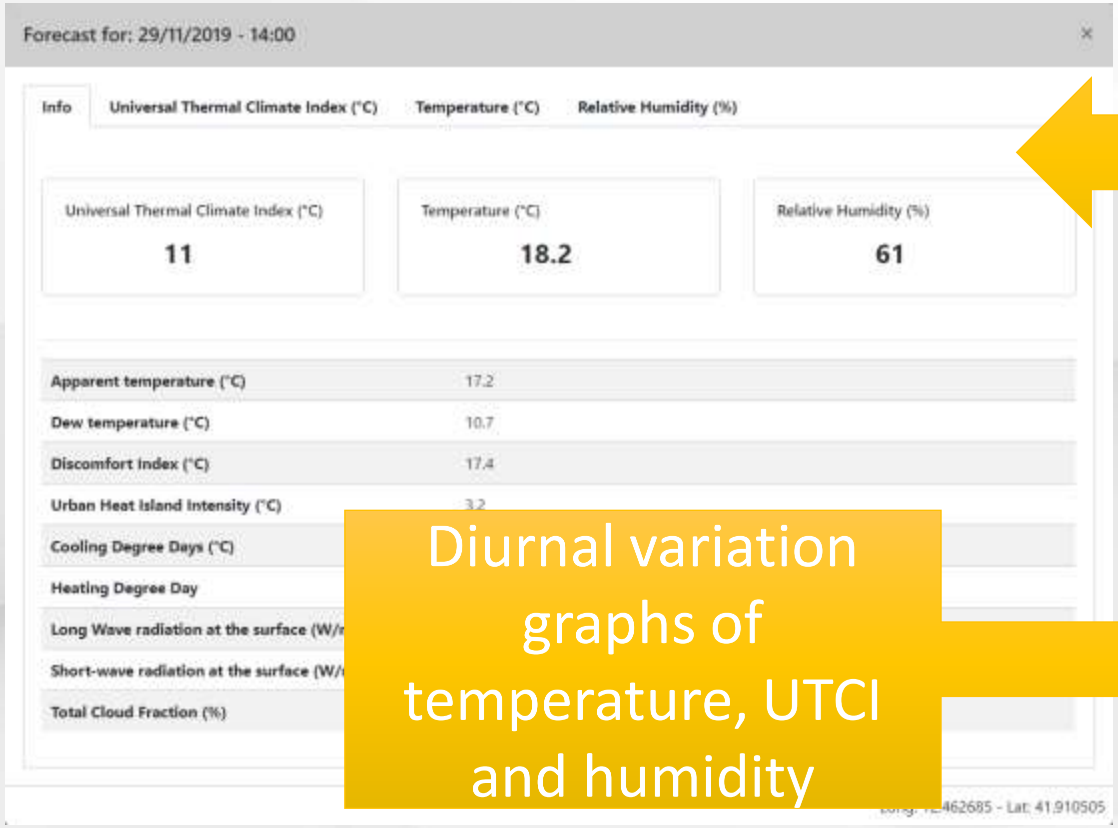
Interactive legend:
Selection of layers (UTCI, temperature, humidity, wind etc.), map customization

Location Info at any point

Selection of date / hour

Dynamic map

One click UHI information at city block level



Forecast for: 29/11/2019 - 14:00

Universal Thermal Climate Index (°C): 11

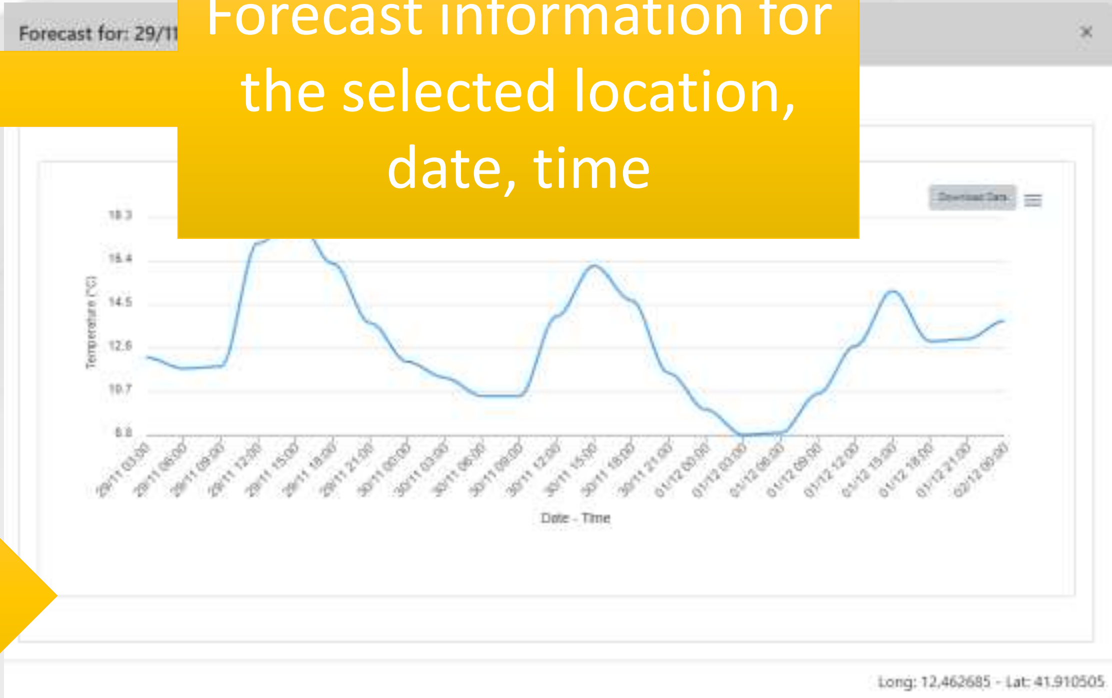
Temperature (°C): 18.2

Relative Humidity (%): 61

Apparent temperature (°C)	17.2
Dew temperature (°C)	10.7
Discomfort Index (°C)	17.4
Urban Heat Island Intensity (°C)	3.2
Cooling Degree Days (°C)	
Heating Degree Day	
Long Wave radiation at the surface (W/	
Short-wave radiation at the surface (W/	
Total Cloud Fraction (%)	

462685 - Lat: 41.910505

Forecast information for the selected location, date, time



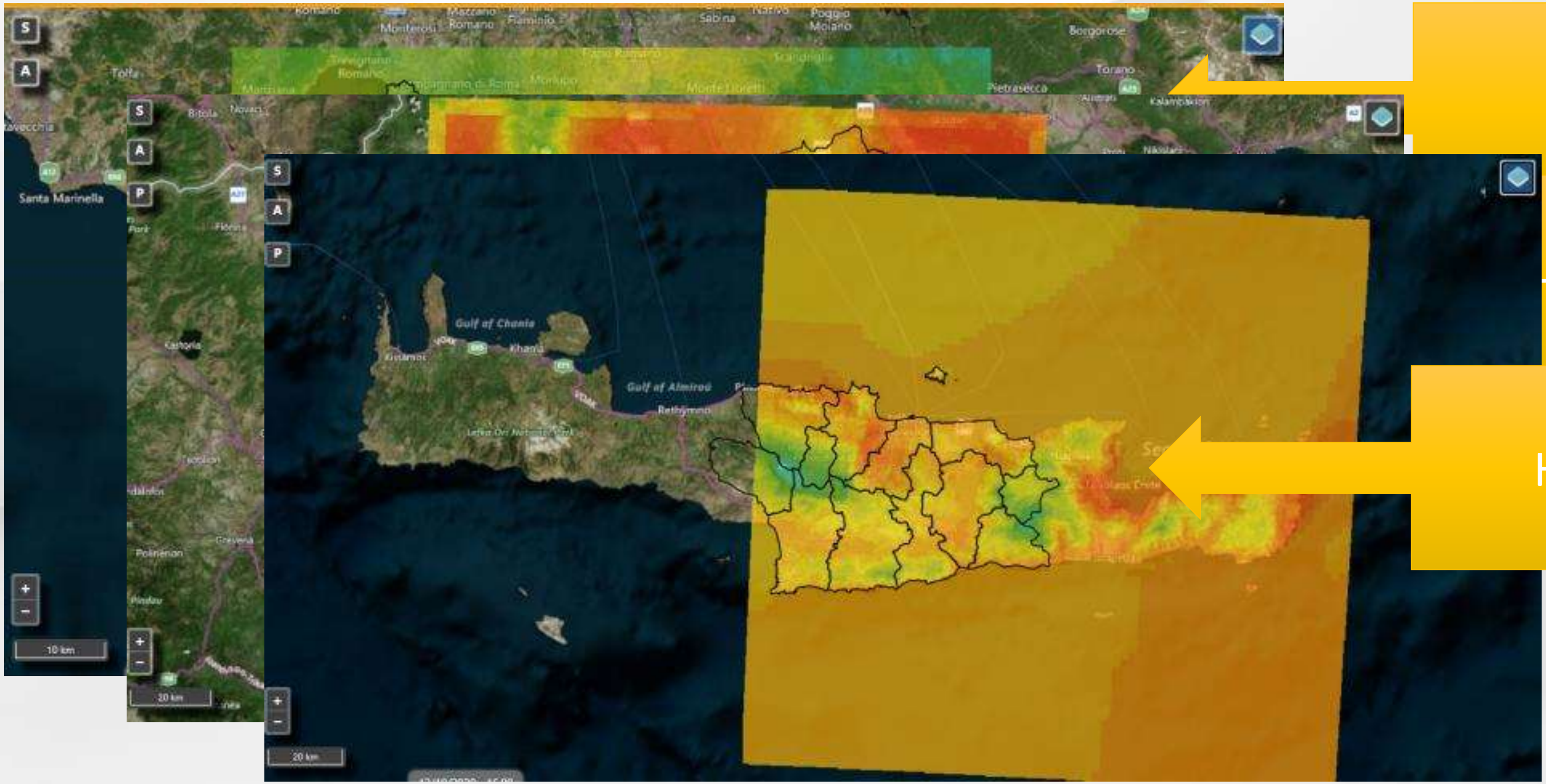
Forecast for: 29/11

Long: 12.462685 - Lat: 41.910505

Diurnal variation graphs of temperature, UTCI and humidity

Pilot areas

1 Pilot area in Italy (Rome) and 2 Pilot areas in Greece (Thessaloniki, Heraklion)



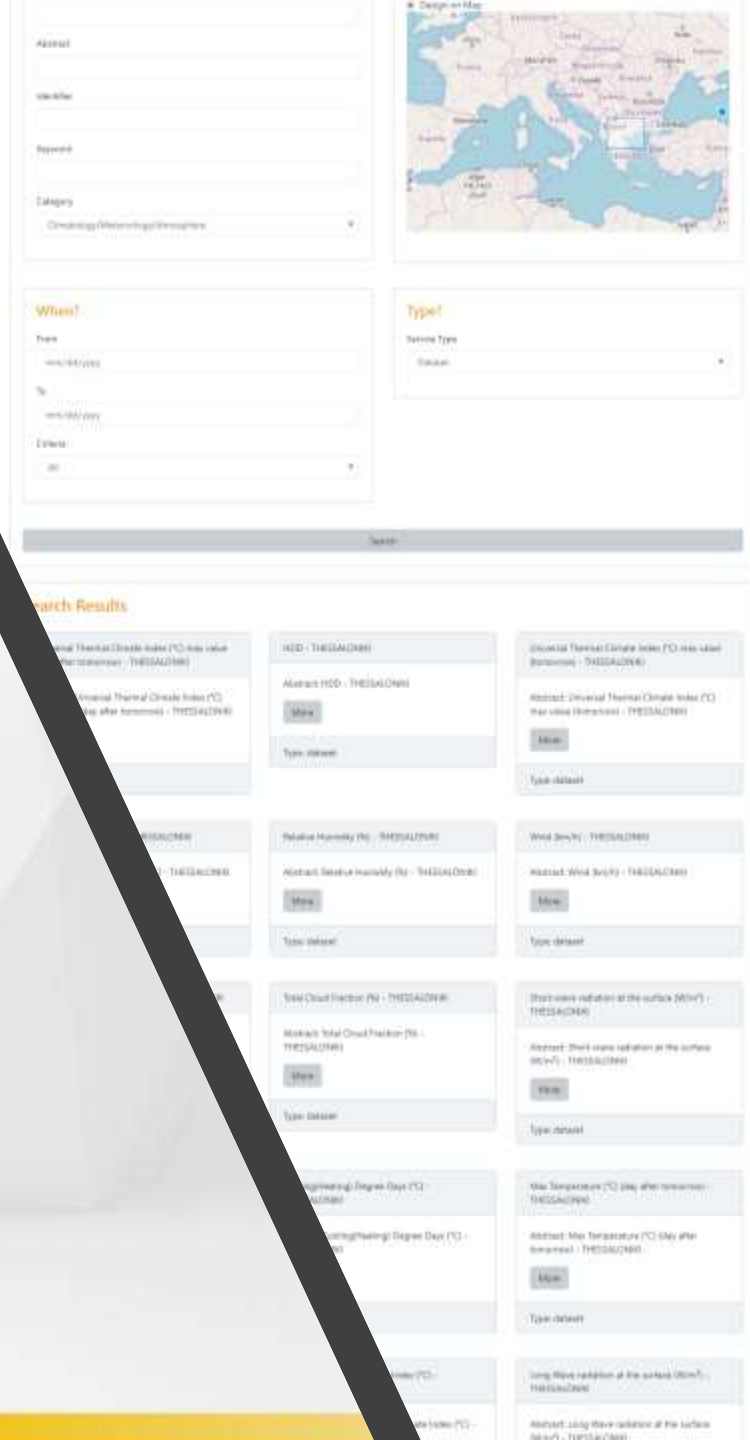
ROME

HESSALONIKI

HERAKLION

Open Data Services

- **All data can be re-used using the provided web services.**
- **Search for data using their metadata (Catalogue Service for the Web – CSW)**



LIFE ASTI mobile app

Easy access to UHI information at city block level in your mobile

- Provide Access to forecast data for all pilot areas
- UHI dashboard with simple to understand information
- Diurnal variation of the basic thermal related parameters
- Dynamic map of UHI products
- One click UHI information at city block scale
- Personalized information / alerts *for registered users*
- Custom locations *for registers users*

Download our Android App

Download on the App Store

LIFE ASTI mobile app

Easy access to UHI information at city block level in your mobile

The UTCI Equivalent Temperature of an actual thermal condition is the air temperature of the reference condition (which is determined by wind speed ~0.5m/s, mean radiant temperature equal to air temperature and relative humidity ~50%) causing the same dynamic physiological response.

Home page

Dashboard

Diurnal variation

LIFE ASTI mobile app

Easy access to UHI information at city block level in your mobile

Relative Humidity (%) 31.1

Temperature (°C) 28.7

Universal Thermal Climate Index (°C) 30.8

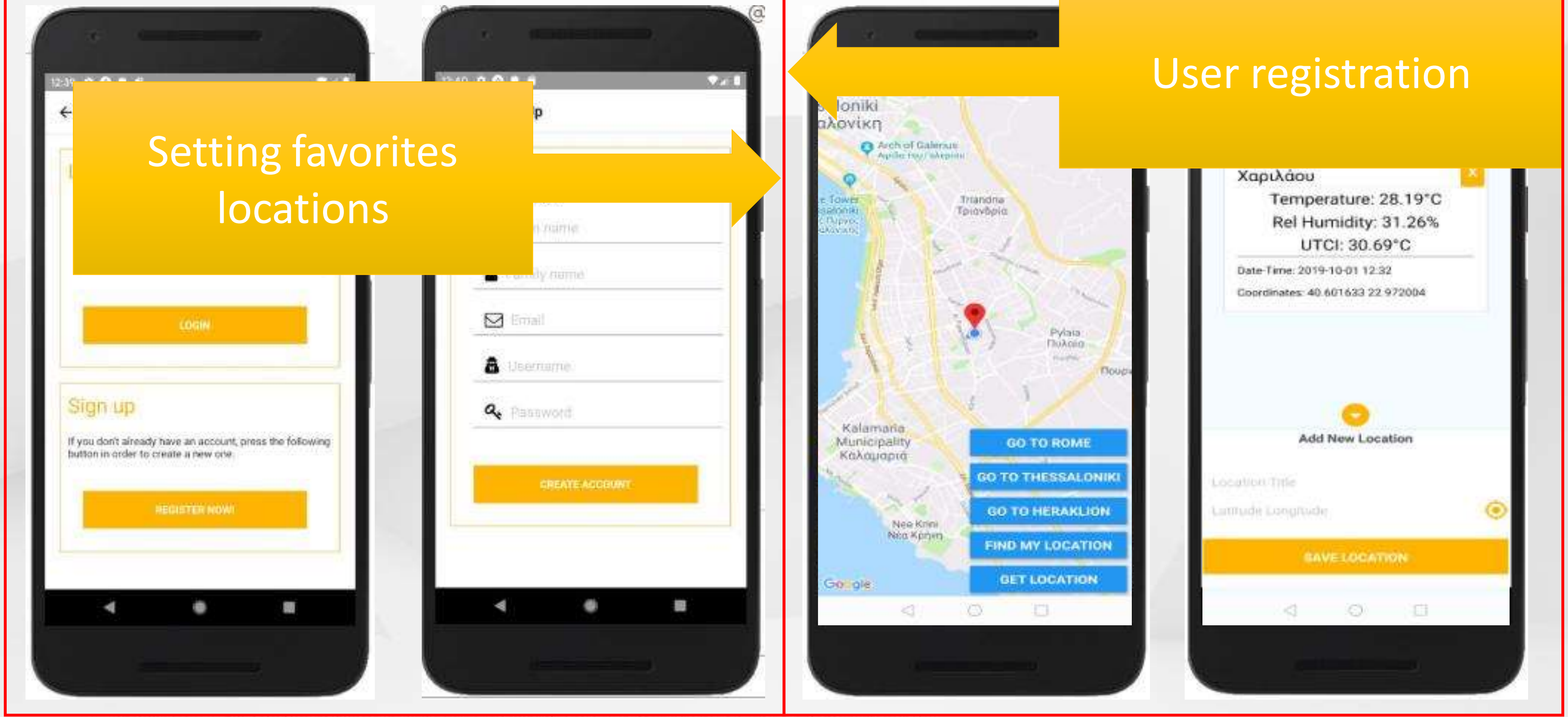
Dynamic map

Point location information

Diurnal variation at point location

LIFE ASTI mobile app

Easy access to UHI information at city block level in your mobile



Setting favorites locations

User registration

Sign up

If you don't already have an account, press the following button in order to create a new one.

Χαριλάου

Temperature: 28.19°C

Rel Humidity: 31.26%

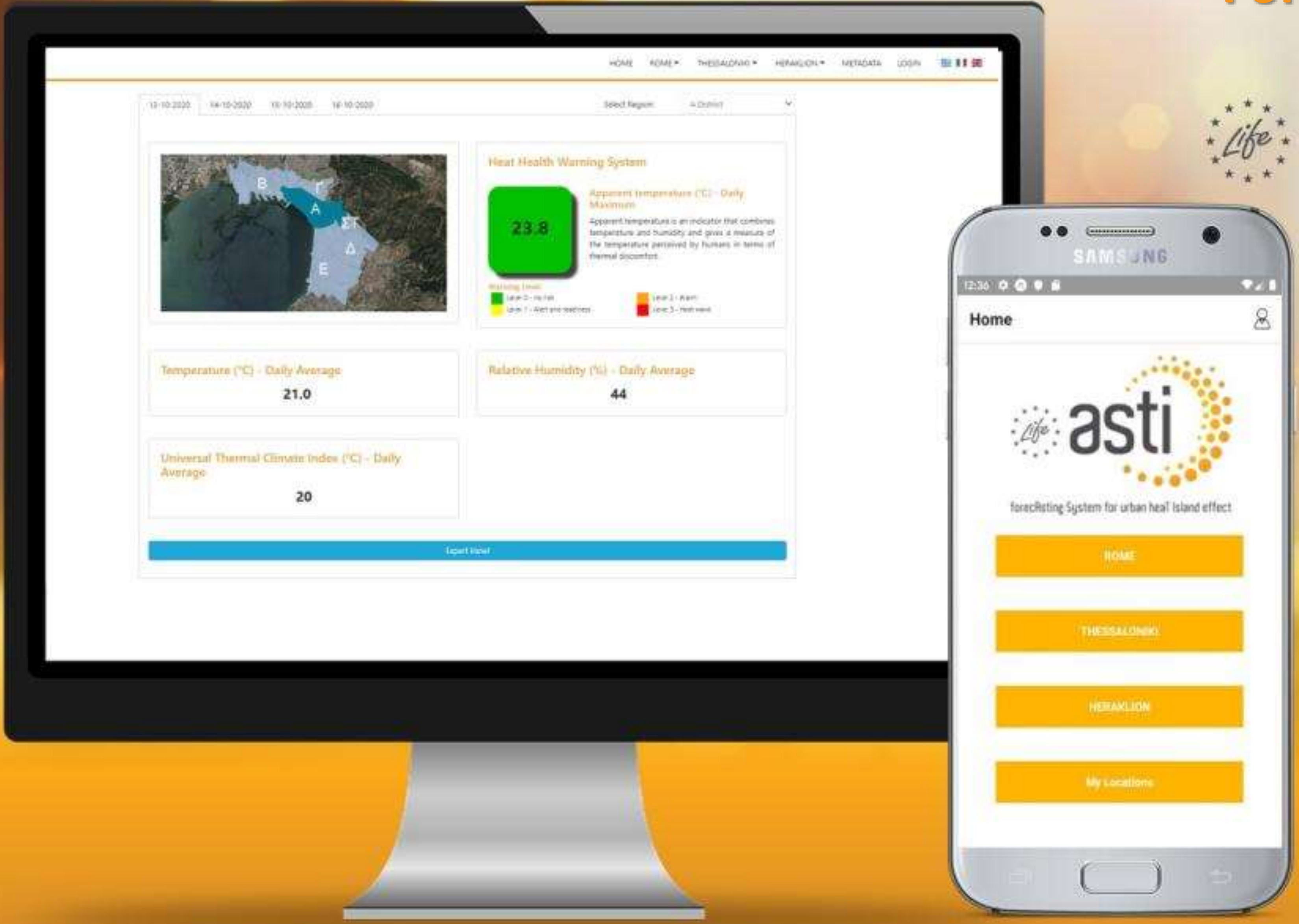
UTCI: 30.69°C

Date-Time: 2019-10-01 12:32

Coordinates: 40.601633 22.972004

For more information…

forecAsting System for urban heaT Island effect



Apparent temperature is an indicator that combines temperature and humidity and gives a measure of the temperature perceived by humans in terms of thermal discomfort.

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https://app.lifeasti.eu/

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Life asti
forecAsting
System
for urban
heaT Island
effect

Heat Health Warning Systems for Rome and Thessaloniki

Francesca de'Donato

2nd European workshop

14 October 2020

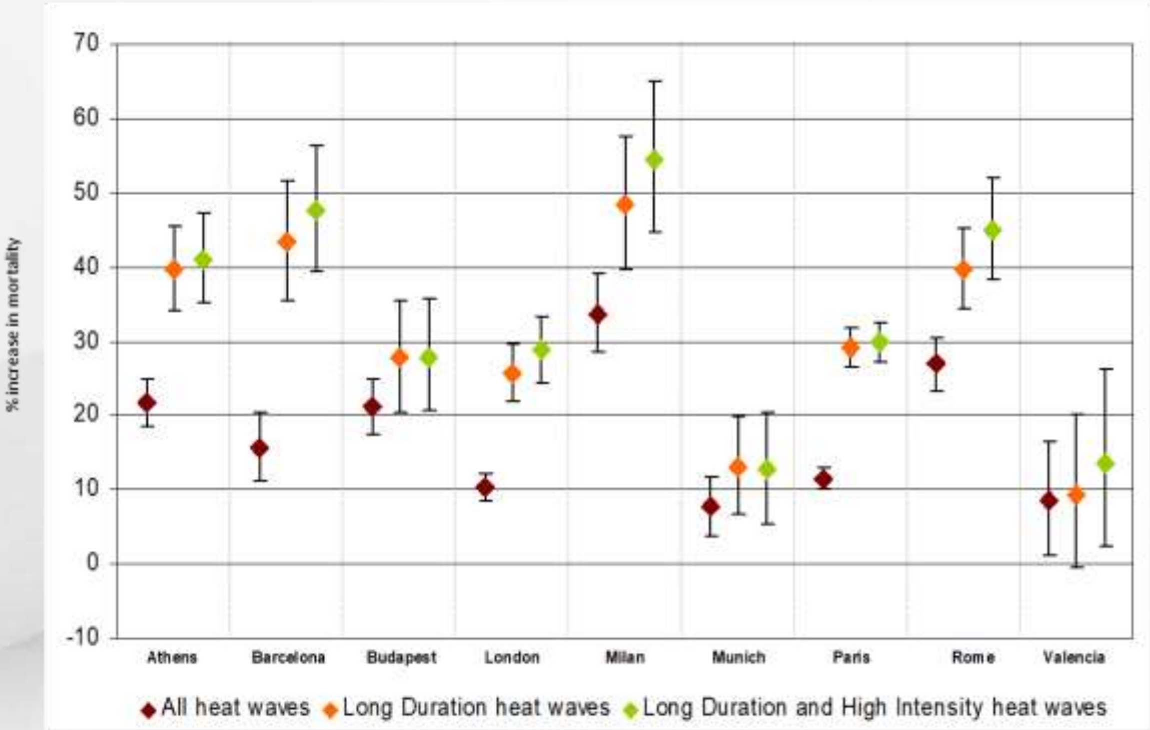
The project *Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies - LIFE ASTI* has received funding from the LIFE Programme of the European Union.

D/EP/Lazio
Department of Epidemiology
Lazio Regional Health Service, Italy

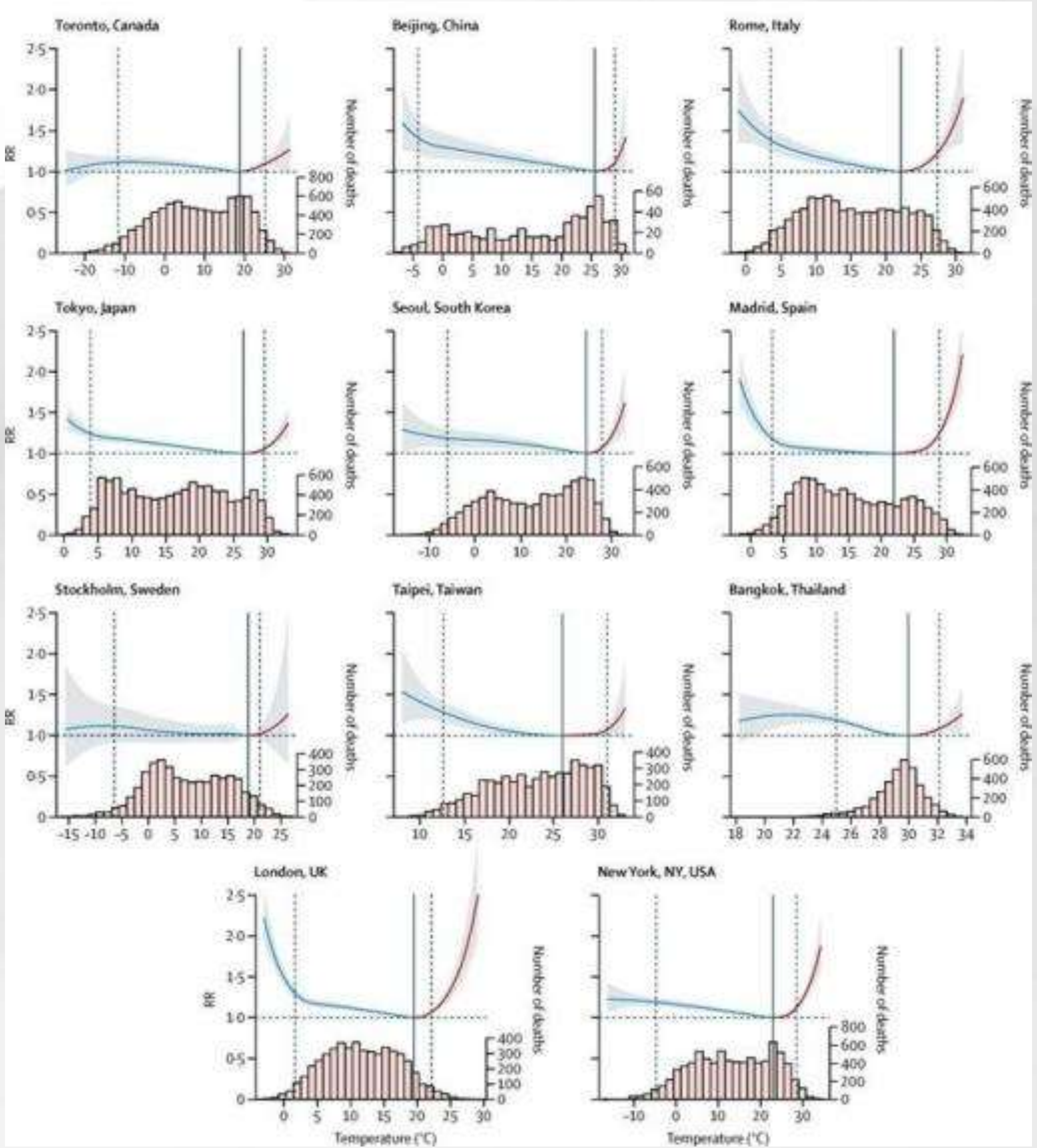
SISTEMA SANITARIO REGIONALE
ASL ROMA 1

REGIONE LAZIO

Health risks related to heat in urban areas

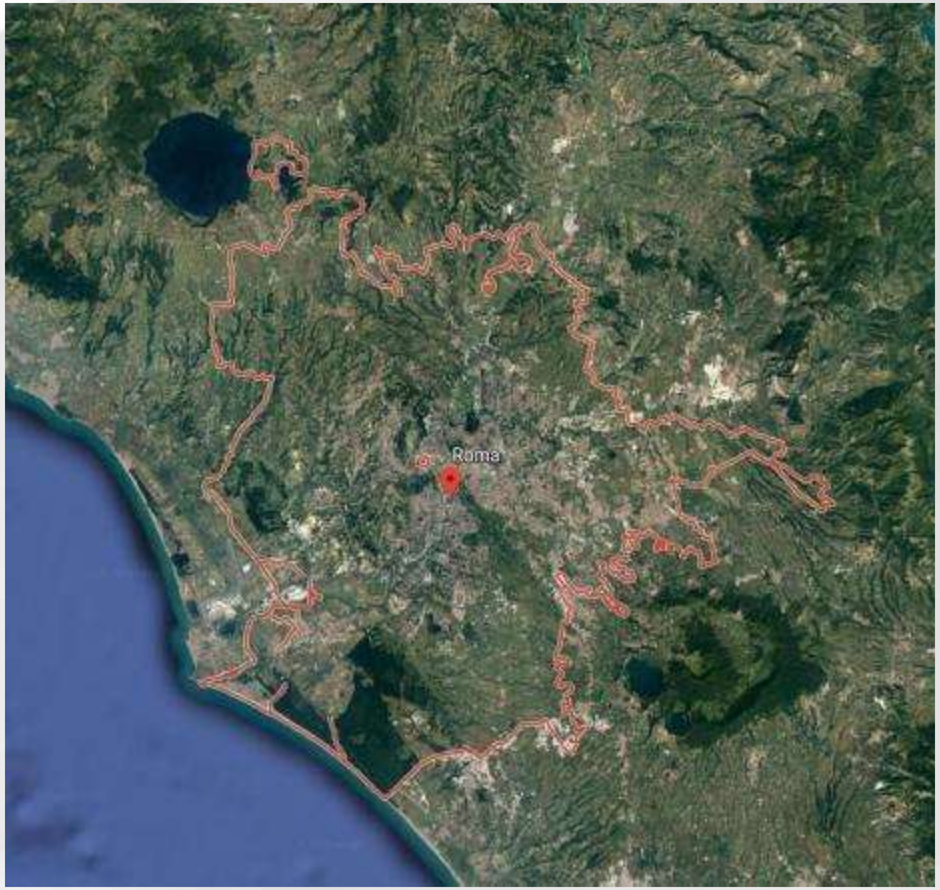


D'Ippoliti et al. 2010 Env Res

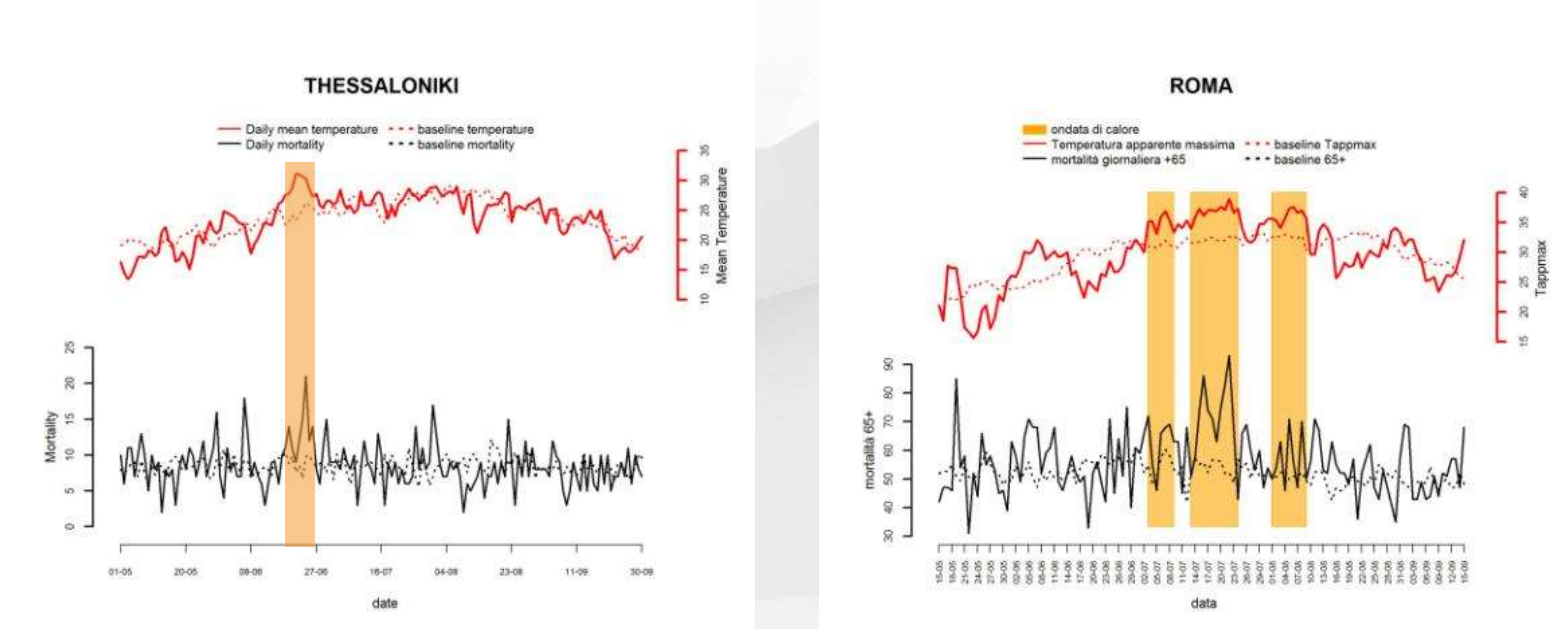


Gasparrini et al. 2015 Lancet

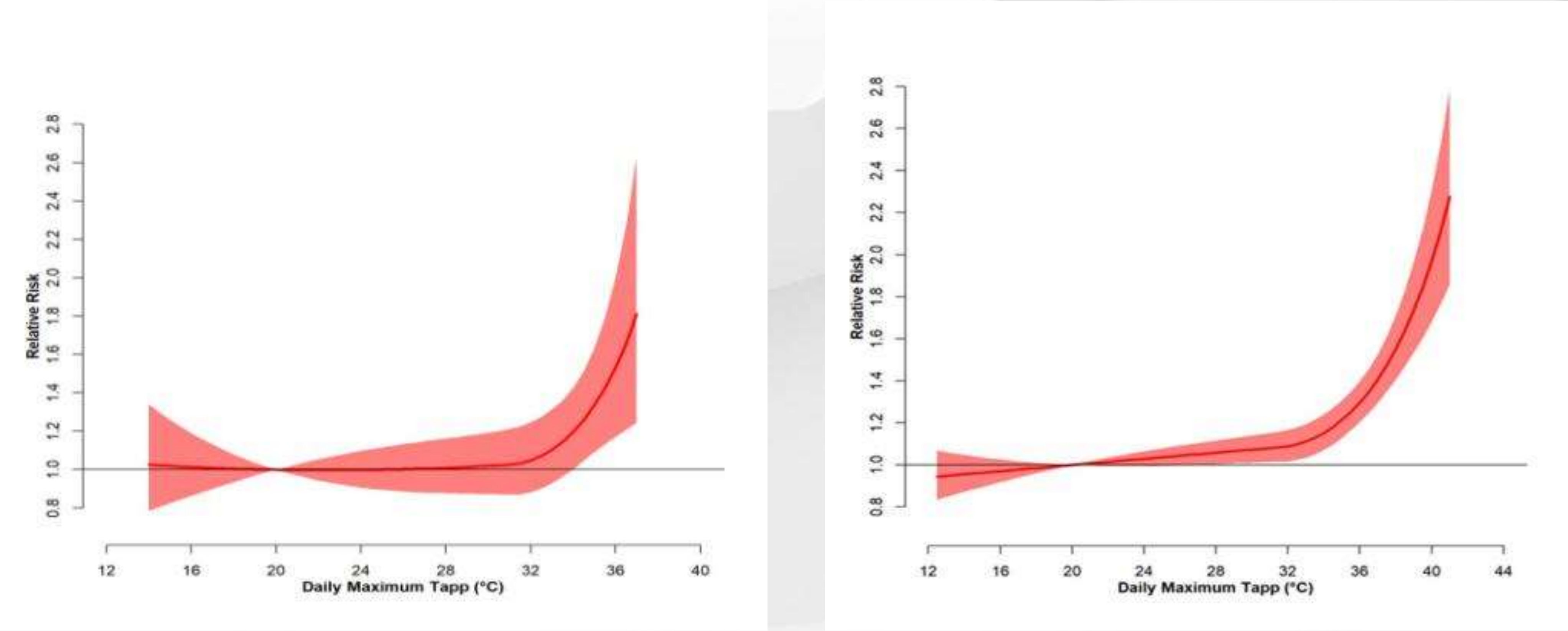
Case study cities Thessaloniki and Rome



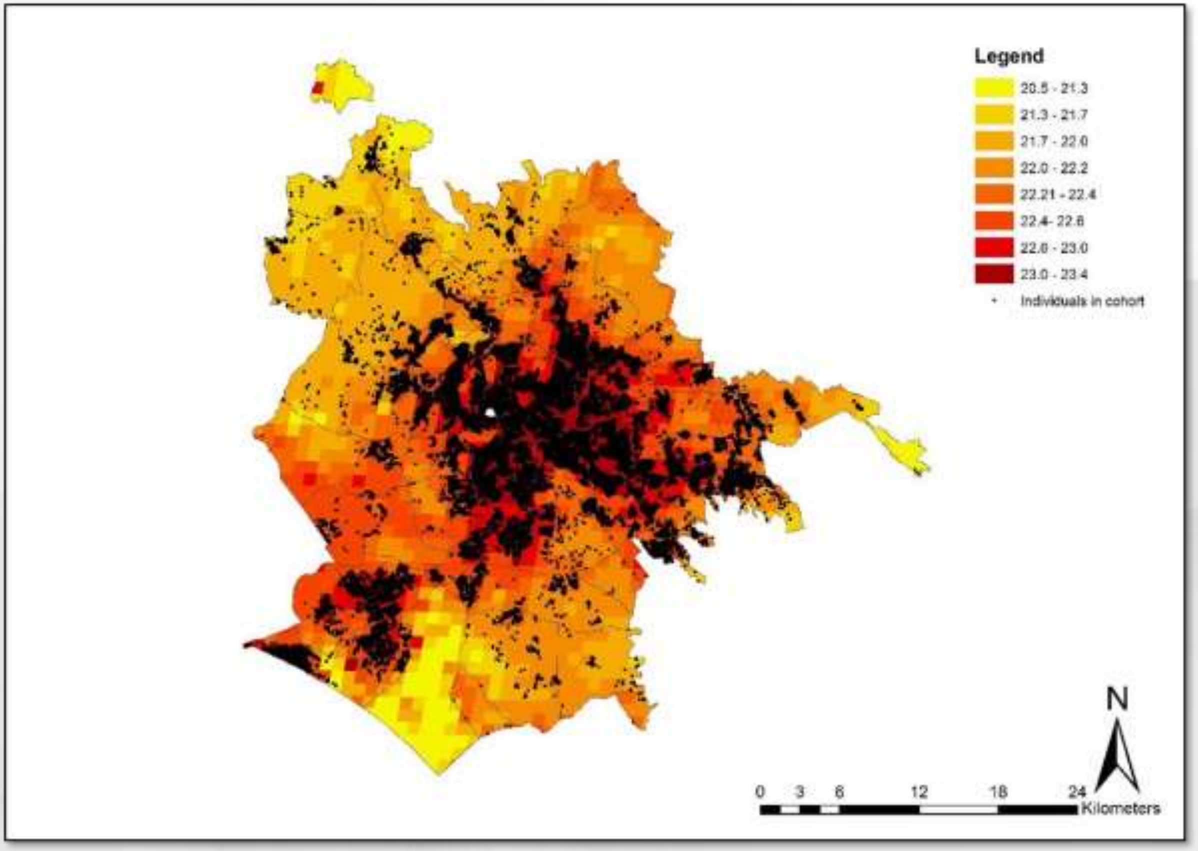
Daily temperatures and mortality trends for summer 2016 Thessaloniki (left) and Rome (right)



The association between maximum apparent temperature and mortality in Thessaloniki (left) and Rome (right)



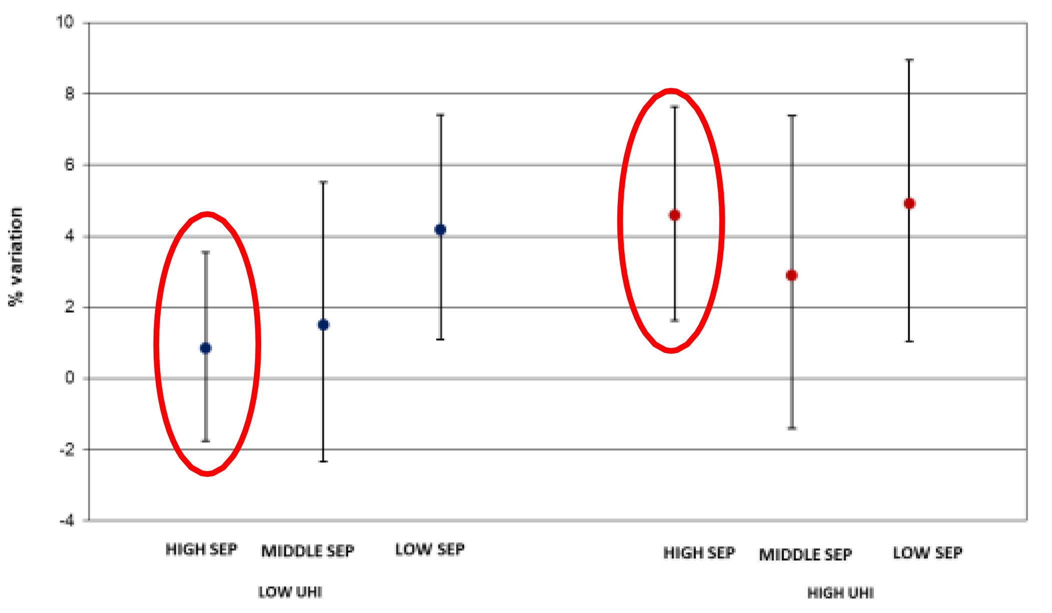
Differential effect of heat within a city? UHI effect and individual characteristics



Exposure : 1x1km at individual level

Individual level: Age, gender, education, marital status, occupation, comorbidities,

Area level: SEP, Urban heat island



WHO Core elements of heat-health action plans

- Identification of lead body, interdepartmental co-operation
- Accurate and timely site-specific warning systems
- Information campaign (general pop, at risk groups, care givers etc.)
- Preparedness of the health/social care system
- Identification of vulnerable subgroups
- Real-time surveillance (mortality, ER visits, ambulance calls, Help lines)
- Reduction in indoor heat exposure
- Long-term urban planning

Heat Health Watch Warning systems

City-specific models based on the temperature-mortality relationship.

On the basis of this relationship, defined using time series data, **HHWW** use weather forecast data to predict at-risk conditions for local populations associated to an increase in mortality.

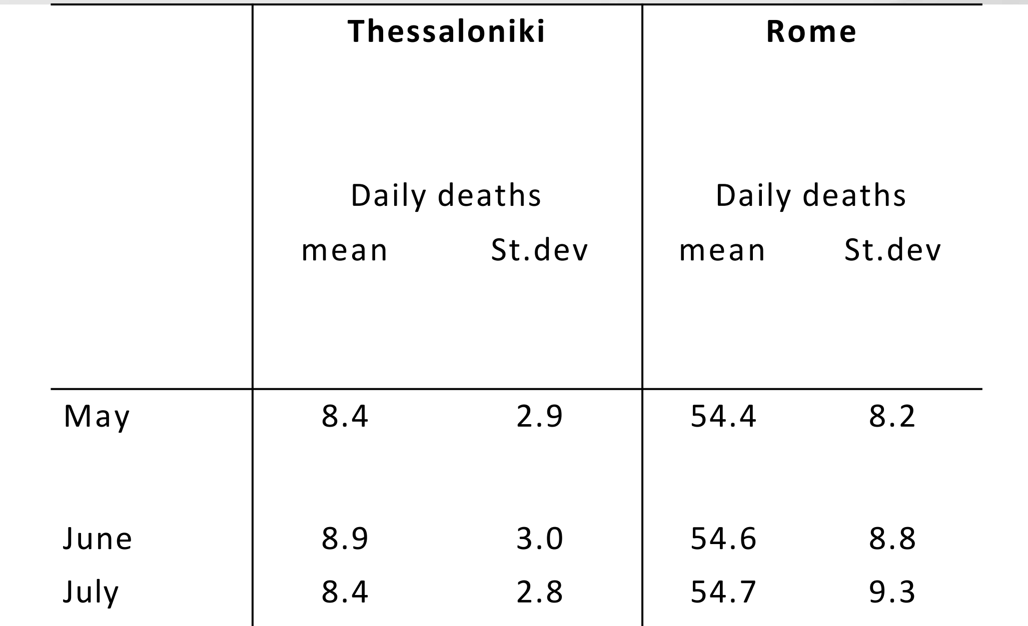
High spatio-temporal resolution forecasts enable accurate and differential warnings within urban areas.

Dataset

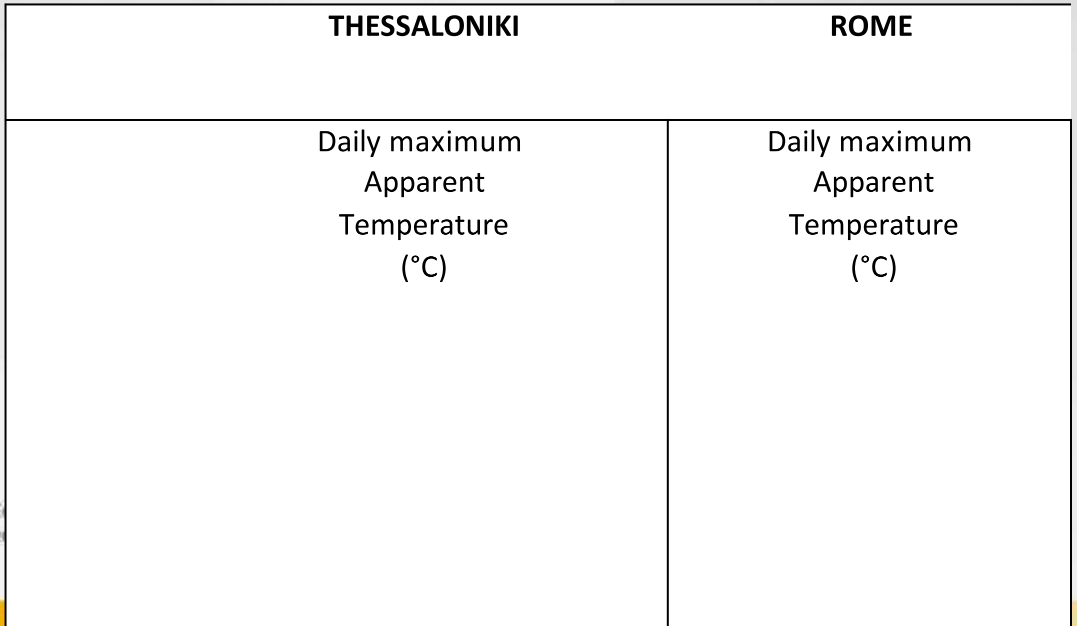
Temperature, dew point and humidity: hourly data from 9 monitoring stations in the Thessaloniki area for the period 2013-2017 (ΕΠΤΑΠΥΡΓΙΟ,) and Rome Ciampino airport 3 hourly SYNOP data (2000-present)

Exposure indictors developed: Tappmax

Mortality: daily counts of deaths (Thessaloniki 2013 –2018; Rome 2000-2018)



	Thessaloniki		Rome	
	Daily deaths		Daily deaths	
	mean	St.dev	mean	St.dev
May	8.4	2.9	54.4	8.2
June	8.9	3.0	54.6	8.8
July	8.4	2.8	54.7	9.3



THESSALONIKI	ROME
Daily maximum Apparent Temperature (°C)	Daily maximum Apparent Temperature (°C)

HHWW predictive model definition

The tappmax threshold model is defined on the basis of the relationship between mortality and Tappmax investigated through a city-specific Poisson regression model

$$log[E(Y_i)] = \alpha + tappmax_i * month_i + consecutive\_days_i$$

The explicative variables included in the model are:

- holidays, month (May–August),
- interaction between Tappmax and month
- number of consecutive hot days with Tappmax above the threshold (defined as the mean temperature value corresponding to all days for which excess mortality was greater than 10%)

Definition of Risk Levels

For each month, a health-risk table were drawn up and a daily level of risk attributed:

No risk: increase in mortality <10%

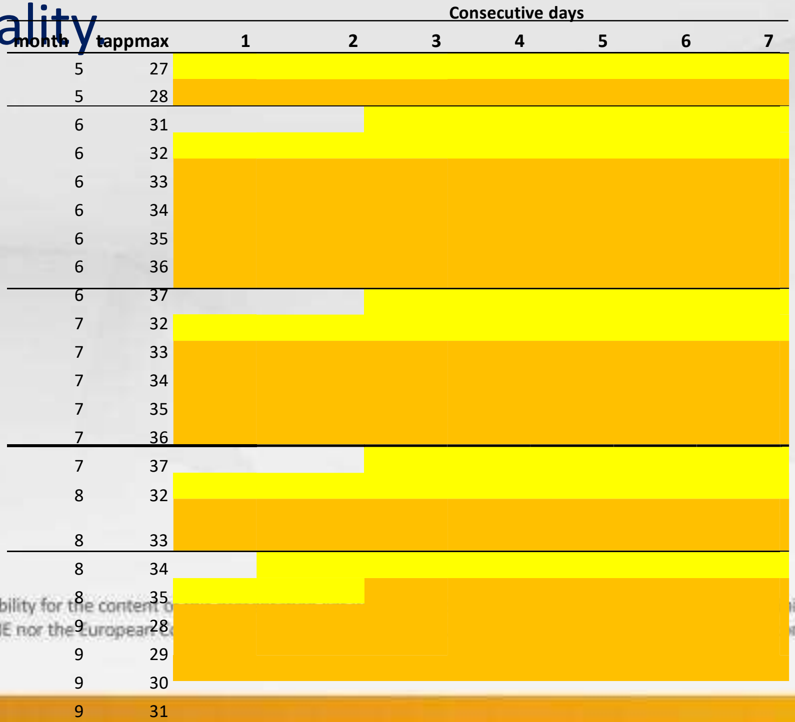
low risk: increase in mortality between 10-20

high Risk: increase in mortality between >20%

The increase in mortality is defined as the difference been observed and baseline mortality.

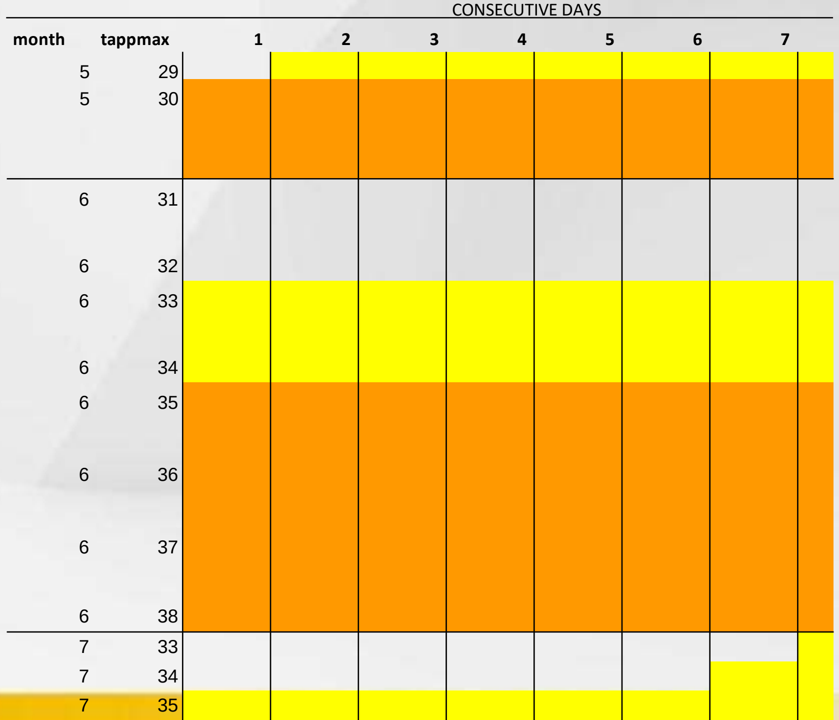
Thessaloniki

e



		Consecutive days						
month	**tappmax**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	27	🟨	🟨	🟨	🟨	🟨	🟨	🟨
5	28	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	31			🟨	🟨	🟨	🟨	🟨
6	32	🟨	🟨	🟨	🟨	🟨	🟨	🟨
6	33	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	34	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	35	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	36	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	37			🟨	🟨	🟨	🟨	🟨
7	32	🟨	🟨	🟨	🟨	🟨	🟨	🟨
7	33	🟧	🟧	🟧	🟧	🟧	🟧	🟧
7	34	🟧	🟧	🟧	🟧	🟧	🟧	🟧
7	35	🟧	🟧	🟧	🟧	🟧	🟧	🟧
7	36	🟧	🟧	🟧	🟧	🟧	🟧	🟧
7	37			🟨	🟨	🟨	🟨	🟨
8	32	🟨	🟨	🟨	🟨	🟨	🟨	🟨
8	33	🟧	🟧	🟧	🟧	🟧	🟧	🟧
8	34		🟨	🟨	🟨	🟨	🟨	🟨
8	35	🟨	🟨	🟧	🟧	🟧	🟧	🟧
9	28	🟧	🟧	🟧	🟧	🟧	🟧	🟧
9	29	🟧	🟧	🟧	🟧	🟧	🟧	🟧
9	30	🟧	🟧	🟧	🟧	🟧	🟧	🟧
9	31							

Rom



		CONSECUTIVE DAYS							
month	**tappmax**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
5	29		🟨	🟨	🟨	🟨	🟨	🟨	🟨
5	30	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	31								
6	32								
6	33	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
6	34	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨
6	35	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	36	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	37	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
6	38	🟧	🟧	🟧	🟧	🟧	🟧	🟧	🟧
7	33								🟨
7	34							🟨	🟨
7	35	🟨	🟨	🟨	🟨	🟨	🟨	🟨	🟨

Local Heat plan and Information Network: dissemination of warning to stakeholders.

Heat Health Warning System

17.5

Apparent temperature (°C) - Daily Maximum

Apparent temperature is an indicator that combines temperature and humidity and gives a measure of the temperature perceived by humans in terms of thermal discomfort.

Warning Level

- 🟩 Level 0 - no risk
- 🟨 Level 1 - Alert and readiness
- 🟧 Level 2 - Alarm
- 🟥 Level 3 - Heat wave

Temperature (°C) - Daily Average

13.9

Relative Humidity (%) - Daily Average

78

Expert Panel

E-mail

ntion plan

Emergency services
(civil protection,
Health, etc)

Action and prevention graded on HHWW: Local stakeholders (health, environmental, social services, etc)

Information and health recommendations

HEALTH EFFECTS OF HEAT

SHORT-TERM EFFECTS OF HEAT ON HEALTH

DIRECT EFFECTS

- DEHYDRATION ELECTROLYTES IMBALANCE
- HEAT RASH
- HEAT CRAMPS
- HEAT EDEMA, SYNCOPE
- HEAT STROKE

INDIRECT EFFECTS

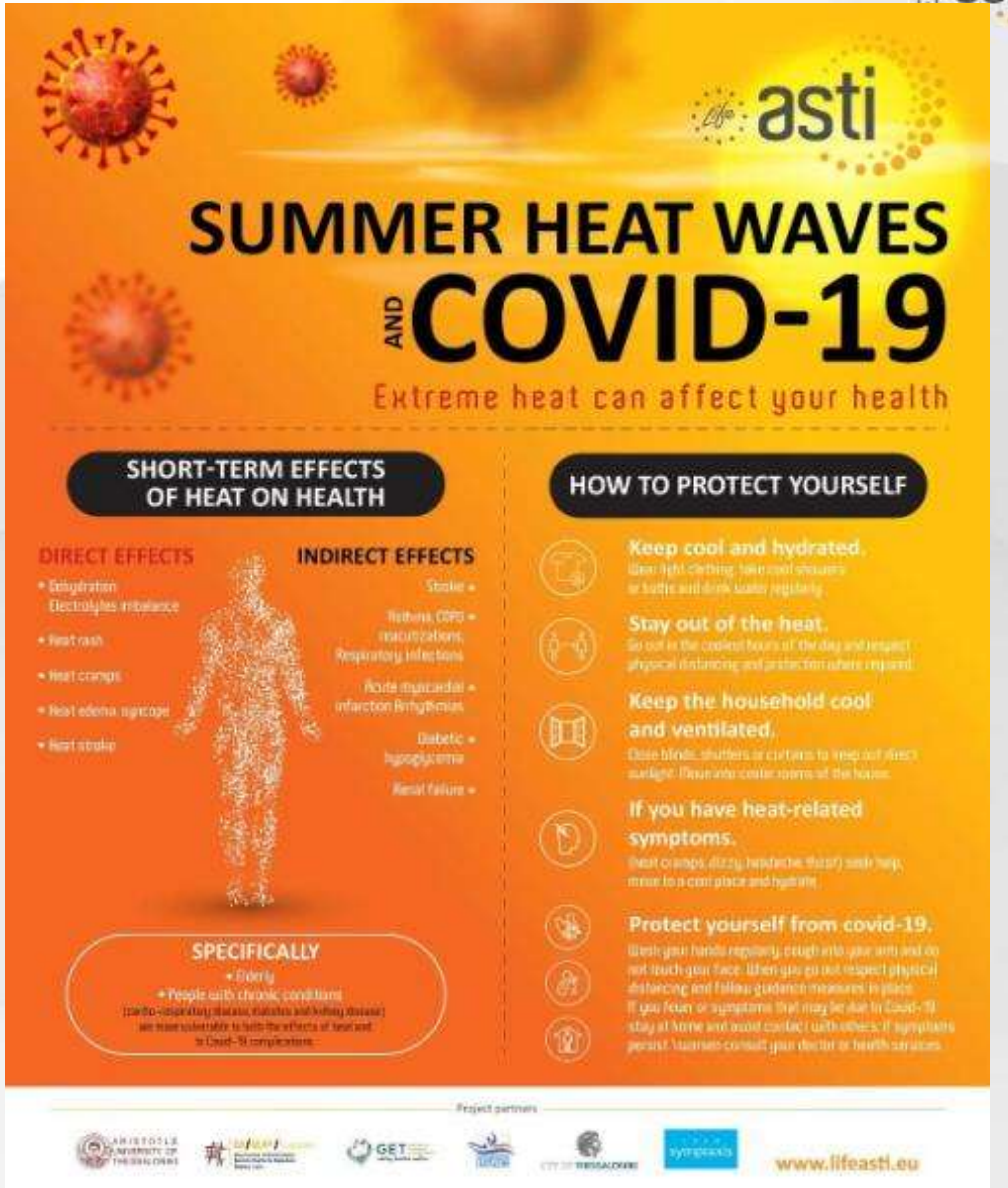
- STROKE
- ASTHMA, COPD REACUTIZATIONS, RESPIRATORY INFECTIONS
- ACUTE MYOCARDIAL INFARCTION ARRHYTHMIAS
- DIABETIC HYPOGLYCEMIA
- RENAL FAILURE

INCREASED AMBULANCE CALLS, ER VISITS, MORTALITY

POPULATION SUBGROUPS VULNERABLE TO HEAT

SUBJECTS WITH CHRONIC DISEASE VULNERABLE TO HEAT

Source: DEASL



SUMMER HEAT WAVES AND COVID-19

Extreme heat can affect your health

SHORT-TERM EFFECTS OF HEAT ON HEALTH

DIRECT EFFECTS

- Dehydration Electrolytes imbalance
- Heat rash
- Heat cramps
- Heat edema, syncope
- Heat stroke

INDIRECT EFFECTS

- Stroke
- Asthma, COPD reacutizations, Respiratory infections
- Acute myocardial infarction Arrhythmias
- Diabetic hypoglycemia
- Renal failure

SPECIFICALLY

- Elderly
- People with chronic conditions

HOW TO PROTECT YOURSELF

Keep cool and hydrated.

Stay out of the heat.

Keep the household cool and ventilated.

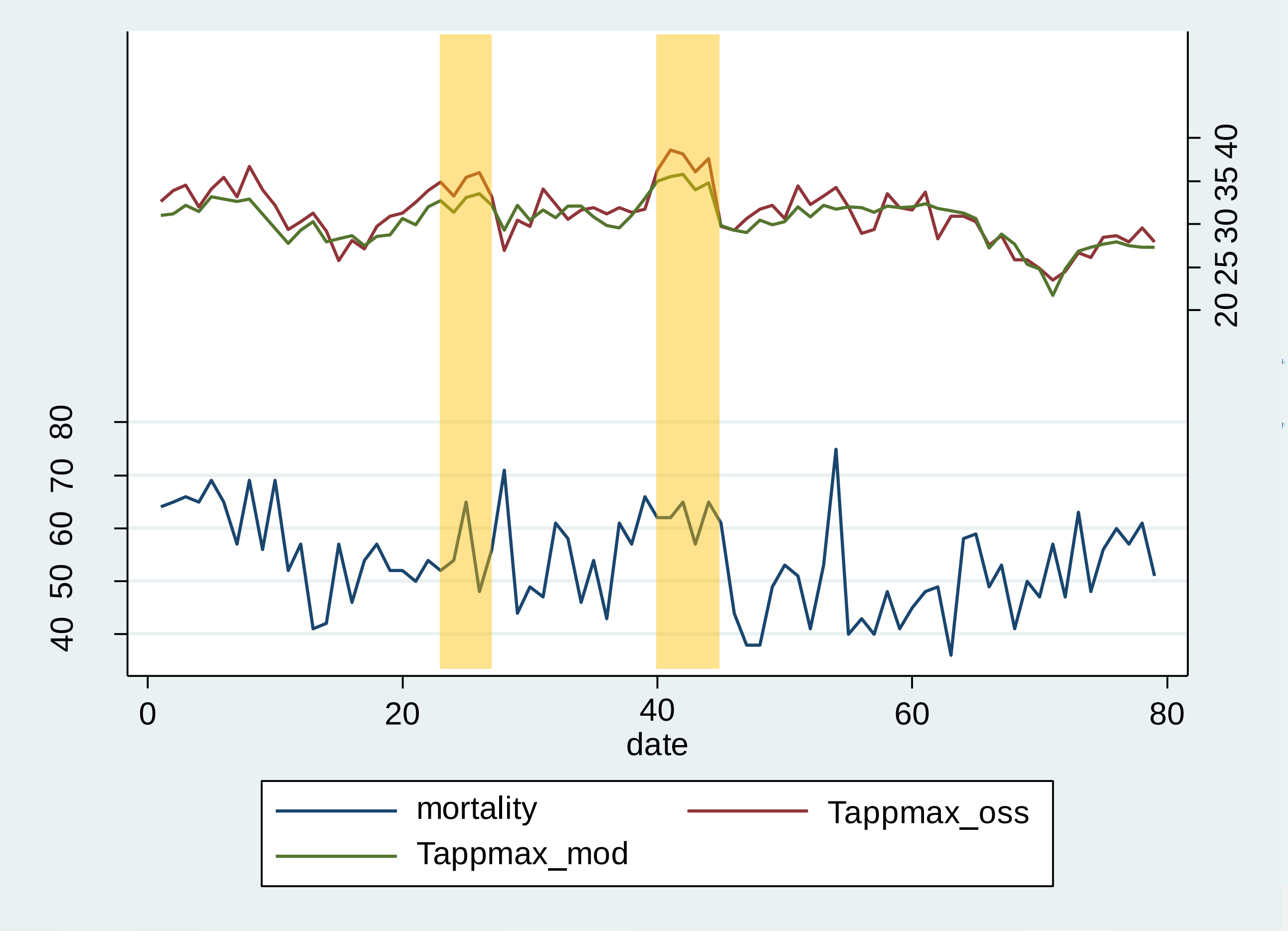
If you have heat-related symptoms.

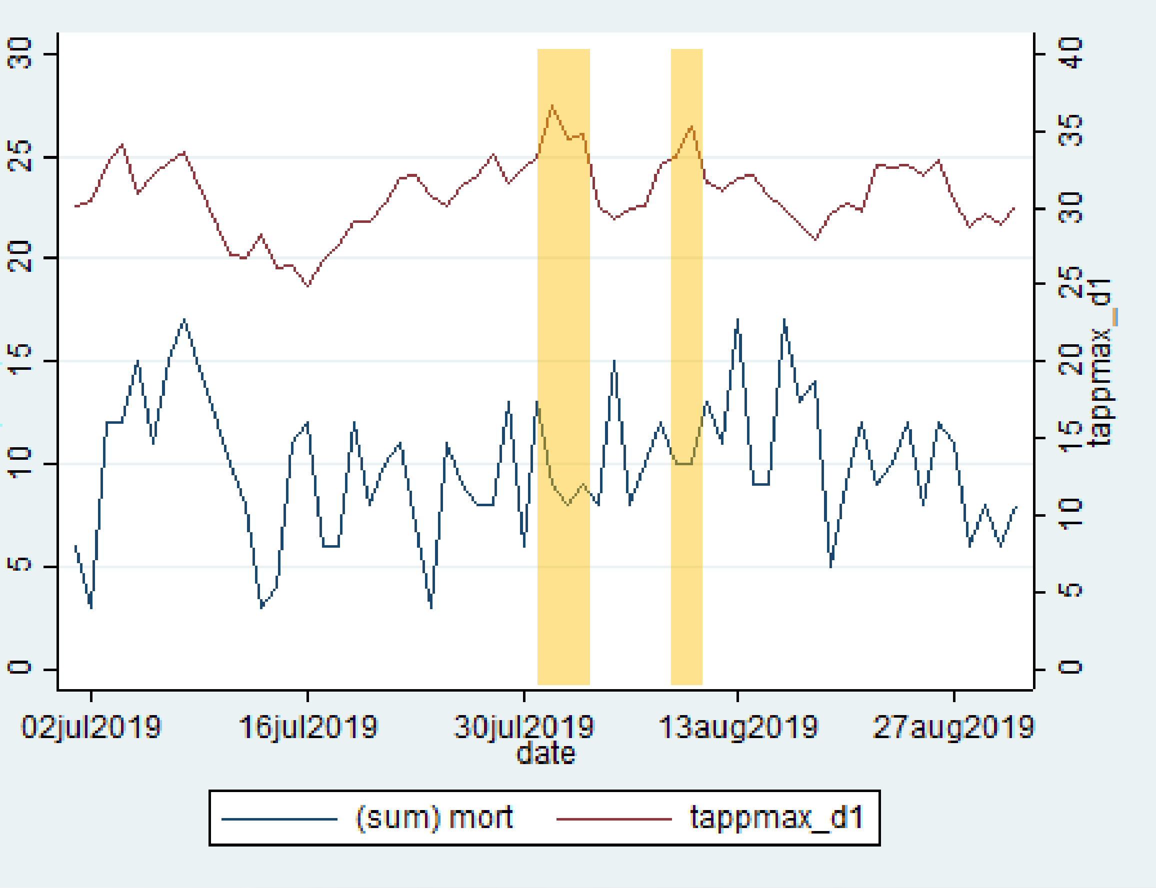
Protect yourself from covid-19.

Project partners

www.lifeasti.eu

Validation – daily temperature and mortality. Period 1st july-15th September 2019. Rome





Deliverables


forecAsting System for urban heaT Island effect

"Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies" (LIFE ASTI)

Action C.6 **Report on heat health warning models definition protocol**

Rome, may2019

HHWWS model definition protocol


forecAsting System for urban heaT Island effect

"Implementation of a forecAsting System for urban heaT Island effect for the development of urban adaptation strategies" (LIFE ASTI)

Action C.6 **HEAT HEALTH WARNING SYSTEMS ROME AND THESSALONIKI**

Rome, april 2020

HHWW Rome and Thessaloniki

D/EP/Lazio
Department of Epidemiology
Lazio Regional Health
Service, Italy

SISTEMA SANITARIO REGIONALE
ASL
ROMA 1

REGIONE
LAZIO

THANK YOU!

f.dedonato@deplazio.it
www.deplazio.net

Session III: Other LIFE projects. Networking with partners

- **LIFE-IP AdaptInGR - Boosting the implementation of adaptation policy across Greece**

Aggelos Sotiropoulos, LIFE-IP AdaptInGR

- **Improving climate resilience of small and medium-sized communities by the project LIFE LOCAL ADAPT**

Majana Heidenreich, LIFE LOCAL ADAPT

- **Vegetation impact on meteorology and air quality in the cities preliminary results from Life VEG-GAP Project**

Mihaela Mircea, LIFE VEG-GAP

- **Cool pavements for future cities. Results from LIFE HEATLAND project (Spain)**

Francisco Miguel Moral Moreno, LIFE HEATLAND

- **LIFE METRO ADAPT: - enhancing climate change adaptation strategies and measures in the Metropolitan City of Milan**

Dr. Elena Francioni, LIFE Metro Adapt

Session III: Other LIFE projects. Networking with partners

- ○ **Urban Heat Vulnerability Assessment: Applications for Smart Mobility and Smart Border**

Sagnik Bhattacharjee, ECOTEN Urban Comfort

- ○ **The LIFE DERRIS project – Public-private partnership to increase SMEs' resilience to climate change**

Marjorie Breyton, LIFE DERRIS

- ○ **Latest developments of Life Adaptate project: fostering adaptation of municipalities to CC**

Rafael Ataz Gómez, LIFE Adaptate

- ○ **Coastal Urban Development through the Lenses of Resilience**

Spiros Nikolopoulos, H2020 CUTLER

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LIFE-IP AdaptInGR – Boosting
the implementation of adaptation
policy across Greece
LIFE17 IPC/GR/000006

LIFE-IP AdaptInGR - Boosting the implementation of adaptation policy across Greece»

2nd European Workshop: "Urban Heat Island and Heat Resilience: Networking for Future Strategy"
Thessaloniki (web-based), 14 October 2020

Angelos Sotiropoulos,
LIFE-IP AdaptInGR Project Manager

With the contribution of the LIFE Programme of the European Union

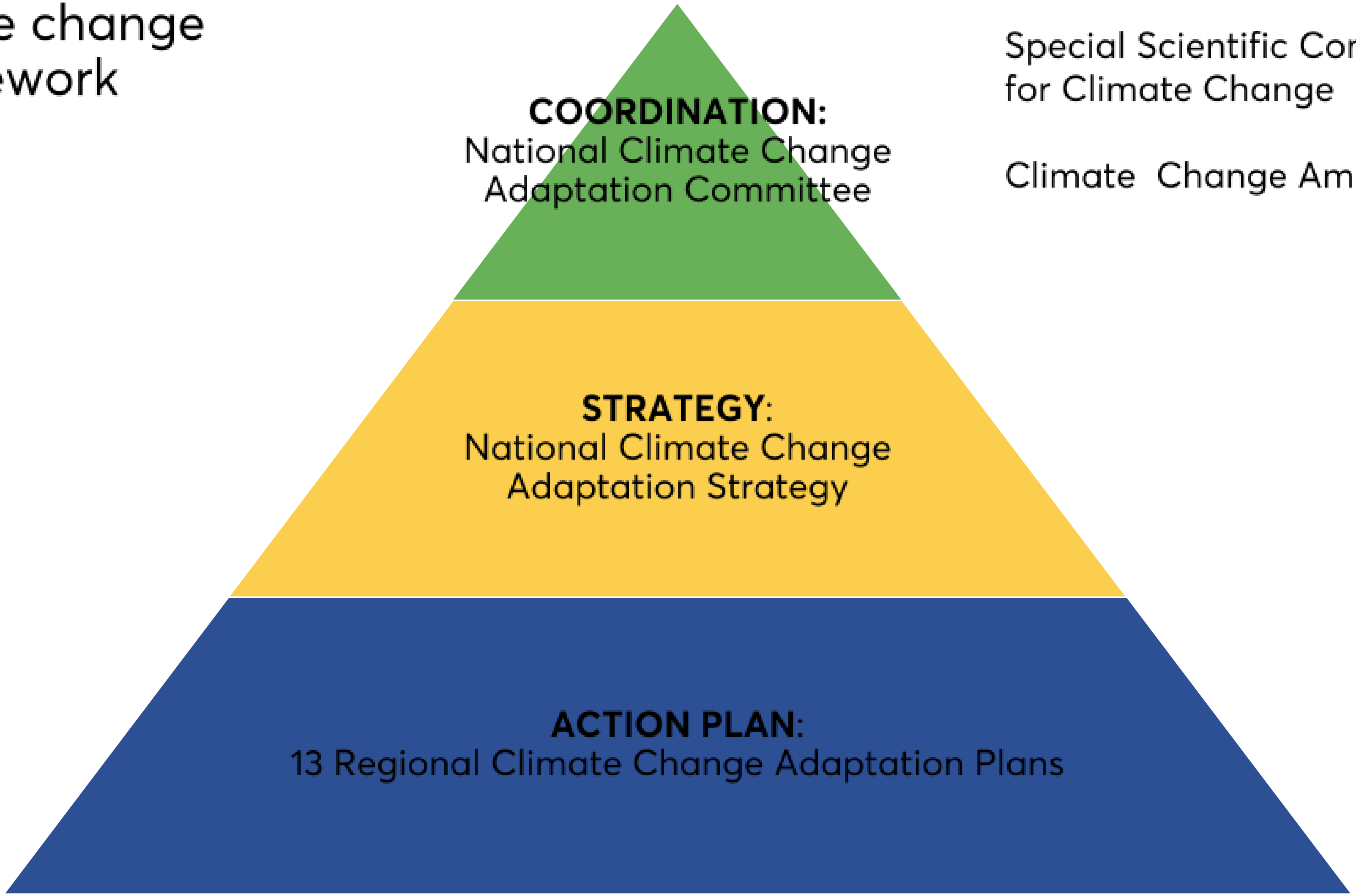
With the contribution of the Green Fund

ΠΡΑΣΙΝΟ ΤΑΜΕΙΟ

MINISTRY OF ENVIRONMENT & ENERGY

Με την υποστήριξη:

The Greek climate change adaptation framework



COORDINATION:
National Climate Change Adaptation Committee

STRATEGY:
National Climate Change Adaptation Strategy

ACTION PLAN:
13 Regional Climate Change Adaptation Plans

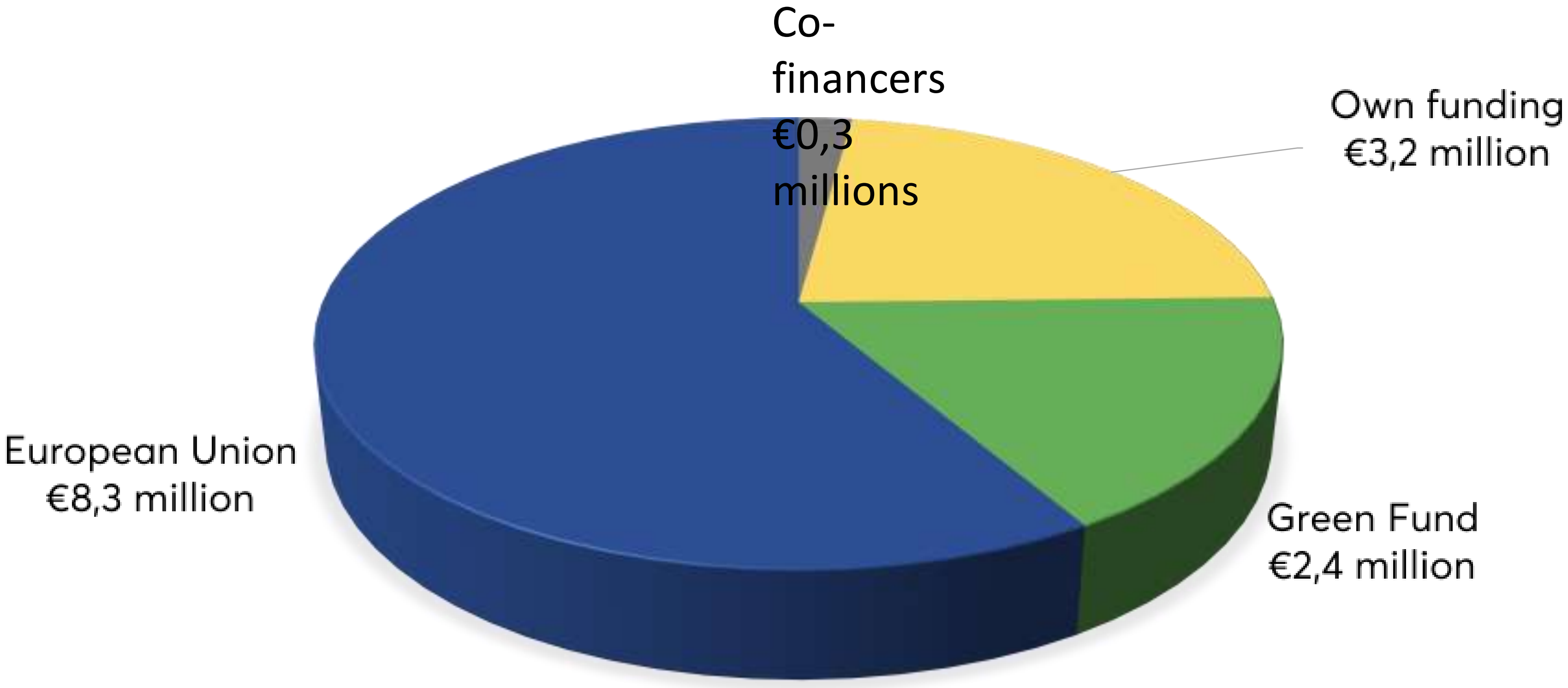
Special Scientific Committee for Climate Change

Climate Change Ambassador

The National Adaptation Strategy

- AGRICULTURE
- FORESTRY
- BIODIVERSITY & ECOSYSTEMS
- FISHERIES
- ACQUA-CULTURE
- WATER RESOURCES
- COASTAL AREAS
- TOURISM
- ENERGY
- TRANSPORT & INFRA-STRUCTURE
- HEALTH
- BUILT ENVIRONMENT
- MINING INDUSTRY
- CULTURAL HERITAGE
- INSURANCE

Acronym: LIFE-IP AdaptInGR
Title: Boosting the implementation of adaptation policy across Greece
Ref.: LIFE17 IPC/GR/000006
Duration: 2019-2026 (8 years)
Budget: €14.189.548,00



The LIFE-IP AdaptInGR Consortium

National administration

- **Ministry of Environment & Energy (MEEN)**
- Green Fund (GRFU)
- National Environment and Climate Change Agency (NECCA)
- Bank of Greece (BoG)

Regional administration

- **Union of Greek Regions (UGR)**
- Region of Central Greece (Sterea Ellada) (RSE)
- Region of Western Greece (RWC)
- Region of Ionian Islands (RII)

Local administration

- **Central Union of Municipalities of Greece (KEDE)**
- Municipality of Katerini
- Mun. Supply &Sewage Company of Komotini
- Municipality of Larissa
- Municipality of Agii Anargyroi – Kamatero
- Municipality of Rhodes

Academic community

- National Technical University of Athens (NTUA)
- Academy of Athens (AA)
- National Observatory of Athens (NOA)

Non Governmental Organisations

- ELLINIKI ETAIRIA Society for the Environment and Cultural Heritage (ELLET)
- Mariolopoulos-Kanaginis Foundation for the Environmental Sciences (MKF)

1st Policy Cycle

2nd Policy Cycle

National Adaptation Strategy

Endorsement 08/2016

Revision 08/2026

Regional Adaptation Plans

Q4/2020

Revision Q4/2026

Initiation of the LIFE-IP AdaptInGR

After the LIFE-IP AdaptInGR

Project contribution to NAS implementation

Catalyse the implementation of the 1st adaptation policy cycle (2016-2025)

- Build capacity to prioritise and implement adaptation measures
- Provide replicable "good practice" examples of concrete adaptation projects to promote action in major vulnerable sectors
- Monitor and evaluate NAS and RAAPs implementation
- Strengthen adapting capacity of stakeholders and the general public through dedicated awareness raising
- Pool and coordinate funding for adaptation implementation in post-2020 period

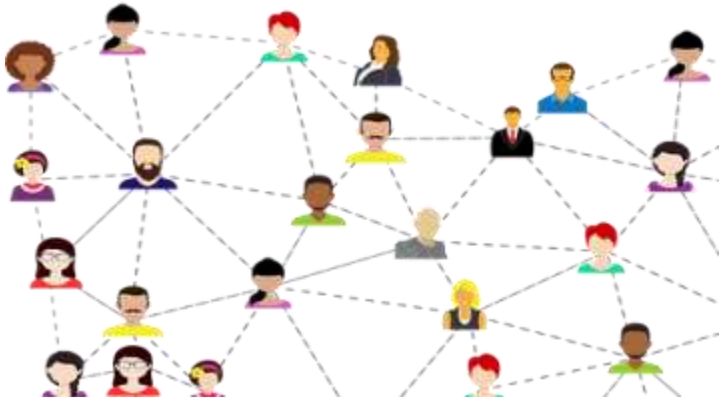
Prepare the passage to the 2nd adaptation policy cycle (2026+)

- Review and revise the NAS
- Make recommendations for the RAAPs review and revision
- Identify adaptation priorities for post-2027 programming period

Capacity building for adaptation implementation & mainstreaming

Stakeholders' mapping and identification of stakeholders needs :

- Mapping of key actors involved with adaptation planning and implementation in priority sectors and vulnerable areas.
- Identification of their needs in terms of knowledge, funding and capacity building.



13 regional and 2 national capacity building workshops involving national, regional and local authorities and stakeholders:

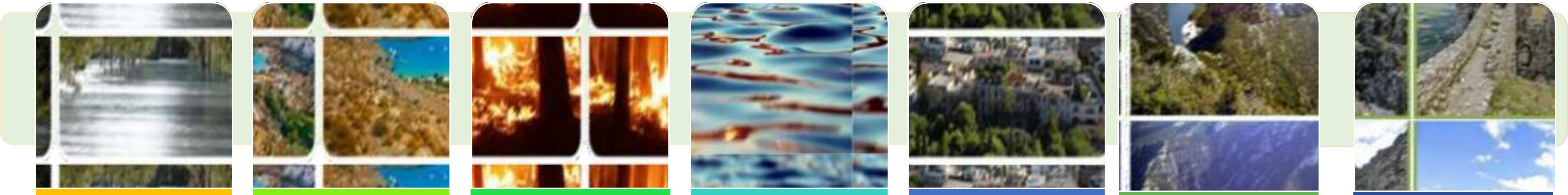
- strengthen CCA management skills of decision makers;
- improve technical skills of technical staff;
- increase knowledge of main stakeholders;
- facilitate & support the actual implementation of NAS/RAAPs.

Capacity building for adaptation implementation & mainstreaming

A publicly accessible web-based application to:

- provide tools & resources for assisting decision makers;
- raise awareness on adaptation among the different target groups, including citizens;
- promote the sharing of good practice among adaptation stakeholders;
- provide access to the climate projections datasets, indices and maps for all the Greek Regions (resolution of 12 km) making the data available to all the users.

Promote pilot adaptation actions in major vulnerable areas



- Flood risk management (3)
- Coastal zone management (3)
- Forest fires in drought-prone areas (1)
- Sustainable water management (3)
- Urban planning & regeneration (2)
- Landscape & land uses (9)
- Cultural sites (5)

12 pilot CCA projects & 14 CCA case studies across 7 priority sectors

Pilot adaptation actions in the Regions of Central Greece, Ionian Islands and Western Greece

1. Delineation of Inahos river in Aitoloakarnania, (RWG)

2. Stream bed management-Flood control in Drimatorema area (RSE)

3. Stream bed management, Amarynthos beach in Evia island (RSE)

4.Assessment, monitoring and recording of the coastal erosion using Unmanned Aerial Vehicles in the Region of the Ionian Islands

5.Coastal zone management in Kalamaki beach (RWG)

6. Forest fire prevention in Peristeri & Geraki areas, Ilida (RWG)

7. Cleaning of the draining system in former Lake Xynias, (RSE)

LIFE-IP AdaptInGR: Tenders, studies and implementation of selected measures

Pilot adaptation actions in the Municipalities of Agii Anargyri-Kamatero, Katerini, Komotini, Larissa and Rhodes

8. Coastal zone management in the NW coast of Rhodes island

9. Network for the collection of rainwater in Gerovouno area and its transfer to the Antonis Tritsis park (Agioi Anargyroi-Kamatero)

10.Water resources management in the Municipal department of Aigeiros in Komotini

11. Urban regeneration of public spaces &creation of green spaces in Katerini

12. Regeneration of school yards, incl. green spaces/infrastructure in Larissa

LIFE-IP AdaptInGR: Tenders, studies and implementation of selected measures

Pilot assessments & guidelines for landscapes, land uses, Cultural Heritage

Nestos

Vistonida

Avdira

Zagoria

Leuka Ori

Samaria

Ioannina

Messini

Taygetos

Monemvasia

Kriti

Dikti

TTinos

Itea

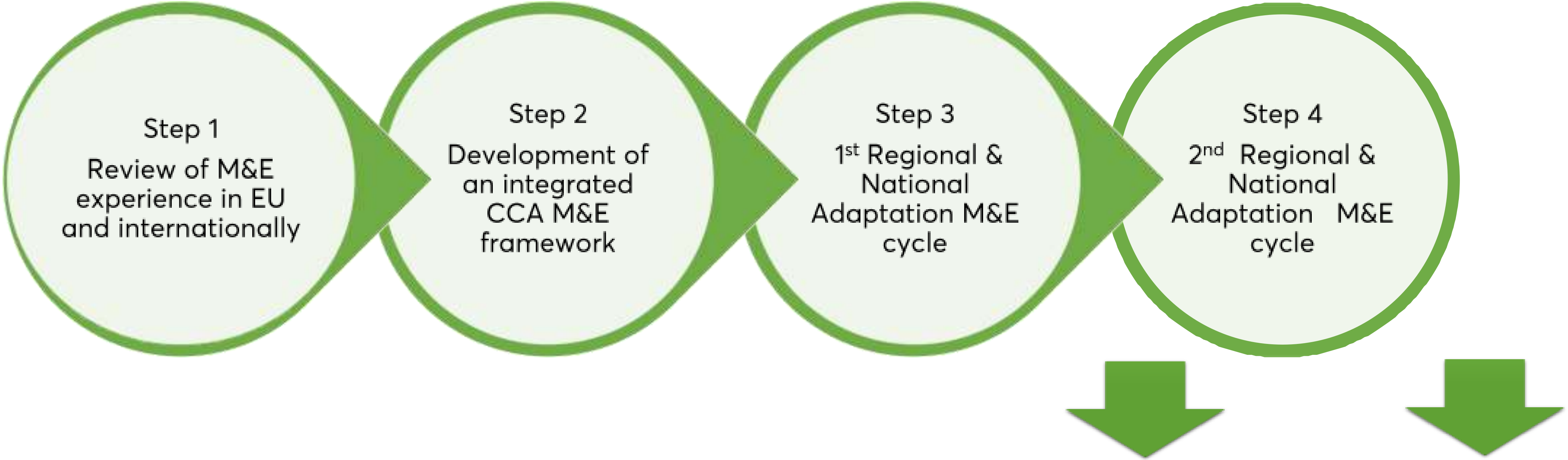
Parnassos

Kalloni

Area Natura 2000

Area ή Natura 2000

Create an effective monitoring, evaluating and prioritizing framework for adaptation



Step 1

Review of M&E experience in EU and internationally

Step 2

Development of an integrated CCA M&E framework

Step 3

1st Regional & National Adaptation M&E cycle

Step 4

2nd Regional & National Adaptation M&E cycle

Funding priorities for GRFU and ESIF management structure

Public awareness and dissemination of results

Action Planning

- Dissemination & Communication strategy (<80p) outlining how to reach target audiences
- 2 waves of public opinion research to determine level of awareness (M2 and M44)
- 4 waves of surveys & interviews with stakeholders (more informed audience) to determine level of awareness (M3, M44, M68, M92)

Dissemination

- Website (GR/EN) 50.000 visits/year
- Social media 5.000 followers
- Newsletter (2/year)
- Press releases
- >50 Articles &media presentations
- Leaflets (3 x2.000 GR and 2 x2.000 EN)
- Posters & flyers for 13 info-days
- Banners (2 GR,2EN)
- TV spot (2min)
- 8 radio spots
- Notice boards (each partner, each pilot)
- Layman's report

Education

TEACHERS:

- Teachers' kit (USB/CD)
- 16 one-day seminars

PUPILS (7-17y)

- "Youth adapts" material
- "Youth adapts" campaign (>100 schools)
- 2 school competitions & awards
- "Keepers of the planet network"

Awareness raising

- 13 reg. info-days (p.m project presentations, measures/ techniques a.m documentary film)
- 3 fora (Athens M6, Thessaloniki M49 Athens M93)

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www.adaptivegreece.gr

LIFE-IP AdaptInGR
Prepare the passage to the 2nd policy cycle

Review of NAS and RAAPs

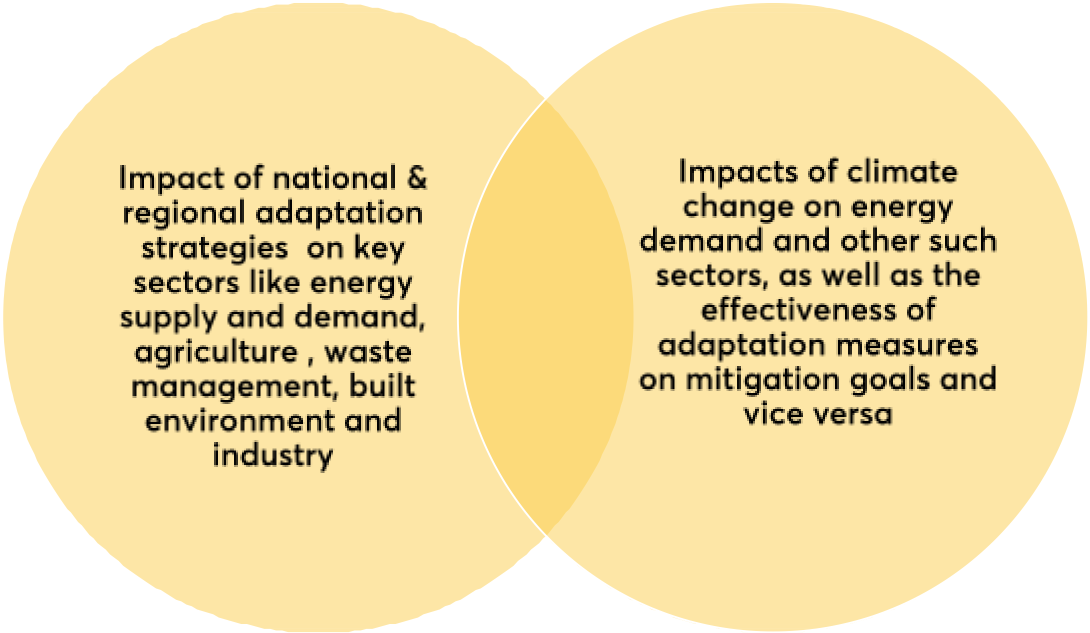
- Apply state-of-the-art regional climate models to provide future climate projections and to study climate change impacts in each of the 13 Greek Regions.
- Create an open geospatial database.

- Update the CCIV assessment for Greece (2011 report) based on RCPs and A4 projections.

- NAS Review report.
- ToRs and Recommendations for RAAPs review.

- Cross-cutting working groups to revise the NAS.
- Formal NAS revision process & arrangements for endorsement.
- Regional authorities to initiate the RAAPs revision process.

Analysis of synergies between CCM & CCA policies in view of the 2050 long-term low emission strategy



Impact of national & regional adaptation strategies on key sectors like energy supply and demand, agriculture , waste management, built environment and industry

Impacts of climate change on energy demand and other such sectors, as well as the effectiveness of adaptation measures on mitigation goals and vice versa

To provide an integrated framework for the future planning of climate-related policies in Greece, which will feed both into the review of the Greek NAS, into updates of the National Plan for Energy & Climate 2030 and the 2050 Long-term low emission strategy.

Thank you for your attention!

Angelos Sotiropoulos,

LIFE-IP AdaptInGR Project Manager
E-mail: a.sotiropoulos@prv.ypeka.gr

More information:
Ioanna Tsalakanidou
Climate Change Department, Ministry of Environment and Energy
LIFE-IP AdaptInGR Project Coordinator
E-mail: i.tsalakanidou@prv.ypeka.gr
Tel. (+30) 210.8642.118

LIFE LOCAL ADAPT | Integration of climate change adaptation into the work of local authorities

Improving climate resilience of small and medium-sized municipalities by the project LIFE LOCAL ADAPT

Majana Heidenreich

with the cooperation of Astrid Ziemann and Ronald Queck TU Dresden, Chair of Meteorology

LIFE LOCAL ADAPT

Integration of climate change into the work of local authorities

July 2016 – June 2021

4 Regions

6 Partners

<u>Coordinating Beneficiary</u>

Technische Universität Dresden

<u>Associated Beneficiaries</u>

- Climate Service Center Germany
- Provincial Government of Styria
- Saxon State Agency for Environment, Agriculture and Geology
- Czech Globe - Global Change Research Institute
- Valka Municipality Council

https://www.life-local-adapt.eu/en/

Objectives

The project aims to

1. improve data base and information on CC, the impacts, CCA and to enhance the knowledge of municipalities
2. integrate CCA into the administrative work of local authorities
3. implement specific measures of CCA in cooperation with the municipalities

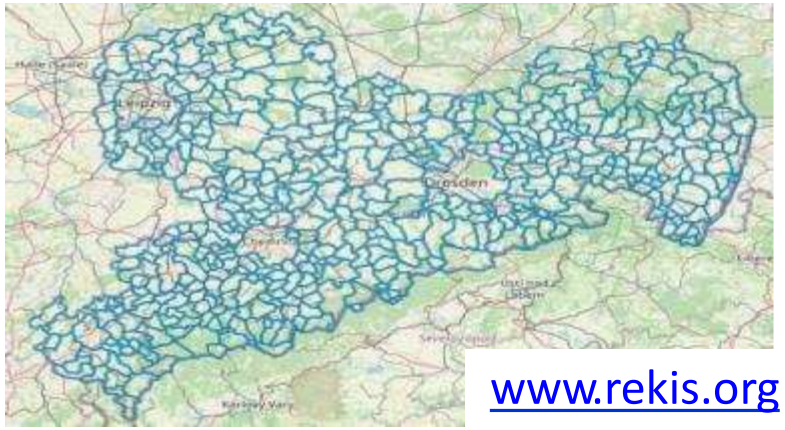
Focus on small and medium-sized municipalities! In close cooperation with municipalities!

Actions of LIFE LOCAL ADAPT

- Workshops for improvement of municipal knowledge on CC and CCA
- Information about funding opportunities
- Establishment of advisory service
- Development & enhancement of climate information tools
- Improvement of heavy rain and heat stress resilience
- Pilot measures in selected municipalities
- Climate change adaptation in the pilot municipality Valka in Latvia
- Transferability and replicability

Action: Development & enhancement of information tools

- ReKIS - Regional climate information system
- interactive tool to provide climate data and information about CCA
- for the federal states Saxony, Thuringia and Saxony-Anhalt
- Implementation by TUD
- Extension “ReKIS kommunal” for Saxony by LIFE Local ADAPT



www.rekis.org

REKIS KOMMUNAL - SACHSEN

Alle Klimainformationen für Ihre Region auf einen Blick

HERAUS-FORDERUNGEN

HANDLUNGS-FELDER

INFOS UND HILFSANGEBOTE

Action: Improvement of heat stress resilience

Fact sheet

- measures and recommendations
- in German, English and Czech
- short and easy to understand as a starting point for adaptation

FACT SHEET: HEAT STRESS

HEAT STRESS MEASURES AND RECOMMENDATIONS

FACT SHEET: HEAT STRESS

Measures and Recommendations

Physical measures

FACT SHEET: HEAT STRESS

Administrative measures

Social measures

FACT SHEET: Heatstress

Good Practice Example

Action: Improvement of heat stress resilience

Contingency plan

- Introduction with general information about heat stress and the importance of a contingency plan for municipalities
- Main objective of an heat protection plan, which groups are affected, general information how to deal with heat stress, emergency numbers, contact points etc.
- Responsibilities
- Recommendations and measures

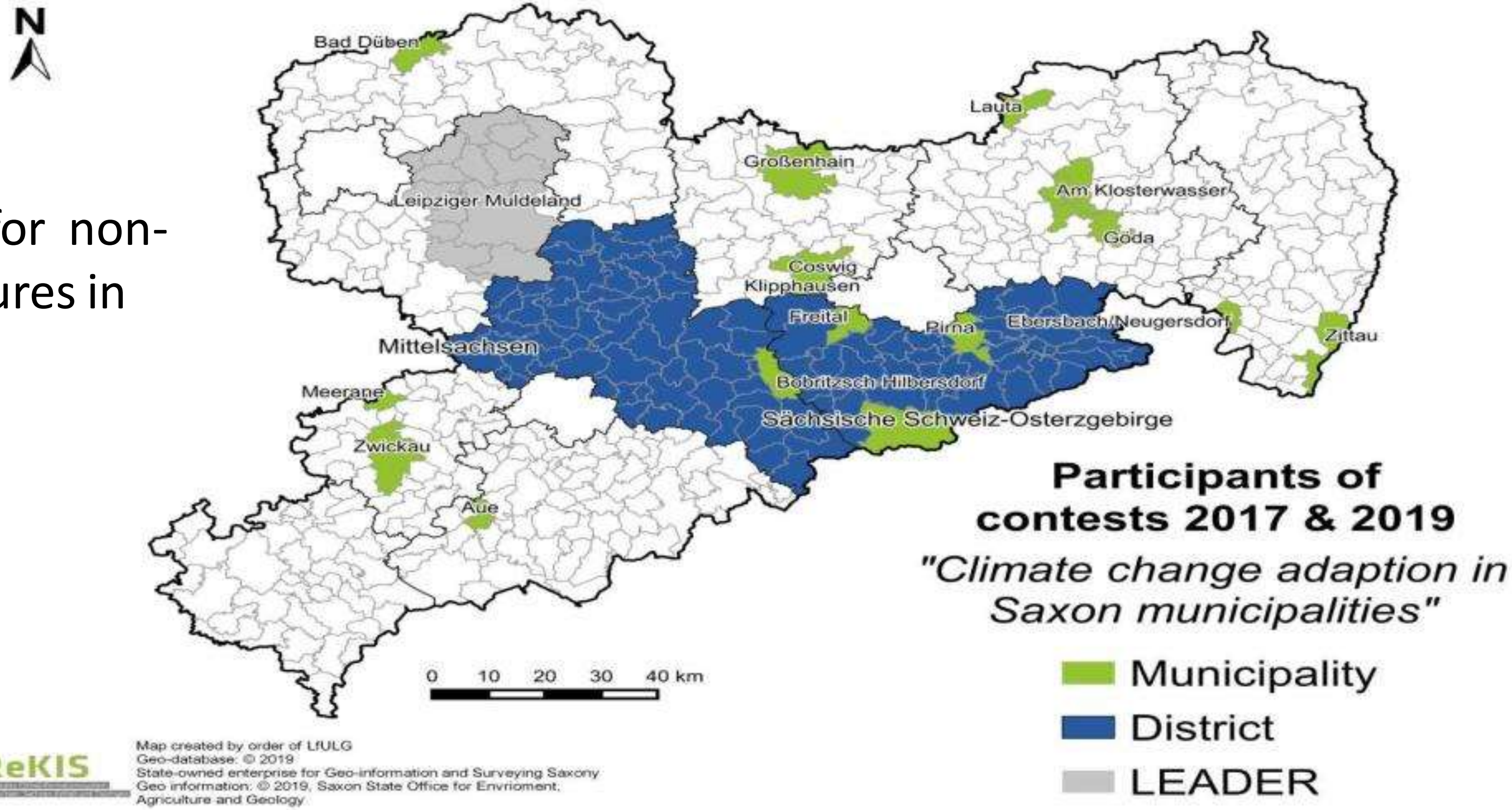
Hitzeschutzplan Steiermark

Landessanitätsdirektion
A8 | FA Gesundheit und Pflegemanagement

Example: Heat Protection Plan Styria

Action: Pilot measures

Financial support for non-investment measures in Saxony



Participants of contests 2017 & 2019

"Climate change adaption in Saxon municipalities"

Map created by order of LfULG
Geo-database: © 2019
State-owned enterprise for Geo-information and Surveying Saxony
Geo information: © 2019, Saxon State Office for Envrioment, Agriculture and Geology

Action: Pilot measures

Examples:

Bad Düben

Adaptation concept for green infrastructure - facade and roof greening

Zwickau

Site-specific plant lists with climate- resilient tree species, planning of irrigation options with rainwater

© City Zwickau

Related Project: Heat Resilience Cities

Good living quality despite summer heat

In two quarters in Dresden Gorbitz and Erfurt Oststadt, preventive measures for heat waves in residential areas are being researched in 4 modules.


© A. Ziemann

Module 1 → Impact analyses of CC and adaptation options

- Analysis of regional climate model data
- Measurements
- Determination of a regional UHI effect
- Simulations with ENVI-met

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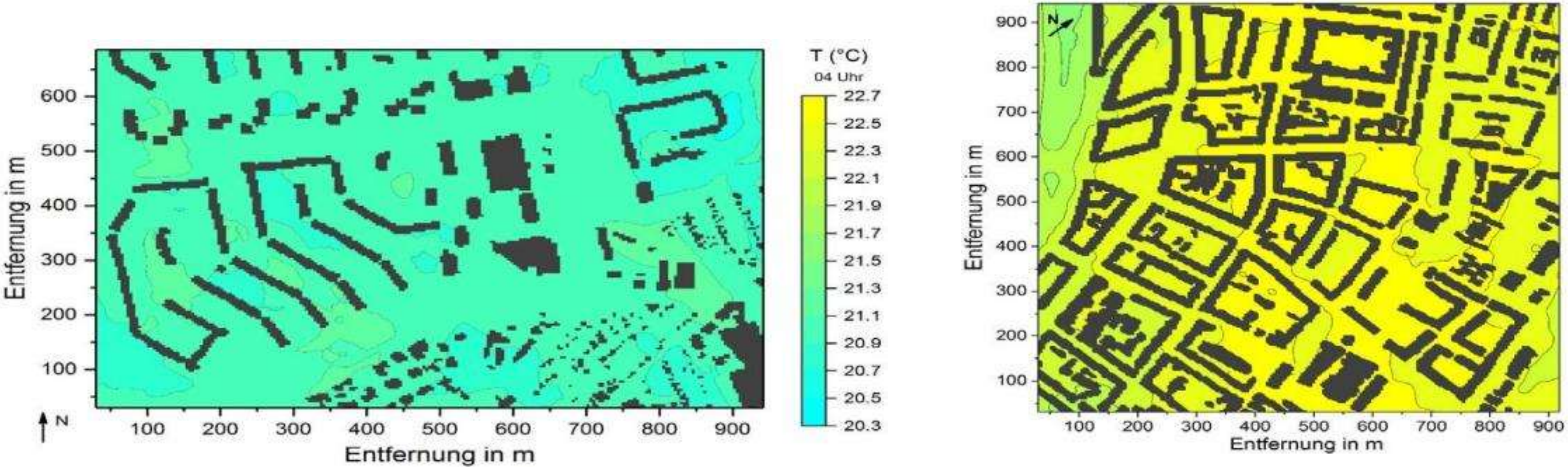
Federal Ministry
of Education
and Research

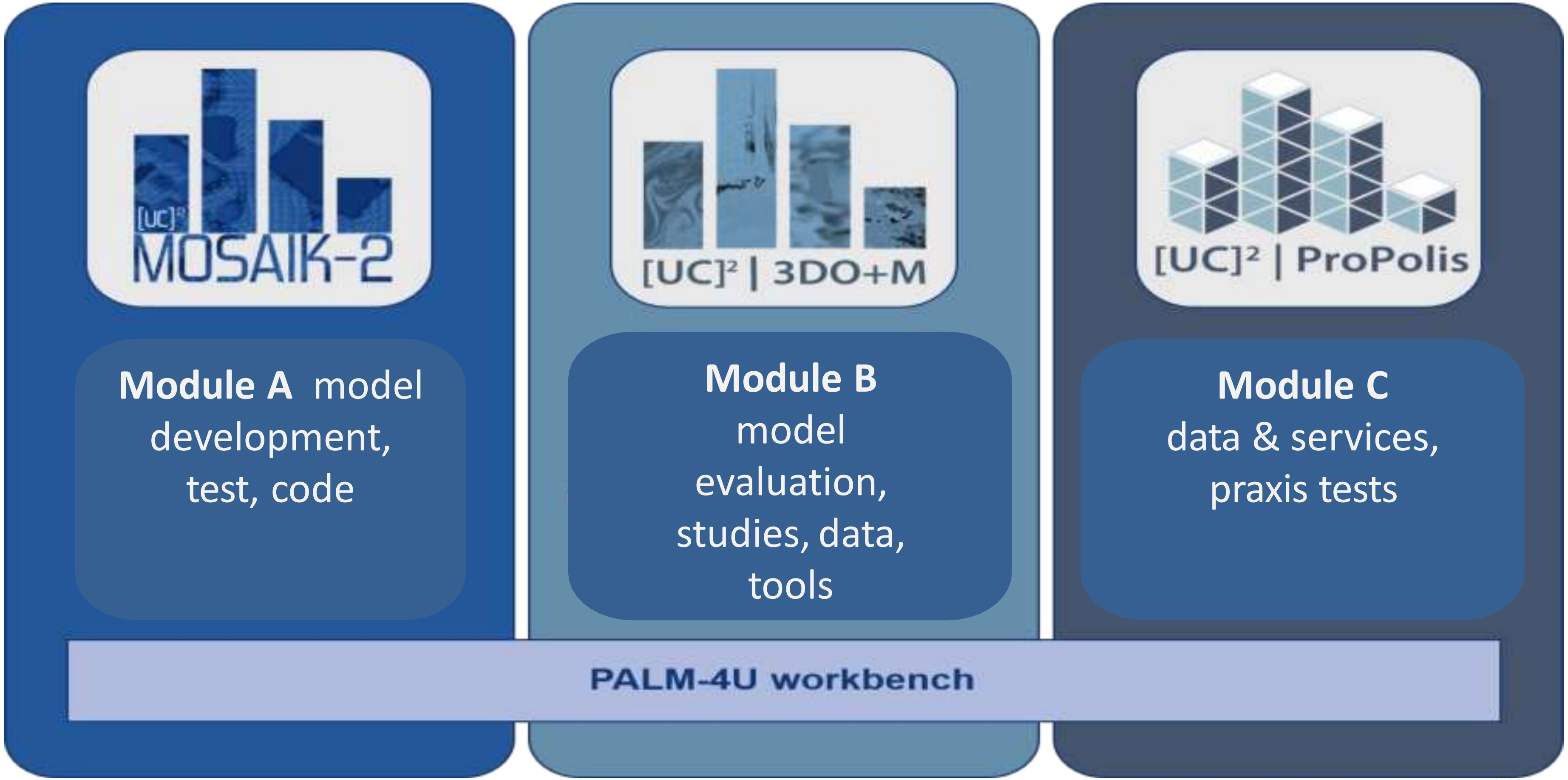
http://heatresilientcity.de/en/

Spatial differences in a microclimate city: examples from Dresden and Erfurt



Temperature distribution at night in Dresden-Gorbitz(left) and Erfurt-Oststadt (model simulation ENVI-met for the 15th of July) → The more densely built-up urban area in Erfurt is slightly warmer and has more spatial differences. Source: Goldberg & Ziemann, 2020

Related Project: Urban Climate Under Change [UC]²



Module A model development, test, code

Module B model evaluation, studies, data, tools

Module C data & services, praxis tests

PALM-4U workbench

[UC]²

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http://www.uc2-program.org/en

UHI effect in metropolitan areas

Air temperature „Showcase Berlin“

PALM-4U

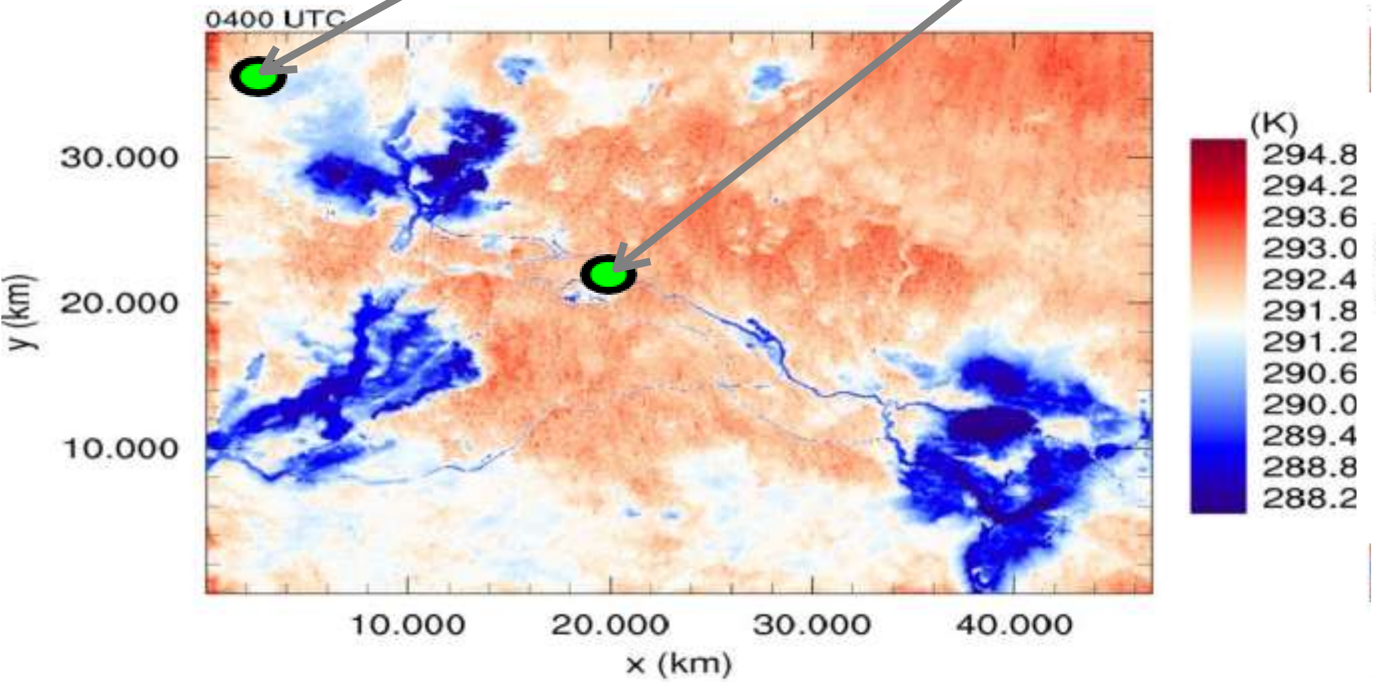
Comparison of virtual stations

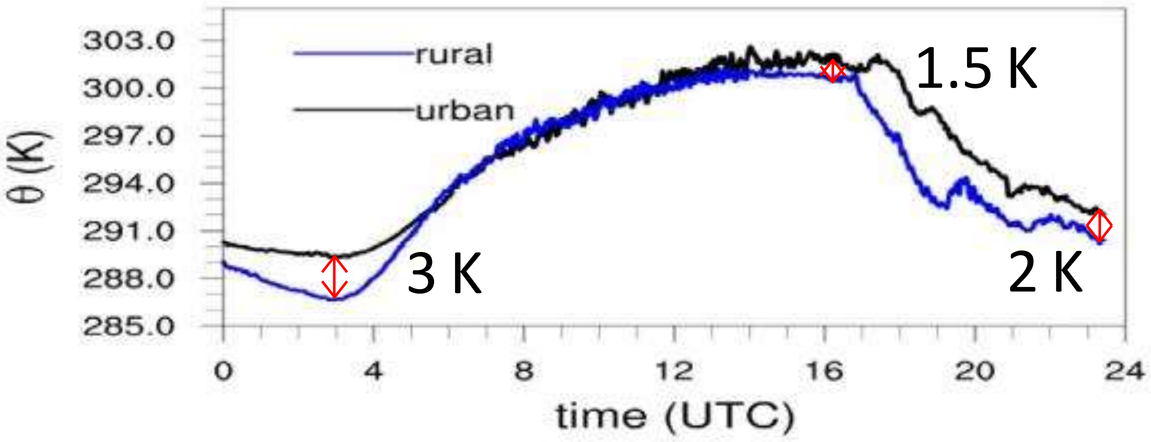
0400 UTC

rural

urban

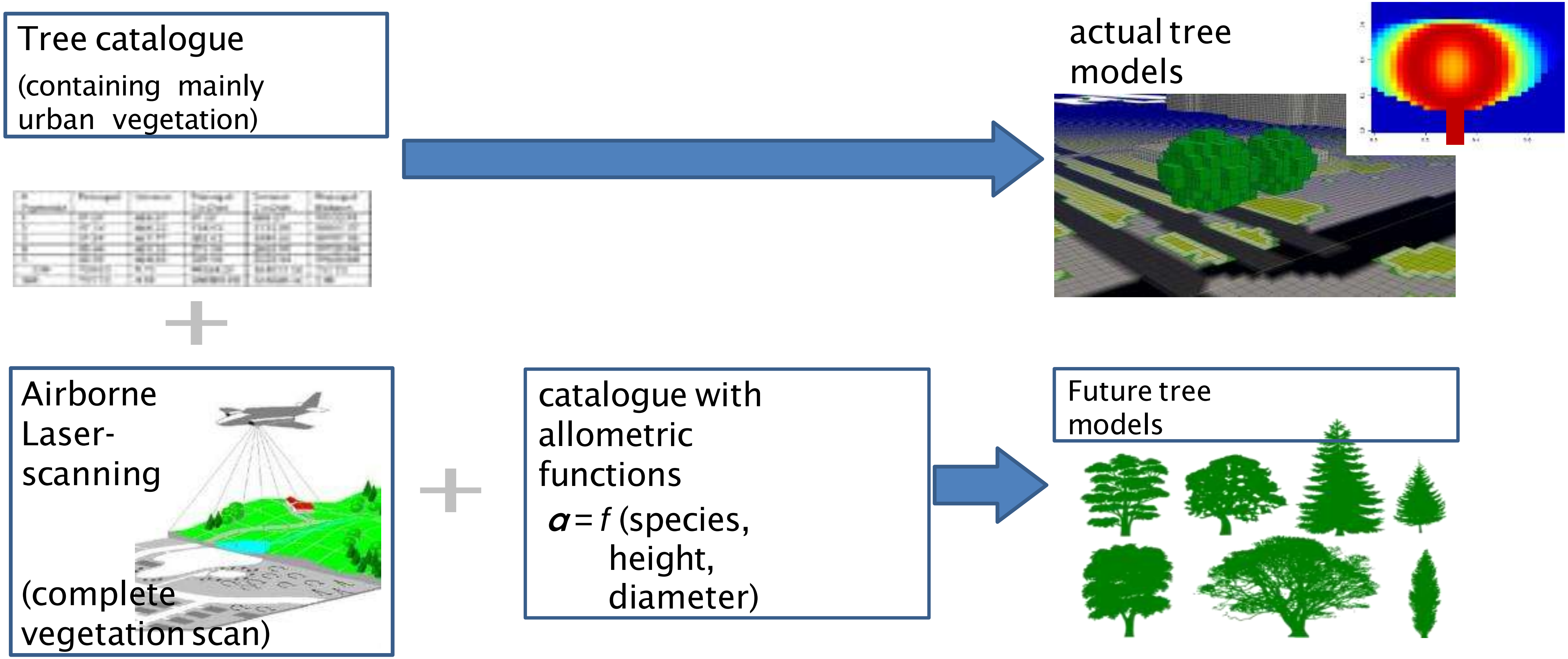
1200 UTC





Source: Maronga 2018, Building-resolving large-eddy simulations for entire Berlin, ICUC 10

Objective: Improved representation of vegetation



Tree catalogue

(containing mainly urban vegetation)

+

Airborne Laser-scanning

(complete vegetation scan)

+

catalogue with allometric functions

$a = f$ (species, height, diameter)

actual tree models

Future tree models

Thanks for your attention!

© Czech Globe

© Valka

© LfULG

© Prov. Government Styria

LIFE-18 PRE IT 003 - The VEG-GAP project has received funding from the LIFE Programme of the European Union

Vegetation for Urban Green Air Quality Plans

Italian National Agency for New Technologies, Energy and Sustainable Economic Developmen

Vegetation impact on meteorology and air quality in the cities: preliminary results from Life VEG-GAP Project

Mihaela Mircea (ENEA), Sandro Finardi and Camillo Silibello (ARIANET), Gino Briganti, Andrea Cappelletti, Giuseppe Cremona, Massimo D'Isidoro and Felicita Russo (ENEA), Stefania Passetti and Simone Mantovani (MEEO), Rafael Borge and David de la Paz (UPM)

https://www.lifeveggap.eu

Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

CITTÀ METROPOLITANA DI BOLOGNA

Comune di Milano

MADRID

ARIANET

crea

UNIVERSIDAD POLITÉCNICA DE MADRID

MEEO
Meteorological Environmental Earth Observation

The Platform access point

Legal Notice

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A cookie is a small piece of text that is stored on your computer for user interaction with websites such as but not limited to record-keeping purposes. For instance, a cookie can be used to ensure that you do not have to login or otherwise identify yourself more than once per visit to a website. Some cookies expire when the browser closes, while others remain on your computer unless you delete them. Cookies on the VEG-GAP website help us to improve our site and your user experience.

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Information

Temporary restricted access to project consortium only

Three main questions

LIFE-18 PRE IT 003 - The VEG-GAP project has received funding from the LIFE Programme of the European Union

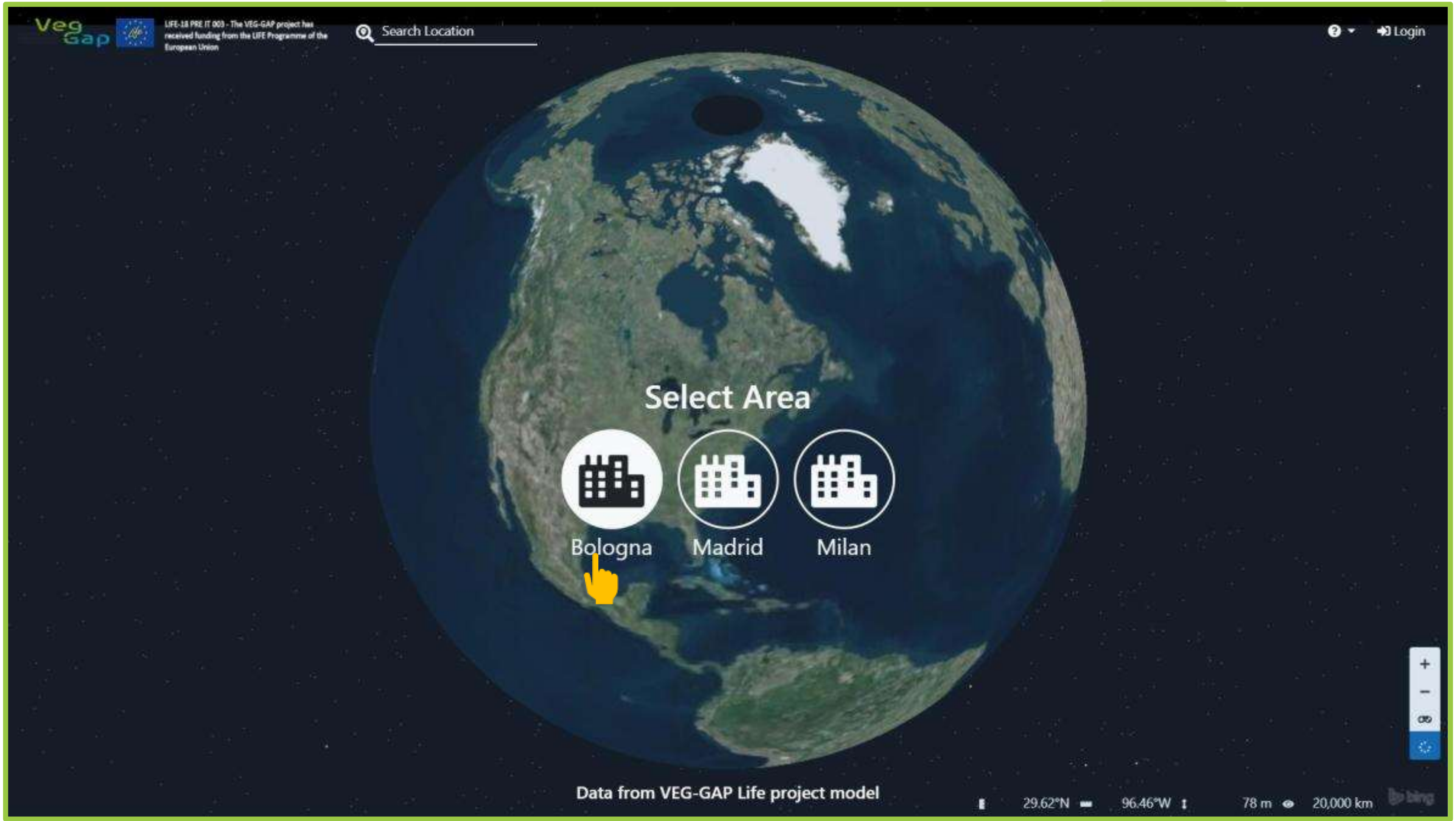
Do you know...

How much and which type of vegetation is present?

Vegetation for cleaner air
and better climate:
a holistic integration
towards future cities

Data from VEG-GAP Life project model

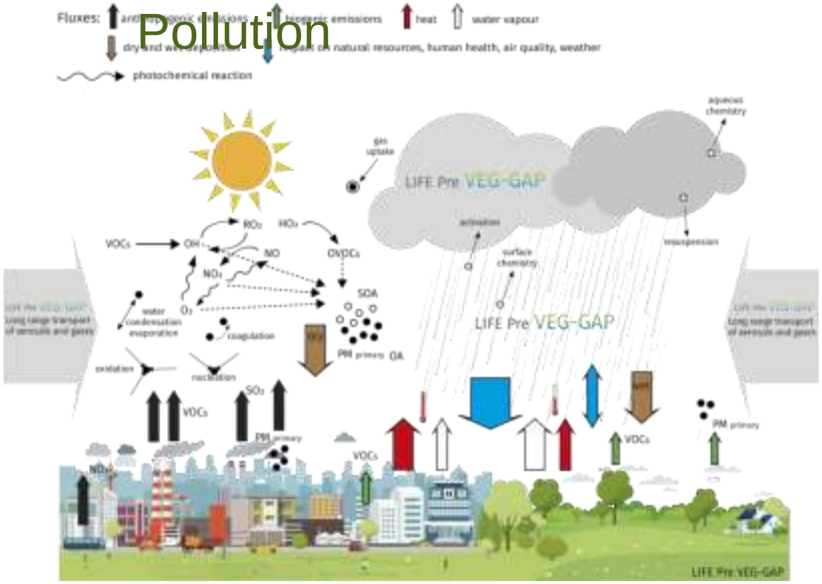
The city selection



LIFE-18 PRE IT 003 - The VEG-GAP project has received funding from the LIFE Programme of the European Union

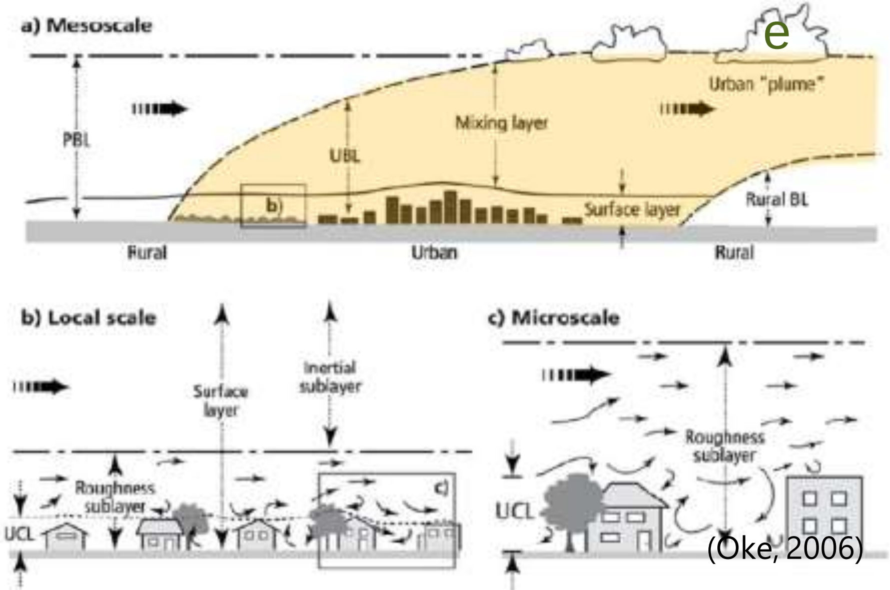
VEG-GAP approach: comprehensive modelling of physical and chemical atmospheric processes over the scales

Meteorology&Air Pollution

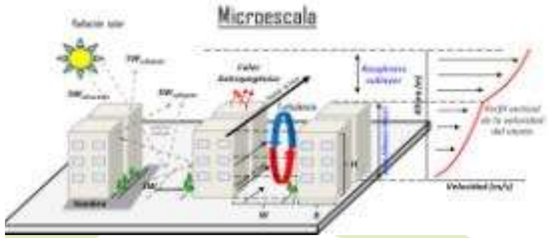


Multiscale

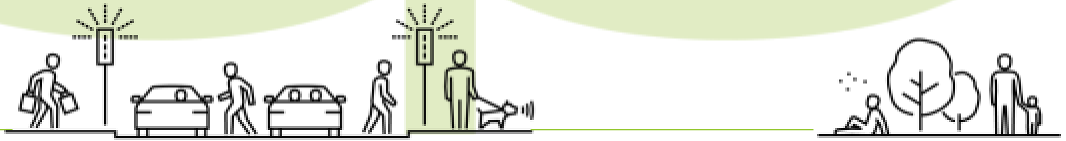
▪



(Oke, 2006)



Meteorology: WRF and WRF+BEP
Air pollution: AMS-MINNI (ENEA), CMAQ (UPM)



Reconstruction of vegetation effects

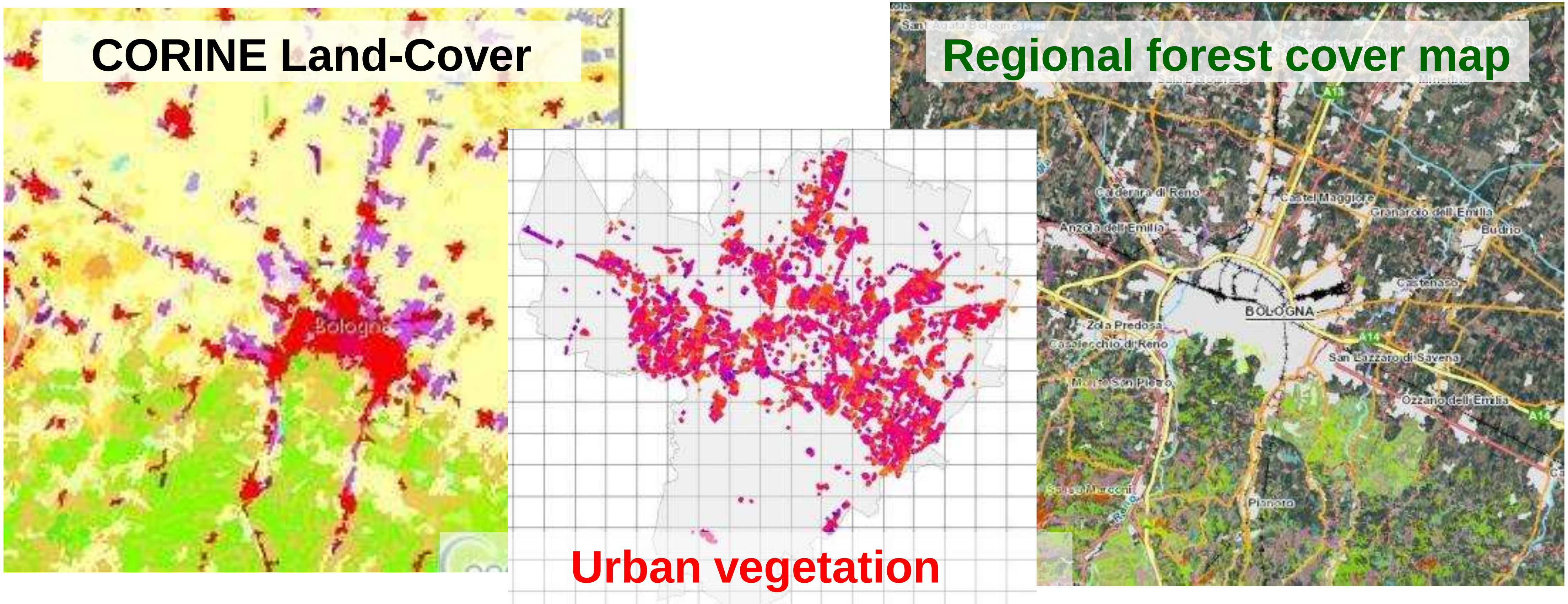
Simulation with vegetation (simVEG): Simulation without vegetation (simNO_VEG): reconstruct the real atmosphere hypothetical scenario

vegetation effects

Preliminary results for Bologna

Integration of different data sources

Bologna


CORINE Land-Cover

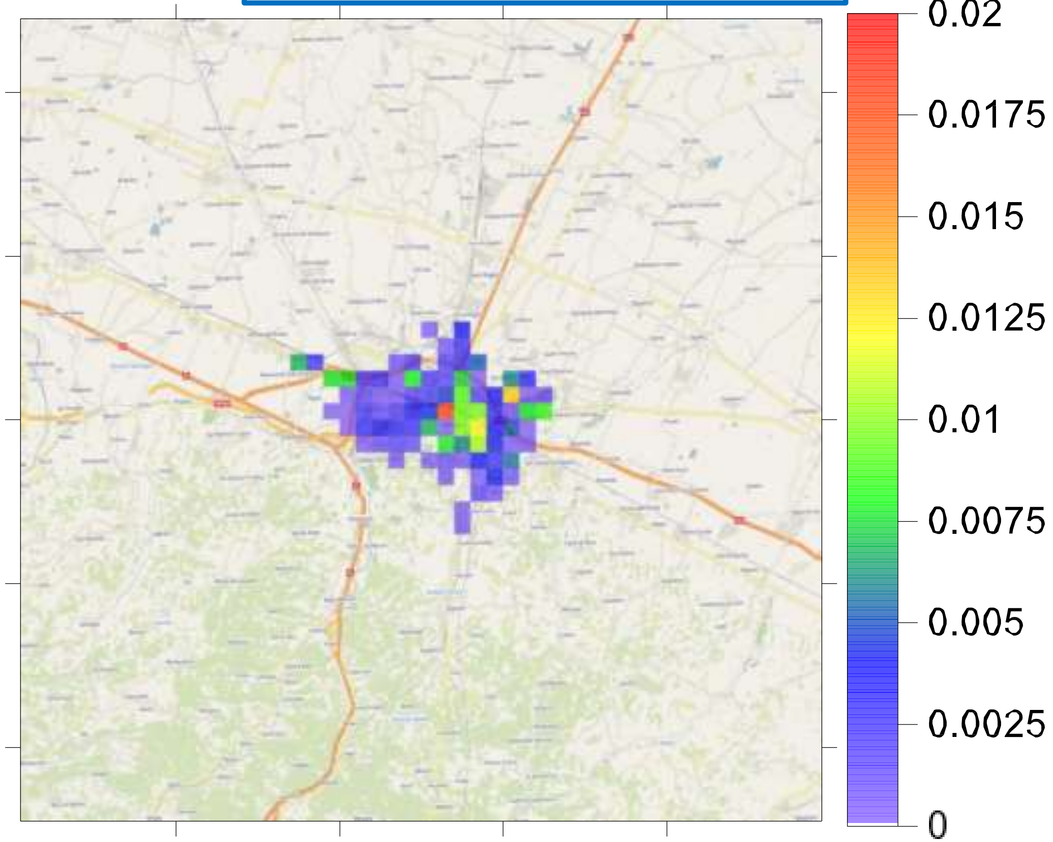
Regional forest cover map

Urban vegetation (individual tree inventory)

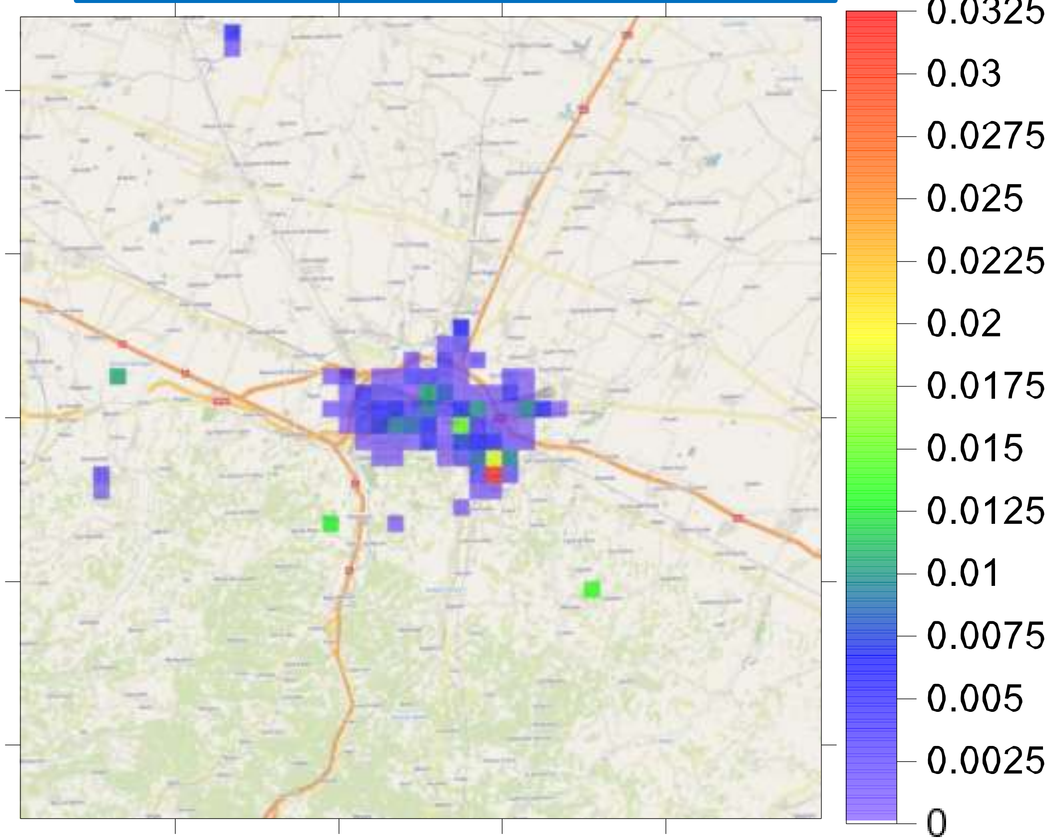
VEG-GAP Vegetation maps

Bologna: dominant urban species distribution

Platanus Acerifolia



Celtis Australis (Bagolaro)



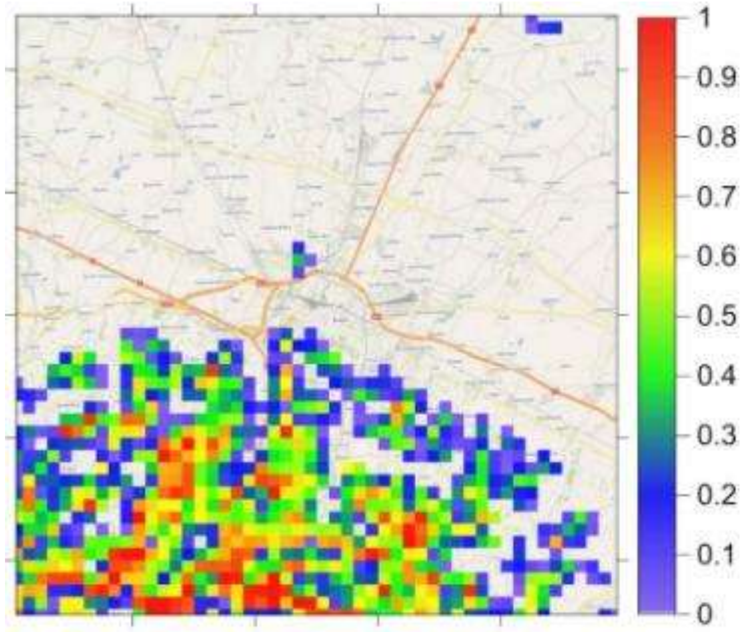
Improvement of vegetation maps

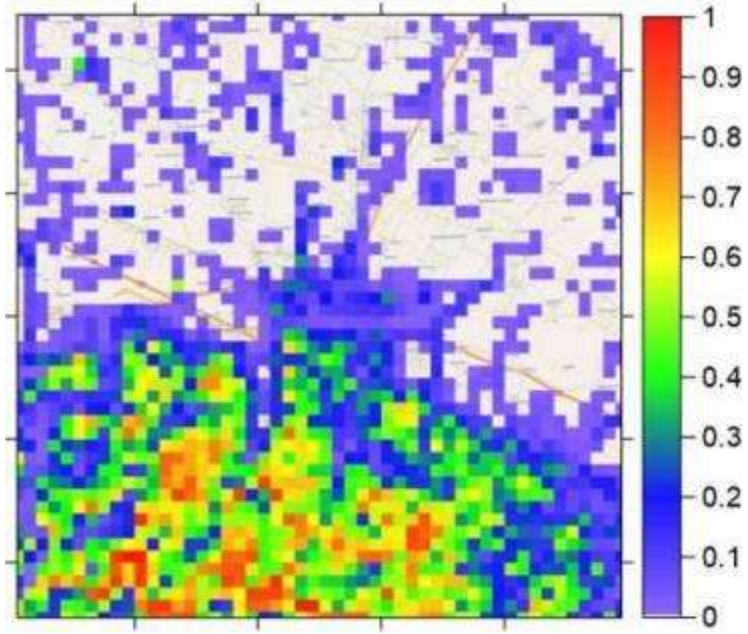
Bologna domain

All-species trees cover

CORINE Land Cover

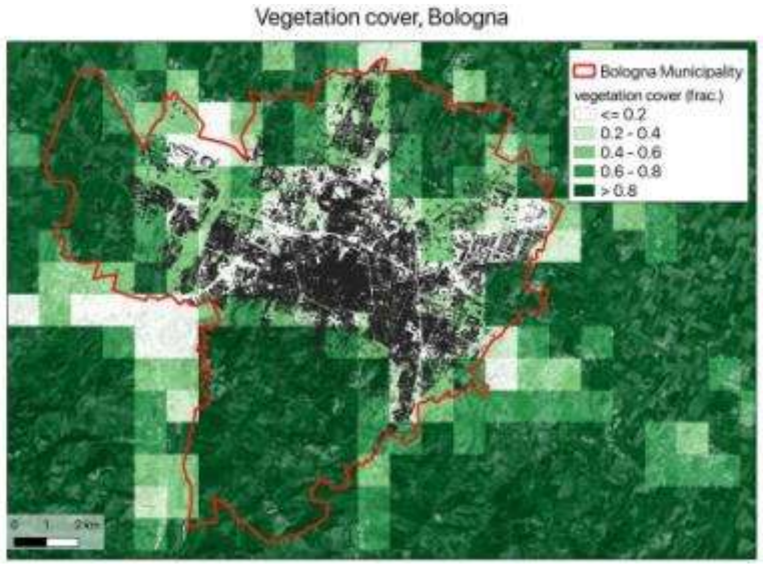
VEGGAP integrated map





Bologna Municipality

All vegetation

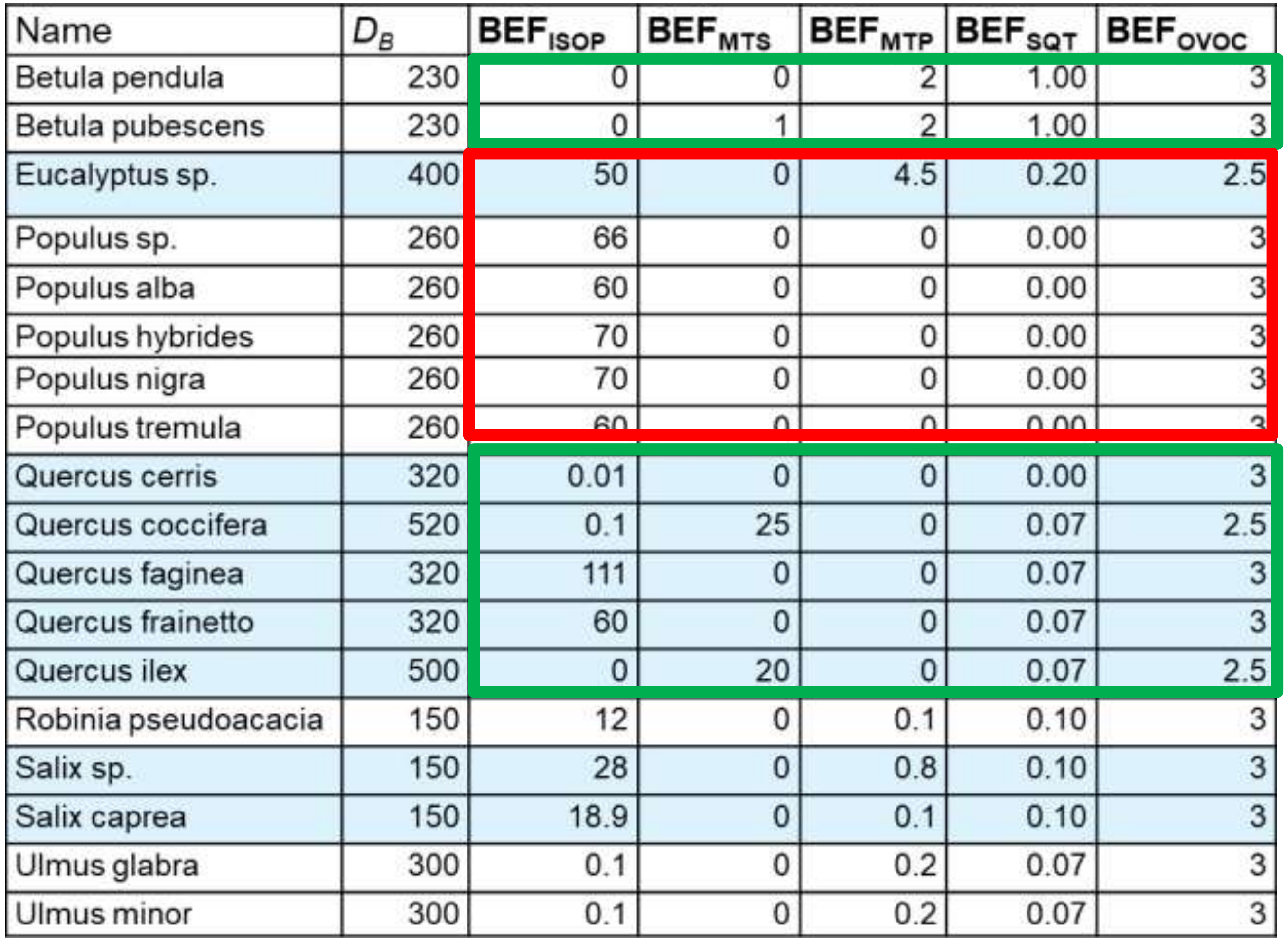


Biogenic emissions from tree species

Basal Emission Factors (μg g (DW)$^{-1}$ h^{-1}): capacity of plants to emit BVOC under "basal conditions" (air T of 30°C and PPFD of 1000 μmol m^{-2} s^{-1}).

PPFD = Photosynthetic Photon Flux Density

BVOC emissions simulated with a **plant specific emission model: PSEM** (ARIANET)



Name	D_B	BEF_{ISOP}	BEF_{MTS}	BEF_{MTP}	BEF_{SQT}	BEF_{OVOC}
Betula pendula	230	0	0	2	1.00	3
Betula pubescens	230	0	1	2	1.00	3
Eucalyptus sp.	400	50	0	4.5	0.20	2.5
Populus sp.	260	66	0	0	0.00	3
Populus alba	260	60	0	0	0.00	3
Populus hybrides	260	70	0	0	0.00	3
Populus nigra	260	70	0	0	0.00	3
Populus tremula	260	60	0	0	0.00	3
Quercus cerris	320	0.01	0	0	0.00	3
Quercus coccifera	520	0.1	25	0	0.07	2.5
Quercus faginea	320	111	0	0	0.07	3
Quercus frainetto	320	60	0	0	0.07	3
Quercus ilex	500	0	20	0	0.07	2.5
Robinia pseudoacacia	150	12	0	0.1	0.10	3
Salix sp.	150	28	0	0.8	0.10	3
Salix caprea	150	18.9	0	0.1	0.10	3
Ulmus glabra	300	0.1	0	0.2	0.07	3
Ulmus minor	300	0.1	0	0.2	0.07	3

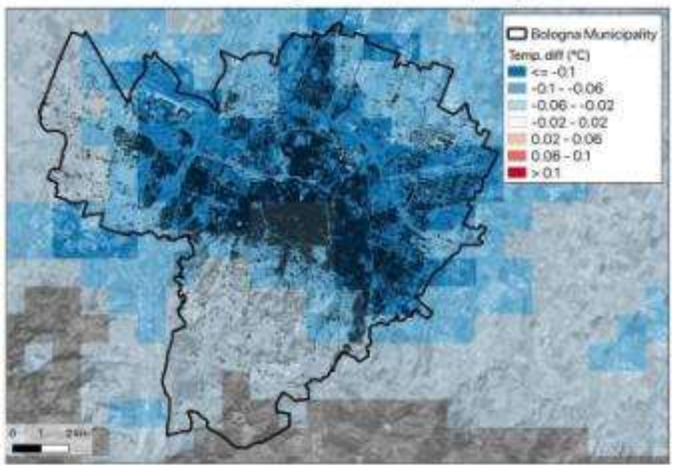
The effect of vegetation on temperature and wind speed

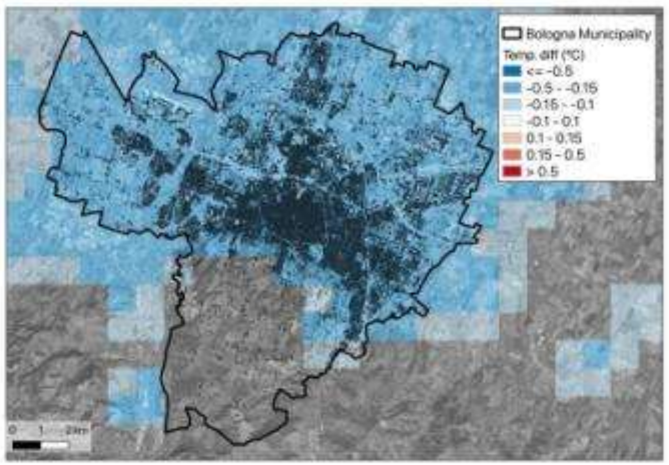
Winter

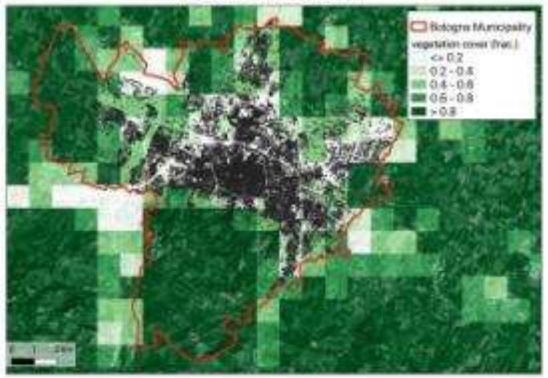
Summe

Temperature

Blue -> vegetation decreases temperature Red -> vegetation increases temperature

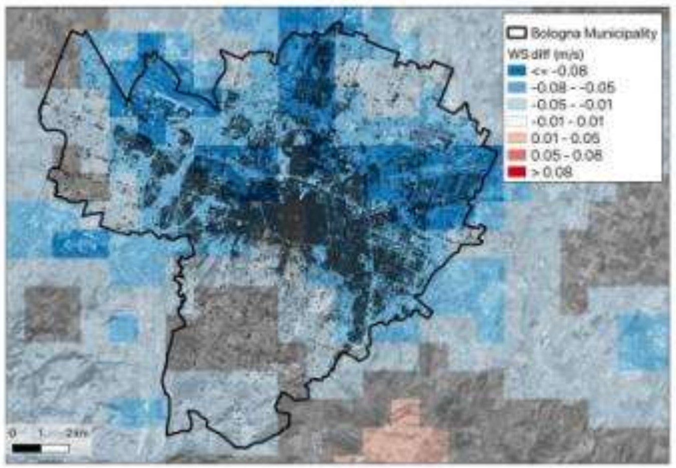

Temperature average difference, January, Bologna

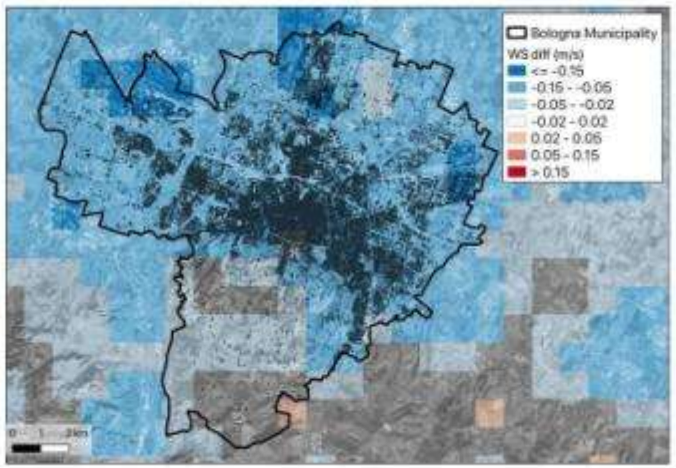

Temperature average difference, July, Bologna

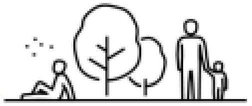

Vegetation cover, Bologna

Wind Speed

Blue -> vegetation decreases wind speed
Red -> vegetation increases increases wind speed


WS average difference, January, Bologna


WS average difference, July, Bologna



simVEG - simNO_VEG

Veg Gap
Vegetation for Urban Green Air Quality Plans

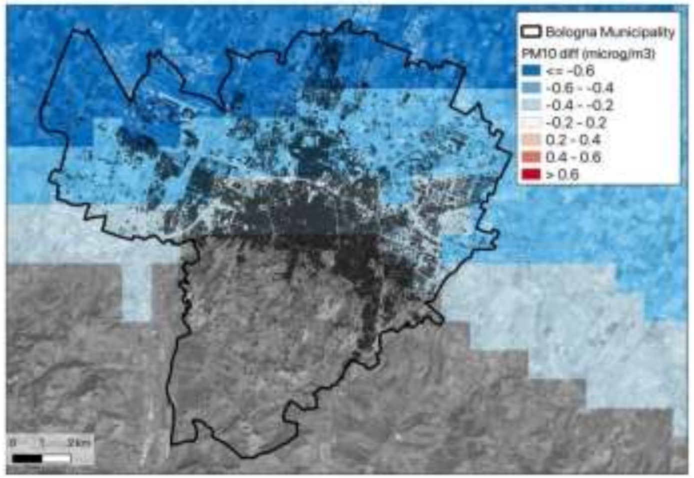
The effect of vegetation on concentrations and depositions

Italian National Agency for New Technologies, Energy and Sustainable Economic Development

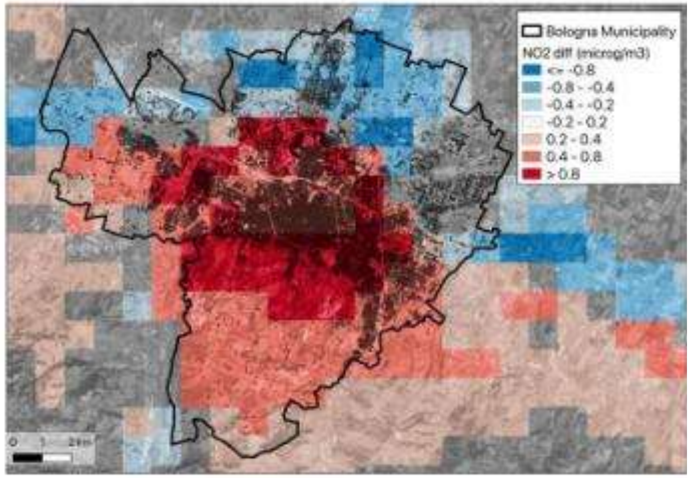
Concentrations

Blue -> vegetation increases concentration Red -> vegetation decreases concentration

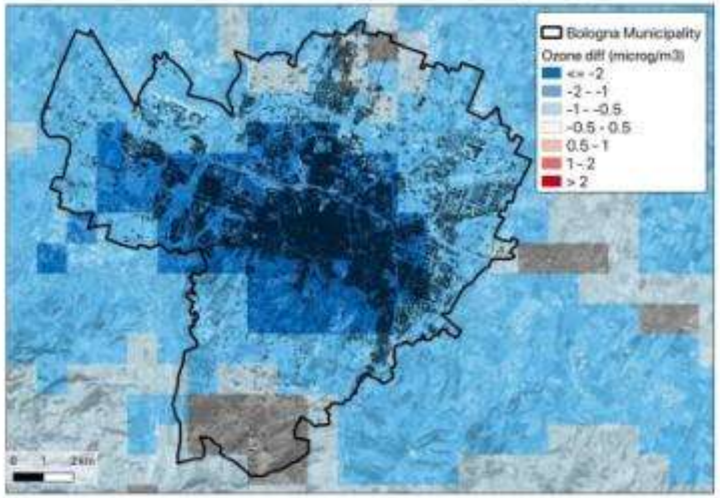
PM10 concentration average difference, July, Bologna



NO2 concentration average difference, July, Bologna



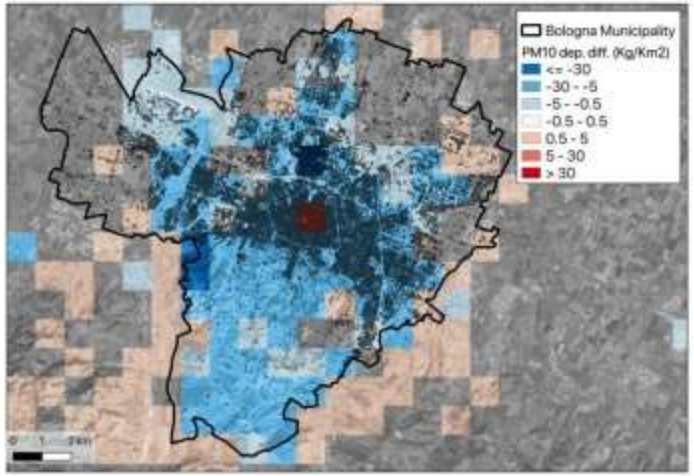
Ozone concentration average difference, July, Bologna



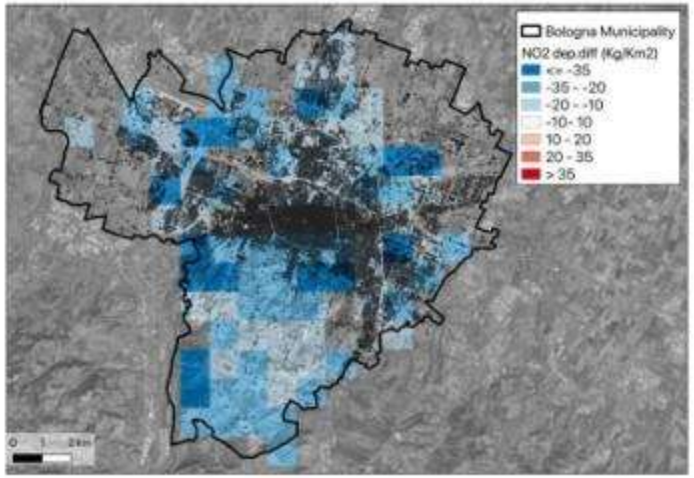
Depositions

Blue -> vegetation increases deposition Red -> vegetation decreases deposition

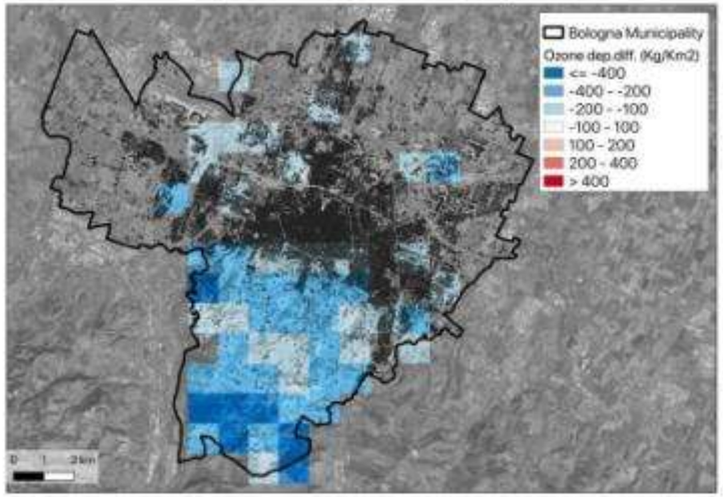
PM10 deposition average difference, July, Bologna



NO2 deposition average difference, July, Bologna



Ozone deposition average difference, July, Bologna



simNO_VEG - simVEG

Vegetation for Urban Green Air Quality Plans Gap

VEG-GAP cities

NO_2

PM10 O_3

- **Bologna**

Population: 390,849 inhabitants (January 2019, MCBO)

Area: 140,8 km²

- **Madrid**

Population: 3,141, 991 inhabitants

Area: 604,3 km²

- **Milano**

Population: 1,378,689 inhabitants (2018-ISTAT)

Area: 181,7 km²

More results available in November!

ENEA
Italian National Agency for New Technologies,
Energy and Sustainable Economic Development

VegGap
Vegetation for
Urban Green Air
Quality Plans

Thank you for your time and attention!

Stay tuned to discover our Information Platform on:

https://www.lifeveggap.eu/

mihaela.mircea@enea.it
skype account:
mihaela.mircea.enea

Life

life
HEATLAND

PROJECT LIFE HEATLAND

(LIFE16 CCA/ES/000077)

COOL PAVEMENTS FOR FUTURE CITIES. RESULTS FROM LIFE HEATLAND (SPAIN)

ctcon
Centro Tecnológico de la Construcción

chm

Murcia

FRECOM

SGGCCS
SLOVENSKI GRADBENI GROZD
CONSTRUCTION CLUSTER OF SLOVENIA

Life

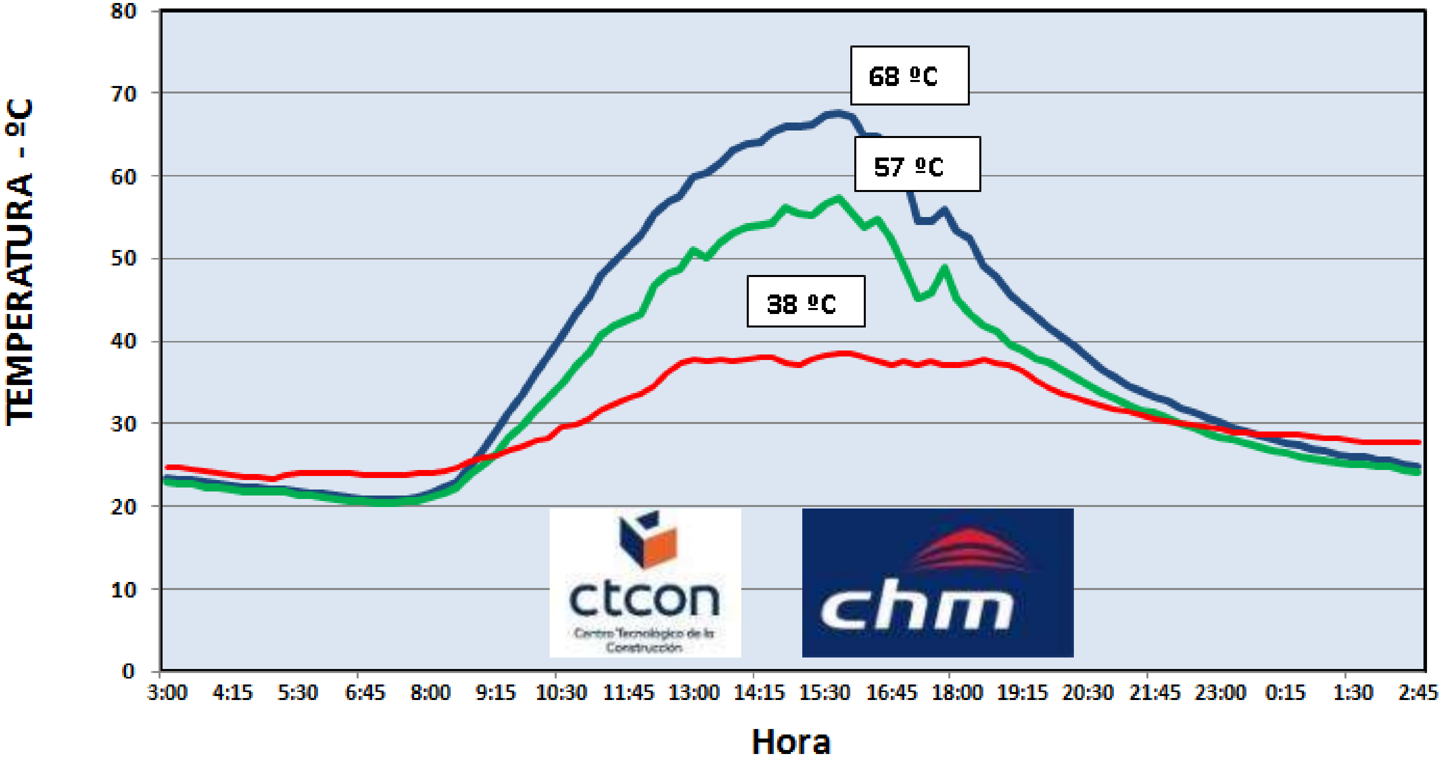
CONTENT

https://heatlandlife.eu/

1. COOL PAVEMENTS

↓ *Surface Temp* = ↓ *Ambient Temp*

SURFACE TEMPERATURE EVOLUTION 2016-07-30



🟦 Traditional pavement

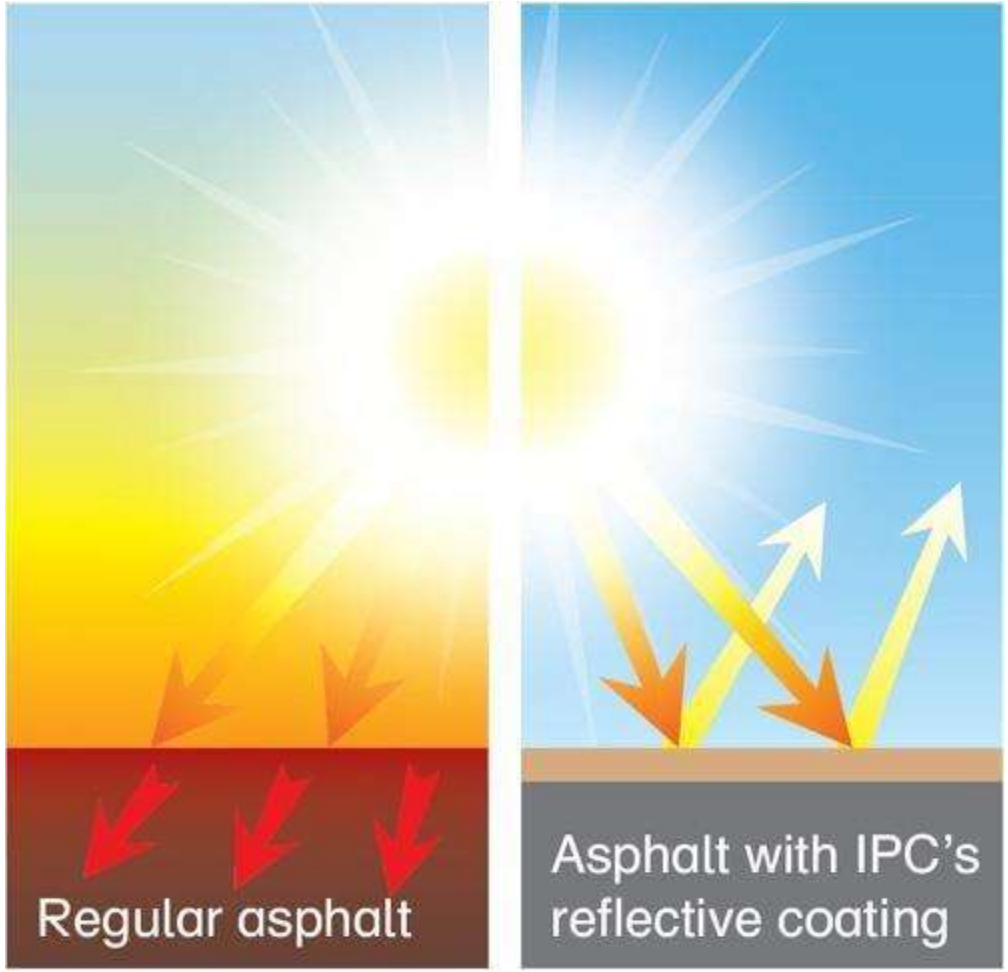
🟩 Cool pavement

🟥 Air temperature

1. COOL PAVEMENTS

Advantages:

- ✓ *Cool mixtures could be more durable*
- ✓ *These mixtures are not harmful to health, because they absorb 90% of the UV spectrum*
- ✓ *They can mitigate UHI effect and contribute to decrease CO_2 emissions*



1. COOL PAVEMENTS

life

HEATLAND

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chm

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SLOVENSKI GRADBENI GROZD
CONSTRUCTION CLUSTER OF SLOVENIA

2. HEATLAND OBJECTIVES

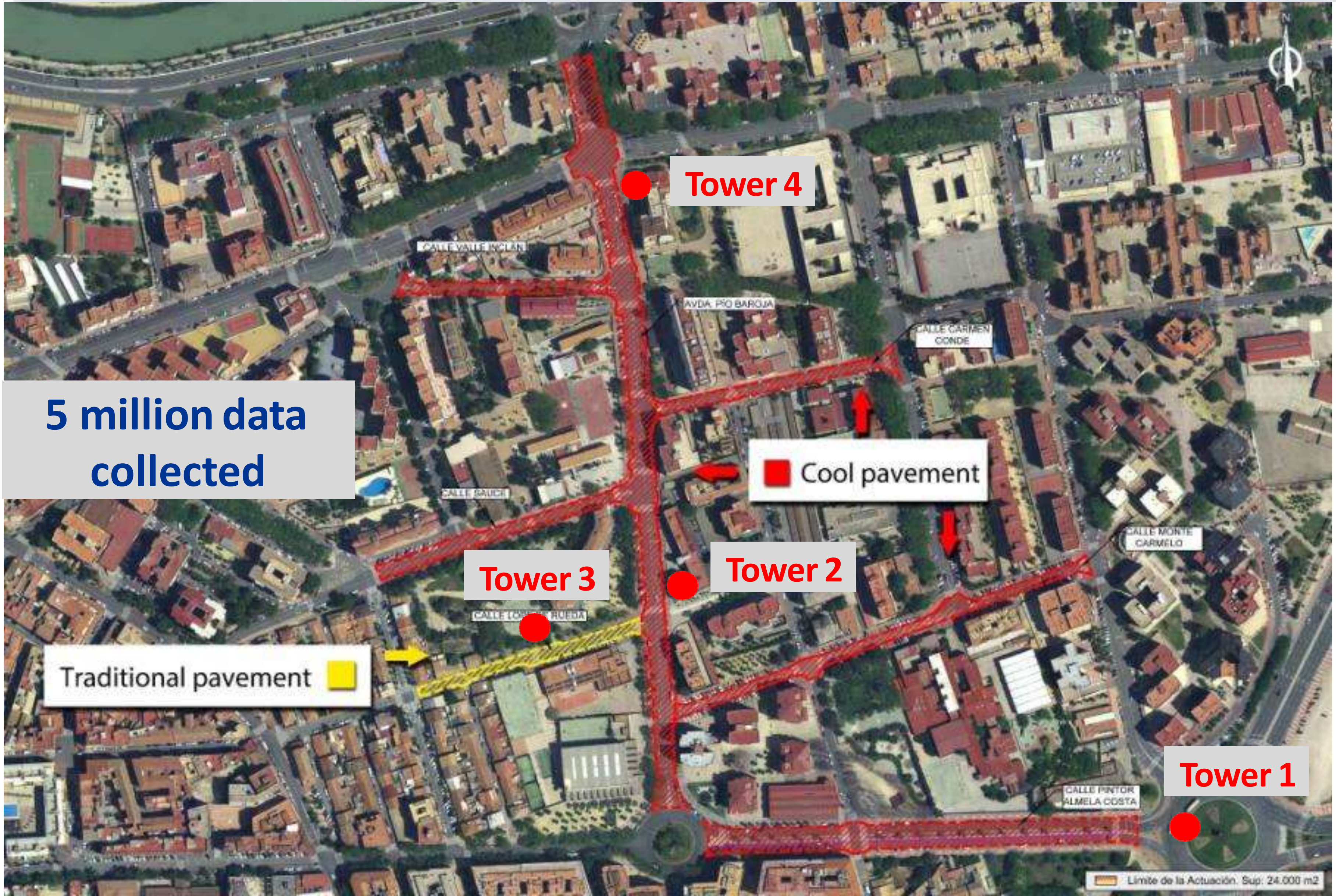
- *To mitigate Urban Heat Island (UHI) effect*
- *To reduce the surface and environmental temperature of the area, which will contribute to a better quality of life and people's well-being*
- *To achieve energy savings in the urban environment*
- *To reduce air pollution*
- *To develop a tool to assess the impact of the implementation of cool pavement in any city*

3. HEATLAND DEVELOPMENT

Second Informative Video:

https://youtu.be/5u8RSCsleuw

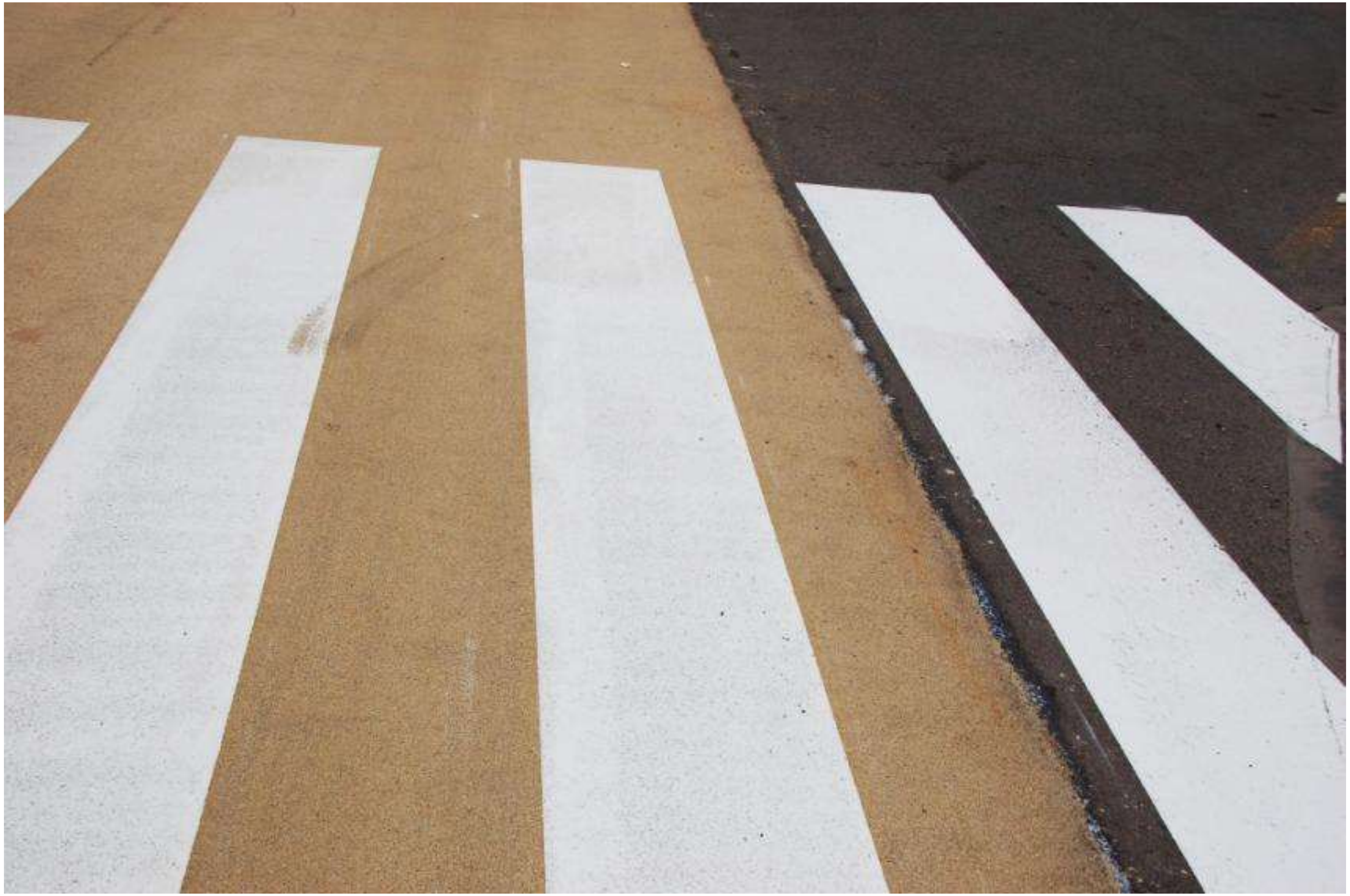
3. HEATLAND DEVELOPMENT



5 million data collected

4. RESULTS: VISUAL IMPACT

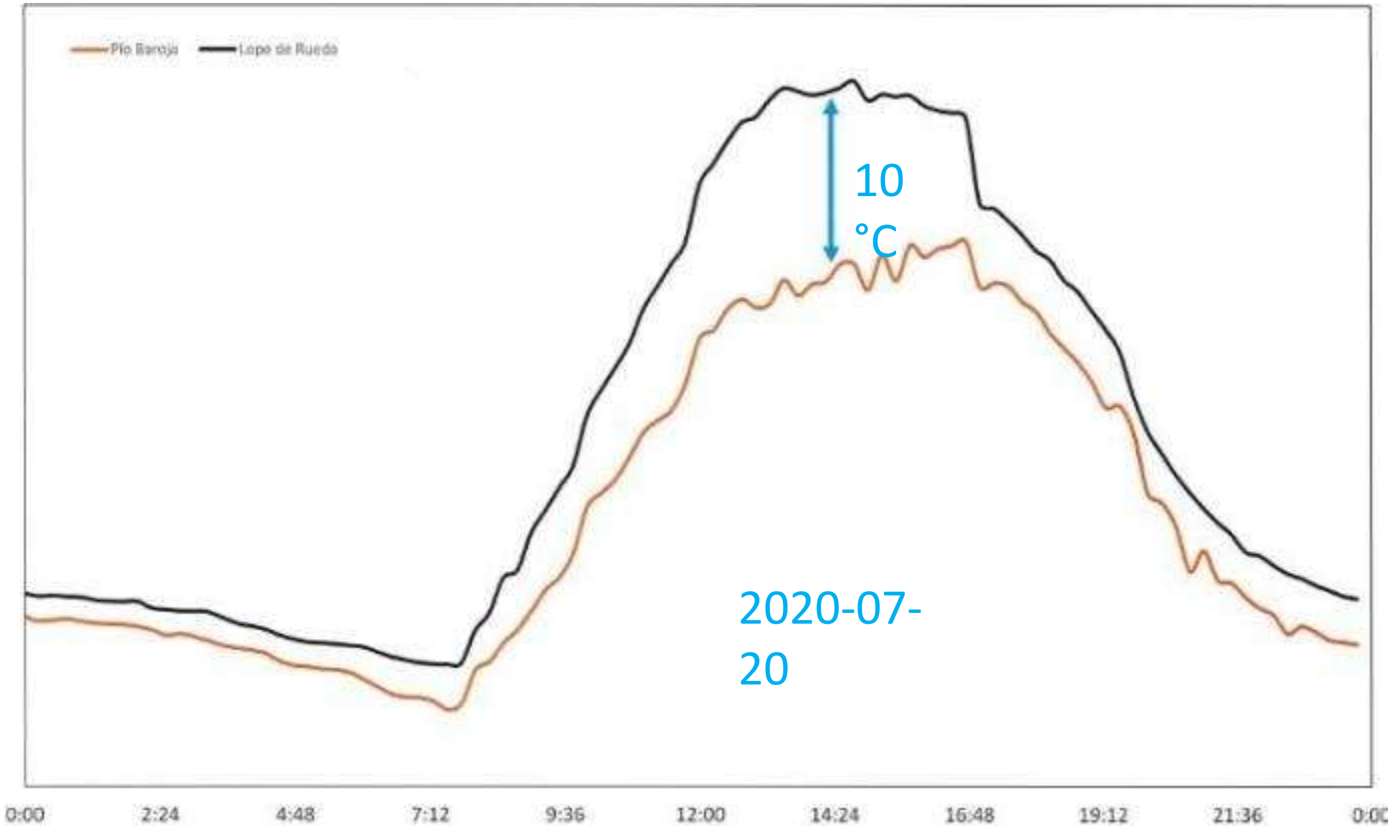
4. RESULTS: VISUAL IMPACT



4. RESULTS: VISUAL IMPACT

Luminance increased by 150%

4. RESULTS: THERMAL IMPACT



10 °C

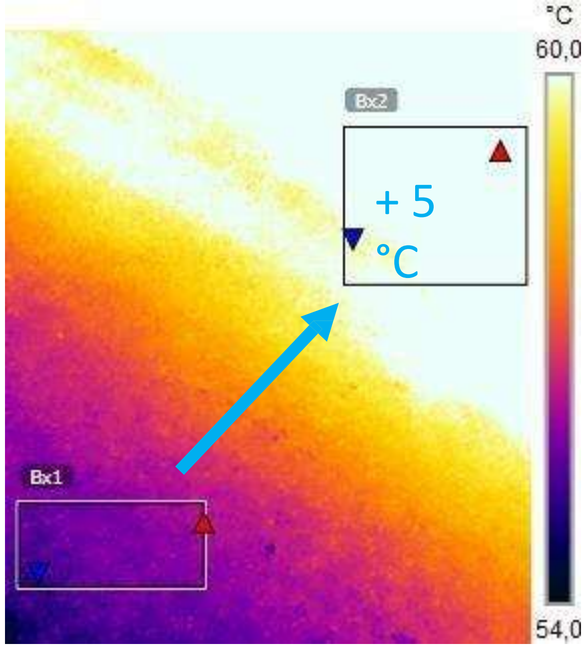
2020-07-20

Surface temperature decreased between 7 °C and 11 °C

4. RESULTS: THERMAL IMPACT

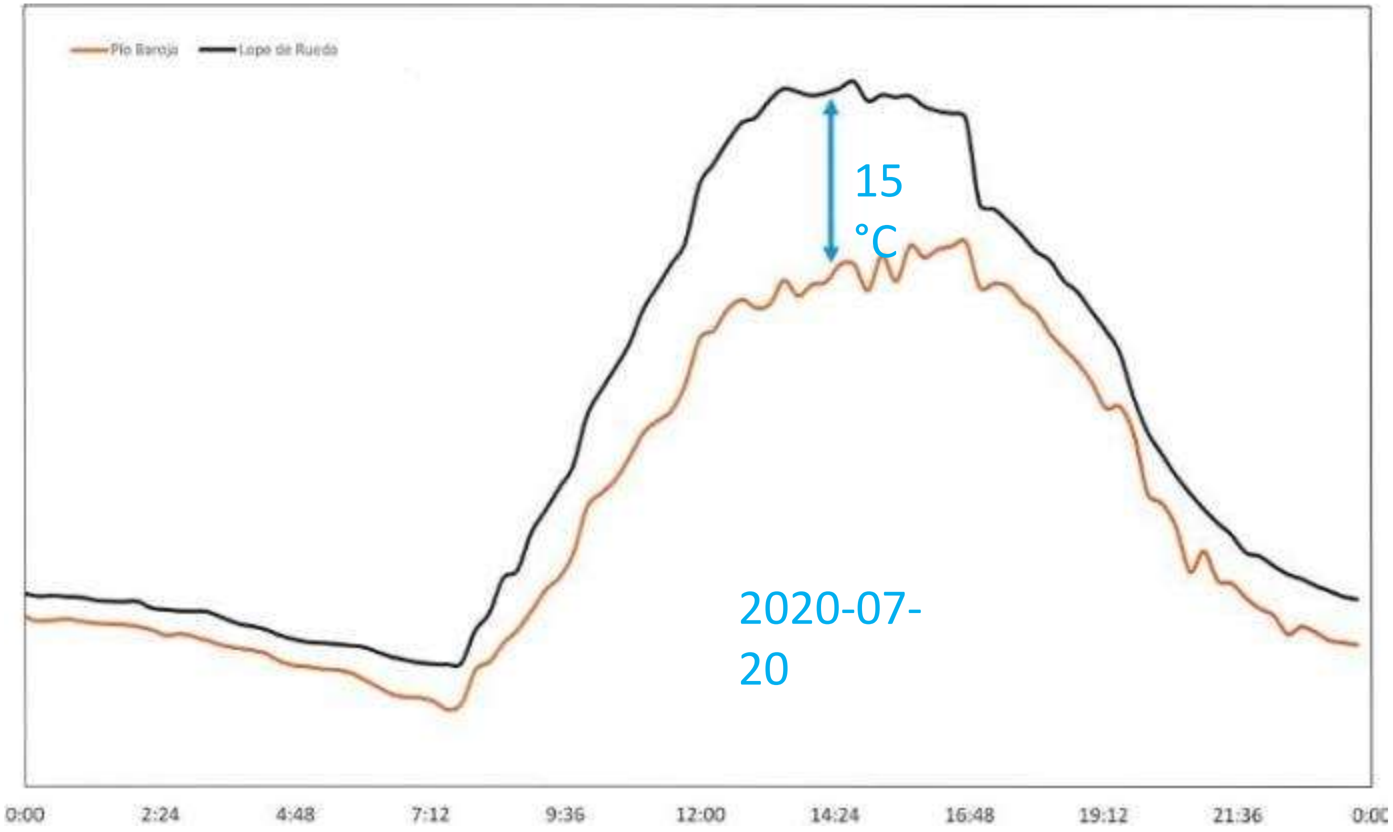
Surface temperature decreased between 7 °C and 11 °C

4. RESULTS: THERMAL IMPACT



Surface temperature decreased between 7 °C and 11 °C

4. RESULTS: THERMAL IMPACT



15 °C

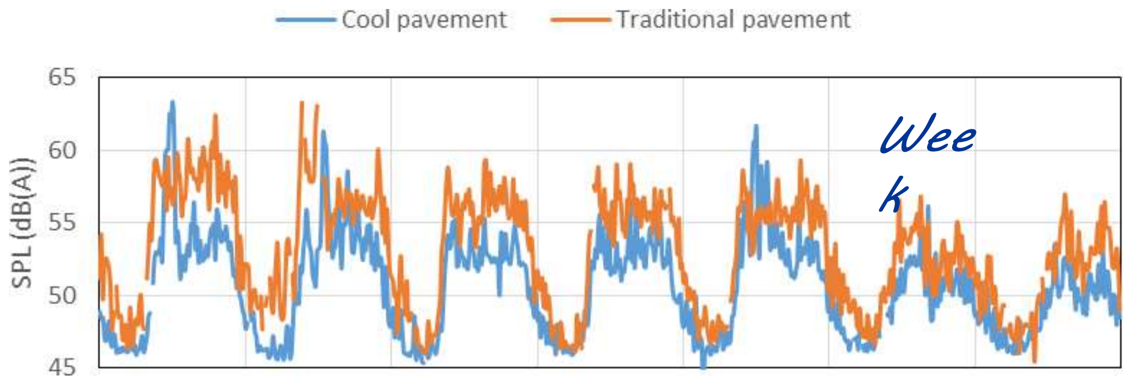
2020-07-20

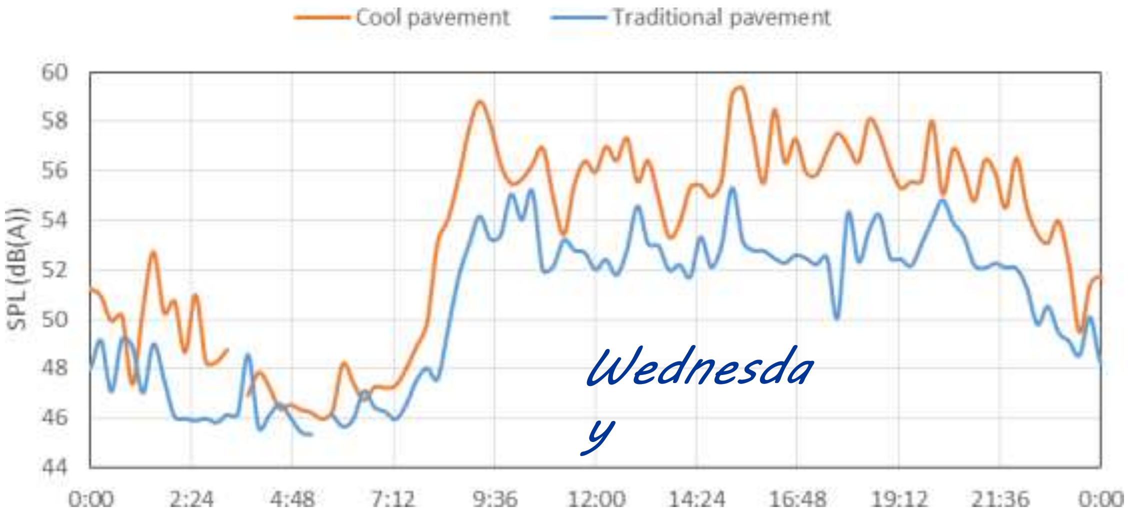
Surface temperature decreased between 7 °C and 11 °C

4. RESULTS: THERMAL IMPACT

4. RESULTS: SOUND IMPACT

Noise decreased by 3 dB(A)





PROJECT LIFE HEATLAND

(LIFE16 CCA/ES/000077)

life
HEATLAND

Contact

info@heatlandlife.eu

fmoral@ctcon-rm.com

INNOVATIVE PAVEMENT SOLUTION FOR THE MITIGATION OF THE URBAN HEAT ISLAND EFFECT

ctcon
Centro Tecnológico de la Construcción

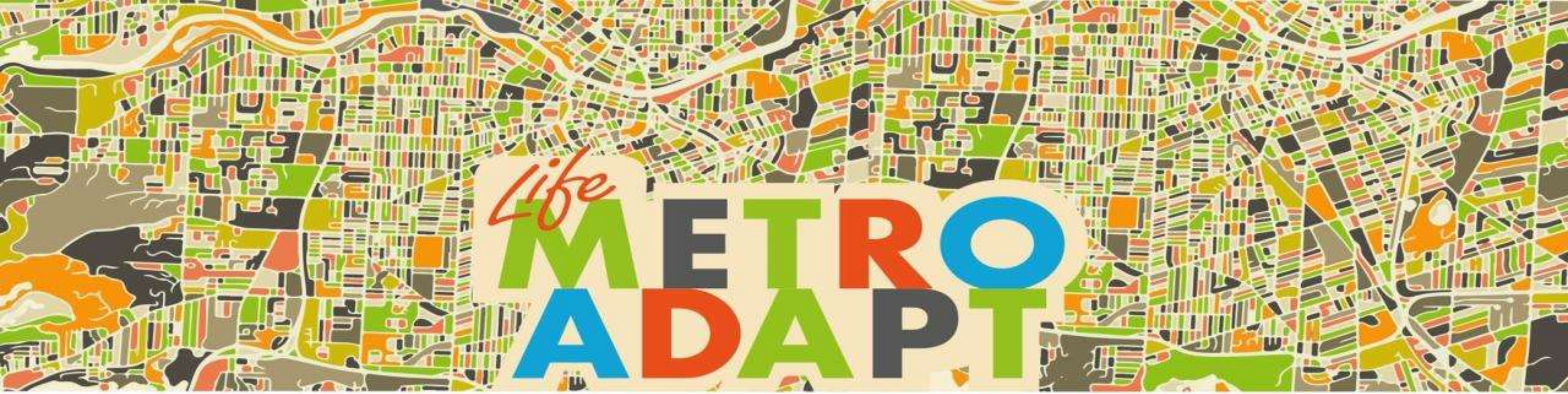
chm

Murcia

FRECOM

SGGCCS
SLOVENSKI GRADBENI GROZD
CONSTRUCTION CLUSTER OF SLOVENIA

Life



Enhancing climate change adaptation strategies
and measures in the Metropolitan City of Milan

2nd European Workshop:
“Urban Heat Island and Heat Resilience: Networking for Future Strategy”

Thessaloniki, 14 October 2020

2nd European Workshop:
“Urban Heat Island and Heat Resilience:
Networking for Future Strategy”

Thessaloniki, 14 October 2020

LIFE17CCA/IT/000080
Città metropolitana di Milano
CAP
AMBIENTEITALIA we know green
ALDA European Association for Local Democracy
e-geos AN ASI / TELESPAZIO COMPANY
LEGAMBIENTE

Life METRO ADAPT Project

(Life 17CCA/IT/000080 – CUP I43E17000230007)

Duration: 36 months (from 3 September 2018 to 30 September 2021)

Financing: LIFE17 CCA/IT/000080

The Partners:

Città Metropolitana di Milano (Leader)
ALDA (European association for local democracy, France)
Ambiente Italia S.r.l. (Italy)
CAP Holding S.p.A. (Italy)
e-GEOS S.p.A. (Italy)
Legambiente Lombardia Onlus (Italy)

PROJECT ACTION Life METRO ADAPT

Simple and standardized tools and rules on resilient measures

Platform on NBS including guidelines, tech-specs and European best practices

Raise citizens awareness on the climate change issue

Two demonstrative NBS facilities Boost

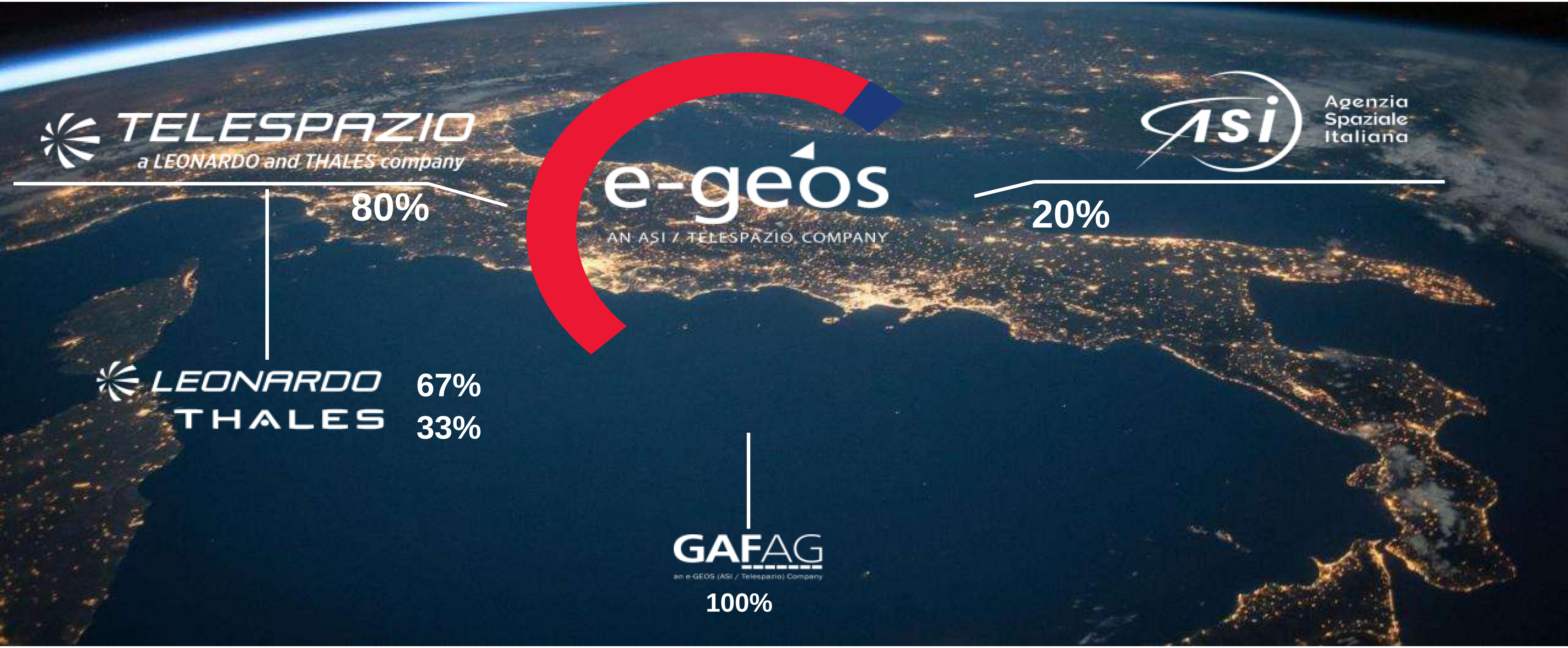
knowledge exchange and good practice

in a network of European metropolitan cities

LIFE17CCA/IT/000080

NBS: Nature Based Solutions

e-GEOS S.p.A



TELESPAZIO
a LEONARDO and THALES company
80%

LEONARDO 67%
THALES 33%

e-geos
AN ASI / TELESPAZIO COMPANY

Agenzia Spaziale Italiana
20%

GAFAG
an e-GEOS (ASI / Telespazio) Company
100%

Use of the Remote-sensing within the Project

Action CC1 (e-GEOS)

- analyzing the phenomenon of urban heat islands
- analyzing the relationship between temperature and drought in the agricultural areas of the Metropolitan City of Milan

exploiting satellite remote sensing technologies

Satellite technology

Synoptic vision of the territory

Information at various scales and updates

Integration of Satellite Analysis with other ground sources and data

optimization of available economic resources

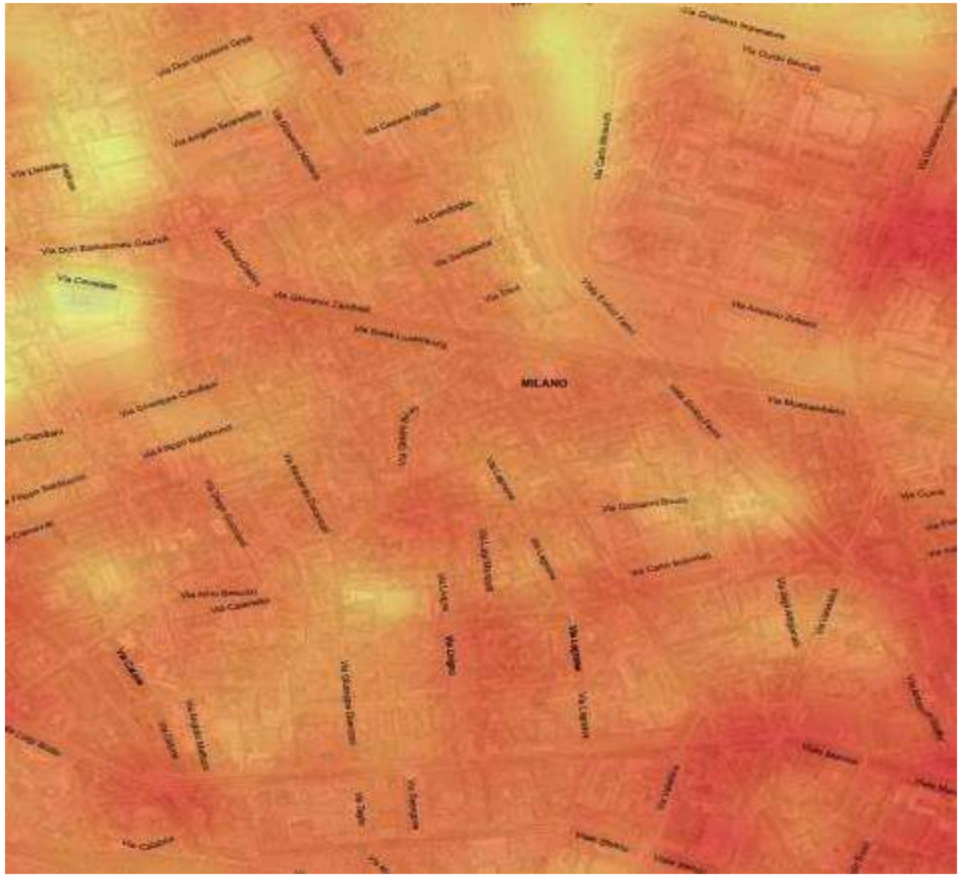
implementation of multi-objective and integrated actions

UHI Maps – Targets

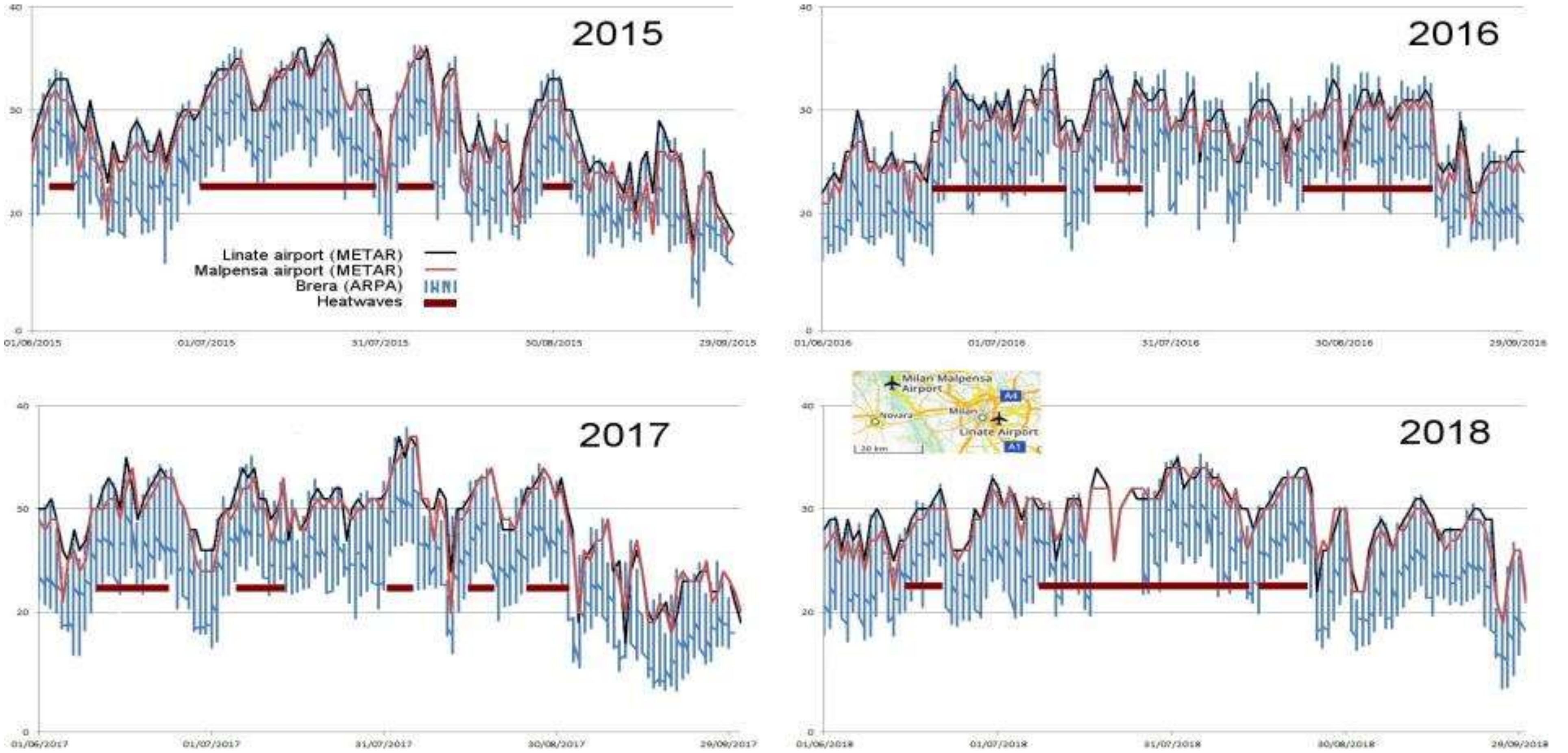
HAZARD maps assessing the physical impact of Land Surface Temperatures (LST) in the urban structure

The urban context:

- High building density causes a reduced «Sky View Factor» that retains heat in the urban structure.
- High minimum night temperatures carry a great health risk for some for some segments of the population



STEP 1:
Identification of recent Urban Heat Waves



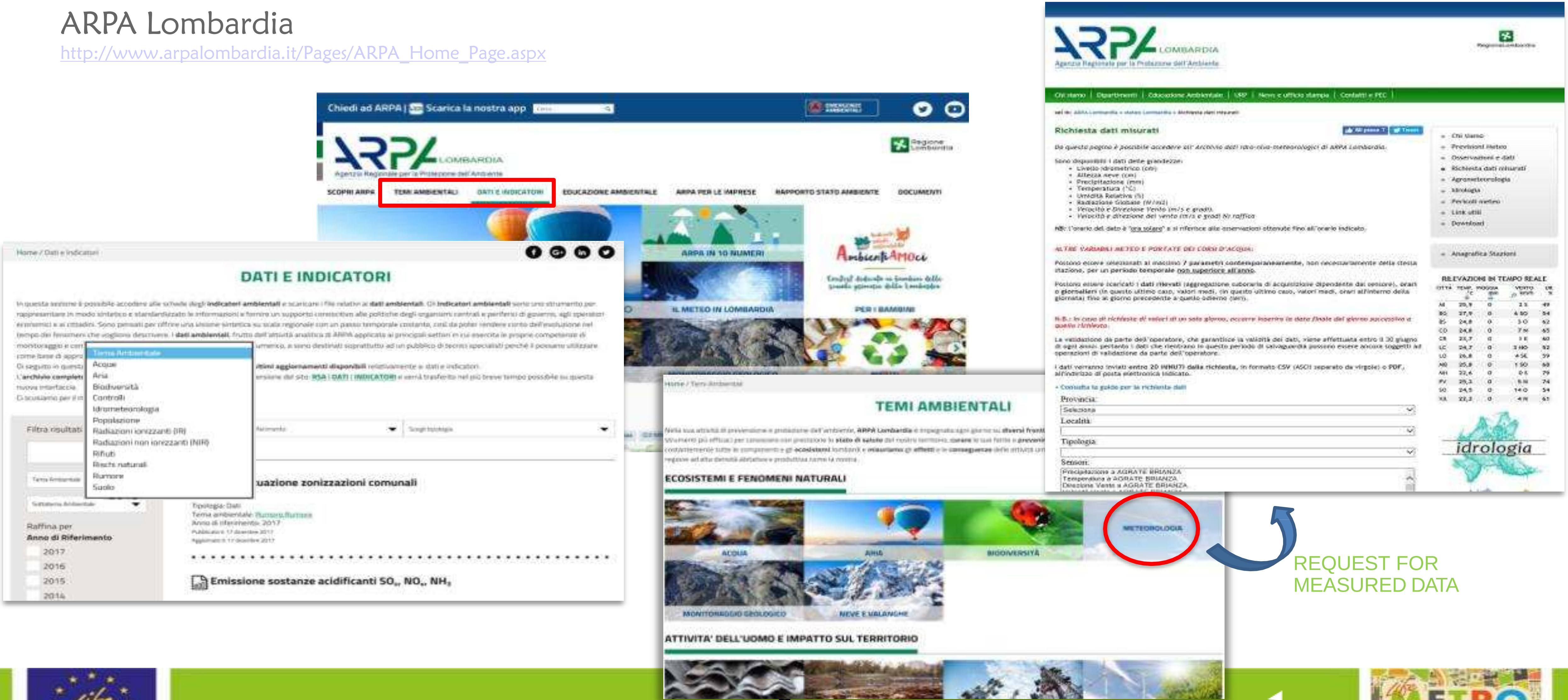
LIFE17CCA/IT/000080

AN ASI / TELESPAZIO COMPANY

STEP 1:
Identification of recent Urban Heat Waves

ARPA Lombardia

http://www.arpalombardia.it/Pages/ARPA_Home_Page.aspx



DATI E INDICATORI

uazione zonizzazioni comunali

Emissione sostanze acidificanti SO_x, NO_x, NH_3

TEMI AMBIENTALI

ECOSISTEMI E FENOMENI NATURALI

ATTIVITA' DELL'UOMO E IMPATTO SUL TERRITORIO

Richiesta dati misurati

Da questa pagina è possibile accedere all' Archivio dati idro-nivo-meteorologici di ARPA Lombardia.

Sono disponibili i dati delle grandezze:
- Livello idrometrico (cm)
- Altezza neve (cm)
- Precipitazione (mm)
- Temperatura (°C)
- Umidità Relativa (%)
- Radiazione Globale (W/m2)
- Velocità e Direzione Vento (m/s e gradi)
- Velocità e direzione del vento (m/s e gradi) di raffica

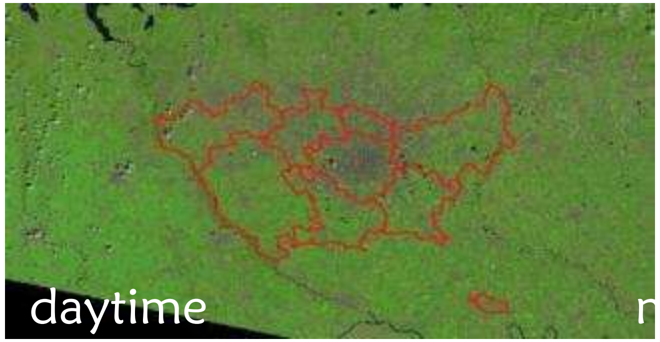
NB: l'orario del dato è "ora solare" e si riferisce alle osservazioni ottenute fino all'orario indicato.

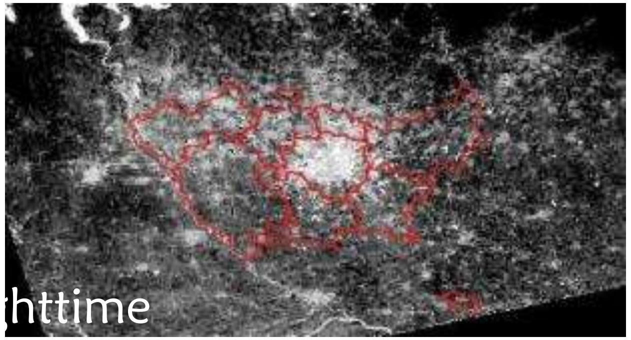
REQUEST FOR MEASURED DATA

STEP 2:
Input data analysis: Satellite sensors and data selection

Landsat 8

Landsat8





Landasat8 is an American earth observation satellite

Temporal resolution

Temporal resolution: 16 days

Spatial resolution:

Spatial resolution: 30 m in VIS and NIR (OLI sensor) and 100 m TIR (TIRS sensor).

Both satellites data can be obscured by clouds.

MODIS

MODIS

MODIS is a spectro-radiometer aboard the TERRA and AQUA satellites. AQUA acquisition are the one used for UHI.

AQUA

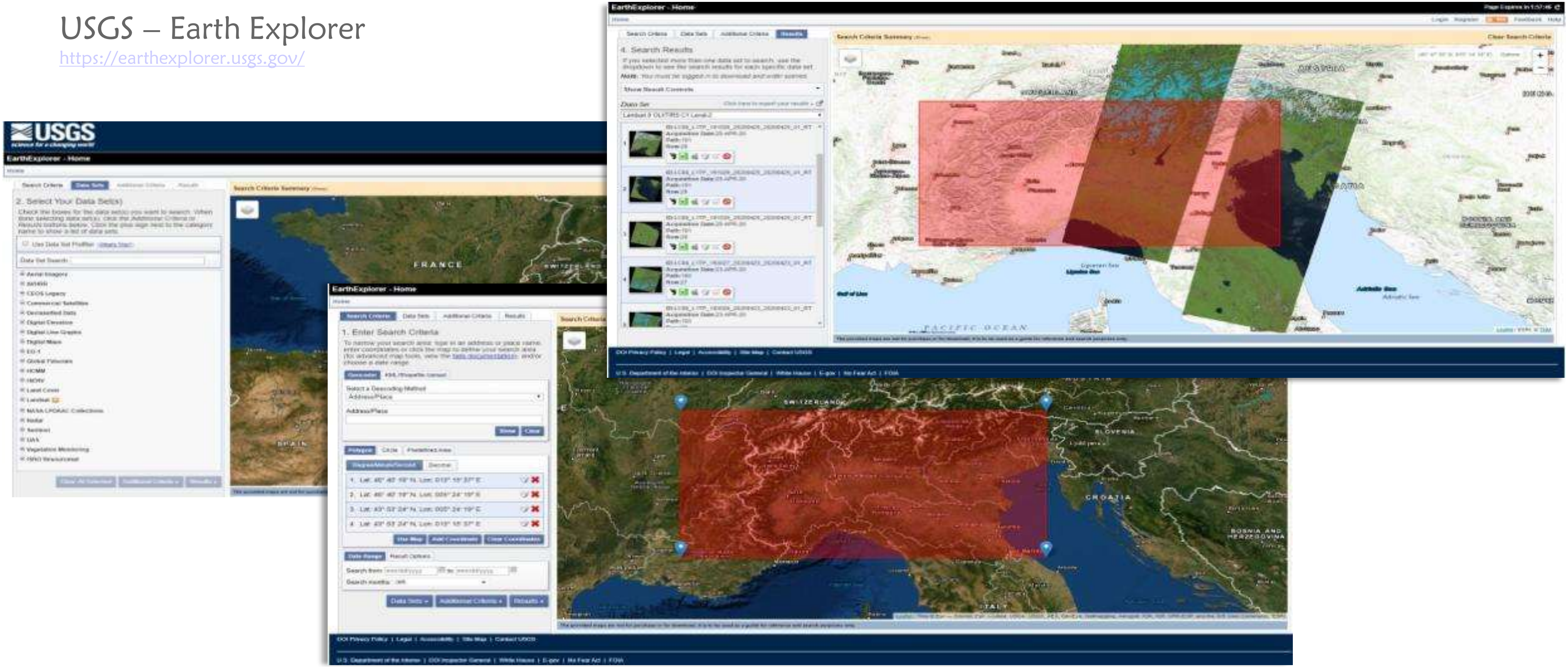
Available daily, both day and night.

Spatial resolution of night surface temperature (LST) : 1 km

STEP 2:
Input data analysis: Satellite sensors and data selection

USGS – Earth Explorer

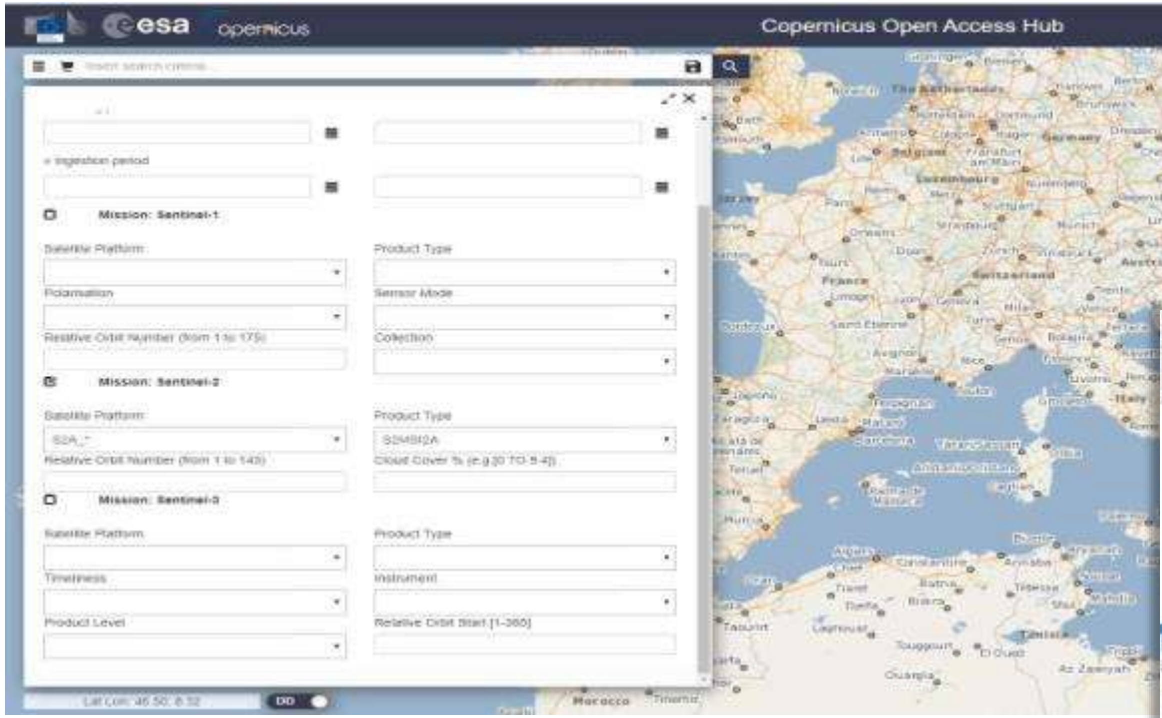
https://earthexplorer.usgs.gov/



STEP 2:
Input data analysis: Satellite sensors and data selection

Copernicus Open Access Hub

https://scihub.copernicus.eu/dhus/#/home



☐ **Mission: Sentinel-1**

Satellite Platform:

Product Type

Polarisation

Sensor Mode

Relative Orbit Number (from 1 to 175)

Collection

☑ **Mission: Sentinel-2**

Satellite Platform: S2A_*

Product Type: S2MSI2A

Relative Orbit Number (from 1 to 143)

Cloud Cover % (e.g.[0 TO 9.4])

☐ **Mission: Sentinel-3**

Satellite Platform

Product Type

Timeliness

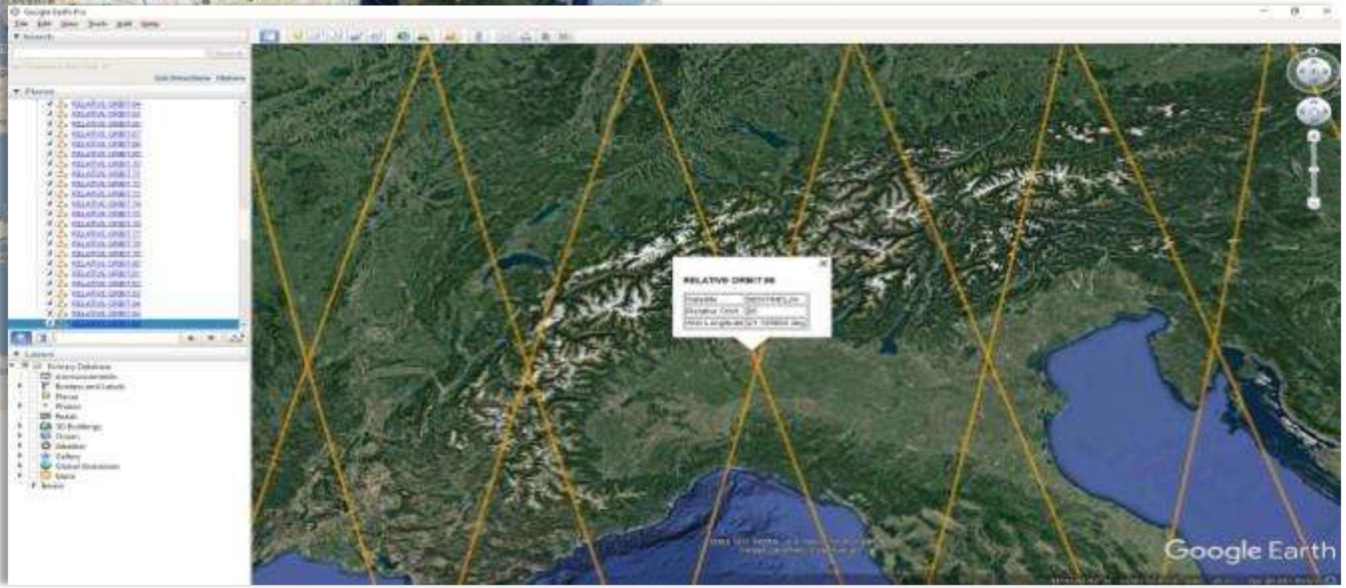
Instrument

Product Level

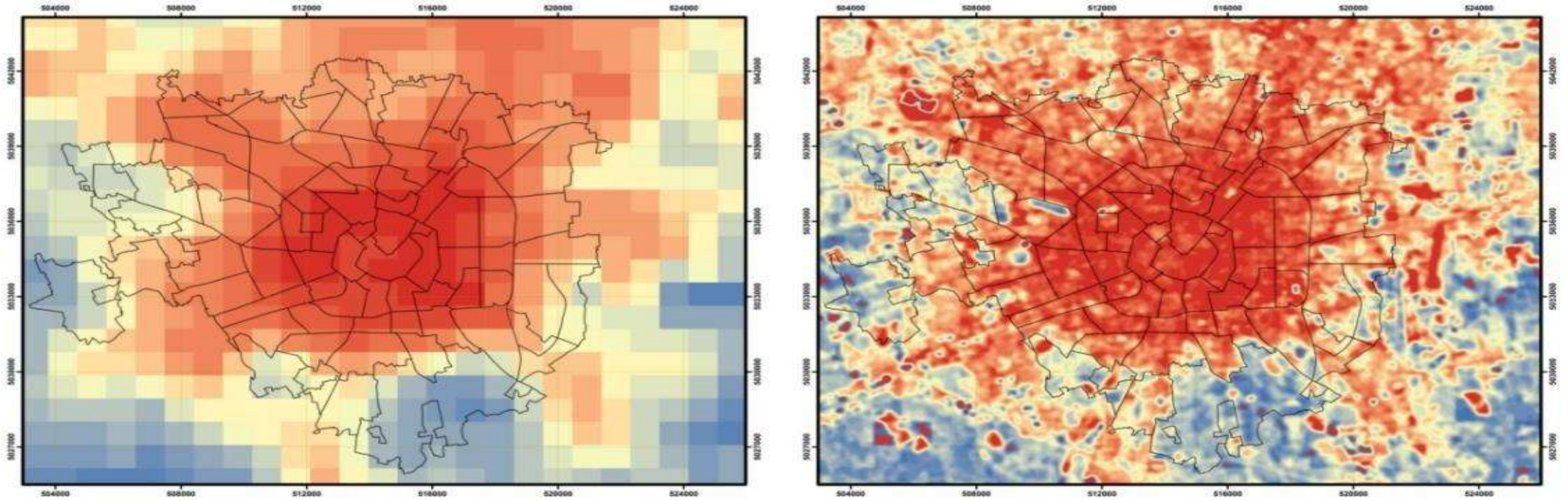
Relative Orbit Start [1-385]

Relative Orbits

https://sentinel.esa.int/web/sentinel/missions/sentinel-2/satellite-description/orbit



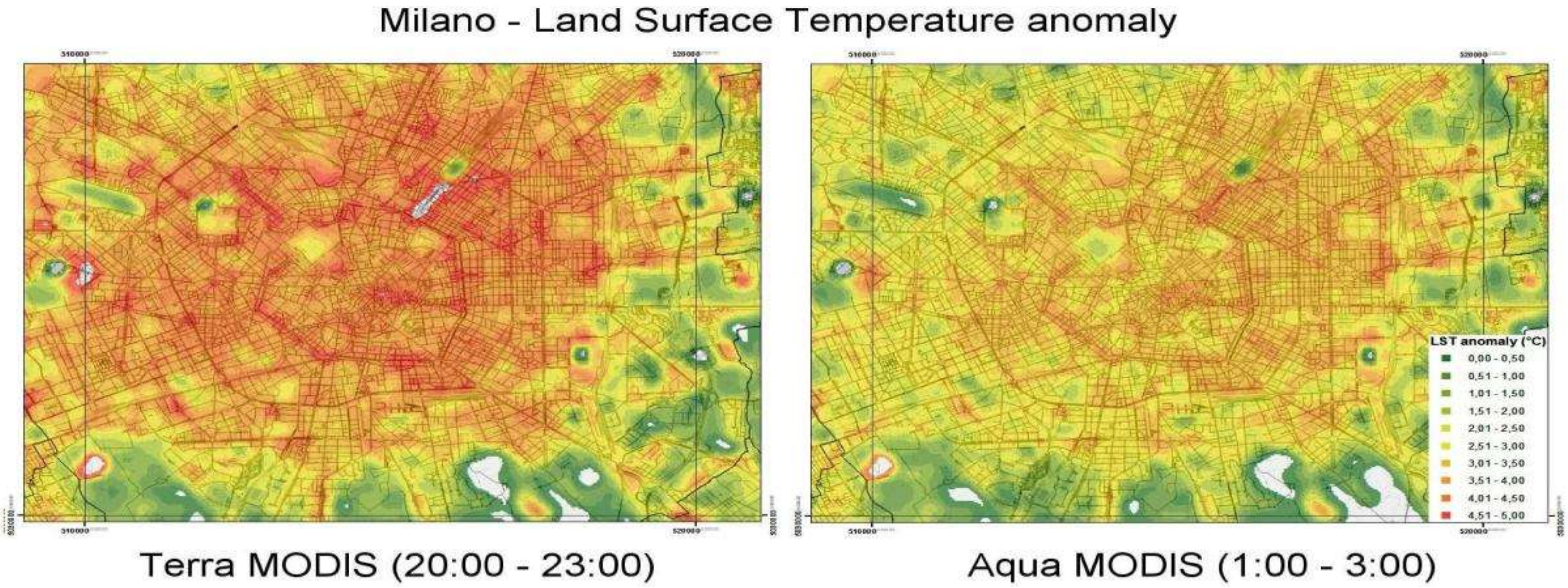
STEP 3:
UHI Maps generation - LST product rescaling



An example of the product obtained. The MODIS LST at 1 km is shown on the left and the product of downscaling to 100 m spatial resolution (but on a 30m grid) is shown on the right.

STEP 3:
UHI Maps generation - Terra VS Aqua

An example of the comparison between the averages of the ground thermal anomaly data in Milan relative to the evening (TERRA) and night (AQUA) acquisitions.



Milano - Land Surface Temperature anomaly

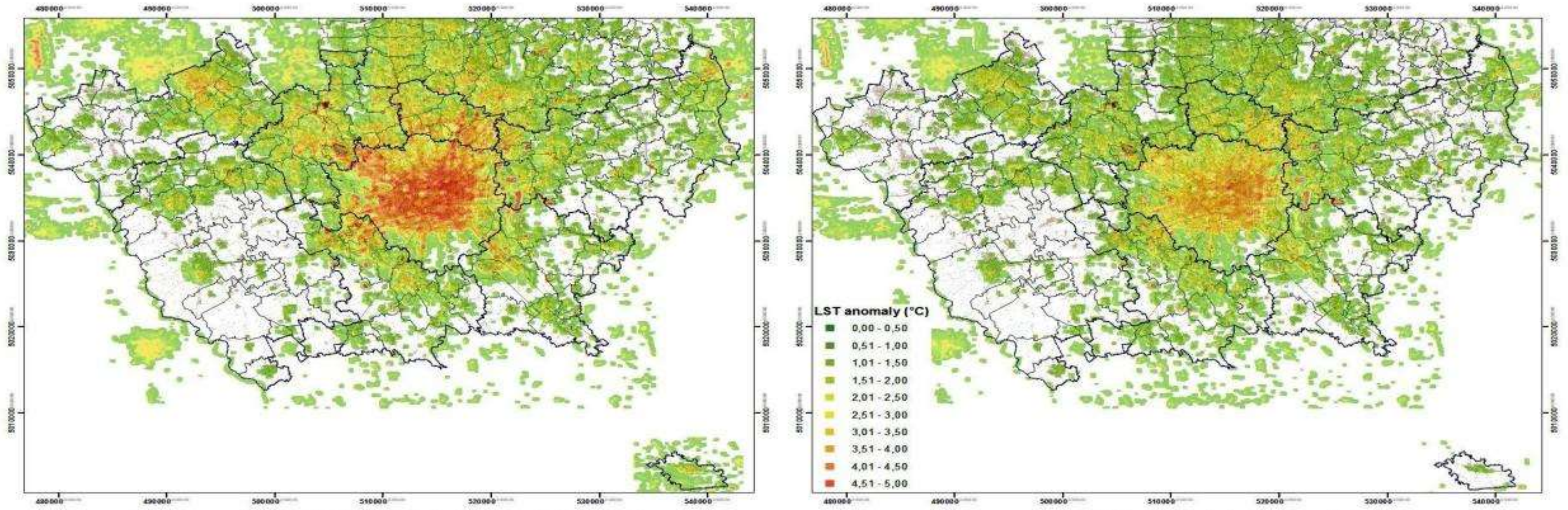
Terra MODIS (20:00 - 23:00)

Aqua MODIS (1:00 - 3:00)

STEP 3:
UHI Maps generation - Terra VS Aqua

An example of the comparison between the averages of the ground thermal anomaly data in CMM relative to the evening (TERRA) and night (AQUA) acquisitions.

Città Metropolitana di Milano - Land Surface Temperature anomaly

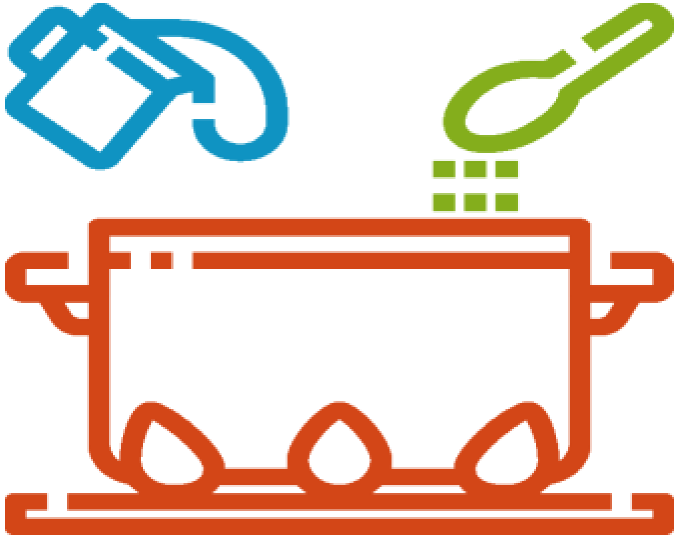


Terra MODIS (20:00 - 23:00)

Aqua MODIS (1:00 - 3:00)

LIFE17CCA/IT/000080

STEP 4:
Population Risk Assessment at UHI



- Analysis of night temperatures during the urban. This information represents the HAZARD.
- VULNERABILITY INDEX derived and normalized by ISTAT data (2011 census, published 2017): population over 70 and under 10 are categories at risk

RISK INDEX OF THE POPULATION SENSITIVE TO TEMPERATURE ANOMALIES

Refined analysis can be done considering ECONOMIC SITUATION.

STEP 4: How to
Vulnerability Index – Input Data from CMM

Topographic Data Base

Developed on INSPIRE specifications, complete coverage of the territory, 14 cm accuracy, 3D of the territory and buildings. 2017 Edition.

Thematic Maps

- Land cover map with data Corine Land Cover III level
- Soil sealing Map

Territorial Index

At the municipal level, homogeneous areas, census sections, isolated
- Morphological
- Socioeconomic

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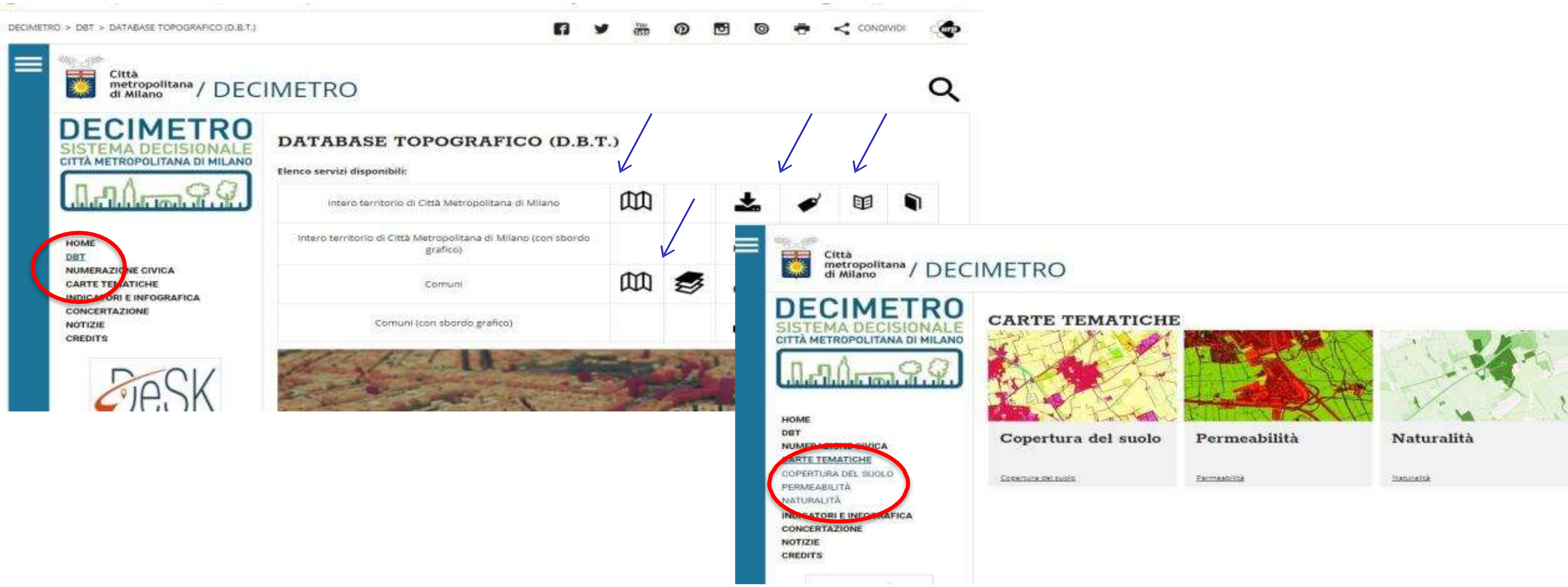
STEP 4: How to Origin and Type of Data

DECIMETRO: Data Base Topografico CMM and derivate Maps

http://www.cittametropolitana.mi.it/DeCiMetro/DBT/index.html



DATABASE TOPOGRAFICO (D.B.T.)

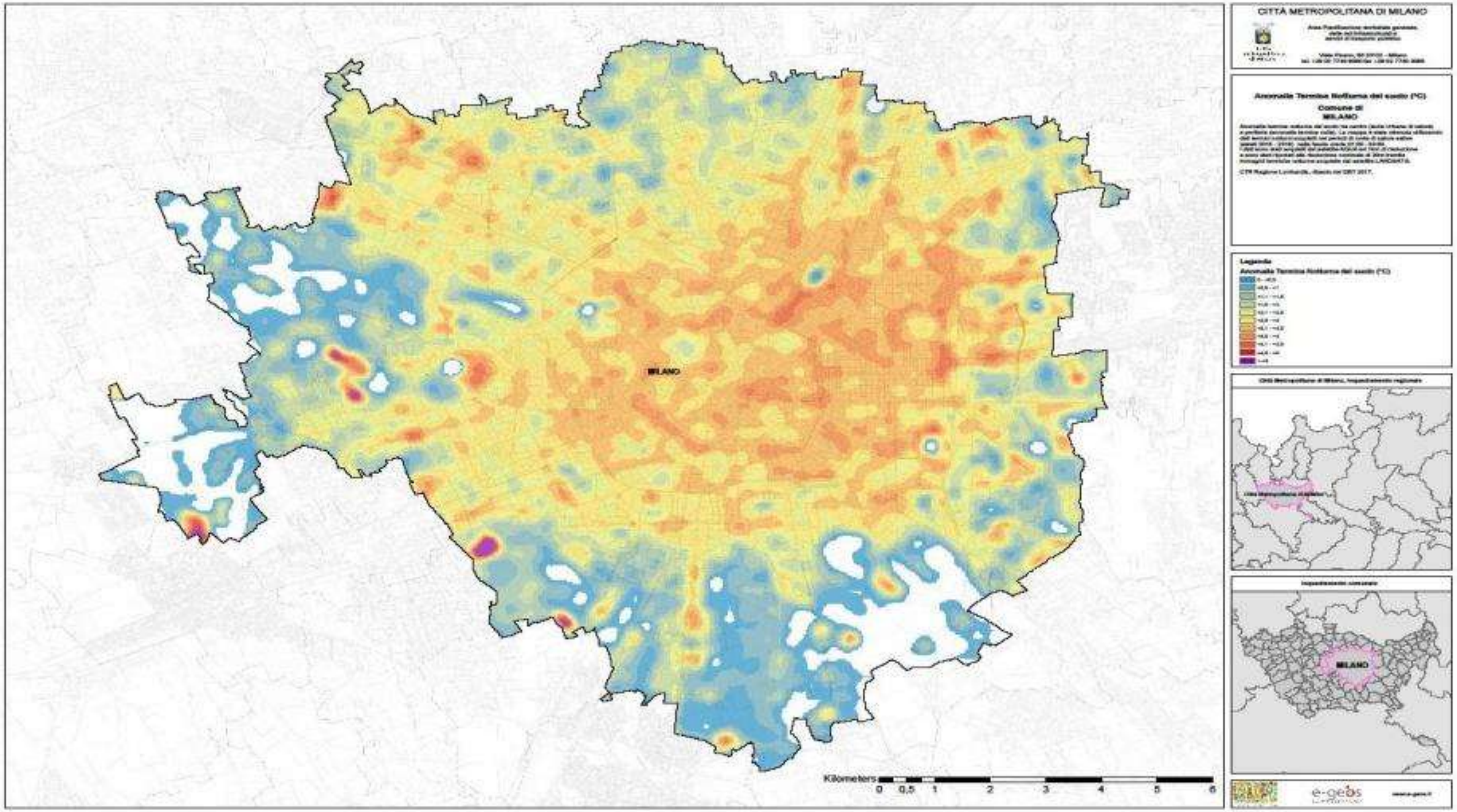
Elenco servizi disponibili:

Intero territorio di Città Metropolitana di Milano	🗺		⬇		📖	
Intero territorio di Città Metropolitana di Milano (con sbordo grafico)						
Comuni	🗺	≋				
Comuni (con sbordo grafico)						

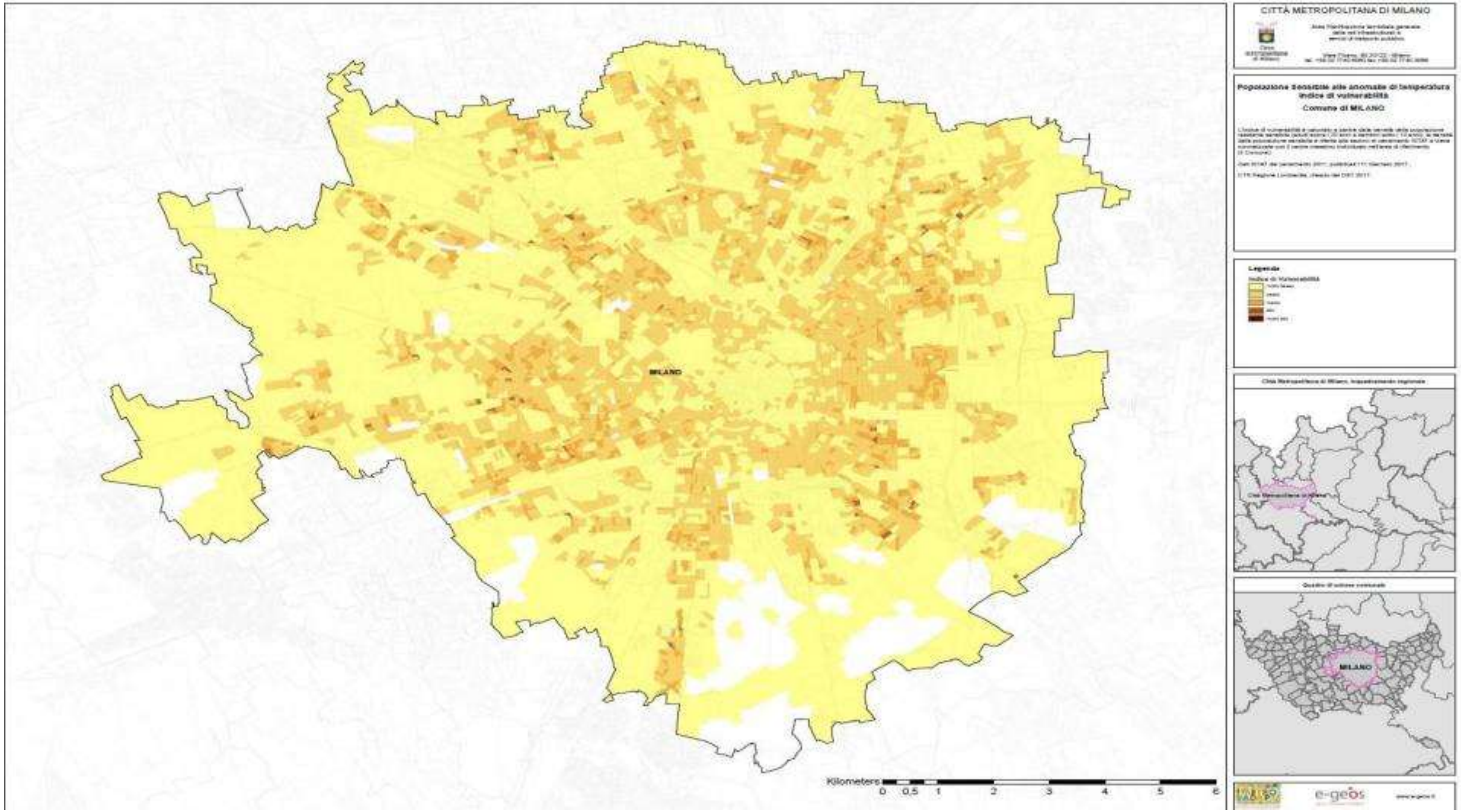
CARTE TEMATICHE

Copertura del suolo	Permeabilità	Naturalità
Copertura del suolo	Permeabilità	Naturalità

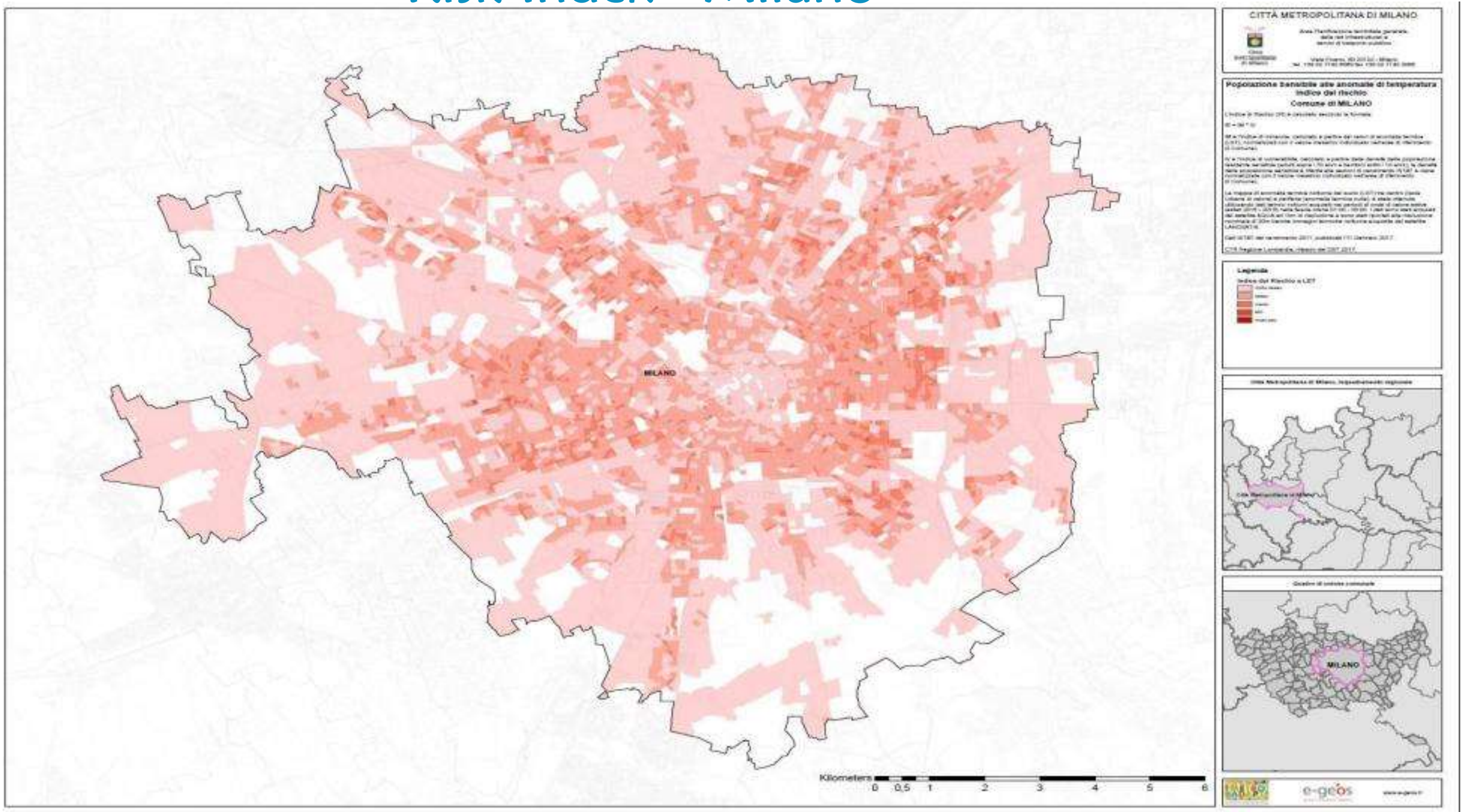
STEP 4: first ingredient Land Thermal Anomaly - Milano



STEP 4: second ingredient Vulnerability Index – Sensible population



STEP 4: the result
Risk Index - Milano



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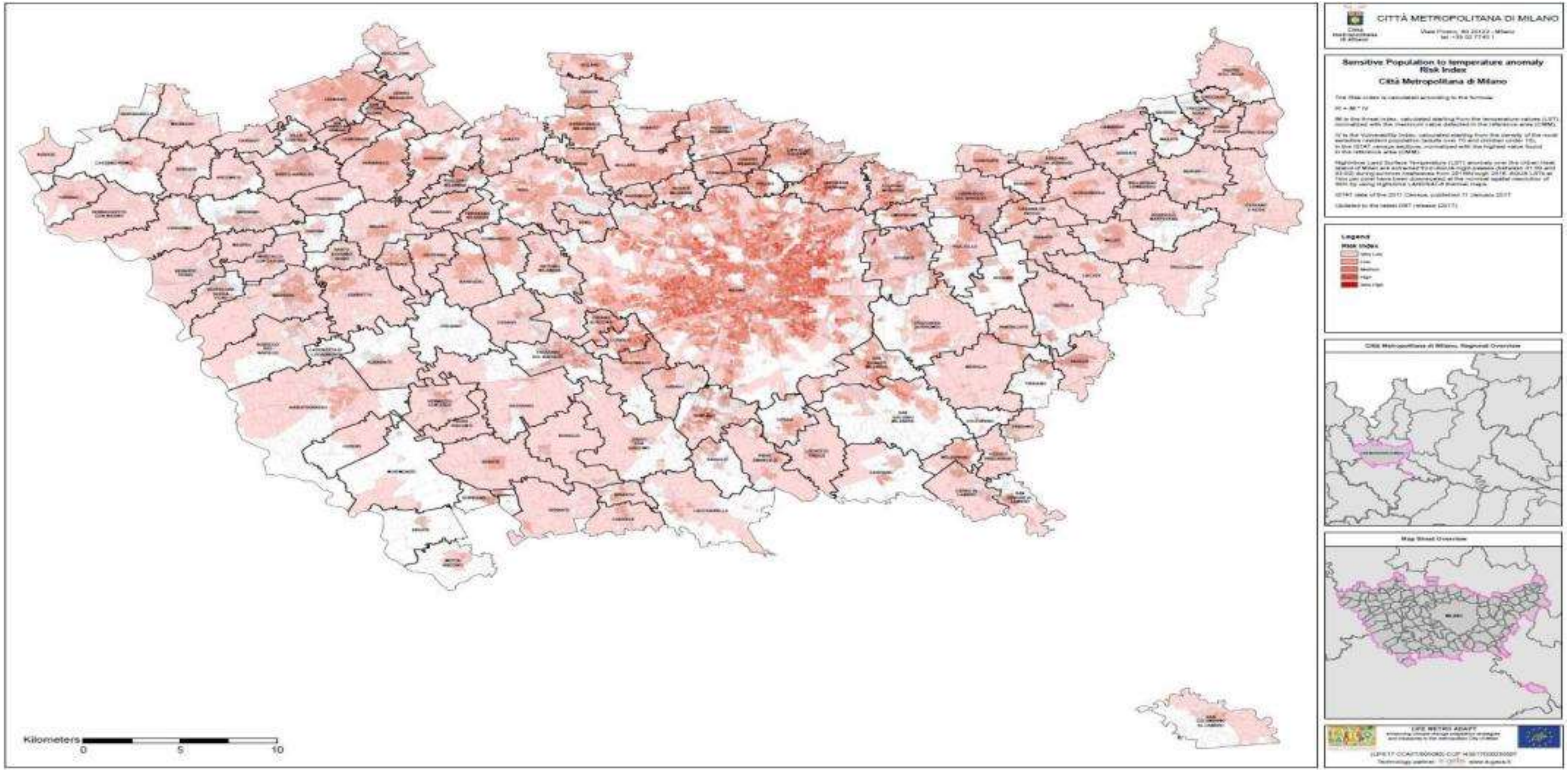
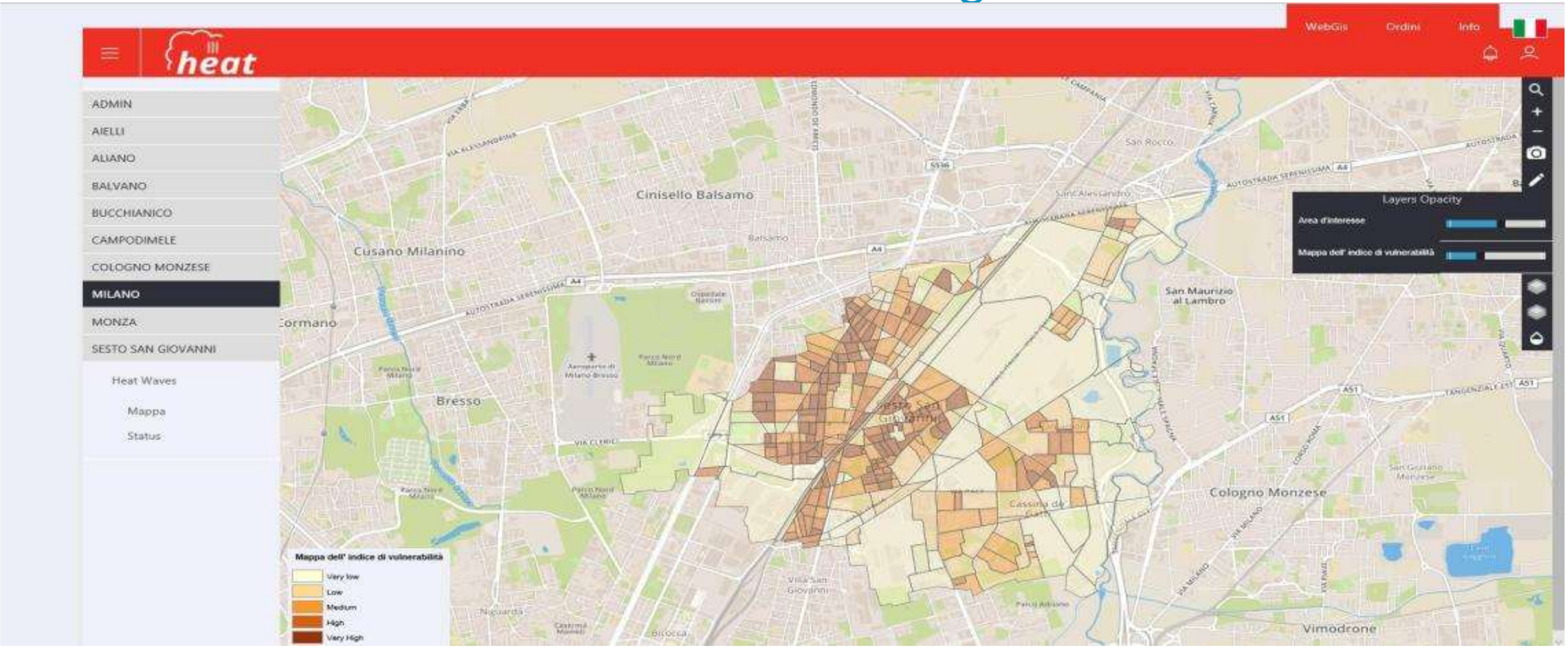
STEP 4: the result
Risk Index - Città Metropolitana di Milano



APPs-EO – framework for requesting services based on remote sensing



Example of the Service Platform screen available from the e-GEOS website for the provision of Urban Heat Island Maps and Vulnerability Map

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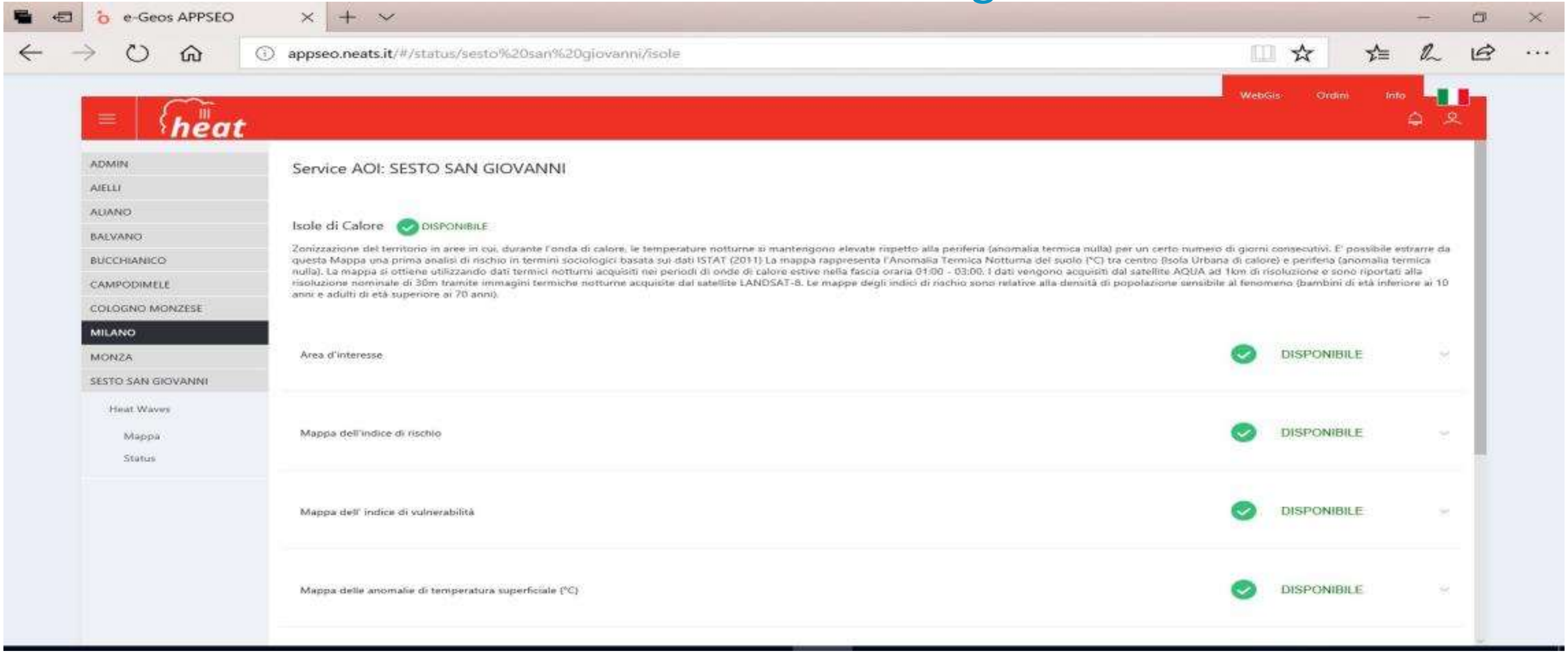
APPs-EO – framework for requesting services based on remote sensing



Service AOI: SESTO SAN GIOVANNI

Isole di Calore ✓ DISPONIBILE

Zonizzazione del territorio in aree in cui, durante l'onda di calore, le temperature notturne si mantengono elevate rispetto alla periferia (anomalia termica nulla) per un certo numero di giorni consecutivi. E' possibile estrarre da questa Mappa una prima analisi di rischio in termini sociologici basata sui dati ISTAT (2011) La mappa rappresenta l'Anomalia Termica Notturna del suolo (°C) tra centro (Isola Urbana di calore) e periferia (anomalia termica nulla). La mappa si ottiene utilizzando dati termici notturni acquisiti nei periodi di onde di calore estive nella fascia oraria 01:00 - 03:00. I dati vengono acquisiti dal satellite AQUA ad 1km di risoluzione e sono riportati alla risoluzione nominale di 30m tramite immagini termiche notturne acquisite dal satellite LANDSAT-8. Le mappe degli indici di rischio sono relative alla densità di popolazione sensibile al fenomeno (bambini di età inferiore ai 10 anni e adulti di età superiore ai 70 anni).

Area d'interesse ✓ DISPONIBILE

Mappa dell'indice di rischio ✓ DISPONIBILE

Mappa dell' indice di vulnerabilità ✓ DISPONIBILE

Mappa delle anomalie di temperatura superficiale (°C) ✓ DISPONIBILE

Example of the Service Platform screen available from the e-GEOS website for the provision of Urban Heat Island Maps and Vulnerability Map

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e-geos
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LIFE METRO ADAPT:
www.facebook.com/lifemetroadapt/

LIFE METRO ADAPT: @lifemetroadapt

LIFE METRO ADAPT: http://www.lifemetroadapt.eu/en/newsletter/

Enhancing climate change adaptation strategies
and measures in the Metropolitan City of Milan

Thank you

Pierluigi Adami
Achille Ciappa
Nicola Corsini
Elena Francioni
Maria Lucia Magliozzi
Monica Palandri

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Città metropolitana di Milano
CAP
AMBIENTEITALIA we know green
ALDA European Association for Local Democracy
e-geos AN ASI / TELESPAZIO COMPANY
LEGAMBIENTE


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forecAsting System for urban heaT Island effect

3 GOOD HEALTH AND WELL-BEING
11 SUSTAINABLE CITIES AND COMMUNITIES
13 CLIMATE ACTION
15 LIFE ON LAND

URBAN HEAT VULNERABILITY ASSESSMENT: APPLICATIONS FOR SMART MOBILITY AND SMART BORDER

Sagnik Bhattacharjee | Chief Technology Officer | bhattacharjee@urban-comfort.eu

INTRODUCTION

Who are we?

ecoten urban comfort

Copernicus accelerator

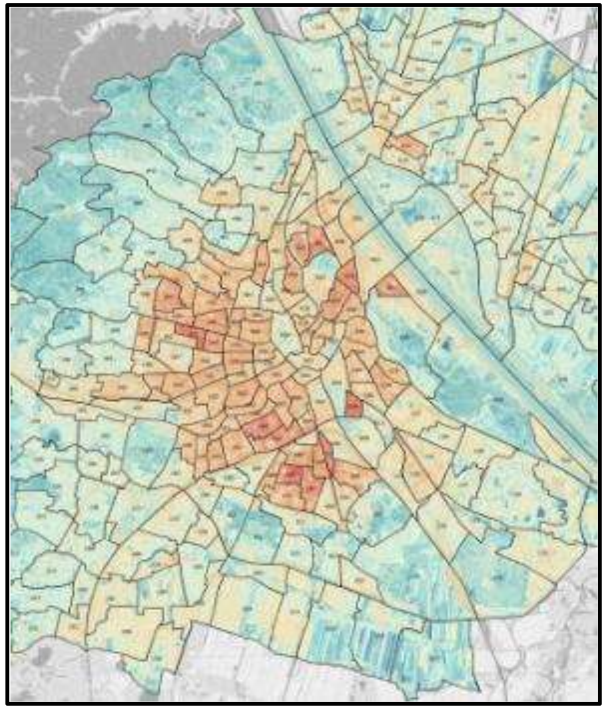
eit Climate-KIC

Climate-KIC is supported by the EIT, a body of the European Union

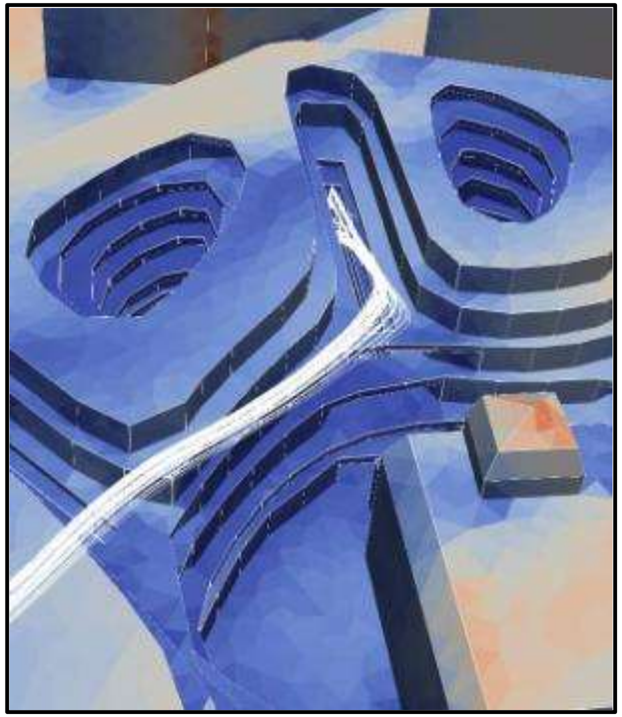
Member of

WORLD ALLIANCE for EFFICIENT SOLUTIONS by SOLARIMPULSE FOUNDATION

What We Do?



Urban Heat Vulnerability Mapping & Assessment



Urban Microclimate Simulations

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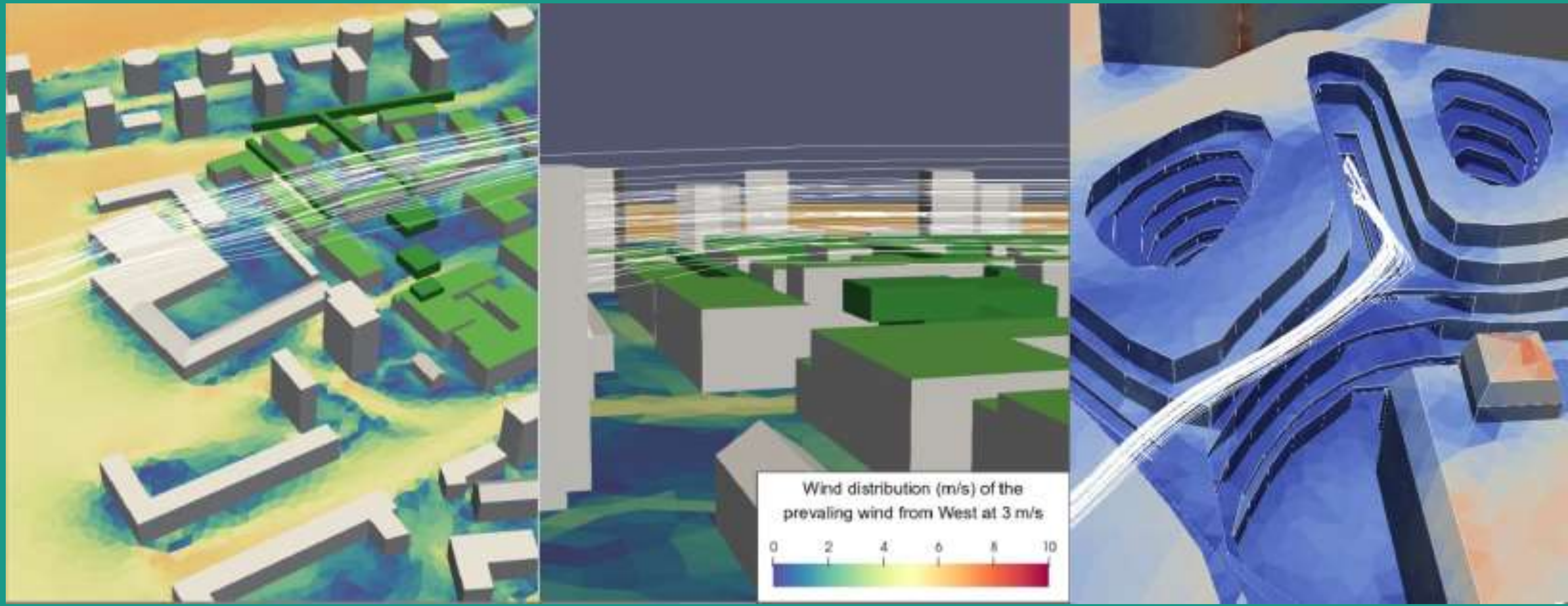
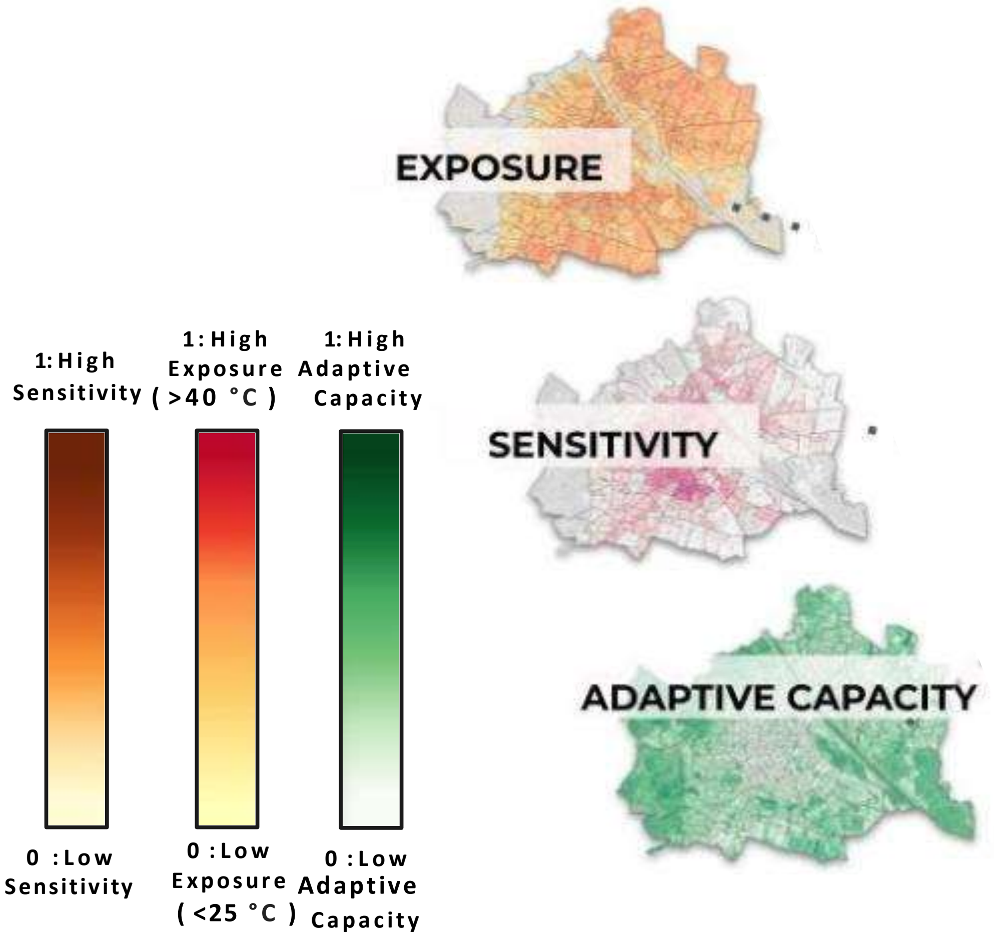
URBAN HEATVULNERABILITY ASSESSMENT



Urban Heat Vulnerability Assessment

Identifying critical hotspots

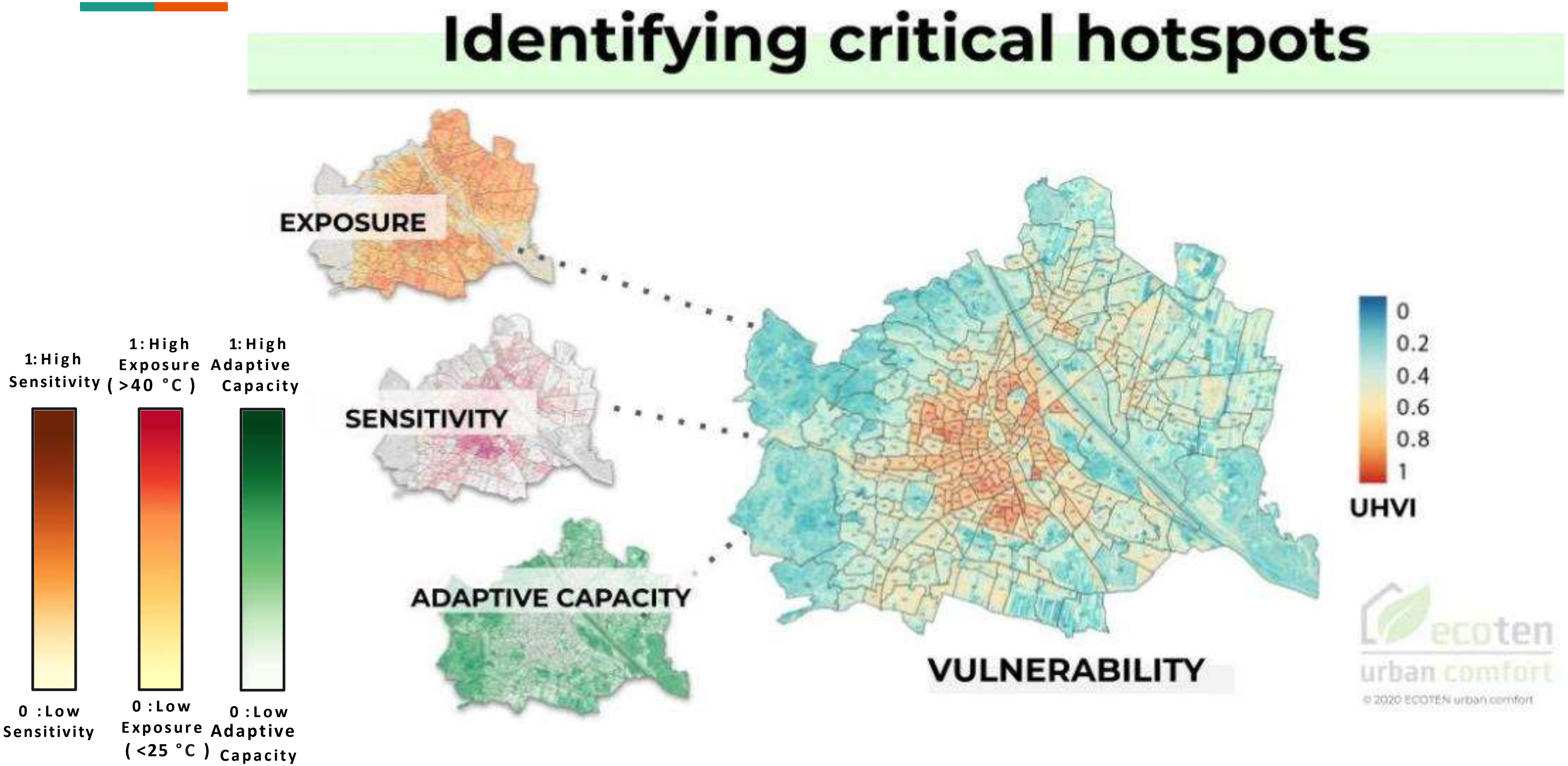


Surface Temperatures (During Summer / Heat Day)

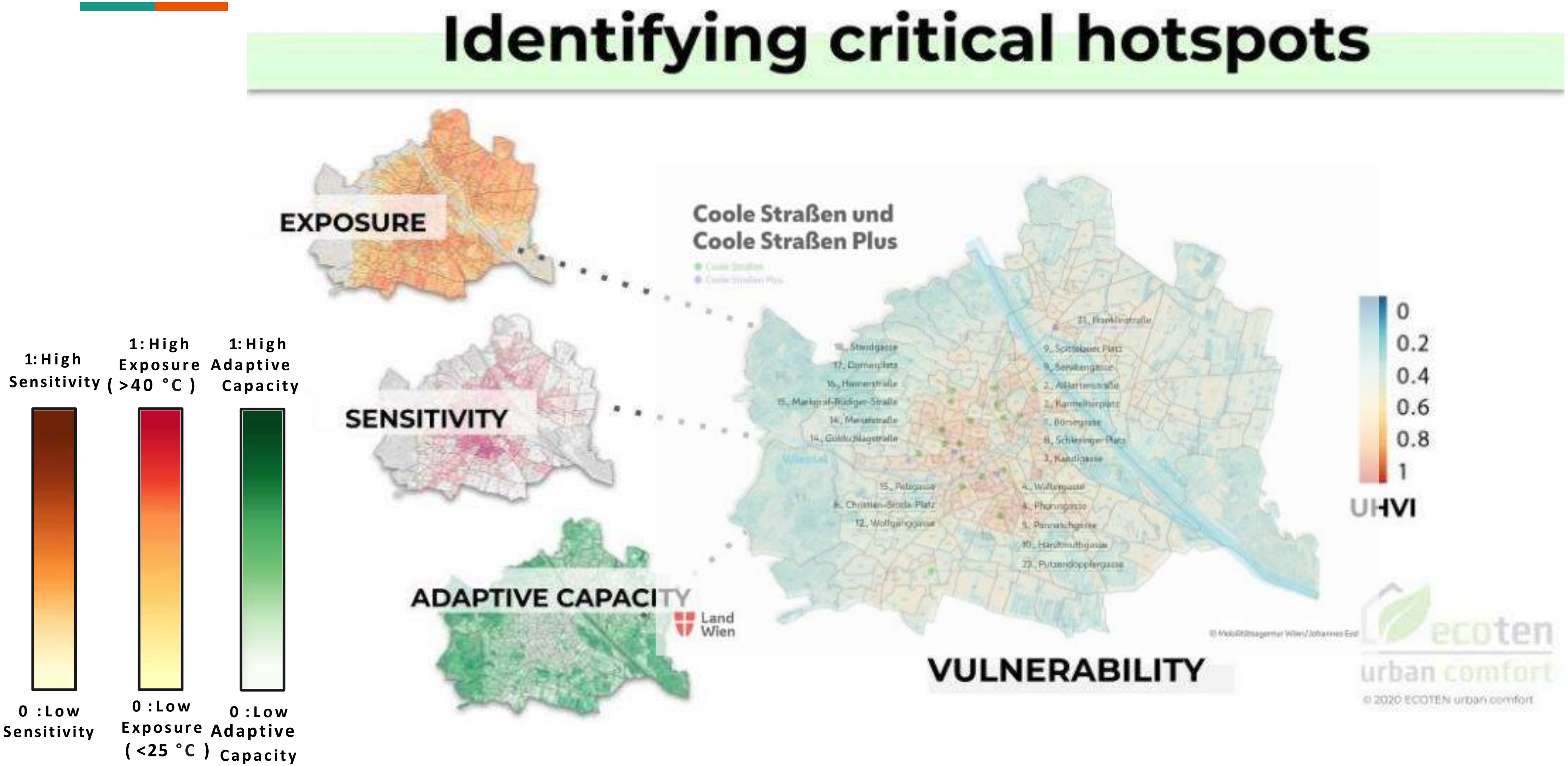
Heat Vulnerable Population (Very Young & Very Old)

Adaptation to Extreme Heat (Greenery & Water Bodies)

Urban Heat Vulnerability Assessment



Urban Heat Vulnerability Assessment



1: High Sensitivity

1: High Exposure (>40 °C)

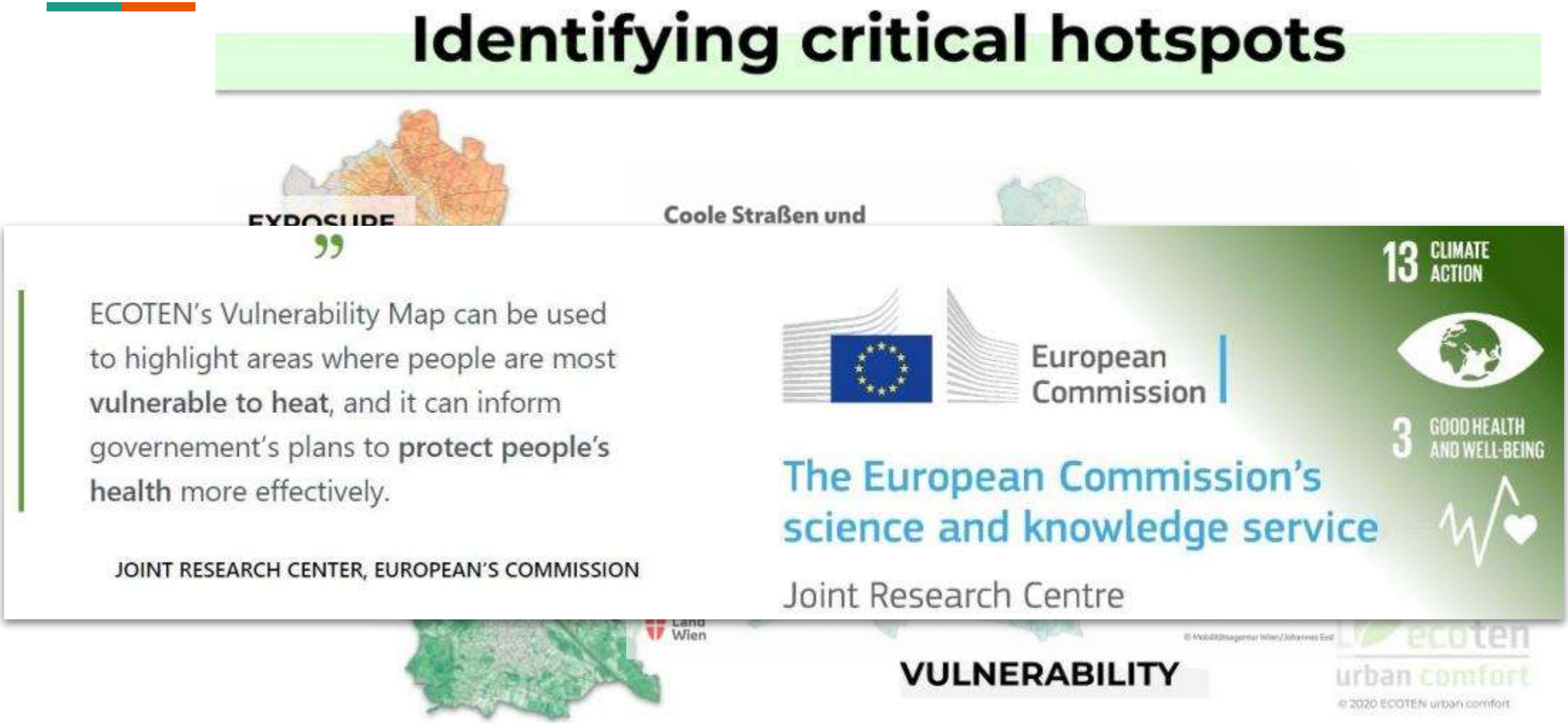
1: High Adaptive Capacity

0 : Low Sensitivity

0 : Low Exposure (<25 °C)

0 : Low Adaptive Capacity

Urban Heat Vulnerability Assessment



Identifying critical hotspots

> ECOTEN's Vulnerability Map can be used to highlight areas where people are most **vulnerable to heat**, and it can inform governement's plans to **protect people's health** more effectively.
>
> JOINT RESEARCH CENTER, EUROPEAN'S COMMISSION

European Commission

The European Commission's science and knowledge service

Joint Research Centre

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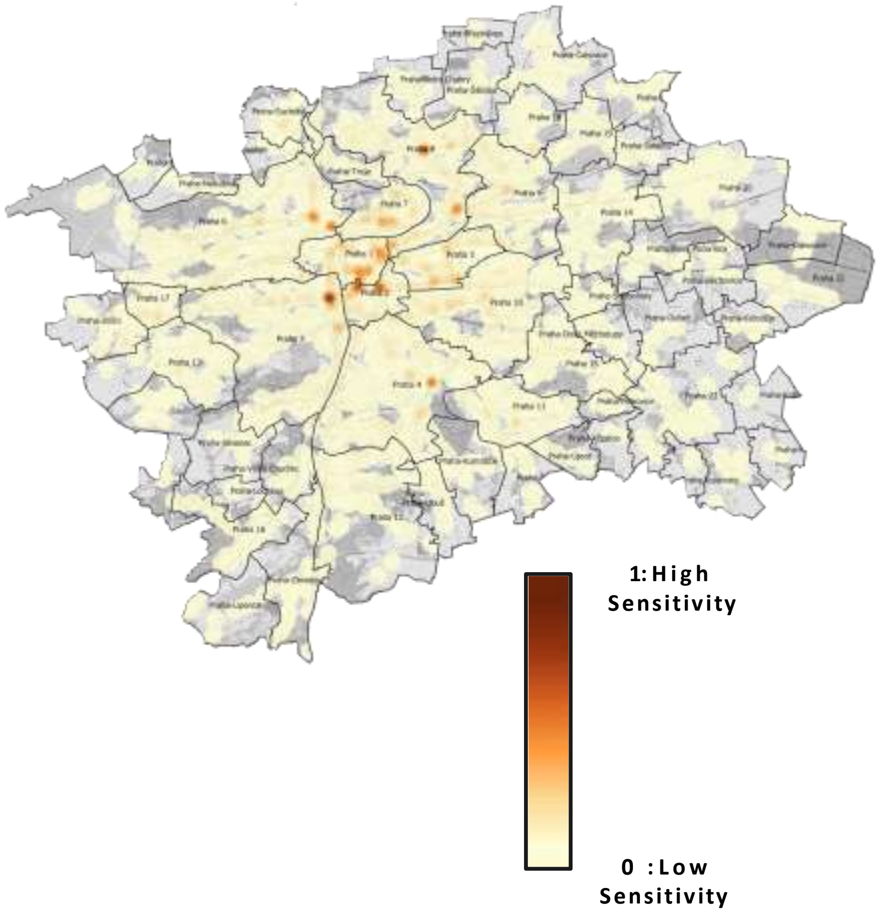
SMART MOBILITY

Smart Mobility in Prague, Czech Republic

Smart Mobility in Prague, Czech Republic

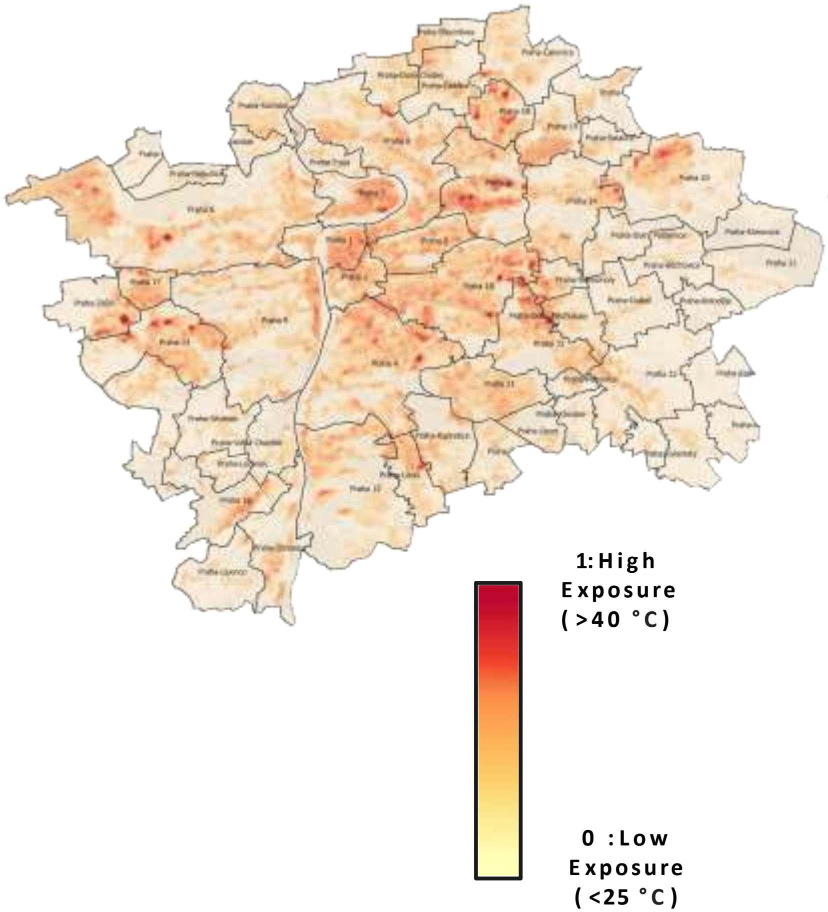
Sensitivity



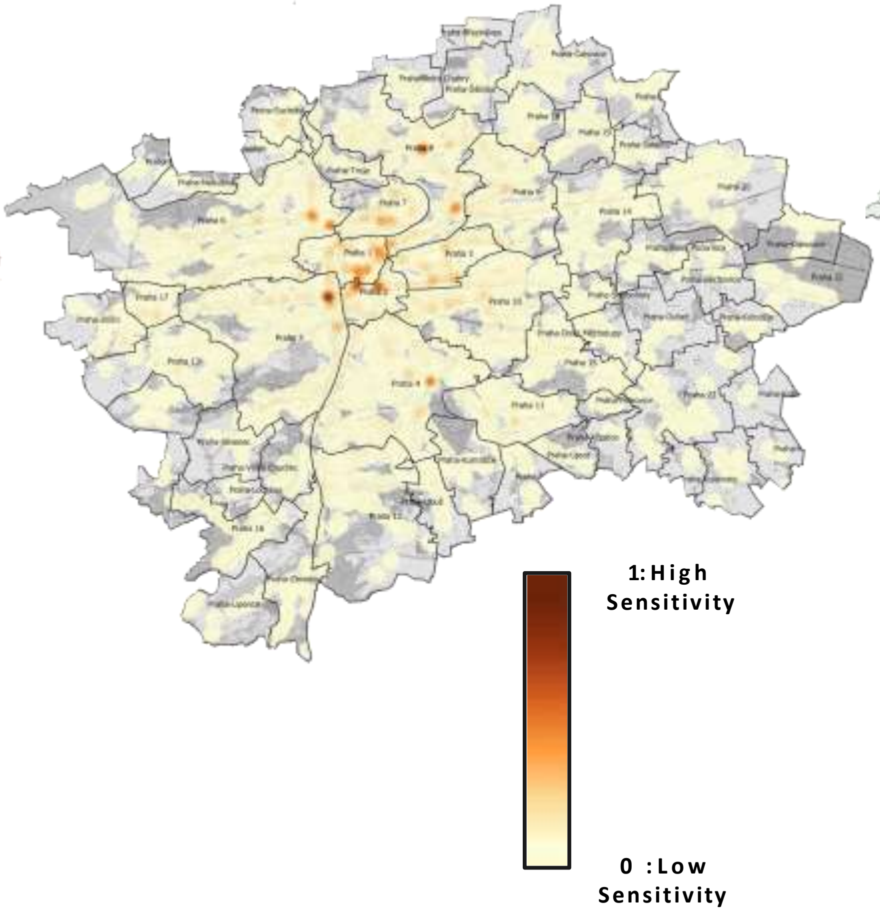
FREQUENCY of USAGE of PUBLIC TRANSPORT STOP

Smart Mobility in Prague, Czech Republic

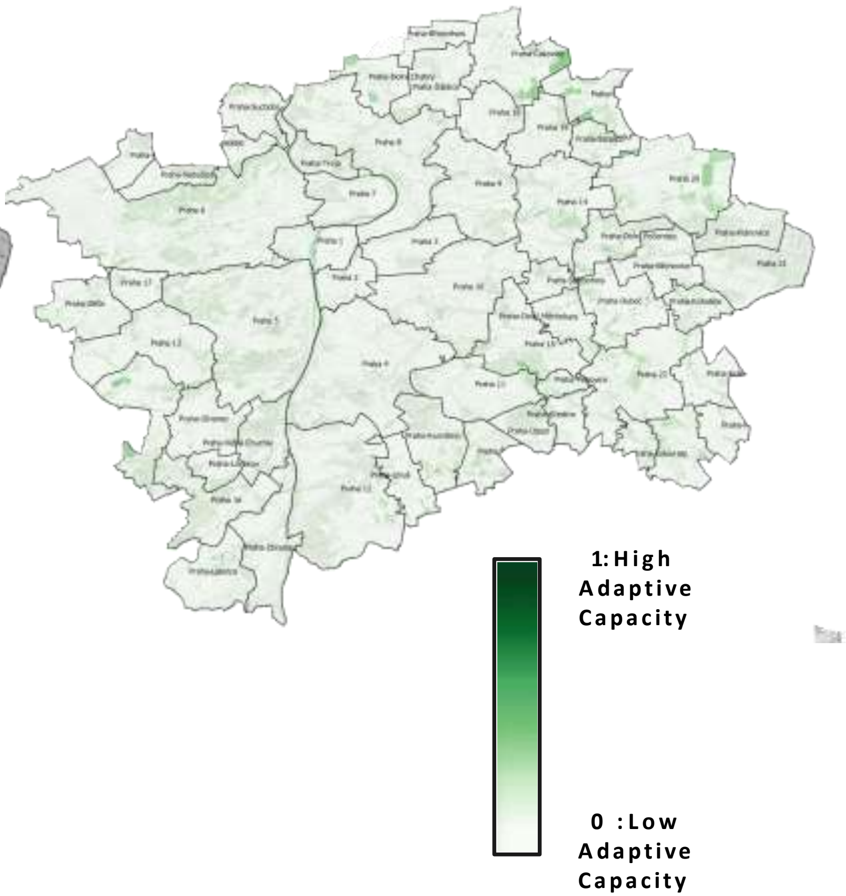
Exposure



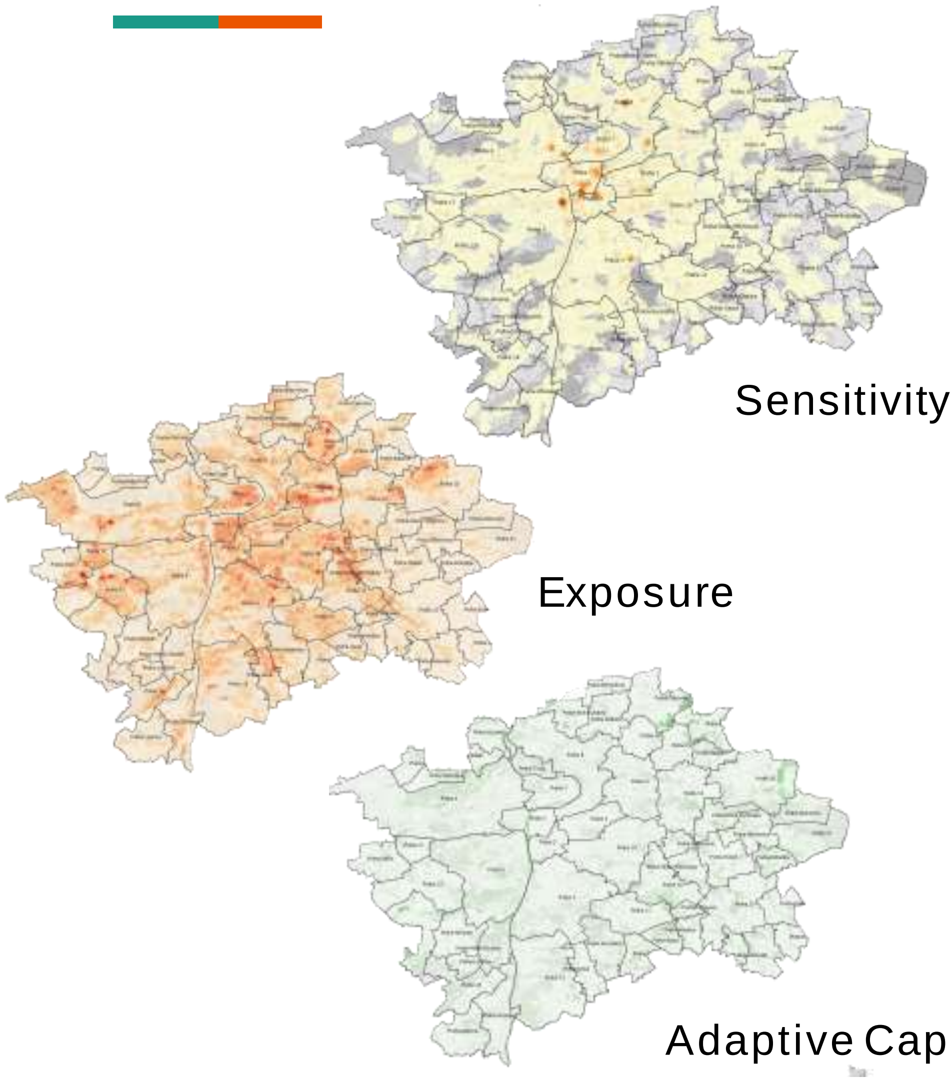
Sensitivity



Adaptive Capacity



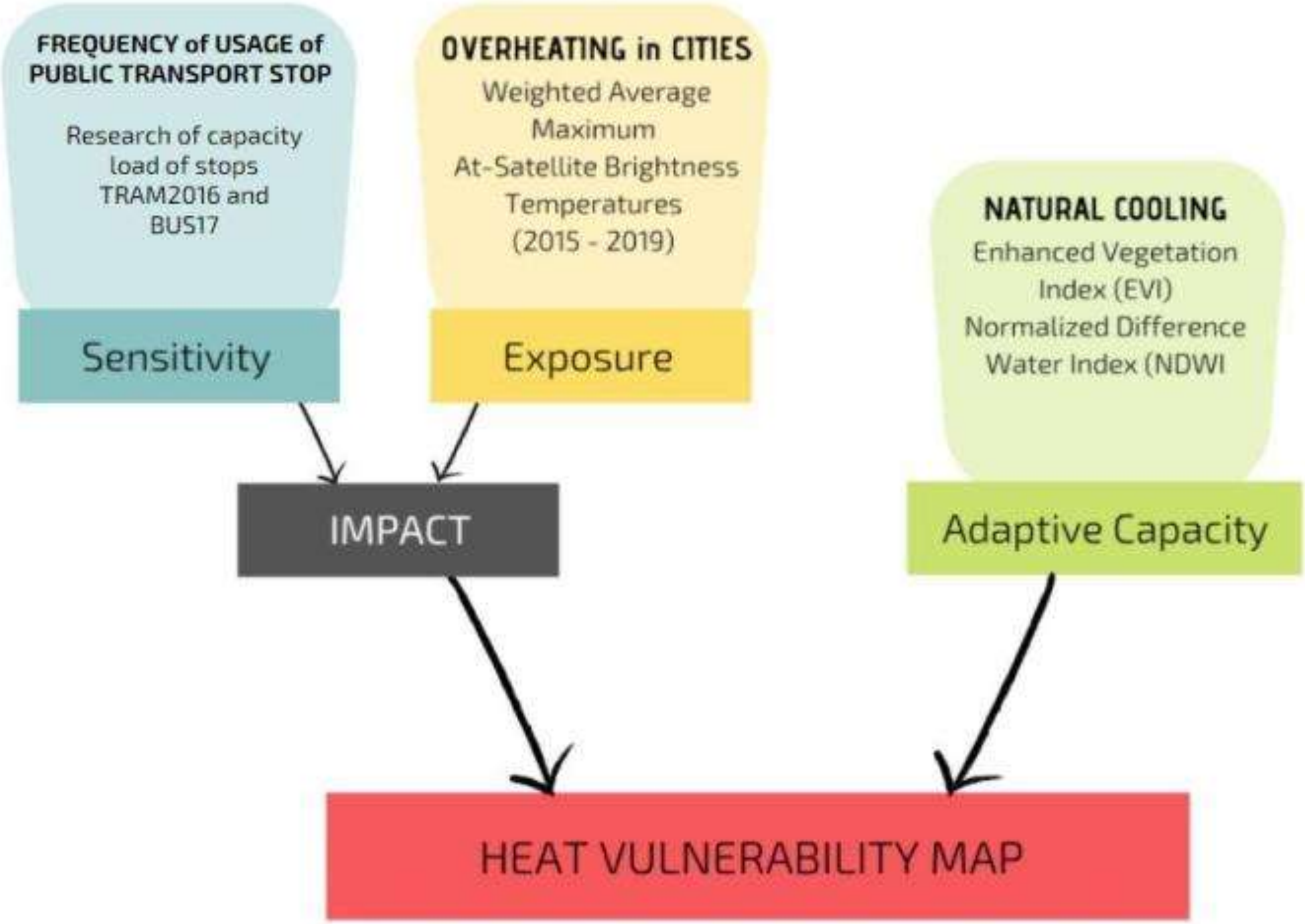
Smart Mobility in Prague, Czech Republic



Sensitivity

Exposure

Adaptive Capacity



FREQUENCY of USAGE of PUBLIC TRANSPORT STOP

Research of capacity load of stops TRAM2016 and BUS17

Sensitivity

OVERHEATING in CITIES

Weighted Average Maximum At-Satellite Brightness Temperatures (2015 - 2019)

Exposure

NATURAL COOLING

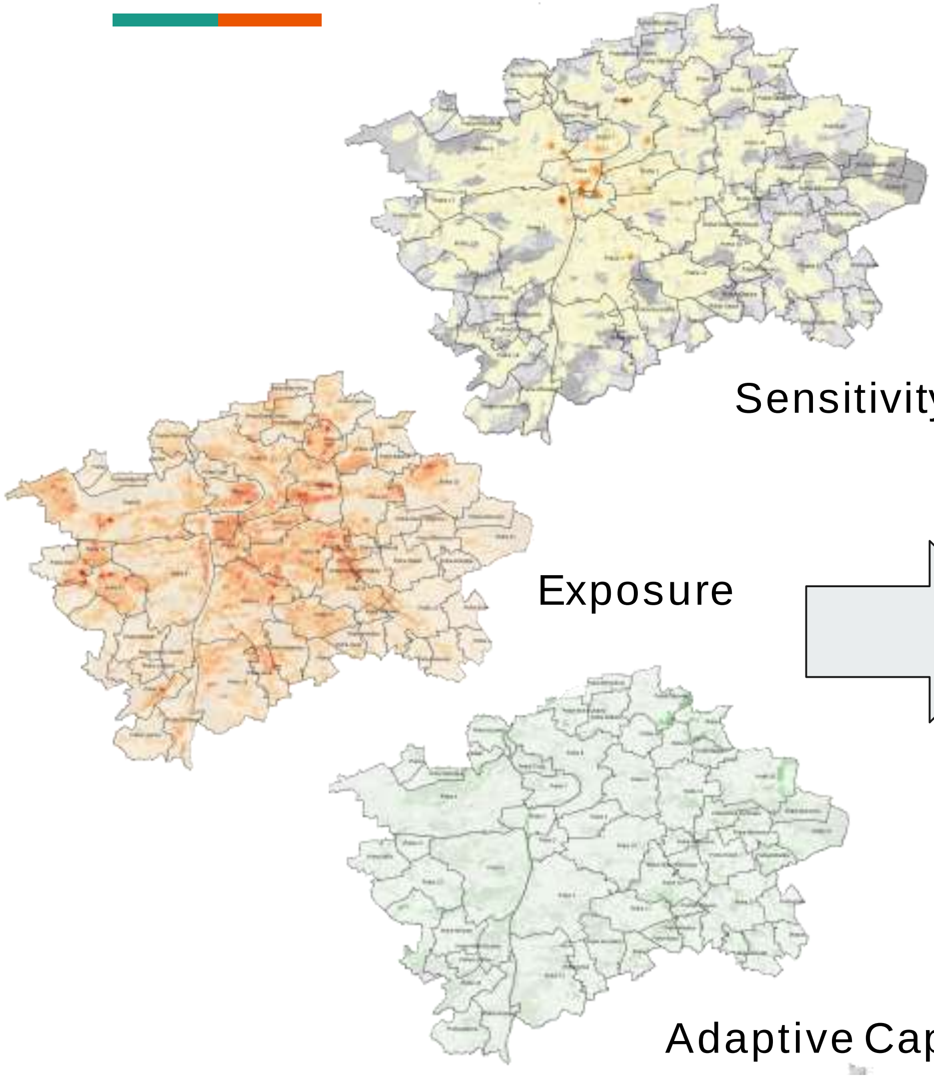
Enhanced Vegetation Index (EVI) Normalized Difference Water Index (NDWI

Adaptive Capacity

IMPACT

HEAT VULNERABILITY MAP

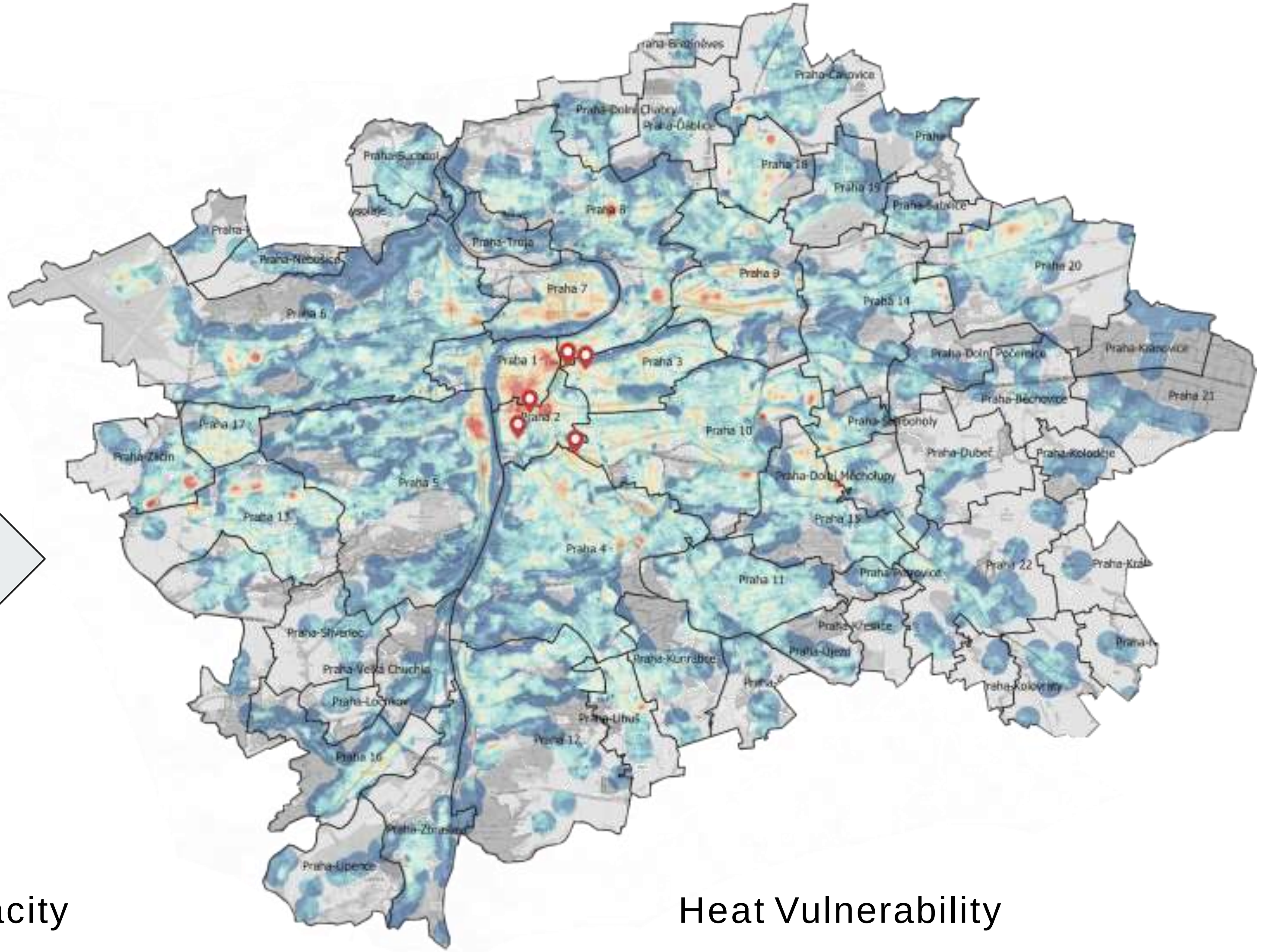
Smart Mobility in Prague, Czech Republic



Sensitivity

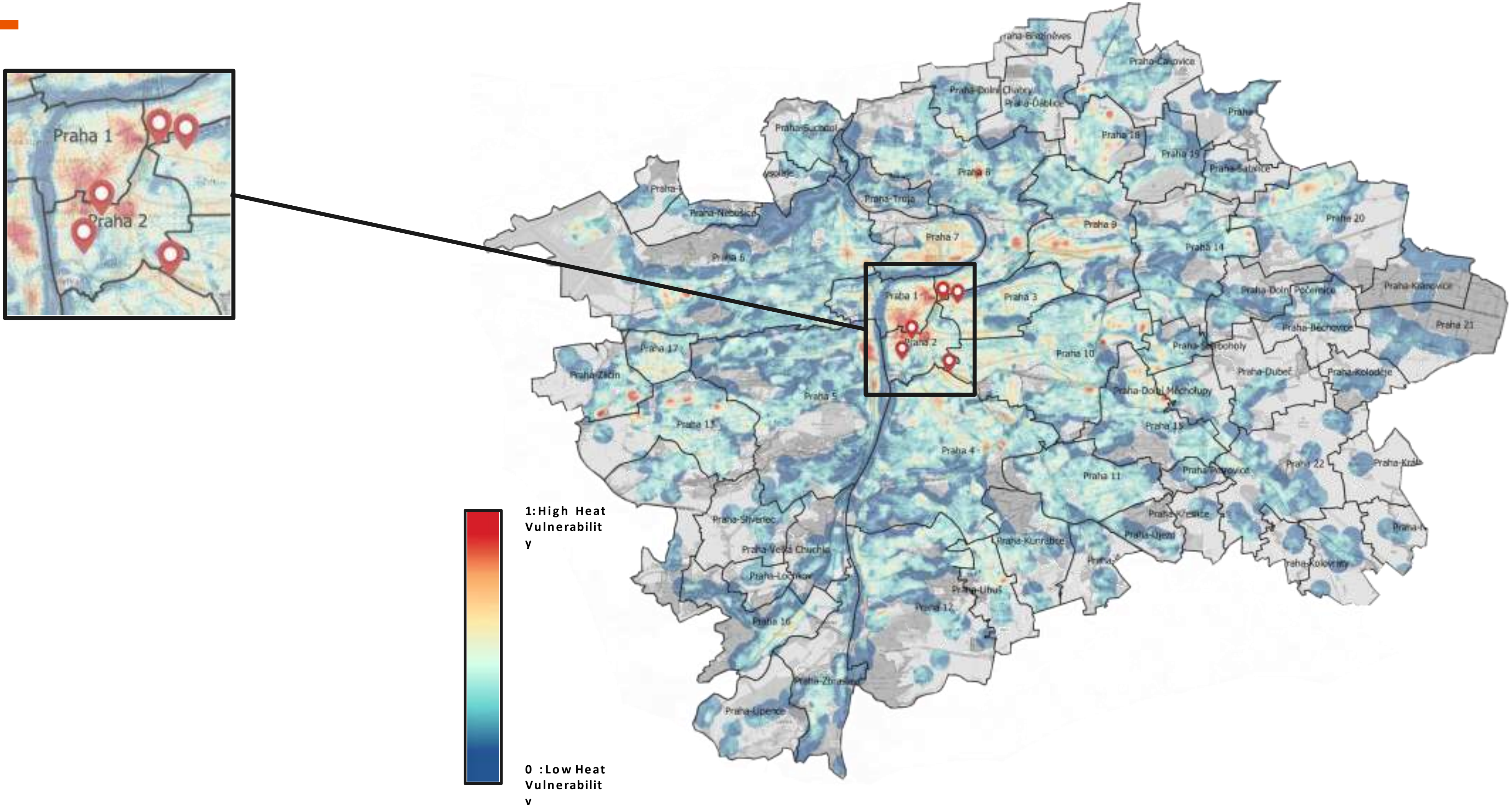
Exposure

Adaptive Capacity

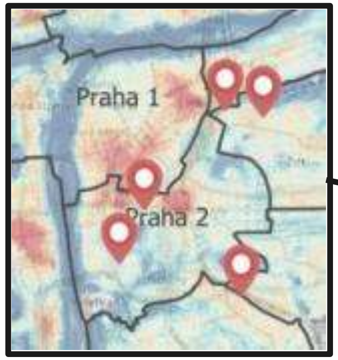


Heat Vulnerability

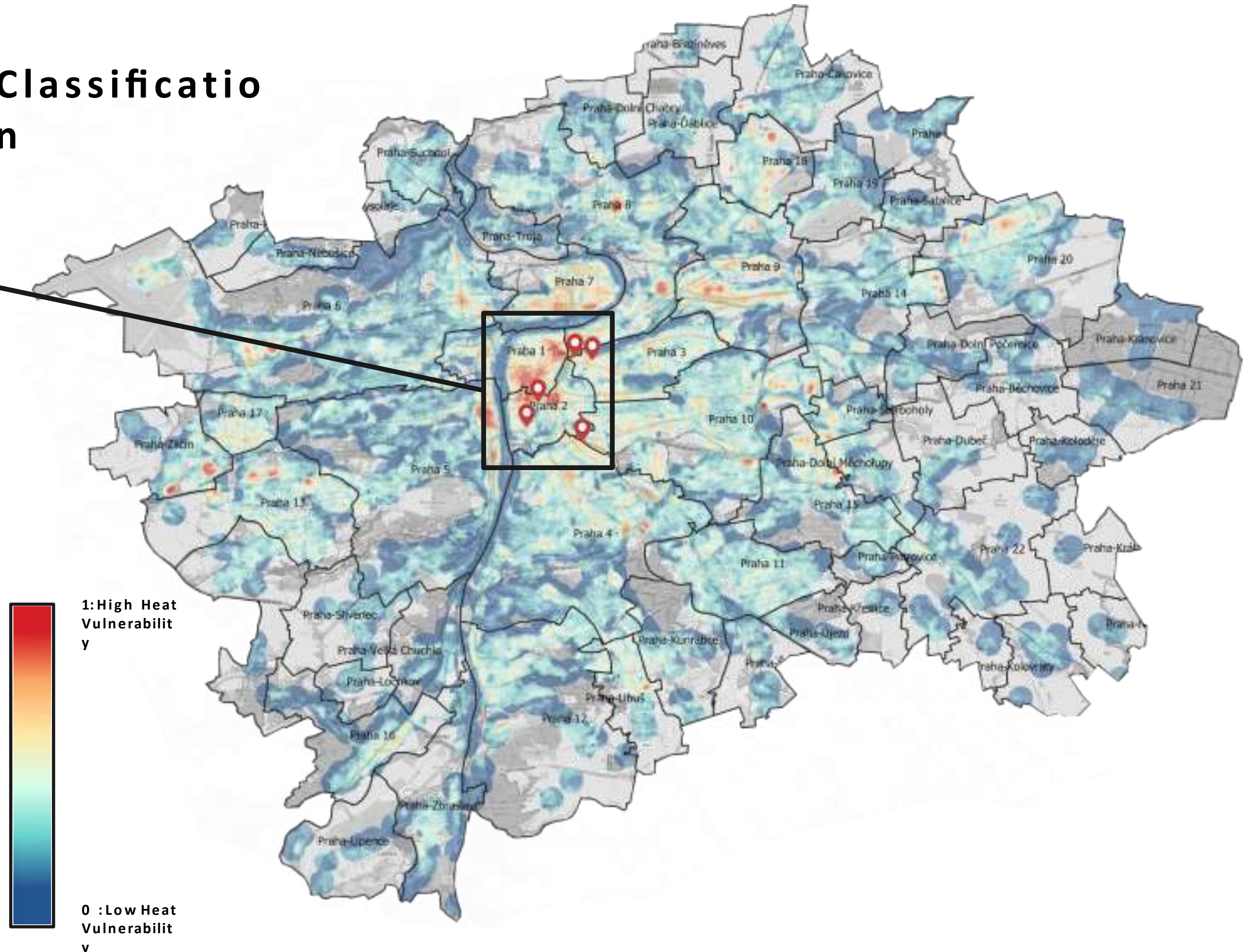
Smart Mobility in Prague, Czech Republic

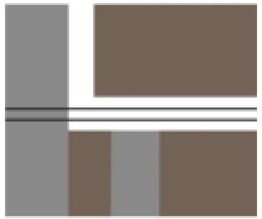


Smart Mobility in Prague, Czech Republic

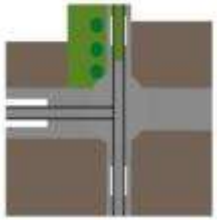


Classification

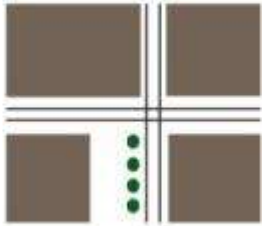




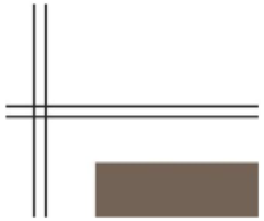
GROUP A



GROUP B



GROUP C

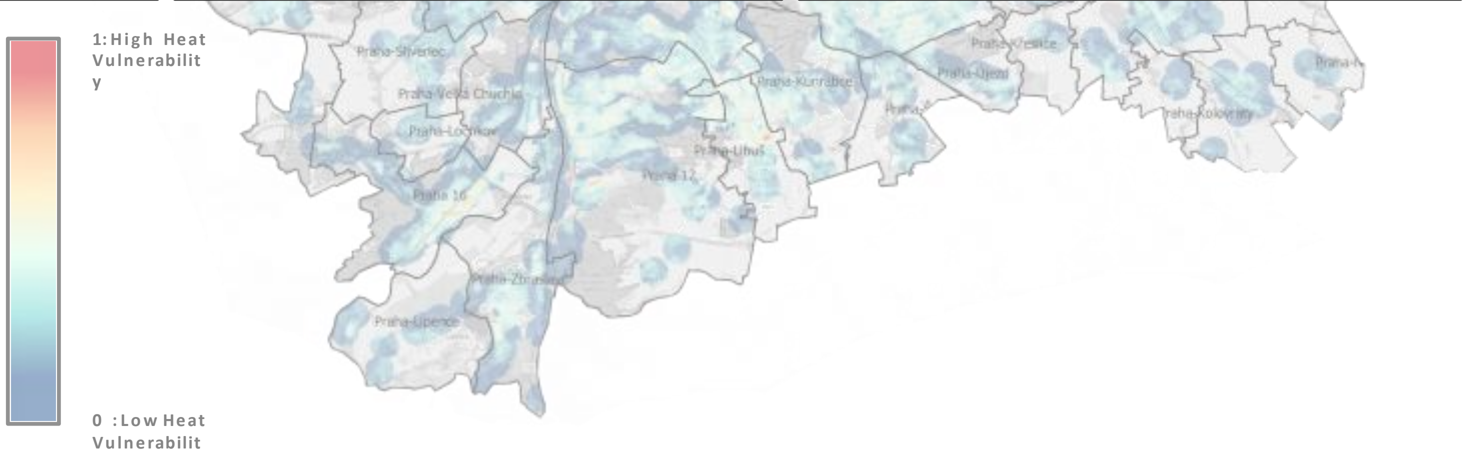


GROUP D

GROUP E

Smart Mobility in Prague, Czech Republic

Heat Mitigation Strategies



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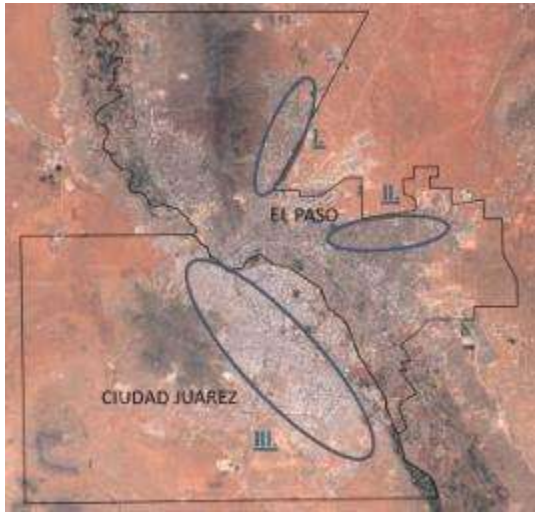
SMART BORDER

Smart Border in El Paso & Ciudad Juarez

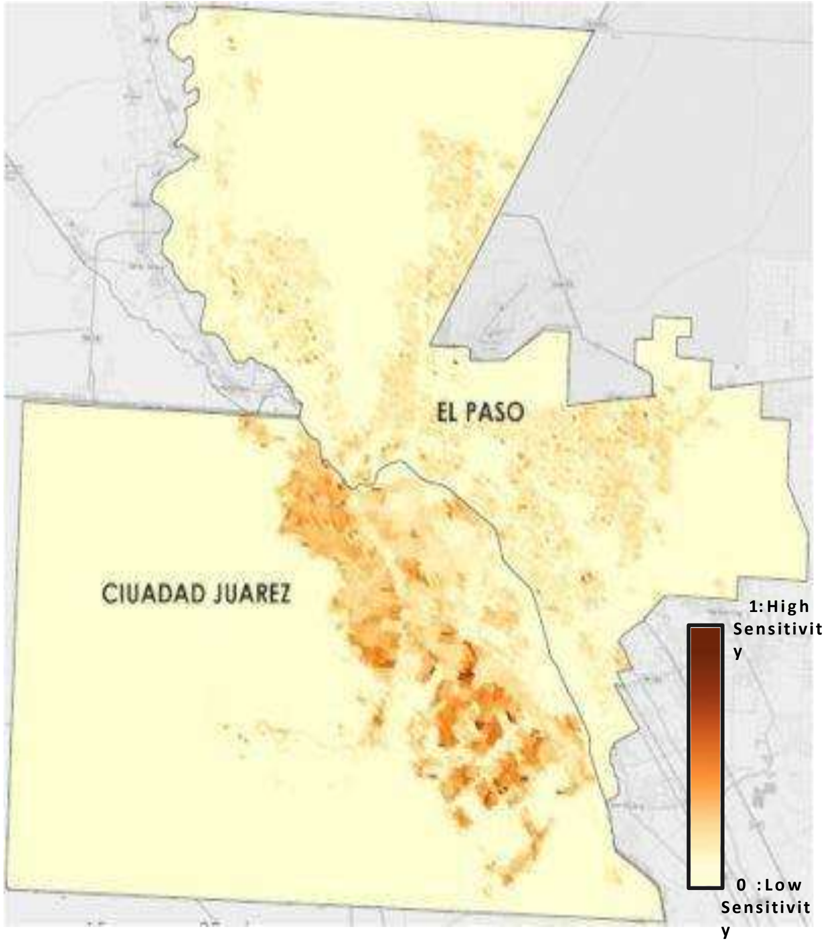
CTU
CZECH TECHNICAL
UNIVERSITY
IN PRAGUE



Smart Border in El Paso & Ciudad Juarez

EUROPEAN COMMISSION
Global Human Settlement
European Commission

Sensitivity

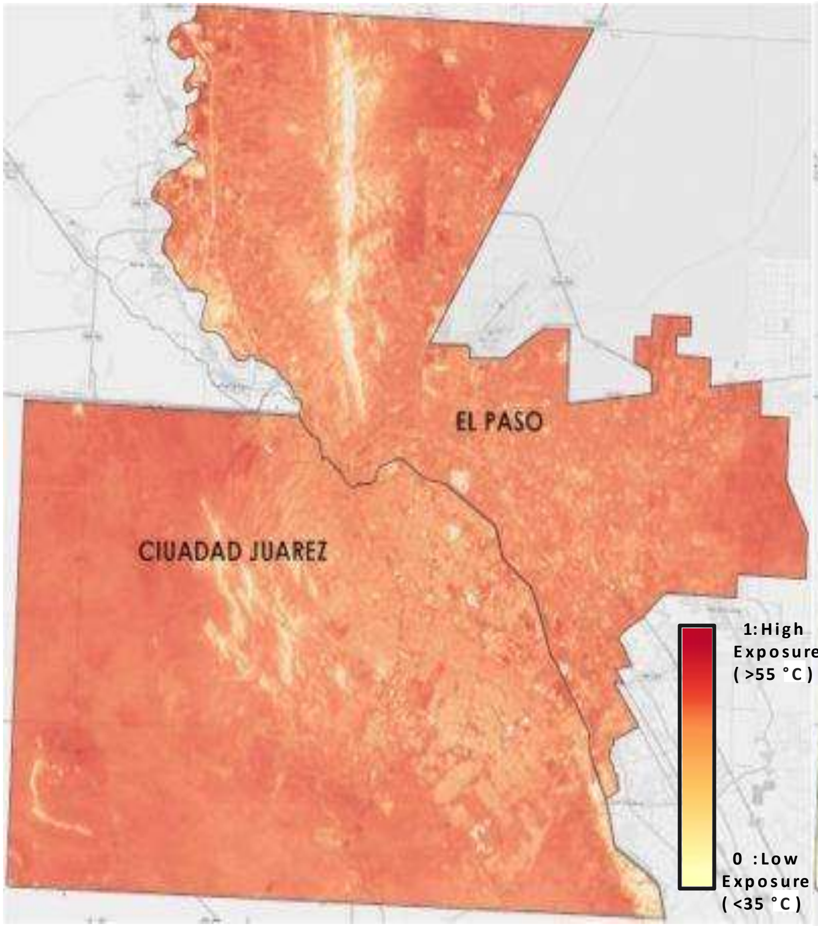


GHS-POP

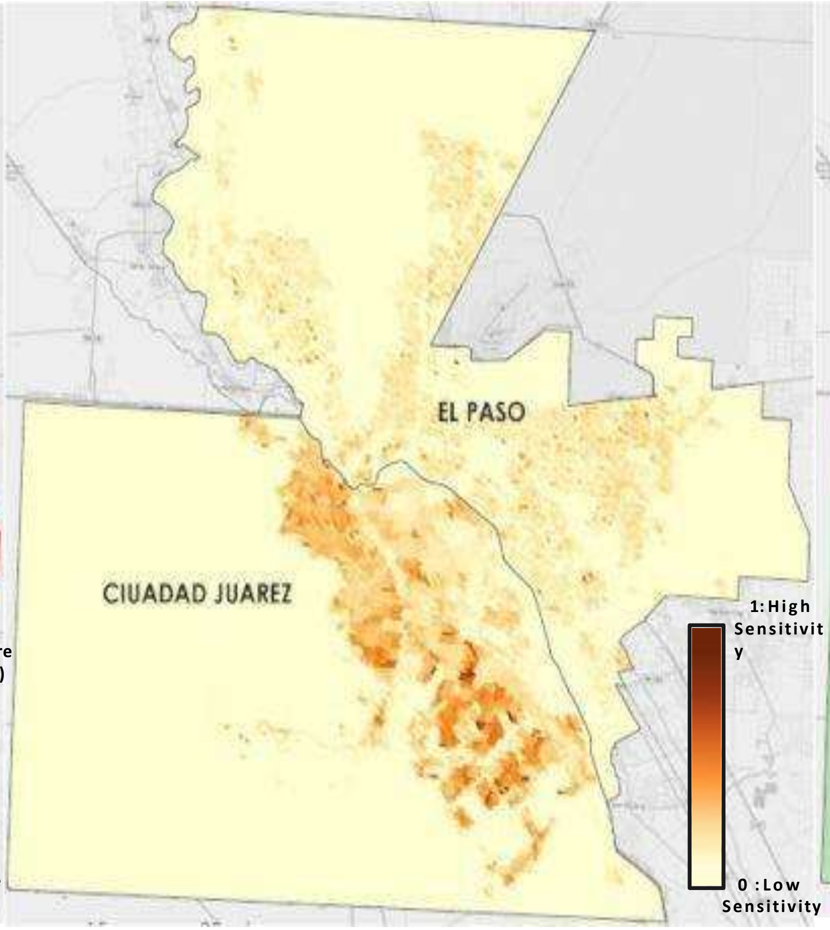
European Commission

Smart Border in El Paso & Ciudad Juarez

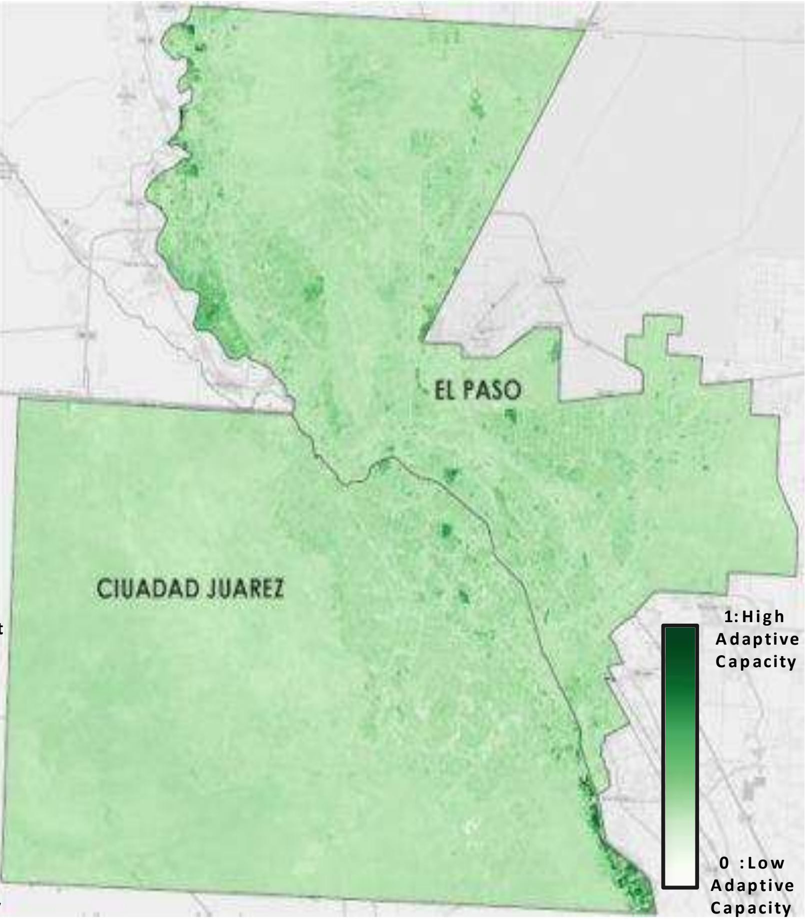
Exposure



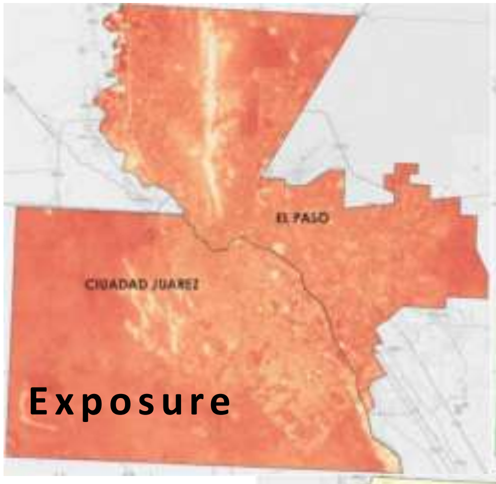
Sensitivity



Adaptive Capacity



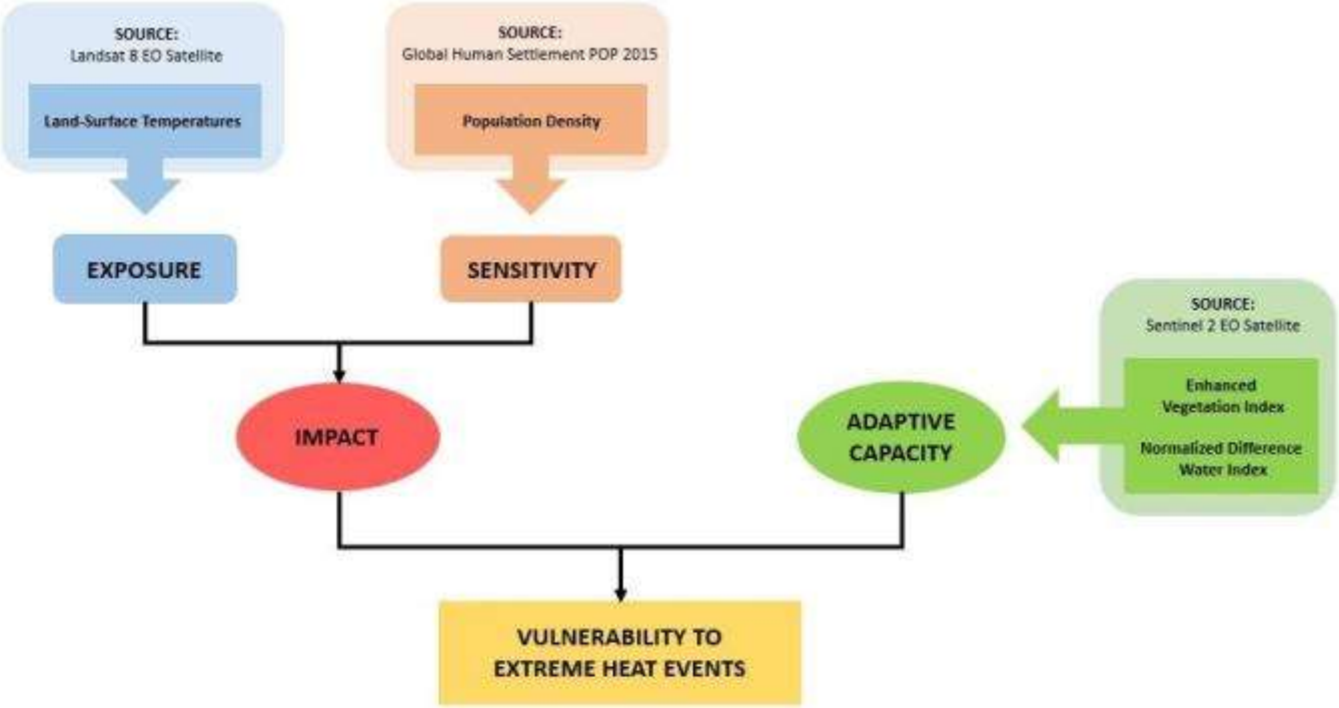
Smart Border in El Paso & Ciudad Juarez



Exposure

Adaptive Capacity

Sensitivity



SOURCE:
Landsat 8 EO Satellite

Land-Surface Temperatures

SOURCE:
Global Human Settlement POP 2015

Population Density

EXPOSURE

SENSITIVITY

IMPACT

ADAPTIVE CAPACITY

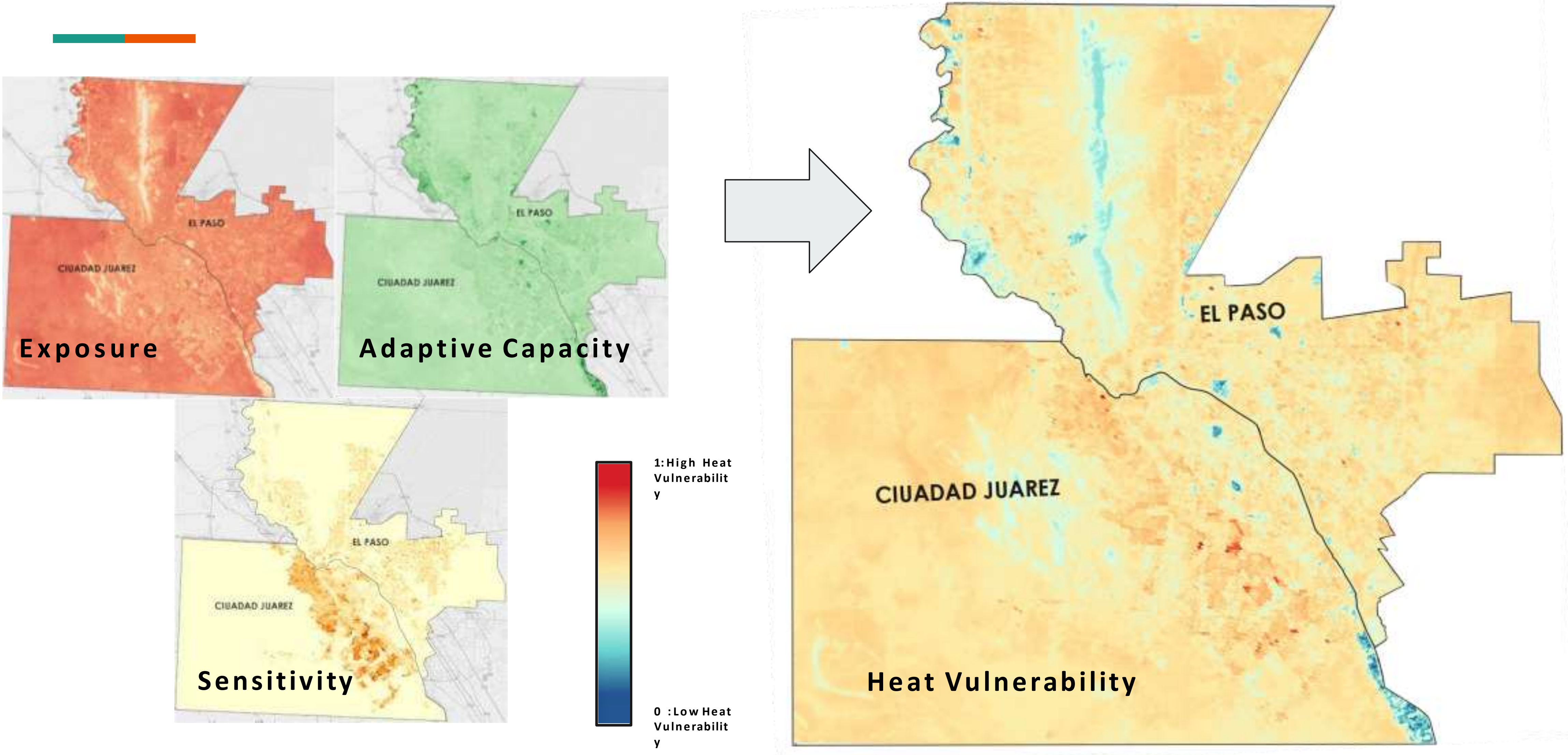
SOURCE:
Sentinel 2 EO Satellite

Enhanced Vegetation Index

Normalized Difference Water Index

VULNERABILITY TO EXTREME HEAT EVENTS

Smart Border in El Paso & Ciudad Juarez

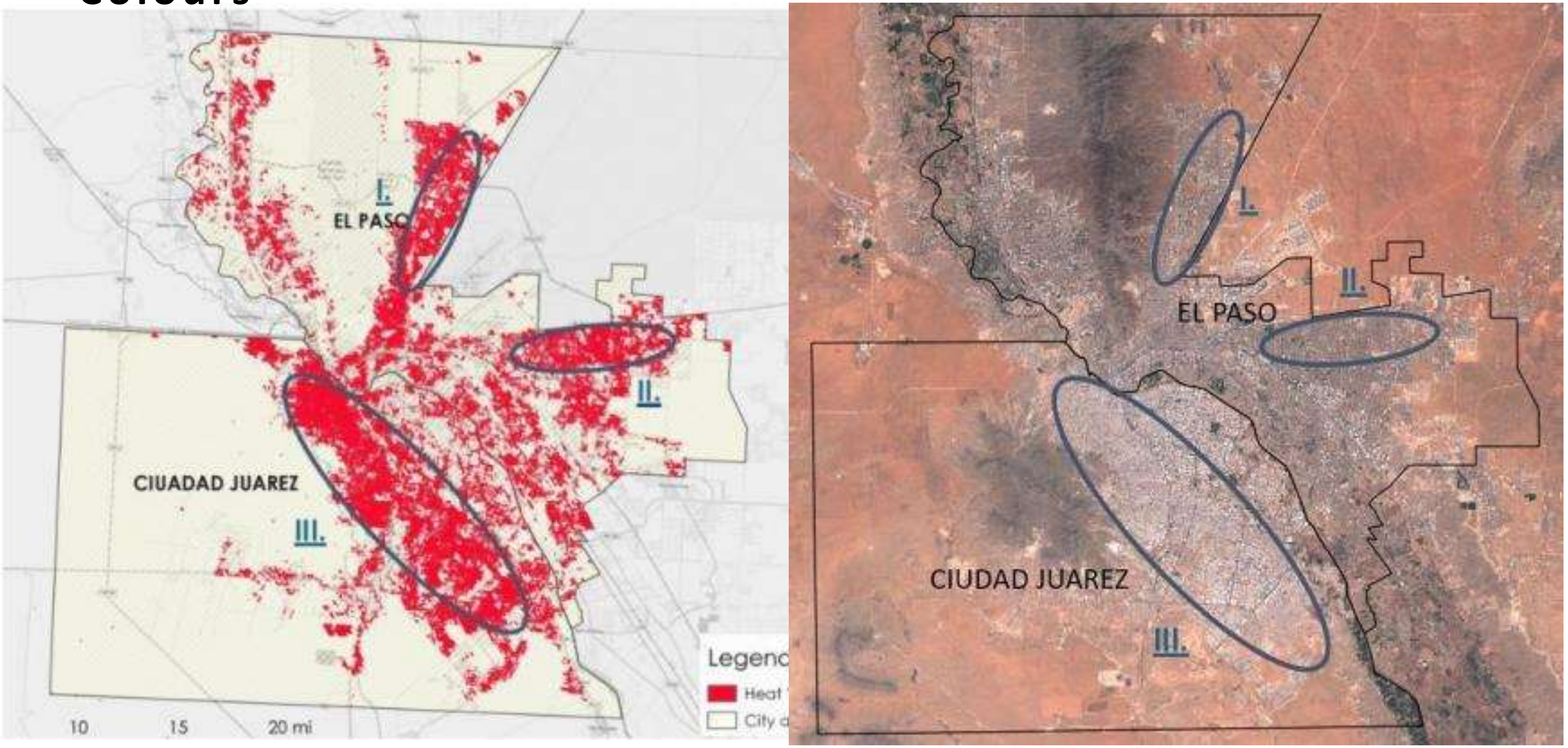


Smart Border in El Paso & Ciudad Juarez

Zone I and Zone II (USA)

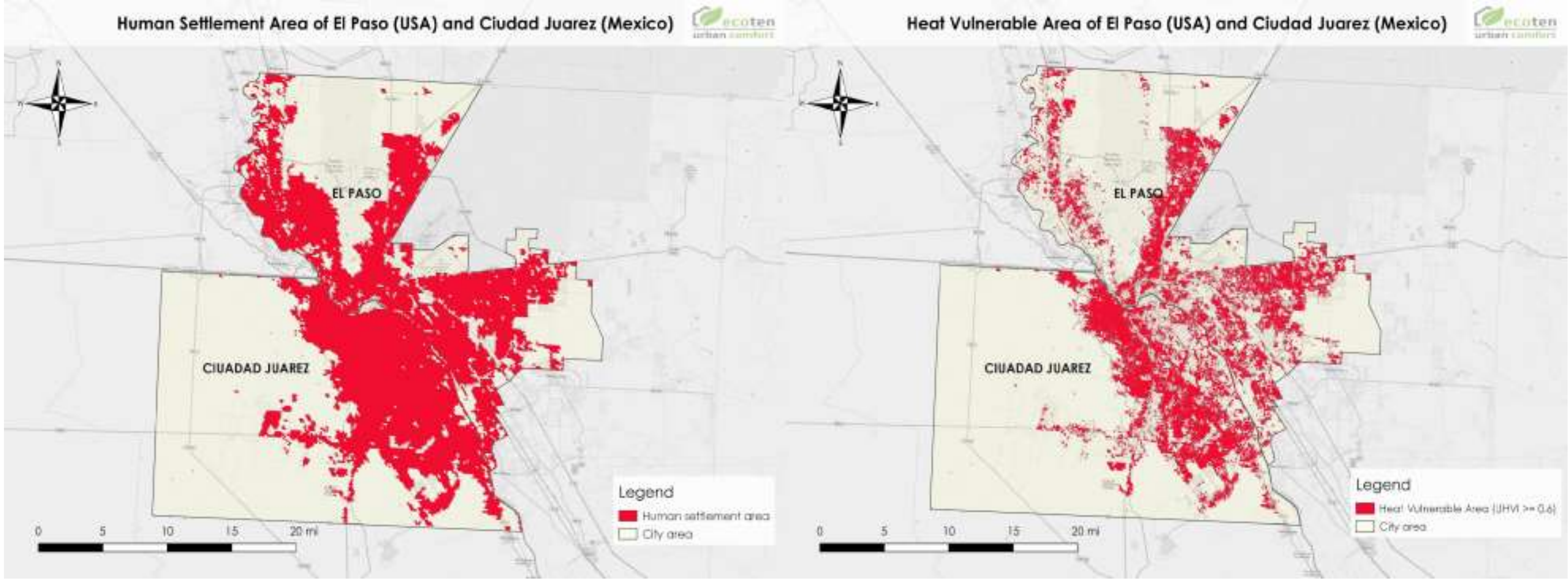
Zone III (Mexico)

Density of Heat Vulnerable Areas and Building Roof Colours



Smart Border in El Paso & Ciudad Juarez

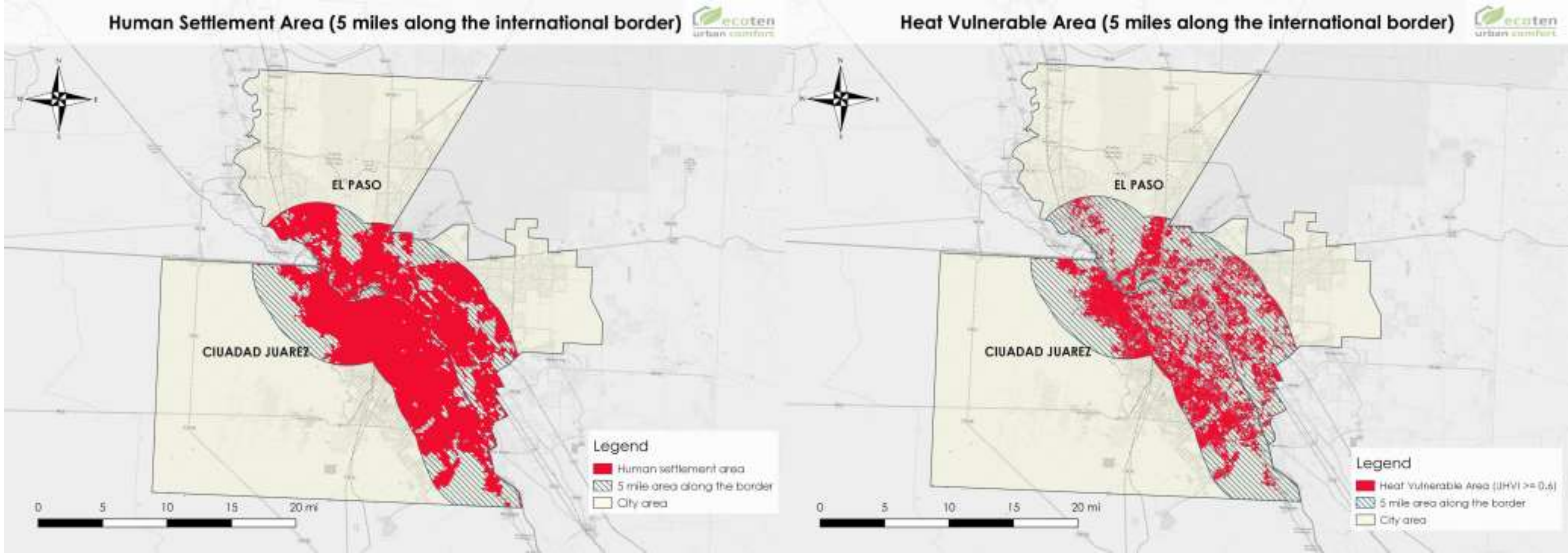
Overall Urban Heat



	Total area, km2	**Heat vulnerable area,** km2	**UHVI**

Smart Border in El Paso & Ciudad Juarez

Urban Heat Vulnerability along 5 Miles of the International



	Total area, km2	**Heat vulnerable area,** km2	**UHVI**

Contact & References

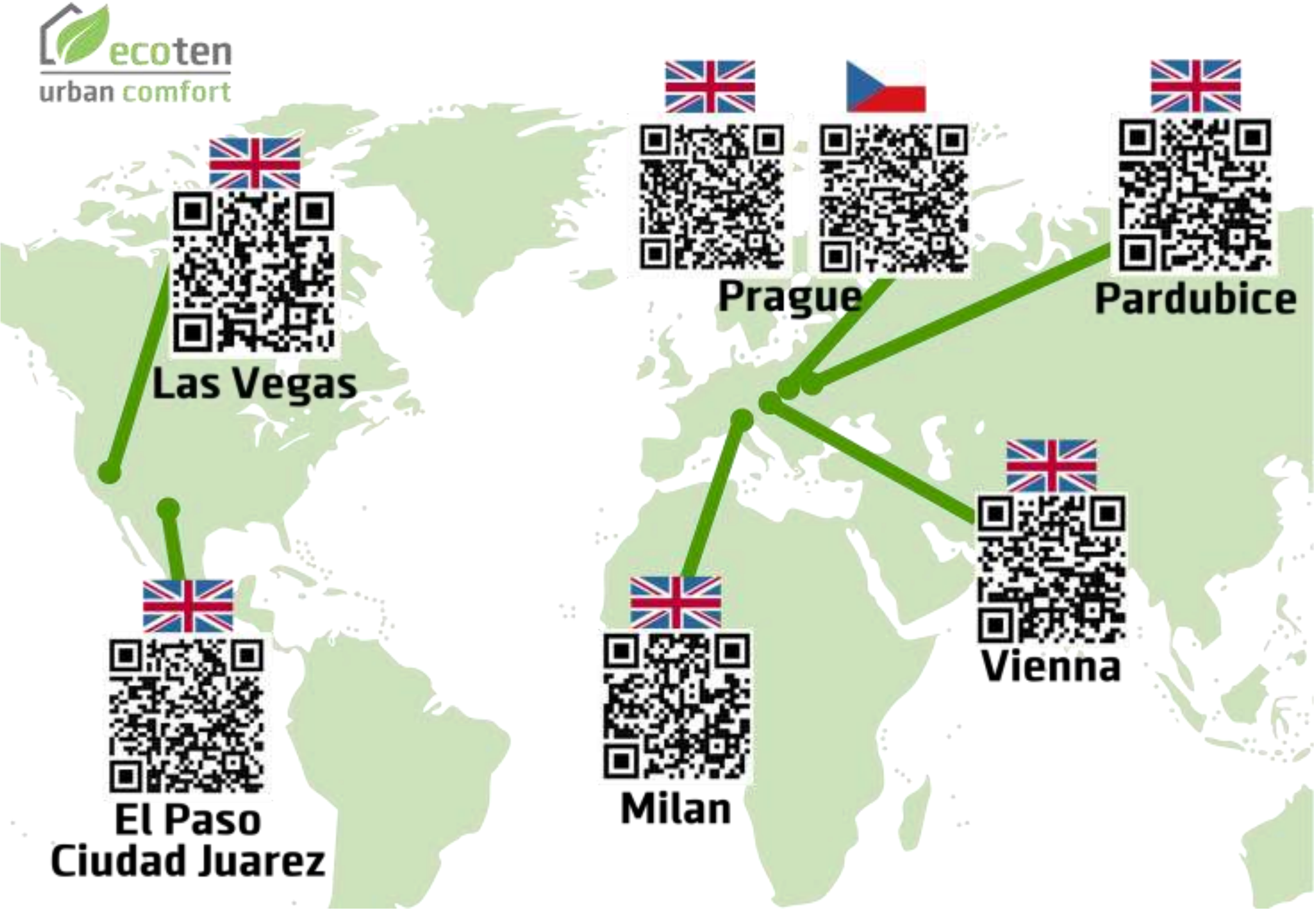
[Video Presentation (2:55 M)]

[Official Website]

Get in touch!

Jiri Tencar | CEO|
tencar@urban-comfort.eu

Sagnik Bhattacharjee| CTO |
bhattacharjee@urban-comfort.eu



Thank You!

14th October 2020

Il clima cambia. Riduciamo i rischi.

The LIFE DERRIS project – Public-private partnership to increase SMEs' resilience to climate change

LIFE ASTI 2nd European Workshop

Why DERRIS ?

The problem

Italy is one of the European countries **most vulnerable to climate change**.

The **greater number of weather events** we are witnessing with increasing frequency have particularly **significant effects on small and medium-sized enterprises** (SMEs).

2 MAJOR GAPS TO FILL:

➔In Italy, **SMEs do not have adequate tools** for assessing and managing these phenomena.

➔Italy is one of the countries where the impact of extreme weather events on their businesses is most underestimated by companies.

The response

DERRIS is the **first European project** that combines public administration (PA), businesses, and insurers to reduce risks caused by exceptional climatic events.

The project objectives were to:

- **Test and implement innovative forms of public-private partnerships** between insurers, PA and businesses to augment the resilience of local communities
- Promote **greater risk culture**, by transferring knowledge from the insurance sector to the PA and SMEs
- Make **adequate climate risk prevention and management tools** available to the SMEs
- Study **innovative financial instruments** that can mobilize capital dedicated to reducing risks

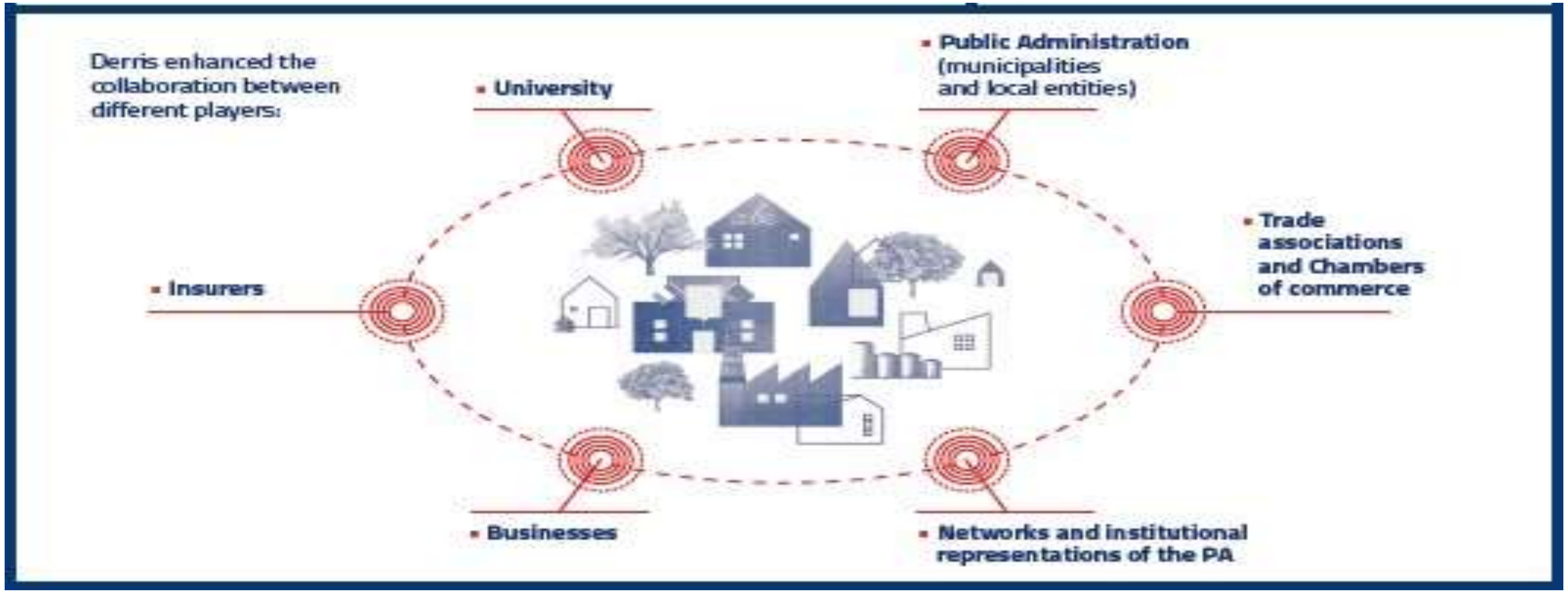
LIFE DERRIS: Partnership

The **LIFE DERRIS** (Disaster Risk Reduction Insurance) project, led by Unipol Group together with the partners ANCI, CINEAS, City of Turin, Coordinamento Agende 21 Locali Italiane and Unipolsai, developed between September 2015 and September 2018.

Unipol GRUPPO UnipolSai ASSICURAZIONI CITTA' DI TORINO CINEAS PER UNA CULTURA DEL RISCHIO anci AGENDE 21 LOCALI ITALIANE COORDINAMENTO AGENDE 21 LOCALI ITALIANE

Public-private partnership

The DERRIS project tested and implemented innovative forms of local partnerships between the public administration, insurers and enterprises with the aim of increasing the resilience of local communities.



DERRIS model

Support SMEs to:

- Know and assess risks
- Manage risks and emergencies
- Manage residual risk

DERRIS TOOLS

- CRAM TOOL DERRIS
- TRAINING AND WEBTRAINING

INCREASE BUSINESS RESILIENCE

Being ready to react quickly

The market doesn't wait!
If a company lacks the tools required to react to harmful events and quickly restore full operations, it will lose orders and customers, and will have a hard time recovering its lost market share.

In crisis situations, reaction time is a decisive success factor!

To be able to effectively react to a harmful event and return to prior conditions as rapidly as possible, every company should first define and then implement a **Business Continuity Management** plan.

The CRAM tool - Objectives

The CRAM tool

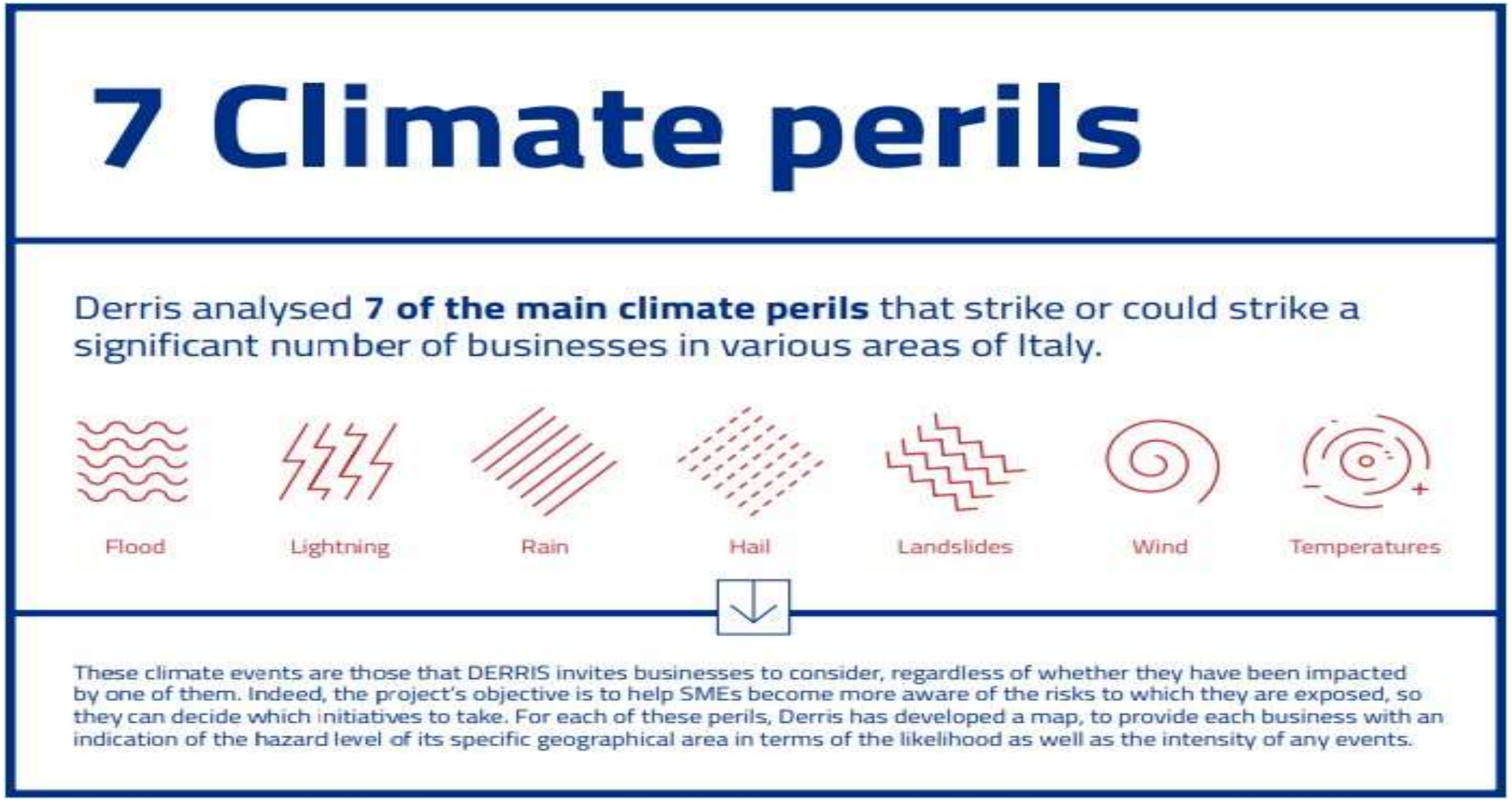
Do you want to understand which perils your company is exposed to and what you can do to make it more resilient, safe and prepared?

The **Derris CRAM tool** was designed precisely for this purpose: it is an online tool that allows you to immediately analyse the risks your company is exposed to and select the measures you can take for your business.

On the basis of your company's positioning and the risks to which it is exposed, the tool will suggest some actions to be taken to make it less vulnerable to climatic events. At the end, you can check your resilience index and build your own **Adaptation Plan**: this is a document that summarises everything there is to do, who is responsible for it and when to intervene.

We can respond to climate change by taking mitigation measures to reduce greenhouse gas emissions (renewable energy, energy efficiency, transport, better scrap and waste management) **as well as with adaptation policies to increase community resilience.**

These interventions require significant effort and large investments, and are possible only if all sectors of society cooperate: governments, local authorities, citizens and businesses.



7 Climate perils

Derris analysed **7 of the main climate perils** that strike or could strike a significant number of businesses in various areas of Italy.

Flood
Lightning
Rain
Hail
Landslides
Wind
Temperatures

These climate events are those that DERRIS invites businesses to consider, regardless of whether they have been impacted by one of them. Indeed, the project's objective is to help SMEs become more aware of the risks to which they are exposed, so they can decide which initiatives to take. For each of these perils, Derris has developed a map, to provide each business with an indication of the hazard level of its specific geographical area in terms of the likelihood as well as the intensity of any events.

DERRIS in Italy

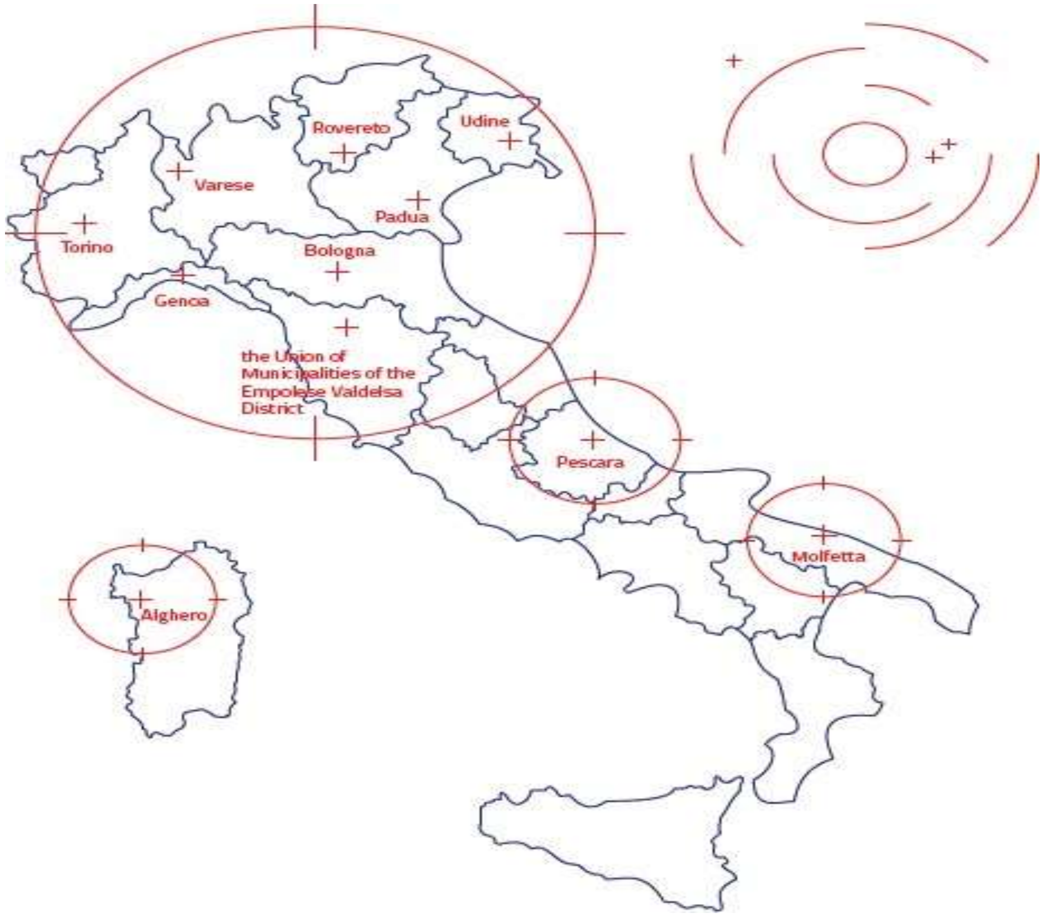
TURIN (PILOT)

30 SMEs involved in the pilot experiment

ITALY

14 cities replicated the experiment

By the end of 2019: over **6.000 users** of the CRAM tool (8.000 sessions); **around 200 action plans** for adapting to climate change had been drawn up, containing over **4,000 climate-related risk prevention and management measures**



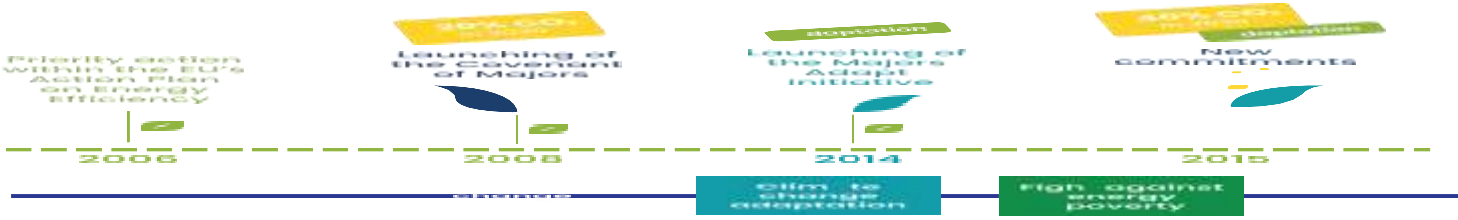
DERRIS PROJECT – *Lessons learnt*

- **Difficulty in systematising existing data and knowledge** to make them usable by other actors (PA, businesses) and need to encourage greater exchanges between the various actors (research, PA and insurance);
- Necessity to **activate a widespread model of engagement on local territories of a wide range of actors** (public administration, trade organisations, Chambers of Commerce, agencies…) **to face the very low level of awareness on the impacts of climate change**;
- **Difficulty in reconciling public and private planning for resilience:** conflicting planned interventions and unaligned timing (short-medium vs long-term);
- **Difficulty measuring the costs and benefits of resilience interventions** (in terms, for example, of impacts on business competitiveness);
- The DERRIS project analysed the **possible financial instruments available to local entities** to adapt to climate change while assessing their expediency and critical nature in the Italian context, and conducted an in-depth study of possible incentive schemes (including tax incentives) that can create incentives for SMEs to implement interventions to reduce climate risks and increase their resilience.

MUNICIPALITIES HAVE AN INCREASINGLY IMPORTANT ROLE IN MITIGATION AND ADAPTATION THE - COVENANT OF MAJO

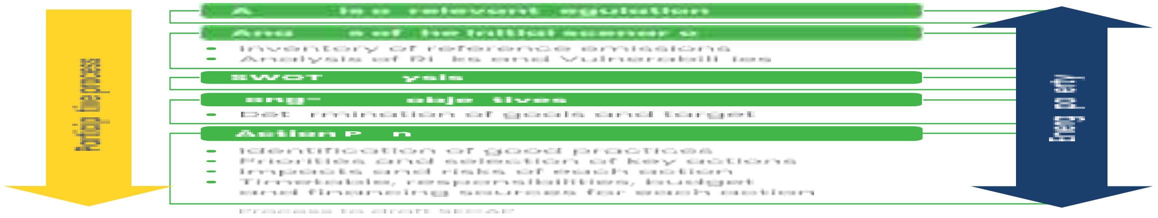
This is the most important voluntary global initiative worldwide in the fight against climate change. It currently groups over 9,800 municipalities in 57 countries in all 5 continents, involving the participation of multiple stakeholders.

The Global Covenant of Majors develops key factors for the success of this initiative: a bottom-up governance approach, a multi-level cooperation model and a context-driven action pattern.



Covenant of Majors signatories commit to the following:

- **Preparing an inventory of emission references.** More specifically, all member municipalities in this initiative commit to emission reductions of at least 40% in their territories before 2030 through the increase of energy efficiency and the use of renewable energy sources.
- Preparing a climate change **vulnerability and risk assessment.**
- Drafting a **Sustainable Energy and Climate Action Plan (SECAP)** and integrating aspects related to mitigation and adaptation of relevant policies, strategies and plans within two years after the City Hall's decision.



A   le s relevant egulation

Analysis of the initial scenario
- Inventory of reference emissions
- Analysis of Risks and Vulnerabilities

SWOT Analysis

ang–   objectives
- Determination of goals and target

Action Plan
- Identification of good practices
- Priorities and selection of key actions
- Impacts and risks of each action
- Timetable, responsibilities, budget and financing sources for each action

Process to draft SECAP

LIFE ADAPTATE Project

life adaptate

Application of a common methodology to develop a Sustainable Energy and Climate Action Plans in European municipalities and to deal with effects of climate change.

What is the problem faced by LIFE ADAPTATE?

Urban areas are exposed to climate change consequences, including intense heat, sea level increase, extreme rainfall, flooding, landslides, atmospheric pollution, food problems and water scarcity. Impacts become increasingly worse in case of damages to the provision of services, infrastructures and housing.

What actions are expected as part of the LIFE ADAPTATE project?

To develop Sustainable Energy and Climate Action Plans (SECAP) in 8 municipalities of 3 different countries (Latvia, Portugal and Spain), taking advantage of synergies and know-how of different entities supporting technical development and public participation.

Main project objectives

- To develop, implement, monitor and assess Sustainable Energy and Climate Action Plans (SECAP).
- To develop demonstrative pilot actions.
- To test cooperation schemes among municipalities.
- To evaluate local initiatives for climate change adaptation and mitigation.
- To promote specific resources and guidelines, transferring and replicating them at a European level.

Pilot Actions

Aguilas
Creation of a wooded area with drip irrigation using treated water from the local treatment plant.

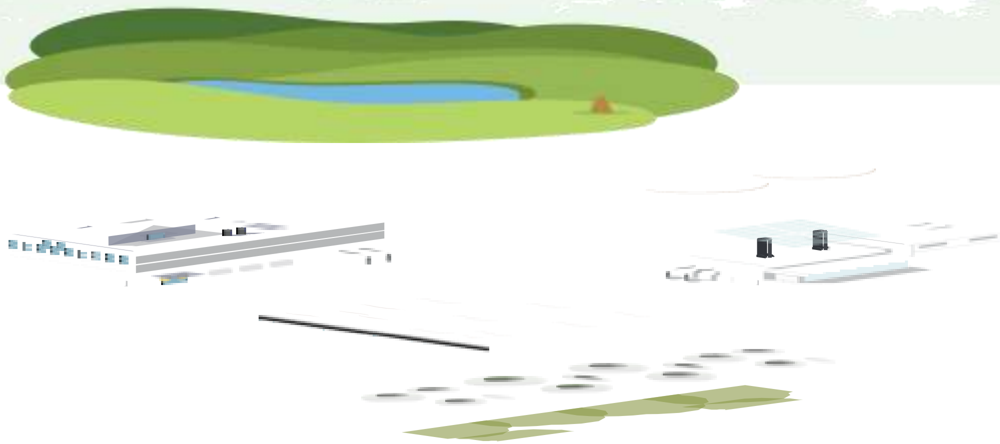
Cartagena
Project to use a combined bike-pedestrian pathway to connect green zones to areas shaded by new trees and open-air covered walkways.

Mértola
Creation of shaded areas integrating renewable energies.

orca
Installation of tarps to create shaded areas in busiest streets of the old quarter.

miltene
Recovery of artificial lake Vidusezers.

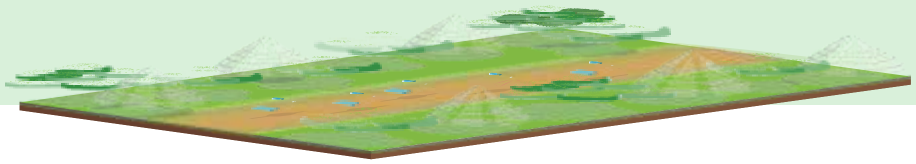
lfândega da Fé
Creation of shaded areas with an open-air photovoltaic cover and construction of a natural lake.



Creation of a 30.000 m² wooded area distributed in 5 bioclimatic areas of native vegetation irrigated with reused water from the municipal water treatment plant. The goal is to **reduce local temperature, lower the amount of solar radiation reaching the ground and achieve reduced runoff by means of a Sustainable Urban Drainage System.** The irrigation system includes the catchment, pumping, storage and transport of treated water from the municipal water treatment plant for usage in the area around Aguilas' bike lane and bypass. Water is stored into two 25 m³ in the highest elevation of an old dump site, from where it is pumped using renewable energy (by means of photovoltaic panels).

ES IN CARTAGENA (SPAIN)

Cartagena aims to **link green areas** by means of a pedestrian promenade and connection to existing bike lanes, trees and open-air covered walkways with green roofing, **providing neighbors with a pleasant environment in which to walk and live together.** The action, called "Conditioning and connection of green areas from the surroundings of the Severo Ochoa Square to the Ensanche Park", seeks **to minimize climate-related risks** in the daily life of neighborhoods by **reducing air temperature in the area.**

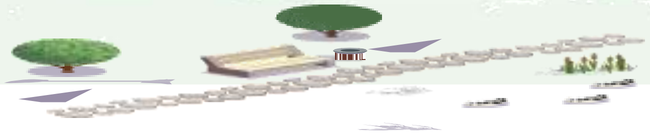


SHADED URBAN CORRIDORS OF LORCA (SPAIN)

Lorca aims to **reduce the effects of heat waves** and urban heat islands with **the creation of shaded corridors.** This is achieved **by installing tarps in a number of busin**
z **reets of Lorca's city center**, such as Corredera and other adjacent st

stalled from June to September, measuring temperature redu
he benefits for people and the business area around these symboli
of Lorca.

SPECIFIC PROJECTS FOR ADAPTATION OF OUR CITIES TO CLIMATE CHANGE



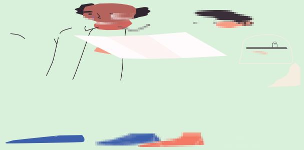
MERTOLA (PORTUGAL)

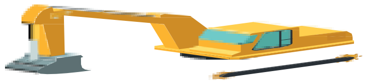
CREATION OF SHADED AREAS

Mertola is creating **shaded areas which integrate renewable energies**, offering solutions for 3 types of urban areas: streets in the old quarter and a business area, in stores and restaurants, and in leisure centers. **The main objective is to reduce the effects of heat waves and urba   h**

DEVELOPMENT OF A SUSTAINABLE TOURISM PLAN

Considering the strategic value of sustainable tourism planning and management instruments, collaboration with key local tourism stakeholders, local governance agencies and the community, **Mertola is drafting a sustainable tourism plan to raise awareness on these protected areas, making people increasingly more interested in and supportive of them.**

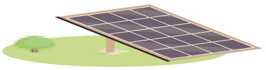




rface area of some 3,000 m², **the construction of a lake in Alfandega da Fe** aims to achieve the following: Adapting to climate change and addressing water scarcity, **supplying water for irrigation, rur l usage and conservat n measures, as well as allowing the stora f v tal water resourc s outside the rainy seas n.** The lake, locate n S rra de Bornes and als us d to support forest f r f ghting, will stor r inw ter, runoff water and water comi rn s w ter line

n e d Fe is ins lling a cover of abo 20 m² (solar gain are ver an area of 262.5 m **ce covered with photov panels, this area will sh ng to people,** mo rk rs nd citizens acc u l c buildings. Fur r , it will **also gener ctricity** for self– mption by two munic c nt rs.

th Port s munc alitie developing a p n med, on t n , at **creati t – urpose fe ith n t ve spec nd, on the othe n , at romoti h re nerati of nat ve spec s.** The ultimate l is to draft an a on plan for appl tion of innovative solutions with the aim t ation, ad



CUTLER (cutler-h2020.eu)

2nd European Workshop

Urban Heat Island and Heat Resilience: Networking for Future Strategy

Spiros Nikolopoulos (Researcher Grade C')
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Information Technologies Institute – Centre for Research & Technology Hellas (CERTH-ITI)

Coastal urban development - Motivation

- **Water element** in coastal cities (bay, lake, river, brook, etc.) constitutes the heart of the city

- Cities promote urban development policies to
  - **Foster economic development** in the coastal area
  - **Alleviate water-related environmental stresses** from floods, erosion, etc.

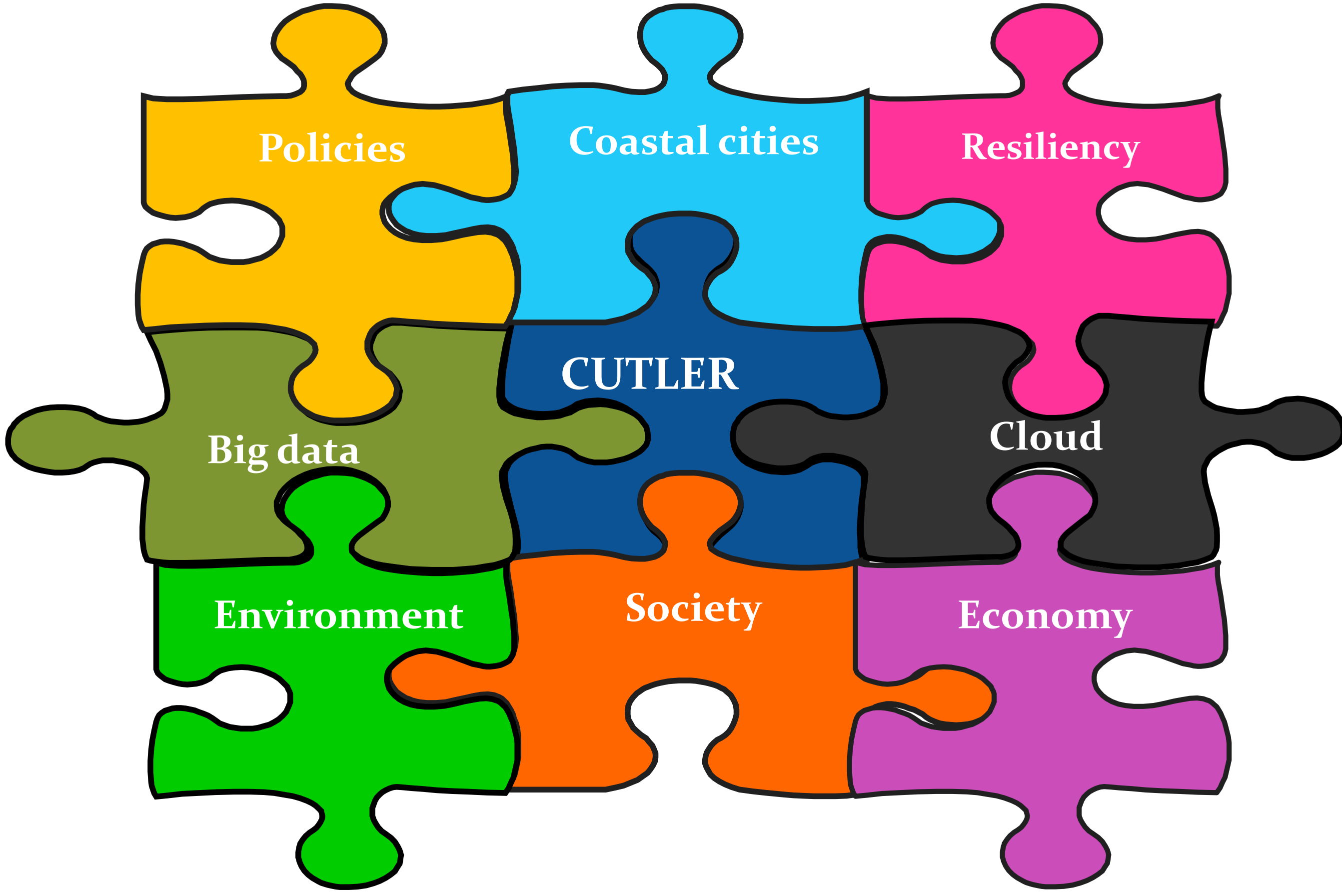
- However, the **surrounding ecosystem** is disturbed in terms of environmental impact and social cohesion

- Modern waterfront cities need policies that
  - Drive urban **development in the coastal area**
  - Balance effectively between **economic growth, environmental protection & social cohesion**

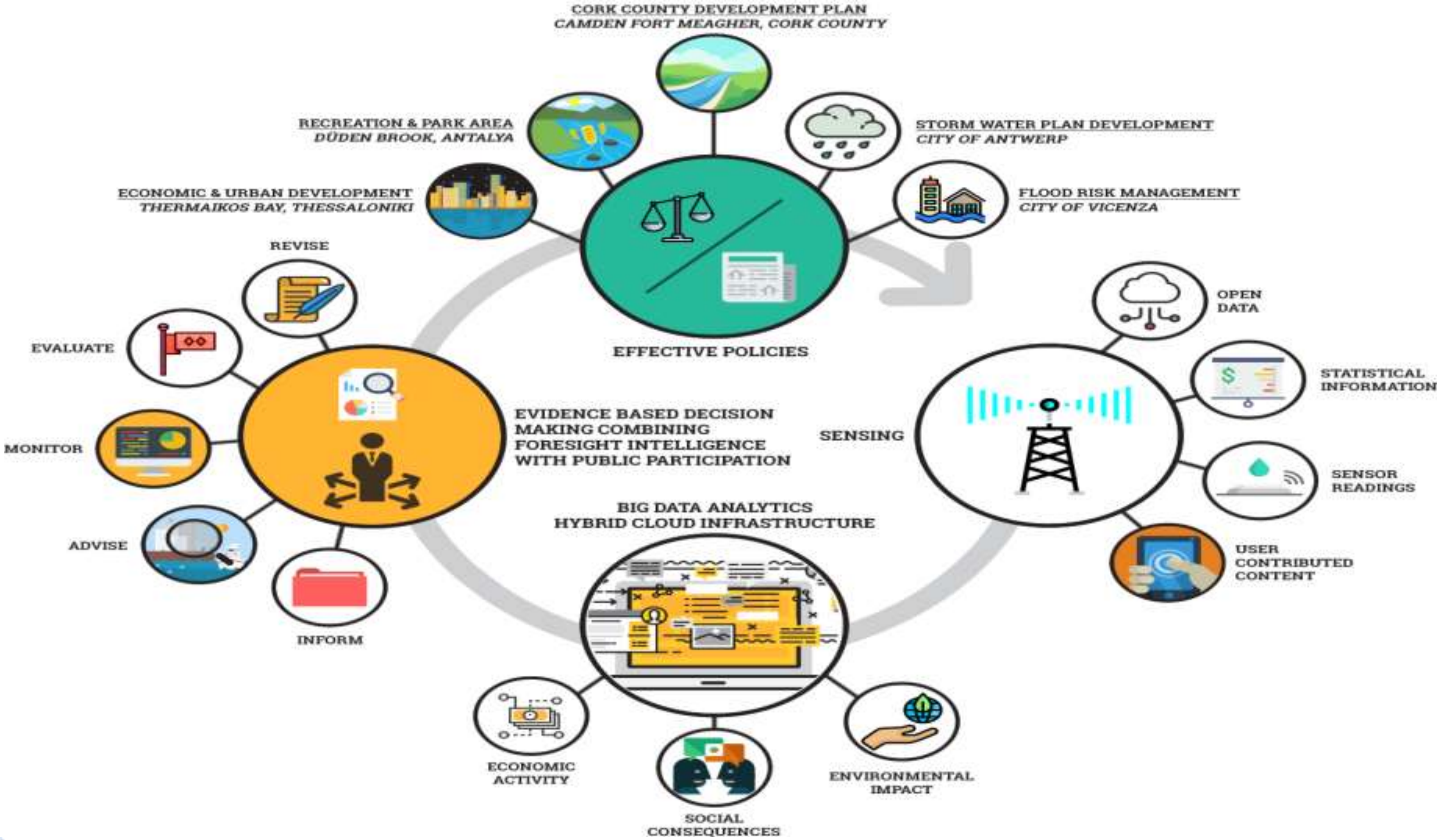
- Policy making is still **largely based on intuition**
  - Need for advanced **data integration, analysis and visualization tools**
  - Leading to **evidence-driven decision–making mechanisms**

CUTLER in a nutshell

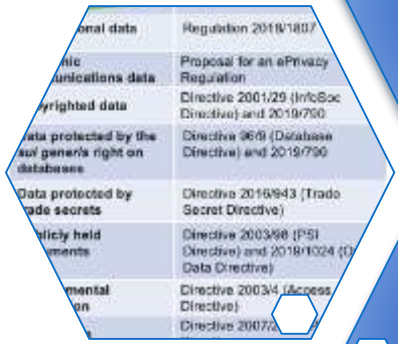
- Assists policy makers in urban development policies for coastal cities
- Exploits datasets and big data technologies
- Models the complex decision making processes
- Resiliency lens to balance between
  - Economic growth
  - Environmental protection
  - Citizen well-being



CUTLER – Conceptual Approach



Achievements



onal data	Regulation 2018/1807
nic unications data	Proposal for an ePrivacy Regulation
yrighted data	Directive 2001/29 (InfoSoc Directive) and 2019/790
ata protected by the sui generis right on databases	Directive 96/9 (Database Directive) and 2019/790
Data protected by rade secrets	Directive 2016/943 (Trade Secret Directive)
blicly held ments	Directive 2003/98 (PSI Directive) and 2018/1024 (O Data Directive)
mental on	Directive 2003/4 (Access Directive)
	Directive 2007/2

Data crawlers and data integration

Legal Taxonomy of datasets

Cloud Infrastructure

Policy design, implementation and evaluation

Sensing economy, environment and social

Business Process Model

Platforms Integration and Policy Dashboards

Lessons Learned

- **Face the challenges of digital transformation of the public sector**
  - *Big data analysis requires understanding and cooperation between policy makers and data experts*
  - *Data visualisation: a graph is worth a thousand words*

- **Innovative actions to be taken up by governments in Europe**
  - *Exploit social media and online discussion platforms to sense the society*
  - *Develop a generic framework to assess policy impact in waterfront cities in a standardized way*
  - *The introduction of ICT in public administration necessitates Business Process Management logic*

- **Challenges and opportunities that public administration and citizens are facing regarding the use of data**
  - *Data exist but are not always accessible*
  - *Legal issues hinder data collection & processing*
  - *Not just big data. First of all, useful data*

Key enablers/strategies for digital public services

- **Data access and clearance**
  - *Negotiate and collaborate with data providers*
  - *Review of regulatory frameworks and create legal taxonomies*

- **Capacity building in data-driven analysis**
  - *Interdisciplinary team of experts*
  - *Extensive communication and collaboration is required to jointly design the system.*

- **Visualization**
  - *Comparison of different data over time and space*
  - *Interactive analytics*
  - *Tell a story*

Policy recommendations on data

- **Ensure that governments reap the opportunities of data?**
  - Offer regulatory frameworks so that can be cleared
- **Encourage governments to use data in decision-making**
  - Enforce in procurements that suggestions/decisions should rely on data-derived evidence
- **Encourage the reuse of data by governments?**
  - Allow building a business model around the use of open data
- **Ensuring that data helps providing user-centric digital public services and engage citizens?**
  - *Exploit social media and online discussion platforms to sense the society*

Thank you!
Questions?

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