



# Operational Heat Health Warning Systems for selected Mediterranean urban areas

Daphne Parliari

19<sup>th</sup> International Conference on Nanosciences & Nanotechnologies (NN22)

5-8 July 2022, Thessaloniki, Greece



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.



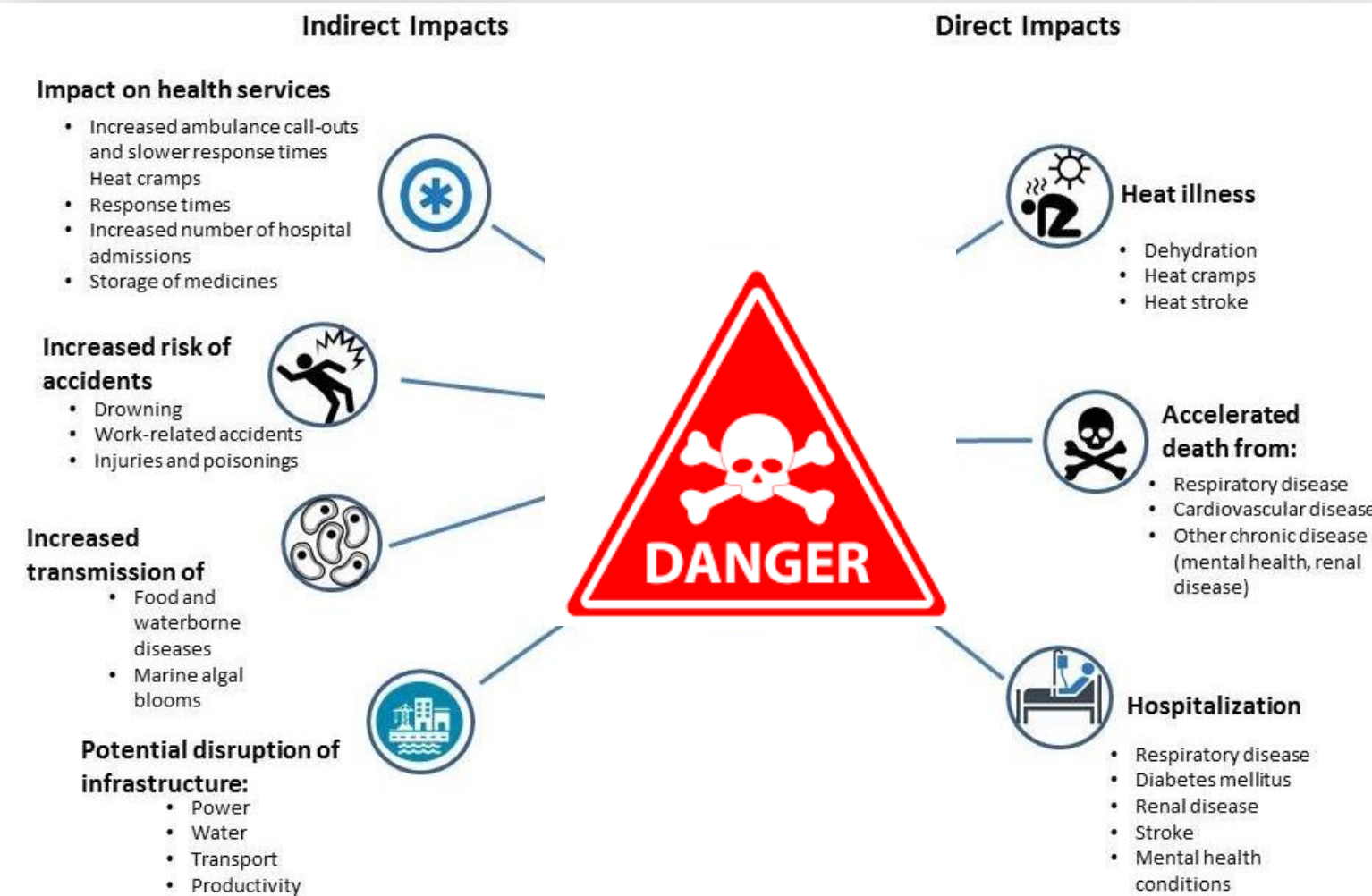
SISTEMA SANITARIO REGIONALE



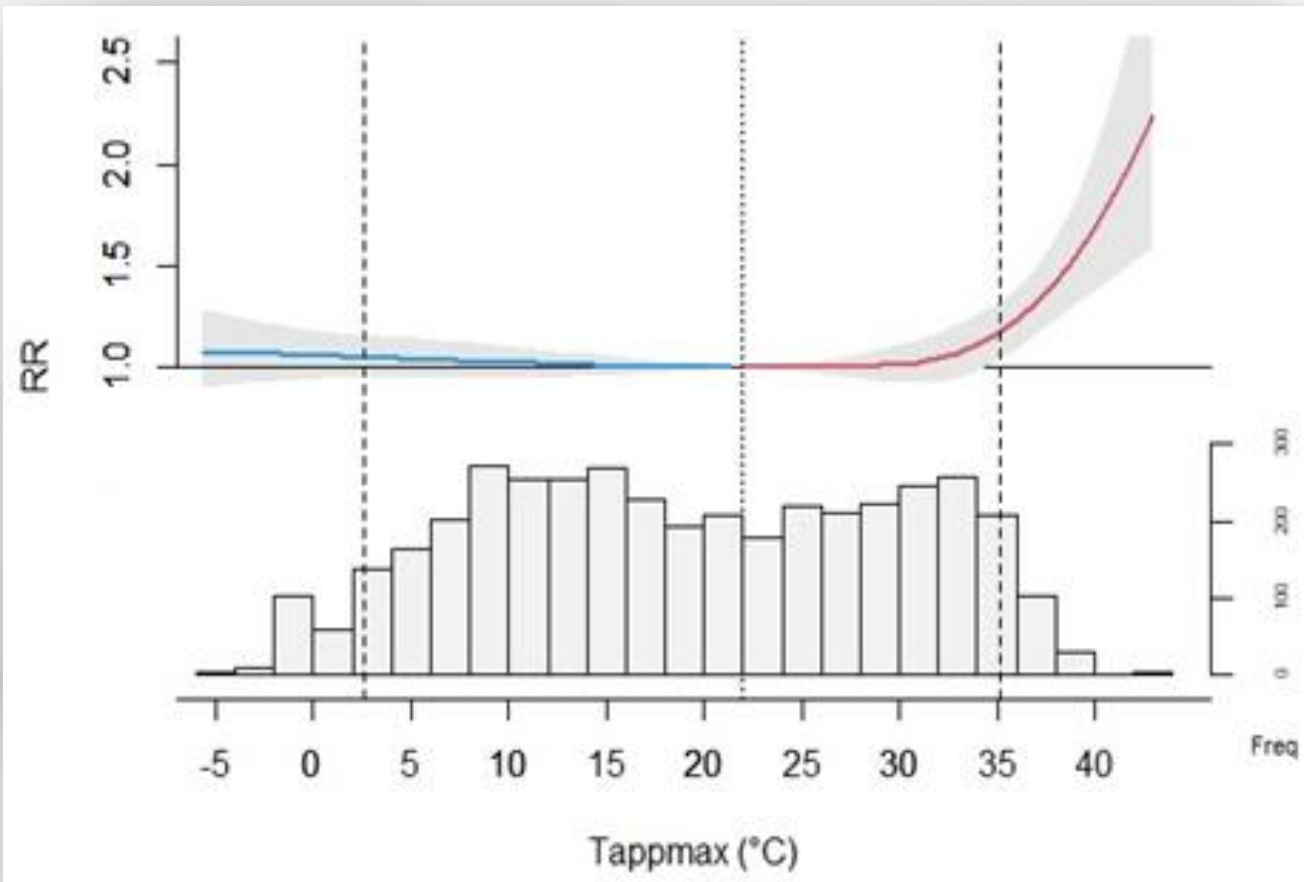
# Presentation outline

- Heat and human health
- Heat Health Warning Systems: Why are they important?
- LIFE ASTI (overview, objectives, forecasting systems, health results)
- LIFE ASTI Heat Health Warning Systems

# Heat impact on health



# Health risks related to heat in urban areas



*Parliari et al. Atmosphere 2022*

- ✓ Urban settlements are areas with degraded environmental quality and increased thermal discomfort.
- ✓ Significantly increased risk of morbidity and mortality due to high temperatures.



# Heat Health Warning systems

## ✓ What HHWS do?

They are information tools used to identify and predict weather conditions that may adversely affect health in a specific city.

## ✓ What exactly are HHWS?

City-specific models based on the temperature-mortality relationship, defined with time series data (temperature, mortality).

## ✓ How do HHWS work?

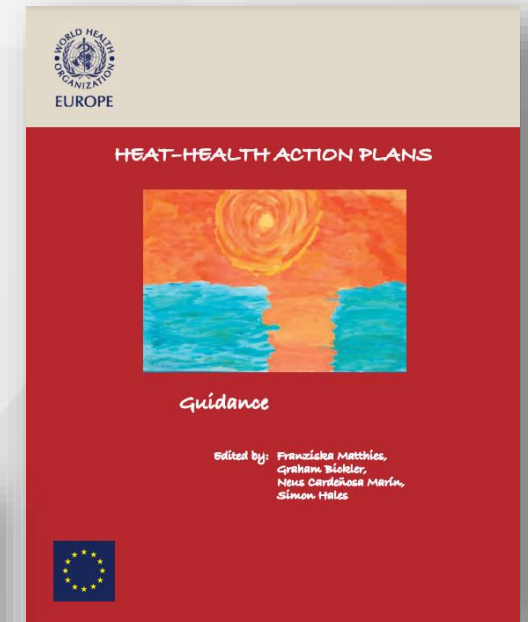
They use weather forecast data to predict at-risk conditions for local populations associated to an increase in mortality. **High spatio-temporal resolution forecasts enable accurate and differential warnings within urban areas.**

# 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., 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

The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



# LIFE ASTI: General information



**Location:** Thessaloniki, Greece + Rome, Italy

**Replication:** Heraklion, Pavlos Melas, Greece



linator)

ate, National Research Council of Italy

➤ Sympraxis Team P.C.

The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



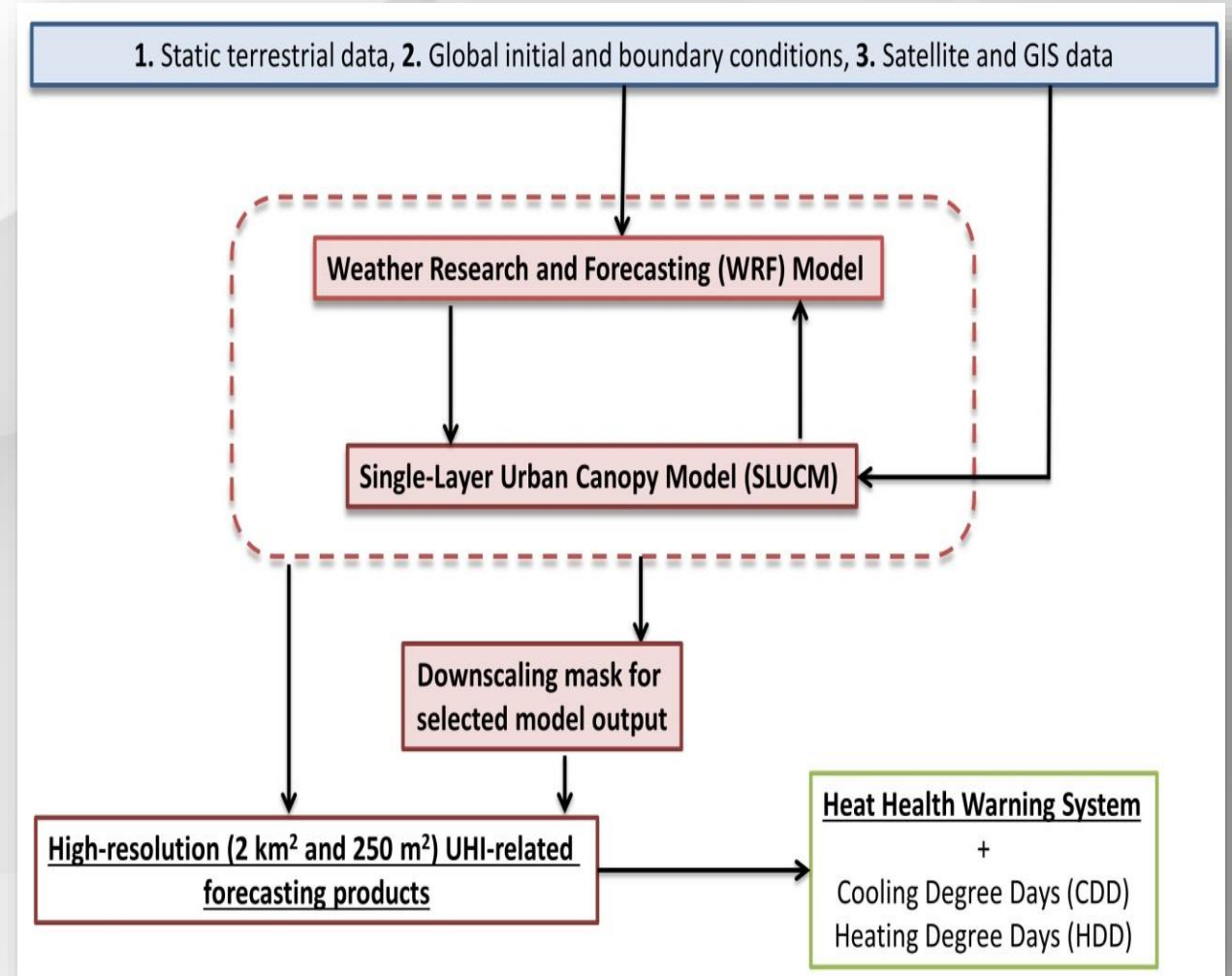
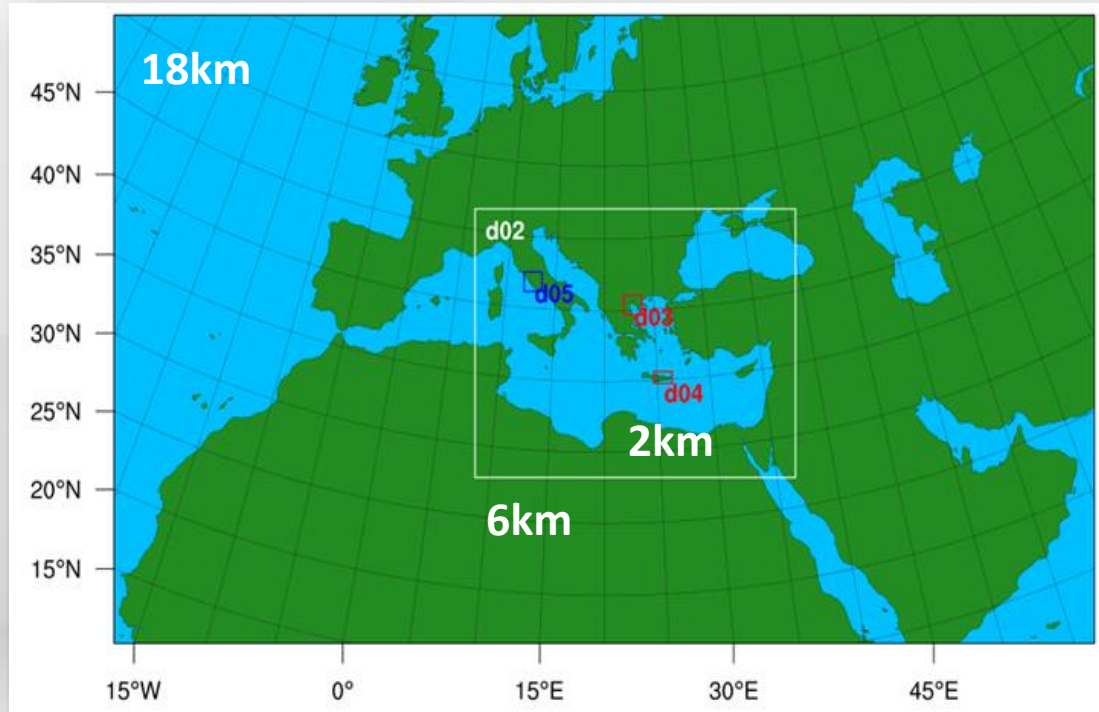
# Project goals



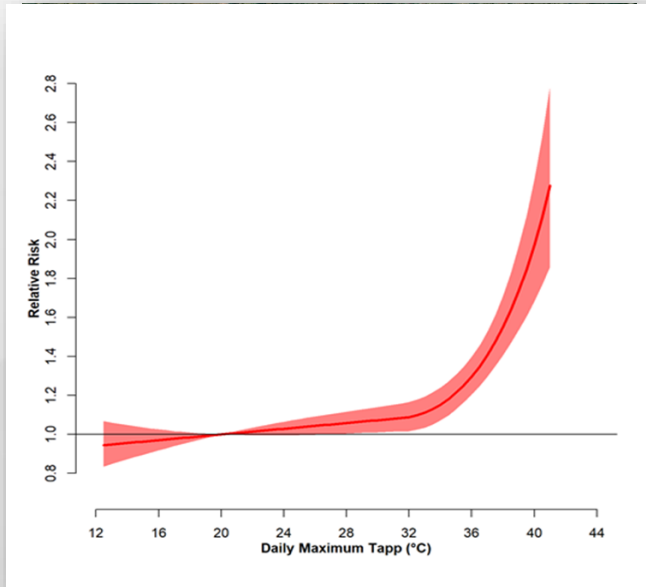
1. Design and implement a set of **Urban Heat Island forecasting systems**, to provide stakeholders with several UHI-related, high-resolution forecasting products.
2. UHI-FS drive the **Heat Health Warning Systems**, helping the local authorities to react appropriately to extreme events.
3. Establish **dissemination tools** and allow **open access** to UHI-related information, to help the concerned authorities and the general public to fill the knowledge gap on local climate vulnerabilities and risks.



# Overview of the two-stage modeling systems

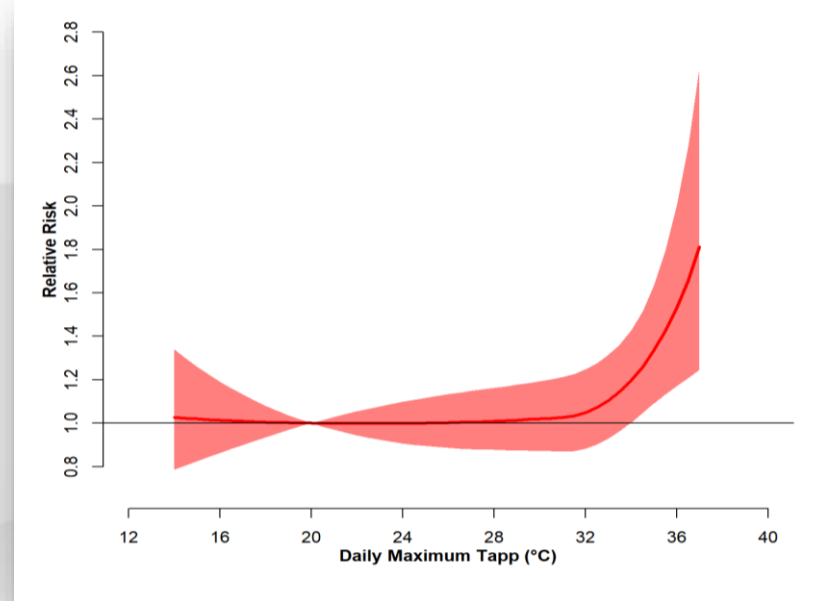


# LIFE ASTI Replication cities-Association between temperature and mortality



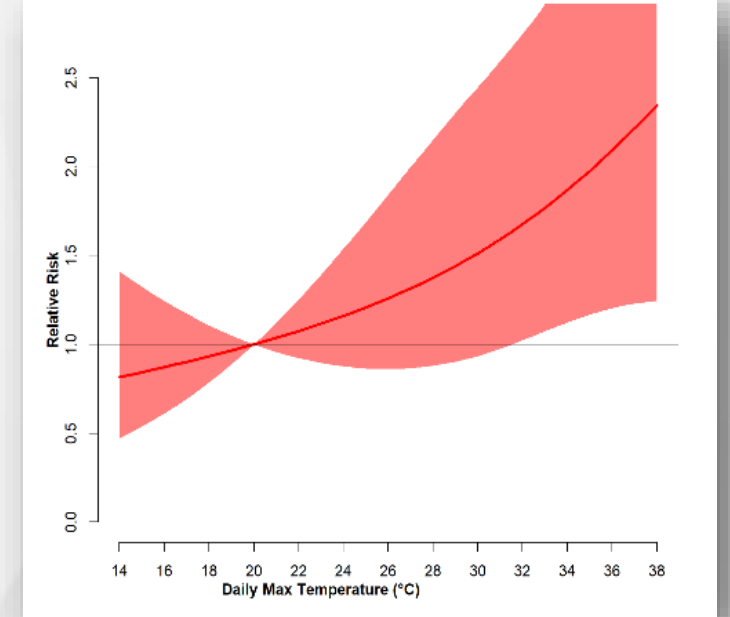
## Rome, Italy

Population: 2.8 million (4.5 million metropolitan area)



## Thessaloniki, Greece

Population: 1 million



## Heraklion, Crete - Greece

Population: 150 thousand

# LIFE ASTI HHWS



## ✓ What is special with LIFE ASTI HHWS?

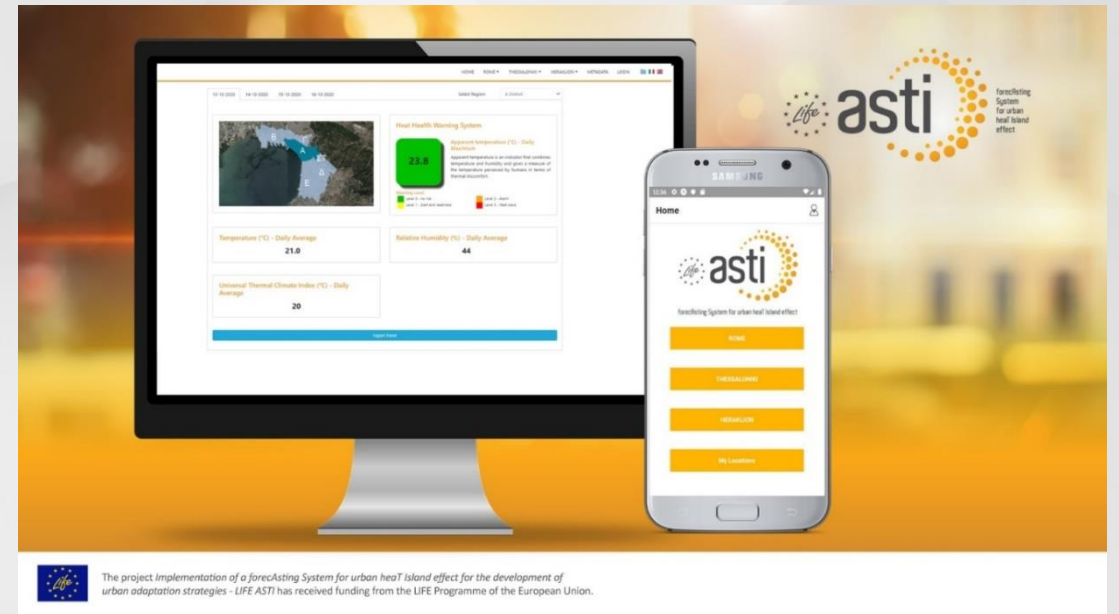
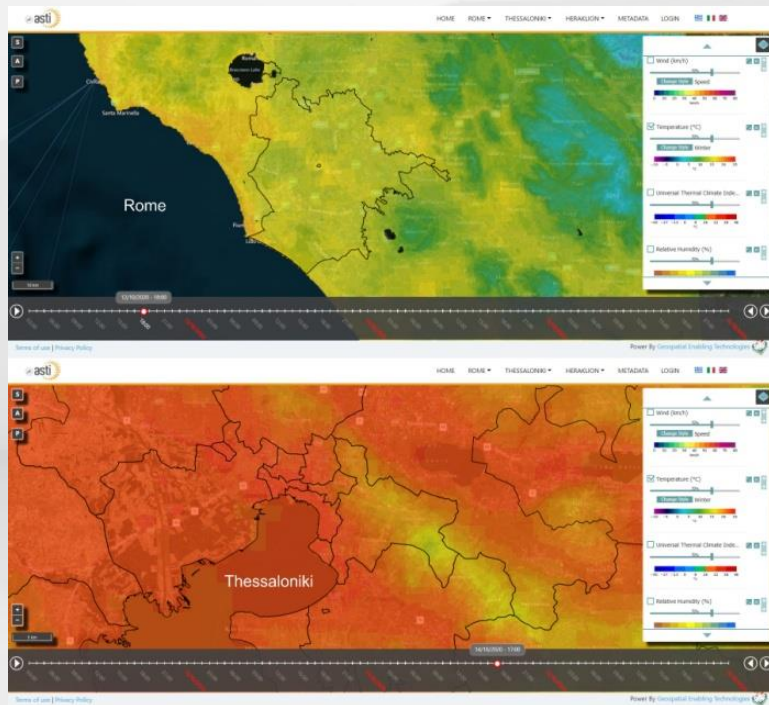
Model defined on the relationship between mortality and **Tappmax**. **Very high** spatio-temporal **resolution forecasts** (250m) enable accurate and differential warnings within urban areas.

<b>Low risk:</b>	increase in mortality between 10-20% <b>Alert level 1</b>
<b>High Risk:</b>	increase in mortality >20% <b>Alert level 2</b>
<b>Very high Risk:</b>	3 consecutive days of High Risk <b>Alert level 3</b>

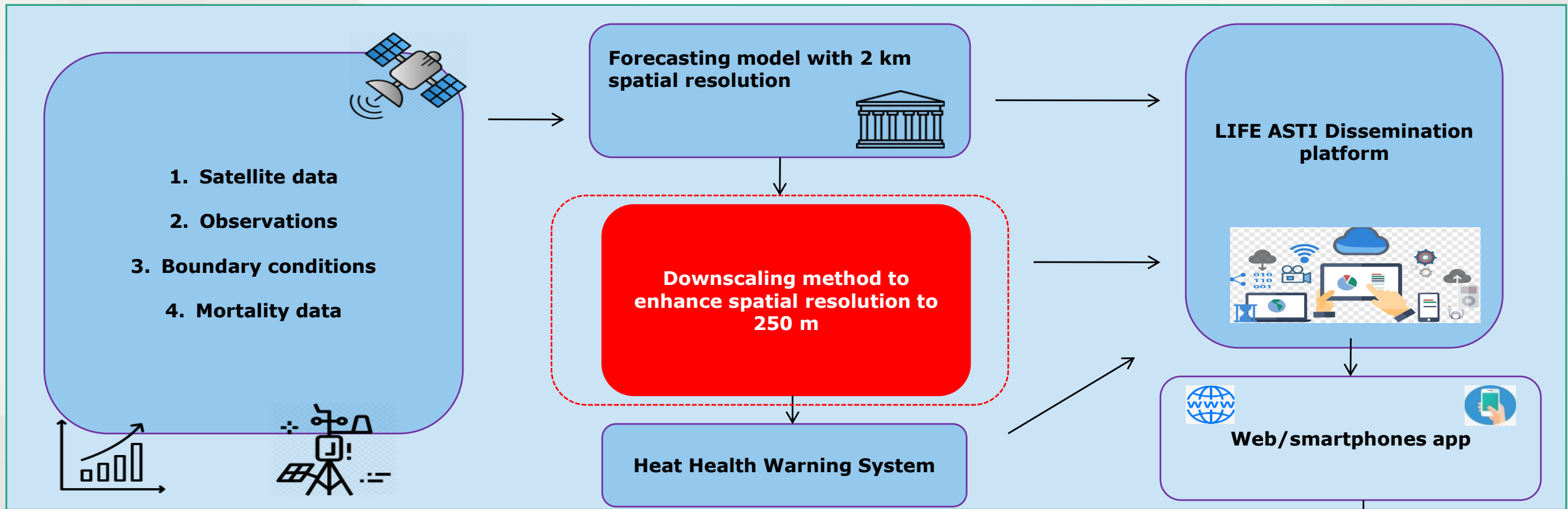
# Dissemination of results

Open access web portal  
(<https://app.lifeasti.eu/>)

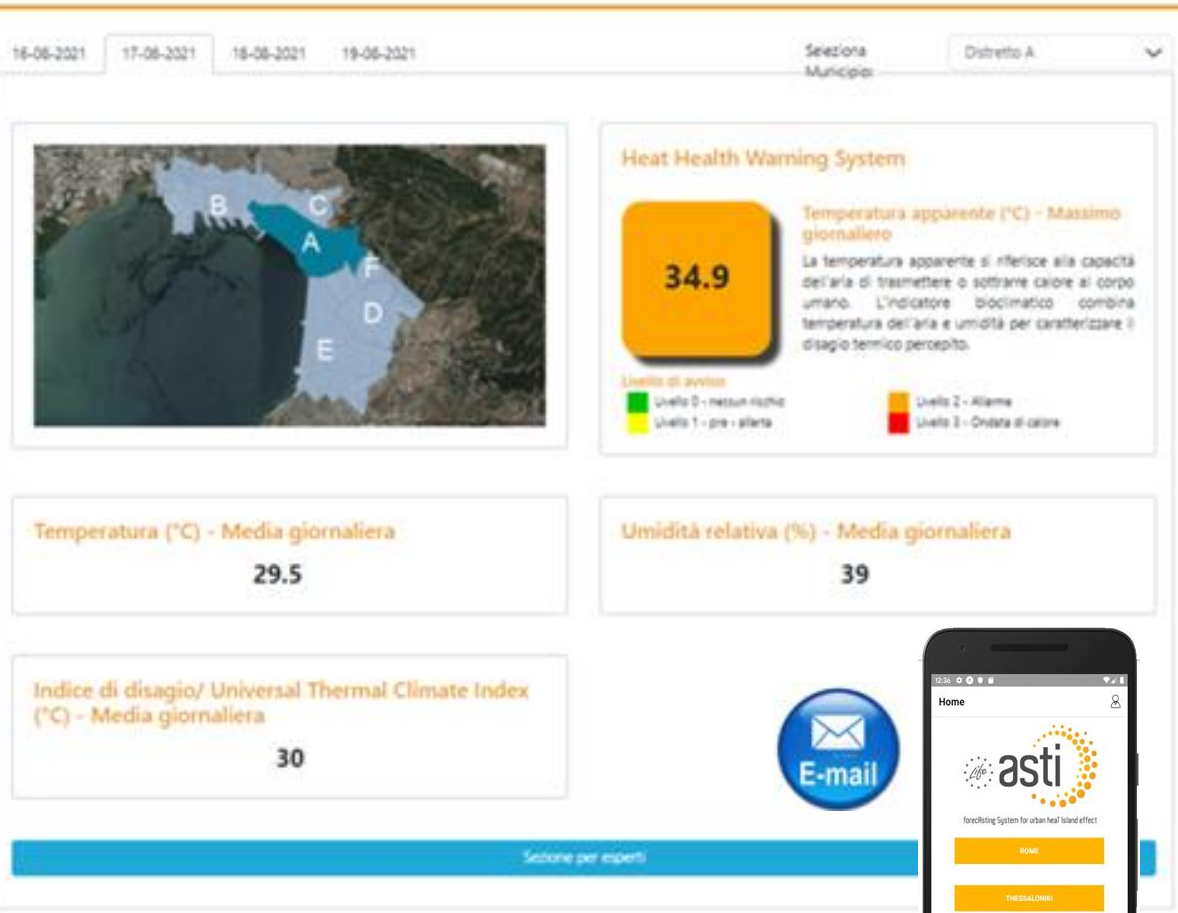
Smartphone app







# Local Heat Plan and Information Network: dissemination of warning to stakeholders



## Local prevention plan

Emergency services (civil protection, Health services, etc)

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

Raise awareness, adaptation and response: General public and registered users



## Δελτίο θερμοκρασιών και προειδοποίησης κινδύνου για την ανθρώπινη υγεία

(<https://app.lifeasti.eu/>)



### 2021-09-17: Επίπεδο 2 - Προειδοποίηση κινδύνου

Η θερμοκρασία στο κέντρο της Θεσσαλονίκης θα κυμανθεί από 20.3 έως 32.2°C, ενώ στα ενδότερα τμήματα του αστικού ιστού θα φτάσει και τους 32.6°C. Το επίπεδο προειδοποίησης κινδύνου για την ανθρώπινη υγεία είναι στο επίπεδο 2\*.

Αναλυτικά σε κάθε δημοτικό διαμέρισμα η θερμοκρασία θα κυμανθεί:

Περιοχή	Ελάχιστη	Μέση	Μέγιστη
A' Διαμέρισμα	20.3°C	25.9°C	32.2°C

### 2021-09-18: Επίπεδο 3 - Καύσωνας

Η θερμοκρασία στο κέντρο της Θεσσαλονίκης θα κυμανθεί από 21.5 έως 32.4°C, ενώ στα ενδότερα τμήματα του αστικού ιστού θα φτάσει και τους 32.7°C. Το επίπεδο προειδοποίησης κινδύνου για την ανθρώπινη υγεία είναι στο επίπεδο 3\*.

Αναλυτικά σε κάθε δημοτικό διαμέρισμα η θερμοκρασία θα κυμανθεί:

Περιοχή	Ελάχιστη	Μέση	Μέγιστη
A' Διαμέρισμα	21.5°C	27.4°C	32.4°C
B' Διαμέρισμα	21.9°C	27.1°C	32.7°C
Γ' Διαμέρισμα	23.4°C	27.3°C	32.3°C
Δ' Διαμέρισμα	23.3°C	27.5°C	32.7°C
Ε' Διαμέρισμα	22.1°C	27.5°C	32.7°C
ΣΤ' Διαμέρισμα	23.4°C	27.4°C	32.5°C

Θέλω να ενημερωθώ Ανακοινώσεις Χρηματοδοτούμενα Δελτία τύπου Χρηματοδοτούμενων προγραμμάτων

## Δελτίο θερμοκρασιών και προειδοποίησης κινδύνου για την ανθρώπινη υγεία για την περίοδο 17 έως 20/9/2021- LIFE ASTI

17/09/2021 10:15

Στο πλαίσιο ενημέρωσης των δημοτών και επισκεπτών της πόλης, αλλά και της υλοποίησης του ευρωπαϊκού έργου LIFE ASTI, μπορείτε να βρείτε [εδώ](#) το Δελτίο Θερμοκρασιών και Προειδοποίησης Κινδύνου για την Ανθρώπινη Υγεία, για τον Δήμο Θεσσαλονίκης, που εκδόθηκε από το Προγνωστικό Σύστημα Αστικής Θερμικής Νησίδας του έργου, για τη χρονική περίοδο 17/09/2021 έως 20/09/2021.

Περισσότερες πληροφορίες για το έργο LIFE ASTI μπορείτε να βρείτε στην επίσημη ιστοσελίδα του <https://lifeasti.eu/> και στα μέσα κοινωνικής δικτύωσης (Facebook, Twitter, Instagram, LinkedIn, Youtube).



# Operational Plan of MoT – LIFE ASTI contribution

## Pillar 1: Environment and Quality of life

- Measure 1.7 **Increasing the resilience of MoT** against climate change
- Target 1.7.1 Mitigation actions against climate change

## Pillar 2: Society – Health – Education – Culture - Sports

- Measure 2.1 Health and social care
- Target 2.1.1 **Improving public health services**

## Pillar 3: Local Economy and Employment

- Measure 3.1 Mapping and rebooting of local financial activities
- Target 3.1.3 **Boosting local financial activities**

## Pillar 4: Administrative Capacity and Internal Development of the Municipality of Thessaloniki

- Measure 4.2 e-governance & improving citizen services
- Target 4.2.2 **Thessaloniki “Smart City”**



# Information and health recommendations

**HEALTH EFFECTS OF HEAT**

**SHORT-TERM EFFECTS OF HEAT ON HEALTH**

DIRECT EFFECTS	INDIRECT EFFECTS
<ul style="list-style-type: none"> <li>DEHYDRATION</li> <li>ELECTROLYTES IMBALANCE</li> <li>HEAT RASH</li> <li>HEAT CRAMPS</li> <li>HEAT EDEMA, SYNCOPE</li> <li>HEAT STROKE</li> </ul>	<ul style="list-style-type: none"> <li>STROKE</li> <li>ASTHMA, COPD REACUTIZATIONS, RESPIRATORY, INFECTIONS</li> <li>ACUTE MYOCARDIAL INFARCTION ARRHYTHMIAS</li> <li>DIABETIC HYPOGLYCEMIA</li> <li>RENAL FAILURE</li> </ul>

INCREASED AMBULANCE CALLS, ER VISITS, MORTALITY

**SUMMER HEAT WAVES AND COVID-19**

Extreme heat can affect your health

SHORT-TERM EFFECTS OF HEAT ON HEALTH	HOW TO PROTECT YOURSELF
<p><b>DIRECT EFFECTS</b></p> <ul style="list-style-type: none"> <li>Dehydration</li> <li>Electrolytes imbalance</li> <li>Heat rash</li> <li>Heat cramps</li> <li>Heat edema, syncope</li> <li>Heat stroke</li> </ul> <p><b>INDIRECT EFFECTS</b></p> <ul style="list-style-type: none"> <li>Stroke</li> <li>Asthma, COPD reacutezations, Respiratory, infections</li> <li>Acute myocardial infarction Arrhythmias</li> <li>Diabetic hypoglycemia</li> <li>Renal failure</li> </ul>	<p><b>Keep cool and hydrated.</b> Wear light clothing, take cool showers or baths and drink water regularly.</p> <p><b>Stay out of the heat.</b> Go out in the coolest hours of the day and respect physical distancing and protection where required.</p> <p><b>Keep the household cool and ventilated.</b> Close blinds, shutters or curtains to keep out direct sunlight. Move into cooler rooms of the house.</p> <p><b>If you have heat-related symptoms.</b> (heat cramps, dizzy, headache, thirst) seek help, move to a cool place and hydrate.</p> <p><b>Protect yourself from covid-19.</b> Wash your hands regularly, cough into your arm and do not touch your face. When you go out respect physical distancing and follow guidance measures in place. If you fever or symptoms that may be due to Covid-19 stay at home and avoid contact with others. If symptoms persist \ worsen consult your doctor or health services.</p>

**SPECIFICALLY**

- Elderly
- People with chronic conditions (cardio-respiratory diseases, diabetes and kidney disease) are more vulnerable to both the effects of heat and to Covid-19 complications.

Project partners

ARISTOTLE UNIVERSITY OF THESSALONIKI, EUSP/ΕΛΠΙΣ, GET, ISAF, CITY OF THESSALONIKI, sympraxis, www.lifeasti.eu



Thank you for your attention



[app.lifeasti.eu](http://app.lifeasti.eu)



The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



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.

