



Monitoring the Urban Thermal Environment

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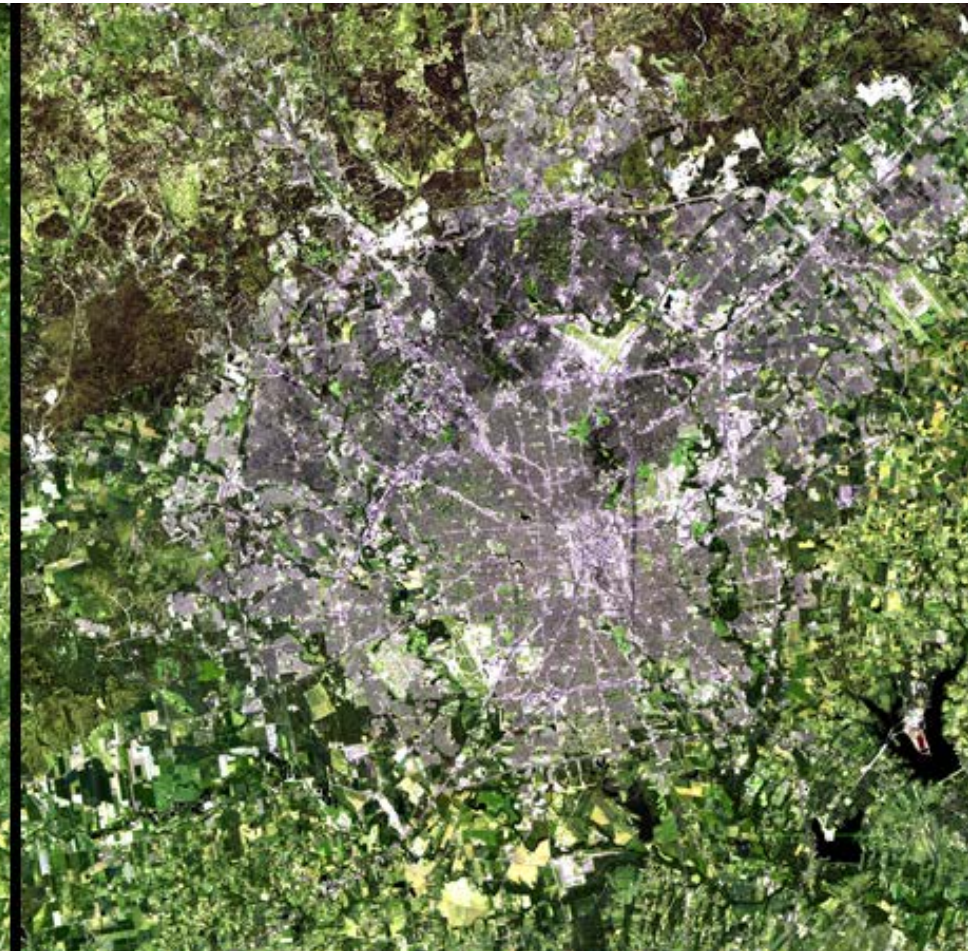
ONE step BEYOND workshop
ESA – Frascati, Italy
October 15, 2015



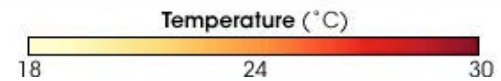
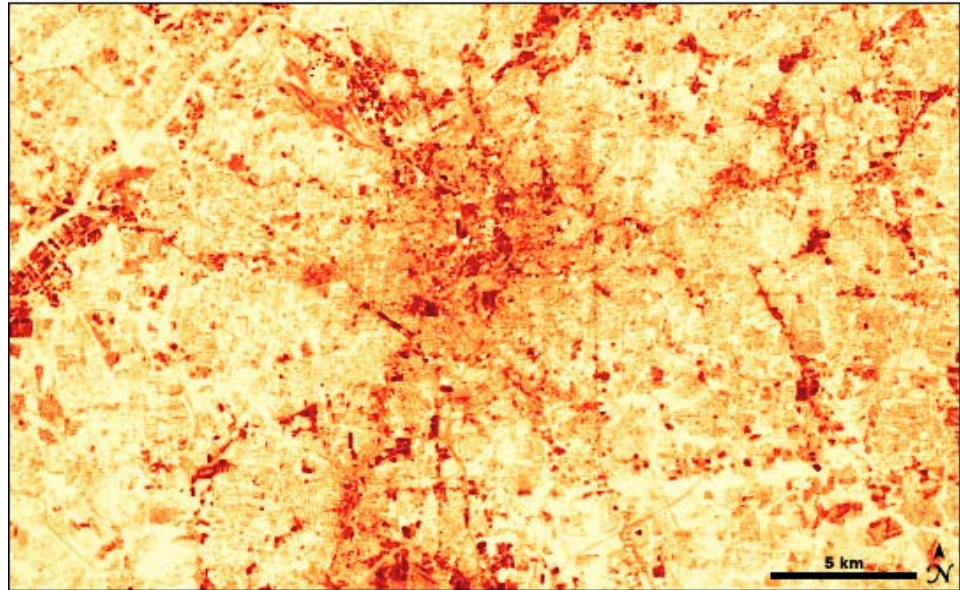
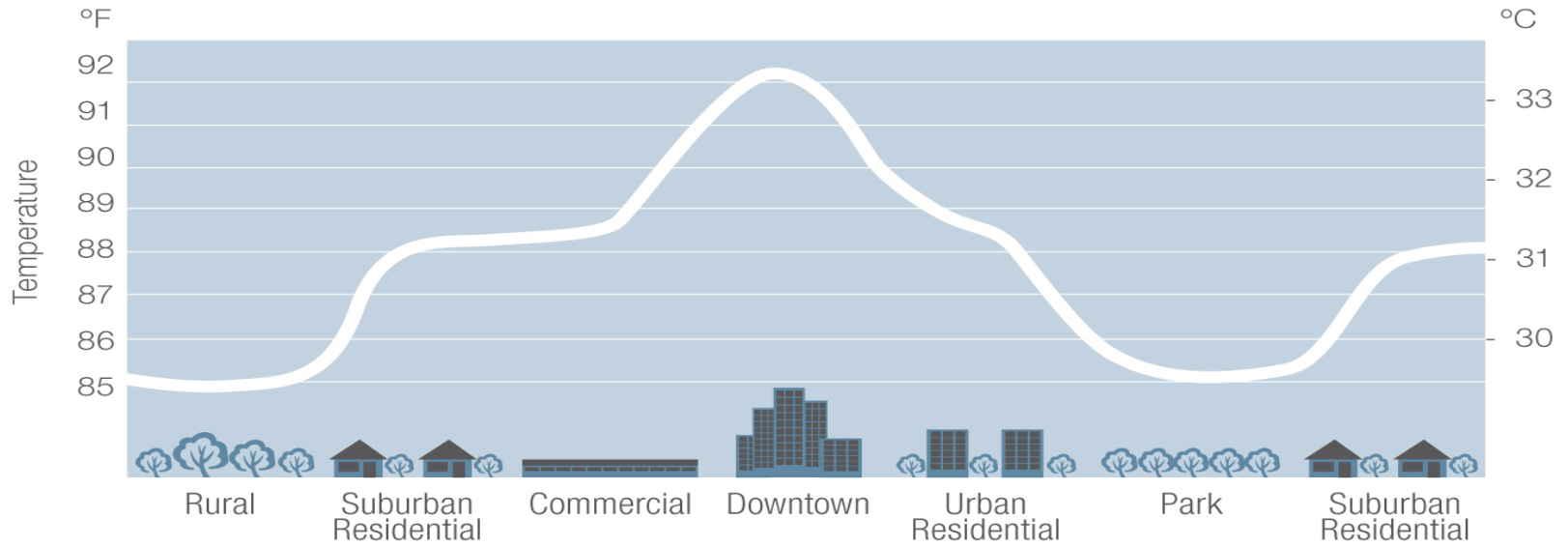
FP7-Regpot-2012-23-1



URBANIZATION



URBAN HEAT ISLAND



URBAN THERMAL ENVIRONMENT

A cityscape at sunset with a large bridge in the foreground. The sky is filled with warm, golden light from the setting sun, creating a hazy atmosphere. The bridge's steel structure is silhouetted against the bright sky. In the background, various city buildings and industrial structures are visible, including two tall chimneys on the left.

URBAN HEAT ISLAND EFFECT

Urban areas are warmer than their rural surroundings.

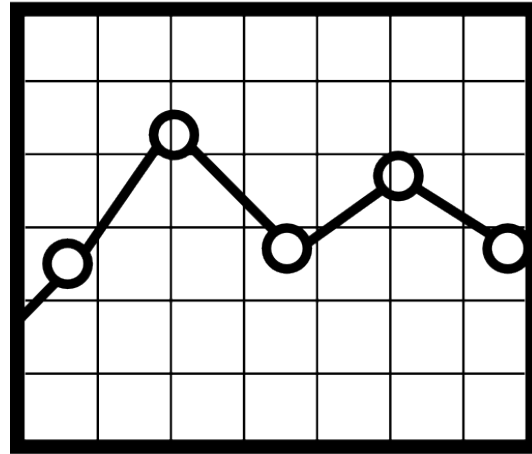
IMPACT ON URBAN POPULATION

Influences the wellbeing and safety of a large number of people.

HEATWAVES

UHIs prolong and intensify heatwave events.

DATA NEEDED



HIGH SPATIOTEMPORAL URBAN TEMPERATURE DATASETS

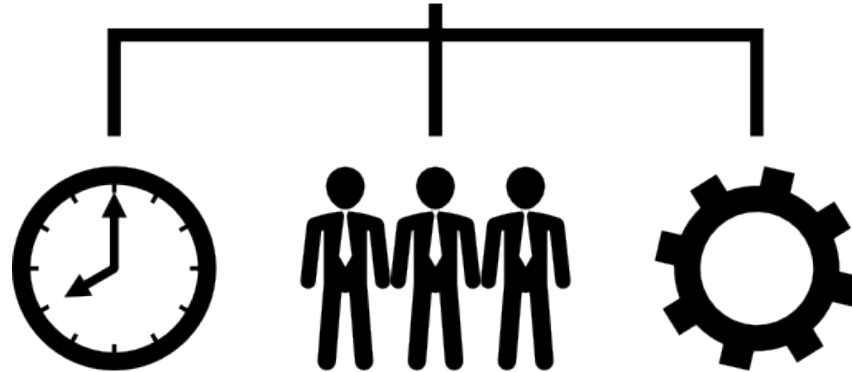
To assess the urban thermal environment we need an urban temperature dataset that can capture the diurnal evolution of a city's hotspots.

Ideally: a spatial resolution of 100 m and a temporal of < 1-2 h are required.

LACK OF DATA

Currently, no operational service to provide such datasets exists.

IAASARS/NOA SERVICE



IAASARS/NOA IMPLEMENTS SUCH A SERVICE

The goal set is to produce high spatiotemporal urban temperature data for a number of cities around the globe in real-time.

THE DEVELOPED SYSTEM EXPLOITS EO DATA

Thermal Remote Sensing is the only means available that can provide a continuous and simultaneous view of a city's thermal environment.

Summer **2014** – **1 product available** [DOWNSCALED LST (DLST)]

Summer **2015** – **6 products available** [DLST, AIR TEMP, TAPP, HUMIDEX, HEAT WAVE HAZARD, COOLING DEGREES]

MSG2-SEVIRI RSS



FP7-Regpot-2012-23-1

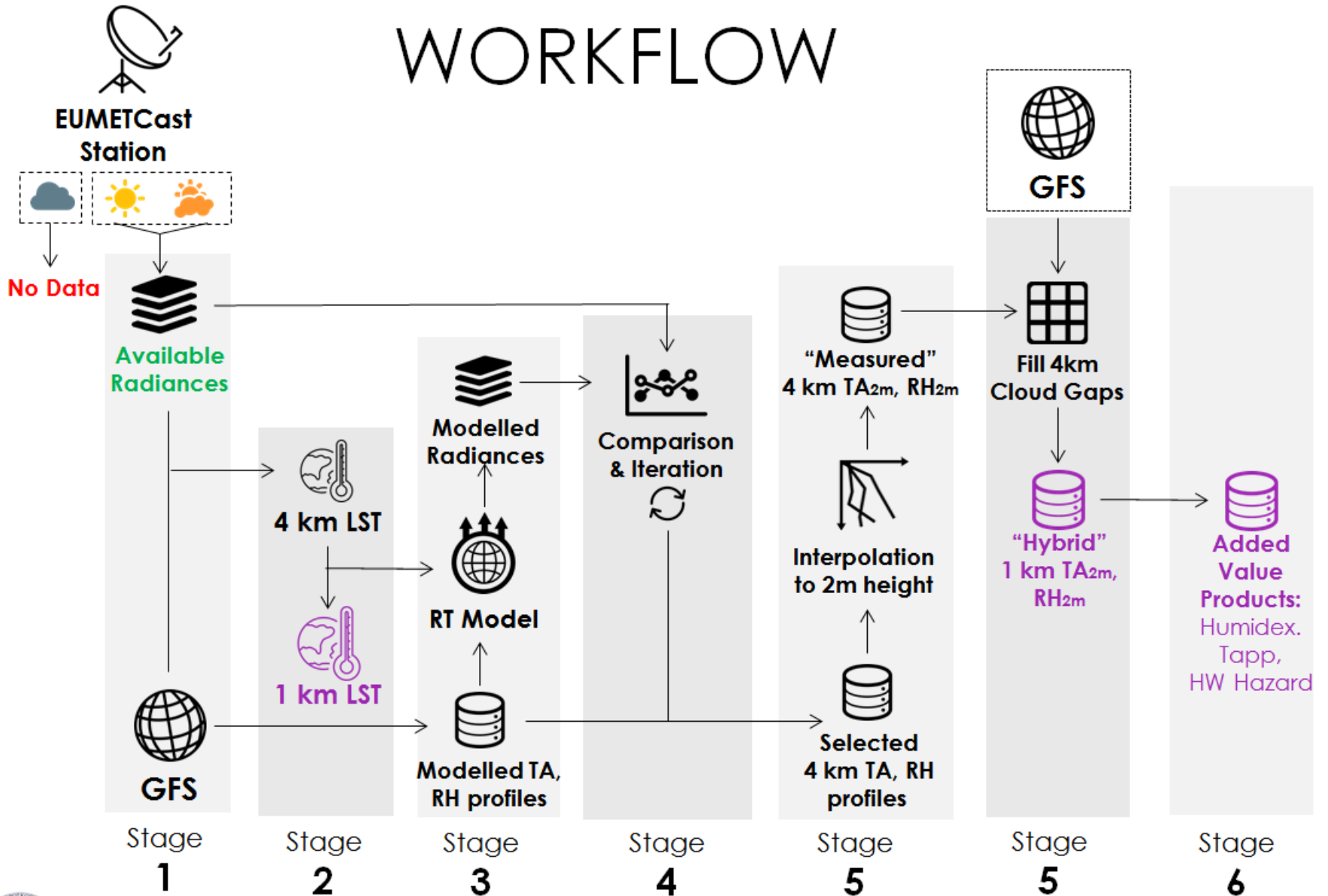
Geostationary Satellite

4 VNIR and **8 IR** Spectral Bands

3-5 km Spatial Resolution

5 min Temporal Resolution

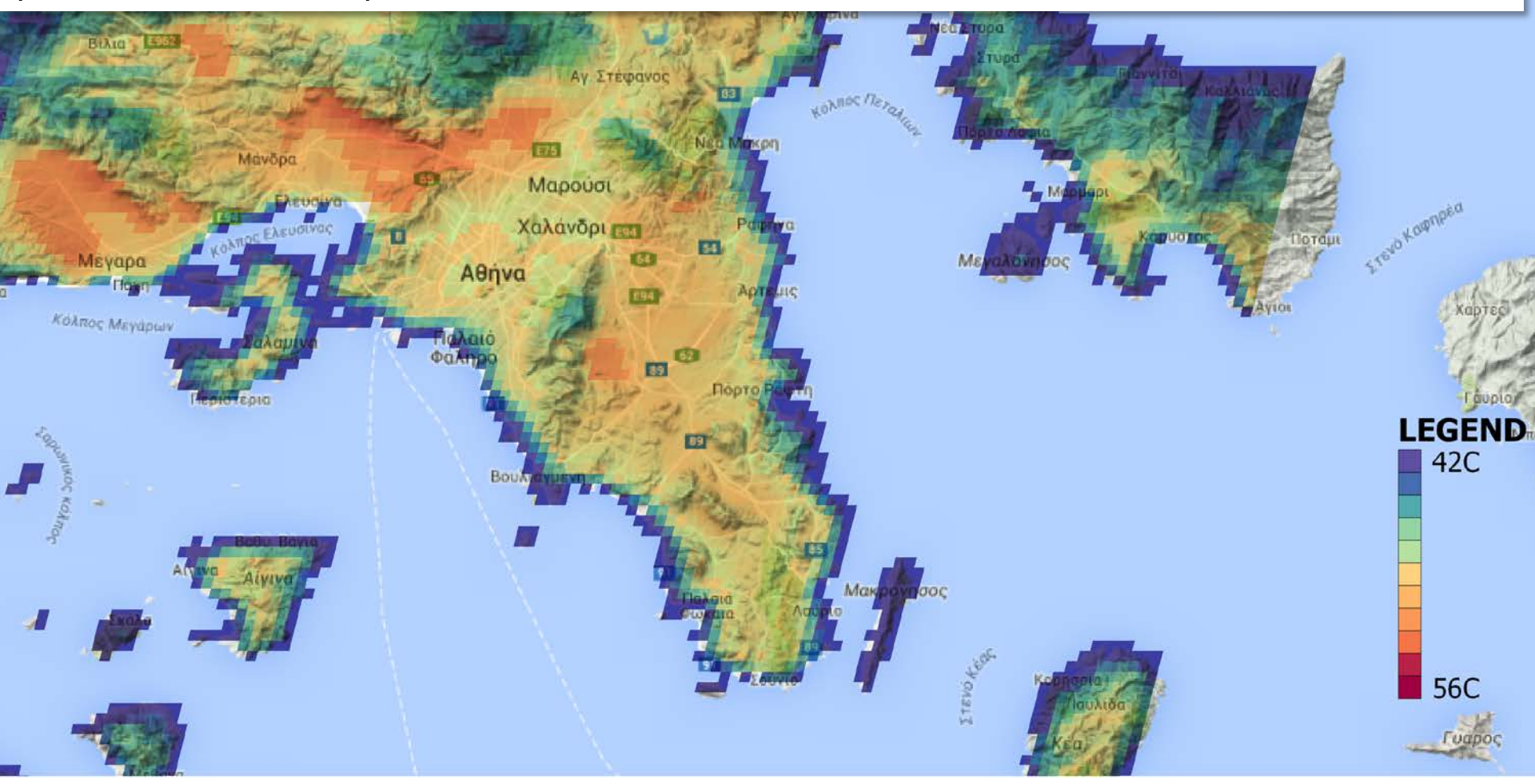
WORKFLOW





LAND SURFACE TEMPERATURE

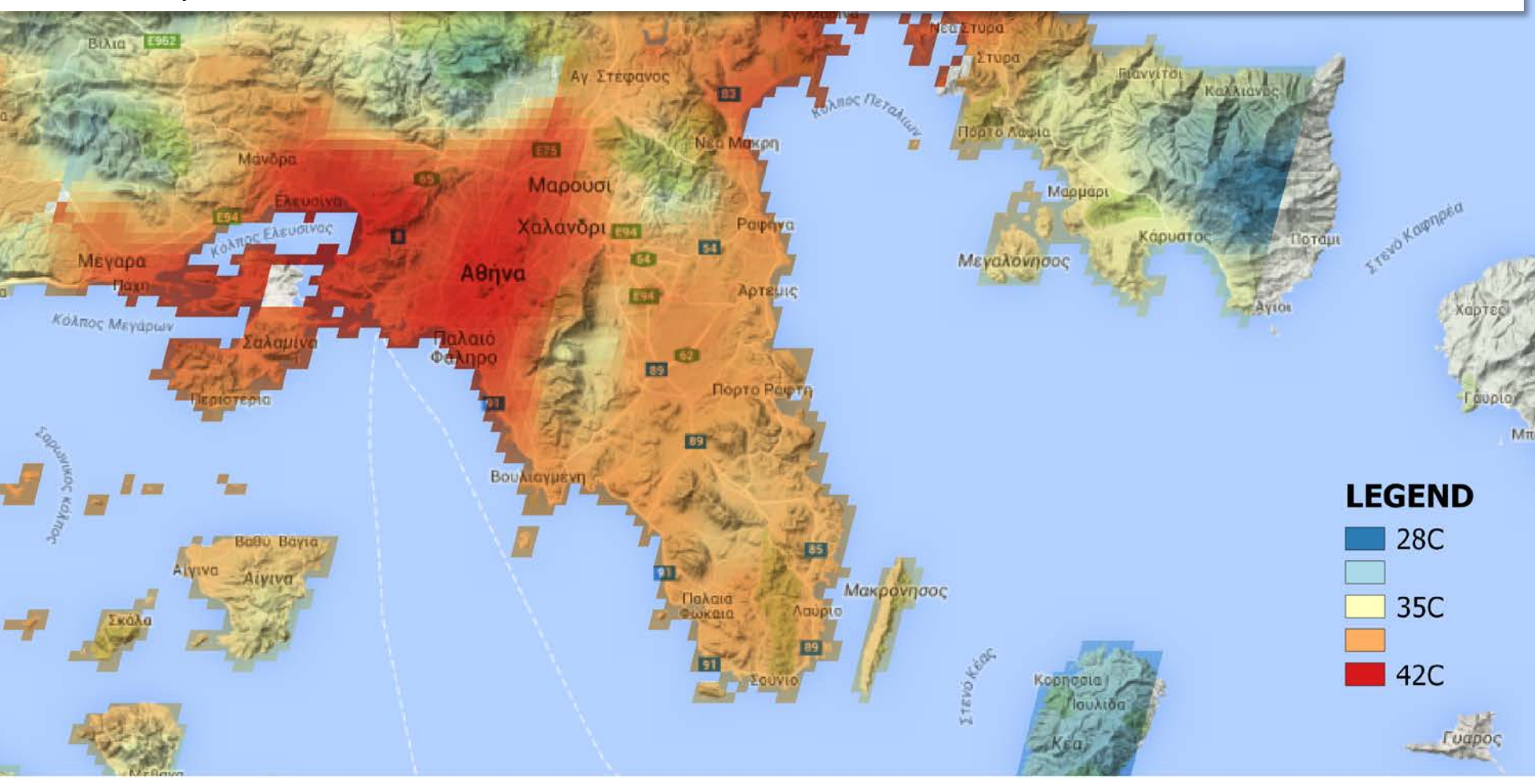
Land surface temperature is the radiometric temperature of the surface and an important factor for the determination of several biophysical parameters and processes.





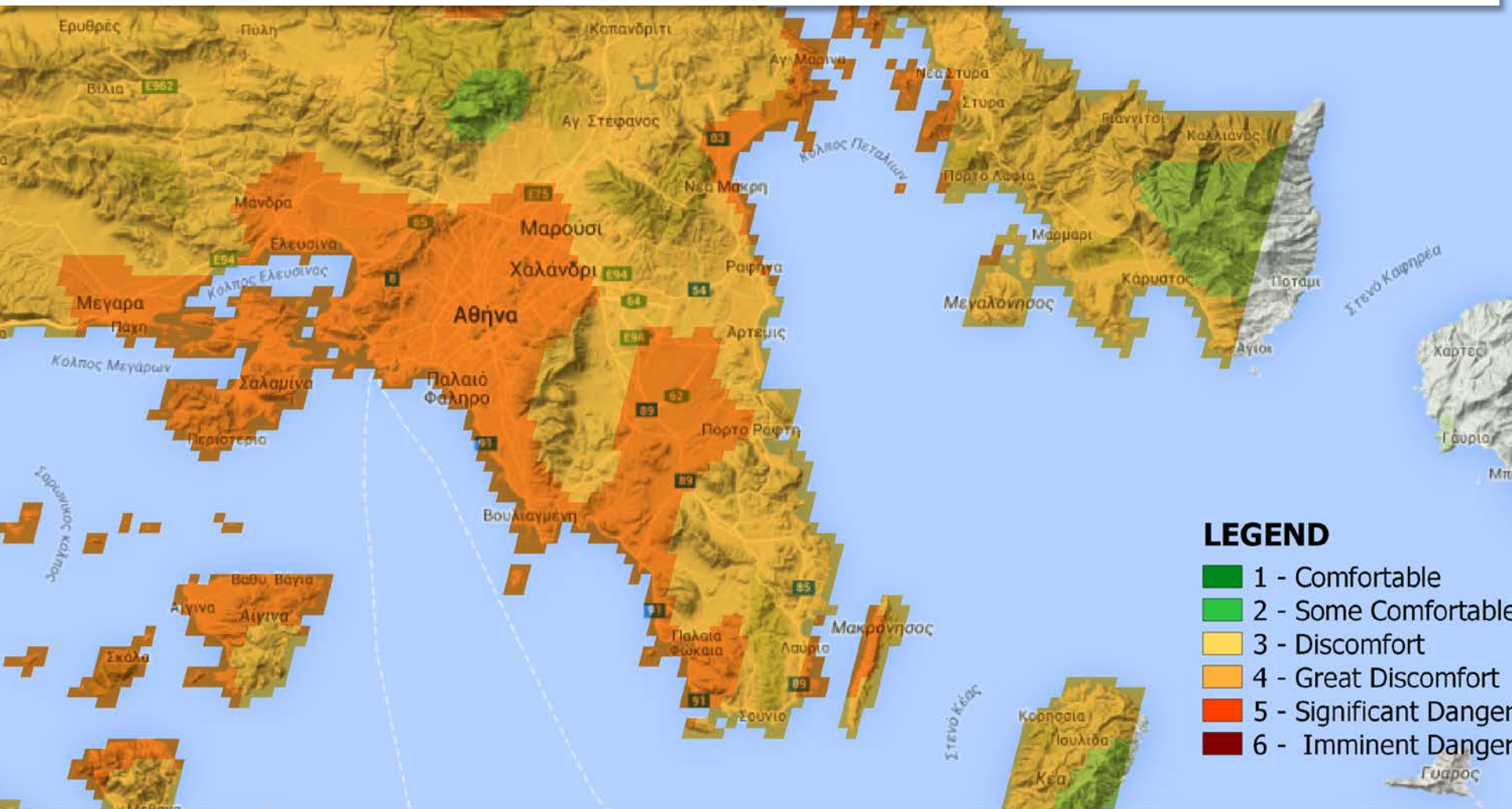
AIR TEMPERATURE (2m height)

Air temperature is a key parameter for monitoring urban heat islands, assessing heat related risks, and estimating building energy consumption.



HUMIDEX

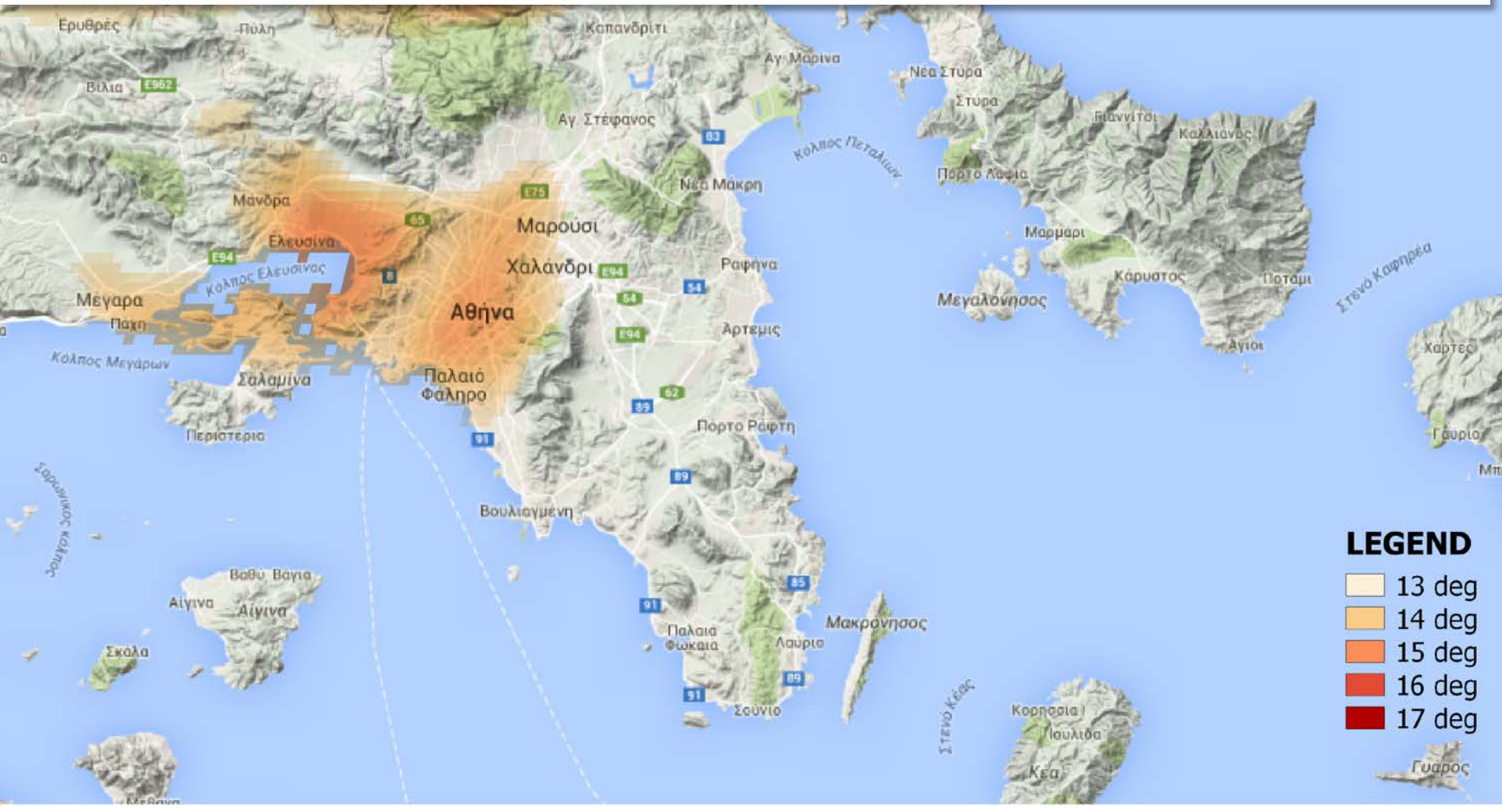
HUMIDEX is applied in warm periods and describes the temperature felt by an individual exposed to heat and humidity





COOLING DEGREES

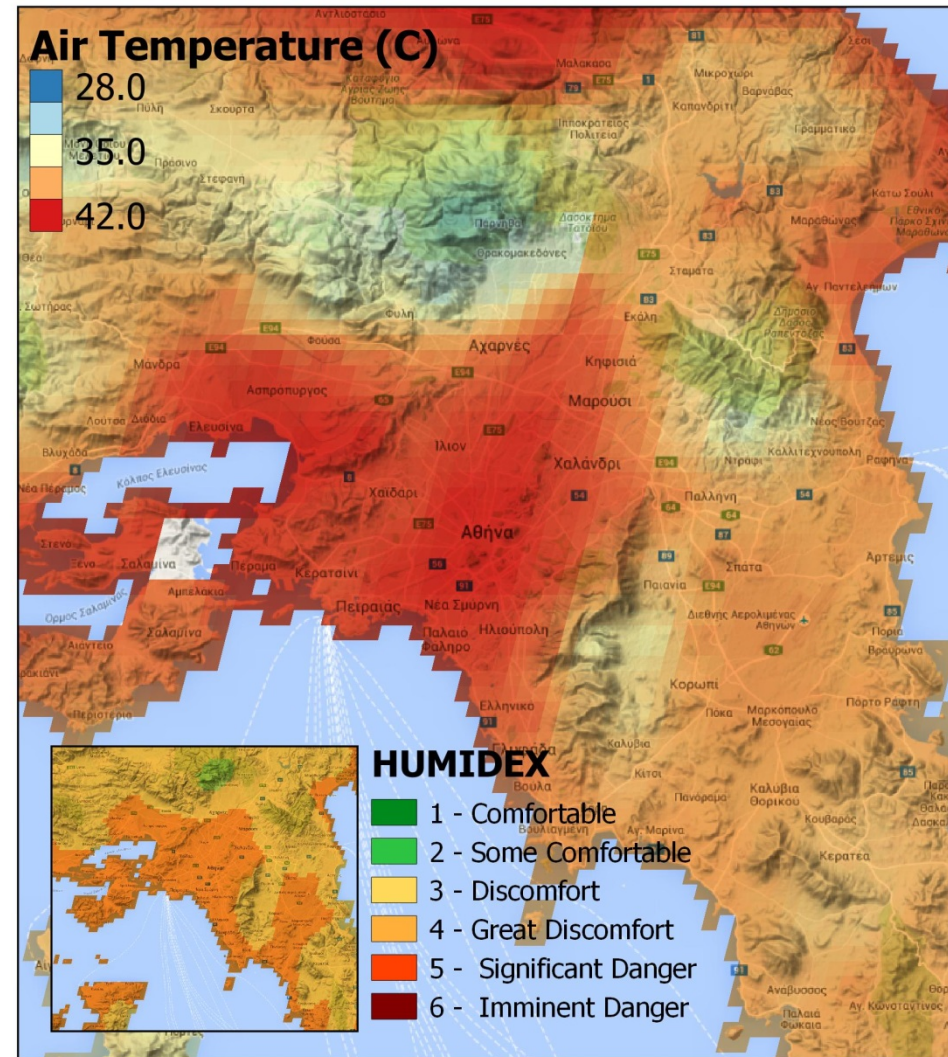
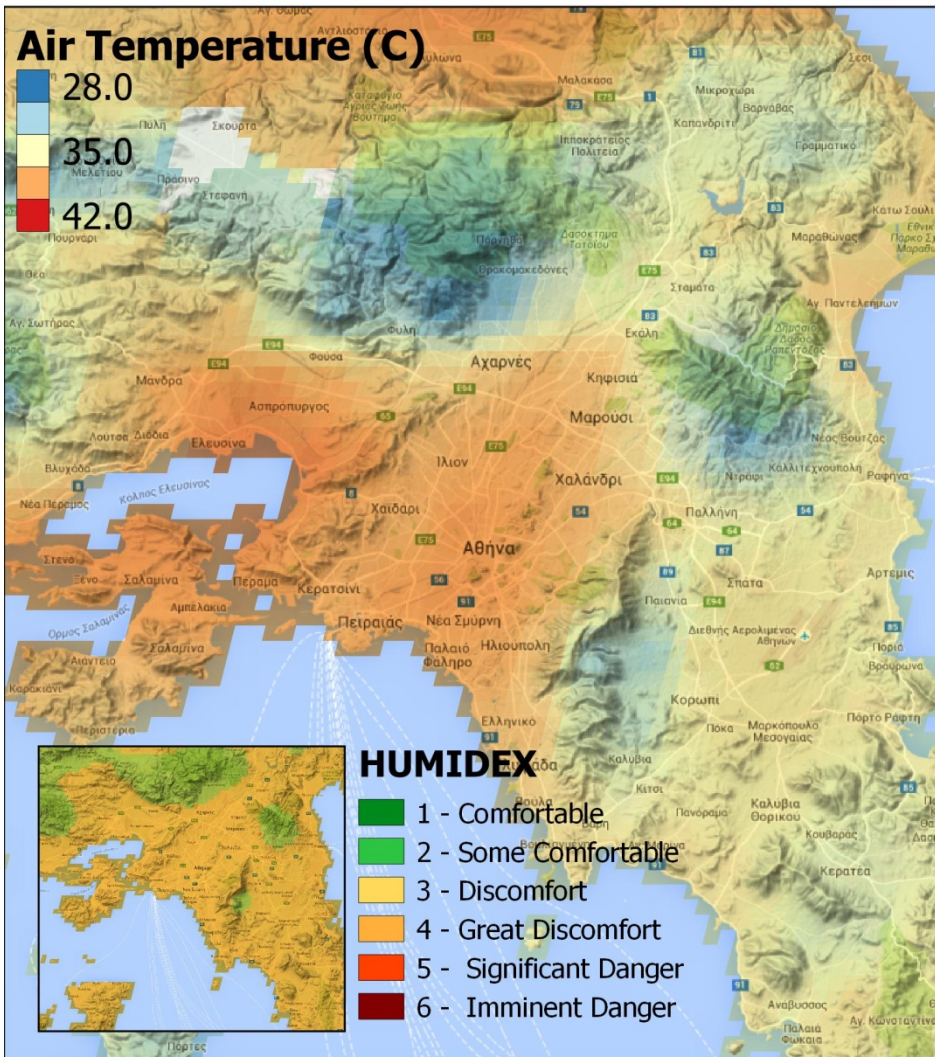
CD is a measurement designed to reflect the demand for energy needed to cool a building.



ATHENS SEPTEMBER 2015 HEATWAVE

September 5th, 2015 | 12:00 UTC

September 6th, 2015 | 12:00 UTC





Urban
Planning



Urban
Climate



Human
Health



Energy
Demand

PUBLICATIONS

7 Published Journal Articles + 1 Book Chapter



Sismanidis, P., I. Keramitsoglou, and C. T. Kiranoudis. 2015. "A Satellite-Based System for Continuous Monitoring of Surface Urban Heat Islands." *Urban Climate*. Elsevier B.V., 1–13.



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Thank you!

To find more details please visit:
beyond-eocenter.eu @ URBAN ENVIRONMENT

treasure.eu-project-sites.com

