**1st DestinE User eXchange 2023**

15th February 2023 | ESA-ESRIN | Frascati (Rm), Italy

Urban heat maps in support of EU adaptation policy (u-MAP)
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Cities are hot spots for climate change

Urban areas create their own climate because of the presence of buildings/roads and the lack of green, natural surfaces. This leads to creation of urban heat island and causes pluvial flooding during intense precipitation.

Climate Change 2022
Impacts, Adaptation and Vulnerability
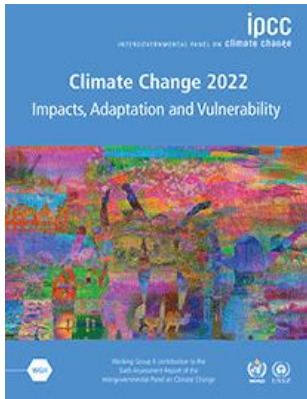
"In all cities and urban areas, the risk faced by people and assets from hazards associated with climate change has increased (*high confidence*) ...Evidence from urban and rural settlements is unequivocal; climate impacts are felt disproportionately in urban communities with the most economically and locally marginalized, most affected (*high confidence*)"

Extreme heat

Pluvial Flooding

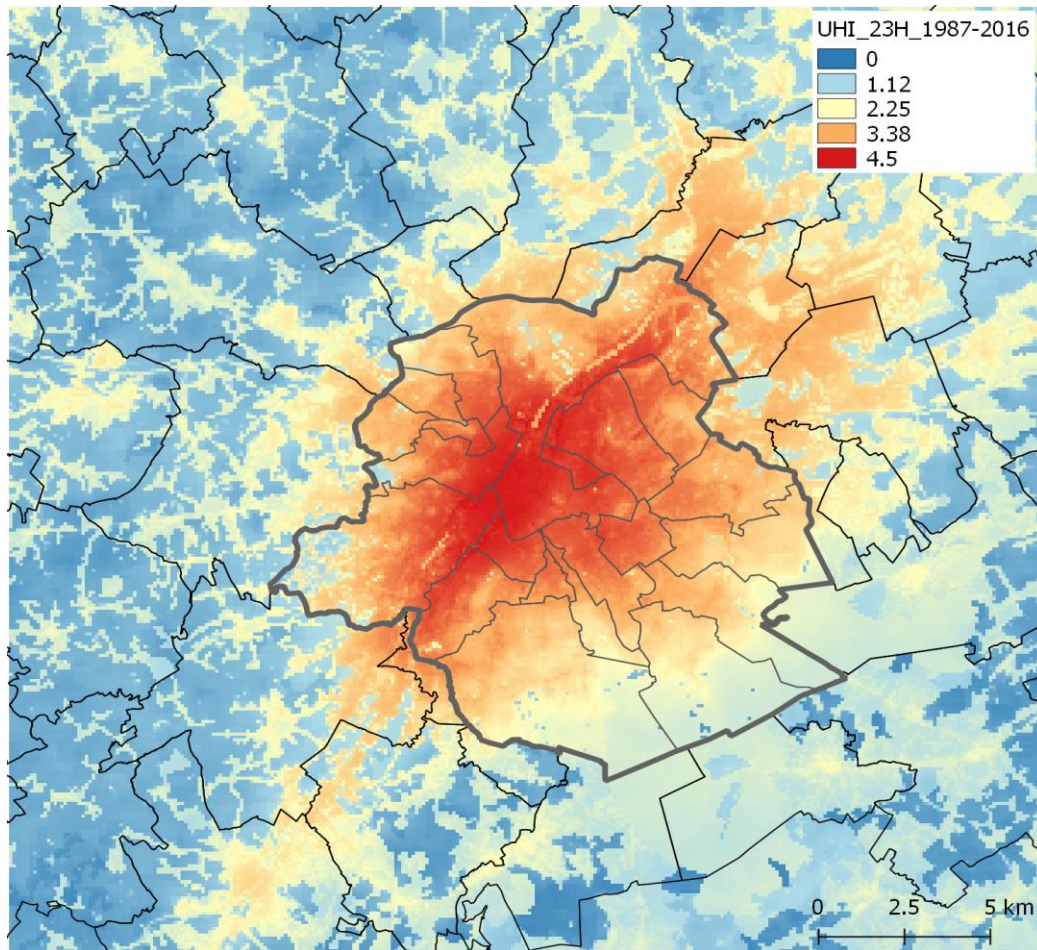Average 2m air temperature at 23h (moment of max UHI) during all summer months (June-August) of the years 1987-2016
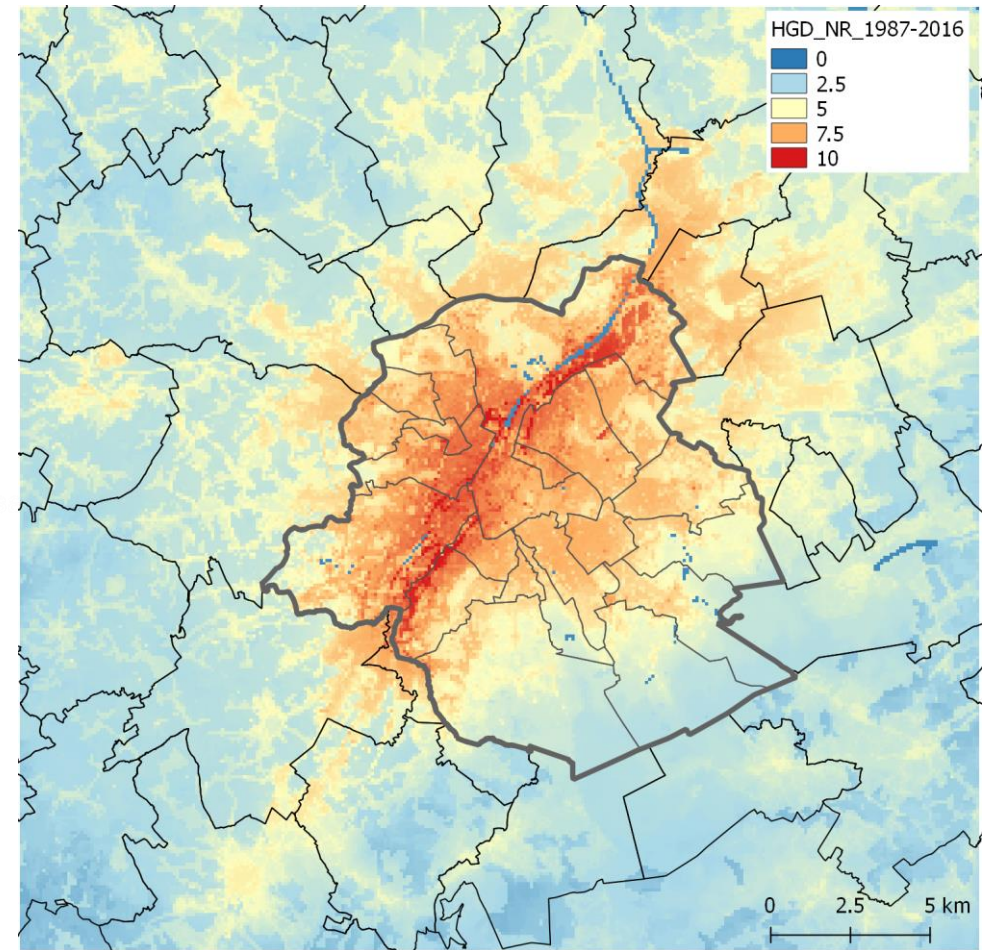
Average number of Heat Wave Days (tmax ≥ 30°C and tmin ≥ 18°C) per year for the years 1987-2016

Sector	Impacts	Impact indicators
Health	mortality, sleep depreviation, early birth	# heat wave days, # tropical nights, # tropical days # people exposed to heat risks, human comfort mapping, mortality
Energy	increased cooling demand, decreased heating demand	# cooling degree days, # heating degree days
Transport	human discomfort, infrastructure damage	# hours/days above human and infrastructure thresholds
Tourism	human discomfort, health impacts	# number of unfavorable days (using e.g. Holiday Climate Index)
Biodiversity	invasive species	suitability mapping (using climatic envelopes)
Economy	labor productivity losses	thermal comfort indicators

VITO UrbClim - urban climate model

The urban boundary layer climate model UrbClim is designed to cover agglomeration-scale domains at a high spatial resolution up to 100m. UrbClim consists of a land surface scheme containing simplified urban physics, coupled to a 3-D atmospheric boundary layer module.

The UrbClim® model

Input — UrbClim — Output

De Ridder et al., 2015, Urban Climate
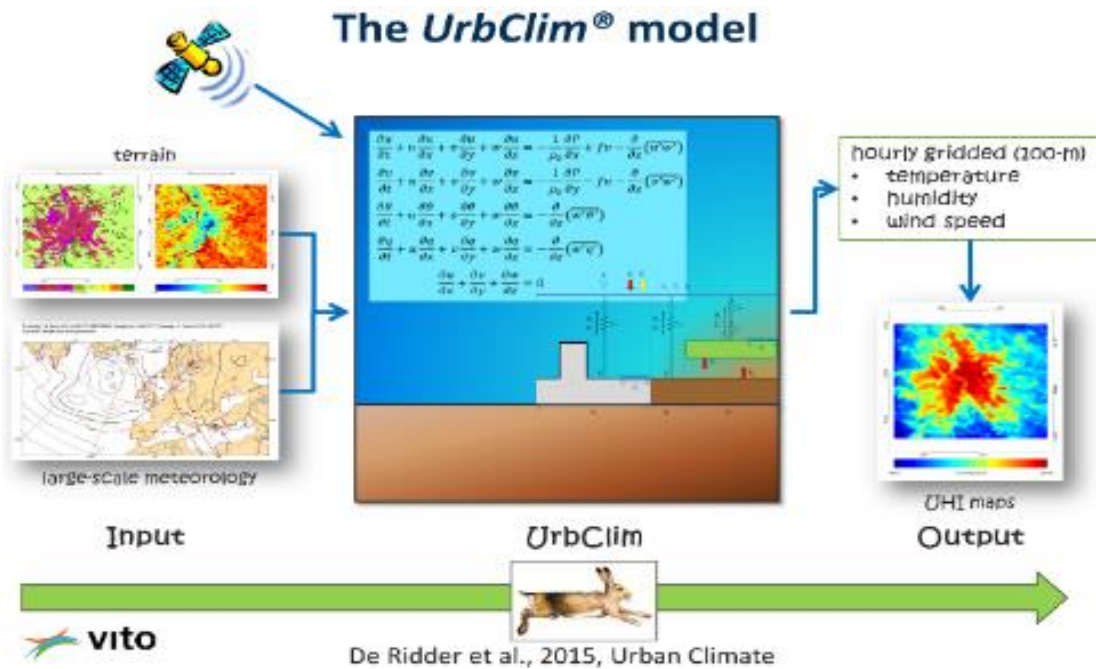
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European Commission Copernicus Europe's eyes on Earth IMPLEMENTED BY ECMWF Climate Change Service

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Climate variables for cities in Europe from 2008 to 2017

Overview   Download data   Documentation

The dataset contains air temperature, specific humidity, relative humidity and wind speed for 100 European cities for the current climate.

The data were generated using the urban climate model UrbClim, developed at VITO. This model was designed to simulate and study the urban heat island effect (UHI) and other urban climate variables at a spatial resolution of 100 metres. The unique capabilities of UrbClim allow to generate spatially explicit timeseries of hourly variables from which a variety of indicators can be retrieved in postprocessing at the scale of a city neighbourhood.

For this specific dataset, the ERA5 reanalysis large-scale weather conditions are downscaled to agglomeration-scale. UrbClim then computes the impact of urban development on the most frequent weather parameters, such as temperature and humidity.

The 100 European cities for the urban simulations were selected based on user requirements within the health community. Furthermore, a high spatial distribution was aimed with specific focus on Eastern European countries that often lack access to relevant information.

The data was produced on behalf of the Copernicus Climate Change Service.

Tmax Brussels
Summer 2008-2017

K
296.5
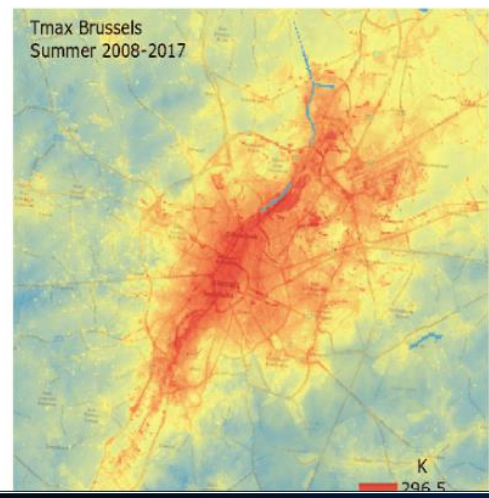
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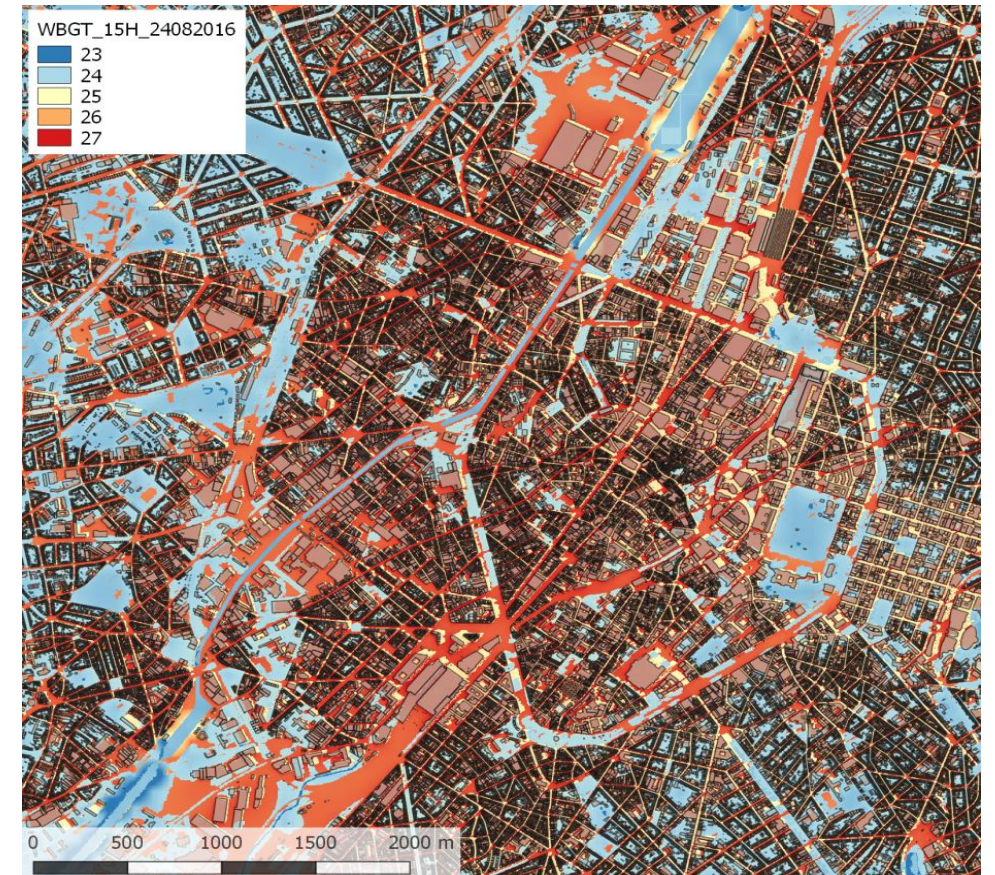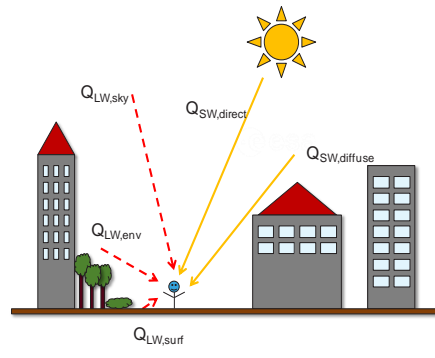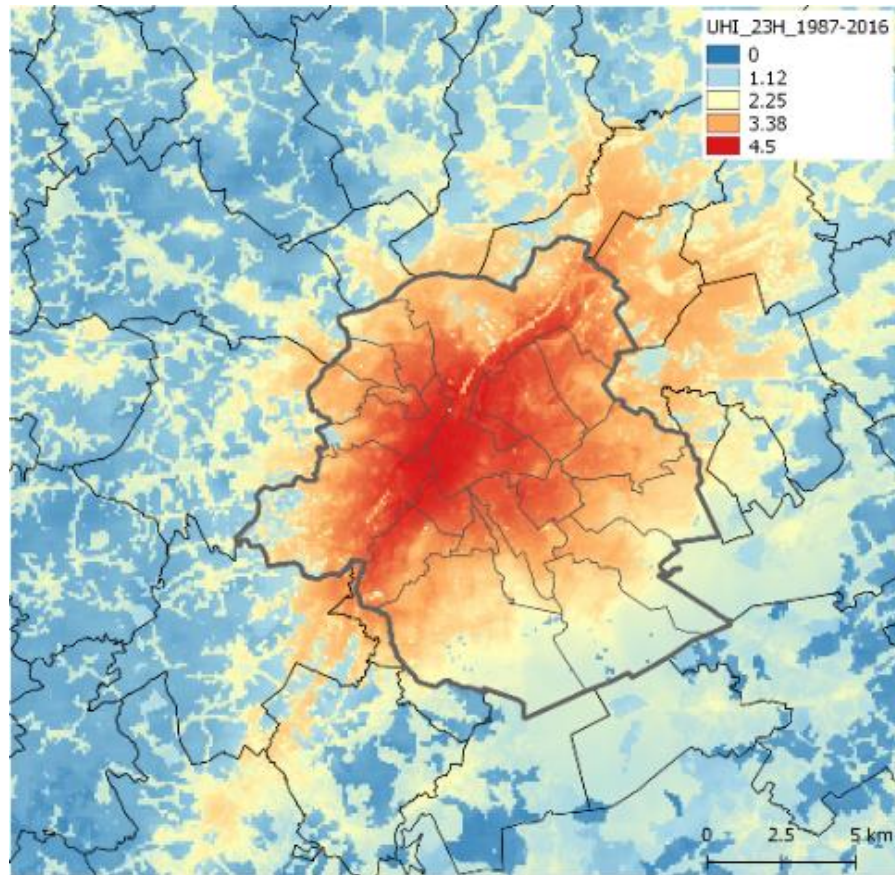Publication date

2019-12-04

References

Citation

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VITO UrbClim – added value

Destination Earth – Urban heat use case

- User community

  - DG REGIO, DG CLIMA, DG ENV, EEA, DG EMPL, …

  - Local administrations

- DestinE implementation

  - Climate change time horizon

  - Enhanced large-scale data will lead to increased quality of results

  - Flexible application