URBAN HEAT MAPS IN SUPPORT OF EU ADAPTATION POLICY (U-MAP)

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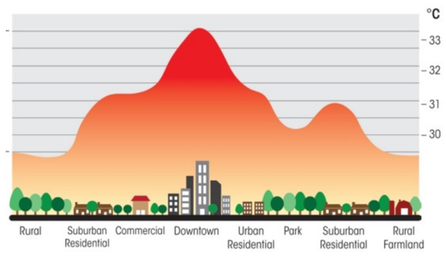
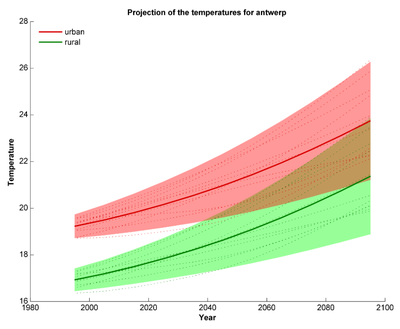
Problem statement

Cities subjected to heat stress

- Climate change leads to increasingly frequent and intense heatwaves in Europe
- Cities are especially at risk because of the urban heat island (UHI) phenomenon



Typical air temperature profile at night across a city



Projected average rural and urban summer air temperatures [°C] for the city of Antwerp under the RCP8.5 climate scenario.

Need for pan-European and local information

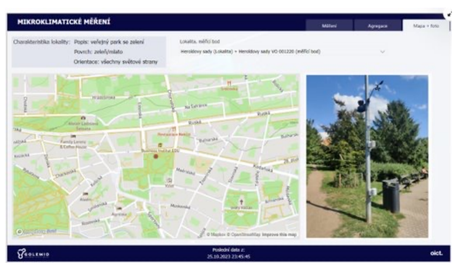
Mapping of urban heat risks in support of:

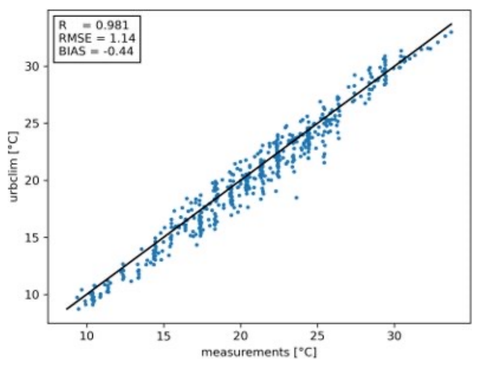
- European policy development and monitoring
  - Regional policy
  - Climate action (adaptation/mitigation)
  - Urban environment
  - Health policies
- Urban administrations
  - Adaptation planning
  - Spatial planning and building codes
  - Heat-health action plans and warning systems

Core users involved: DG REGIO, cities of Prague and Lisbon Metropolitan area

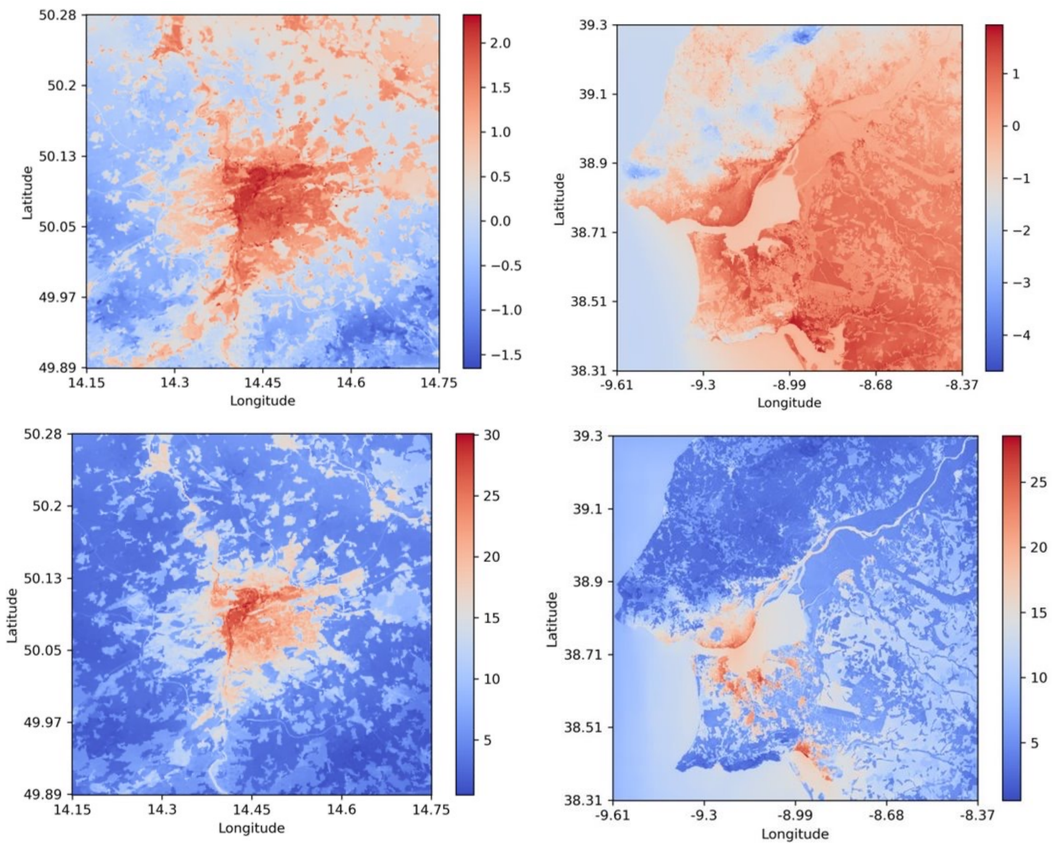
Envisioned urban service

- Heat stress calculations for recent past period (2011-2020) and future climate projections (2020-2040/2050)
- Calculation of advanced heat stress variables
  - Wet Bulb Globe Temperature (WBGT)
  - Universal Thermal Climate Index (UTCI)
  - Apparent Temperature
- Horizontal resolution of 100m, coverage of the entire metropolitan areas of Prague and Lisbon.
- Hourly output data as well as decadal overview maps
- Provision of indicators:
  - Urban Heat Island (UHI) intensity
  - number of heatwave days
  - exposure of the population to heatwaves
  - heat-related mortality
  - exceedances of health threshold levels
  - lost working hours
  - cool island identification.





Observed vs modelled daily maximum apparent temperatures (data for summer 2022 from 14 local stations in Prague, monitoring hourly humidity). Source: VITO.



Average UHI [°C] (top) and number of tropical nights (bottom) during the summer months, period 2011-2020, for Prague (left) and Lisbon (right). Source: VITO.

- Validation based on local measurement data
- Assessment of climate adaptation scenarios (in off-line postprocessing)
- Comparison of the DT Climate projections with IPCC CMIP6 global climate model results

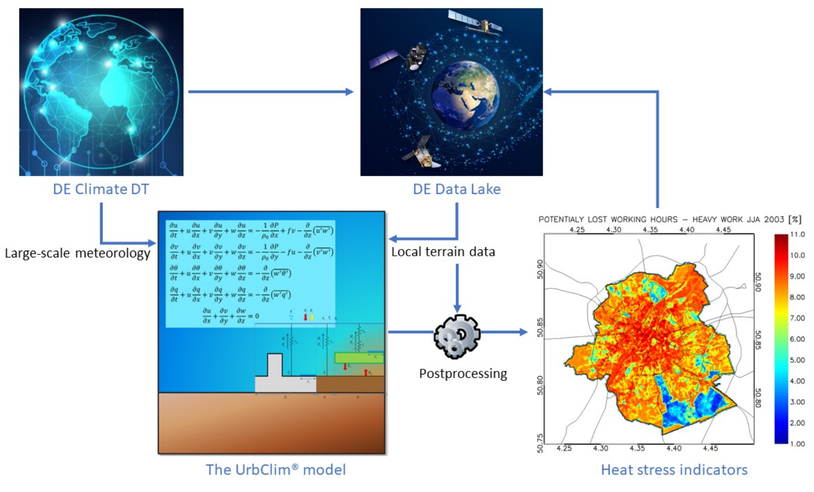
Key Innovations

Modelling capabilities

- Urban climate model, UrbClim®, nested within large-scale atmospheric output provided by state-of-the-art global climate models in the DestinE (DE) Digital Twin (DT) platform
- API to launch the service and interface to analyze the results

DestinE capabilities used

- Improved high resolution (5 km) global climate model output fields (Climate DT)
- Auxiliary data, e.g. terrain data accessed via the Data Lake
- Use of DT Engine interfaces and DE Core Services Platform



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