



CITYCLIM UPDATES

MARCH 2023

THIS ISSUE

Simulation and Mitigation

The UltraHD

Citizen Science Work

Heat Indices

DELIVERABLES

February and March were extremely busy with report writing and documentation of the consortium's progress within the deliverables. About a dozen deliverables had to be prepared for the commission to oversee the milestones of the ongoing project work in CityCLIM.

WHAT HAVE WE WORKED ON?

The first quarter of 2023 was very productive in terms of both: reporting on progresses as well as finishing the first Early Prototypes for the Citizen Climate Knowledge Services as well as the City Administration Services.

The Citizen Sensation Engine and its resulting Sensation map have been implemented in a web-widget, so it can be easily delivered to different Pilot cities, Citizen Science activities have started and the Pilot cities are eager to find the right locations for the weather stations that have been ordered and delivered to the Pilot cities.

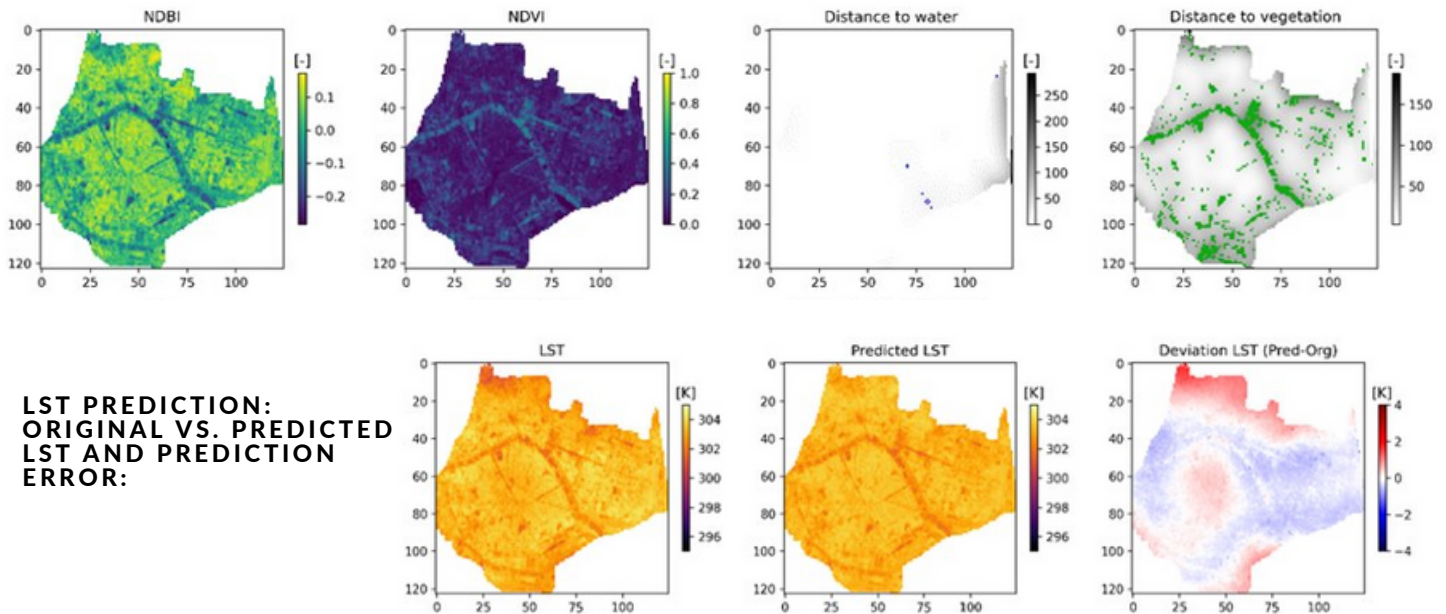
The consortium works together to integrate the evolving products and services into the CityCLIM framework and has reported its progress in various deliverables covering the GCCP, the Citizen Knowledge and Administration Services, the support services like the space-borne data processors as well as the EO-based Heat Island Identification has also seen vast developments and the detailed UltraHD specification as well as its setup have been successfully completed.



HEAT ISLAND SIMULATION AND MITIGATION STRATEGIES SERVICE

EXAMPLE FOR VALENCIA CITY CENTER

2D LAND SURFACE PARAMETERS CURRENTLY USED TO PREDICT LST:



The EO-based "Heat Island Simulation and Mitigation Strategies Service" presents a scenario tool developed by OHB SYS where users from city administrations or the interested public can explore how Land Surface Temperature (LST) in a city changes when urban characteristics are modified (e.g., surface material as sealed, urban green or water surface or the building geometry). In the CityCLIM early prototype, a model was set up predicting LST from urban characteristics. This model underlies the simulation service. Over the next months, the model will be refined, 3D urban morphology parameters will be included, the scenario facilities will be added, and the engine will be integrated on the CityCLIM platform

KARLSRUHE

- Karlsruhe is working on concept ideas of how we want to integrate the citizen science project in the city.
- We work on our inputs for the deliverables that should be ready at the midterm of the project.
- We continued the planning for installing weather stations in the city.

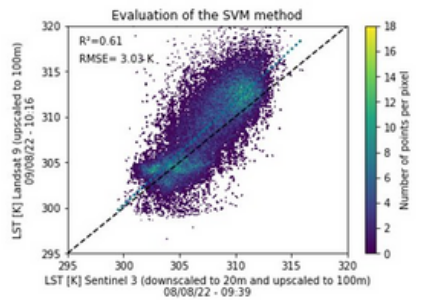
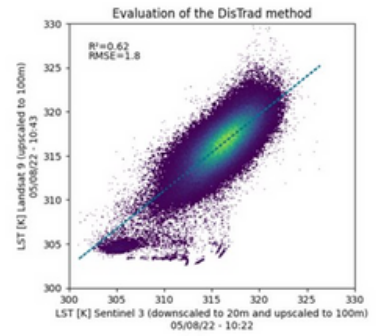
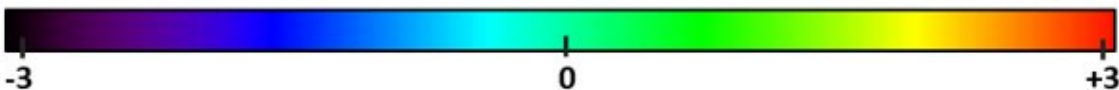
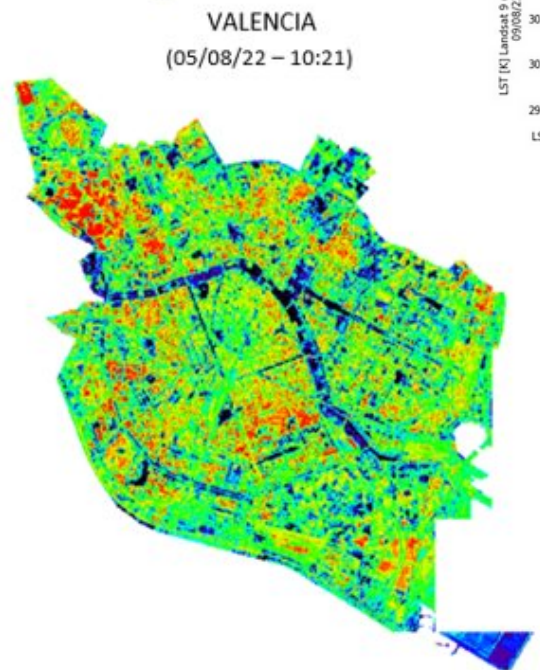
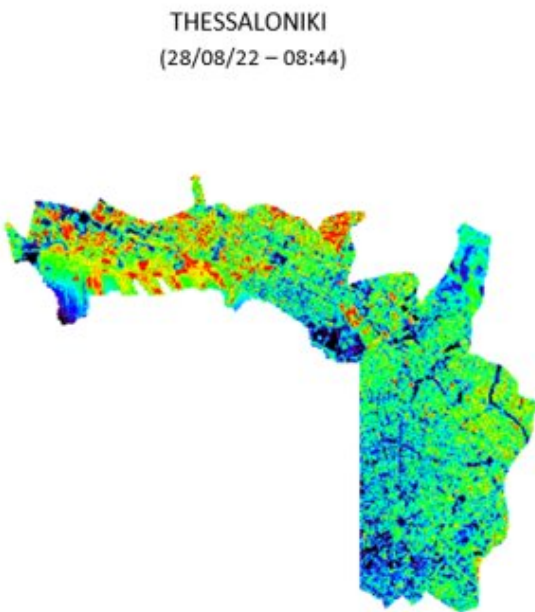
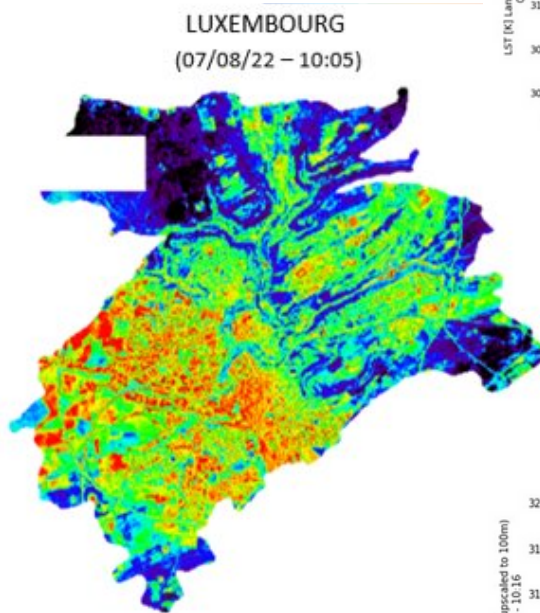
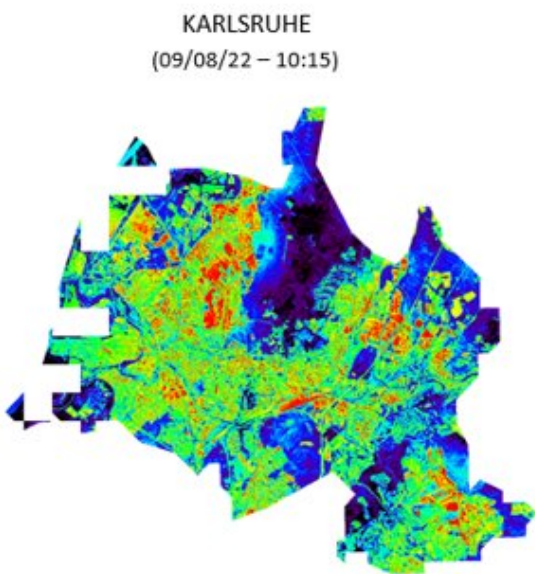
GCCP

Work on the GCCP specification has been completed, paving the way to focus on implementation. The first phase of this implementation has already been completed, as early prototypes of GCCP components have been developed and installed by OHB-DS and ATB. One of the early prototype components implemented is the central GCCP Identity Management, which is the responsibility of ATB Bremen. In cooperation with OHB-DS, the City Climate Services have been integrated into the Identity Management component, enabling the first secure use of these early prototypes with simple single sign-on authentication to the City Climate Services. In the coming months, the various components will be further integrated, the features from the specification will be implemented iteratively and the system will be made ready for pilot use.

EO-BASED HEAT ISLAND INDEX

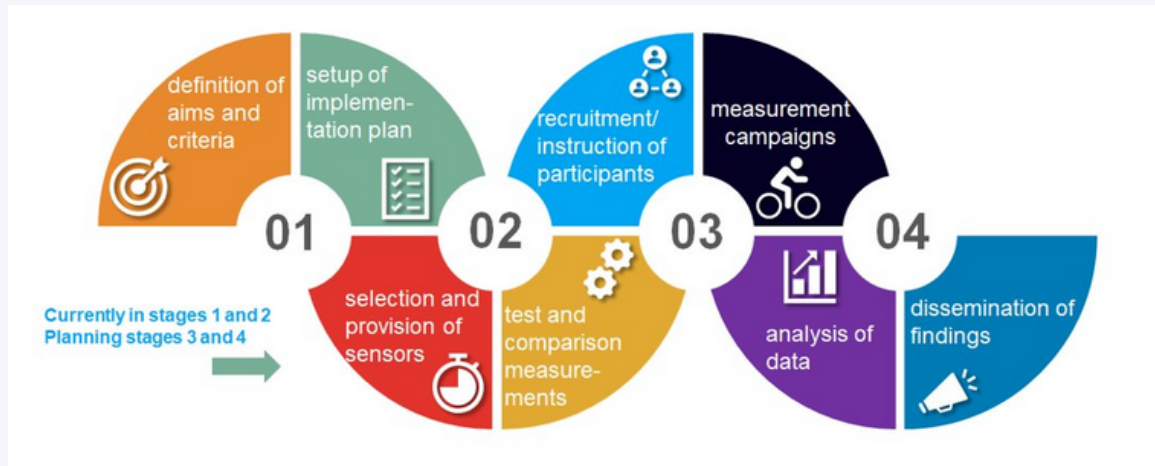
Also, EO-based surface urban heat island (SUHI) maps are being calculated for each one of the pilot cities. In the following figure, cold areas (e.g. parks, rivers) are highlighted with blue colors, while impervious hot areas are highlighted in red.

New downscaling models are being implemented in order to compare and select the best performing method, we're tuning Machine learning (ML) models to predict the fine scale LST using new explanatory variables (e.g. NDVI, NDBI, SAVI)



CITIZEN SCIENCE

Initial meetings with pilot cities to set up citizen science activities have begun.



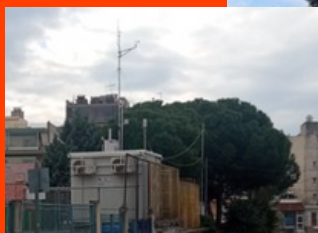
Those involve first defining the aims of the city, the types of activities to achieve these aims, and the following planning steps in order to carry out the proposed activities. We have also ordered the sensors for the citizens and they are on the way.

RCM (THESSALONIKI)

- Looking for places to install the weather stations. Contacts with the Environmental department that already has installed several air-quality stations.
- Contributing to the deliverables that have to be delivered by the end of March.
- Contacts with the National Observatory of Athens (NOA) to provide with historical weather data as inputs for the forecast model.



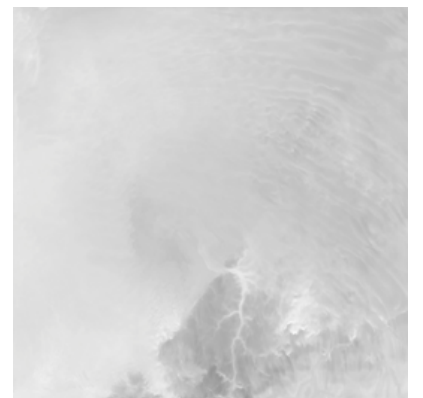
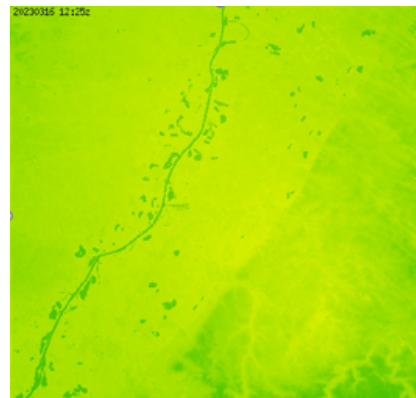
SOME OF THE POSSIBLE LOCATIONS FOR THE WEATHER STATIONS



THE ULTRA HD

The UltraHD weather prediction model is constantly refined and improved by adding more complicated model physics to it and thus improving the resulting forecast. These pictures are taken out of a loop. Within the Administration services, these maps can be looked at with a visual overlay of streets and other land marks.

There has been development also on the setup of the sensation map for Luxembourg on a free-scale map widget provided also by MTL.



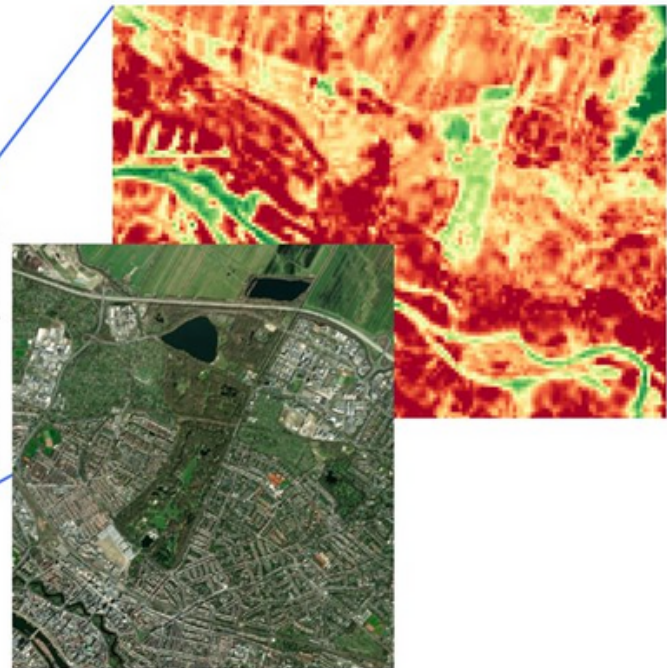
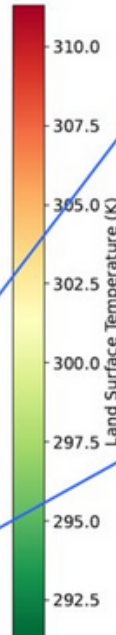
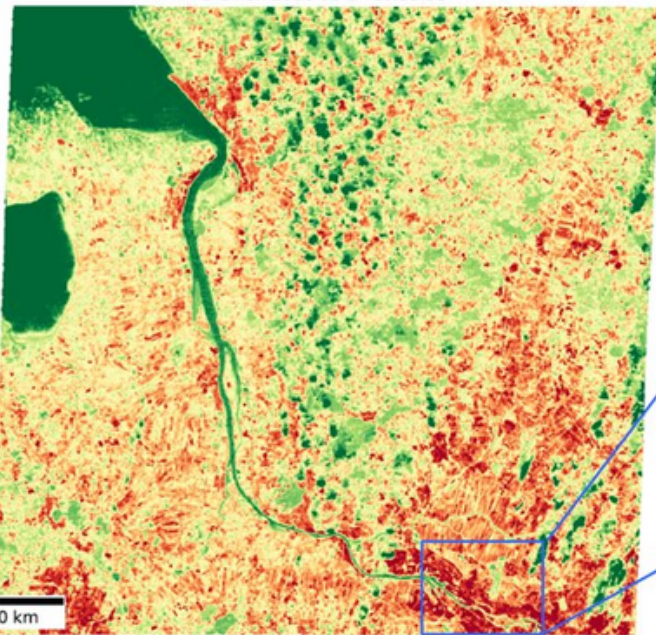
Pictures left and right down: Sunny Day (2023-03-16) in EP-Karlsruhe (2m-Temperature, relative Humidity). Picture upper right: Sensation map.



SPACEBORNE DATA PROCESSOR

Northern Germany may be famous for many things, yet hot summers is not one of them. Nevertheless, the correlation between higher surface temperatures and man-made surfaces is clearly visible even here.

Bremen 2018-06-27 10:33:53



We have tested algorithm prototypes for retrieval of land surface temperatures from thermal infrared radiation by re-processing data collected by the space-borne ASTER instrument. The 90 m resolution of ASTER is generally too coarse to resolve urban features, but it is sufficient to highlight the temperature difference between cities and their surroundings. Similarly, larger parks like the Bremen Bürgerpark can be discerned and underline the cooling effect of urban greenery.

To resolve more delicate features, other data sources like airborne sensors or next-generation satellite systems are required. These may be complemented by algorithmic downscaling methods exploiting the empirical relationship between surface temperature and land cover. Both approaches are covered by the CityCLIM project.