City Administration Services: A User Guide

A comprehensive overview of CityCLIM's City Administration Services, detailing their functions, benefits, and application in urban management.

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Foreword

Dear Reader,

Welcome to the user manual of the City Administration Services, a key result of the CityCLIM project. Our initiative is dedicated to providing urban planners and city administrators with advanced tools and insights for effective environmental management in urban settings.

Cities today face a variety of environmental challenges, from heat islands to air pollution. The CityCLIM project addresses these issues head-on, offering a range of services specifically designed to identify, analyse, and mitigate urban environmental concerns. Our suite of services, including Heat Island Identification, City Air Flow Analysis, Pollution Area Detection, and their respective simulation and mitigation strategies, are tailored to empower city administrations or anyone who's involved in making decisions about a city's future with the necessary data and strategies for informed decision-making.

In this user guide, we will delve into each City Administration Service, demonstrating their practical application and effectiveness in real-world scenarios. You will gain insight into how each service operates, the kind of data it provides, and how this information can be leveraged to create healthier, more sustainable urban environments.

Our goal with these services is not just to offer solutions, but to equip decision makers with the means to proactively manage and improve their urban environments through informed planning and strategic implementation, to make cities more liveable and resilient.

Join us as we explore the capabilities and benefits of the City Administration Services under the CityCLIM project, your partner in urban environmental management.

Sincerely,

The CityCLIM Consortium

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Abbreviations

2D	two-dimensional
3D	three-dimensional
ANN	Artificial Neural Network
CSV	Comma-separated values
D	Deliverable
DI	Discomfort Index
e.g.	Exempli gratia = for example
EO	Earth Observation
etc.	et cetera.
GUI	Graphical User Interface
i.e.	id est = that is to say
LST	Land Surface Temperature
SUHI	Surface Urban Heat Island
UFTVI	Urban Thermal Field Variance Index
UHIII	Urban Heat Island Intensity Index
UltraHD	Ultra High Definition
UTC	Coordinated Universal Time

1 Introduction

CityCLIM provides cities with specialised data-driven services to understand and address urban climate challenges, such as the Urban Heat Island Effect. This user guide is dedicated to the commercially offered City Administration Services from the service portfolio of the CityCLIM project which support the identification of different aspects of city's climate profile and moreover allow to investigate and evaluate effects of simulated changes to urban areas. The user guide details the functions, benefits, and applications of these services and explains how they enable various key stakeholders, such as government agencies (e.g., environmental, health, planning), building authorities, insurers, or real estate developers, to analyse and simulate urban climate patterns in selected cities.

The City Administration Services are divided into two main categories:

(1.) **Identification Services**, which offer statistical analyses with customisable configurations related to the themes heat, pollution and city airflow, that rely on aggregated results from past UltraHD weather model runs.

(2.) **Simulation and Mitigation Services**, which offer simulation features to estimate and visualise the impact of simulated changes in the urban landscape.

The user guide is structured as follows:

- **Chapter 2** provides detailed information for using the City Administration Services. It begins with an onboarding procedure in section 2.1, outlining the steps to access the service GUIs. Section 2.2 covers the use of the Identification Services, including the Earth Observation (EO)-based Heat Island Identification Service (2.2.1) and UltraHD-based Identification Services (2.2.2). Section 2.3 explains the use of the Simulation and Mitigation Strategies Services, covering the EO-based Heat Island Simulation and Mitigation Strategies Service (2.3.1), the UltraHD-based Simulation and Mitigation Services (2.3.2), and the Simulation Editor (2.3.3).
- **Chapter 3** provides information on where to find further support and how to make contact.

2 City Administration Services

This chapter describes the usage of the City Administration Services. An overview is given in Table 2-1.

Table 2-1: Overview of City Administration Services.

City Administration Services	Description	Usage in Section
Identification Services		
EO-based Heat Island Identification Services	Provides Land Surface Temperature (LST) maps and indices using only purely EO data to identify urban heat islands.	2.2.1
UltraHD-based Identification Services	Offers statistical analysis of heat, pollution, and airflow using aggregated UltraHD weather model data.	2.2.2
Simulation and Mitigation Strategies Services		
EO-based Heat Island Simulation and Mitigation Strategies Service	Simulates and visualises the impact of urban landscape changes on heat patterns using purely EO data and machine learning.	2.3.1
UltraHD-based Simulation Services	Analyses the effects of mitigation activities on heat, pollution, and airflow through user-manipulated scenarios in UltraHD simulations.	2.3.2
Simulation Editor	A service for manipulating urban characteristics to create scenarios for analysis with UltraHD simulations.	2.3.3

To access these services via the web-based graphical user interfaces (GUIs), an onboarding procedure needs to be completed in advance to get CityCLIM account, described in Section 2.1.

All services are powered by an advanced full-physics weather forecast model processor designed specifically for high-precision, short-term weather forecasting. This focus allows the simulation services to provide accurate, actionable insights for assessing mitigation measures in relation to current local climate conditions that are already influenced by climate change.

The City Administration Services form a substantial part of the implemented workflows within the CityCLIM project, where more detailed information on CityCLIM as a whole can be found in the handbook “Towards a Green Future with CityCLIM: A Handbook for Interested Cities” (CityCLIM Consortium, 2023b) or as short fact sheet in the “Deliverable 6.6 - Optimised City Administration Services” (CityCLIM Consortium, 2024).

2.1 Onboarding Procedure

The access to the CityCLIM City Administration Services requires a prior registration to get a CityCLIM account, which will be used for login as described below. To get the needed links to access the chosen City Administration Services and account management, please get in contact with the CityCLIM administration team in advance (see section 3).

Account Registration

To create a CityCLIM account, access the central account management (see Figure 2-1) using the provided links from the CityCLIM administration team.

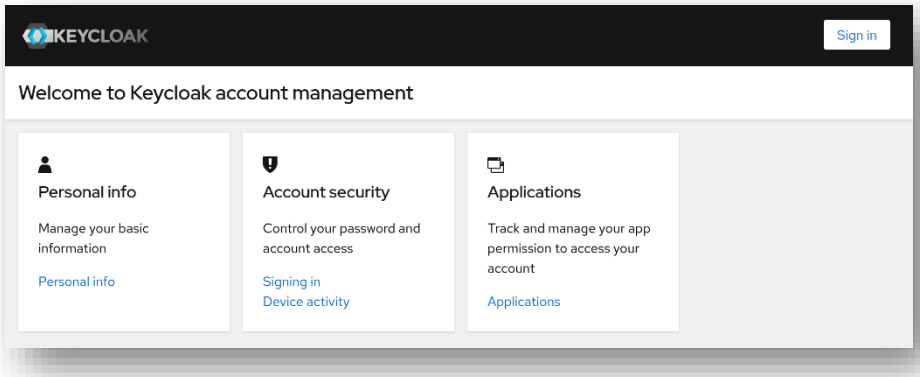


Figure 2-1: CityCLIM Account Management Software.

On the homepage click on "Sign In" (see button in the upper right corner in Figure 2-1) to navigate to the sign-in page (see Figure 2-3). On the bottom of the sign-in page click on "Register" to get to the registration page shown in Figure 2-2. Complete the registration form and click on "Register". After a few moments, an email with a confirmation link will be sent. Clicking on this link completes the registration process.

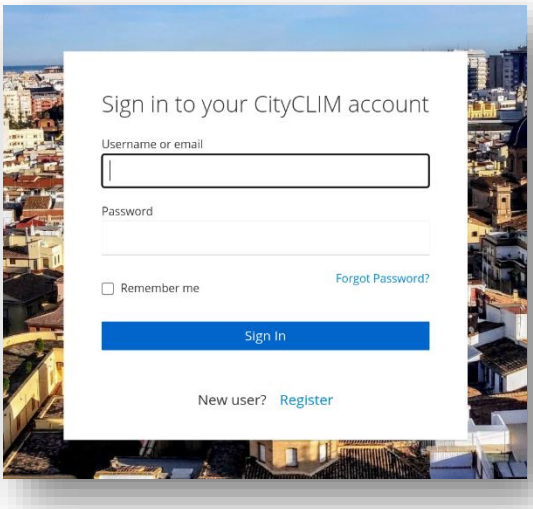


Figure 2-3: Sign-In page.

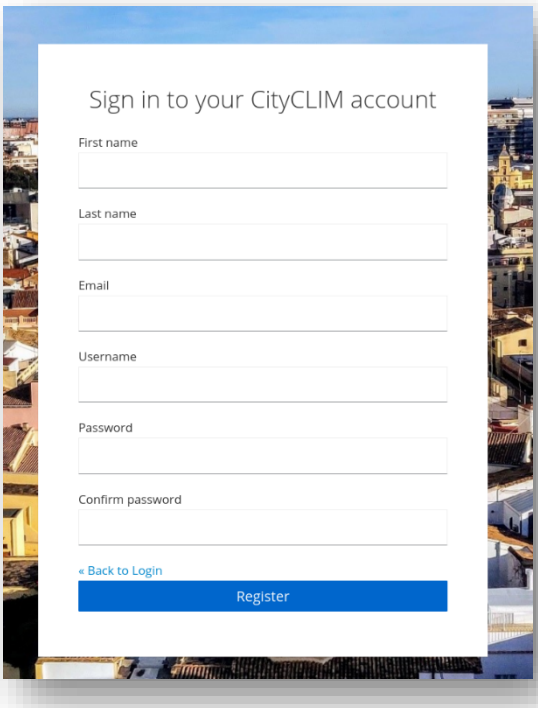


Figure 2-2: Registration page.

Login/Sign In

To access the City Administration Services, use the direct links provided by the CityCLIM administration team. If not already logged in, the system will redirect to the sign-in page (see Figure 2-3) for authentication. After logging in, it will redirect back to the originally requested service.

Update Account Information

To change account information, such as name or email address, or to delete the account, navigate to the sign-in page (Figure 2-3), sign in, and on the account page, click "Personal info". In the upcoming page (see Figure 2-4), perform the needed actions.

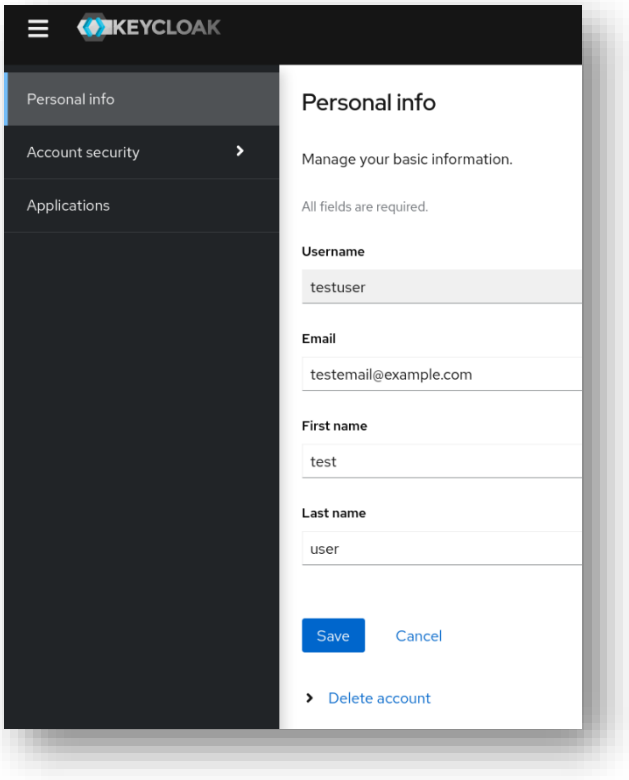


Figure 2-4: Account information.

2.2 Identification Services

The Identification Services offer on-demand statistical analysis of the urban area for heat-related environmental parameters and time specifications, which facilitates the identification of critical local urban areas accordingly. Two service variants based on the beyond-state-of-the-art physical weather model (UltraHD-based; see Section 2.2.2) and purely based on EO data (EO-based; see Section 2.2.1) are available.

2.2.1 EO-based Heat Island Identification Service

The EO-based Heat Island Identification Service provides a remote sensing platform designed to support urban planners and city administrators in managing and monitoring urban heat islands purely based on EO data. Urban heat islands are phenomena that occur in cities due to the accumulation of impervious surfaces and the reduction of green areas, leading to a significant increase in temperature compared to surrounding rural areas.

The service allows users to make informed decisions to mitigate the negative effects of heat in urban areas. By leveraging satellite data and advanced tools, this service helps to identify critical areas with greater heat exposure, track their changes over time, and plan effective adaptation strategies using several indices derived from LST maps.

Each index offers a unique perspective on the impact of heat in urban areas, helping planners assess thermal comfort, temperature distribution, and the intensity of the urban heat island phenomenon. Below are the key indices used in the EO-based Heat Island Identification Service, which are critical for monitoring and informed decision-making.

Available Indices:

- **Discomfort Index (DI)**: This index quantifies the combined impact of temperature and humidity on human comfort. It is calculated using temperature and relative humidity. Higher values indicate greater discomfort.
- **Surface Temperature (LST)**: Surface temperature, measured from satellite data, provides information on the thermal state of various surfaces, such as urban areas, vegetation, and water bodies. It is essential for monitoring environmental changes and assessing thermal patterns.
- **Surface Urban Heat Island (SUHI):** This index measures the difference in surface temperature between urban areas and surrounding rural areas. It highlights how urbanisation affects local temperatures, often revealing higher temperatures in cities due to human activities and modified land surfaces.
- **Urban Thermal Field Variance Index (UFTVI):** The UFTVI assesses the variability of surface temperatures within a city. It captures the thermal heterogeneity caused by different land uses, materials, and activities, providing a detailed view of the spatial distribution of heat within urban areas.
- **Urban Heat Island Intensity Index (UHIII):** The UHIII quantifies the intensity of the urban heat island effect by calculating the temperature difference between urban areas and their rural counterparts. This index is critical for understanding the magnitude of temperature elevation caused by urbanisation.
- **Urban Hot Spots:** Urban hot spots are specific areas within a city that exhibit significantly higher temperatures compared to their surroundings. These zones are identified through LST data and are often associated with high levels of impervious surfaces, lack of vegetation, and concentrated human activities. Identifying urban hot spots is crucial for targeted mitigation strategies.

The following sub-sections describe how to use the features offered by the EO-based Heat Island Identification Service.

2.2.1.1 Visualisation of LST and Urban Heat Indices

The service allows to visualise interactive maps showing LST and derived indices for urban areas.

One of the main functionalities is the visualisation of detailed LST maps which provides access to high-resolution data that displays temperature variations across different parts of the city, allowing users to explore thermal patterns and urban heat concentrations.

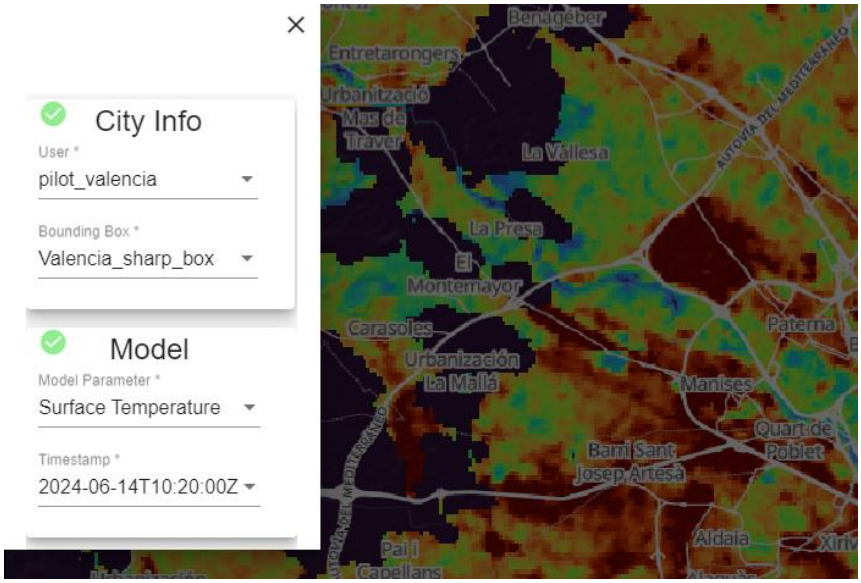


Figure 2-5: Parameter selection for map visualisation.

Steps to use the function (compare with Figure 2-5):

(1) **User and Bounding Box selection:** Select the user id and the corresponding area of interest (bounding box) from the dropdown list.
(2) **Model parameter selection:** Select the desired index from the dropdown.
(3) **Timestamp selection:** Select the desired date from the available timestamps on the dropdown list.
(4) **Map navigation:** Panning and zoom is available to explore different areas in the selected bounding box. Note that dark blue areas indicate missing pixels due to cloud cover or radiometric artifacts on the source satellite data.

The interactive interface enables users to quickly access relevant information, making it easier to identify hotspots and assess the impact of urbanisation on local temperatures. This visual tool is essential for highlighting areas where immediate interventions may be required to reduce heat-related risks.

2.2.1.2 LST and Urban Heat Indices time series exploration

Another key feature of the EO-based Heat Island Identification Service is the comparison of LST data and derived indices through time series analysis. This functionality allows users to select specific points on the map and generate temporal data to monitor temperature trends over time (see Figure 2-6).

Figure 2-6: Time series graphs from EO-Based Heat Island Identification Service.

Steps to use the function (compare with Figure 2-6):

(1) **Point selection:** Use the icon to enable point selection. Then click on the map to place a marker.
(2) **Point modification:** Modify or Erase the markers if necessary.
(3) **Opening Chart Panel:** Click on Chart Icon to show the Chart panel.
(4) **Parameter Selection:** Select the required parameter and the time of the day (Morning, Afternoon or All Day).
(5) **Date interval selection:** Select start and end dates.
(6) **Request a Chart:** Click on Get Time Series button and the chart will be displayed (this may take time depending on the Start and End date interval amplitude).

By comparing data from different periods, planners can better understand seasonal variations, track the effectiveness of mitigation measures, and identify long-term trends in urban heat islands. This tool is invaluable for analysing the evolution of thermal conditions and planning for future environmental challenges.

2.2.2 UltraHD-based Identification Services

The UltraHD-based Identification Services offer statistical analysis using different configuration capabilities related to heat, pollution and city airflow. These analyses rely on aggregated results from past UltraHD weather model runs. Hence, the UltraHD-based Identification Services unify the following services:

- Heat Island Identification Service
- City Air Flow Identification Service
- Pollution Area Identification Service

The main features of the UltraHD-based Identification Services are the following:

- On-demand requests to analyse local urban climate for time periods (e.g., for the last 7 days) that returns an image overlay as a result for the entire urban area
- Line charts comparing specific local urban areas to their exposure to heat, pollution and airflow
- Export functionality for time series data
- Access to already calculated results that prevents re-calculation and allows to share results
- An integrated user guides explaining the functionality and workflows
- Multi-language support

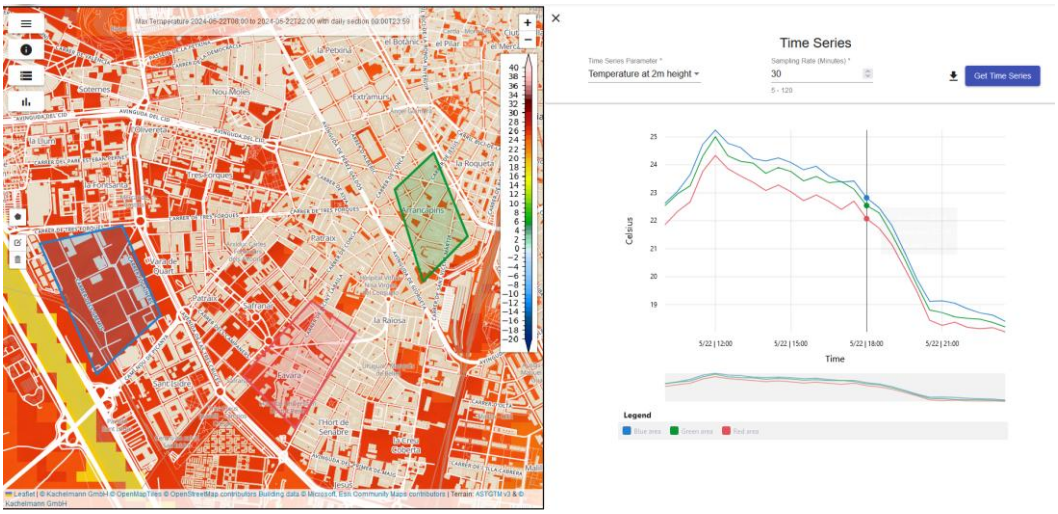


Figure 2-7: View of the UltraHD-based Identification Services showing analysis results for the entire region and specified local areas via a map and line-charts.

The following manual explains how to use the UltraHD-based Identification Services that lead to results presented in Figure 2-7, where the supported parameters are as follows:

- Temperature at 2-metre height
- Dewpoint at 2-metre height
- Surface temperature
- Nitric acid
- Particulate Matter 10
- Nitrogen dioxide
- Ozone
- Airflow

Supporting these parameters, the features of the UltraHD-based Identification Services allow the following:

- Compute heat profiles of urban areas which could be used as indicators for mitigation measures.
- Identify critical areas prone to extreme heat events via a 2D-map.
- Get insights to spatial temperature pattern in urban areas which can be utilised in decision-making processes and for public information regarding heat, pollution, and airflow.
- Analyse climate land-sea interaction when applied to coastal regions.
- Give recommendations of areas with cold winds.
- Understand which urban areas are exposed to harmful pollution.

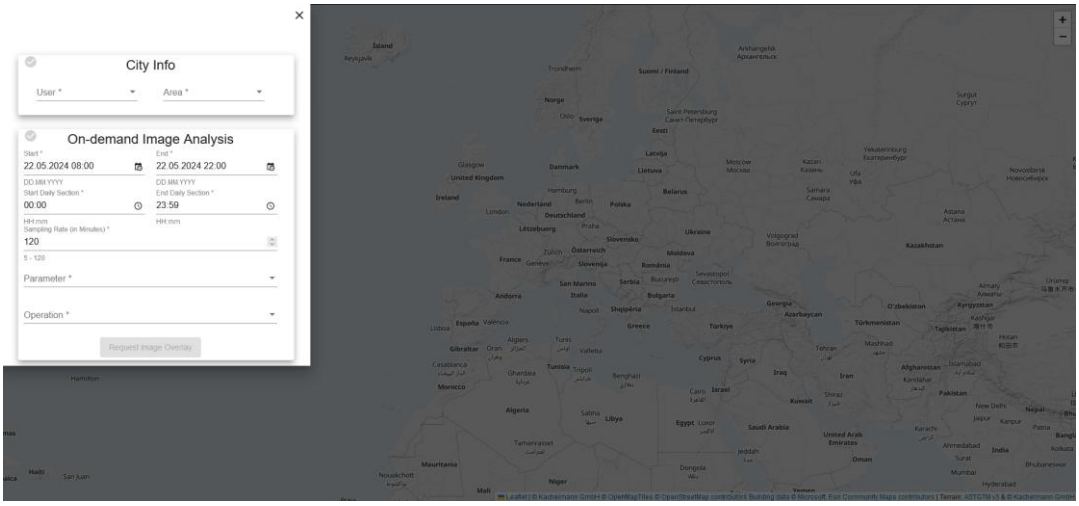


Figure 2-8: Init view of the UltraHD-based Identification Service.

When entering the UltraHD-based Identification Services (see Figure 2-8), the following options appear:

(1) Selection of the user and area.
(2) Configuration of the image analysis (see also Figure 2-9):
    a) Start and End date of the request time range.
    b) For each day within the requested time range, daily sections (e.g., every night, every morning section 6-10 AM) can be determined.
    c) Sampling rate used for the image analysis (e.g. 60 minutes would mean to consider hourly results of the UltraHD model loop).
    d) Parameter for the image analysis.
    e) Statistical option for the image analysis, which is applied to the series of values of each grid cell within the requested time range (available are max, min, and mean).

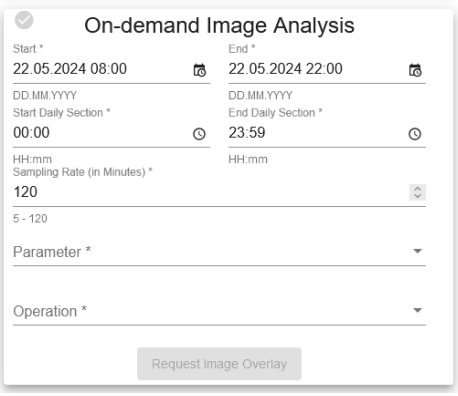


Figure 2-9: Configuration for the on-demand image analysis.

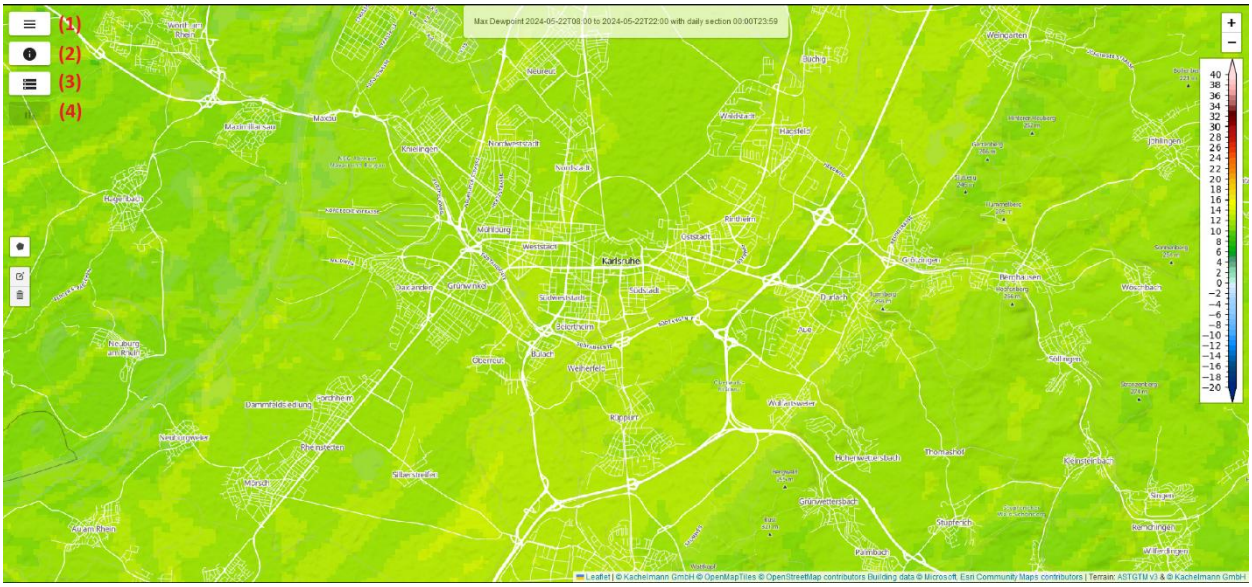


Figure 2-10: View on the UltraHD-based Identification Service showing access to all different service features.

Closing the configuration panel (or executing an image analysis), the following options appear (see also Figure 2-10):

(1) User, area selection and image analysis configurations.
(2) Start user guide, which explain the usage and navigation of the service.
(3) Access to database of already calculated image analysis with filtering option. It is available when if the user and area is selected.
(4) Time series requests and line charts for specified area (see below). It is available whenever at least one area is specified for the time series request.

Whenever a user and an area are selected, the button (3) is enabled and shows completed image analysis results.

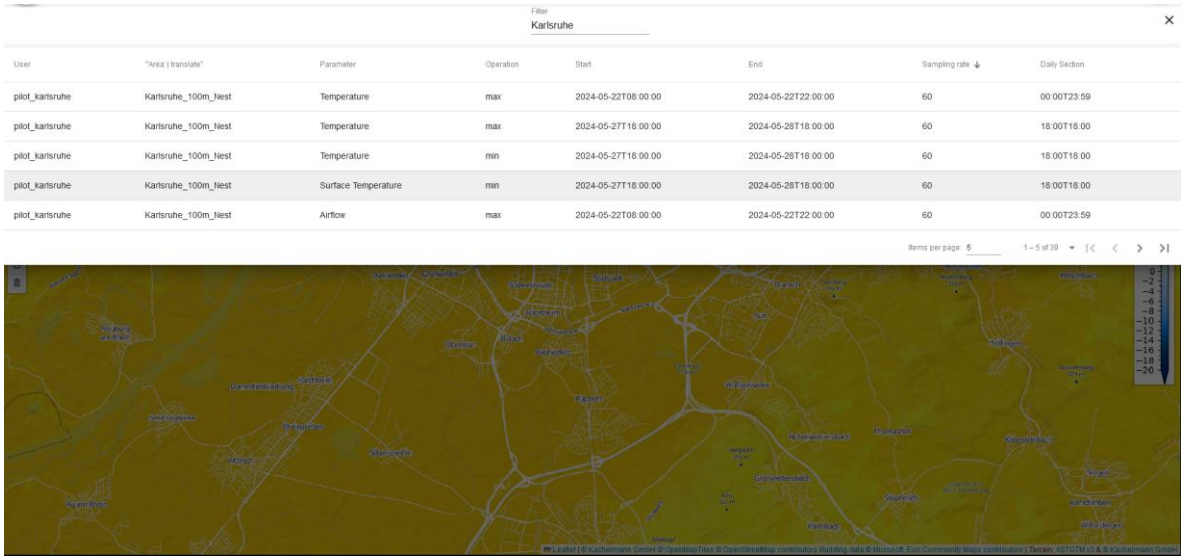


Figure 2-11: Results.

The completed results are presented in a table which supports filtering (e.g. by parameter) (see table in Figure 2-11). Clicking on a row shows the underlying result on the map.

Figure 2-12: Polygons drawn on the map to prepare the comparison of three different local urban areas with respect to their exposure e.g. to temperature at 2m height.

If an image analysis result is present (see Figure 2-12) (i.e., by on-demand request or selected from the database), then the areas can be determined by drawing polygons on the map using (1). Option (2) can be used to move or delete polygons. If at least one polygon is drawn on the map, the time series panel is enabled (see Figure 2-13).

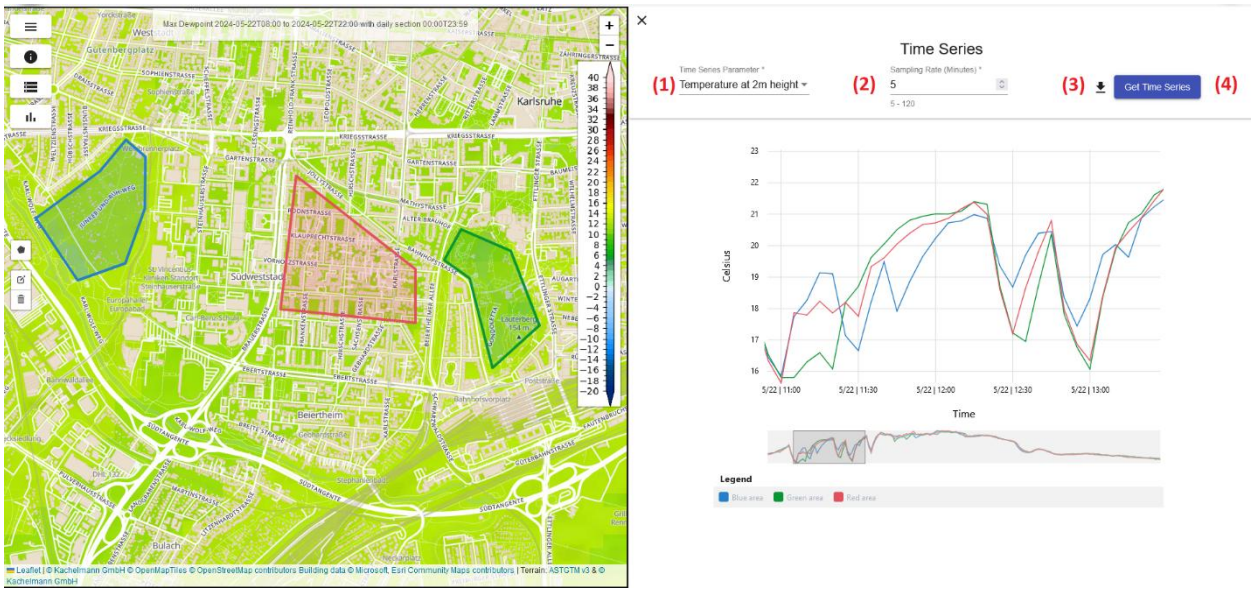


Figure 2-13: Comparison of three local urban areas regarding temperature development at 2m height.

On the time series chart (see Figure 2-13) the following options are available:

(1) Selection for the demanded time series parameter.
(2) Sampling rate of the time series with a range of 5 to 120 minutes (e.g., sampling rate of 60 minutes means getting a time series with hourly values).
(3) Export of the time series data in CSV format.
(4) Trigger the time series request, which is possible having a time series parameter selected.

After requesting the time series, the result is presented as line charts, where moving the cursor on the graphs shows the values for each location. Moreover, zooming to sections of the line charts is supported.

2.3 Simulation and Mitigation Strategies Services

The “Simulation and Mitigation Strategies Services” allow users to analyse the impact of user-provided simulated changes to urban structure (e.g., planting trees, new buildings) to local climate conditions.

The UltraHD-based services (see section 2.3.2) address urban heat, pollution, and airflow issues, with an additional purely EO-based service variant (see section 2.3.1) on urban heat available.

2.3.1 EO-based Heat Island Simulation and Mitigation Strategies Service

The “EO-based Heat Island Simulation and Mitigation Strategies Service” offers a simulation tool to estimate and visualise the impact of changes in the urban landscape on urban heat patterns as indicated by the land surface temperature.

This tool was developed to provide a fast and initial overview of the direct effects of future construction projects before they are realised. Multiple options can easily be evaluated as it is needed by city administrations or the interested public.

Since the tool is based on EO data only, its advantages are a short runtime (seconds) and a low effort of implementation for any city worldwide. In comparison to this EO data-based tool, the CityCLIM ecosystem offers another simulation applying UltraHD weather model simulations (UltraHD Heat Island Simulation Service; see section 2.3.2) for the same purpose.

While the EO-based tool was developed to provide first assessments for an unlimited number of user-built scenarios, the UltraHD-version of the tool can be used for a deeper view into selected scenarios as it is expected to provide a higher degree of reliability because of a process-based representation. However, it is computationally very intensive (several hours) and requires a high effort to implement for a specific city.

Technically, the EO-based simulation tool underlies a machine learning model linking LST measurements from the Landsat 8 and 9 satellites to a number of layers characterising the urban land surface that are derived from multispectral Sentinel-2 satellite data (vegetation and built-up indices, distances to vegetation and water), and - if a digital elevation model of a city is existing - the 3D structure of a city. A machine learning model is trained to represent the relationship between LST and the urban characteristics, which is then applied to predict changes in LST upon user-defined changes in the urban configuration. With this, for instance, the effects of sealing a park area on the urban temperature can be assessed and suitable construction alternatives can be explored before the construction is implemented.

Features:

- Evaluation of urban heat upon changes in urban configuration (such as construction scenarios) under typical and extreme summer day conditions of last years
- User-defined changes
- Possible land uses: built-up (when 3D information is included, also building heights), vegetation, and water
- Prediction of changes in LST for the user-defined configuration

The following provides a step-by-step guidance on how to use the tool.

After accessing the tool, **the pilot city is selected** which should be explored (mandatory before any other setting). Below this, 3 tabs are located (named “Info”, “Editor”, “Result”) which correlate to the following 3 steps.

Step 1 “Info”: Select land surface temperature dataset to evaluate

In this first step, users can view and evaluate the land surface temperature patterns in the city. The land surface temperature is the skin temperature of the urban surface as measured by the Landsat 8 and 9 satellites (measured on 100m resolution, although the data product is provided on 30m resolution).

Data are available each for both average and extreme summer day of 2021-2024 so that average summer conditions as well as the condition under past heat waves can be considered.

Perform following steps (compare with Figure 2-14):

(1) **Select model:** selection of the type of machine learning prediction model which is used within the tool. “ANN_2D” is an Artificial Neural Network (ANN) only including the 2D land surface information (surface type and distance metrics). “ANN_3D” is a model including 3D variables reflecting the building geometry of the city in case a height model was available from the city. Since the addition of the 3D building geometry variables does not provide a significant gain in model prediction accuracy, it is recommended to use “ANN_2D”.

(2) **Select reference days:** selection of the reference LST dataset to be used in the evaluation, either an average (e.g., “2024_median”) or an extreme summer day (e.g., “2024_max”) of the last years.

The display will show the LST for the selected configuration in °C for the city centre. A layer showing the cities’ buildings provided by Open Street Map is overlaid for orientation.

Figure 2-14: Visualisation of the LST in the EO-based Heat Island Simulation and Mitigation Strategies Service (step 1).

Step 2 “Editor”: Draw custom user scenario

In this step, a user can define a new urban configuration as a scenario to evaluate. For instance, a building in a park area can be drawn or a new park or water body can be created instead of housing areas. Here, the spatial resolution of the underlying LST data of 100m should be considered when creating a scenario (although data are given in pixel size of 30m). Therefore, changes in structures should not be too small but at least extent to building blocks rather than isolated houses to see a difference. Multiple polygons can be drawn (e.g. different house blocks) but all polygons of one scenario should be located within the same urban quarter.

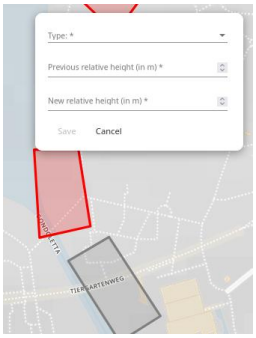
Perform following steps (compare with Figure 2-15):

(1) Press “New”, enter a scenario name and press “Create”

(2) The polygon button  on the left side of the map view allows to draw a new shape. Click in the map to start drawing, click on the first point to finish the drawing.

(3) Upon closing the shape, a new land use can be assigned to the area. Specify as “Type” the new land use as built-up (new building), tree cover or permanent water bodies. Specify the previous and new relative height, e.g., 0 and 10 if there was no building before and now a 10m tall building is created.

The information is needed to save the polygon, but is only used when new buildings are created instead of vegetation or water and when 3D information is used in the modelling.



(4) Press “Save” to save this polygon.

(5) Polygons can be edited or deleted .

(6) Under “Model”, the type of prediction model (recommended: “ANN_2D”) is selected and “Reference” defines the summer day reference as in step 1.

(7) Press “Request” to request the simulation of LST for your custom urban scenario. The run takes 30 seconds to some minutes.

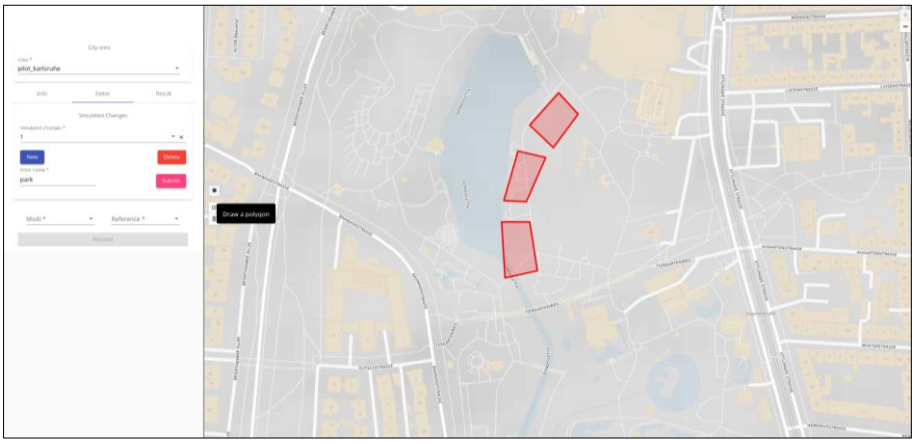


Figure 2-15: The simulation function for creating user-defined scenarios within the EO-based Heat Island Simulation and Mitigation Strategies Service (step 2).

Step 3 “Result”: Evaluation of changes in LST upon changes in urban configuration

This step is to explore the changes in land surface temperature resulting from the custom changes in the urban configuration.

Perform following steps (compare with Figure 2-16):

(1) Select the scenario name under “Simulated changes”

(2) Set again “Reference days” and “Model” as in steps 1 and 2.

(3) “Order days” relates to the time when the run was requested (UTC time, i.e. for central European time -2 hours). By this, you can discriminate multiple versions of one scenario (e.g. with small adaptations in the polygons).

The main view shows the **original LST on the left side** and the **LST predicted for the custom scenario on the right side**. You can move a slider in between with this icon .

The modification of the city configuration causes an effect in the distribution of urban heat as indicated by the LST. Adding vegetation or water areas has a cooling effect. In contrary, sealing green spaces by buildings increases the temperature. This effect is most pronounced in the areas which were modified but clearly goes beyond these areas because of neighbourhood effects. Following scientific research, the cooling effect of water is assumed to last at maximum 1 km, while it is 500m for vegetation.

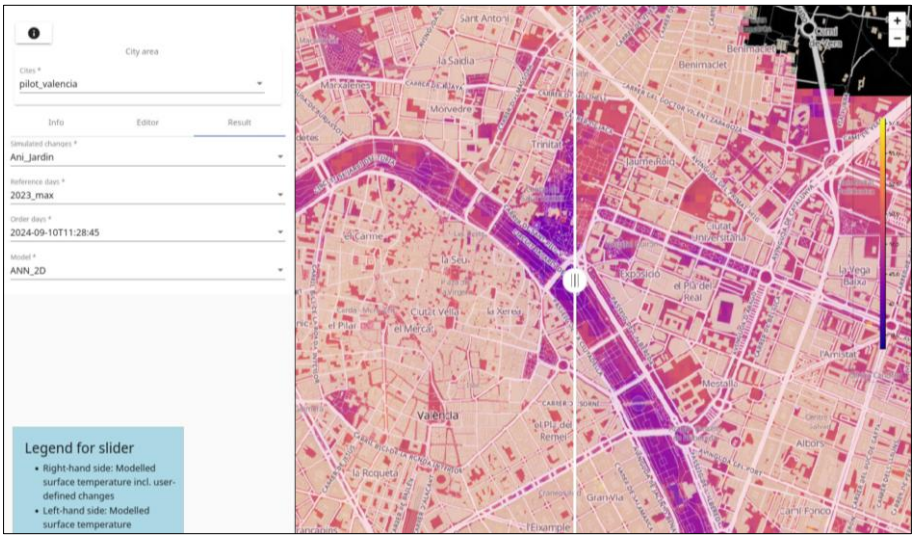


Figure 2-16: Evaluation of changes in urban heat originating from a user-defined scenario within the EO-based Heat Island Simulation and Mitigation Strategies Service (step 3).

2.3.2 UltraHD-based Simulation and Mitigation Services

The UltraHD-based Simulation and Mitigation Services allow to analyse the effect of mitigation activities (e.g., planting trees, or building constructions) with respect to heat, pollution and city airflow related aspects of urban local climate. The manipulation of urban structure can be performed by using a 2D map editor (the so-called Simulation Editor from Section 2.3.3), where another web interface provides information of their induced effects. Hence, the following descriptions of the UltraHD-based Simulation Services summarises the following services:

- Heat Island Simulation Service
- City Airflow Simulation Service
- Pollution Simulation Service

As the purpose of this service is to visualise the impact of local changes on urban characterisation (e.g. by planting trees, new buildings, water bodies) by video and image overlays as well as line charts for time series, the operation of this service requires two steps:

(1) Creation of manipulated changes and requesting an analysis using the Simulation Editor (see section 2.3.3).
(2) Investigate results (after completion of the analysis) using the simulation services web page described below.

The completion of a requested analysis requires restarting the UltraHD model loop, which means that the results can be expected after some delay of 1-2 days.

The variants of the services for the themes heat, city airflow and pollution only distinguish from each other by the considered UltraHD parameter. Hence, all the three variants share the same main features:

- Map with zooming functionality.
- Video and image overlays showing the difference between original and manipulated UltraHD model loop.

- Time series data by line-charts for up to three locations showing the difference between original and manipulated UltraHD model loop.
- Overview of analysis requests.

With all these features, the services facilitate the impact estimation of heat island, airflow, and pollution mitigation strategies. Among others, it allows to:

- Inform about the impact of specific theoretical city structure adaptations and to have data-driven reasoning for mitigation measures in real life.
- Optimise city airflow by adapting the city structure to prevent pollution and heat island events.
- Take preventive actions by adapting the city structure.

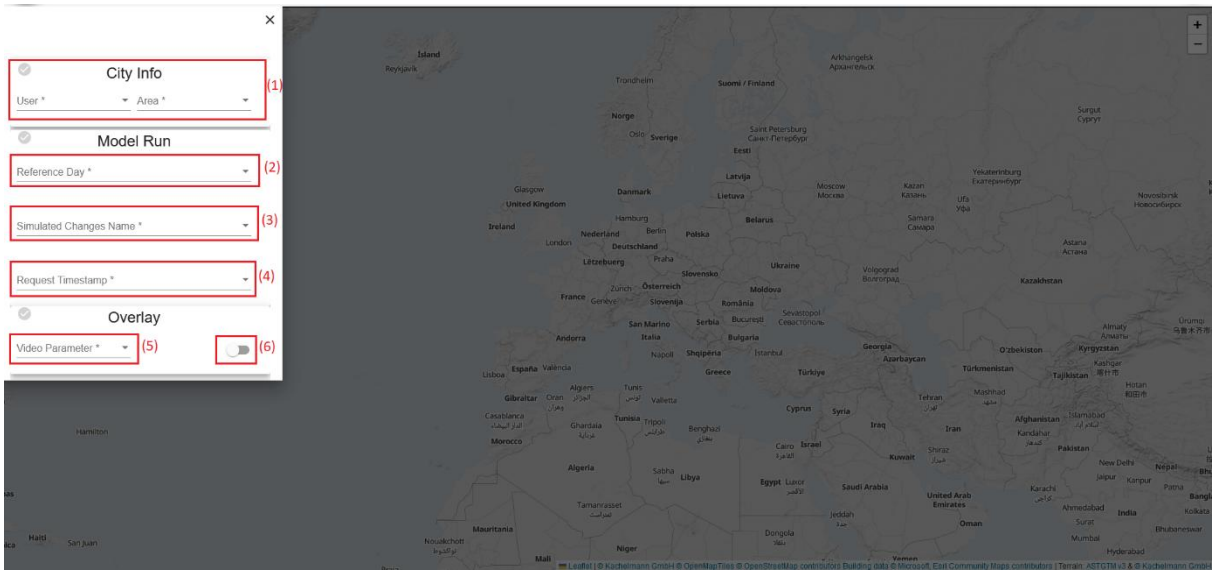


Figure 2-17: Initial view on the UltraHD Simulation Service.

When entering the UltraHD simulation service (see Figure 2-17), the following options are available:

(1) Selection of the user and area.
(2) Selection of the reference day specified when ordering the simulation analysis. The reference day refers to the UltraHD model loop which is used for the analysis.
(3) In the Simulation Editor to each set of manipulated changes you assign a name. Here you select the set of changes for which you would like to see the analysis outcome.
(4) Selection of the timestamp, where you have requested the analysis.
(5) Selection of the parameter for the video overlay.
(6) Toggle to switch from video overlay and image overlays (see Figure 2-18).

Figure 2-18: Initial view of the UltraHD Simulation Service with activated toggle to select image overlay.

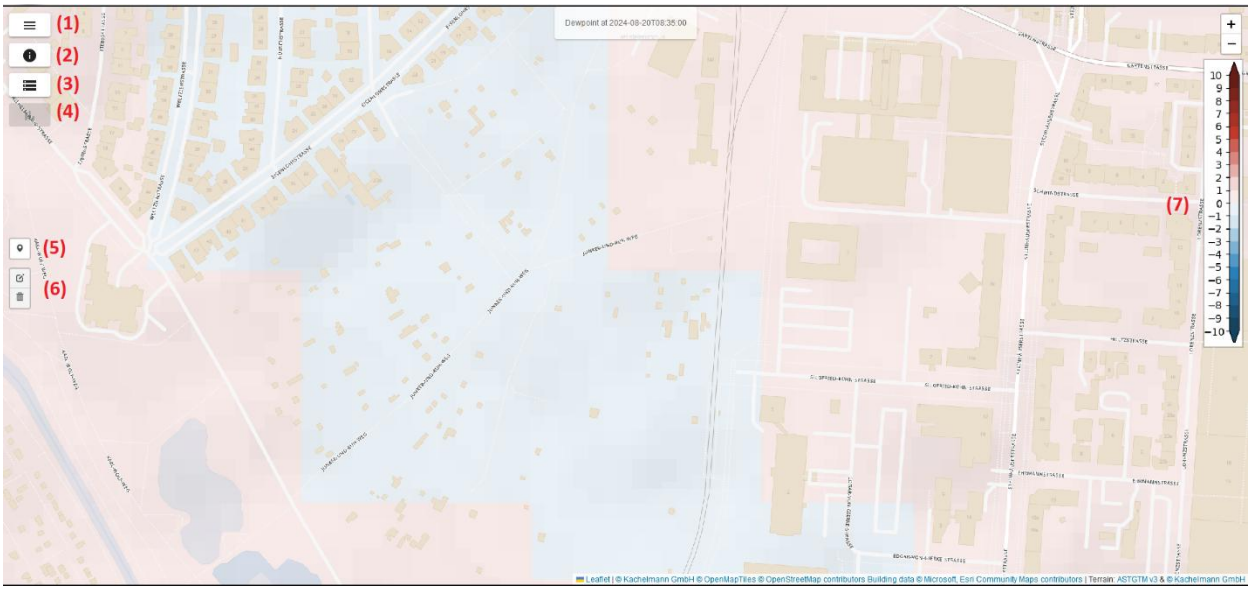


Figure 2-19: UltraHD Simulation Service with overlay selected.

When having an overlay selected, on the webpage the following options are provided (see also Figure 2-19):

(1) Opens the menu for selecting city area and analysis runs.
(2) Start the user guide, which explains usage and navigation of the service.
(3) Opens an overview of past simulation analysis requests, which can also be used to check the status of the analysis order.
(4) Opens the line charts that show time series data, which is available, if at least one location has been set by using the marker functionality.
(5) Button to set markers on the map to prepare the time series requests.
(6) Options for moving and deleting markers.
(7) Scale showing the difference between the original UltraHD model loop and the model loop with manipulated input data provided by the Simulation Editor.

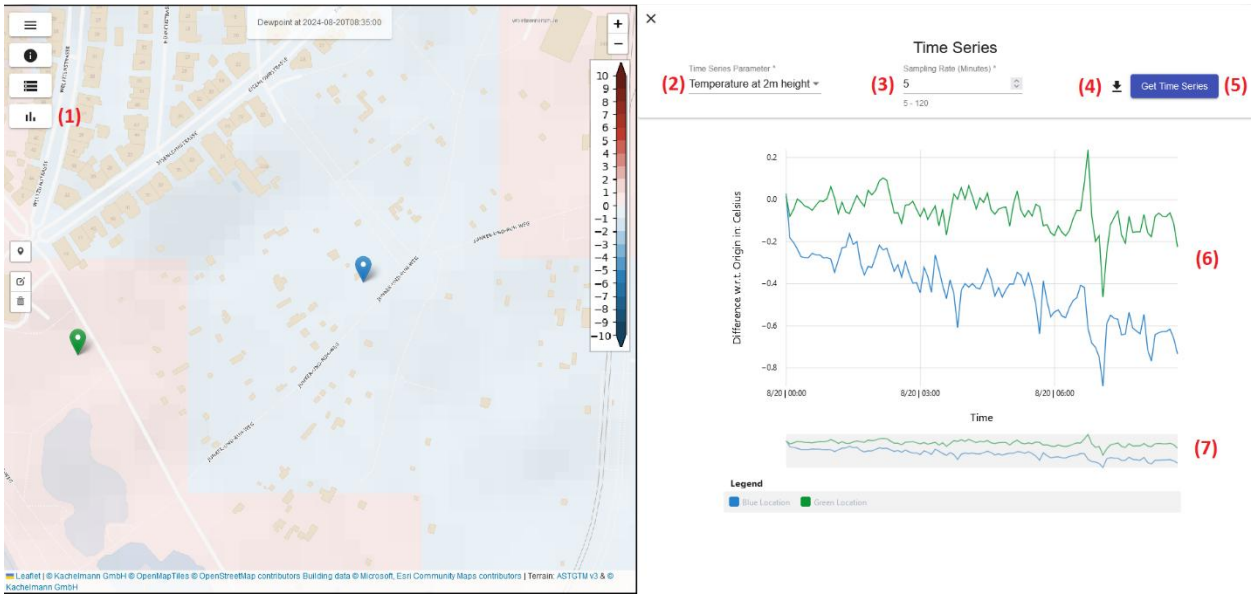


Figure 2-20:View on the UltraHD Simulation Services with time series results.

If markers have been set on the map, the following options are available for getting time series data (see also Figure 2-20):

(1) Opens the line chart element on the right-hand-side.
(2) Selection for choosing the time series parameter.
(3) Sampling rate of the time series with range 5 and 120 minutes (e.g. sampling rate of 60 minutes means getting a time series with hourly values).
(4) Export of the time series data in CSV format.
(5) Trigger the time series request, which is possible having a time series parameter selected.
(6) Line charts.
(7) Zooming features of the line chart element.

2.3.3 Simulation Editor

The Simulation Editor is used to manipulate local changes to urban characteristics, and moreover to request an UltraHD model loop using these manipulated changes.

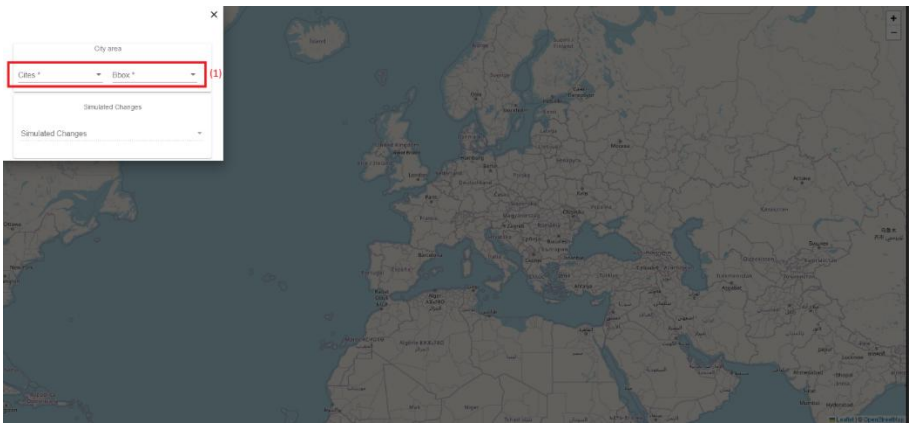


Figure 2-21: Initial view of the Simulation Editor.

When entering the editor, it is required to select a city and corresponding area of interest/bounding box (see Figure 2-21).

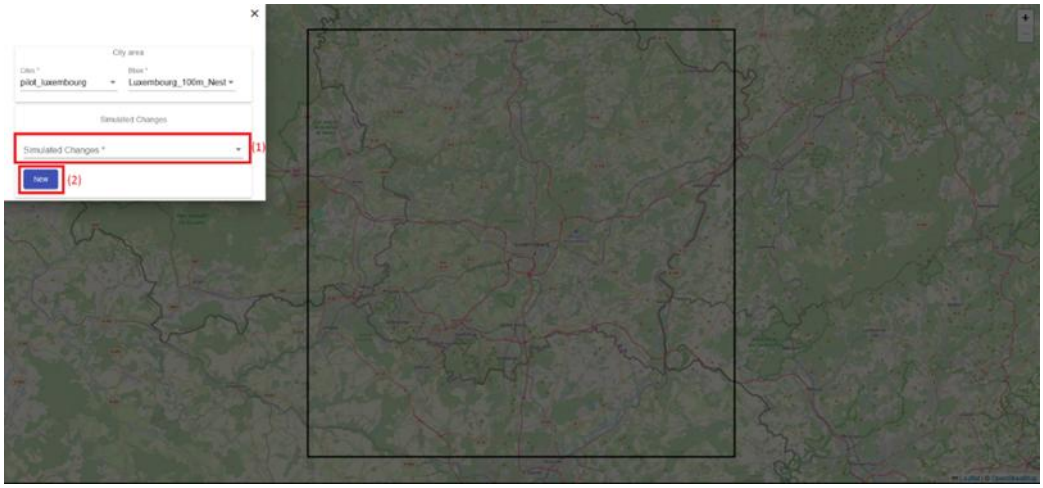


Figure 2-22: View on the Simulation Editor after selecting the city area.

If a city area is selected, then so-called simulated changes can be selected or created; see (1) and (2) in Figure 2-22. The selection of “simulated changes” has been assigned a unique name and refers to a set of simulated changes to urban characteristics, that shall be considered when analysing the local impact with respect to the past UltraHD model loop.

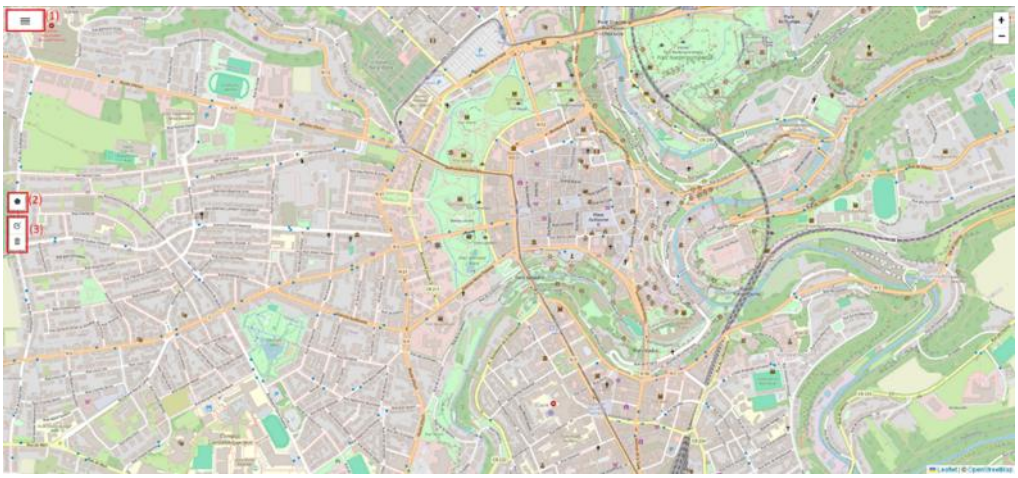


Figure 2-23: View on the Simulation Editor when selected an empty set of simulated changes from the selection.

If a set of simulated changes is just created or already existing, the following options are provided (see also Figure 2-23):

(1) Opens the menu for selection sets of simulated changes and city area.
(2) Drawing polygons representing different land cover types.
(3) Options for deletion and moving of drawn polygons.

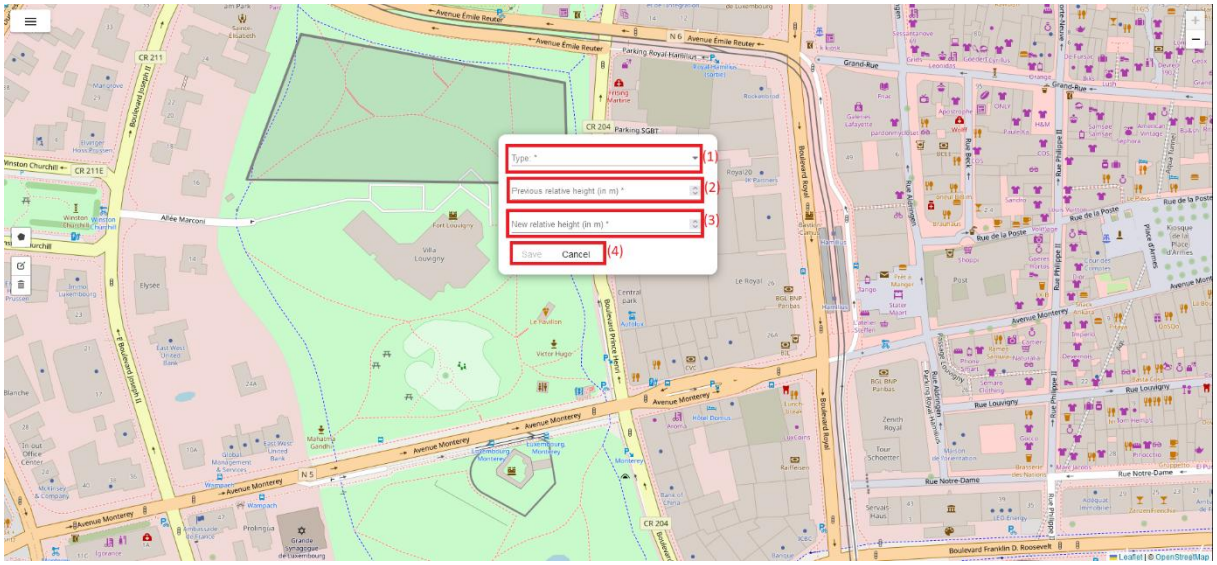


Figure 2-24: View on the Simulation Editor with open information card for new simulated change.

After a completion of a new polygon a pop-up appears (see Figure 2-24) that asks for the following information:

(1) Landcover type, where currently built-ups, tree cover and water bodies are supported.
(2) Previous height relative to the terrain height. If not know, enter zero here.
(3) New height relative to the terrain height.
(4) Options for save and cancel data input.

Figure 2-25: View on the Simulation Editor when requesting a new analysis run.

When having completed all manipulated changes, then a new analysis run can be requested by specifying in (1) the past UltraHD model loop you like to analysis with respect to the new impact of your local simulations. Clicking on “Request” in (2) registers your request (see Figure 2-25). After that depending on the UltraHD model capacities, your request will be executed with approximate **1 day of waiting time**. If completed, you can see the results on the webpages for the simulation services.

3 Conclusion and Contact

This user guide provides an overview of the features and usage of the commercial CityCLIM City Administration Services as part of the service portfolio of the CityCLIM ecosystem.

Further Information

Furthermore, general information on City Administration Services can be found in the handbook “Towards a Green Future with CityCLIM: A Handbook for Interested Cities” (CityCLIM Consortium, 2023b) or as a short fact sheet in “Deliverable 6.6 - Optimised City Administration Services” (CityCLIM Consortium, 2024). If you are also interested in our Citizen Science approach, have a look at the handbook “Becoming a CityCLIM Citizen Scientist: A Comprehensive Guide” (CityCLIM Consortium, 2023a) to get a broader view of the project.

Get in contact with us

If you have any questions or need advice at any stage, or if you would like to receive updates on CityCLIM or to get further information, please do not hesitate to contact us! To get updates on CityCLIM, you can visit the CityCLIM website at https://cityclim.eu and subscribe to the newsletter. You can also follow us on social media platforms such as Twitter (X) and LinkedIn, and, ResearchGate. If you have any questions about the project or are interested in collaboration, you can contact us by filling out the form available on our website. If you would like to contact the CityCLIM administration team regarding the City Administration Services directly, please send an email to the address below.

Contact Us: Email: satelliteservices@ohb-ds.de

Thank you for joining the CityCLIM community.

4 References

CityCLIM Consortium. (2023a). *Becoming a CityCLIM Citizen Scientist: A Comprehensive Guide*. https://www.cityclim.eu/info-material

CityCLIM Consortium. (2023b). *Towards a Green Future with CityCLIM: A Handbook for Interested Cities*. https://www.cityclim.eu/info-material

CityCLIM Consortium. (2024). *D6.6—Optimised City Administration Services*. https://www.cityclim.eu/info-material

About CityCLIM

The strategic objective of CityCLIM is to significantly contribute to delivering the next-generation of City Climate Services based on advanced weather forecast models enhanced with data both from existing, but insufficiently used, sources and emerging data sources, such as satellite data (e.g., Copernicus data) or data generated by Citizens Science approaches for Urban Climate Monitoring etc. For City Climate Services, data products of interest related to land surface properties, atmospheric properties (e.g., aerosol optical thickness), geometry etc. For all of those, information of interest concerns e.g., Copernicus data products and services that are already existing (e.g., based on Sentinel-3/OLCI, PROBA-V, SPOT, Sentinel-1, MetopASCAT data), will exist in the near future (based on already flying satellites such as Sentinel-2), or will exist in the mid-term (based on satellites currently under development) and long-term (based on satellites soon starting concept phase) future. The project will establish; (i) an open platform allowing for efficient building of services based on access to diverse data; (ii) enhanced weather models based on data from diverse existing and emerging sources; (iii) a set of City Climate Services customisable to specific needs of users in cities; and (iv) a generic Framework for building next generation of Urban Climate Services. CityCLIM will be driven by 4 Pilots addressing diverse climate regions in Europe (Luxembourg, Thessaloniki, Valencia, Karlsruhe) which will define requirements upon the tools to be developed, support specification and testing of the services and serve as demonstrators of the selected approaches and the developed technologies. The Consortium will elaborate business plan to assure sustainability of the platform and services.

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