



Challenge #1: Can you spot the pools?

Detection of private pools using earth observation in times of water shortage

In many regions around the world, water scarcity is worsening and the private operation of pools can lead to significant water consumption. The task of this challenge is to develop an innovative solution that uses Earth Observation technologies to automatically detect and map private pools on properties. The solution should enable municipalities to get an accurate overview of the geographical distribution of pools in their region in order to use resources more efficiently and regulate water consumption.

Food for thought (optional):

1. Earth observation data: Use satellite imagery and other earth observation data to identify and classify private pools on properties.
2. Accuracy and scalability: The solution should be accurate and able to detect pools in different environments and regions. It should also be scalable to meet the needs of different municipalities.
3. Automation: Develop a fully automated approach to pool detection that is regularly updated to reflect changes in pool operations.
4. Interactive user interface: Provide a user-friendly interface for municipalities to access and use the collected pool data for water consumption regulation purposes.
5. Privacy: Integrate privacy provisions to protect the privacy of citizens and ensure that the collected data is kept confidential.

Participants are invited to develop innovative solutions to help municipalities detect and monitor private pools, thereby contributing to the more efficient use of water resources during water scarce periods.

Further information:

- [Update will follow, soon]

More information about the Climathon and the challenges:

<https://climathon.cesah.com>



Challenge #6: Forest Guards in Darmstadt's city forest

Satellite-based time travel in Darmstadt's city forest to analyse the loss of vitality

The aim of this unique challenge is to record the changes in Darmstadt's city forest over the last eight years using the latest remote sensing technology. Climate change has had a major impact on this valuable forest and we need your innovative ideas to analyse the changes in vegetation and assess the loss of vitality. With the Sentinel-2 satellites of the Copernicus Earth Observation Programme, you can access high-resolution images in the visible and infrared spectrum to document the condition of the city forest. Your solutions will help provide valuable insights for the protection and restoration of this threatened ecosystem. Be part of this exciting project and help to preserve and protect Darmstadt's city forest. Let's make a difference together!

The Challenge:

Use satellite-based remote sensing technologies, in particular the Sentinel-2 satellites of the Copernicus Earth Observation Programme, to monitor the condition of the city forest and analyse changes in vegetation in the forest over a period of eight years. Your task is to record and assess the loss of vitality in this forest area, which has been severely affected by climate change.

Background:

Darmstadt's city forest is a valuable ecosystem that is suffering from the effects of climate change. The Sentinel-2 satellites offer the possibility to acquire high-resolution images in the visible and infrared spectrum. These images make it possible to detect and analyse changes in forest vegetation. Your goal is to quantify and map the loss of vitality and healthy forest cover over the last eight years.

Possible approaches:

Your solution may include developing algorithms to analyse sentinel images, identifying vitality losses in different forest areas, creating time series to track changes and providing concrete recommendations for forest conservation. Your work will help to provide important information for the protection and restoration of this endangered forest area.

Further information:

- Article forest medal award for the city of Darmstadt [[see here](#)]
- report of the round table „forest“ [[see here](#)]
- maps NDVI (Normalized Difference Vegetation Index) in the area of Darmstadt and land surface temperature in the urban area of Darmstadt [available on request from the cesah team].

Challenge Partner

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Challenge #7: Green oases in the city

GIS-based registration of Darmstadt's Greenified Roofs

Climate adaptation in Darmstadt requires the expansion of greenified roofs on buildings in order to make our city more sustainable and liveable. However, the City of Darmstadt currently lacks a precise overview of how many flat roofs in the city are already covered with greenery and where they are located. Your task is to locate these roofs in Darmstadt with the help of geoinformation systems, aerial and satellite images and surface models. Your solutions will be instrumental in identifying these green oases in our city and using them for future urban expansions and green projects. Let's make the city greener together!

The Challenge:

Develop innovative approaches to identify and map greenified roofs in Darmstadt using geographic information systems (GIS), aerial and satellite imagery and surface models. Your goal is to map the exact location and extent of these greenified roofs to provide the basis for targeted greenscaping measures and to promote sustainable urban living.

Background:

Greenified roofs play a decisive role in reducing heat islands in urban areas, improving air quality and enhancing the quality of life for residents. But to realise these potentials, we first need to know where these greenified roofs are located. Your work will help provide the city administration with the necessary information to make Darmstadt greener and better adapt to climate change.

Possible Approaches:

Your solution may include developing algorithms to automatically detect greenified roofs, creating accurate maps and databases, identifying potential sites for future greenscaping projects and providing recommendations to the city administration.

Further information:

- Green roof and unsealing register Darmstadt [[see here](#)]

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Challenge #11: Smart Unsealing

Identification and promotion of water-permeable surfaces

Welcome to the challenge „Smart unsealing - identification and promotion of water-permeable surfaces“ within the Climathon! Unsealing paved surfaces is an important contribution to the reduction of runoff and groundwater recharge. But how can we automatically identify areas in a municipality where unsealing measures are possible and at the same time determine the potential of these areas?

Challenge:

Your task is to develop innovative solutions to use automated processes to identify paved areas where unsealing is possible and determine the potential of these areas. You will also be asked to develop approaches for identifying land-owners, promoting unsealing measures, and tailoring these measures to specific land uses.

Background:

Unsealing land can contribute significantly to improving the environment. It reduces surface runoff, contributes to groundwater recharge and reduces the amount of water in the sewers. Your work will help promote unsealing as a sustainable practice in cities and towns.

Solutions:

Your solution may include developing automated methods to identify potential unsealing sites, creating geodatabases to identify property owners, designing financial incentives for unsealing, and developing guidance for appropriate unsealing measures based on land use.

Further Information:

- <https://regenwasseragentur.berlin/massnahmen/entsiegelung-von-flaechen-in-berlin/>

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