



Tunisian Space Association

الجمعية التونسية للفضاء



UDENE - Urban Developement Explorations using Natural Experiments

Project Overview

*Presented by:
Mohamed Rajhi*



The project has received funding from the European Commission's Horizon Europe Research and Innovation Programme under grant agreement No 101131190

Overview

UDENE - Urban Developement Explorations using Natural Experiments

The UDENE project aims to **support evidence-based decision making for urban development**, especially in international partner countries, by creating a **virtual laboratory** for urban planners and visionaries to test their development ideas.



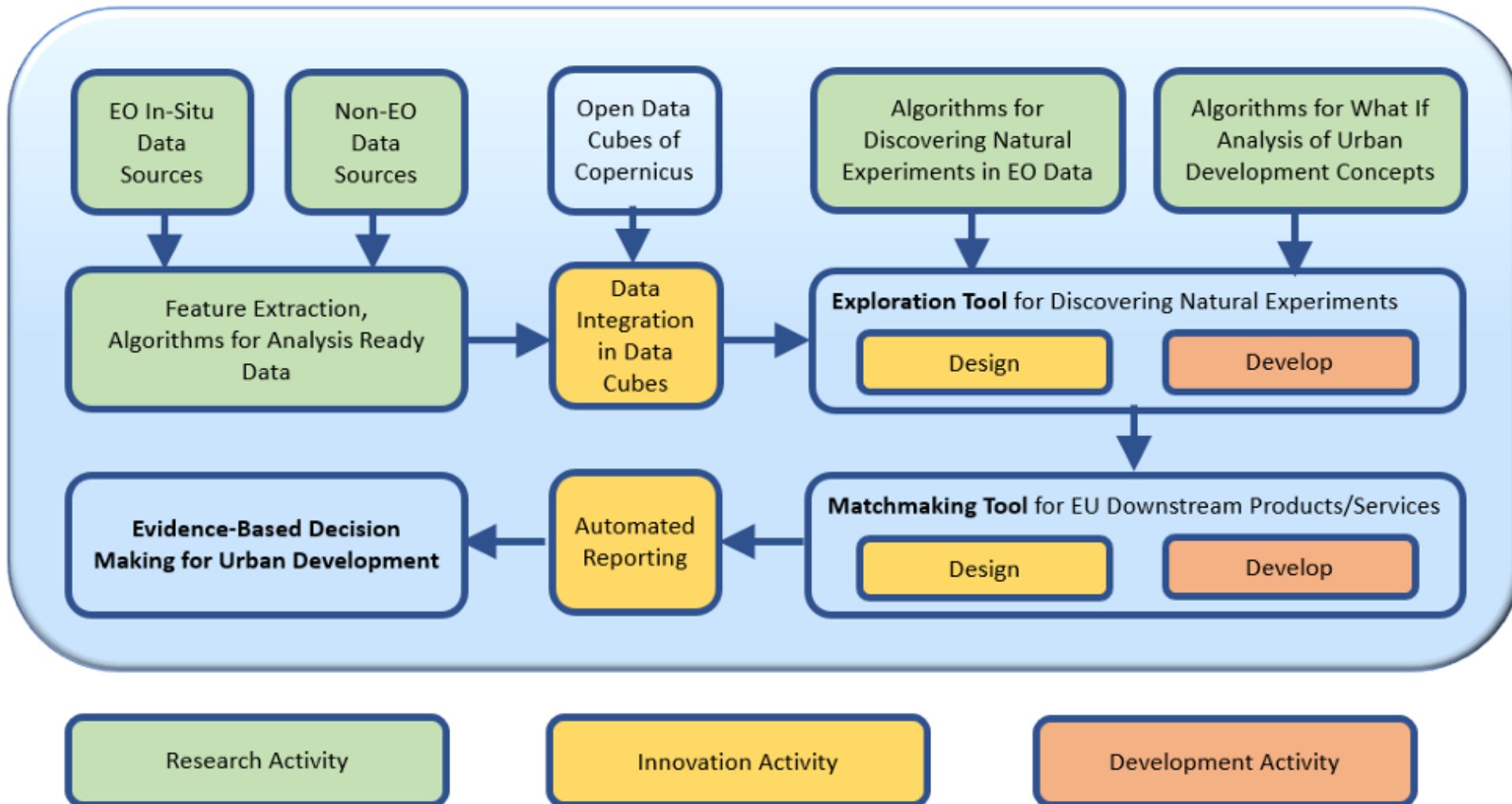
Funded under the **Horizon EUSPA Call**
24 months (January 2024 – January 2026)



9 Consortium Partners

From **6 countries**: Italy, Tunisia, Turkey,
France, Serbia, Slovenia

UDNE Tool Workflow



Discovering Urban Development Natural Experiments in EO Data

Urban Development Idea

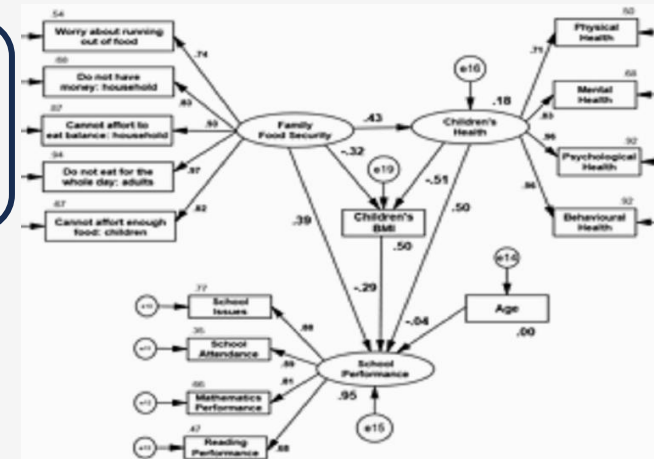
Input variables

Exemple:

- A new high rise
- A new ring road
- A new linked park
- **A new sea wall**

Examples:

- Trace Gas Data
- Pollutant Transport Data
- Socioeconomic Data
- Land consumption vs population growth
- Waste management
- **Land use / Land cover**
- **Topography**
- **Climate Data**
- **Oceanographic Data (Sea level hight)**



Structural Equation of the Hierarchical Multivariate Model of the Outcome Variable in terms of the Income Variables

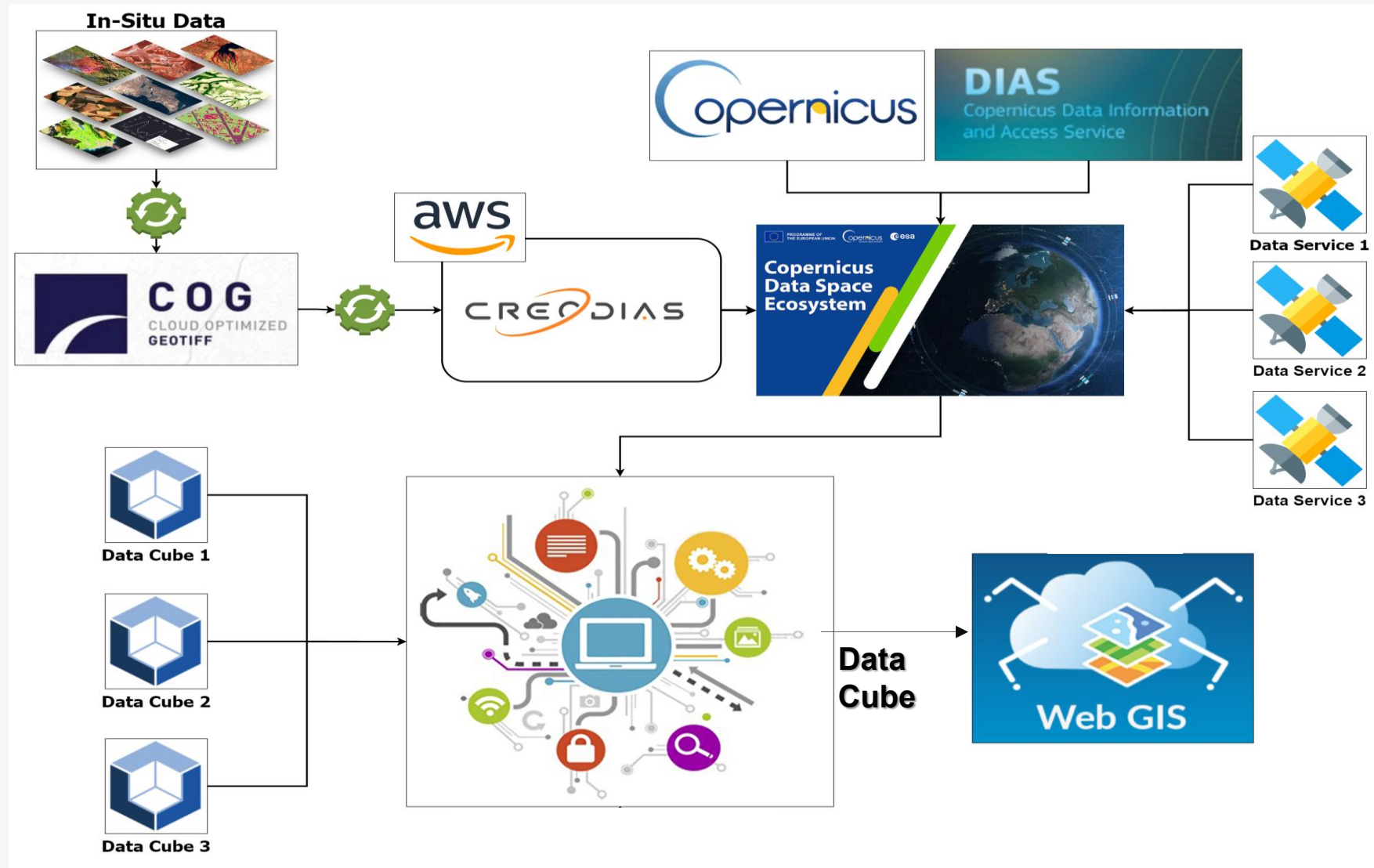
Outcome variables

Examples:

- efficient water use
- air quality
- heat load
- energy consumption
- Earthquake Scenario Expected Loss
- **Sea level rise**
- **Shoreline dynamic change**

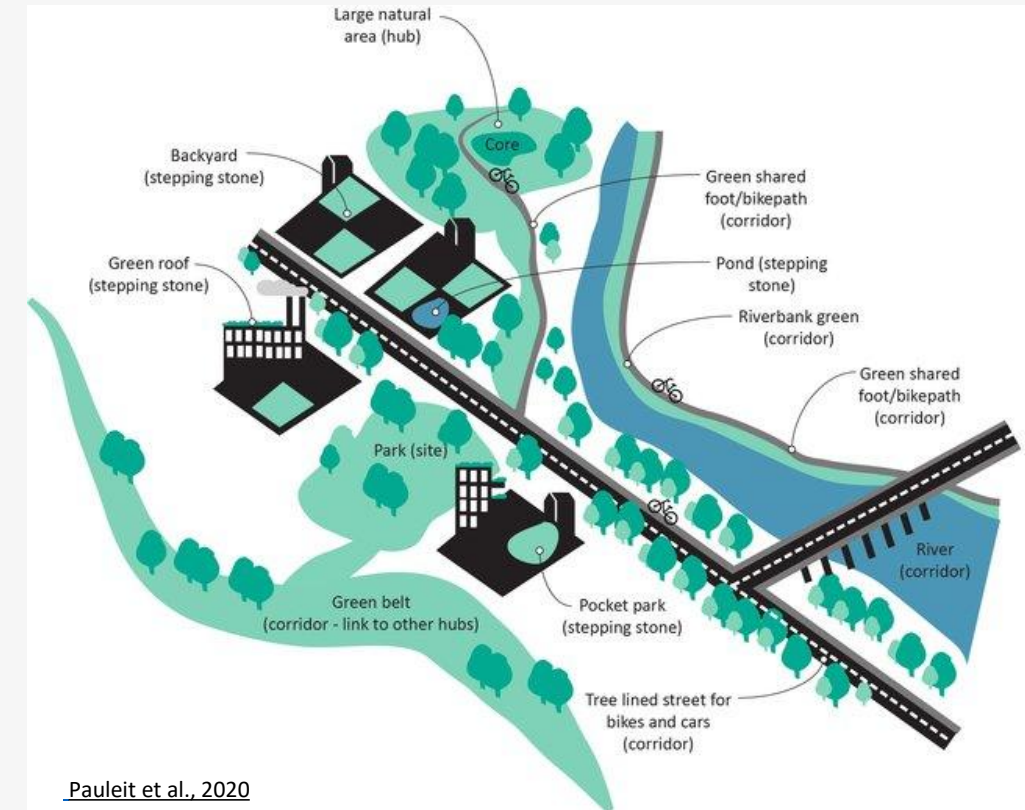
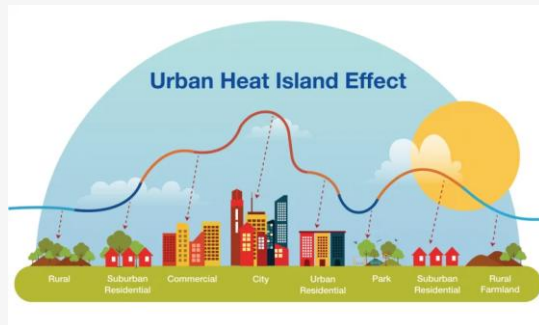
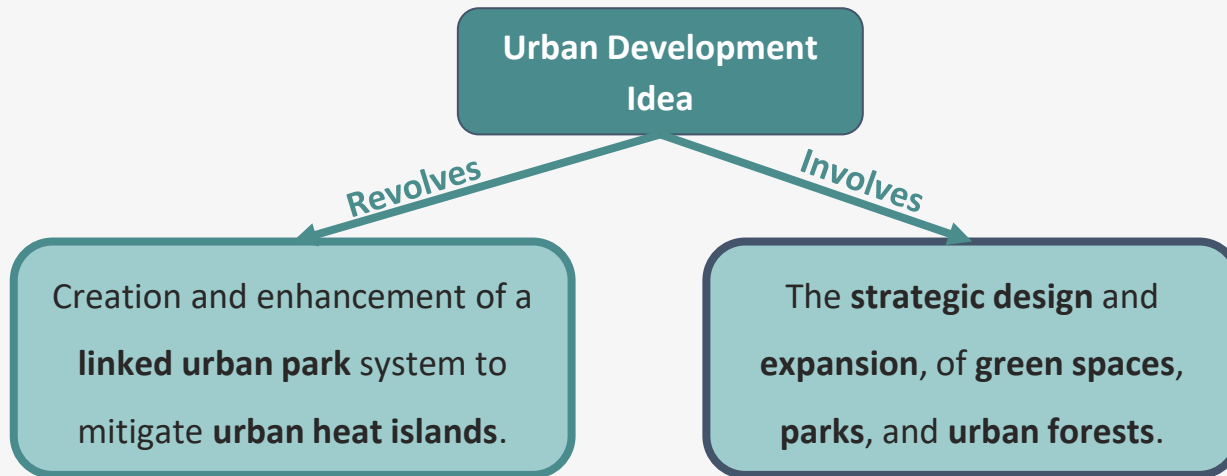
UDENE Data Cube

Data Cube Frame
Workflow



Use case exemple 1

Effect of a linked park system on heat load



Pauleit et al., 2020

Use case exemple 2

Coastal Urban Resilience

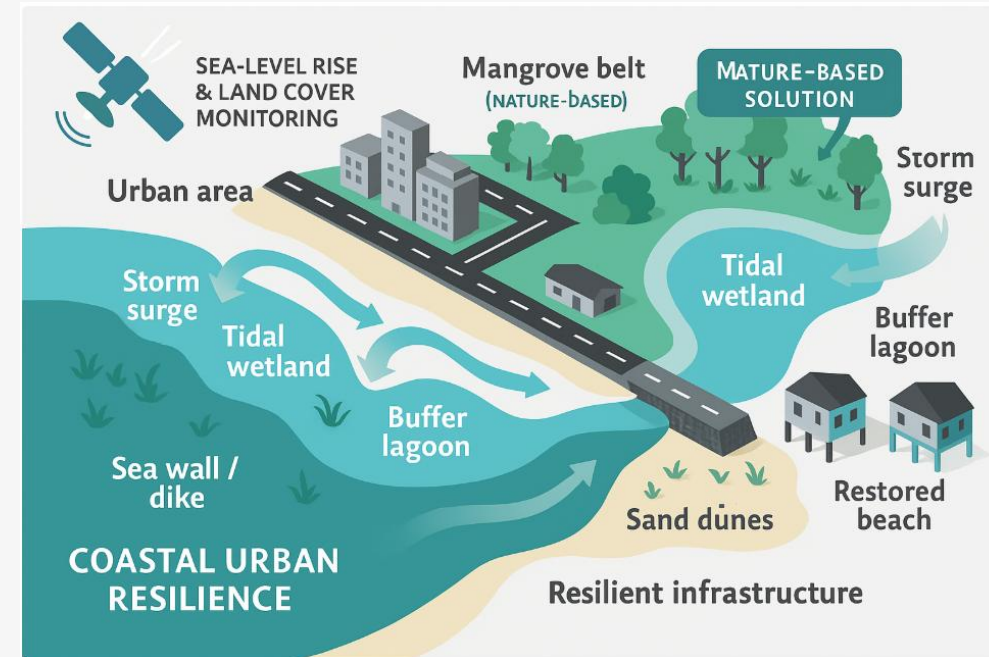
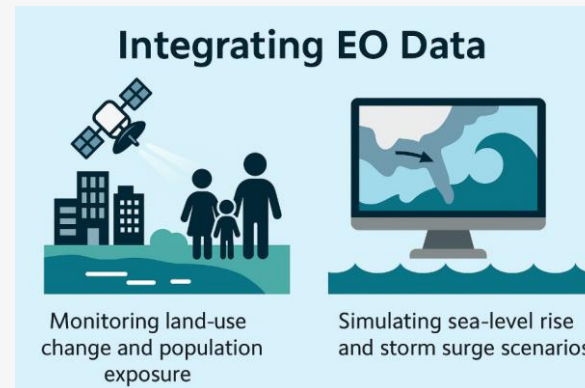
Urban Development Idea

Revolves

Involves

- Urban growth into flood-prone coastal areas
- Land reclamation projects
- Infrastructure built near shorelines

- Integrating EO data
- Monitoring land-use change and population exposure
- Simulating sea-level rise and storm surge scenarios



Outcomes / Impacts

- Identification of **coastal vulnerability hotspots**
- Policy guidance for **resilient urban planning & zoning**
- Evidence for **nature-based solutions**
- Support to **SDG 11 (Sustainable Cities) & SDG 13 (Climate Action)**

UDNE - Exploration and Matchmaking Tool



Datasets

Experiments

Use cases

K khalil
khalilbensaid98@gmail.com

In-Situ Datasets

Global Datasets

Upload



Sentinel 2

Multispectral imagery from Sentinel-2 used for land monitoring and vegetation analysis.

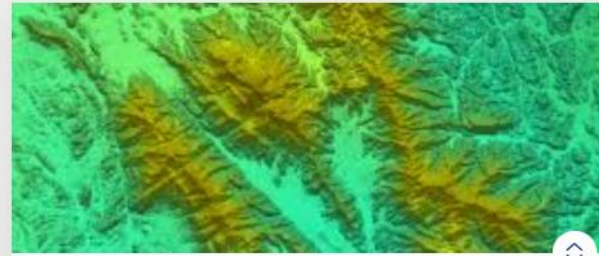
Jan 2016 - present



Sentinel-2 Quarterly Mosaics

Quarterly mosaics derived from Sentinel-2 imagery for long-term monitoring.

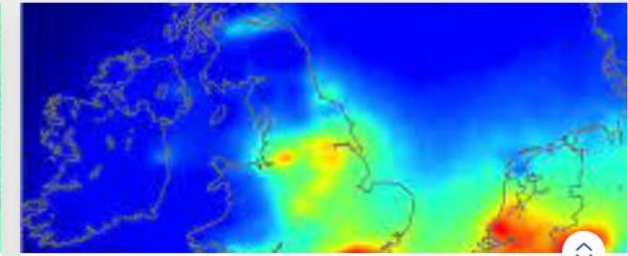
Jan 2019 - Jan 2025



Copernicus DEM

Digital elevation models for terrain analysis and 3D visualizations.

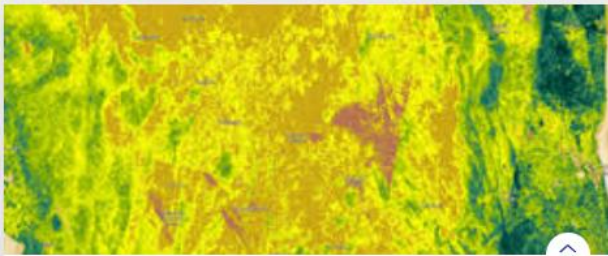
Timeless



Sentinel 5P

Atmospheric monitoring for gases and pollution tracking.

Jan 2018 - present



Landsat 8-9

Multispectral and thermal imagery for land and environmental monitoring.

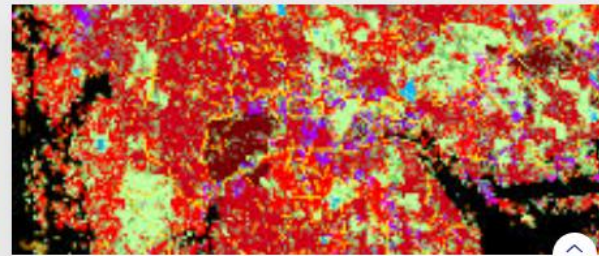
Jan 2013 - present



Landscan Global

Population distribution estimates for disaster and infrastructure planning.

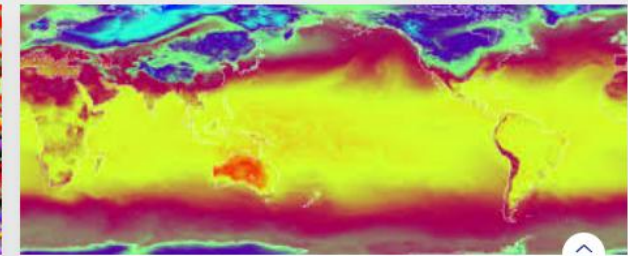
Jan 2000 - Jan 2023



Global Human Settlement layers

Information on built-up areas and population derived from satellite imagery.

Jan 1975 - Jan 2025



ERA5

Climate reanalysis data providing consistent temporal and spatial estimates.

Jan 2008 - Jan 2024

UDNE - Exploration and Matchmaking Tool



Datasets

Experiments

Use cases

K khalil
khalilbensaid98@gmail.com

Automatic

Manual

Please write your urban Development Concept

Describe your idea

Start date

12/15/2024



End date

12/15/2024



Run Experiment

To run an experiment, please draw a zone using the drawing tools on the right of the map



UDNE - Exploration and Matchmaking Tool



Datasets

Experiments

Use cases

K khalil
khalilbensaid98@gmail.com

Filter by Topics

• Heat

• Green Area

• Climate change

• Air pollution

• Earthquake

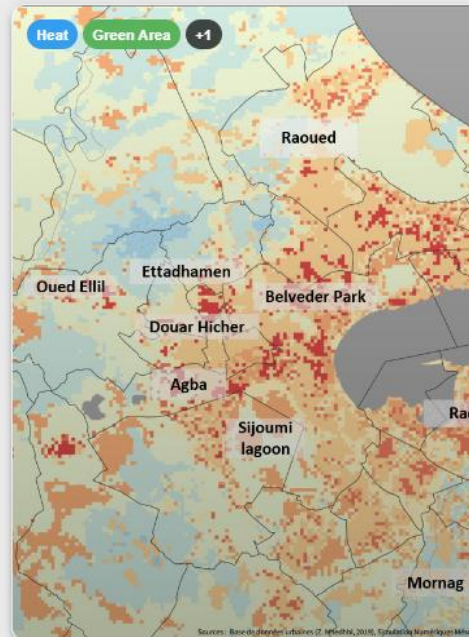
• Temperature

Clear all filters (4)

Filtered Results

Active filters:

Heat × Climate change × Air pollution × Earthquake ×



Effect of a linked park system on heat load

Tunis, Tunisia 01/01/2023

Description

The urban development idea revolves around the creation and enhancement of a linked park system within the city to mitigate urban heat islands (UHI). This idea would involve the strategic design and e...

Read more

Heat Green Area Climate change

Explore

Download

High-Rise District Effect on earthquake preparedness





Tunisian Space Association

الجمعية التونسية للفضاء



UDENE Project

Tunisian Space Association

Thank you for your attention 😊

Contact

Mohamed Rajhi

Email 1: mohamed.rajhi@ext.esa.int

Email 2: m.rajhi.inat@gmail.com

Phone: (+216) 92 885 433 / (+39) 347 961 3653



The project has received funding from the European Commission's Horizon Europe Research and Innovation Programme under grant agreement No 101131190