

eo science for society



Soil Sealing Assessment and Monitoring of the Mediterranean Coastal Area

Ulysses project



ISPRA

Istituto Superiore per la Protezione
e la Ricerca Ambientale



CLS

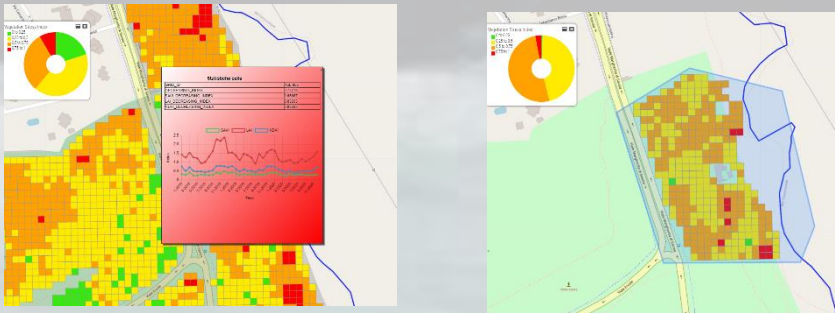
COLLECTE LOCALISATION SATELLITES

The ESA Ulysses project

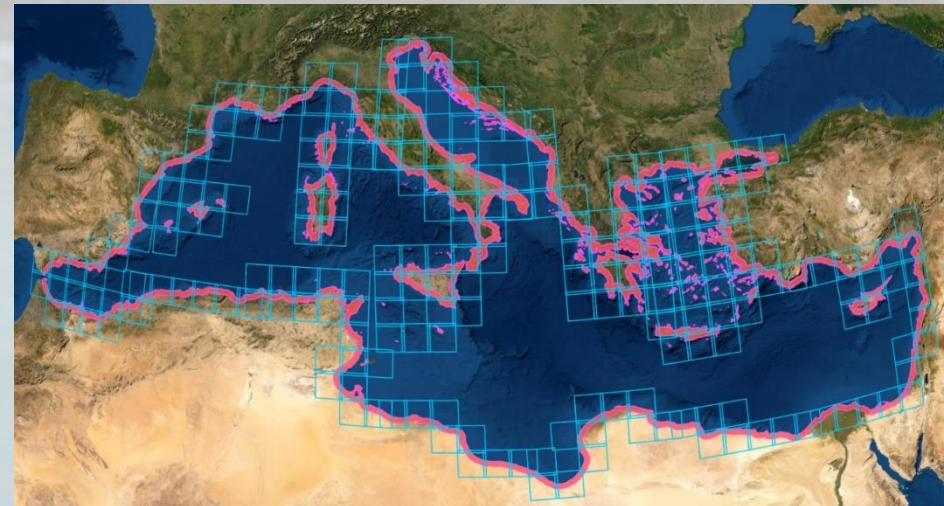


The Ulysses project (ESA Mediterranean initiative) is led by Planetek Italia and with CLS and ISPRA, is producing soil sealing products for the coastline of the Mediterranean Sea, exploiting the large volume of EO data made available by Copernicus. The project aims at embedding EO-derived information into the strategies and cooperation actions by:

- Assessing the soil sealing and imperviousness degree - annual time series from 2018 to 2022
- Delivering the products together with web exploitation tools
- Involving directly and actively authoritative end users



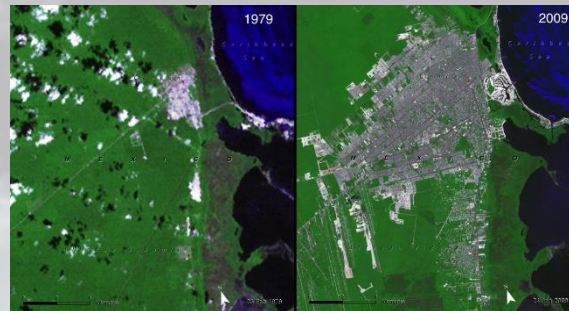
Innovative indicators on the soil sealing products, according to users' needs



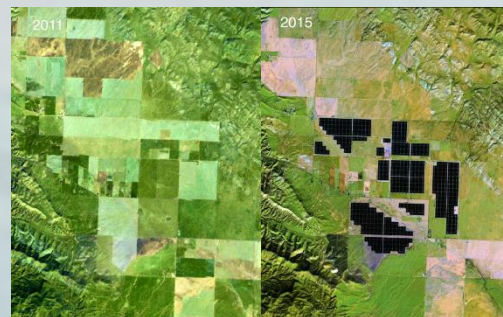
Products time series available from 2015 to 2020 on a buffer of 20 km inland of coastline of the Mediterranean sea

Soil sealing – definition

Permanent covering of the soil surface with impermeable artificial materials, leading to non-reversible loss of soil and most of its ecosystem services



Worldwide, 17 ha of soil are sealed every minute under expanding infrastructure (2016)

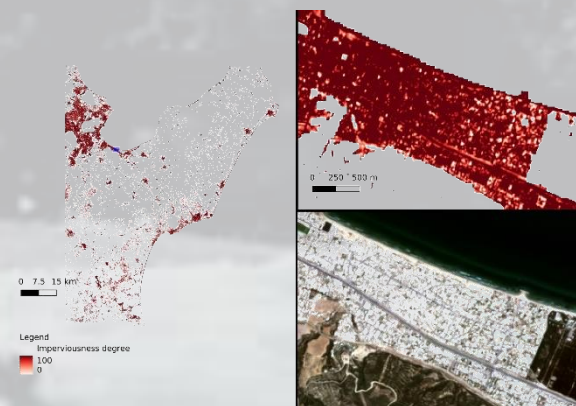


Soil sealing maps



The products developed by the project are

- Soil sealing maps (*binary mask*)
- Imperviousness degree (*sealed surfaces percentage per pixel*)



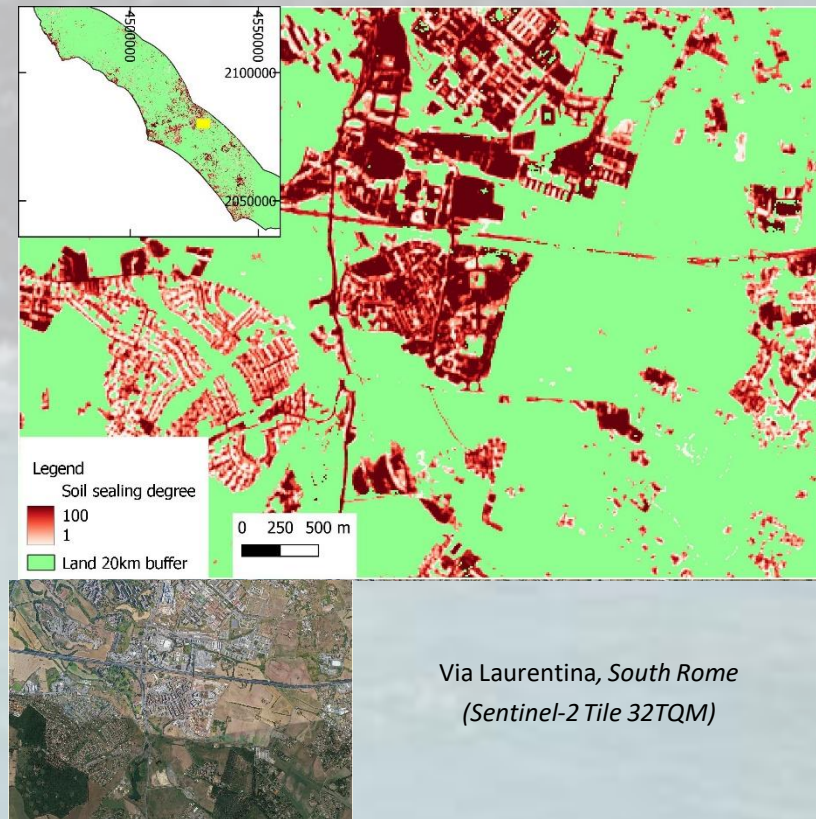
Hammam Lif, Tunisia (Sentinel-2 Tile 32SPF)

The products:

- are available as time series of yearly maps from 2018 to 2022
- covers a buffer of 20 km inland of the Mediterranean Sea coastline
- have 10-meters resolution

The processors

- exploits Machine Learning algorithms
- are deployed on the Onda DIAS, thanks to the NoR sponsorship

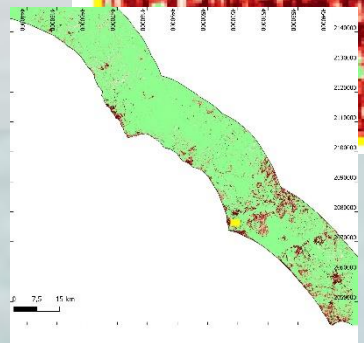
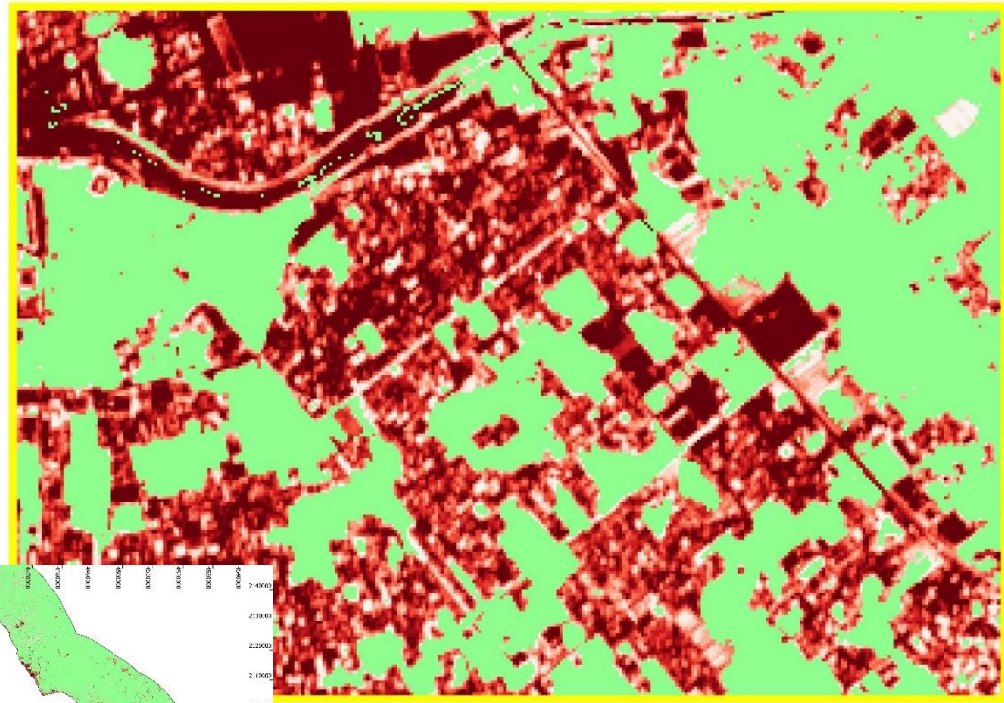
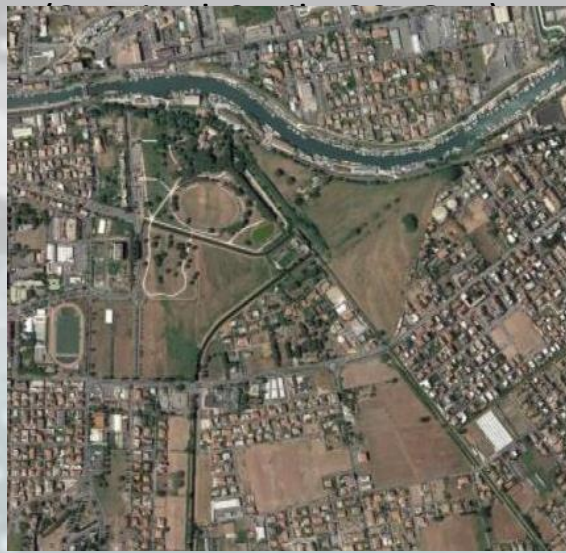


Via Laurentina, South Rome (Sentinel-2 Tile 32TQM)

The soil sealing degree map



Details of the Soil sealing degree product over Fiumicino

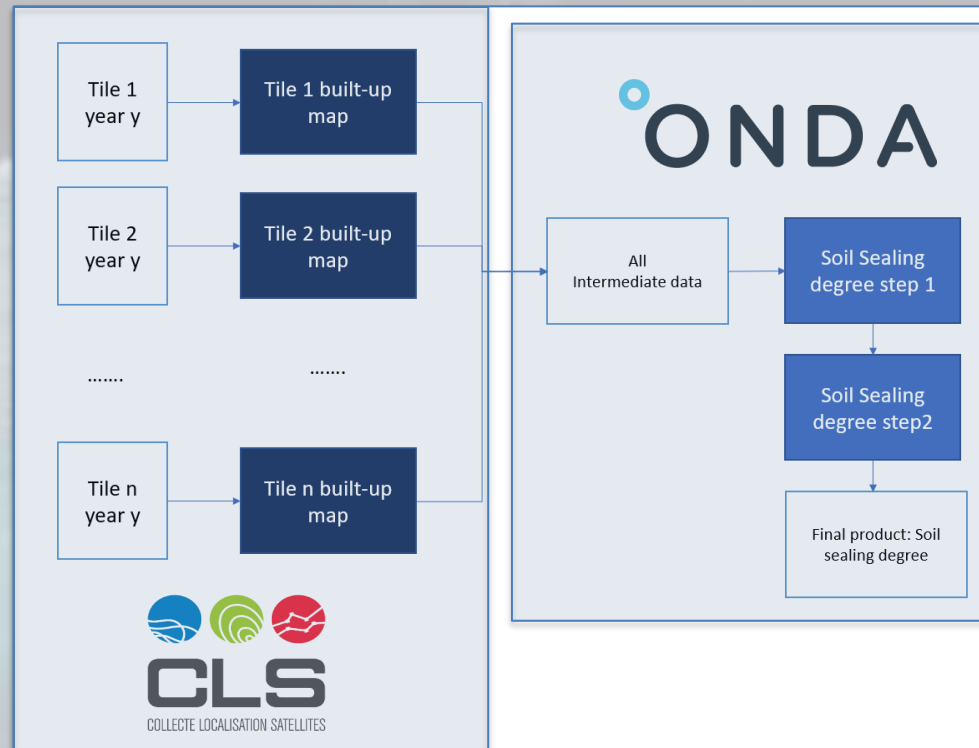


Implementation



- The project is implemented in two subsequent phases: the first phase ended in December 2022, with the delivery of the products for 2020
- The second phase is starting at the beginning of 2023, to produce the complete time series from 2018 to 2022

- *In phase 1, the processing architecture has been deployed on the **ONDA DIAS** (thanks to the **NoR** sponsorship), and **CLS**' environment*
- *Soil sealing binary mask has been mostly produced on CLS facility, partially on the ONDA DIAS*
- *Soil sealing degree has been produced on the ONDA DIAS*



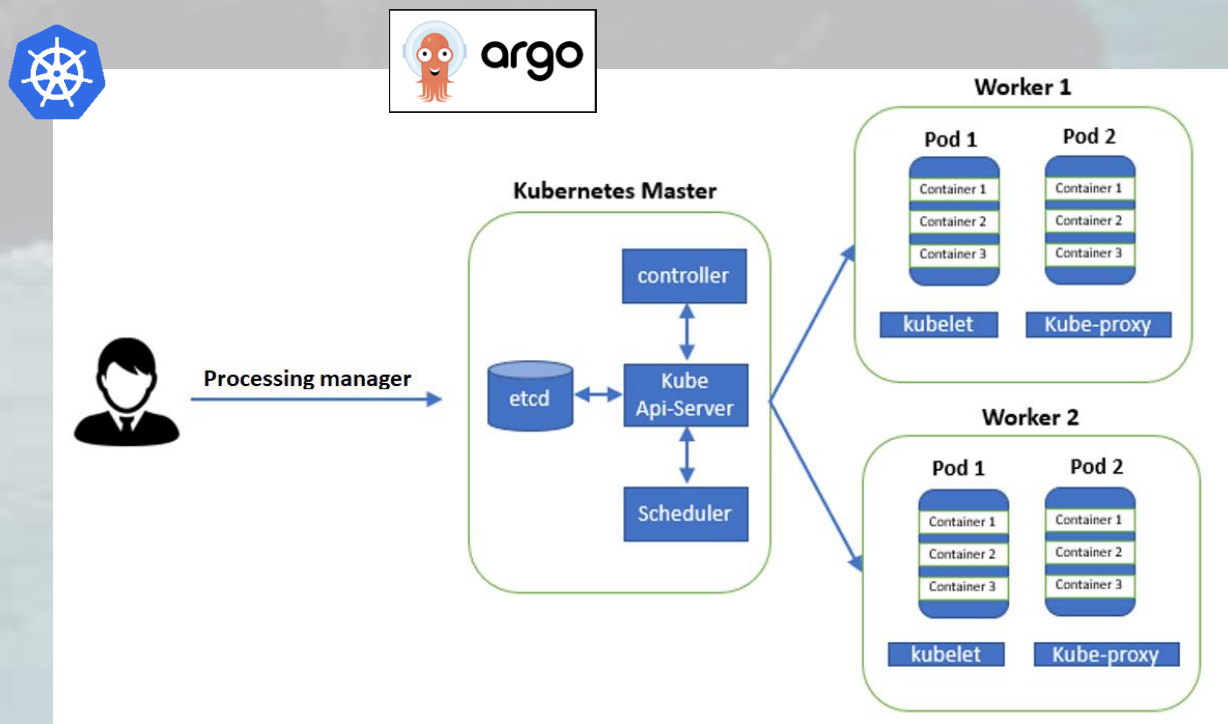
Implementation

The Processing Architecture will be based on a Kubernetes cluster, with Argo used as workflow manager

- The master node manages the Kubernetes cluster
- A worker node is a virtual or physical server that runs the applications and is controlled by the master node
- The pods are scheduled on the worker nodes
 - Pods → processing pipeline
- Pods are nothing but a collection of containers.

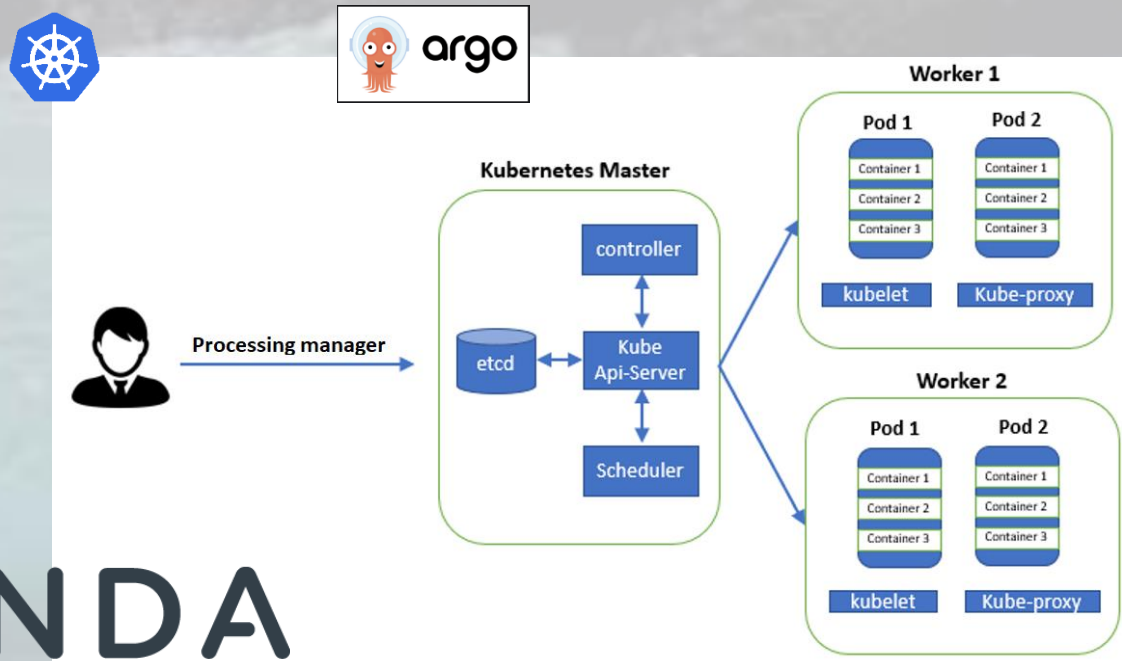
Containers → processing pipeline steps

- *The processing architecture has been deployed on the OndaDIAS in phase 1*
- *In phase 2, the availability of Sentinel-2 Level 2A data will be the key element for the selection of the DIAS*



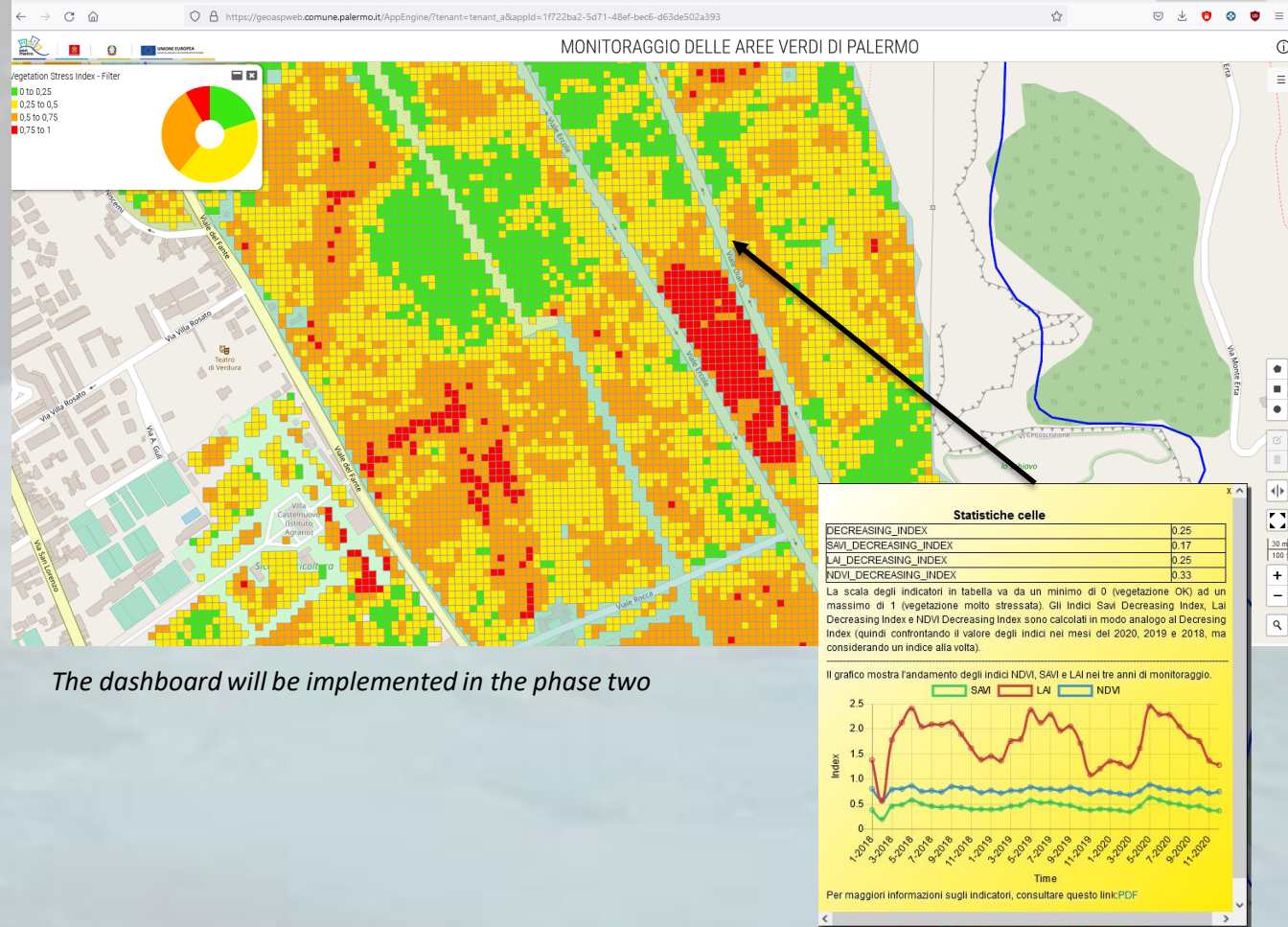
Data usage and availability

- The AoI (Area of Interest) is the complete coastal area of the Mediterranean Sea, with a buffer of 20 km from the coastline. It corresponds to ~ 250 Sentinel-2 tiles
- For the product of the year 2020, a total of ~ 15,000 Sentinel-2 tiles are required
- Sentinel-2 L1C data are not available online on the ONDADIAS, except for the last three months of data -> a mechanism for ordering the data and waiting for their availability has been setup



Indicators

- Soil consumption
- Soil consumption in coastal protected areas
- Anthropic pressure in coastal protected areas
- Soil consumption in river buffer areas
- Soil consumption in coastal areas
- Soil consumption for elevation and slope classes
- Soil consumption in flood hazard areas
- Soil consumption in landslide hazard areas
- Soil consumption in seismic hazard areas
- Urban sprawl



The dashboard will be implemented in the phase two

Web site

ULYSSES: Soil Sealing Assessment and Monitoring Project

A Mediterranean Regional Initiative by ESA

HOME PAGE THE PROJECT SOIL SEALING STAKEHOLDERS DATA AND SERVICES

The project Mediterranean Soil Sealing, promoted by ESA - European Space Agency - aims at providing specific products related to soil sealing presence and degree over the Mediterranean coastal areas by exploiting EO data.

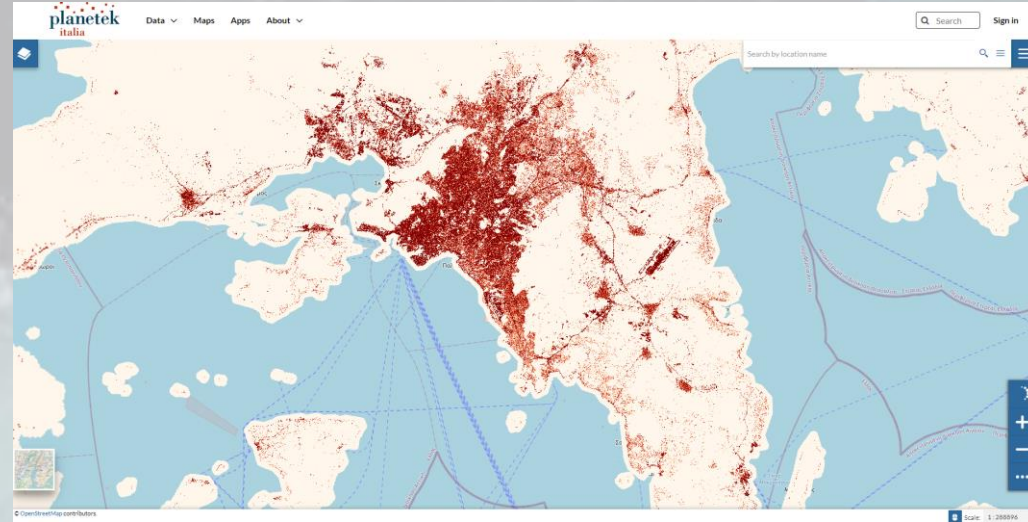
Stakeholders

Read more



<https://www.ulysses-project.org/>

Data pool (available only to authorized users)



info@ulysses-project.org