System for automatic land use change detection

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Framework Partnership Agreement
for Copernicus User Uptake

Land cover data

Copernicus Climate Change Services:
Global:

The United Nations Food and Agriculture Organization's (UN FAO) Land Cover Classification System (LCCS) at 300 m resolution. Land cover classification gridded maps are provided for the period 1992-2020, yearly.

Copernicus Land Monitoring Service:
Global

The Copernicus Global Land Service (CGLS) Dynamic Land Cover map at 100 m resolution, provided for the period 2015-2019, yearly.

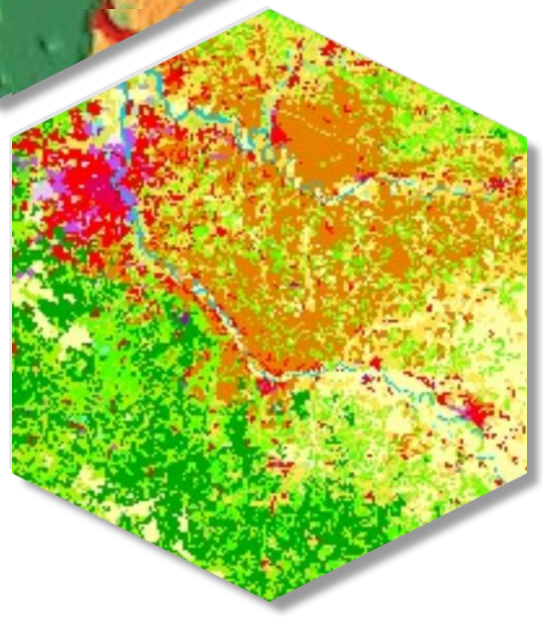
Pan-European:

The CORINE Land Cover (CLC) vector inventory produced in 2000, 2006, 2012, and 2018

Land cover changes in European countries in 2000-2018

Google Dynamic World

ESA CCI



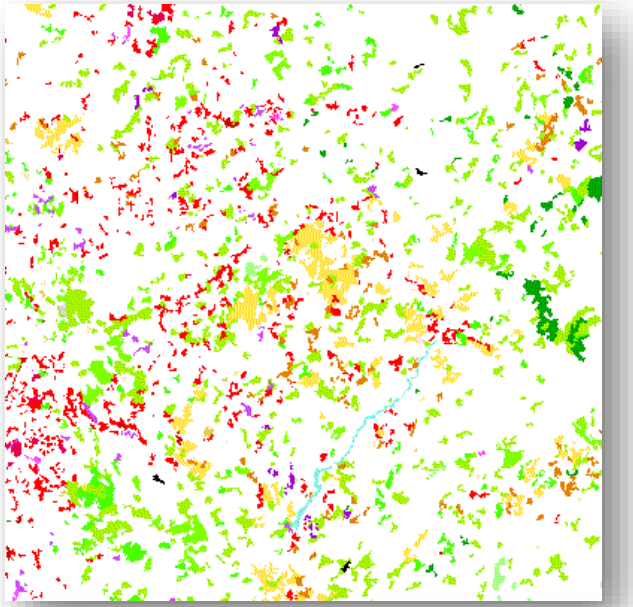
Corine Land Cover

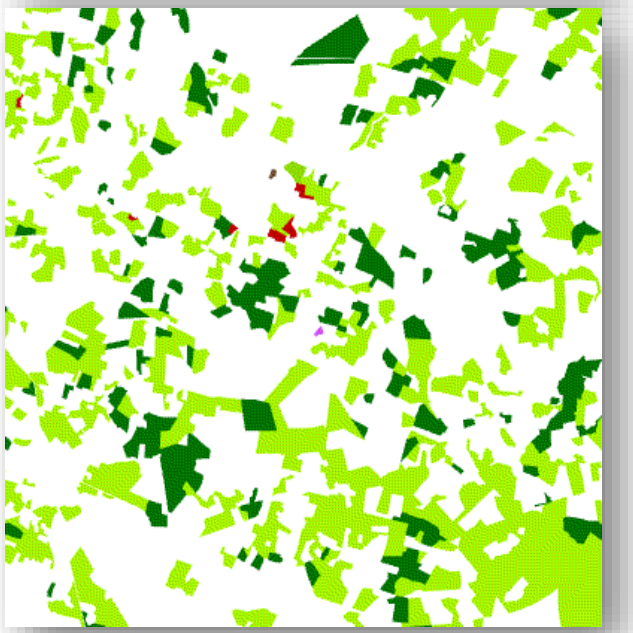
Land cover changes

Corine land cover change editions (100 m):
1990-2000 2000-2006 2006-2012 2012-2018

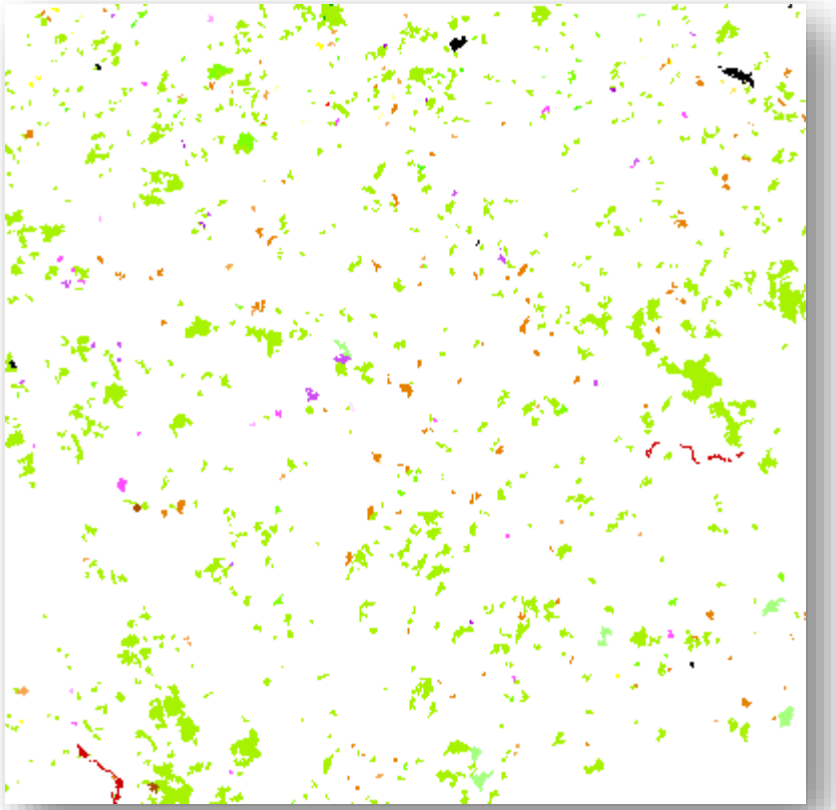
Other CLMS products:

- N2K Land Cover/Land Use Change (6-yearly)
- Grassland Change (20 m, 3-yearly)
- Dominant Leaf Type Change (20 m, 3-yearly)
- Riparian Zones Land Cover/Land Use Change (6-yearly)
- Tree Cover Change Mask Change (20 m, 3-yearly)
- Imperviousness Classified Change (20 m, 3-yearly)
- Land Cover Change Hot Spots globally
- Urban Atlas Land Cover/Land Use Change (6-yearly)
- Coastal Zones Land Cover/Land Use 2018 (6-yearly)

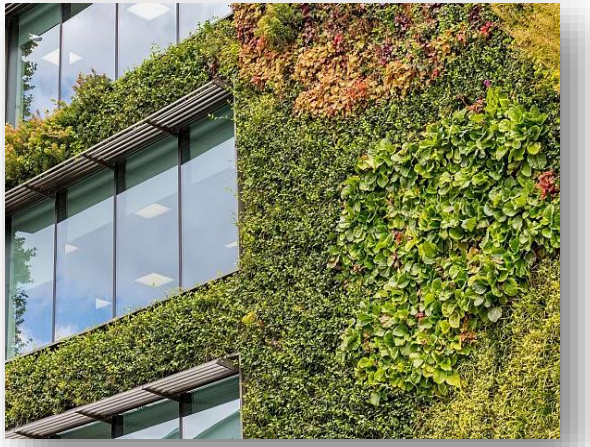




Types of land cover changes considered in the application



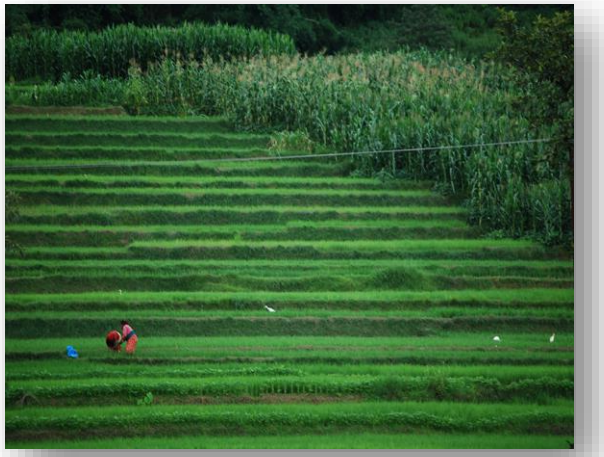
Deurbanisation



Afforestation

Urbanisation

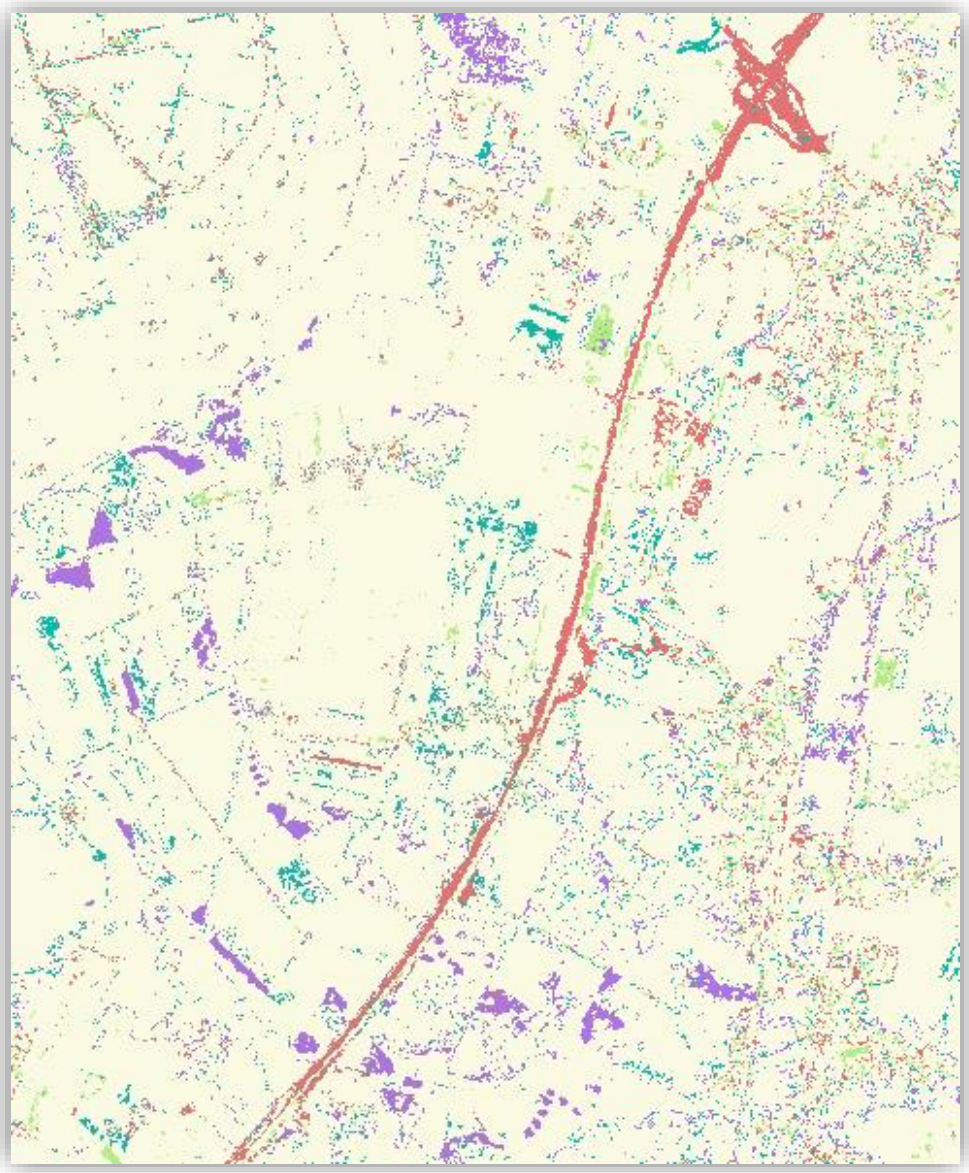
Natural to agriculutral areas



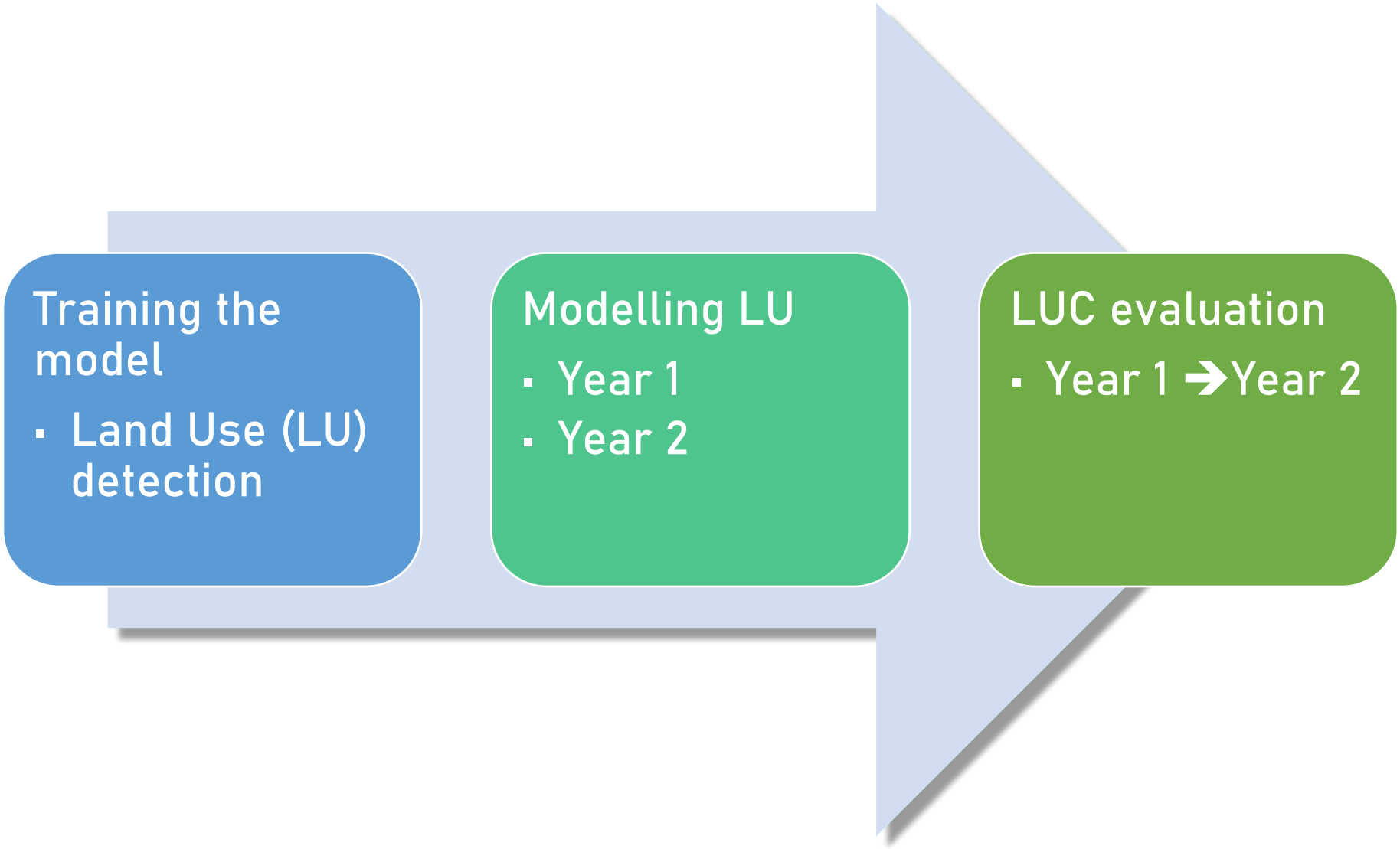
Proposed application: novelty

Satellite input:
Sentinel-1 SAR GR
Sentinel-2 MSI Level-1C and Level-2A
Spatial resolution: 10 m
Temporal resolution: yearly, 2015 (2019) – 2023
Evaluation of Land Use Change:

- No change
- Retained / reclassified
- Deurbanisation
- Afforestation
- Urbanisation
- Natural to agricultural areas



Application schema: simplified workflow



Input dataset

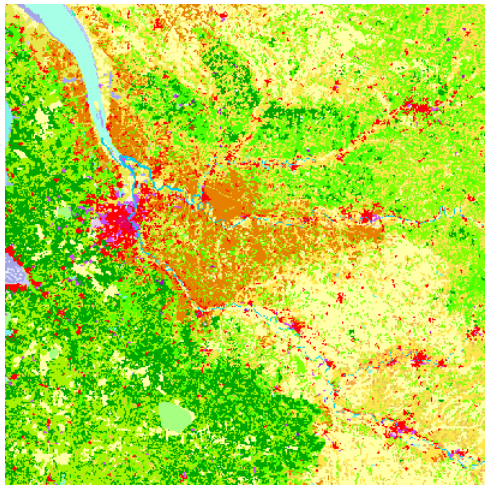
Copernicus data:

- Sentinel-1 GRD
- Sentinel-2 level 1C
- Sentinel-2 level 2A
- Corine Land Cover 2018

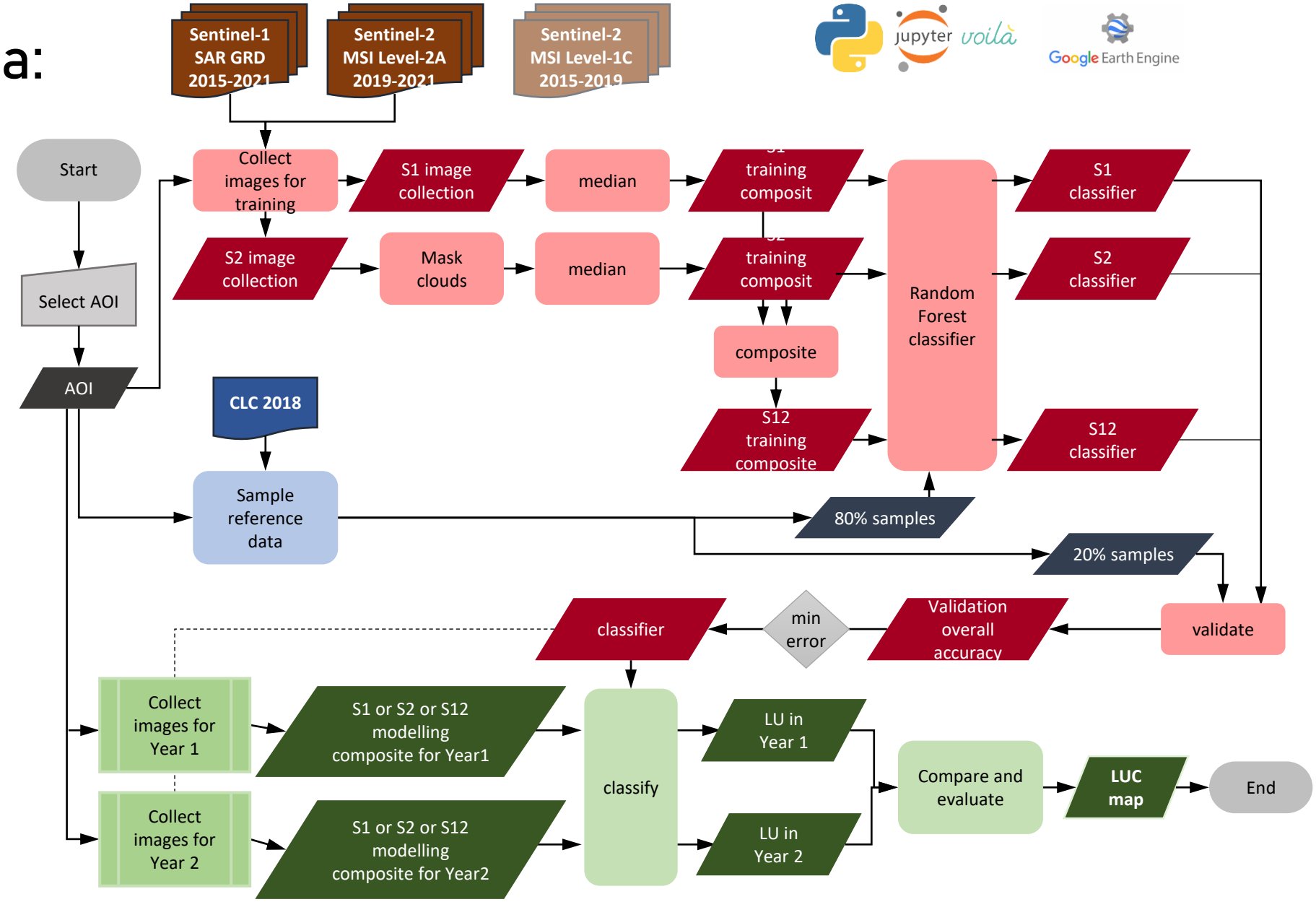
Sentinel-1
GRD

Sentinel-2
Level 1C
Level 2A

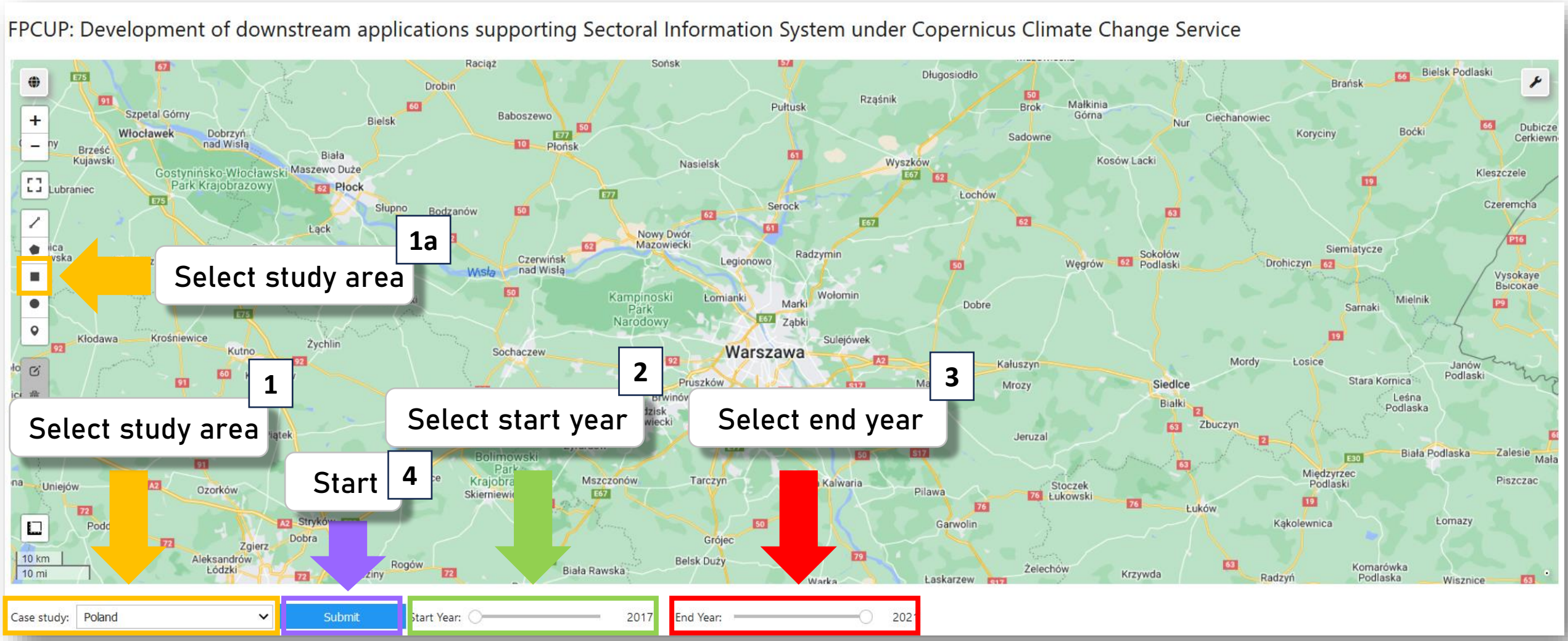
Corine Land Cover 2018



Application schema: main workflow



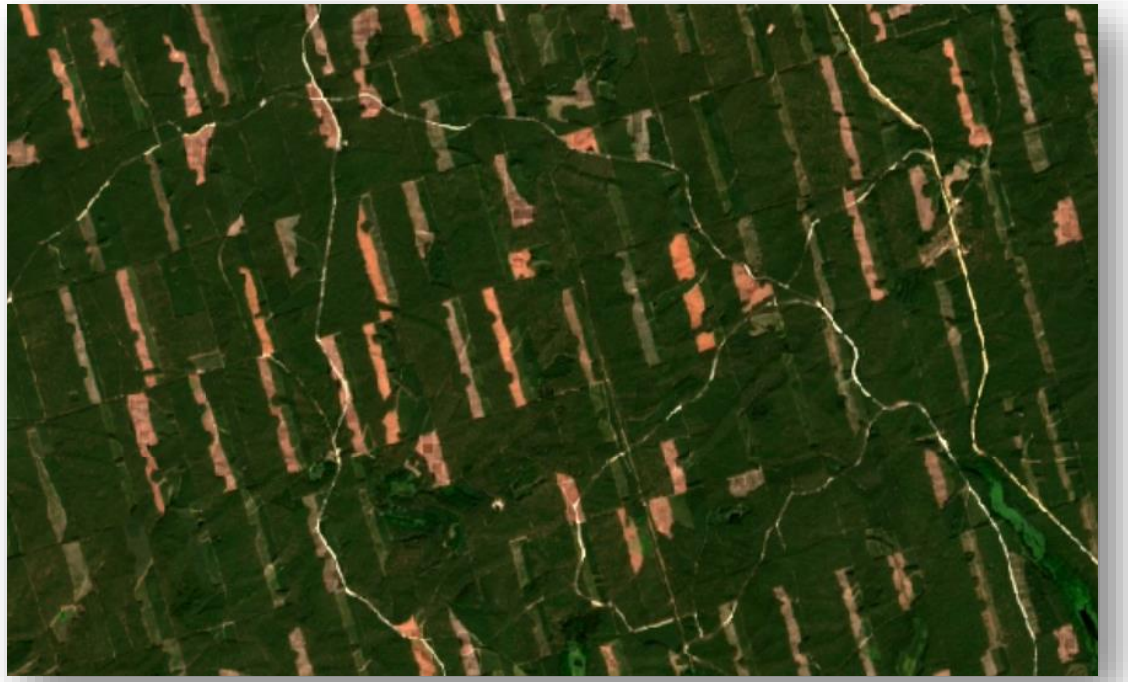
Application interface



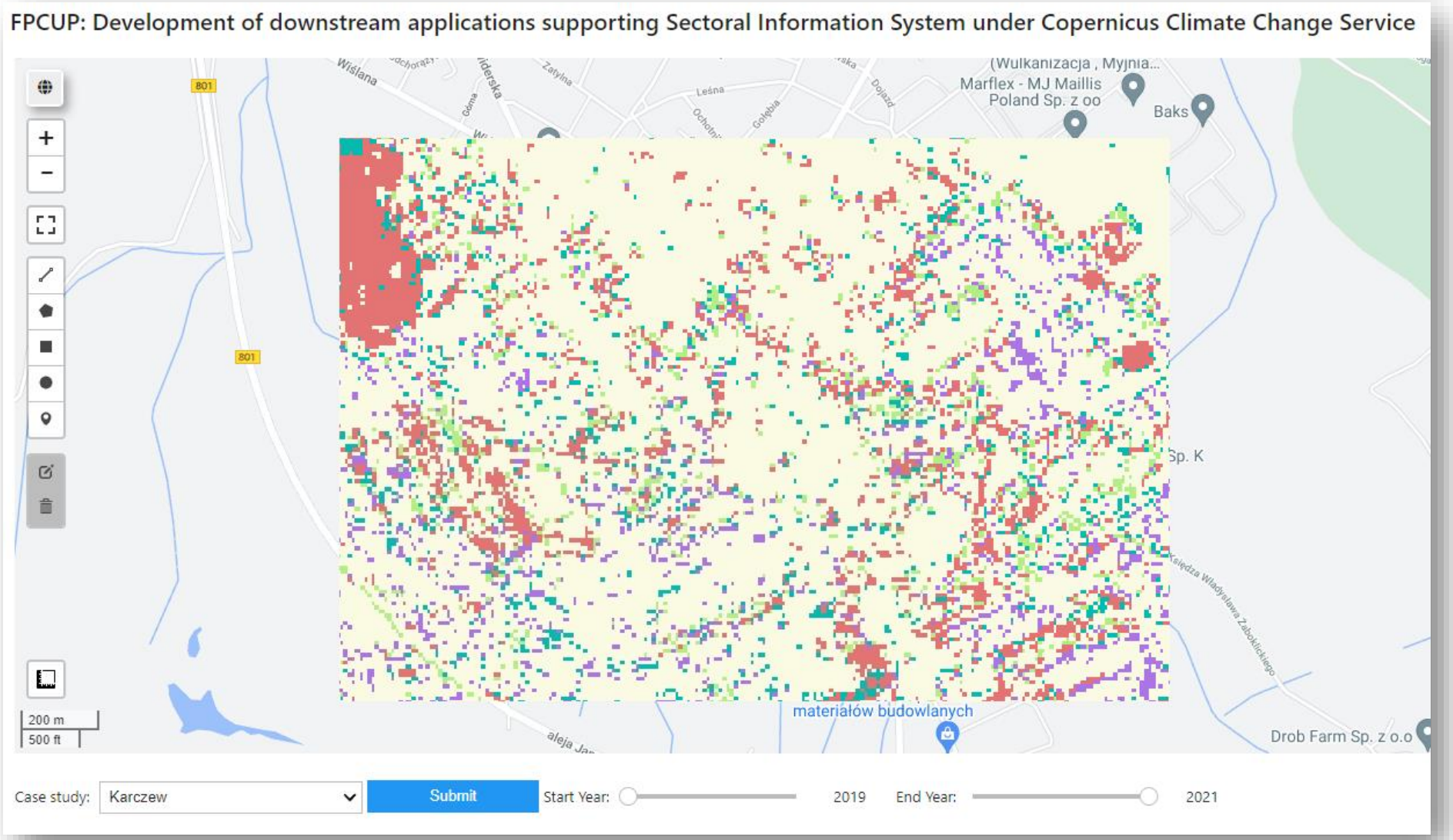
Polish case studies

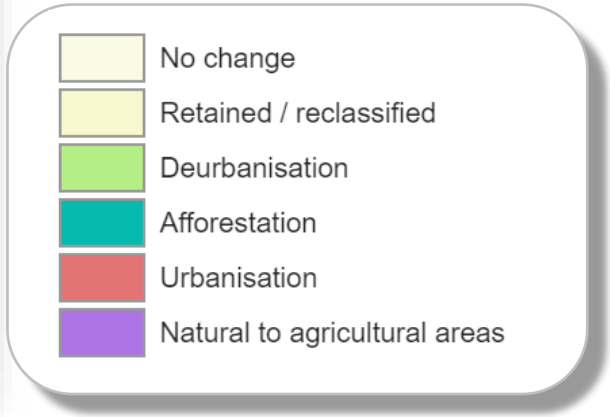
The diferent types of land cover change:

- Karczew – expansion of housing areas
- Kamieńsk - highway construction
- Białowieża – changes in forest areas, both (afforestation & deforestation)

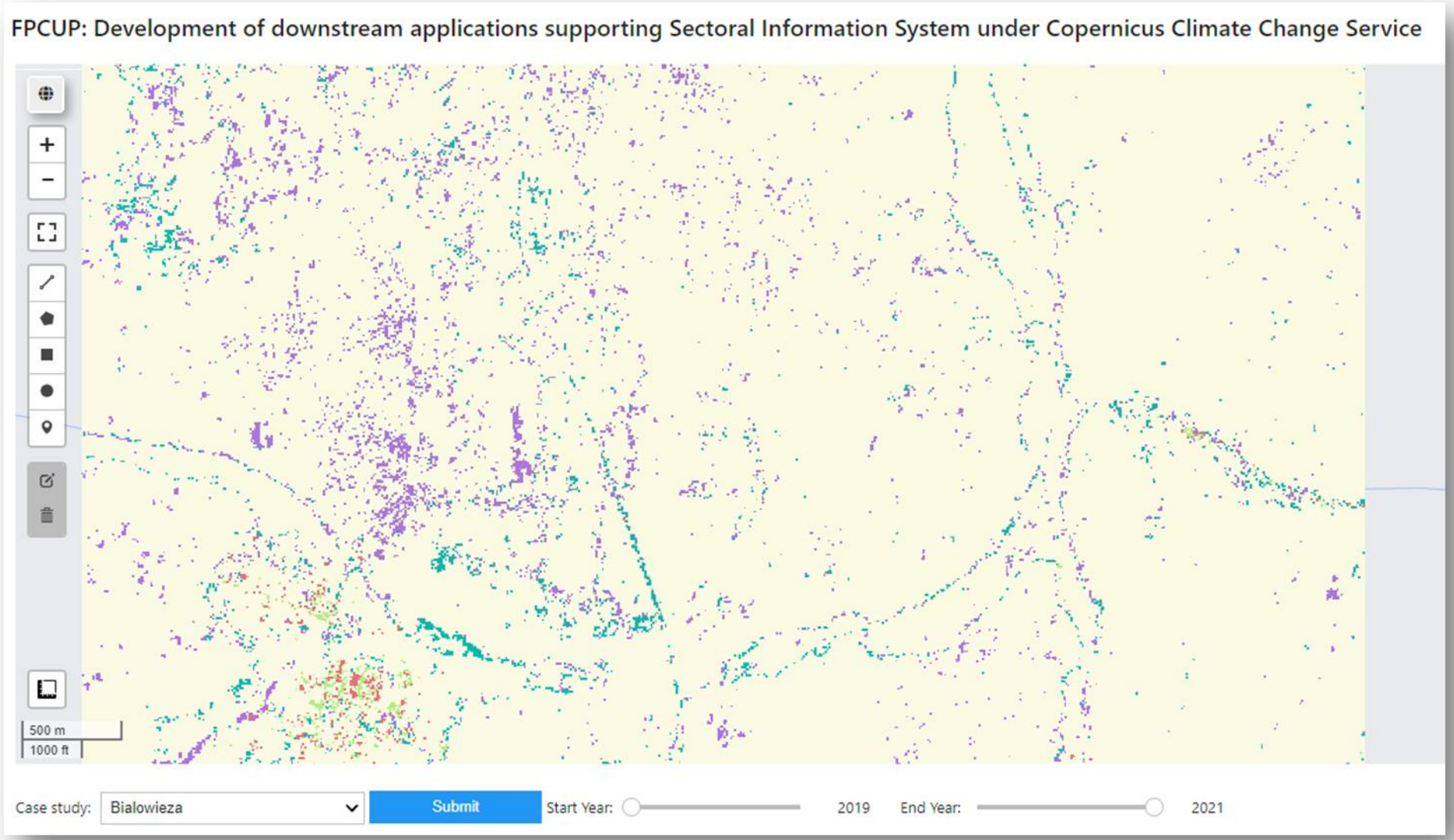


Polish case study - Karczew

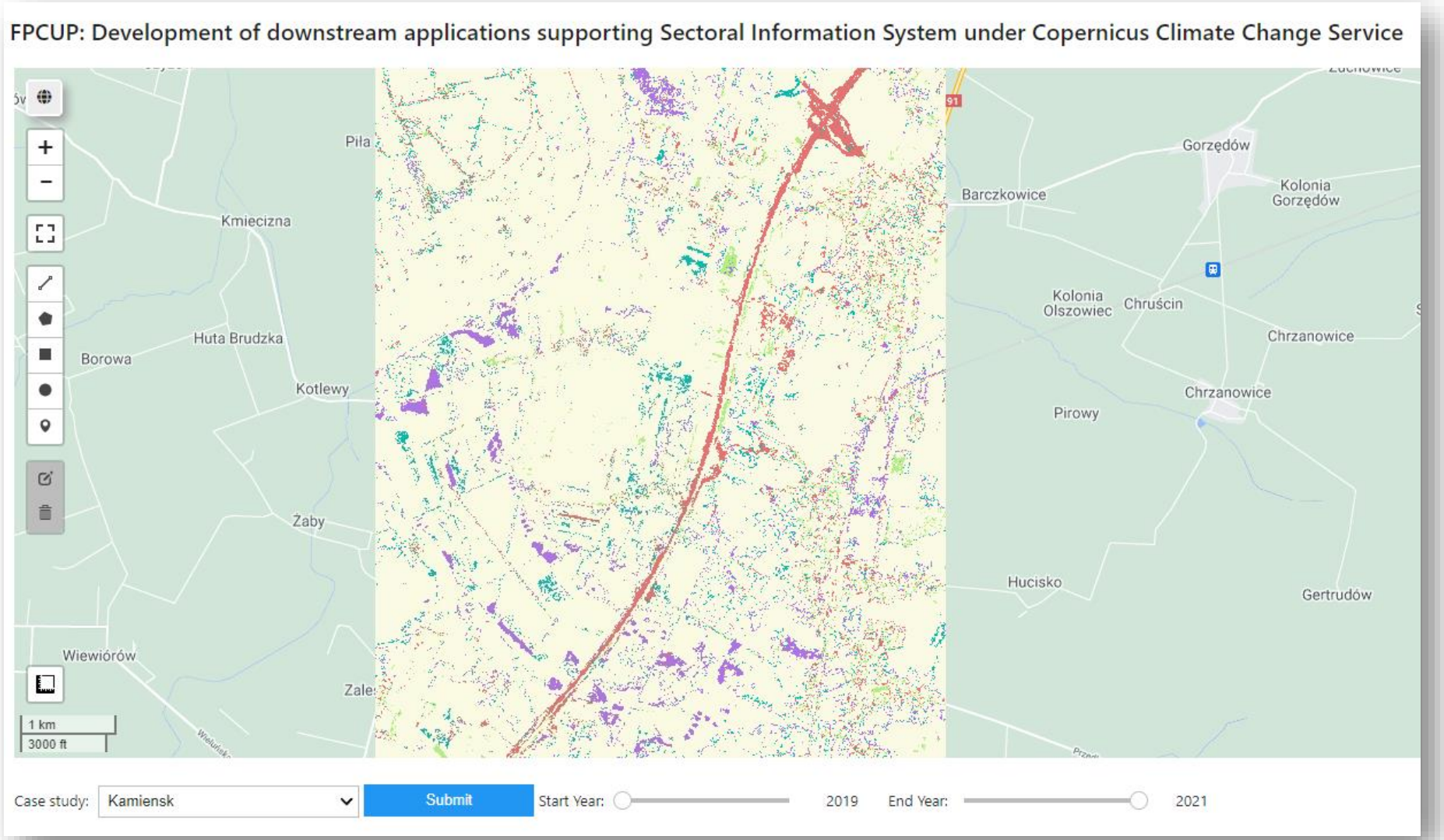




Polish case study - Białowieża



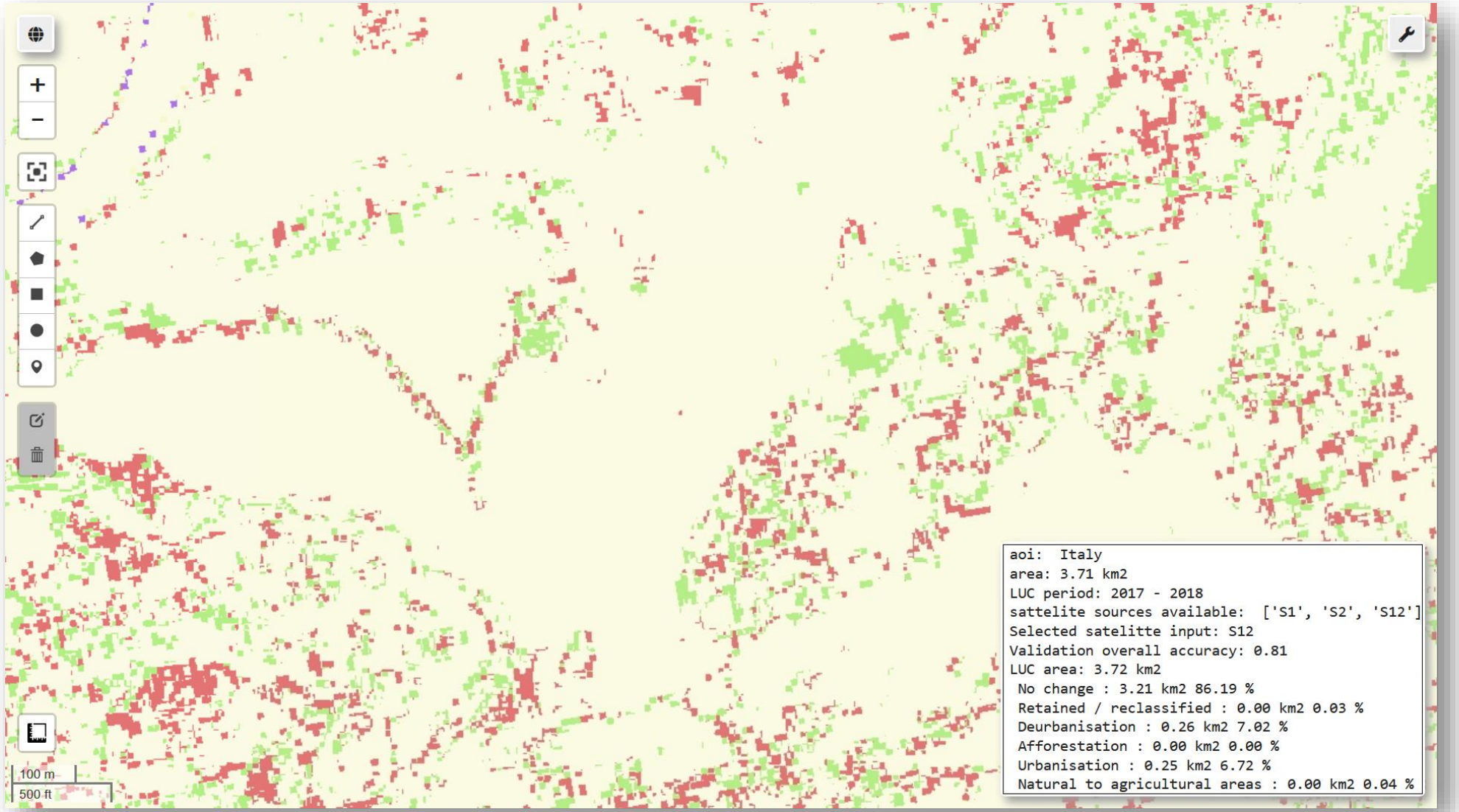
Polish case study - Kamieńsk



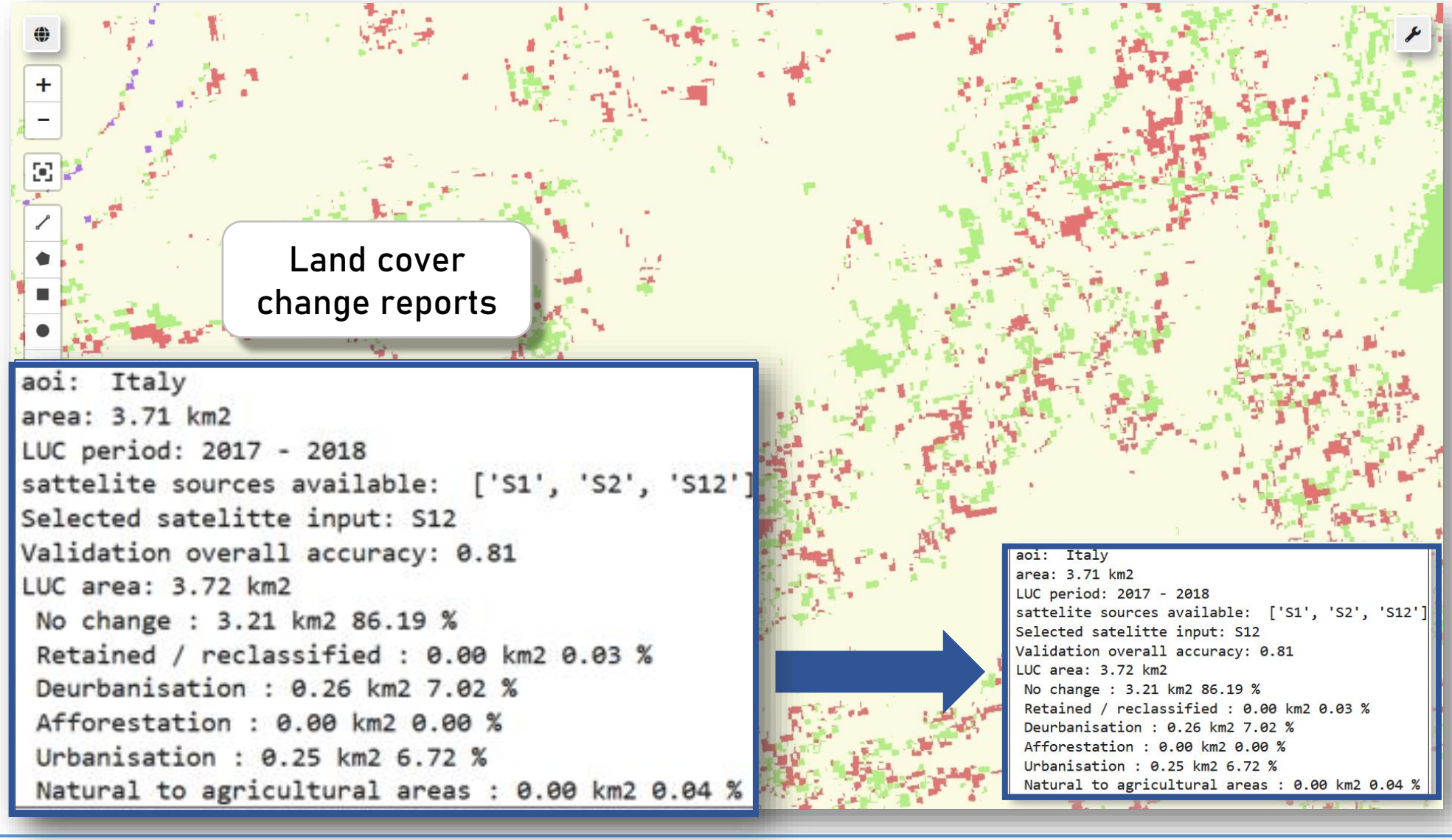
- No change
- Retained / reclassified
- Deurbanisation
- Afforestation
- Urbanisation
- Natural to agricultural areas

Italy case study

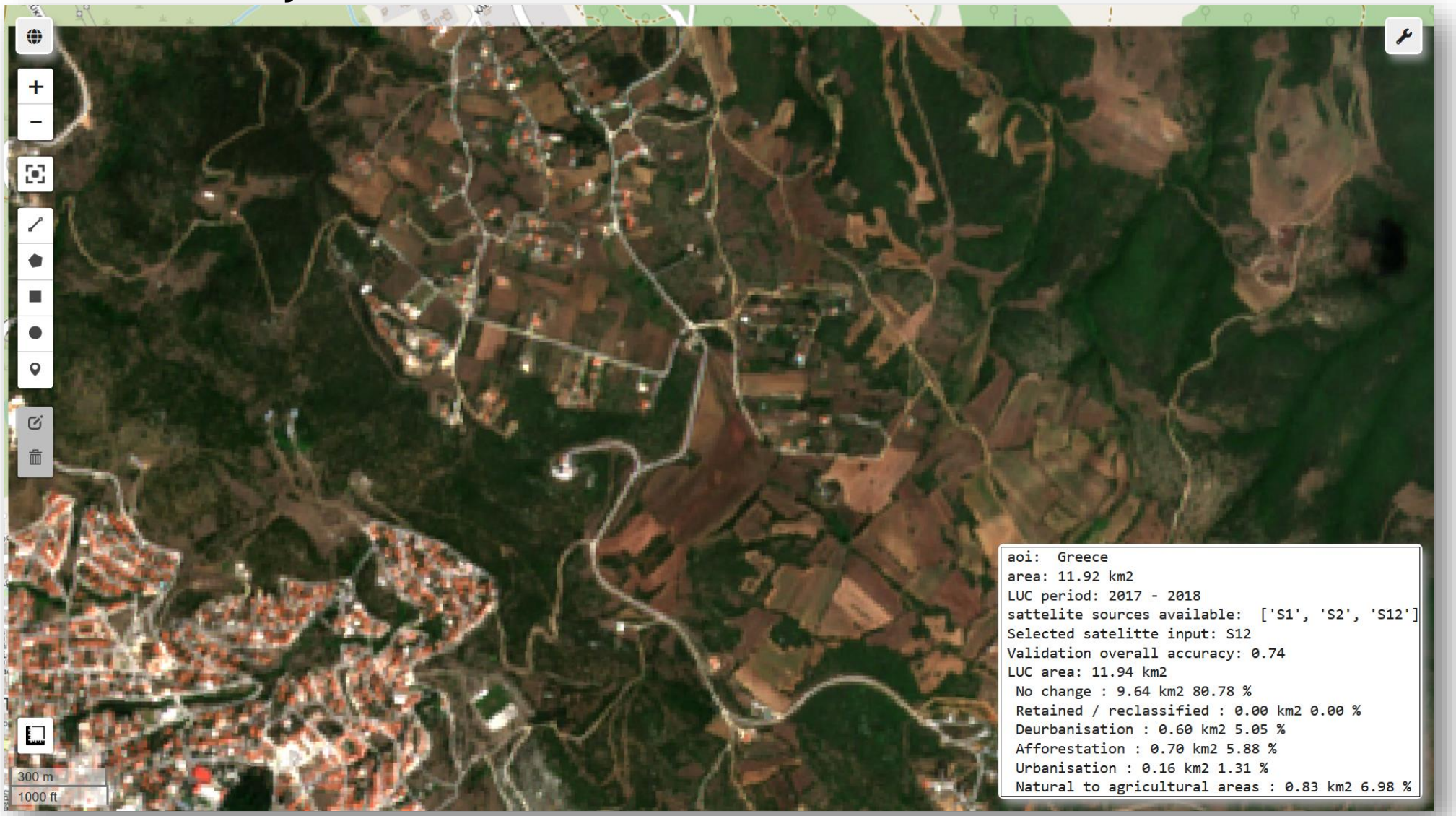
Italy case study



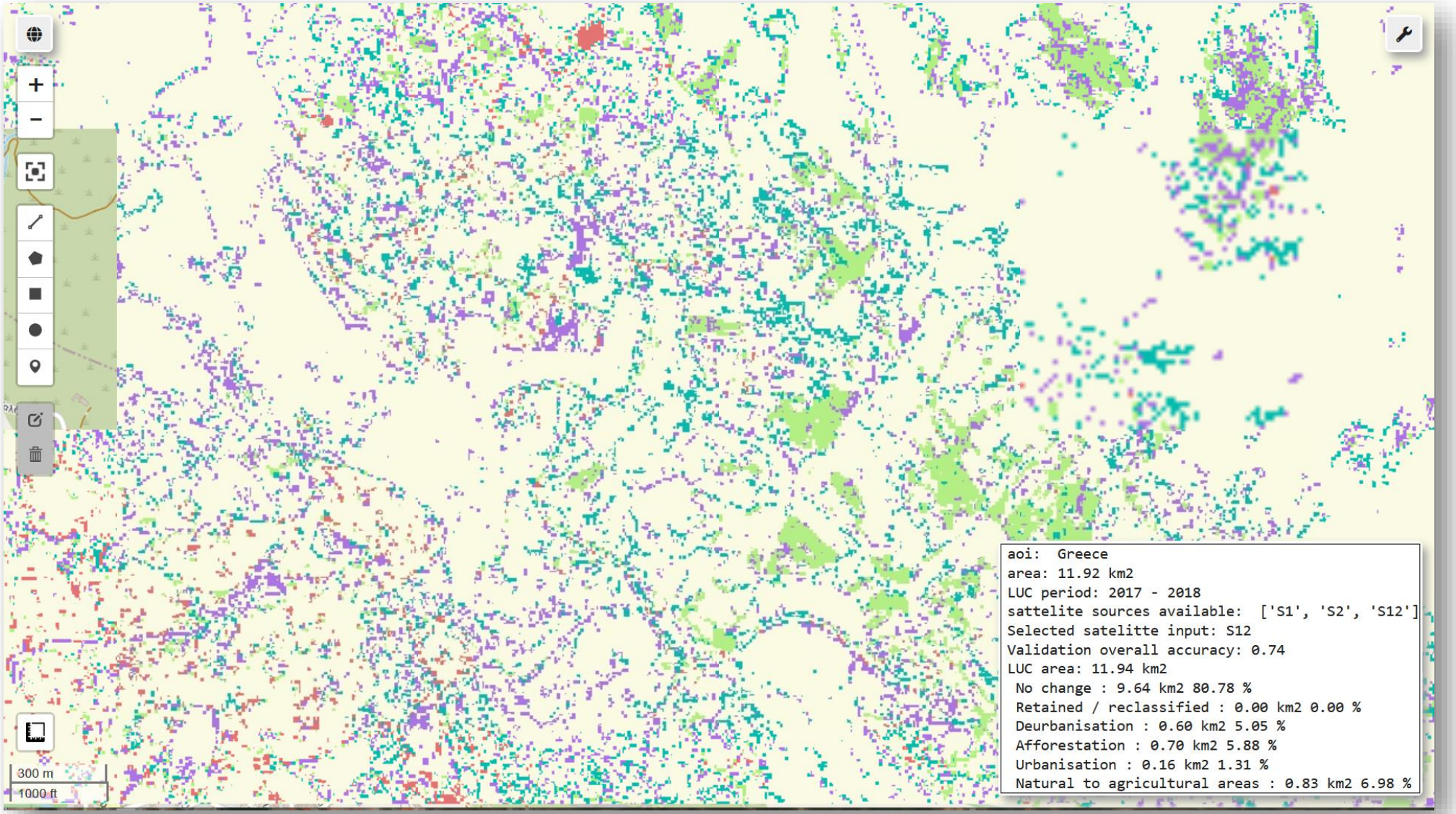
Italy case study



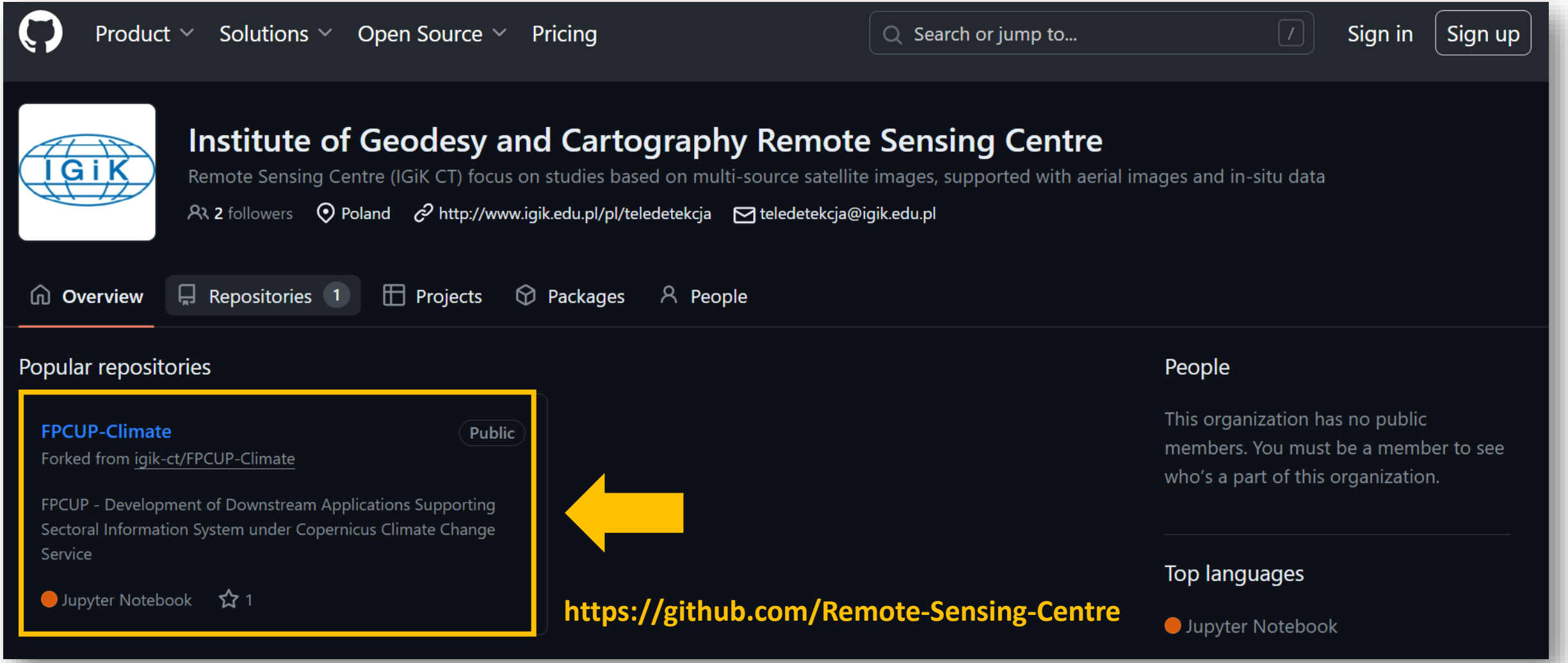
Greece case study



Greece case study



GitHub repository open-access



GitHub repository open-access

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IGIK FPCUP LANDCHANGE

python 3.8 | 3.9 | 3.10 | 3.11

FPCUP-Climate

Development of Downstream Applications Supporting Sectoral Information System under Copernicus Climate Change Service

System for automatic land use change detection

Land use/land cover change products available under Copernicus framework:

Languages

Jupyter Notebook 99.9% Procfile 0.1%

Thank you for your attention

Acknowledgments

Design and development of user applications to support the sectoral information system for the Climate Change Service under the Caroline Hershel Programme's partnership framework agreement (acronym: FP CUP Downstream Applications), Contract No. 8-SI2.829837 CONTRACT No. 5206/GRANT KE/2021/2 for the execution of the international co-financed project No. W44/GRANT KE/2021 dated 29.12.2021.

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Framework Partnership Agreement for Copernicus User Uptake

Ministry of Education and Science