

# ERA-PLANET project in move – lessons learned and prospective



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# H2020 ERA-PLANET Project



## ERA-PLANET

THE EUROPEAN NETWORK FOR OBSERVING OUR  
CHANGING PLANET

H2020 Topic

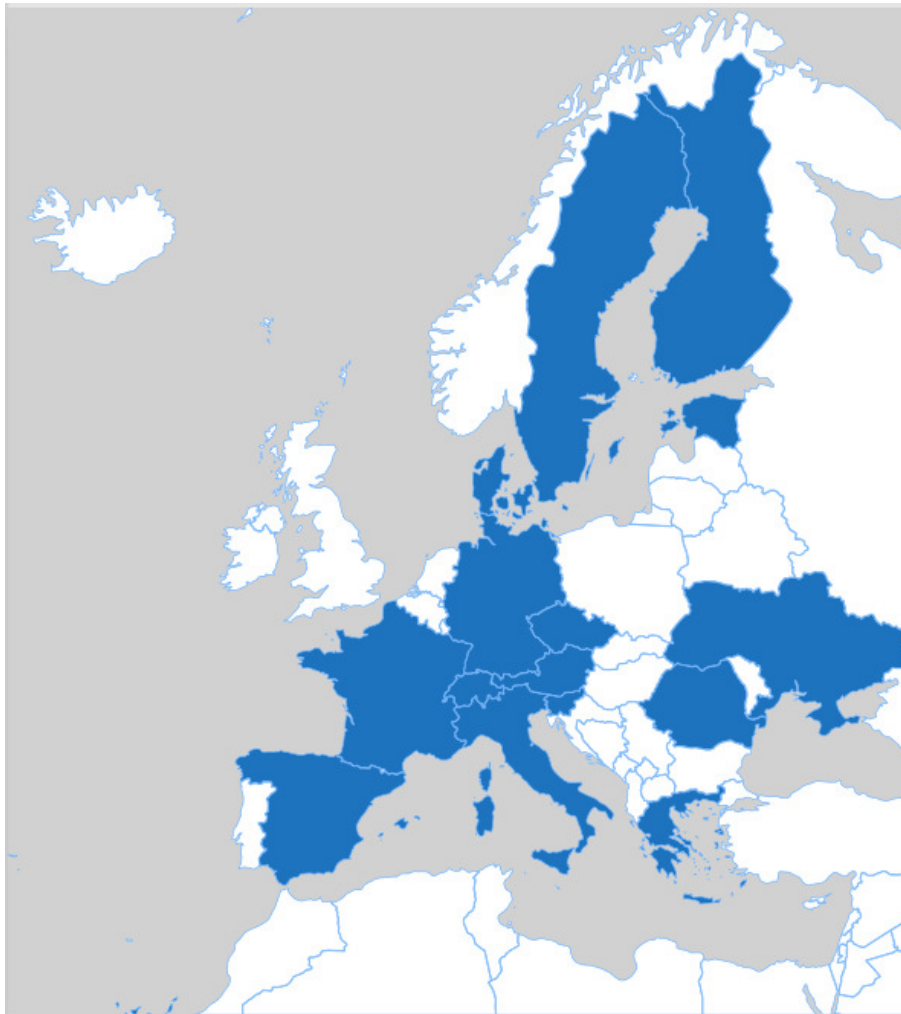
SC5-15-2015: Strengthening the European Research Area in the  
domain of Earth Observation

The **overarching goal** of ERA-PLANET is to strengthen the European Research Area in the domain of Earth Observation in coherence with the European participation to Group on Earth Observation (GEO) and the Copernicus.

The **main objective** is to strengthen the leadership of Europe in GEO 2015-2025 Work Plan implementation



# Project participants



**35 participants** with budget of **11 million Euro** from EC-European Commission

**Co-Fund Action:** 1<sup>st</sup> part from **EC** – 2<sup>nd</sup> part from **countries-participants**

Coordinator from **Ukraine** – **Space Research Institute NAS Ukraine and SSA Ukraine**



# Projects



**SMURBS**  
ERA-PLANET

Smart URBan Solutions for air  
quality, disasters and city growth

**GEO**ESSENTIAL  
ERA-PLANET

Essential Variables workflows for  
resource efficiency and  
environmental management

**iGOSP**  
ERA-PLANET

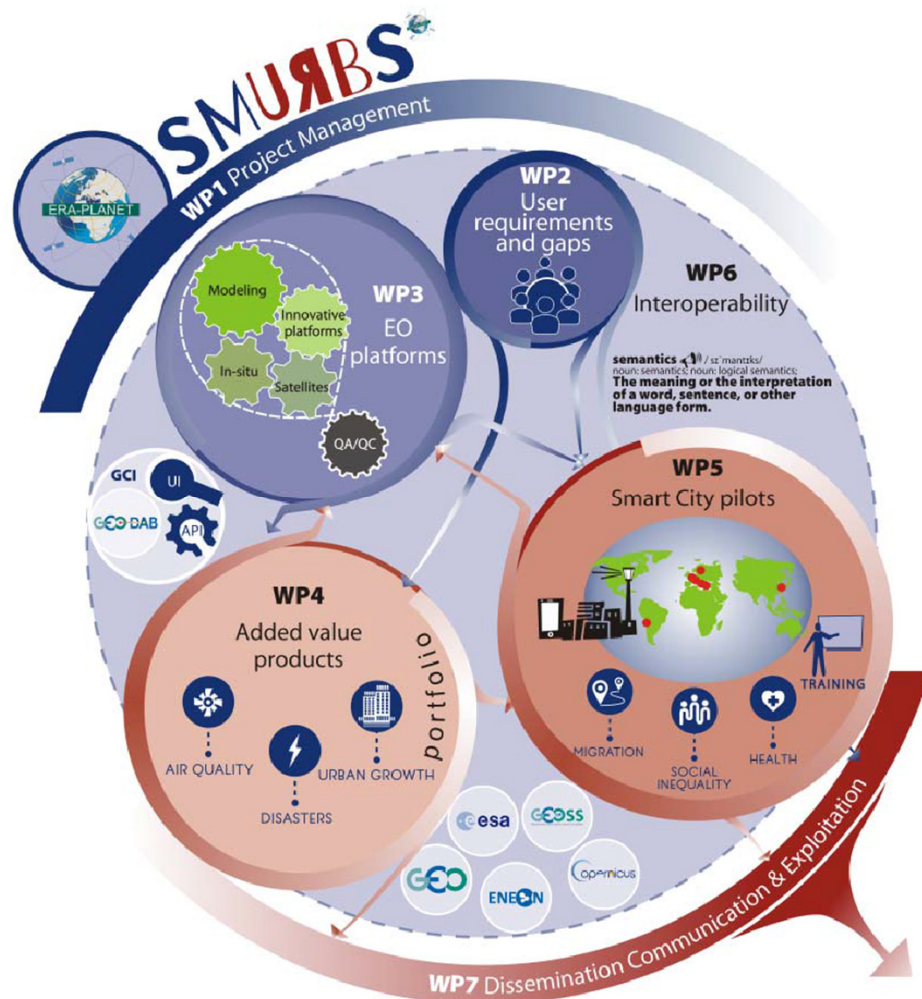
Integrated Global Observing  
Systems for Persistent Pollutants

**iCUPE**  
ERA-PLANET

Integrative and Comprehensive  
Understanding on Polar  
Environments



# SMURBS project - “Smart cities”



## SMURBS - SMart URBan Solutions for air quality, disasters and city growth

Coordination of national and regional programs in environmental monitoring of Smart Cities.

### Directions:

**Air quality**

**Urban growth**

**Disasters (peat fires)**

# SMURBS services we are involved



## Precursors of our services:

- **Air quality** – PM, chemical contaminations
- **Urban growth** – CLMS Urban Atlas extension (temporal resolution and coverage)
- **Disasters** – peat fires monitoring based on thermal bands of satellite data

**Urban related essential variables and SDG indicators**

**Dashboard**



# SMURBS, Urban Atlas



## UA\_UrbanAtlas\_2012

Greater City Boundary



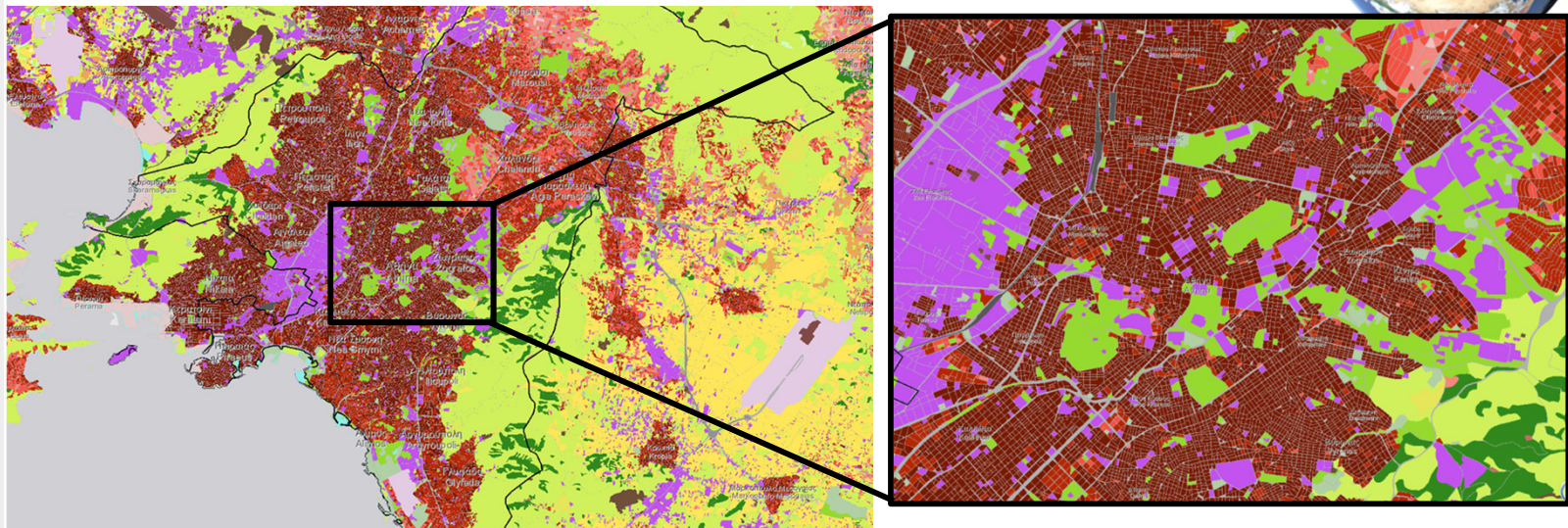
City Boundary



Land Use vector

- 11100: Continuous Urban fabric (S.L. > 80%)
- 11210: Discontinuous Dense Urban Fabric (S.L.: 50% - 80%)
- 11220: Discontinuous Medium Density Urban Fabric (S.L.: 30% - 50%)
- 11230: Discontinuous Low Density Urban Fabric (S.L.: 10% - 30%)
- 11240: Discontinuous very low density urban fabric (S.L. < 10%)
- 11300: Isolated Structures
- 12100: Industrial, commercial, public, military and private units
- 12210: Fast transit roads and associated land
- 12220: Other roads and associated land
- 12230: Railways and associated land
- 12300: Port areas
- 12400: Airports
- 13100: Mineral extraction and dump sites
- 13300: Construction sites
- 13400: Land without current use
- 14100: Green urban areas
- 14200: Sports and leisure facilities
- 21000: Arable land (annual crops)
- 22000: Permanent crops
- 23000: Pastures
- 24000: Complex and mixed cultivation patterns
- 25000: Orchards
- 31000: Forests
- 32000: Herbaceous vegetation associations
- 33000: Open spaces with little or no vegetations
- 40000: Wetlands
- 50000: Water

## Urban Atlas (2012)



## Service

**Urban Atlas** – Copernicus service for cities with population more than 100 thousand

5 m SPOT data, 2006, 2012 for Europe only

[https://data.europa.eu/euodp/data/dataset/data\\_urban-atlas](https://data.europa.eu/euodp/data/dataset/data_urban-atlas)

## The aim of SMURBS:

Developing of technology for every year analog constructing (expanding of Copernicus service) for all cities based on free data



# Method and data

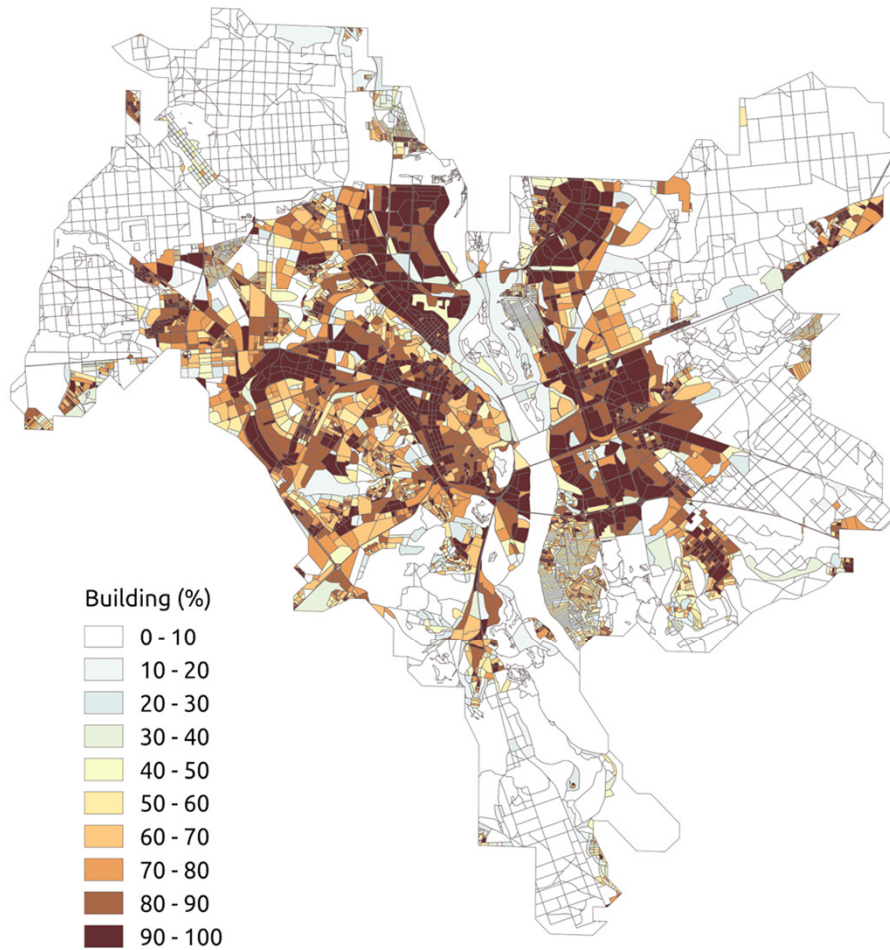


- **Data:**
  - Open Street Map
  - Map of classification by own development
  - Thermal map based on Landsat-8 thermal bands
- **Methods:**
  - Methods of segmentation (percentage of buildings, water, etc)
  - Geostatistics

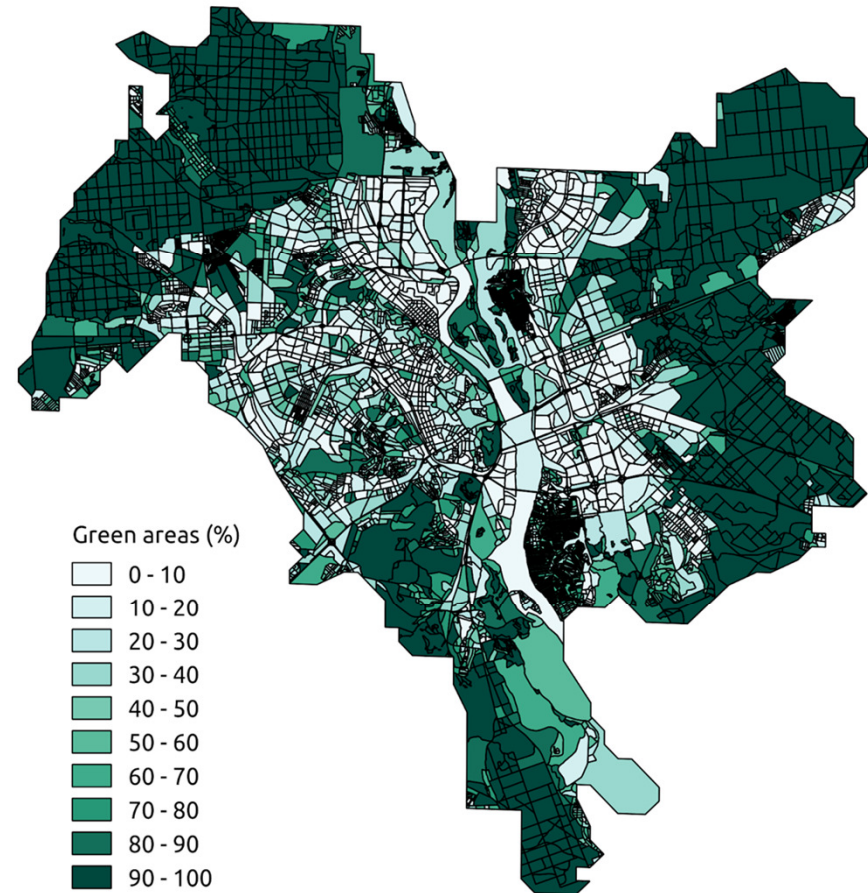


# SMURBS, Urban Atlas

Kyiv vectorization



Percentage of buildings



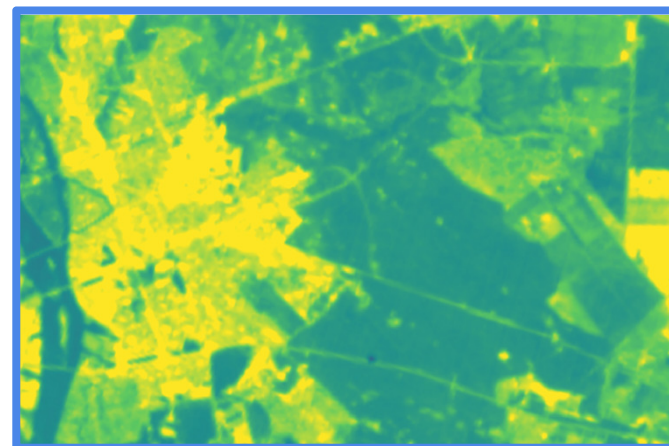
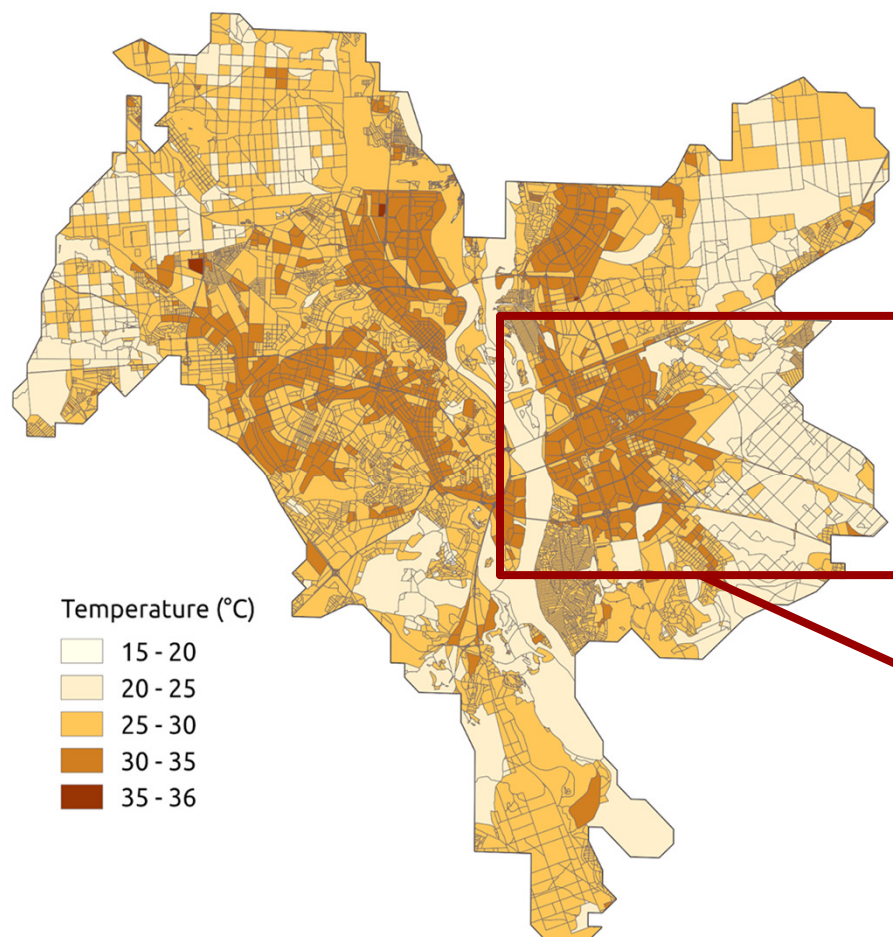
Percentage of green areas



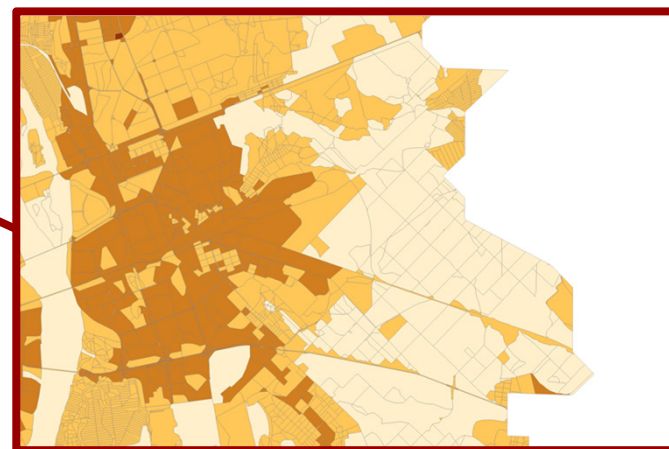
# SMURBS, Urban Atlas



## Thermal Map

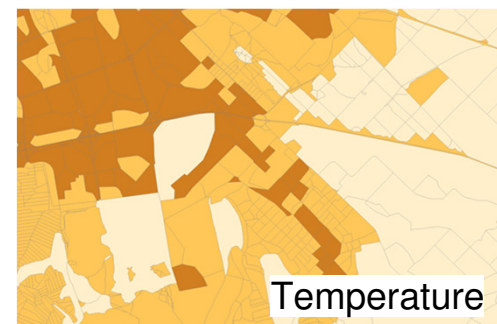
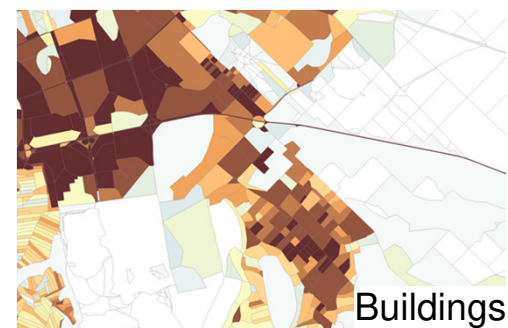
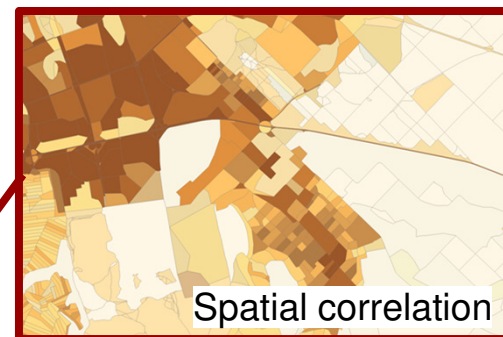


Landsat-8 thermal band





# Correlation of temperature and building density



# Correlation of temperature and green areas





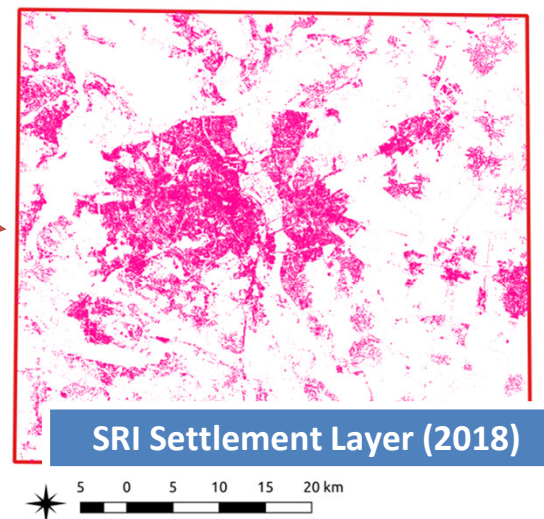
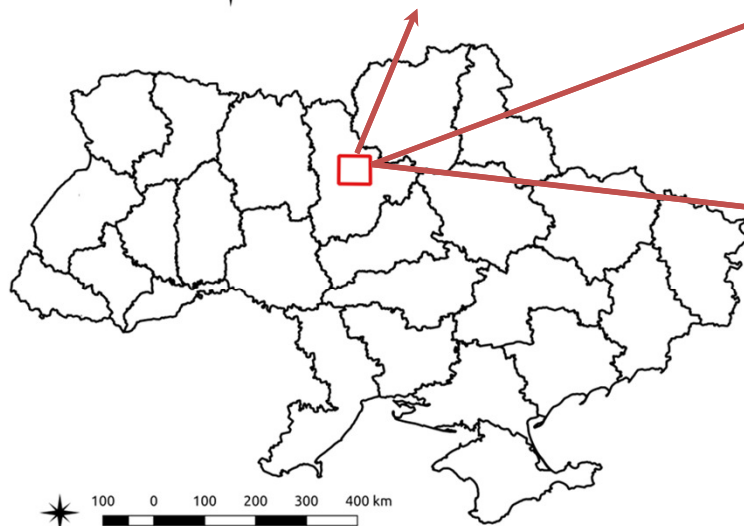
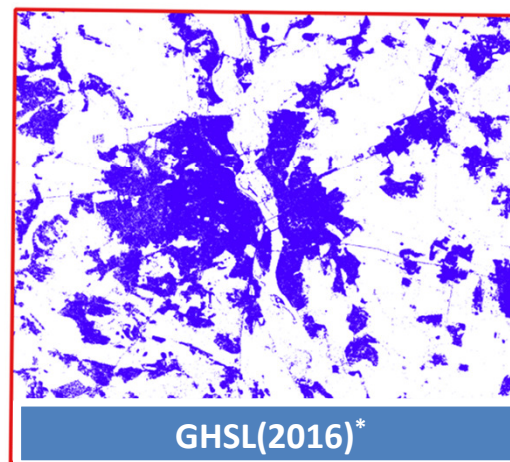
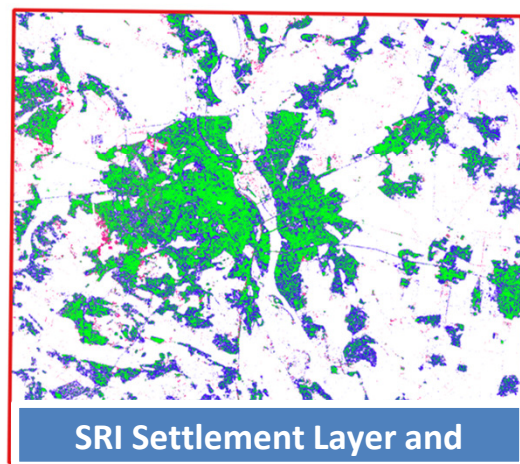
# JRC Human Settlement Layer Validation



- Copernicus Service
- A raster that covers all cities
- **Objective of SMURBS:**
  - Create a global product validation technology using national data and product sets
  - **Method:**
    - Validation using own Earth's surface maps
    - Ground Scan + Estimation of Accuracy



# SMURBS, GHSL validation



■ SRI Settlement Layer and GHSL - common part ■ GHSL ■ SRI Settlement Layer

[http://cidportal.jrc.ec.europa.eu/ftp/jrc-opendata/GHSL/GHS\\_BUILT\\_S1NODSM\\_GLOBE\\_R2018A/GHS\\_BUILT\\_S1NODSM\\_GLOBE\\_R2018A\\_3857\\_20/V1-0/](http://cidportal.jrc.ec.europa.eu/ftp/jrc-opendata/GHSL/GHS_BUILT_S1NODSM_GLOBE_R2018A/GHS_BUILT_S1NODSM_GLOBE_R2018A_3857_20/V1-0/)

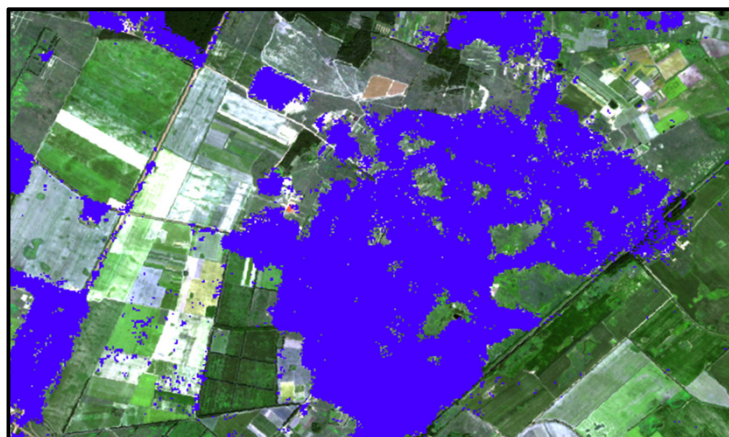




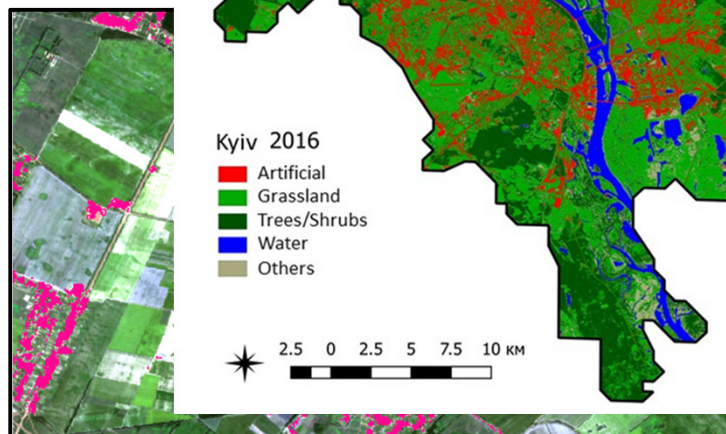
# SMURBS, GHSL validation



SRI Settlement Layer and GHSL – common part



GHSL(2016)



SRI Settlement Layer (2018)

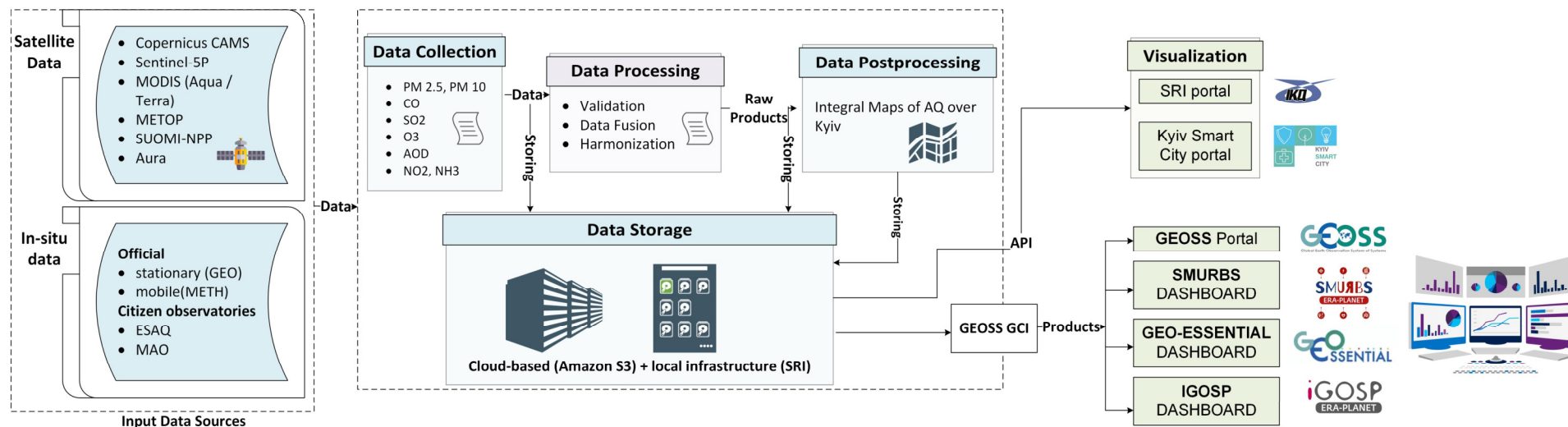
■ SRI Settlement Layer and GHSL - common part ■ GHSL ■ SRI Settlement Layer



# Information System Development

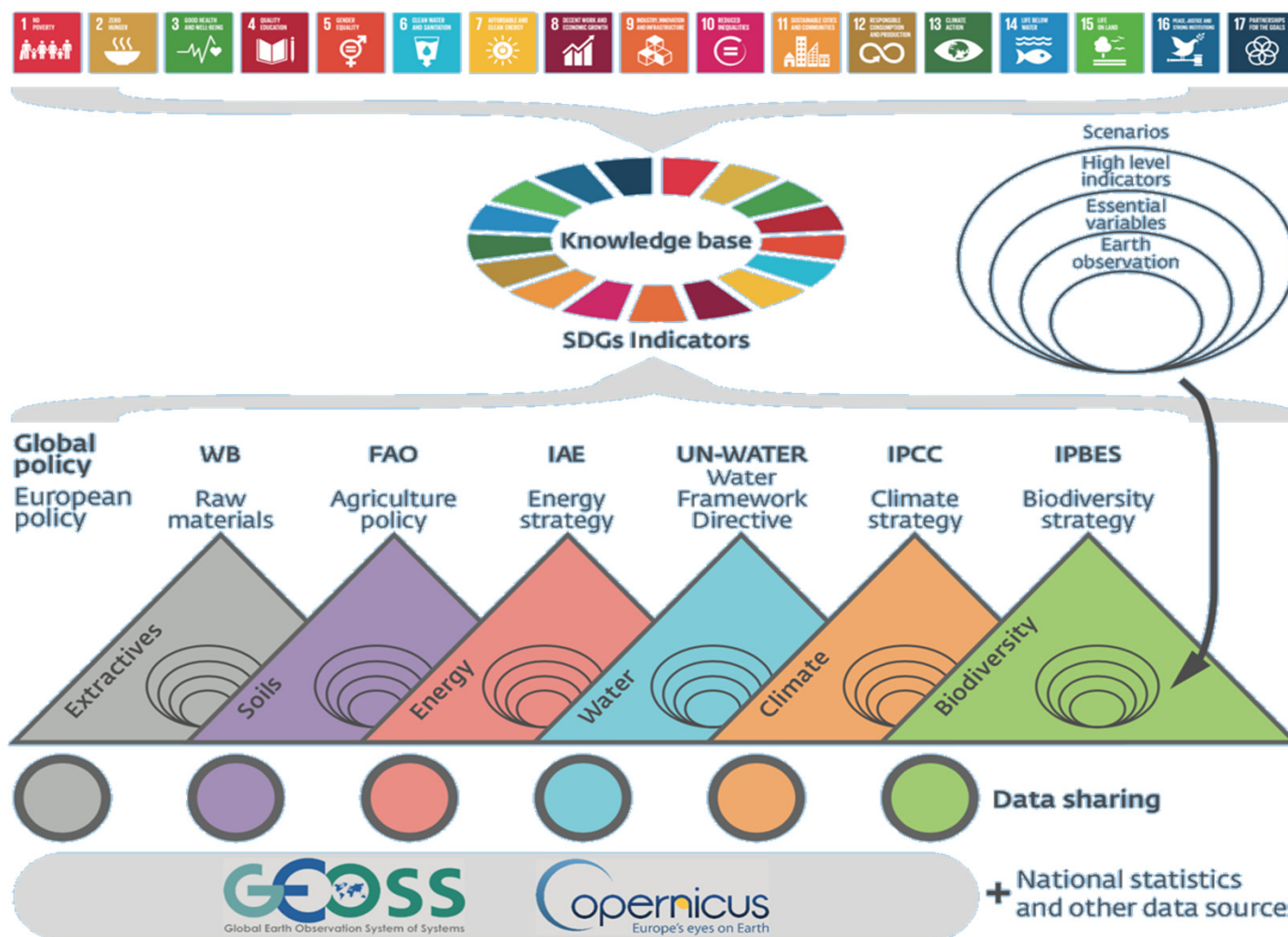


## Kyiv SMURBS Air Quality SYSTEM

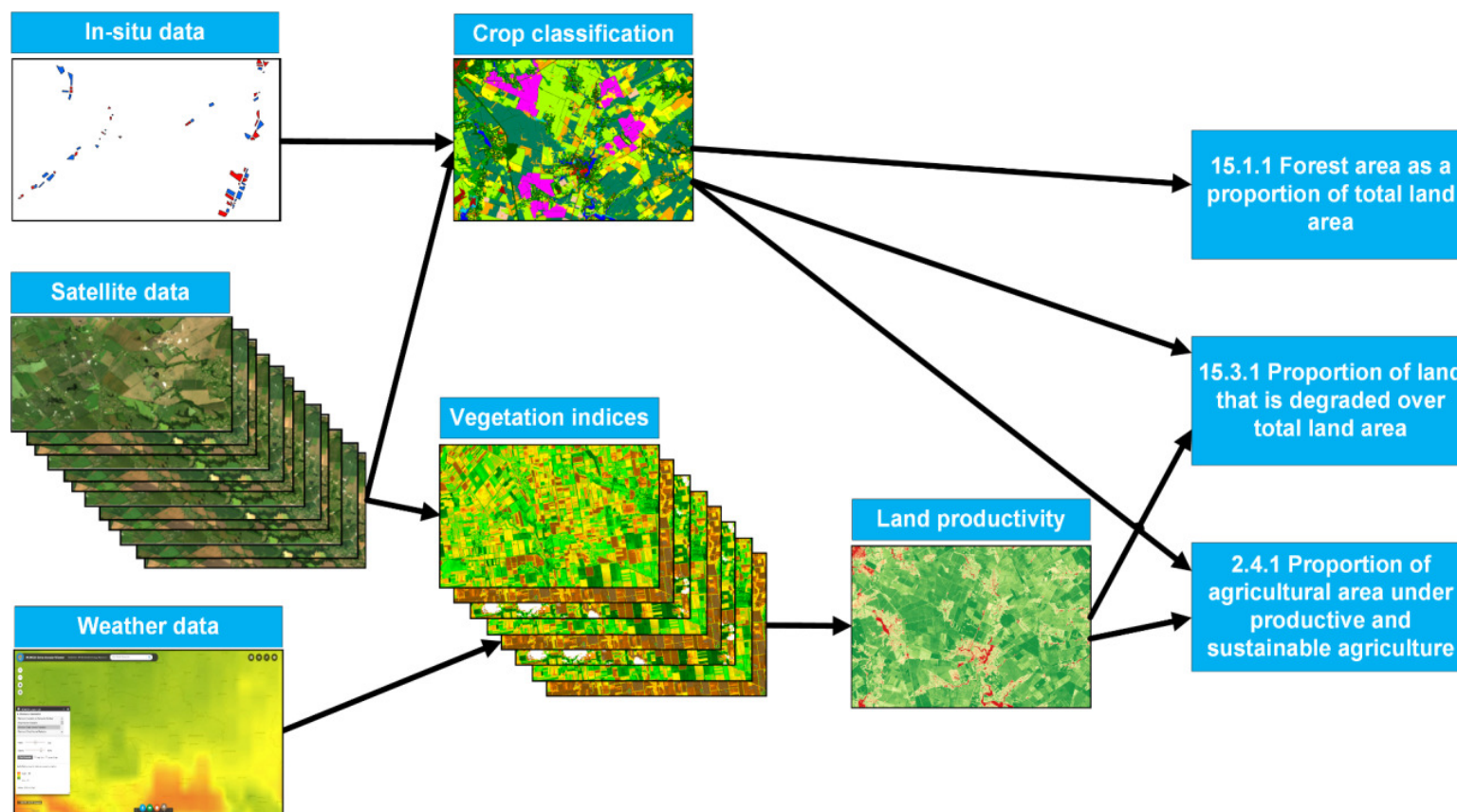




# GEOEssential, Generalisation of the EV concept across SBAs and knowledge base

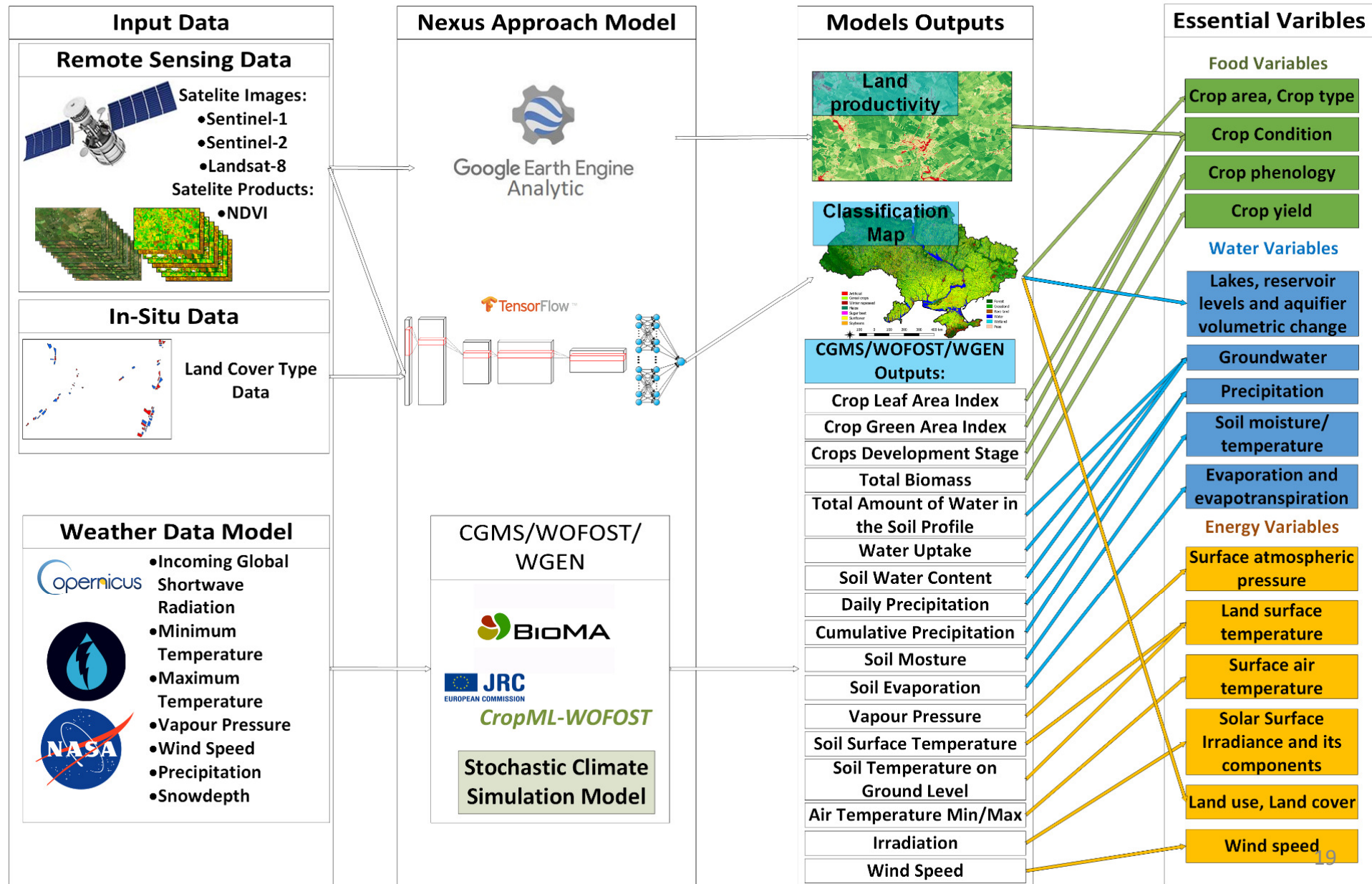


# Indicator 15.1.1, 15.3.1 and 2.4.1 workflow realization in Vlab



<http://vlab.geodab.eu/>

# Essential variables monitoring workflow





# H2020 ERA-PLANET Ukraine State-of-the-art



THE EUROPEAN NETWORK FOR OBSERVING OUR CHANGING PLANET

**GEO**  
**ESSENTIAL**  
ERA-PLANET



**SMURBS**  
ERA-PLANET

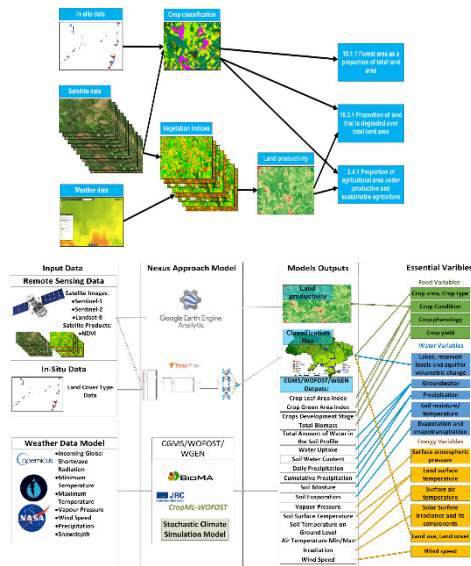


**Sustainable Development Goals:**

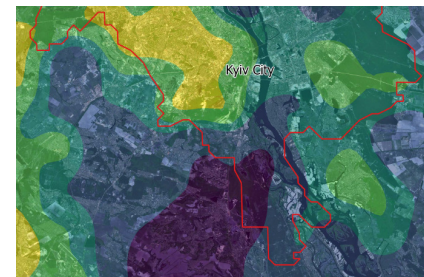
- 2.4.1
- 15.3.1



**Essential  
variables  
monitoring  
workflow**



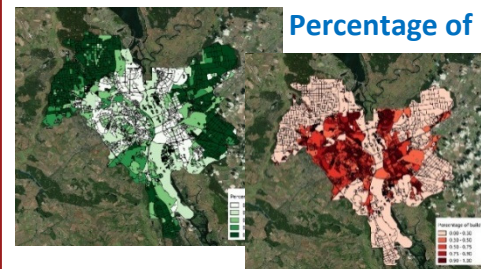
**Aerosols over Kiev**



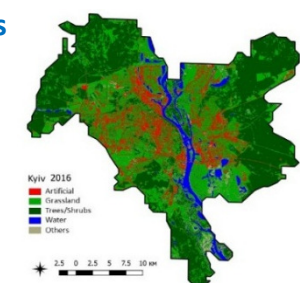
**Disasters monitoring (peat fires)**



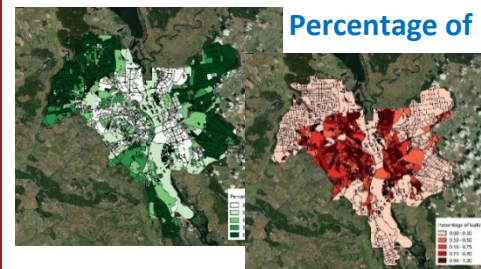
**Percentage of green areas**



**Land cover map of Kiev**



**Percentage of built-ups**



*Results usage:*

**Ministry of Ecology and Natural  
Resources of Ukraine**



*Results usage :*

**Urban Atlas,  
Kiev city state administration**



# Cooperation

- **Land Degradation Neutrality Assessment (UN CCD)** – Ministry of Ecology and Natural Resources of Ukraine

- **Crop Areas assessment** - Ministry of Agrarian Policy and Food of Ukraine, **World Bank**

- **Urban Atlas + AQ monitoring** - Kiev city state administration

- **Crop yield, crop production** - GEOGLAM

- **Cloud services deployment + development of dashboard**- U-TEP (DLR)



THE WORLD BANK



**Thank You for attention!**  
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