

# GEO WEEK & MINISTERIAL SUMMIT 2023



**Earth Observations in Support of the Sustainable Development Goals:  
Opportunities and Challenges**

November 7th, 2023

#TheEarthTalks



science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



**GEO WEEK**  
**2023** MINISTERIAL  
SUMMIT

**GO** GROUP ON  
EARTH OBSERVATIONS

**1** NO  
POVERTY



**2** ZERO  
HUNGER



**3** GOOD HEALTH  
AND WELL-BEING



**4** QUALITY  
EDUCATION



**5** GENDER  
EQUALITY



**6** CLEAN WATER  
AND SANITATION



**7** AFFORDABLE AND  
CLEAN ENERGY



**8** DECENT WORK AND  
ECONOMIC GROWTH



**9** INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



**10** REDUCED  
INEQUALITIES



**11** SUSTAINABLE CITIES  
AND COMMUNITIES



**12** RESPONSIBLE  
CONSUMPTION  
AND PRODUCTION



**13** CLIMATE  
ACTION



**14** LIFE  
BELOW WATER



**15** LIFE  
ON LAND



**16** PEACE, JUSTICE  
AND STRONG  
INSTITUTIONS

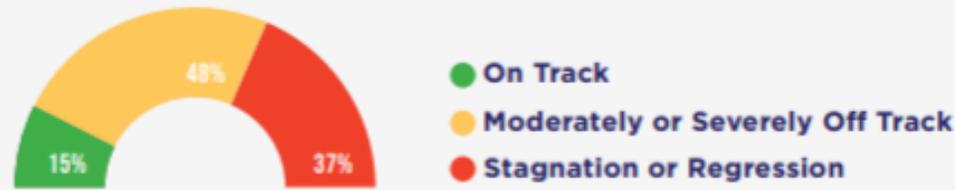


**17** PARTNERSHIPS  
FOR THE GOALS

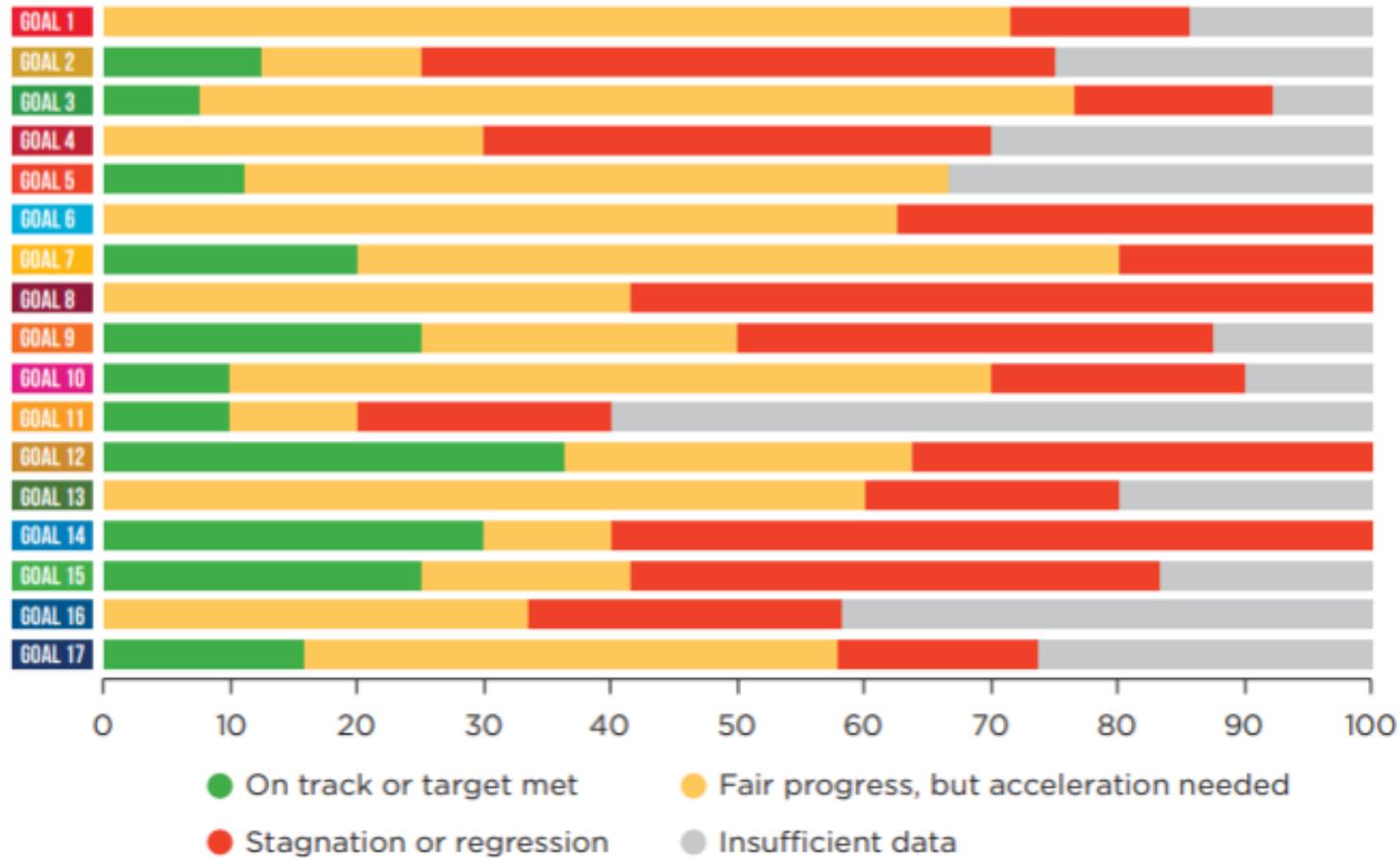


  
**SUSTAINABLE  
DEVELOPMENT  
GOALS**

A concerning picture of SDG progress at the midpoint:



Progress assessment for the 17 Goals based on assessed targets, 2023 or latest data (percentage)



## Leveraging EO and Geospatial Data to Advance the SDGs

- 2030 Agenda, Article 76: *“We will...exploit the contribution to be made by a wide range of data, including Earth observation and geo-spatial information, while ensuring national ownership in supporting and tracking progress.”*
- EO4SDG: Founded in 2016 to increase the use and strength of Earth observations to advance the SDGs.



**EARTH OBSERVATIONS FOR THE  
SUSTAINABLE DEVELOPMENT GOALS**



## SDG Summit: A Renewed Call to Action

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*“This year marks the midpoint for achieving the goals and targets of the 2030 Agenda for Sustainable Development. But the world is falling short of meeting most of the goals. Moreover, despite some improvements since 2015, the availability and accessibility of quality, timely and reliable data for decision-making remains a challenge...[The] SDG Summit will launch a new phase of accelerated action to deliver the ambitions of the SDGs. Geospatial information will play a vital role in filling many of the existing data gaps.”*

- Li Junhua, Under-Secretary-General for Economic and Social Affairs (Sept 2023)

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Osamu Ochiai



Miguel Angel Exposito Verdejo



Monica Miguel-Lago

# Participants



Steve Kopp



Michele Melchiorri



Yuzhou LIU



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# Mentimeter Instructions

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## Option 1:

- Step 1: Go to [menti.com](https://menti.com)
- Step 2: Type in code **9158 6361**
- Answer the question on your screen
- Press submit!

## Option 2:

- Scan QR code on your smart phone
- Answer the question on your screen
- Press submit!





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## Mentimeter Question

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How are you feeling today?

## Mentimeter Question

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How would you rate your understanding of the role of Earth Observation in advancing Sustainable Development Goals (SDGs)?

- Novice: I'm here to learn the basics.
- Intermediate: I have some knowledge but want to delve deeper.
- Advanced: I'm well-versed and looking for nuanced insights.
- Expert: I could lead a session on this!



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## Topic 1

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Win-win Partnerships Building on Copernicus Ecosystem and Contributing to Sustainable Development Goals

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### **Miguel Angel Exposito Verdejo**

Head of Unit for Science, Technology, Innovation, Digitalisation at the European Commission's DG for International Partnerships



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# Win-win Partnerships Building on Copernicus Ecosystem and Contributing to Sustainable Development Goals



# The Geopolitical European Commission

A stronger Europe in  
the World promoting  
a just, green and  
*digital* transition

Stronger together  
through *sustainable*  
*investments*

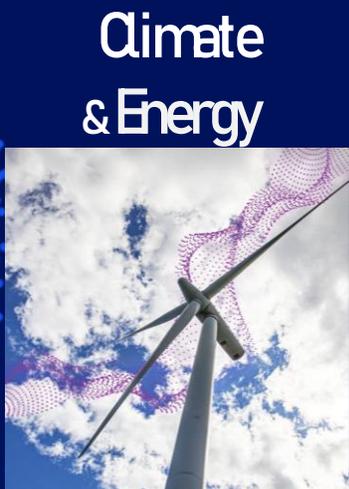


# Global Gateway 300bn €

- EU sustainable offer to partner countries to accelerate their fair transitions and to meet infrastructure needs
- Anchored in
  - 2030 Agenda for Sustainable Development
  - Paris Agreement



Digital



Transport



Education & Research



✓ Soft skills

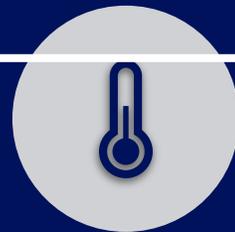
✓ Regulatory environment

✓ Physical Infrastructure



# The Global Gateway

- principles -



EDUCATIO  
N AND  
RESEARC  
H

HEALTH

TRANSPOR  
T

CLIMATE  
& ENERGY

DIGITAL



**Triple Transition  
(green / digital /  
society)**



**Partnership**



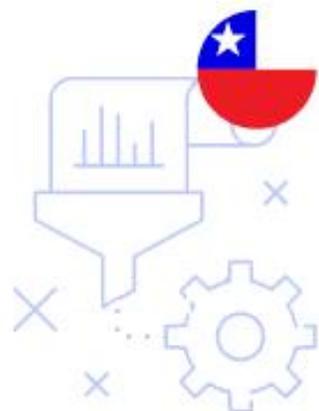
**Ownership**



## Objective.



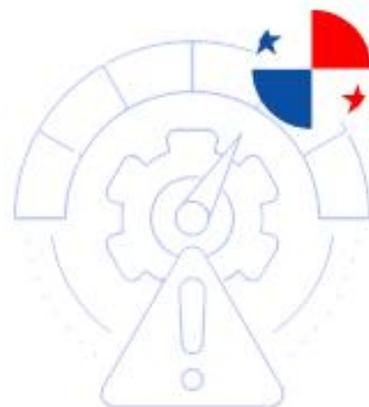
The EU and LAC partnership launched the Digital Alliance, a strategic framework to foster regional cooperation across the full spectrum of digital and space issues, unveiling two regional centres.



### Copernicus Chile

Data Storage, Processing and Distribution for the region.

Based on EO-enabled services and products, IaaS and SaaS Cloud Services.



### Copernicus Panama

Support the provision of Risk Preparedness and Recovery products.

Increase access to Sentinel data and support for disaster management.

# EU Space cooperation

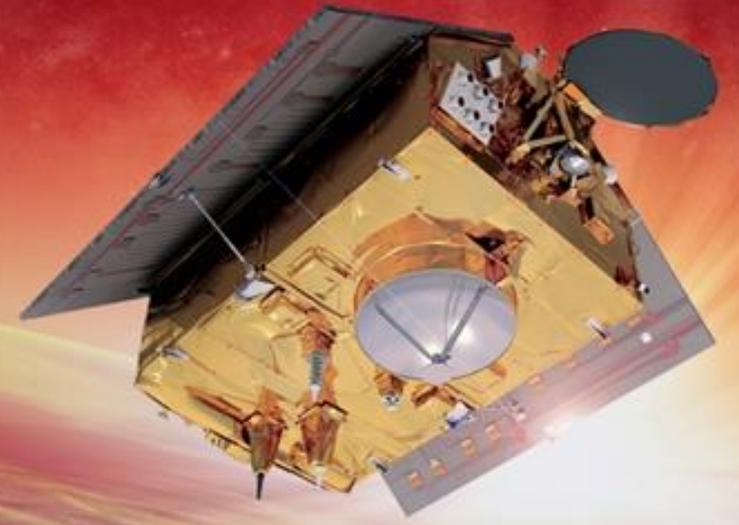
Regional Copernicus Centres in Panama & Chile

EU-Africa Space flagship

Bilateral Copernicus centres, e.g. Philippines

Use of Space data in programmes

IRIS<sup>2</sup> secure space based connectivity





## National Copernicus Capacity Support Action Programme for the **Philippines**

### Objective.

Reduce the vulnerability of populations and ecosystems due to natural disasters in the Philippines.

### Approach.



Provide easy access to Sentinel data through a Copernicus Mirror Site and drive the uptake of Copernicus data and information.

### Impact.

Secure the integrity of ecosystems, sustain the livelihood of local populations and support better informed decision-making.

Uptake of data and information through **pilots projects.**



Ground Motion  
monitoring



Land Cover, Forests  
and Crop mapping



Benthic Habitat  
monitoring



## Objective.



Strengthen the cooperation on Earth Observation and Satellite Navigation to support African countries for sustainable development, green transition and digitalization.

Implemented with a  
**3 pillar approach.**



### Space & Partnership

Focus on strategic dialogue: improving the cooperation framework for space and innovation in Africa.



### Space & Green Transition

Focus on environment: fostering the development of space-based services in support of the green transition for risk-informed, evidence-based, sustainable and inclusive development in related areas.



### Space & Private Sector

Focus on data driven economy: supporting the uptake of space data for the development of the space-based private sector.





EU-Africa Space cooperation flagship and support to SDGs

<b>1</b> NO POVERTY 	<b>2</b> ZERO HUNGER 	<b>3</b> GOOD HEALTH AND WELL-BEING 	<b>4</b> QUALITY EDUCATION 	<b>5</b> GENDER EQUALITY 	<b>6</b> CLEAN WATER AND SANITATION 
<b>7</b> AFFORDABLE AND CLEAN ENERGY 	<b>8</b> DECENT WORK AND ECONOMIC GROWTH 	<b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE 	<b>10</b> REDUCED INEQUALITIES 	<b>11</b> SUSTAINABLE CITIES AND COMMUNITIES 	<b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION 
<b>13</b> CLIMATE ACTION 	<b>14</b> LIFE BELOW WATER 	<b>15</b> LIFE ON LAND 	<b>16</b> PEACE, JUSTICE AND STRONG INSTITUTIONS 	<b>17</b> PARTNERSHIPS FOR THE GOALS 	



# Thank you!

Miguel Angel EXPOSITO VERDEJO (INTPA, HbU acting STI and Digital)

[Miguel-Angel.EXPOSITO-VERDEJO@ec.europa.eu](mailto:Miguel-Angel.EXPOSITO-VERDEJO@ec.europa.eu)



## Mentimeter Question

In your views, what do you think is the key ingredient for an equal and sustainable partnership?



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# SDGs-EYES - Enhanced monitoring of SDGs through the family of copErnicus Services



07/11/2023 – 16:00 – 18:00  
Flash Talk – Room BlueBell

Ms. Monica Miguel-Lago  
EARSC Senior Project Manager



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REPUBLIC OF SOUTH AFRICA



EARSC – SDGsEYES @  
GEOWeek2023



European Association  
of Remote Sensing  
Companies



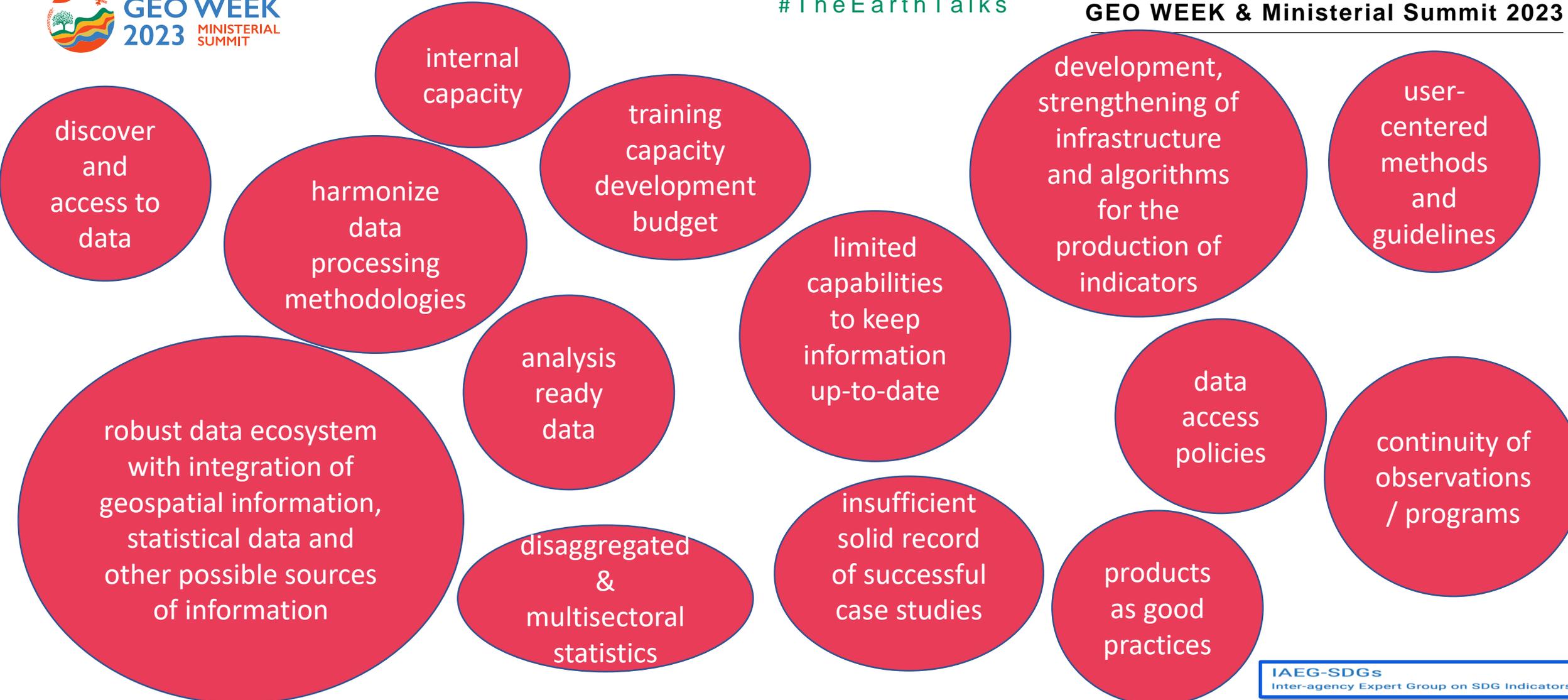
# What? State of the Art

# Challenges



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IAEG-SDGs  
Inter-agency Expert Group on SDG Indicators

# What?

# Opportunities



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stimulating innovation with data

increasing data availability (spatial coverage, spectral & temporal resolution)

global platforms, user approach to data and exploitation of the same (toolboxes)

ability to own and use geospatial data (convert geospatial data into statistics and indicators)

community to collaborate and coordinate data

simplified extraction of information from EO data (data analytics)

multi-annual time series

global guidance on which EO products can be used and for what purposes

ability to use global products to create nationally relevant indicators

regular & repeatable observation

resources for in-situ verification

technological progress for analysis: big data, ML, AI, ...open data cubes

cost effective to monitor remote areas

users demand



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EARSC – SDGsEYES @ GEOWeek2023



European Association of Remote Sensing Companies



# How? SDGs-EYES Support

# Enhancing monitoring



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Home About Pilots News Contact

### Sustainable Development Goals - Enhanced monitoring through the family of Copernicus Services

A Copernicus driven service for monitoring SDG indicators in the EU

### Get to know the Consortium



## Uncovering SDGs-EYES

## In a nutshell, SDGs-EYES aims to:

01

Facilitate access and increase usability of EO information

02

Improve reliability, robustness and accuracy of SDG indicators

03

Advance stakeholder capacity to deliver economic, social and policy value to European society in the context of UN SDG indicators

# How?



# What SDGs-EYES will bring?

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Results



Improve **end-users' awareness** and skills for effective and systematic use of EO

Advancing SDG indicators **calculation approaches**

Integrated **scientific, technological** and user engagement framework



Impacts



Trigger a step change in the **assessment and monitoring of SDG indicators** in synergy with (EU Green Deal, EU digital strategy)

Stimulating value-added service providers to generate **new tailored** and practicable products

better respond to **multi-faceted aspects** connected to SDGs, through integration of existing services and disciplines

## TECHNOLOGICAL

- Copernicus-based Service to **build, access** and **visualise** indicators
- Monitor SDGs targets through an **holistic Data Ecosystem** (Unified Data Model)

## SCIENTIFIC

- Copernicus-driven indicators based on scientific **algorithms** and rigorous validation
- Overcoming **fragmentation** and **heterogeneity** among countries in monitoring SDG indicators
- Promoting **methodologies** through unified technological solutions and user-friendly tools

## USER ENGAGEMENT

- Facilitating access to SDGs-EYES outputs
- Stakeholders can **incorporate data** and **tools** in their **decision-making process**
- Increase capability through a **scientific and evidence-based approach**

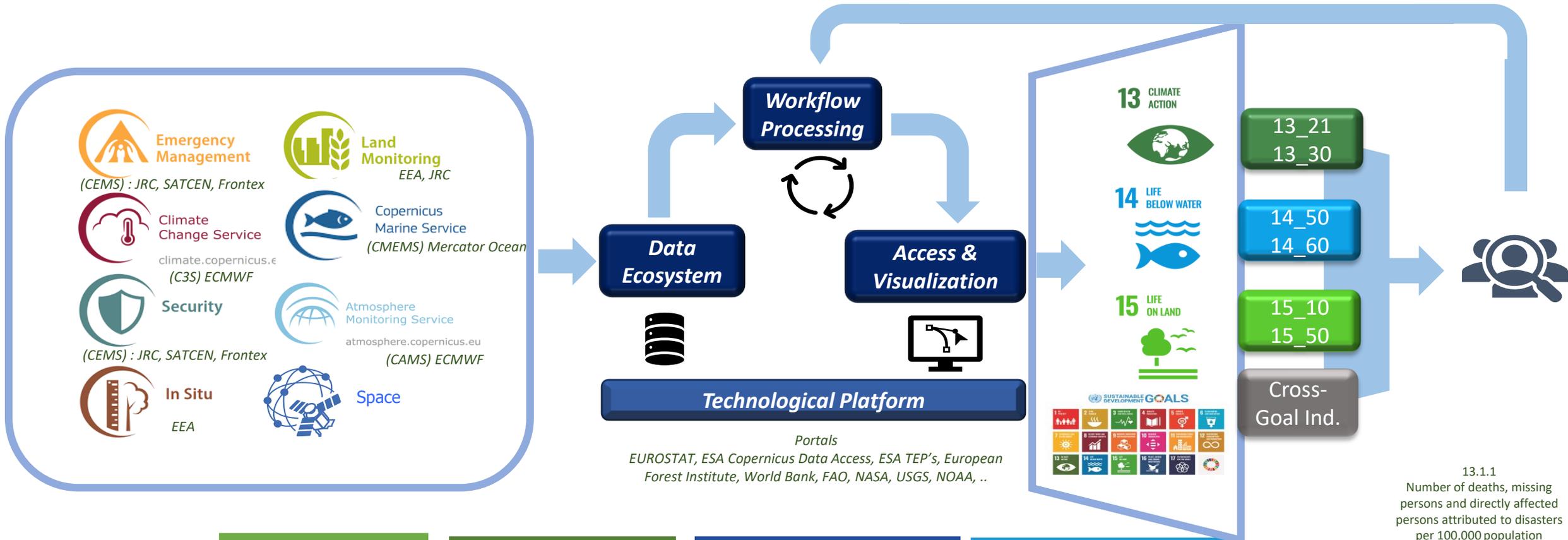
# How?



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Authoritative international initiatives, networks & dedicated platforms: GEOSS Portal, NextGEOSS, Sentinel HUB, FAOSTAT, Forest Resources Assessment, Global Forest Watch, CIESIN, WorldPop, EMODnet) etc



GHG Emissions from Fire Cosenza (Italy)

Extreme Temperature Risk Turin (Italy)

Eutrophication and Acidification North Sea

Forest Cover and Erosion Romania

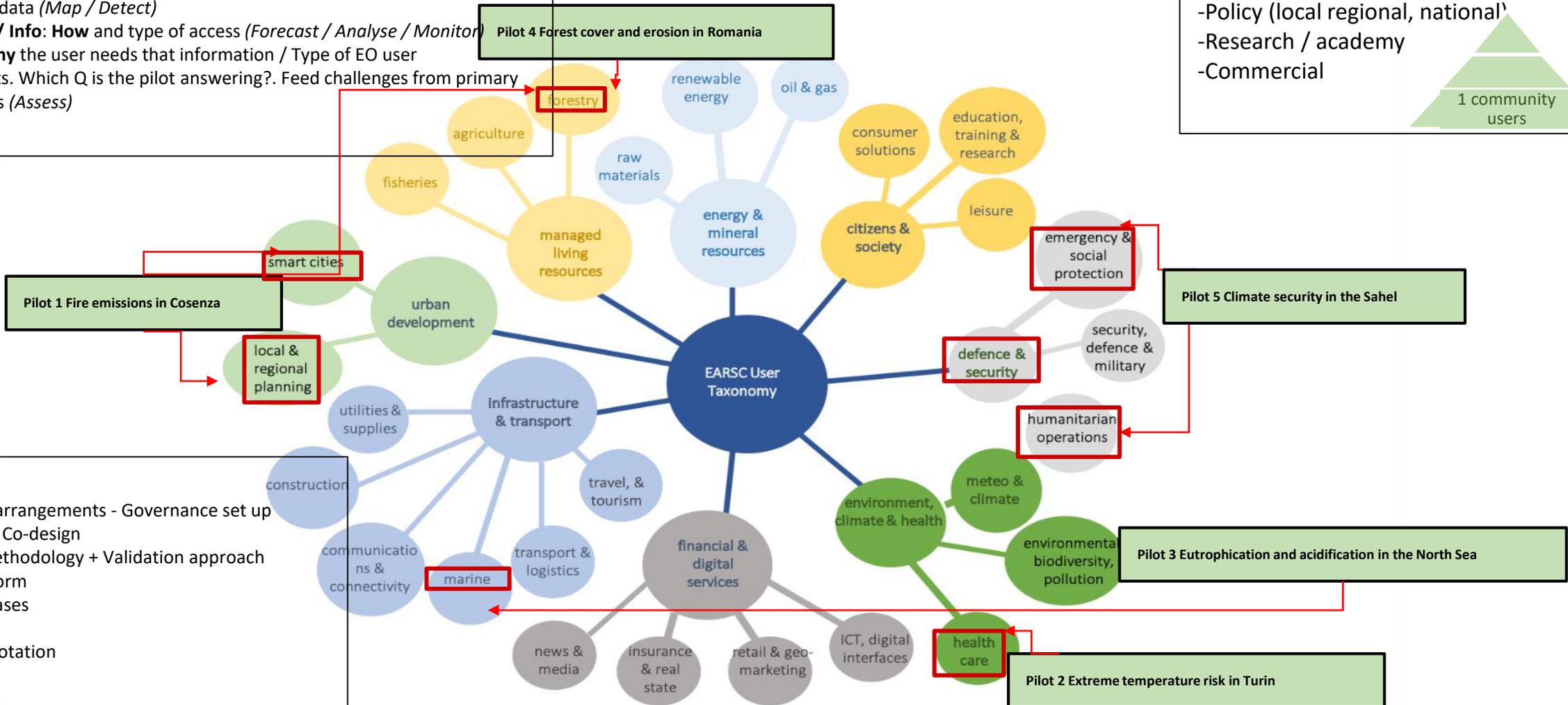
Climate Security Sahel

Messages:

- **Data: What** data (Map / Detect)
- **Knowledge / Info: How** and type of access (Forecast / Analyse / Monitor)
- **Wisdom: Why** the user needs that information / Type of EO user requirements. Which Q is the pilot answering?. Feed challenges from primary communities (Assess)

**Type of communities identified:**

- Policy (local regional, national)
- Research / academy
- Commercial



**Engaging:**

- Institutional arrangements - Governance set up
- Partnership / Co-design
- Dataset & Methodology + Validation approach
- Tools & Platform
- Pilots - Use cases
- Training
- Benefits / Quotation
- ...

# How? Example pilot

# Understanding workflow



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## Where we are?

1) Land degradation (15.3.1) *“Proportion of land that is degraded over total land area”*

sub-indicators :

- land cover
- land productivity
- carbon stocks

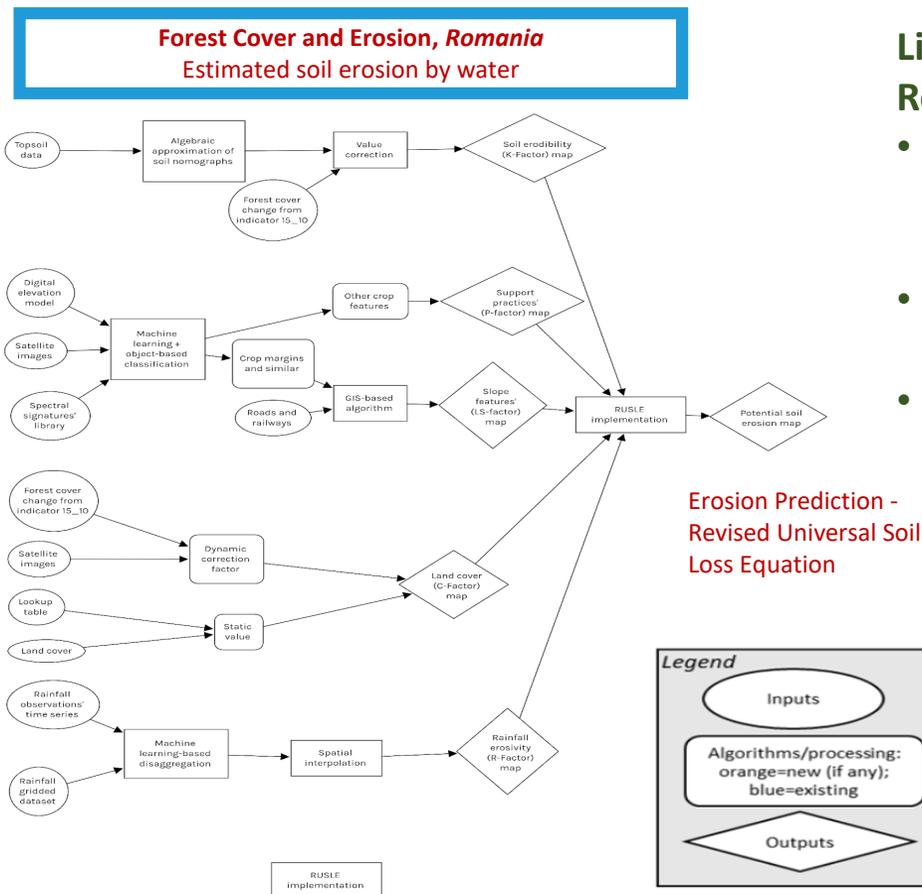
whose value can be

- (i) positive or improving
- (ii) negative or declining
- (iii) stable or unchanging with respect to the baseline period 2000-2015

2) Proxy: Workflow for the EUROSAT SDG indicator 15\_50 *“Estimated soil erosion by water”*

3) Dependence of land degradation on soil erosion (capacity of soil to absorb CO<sub>2</sub>, eutrophication, soil to water quality - human health..)

## How do we get there?

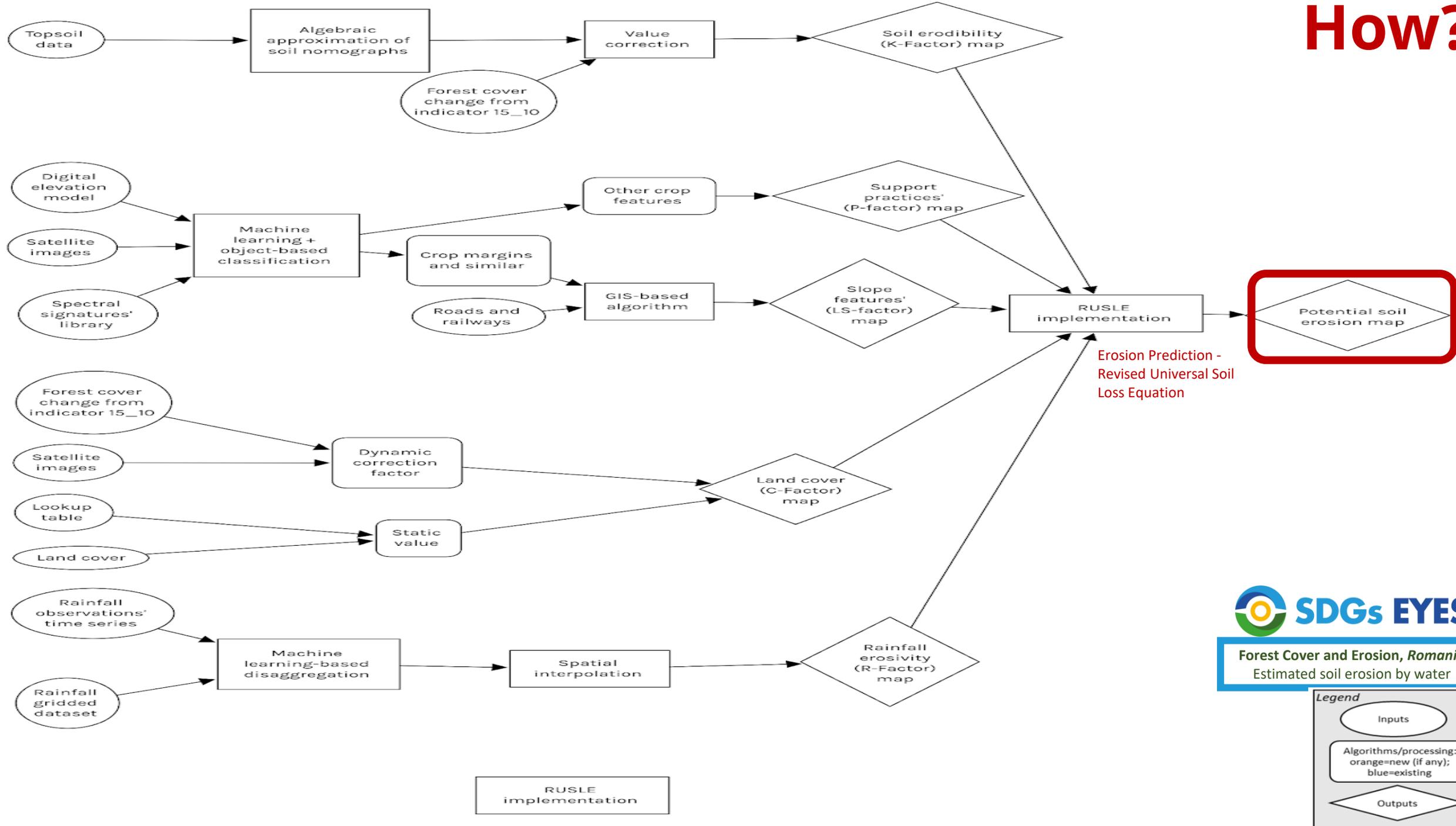


## Where do we want to Go?

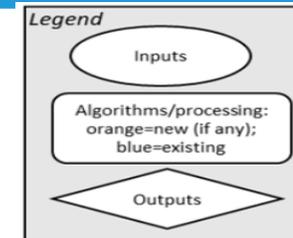
Liaison & co-design discuss User Requirements

- unlock good information on the general timing of erosive rainfall events
- improve timeliness & coverage of dissemination
- dynamic (high-frequency) assessment of rain erosivity, representing temporal climate variability and changes in rainfall intensity

# How?



Forest Cover and Erosion, Romania  
Estimated soil erosion by water



# Where do we want to go?

## Recommendations



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exchange of **good methodological practices** (success stories), **co-design** and facilitation, capacity building for the calculation of SDGs / targets and indicators (dissemination and participation)

**leverage** what already exists (i.e., EO products, methods and services)

importance of **collaboration** with national statistical offices, ministries, mapping agencies and United Nations agencies

need to structure an information system for SDGs based on earth observation and guidelines to **incorporate EO into statistical processes**

**scalability** and **replicability** of EO methods for SDGs (relevant data, reproducible and openly shared methodologies)

**platforms** for managing large volumes of data, massive information processing (exploitation platforms / knowledge-hub / toolbox / and time series analysis / open data cube)

**SDGs-EYES service will seek to facilitate a shared understanding** of how geo-information can help to support most effectively the achievement of the **SDGs**



## Mentimeter Question

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How do you see the potential of SDG monitoring by upgrading the dataset with satellite-derived data?

Select the most relevant:

1. Improving accountability
2. Resource efficiency
3. Increase policy impact
4. Collaboration & partnership
5. Coverage
6. Continuity
7. Innovation
8. Other



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## Topic 3

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Imagery Deep Learning in  
Support of SDGs

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**Steve Kopp**  
Senior Principal Product  
Engineer and Science  
Community Liaison, Esri



science & innovation

Department:  
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REPUBLIC OF SOUTH AFRICA





FOCUS:



# A Multi-Stakeholder Partnership

## Data Alliance **Key Activities**

- **IGIF Country-level action plans.** To improve national geospatial information management, an essential element of national digital infrastructures.
- **SDG Data Hubs.** To enable monitoring of achievement of the SDGs by goal, target, and indicator.



# Chlorophyll

Global analysis and metrics



Methodology, processing and application development in support of Sustainable Development Goal 14.1

Collaborative project with



MONITORING FOR SDG INDICATOR 14.1.1: Coastal Eutrophication

- Chlorophyll Hub: <https://chlorophyll-esriocceans.hub.arcgis.com/>
- 2020 GEO SDG Award [Collaboration category] winner

## SDG 3.3.3

## 3 GOOD HEALTH AND WELL-BEING

# Monitor malaria epidemics

Map the malaria incidence rate from 2016 to 2020 to analyze progress towards reaching the United Nations Sustainable Development Goal.



Author

Niki Wong

Duration

45mins

Difficulty

Beginner

Mapping

#Health & Human Services

#Sustainable Development



- ArcGIS Learn Lesson: <https://learn.arcgis.com/en/projects/monitor-malaria-epidemics/>
- UN SALB Blog: <https://salb.un.org/en/news/learning-how-use-mapping-monitoring-malaria-eradication>

## Classify areas by degree of urbanization

Implement the United Nations-endorsed degree of urbanization method to classify urban and rural areas across a territory.



Author

Keera Morrish

Duration

1hr(s)

Difficulty

Intermediate

Mapping

Spatial Analysis & Data Science

#Government

#Sustainable Development

- ArcGIS Learn Lesson: <https://learn.arcgis.com/en/projects/classify-areas-by-degree-of-urbanization/>
- Highlighted here - EO Toolkit for Sustainable Cities and Human Settlements: <https://eotoolkit.unhabitat.org/>

# SDG Geospatial Learning Lab

- <https://mygisjourney-learn3.hub.arcgis.com/>
  1. General introduction to GIS
  2. SDG Library of specific workflow education



**New to GIS**

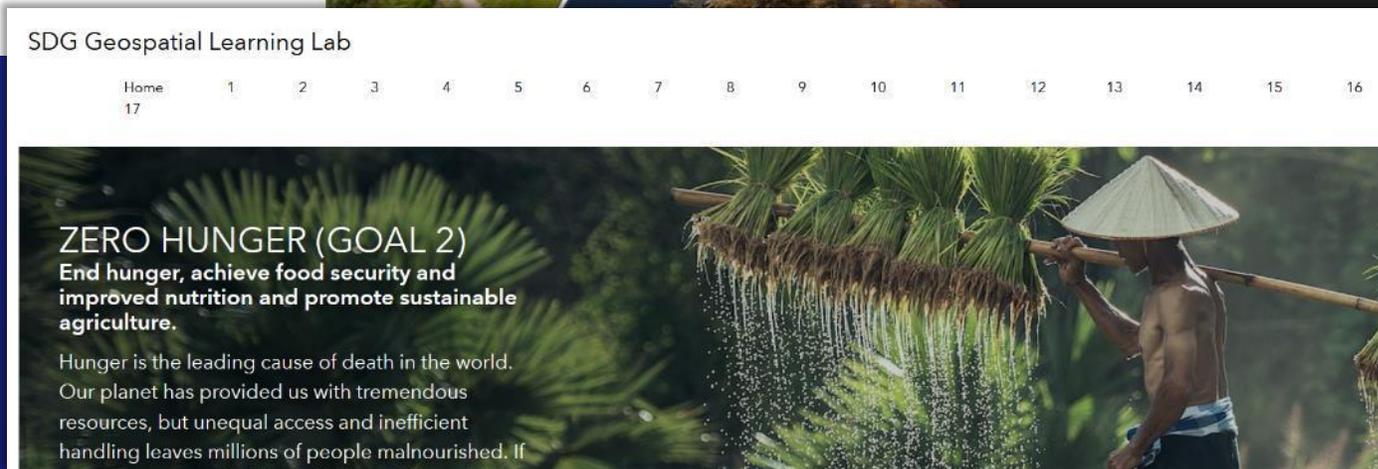
If you've never worked with GIS before, or if you want to see modern best-practices, learn the fundamentals of GIS here through a series of guided videos.

Let the Journey Begin

**Experienced Users**

If you're already familiar with the concepts and apps used with GIS and want to learn new workflows to apply your knowledge to GIS.

Explore the SDG Library

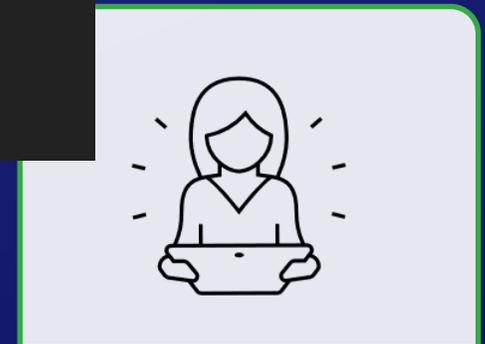


SDG Geospatial Learning Lab

Home 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

**ZERO HUNGER (GOAL 2)**  
End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

Hunger is the leading cause of death in the world. Our planet has provided us with tremendous resources, but unequal access and inefficient handling leaves millions of people malnourished. If



# GeoAI for SDGs

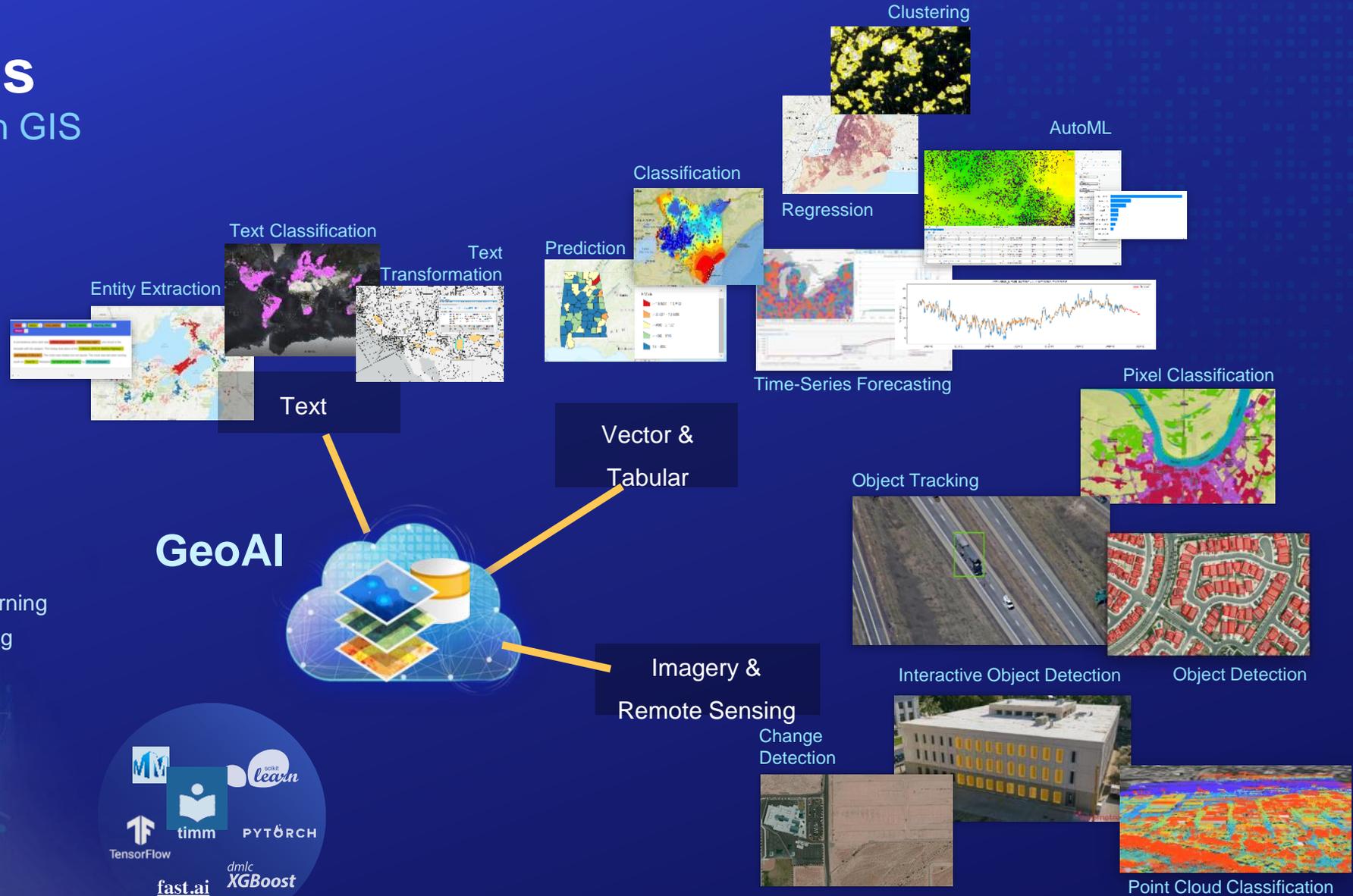
Unlock the power of AI in GIS

## Advancing capabilities

- GeoAI toolbox
- **Pretrained models**

## Simplifying workflows

- Automated machine learning
- Automated deep learning
- AI Assisted Labelling



*Accelerating intelligent decision-making*



# An end-to-end Geospatial AI System



GeoAI System



Data Access



Data Prep



Data Labelling



**Model Training**



Deploy Models to Production



Consume Models



Run Inference at SCALE

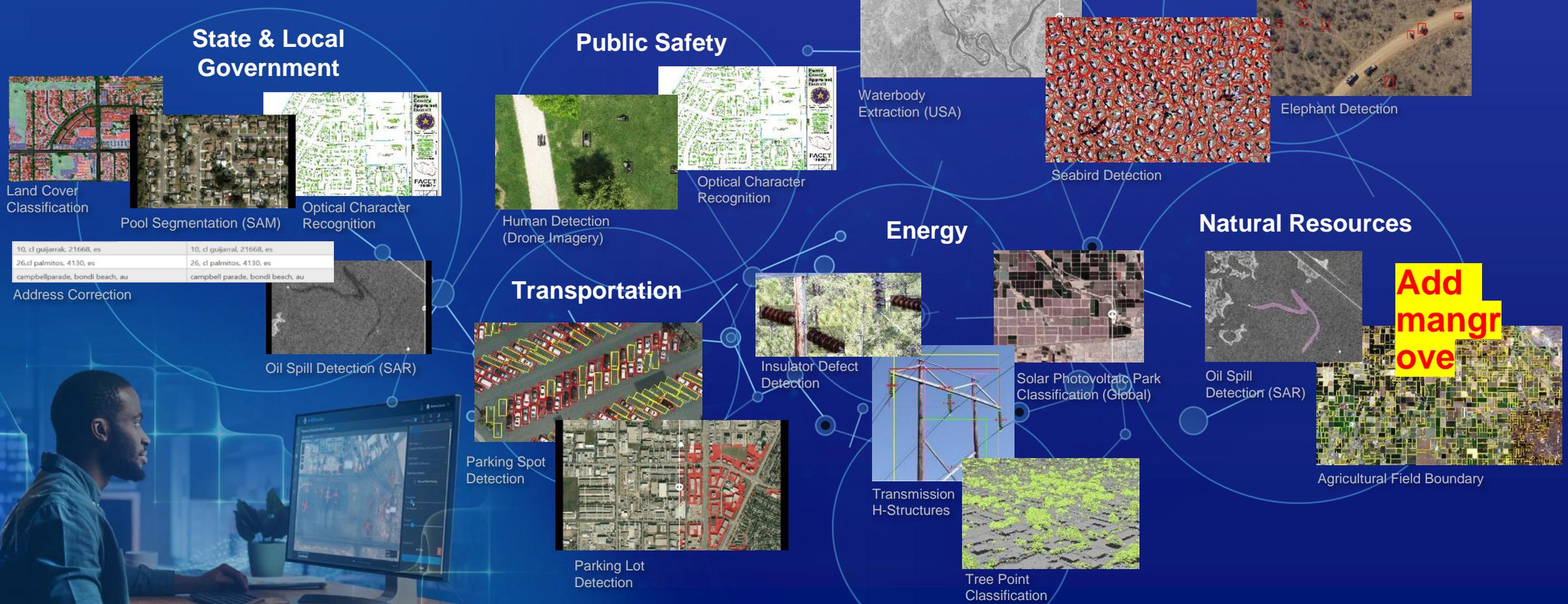


Take Action



# Pretrained AI Models

Making AI approachable



[Search Examples](#)[All](#)[Trending](#)[Basemaps](#)[Imagery](#)[Boundaries](#)[People](#)[Infrastructure](#)[Environment](#)[All content types](#)[All time](#)[All regions](#) Esri-only content Authoritative-only content

Sort by:

[Relevance](#)

22 Results



### Building Footprint Extraction - USA

Deep Learning Package By [esri\\_analytics](#)

Deep learning model to extract building footprints from high-resolution aerial and satellite imagery.

 Authoritative

### Land Cover Classification (Landsat 8)

Deep Learning Package By [esri\\_analytics](#)

Deep learning model to perform land cover classification on Landsat 8 imagery.

 Authoritative

### Land Cover Classification (Sentinel-2)

Deep Learning Package By [esri\\_analytics](#)

Deep learning model to perform land cover classification on Sentinel-2 imagery.

 Authoritative

### Mangrove Classification (Landsat 8)

Deep Learning Package By [esri\\_analytics](#)

Deep learning model to perform mangrove classification on Landsat 8 imagery.

 Authoritative

### Road Extraction - Global

Deep Learning Package By [esri\\_analytics](#)

Deep learning model to extract roads from high resolution satellite imagery.



### Car Detection - USA

Deep Learning Package By [esri\\_analytics](#)

Deep learning model to detect cars in high resolution imagery.

## Mentimeter Question

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In your opinion, how do you think AI has the capability to advance the SDG's?



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## Topic 4

The EO Toolkit: Supporting Sustainable Cities and Human Settlements



**Michele Melchiorri**

Project Officer for the Copernicus  
Global Human Settlement Layer,  
European Commission's Joint  
Research Centre



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Department:  
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REPUBLIC OF SOUTH AFRICA





# Earth Observations Toolkit for **SUSTAINABLE CITIES AND HUMAN SETTLEMENTS**



The Earth Observations Toolkit for Sustainable Cities and Communities is an  
**online knowledge resource**

to enable the **use of Earth observations** to advance  
Sustainable Development Goal 11 and the New Urban Agenda

the web portal hosts use cases, data and tools for SDG 11 applications on **housing,**  
**open spaces, urbanization** and **public transport**

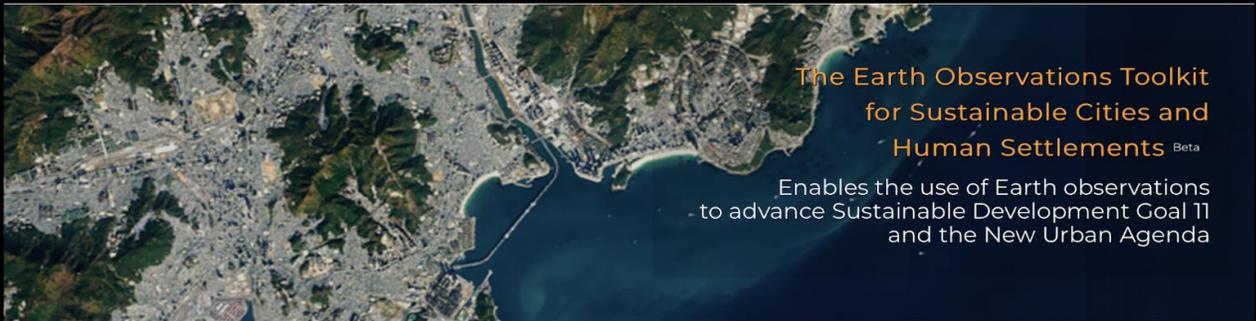


# Earth Observations Toolkit for Sustainable Cities and Human Settlements

- An **online knowledge resource** and **portal**
- Aim: To make EO data available to stakeholders interested in making cities and human settlements more inclusive, safe, resilient, and sustainable
- Aids SDG 11 and New Urban Agenda
- Launched in 2021 in collaboration with UN Habitat and 40 int'l organizations



Earth Observations Toolkit for  
**SUSTAINABLE CITIES  
AND HUMAN SETTLEMENTS**



The Earth Observations Toolkit for Sustainable Cities and Human Settlements Beta

Enables the use of Earth observations to advance Sustainable Development Goal 11 and the New Urban Agenda

HOUSING	OPEN SPACES	URBANIZATION	PUBLIC TRANSPORT
			

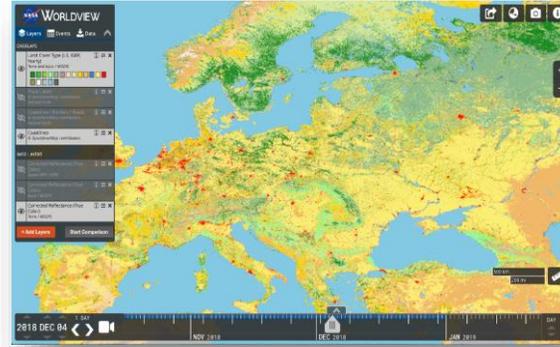
KEY CONTENT      HIGHLIGHTS

<https://eotoolkit.unhabitat.org/>

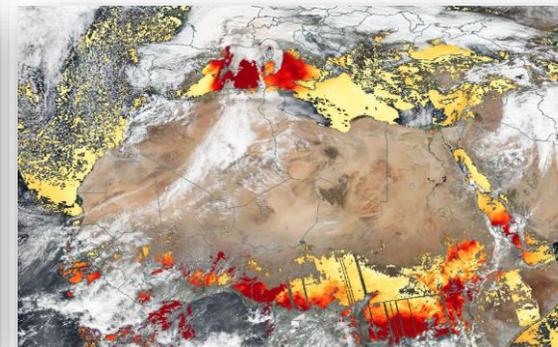
# Examples of SDG 11-Related Earth Observation Data & Products



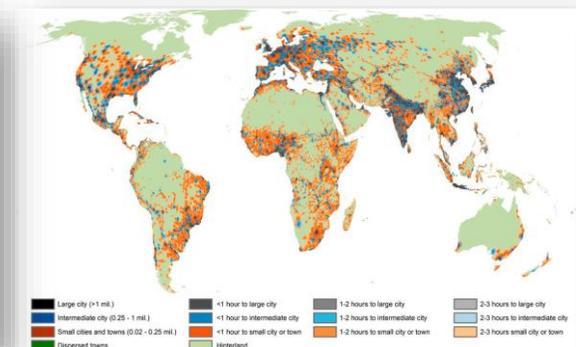
Land Surface Reflectance



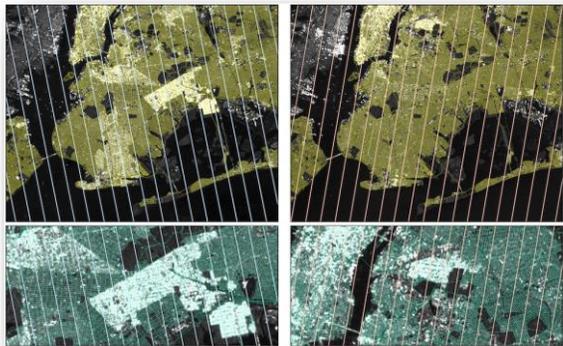
Land Cover/ Land Use



Air Quality



Urban-Rural Continuum



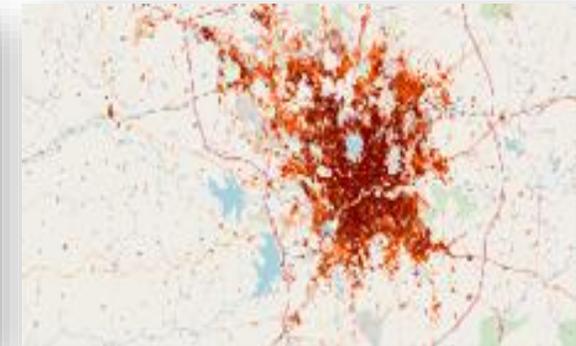
Synthetic Aperture Radar (SAR) Data Products



Vegetation Greenness/Phenology



Nighttime Imagery



Impervious Surface



Earth Observations Toolkit for  
**SUSTAINABLE CITIES**  
AND HUMAN SETTLEMENTS

# Earth Observations Toolkit for Sustainable Cities and Human Settlements

The web portal hosts use cases, data, and tools for SDG 11 applications on:

- Housing
- Open spaces
- Urbanization
- Public transport



Free and open, ready-to-use EO data sets.

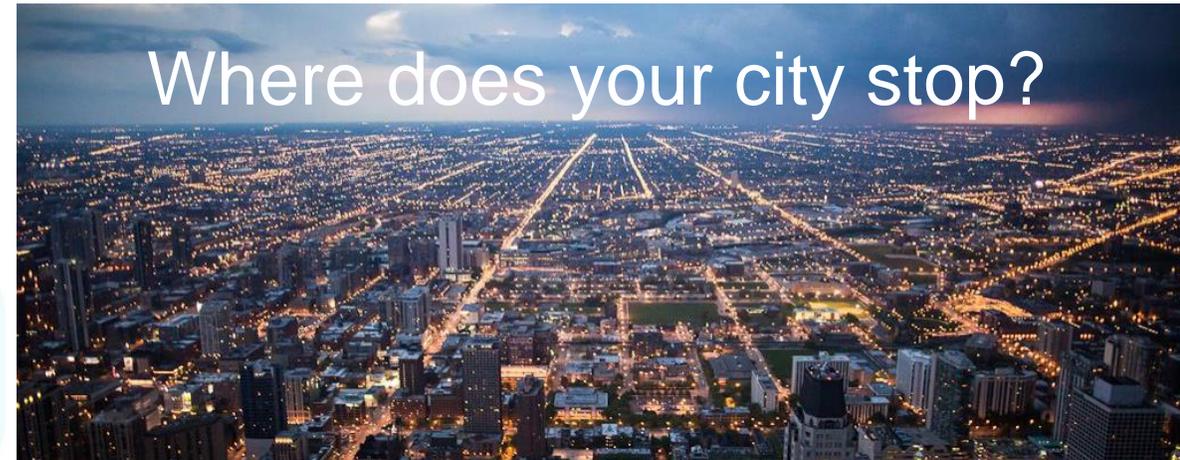
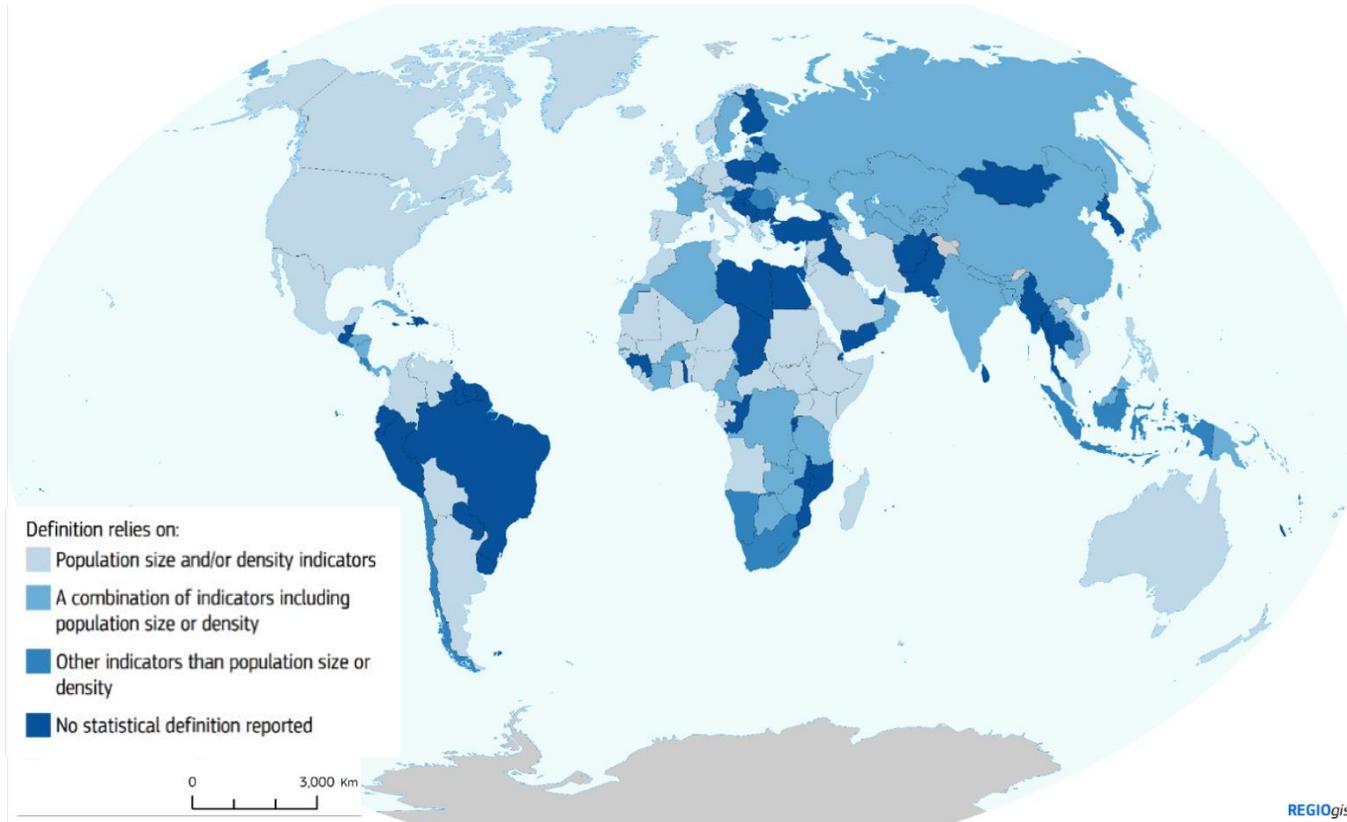


Tools to produce indicators, enable visualization, and access available data.



Documented use cases from cities and countries.

# A plethora of national definitions of urban



SDGs require urban-rural disaggregation



REGIOgis



*Endorsed the methodology for delineation of cities and urban and rural areas for international and regional statistical comparison purposes, as presented in the report, while emphasizing that the methodology is not intended to replace national definitions of urban and rural areas, but to complement them;*

# Applying the Degree of Urbanisation

A METHODOLOGICAL MANUAL TO DEFINE CITIES, TOWNS AND RURAL AREAS FOR INTERNATIONAL COMPARISONS

2021 edition



MANUALS  
AND GUIDELINES

eurostat 



European  
Commission



OECD



THE WORLD BANK



UN-HABITAT

FOR A BETTER URBAN FUTURE

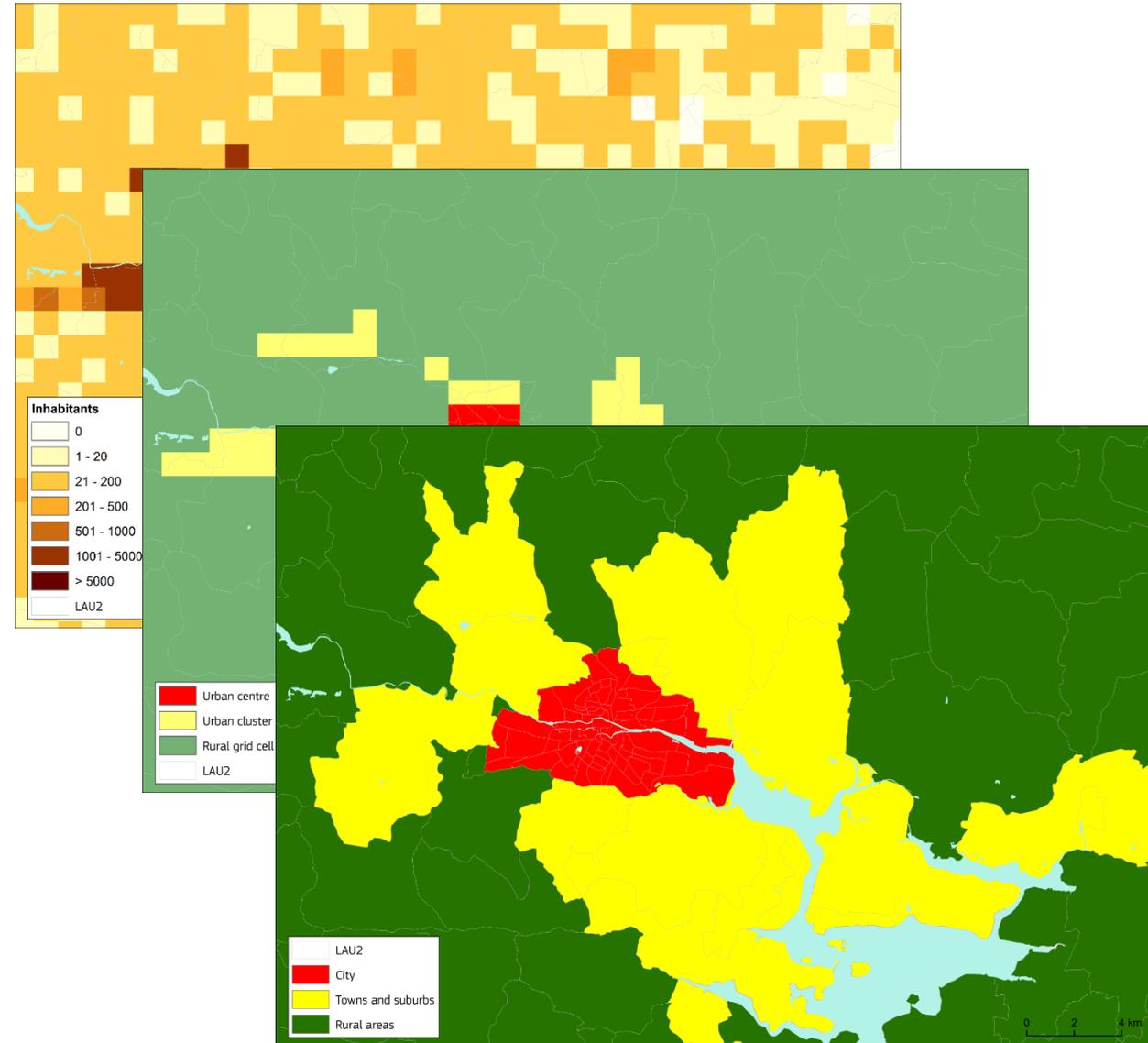


FOOD AND AGRICULTURE  
ORGANIZATION  
OF THE UNITED NATIONS



# Degree of Urbanisation

- It is a people based definition
- Relies on a **population grid**
- It is applied in a two stage process:
  - First grid cells are classified
  - Second local units are classified
- It has 3 classes (urban centre, urban cluster, rural area) rather than 2 (urban / rural)



# Human Settlement information is essential for policy frameworks and crisis management



The bottom section of the slide features a large aerial map of a region with various disaster risk overlays in blue and green. A circular diagram on the left side of the map illustrates the disaster management cycle: **preparedness**, **Response**, **Recovery**, and **Recovery**. Below the map, a horizontal row of seven icons is connected by a line, each with a corresponding label: **Rapid Mapping** (location pin), **Risk & Recovery Mapping** (location pin with hazard symbol), **Floods** (house with water), **Fires** (flames), **Droughts** (drying plant), **Population** (group of people), and **Built-up areas** (city buildings). In the bottom left corner, the logo of the **PROGRAMME OF THE EUROPEAN UNION** is displayed.

# COPERNICUS GHSL

## CONTINUOUS UPDATE –biennial releases

- Production of the 2022, 2024 and 2026 global built-up surface layers

## Flexible products

- Global built-up surface fraction at 10 m resolution
- Intermediate products (including imagery, training and reference data)
- Post-processed products (including reprojected and aggregated versions of the built-up layer)
- Greenness (NDVI) in the built-up layer

## Quality controlled and validated

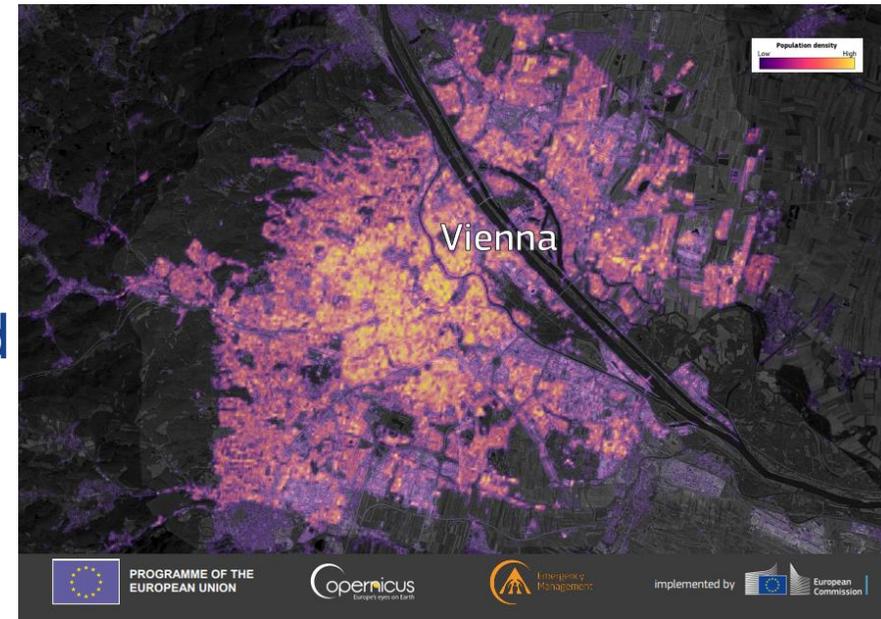
Exposure  
Mapping



Population



Built-up  
areas



Melchiorri, M., & Kemper, T. (2023, May). Establishing an operational and continuous monitoring of global built-up surfaces with the Copernicus Global Human Settlement Layer. In *2023 Joint Urban Remote Sensing Event (JURSE)* (pp. 1-4). IEEE. <https://doi.org/10.1109/JURSE57346.2023.10144201>

# STAY CONNECTED

EVENTS, ONLINE, and MAP VIEWERS



@CopernicusEMS



[emergency.copernicus.eu](https://emergency.copernicus.eu)



[activations.emergency.copernicus.eu](https://activations.emergency.copernicus.eu)

More Information on the  
Global Human Settlement Layer:



[ghsl.jrc.ec.europa.eu](https://ghsl.jrc.ec.europa.eu)



Rapid  
Mapping



Risk & Recovery  
Mapping



Floods



Fires



Droughts



Population



Built-up  
areas



PROGRAMME OF THE  
EUROPEAN UNION

## Mentimeter Question

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**Geospatial data** for human settlements are widely used. In **which of these fields** would you use them or would you benefit the most from their use:

- a. **SDG 9: Industry, Innovation, and Infrastructure:** for the planning and development of infrastructure, especially in rapidly growing urban areas
- b. **SDG 6: Clean Water and Sanitation:** By monitoring urban expansion and population growth, support the planning and management of water and sanitation services in urban areas
- c. **SDG 13: Climate Action:** to assess the impact of urbanization on greenhouse gas emissions and climate vulnerabilities
- d. **SDG 11: Sustainable and Resilient human settlement:** to monitor changes in land use changes



**GEO  
WEEK  
2023  
MINISTERIAL  
SUMMIT**

#TheEarthTalks

GEO WEEK & Ministerial Summit 2023

## Topic 5

Advancing SDGs from an  
Urban Safety Perspective



**Yuzhou LIU**

Research Fellow at Shenzhen Institute of  
Urban Public Safety (SIUPS)



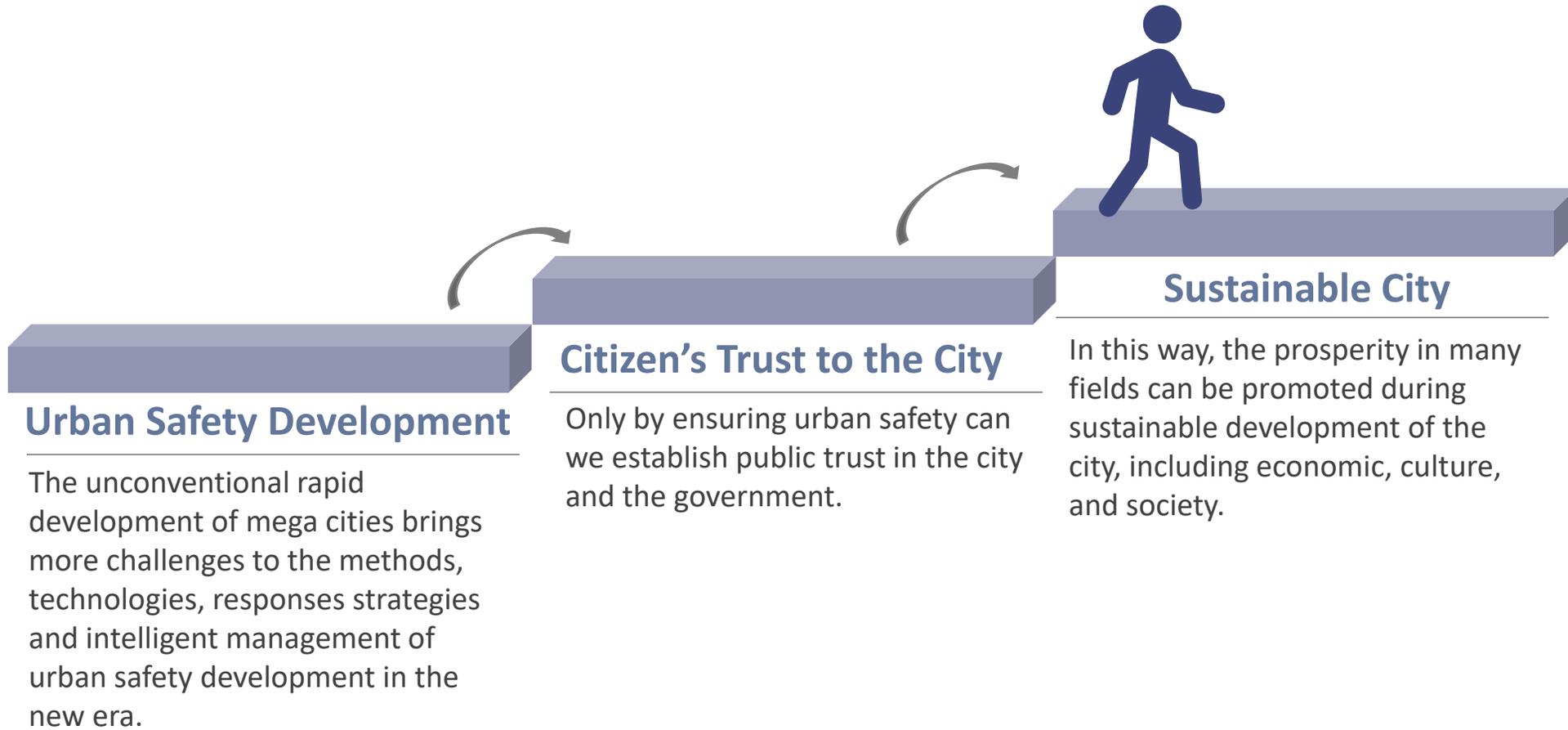
science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



## Growing Cities/Agglomerations



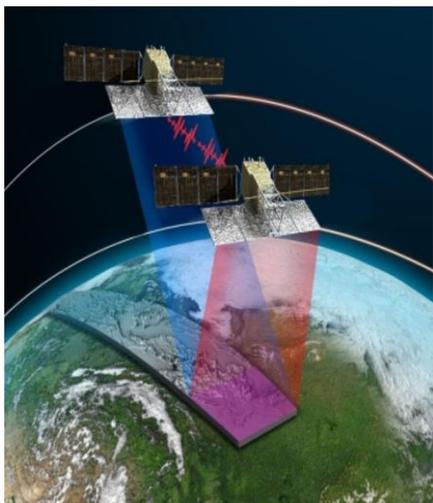


**SUSTAINABLE DEVELOPMENT GOALS**



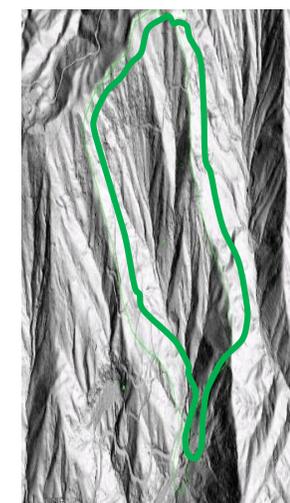
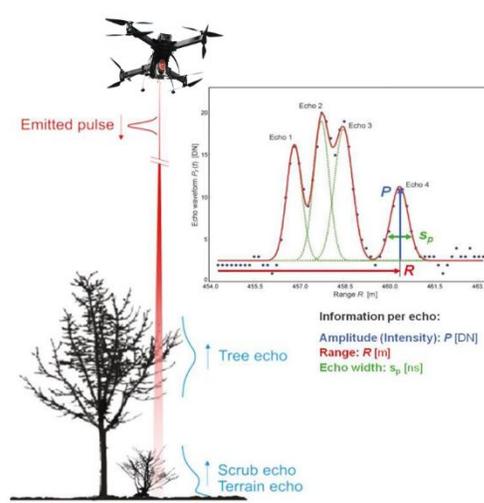
## Space-air-ground based monitoring network: wide-range, full-info, full-time

### Space-borne Monitoring: Satellite Remote Sensing & China's Beidou



- wide-range
- all-time
- all-weather
- sensing-enhancement

### Air-borne Monitoring: Aircraft & UAV



- intelligent inspection
- self-adaptive
- self-evolution
- self-decision

• multiple identification by single sensing

• multifield coverage

### Ground-based Monitoring: IoT & Non-contact tech.



Emergency

Construction

Transportation

Fire Control

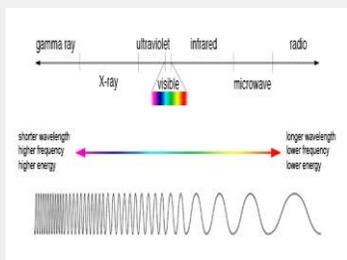
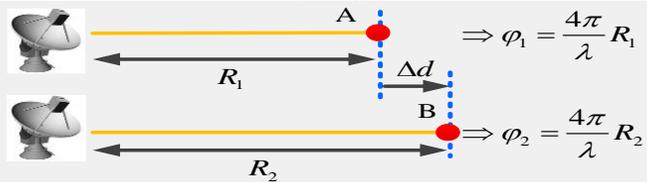
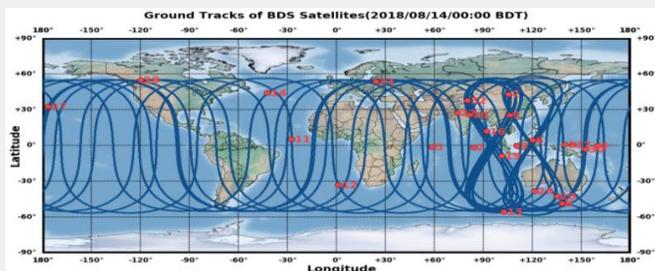
Water Utilities

Market  
Surveillance

.....

## ■ GNSS & Satellite Remote Sensing

### Multi-source data and info. integration



	1	2	3	4	5	6	7	8
1	1	1	5	6	8			
2	3	5	7	1				
3	4	5	7	1	2			
4	8	5	1	2	5			
5								
6								
7								
8								



- Beidou
- position
- deformation
- time

- Radar
- phase
- amplitude

- optical sensor
- spectrum
- texture

- LiDAR
- height

### Multi-scale mixed-scenario applications

oil facility



land reclamation area



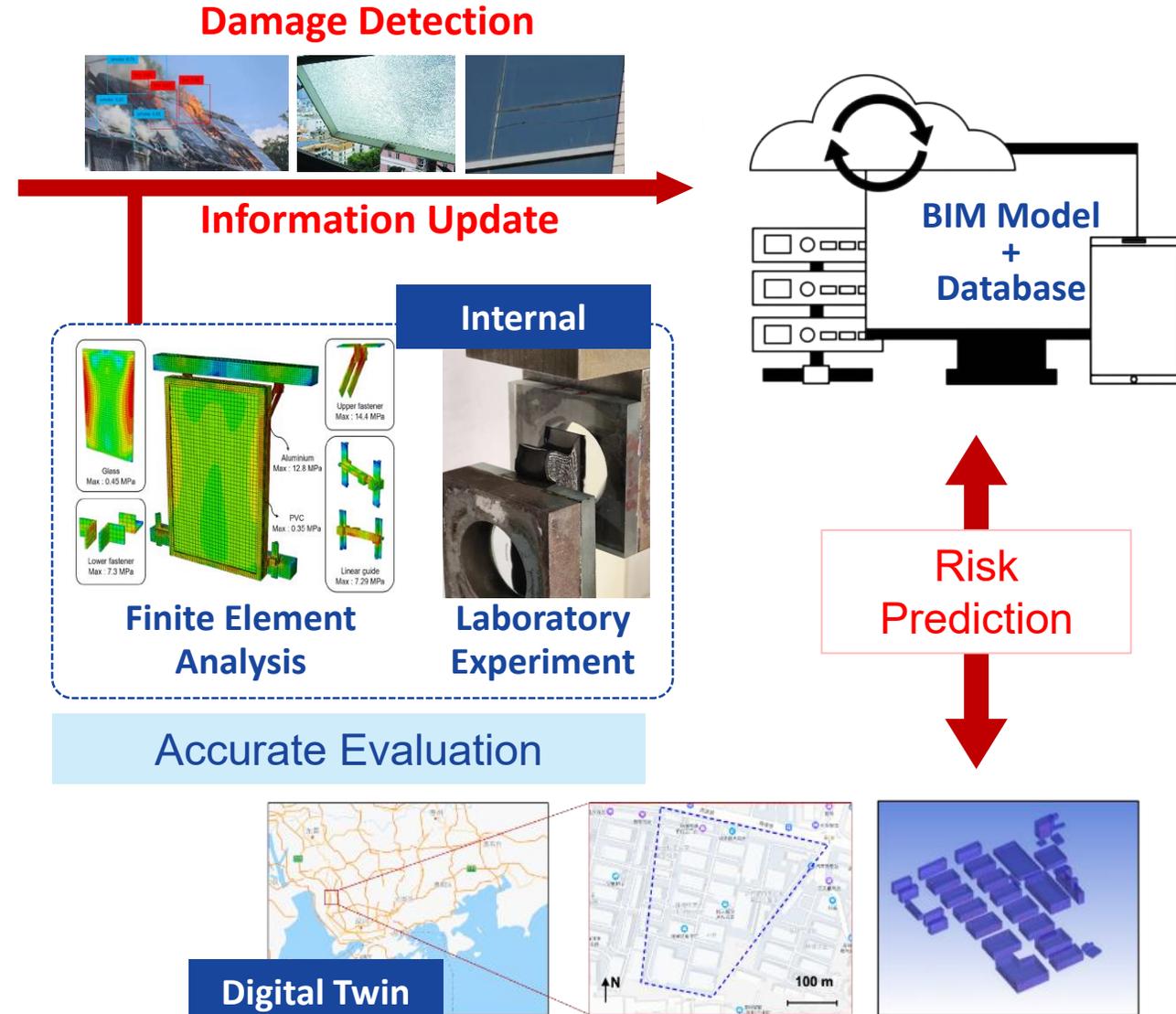
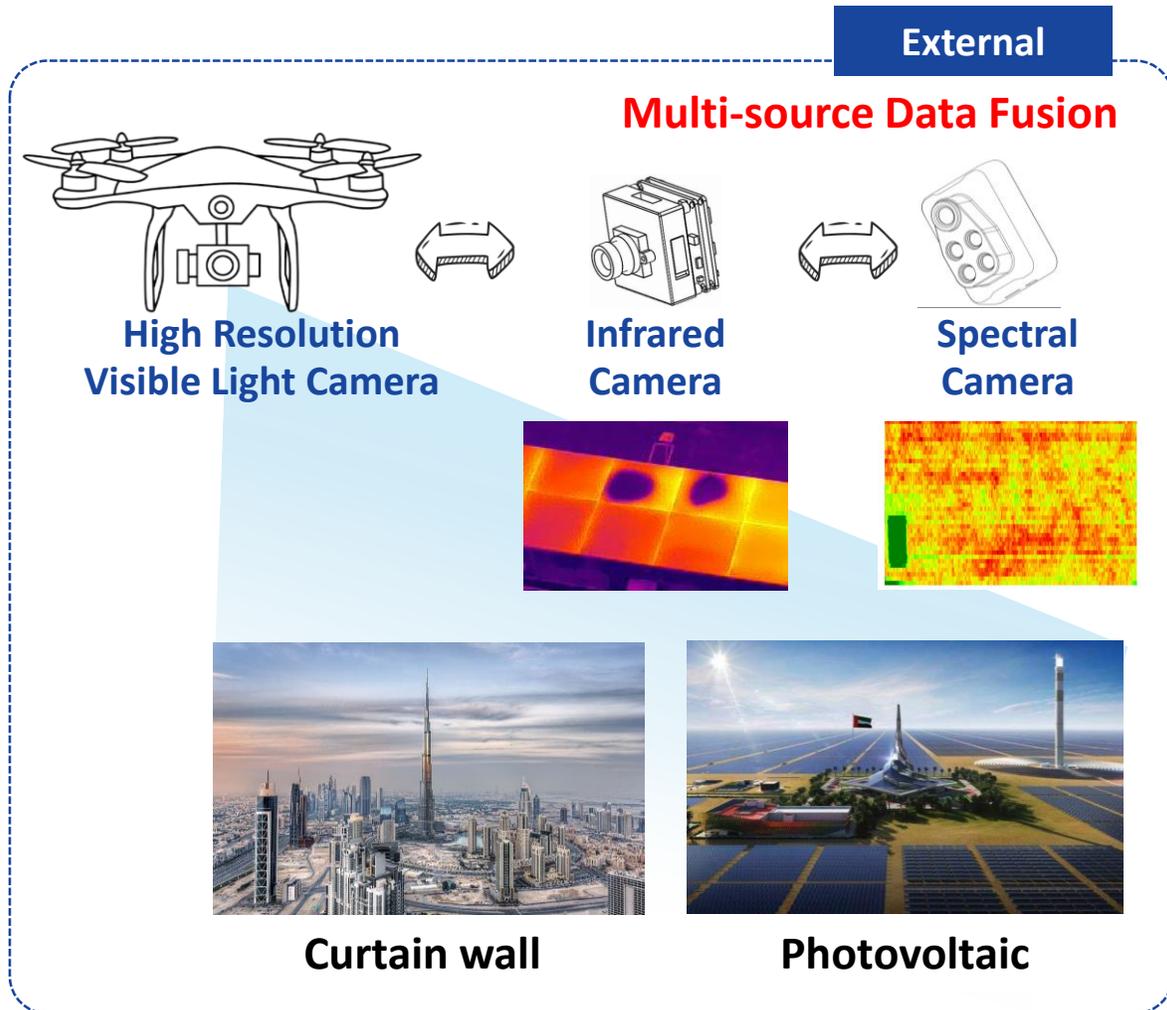
high-rise bldg.



area



## Urban Health Monitoring with UAV



## Information Systems for Urban Safety Management

### production safety



Risk of urban public safety



Hazardous chemicals



Confined Space



Production safety



Fire protection for high-rise bldgs



Electric fire protection

### disaster reduction



Forest fire prevention



Forest fire prevention



Safety of slopes

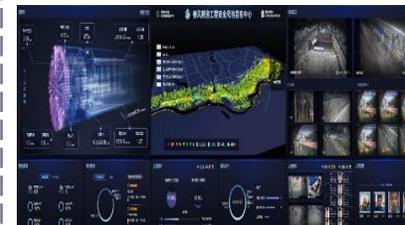
### major project



Construction works



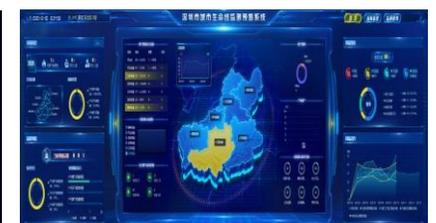
Existing buildings



Tunnelling works



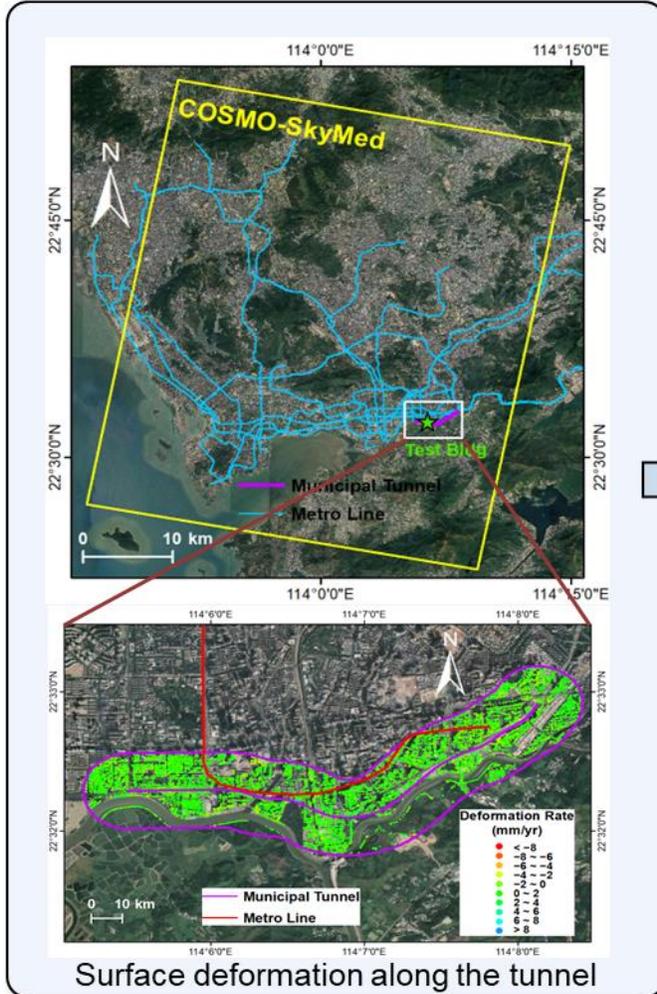
Sea-crossing tunnel



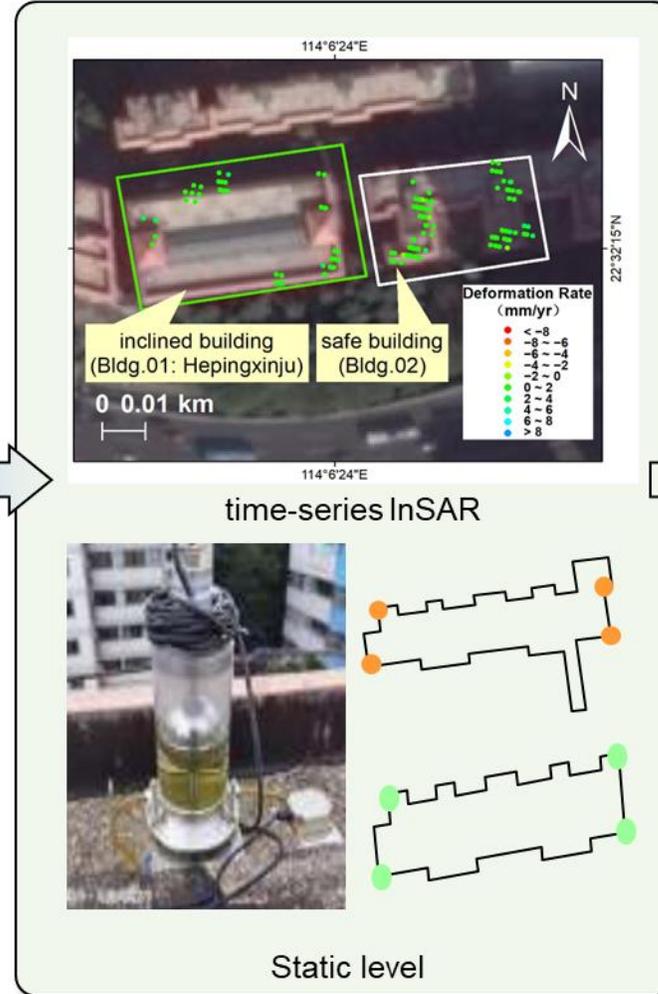
Urban lifeline

## Risk assessment of aged buildings to prevent potential personnel casualties

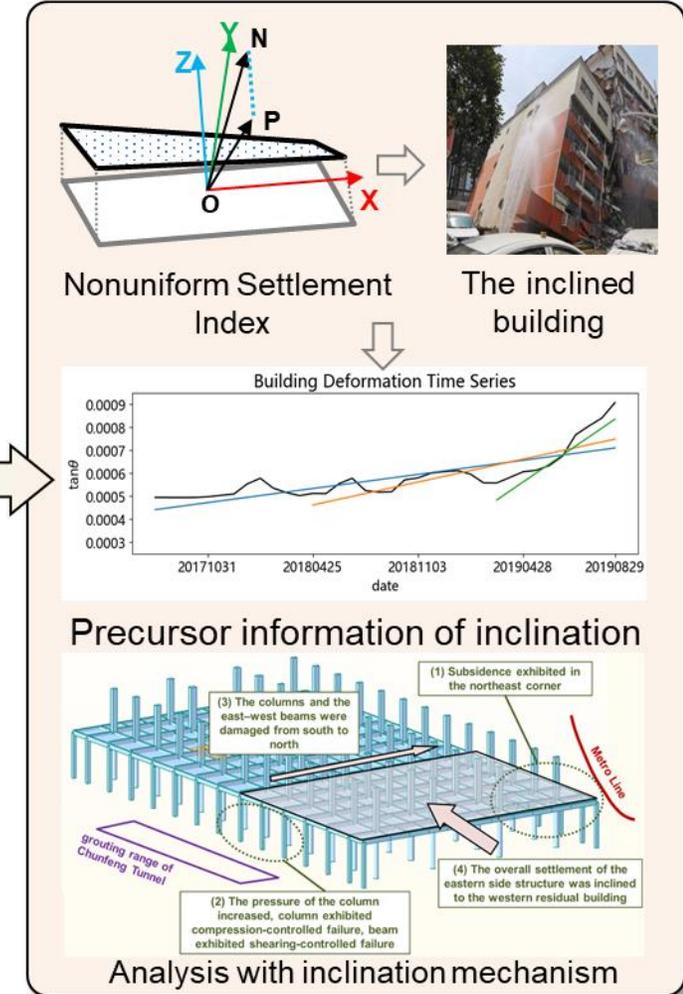
### Wide-range detection



### Building monitoring

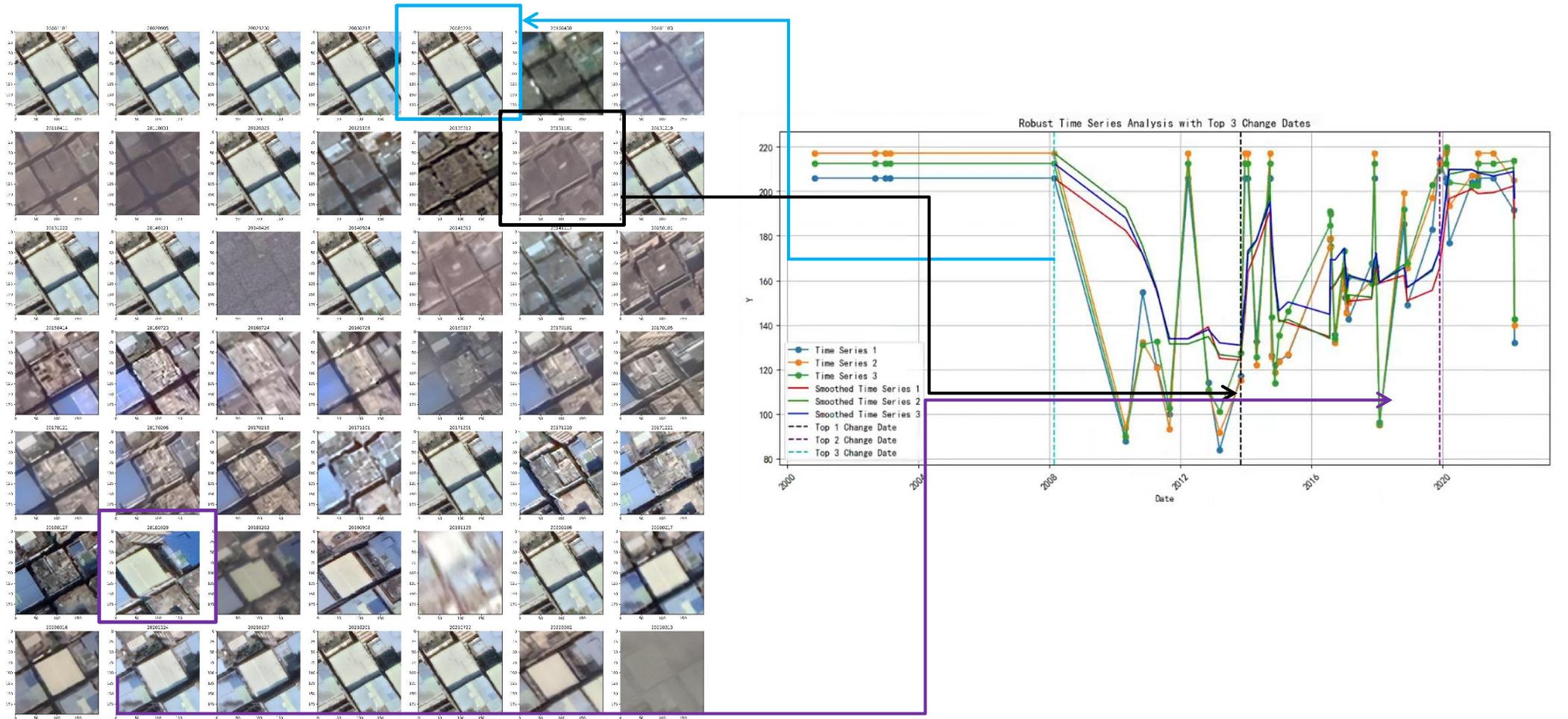


### Risk evaluation



Analysis with inclination mechanism

## Establishing basic archives for aged buildings by EO and artificial intelligence



# For safe and sustainable cities.

**CONTACT US:**



<https://www.szsti.org>



[szsti@szsti.org](mailto:szsti@szsti.org)



LIU Yuzhou ([liuyz@szsti.org](mailto:liuyz@szsti.org); [yuzhouliu@link.cuhk.edu.hk](mailto:yuzhouliu@link.cuhk.edu.hk))

## Mentimeter Question

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EO data and technologies have long been applied to surface processes inversion. Whereas systematic solutions for urban safety are still rare. What do you think is the main difficulty when using EO to solve problems of urban safety management?

#TheEarthTalks



**6-10 NOVEMBER**

CAPE TOWN, SOUTH AFRICA

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science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



## Mentimeter Questions during Roundtable

As we navigate the second phase toward the 2030 Agenda, what, in your view, is the most crucial action GEO should take to help achieve the Sustainable Development Goals?