

Earth Observation solutions for biodiversity monitoring

Federica Marando

Biodiversity Applications Scientist

Climate Action, Sustainability and Science Department

ESA ESRIN

federica.Marando@esa.int

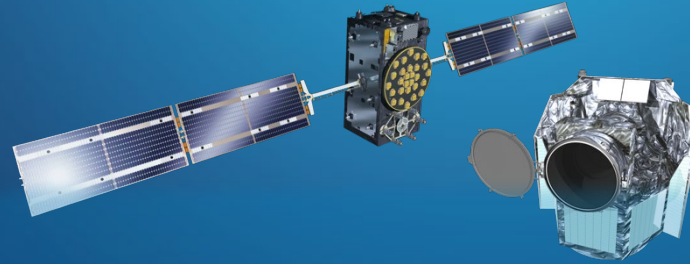
LifeWatch ERIC BEeS 2026
08/07/2026

ESA UNCLASSIFIED – For ESA Official Use Only

What is the European Space Agency?



Make Space
for Europe



Promoting cooperation among
European States in space research,
technology and applications, for
exclusively peaceful purposes

5 500+

ESA Workforce

23

Member States

2025 Budget

€ 22.3 billion =
30 per European



ESA's Earth Observation Missions



Satellites

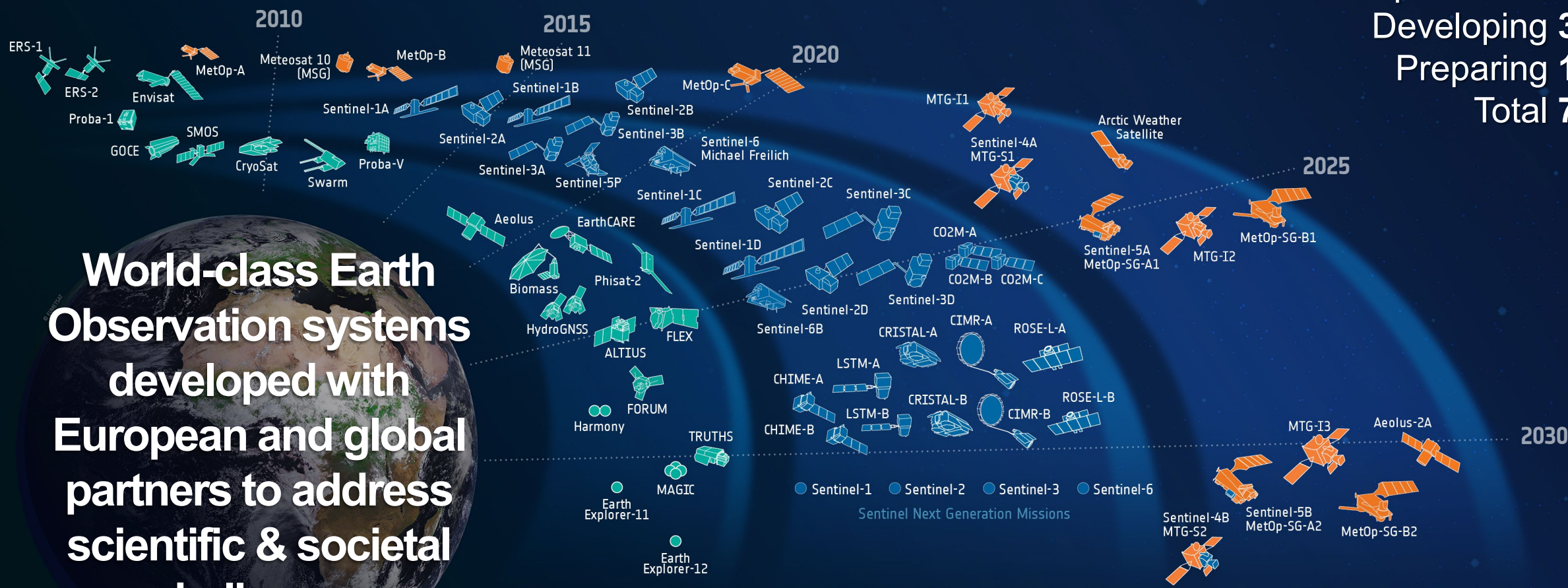
Heritage 06

Operational 14

Developing 39

Preparing 19

Total 78



World-class Earth
Observation systems
developed with
European and global
partners to address
scientific & societal
challenges

Science



Copernicus



Meteorology



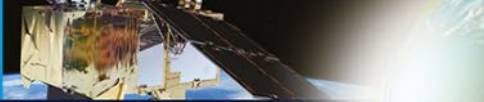
The Copernicus Space Component – Sentinels



PROGRAMME OF THE
EUROPEAN UNION



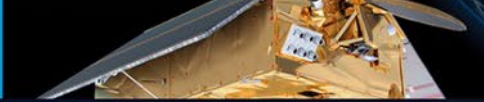
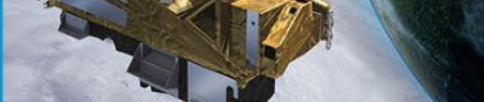
**State-of-the-art
observations with
unprecedented
coverage**



**Systematic data
availability**



**Full, free and open
data policy**



sentinel-1

→ **RADAR VISION**



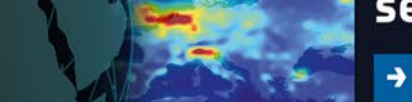
sentinel-2

→ **COLOUR VISION**



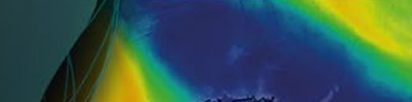
sentinel-3

→ **A BIGGER PICTURE**



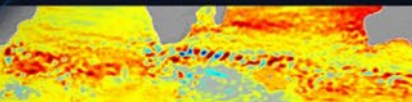
sentinel-4

→ **EUROPEAN AIR MONITORING**



sentinel-5p | sentinel-5

→ **GLOBAL AIR MONITORING**



sentinel-6

→ **SURFING THE SEAS**

→ Know more: <https://copernicus.eu> and <https://sentinels.copernicus.eu>

* ESA Sentinel Data Policy (Sep 2013) and
EU Delegated Act on Copernicus Data and Information Policy (Dec 2013)



→ THE EUROPEAN SPACE AGENCY

All global
landmass is
observed every
5 days at 10m
resolution

**30 TB of Daily Data
Production by Sentinels**

**350 TB of Daily Sentinel
Products Disseminated for
Services to Society**

**> 750.000
Registered Users**

Supporting 6
operational services



**Full, Free & Open
Data Policy***

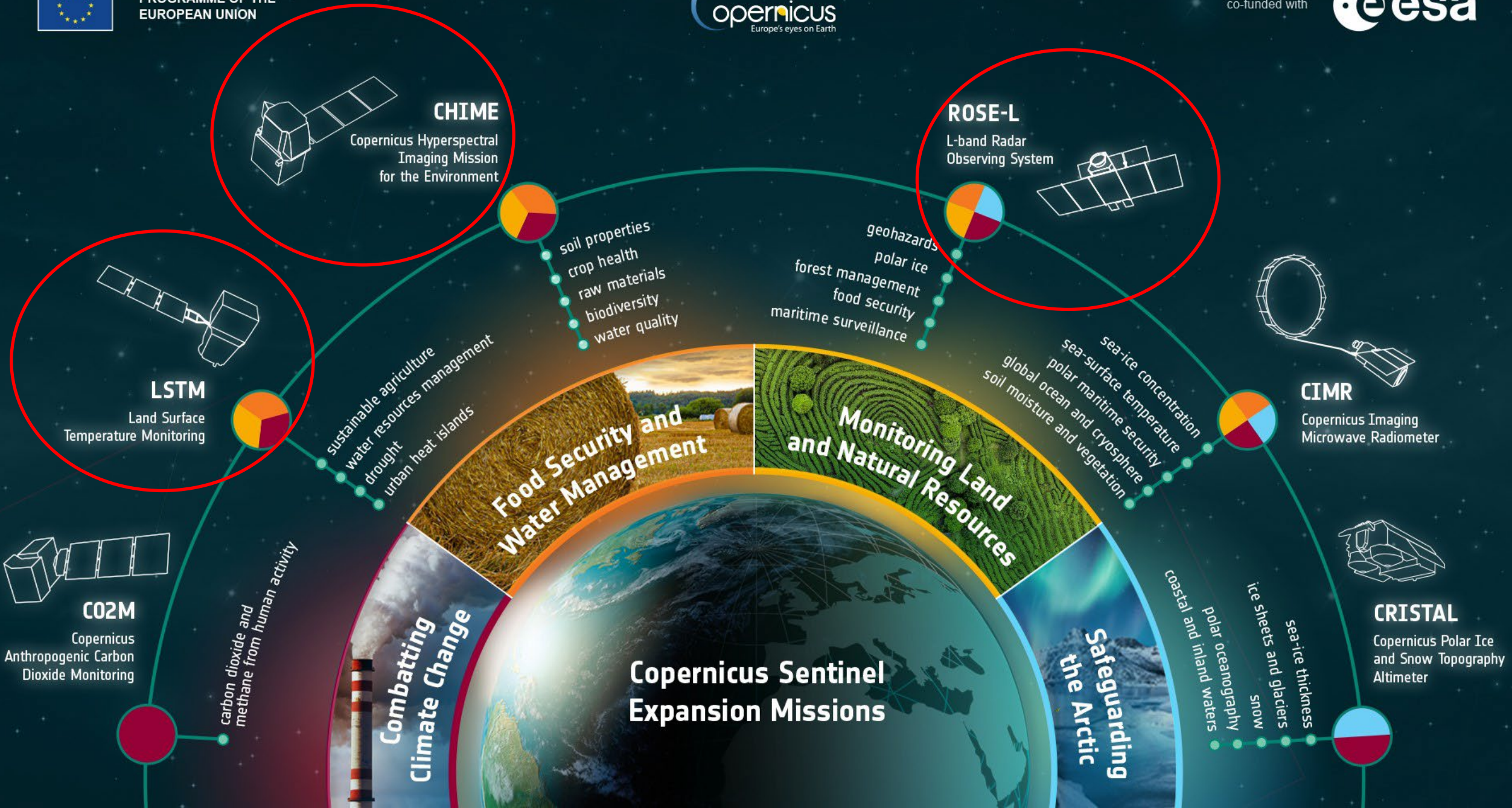
* ESA Sentinel Data Policy (Sep 2013) and
EU Delegated Act on Copernicus Data and Information Policy (Dec 2013)



PROGRAMME OF THE
EUROPEAN UNION



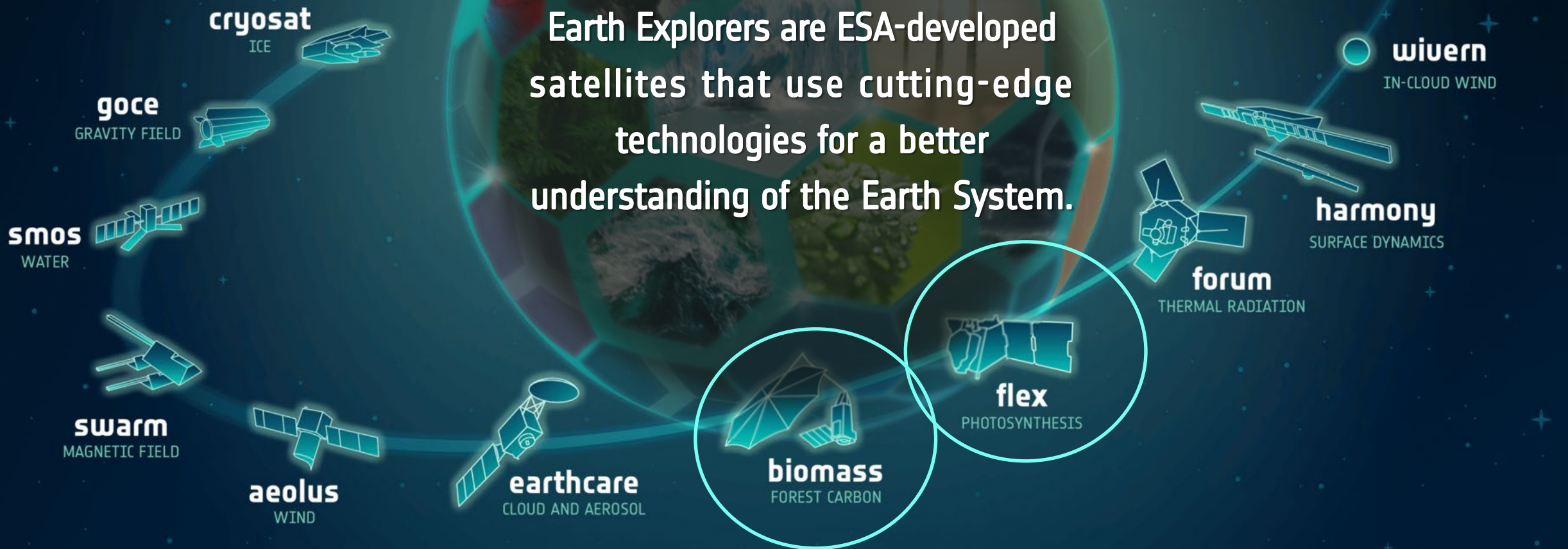
co-funded with



Earth Explorers

Pioneering Scientific and Technical Excellence

Earth Explorers are ESA-developed satellites that use cutting-edge technologies for a better understanding of the Earth System.



From satellites to applications through open algorithms

Transparent EO data and Earth system science insights, powered by the ICT revolution.

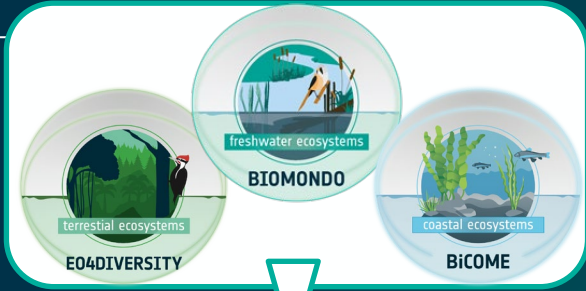
Cross-cutting activities across EO missions, with diverse stakeholders to deliver reliable data and technologies.



Open science + open-source foundation
FAIR principles: Findable, Accessible, Interoperable, Reusable

ESA roadmap on Biodiversity Applications

2020



2026

Project of ESA’s **PEOPLE series** (Pioneering Earth Observation Applications for the Environment)
 Response to community needs identified by **CSOs/NGOs** active in **ecosystems conservation**

2 main objectives:

OBJ-A: monitoring and assessment of **existing** conservation actions

OBJ-B: identifying **high-priority areas** for **new** conservation actions

2-year project: 2024-2026

JUL
9
THU



TRAINING SESSION

Assessing Grassland Productivity Trend using Sentinel-2 Remote Sensing Time-Series

🕒 14:30 - 15:30 UTC+3

📍 Parallel C

JUL
10
FRI



HABITAT MAPPING, BIOGEOGRAPHY, SOIL MISSION & ONE HEALTH

Earth Observation tools to support ecosystem conservation actions

Authors: Jasper Van doninck, Andy Dean, Marcos Kavlin, Barry Pierce, Michael Munk, Mads Christensen, Gyde Kruger, Paul Jacques Connetable, Matthes Rieke, Jan Speckamp, Julia Rotert, Wietske Bijker, Louise Willemen

🕒 09:20 - 09:35 UTC+3

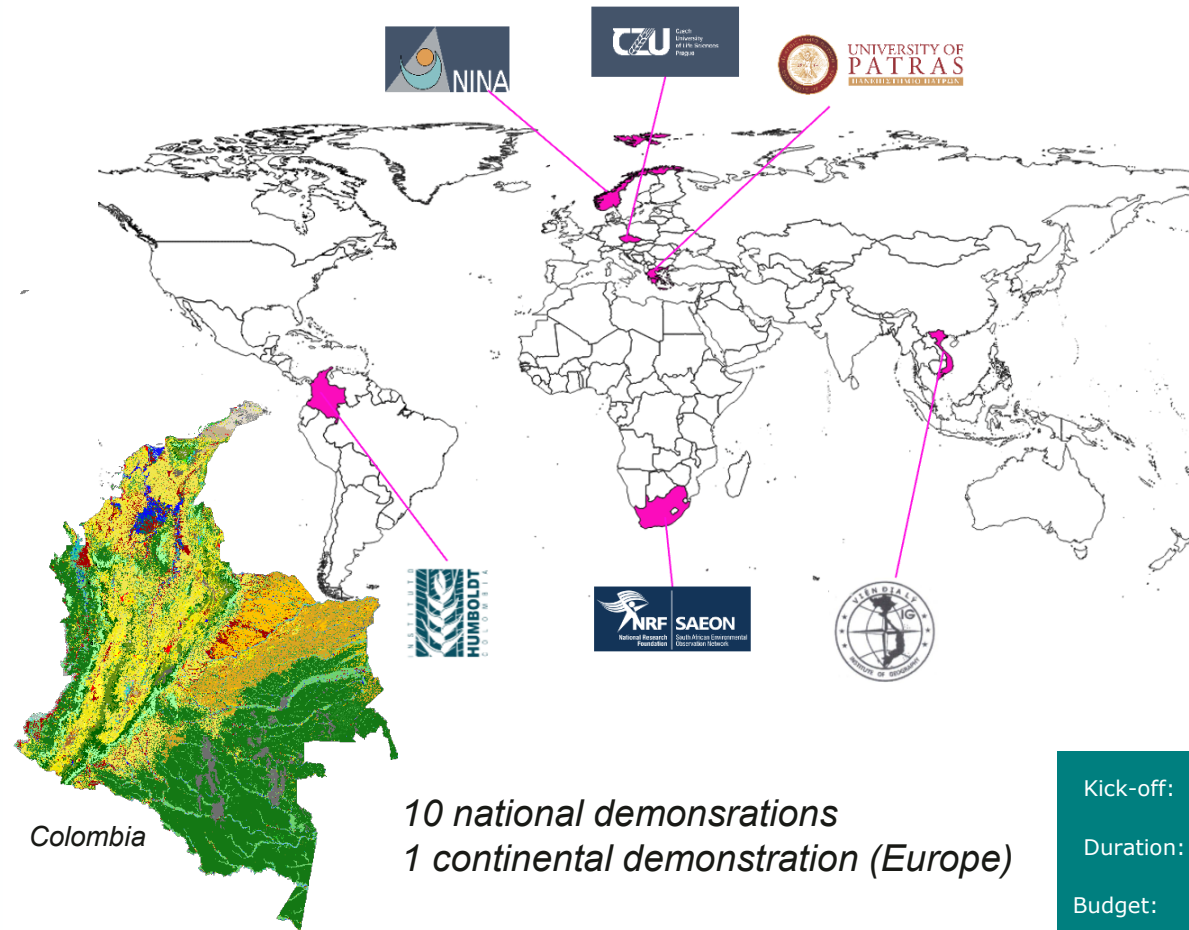
📍 Parallel B

WEED - World Ecosystem Extent Dynamics

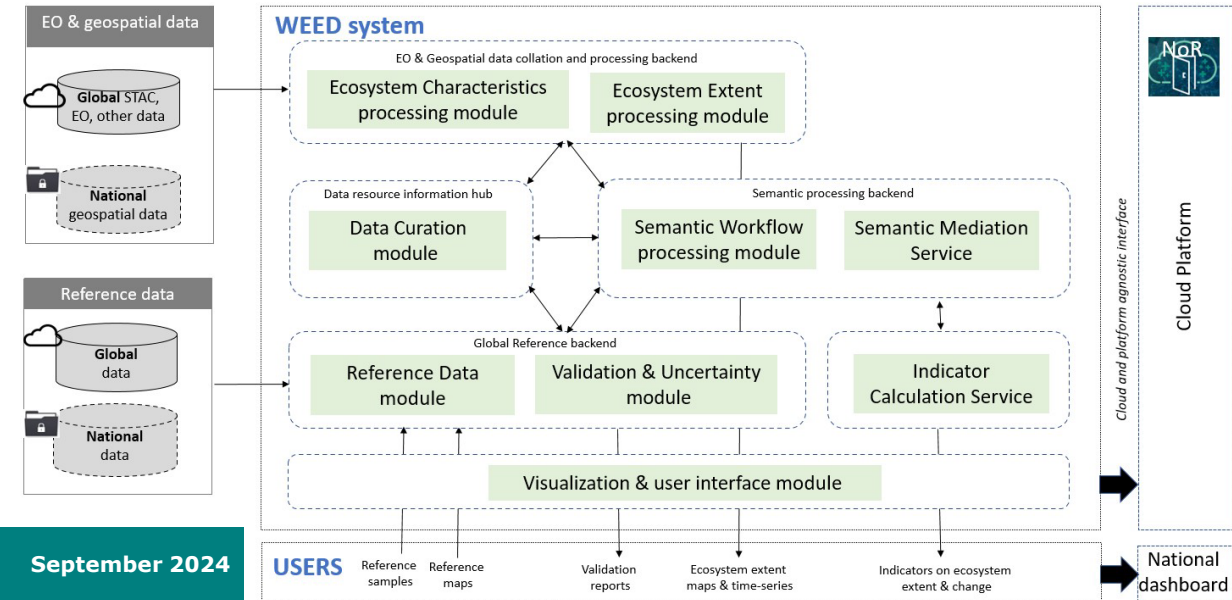


Ecosystems are an order of magnitude more difficult to classify than land cover/land use

Country Ownership: Co-creation & Capacity Building



WEED Open Source Toolbox



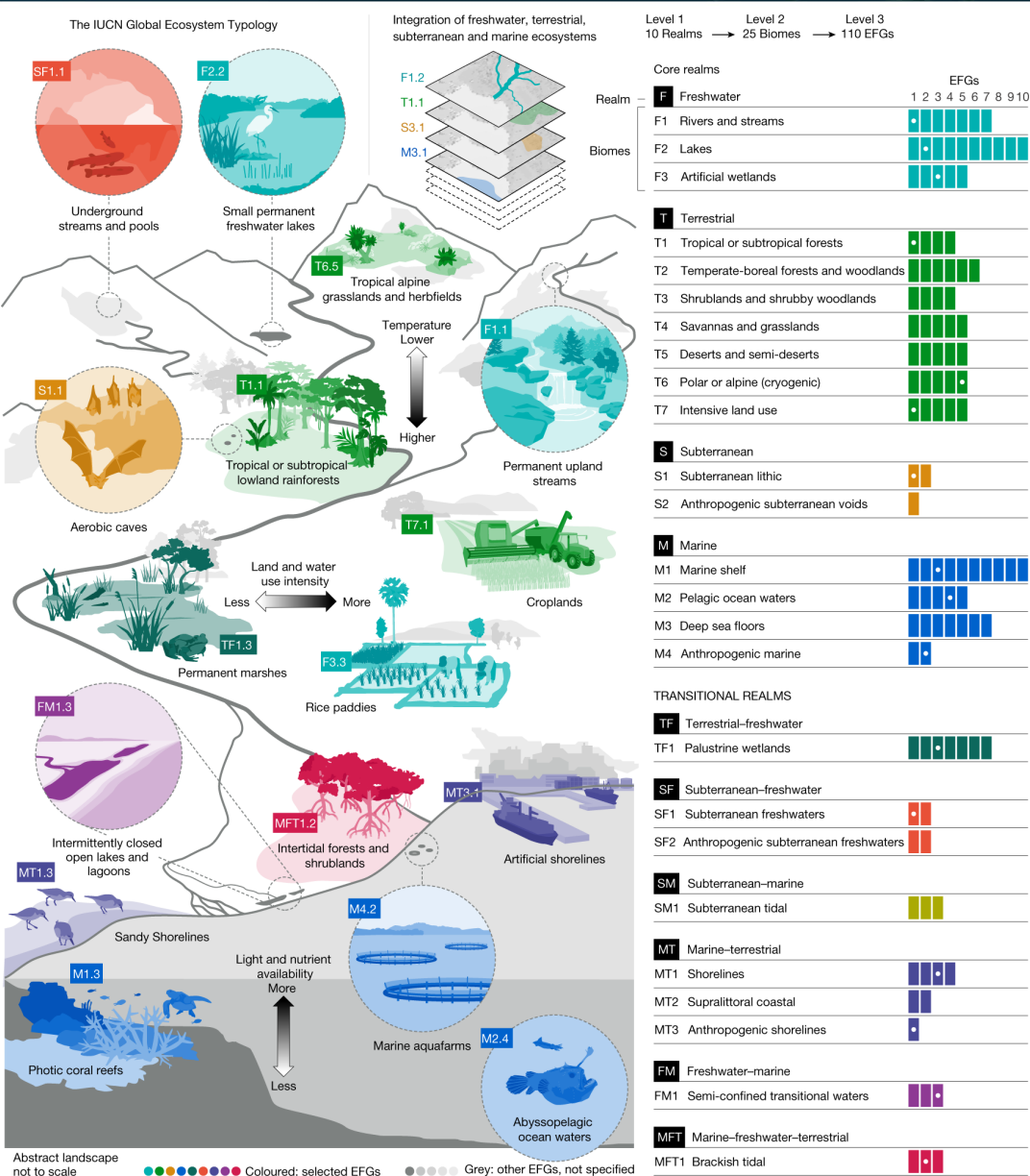
Kick-off: **September 2024**

Duration: **24 months**

Budget: **1,800 k€**

<https://esa-worldecosystems.org/>

Coastal ecosystems in the IUCN Global Ecosystem Typology (GET)



Realm	Biome	EFG Code	EFG Name	Type
Marine– Terrestrial (MT)	Shorelines (MT1)	MT1.1	Rocky shorelines	Natural
		MT1.2	Muddy shorelines	Natural
		MT1.3	Sandy shorelines and dunes	Natural
	Supralittoral coastal systems (MT2)	MT2.1	Coastal shrublands and grasslands	Natural
		MT2.2	Large seabird and pinniped colonies	Natural
	Anthropogenic shorelines (MT3)	MT3.1	Artificial shorelines	Artificial
Marine– Freshwater– Terrestrial (MFT)	Brackish tidal biome (MFT1)	MFT1.1	Coastal River Deltas	Natural
		MFT1.2	Intertidal forests and shrublands	Natural
		MFT1.3	Coastal saltmarshes and reedbeds	Natural
Freshwater– Marine (FM)	Transitional waters (FM1)	FM1.1	Deepwater coastal inlets	Natural
		FM1.2	Permanently open riverine estuaries and bays	Natural
		FM1.3	Intermittently closed and open lakes and lagoons	Natural
Freshwater (F)	Artificial wetlands (F3)	F3.4	Freshwater Aquafarms	Artificial
Marine (M)	Anthropogenic marine systems (M4)	M4.1	Submerged artificial structures	Artificial
		M4.2	Marine aquafarms	Artificial
Terrestrial (T)	Intensive land-use systems (T7)	T7.1	Annual croplands	Intensive use
		T7.3	Plantations	Intensive use
		T7.4	Urban and industrial ecosystems	Artificial

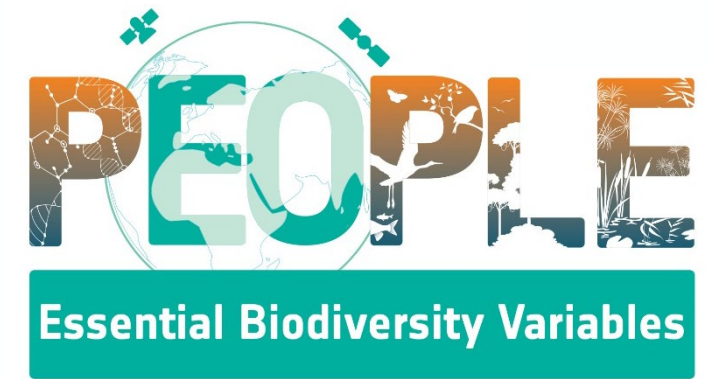
EO for Essential Biodiversity Variables & GBF indicators



This activity will study how **Essential Biodiversity Variables (EBVs)** enabled by satellite remote sensing can be integrated in the **monitoring framework of the Kunming-Montreal Global Biodiversity Framework (KM-GBF)** adopted at COP 15 of the Convention on Biological Diversity (CBD) in December 2022.

The objective is to **develop state-of-the-art EO solutions for the production of EBVs** in different **ecosystems** addressing different EBV classes (e.g., ecosystem structure and function, community composition, species population), **and their transformation into selected indicators of the GBF monitoring framework.**

By integrating EO data and providing practical monitoring and assessment tools, the project will enhance the capacity of Parties of the CBD to monitor biodiversity more effectively, inform national planning and reporting, improve the quality and consistency of the reporting and fulfil their commitments under the CBD.



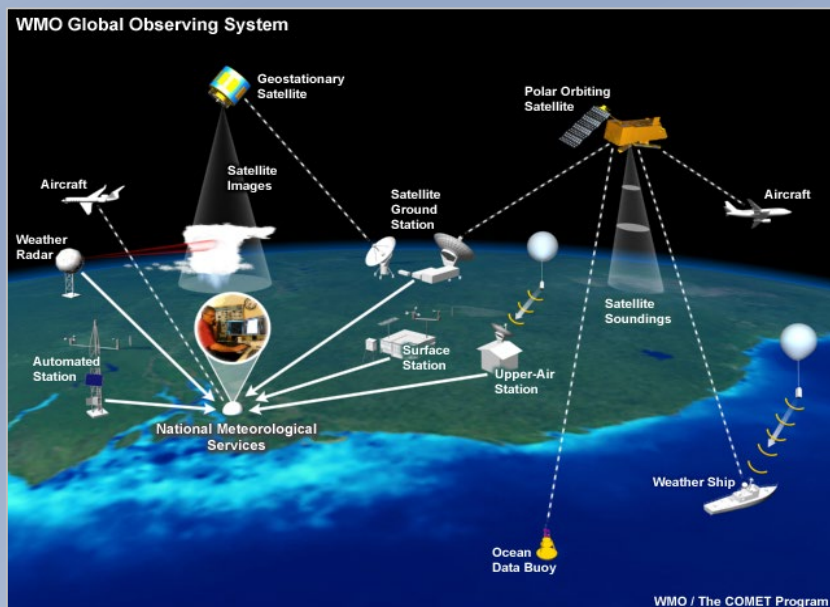
ITT issued in March 2026 - Single Contract. | Duration: 24 months. | Budget 1,200 KEUR. |

Biodiversity virtual constellation



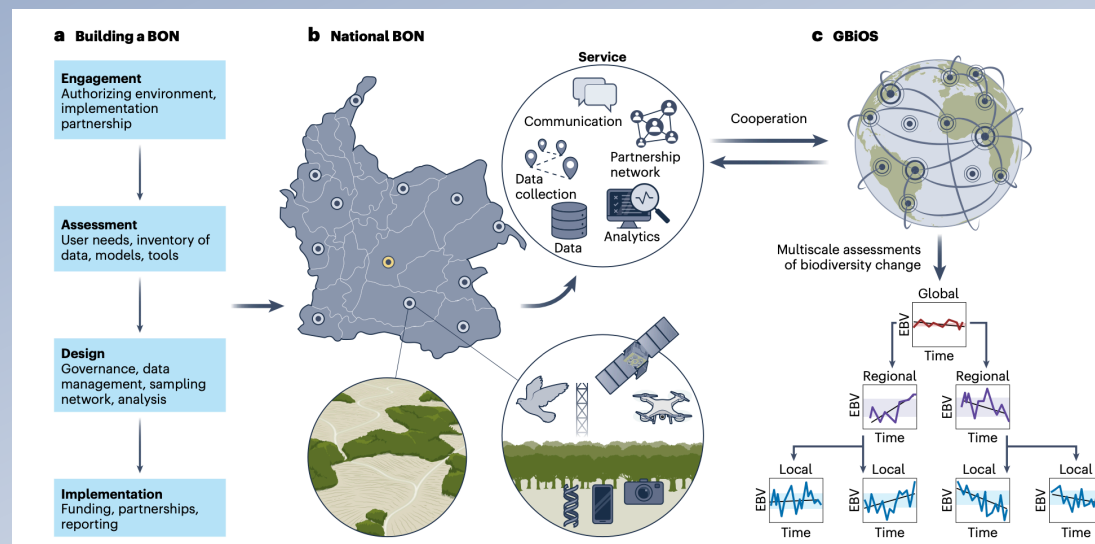
Mission Statement: Advance biodiversity understanding, monitoring, and applications for the benefit of society by strengthening the community's use of space-based Earth observations and data products for biodiversity

Weather and climate



Biodiversity?

B-VC serving as the “space arm” of a Global Biodiversity Observation System (GBIOS – GEO BON)



Gonzalez et al., 2023 Nature ecology & evolution



Co-led by



The Stakeholder Engagement Facility supports a wide range of stakeholders to help them use Earth Observation in their daily work.

JUL
8
WED



TRAINING SESSION

Introduction and hands-on EO for Biodiversity Monitoring using Copernicus Browser (ESA)

🕒 16:15 - 17:15 UTC+3

📍 Parallel B

SPACE FOR ALL

www.esa.int

federica.marando@esa.int