

# ESA Earth Observation Programme

**BELSPO Space Talks**

17 April 2023

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ESA UNCLASSIFIED – For ESA Official Use Only



A large, semi-transparent image of the Earth as seen from space, showing the Western Hemisphere with North and South America visible. The image is centered behind the main title.

# ESA's Earth Observation Vision

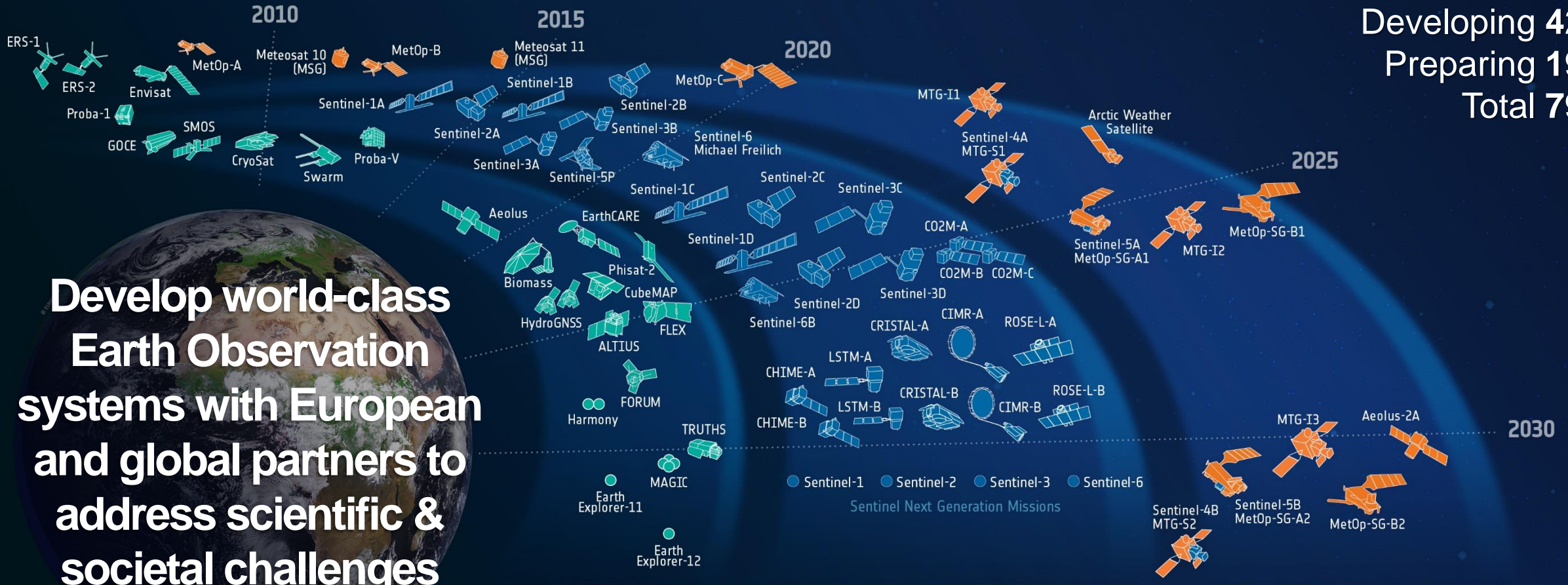
## Taking the Pulse of our Planet

# ESA's Earth Observation Mission



## Satellites

Heritage 04  
Operational 14  
Developing 42  
Preparing 19  
Total 79



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

Science



Copernicus



Meteorology



# Earth Explorers Putting together the puzzle Earth Since 2009



forum

ESA'S THERMAL RADIATION MISSION  
2026

flex

ESA'S PHOTOSYNTHESIS MISSION  
2025



Science & Innovation



1.200+ Active Users



400+ Publ. per Year

High Risks for Great Rewards

goce

ESA'S GRAVITY MISSION  
2009-2013

smos

ESA'S WATER MISSION  
2009-present

harmony

ESA'S EARTH SYSTEM MODELING MISSION



EE-11 candidates

NITROSAT, WIVERN, SEASTAR, CAIRT



cryosat

ESA'S ICE MISSION  
2010-present

swarm

ESA'S MAGNETIC FIELD MISSION  
2013-present

EE-12

CALL FOR MISSION IDEAS ON 20<sup>TH</sup> FEBRUARY 2023



biomass

ESA'S FOREST MISSION  
2024

earthcare

ESA'S CLOUD, AEROSOL & RADIATION MISSION  
2024

aeolus

ESA'S WIND MISSION  
2018-present



# The Copernicus Space Component – Sentinels



PROGRAMME OF THE  
EUROPEAN UNION



## Copernicus is the largest producer of EO data in the world

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

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

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

**> 650.000**

Registered Users

6 operational services



Land



Atmosphere



Ocean



Climate



Disaster



Security

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

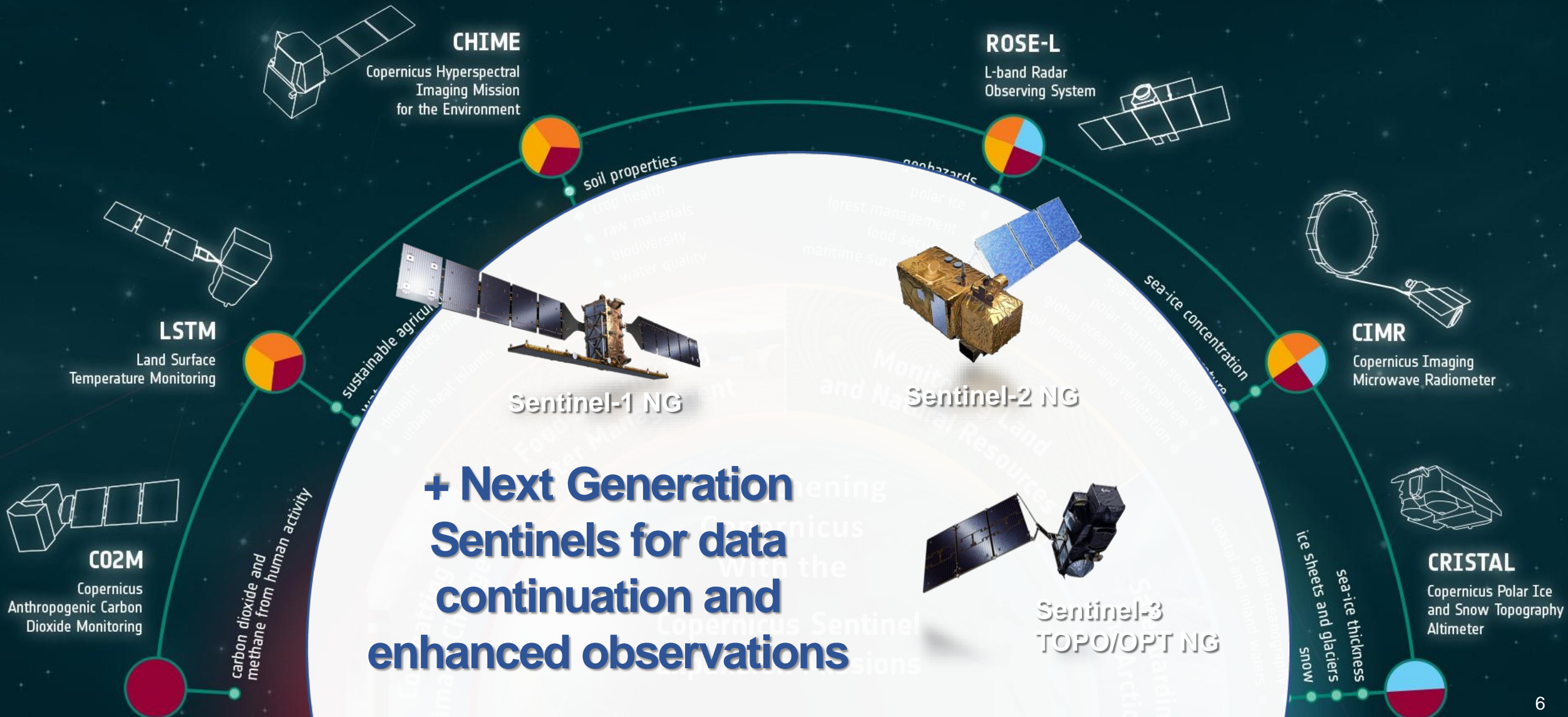
\* ESA Sentinel Data Policy (Sep 2013) and  
EU Delegated Act on Copernicus Data and Information Policy (Dec 2013)



# The Copernicus Space Component – Evolution

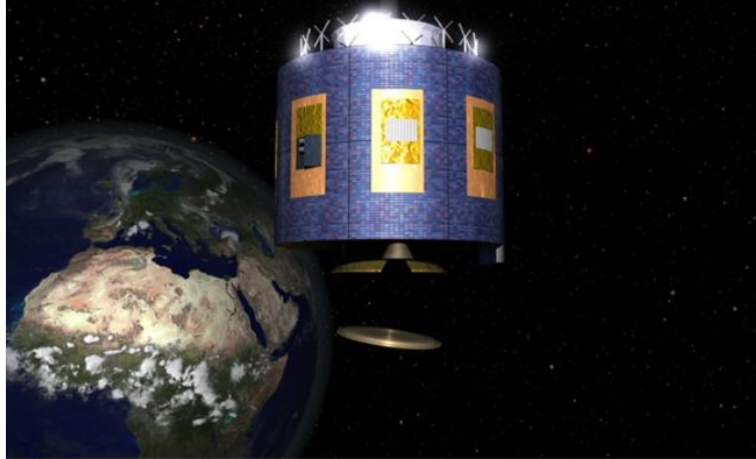


PROGRAMME OF THE  
EUROPEAN UNION



# Meteorological Missions

**Meteosat SG**



**MetOp**



< Current Systems

**Meteosat TG**



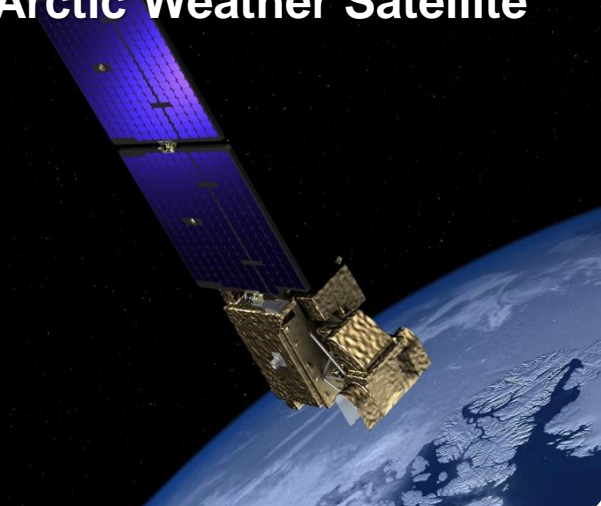
MTG-I1 2022

**MetOp SG**



2025

**Arctic Weather Satellite**



< Next Gen. Systems

## EO overall budget: 2.7B€

Guarantees continuity of current activities and programmes and allows the start of new projects

IT subscription to EO 491M Euro

## FutureEO

- HARMONY
- SCOUTS 3-4
- MAGIC/NGGM
- + Preparations of S-2 NG, S-3OPT NG, EE-11, EE-12, EE-13

Preparing tomorrow's Earth Observation capabilities

## TRUTHS

Not Subscribed by Belgium

Reference standard for climate measurements

## Incubed-2

### InCubed

Supporting industrial innovation

## Digital Twin Earth

Boosting insight into the earth system

## Climate Space

Strengthening climate monitoring & reporting

## Copernicus

- Sentinel-1 NG
- Sentinel-3 NG

Continuing & enhancing our eyes on Europe and the World

## Aeolus-2

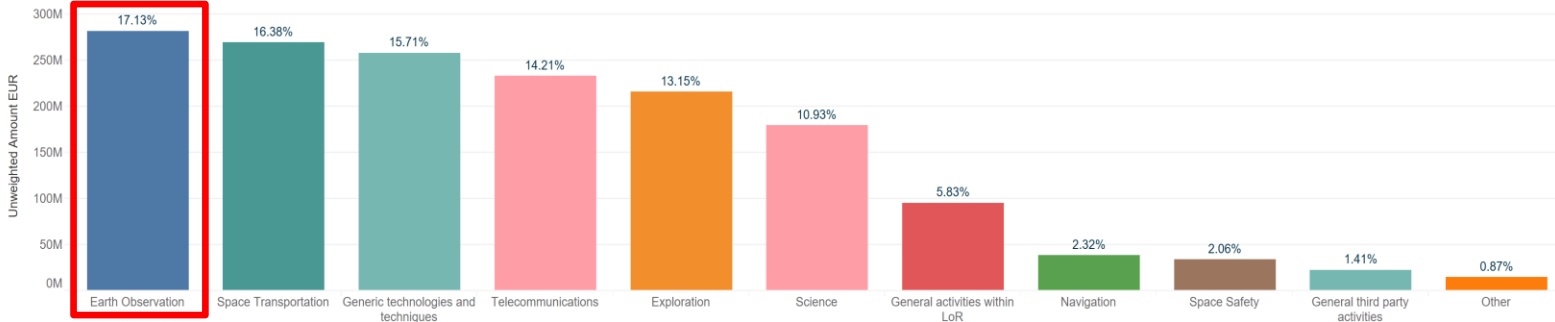
Improving weather predictions



# Belgium investments across ESA



## Application Domains - Belgium



Entry Date Range  
5/1/2015 - 23/12/2022

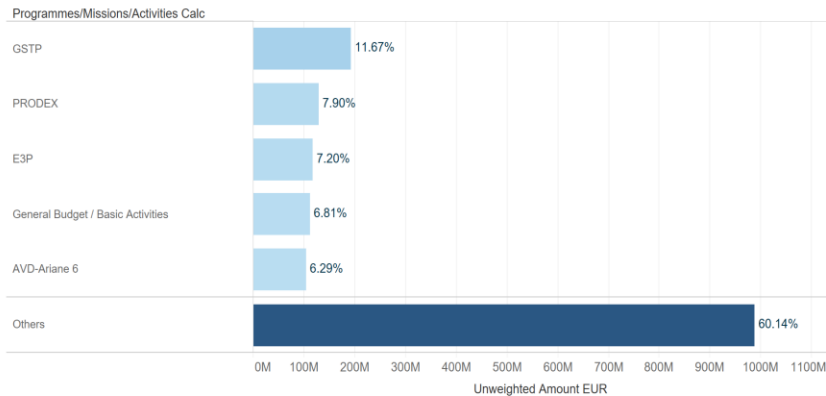
Earth Observation is one of the main priorities of BE in ESA!

Very healthy return in EO domain with a RC > 1.00 for the last seven years!

Current RC at 96% after adjustment to normalised scale, triggered by the generous subscriptions at CM22

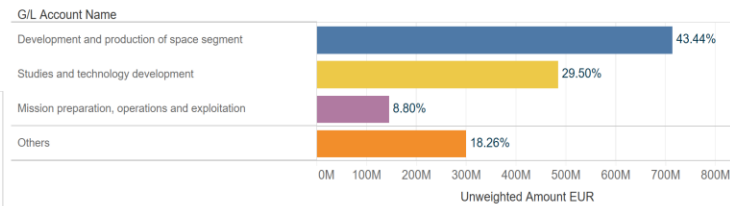
Top Programmes/Missions/Activities  
5

## Programme/Mission/Activity - Belgium | Application Domain: All



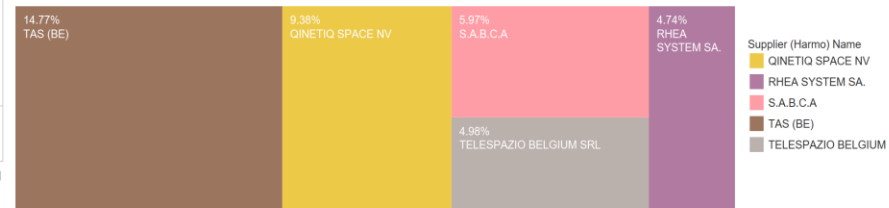
## G/L Account Distribution - Belgium | Application Domain: All

Top G/L Accounts  
3



## Top Suppliers - Belgium | Application Domain: All

Top Suppliers  
5



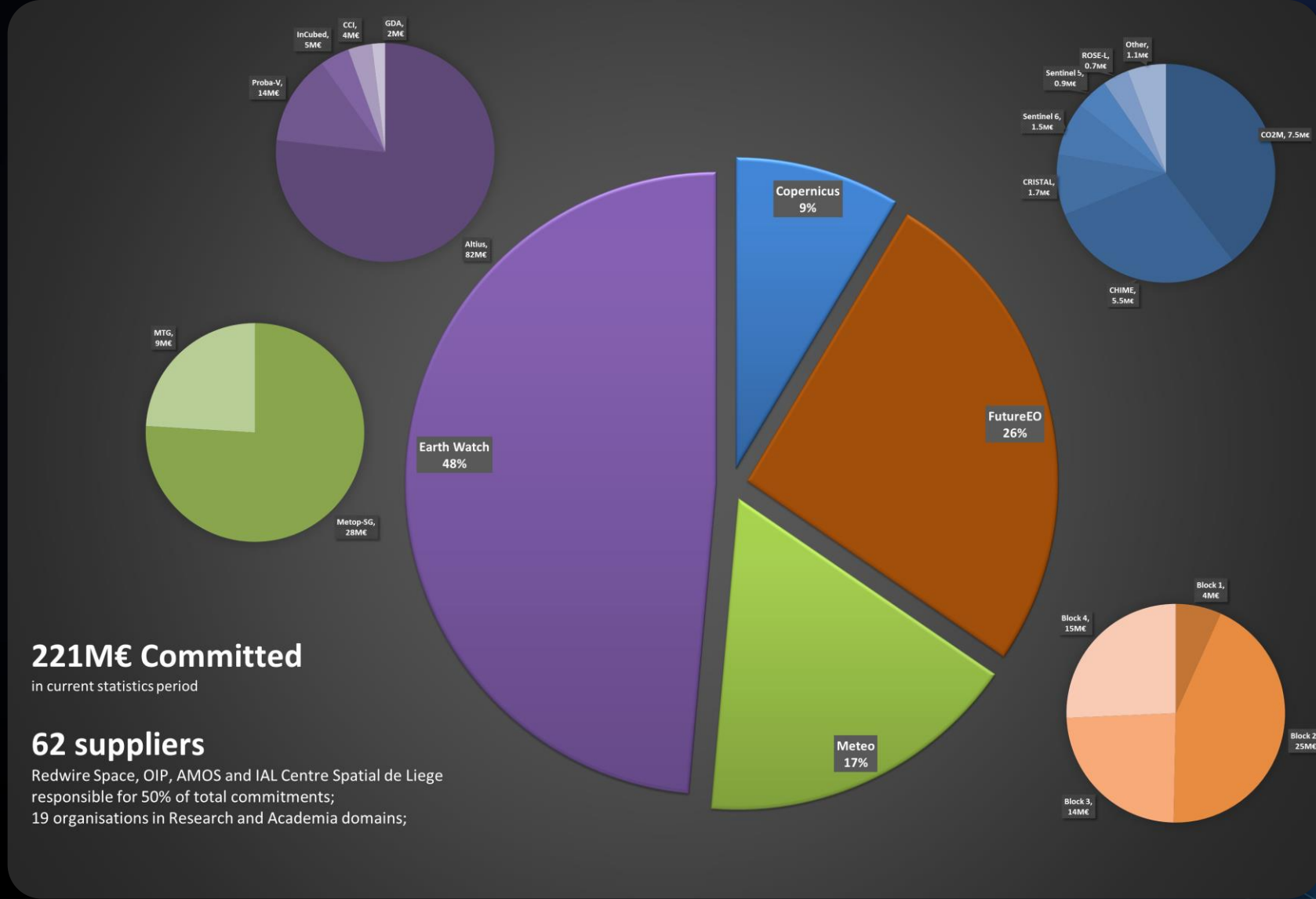
→ THE EUROPEAN SPACE AGENCY

Source: Observatory of Country Capabilities / CIP



→ THE EUROPEAN SPACE AGENCY

# Overview of BE industry from geo-return perspective



**221M€ Committed**

in current statistics period

**62 suppliers**

Redwire Space, OIP, AMOS and IAL Centre Spatial de Liege responsible for 50% of total commitments;  
19 organisations in Research and Academia domains;

**Altius programme is the main priority of BE in EO**

In Future-EO return anchored mainly in Blocks 2 (Flex, Biomass, EarthCARE), Block 3 and Block 4;

In Meteo domain, very good performance both in MTG and MetopSG programmes

In Copernicus, positive engagement with many of the new Sentinel Expansion Missions



## ESA as Enabler/Partner

## ESA as Anchor Customer

### InCubed

To develop innovative/novel & commercially viable products and services related to EO data

From building satellites to data platforms and all in between

Producing a minimum viable product, robust from a technical, commercial, programmatic and financial point of view



### Earthnet Third Party Missions



Data for R&D and science needs

### Copernicus Contributing Missions



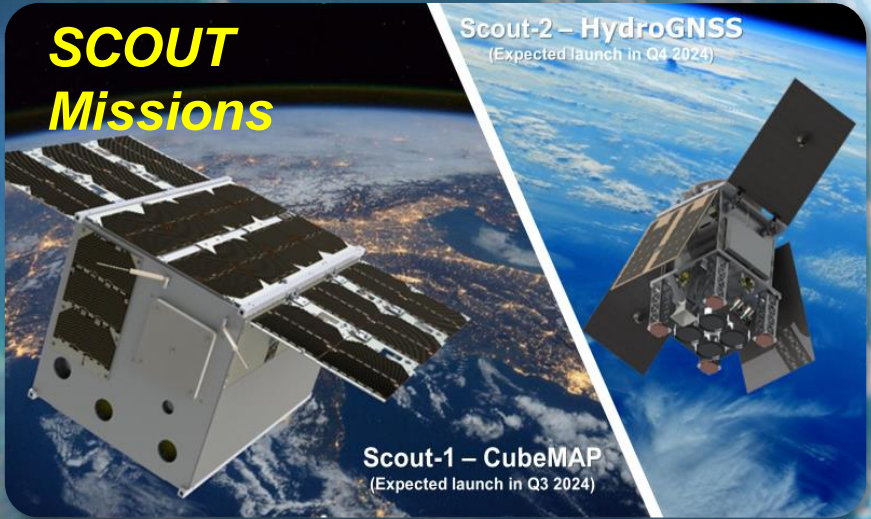
Data (and delivery services) for operational public needs



### φ-Sats

3Cat-5/A

3Cat-5/B



### SCOUT Missions

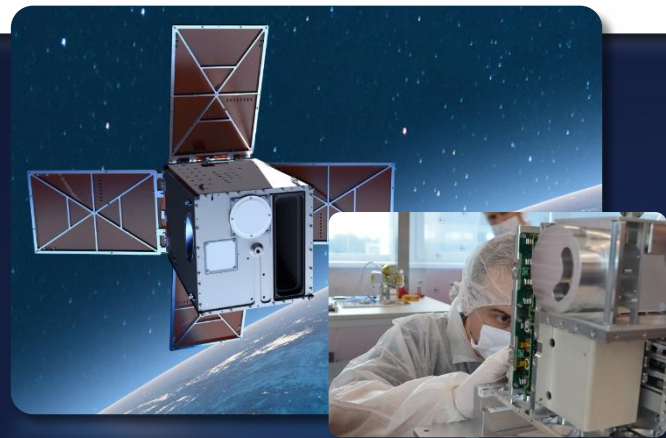
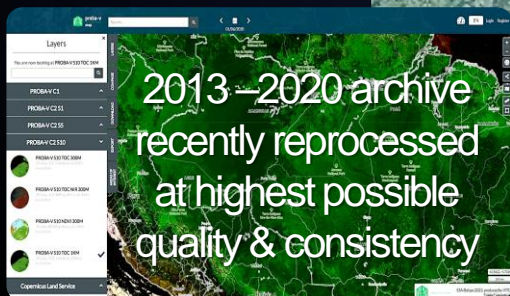
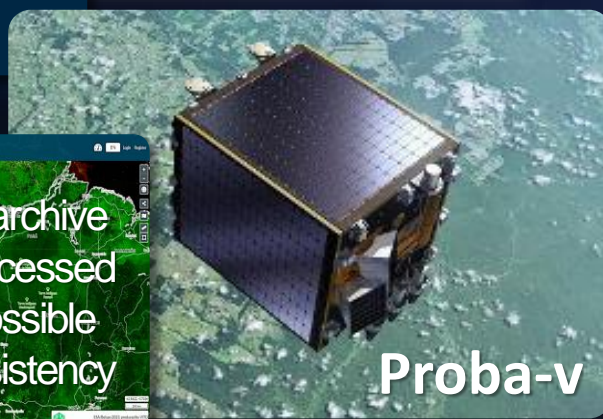
Scout-2 – HydroGNSS  
(Expected launch in Q4 2024)

Scout-1 – CubeMAP  
(Expected launch in Q3 2024)

## Developing Satellites



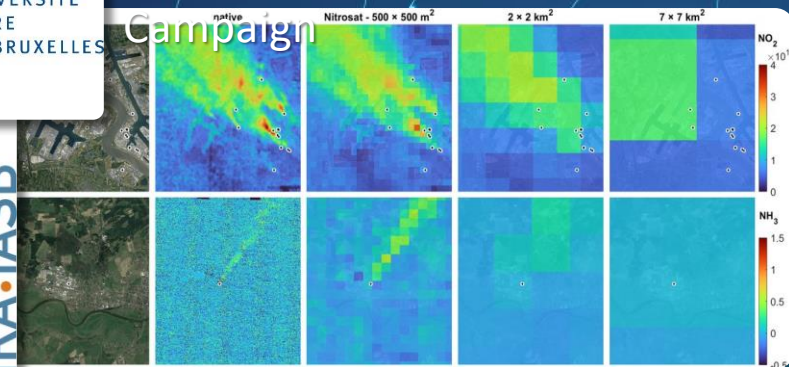
QINETIQ



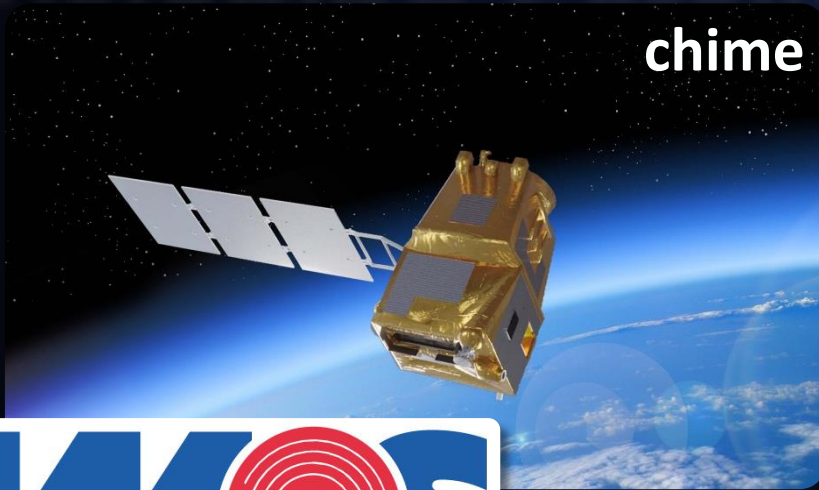
Proba-V Companion  
CubeSat  
&  
MultiSpectral  
Companion Mission



NitroCam, EE11 candidate  
Nitrosat Ph-0 Demonstrator



## Developing Satellites



## Applications

## CALVAL



EO Africa



Nat. Incubator



Nat. Explorer



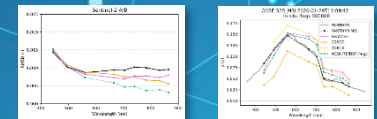
HYPERNETS

• INSTRUMENTS



• NETWORK

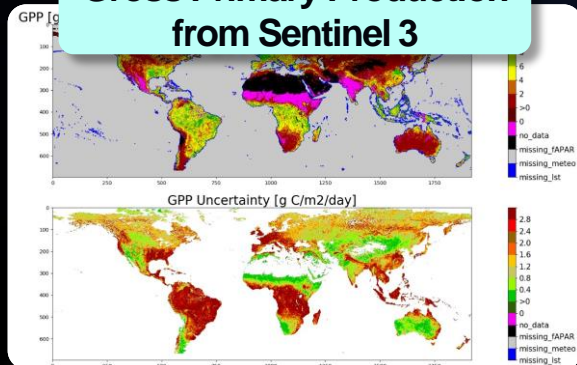
• DATA PROCESSING and ANALYSIS



ESA WorldCover 10m 2021



Gross Primary Production from Sentinel 3



World Cereal



AI4FOOD

CCI+ VEGETATION

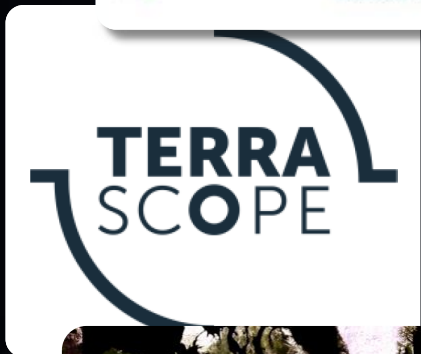
# Belgian-ESA Successes in EO – Examples 4/4



## Data Distribution & Services

## InCubed

## Φ-lab



One year of Vegetation data 01/09/2018



### MSCM

MultiSpectral Companion  
Mission prototype satellite and  
ground segment development



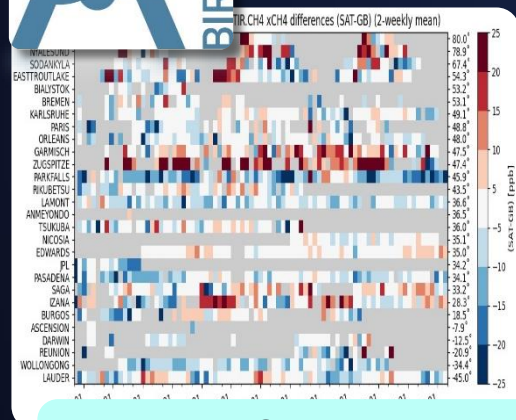
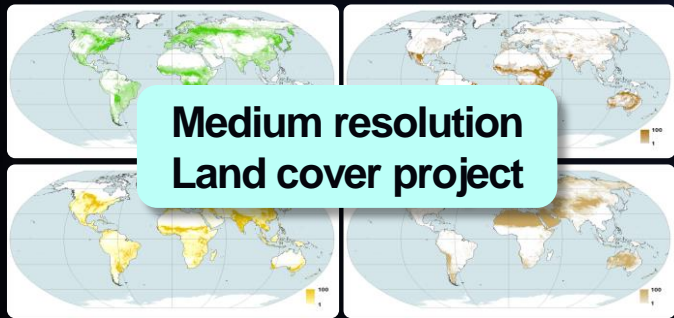
### AI4EO challenges



# Belgian-ESA Successes in CCI & New Belgian Climate Centre

## CCI

## New Belgian Climate Centre



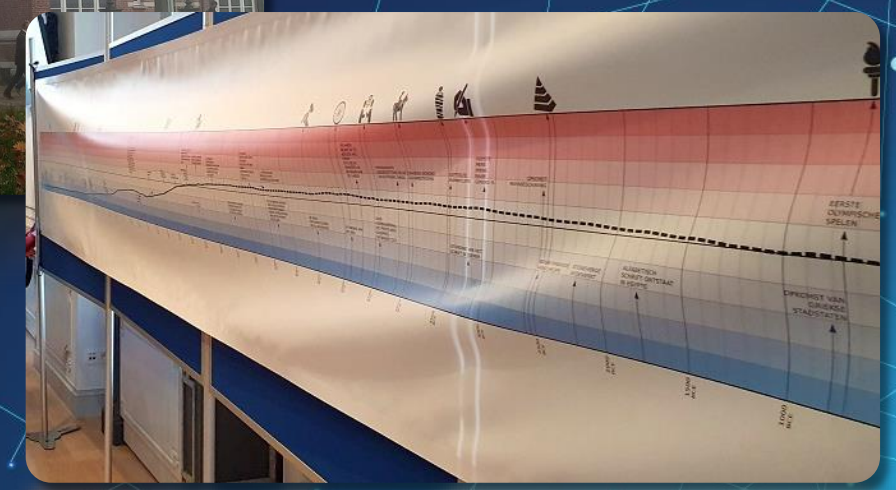
ULB UNIVERSITÉ LIBRE DE BRUXELLES

precursors CCI

PRECURSORS OF AERSOLS & OZONE



ESA Climate Office interested in close collaboration with the recently opened Belgian Climate Centre.





# EO Science Strategy Workshop

19 - 20 June 2023 | Bruges | Belgium



<https://atpi.eventsair.com/science-strategy-workshop-2023/>



# MAKE SPACE FOR EUROPE

[www.esa.int](http://www.esa.int)