Earth Observation and Copernicus for Climate Action

EO*GI: a crucial tool to monitor and tackle climate change

Eduard ESCALONA, Space Downstream Market Officer

26th October 2021

EUSPA
European Union Agency for the Space Programme

GSA

EUSPA

European Union Agency for the Space Programme

A new EU Agency for the Space Programme

The user-oriented operational Agency of the EU Space Programme, contributing to **sustainable growth, security and safety** of the EU

With the new regulation, **space data is at the heart of a technological revolution**

EUSPA linking space to user needs

EU space activities **under one umbrella**:

Copernicus

Earth Observation (EO) and monitoring based on satellite and non-space data

Nr.1 world provider of space data and information (>20TB/day)

Galileo

Global satellite navigation and positioning system (GNSS)

10% of the EU GDP enabled by satellite navigation

EGNOS

Makes navigation signals more accurate and reliable

Operational in **360+ airports & helipads in 23 countries**

GovSatCom

Secures satellite communications for EU governmental actors

Delivering rapid support over crisis areas

Others

…under negotiation

EUSPA – key tasks

Exploitation Manager

- Management, operation, maintenance, improvement, evolution, and protection of infrastructure
- Continuous provision of services

Gatekeeper of security

- Security accreditation of all programme components
- Operational security of Galileo and EGNOS
- Operation of the Galileo Security Monitoring Centre

Market and innovation

- User and market uptake
- Applications
- Innovation
- Promotion

Support to business, recovery and innovation leveraging EU Space services

EARTH OBSERVATION

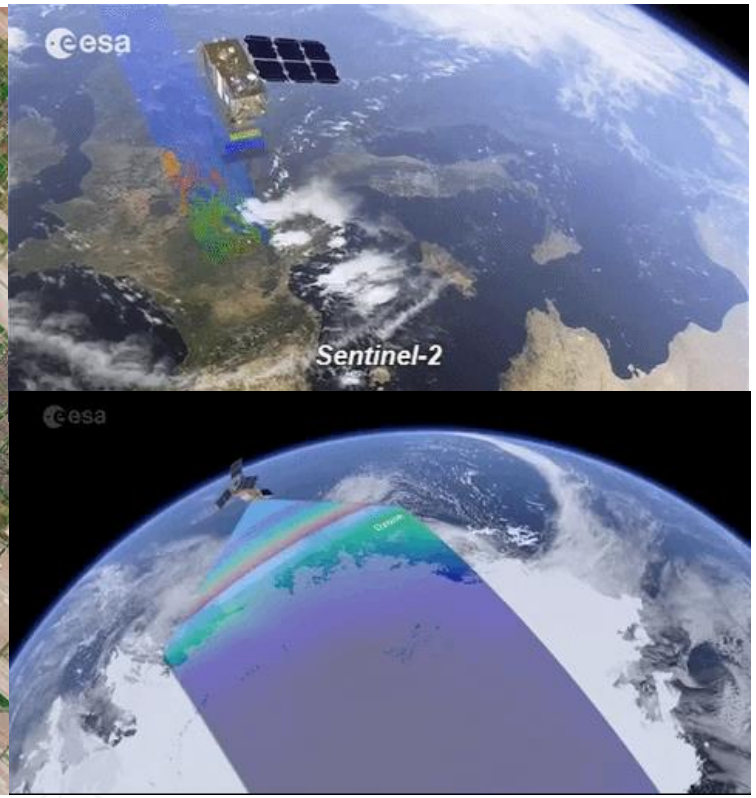
What is Remote Sensing?

Credit photo: Sandra Lorenz

Remote Sensing

Detecting and monitoring the physical characteristics of an area or an object at a distance

What is Earth Observation?



Earth Observation

Gathering of information about planet Earth's physical, chemical and biological systems via remote sensing technologies

What is Earth Observation?

PASSIVE

Mono/Panchromatic
Multispectral
Hyperspectral
Passive microwave
Gravity

ACTIVE

Radar (X, C, L)
LIDAR

Earth Observation: Resolution

Temporal
Frequency of acquisitions for a particular area

Spatial
Smallest sensed area (pixel size)

Spectral
Number of and size of bands

Radiometric
Sensitivity of a sensor to detect slight differences in energy

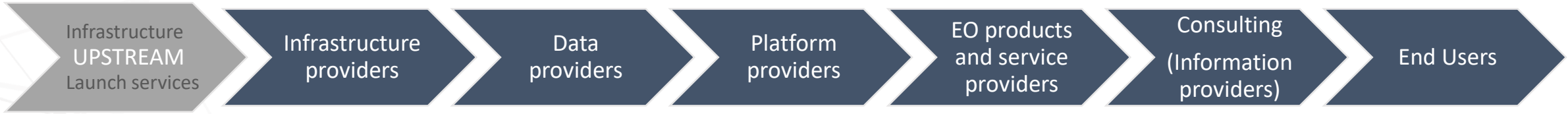
EO is pivotal data source for business and organisational intelligence

Examples

… supporting the **green digital transformation** and **accelerating innovation**

Huge opportunities in EO downstream market

DOWNSTREAM EO VALUE CHAIN



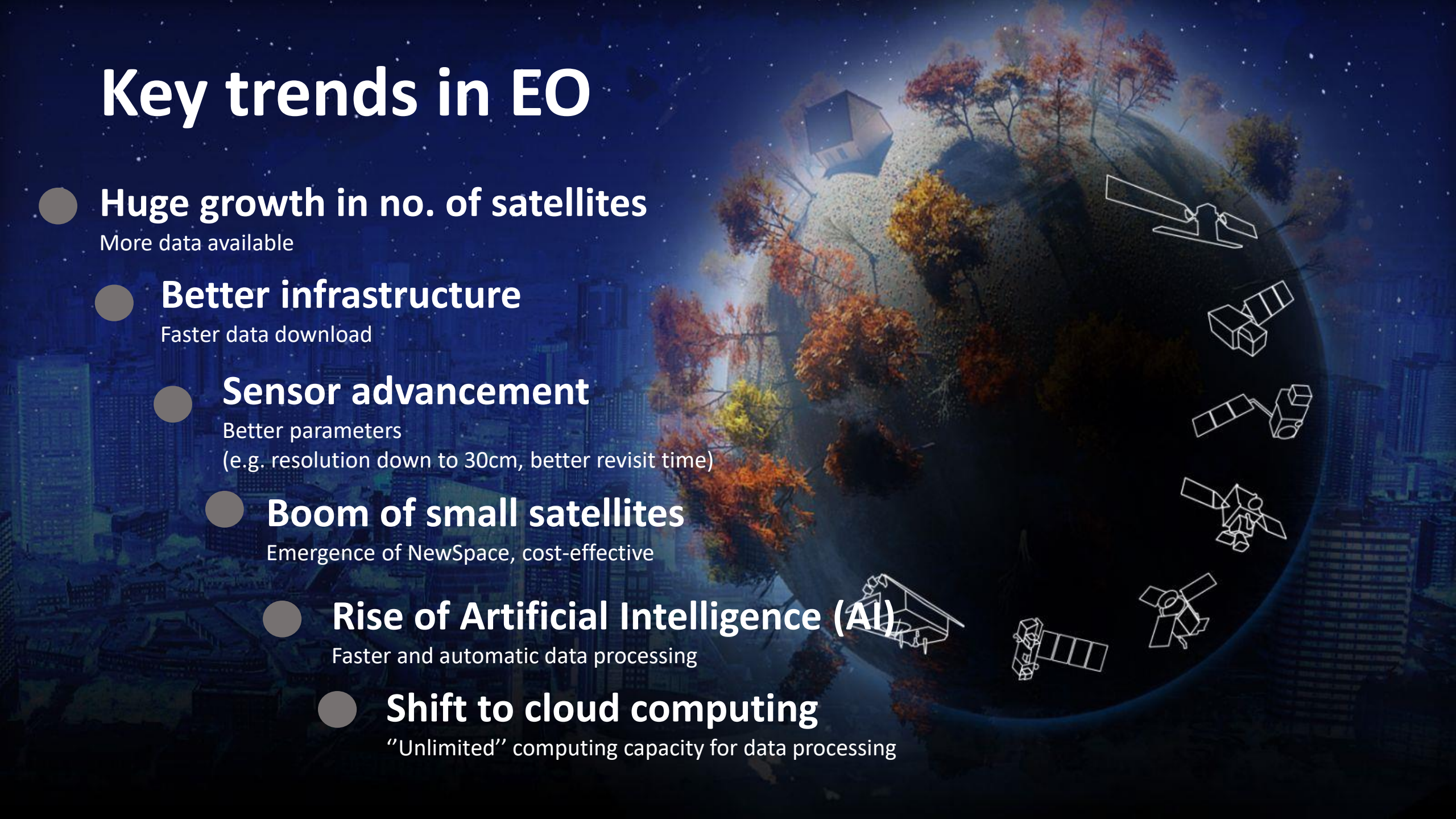
€2.6bn to €2.8bn

global revenues of the EO downstream industry in 2017**

*Source: PwC: Main trends and challenges in the space sector June 2019

Key trends in EO

- **Huge growth in no. of satellites**
  More data available
- **Better infrastructure**
  Faster data download
- **Sensor advancement**
  Better parameters
  (e.g. resolution down to 30cm, better revisit time)
- **Boom of small satellites**
  Emergence of NewSpace, cost-effective
- **Rise of Artificial Intelligence (AI)**
  Faster and automatic data processing
- **Shift to cloud computing**
  ''Unlimited'' computing capacity for data processing

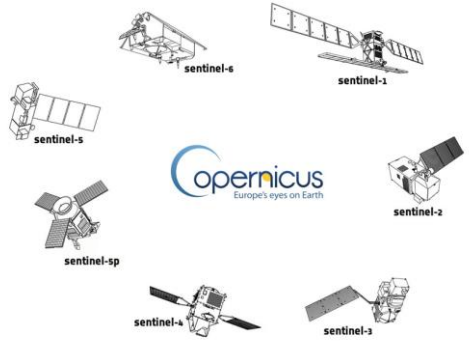


COPERNICUS

Copernicus delivers unique data and information

European Union's Earth observation programme, looking at our planet and its environment to benefit all European citizens

Copernicus provides **free** and **openly** accessible data to all users around the world



SPACE

In Situ

IN SITU

Atmosphere Monitoring
Copernicus Marine Service
Land Monitoring
Climate Change
Security
Emergency Management

SERVICES

Copernicus delivers unique data and information

European Union's Earth observation programme, looking at our planet and its environment to benefit all European citizens

Copernicus provides **free** and **openly** accessible data to all users around the world

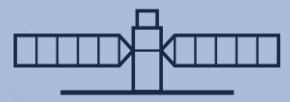
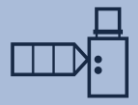
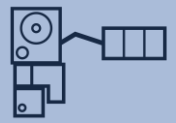
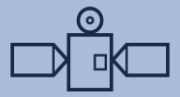
Nr.1 world provider of space data and information

20TB/day

Space Component: The Sentinel Fleet

Mission	*Key Features*	*Characteristics*	*In Orbit*
SENTINEL-1A AND -1B	Sun-synchronous orbit, all-weather, day-and-night radar imaging	5-40m resolution, 6 days revisit time	✓
SENTINEL-2A AND -2B	Sun-synchronous orbit, multispectral optical, high-res imaging	10-60m resolution, 5 days revisit time	✓
SENTINEL-3A AND -3B	Optical and altimeter mission monitoring sea and land parameters	300-1200m resolution, <2 days revisit	✓
SENTINEL-4	Payload for atmosphere chemistry monitoring on MTG-S	8km resolution, 60 min revisit time	
SENTINEL-5P	Tropomi, Mission to reduce data gaps between Envisat, and S-5	7-68km resolution, 1 day revisit	✓
SENTINEL-5	Payload for atmosphere chemistry monitoring on MetOp 2ndGen	7.5-50km resolution, 1 day revisit	
SENTINEL-6	Radar altimeter to measure sea-surface height globally	10 days revisit time	✓

Space Component: The Sentinel Fleet


SENTINEL-1

All-weather, day and night observations to support services for sea-ice monitoring, marine environment surveillance, ship detection, land-surface motion risks, mapping of forest, water and soils, humanitarian aid and crisis management

SENTINEL-2

Agriculture/vegetation monitoring, soil and water cover, forest management, border and maritime surveillance, emergency management: floods, fires

SENTINEL-3

Ocean forecast, climate change and operational oceanography: sea surface height, ocean color, oceanic carbon fluxes, monitoring river or lakes level

SENTINEL-4

Continuous monitoring of atmospheric composition focused on air quality over Europe, with main products Ozone (O3), Nitrogen Dioxide (NO2), Sulphur Dioxide (SO2), Formaldehyde (HCHO) and aerosol properties

SENTINEL-5

(Precursor of Sentinel-5) daily global monitoring of the main atmospheric pollutants (CH4 and O2 NO2 CO2 HCHO, SO2) and two major greenhouse gases (CH4 and tropospheric O3)

SENTINEL-5P

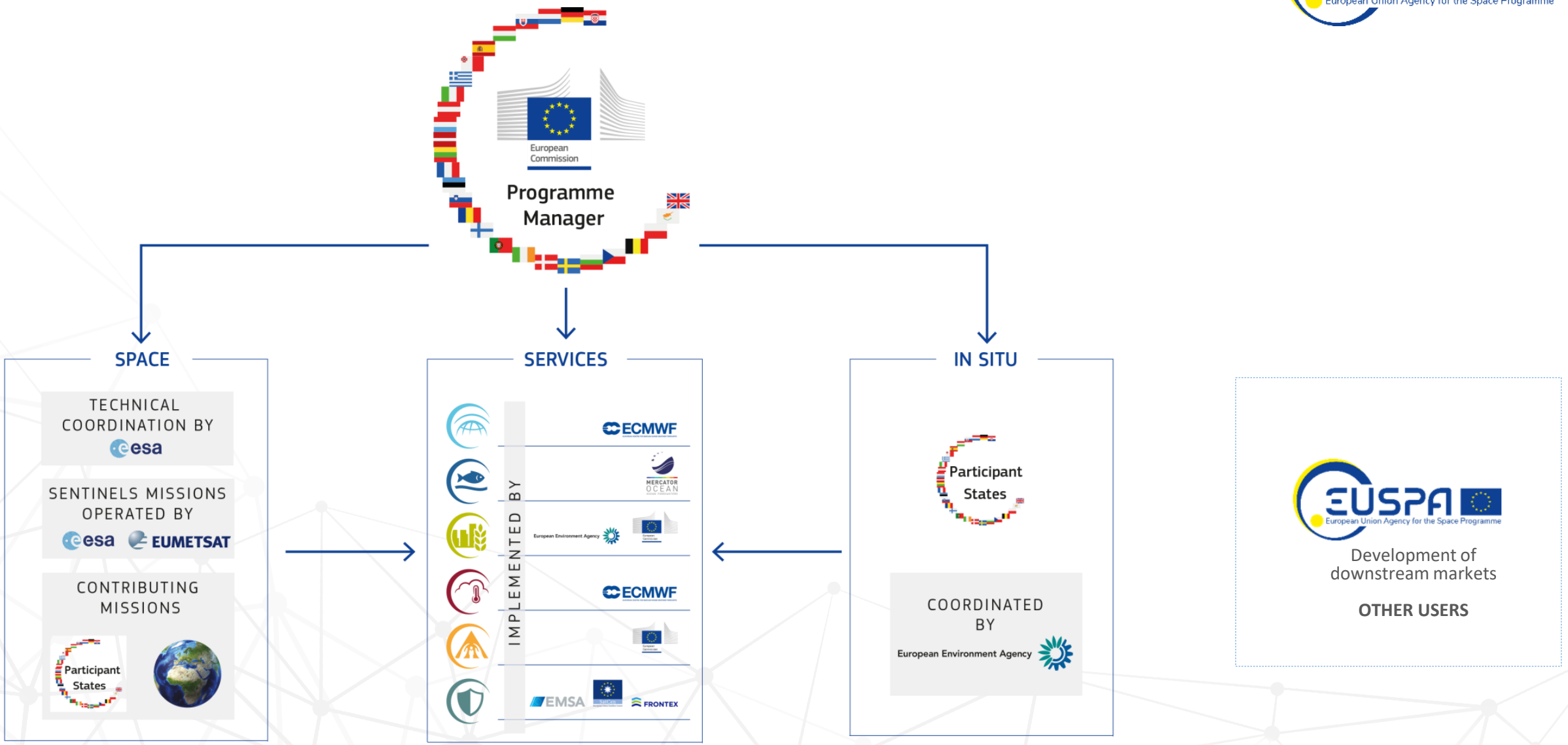
Daily global monitoring for climate, air quality and ozone/surface UV applications, with key parameters O3, NO2, SO2, HCHO, CHOCHO, Aerosols, CH4 and stratospheric Ozone

SENTINEL-6

Ocean forecast, climate change and real time ocean topography: wave height, ocean surface, wind speed

https://sentinels.copernicus.eu/web/sentinel/user-guides/

Governance


European Commission
Programme Manager
SPACE
TECHNICAL COORDINATION BY
esa
SENTINELS MISSIONS OPERATED BY
esa
EUMETSAT
CONTRIBUTING MISSIONS
Participant States
SERVICES
IMPLEMENTED BY
ECMWF
MERCATOR OCEAN
European Environment Agency
ECMWF
EMSA
FRONTEX
IN SITU
Participant States
COORDINATED BY
European Environment Agency
EUSPA
European Union Agency for the Space Programme
Development of downstream markets
OTHER USERS

EO FOR CLIMATE ACTION

EO can monitor

- Deforestation
- Rising sea levels
- Greenhouse gas emissions in the atmosphere
- Snow ice and coverage
- Temperature and humidity
- Floods / Fires
- Climate (incl. forecasting)

EO supports climate change adaptation and mitigation

- Manage climate change related disasters
- Monitor environmental impact for large industries
- Understand the earth's system and evolution
- Prepare strategies for climate change adaptation
- Understanding extreme hydrometeorological events

- Agriculture is **responsible for 25% of greenhouse gas emissions**
- **Affected by**: Scarce land, water and energy resources
- World population to increase

To increase global food production while **ensuring a preserved environment**, agriculture will need to improve its productivity by using **innovative technologies, such as EO-data solutions**

EO applications in agriculture

*Source: The World Bank, The Food and Agriculture Organization of the United Nations

La Palma - Spain. Sentinel-2, 16 October 2021.

Examples

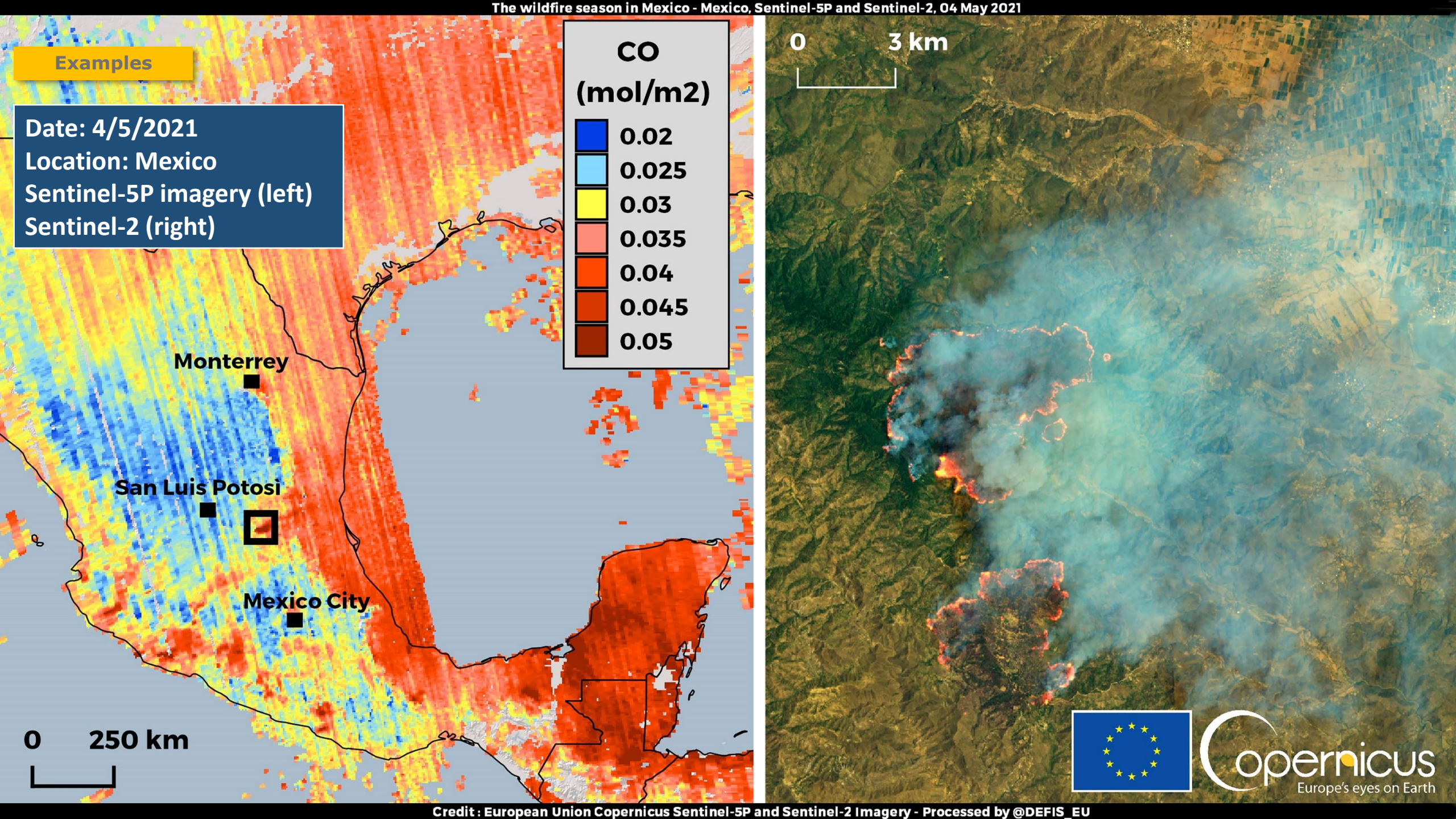
Date: 15/10/2021
Location: La Palma, Spain
Sentinel-2

Copernicus
Europe's eyes on Earth

Examples

Date: 5/4/2021
Location: Baucau
Sentinel-2

The wildfire season in Mexico - Mexico, Sentinel-5P and Sentinel-2, 04 May 2021



Credit : European Union Copernicus Sentinel-5P and Sentinel-2 Imagery - Processed by @DEFIS_EU

New EUSPA **EU Space Market Report** with **focus on GNSS and EO**

January 2022

EUSPA EO Funding Opportunities

Horizon Europe

Igniting innovative space downstream applications

Fundamental Elements

Supports the development of EGNSS-enabled chipsets, receivers and antennas

START-UP SUPPORT CASSINI EU SPACE

Support innovative entrepreneurs, start-ups and SMEs in the space industry


2nd CASSINI HACKATHON
5-7 NOVEMBER 2021
Connecting the Arctic
CASSINI
Hackathons & Mentoring

myEUspace COMPETITION

part of the CASSINI initiative

+ 50+ awards

+ €1.000.000 prize pool

LIVE NOW

EUSPA

SPACE DOWNSTREAM INNOVATION DAYS

- 8 - 9 NOVEMBER 2021
- PRAGUE - ONLINE

EUSPA

Linking space to user needs

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