European Commission

Copernicus

General Overview

Copernicus
Europe's eyes on Earth

Space

Copernicus EU
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www.copernicus.eu

COPERNICUS IN BRIEF

- **Copernicus is a flagship programme** of the European Union:
  - Monitors **the Earth,** its environment and ecosystems
  - Prepares for **crises, security risks** and **natural or man-made disasters**
  - Contributes to the **EU's role as a global soft power**
- a **full, free and open data policy**
- Is a tool for **economic development** and a driver for the **digital economy**

COPERNICUS HISTORY

GIO = GMES Initial Operation

COPERNICUS FUNDING

From research to operations

COPERNICUS GOVERNANCE

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COPERNICUS IS DRIVEN BY THE USERS

THE SENTINELS

			Key Features
	SENTINEL-1: 4-40m resolution, 3 day revisit at equator	***S1A and 1B in orbit***	Polar-orbiting, all-weather, day-and-night radar imaging
	SENTINEL-2: 10-60m resolution, 5 days revisit time	***S2A and 2B in orbit***	Polar-orbiting, multispectral optical, high-resolution imaging
	SENTINEL-3: 300-1200m resolution, <2 days revisit	***S3A in orbit*** *S3B Spring 2018*	Optical and altimeter mission monitoring sea and land parameters
	SENTINEL-4: 8km resolution, 60 min revisit time	*1st Launch 2020*	Payload for atmosphere chemistry monitoring on MTG-S
	SENTINEL-5p: 7-68km resolution, 1 day revisit	***S5P launched 13/10/2017***	Mission to reduce data gaps between Envisat, and Sentinel 5
	SENTINEL-5: 7.5-50km resolution, 1 day revisit	*1st Launch 2021*	Payload for atmosphere chemistry monitoring on MetOp 2ndGen
	SENTINEL-6: 10 day revisit time	*1st Launch 2020*	Radar altimeter to measure sea-surface height globally

HIGH PRIORITY CANDIDATE MISSIONS

Studies phase A/B1 HPCMs

- **High Spatio-Temporal Resolution Land Surface Temperature Monitoring Mission**
- **Hyperspectral Imaging Mission for Environment**
- **Anthropogenic CO2 Monitoring Mission**
- **Imaging Microwave Radiometer Mission**
- **Polar Ice and Snow Topography Mission L-Band SAR Mission**
- **L-Band SAR Mission**

THE CONTRIBUTING MISSIONS

Space Component

Subject to Data Owner's Data Policy

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IN-SITU: OVERVIEW

- *In situ* data = observation data from ground-, sea-, or air-borne sensors, reference and ancillary data licensed for use in Copernicus
- Use of *In situ* data:
  - Validate & calibrate Copernicus products
  - Reliable information services
- Implementation in two tiers:
  - Tailored *in situ* data for each Copernicus service level
  - Cross-cutting coordination across services by the EEA

COPERNICUS SERVICES

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Monitoring the State of the Earth System Environment …

… Six cross-cutting Thematic Services

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SERVICES IMPLEMENTATION SCHEDULE

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Benefit areas and products examples

Land Monitoring

- Ecosystems
- Biodiversity
- Agriculture
- Forestry
- Energy
- Natural Resources
- Water
- Urban planning

Global

Pan-European

Image Mosaics

EU Land Cover

CORINE Land Cover

Specific land cover info

High Resolution Layers

Hydrographic and elevation reference maps

Reference Data

% of built-up area

Related Pan-European products

Local

Urban Atlas

Riparian Zones

Natura 2000 (N2K)

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Marine Monitoring

Benefit areas and products examples

Marine safety

Marine resources

Coastal and marine environment

Climate and meteorological forecasting

Other: Transport, Tourism, Environment, Pollution, Energy, etc.

Sea Level

Ocean Salinity

Ocean Temperature

Sea Ice

Wind

Ocean Currents

Ocean Colour / Biogeochemistry
(e.g. optics, chlorophyil, biology, chemistry)

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Atmosphere Monitoring

Benefit areas and products examples

Health

Environment

Pollution

Climate

Renewable Energy

Air Quality and Atmospheric Composition

Climate forcing

Ozone layer & UV

Solar radiation

Emissions and surface fluxes

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Climate Change

Benefit areas and products examples

- Climate change
- Mitigation and adaptation
- Weather forecast
- Pollution
- Environment
- Health

Consistent Estimates of the Essential Climate Variables (ECVs)

Support to Mitigation and Adaptation Strategies

Global and Regional Reanalyses

Seasonal Forecasts And Climate Projections

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Benefit areas and products examples

Emergency Management

Disaster Emergency Situations

Humanitarian Crises

Risk & Recovery Mapping:
- Reference Maps
- Pre-disaster Situation Maps
- Post-disaster Situation Maps

Rapid Mapping:
- Reference Maps
- Delineation Maps
- Grading Maps

Early Warning:
- Floods: EFAS
- Forest Fires: EFFIS

EFAS = European Flood Awareness System;
EFFIS=European Forest Fire Information System

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Security

Benefit areas and products examples

Border Surveillance

- Coastal monitoring
- Pre-frontier monitoring
- Reference mapping

Maritime Surveillance

- Maritime surveillance of an area of interest
- Vessel detection
- Vessel tracking and reporting
- Vessel anomaly detection

Support to EU External Action

- Road network status assessment
- Conflict damage assessment
- Critical infrastructure analysis
- Reference map
- Support to evacuation plans
- Crisis situation map
- Border map
- Camp analysis

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COPERNICUS SERVICES EXAMPLES

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Emergency Management Service - Mapping

cus | EMS - Mapping | EMS - Early Warning System News

[EMSN057] Ground subsidence analyses, Mekong Delta, Vietnam

EMSR267: Flood in Silute, Lithuania

Event Time (UTC): 2018-01-31 01:00
Event Time (LOC): 2018-01-31 01:00
Event Type: Flood (Riverine flood)
Activation Time (UTC): 2018-02-01 15:42
Reference maps produced: 0
Delineation maps produced: 1
Grading maps produced: 0
Activation Status: Closed
Affected Countries/Territories:
Republic of Lithuania
Authorized User:
Lithuania|Ministry of Interior - Fire and Rescue Department
Activation Reason:
Bad weather conditions are affecting Silute municipality, in Lithuania. The emergency situation was declared on 31/01/2018 after the firsts flooded areas around Rusne that affected 6 villages. Due to the declared emergency, the Fire and Rescue Department under the Ministry of Interior of the Republic of Lithuania activated the Copernicus EMS Rapid Mapping Service.
Relevant news:
- Copernicus Emergency Management Service Monitors the Impact of Flooding in Silute, Lithuania

Tweet Coverage map: GeoRSS:

EMSR267 - Activation Extent Map
Release: r02 - Version: v1 - Delivered: 2018-02-03 17:11
View as: EMSR267-AEM-JPG - EMSR267-AEM-KMZ - EMSR267-AEM

Filter by map type: · ALL · DELINEATION

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EXAMPLE OF COPERNICUS BENEFITS

Pipeline Infrastructure Monitoring in the Netherlands

Benefits for the Netherlands: €15 to €18 M/year

Forest Management in Sweden

Benefits for Sweden: €16 to €22 M/year

Winter Navigation in the Baltic

Benefits for Sweden and Finland: €24 to €106 M/year

Source: EARSC

Copernicus Data Access Overview

- Satellite Data distribution Hubs
  - Sentinels
  - Contributing missions
  - Access to images in NRT
  - Access to archives

- Services Information portals for
  - Added value products, indicators
  - Models
  - Archives, Near Real Time and Forecasts products

Note: *Copernicus in situ component provides in situ data access, serving the Copernicus services. It is not delivering in-situ data to the end-users.*

COPERNICUS USER UPTAKE STRATEGY

User Uptake

THE BIG DATA CHALLENGE

- **Massive amounts of data**
- **Full, open and free-of-charge**

Over 10 Petabyte/year of new data
with just Sentinels-1, -2 and -3 fully operational (data are downloaded **many time over)**

- Different types of **dissemination** infrastructures
- **New technology** developments
- ICT and EO **cross-fertilisation**
- **Interoperability** with non-EO datasets
- Global EO **competition**
- Growth and jobs in **downstream** sector

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COPERNICUS BIG DATA APPROACH

Dual approach:

- Strong Copernicus Distribution Services for download
- Availability of several **Data Access and Information Services (DIAS)**
  - **Access to all Copernicus data and information collocated with computing resources**
  - **Big Data analytics without the need to download the data and information**
  - **Data fusion with non-EO data and information**

Overall **ensuring that Copernicus data is easily accessible and used!**

User Uptake

COPERNICUS BIG DATA APPROACH: the DIAS

CREODIAS

WWW.CREODIAS.EU

mundi WEB SERVICES

WWW.MUNDIWEBSERVICES.COM

ONDA

WWW.ONDA-DIAS.EU

sobloo

WWW.SOBLOO.EU

WEKEO by COPERNICUS

WWW.WEKEO.EU

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COPERNICUS USER UPTAKE STRATEGY

Basis
=
Full, free and open data policy

Objective: maximizing the socio-economic benefits of Copernicus

Challenge: geospatial data (including Copernicus) are difficult to use by non-experts

Strategy: support the emerging downstream ecosystem, which use Copernicus data and services to create products for non-experts

User Uptake

COPERNICUS USER UPTAKE INITIATIVES

RUS: A NEW EXPERT SERVICE FOR SENTINEL USERS

- **RUS: Research and User Support for Sentinel Core Products**

- **Goal:** Foster the use of Sentinel Core products by providing several types of support to the Sentinel data users for free.

- **Project funded by EC and managed by ESA**.

User Uptake

RUS: A NEW EXPERT SERVICE FOR SENTINEL USERS

https://rus-copernicus.eu/portal/

RUS Copernicus

Non Commercial activities

Students, Trainers
Researchers
Decision-makers
R&D development

Free access

Powerful computing environment with scalable VMs & full support

Scientific Support

Support from experts in geospatial data processing

Process

Process large Sentinel datasets possible for any user

Training

Face-to-face sessions & webinars for all users

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THE COPERNICUS NETWORKS

Copernicus Relays

- 80 Relays
- 33 countries
- 4 continents

Copernicus Academy

- 135 Academy members
  - 41 countries
  - 3 continents

User Uptake

THE COPERNICUS SUPPORT OFFICE

Copernicus Support Office

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CopernicusEU

Copernicus Support Office

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