



Access to Sentinel Data Research & User Support Service



Space



Copernicus EU



Copernicus EU



Copernicus EU



www.copernicus.eu



Copernicus

COPERNICUS – A NEW PHASE IN EO

- **European Earth Observation System, led by the EU**
- **European response to global needs:**
 - to manage the environment
 - to mitigate the effects of climate change
 - to ensure civil security
- **European independence, contribution to global system (GEOSS)**





Space

Component

COPERNICUS – DEDICATED MISSIONS



Sentinel 1 (A/B/C/D) **SAR Imaging**

All weather, day/night applications,
interferometry



Sentinel 2 (A/B/C/D) **Multispectral Imaging**

Land applications: urban, forest, agriculture, ...
Continuity of Landsat, SPOT



Sentinel 3 (A/B/C/D) **Ocean & Global Land Monitoring**

Wide-swath ocean colour, vegetation, sea/land
surface temperature, altimetry



Sentinel 4 (A/B) **Geostationary Atmospheric**

Atmospheric composition monitoring, pollution;
instrument on MTG satellites



Sentinel 5 (A/B/C) & Precursor **Low-Orbit Atmospheric**

Atmospheric composition monitoring;
instrument on MetOp-SG satellites



Sentinel 6 **Jason CS (A/B)**

Altimetry reference mission





Space
Component

COPERNICUS – DEDICATED MISSIONS

S-1



Radar

A



3 Apr. 2014

B



25 Apr. 2016

C

2022/23

D

> 2022/23

S-2



High
Resolution
Optical

A



23 Jun. 2015

B



7 Mar. 2017

C

2022/23

D

> 2022/23

S-3



Medium
Resolution
Optical &
Altimetry

A



16 Feb. 2016

B

25 Apr. 2018

C

2023

D

> 2023

S-4



Atmospheric
Chemistry
(GEO)

A

2021

B

2027

S-5P



Atmospheric
Chemistry
(LEO)

A



13 Oct. 2017

S-5



Atmospheric
Chemistry
(LEO)

A

2021

B

2027

C

> 2027

S-6



Altimetry

A

Nov. 2020

B

2025

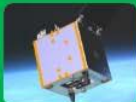


Space
Component

COPERNICUS – CONTRIBUTING MISSIONS

Optical High & Very High Resolution

DMC



Pléiades



RapidEye



Deimos-2 SPOT (HRS)



Synthetic Aperture Radar

Cosmo
SkyMed



Radarsat



TerraSAR-X
Tandem-X



Optical Medium & Low Resolution

SPOT



PROBA-V



Altimetry

Cryosat



Jason



Atmosphere

MetOp



MSG



and many
more ...



Data
Access

CONTENT

1. The Challenge
2. Data Access Strategy
3. Data access: Human – to – Server
4. Data access: Application – to – Server
5. Mirroring Data Resources
6. Resource List
7. Research & User Support (RUS) service
8. Q&A



Data
Access

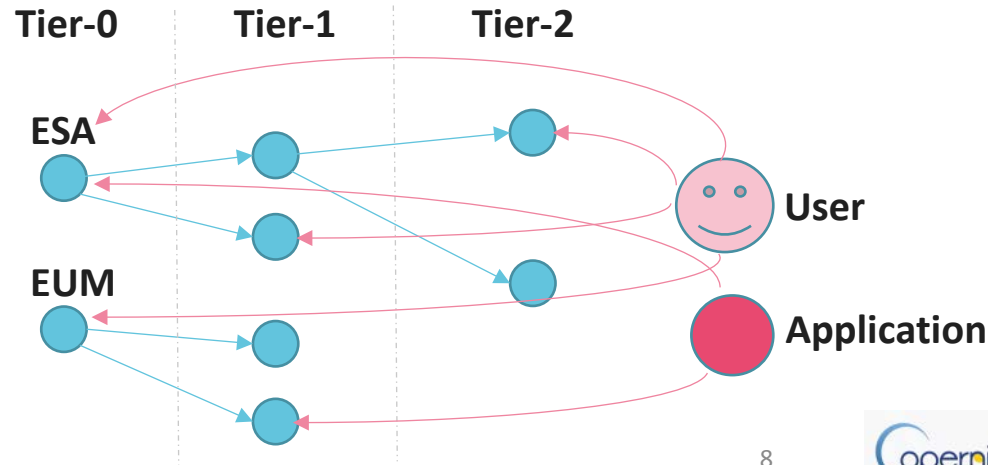
THE CHALLENGE

- **6 Sentinel satellites** in operation: S-1 (A&B), S-2 (A&B), S-3A, S-5P
- Almost **500,000** of new Sentinel **products (350 TB) monthly**
- Registered **users** in the order **120000** – 4.5M downloads monthly
- Total downloaded Sentinel data from ESA about **51 PB**
- Increasing number of satellites in 2018: **Sentinel-3B**
- **Near-Real-Time** availability



DATA ACCESS STRATEGY

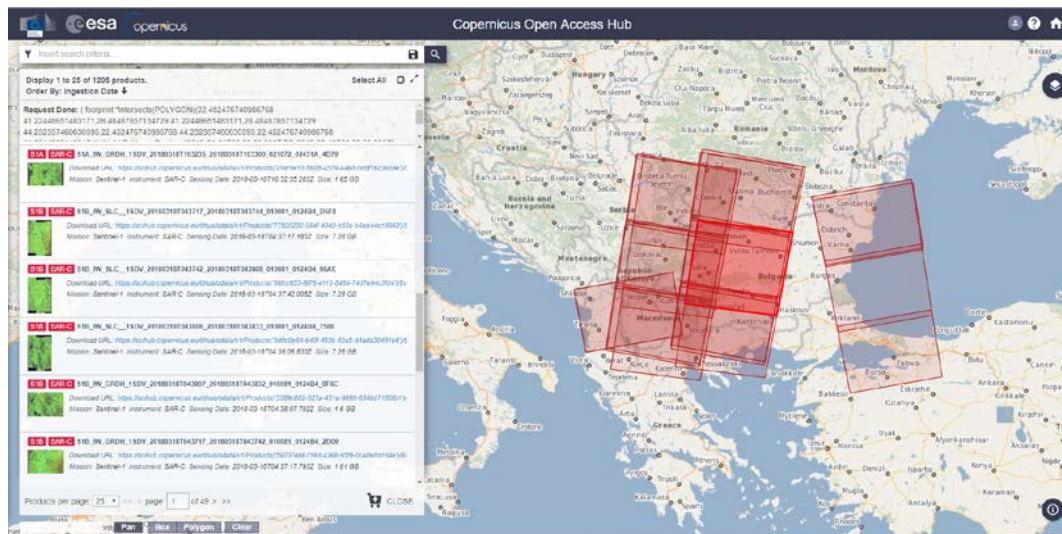
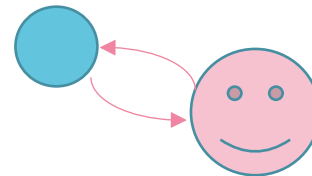
- **Free and Open Data Policy** allows to maximise value in the data and also allows all institutions/users to re-distribute Sentinel data
- **ESA/EUMETSAT** distribute Sentinel data; other institutions can re-distribute data on the basis of their national and local users
- **Mirroring software** is also freely available as Free and Open Source





Copernicus Open Access Hub

- User self-registration
- Geographical search
- Catalogue query
- Product Browse
- Download





Data Access

3. Move on map



Data Access

DATA ACCESS: HUMAN – TO – SERVER

The screenshot displays the Copernicus Open Access Hub interface. On the left, a search results panel shows a list of Sentinel-2 products. The first product is S2B_MSIL1C_20170802T092029_N0205_R093_T34TFN_20170802T092027. Below it, the download URL and mission details are provided. The map on the right shows a satellite view of Bulgaria with a green selection box over Sofia. Callout boxes highlight key actions: 'Zoom to product on map', 'Add product to cart', 'Download product', 'Select product', and 'View product details'.

Zoom to product on map

Add product to cart

Download product

Select product

View product details



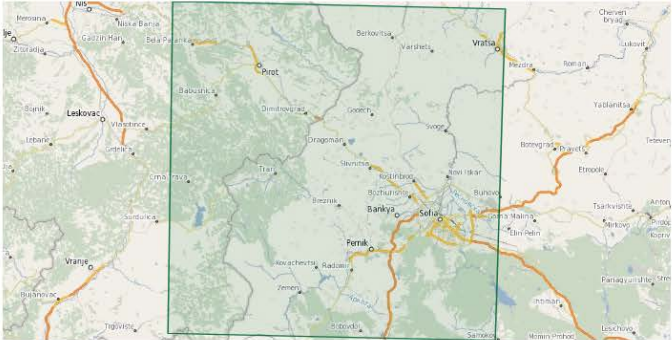
Data Access

DATA ACCESS: HUMAN – TO – SERVER

S2B_MSIL1C_20170802T092029_N0205_R093_T34TFN_20170802T092027

[https://scihub.copernicus.eu/dhus/odata/v1/Products\('b7c2befc-1e5d-474e-b155-6915b68a4dfd'\)/\\$value](https://scihub.copernicus.eu/dhus/odata/v1/Products('b7c2befc-1e5d-474e-b155-6915b68a4dfd')/$value)

Footprint



Attributes

Summary

Date: 2017-08-02T09:20:29.027Z
Filename: S2B_MSIL1C_20170802T092029_N0205_R093_T34TFN_20170802T092027.SAFE
Identifier: S2B_MSIL1C_20170802T092029_N0205_R093_T34TFN_20170802T092027
Instrument: MSI
Satellite: Sentinel-2
Size: 782.18 MB

Quicklook



Inspector

Move from product
to product

Quicklook

Start download

←

→

×

↓

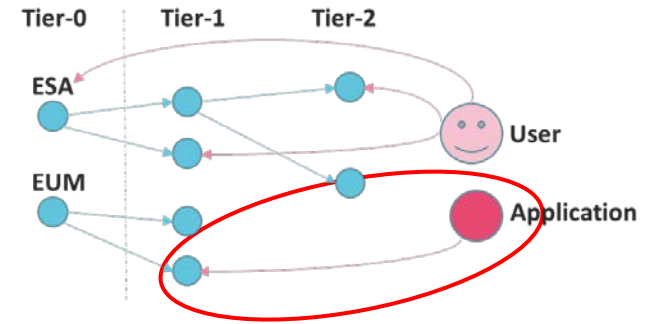


Data
Access

DATA ACCESS: APPLICATION – TO – SERVER

Copernicus Open Access Hub

- User self-registration
 - Geographical search
 - Catalogue query
 - Product Browse
 - Download
-
- Protocols supported: **OpenSearch** and **Open Data Protocol (ODATA)**
 - Scripts based on “wget” <https://en.wikipedia.org/wiki/Wget>
 - Sample scripts available at:
<https://scihub.copernicus.eu/userguide/5APIsAndBatchScripting>
 - Example of integrated application with QGIS:
<https://www.youtube.com/watch?v=FcETq8OWM0k>





DATA ACCESS: APPLICATION – TO – SERVER

<https://scihub.copernicus.eu/dhus/search?q=>

Perform search

(footprint:"**Intersects(POLYGON((23.2039 42.6072,23.4564 42.6072,23.4564 42.8011,23.2039 42.8011, 23.2039 42.6072)))"**)

Define AOI

AND (platformname:Sentinel-2)

Define search criteria

AND (beginPosition:[2018-01-01T00:00:00.000Z TO 2018-12-31T23:59:59.999Z])

<https://scihub.copernicus.eu/dhus/odata/v1/>

Products('d5907a87-919b-4695-9e9f-c769fcada8f6')/

Products('Quicklook')/\$value

Quicklook

<https://scihub.copernicus.eu/dhus/odata/v1/>

Products('d5907a87-919b-4695-9e9f-c769fcada8f6')/\$value

Download product

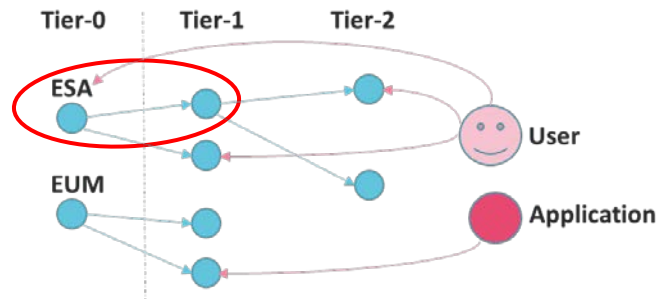


Data
Access

MIRRORING DATA RESOURCES

Copernicus Open Access Hub

- Installation
- User self-registration
- Geographical search
- Catalogue query
- Product Browse
- Download
- Resources: DHuS Open Source Portal
<http://sentineldatahub.github.io/DataHubSystem/>
<https://www.youtube.com/watch?v=TNnKmOniXfo>





Data
Access

DATA HUB RESOURCE LIST (TIER - 0)

Initiative Name	Provider	Website, Target User Group, Rolling Size
Copernicus Open Access Hub	ESA	• URL: scihub.copernicus.eu • All • No rolling
Collaborative Data Hub	ESA	• Authorized mirror sites • 30 days
Copernicus Services Hub	ESA	• Copernicus Services • No rolling
International Hub	ESA	• Copernicus International Agreements • 30 days
Copernicus Online Data Access	EUMETSAT	• URL: coda.eumetsat.int • All • 12 months



Data
Access

DATA HUB RESOURCE LIST (TIER - 1)

Initiative Name	Website
Australia National Mirror	copernicus.gov.au
Austria National Mirror	data.sentinel.zamg.ac.at/#/home
Finland National Mirror	finhub.nsdci.fmi.fi/#/home
France National Mirror	peps.cnes.fr/rocket/#/home
Germany National Mirror	code-de.org
Greece National Mirror	sentinels.space.noa.gr

Initiative Name	Website
Italy National Mirror	collaborative.mt.asi.it/#/home
Portugal National Mirror	ipsentinel.ipma.pt/dhus/#/home
Norway National Mirror	collaborative.mt.asi.it/#/home
UK National Mirror	sedas.satapps.org
Sweden National Mirror	swea.rymdstyrelsen.se/portal



Data
Access

OTHER DATA ACCESS PUBLIC INITIATIVES

Initiative Name	Provider	Website and Target User Group
ESA Thematic Exploitation Platforms	ESA	• URL: tep.eo.esa.int • All user types
THEIA Land Data Centre	CEA, Cerema, CIRAD, CNES, CNRS, IGN, INRA, IRD, IRSTEA, Meteo France, ONERA	• URL: www.theia-land.fr • Scientific communities and public authorities
Center for Environmental Data Analysis - CEDA	CEDA, NCAS, NCEO	• URL: catalogue.ceda.ac.uk • All user types
USGS Earth Explorer	USGS	• URL: earthexplorer.usgs.gov • All user types
Alaska Satellite Facility	NASA University of Alaska Fairbanks	• URL: asf.alaska.edu/sentinel • Scientific users



Data
Access

OTHER DATA ACCESS PRIVATE INITIATIVES

Initiative Name	Provider	Website and Target User Group
CloudEO	CloudEO	• URL: cloudeo-ag.com • Users, developers and providers of geo data/ geo services; software developers
Geopedia platform	Synergise	• URL: geopedia.world • Users of geo data/ geo services
Geostorm platform	CS-SI	• URL: geostorm.eu • Users and developers of geo data/ geo services
Google Earth Engine	Google	• URL: earthengine.google.com • Scientists, researchers and developers
Planet platform	Planet	• URL: planet.com/products/platform/ • Users and developers of geo data/ geo services
Sentinel on AWS	Amazon	• URL: sentinel-pds.s3-website-eu-central-1.amazonaws.com • Developers, private/public downstream players

* The European Commission does not endorse any particular commercial solution.



User
Uptake

RESEARCH & USER SUPPORT (RUS) SERVICE

RUS - Research and User Support

- **“Expert Service for Sentinel Users”** managed by ESA and funded by the EC; operated by a consortium of companies led by CS SI
- The main objectives are:
 - to promote the **uptake** of Copernicus EO data
 - to support the **scaling up** of R&D activities with Copernicus EO data
- **Free access to ICT platforms** for processing data and developing technical solutions customized to users’ needs
- **Open to you:** freely available for first-time data users to specialist users
- **Dedicated helpdesk** for assistance and organisation of **regular training sessions**





Data
Access



RUS builds on the experience with precursor activities funded through ESA EO Envelope Programme:

→ G-POD

→ EO Research and Service Support (RSS)

Virtual ICT environment

- Pre-configured workstation
- Powerful computing
- Fast data access
- ICT expertise

Doing

*Contextual
help*

Sharing

EO Expertise

- Sentinel products
- optical/IR, SAR, altimeter
- Common EO processing tools

*Effective
training
platform*

Learning

Training

- Training catalogue
- Webinars
- Face-2-face training

*Experts as
trainers*



User
Uptake

- **Hardware Configuration of the Virtual Machine (VM)**
 - From 2 to 32 processing cores with 15-240 GB of RAM
 - Disk space from 500GB to 30TB
- **EO Data availability**
 - Sentinel-1/2/3 (via DataHub)
 - CCM (for authorised users)
- **Processing environment**
 - Sentinel-1/2/3 Toolboxes
 - Other tools: Orfeo Toolbox, QGIS, Sen2Cor, Sen2Three, SMOS Toolbox, NEST, BRAT Toolbox
 - GDAL library, NCO, NETCDF, OpenJPG, Image Magick, Rugged library
- **Development environment**
 - Eclipse, GCC, Cmake, Maven, Git, R, Eclipse Mars plugins



User
Uptake

RESEARCH & USER SUPPORT (RUS) SERVICE

- Virtual Platform **open and available** to public users (since 25/09/2017)
 - RUS Web portal: Over 10,000 visits
 - RUS Virtual platform: 270 users (university and research ~60%)
 - User accounts are provided for a **“strict” pre-defined period** between 3 and 12 months. After that time the “uptake” is assumed to be finished and users leave the service, i.e. they can directly address the cloud providers.
- **Communication:** ~600 followers on **Twitter**
 - <http://rus.copernicus.eu>
 - https://twitter.com/RUS_Copernicus
 - <https://www.youtube.com/channel/UCB01WjameYMvL7-XfI8vRIA/videos>



@RUS_Copernicus



- **Training activities** (since 03/07/2017)
 - 6 Webinars, 800 attendants, >3,000 views on **YouTube**
 - 3 Face-2-Face Trainings, 80 participants, e-learning materials under construction
 - Training on Data Access as part of the **Copernicus Academy** (<http://copernicus.eu/main/copernicus-academy>)



RUS Webinar: Land Monitoring with Sentinel-3 -

120 показвания •
преди 1 седмица



RUS Webinar: Ocean colour monitoring with Sentinel-3 -

210 показвания •
преди 3 седмици



RUS Webinar: Crop mapping with Sentinel-2 - LAND01

955 показвания •
преди 2 месеца



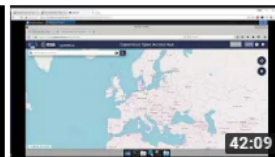
RUS Webinar: Burned area mapping with Sentinel-2 -

1,2 хил. показвания •
преди 3 месеца



RUS Webinar: Flood Mapping with Sentinel-1 - HAZA01

1 хил. показвания •
преди 4 месеца



RUS Webinar: Ship Detection with Sentinel-1 - OCEA01

689 показвания •
преди 5 месеца