



Hungarian
Space Office



→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary



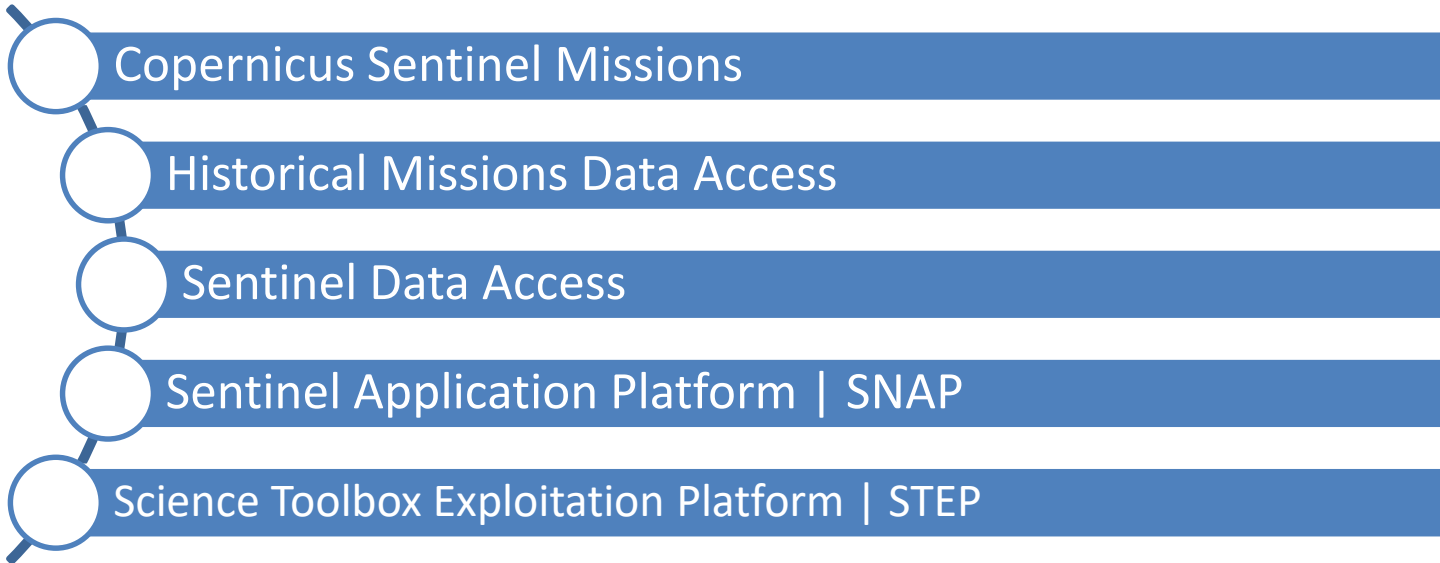
SENTINEL DATA ACCESS & PROCESSING TOOLS

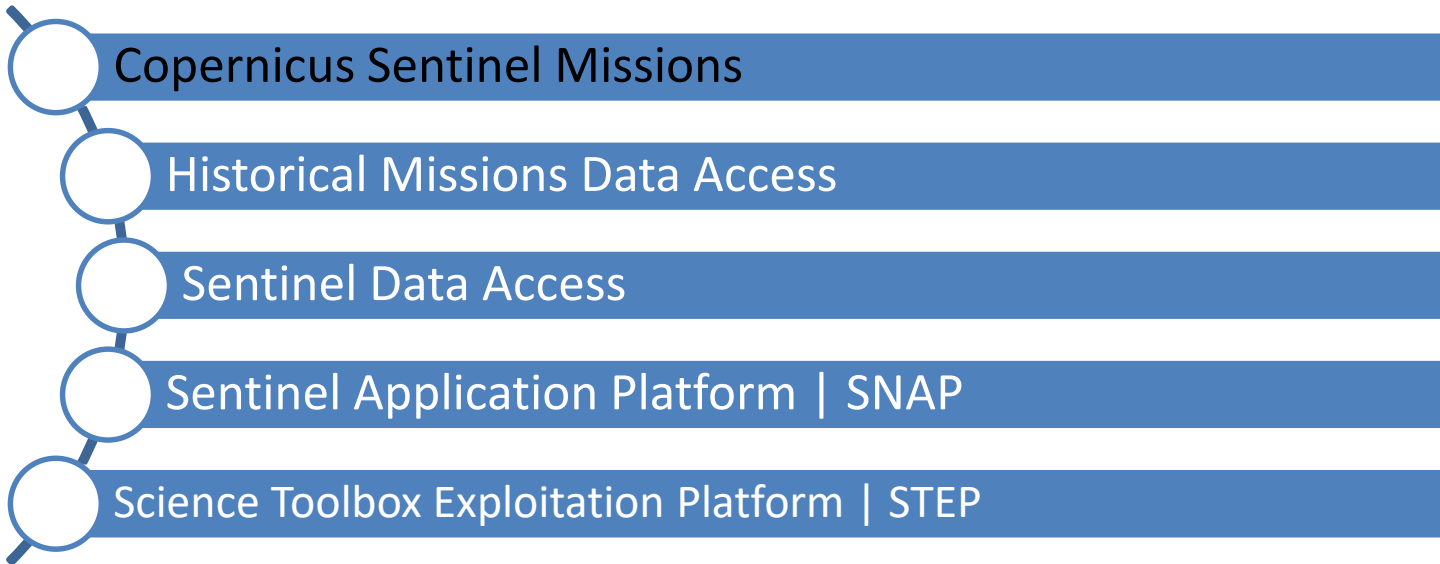
Michael Foumelis

French Geological Survey (BRGM), France

with contribution from **ESA-ESRIN**

Presentation Overview






The Copernicus Programme

A Space Flagship Programme run by EU and ESA

Dedicated satellites (“Sentinels”):

- **S1: Radar Mission**  S1A: April-2014
S1B: April-2016
- **S2: High Resolution Optical Mission**  S2A: June-2015
- **S3: Medium Resolution Imaging and Altimetry Mission**  S3A: Feb-2016
- S4: GEO Atmospheric Chemistry Mission
- S5P/S5: LEO Atmospheric Chemistry Missions
- S6/Jason-CS: Altimetry Mission



Sentinel Online | The Official Sentinel Website

<https://sentinel.esa.int/web/sentinel/home>

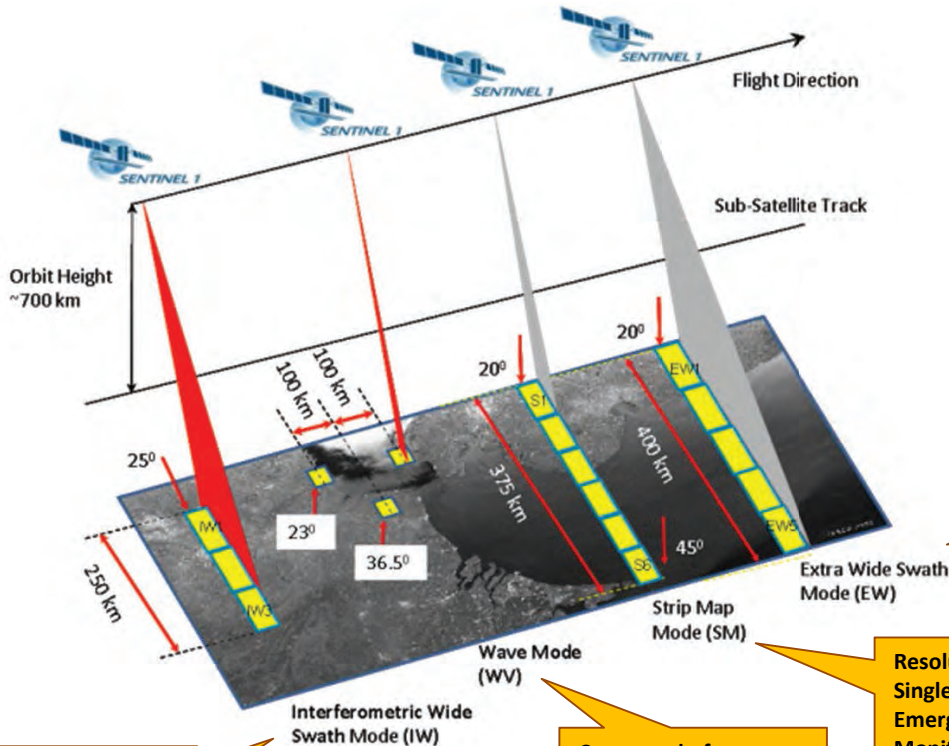


Sentinel online website provides technical guidelines for all sentinels, news and events related ,data access info and policy, last scientific results and more...

→ **7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING**

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Sentinel-1 Mission Profile



S-1 SAR can be operated in 4 exclusive imaging modes with different resolution and coverages.

Resolution: 20 x 40m
Single and dual Polarisation
Polar areas, and ocean relevant areas
Can be used for interferometry

Resolution: 5m x 5m
Single and dual Polarisation
Emergency Services-Disaster
Monitoring

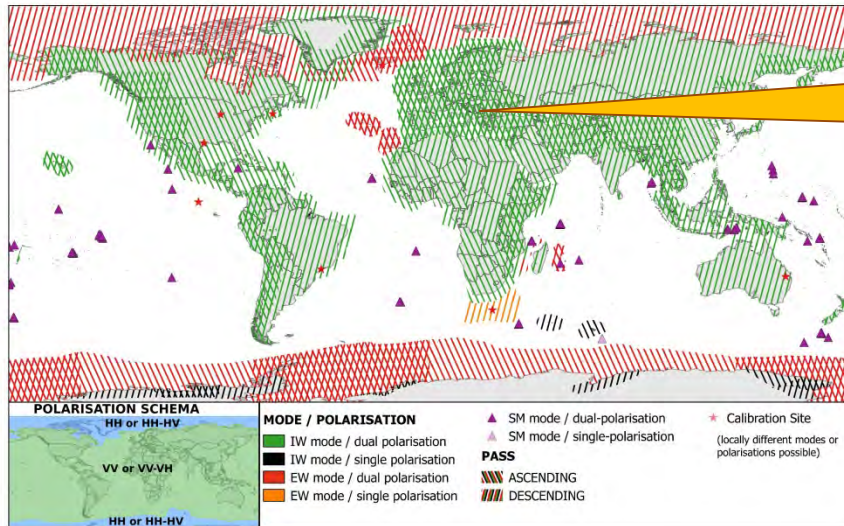
Resolution: 5m x 20m
Single and dual Polarisation
Pre-defined mode over Land

Composed of
Stripmap imagettes
Single polarisation
Pre-defined mode
over open oceans

Sentinel-1 Observation scenario

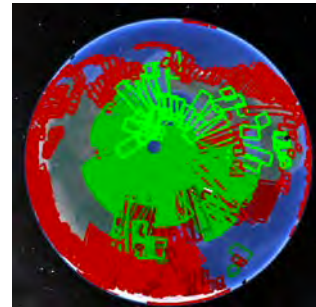
Sentinels are operated via a pre-defined background observation plan published ahead of every repeat cycle as KML format at: <https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-1/observation-scenario>

Sentinel-1 Constellation Observation Scenario: Mode - Polarisation - Observation Geometry



Europe covered systematically every cycle, ascending and descending passes, IW mode, Dual polarisation

- HH-HV or HH polarization for the monitoring of polar environments, sea-ice zones
- VV-VH or VV polarization for all other observation zones



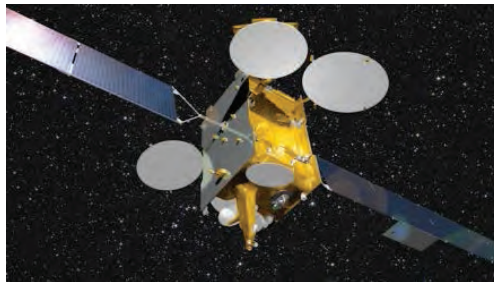
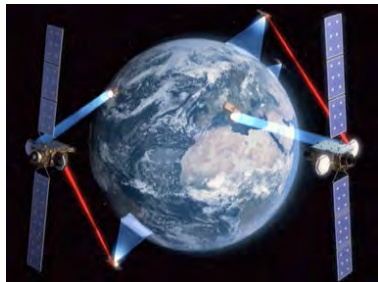
Operational use of European Data Relay System (EDRS)

The European Data Relay System service provides complementary acquisition of Sentinel-1 mission data addressing in particular:

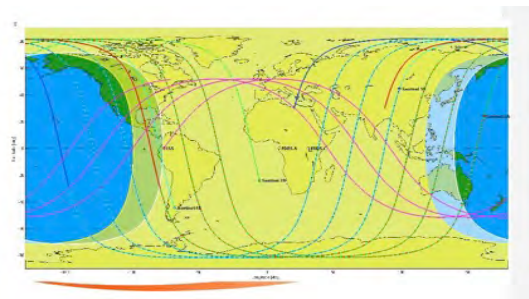
- **increased coverage**
- **enhanced timeliness, including quasi-real time (QRT) observation capabilities**, in particular outside Europe

The main functions provided by the service are:

- Sentinels mission **data transmission via Optical (Laser) link** to the GEO satellites
- Mission **data relay** between the GEO satellites and the Ka-band ground receiving terminals
- Mission **data reception, decommutation and provision** to the service interface point (Copernicus WAN circulation network)



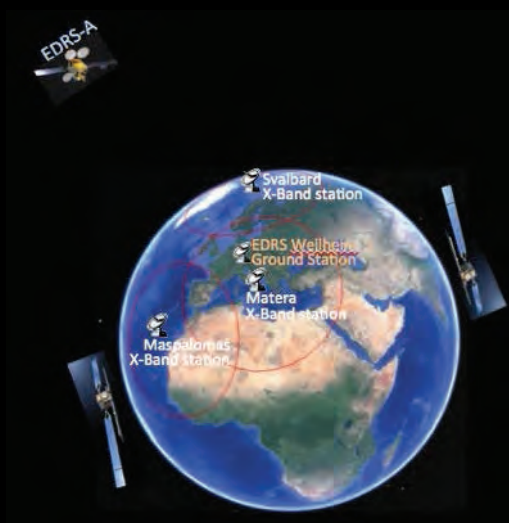
EUTELSAT 9B hosting EDRS-A



EDRS-Sentinels geometrical visibility map

Sentinel-1/EDRS-A Operations

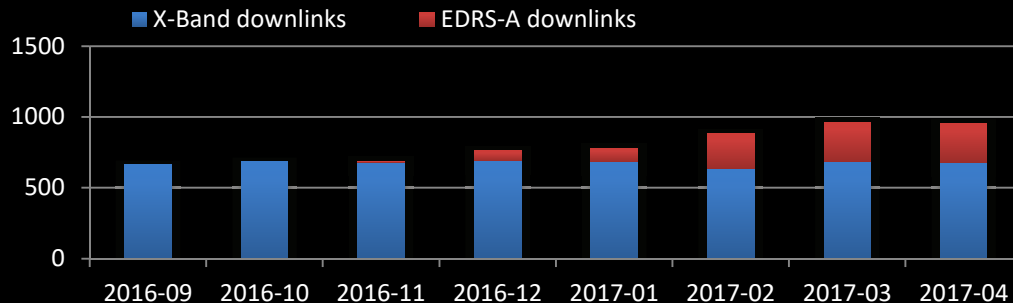
EDRS-A is operated as an additional downlink resource supporting Sentinel-1A and Sentinel-1B operations and brings a significant enhancement to the S1 operations, in particular:



More than 1000 EDRS-A/S1A operational downlinks performed to date

- ✓ Significant **increase in production volume** thanks to the additional downlink capabilities. Sentinel-1 products are being made available through the standard on-line data access mechanisms
- ✓ **Increased observations** (e.g. revisit) and SAR dual polarisation acquisitions
- ✓ significant **increase of Sentinel-1 pass-through acquisitions in X-Band over Europe**

S1A: X-Band and EDRS Downlinks per month



Sentinel-1 Systematic GLOBAL processing for IW SLC

- Backwards processing of IW SLC over areas not included in the SLC processing scenario since 2014.10.06 has started in summer 2016



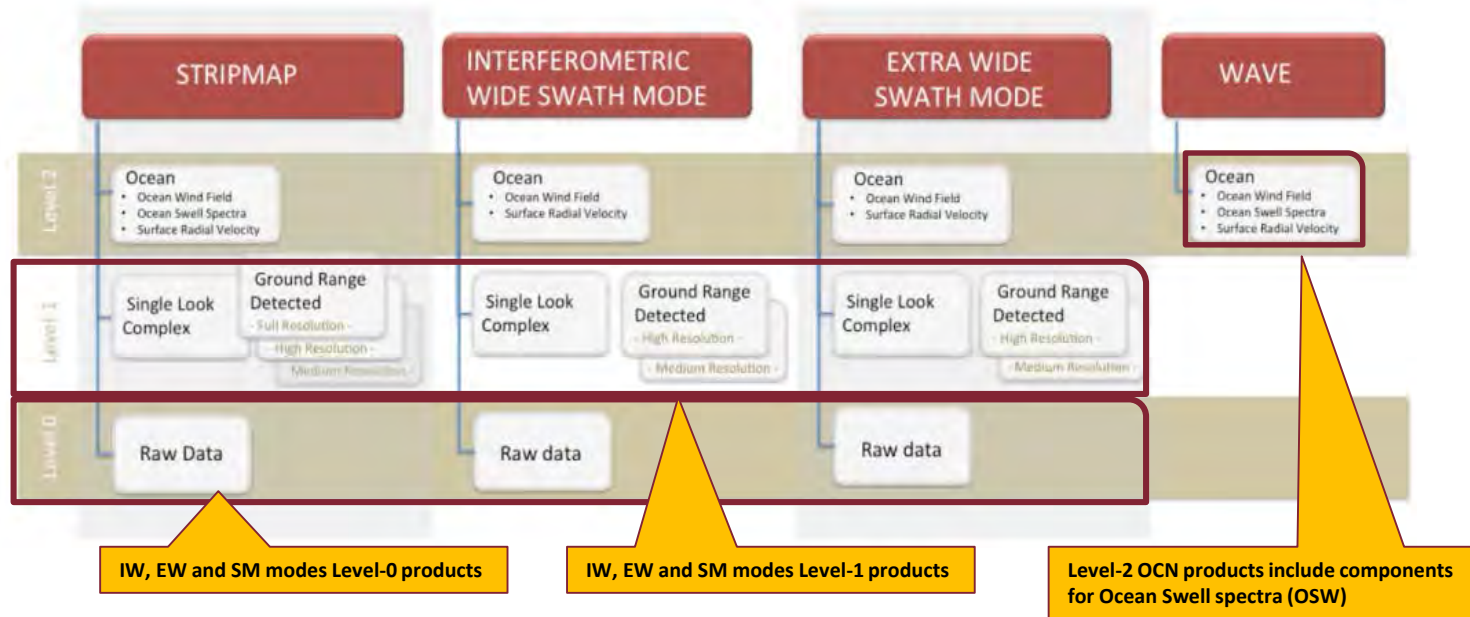
- Missing IW SLC for all areas in the past have being gradually made available on-line during 2016
- On-line availability of IW SLC products for all S1A data acquired since Oct. 2014 over land and ice masses has been completed in November 2016.

All Sentinel-1 data acquired in IW over Land and Ice masses since the Sentinel-1A data access opening is now available on-line to all users.

Sentinel-1 Production Scenario

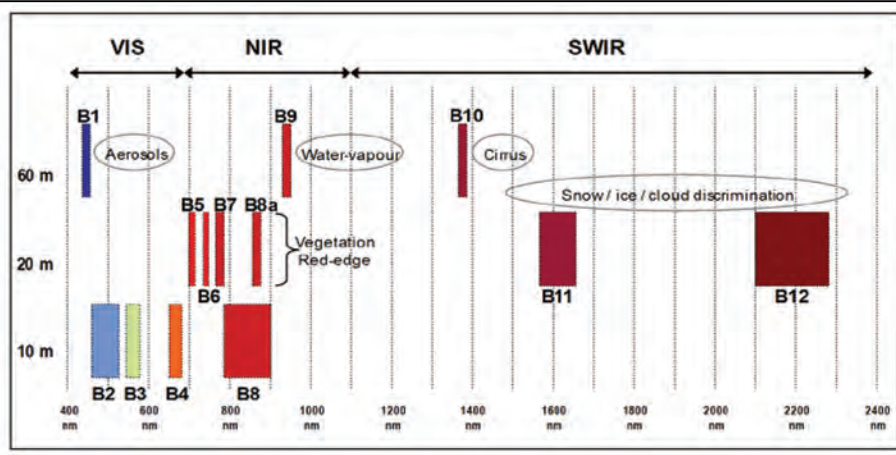
All Sentinels acquired data is systematically downlinked and processed to generate a predefined list of core products within specific timeliness

Products Available from the Sentinel Data Hubs

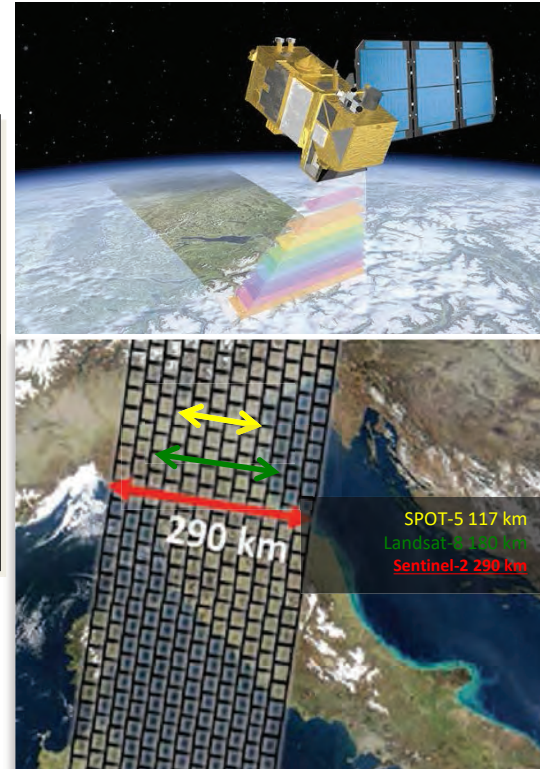


Sentinel-2 Mission Profile

High Resolution Optical Mission - Multispectral Imager (MSI) Instrument



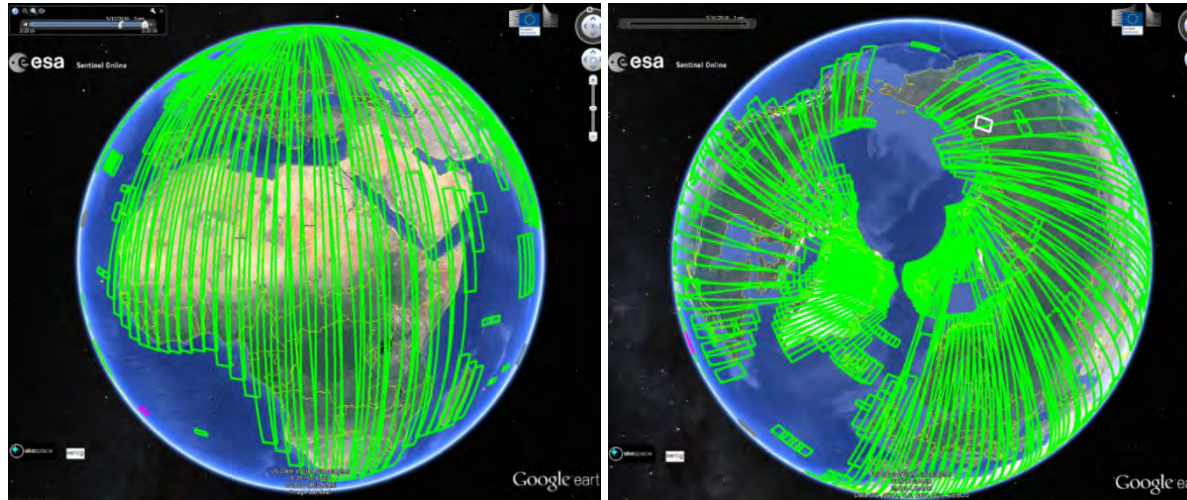
- 13 spectral bands in the Visible (VIS), Near Infrared (NIR), Short Wave Infrared (SWIR)
- Ground pixel resolution of 10m, 20m, 60m (for atmospheric correction) across a 290 km swath



Sentinel-2 Observation scenario

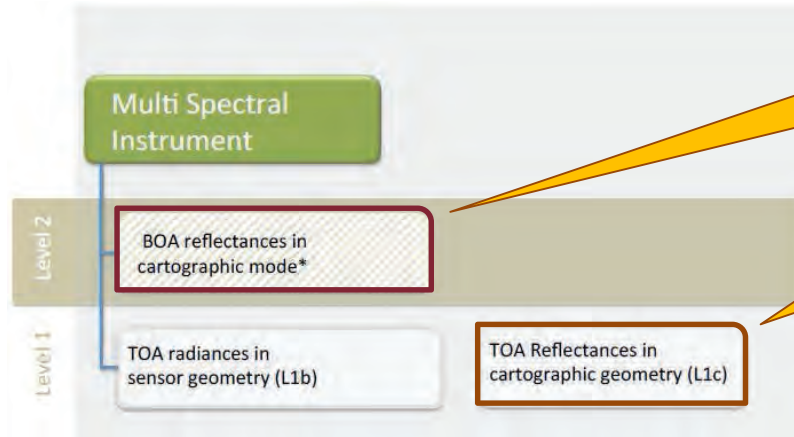
Regularly published online in KML format at:

<https://sentinels.copernicus.eu/web/sentinel/missions/sentinel-2/acquisition-plans>



- High Revisit (10 days) at the equator with one satellite - 5 days with 2 satellites (2-3 days at mid-latitudes)
- Sentinel-2 systematically covers all land surfaces (56° South latitude - 84° North latitude)
- Europe & Africa systematically covered on every orbit
- The rest of the world within a certain time interval: currently 30 days, will be progressively reduced over the coming months to reach 10 days.

Sentinel-2 Production Scenario



Sentinel 2 Toolbox – L2b Biophysical Products

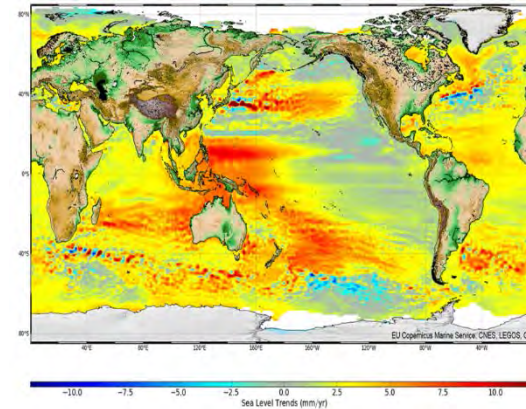
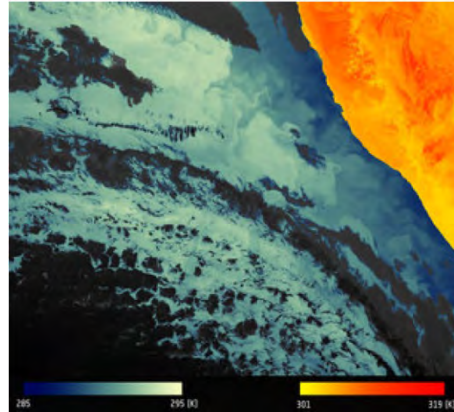
- **LAI:** Leaf Area index
- **FAPAR:** Fraction of Photosynthetically Active Radiation
- **CCC:** Canopy Chlorophyll Content
- **CWC:** Canopy Water Content



L1c Product Tile Composition

Sentinel-3 Mission Profile

Operational Oceanography & Global Land Application



Optical Payload

OLCI (Ocean and Land Color Instrument)

SLSTR (Sea and Land Surface Temperature Radiometer)

Data continuity of the Vegetation instrument (on SPOT4/5),
Enhanced fire monitoring capabilities

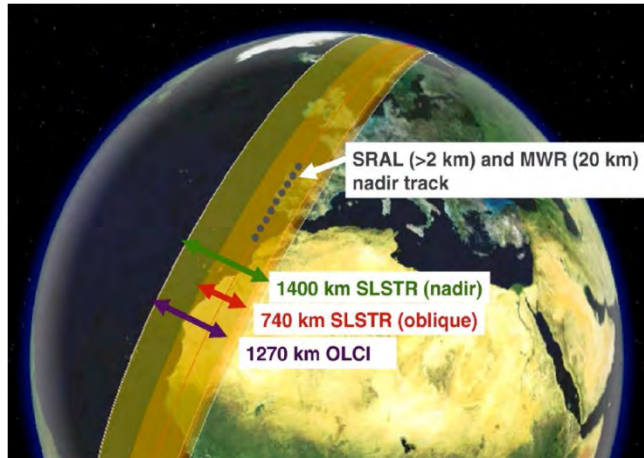
Topography Payload

SRAL (Synthetic Radar Altimeter)
Sea surface topography data

MWR (Micro Wave Radiometer)

POD
Precise Orbit Determination

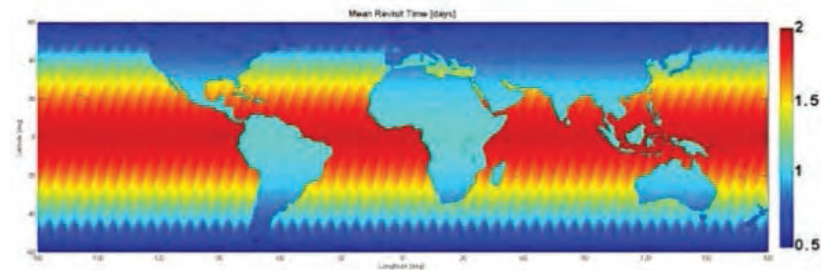
Sentinel-3 Observation scenario



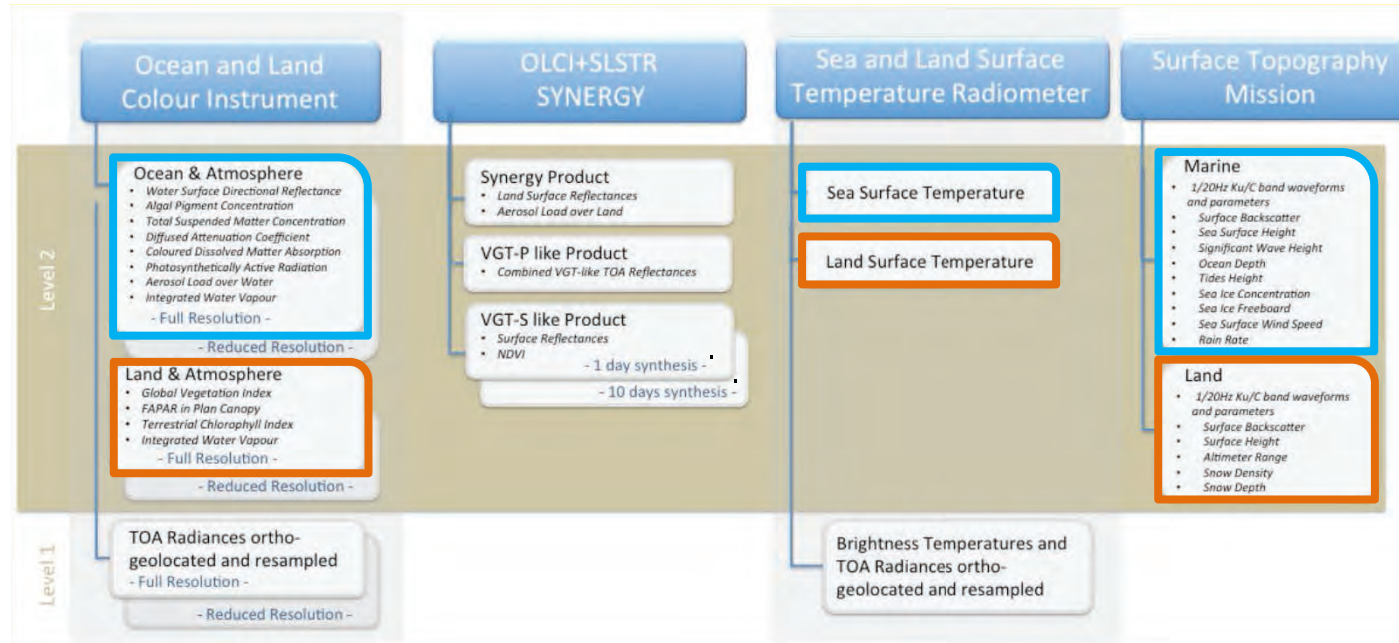
- Sentinel 3 Systematic Processing and dissemination in NRT
- The OLCI instrument acquires data over daylight part of the orbit
- SLSTR, SRAL and MWR acquired data over the whole orbit

Revisit at Equator

Ocean Colour	< 1.9 days
Land Colour	< 1.1 day
SLST	< 0.9 day



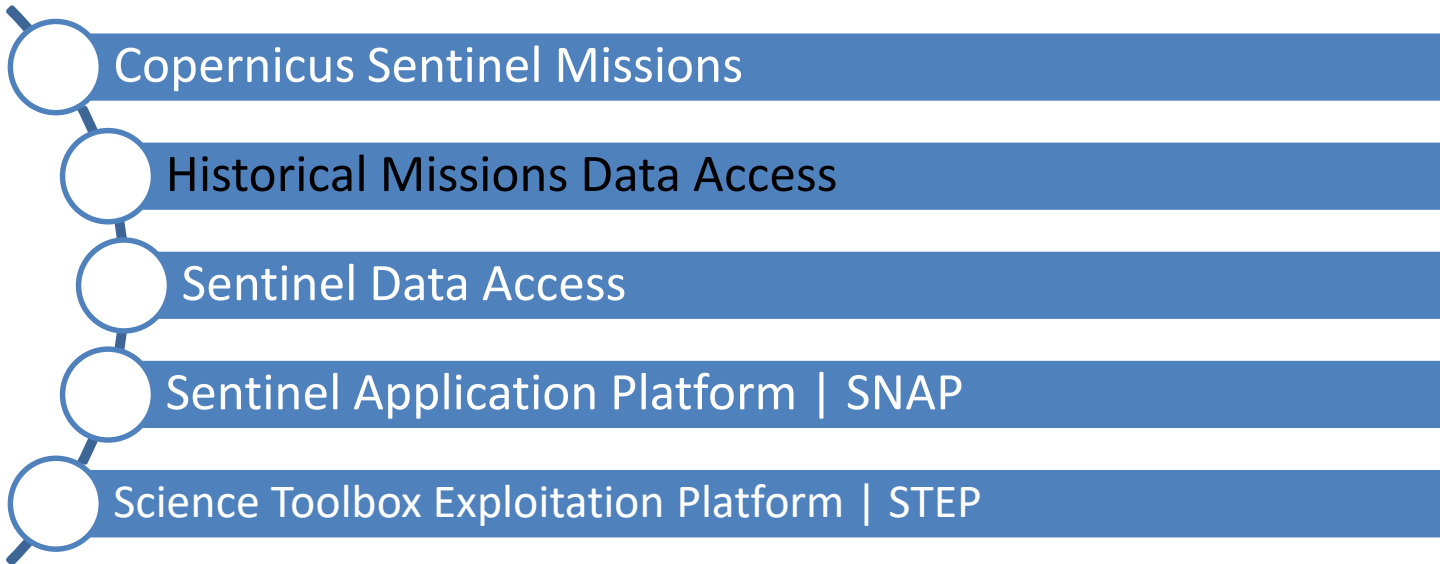
Sentinel-3 Production Scenario



ESA disseminates the S-3
L1 & L2 Land Products



Eumetsat disseminates the S-3
L1 & L2 Marine Products



Facilitating Access to EO data

A constant ESA objective:

→ *Ease access to Earth Observation data*

1. ESA EO data policy:
 - free of charge, open (and of high quality)
2. Constant upgrade of ground segment for easier access to EO data including Near Real Time (NRT) and reprocessing
3. Need to address “heritage” data for future use

→ *Need to anticipate the way users will use EO data in future
(e.g. exploitation platform, data/algorithm toolboxes)*

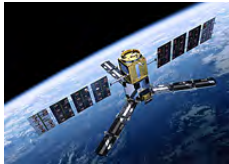
ESA Earth Observation Data Policy | **PAST**

To stimulate a balanced development of Science, Public Utility and Commercial Applications, consistent with the mission objectives

To maximize the beneficial use of data from ESA EO satellites



ERS and Envisat



Earth Explorers



ESA Third Party Missions

ESA Data Policy

Free datasets

Open access and free of charge. User registration and acceptance of ESA Terms & Conditions are required

Restrained datasets

Free of charge. The submission of a Project (Full) Proposal and acceptance of the ESA Terms & Conditions are required, after its evaluation a quota will be assigned

Data Policy of individual data providers

In some case a reproduction cost (e.g. ALOS) or Specific Restrictions (limitations of quota, geographical restrictions, etc.) to the use of data may be applied for TPM

Historical Missions Data Access

ESA Link to Earth Observation | EOLI



The screenshot displays the ESA Earth Online (EOLI) website. The header features the ESA logo and navigation links for 'Data Access', 'Missions', 'Earth Topics', and 'PI Community'. A search bar is located in the top right corner. The main content area is titled 'EOLI "ESA's Link to Earth Observation"' and includes a description of the service, a list of supported satellites, and a section for downloading and installing the EOLI application. The 'Download & Install' section lists download links for Windows, MacOS X, Linux, and a Generic Linux version. The 'Release Notes' section provides information about changes in EOLI 9.6.7. The 'Useful Links' section lists various resources, including ESA EO Missions, ATSR World Fire Atlas, GlobCover, and GLOFAS. The 'Contact & Support' section provides contact information for users with questions or suggestions.

ESA Earth Online

Log in My Earthonline Register Google Custom Search

Need Help? Contact here European Space Agency

Data Access Missions Earth Topics PI Community Explore more...

You are here Home » Data Access » Catalogue Access

- EOLI "ESA's Link to Earth Observation"

EOLI (Earth Observation Link) is the European Space Agency's client for Earth Observation Catalogue and Ordering Services.

Using EOLI you can browse the metadata and preview images of Earth Observation data acquired by the satellites: Envisat, ERS, Landsat, KONOS, DMC, ALOS, SPOT, Kompsat, Proba, IRS, SCISAT.

Scientific Users with a registered account can order or download products of various processing levels.

Data Access

- Data Access Home
- Browse Data Products
- Latest Data Products
- Products Typology
- Data Product News
- Online Archives
- Catalogue Access
- Sample Data
- Auxiliary Data
- How ESA processes Data
- How ESA delivers Data
- How to Access EO Data
- How to Access EO Campaign Data
- Helpdesk
- Help

- Download & Install

EOLI is a java application which is supported on all major platforms: Windows (95/98/ME/2000/NTXP), Linux, MacOS X and other Unix systems. [Java SE Runtime Environment](#) 1.6 or later is required.

- Windows: [eoli-9.6.7-windows.msi](#)
- MacOS X: [eoli-9.6.7-macosx.dmg](#)
- Linux: [eoli-9.6.7-linux.tar.gz](#)
- Generic Linux: [eoli-9.6.7-linux-generic.tar.gz](#)

- Release Notes

Changes in EOLI 9.6.7

- DM-767: During downloads, EOLI frequently crashes, and does not maintain downloads queue on restart
- DM-786: During downloads, EOLI logs some users out after a short session time.

Please note that Java version 1.6 is required to run this version.

For information on new features and known issues of previous EOLI versions, please see our [release notes page](#).

- Useful Links

- ESA EO Missions
- ATSR World Fire Atlas
- GlobCover
- GLOFAS
- NASA's WorldWind

- Contact & Support

For any question on using EOLI, on the catalogue and ordering service, on registration, or any other EO related information, please [contact us](#).

For comments and suggestions on the EOLI Client: oliwin@esa.int

- Resources

- Video Tutorial
- User Manual
- Quick Guide
- EOLI-SA procedure for data ordering
- How EOLI links to other EO resources

→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

ERS/ENVISAT (A)SAR - How to Obtain (A)SAR OTF Data

(A)SAR **On The Fly** data products are freely available to ESA registered users via the [EOLI-SA client](#).

Users can search and browse all products openly, but a registration on the ESA EO Data Portal is order required to download.

In order to register and to be granted access to the available products, users are required to follow the steps below:

- Create an EO-SSO account following the [instructions](#) (for users who have not registered already).
- Apply for (A)SAR OTF Data
 - **Level 1** ([ASAR IMS](#) - [ASAR IMP](#) - [ASAR APS](#) - [ASAR APP](#))
Users can access (A)SAR OTF Standard Service (Level 1 data products) by submitting a [Fast Registration](#). Access will be automatically enabled at registration submission. Users will receive an email containing access details.
 - **Level 0** ([ASAR IM](#) - [ASAR APC](#) - [ASAR APH](#) - [ASAR APV](#))
Users can access (A)SAR OTF Level 0 data products by submitting a [Data Service Request](#) justifying and describing the data needs. **Please note that access** to Level 0 Data is not part of the standard OTF Service and it will be granted in exceptional cases. Requests will be evaluated and feedback will be provided usually within 2 weeks.

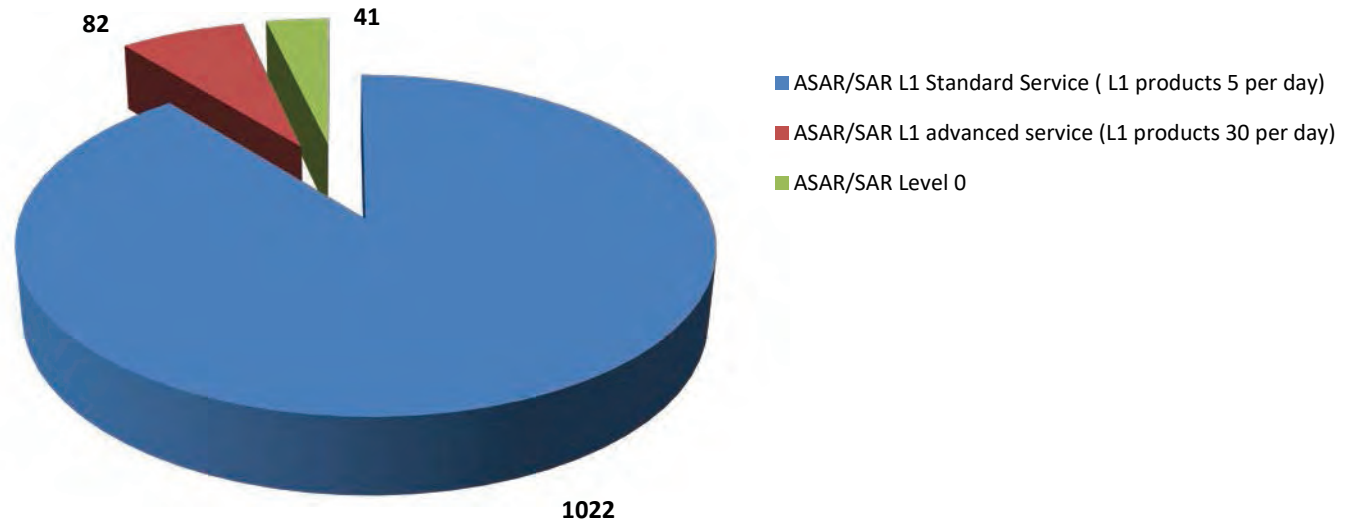
The service is being rolled out gradually (*ASAR WS from December 2016, and ERS IM from Q1 2017*).

Quality of Service : In order to allow a fair share of resources the dissemination system allows data download with the following rules:

- Users can download only a fixed number of products per day (from 00:00 to 23:59 UTC) – *Standard service up to 5 products per day*
- Users can perform only a limited number of requests or download in parallel

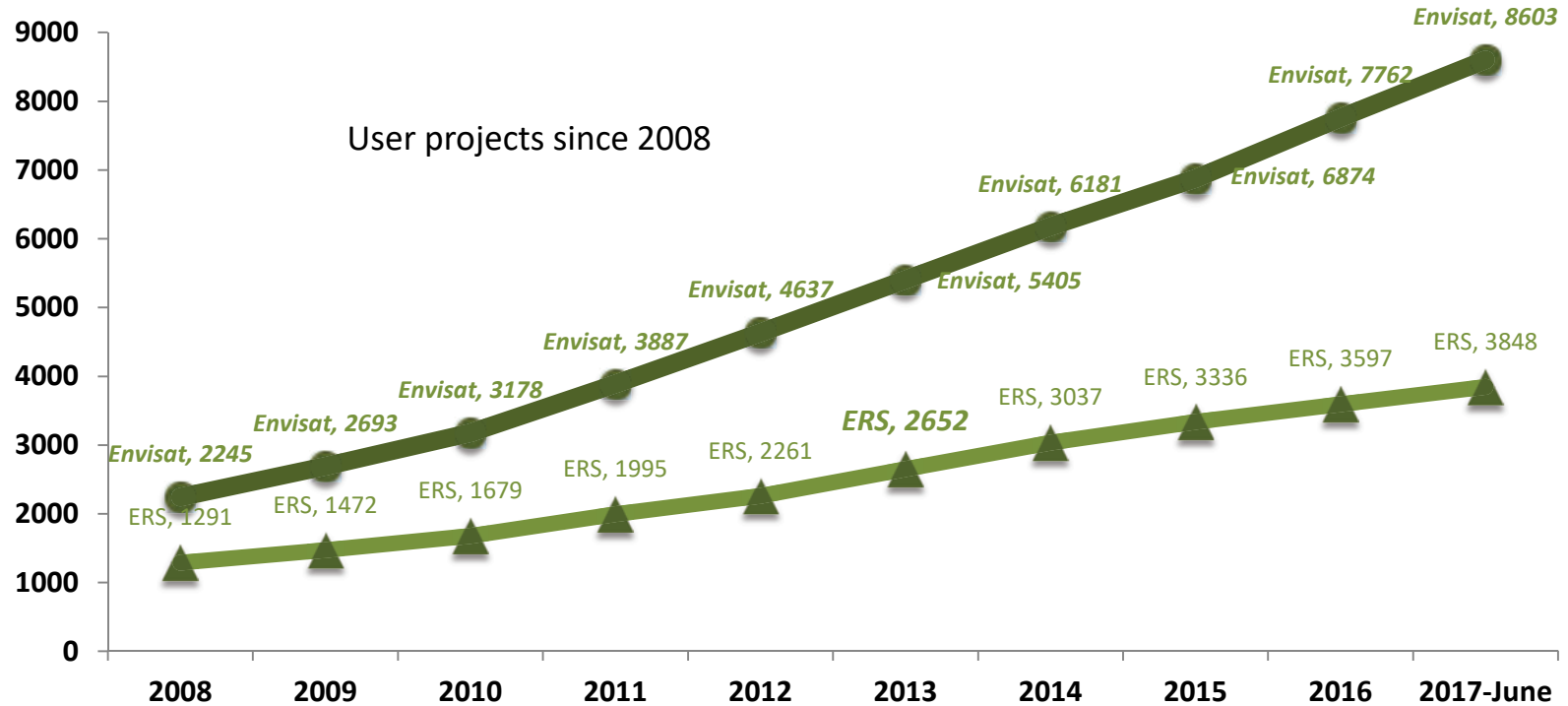
Because not all online disseminated data is immediately available for download, as there might be products that need to be processed, the consumption of daily quota occurs already when the product is requested and not when the download begins. However, even if daily quota is over, users are allowed to download the products already requested or not yet available at request time.

(A)SAR On The Fly system new users (opened in July 2016)



Note: Please consider that Old/already existing PIs have been migrated to the new (OTF) system with corresponding download rights for ASAR and SAR Level 1 and Level 0 products

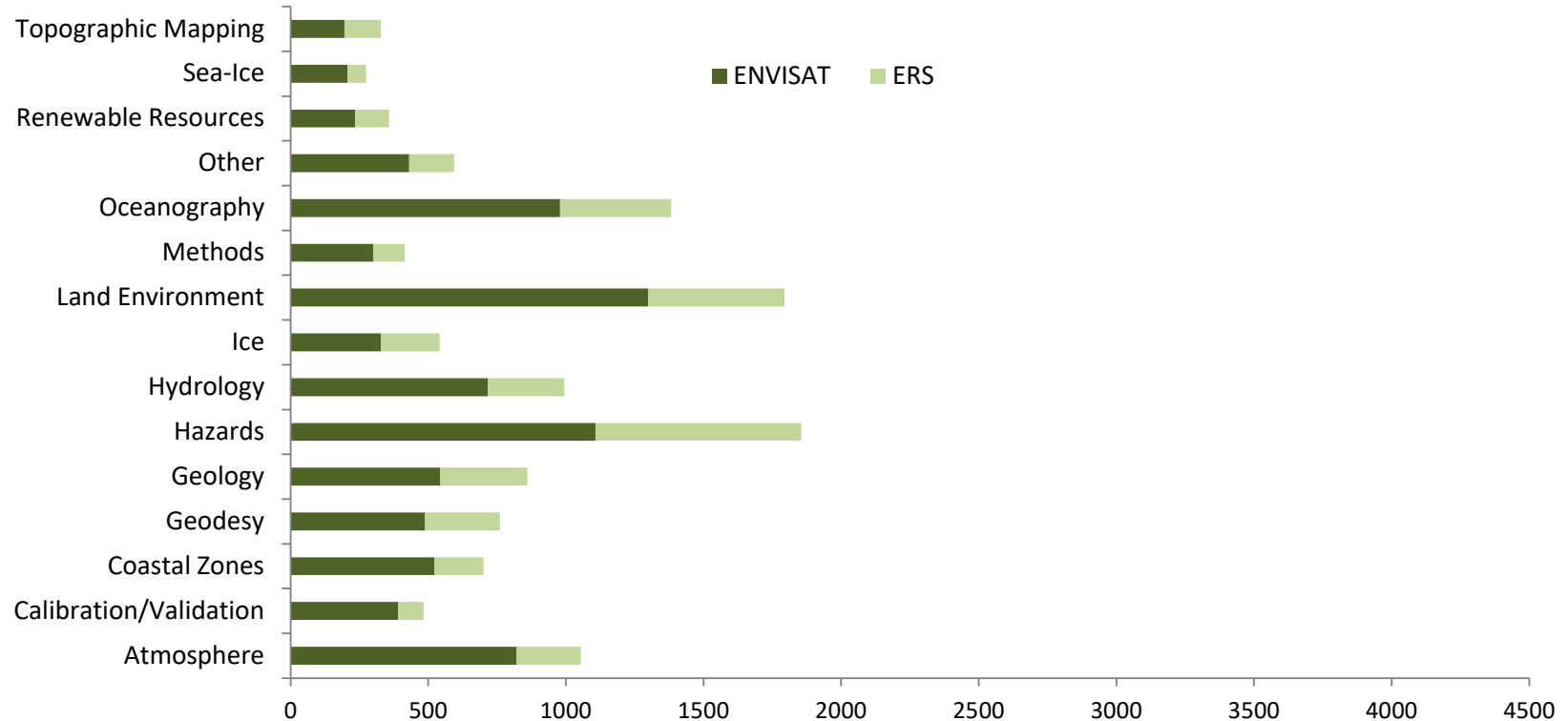
Evolution of ERS and ENVISAT user project

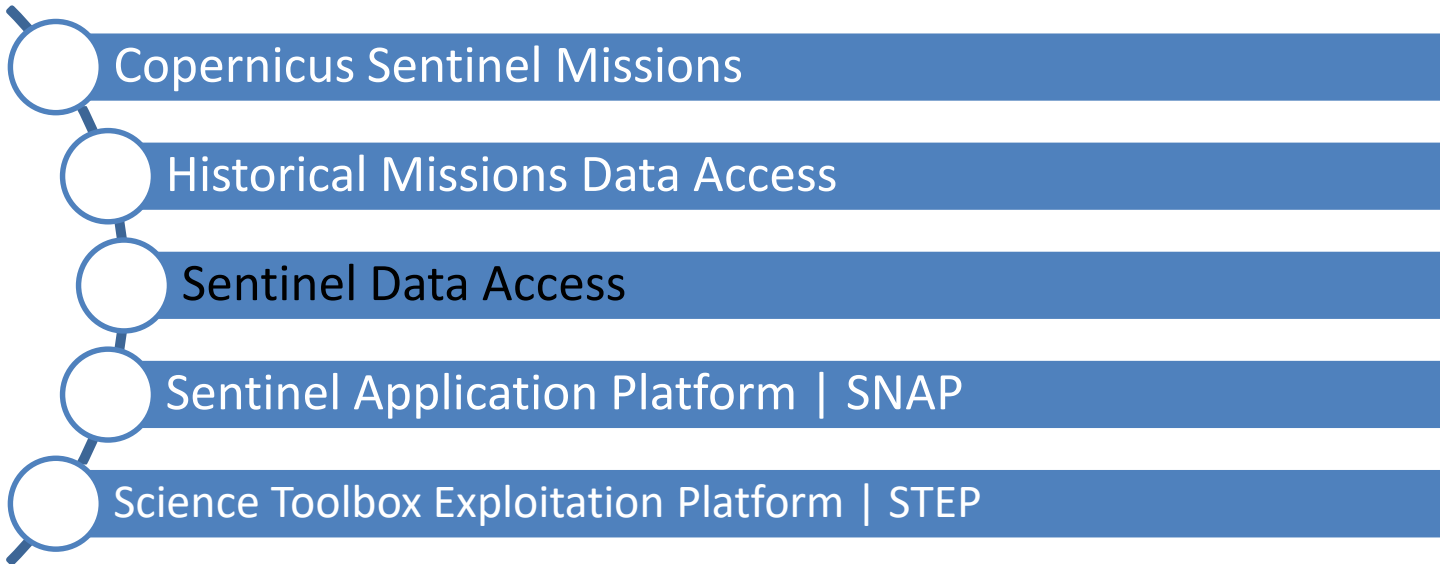


→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Distribution of ENVISAT and ERS user projects by Application Domain



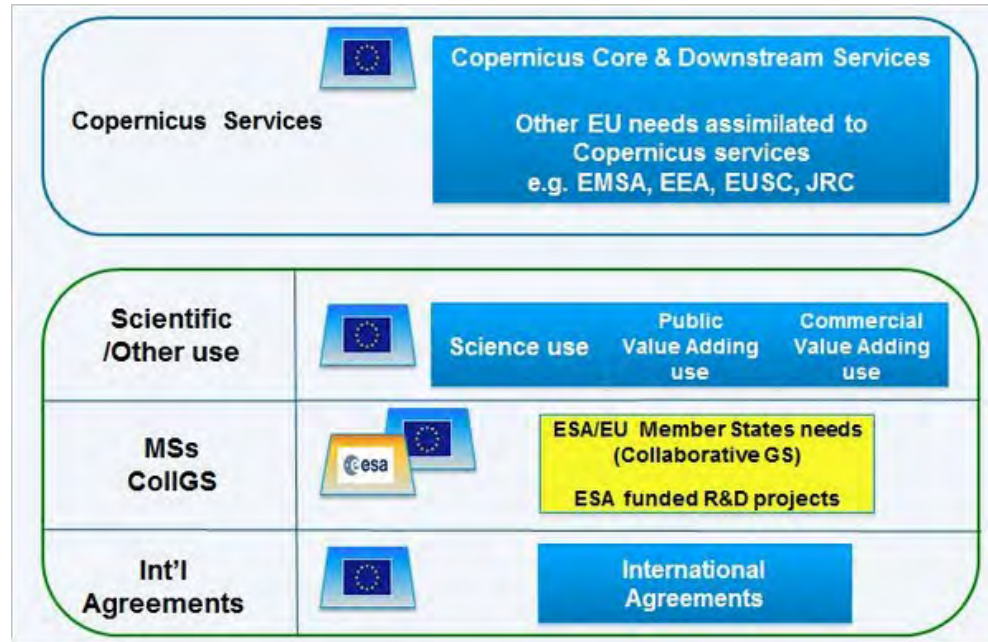


The Copernicus Space Component



Sentinel data access | Use typologies and the corresponding services/data access (overview)

Typologies are defined for Sentinel data access



Register for use by Copernicus services via CSCDA → <https://spacedata.copernicus.eu>

Register for Other/Scientific use via Sentinel-1 Scientific Data hub → <https://scihub.copernicus.eu>

Copernicus Sentinel Data Policy

Copernicus Data Policy for Sentinels Missions

- ❑ The Copernicus data policy is adopted via a Delegated Regulation
- ❑ This policy promotes the access, use and sharing of Copernicus information and data on a full, free and open basis
- ❑ One of the main objectives is to support downstream segment and research, technology and innovation communities
- ❑ The European research institutes will be able to make the best use of these data to create innovative applications and services

**Sentinel Data Policy = full and open access
to Sentinel data to all users**

In practical terms

- Anybody can (has the right to) access acquired Sentinel data
- Licenses for the Sentinel data are free of charge
- Online access with users registration including acceptance of T&C*

* *TERMS AND CONDITIONS FOR THE USE AND DISTRIBUTION OF SENTINEL DATA*
available online on the Sentinel website
(https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Legal_Notice)

Copernicus Data Access & Redistribution



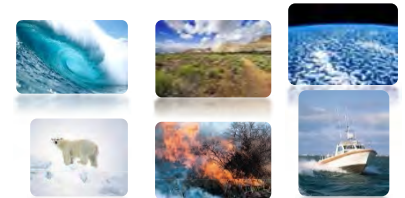
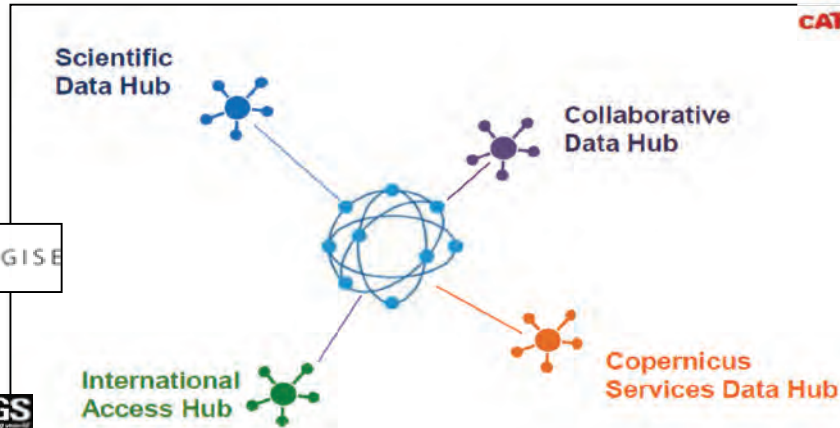
Private companies are re-distributing Sentinel products/images via free and pay-per-use schemes

The open access Data Hub, for anyone (82,000 users)

Collaborative mirror sites directly serve 900+ users (status end 2016)



As of spring 2016, international partners mirror sites have started disseminating towards own national communities



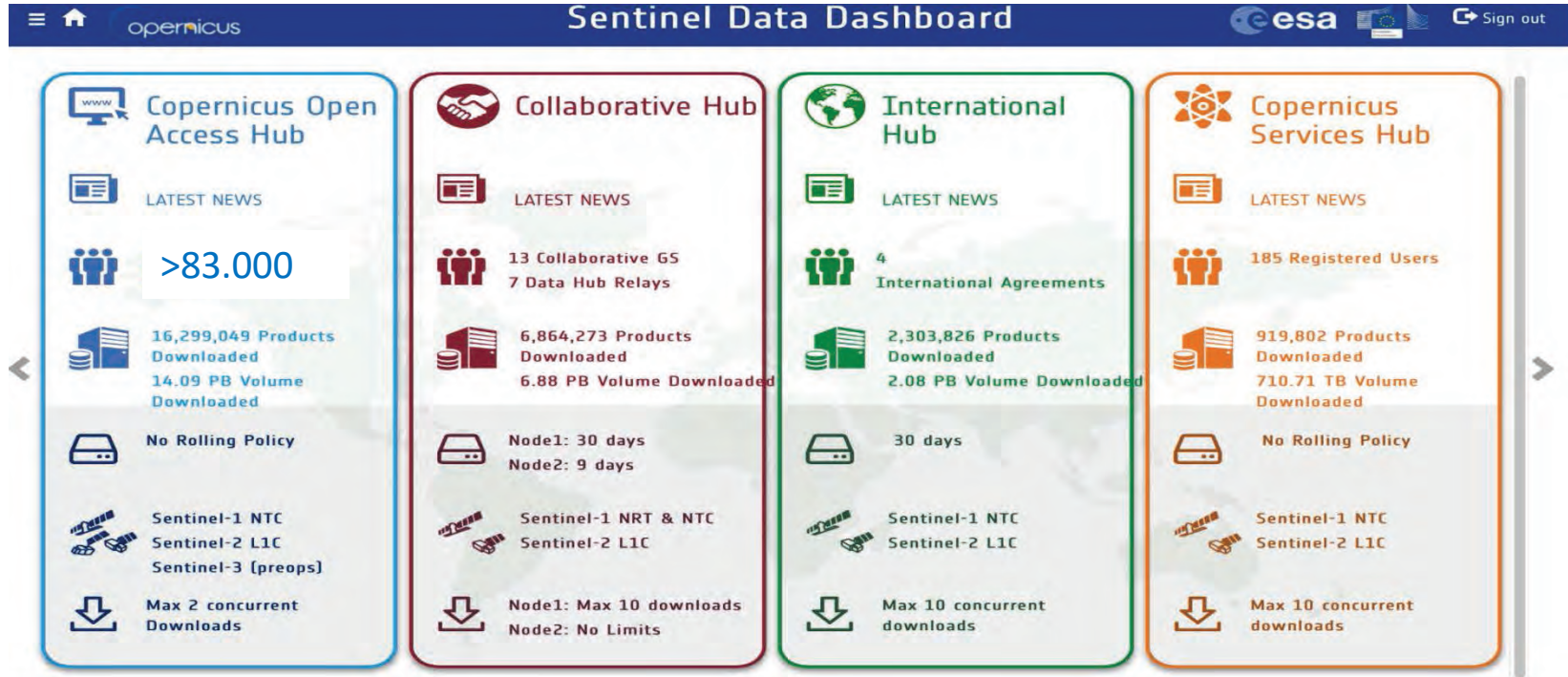
Copernicus services are providing their higher level products to ~10,000 users (status Q1 2016)

→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Sentinel Data Hubs – Configuration

Sentinel Data Hubs operated by ESA



→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Sentinel Data Access for Scientific Users | Open Access Hub

The free, full and open data policy adopted for the Copernicus programme foresees access available to all users for the Sentinel data products, via a simple registration.

Users can register and download Sentinel-1 data from the online Sentinel Data Hub (<https://scihub.copernicus.eu/>).

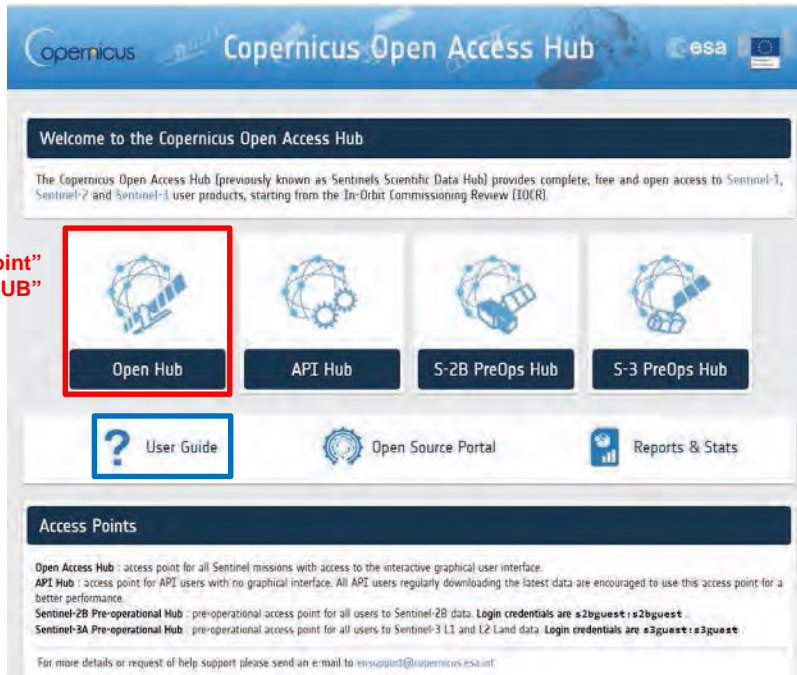
Anyone can register online via self-registration. The self-registration process is automatic and immediate. Registration grants access rights for searching and downloading Sentinels products. Sentinel-1 and Sentinel-2 (coming soon Sentinel-3) products are available at no cost for anybody. The data available through the Data Hub is governed by the Terms and Conditions of the use and distribution of Sentinel data, which the User is deemed to have accepted by using the Sentinel data.

More technical <https://scihub.copernicus.eu/userguide/>

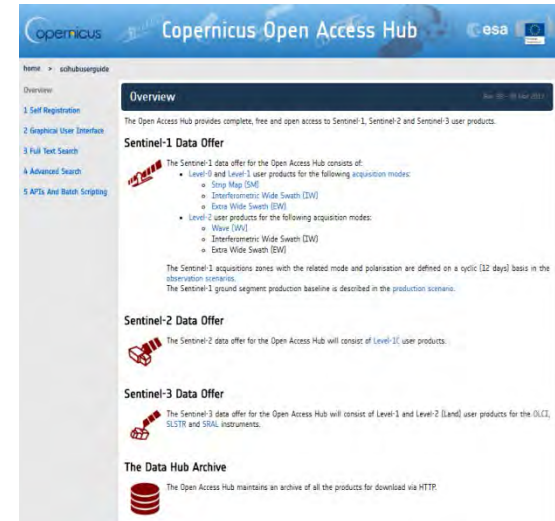
Copernicus (Sentinel) Open Access Hub (1/5)

S1/S2 and S3 data are available to all users via Sentinel Open Access Hub

“Access point”
click on “Open HUB”



User Guide

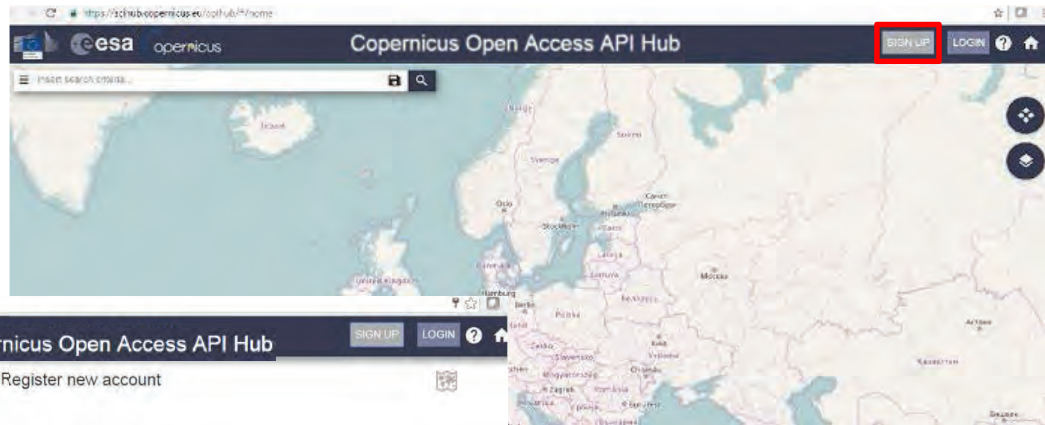


→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Copernicus (Sentinel) Open Access Hub (2/5)

If you are already registered log in to start using the Sentinel Hub geographic interface to browse and download Sentinel data, if you are a new user click on the **circled red** link “SIGN UP” to complete registration

A screenshot of the Copernicus Open Access API Hub registration page. The page title is 'Register new account'. It contains a registration form with fields for Firstname, Lastname, Username, Password, Confirm Password, E-mail, and Confirm E-mail. There are also dropdown menus for Select Domain, Select Usage, and Select Country. A blue arrow points to the form fields. At the bottom, there is a 'REGISTER' button and a disclaimer: 'By registering in this website you are deemed to have accepted the T&C for Sentinel data use.' The URL in the browser is 'https://scihub.copernicus.eu/ohub/#/self-registration'.

Fill this form to start registration procedure (username and e-mail address should be provided in lower case only) then you will receive a mail with a link to validate your mail address. Finally an administrator will be able to let you access to the Sentinel Data Hub.
Please note that by registering in this website you are deemed to have accepted the T&C for Sentinel data use.

https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Terms_and_Conditions

Copernicus (Sentinel) Open Access Hub (3/5)

Once completed registration you can log in and use the “Advanced search” criteria, start use Sentinel hub interface to search and download sentinels data .

Search criteria available:

- Draw region of interest
- Full text search
- Advanced search (product, type, acq.dates, etc.)



Sentinels Scientific Data Hub

The Sentinels Scientific Data Hub is a web based system designed to provide EO data users with distributed mirror archives and bulk dissemination capabilities for the Sentinels products.

Terms of Sentinels Scientific Data Hub portal and Data supply conditions

[illegible]

Full details on **Sentinel Online** at:

<https://sentinel.esa.int/>

Copernicus (Sentinel) Open Access Hub (4/5)

The screenshot displays the Copernicus Open Access API Hub interface. At the top, there is a search bar and a map of Europe. A red rectangle on the map highlights a specific area in Italy. Below the map, there is a list of search results for Sentinel-1 SAR data. The first result is selected, showing details like 'Request Done:', 'Download URL:', and 'Mission: Sentinel-1; Instrument: SAR-C; Sensing Date: 2016-02-27T16:41:03.872Z; Size: 7.05 GB'. A red box highlights the 'Download URL' and 'Mission' information. A red arrow points from the red box in the map to the red box in the search results.

Sentinels data are distributed using a SENTINEL-specific variation of the **Standard Archive Format for Europe (SAFE)** format

Select product of you interest and use the icons to (the **circled red** icons): Zoom in the map, view product details, move it in the 'Cart' or "Download product"



Click and download, shopping cart, batch download.
A maximum of 2 concurrent downloads per user is allowed in order to ensure a download capacity for all users.

Copernicus (Sentinel) Open Access Hub (5/5)

S1A_IW_SLC__1SDV_20160629T050338_20160629T050406_011921_0125CC_B765

[https://scihub.copernicus.eu/dhus/odata/v1/Products\('c5b258f-f985-4945-b77b-5f724985316b'\)/\\$value](https://scihub.copernicus.eu/dhus/odata/v1/Products('c5b258f-f985-4945-b77b-5f724985316b')/$value)

Footprint

Quicklook

Attributes

Summary

Date: 2016-06-29T05:03:38.922Z

Filename: S1A_IW_SLC__1SDV_20160629T050338_20160629T050406_011921_0125CC_B765.SAFE

Identifier: S1A_IW_SLC__1SDV_20160629T050338_20160629T050406_011921_0125CC_B765

Instrument: SAR-C

Mode: IW

Satellite: Sentinel-1

Size: 7.93 GB

Product

Platform

Inspector

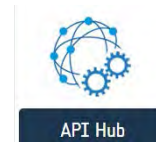
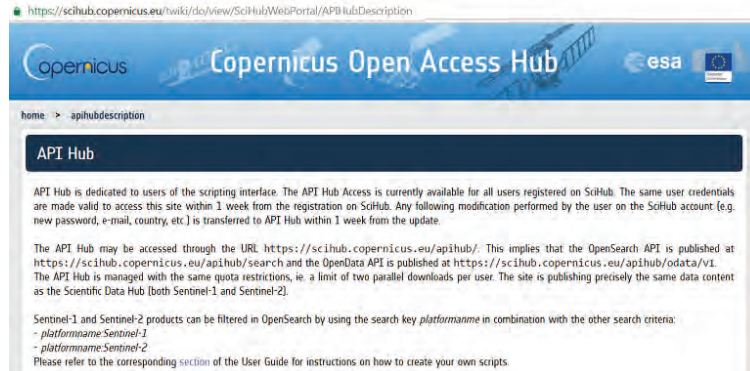
- S1A_IW_SLC__1SDV_20160629T050338_20160629T050406_011921_0125CC_B765.SAFE
 - annotation
 - measurement
 - preview
 - support
 - S1A_IW_SLC__1SDV_20160629T050338_20160629T050406_011921_0125CC_B765.SAFE-report-20160629T072914.pdf
 - manifest.safe

View product details is an online inspection of the searched products by browsing and pre-viewing the product metadata and measurements without downloading it. A preview panel displays information on the product contents and structure.

API Hub

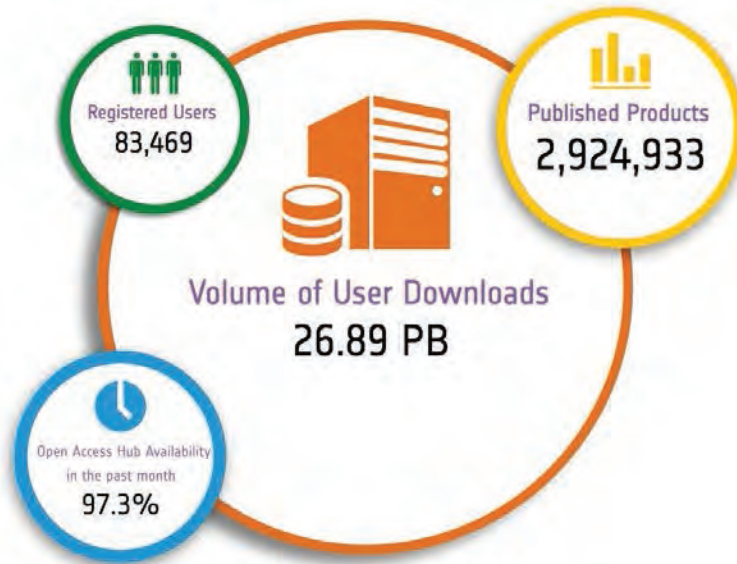
APIs And Batch ScriptingRev. The Data Hub exposes two dedicated Application Program Interfaces (API) for browsing and accessing the EO data stored in the rolling archive. The APIs are: [Open Data Protocol \(OData\)](#) & [Open Search \(Solr\)](#). The OData interface is a data access protocol built on core protocols like HTTP and commonly accepted methodologies like REST that can be handled by a large set of client tools as simple as common web browsers, download-managers or computer programs such as [cURL](#) or [Wget](#).

OpenSearch is a set of technologies that allow publishing of search results in a standard and accessible format. OpenSearch is RESTful technology and complementary to the OData. In fact, OpenSearch can be used to complementarily serve as the query aspect of OData, which provides a way to access identified or located results and download them.



API Hub : access point for API users with no graphical interface. All API users regularly downloading the latest data are encouraged to use this access point for a better performance.

Sentinel Open Access Data Hub



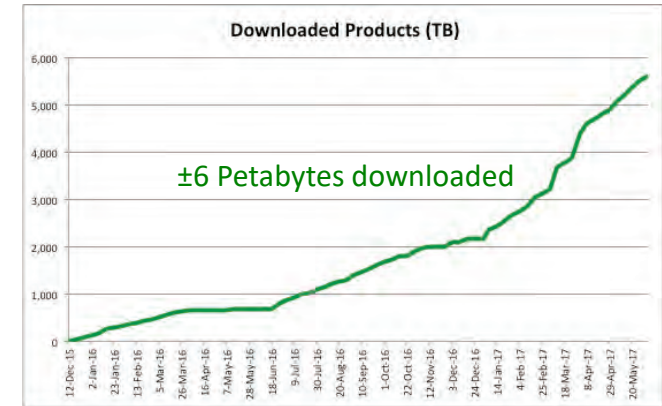
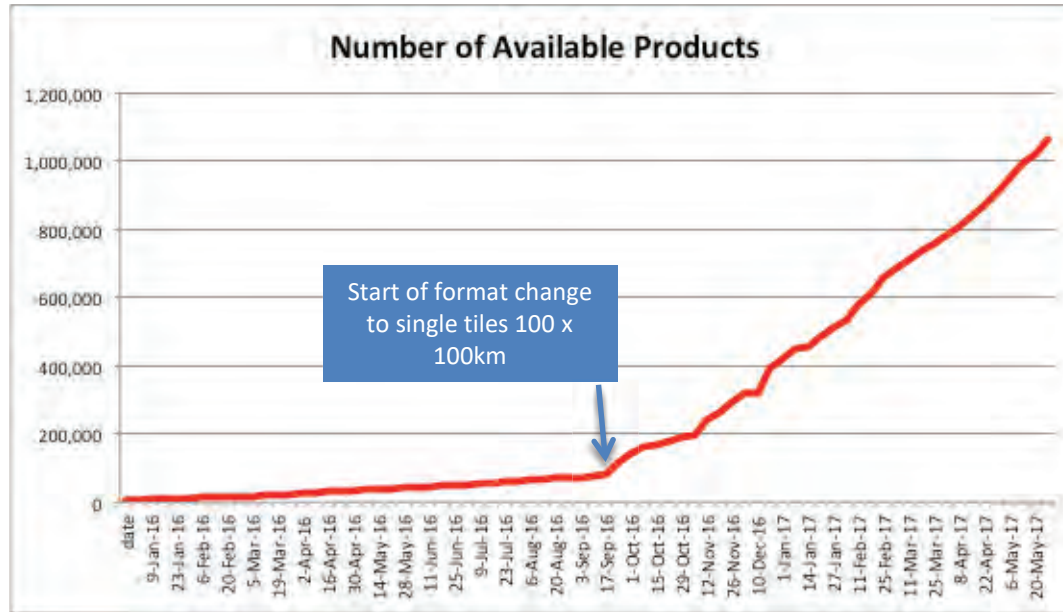
Stats on June 2017



→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary



Sentinel-2 Data Access (since Dec 2015)



More than 6.000.000 Sentinel-2 products downloaded by the time of S2B launch!

Annual Data Access Report online



<div> <div>  </div> <div> <p>Page 10/12</p> <p>CONFIDENTIALITY STATEMENT: Copernicus Data Access Annual Report (15/12/2018 – 30/11/2019)</p> <p>Doc. 00-28-2017</p> <p>History: 1 page 9</p> </div> </div>	
<div> <div>  </div> <div> <p>Page 10/12</p> <p>CONFIDENTIALITY STATEMENT: Copernicus Data Access Annual Report (15/12/2018 – 30/11/2019)</p> <p>Doc. 00-28-2017</p> <p>History: 1 page 9</p> </div> </div>	

SERCO PUBLIC

serco 

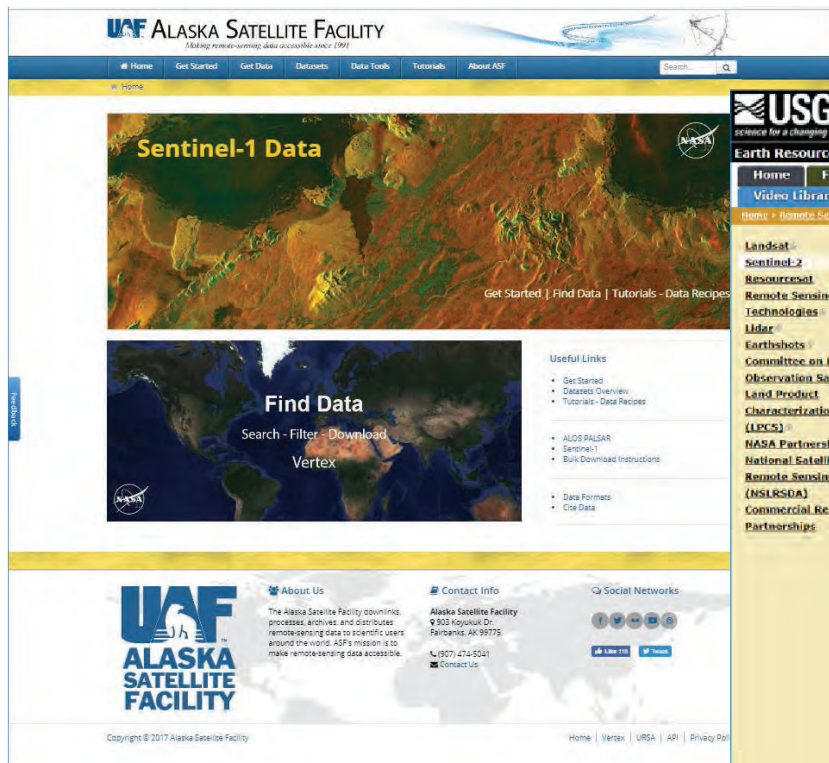
4.2	INTERNATIONAL TECHNICAL ARRANGEMENTS	44
4.2.1	REDISTRIBUTION STATISTICS	44
4.3	COMMERCIAL REDISTRIBUTORS	46
4.3.1	ENERGISE	46
4.3.2	CLOUDFERRO	46
5	DATA ACCESS SYSTEM PERFORMANCE ANALYSIS	47
5.1	AVAILABILITY	47
5.1.1	COPERNICUS OPEN ACCESS HUB FOCUS	48
5.2	PUBLICATION TIMELINESS	50
5.2.1	PUBLICATION OF RETROSPECTIVELY PROCESSED PRODUCTS	52
5.3	HUB SOFTWARE IMPROVEMENTS	53
5.3.1	PUBLICATION PERFORMANCE	53
5.3.2	RESPONSE TIME	54
6	USER EXPERIENCES	55
6.1	USER FEEDBACK	55
6.1.1	COPERNICUS OPEN ACCESS HUB AND COPERNICUS SERVICES HUB USER FEEDBACK	55
6.1.2	COLLABORATIVE GROUND SEGMENT PARTNER FEEDBACK	55
6.2	BANDWIDTH ANALYSIS	58
7	OUTLOOK	59
7.1	SENTINEL-3A BEGINNINGS	59
7.2	SHORT TERM PLANNED DEVELOPMENT	60
7.2.1	SCALABILITY	60
7.2.1	SENTINEL DATA DASHBOARD	60
7.2.1	OPEN SOURCE RELEASE	60
7.3	2017 OUTLOOK	61
8	BIBLIOGRAPHY	62

<https://sentinels.copernicus.eu/documents/247904/2955773/Sentinel-Data-Access-Annual-Report-2016>

→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

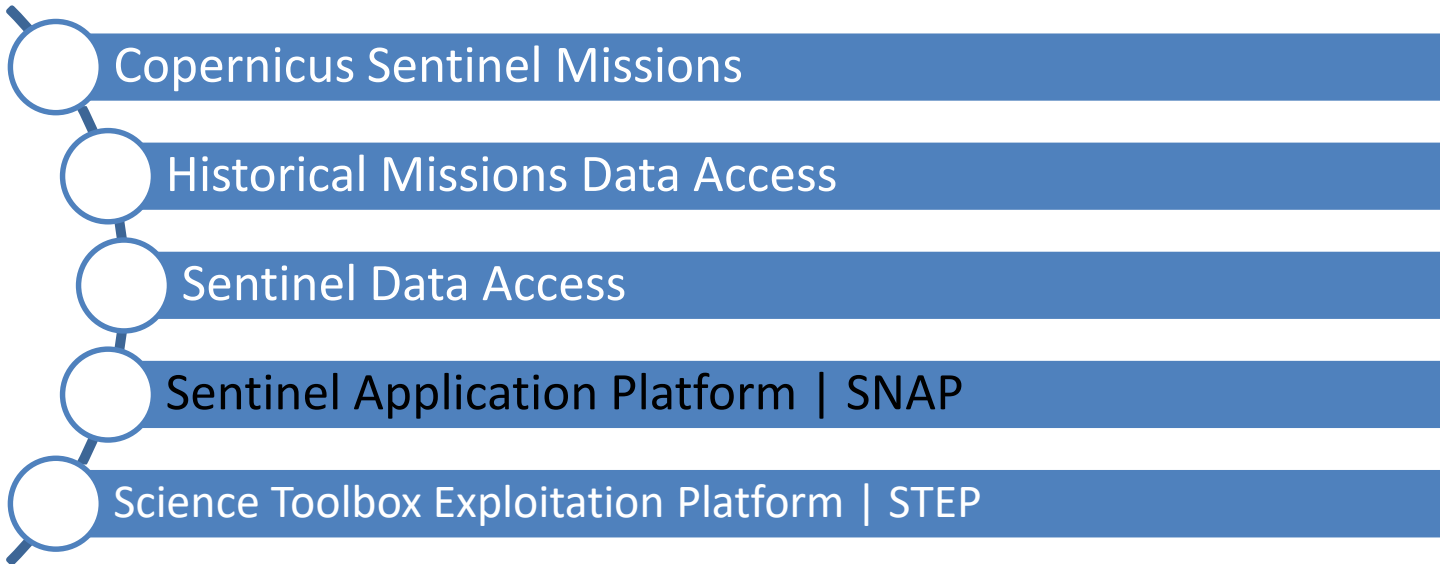
4-9 September 2017 | Szent István University | Gödöllő, Hungary

Copernicus Sentinel Data | Alternative Dissimination Sources



→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary



SNAP

- The common architecture for all **Sentinel Toolboxes** and **SMOS Toolbox** is called Sentinel Application Platform (SNAP).
- SNAP architecture is ideal for Earth Observation processing and analysis due the following technological innovations: Extensibility, Portability, Modular Rich Client Platform, Generic EO Data Abstraction, Tiled Memory Management and a Graph Processing Framework.

Activity initially funded through SEOM element of ESA's EOEP-4 (www.seom.esa.int)



SNAP Development History



ESA Polarimetric SAR Data Processing and Educational Tool



User Developed Plugins



Multi-Mission Scientific Platform

Development Consortia



→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Sentinel Application Platform | SNAP

☐ **SAR Toolbox (S1TBX)**

- Scientific toolbox for the handling and post-processing of data products from Sentinel-1 SAR mission

☐ **High Resolution Optical Toolbox (S2TBX)**

- Toolbox for the visualisation, analysis and post-processing of data products from Sentinel-2 multi-spectral optical data

☐ **Medium Resolution Optical Toolbox (S3TBX)**

- Toolbox for the processing and analysis of Sentinel 3 OLCI and SLSTR

☐ **Developer forum**

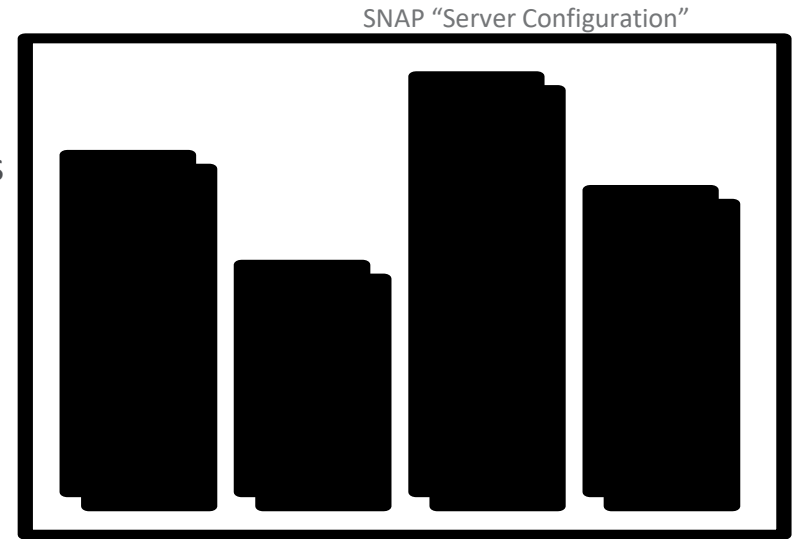
- Requirements addressing a common platform issues
- Define the platform roadmap
- Coordinate horizontal activities across the three toolboxes

SNAP Cardinal Requirements

- ☐ CR 1 Openness
- ☐ CR 2 Multi-mission support
- ☐ CR 3 Extendibility & Modularity
- ☐ CR 4 Portability
- ☐ CR 5 Easy operability
- ☐ CR 6 Building on heritage
- ☐ CR 7 Performance

Benefits of SNAP

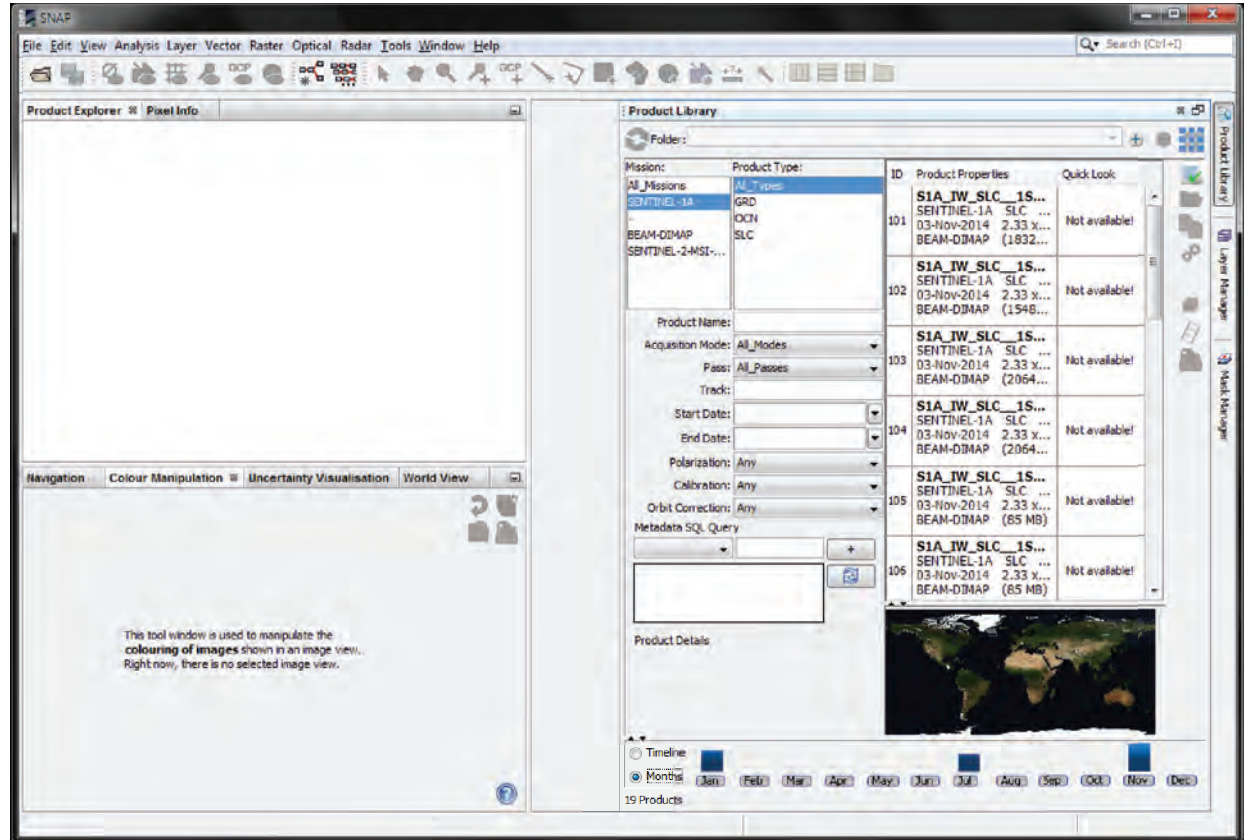
- Developed as open source software
- Common Java core framework
- Joint development plan for Sentinel toolboxes
- Interchangeable Java/Python plugins
- Portable engine to Cloud infrastructure
- Single installer





SNAP

All-in-One Environment



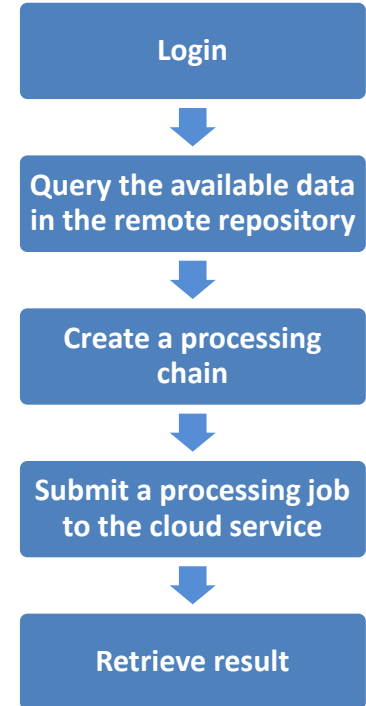
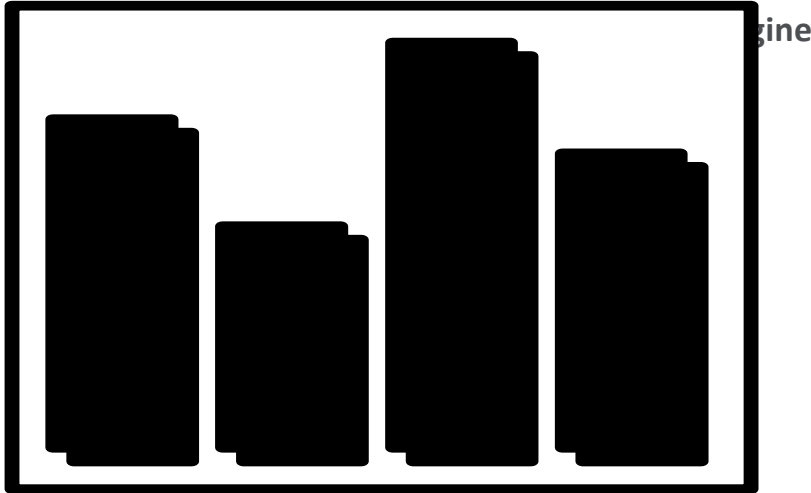
→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary

Cloud Exploitation Platform (CEP)

Smoothly utilize a **Cloud Computing Platform** where data repositories and high performance processing capabilities are available

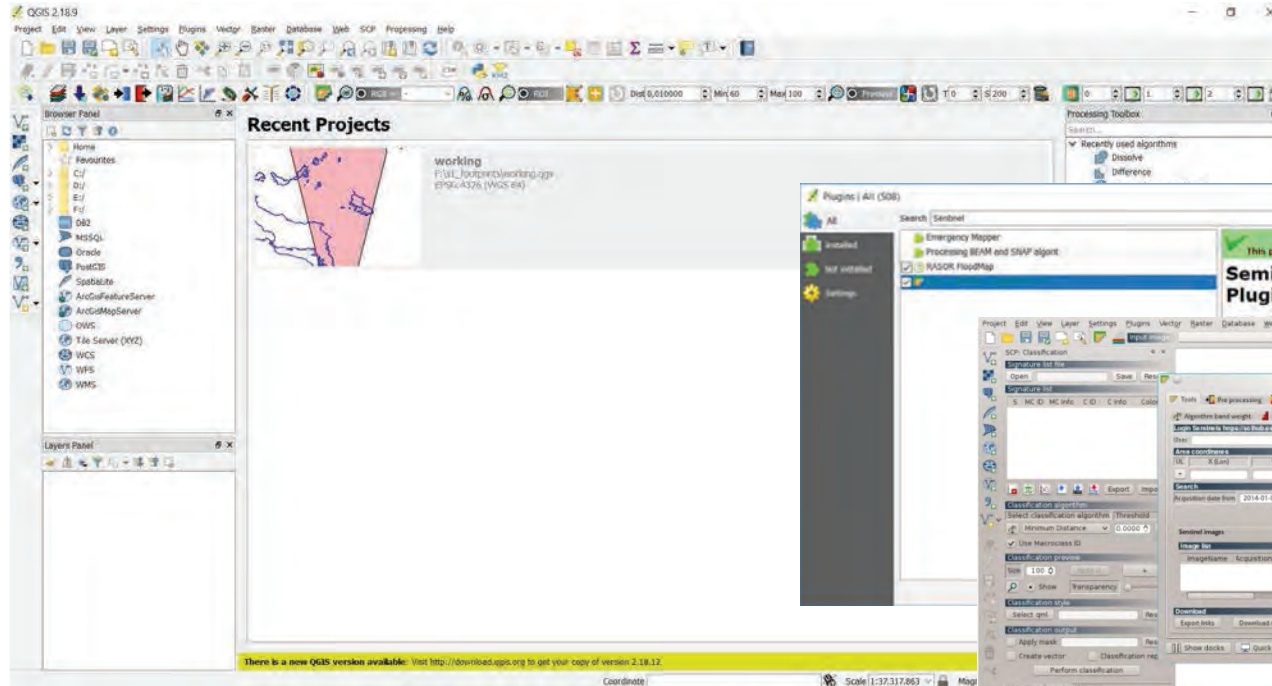
Facilitate entry into **Cloud Processing Services** through the familiar and user friendly graphical interface of the Toolboxes



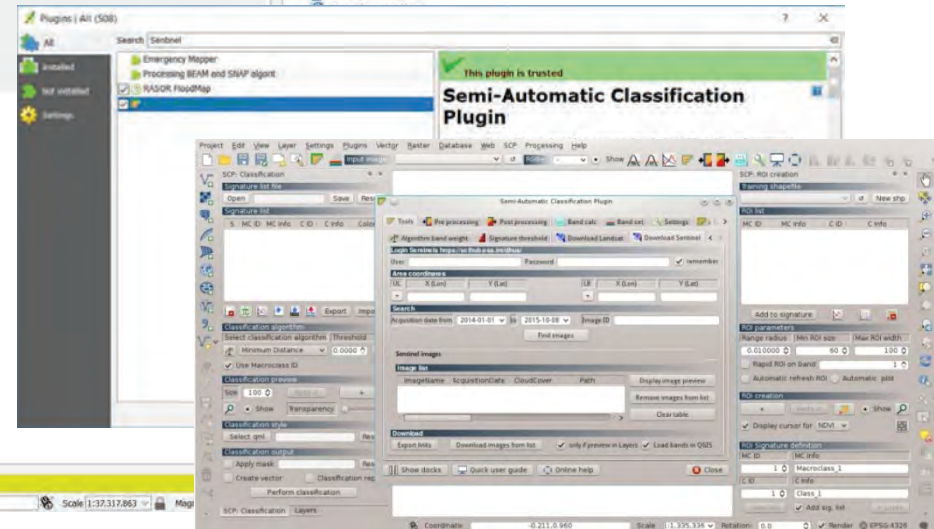
How to Measure Success

- ❑ The success of the Toolboxes can only be measured in terms of **user acceptance**.
- ❑ User acceptance is gained
 - if we provide the **tools that users need**;
 - if users **enjoy working with tools** we provide;
 - if we ensure that **these tools grow, improve and evolve** while they are being used;
 - if we **support and train the users** in using the tools;
 - if we **maintain the tools** and retain the efforts users already invested in understanding and applying the tools;
 - if we **let users participate** in a sustainable Toolbox development.

Third Party Sentinel Processing Tools | QGIS

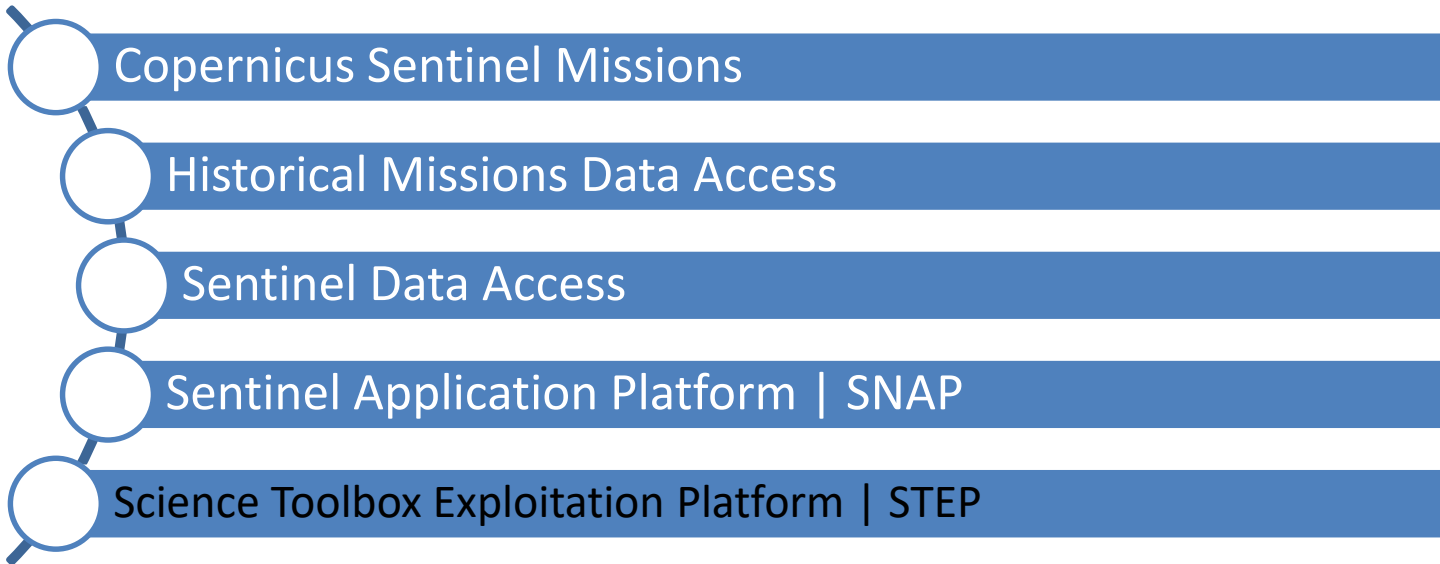


QGIS PLUGINS



→ 7th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

4–9 September 2017 | Szent István University | Gödöllő, Hungary





The screenshot shows the step.esa.int website. The navigation bar includes 'ESA', 'STEP', 'TOOLBOXES', 'DOWNLOAD', 'GALLERY', 'DOCUMENTATION', and 'COMMUNITY'. The 'TOOLBOXES' and 'DOWNLOAD' tabs are highlighted with red boxes. The main content area features a search bar, a 'seom' logo, and a section titled 'multimission scientific toolboxes'. Below this, there is a paragraph about ESA's free open source toolboxes for Earth Observation missions. A grid of icons represents various features: SNAP Features, Download, Tutorials, Community, Documentation, Developers, Gallery, and Blog. At the bottom, there is a section titled 'SIA Country Mosaic of Romania' with a satellite image and a 'View More' button.

SNAP Download page Information on Sentinel Toolboxes' Access to Beta versions for testing development including Frequently Asked Questions (FAQs)



The screenshot shows the SNAP Download page on step.esa.int. The navigation bar is the same as the previous screenshot. The main content area is titled 'Download' and includes a search bar, a 'seom' logo, and a section titled 'Download'. Below this, there is a paragraph about downloading the latest installers for SNAP and the Sentinel Toolboxes. A 'Previous Versions' section lists older releases. An 'Installers' section provides information about the current installers for Windows, macOS, and Linux. A 'Beta' section mentions the current version is in beta stages. A 'Feedback' section encourages users to provide feedback. At the bottom, there is a form for 'Your Name (required)' and 'Your Email (required)', a 'Send' button, and a 'Sources' section.



The screenshot shows the 'step' science toolbox exploitation platform website. The navigation bar includes links for ESA, STEP, TOOLBOXES, DOWNLOAD, GALLERY, DOCUMENTATION (highlighted with a red box), and COMMUNITY. The main content area displays 'multimission scientific toolboxes' and a list of results obtained thanks to the Sentinel Toolboxes, including a 'S1A Country Mosaic of Romania'.

step
science toolbox exploitation platform

ESA STEP TOOLBOXES DOWNLOAD GALLERY DOCUMENTATION COMMUNITY

Home > Scientific Toolbox Exploitation Platform

multimission scientific toolboxes

ESA is developing free open source toolboxes for the scientific exploitation of Earth Observation missions under the Scientific Exploitation of Operational Missions (SEOM) programme element. STEP is the ESA community platform for accessing the software and its documentation, communicating with the developers, dialoguing within the science community, promoting results and achievements as well as providing tutorials and material for training scientists using the Toolboxes.

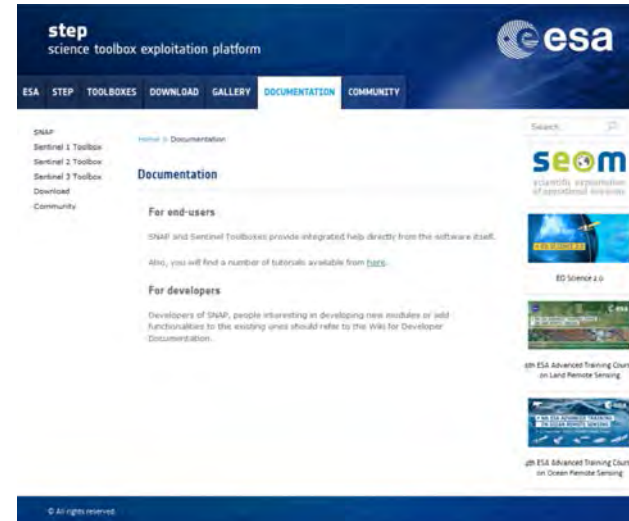
The ESA toolboxes support the scientific exploitation for the ERS-ENVISAT missions, the Sentinels 1/2/3 missions and a range of National and Third Party missions. The three toolboxes are called respectively Sentinel 1, 2 and 3 Toolboxes and share a common architecture called SNAP. They contain some functionalities of historical toolboxes such as BEAM, NEST and Orfeo Toolbox that were developed over the last years.

SNAP Features
Download
Tutorials
Community
Documentation
Developers
Gallery
Blog

The following results have been obtained thanks to the Sentinel Toolboxes :

S1A Country Mosaic of Romania
A dual polarization colour composite of entire Romania using fifteen Sentinel-1A SAR products acquired between October and November 2014.
View More

Technical documentation for both end-users and developers



The screenshot shows the 'step' science toolbox exploitation platform website with the 'DOCUMENTATION' tab highlighted. The content is divided into 'For end-users' and 'For developers' sections, providing information on how to access the toolboxes and their documentation.

step
science toolbox exploitation platform

ESA STEP TOOLBOXES DOWNLOAD GALLERY DOCUMENTATION COMMUNITY

Home > Documentation

Documentation

For end-users

SNAP and Sentinel Toolboxes provide integrated help directly from the software itself. Also, you will find a number of tutorials available from [here](#).

For developers

Developers of SNAP, people interested in developing new modules or add functionalities to the existing ones should refer to the [links](#) for Developer Documentation.

EO Science 1.0
4th ESA Advanced Training Course on Land Remote Sensing
4th ESA Advanced Training Course on Ocean Remote Sensing

EO Science 1.0
4th ESA Advanced Training Course on Land Remote Sensing
4th ESA Advanced Training Course on Ocean Remote Sensing

© All rights reserved.

step.esa.int

Science Toolbox Exploitation Platform

step
science toolbox exploitation platform

ESA STEP TOOLBOXES DOWNLOAD GALLERY DOCUMENTATION COMMUNITY

Home > Scientific Toolbox Exploitation Platform

multimission scientific toolboxes

ESA is developing **free open source toolboxes** for the scientific exploitation of Earth Observation missions under the Scientific Exploitation of Operational Missions (SEOM) programme element. **STEP** is the ESA community platform for accessing the software and its documentation, communicating with the developers, dialoguing within the science community, promoting results and achievements as well as providing tutorials and material for training scientists using the Toolboxes.

The ESA toolboxes support the **scientific exploitation** for the ERS-ENVISAT missions, the **Sentinels 1/2/3** missions and a range of **National and Third Party** missions. The three toolboxes are called respectively **Sentinel 1**, **2** and **3** Toolboxes and share a common architecture called **SNAP**. They contain some functionalities of historical toolboxes such as **BEAM**, **NEST** and **Orfeo** Toolbox that were developed over the last years.

Tutorials

The following results have been obtained thanks to the Sentinel Toolboxes :

S1A Country Mosaic of Romania

A dual polarization colour composite of entire Romania using fifteen Sentinel-1A GRCH products acquired between October and November 2014.

[View More](#)

Step-by-step tutorials including YouTube videos

step
science toolbox exploitation platform

ESA STEP TOOLBOXES DOWNLOAD GALLERY DOCUMENTATION COMMUNITY

Home > Documentation > Tutorials > Sentinel-1 Toolbox Tutorials

Sentinel-1 Toolbox Tutorials

[SAR Basics with the Sentinel-1 Toolbox](#)

[Sentinel-1 Stripmap Interferometry](#)

[Sentinel-1 TOPSAR Interferometry](#)

[Radarsat-2 Interferometry](#)

[SAR Polarimetry](#)

[ALOS Orthorectification](#)

Video Tutorials

S1TBX Introduction

S1TBX Intro

4th ESA Advanced Training Course on Land Remote Sensing

4th ESA Advanced Training Course on Ocean Remote Sensing

step.esa.int

Science Toolbox Exploitation Platform

step
science toolbox exploitation platform

ESA **STEP** TOOLBOXES DOWNLOAD GALLERY DOCUMENTATION COMMUNITY

• SNAP
• Sentinel 1 Toolbox
• Sentinel 2 Toolbox
• Sentinel 3 Toolbox
• Download
• Community

Home > Scientific Toolbox Exploitation Platform

multimission scientific toolboxes

ESA is developing **free open source toolboxes** for the scientific exploitation of Earth Observation missions under the the Scientific Exploitation of Operational Missions (SEOM) programme element. **STEP** is the ESA community platform for accessing the software and its documentation, communicating with the developers, dialoguing within the science community, promoting results and achievements as well as providing tutorials and material for training scientists using the Toolboxes.

The ESA toolboxes support the **scientific exploitation** for the ERS-ENVISAT missions, the **Sentinels 1/2/3** missions and a range of **National and Third Party** missions. The three toolboxes are called respectively **Sentinel 1**, **2** and **3** Toolboxes and share a common architecture called **SNAP**. They contain some functionalities of historical toolboxes such as BEAM, NEST and Orfeo Toolbox that were developed over the last years.

SNAP Features Download Tutorials **Community** Documentation Developers Gallery Blog

The following results have been obtained thanks to the Sentinel Toolboxes :

S1A Country Mosaic of Romania
A dual polarization colour composite of entire Romania using fifteen Sentinel-1A GRDH products acquired between October and November 2014.
[View More](#)

Technical forum, gathering user feedback and communicating results

step forum

all categories Categories Latest Top

Categories	Topics
s1tbx	<p>Completing Sentinel-1 SLC data 1</p> <p>Automatic Fringes in Cape Verde Tundra TOPSAR interferogram 3</p> <p>Sentinel-1 toolbox memory increase 1</p> <p>This S1 Toolbox category regroups all threads about the Sentinel-1 Toolbox, as well as results or proposals.</p> <p>Position Reports User Community Priority</p>
s2tbx	<p>Sentinel-2 toolbox and data processing 1</p> <p>Can't read S2 commissioning sample data 1</p> <p>Reading S2 L1B in Windows causes a just long file/directory path in Linux 2</p> <p>This S2 Toolbox category regroups all threads about the Sentinel-2 Toolbox, as well as results or proposals. National and Third Party missions are also welcome to discuss their Sentinel-2 Toolbox in this category.</p>
s3tbx	<p>GLD 1.1 header problem 1</p> <p>Deploying GDAL compiler for Sentinel-3 data 2</p> <p>This S3 Toolbox category regroups all threads about the Sentinel-3 Toolbox, as well as results or proposals for Sentinel-3 GLD, S3 L1B, S3 L2 & S3 L3.</p>
snap	<p>Reader - API 1</p> <p>SNAP 2.0 beta 14 2</p> <p>Where is snap? 5</p> <p>This category contains all topics about the Common Toolbox Architecture (CTA) not related to a specific Sentinel Toolbox.</p>

As an open source software, the maintainers of SNAP and the Sentinel Toolboxes welcome code contribution and bug fixes.

The entry point for developers is [here](#).

Issue tracker
You just found a bug? Or maybe you want to report about this wonderful idea you just had for a future release? We welcome reports for issues and feature requests!

Issue tracking is provided by Jira and is located [here](#).

Thank you