

→ 8th ADVANCED TRAINING COURSE ON LAND REMOTE SENSING

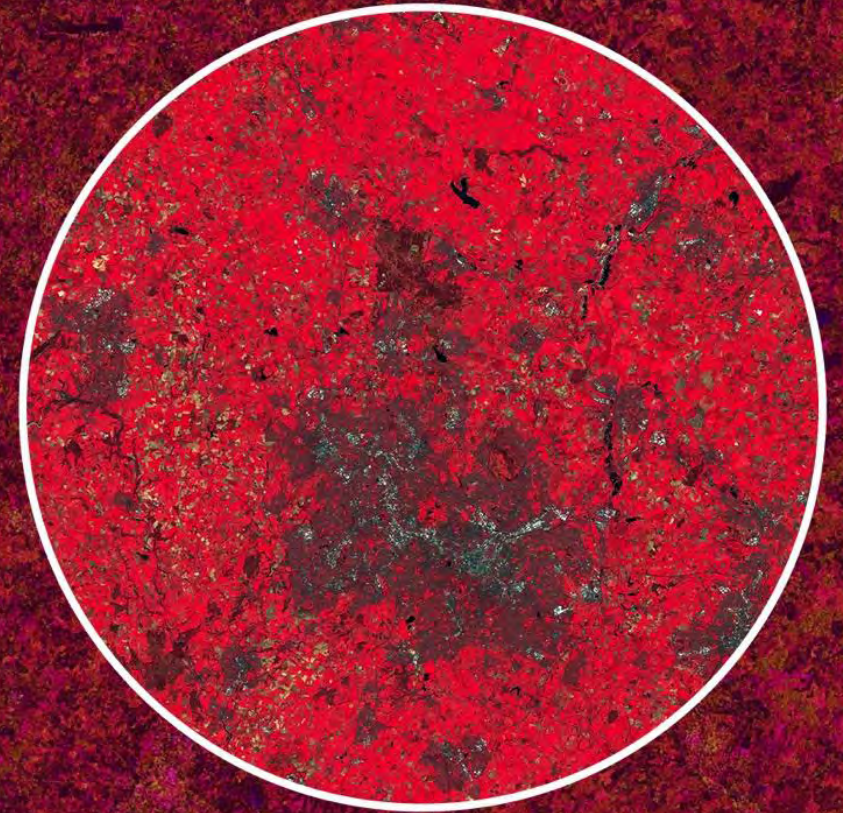
10–14 September 2018

University of Leicester | United Kingdom

Sentinel and ESA Third-Party Mission
data access and processing tools

Magdalena Fitrzyk RSAC c/o ESA ESRIIN

11/09/2018



Content



- Copernicus Sentinel missions
- Copernicus Open Access Hub: Sentinels Data Access
- Overview of historical ESA missions (ERS & ENVISAT) and data access
- Third-Party Mission Data Access
- Sentinels Processing: SNAP toolbox & STEP forum

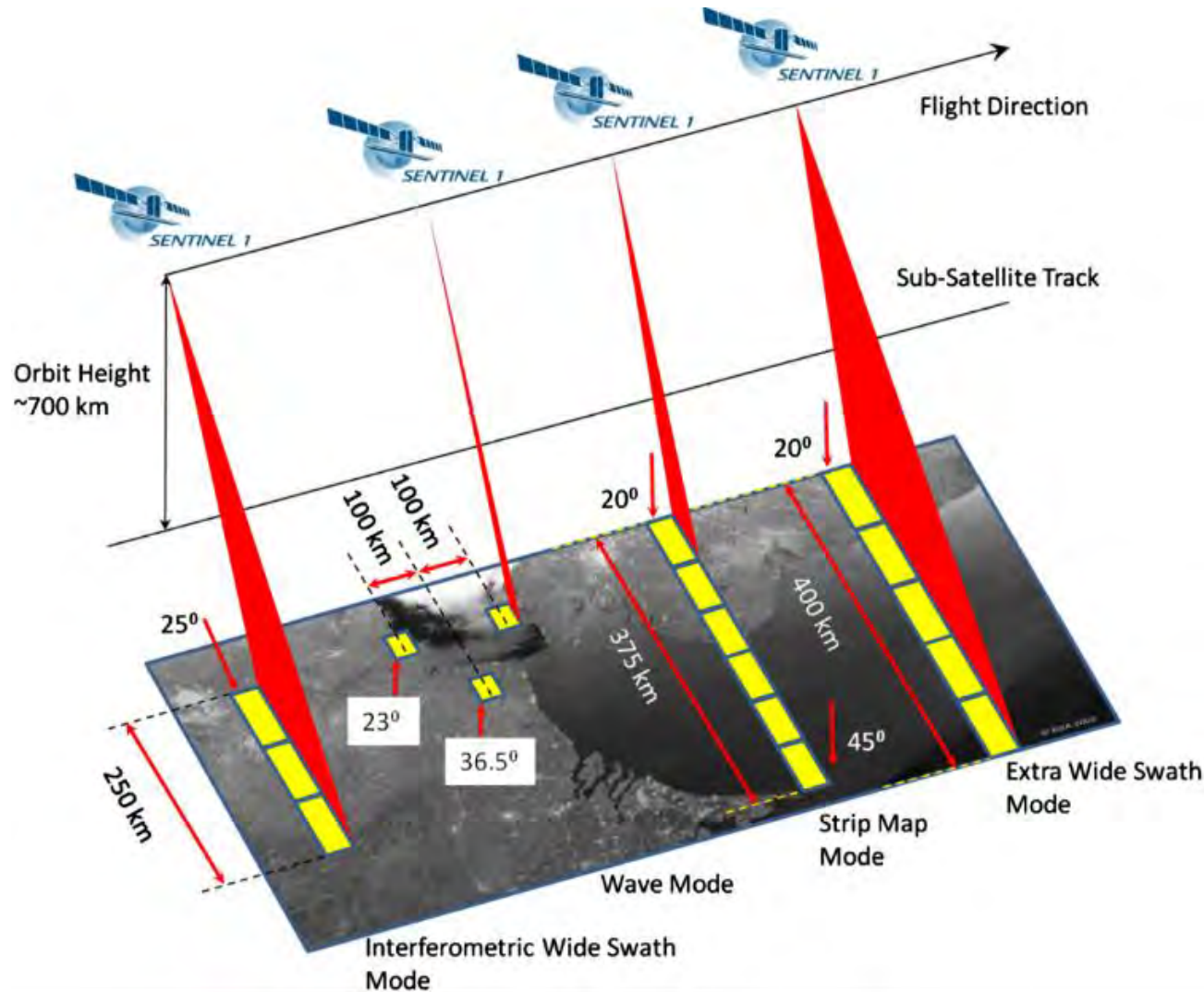
The family of Copernicus Sentinel missions



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Copernicus Sentinel-1 mission



SENTINEL-1 operates in four exclusive [acquisition modes](#):

- Stripmap (SM)
- Interferometric Wide swath (IW)
- Extra-Wide swath (EW)
- Wave mode (WV).

Acquisition mode	Resolution (1 look)	Swath Width	Polarisation
EW	20 x 40 m ²	> 400 km	HH+HV or VV+VH
IW	5 x 20 m ²	> 250 km	HH+HV or VV+VH
SM	5 x 5 m ²	> 80 km	HH+HV or VV+VH
WV	5 x 5 m ²	20 x 20 km ² at 100 km spacing	HH or VV

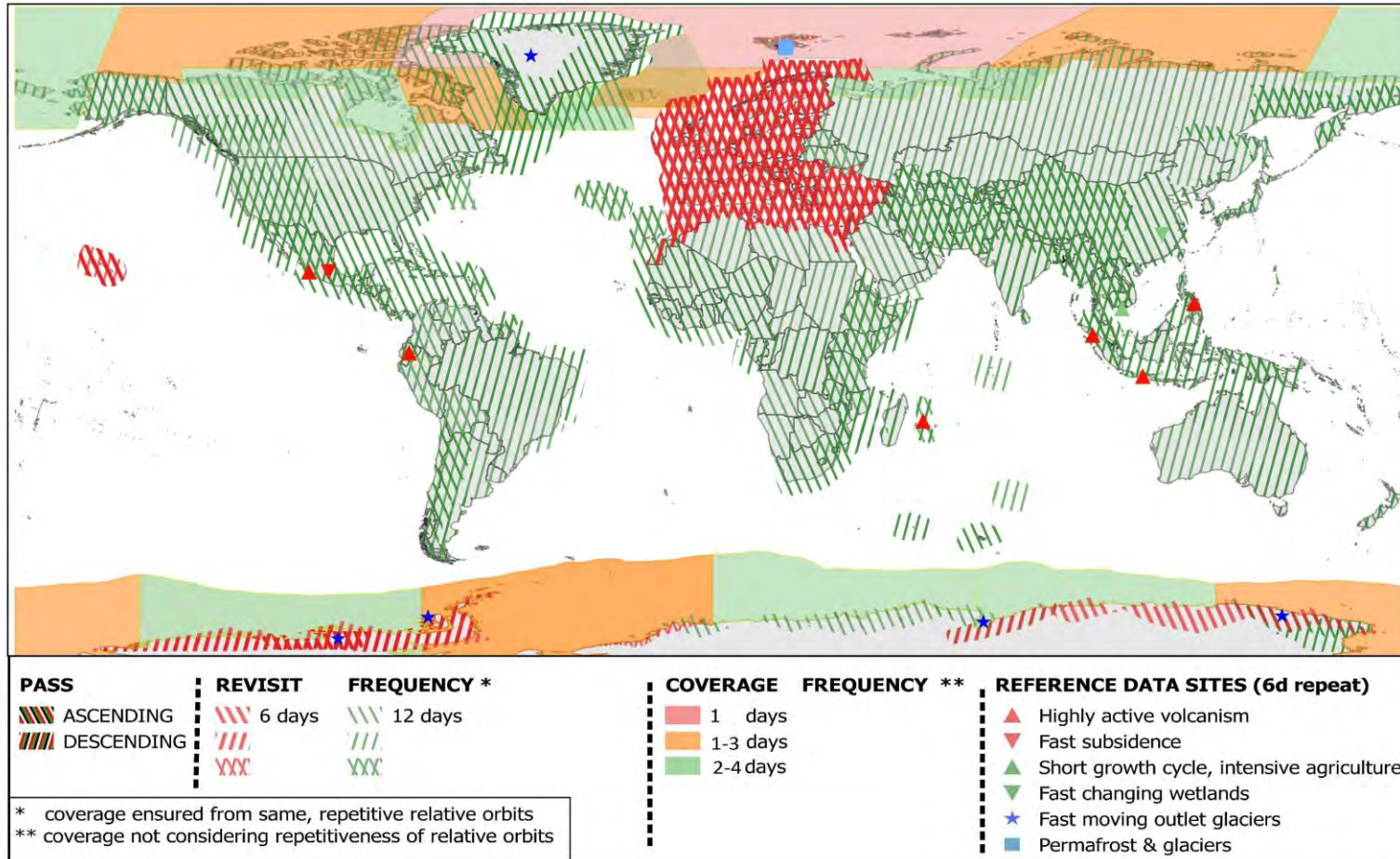
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Sentinel-1 observation scenario



Sentinel-1 Constellation Observation Scenario: Revisit & Coverage Frequency

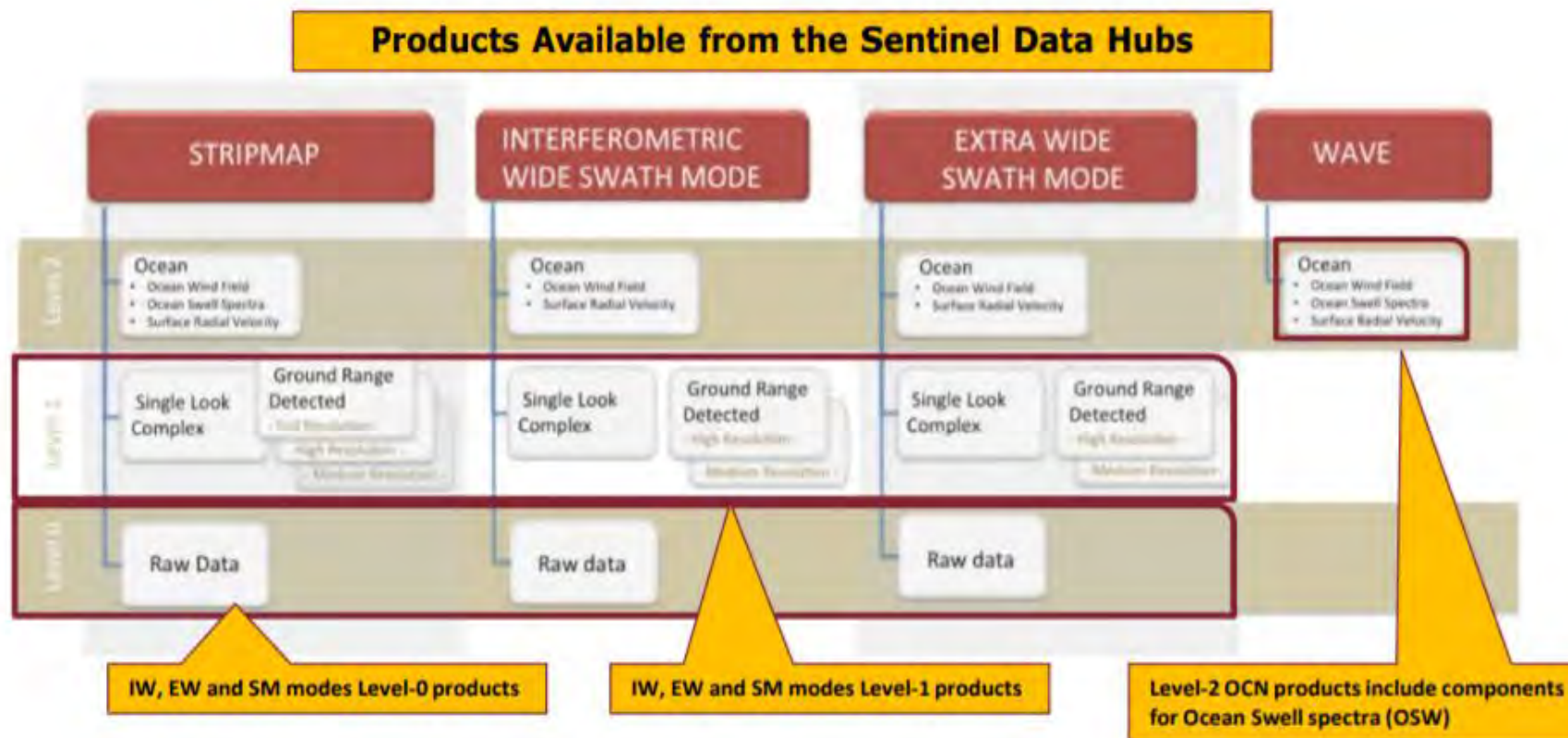


- Europe covered systematically every cycle, ascending and descending pass, IW mode, dual polarisation
- HH or HH-HV for polar areas, sea-ice zones
- VV-VH or VV polarization for all other observation zones

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Sentinel-1 data availability



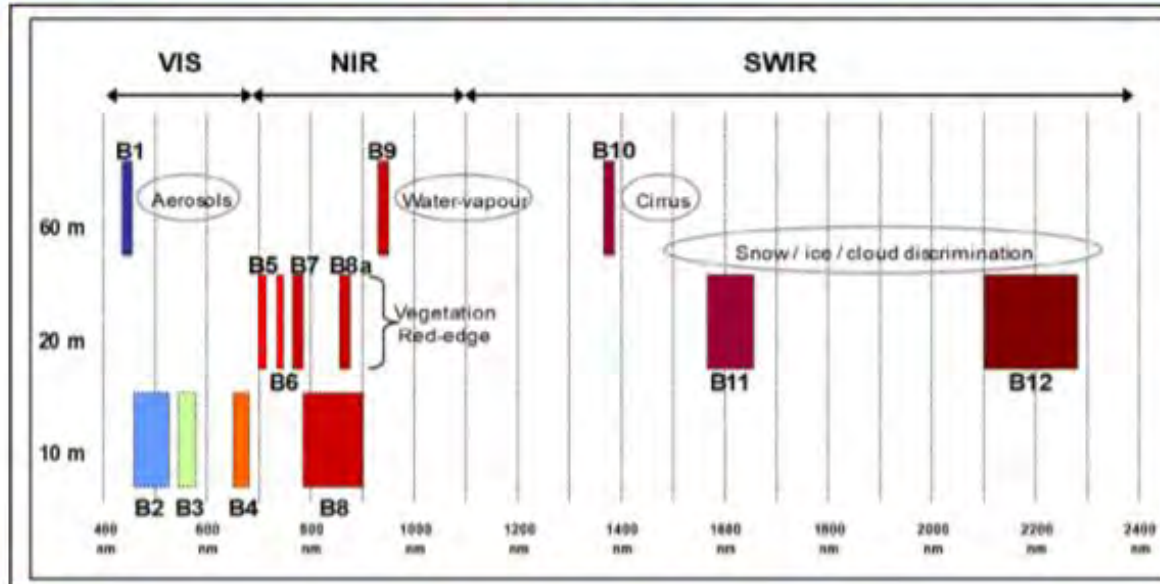
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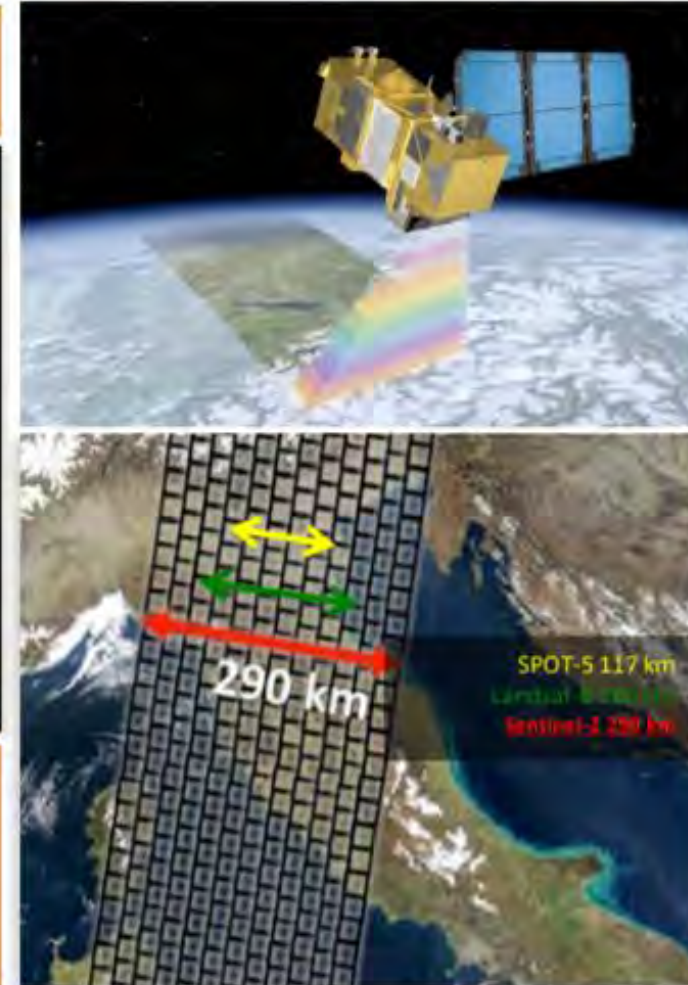
Copernicus Sentinel-2 mission



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



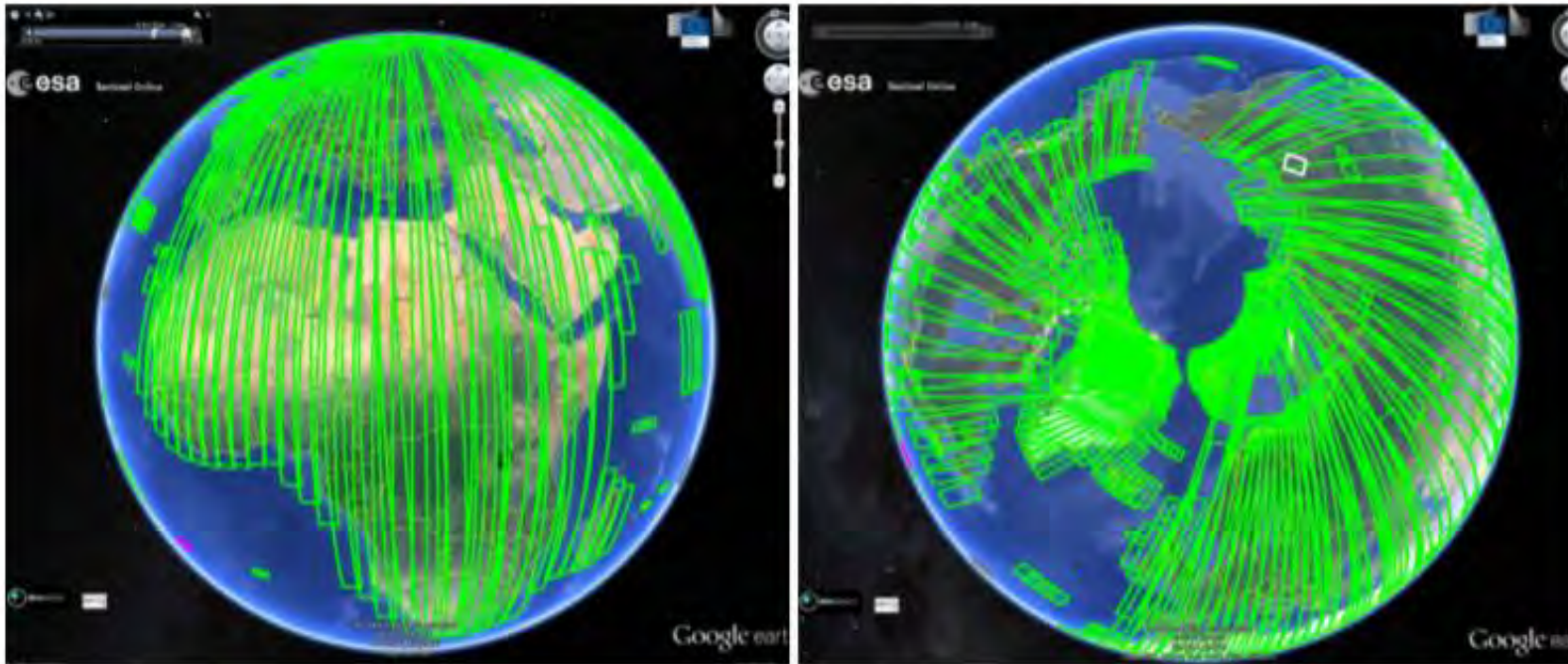
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Sentinel-2 observation scenario

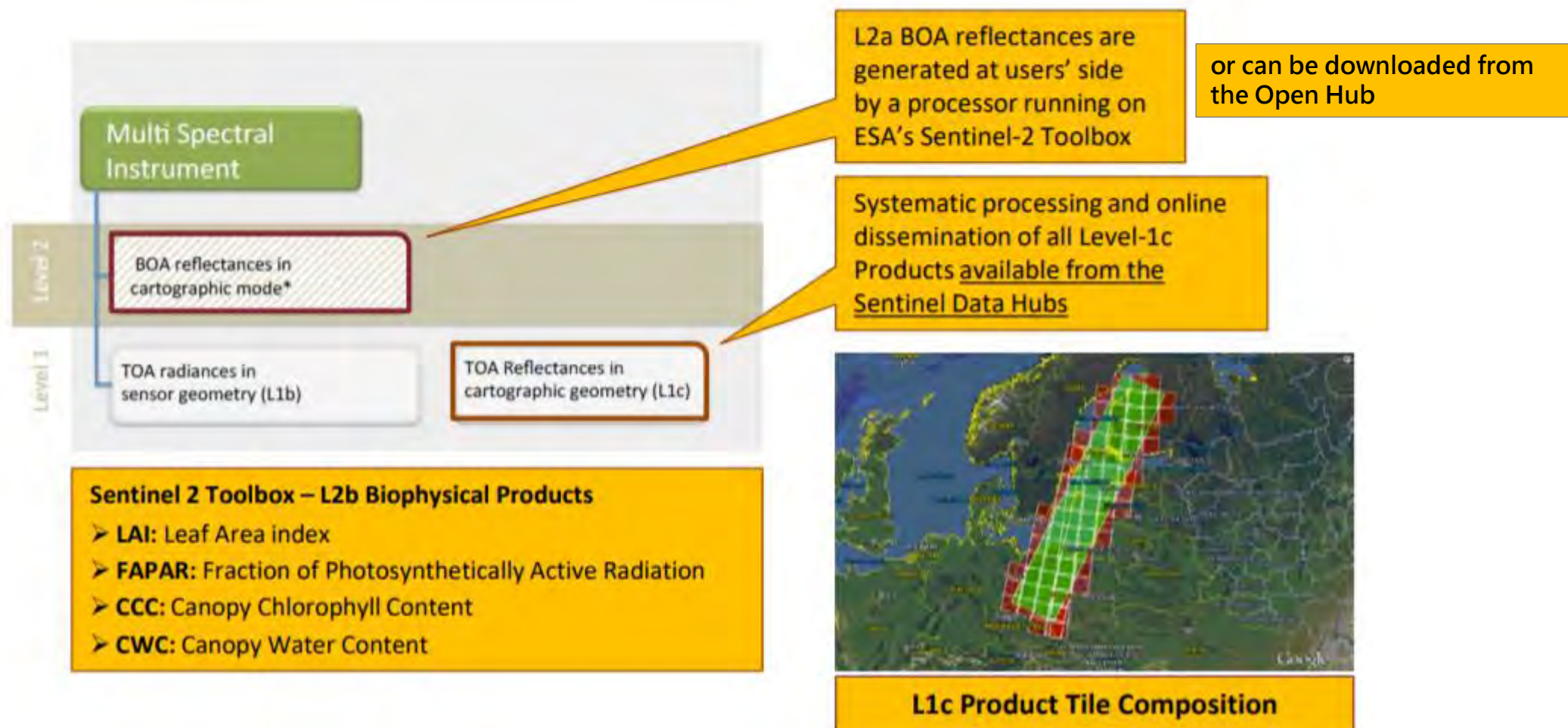


- Sentinel-2 systematically acquires data over land and coastal areas (in a band of latitude from 56° South to 84° North)
- Additionally the scenario includes observations following member States or Copernicus Services requests.

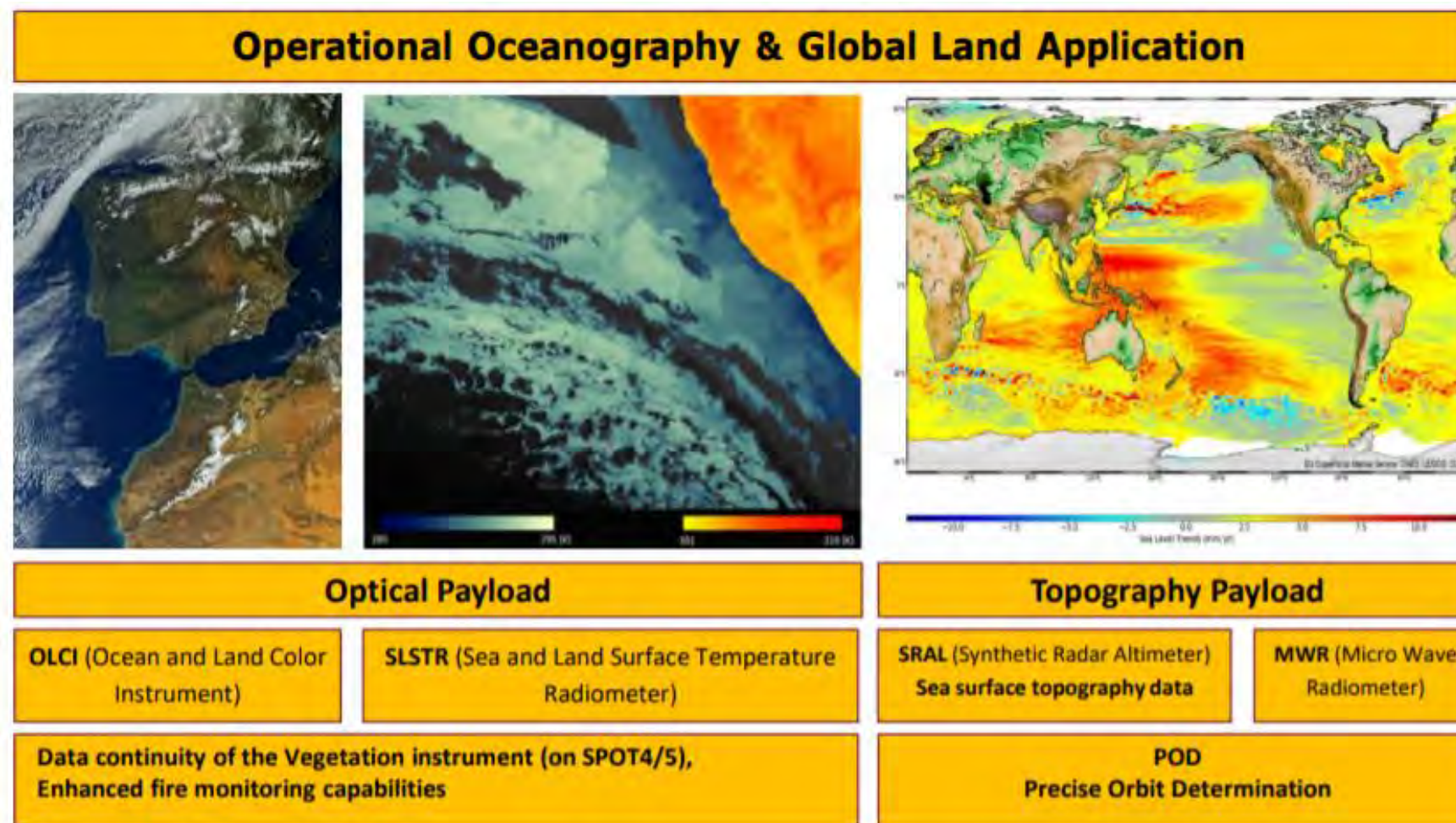


- High Revisit (10 days) at the equator with one satellite;
- 5 days with 2 satellites (2-3 days at mid latitudes)

Sentinel-2 data availability



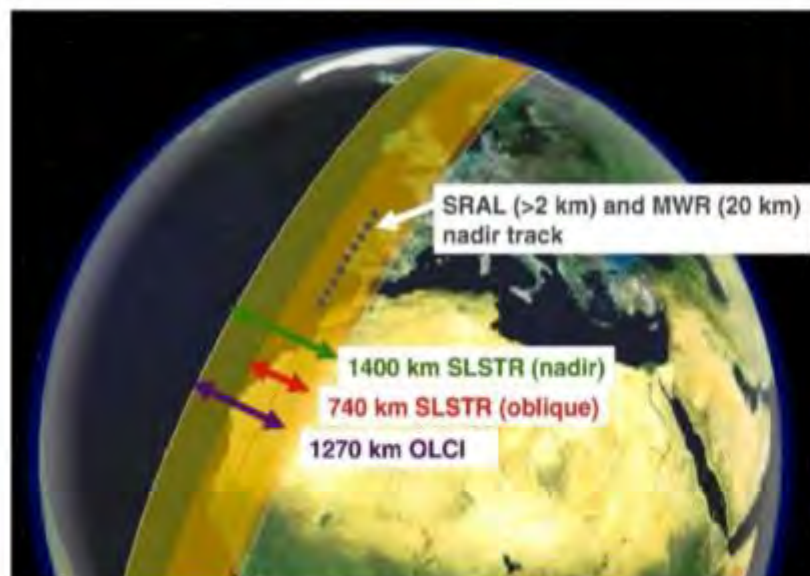
Copernicus Sentinel-3 mission



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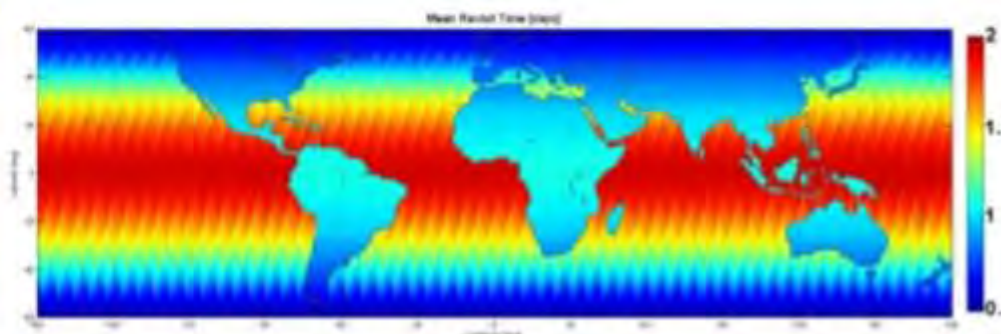
Sentinel-3 observation scenario



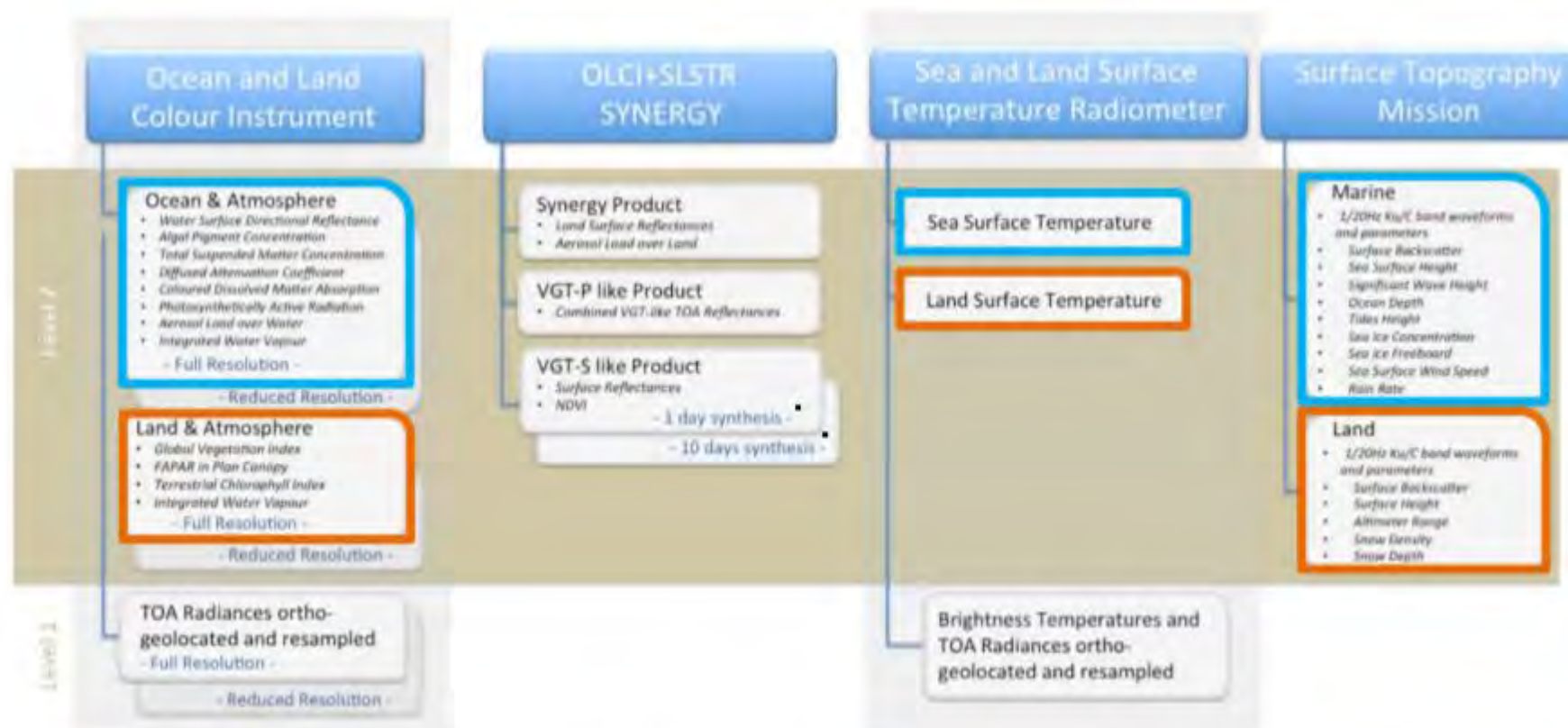
- Sentinel 3 Systematic Processing and dissemination in NRT
- The OLCI instrument acquires data over daylight part of the orbit
- SLSTR, SRAL and MWR acquired data over the whole orbit

Revisit at Equator

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



Sentinel-3 data availability



ESA disseminates the S-3
L1 & L2 Land Products



Eumetsat disseminates the S-3
L1 & L2 Marine Products

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Copernicus Open Access Hub: Sentinels



<https://scihub.copernicus.eu/>

The screenshot shows the Copernicus Open Access Hub website. At the top, there's a header with the Copernicus logo, the text 'Copernicus Open Access Hub', and the ESA and European Union flags. Below the header, a dark blue banner reads 'Welcome to the Copernicus Open Access Hub'. A text box below explains that the hub provides complete, free and open access to Sentinel-1, Sentinel-2, and Sentinel-3 user products. A row of four buttons is displayed: 'Open Hub' (circled in red), 'API Hub', 'S-3 PreOps Hub', and 'GNSS Hub'. Below these buttons are links for 'User Guide', 'Open Source Portal', and 'Reports & Stats'. At the bottom, an 'Access Points' section provides details for each hub type and login credentials.

Welcome to the Copernicus Open Access Hub

The Copernicus Open Access Hub (previously known as Sentinels Scientific Data Hub) provides complete, free and open access to [Sentinel-1](#), [Sentinel-2](#) and [Sentinel-3](#) user products, starting from the In-Orbit Commissioning Review (IOCR).

Open Hub **API Hub** **S-3 PreOps Hub** **GNSS Hub**

User Guide **Open Source Portal** **Reports & Stats**

Access Points

Open Access Hub : access point for all Sentinel missions with access to the interactive graphical user interface.

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-3A Pre-operational Hub : pre-operational access point for all users to Sentinel-3 L1 and L2 Land data. **Login credentials are s3guest:s3guest**.

Sentinels GNSS Rinex Pre-operational Hub : pre-operational access point for all users to the GNSS L1b products in Rinex format of all the Sentinel platforms in operations. **Login credentials are gnssguest:gnssguest**

For more details or request of help support please send an e-mail to eosupport@copernicus.esa.int

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esa opernicus Copernicus Open Access Hub

SIGN UP LOGIN ?

Insert search criteria...

Advanced Search Clear

» Sort By: Ingestion Date

» Order By: Descending

» Sensing period From: to:

» Ingestion period From: to:

☐ Mission: Sentinel-1

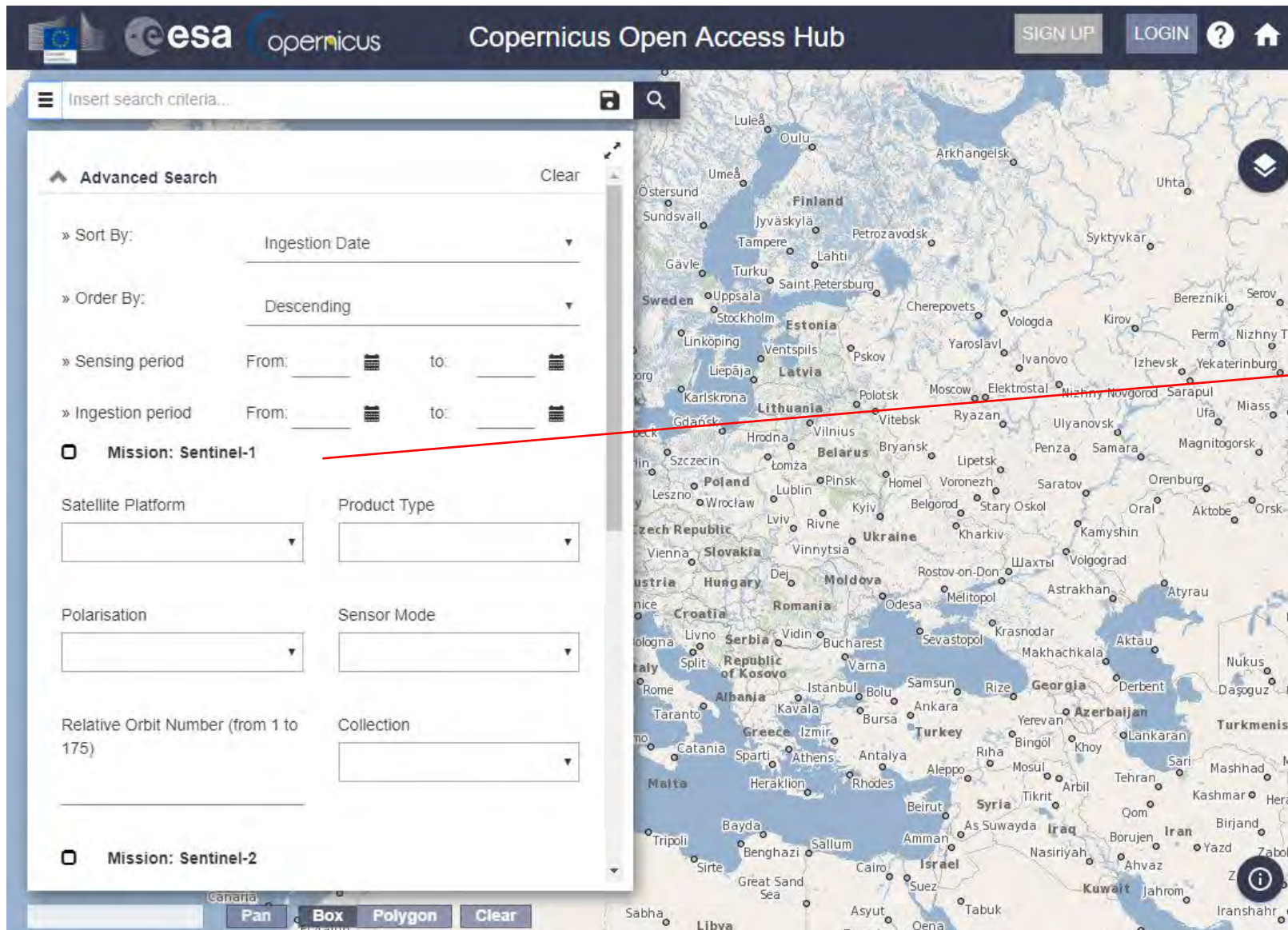
Satellite Platform Product Type

Polarisation Sensor Mode

Relative Orbit Number (from 1 to 175) Collection

☐ Mission: Sentinel-2

Pan Box Polygon Clear



- Sentinel-1
- Sentinel-2
- Sentinel-3 (land)

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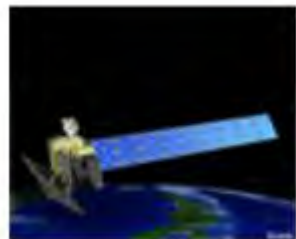
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ERS and Envisat



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

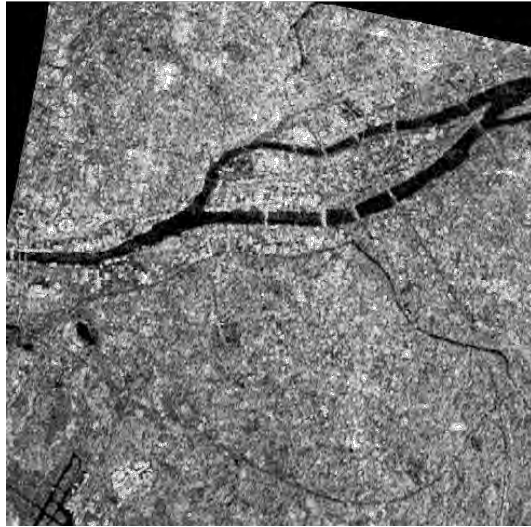
Radar missions



Satellite	Owner	Band	Resolution	Look angle	Swath	Lifetime
ERS-1	ESA	C	25 m	23°	100 km	1991-2000
ERS-2	ESA	C	25 m	23°	100 km	1995-2012
Radarsat-1	Canada	C	10 m - 100 m	20° - 59°	50 - 500 km	1995-2013
ENVISAT	ESA	C	25 m - 1 km	15° - 40°	100 - 400 km	2002-2012
ALOS	Japan	L	10 m - 100 m	35° - 41°	70 - 360 km	2006-2011
CosmoSkyMed	Italy	X	ca. 1 m - 16 m	2007...2010
TerraSAR-X & TanDEM-X	Germany	X	1 m - 16 m	15° - 60°	10 - 100 km	2007/2010-
Radarsat-2	Canada	C	3 m - 100 m	15° - 59°	10 - 500 km	2007-
RISAT-1	India	C	3 m - 50 m	11° - 49°	107 - 659 km	2012-
ALOS-2	Japan	L	3 m - 100 m	8° - 70°	25 - 350 km	2014-
Sentinel-1A	EC/ESA	C	5 m - 50 m	20° - 46°	20 - 400 km	2014-
Sentinel-1B	EC/ESA	C	5 m - 50 m	20° - 46°	20 - 400 km	2016-

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ERS-1/2 - SAR Level 1 Single Look Complex Image Product (SAR_IMS_1P)

Product characteristics

Pixel size	8 m (range - across track) x 4 m (azimuth - along track – varying slightly depending on acquisition Pulse Repetition Frequency)
-------------------	---

Scene area	100 km (range) x at least 102.5 km (azimuth)
-------------------	--

ERS-1/2 - SAR Level 1 Precision Image Product (SAR_IMP_1P)

Product characteristics

Pixel size	12.5 m (range - across track) x 12.5 m (azimuth - along track)
-------------------	--

Scene area	100 km (range) x at least 102.5 km (azimuth)
-------------------	--

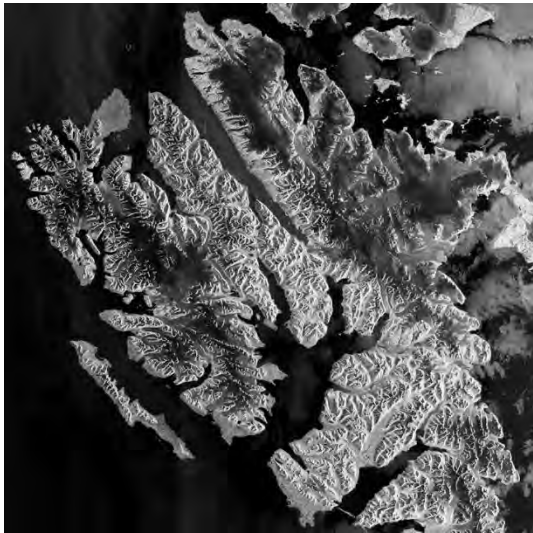


ERS-1/2 - SAR Raw Image Product (SAR_IM_OP)

Product characteristics

Scene area	100 km (range - across track) x full segment length (azimuth - along track)
-------------------	---

Scene size	5616 samples (range) x full segment length (azimuth)
-------------------	--

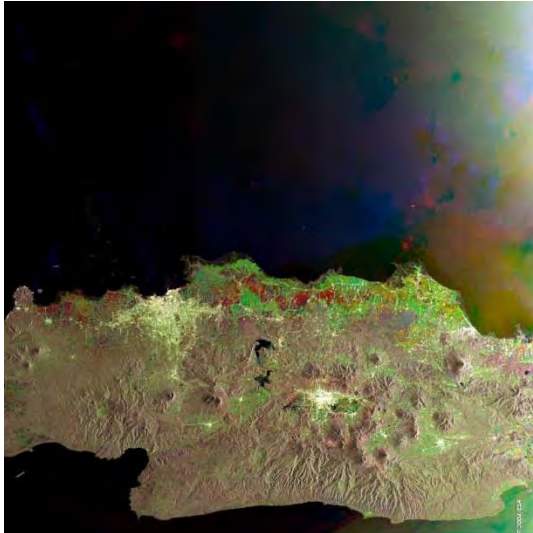


ASAR Image Mode

ASA_IMS_1P	8m(r)x4m(a)	SLC
ASA_IMP_1P	30x30m	Multi-look, ground range
ASA_IM_OP		RAW

ASAR Alternating Polarisation

ASA_APS_1P	8m(r)x4m(a)	SLC
ASA_APP_1P	30x30m	Multi-look, ground range
ASA_AP_OP		RAW



ASAR Wide Swath

ASA_WSS_1P	8m(r)x80m(a)	SLC
ASA_WS_OP		RAW

Accessing ESA Missions (ERS & ENVISAT)



<https://earth.esa.int/web/guest/data-access>

Register to ESA SSO

Login with same ESA SSO account

Register

Login My Earthnet

Need Help? Contact here

European Space Agency

Missions Earth Topics Data Access PI Community

Explore more...

You are here Home > Data Access

Browse Data Products

How to access ESA Data

Data Product News

The home of ESA Earth Online data

Get started

Learn [how to access data](#) and search over 175 datasets

Search Product by missions and earth topics and instruments

In all missions

Most popular mission data products

Recently published products

ERS-1/2 - SAR Level 1 Single Look Complex... (247) recent views

The SAR SLC product is a single look complex acquired in Image Mode. It is a digital image, with slant range and phase preserved, generated from raw SAR...

ERS-1/2 - SAR Raw Image Product (173) recent views

This SAR Level 0 product is acquired in Image Mode. The products consist of the SAR telemetry data and are supplied as full Level 0 segments, unprocessed....

Landsat 7 ETM+ (Enhanced Thematic Mapper... (1782) recent views

This dataset contains all the Landsat 7 Enhanced Thematic Mapper high-quality ortho-rectified L1T dataset over Kiruna, Maspalomas and Matera visibility...

TropForest - ALOS, Deimos-1 & KOMPSAT-2... (136) recent views

The objective of the ESA TropForest project was to create

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Dataset Details

Earth Topics (Applications)

- Natural Disasters
Earthquake/Volcano
- Solid Earth
Tectonics/Seismic Activity


Instrument type

- Radar Imagery

Instrument

- SAR

Mission



ERS

Operators:
ESA

Date of Launch:
ERS-1 - 17 July 1991
ERS-2 - 21 April 1995

Mission Status:
ERS-1 ended on March 2000
and ERS-2 September 2011

Orbit Height:

ERS-1/2 - SAR Level 1 Single Look Complex Image Product (SAR_IMS_1P)

ERS
(258) recent views

Last update: 10 April 2017

The SAR SLC product is a single look complex acquired in Image Mode. It is a digital image, with slant range and phase preserved, generated from raw SAR data using up-to-date auxiliary parameters. The products are intended for use in SAR quality assessment, calibration and interferometric applications. A minimum number of corrections and interpolations are performed on the data. Absolute calibration parameters (when available) are provided in the product annotation.

Product characteristics	
Pixel size	8 m (range - across track) x 4 m (azimuth - along track - varying slightly depending on acquisition Pulse Repetition Frequency)
Scene area	100 km (range) x at least 102.5 km (azimuth)
Scene size	5000 samples (range) x at least 30000 lines (azimuth)
Pixel depth	32 bits signed integer (16 bits I, 16 bits Q)
Total product volume	~ 575 MB
Projection	Slant range
Number of looks	1

Data Set Specifications

Spatial coverage:	82 N, 82 S, 180 W, 180 E
Temporal coverage:	27-07-1991 - 04-07-2011
Current Processor Version:	BE ERS / Evient format

➡➡➡ GET DATA

Data available immediately or after data request approval (a few days, maximum of 2 weeks)

Missions

Earth Topics

Data Access

PI Community

You are here [MyEarthnet](#)

Product Registration - product selection ASAR L1 products (IMP, IMS, APP, APS, WSS)

ESA Products

Satellite	Instrument	Product	#	Action
ENVISAT	ASAR (On-The-Fly)	ASAR L1 products (IMP, IMS, APP, APS, WSS)		Delete

Terms and Conditions acceptance

In order for ESA to give access to the dataset accessible via simple registration, the Principal investigator shall have read and accepted the Terms and Conditions for

[Terms and Conditions for the use of ESA data](#)

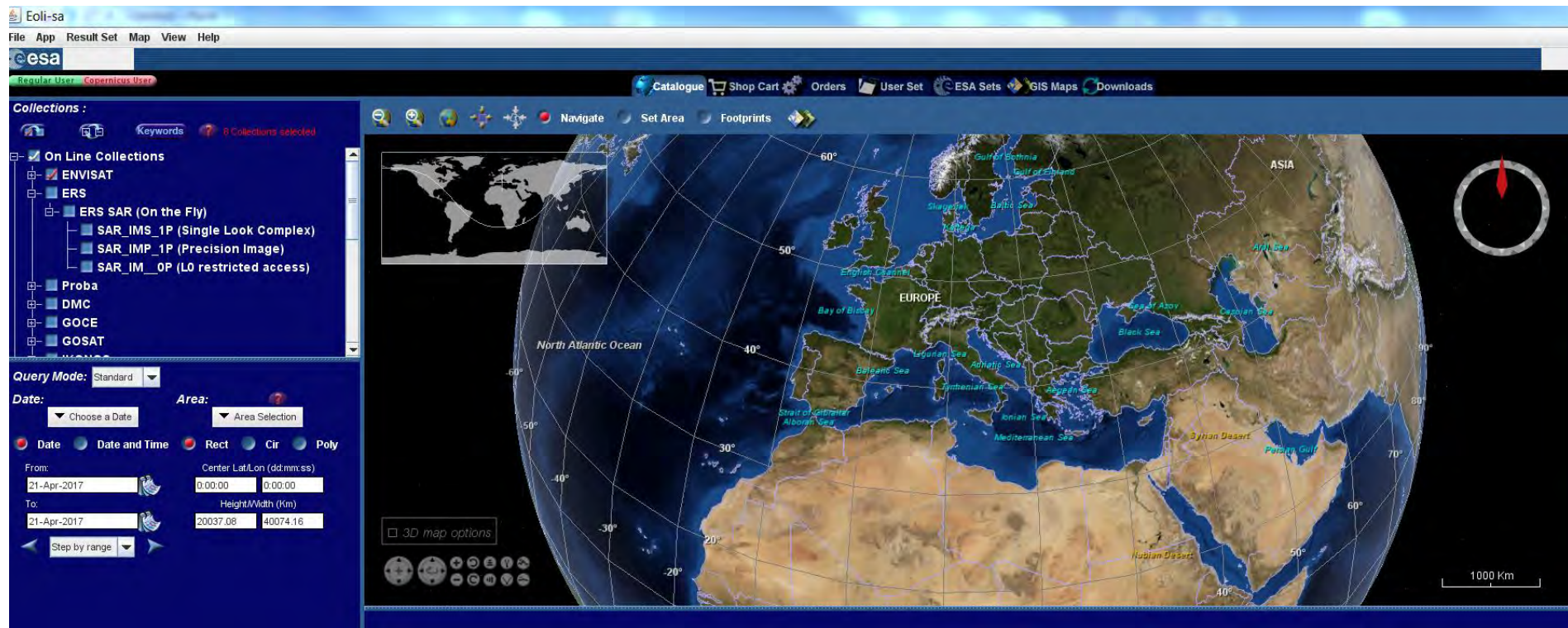
By checking this box I confirm my acceptance of the [Terms and Conditions for the use of ESA data](#)

BackSave

For help, refer to
ASAR-OTF-User Manual.pdf
&
ASAR-OTF-FAQ.pdf

- Registration\ log in
- Acceptance of terms and conditions
- Product download through EOLI-SA client

**some specific datasets (e.g RAW) are available upon positive evaluation of the data service request

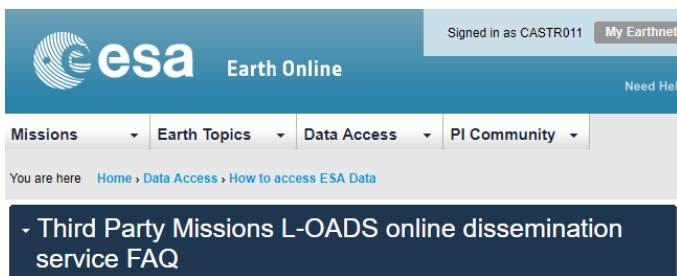


Third Party Mission Data Access via ESA



Online Dissemination Service:

<https://earth.esa.int/web/guest/data-access/how-to-access-eo-data/tpm-l-oads-dissemination-service-faq>



What is the Third Party Missions L-OADS online dissemination service?

The Third Party Missions L-OADS online dissemination system allows direct access to part of ESA's archive of Third Party Missions collections. (The full list of online Third Party Missions collections is available on the [TPM online access list](#)).

From the L-OADS, products can be discovered online from:

- A geographical catalogue
- A folder tree organised by track and frame
- A filename based filtering

Once a user requests a product download, the product is downloaded immediately if the user is logged and authorised for the specific product download.

How do I access the Third Party Missions L-OADS online dissemination service?

You should freely subscribe to the TPM collection of your interest. Please subscribe to a TPM dataset by clicking the get data button in the [dataset description](#) pages.

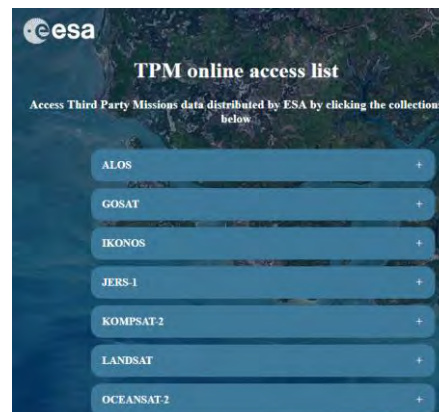
If you do not have an EO-SSO account on Earth Online, you will be requested to create an account following the [registration instructions](#).

Data are accessible through the Third Party Missions [L-OADS web interface](#).

For any additional inquiries please contact eohelp@esa.int.

How do I download a product?

Please refer to the [user manual](#).



TPM Online Access List

<https://tpm-ds.eo.esa.int/collections/>



TPM Data Access Guide:

<https://earth.esa.int/documents/10174/1987716/Third-Party-Mission-Data-Access-Guide>

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Third Party Mission Data Access via ESA



CURRENT		
	Mission	Instrument
Optical (Very High Resolution)	Deimos-2	HiRAIS
	GeoEye-1	GIS
	Ikonos-2	OSA (PAN and MS)
	KOMPSAT-2	MSC
	Pleiades 1A/1B	HiRI
	QuickBird	BGIS2000
	SPOT 6/7	NAOMI
	WorldView-1/2/3	WV-110
Other	GRACE	GRACE Instrument
Radar	ALOS	PALSAR
	JERS-1	L-band SAR
	QuikSCAT	SeaWinds
	SeaSat	L-band SAR
Radar (Very High Resolution)	COSMO-SkyMed	SAR 2000
	RADARSAT-1/2	C-band SAR
	TerraSAR-X	X-band SAR
	TanDEM-X	X-band SAR

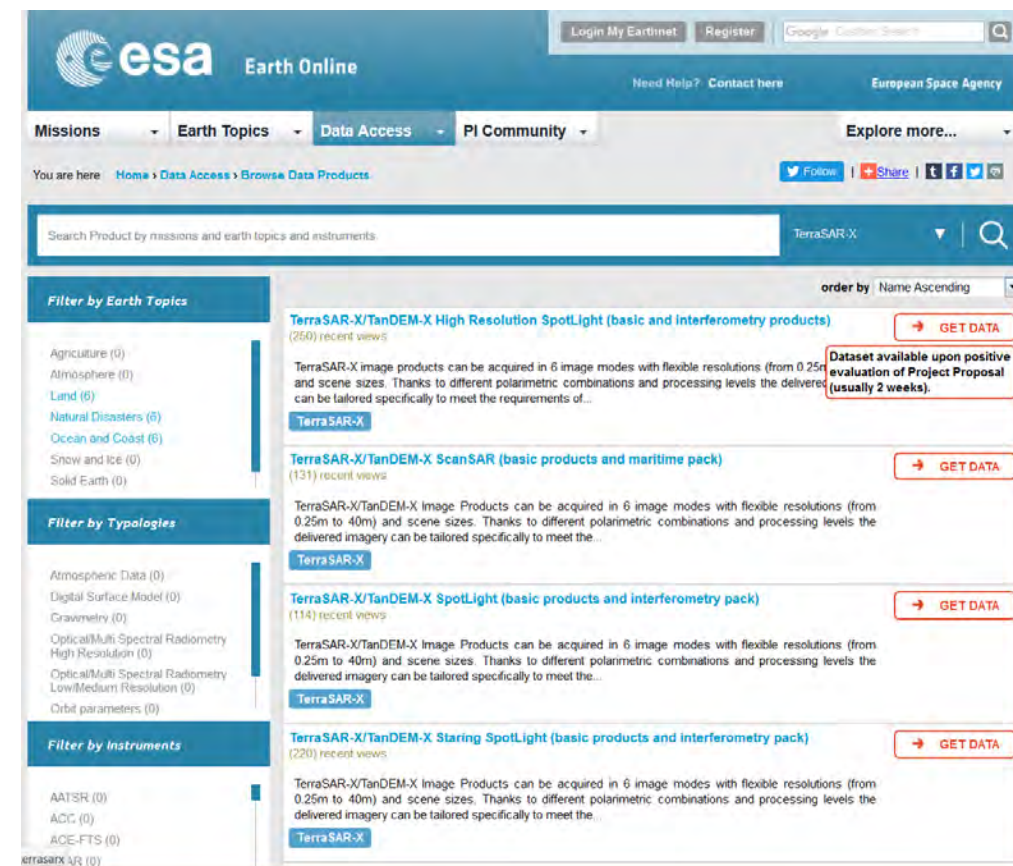
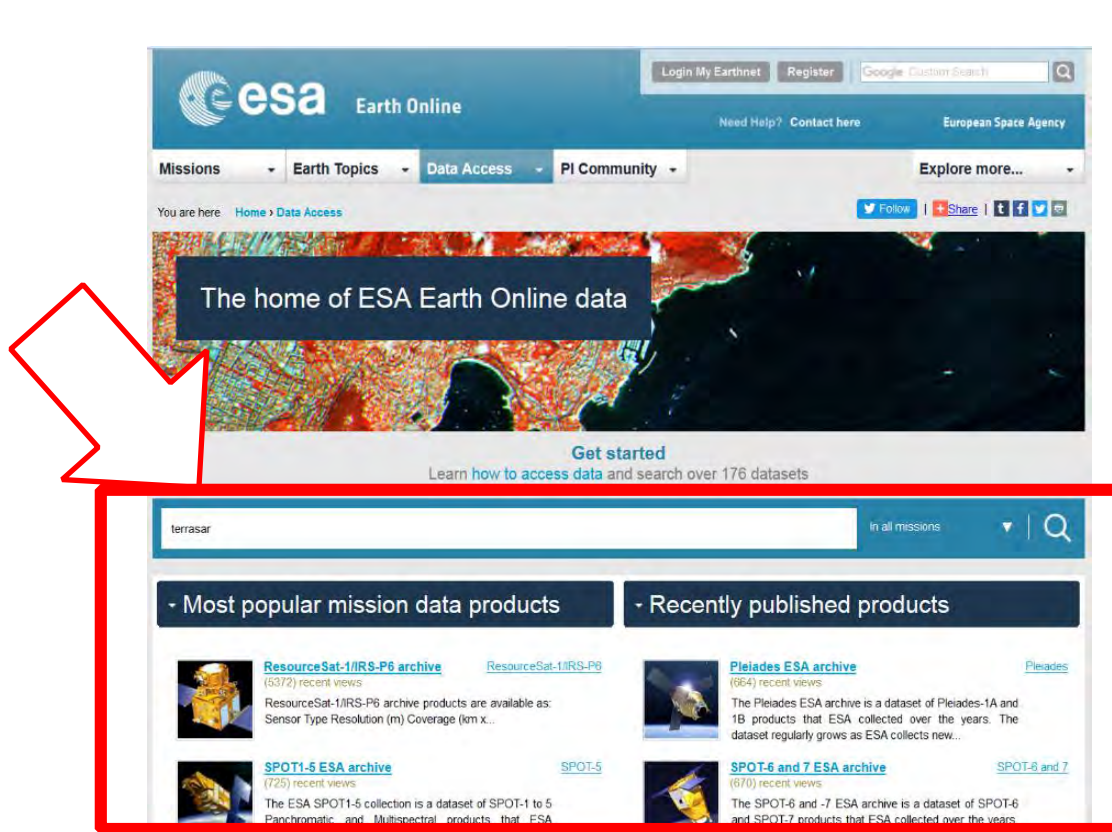
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Third Party Mission data access via ESA

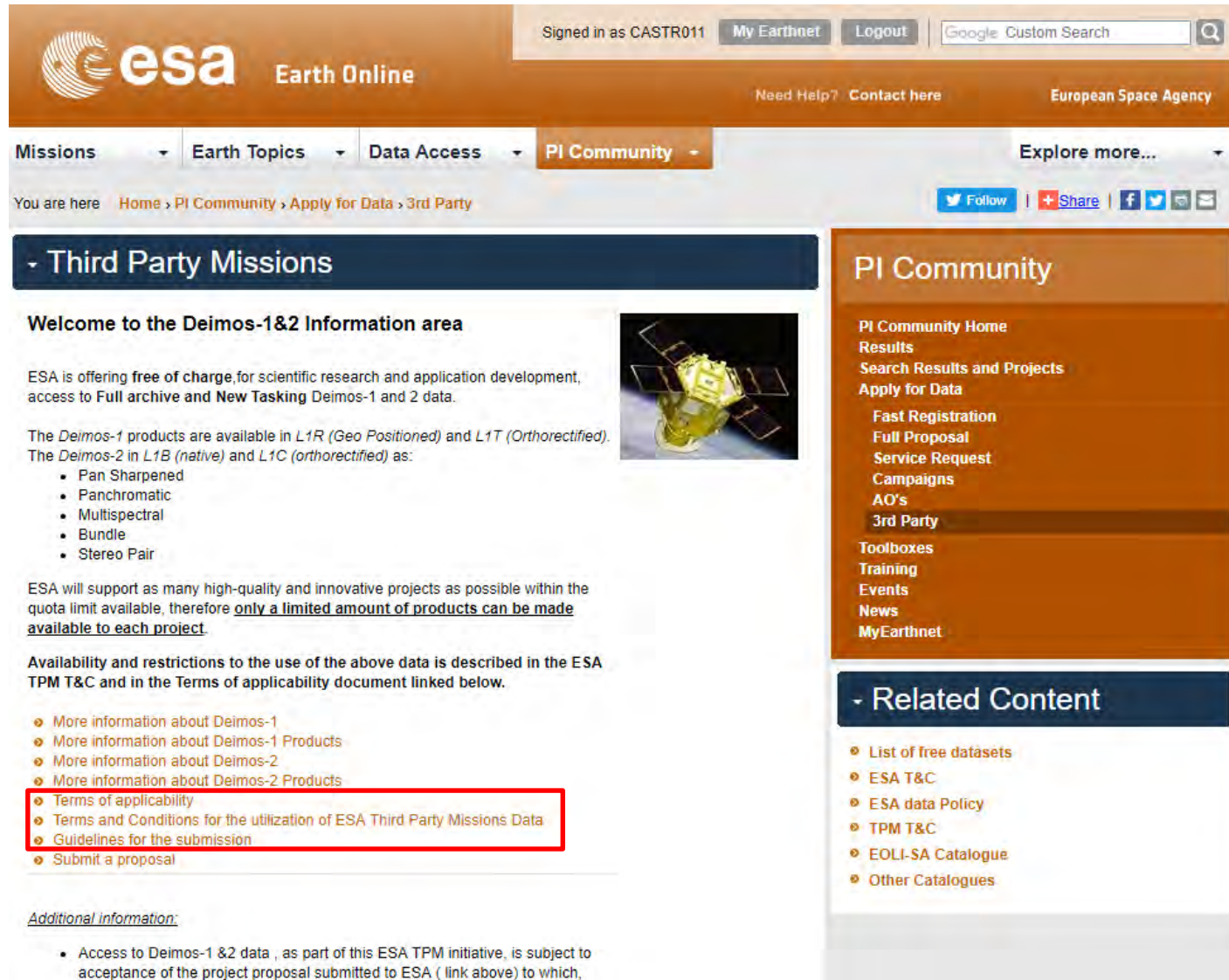


- Data from over 40 instruments from more than 35 missions
- Radar imagery, optical/multispectral, atmospheric data



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esa Earth Online Signed in as CASTR011 My Earthnet Logout Google Custom Search

Need Help? Contact here European Space Agency

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

You are here Home > PI Community > Apply for Data > 3rd Party

- Third Party Missions

Welcome to the Deimos-1&2 Information area

ESA is offering **free of charge**, for scientific research and application development, access to **Full archive and New Tasking** Deimos-1 and 2 data.

The *Deimos-1* products are available in *L1R (Geo Positioned)* and *L1T (Orthorectified)*. The *Deimos-2* in *L1B (native)* and *L1C (orthorectified)* as:

- Pan Sharpened
- Panchromatic
- Multispectral
- Bundle
- Stereo Pair

ESA will support as many high-quality and innovative projects as possible within the quota limit available, therefore **only a limited amount of products can be made available to each project**.

Availability and restrictions to the use of the above data is described in the ESA TPM T&C and in the Terms of applicability document linked below.

- More information about Deimos-1
- More information about Deimos-1 Products
- More information about Deimos-2
- More information about Deimos-2 Products
- **Terms of applicability**
- **Terms and Conditions for the utilization of ESA Third Party Missions Data**
- **Guidelines for the submission**
- Submit a proposal

Additional information:

- Access to Deimos-1 &2 data, as part of this ESA TPM initiative, is subject to acceptance of the project proposal submitted to ESA (link above) to which,

PI Community

- PI Community Home
- Results
- Search Results and Projects
- Apply for Data
 - Fast Registration
 - Full Proposal
 - Service Request
 - Campaigns
 - AO's
 - 3rd Party**
- Toolboxes
- Training
- Events
- News
- MyEarthnet

- Related Content

- List of free datasets
- ESA T&C
- ESA data Policy
- TPM T&C
- EOLI-SA Catalogue
- Other Catalogues

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Free and open dataset

➡ Fast Registration (FR) is submitted online and immediate access is provided

Restricted dataset

➡ Full Proposal (FP) is submitted online. Following peer review and proposal acceptance, a quota of products is allocated to the project

Respond to an AO

➡ ESA issues an Announcement of Opportunity (AO) for either specific new missions, acquisition campaigns or research topics. Acceptance follows evaluation and feasibility

STEP – Sentinel Toolbox Exploitation Platform



step
science toolbox exploitation platform

ESA

STEP

TOOLBOXES

DOWNLOAD

GALLERY

DOCUMENTATION

COMMUNITY

THIRD PARTY PLUGINS

- SNAP
- Sentinel 1 Toolbox
- Sentinel 2 Toolbox
- Sentinel-3 Toolbox
- SMOS Toolbox
- Proba-V Toolbox
- Download
- Community
- Useful Links

Search...

seom
scientific exploitation
of operational missions

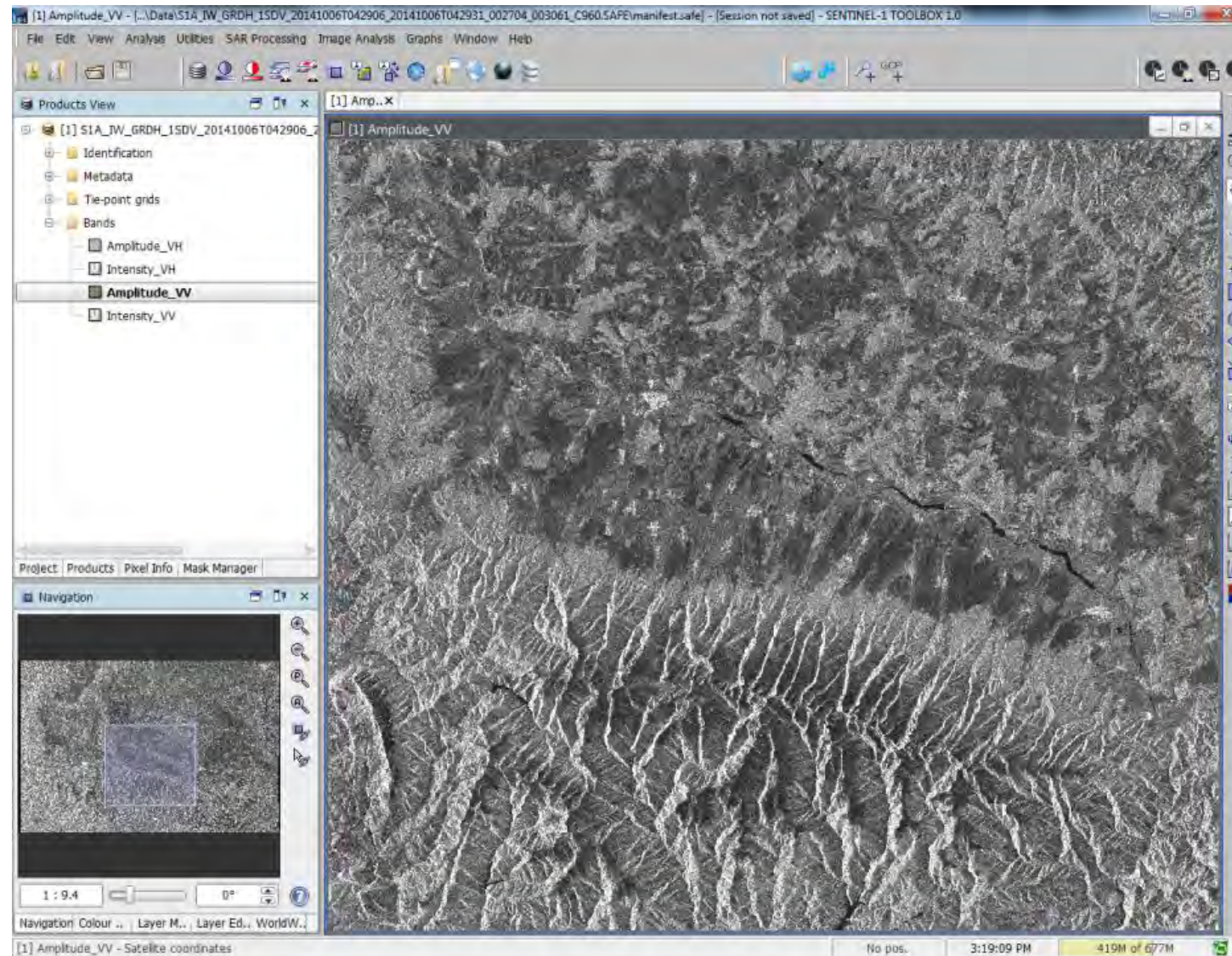
2018

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.

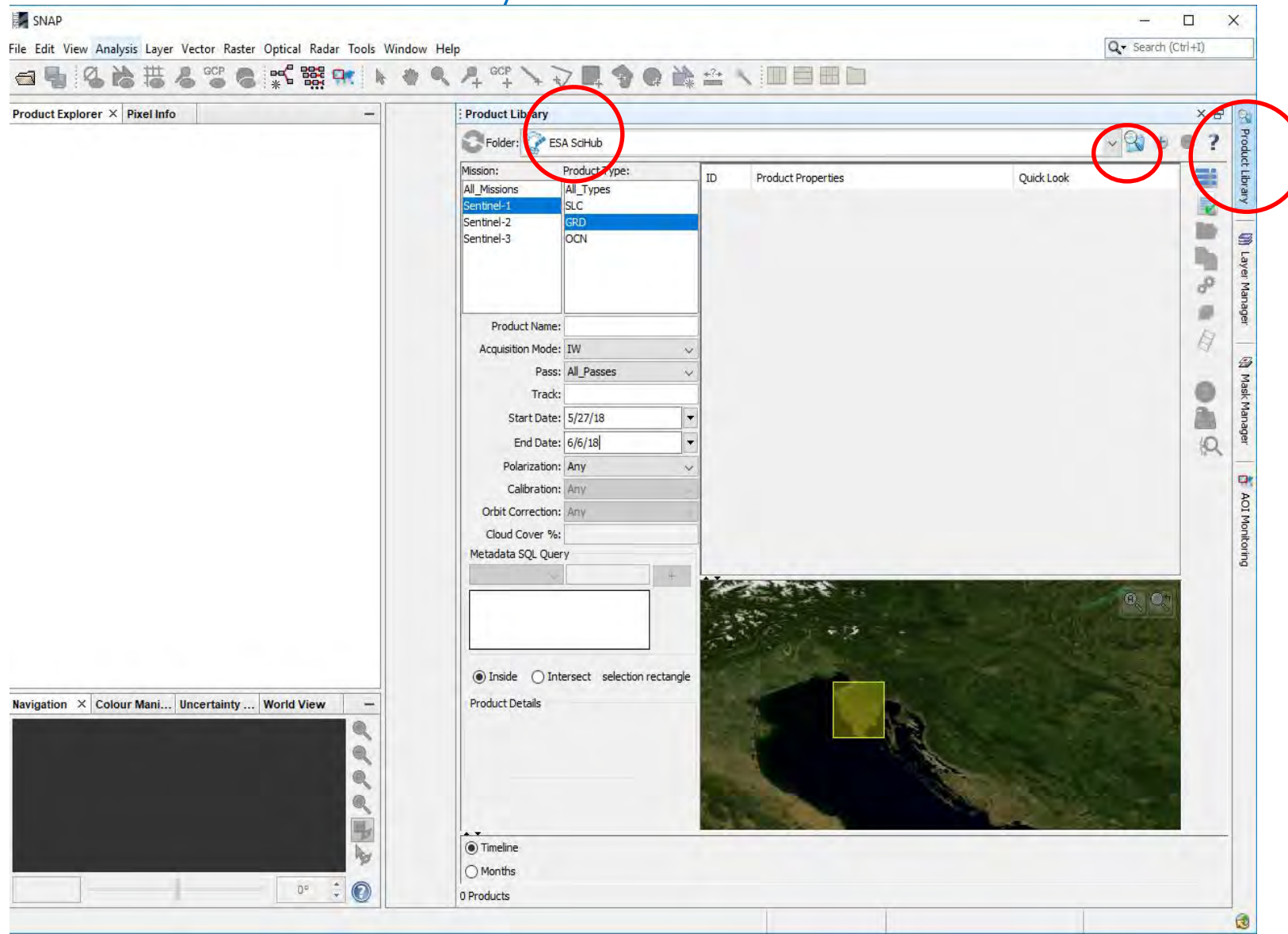
The ESA toolboxes support the **scientific exploitation** for the **ERS-ENVISAT** missions, the **Sentinels 1/2/3** missions and a range of **National** and **Third Party** missions. The three toolboxes are called respectively Sentinel 1, 2 and 3 Toolboxes and share a common architecture called **SNAP**.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

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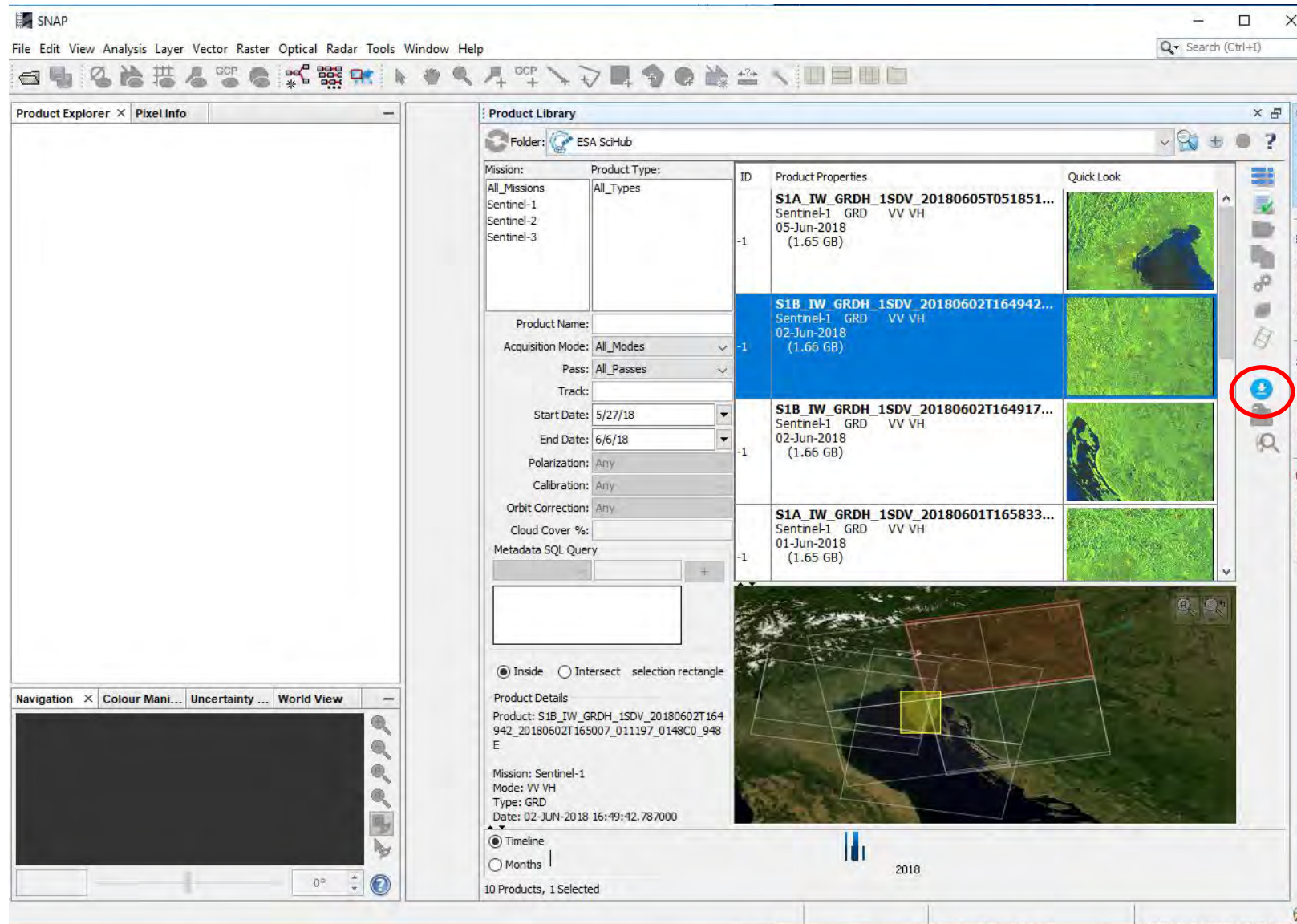


SNAP Toolbox: The Product Library



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SNAP Toolbox: The Product Library



The screenshot displays the SNAP software interface. The 'Help' menu is open, with 'Help Contents' highlighted. The 'Product Explorer' and 'Pixel Info' panels are visible on the left. The 'Help' window is open, showing the 'Product Library' section. The 'Product Library' window is also open, displaying a table of products.

Help Contents

- Context web Search Ctrl+F1
- SNAP Home Page
- Report an Issue
- Tutorials
- Show Log Directory
- Check for Updates
- About SNAP...

Product Library

The **Product Library** tool optimizes the identification of data products in a database for fast retrievable of the metadata of locally stored **products**. Search results are displayed in a table listing **product** name, path, mission, **product** type, acquisition date, pass, pixel spacing, etc. without actually opening the original **products**. The footprint of each image is outlined on the world map over top of Blue Marble images with a place names vector layer. Multilooked quicklooks of the images are also generated and stored in the database for quick previewing.

The **Product Library** can optionally automatically add new metadata to the database whenever a product is manually opened. The user may also define a list of repository folders that will be scanned recursively for new or modified products.

The product readers of the Toolbox are able to abstract the metadata from each product into the Generic Product Model of the Toolbox. Thereby, the **Product Library** and all processing tools of the Toolbox are able to work with the metadata in this common form without requiring the user to manually input any metadata.

Products may be searched in terms of mission, **product** type, beam mode, ground location, date and time of acquisition, processing history, previously defined AOIs, and suggested image pairing. **Products** may also be searched by graphically drawing an area of interest on the world map and querying the database for **products** that cover the AOI. Use the radio buttons to choose whether the **products** have to be inside the AOI selection rectangle or just intersect it.

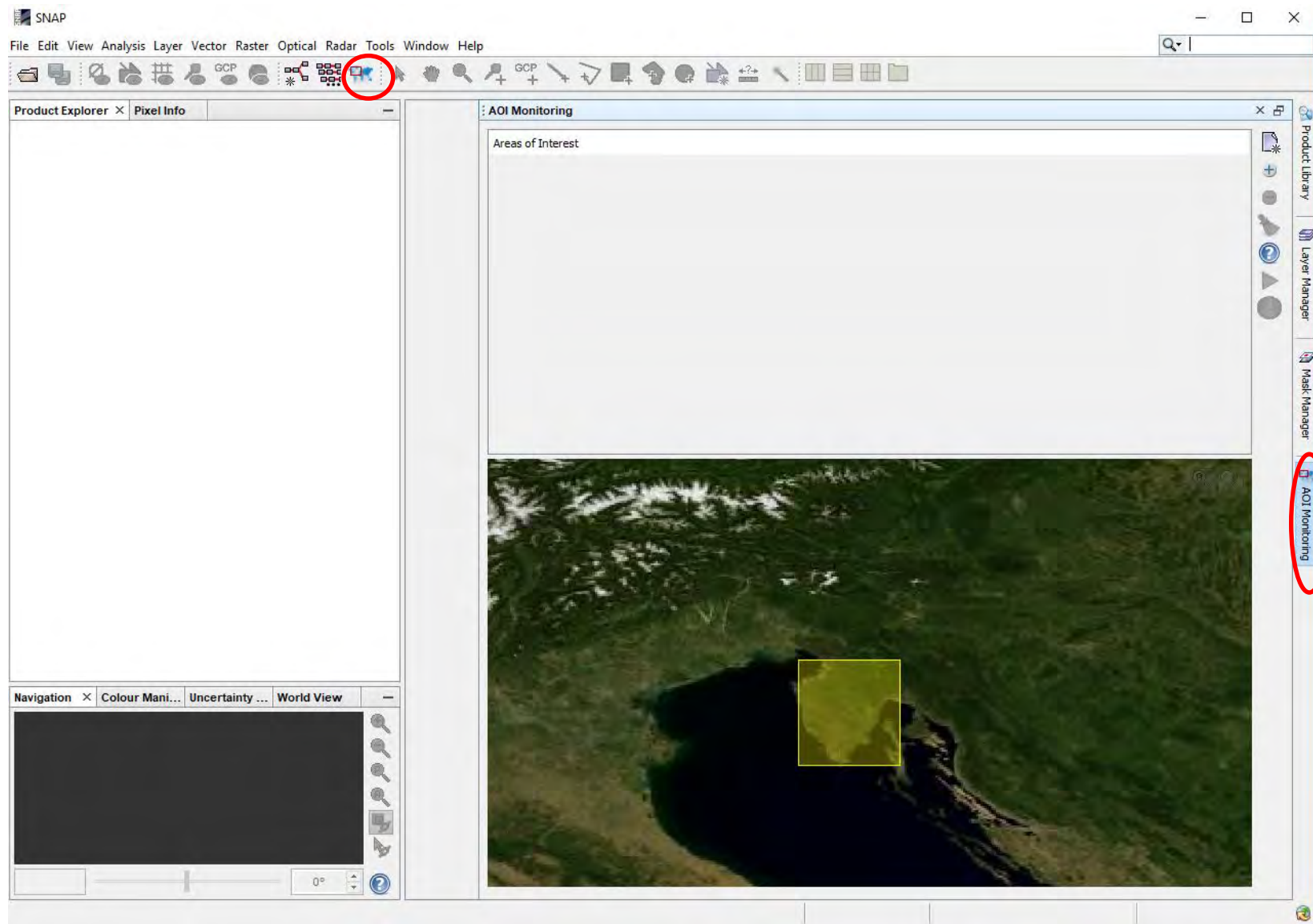
The user may then select from the resulting table of products which products to open, add to a project, or batch process directly from the **Product Library**.

Product Library

Mission	Product Type	ID	Product Properties	Quick Look
All_Missions	All_Types		S1A_IW_OCN_2SDV_2017...	
SENTINEL-1B			S1A_IW_OCN_2SDV_2017073...	
SENTINEL-1A		9308	SENTINEL-1A_OCN_ASCENDI... 31-Jul-2017 99999 x 99999 m SENTINEL-1 (5 MB)	
			S1A_IW_OCN_2SDV_2017...	

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SNAP Toolbox: AOI Monitoring



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SNAP Toolbox: AOI Monitoring




The screenshot displays the SNAP software interface. The 'Help' menu is open, with 'Help Contents' highlighted. The 'Help Contents' window shows a search for 'AOI Monitoring' with results including '26 Help', '3 Help - Import ENVISAT', '2 Sentinel-2 Reader', '1 SNAP Data Processors - OLCI MPH/CHL F', '1 DDB Documentation', '1 ASA_GM1_1P', '2 ASAR_Wave_Param_ADSR', '2 ATS_VC1_AX_GADS', '2 ASAR_Main_ADSR', and '1 SeaDAS Help - Import OCM2 L1B Product'. The 'AOI Monitoring' help page is open, providing instructions on how to use the AOI Monitoring tool. The page includes a title 'AOI Monitoring' with the ESA SNAP logo, a description of the tool's purpose, and detailed steps for creating and managing AOIs. The steps include clicking the 'AOI Monitoring' button, clicking the 'Create New AOI' button, naming the AOI, selecting input and output folders, and selecting a processing graph. It also mentions the 'Find CCD Slave' checkbox and the 'Remove AOI' button.


AOI Monitoring

The Area Of Interests (**AOI**) Monitoring allows users to specify, save, and load AOIs to be automatically batch processed using a chain of processing steps defined with the Graph Builder.

AOIs can be specified graphically by drawing polygons on the world map. **AOIs** can be saved and reloaded without requiring the user to re-enter any parameters.

The user must specify the input folder where to scan recursively for new products, the output folder where to save the processed results, and the processing graph.

Click the "**AOI Monitoring**" button  to open the "**AOI Monitoring**" window.


Click the "Create New AOI" button  to open the "New Area of Interest" window.

In the "New Area of Interest" window, type in a name for the **AOI** (e.g., **aoi_1.xml**). User can browse for a location to save the file. Click "Save" to close the "New Area of Interest" window and open the "Area of Interest" window.

In the "Area of Interest" window, user can edit the name of the **AOI**, select the input and output folders, select the processing graph and specify the **AOI** by drawing a rectangle in the world map. If no rectangle is drawn, then the entire globe is the **AOI**.

The "Find CCD Slave" checkbox is a placeholder and should not be checked.

Click "OK" to save the AOI xml file. Note that the AOI xml file is saved only if a valid graph is selected. However, even without a valid graph, the **AOI will nevertheless appear in the "Areas of Interest" list in the "AOI Monitoring" window** after the "Area of Interest" window is dismissed. It will stay in the list for the duration of the SNAP session, in case the user wants to edit and save it.

To delete an AOI from the "Areas of Interest" list, highlight it and click the "Remove AOI" button . Only one AOI can be highlighted a time. When an AOI is

Thank you!

Any Questions?