

## Copernicus Space Component

- Overview, deployment plan and status
- Copernicus Contributing Missions Data Access
- Sentinels Data Access @ ESA
- Sentinels Data Access @ Eumetsat



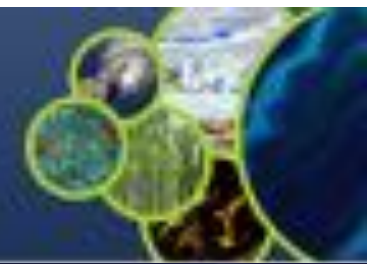
## Copernicus Services Component

- Overview, deployment plan and status
- Access to Copernicus Services

## Copernicus Programme and cross-cutting user uptake actions



# Sentinel missions



**SENTINEL-1** Radar Mission

**SENTINEL-2** HR Optical Mission

**SENTINEL-3** HR Optical and Altimetry Mission

**SENTINEL-4** GEO Atmospheric Chemistry Mission

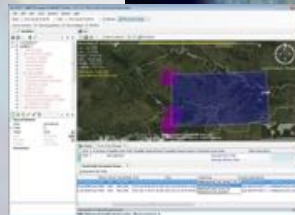
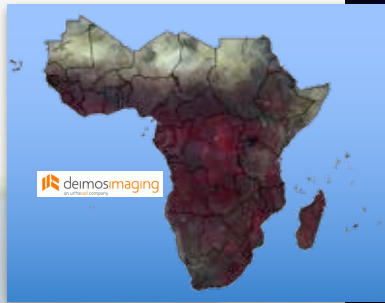
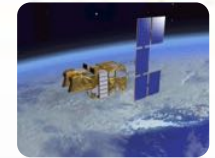
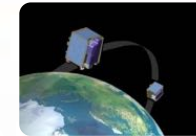
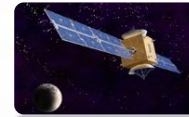
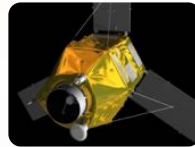
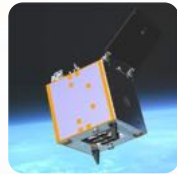
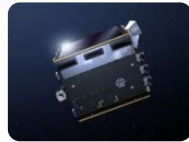
**SENTINEL-5P** LEO Atmospheric Chemistry Mission

**SENTINEL-6** Altimetry Mission

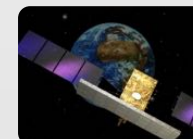
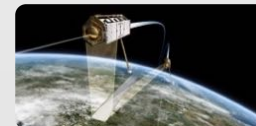
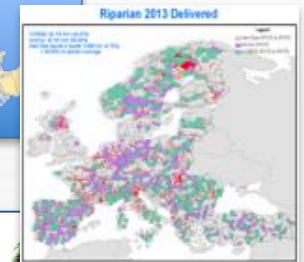
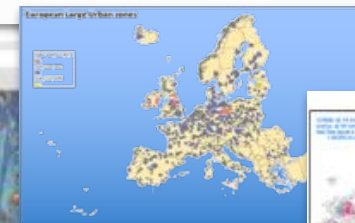
**SENTINEL-5**  
LEO Atmospheric Chemistry Mission

CEOS

# Access to Copernicus

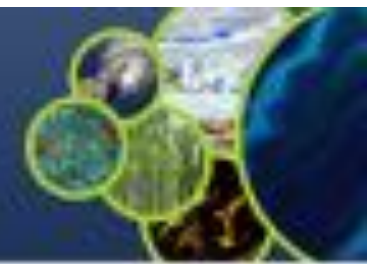


The screenshot shows the Copernicus CSCDA Portal website. The header includes the ESA logo and the text "copernicus space component data access". Below the header, there are navigation tabs for "Copernicus Users", "Data Offer", "How to Access Data", and "Data Provision Status". The main content area features a "Welcome to the new CSCDA Portal" message, a "Latest News" section with several bullet points, and a "User Support Services" section. A large URL is displayed in a white box at the bottom of the screenshot: <https://spacedata.copernicus.eu>

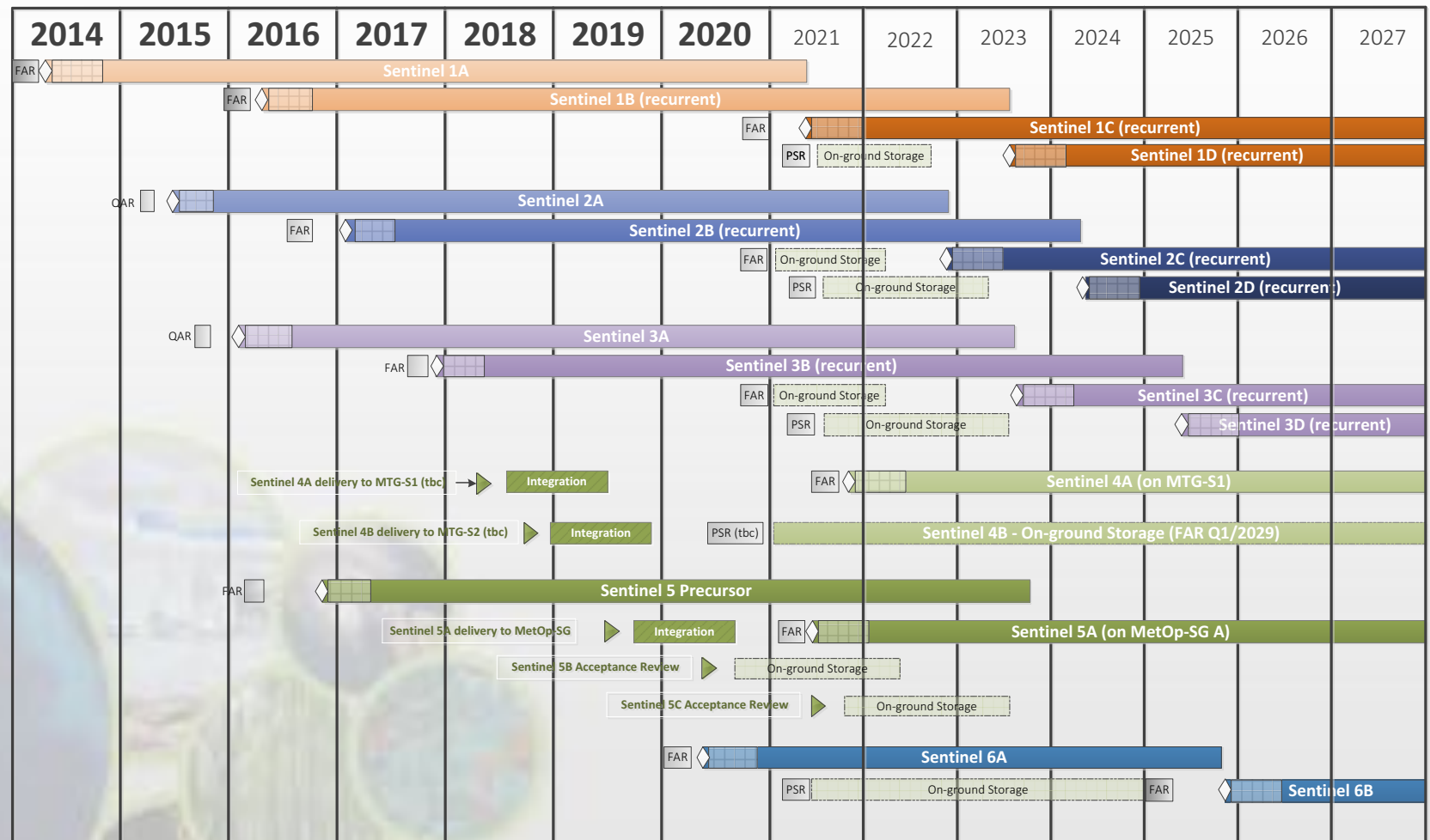




# Sentinels constellation deployment schedule



## Copernicus Constellation Deployment Schedule

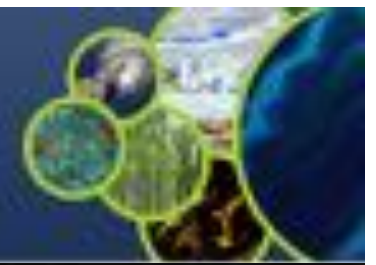


**Legend:** □ Qualification Acceptance Review (QAR) □ Flight Acceptance Review (FAR) or PreStorage Review (PSR) □ On-ground Storage ◇ Tentative launch date □ In-orbit Commissioning

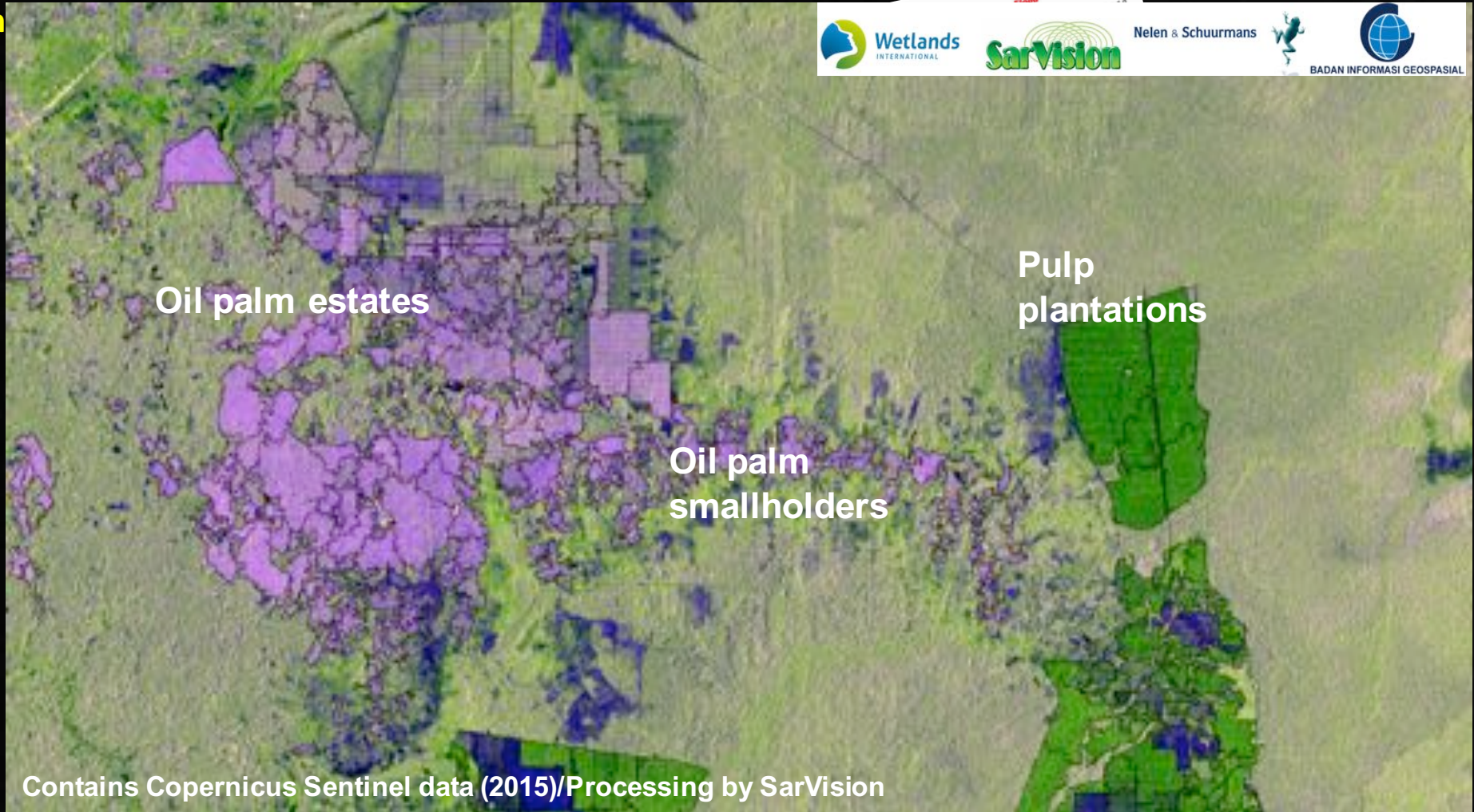
Status: 22 March 2016



# Sentinel-1 Mission



Win



Nelen & Schuurmans



Pulp plantations

Oil palm estates

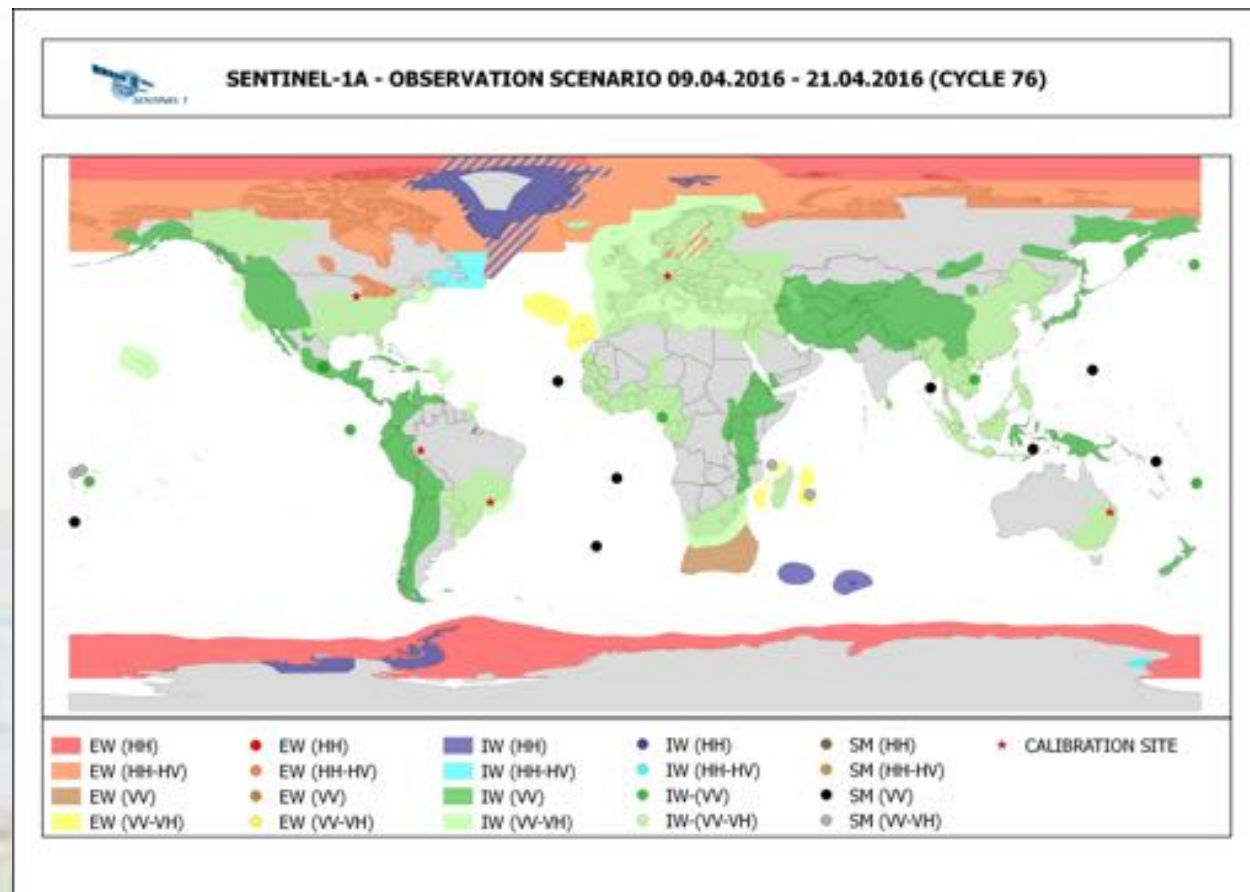
Oil palm smallholders

Contains Copernicus Sentinel data (2015)/Processing by SarVision



# Sentinel-1 mission operations

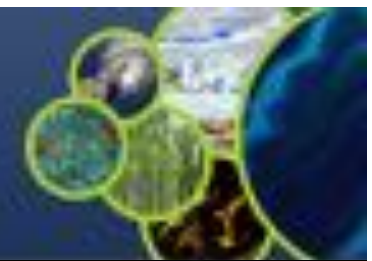
Baseline pre-defined mission observation scenario making optimum use of the SAR duty cycle within the technical constraints of the overall system.



Acquisition plan regularly published on <https://sentinels.copernicus.eu/>  
 All acquired data automatically processed to a set of core products and made available to users



# Sentinel-2 Mission



Sentinel-2 Mission

## Project

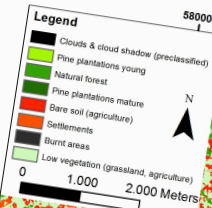
**UCL**

Université  
catholique  
de Louvain



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 685761.

Sentinel 2A image classification of Land Cover in Western Europe  
EOMonDis Project



Monitoring forest regeneration in Finland based on Sentinel-2

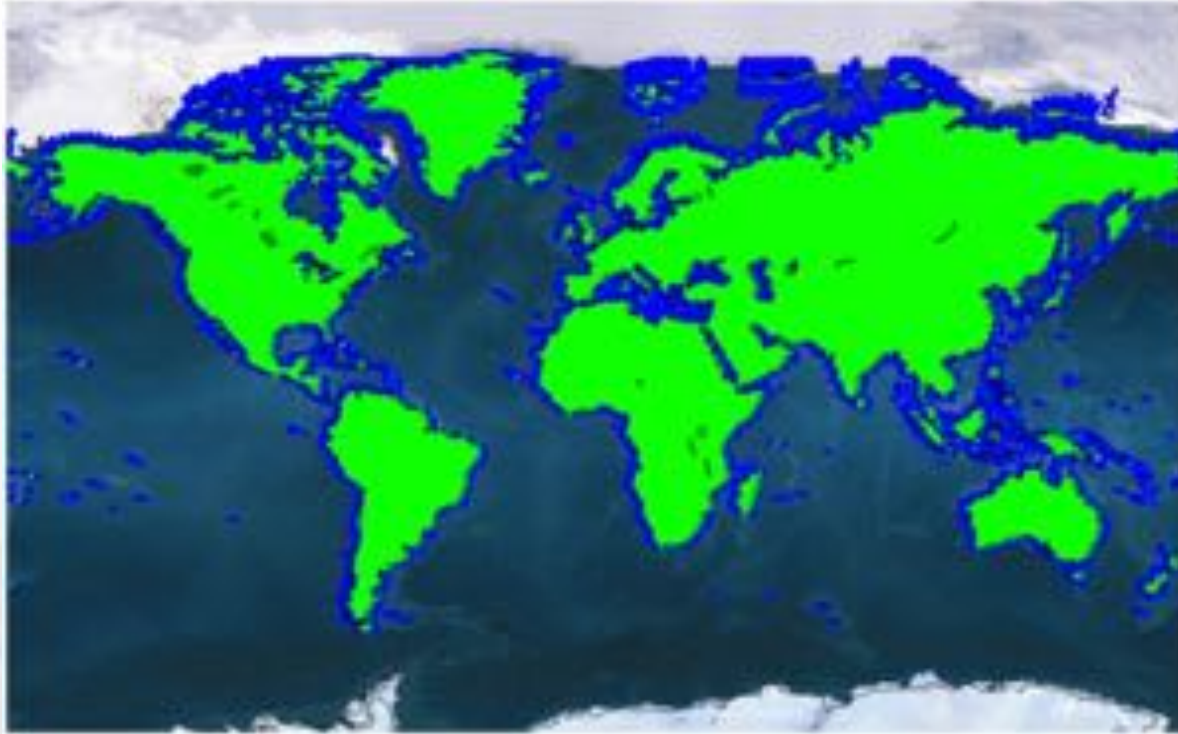
## Key Users



ESA

Contains modified Copernicus Sentinel-2

Sentinel-2 target coverage at full operation



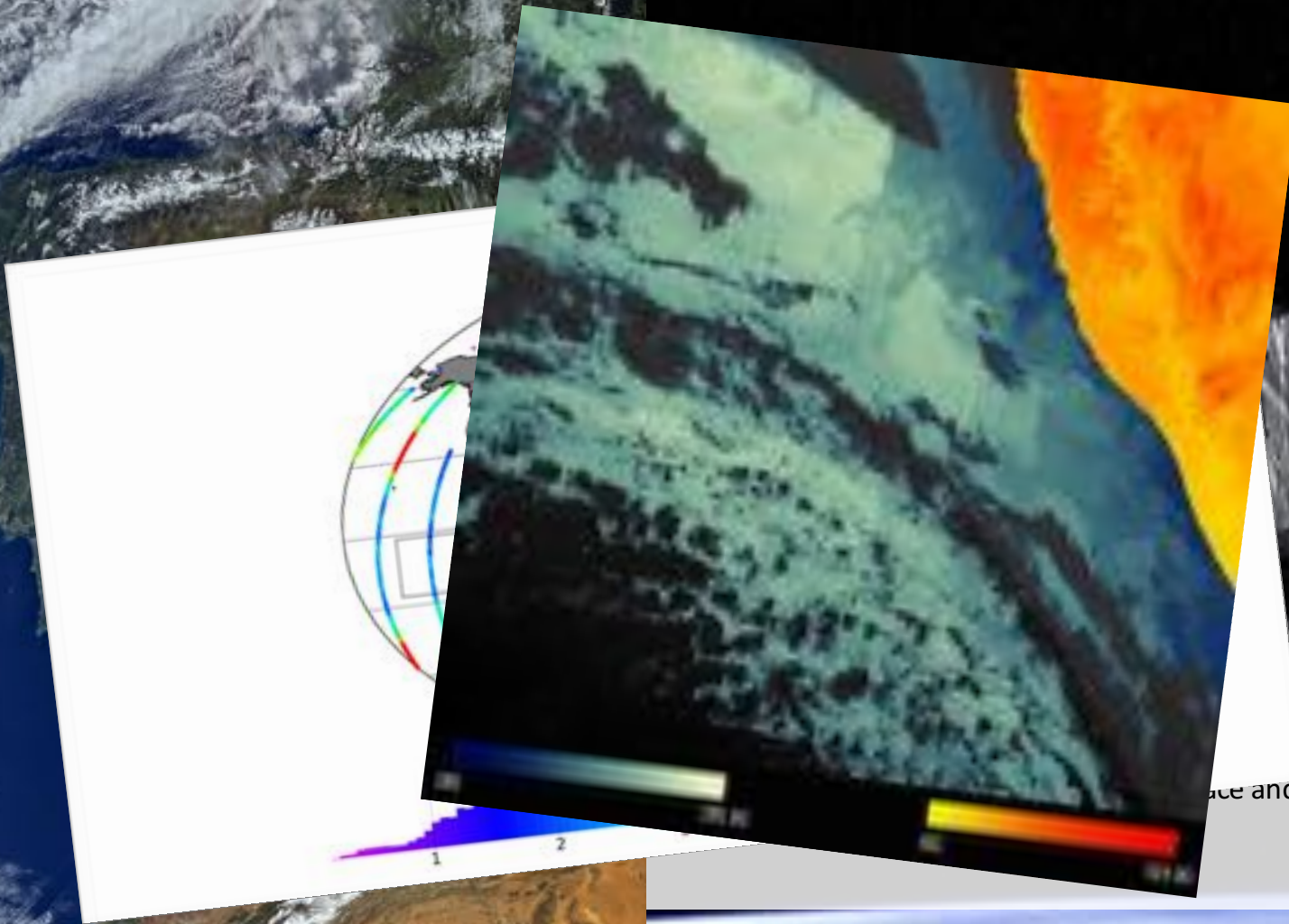
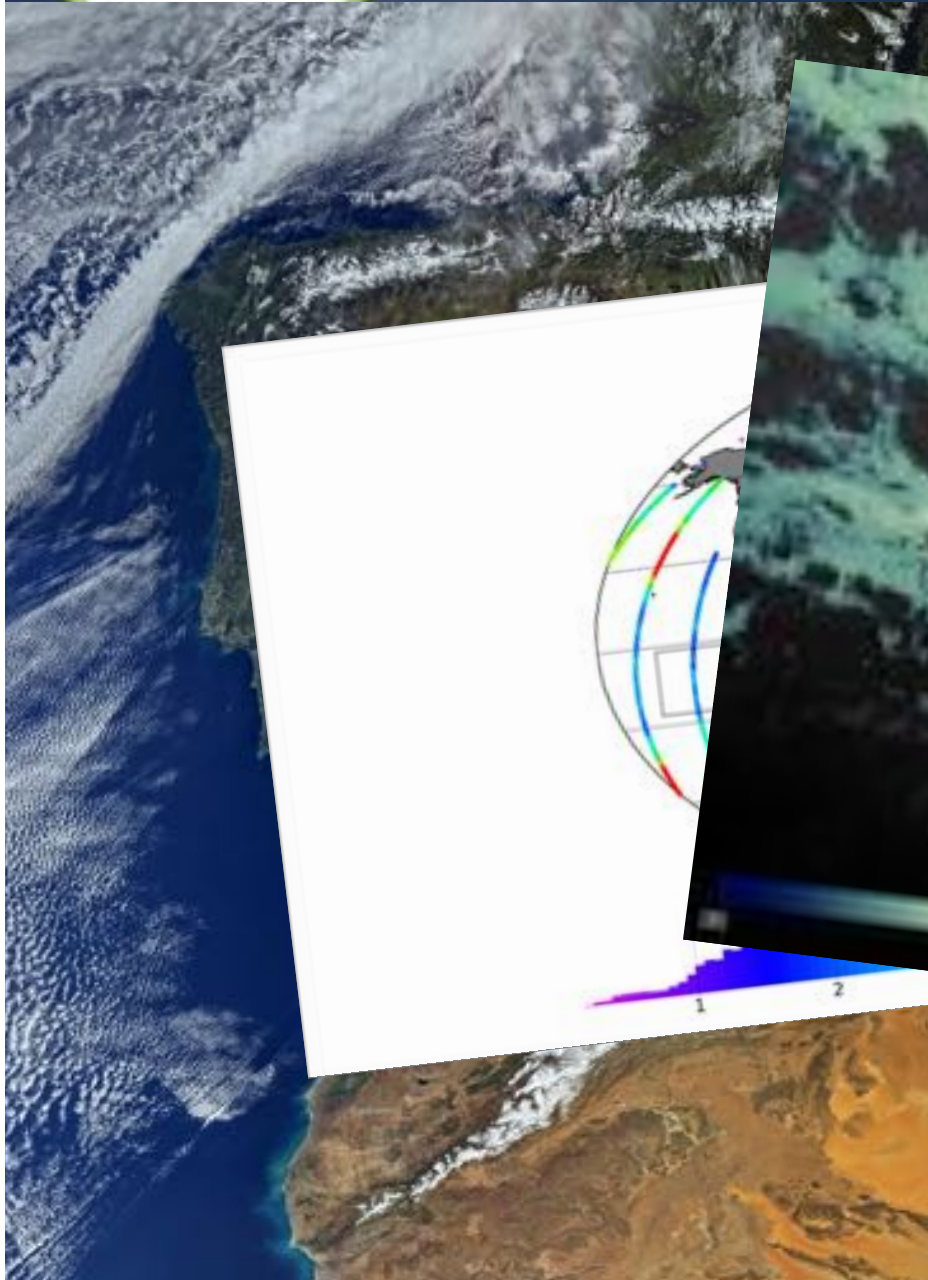
Sentinel-2 operations ramp-up according to <https://sentinel.esa.int/web/sentinel/missions/sentinel-2/operations-ramp-up-phase>

All acquired data automatically processed and made available to users

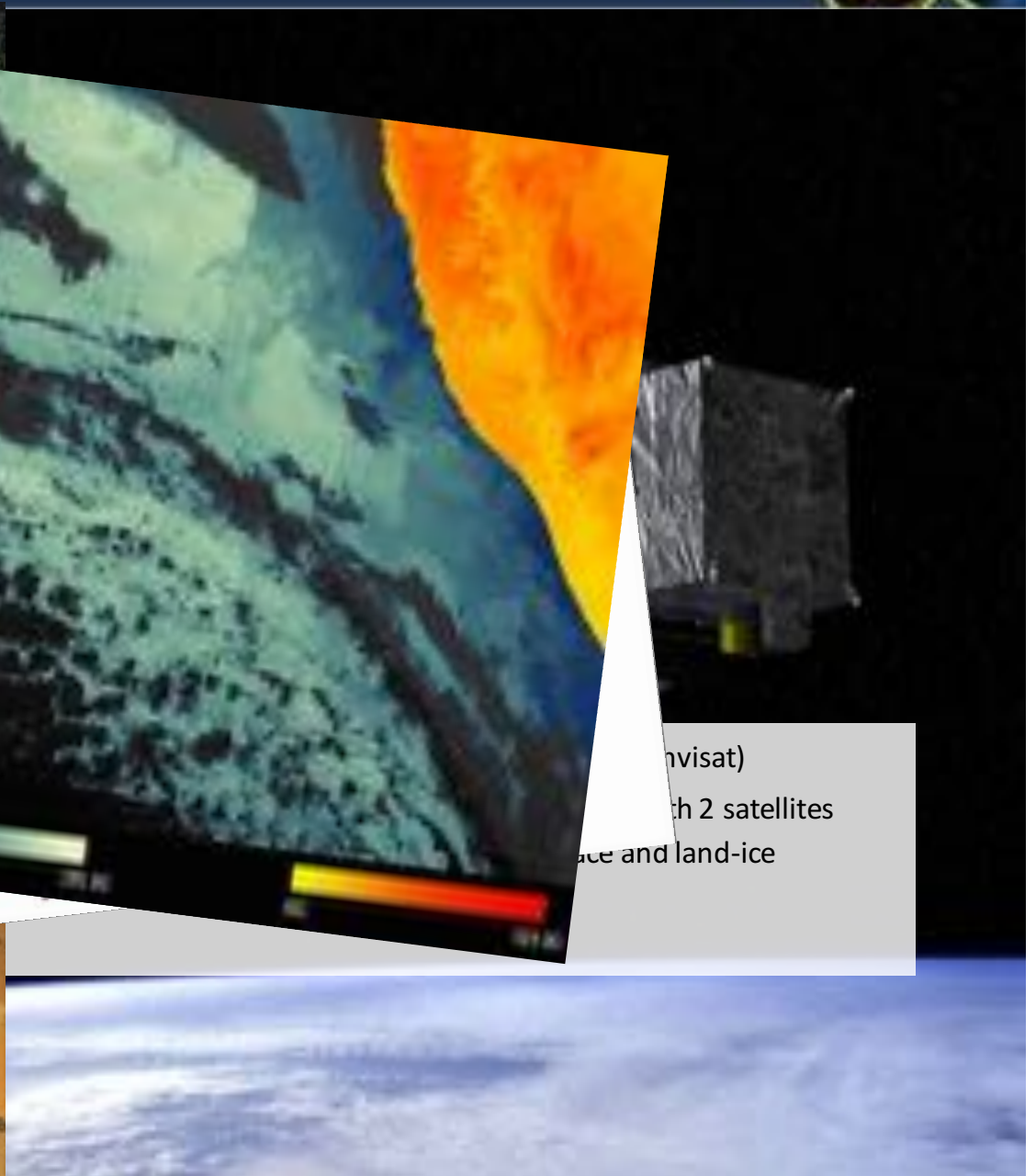




# Sentinel-3 Mission

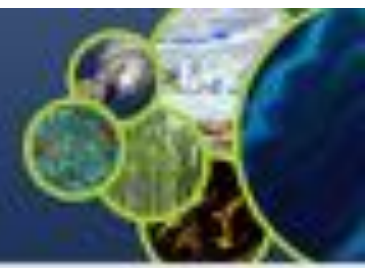


(Envisat)  
with 2 satellites  
ice and land-ice





# Sentinel-3 preparation to operations



**Instruments switched-on progressively as from February 29**

## **Commissioning on-going**

- Instruments calibration
- Reference sets of core products to be released to validation team/ expert users
- In addition, sample core products will be released to all users as early as possible for familiarisation

## **After IOCR (July/August)**

- Gradual ramp-up of operations
- Release of L1 pre-qualified core products
- Progressive release of level 2 pre-qualified core products

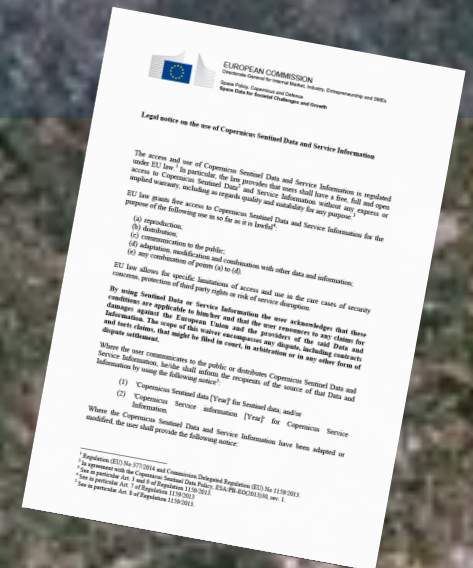


# Sentinel data



Sentinel data are available:

- Open and free
- Over very long term
- Systematically, in an operational fashion





# Sentinel data access @ ESA



ESA is delivering Sentinel products on a 24/7 basis both in **Near Real Time** (3hrs from sensing ) and **Non Time Critical** (within 24 hrs) to all users

ESA data access system is ensuring that at any point in time any user has access to all available Sentinels core products irrespective of their 'age'

All users have free access to all Sentinels data, including most recent products as well as full Long Term Archives

Data download is via terrestrial network featuring two separated and fully redundant outputs each of **10 Gbps bandwidth**

- This includes a dedicated connection to the academic network (GEANT/Internet2)

Online access to all Sentinel **products** via dedicated data hubs

- Detailed product descriptions at [sentinels.copernicus.eu](https://sentinels.copernicus.eu)



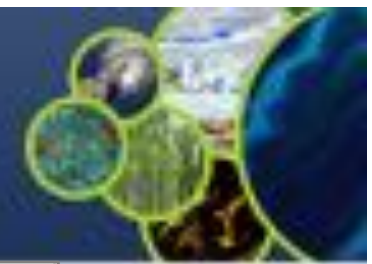
Open access data hub at [scihub.copernicus.eu](https://scihub.copernicus.eu)

- Users can self register online and get free access to ALL products

Additional data access hubs deployed to provide tailored services to specific users, e.g. EU/ESA Member States, International Partners



# Sentinel data access tools @ ESA



Data Hub Web graphic Interface  
<http://scihub.copernicus.eu>

### Open Data Protocol (OData)

The Open Data Protocol (OData) enables the creation of REST-based data services, which allow resources, identified using Uniform Resource Identifiers (URIs) and defined in a data model, to be published and consumed by Web clients using simple HTTP messages.

The OData protocol provides easy access to the Data Hub and can be used for building URIs for performing search queries and product downloads offering to the users the capability to remotely run scripts in batch mode.

#### URI Components

A URI used by an OData service has up to three significant parts: the service root URI, resource path and query string options:

```
<dbase_hostname>+<port>/odata/v1/?products?<filter>=<query>[&[options]]
```

where:

- <dbase\_hostname>+<port>/odata/v1 is the **service root URI** which identifies the root of an OData service
- /products is the **resource path**. It identifies the resource to be interacted with. The resource path enables any aspect of the data model (Data Hub Products, Collections, etc.) separate by the OData service
- ?<filter>=<query>[&[options]] is the **query string options** part

Scientific Data Hub service root URI:

```
<Scheme>://<Host>+<Port>+<Path>+<Query>+<Fragment>
```

Query String Options admitted by the Data Hub service:

- \$format Specifies the HTTP response format
- \$filter Specifies an expression
- \$orderby Determines what values are returned
- \$select Specifies a subset of properties to be returned
- \$skip Specifies the number of records to skip
- \$top Determines the maximum number of records to return

Data Hub Resource Paths:

- /Products

Examples of OData URIs for the Scientific Data Hub:

- `https://scihub.copernicus.eu/odata/v1/Products` lists the first 100 products published
- `https://scihub.copernicus.eu/odata/v1/Products?$filter=Sensor eq 'SAR-C'` lists the first 100 SAR-C products
- `https://scihub.copernicus.eu/odata/v1/Products?$filter=Sensor eq 'SAR-C'&$skip=100` lists the first 100 products skipping the first 100

APIs interface: scripting for automatic data selection and download

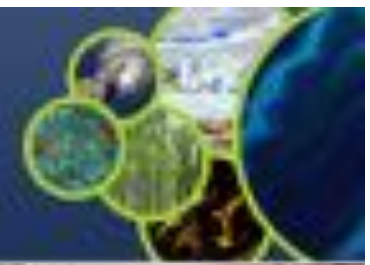
## SNAP Sentinel toolbox

Data Hub Server available as open source software  
<https://github.com/SentinelDataHub/DataHubSystem>

Sentinel Toolbox available as open source software  
<https://github.com/senbox-org>



# Data access stats from the open and free data hub



<https://scihub.copernicus.eu>

**> 500,000  
products  
available**

**> 30,000  
Registered  
users**

**➤ 4 Million  
products  
downloaded**

**> 4,7 PByte  
Data volume  
downloaded**

**Statistics at April 7, 2016**

Copernicus Sentinel data (2015)



# Sentinels products Heatmap



***In 2015 an average of 3 TB of products was generated daily***

***By end 2016 it is projected that this figure will increase to more than 6 TB a day***

***In 2015: on average each product was downloaded 10 times***



***In 2015: 30 TB of products have been disseminated on average a day***

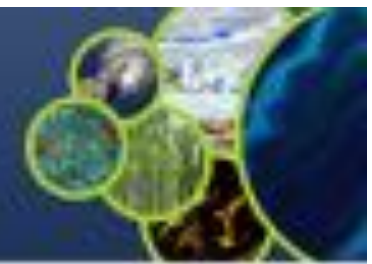


***It is projected that by end 2016 100 TB of products will be disseminated daily***





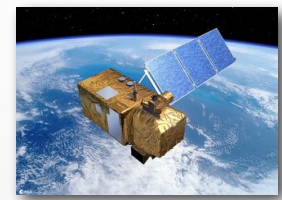
# Sentinels Mission Management 2016 Outlook



**SENTINEL-5P**  
Launch: October

**SENTINEL-2A**  
End of Operational  
Qualification Phase:  
July

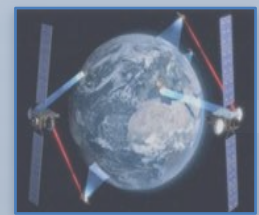
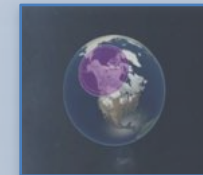
**SENTINEL-1B**  
Launch: 22 April



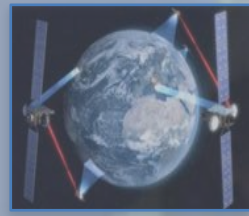
**SENTINEL-3A**  
✓ Launched 16 February  
• Commissioning on-going



4<sup>th</sup> X-band Station  
September: service  
start in Inuvik



EDRS-Sentinel downlink  
May: service start



European Data Relay System  
✓ EDRS-A Launch: January  
• Commissioning on-going