Sentinel Data Access and Selection

ESA PECS Training Course on Earth Observation in Slovakia

17th – 21th September 2018

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17/09/2018

Contents

This Power Point complements the **2018_ESA_PECS_RaffaeleRigoli_EO_data_access.ppt**, in particular the section called “Access to Copernicus Sentinels”, subsection “Sentinel Data Access”:

- 1- Sentinel Data Access: slides copied from the **2018_ESA_PECS_RaffaeleRigoli_EO_data_access.ppt**
- 2- Example of selecting suitable data for Flood mapping
- 3- EO Browser: slide copied from the **2018_ESA_PECS_RaffaeleRigoli_EO_data_access.ppt**

1- Sentinel Data Access: slides copied from the **2018_ESA_PECS_RaffaeleRigoli_EO_data_access.ppt**

Note: Webinars created by RUS Copernicus often start by showing participants how to find the data for the exercise in the Copernicus Open Access Hug (More info at https://rus-copernicus.eu/portal/the-rus-offer/training/)

Sentinel data access for Scientific users- (Copernicus open 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 -2 data from the online Sentinel Data Hub (https://scihub.copernicus.eu/dhus/#/home)

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* . (https://scihub.copernicus.eu/s3/#/home)

Sentinel-5P Pre-operational Hub : pre-operational access point for all users to Sentinel-5P L1B and L2 data. Login credentials are *s5pguest:s5pguest* (https://s5phub.copernicus.eu/dhus/#/home)

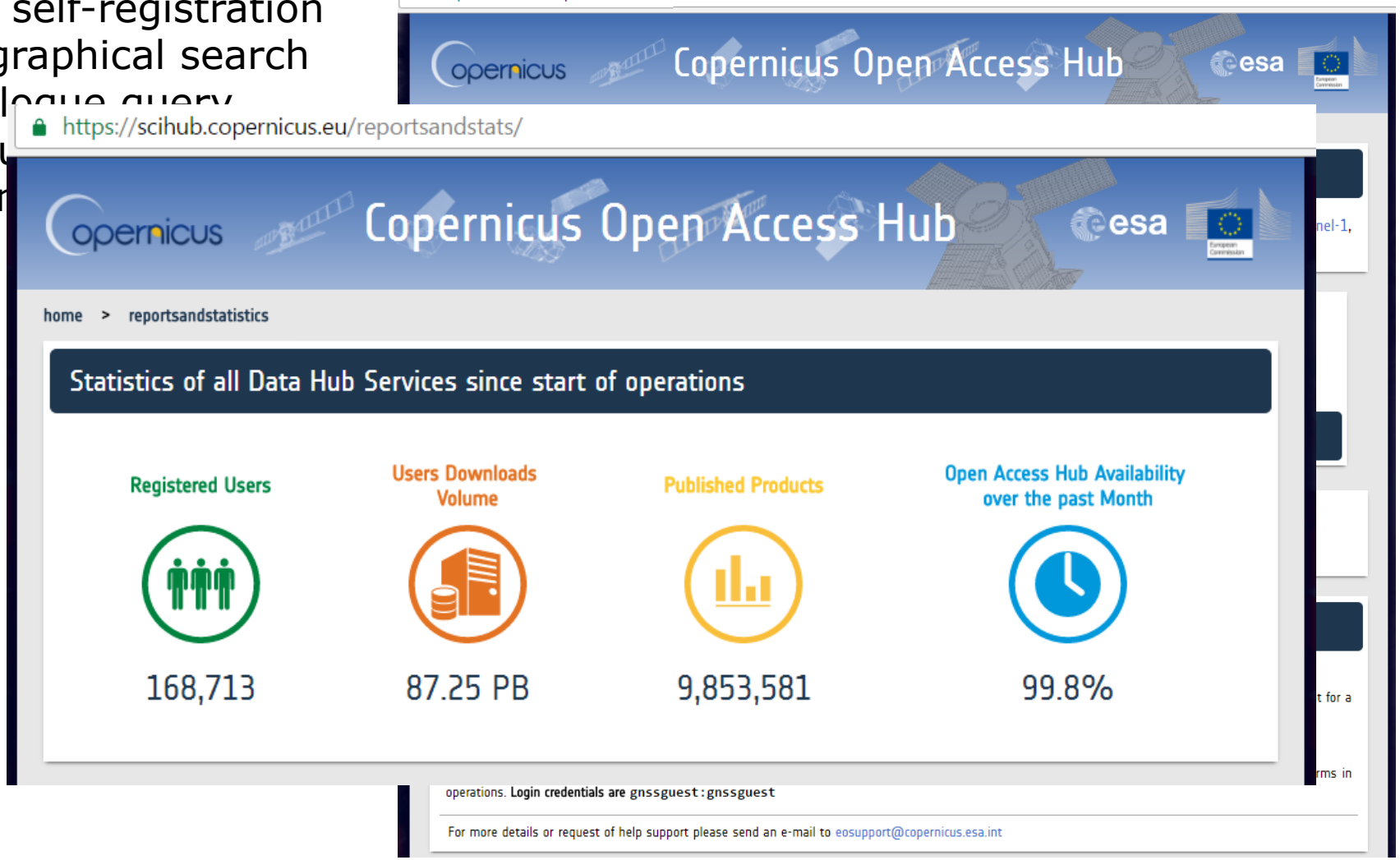
Anyone can register online via self-registration. The self-registration process is automatic and immediate. Registration grants access rights for searching and downloading Sentinels products. Sentinel-1 and Sentinel-2 and 3 (coming soon Sentinel-5P) products are available at no cost for anybody. The 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 Open Access Hub: Sentinels

- User self-registration
- Geographical search
- Catalogue query
- Produ
- Down

https://scihub.copernicus.eu/



Copernicus (Sentinel) Open Access Hub (1/8)

S1/S2 and S3 data are available to all users via Sentinel data hub(s)…

https://scihub.copernicus.eu

Copernicus Open Access Hub

Welcome to the Copernicus Op

The Copernicus Open Access Hub (previous … nd open access to Sentinel-1, Sentinel-2 and Sentinel-3 user products, st

Open Hub | API | GNSS Hub

User Guide | Reports & Stats

Open Hub

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** .
Sentinel-5P Pre-operational Hub : pre-operational access point for all users to Sentinel-5P L1B and L2 data. **Login credentials are s5pguest:s5pguest**
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

user guide

https://scihub.copernicus.eu/userguide/

Sentinels Scientific Data Hub

home > scihubuserguide

Overview
1 Self Registration
2 Graphical User Interface
3 Full Text Search
4 Advanced Search
5 APIs And Batch Scripting

Overview — Rev. 93 - 28 Apr 2016

The Sentinels Scientific Data Hub provides complete, free and open access to Sentinel-1 and Sentinel-2 user products.

Sentinel-1 Data Offer

The Sentinel-1 data offer for the Scientific Data Hub consists of:
- Level-0 and Level-1 user products for the following acquisition modes:
  - Strip Map (SM)
  - Interferometric Wide Swath (IW)
  - Extra Wide Swath (EW)
- Level-2 user products for the following acquisition modes:
  - Wave (WV)
  - Interferometric Wide Swath (IW)
  - Extra Wide Swath (EW)

The Sentinel-1 acquisitions zones with the related mode and polarisation are defined on a cyclic (12 days) basis in the observation scenarios.
The Sentinel-1 ground segment production baseline is described in the production scenario.

Sentinel-2 Data Offer

The Sentinel-2 data offer for the Scientific Data Hub will consist of Level-1C user products.

The Data Hub Archive

The Scientific data Hub maintains an archive of all the products for download via HTTP.

Free and Open data access

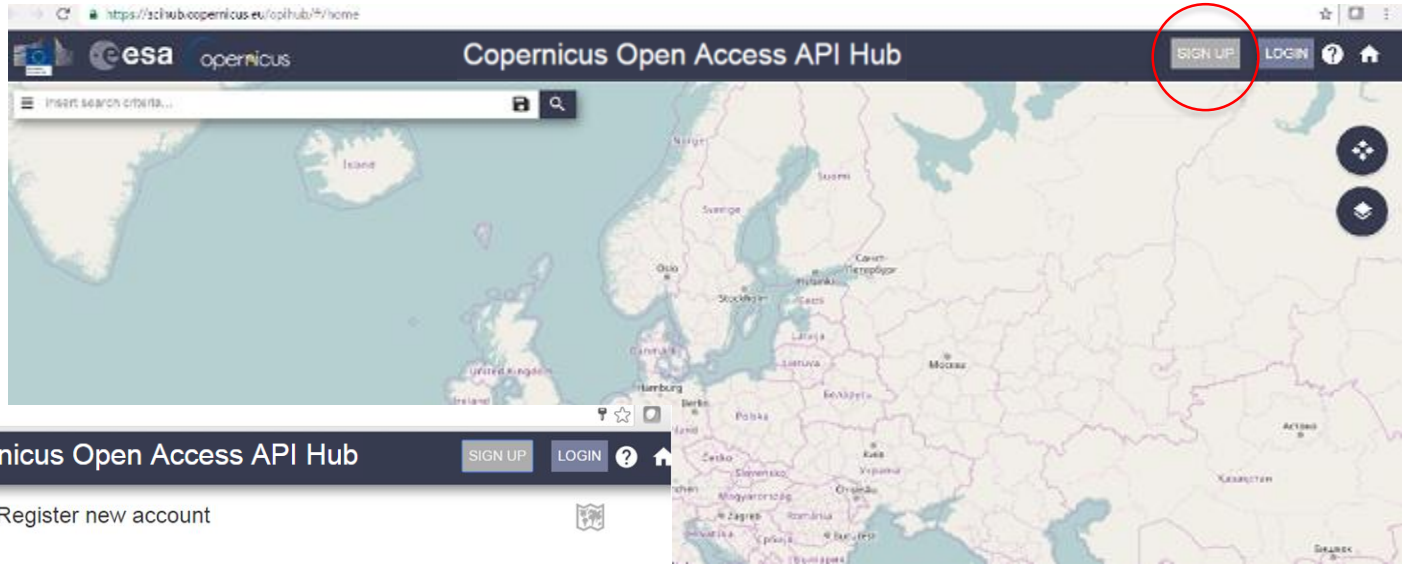
Anyone can register online via self-registration. The self-registration process is automatic and immediate. Registration

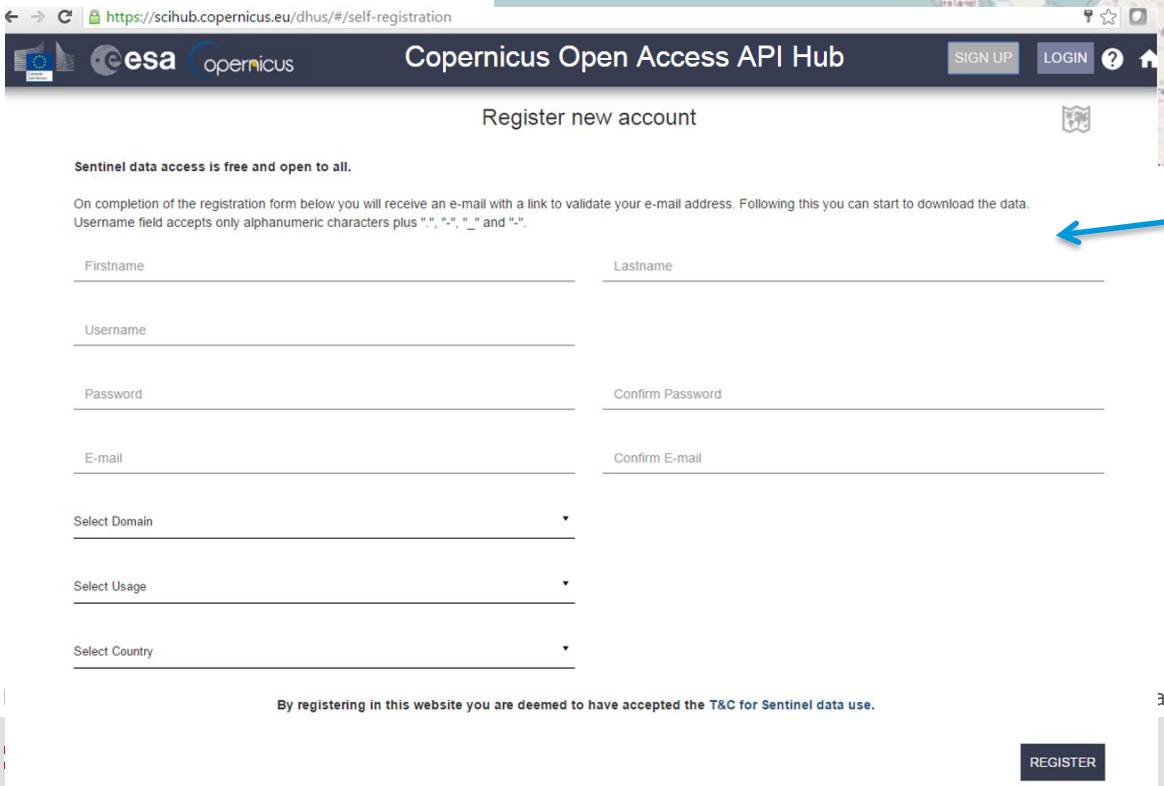
We will focus on the Open hub!

“Access points” description (red circled) …Click on “Open HUB”

Copernicus Open Access Hub overview and registration (2/8)

1) If you are already registered log in to start using the Sentinel Hub geographic interface to browse and download Sentinel data, <u>if you are a new user</u> click on the circled red link "SIGN UP" to complete registration





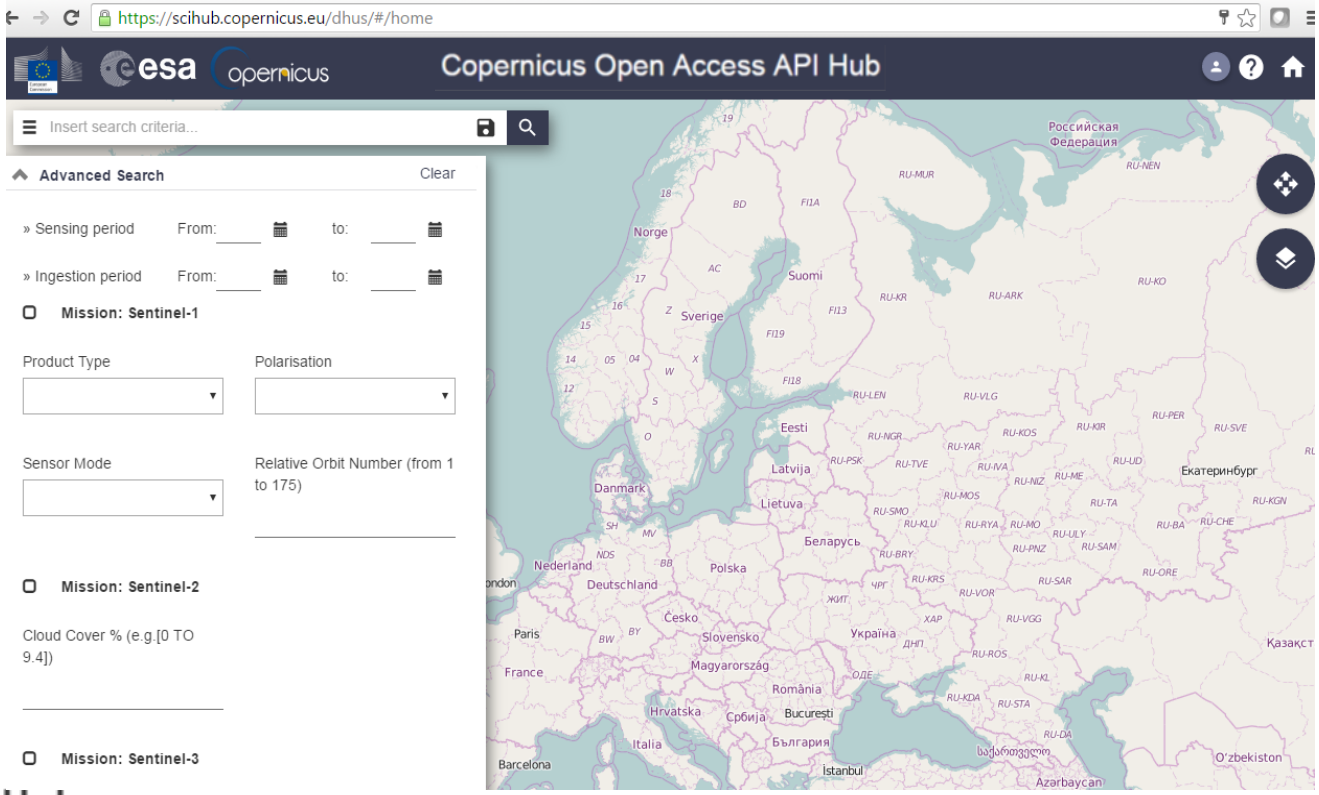
2) fill this form to start registration procedure (username and e-mail address should be provided in lower case only) then you will receive a mail with a link to validate your mail address. Finally an administrator will be able to let you access to the Sentinel Data Hub.
<u>Please note that by registering in this website you are deemed to have accepted the T&C for Sentinel data use.</u>(<u>https://sentinel.esa.int/documents/247904/690755/Sentinel_Data_Terms_and_Conditions</u>)

Copernicus Open Access Data Hub (3/8)

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 (prod, type,acqu.dates..)**



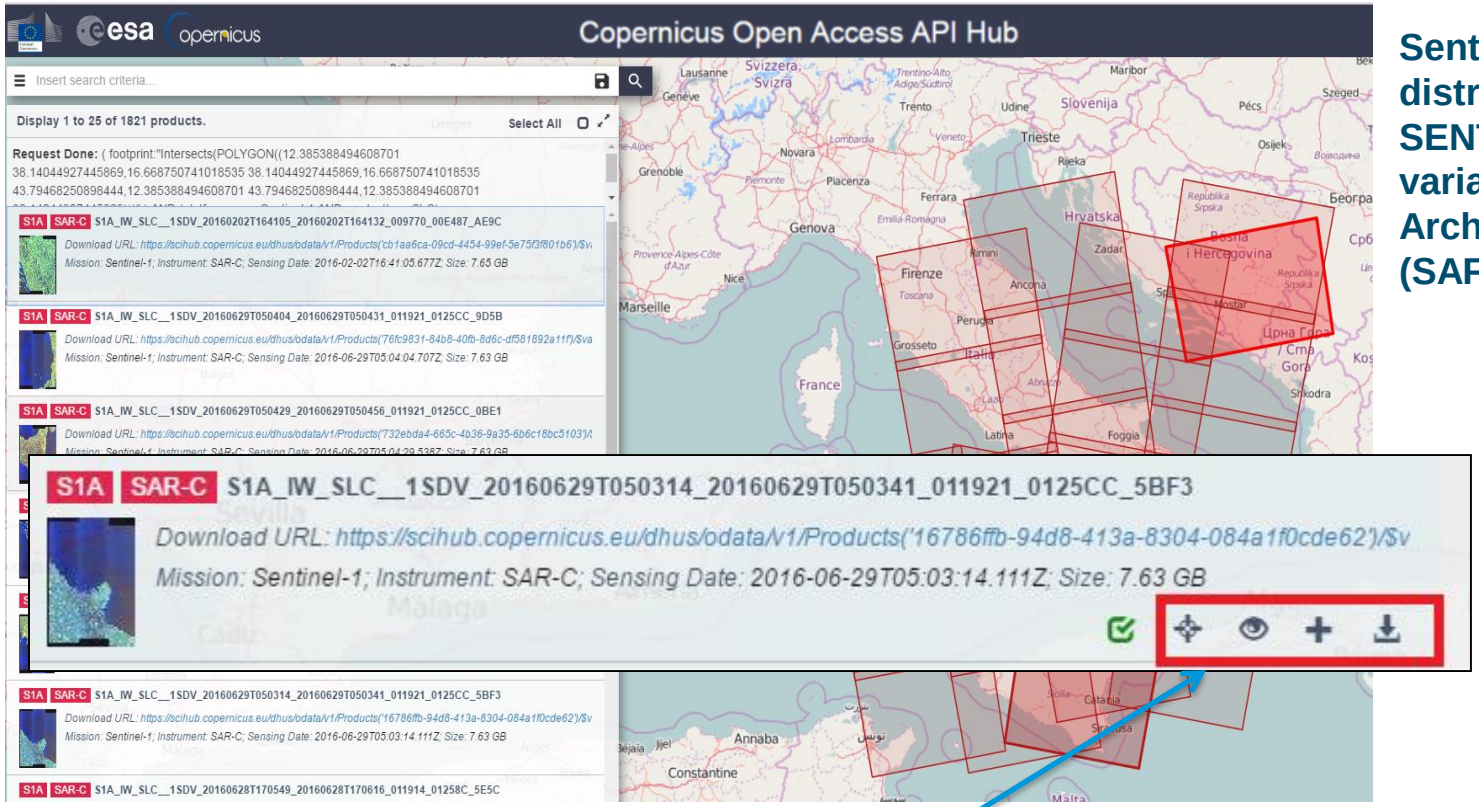
Sentinels Scientific Data Hub

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

Full details on Sentinels at: https://sentinel.esa.int/

Copernicus Open Access Hub (4/8)



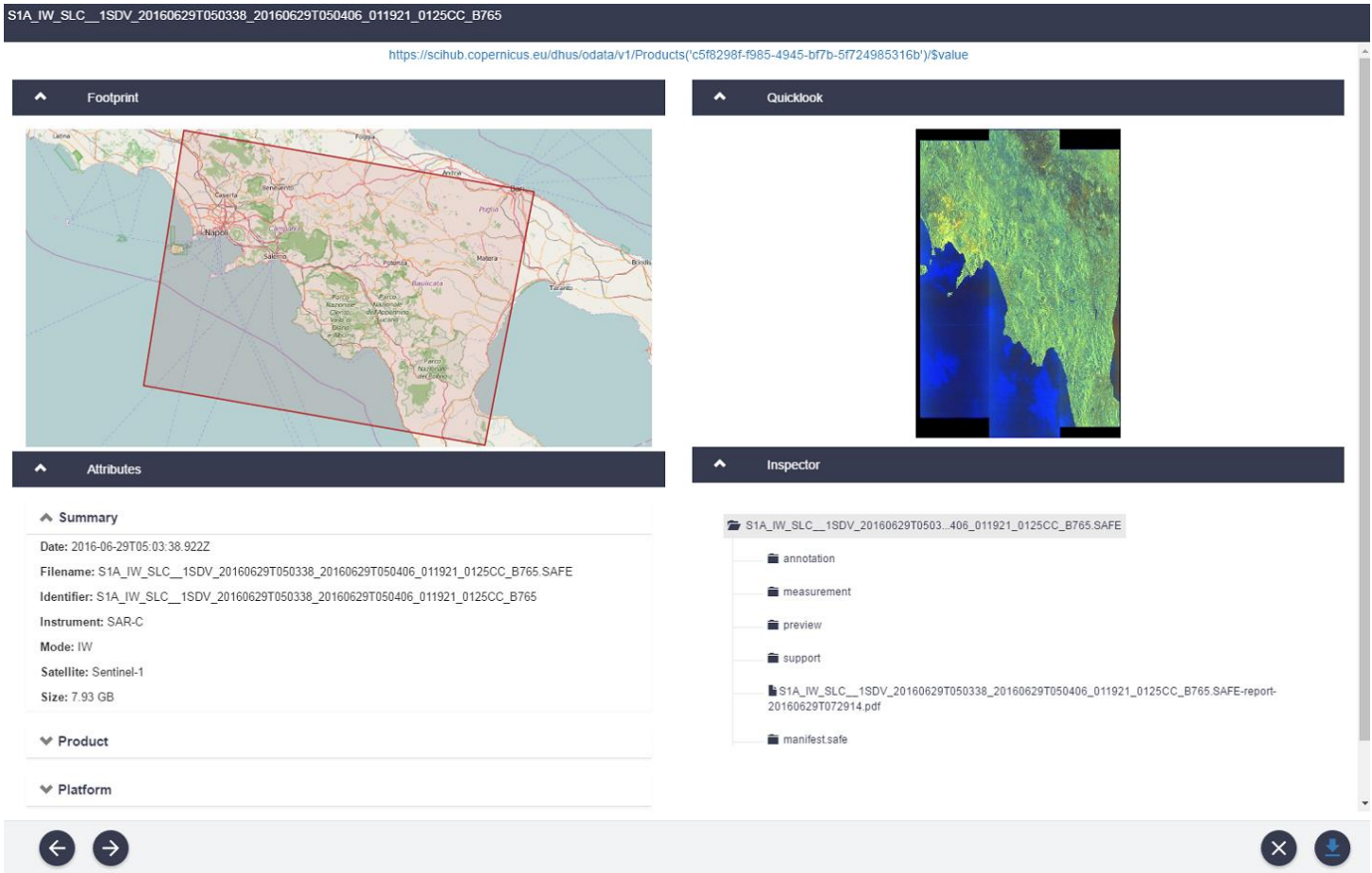
Sentinels data are distributed using a SENTINEL-specific variation of the Standard Archive Format for Europe (SAFE) format

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', "Download product"

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

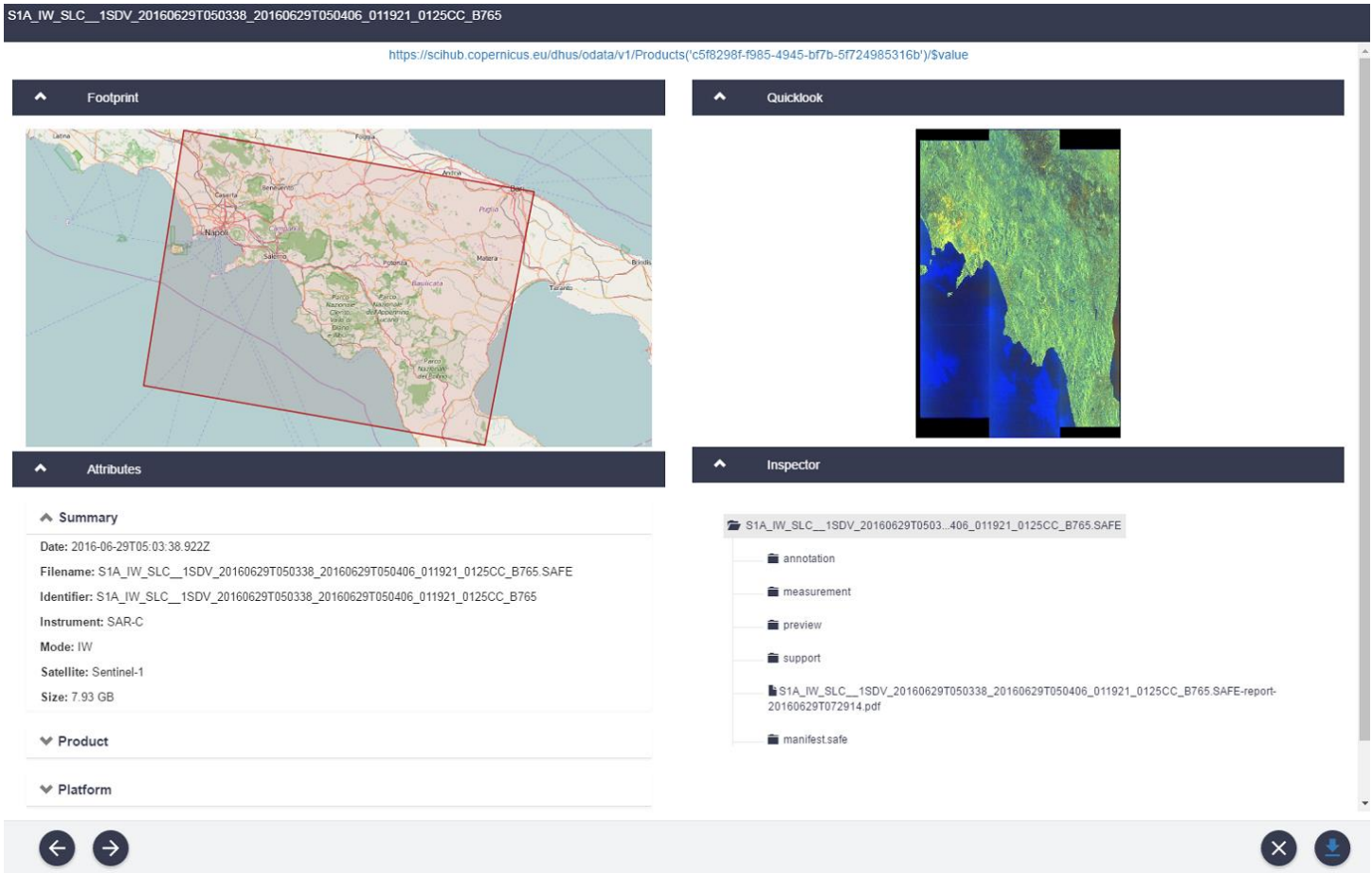
Copernicus Open Access Hub (5/7)

*** 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.**

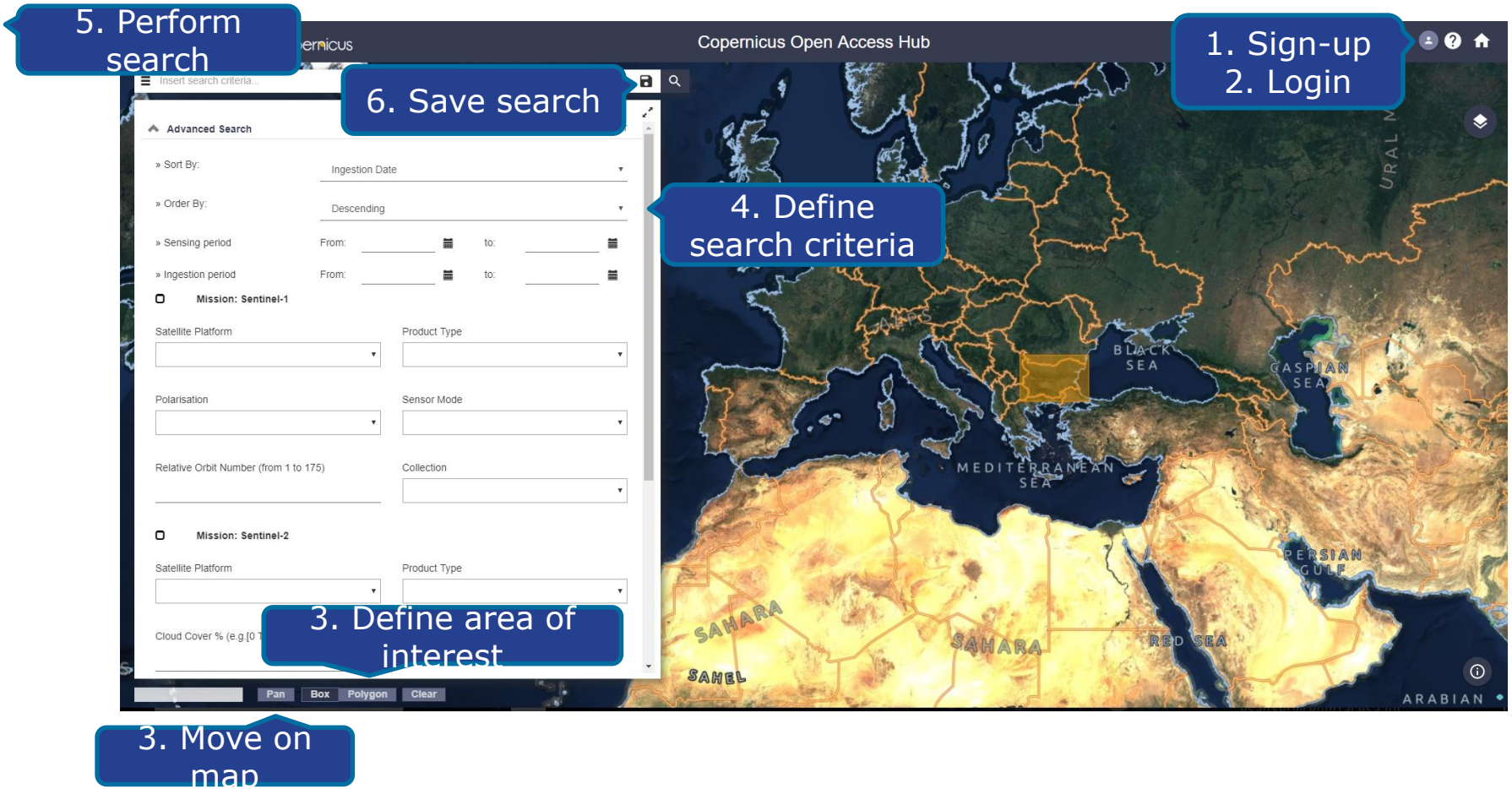


Copernicus Open Access Hub (5/8)

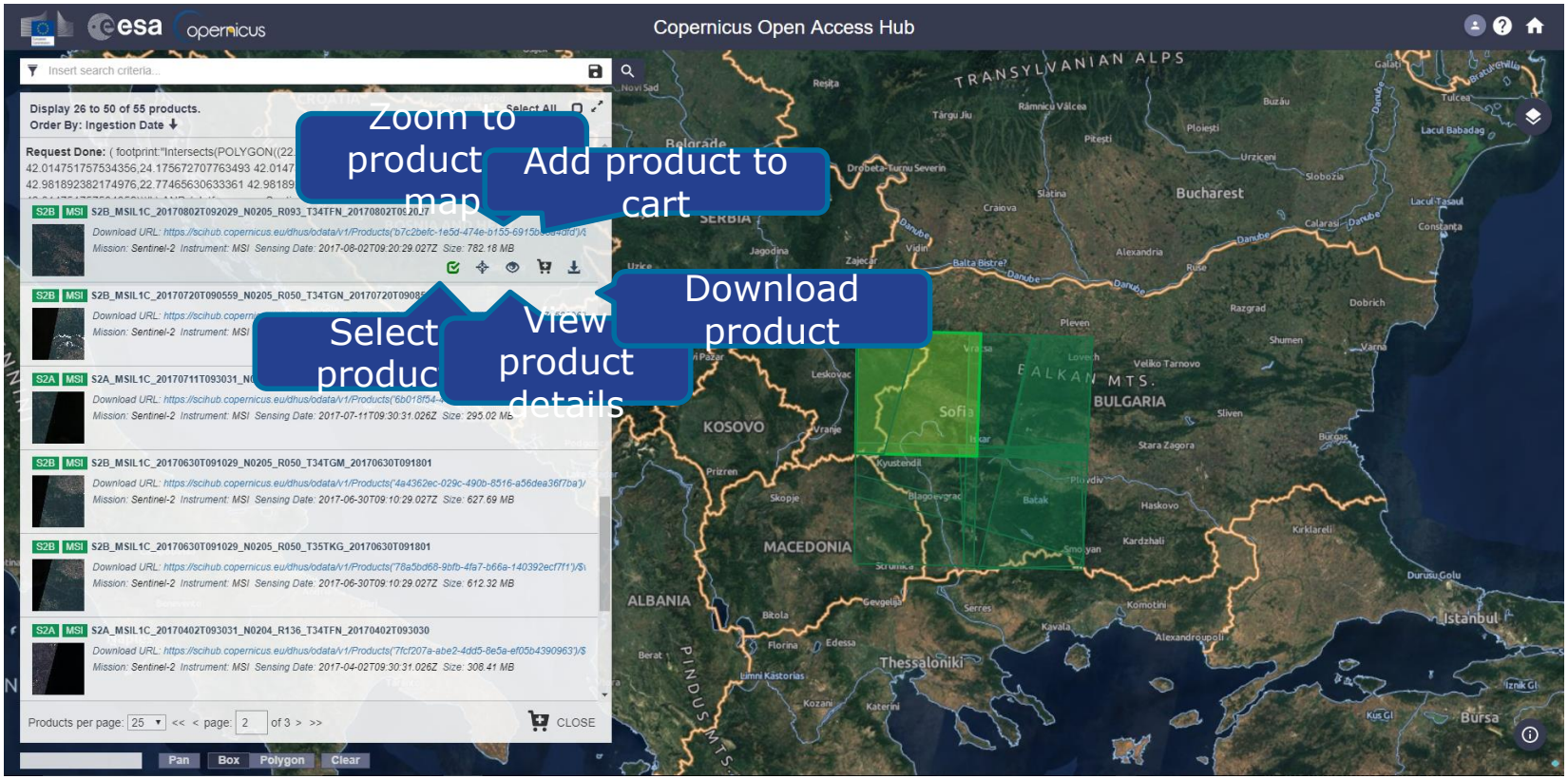
*** View product details is an online inspection of the searched products by browsing and pre-viewing the product metadata and measurements without downloading it. A preview panel displays information on the product contents and structure.**



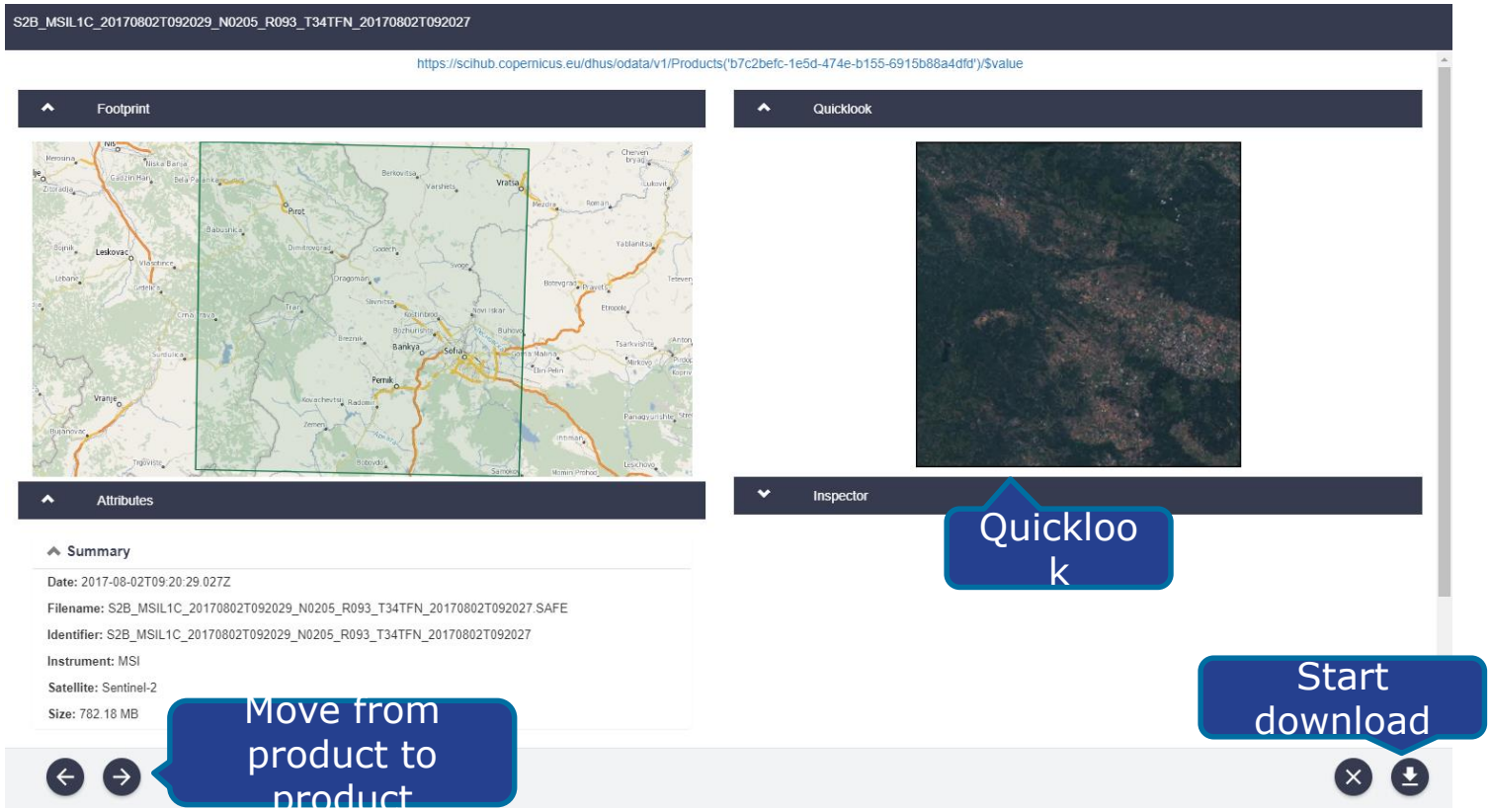
Copernicus Open Access Hub (6/8) : Overview resume (sign-up/login and search)



Copernicus Open Access Hub (7/8): Overview resume (select and download)



Copernicus Open Access Hub (8/8) Overview resume (check product details and download)



2- Example of selecting suitable data for Flood mapping

Detailed example of the recommended workflow, showing how we selected suitable data for a flood over Slovakia

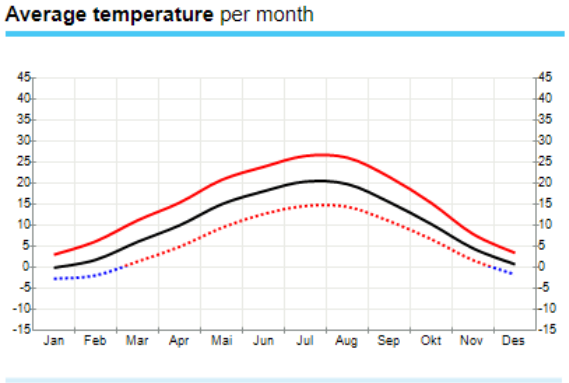
How to select images?

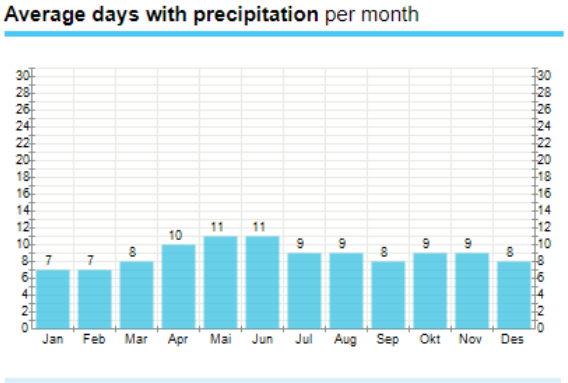
1- Search for an event in particular (e.g. Floods in Slovakia) and first get general knowledge about what happened, when the emergency Services were triggered, and when the heavy rainfalls started.

This allows us to know in which area to search for images, and how to set the time range to search for POST-event images. Regarding PRE-event image selection, it is generally better to use an image from the same season (from a previous year if needed), but by selecting a month where it rains less, we ensure all potential floods are detected.

http://emergency.copernicus.eu/mapping/ems-product-component/EMSR107_02LJUBLJANA_DELINEATION_OVERVIEW-MONIT01/1

Weather statistics for Ljubljana: https://www.yr.no/place/Slovenia/Ljubljana/Ljubljana/statistics.html





How to select images?

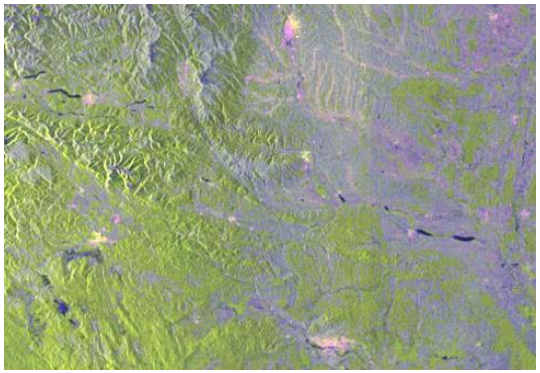
2- Look for a S1 image (IW GRD mode) as close as possible to the crisis date. This will be the POST-event image. This will ensure we capture the event when it was at its worst, and not when waters have started to drain out.

Additionally, the PRE-event and POST-event SAR images we will use need to have the same geometry. So the easiest is to first select a POST-event image, make a note of its Relative Orbit, and then search for a suitable PRE-event image (from the same Relative Orbit, and from the right month).

Floods are easy to visualize from the preview in the Copernicus Open Access Hub, so use that preview for image selection. So after we have found a POST-event image, by simply comparing it visually with a PRE-event image we should be able to see floods.

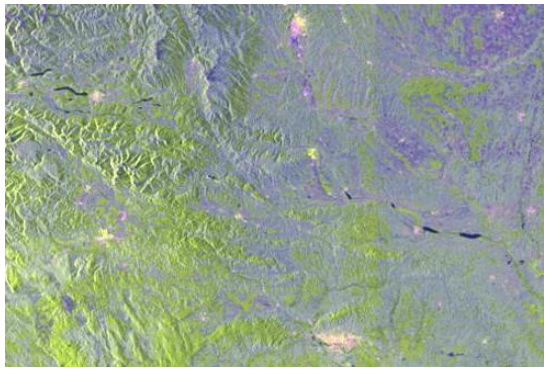
POST-event image,
Relative orbit 146

S1A_IW_GRDH_1SDV_
20141108T165004_20
141108T165029_0031
93_003AD4_**DD1A**

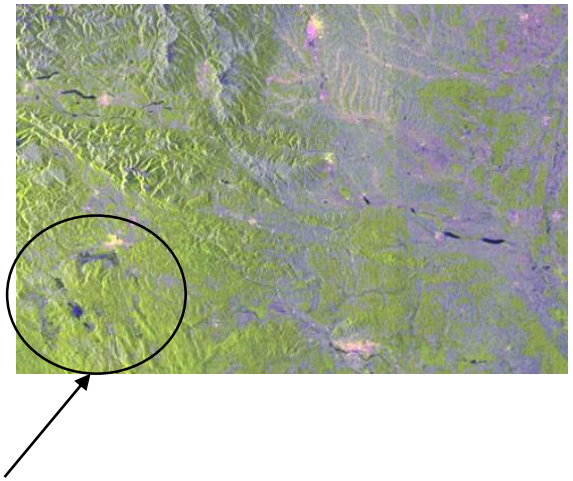


PRE-event image,
Relative orbit 146

S1A_IW_GRDH_1SDV_
20141015T165004_20
141015T165029_0028
43_00334D_**C5A5**



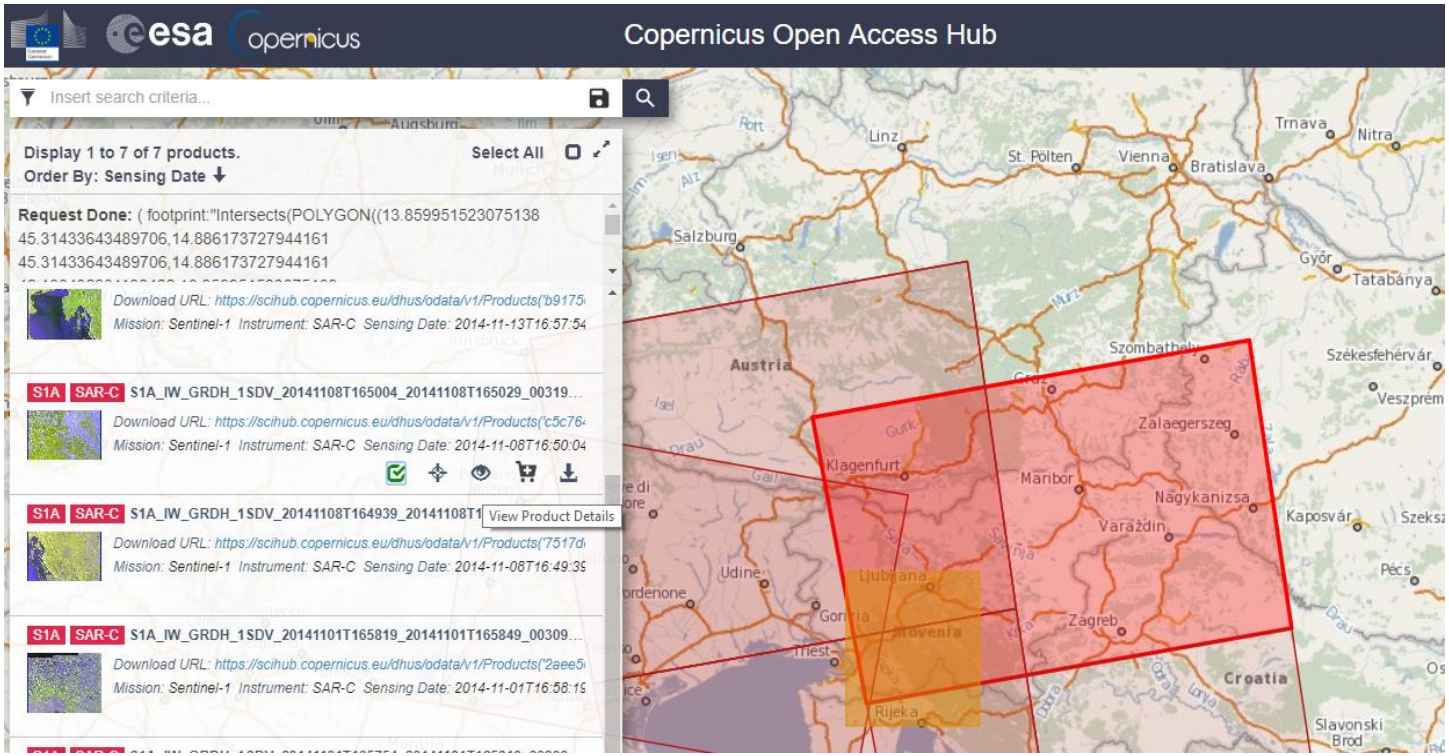
…. So by visual comparison of both, we see this area shows a change in the POST-event. It is most likely the flood !



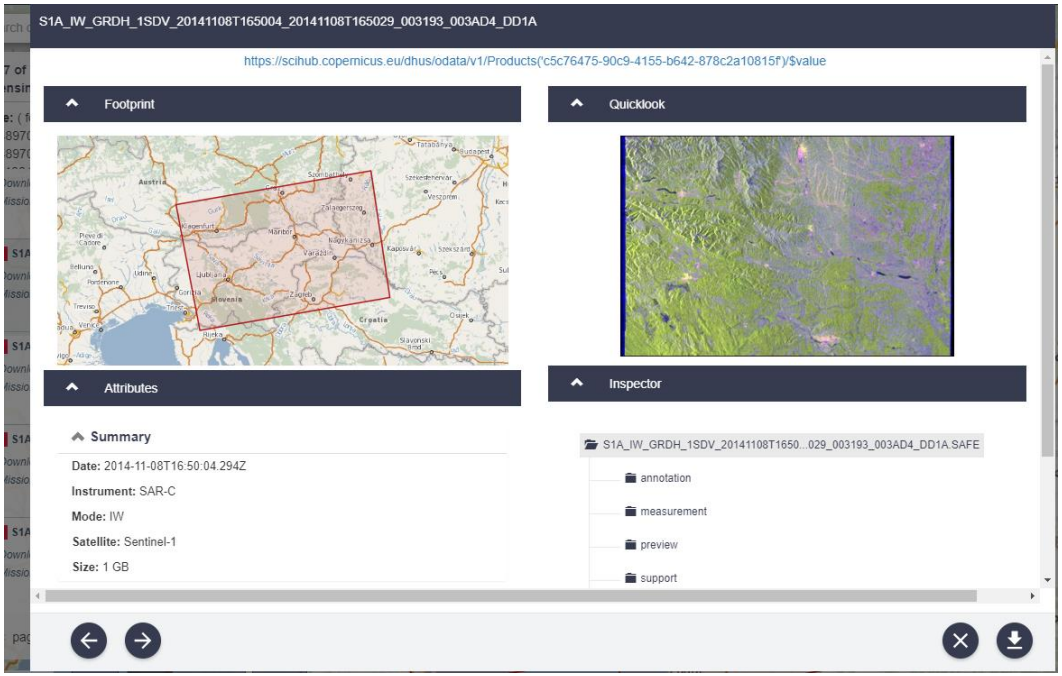
Flooded area

……. But how exactly should we search? Go to the next slide

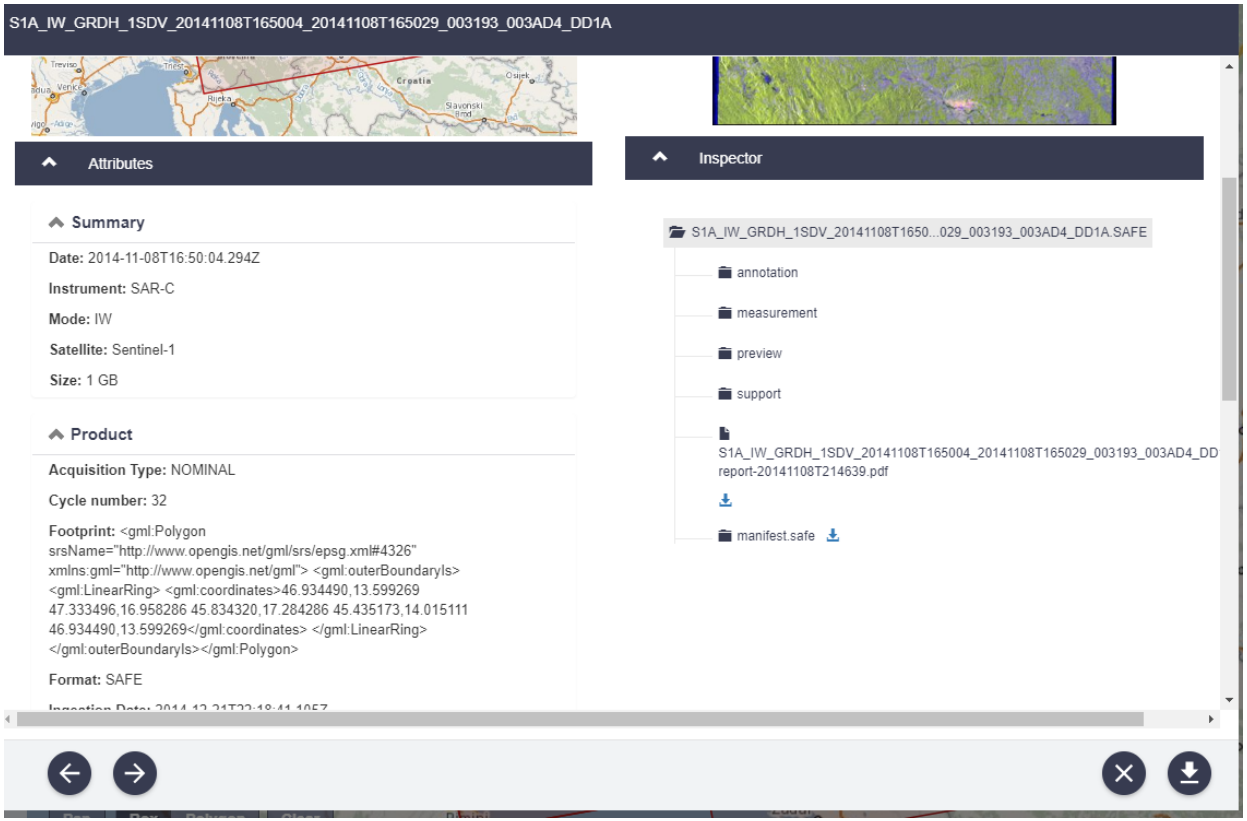
Searching for images in the Copernicus Open Access Hub.
First, search for your POST-event image



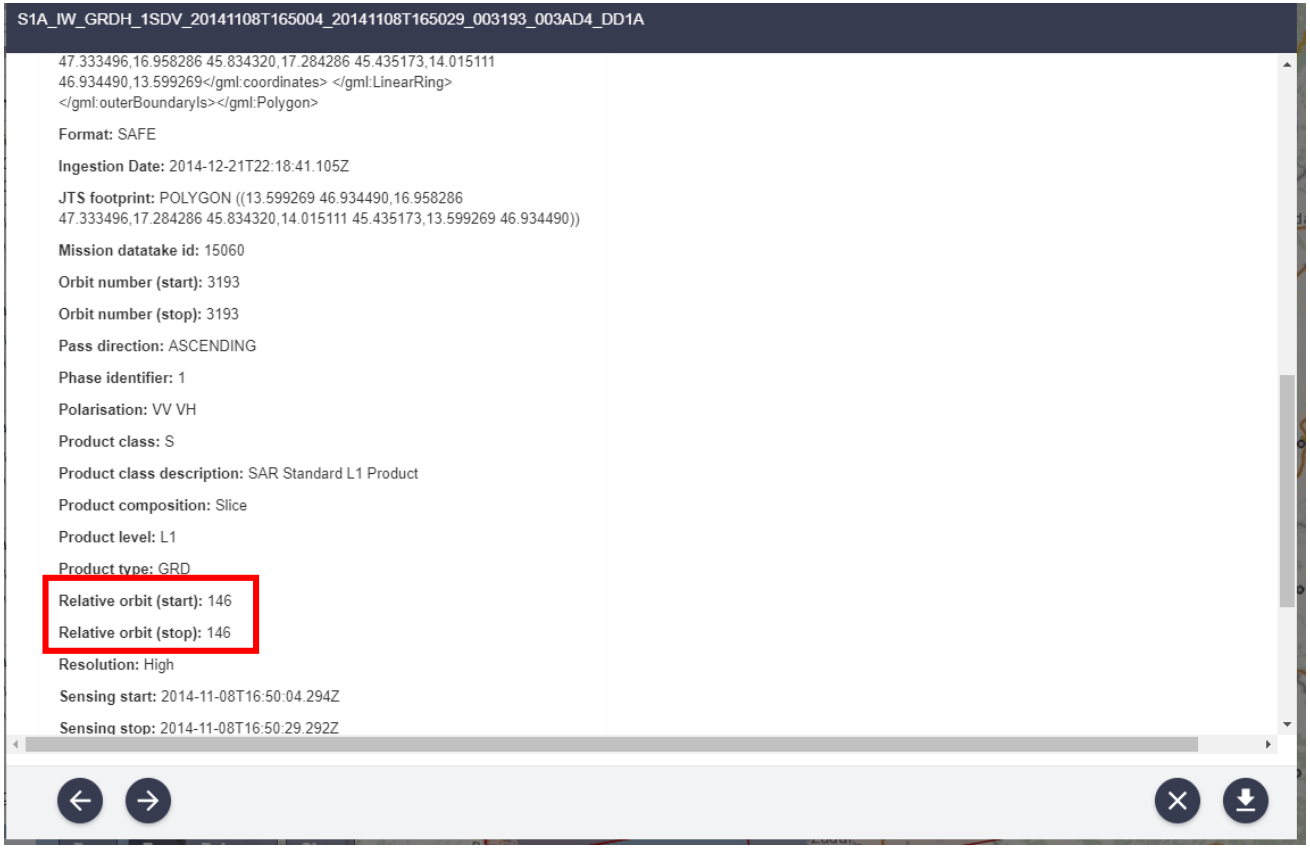
Display the product details. On the right, the quicklook



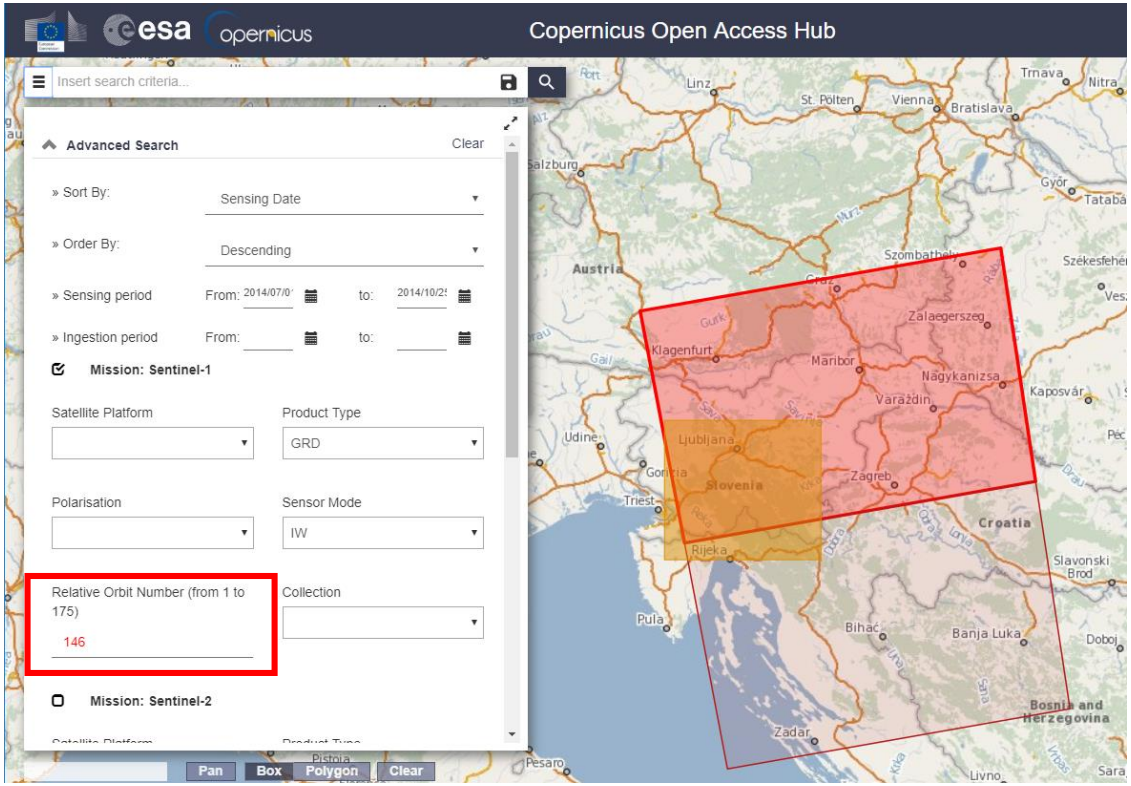
The under Product…….



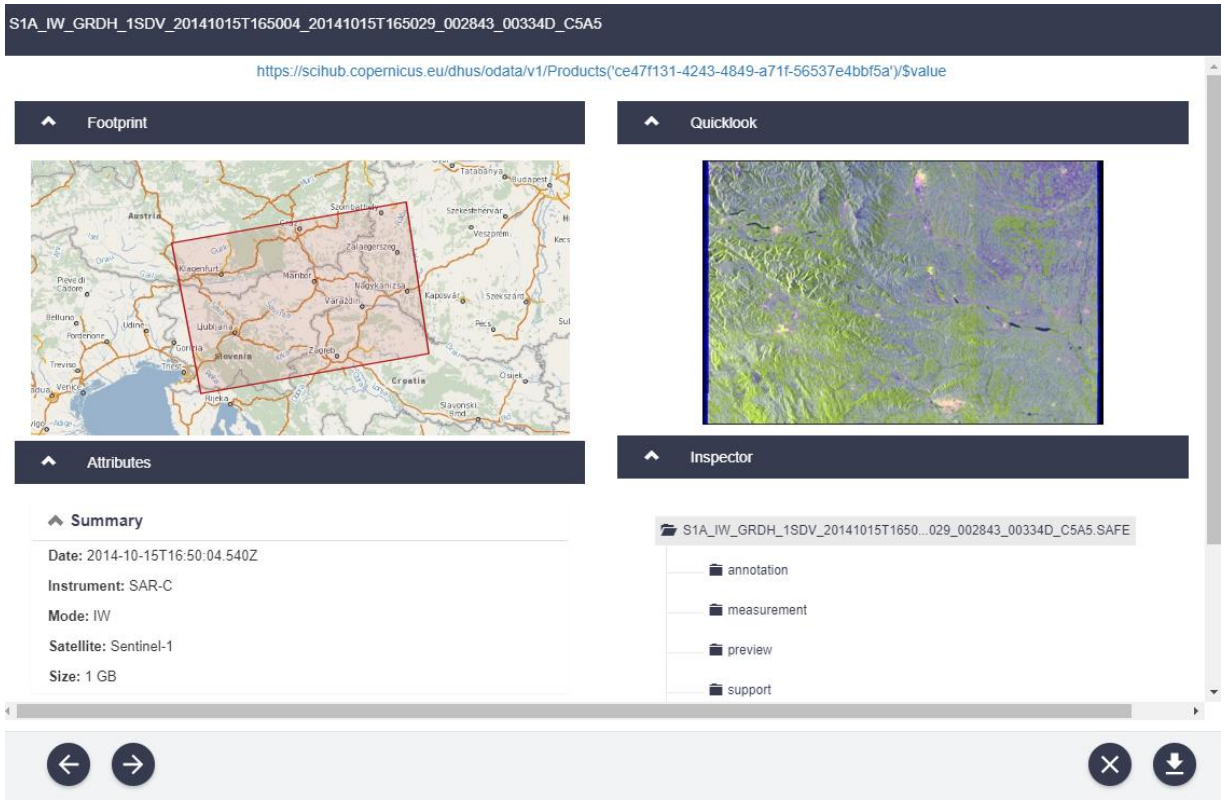
……. Scroll down to Relative Orbit and make a note



Then, if relevant, get a sense of meteorology in another month. Then search for a PRE-event image, from same relative orbit



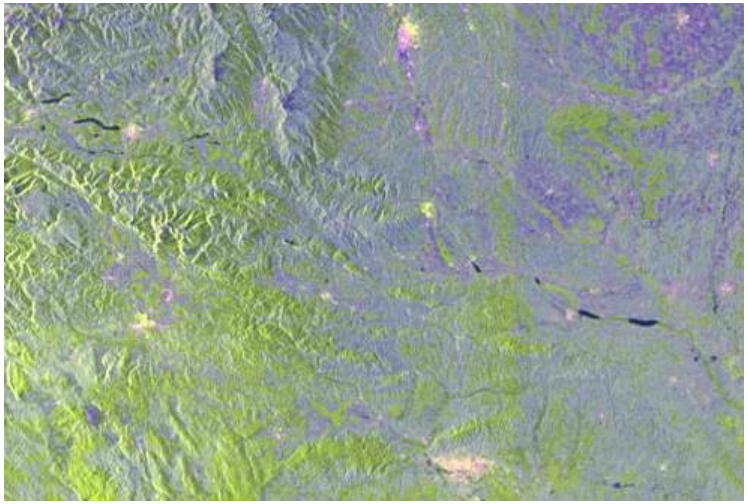
Display it and observe the quicklook



If the event is large enough, we can already see the potential flood

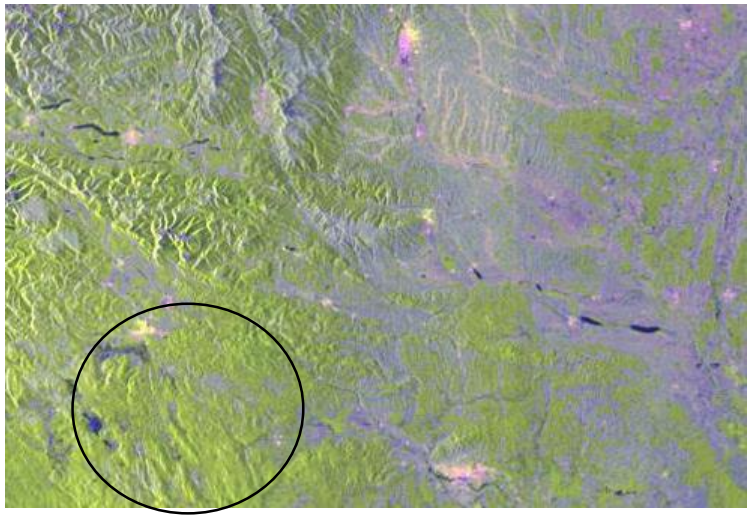
Before the flood

S1A_IW_GRDH_1SDV_20141015T165004_20141015T165029_002843_00334D_C5A5



Crisis image

S1A_IW_GRDH_1SDV_20141108T165004_20141108T165029_003193_003AD4_DD1A



2- Example of selecting suitable data for Flood mapping

Quick results of the search for images regarding the Example of a flood over Nigeria in August 2017

Flooding in Nigeria: August 2017

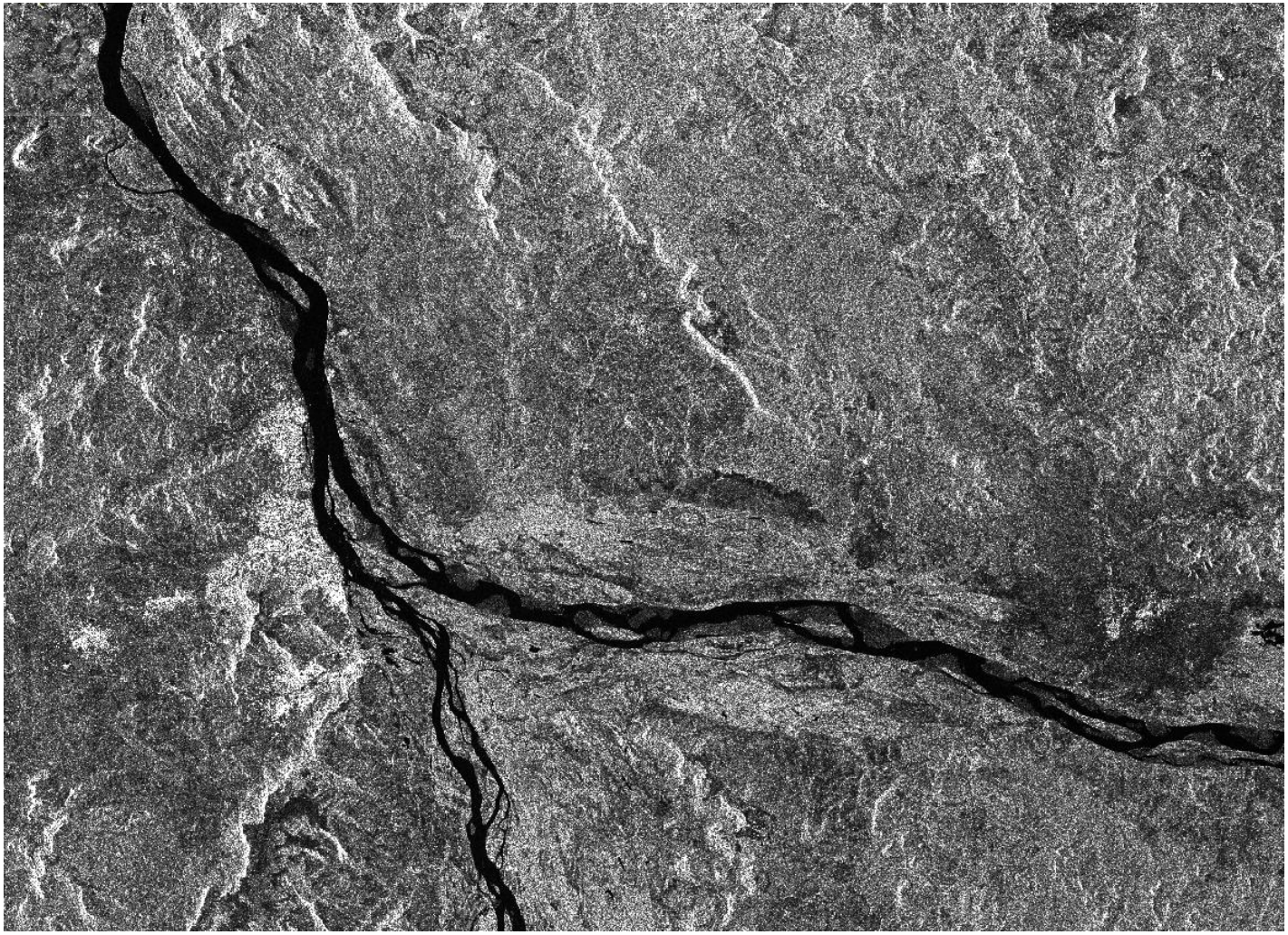
Lokoja, in the Kogi region, suffered from heavy rains at the **end of August 2017**, and around 100 000 persons were displaced on September 7th 2017. Article on the newspaper:
http://floodlist.com/africa/nigeria-floods-kogi-september-2017

Additional data (meteorological)
https://www.meteoblue.com/en/weather/forecast/modelclimate/lokoja_nigeria_2331939
http://www.nimet.gov.ng/drought-and-flood-monitor-bulletin

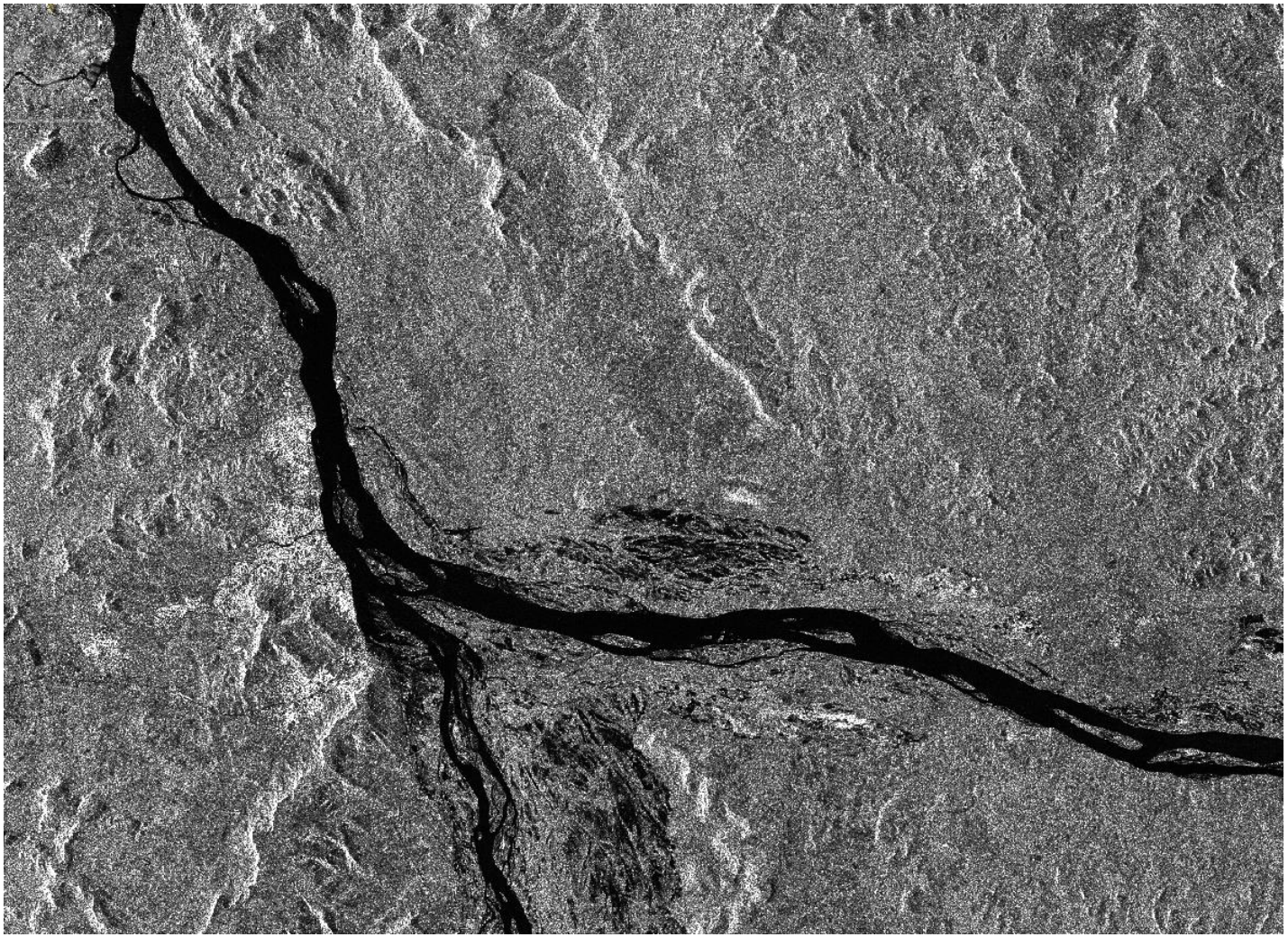
Sentinel-1 image from before the flooding (dry season, 31 Dec 2016):
S1A_IW_GRDH_1SDV_20161231T174528_20161231T174553_014627_017C76_**56BB**

Sentinel-1 **during** the flooding (**9 Sept 2017**):
S1A_IW_GRDH_1SDV_20170909T174535_20170909T174600_018302_01EC87_**50BB**

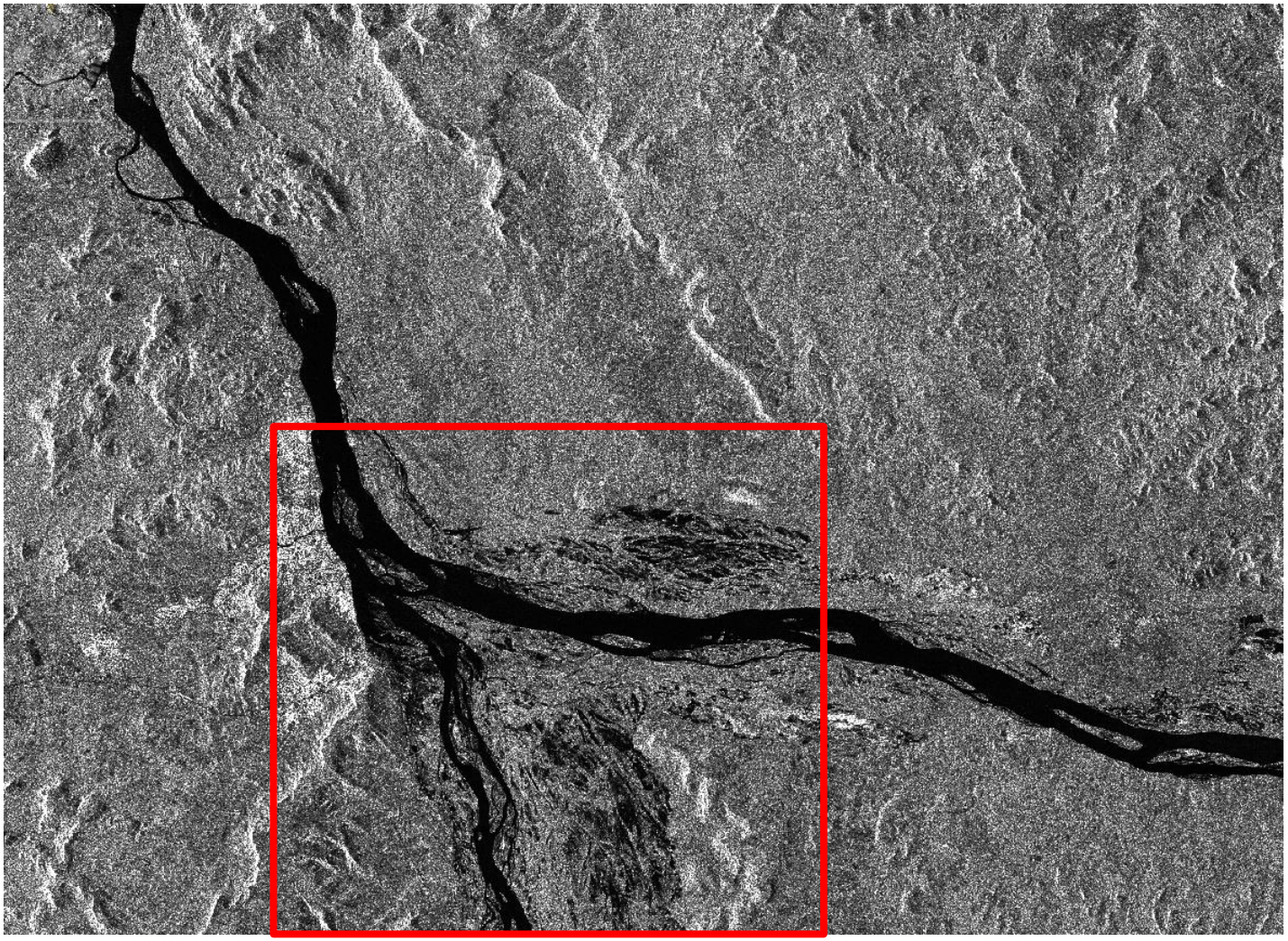
Sentinel-1 image from before the flooding (dry season, from 2016-12-31):
S1A_IW_GRDH_1SDV_20161231T174528_20161231T174553_014627_017C76_**56BB**



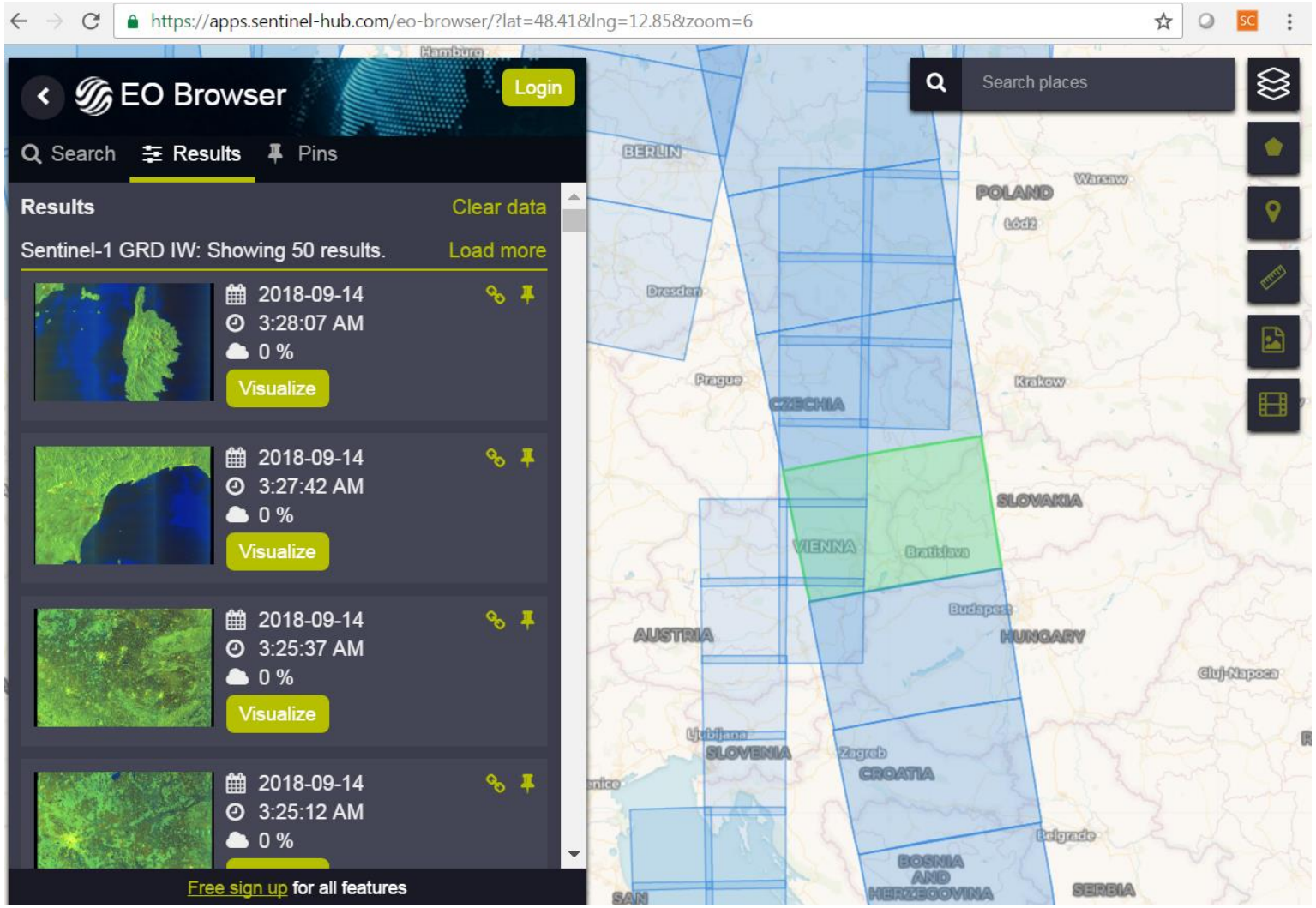
Sentinel-1 **during** the flooding (**2017-09-09**):
S1A_IW_GRDH_1SDV_20170909T174535_20170909T174600_018302_01EC87_**50BB**



Sentinel-1 **during** the flooding (**2017-09-09**):
S1A_IW_GRDH_1SDV_20170909T174535_20170909T174600_018302_01EC87_**50BB**



Areas that appear black in the post-event image are potentially flooded

SENTINEL DATA HUB (EO BROWSER)

https://apps.sentinel-hub.com/eo-browser/