

Quick Guide: Using the ESA Charter Mapper to support Charter operations

Background

In March 2021, the ESA Charter Mapper was released for testing purposes. It is a Processing Environment implemented under the responsibility of the [European Space Agency \(ESA\)](#). After a successful Operations Readiness Review and the acceptance by the Charter Board in July 2021, the ESA Charter Mapper was deployed in COS-2 for operations for Project Managers (PMs), Value Adders (VAs), and Charter members.

The ESA Charter Mapper is intended to provide the PM and VAs of an activation easy access to the available collection of EO data and allow them to perform basic EO processing without downloading software. The primary benefit is that imagery is ingested and transformed systematically in full resolution, irrespective of the original format, so as the user logs in, all of the EO data provided for an activation can be viewed on-line. The PM / VA can browse imagery on-line, select EO data of interest, analyze the data, and process it on-line to generate geo-information products. To support this, a growing list of EO services are available on-demand, as well as basic GIS tools integrated into the platform.

It is not expected that the platform will be a complete substitute for the work of the PM and VAs, but it can assist with data visualization and occasionally the generation of Value Added Products (VAPs) through the available EO processing services.

Access to Charter Mapper & Key Functions

The Charter Mapper is available at: <https://cpe.disasterscharter.org>

Once logged in to COS-2 with the provided credentials, the PM/VA can access **the workspace of the specific activation** for which they are appointed.

Here they will find a geo-browser with tabs at the top which allow for viewing the different collections. The **Acquisitions** tab shows the full list of EO data of the activation (fresh acquisitions and data from archives) which includes data that has not yet been calibrated. The **Datasets** tab shows the aggregated list of pre-processed data, resulting from the ingestion and calibration of imagery with on-line processing chains that are executed in the background. Thanks to background pre-processing done automatically, the PM/VA is able to visualize the EO data in *full resolution* as directly usable *calibrated images* in the **Datasets** tab.

The Aux Datasets tab shows globally available products which can aid visualization or enhance processing (e.g. elevation, land cover, surface water). These products can be used as input for processing services such as STACK.

In **Datasets**, the ESA Charter Mapper extracts *intra-product components* (i.e. single bands) within an EO data product, single bands or three bands grouped in the form of a Red, Green and Blue (RGB) composite. Single bands and groups of bands are referred to as **Assets**. Several Assets can be derived from a single EO data product. They are pre-defined in the ESA Charter Mapper and can be used directly (**Select Asset**) or combined in an ad-hoc fashion by the user (**Combine Assets**) within the **Titiler** widget. In the example shown below, Figure 1 and Figure 2 are True color and Color Infrared (vegetation) composites respectively, they have been generated in the ESA Charter Mapper using multiple assets from WorldView-3 data.

The ESA Charter Mapper generates several Assets for each EO data product, as there are multiple ways to visualize their content, depending on what Assets are most relevant for the type of disaster concerned. What Asset is most relevant depends on what information is needed and the spatial and spectral characteristics of the EO data.

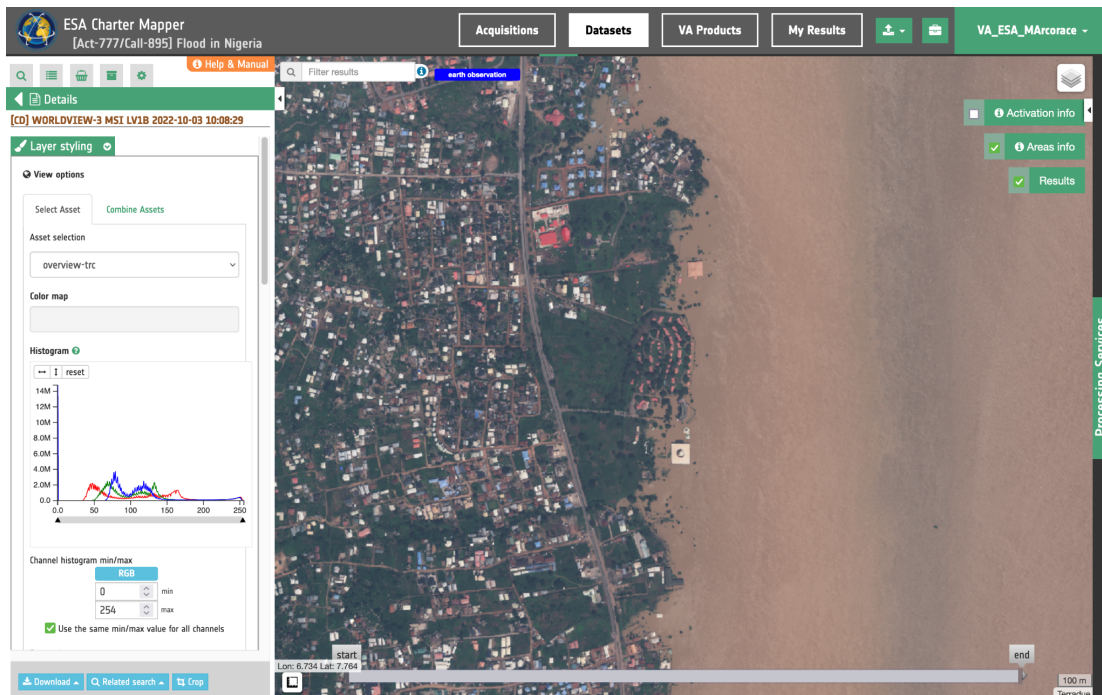


Figure 1 - Full Resolution True Color RGB composite using Select asset of Layer Styling in the left panel of the ESA Charter Mapper workspace. Credits: USGS, DigitalGlobe.

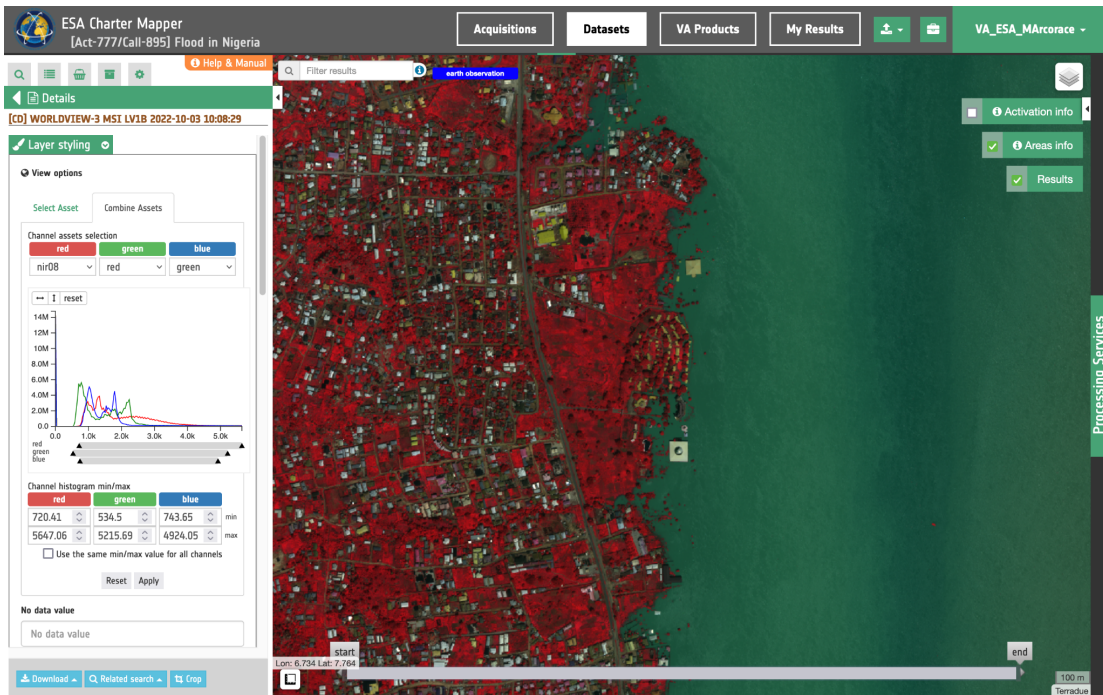


Figure 2 - Full Resolution Color Infrared (vegetation) RGB composite on the fly using Combine Assets in Layer Styling in the left panel of the ESA Charter Mapper workspace. Credits: USGS, DigitalGlobe.

Beyond visualization, the ESA Charter Mapper also provides **EO processing services** accessible through the [Processing Services](#) panel. PM/VAs can execute processing using the items available in **Datasets** as input. After the job has finished, the result of the processing job will then be available in **My Results**. Thanks to the automatic generation of Assets when the EO data is received by the ESA Charter Mapper, any further EO processing service is able to quickly generate geo-information [Products](#) (e.g. spectral indexes).



Figure 3 – Illustration of a simple geo-information product generated by retrieving the NDVI variation between two multispectral images in the case of a landslide (Pleiades vs Sentinel-2). Credits: CNES, Airbus, Copernicus, ESA.

The ESA Charter Mapper provides the [Feature Basket](#) function that allows the user to select EO data of interest (e.g cloud free pre- and post-event images) from the collection supplied to support the activation and save them in a separate viewing area. This helps to sort through what could be a vast collection of data (depending on the activation), to view only relevant data. Some available data may not be useful, considering the area(s) of Interest, cloud coverage, observation date, and the characteristics of the disaster to be observed. In addition, results from processing services can also be added to the feature basket. This allows for comparison between the output of services and the EO data used as input, or for validation of the service with other EO data (e.g VHR optical data to verify the output of a service which used SAR data as input).

The VAPs uploaded to COS-2 are visible under the tab **VA Products**. They are geo-located to allow for quick comparison between EO data and processing results over the same area.

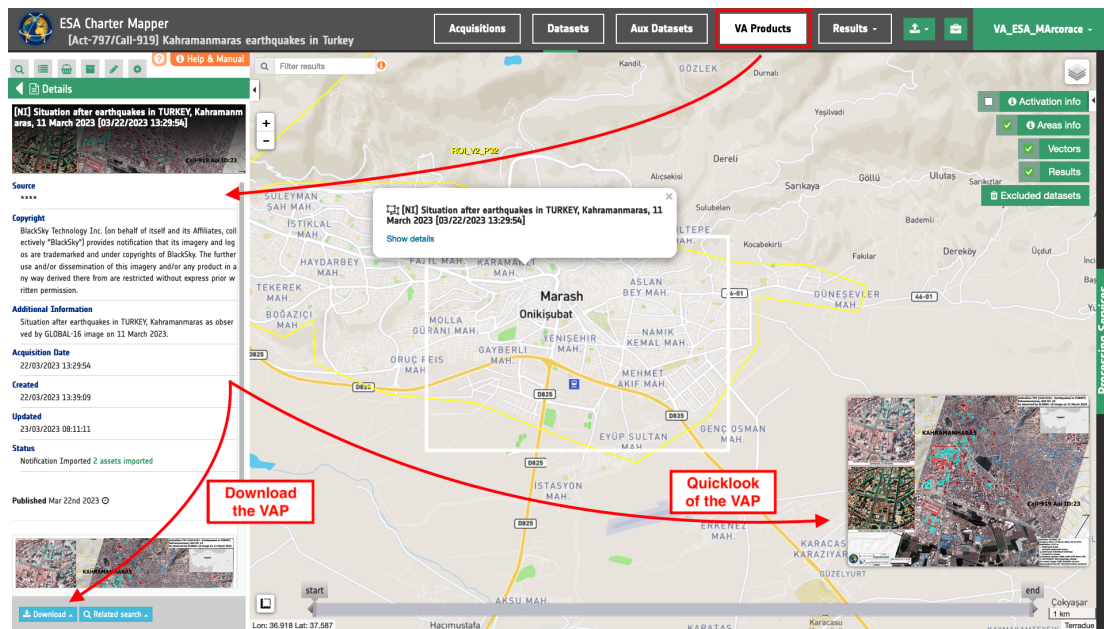


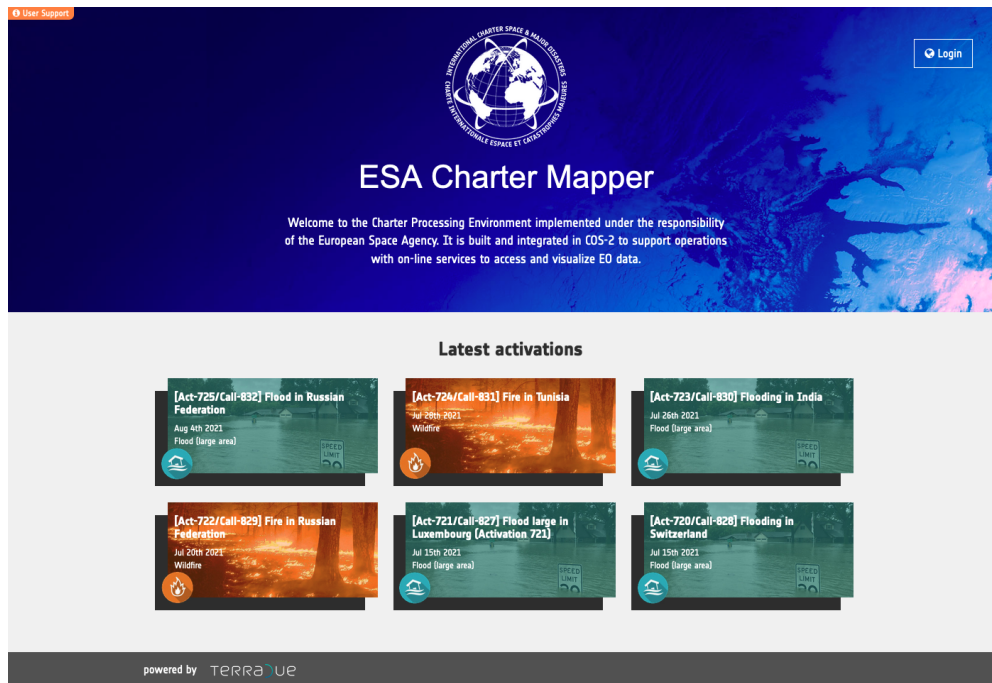
Figure 4 – Interface of the ESA Charter Mapper with the “VA Products” tab selected. The list of VAPs is seen on the right and footprints are seen on the map. A quicklook of the selected VAP can be seen in the bottom right corner of the screen. Credits: UE Geoinformation Systems.

Compliance with operational rules

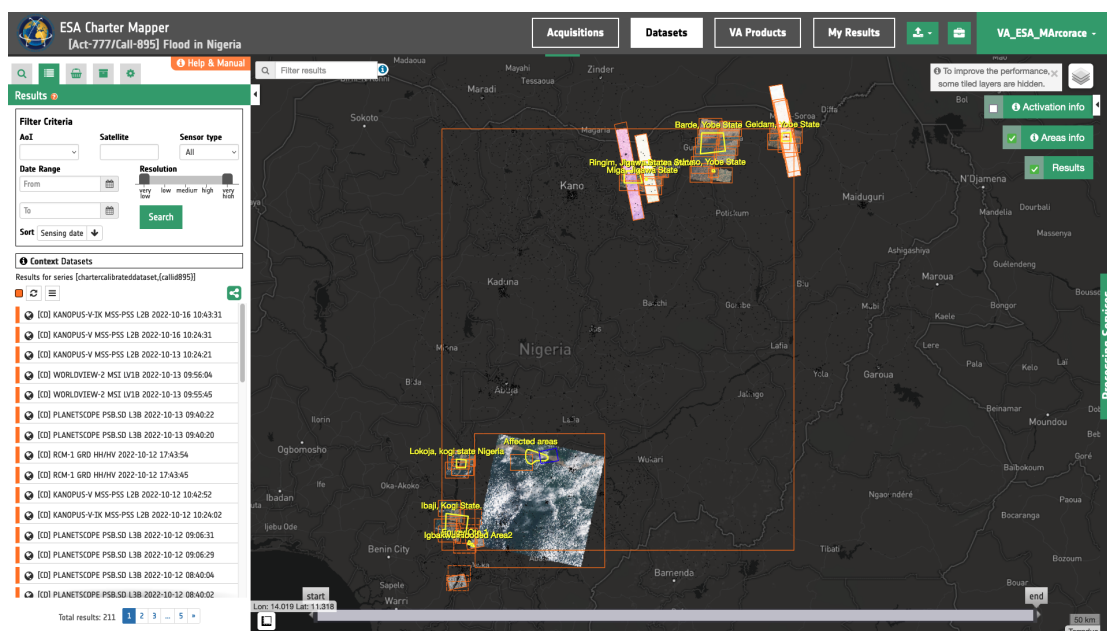
Only registered users may access the ESA Charter Mapper. As per standard COS-2 operations, the EO data collections of an activation are only available for the purpose of the activation and during the associated period of time. The ability to generate geo-information products using the ESA Charter Mapper is a key instrument to help the PM/VA, who remain as the only responsible persons for any content created to support the activation.

Step by step process to access the ESA Charter Mapper for operations

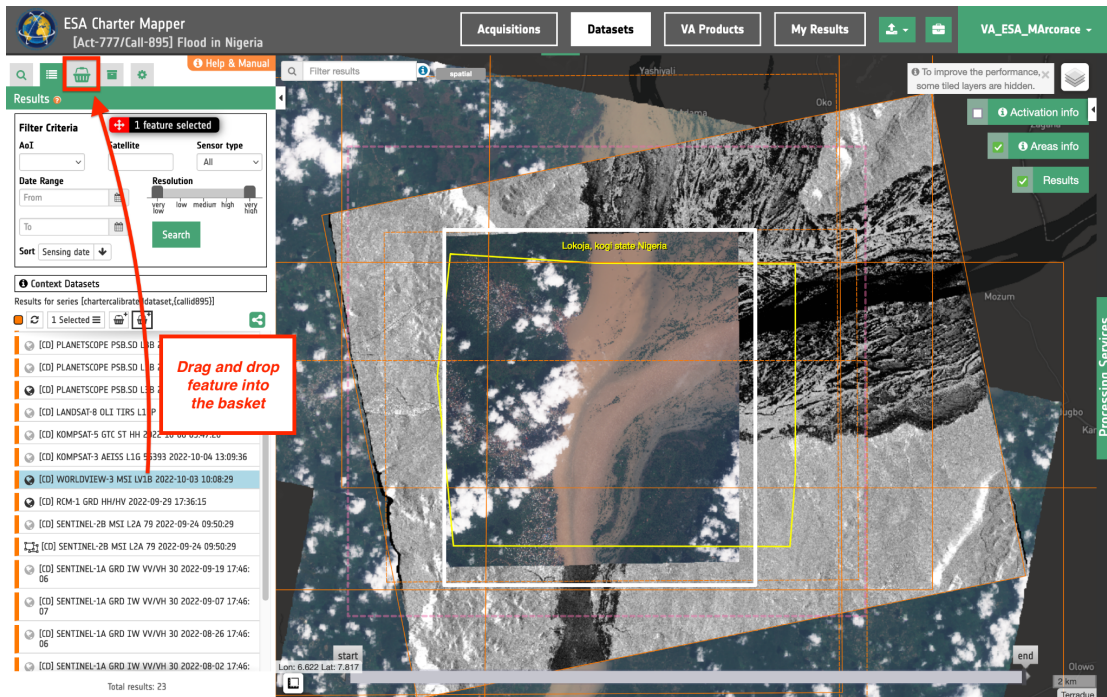
1. Access the ESA Charter Mapper activation workspace [here](#). You will see only the activations which you are entitled to view based on your status as a PM, VA, or tester.



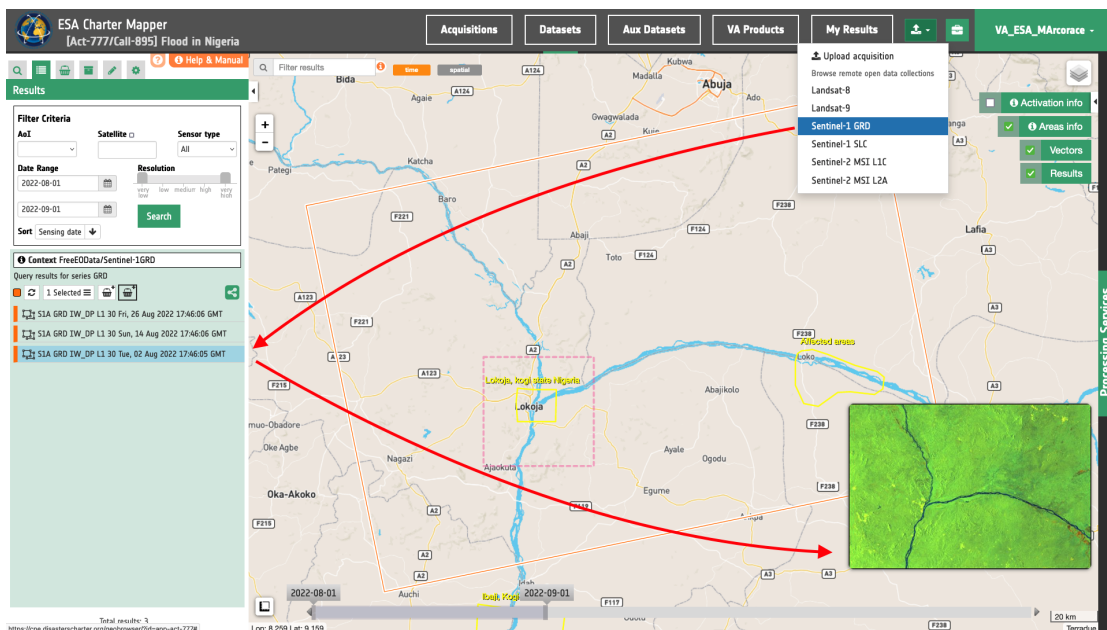
2. Imported data which has been pre-processed is available in the workspace for visualization, search for relevant data using the filter options.



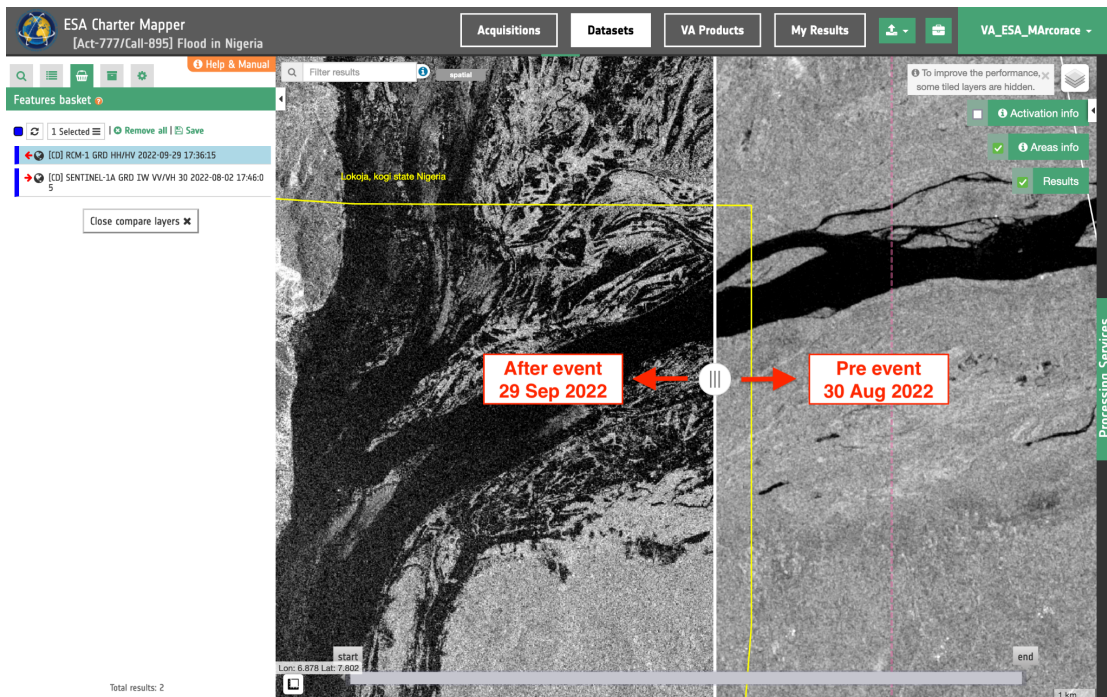
3. Use the feature basket tool to group and save data of interest.
 - a. populate the feature basket with available pre-processed data
 - b. populate the feature basket with results of processing services



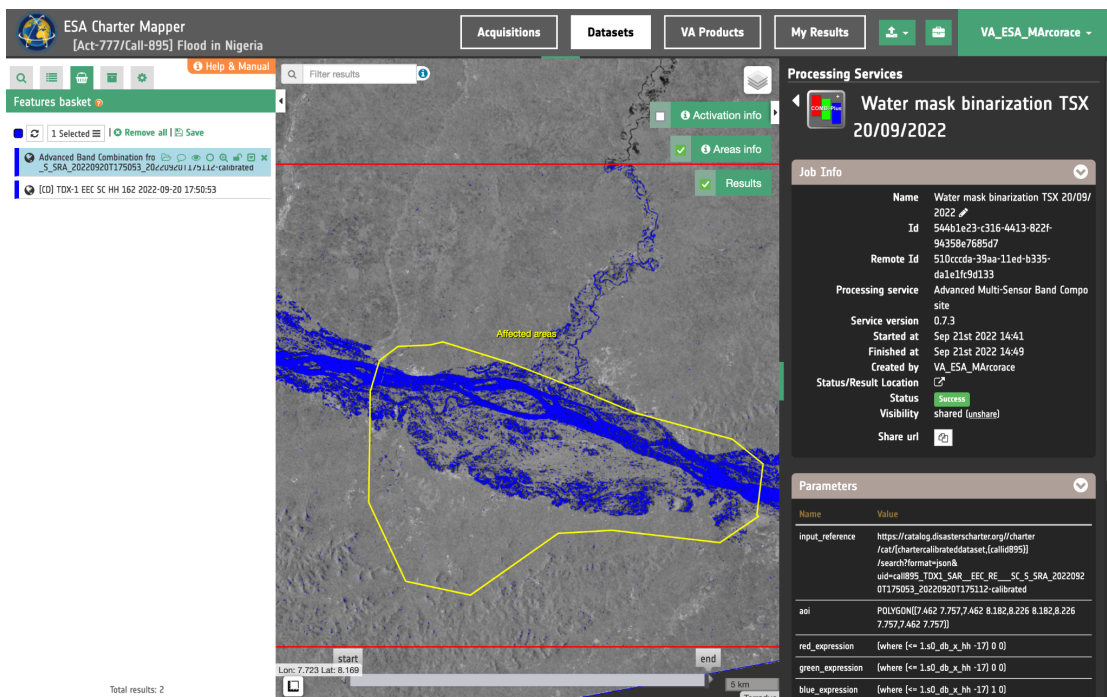
4. If the data provided for the activation is not sufficient, or additional data could be of use, use the import function to browse and upload data from open data collections (Sentinel-1, Sentinel-2, and Landsat-8/9)
 - a. Use the spatial and date filters to quickly find relevant data from the free and open collections
 - b. Quick looks are displayed in the bottom right corner of the map



5. Compare selected data of interest using the “compare layers” slider.

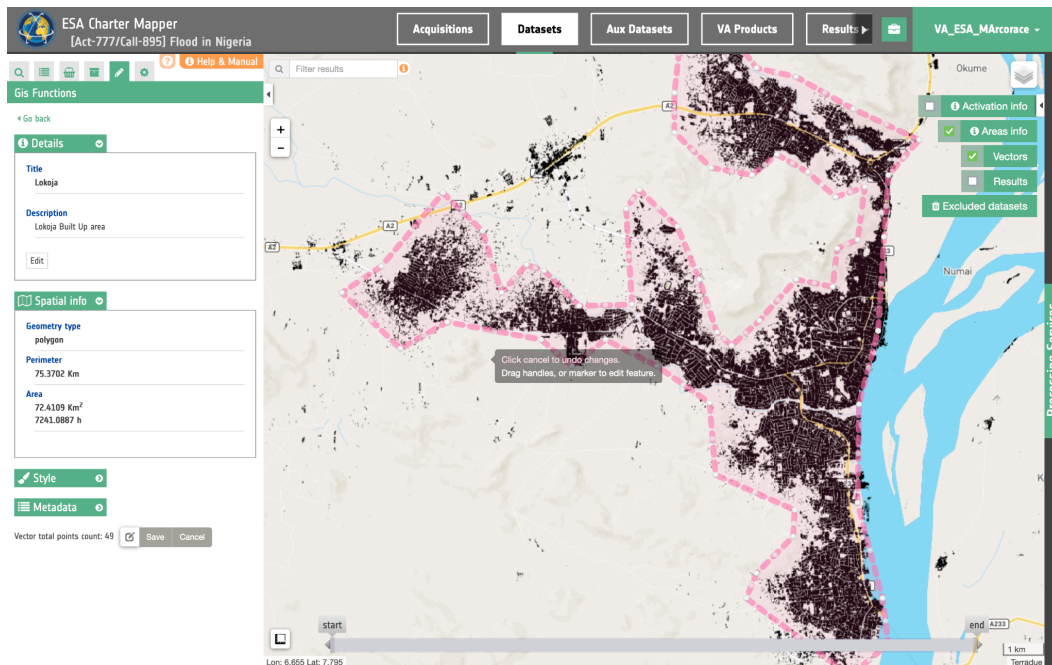


6. Employ the processing services available in the panel on the right side of the interface. Data collected into the features basket can be processed to create geo-information products. Note: it is not required that data is first placed in the feature basket, it is simply a recommendation for organizational purposes. Data can be dragged and dropped directly from the datasets list.



7. Further processing using integrated GIS functions.

- a) Users can create their own vectors, or upload existing vectors for visualization with the available EO data. Four different types of vectors can be created: polylines, polygons, rectangles, and markers. In the left panel under Spatial Info users can find Perimeter and Area of a Polygon feature.



- b) Certain processing services (e.g HASARD) provide output results which are raster bitmasks. Binary rasters can be converted into vectors using the FilterVectorize service available in the platform. Once vectorized, they can be uploaded to the integrated GIS functions space to retrieve area information.

