COPERNICUS AUSTRALASIA REGIONAL DATA HUB

Discover Portal User Guide

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WORKING WITH THE HUB

There are multiple ways to access data from the new version of the Copernicus Australasia Regional Data Hub (the Hub). The Discover portal, its associated OData APIs, and the PyGSSearch (Python) Library, are the recommended pathways for users to search and download products from the Hub. These services require users to register in Discover before they can download data. Alternatively, data is also available via the NCI THREDDS server and directly through the NCI file system for registered NCI users.

***NOTE:** In the past, the Hub's file structure at NCI stored products in a folder structure based on product metadata (date, granule, etc). If you currently access Hub products directly from the file system at the NCI, the new GSS-based platform will change the folder structure where products can be found. This will impact workflow scripts that rely on predicting where new products are located. Recommended access is via the new APIs and PyGSSearch (Python) Library.*

1 The Discover Interface

Discover is based on the GAEL System Store (GSS) Vision platform and provides users an easy-to-use map-based data search and download web interface. It is recommended that users use current versions of common web browsers i.e. Chrome, Microsoft Edge, Safari or Firefox to access Discover. To download data using the Discover interface, follow the instructions below. The instructions assume a basic level of computer literacy.

To access Discover, go to https://discover.copernicus.gov.au/.

The new Discover interface is also accessible from the Copernicus Australasia Regional Data Hub website home page (https://www.copernicus.gov.au/), where users can click **Data Access,** then click the **web portal** link.

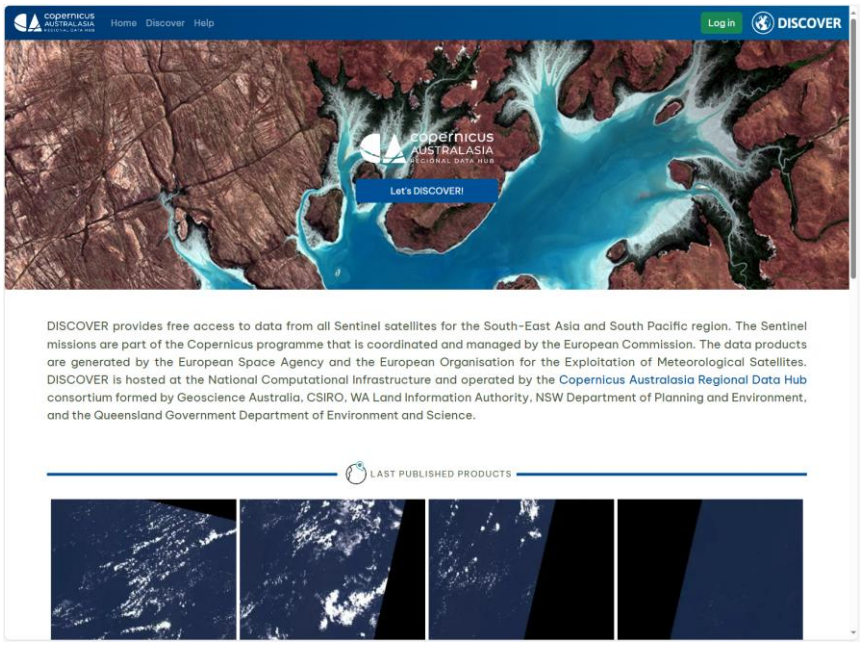

Figure 1 The Discover portal home page

2 Discover Home Page

2.1 Register/Login

The Login/Registration process in Discover is accessed via the green **Log in** button on the right-hand side of the top menu bar (see Figure 1). This will display the User Details dialog (see Figure 2). If you have already registered, please enter your login details and click on the **Sign In** button, otherwise click the **Register** button (see Appendix A). When registering, you will at least need to fill in a valid email address, password and acknowledge the Hub's Copyright and Privacy policy.

NOTE: *You may use Discover without registering or logging in, however, you will need to be logged in to be able to download products, so it is recommended to login before conducting any searches.*

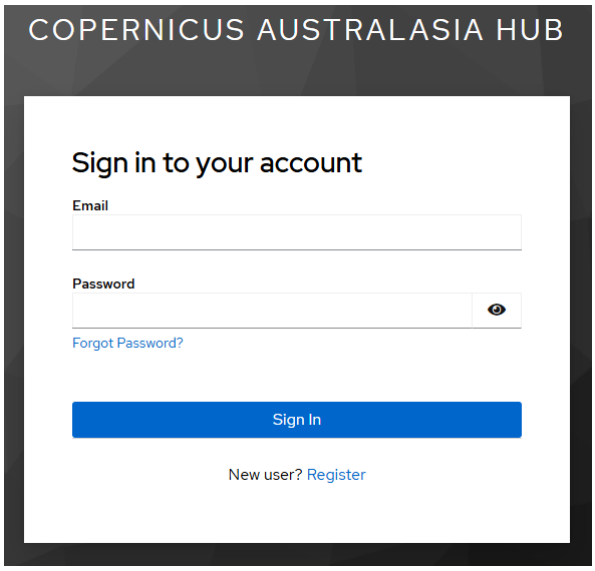

Figure 2 Discover sign in and registration link

2.2 Last Published Products

The Discover Home page provides access to the last 20 imagery published on the Hub. Clicking on any of the new product tiles will take you to the Explore page of Discover (Figure 3), with the selected product highlighted on the map.

3 Discover Explore Page

3.1 Explore Data

Although the Discover Home page provides access to the latest imagery available, it is not the best place from which to search the entire archive. To do so, click on either the **Let's DISCOVER!** button or **Discover** in the top menu bar. This will take you to the Explore page of Discover (Figure 3), which allows you to spatially search for Sentinel products in the Hub archive.

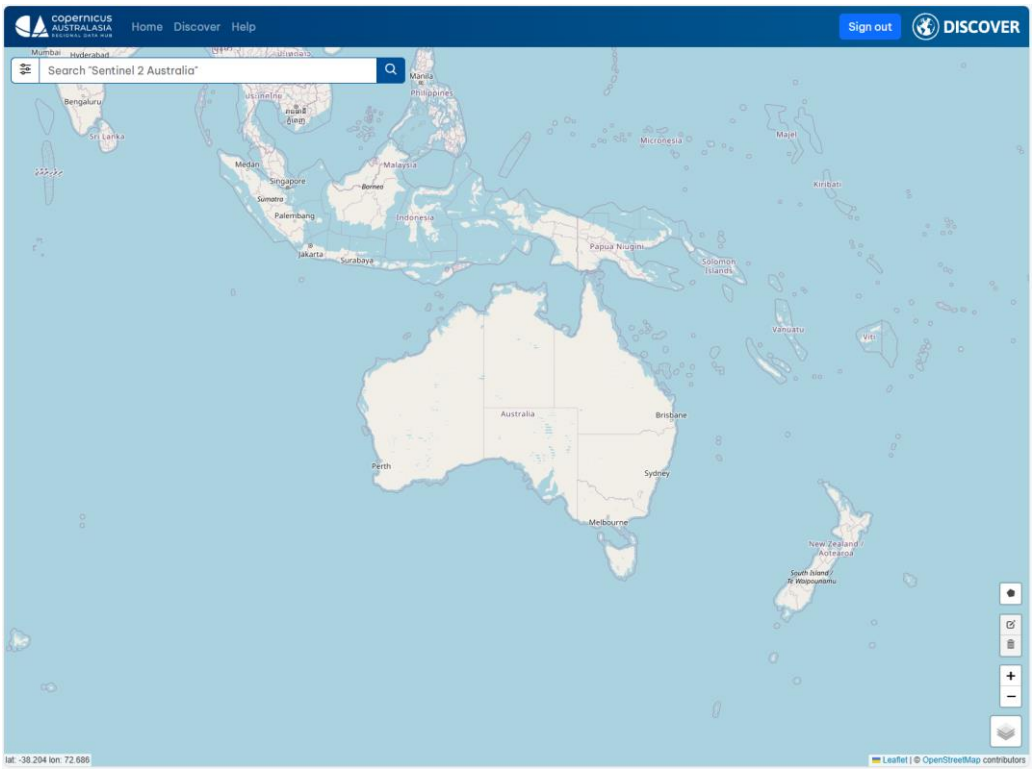

Figure 3 Discover Explore page

3.2 Map Navigation

When you display the Explore page of Discover, most of the background will be a map of the world. You can navigate around the map by:

- Clicking and dragging to move the map around; or
- Zooming in/out using the +/- buttons in the bottom right corner of the map (magenta circle in Figure 4) or using the scroll wheel on the mouse.

The Layers button in the bottom right corner of the map (yellow circle in Figure 4) will let you select your preferred map format. The longitude and latitude coordinates of the cursor's position are displayed in the bottom left corner.

Figure 4 Map navigation icons

3.3 Search Bar

The Search Bar is available at the top of the Explore page and is a shortcut to defining an Area of Interest and/or a product set. However, at the present time only countries are recognised as locations and the format for products is limited to mission (i.e. Sentinel 1, Sentinel 2, etc). For instance, “Sentinel 2 Fiji” would return all Sentinel 2 products that intersect with the islands of Fiji.

3.4 Area of Interest

In order to limit the results of any searches for products in Discover, it is recommended to first define an Area of Interest (AOI).

3.4.1 Drawing an Area of Interest

To specify an AOI, click the **Polygon** button (indicated in Figure 5) so that the **Finish | Delete last point | Cancel** buttons appear. The cursor will now appear as a cross with a tooltip “Click to start drawing shape.” as it hovers over the map. Zoom (using the **+** and **–** buttons at the bottom right of the map or the scroll wheel on the mouse) to the region of interest and click on the map to draw a rough boundary of the area required. Each click creates a new vertex (corner), shown as a small white square with black outline. If you wish to stop drawing at any time, click on the **Cancel** button. Only closed polygons are accepted, so when ready to complete the area, you can click on the first point, double click on the last point, or click on the **Finish** button. The selected area will be outlined and highlighted in blue to indicate the AOI has been defined. As multiple Areas of Interest can exist at any time, you can repeat this process for additional areas if required. Creating a new Area of Interest will **not** erase previously defined polygons.

All future searches using the Filters (see Section 3.5) will be restricted to the defined Area(s) of Interest.

Figure 5 Drawing an area of interest

***NOTE:** Clicking on the **Search** button in the Filter window (Section 3.5) after defining a new AOI will re-apply the current search to the defined AOIs.*

3.4.2 Editing an Area of Interest

You can edit an existing AOI polygon, by clicking on the **Edit** button (the indicated icon in Figure 6) so that the **Save | Cancel** buttons appear. All AOI polygons will now display with dashed outlines, and boxes at each vertex and in the middle of each line edge. You can move a vertex by dragging a vertex box to a new location. You can delete a vertex by clicking in a vertex box until the polygon reaches the minimum three vertices. You can add an additional vertex by clicking or dragging a box in the middle of any line edge, so that the box turns into a vertex and two new line edges are created with each having a box in the middle. If you decide not to make any changes or you don't want to keep the changes you have made, you can click on the **Cancel** button.

Once you have made all changes you **MUST** click on the **Save** button to confirm the changes. If you do not click **Save**, all changes will not take effect and will be lost when the edit session is finished by other operations for example clicking the **Polygon** button.

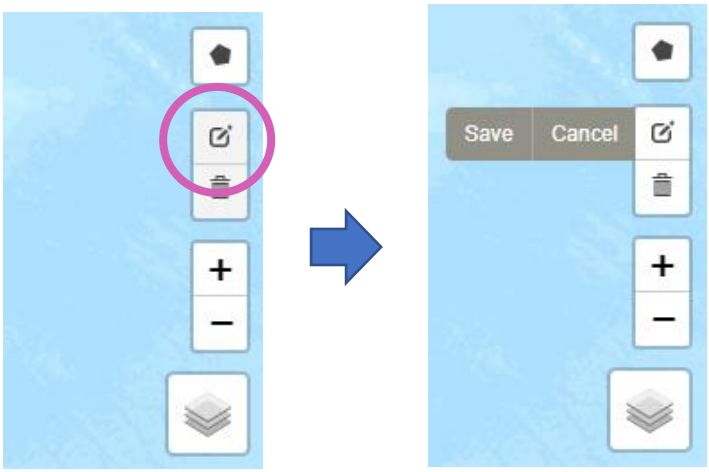

Figure 6 Editing an area of interest

3.4.3 Deleting an Area of Interest

You can delete an existing AOI, by clicking on the **Trashcan** button (the indicated icon in Figure 7) so that the **Save | Cancel | Clear All** buttons appear. You can then delete any AOI by clicking on it, and the polygon should disappear. If you decide not to make any changes or you don't want to keep the deletions you have made, you can click on the **Cancel** button.

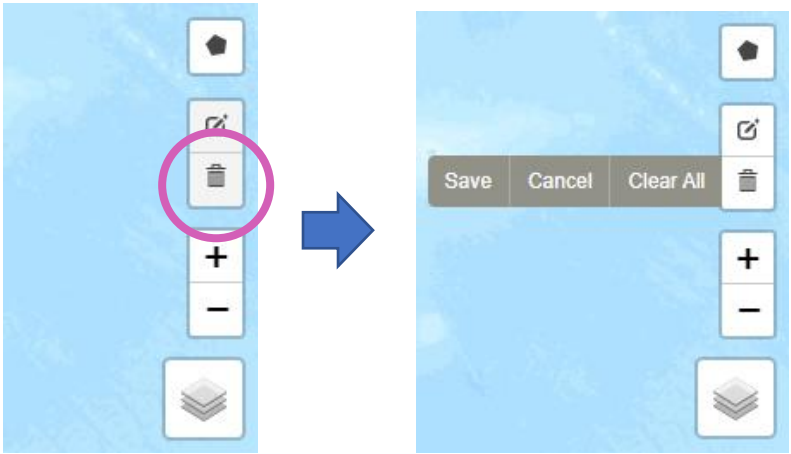

Figure 7 Deleting an area of interest

As with *Editing an AOI*, you **MUST** click on the **Save** button once you have finished to confirm the deletions. If you do not click **Save**, then all changes will be lost when the delete session is over.

You can use the **Clear All** button to remove all the AOI polygons currently defined on the map.

***NOTE:** The **Clear All** button action does not require the **Save** button after using, and in fact, the **Clear All** action cannot be reversed.*

3.5 Filter Data

The Filter pane (Figure 8) is by far the most powerful option to search for relevant Copernicus Australasia products. Here, detailed search criteria can be selected to narrow the search results provided. It is recommended to set the Area of Interest (see previous Section 3.4) before using the Filter search tool.

You can access the Filter pane by selecting the **Options** button to the left of the Search Bar (indicated in Figure 8).

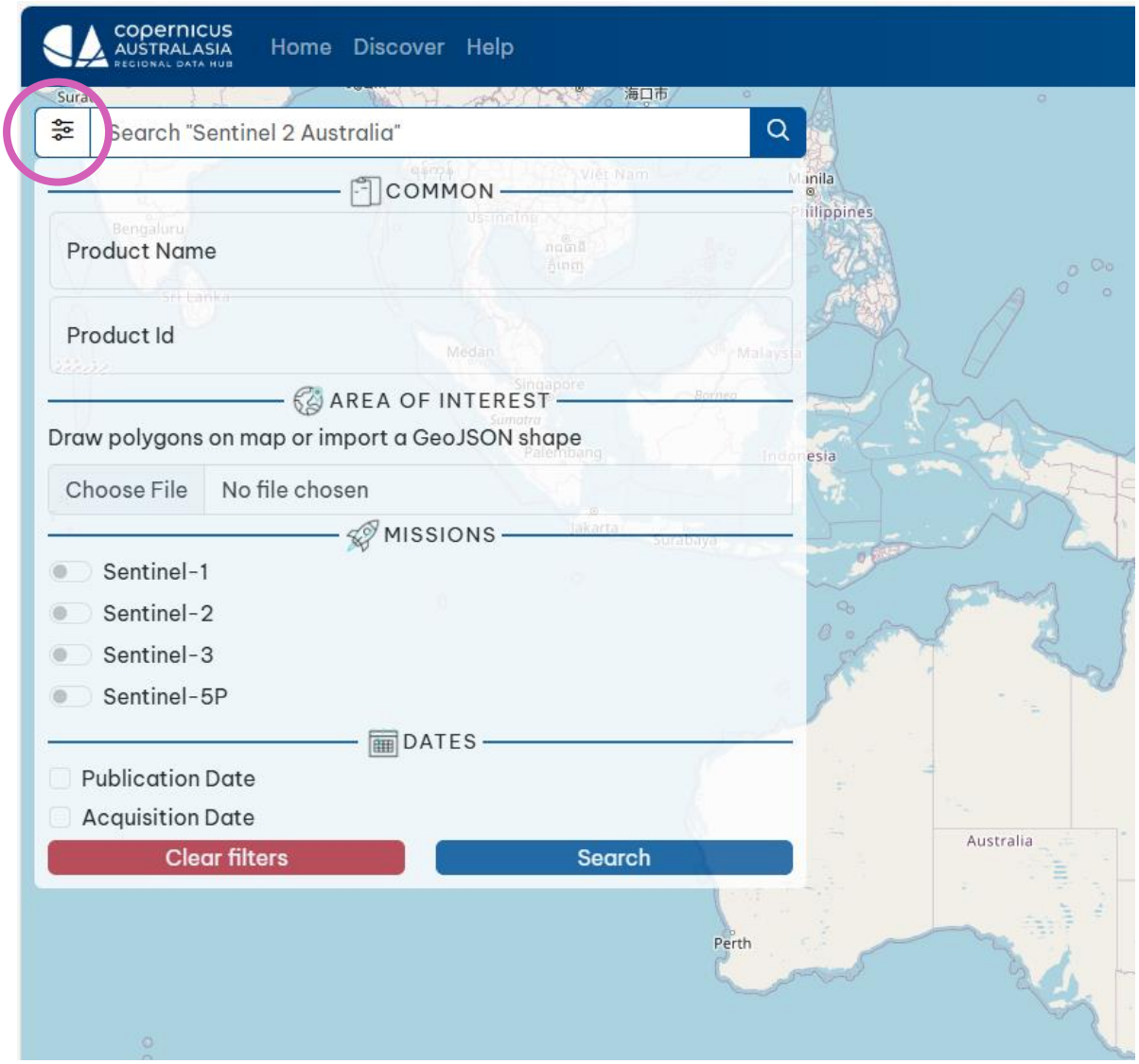

Figure 8 The Filter pane

When you have selected all required filter options, click on the blue **Search** button to see the search results (see Section 3.6)

At any time, you can click on the **Clear filters** button to reset the filters back to a blank search.

NOTE: *The* ***Options*** *button acts as a toggle between the Filter pane and the Results pane.*

NOTE: *All sections of the Filter Pane (****Common****,* ***Area of Interest****,* ***Missions*** *and* ***Dates****) will apply to the Search, so it is important to ensure that any information entered in one section does not conflict with another section, otherwise you may get zero search results.*

3.5.1 Background

It is very useful at this point to know a bit about the data to be downloaded (based on application). You can search on any combination of criteria (or no criteria). The more criteria provided, the more targeted the results will be to requirements. The search criteria applicable to each mission are summarised in Table 1 and include:

- Collection filters – i.e. the Sentinel mission,
- Temporal filters – i.e. the acquisition dates of interest,
- Spatial filters – i.e. the broad regions of interest, and
- Other filters – such as:
    - the product name,
    - the product id,
    - the platform,
    - the product type,
    - the sensor mode (applicable to Sentinel-1),
    - the orbit direction (applicable to Sentinel-1),
    - the polarisation (applicable to Sentinel-1),
    - the relative orbit number (applicable to Sentienl-1 and Sentinel-2),
    - the maximum cloud cover percentage allowable (applicable to Sentinel-2), and
    - the timeliness (applicable to Sentinel-3).

Table 1 Summary matrix of potential search criteria applicable to missions

	Sentinel-1	Sentinel-2	Sentinel-3	Sentinel-5P
Acquisition Period	2014 – present	2015 – present	2016 - present	2018 - present
Sentinel Mission	S1	S2	S3	S5P
Product Type	✓	✓	✓	✓

Sensor Mode	✓	X	X	X
Orbit Direction	✓	X	X	X
Polarisation	✓	X	X	X
Cloud Cover	X	✓	X	X
Timeliness	X	X	✓	X
Area of Interest	✓	✓	✓	✓

3.5.2 Common Filters

The **Common** filters section of the Filter pane (Figure 8) is useful if you are familiar with the structure of a Sentinel product's name or ID format. In this section, you can search for specific text with the wildcards "*" and "?". You can also use this section if you already know the product ID code for a specific image.

For instance, the string "S3?_OL_2_?FR*" under **Product Name** will find all Sentinel-3 full resolution OLCI Level 2 products.

3.5.3 Area of Interest

The **Area of Interest** filename is an experimental feature that allows GeoJSON files defining single or multiple areas of interest to be imported. AOI's imported this way should be editable using the features described in Section 3.4.

3.5.4 Mission Filters

In most cases, you will want to limit your search results to a specific mission type. To do so, select the appropriate switch button icon. Once a switch button is selected, the underlying filter options (see Table 1) will be displayed and can be adjusted as required. In most cases you can select relevant filter options from the drop-down menu. Typing in the filter box can restrict the options displayed in the drop-down menu.

NOTE: *In many cases (particularly where there are more than two options), multiple options in the drop-down can be selected. This is indicated when the selected option appears in a grey box with an "X" on the right-hand side. To clear that option from the filter, click on the "X" in the grey box. To clear all options in the filter, click on the "X" next to the drop-down arrow.*

The products from multiple different missions can be included in the search by selecting the appropriate switches as required. The underlying filter options for each mission type will only be applied to the products for that mission (e.g. cloud cover restrictions will only be applied to Sentinel-2 products). For further information on the underlying mission filters please see Section 5.

If no switch buttons for missions are selected, the search results will return all mission products that meet the remaining criteria.

3.5.5 Date Filters

The **Dates** section of the Filter pane will allow the restriction of the search to a specific date range. This date range can be applied to the date the product was published, and/or to the date the underlying raw data was acquired by the satellite. These two dates can differ substantially if the original product has been reprocessed since its initial release.

3.6 Search Results

Once a search has been executed, products matching the criteria will be listed in the Search Results pane, which is the same pane as the Filter pane. You can toggle between the Filter and Results panes by clicking on the **Options** button indicated in Figure 8. Initially, the first 50 products will be displayed, but an additional 50 products can be loaded by clicking on the **Load more products** button at the bottom of the Results pane. For all products listed in the Results pane, their corresponding footprints will be displayed on the map in blue (see Figure 9).

***NOTE:** If you modify the Search parameters (e.g. by adding or moving an AOI) after clicking on the **Search** button, the **Load more products** will continue to show more products that match the old criteria. It is recommended that you always use the **Search** button immediately after making any changes to the search parameters.*

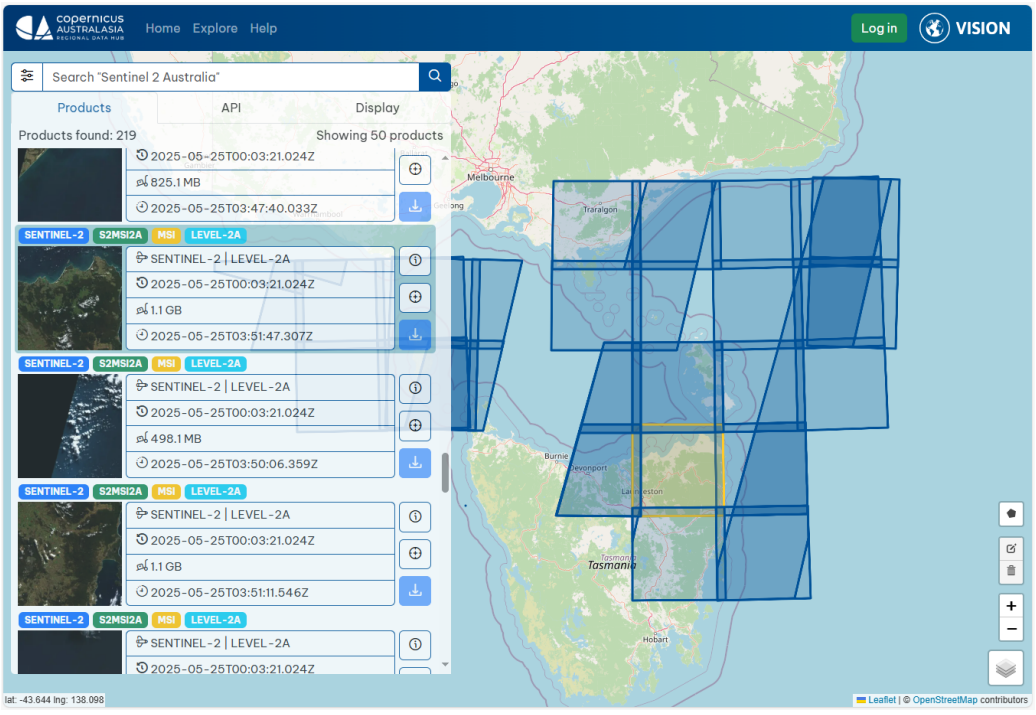

Figure 9 Discover Results pane and footprints

Clicking on a footprint will highlight the respective product in the Results list (Figure 9). Using the icons to the right of each product, you can:

Get more information on the product, including available metadata (See Section 3.6.1).

Reorient the map window to display (and highlight) the selected product centred on the window.

Immediately download a zip file of all the product components.

3.6.1 Product Details

Clicking on the information icon ( ) for a product in the Results pane will display the Product Details pane providing access to more details of the product (Figure 10). Individual product components can be downloaded via the Structure section (see Section 3.6.1.4 below).

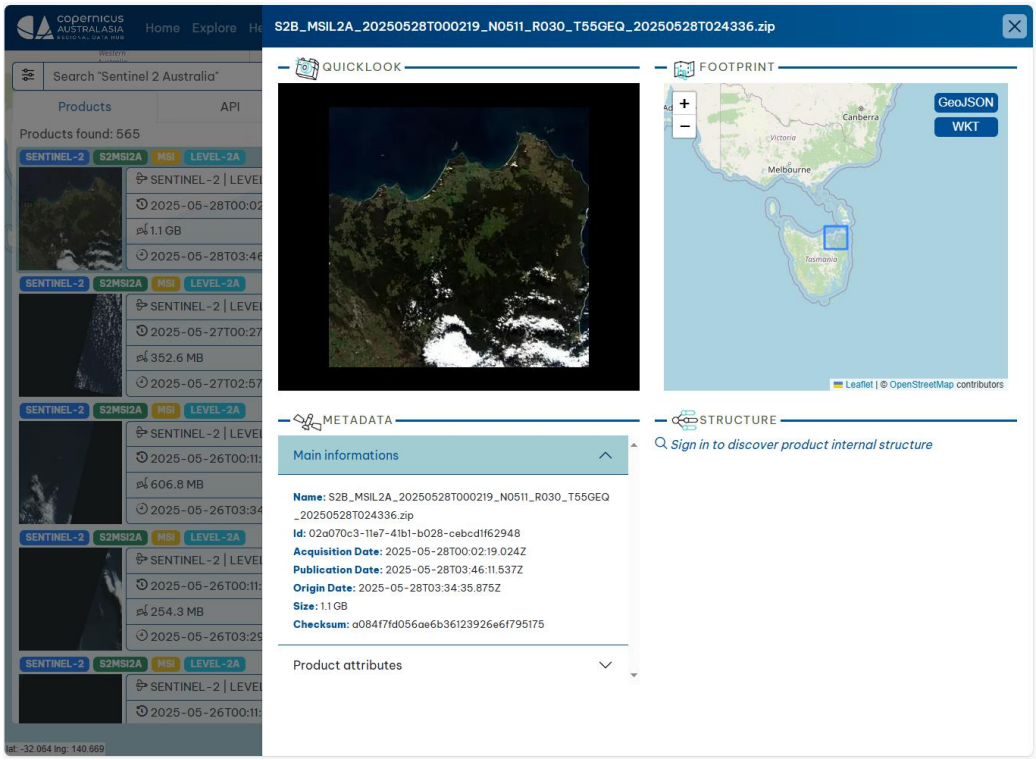

Figure 10 Discover Product details pane

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Clicking on the (X) in the top-right corner of the Product Details pane will close the pane and return to the map and Results pane.

3.6.1.1 Quicklook

For some products (e.g. Sentinel-2), a low resolution quicklook image will be available and displayed in the top-left quadrant of the Product Details pane. Clicking on the quicklook image, will display it in a separate browser tab which allows you to magnify it if required. This is especially useful for non-square or odd shaped footprints that appear distorted in the quicklook pane (e.g. Sentinel-3 OLCI products).

NOTE: *The quicklook file can be downloaded as one of the product components (see Section 3.6.1.4).*

3.6.1.2 Footprint

The footprint of the product will be displayed in the top-right quadrant of the Product Details pane. You can zoom in/out using the **+/-** buttons. The **GeoJSON** and **WKT** buttons will copy the coordinates into the clipboard in the respective formats.

3.6.1.3 Metadata

The Metadata section of the Product Details pane provides the basic information of the product. For more information, including all metadata fields available for the product, click on the **Product attributes** tab.

Each mission will provide a different set of attributes. See Section 6.5 for examples of the attributes that may be available for each mission type.

3.6.1.4 Structure

If you are logged in, you will be able to drill down into the product SAFE file to see the individual components. The heading for any product component that has sub-components, will be clickable to display the sub-components. Any component in the tree with the download icon () can be downloaded separately by clicking on the icon.

3.6.2 API

The **API** tab in the Search Results pane will display the API call used for the search. More information on using API calls to Discover can be found in Section 6.

Use the copy icon () in the top-right corner of the pane to place the API call in the clipboard so that it can be pasted into a browser (or *curl*) to execute.

NOTE: *The results of the provided API call will be in JSON format, but results can also be formatted as XML (see section 6.3.1)*

3.6.3 Display tab

You can use the **Display** tab to hide the Search Results pane if you need to quickly view the entire map window. Clicking on the **Products** tab will restore the Search Results pane.

You can also turn off the display of the footprints on the map from this tab as well.

4 Discover Help Page

The Help page provides a number of references to assist in the use of Discover, OData APIs and the PyGSSearch Python Library.

5 Detailed Filter Options

The detailed filter options available for each mission are as follows.

NOTE: *In some cases (particularly where there are more than two options), multiple options in the drop-down menu can be selected. This is indicated when the selected option appears in a grey box with an "X" on the right-hand side. To clear that option from the filter, click on the "X" in the grey box. To clear all options in the filter, click on the "X" next to the drop-down arrow.*

5.1 Platform

The Platform option allows you to specify the particular satellite for each mission, noting that in most cases this will be "A" or "B", however with the replacement missions now being launched, options "C" and "D" will become relevant.

5.2 Product Type

To specify the Sentinel product, use the **Product Type** filters under each specific mission as follows:

5.2.1 Sentinel-1 product types

S1_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Stripmap mode 1)
S2_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Stripmap mode 2)
S3_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Stripmap mode 3)
S4_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Stripmap mode 4)
S5_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Stripmap mode 5)
S6_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Stripmap mode 6)
IW_GRDH_1S	S1 C-SAR Level-1 Ground Range Detected (Interferometric Wide swath)
EW_GRDM_1S	S1 C-SAR Level-1 Ground Range Detected (Extra Wide swath)
WV_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Wave mode)
EW_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Extra Wide swath)
IW_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Interferometric Wide swath)
S1_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Stripmap mode 1)
S2_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Stripmap mode 2)
S3_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Stripmap mode 3)
S4_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Stripmap mode 4)
S5_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Stripmap mode 5)
S6_SLC__1S	S1 C-SAR Level-1 Single Look Complex (Stripmap mode 6)
WV_OCN__2S	S1 C-SAR Level-2 Ocean (Wave mode)
EW_OCN__2S	S1 C-SAR Level-2 Ocean (Extra Wide swath)
IW_OCN__2S	S1 C-SAR Level-2 Ocean (Interferometric Wide swath)
S1_OCN__2S	S1 C-SAR Level-2 Ocean (Stripmap mode 1)
S2_OCN__2S	S1 C-SAR Level-2 Ocean (Stripmap mode 2)

S3_OCN__2S	S1 C-SAR Level-2 Ocean (Stripmap mode 3)
S4_OCN__2S	S1 C-SAR Level-2 Ocean (Stripmap mode 4)
S5_OCN__2S	S1 C-SAR Level-2 Ocean (Stripmap mode 5)
S6_OCN__2S	S1 C-SAR Level-2 Ocean (Stripmap mode 6)

5.2.2 Sentinel-2 product types

To specify the Sentinel product, use the **Product Type** filters under each specific mission as follows:

L1C	S2 Level-1C Top-Of-Atmosphere reflectance
L2A	S2 Level-2A Surface Reflectance

5.2.3 Sentinel-3 product types

OL_1_EFR	S3 OLCI Level-1 Earth Observation Full Resolution
OL_2_WFR	S3 OLCI Level-2 Water and atmosphere geophysical products in Full Resolution

5.2.4 Sentinel-5P product types

L2__AER_AI	S5P Level-2 UV Aerosol Index
L2__AER_LH	S5P Level-2 Aerosol Layer Height (mid-level pressure)
L2__CH4____	S5P Level-2 Methane (CH4) total column
L2__CLOUD__	S5P Level-2 Cloud fraction, albedo, top pressure
L2__CO_____	S5P Level-2 Carbon Monoxide (CO) total column
L2__HCHO___	S5P Level-2 Formaldehyde (HCHO) total column
L2__NO2____	S5P Level-2 Nitrogen Dioxide (NO2), total and tropospheric columns
L2__NP_BD3	S5P Level-2 Suomi-NPP VIIRS Clouds Band 3
L2__NP_BD6	S5P Level-2 Suomi-NPP VIIRS Clouds Band 6
L2__NP_BD7	S5P Level-2 Suomi-NPP VIIRS Clouds Band 7
L2__O3__PR_	S5P Level-2 Ozone (O3) profile
L2__O3_____	S5P Level-2 Ozone (O3) total column
L2__O3__TCL	S5P Level-2 Ozone (O_3) tropospheric column
L2__SO2____	S5P Level-2 Sulfur Dioxide (SO2) total column

5.3 Sensor Mode

Sensor mode is only applicable to Sentinel-1. To specify the sensor mode of interest, select the relevant **Sensor Mode** option:

EW	Extra Wide swath
IW	Interferometric Wide swath
SM	Stripmap
WV	Wave

Refer to https://sentiwiki.copernicus.eu/web/s1-products for an explanation of S1 sensor modes.

5.4 Orbit Direction

Orbit direction is currently only applicable to Sentinel-1. To specify the orbit direction of interest, select the relevant **Orbit Direction** option:

Ascending	The pass of the satellite going from south to north
Descending	The pass of the satellite going from north to south

For a brief overview of S1 orbit direction, please see: https://sentiwiki.copernicus.eu/web/s1-mission#S1-Mission-Orbit.

5.5 Polarisation

Polarisation is only applicable to Sentinel-1. To specify the polarisation of interest, select the relevant **Polarisation** option:

HH	Single polarisation for horizontal transmit and horizontal receive
HH+HV	Dual polarisation for horizontal transmit and horizontal receive plus horizontal transmit and vertical receive
VV	Single polarisation for vertical transmit and vertical receive
VV+VH	Dual polarisation for vertical transmit and vertical receive plus vertical transmit and horizontal receive
HV	Single polarisation for horizontal transmit and vertical receive
VH	Single polarisation for vertical transmit and horizontal receive

For a brief overview of S1 polarisation, please see: https://sentiwiki.copernicus.eu/web/s1-mission#S1-Mission-Polarimetry for more details.

5.6 Cloud Cover

Cloud cover is only applicable to Sentinel-2. Use the **Cloud Cover** slider to specify the maximum acceptable level of cloud cover percentage allowable for the data (e.g. a value of 10% would mean only S2 products with a calculated cloud cover of less than 10% would be included in the search results).

Refer to the ESA Sentinel-2 Technical Guide for detail on cloud masks: https://sentiwiki.copernicus.eu/web/s2-processing#S2Processing-CloudMasks.

5.7 Timeliness

Timeliness is currently only applicable to Sentinel-3. Use this option to differentiate between Near Real Time (“NR”), Short Time Critical (“ST”), and Non Time Critical (“NT”) products. For more information on timeliness, please see https://sentiwiki.copernicus.eu/web/olci-products#OLCIProducts-ProductsDescription or https://sentiwiki.copernicus.eu/web/slstr-products.

6 APIs and programmatic access to Discover

This section is by no means an exhaustive document on using OData APIs but is designed to give some ideas of what can be achieved using APIs to search for and download Sentinel products from the Copernicus Australasia Regional Data Hub via the Catalogue API interface. As mentioned in section 3.6.2, you can view the exact call used for any search in the API tab of the Search pane as a starting point.

More information on OData APIs can be found here: https://documentation.dataspace.copernicus.eu/APIs/OData.html.

Another programmatic way to access the Hub is via the PyGSSearch (Python) Library, which is covered briefly in Appendix B.

NOTE: *The above link to the Copernicus Data Space Ecosystem (CDSE) OData documentation is provided as reference. The Discover implementation of the OData API is not identical and there may be some differences or missing functionalities. Examples are as follows:*

CDSE OData implementation	Discover OData implementation
Collection/Name filter option	Not available
Default *$top* value of 20	Not applicable (i.e. a value must be supplied)
Default *$skip* value of 0	Not applicable (i.e. a value must be supplied)
$count values: *True*, *true*, 1, *False*, *false*, 0	$count values: *true*, *false*
contains, *endswith* or *startswith* can be used as operators for string values	Not available (i.e. only *eq* can be used)

6.1 Query structure

An OData query consists of various elements. Some of these elements include:

- filter
- format
- orderby
- top
- skip
- count
- expand

These elements should always be preceded with *$* and if multiple elements are used, separated by *&*.

6.2 API *$filter* element

The *$filter* element is the main API query element that defines the search parameters. Consecutive options within the *$filter* term should be separated with *and* or *or*. The *not* operator can also be used. For instance:

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$expand=Attributes&$count=true&$format=json&$top=50&$filter=PublicationDate ge 2025-06-14T00:00:00.000Z and PublicationDate le 2025-06-15T00:00:00.000Z and not ((Attributes/any(a:a/Name eq 'platformShortName' and a/OData.CSC.StringAttribute/Value eq 'SENTINEL-3')))*

6.2.1 Query by Publication Date

To search for products that have been published between two dates:

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$expand=Attributes&$count=true&$format=json&$top=50&$filter=PublicationDate ge 2025-06-14T00:00:00.000Z and PublicationDate le 2025-06-15T00:00:00.000Z*

NOTE: *The non-inclusive* gt *and* lt *parameters can also be used.*

6.2.2 Query by Sensing Date

To search for products that have been acquired by the satellite between two dates:

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$filter=ContentDate/Start ge 2025-06-01T00:00:00.000Z and ContentDate/Start le 2025-06-15T00:00:00.000Z*

NOTE: *There are two parameters describing the ContentDate (Acquisition Dates) for a product - Start and End. Depending on what is required, these parameters can be mixed:*

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$filter=ContentDate/Start ge 2025-06-01T00:00:00.000Z and ContentDate/End le 2025-06-15T00:00:00.000Z*

NOTE: *The non-inclusive* gt *and* lt *parameters can also be used.*

6.2.3 Query by Geographic Criteria

To search for products intersecting the specified polygon:

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$filter=OData.CSC.Intersects(area=geography'SRID=4326;POLYGON((148.8 -34.8,148.8 -35.8,149.5 -35.8,149.5 -34.8,148.8 -34.8))')*

NOTE: *The polygon coordinates provided must be given in the world geodetic system EPSG 4326 (WGS 84) and must start and end at the same point (i.e. be a closed polygon).*

6.2.4 Query by attributes

To search for products by attributes, it is necessary to build a filter with the following structure:

> *Attributes/OData.CSC.**ValueTypeAttribute**/any(a:a/Name eq '[**Attribute.Name**]' and a/OData.CSC.**ValueTypeAttribute**/Value eq [**Attribute.Value**])*

Where:

- ***Attribute.Name*** *is the name of the parameter being queried (see section 6.5 for possible options for each mission).*
- ***ValueTypeAttribute*** *can be any of the values: DoubleAttribute, IntegerAttribute, DateTimeOffsetAttribute, or StringAttribute.*
- ***Attribute.Value*** *is the specific value required in the search.*

For example:

https://catalogue.copernicus.gov.au/odata/v1/Products?$filter=((Attributes/any(a:a/Name eq 'platformShortName' and a/OData.CSC.StringAttribute/Value eq 'SENTINEL-2') and Attributes/any(a:a/Name eq 'cloudCover' and a/OData.CSC.DoubleAttribute/Value le 10)))

NOTE: *Where the* ***ValueTypeAttribute*** *is an Integer, Double or DateTimeOffset attribute type****,*** *you can also use* le, lt, ge, *or* gt *instead of the* eq *before* ***Attribute.Value****.*

6.3 Other API elements:

6.3.1 *$format*

By default, the results from an API search will be returned in XML format. To specify the results to be returned in JSON format, include the *$format=json* option.

6.3.2 *$orderby*

The results from an API search are not ordered by default. The *$orderby* option will order the products in an ascending (*asc*) or descending (*desc*) direction. If a direction is not specified, then the output will be ordered in an ascending order.

The acceptable arguments for this option include: *ContentDate/Start*, *ContentDate/End, PublicationDate,* and *ModificationDate.*

NOTE: *Using the $orderby option will exclude potential duplicates from the search results.*

6.3.3 *$top*

To reduce the output from a search, you can use *$top* to specify the maximum number of items to be returned from a query.

The acceptable arguments for this element are any integer between 1 and 1000.

6.3.4 *$skip*

To facilitate pagination through the output of a search, *$skip* can be used to jump over a specific number of results.

The acceptable arguments for this element are any integer between 0 and 1000.

6.3.5 *$count*

The count option provides the exact number of products matching the query. This option is disabled by default to improve query performance.

The acceptable arguments for this option are *true* or *false*.

6.3.6 *$expand*

By default, only the base level product metadata is supplied in search results. In order to view all product metadata, the *$expand=Attributes* term needs to be added to the API query.

6.4 API Examples

All Sentinel-2 level 2 products over Tasmania with a cloud cover less than 10% acquired in June 2025 (output in JSON format):

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$format=json&$filter=OData.CSC.Intersects(area=geography'SRID=4326;POLYGON((144.327393 -40.472024,145.83252 -43.659924,148.051758 -43.333169,148.458252 -40.763901,144.327393 -40.472024))') and ContentDate/Start ge 2025-06-01T00:00:00.000Z and ContentDate/Start le 2025-06-30T00:00:00.000Z and ((Attributes/any(a:a/Name eq 'platformShortName' and a/OData.CSC.StringAttribute/Value eq 'SENTINEL-2') and Attributes/any(a:a/Name eq 'cloudCover' and a/OData.CSC.DoubleAttribute/Value le 10) and Attributes/any(a:a/Name eq 'productType' and a/OData.CSC.StringAttribute/Value eq 'S2MSI2A')))*

The top fifty Sentinel-1 ‘Interferometric Wide Swath’ products published since August 2024 and sorted with the most recently modified first (including all metadata and output in JSON format):

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$expand=Attributes&$format=json&$top=50&$filter= PublicationDate ge 2025-06-01T00:00:00.000Z and ((Attributes/any(a:a/Name eq 'platformShortName' and a/OData.CSC.StringAttribute/Value eq 'SENTINEL-1') and Attributes/any(a:a/Name eq 'operationalMode' and a/OData.CSC.StringAttribute/Value eq 'IW')))&$orderby=ModificationDate desc*

The count of Sentinel-3 Level 2 OLCI products published in June 2025:

> *https://catalogue.copernicus.gov.au/odata/v1/Products?$count=true&$filter=PublicationDate ge 2025-06-01T00:00:00.000Z and PublicationDate le 2025-06-30T00:00:00.000Z and ((Attributes/any(a:a/Name eq 'platformShortName' and a/OData.CSC.StringAttribute/Value eq 'SENTINEL-3') and Attributes/any(a:a/Name eq 'processingLevel' and a/OData.CSC.StringAttribute/Value eq '2') and Attributes/any(a:a/Name eq 'instrumentShortName' and a/OData.CSC.StringAttribute/Value eq 'OLCI')))*

6.5 Mission applicable attribute names

The following is a list of potential attributes that can be used to search via API.

***NOTE**: Specific values available under each attribute have not been provided and will need to be known before applying the search*.

6.5.1 Sentinel 1 attributes

Name	Value Type	Values
productType	String	(see section 5.2)
origin	String	
datatakeID	Integer	
timeliness	String	
coordinates	String	
cycleNumber	Integer	
orbitNumber	Integer	
sliceNumber	Integer	
totalSlices	Integer	
productClass	String	
processorName	String	
orbitDirection	String	(see section 5.4)
processingDate	DateTimeOffset	
operationalMode	String	(see section 5.3)
processingLevel	String	
swathIdentifier	String	
processingCenter	String	
processorVersion	String	
segmentStartTime	DateTimeOffset	
sliceProductFlag	Boolean	
platformShortName	String	'SENTINEL-1'
productGeneration	DateTimeOffset	
processingBaseline	String	
productComposition	String	
instrumentShortName	String	
relativeOrbitNumber	Integer	
polarisationChannels	String	(see section 5.5)
productConsolidation	String	
platformSerialIdentifier	String	
instrumentConfigurationID	Integer	
startTimeFromAscendingNode	Double	
completionTimeFromAscendingNode	Double	

6.5.2 Sentinel 2 attributes

Name	Value Type	Values
productType	String	(see section 5.2)
origin	String	
tileId	String	
cloudCover	Double	(see section 5.6)
coordinates	String	
datastripId	String	
orbitNumber	Integer	
qualityInfo	Integer	
qualityStatus	String	
sourceProduct	String	
processingDate	DateTimeOffset	
productGroupId	String	
lastOrbitNumber	Integer	
operationalMode	String	
processingLevel	String	
processingCenter	String	
processorVersion	String	
granuleIdentifier	String	
platformShortName	String	'SENTINEL-2'
processingBaseline	String	
instrumentShortName	String	
relativeOrbitNumber	Integer	
illuminationZenithAngle	Double	
sourceProductOriginDate	String	
platformSerialIdentifier	String	

6.5.3 Sentinel 3 attributes

Name	Value Type	Values
productType	String	(see section 5.2)
landCover	Double	
timeliness	String	{"NR", "ST", "NT"}
brightCover	Double	

coordinates	String	
cycleNumber	Integer	
orbitNumber	Integer	
coastalCover	Double	
processorName	String	
closedSeaCover	Integer	
openOceanCover	Integer	
processingDate	DateTimeOffset	
snowOrIceCover	Double	
lastOrbitNumber	Integer	
operationalMode	String	
processingLevel	String	{‘1’, ‘2’}
processingCenter	String	
processorVersion	String	
salineWaterCover	Double	
tidalRegionCover	Double	
platformShortName	String	‘SENTINEL-3’
baselineCollection	String	
lastOrbitDirection	String	
processingBaseline	String	
continentalIceCover	Integer	
instrumentShortName	String	{‘OLCI’, ‘SRAL’, ‘SLSTR’,’SYNERGY’}
relativeOrbitNumber	Integer	
freshInlandWaterCover	Double	
lastRelativeOrbitNumber	Integer	
platformSerialIdentifier	String	

6.5.4 Sentinel 5P attributes

Name	Value Type	Values
productType	String	(see section 5.2)
doi	String	
identifier	String	
coordinates	String	
orbitNumber	Integer	

productClass	String	
processorName	String	
qualityStatus	String	
processingDate	DateTimeOffset	
processingMode	String	
acquisitionType	String	
processingLevel	String	
parentIdentifier	String	
processingCenter	String	
processorVersion	String	
platformShortName	String	‘SENTINEL-5P’
baselineCollection	String	
processingBaseline	String	
instrumentShortName	String	
platformSerialIdentifier	String	

Appendix A. User Registration

While you can browse the Discover portal without an account, you must be logged in to download products from the portal. To register a user account, click the Register button on the sign-in dialog box (accessed from the **Log in** button on the top right of the menu bar). This will display the Registration page (see Figure 11).

When registering, you will need to at least fill in a valid email address and password. You will also need to acknowledge the Hub's Copyright and Privacy policy (a link to the policy is provided and you can also view the policy at any time by visiting the Copernicus Australasia website). Any email address can be used so long as you have access to it, as a verification email will be sent to that address once you have completed the registration process (see Figure 12). This email address will also be where operational notifications (e.g. expected maintenance outages, etc) will be sent. While these notifications are not expected to be more than once a month, if you wish to stop receiving emails from the Hub, please use the Unsubscribe link at the bottom of any of these emails.

Understanding how our Sentinel products are used greatly assists to improve our service to everyone, so any additional information you can provide during the registration process will be appreciated.

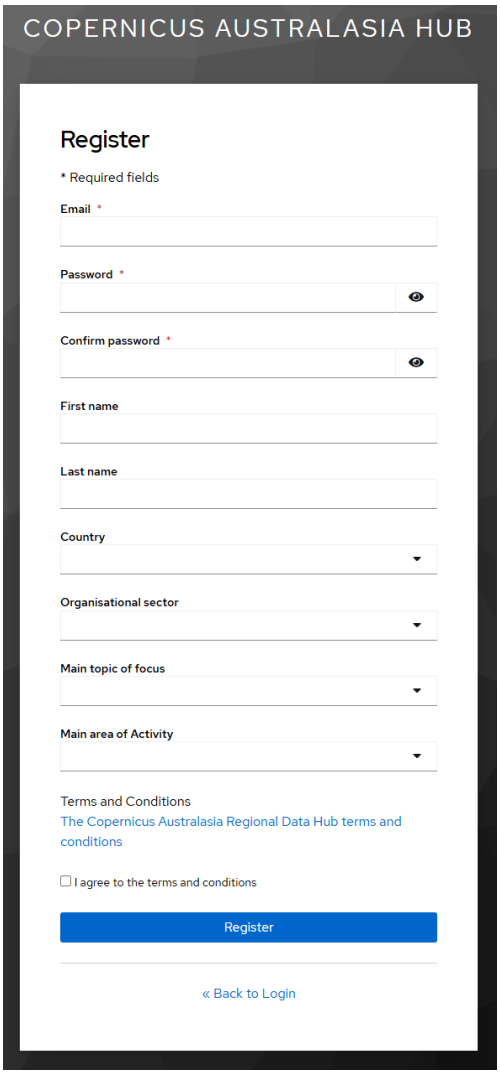

Figure 11 Discover registration page

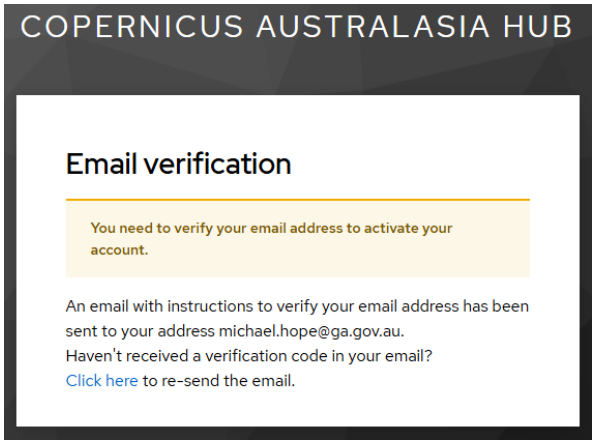

Figure 12 Discover email verification notice

Appendix B. Programmatic Access with PyGSSearch

PyGSSearch is a python module that implements the OData protocol access following the Copernicus Space Component schema to allow users to:

- search certain products with customised filters,
- download the filtered products, and
- report GeoJSON results of the filtered products.

Installation

This module can be simply installed via the standard **pip** command. It is recommended to use a python virtual environment to avoid any confusions between system or other projects' libraries.

Step 1: Install the package **python3-venv** if it has not been installed already. For example, use the following command on ubuntu:

```
sudo apt install python3-venv
```

Step 2: Set up the virtual environment:

```
python3 -m venv venv
source venv/bin/activate
```

Step 3: Install the module using **pip** command:

```
pip install pygssearch
```

Step 4: Validate the installation:

```
pygssearch --help
pygssearch --version
```

Usage

This module can be used within a python code, or as command lines. They are explained here respectively.

Python code

Connect to the service of Copernicus Australasia Regional Data Hub

- **Basic Authentication**

The following code snippet shows how to connect to the service of Copernicus Australasia Regional Data Hub using the basic authentication method.

```
from pygssearch import OdataSource
```

```
from requests.auth import HTTPBasicAuth

service = 'https://catalogue.copernicus.gov.au/odata/v1'
auth = HTTPBasicAuth('username', 'password')

source = OdataSource(service=service, auth=auth)
```

The **username** and **password** are the information when you register an account following the instructions in Appendix A. The basic authentication allows you to query the products, but not enough for downloading the products. To be able to download the products, **OAuth2.0** authentication is required.

- **OAuth2.0 Authentication**

The following code snippet shows how to connect to the service of Copernicus Australasia Regional Data Hub using the **OAuth 2.0** authentication method.

```
from pygssearch import OdataSource
from drb.drivers.http import HTTPOAuth2

service = 'https://catalogue.copernicus.gov.au/odata/v1'
token_url='https://auth.copernicus.gov.au/realms/gss/protocol/openid-connect/token'
client_id='copernicus-au-public'
user = 'username'
password = 'password'

auth = HTTPOAuth2(username=user, password=password, token_url=token_url, client_id=client_id)

source = OdataSource(service=service, auth=auth)
```

The **OAuth2.0** authentication requires two extra parameters (**token_url** and **client_id**) in addition to the **username** and **password** used in the basic authentication.

Requesting products

To request products, the **request** function within the **OdataSource** class is used.

```
def request(self, query=None, query_controls=None, include=('Name', 'Id')):
    """
    Request the OData services to retrieve the matching data.
    :param query: The OData filter to apply in the query. Default is None.
    :param query_controls: The parameters to manage results. Default is None.
    :param include: (tuple[str]) The list of attributes to be included into the results. Default value is ('Name', 'Id').

    :return: A list of dicts containing matched data, being an empty list if no matching products are found.
    """
```

Products can be searched against specific criteria created by using the function **query_builder**, which builds query filters based on a series of information given as parameters.

```
def query_builder(filter=None, date=(None, None), geometry=(), id=(), name=(), mission=None, instrument=None,
product_type=None, cloud=None):
    """
    :param filter: (str) An existing OData query to apply. Default is None.
    :param date: (tuple[str, str]) A tuple of dates. The first one corresponds to the ContentDate/Start and the second one for
the End. Default is (None, None).
```

*:param **geometry**: Can be a path to the GeoJSON file containing a footprint or a series of coordinates contained in a tuple separated by comas. Default is ().*

*:param **id**: A series of UUIDs to match. Default is ().*

*:param **name**: A series of complete or partial names to match. Default is ().*

*:param **mission**: The sentinel mission to match, value can be 1, 2, 3 or 5. Default is None.*

*:param **instrument**: A filter on the instrument. Default is None.*

*:param **product_type**: A filter on the product type. Default is None.*

*:param **cloud**: Maximum cloud cover in percentage to apply. Default is None.*

:return: The filter string to be passed to the OData Service.

"""

To handle the returned results from the queries, **query_controls_builder** function is used in conjunction with the **query_builder** function.

```
def query_controls_builder(format="json", count=False, orders=None, skip=default_skip, limit=default_limit,
expand=None, select=None):
    """
    :param count: (Boolean) Whether to request a count of the matching resources included in the response. It has a
Boolean value of true or false.
    :param orders: (tuple) Particular order to request resources. If it includes '-' modifier, the display order is considered
descending, otherwise, it is considered ascending for the given property value. It is a list of orders.
    :param skip: (int) A number of items in the queried collection that are to be skipped and not included in the results. A
client can request a particular page of items by combining limit and skip.
    :param limit: (int) The number of items in the queried collection to be included in the result.
    :param expand: (str) The related resources or media streams to be included in line with retrieved resources. Each
expanded item is evaluated against the entity containing the navigation or stream property being expanded.
    :param select: (str) A specific set of properties for each entity or complex type. It is often used in conjunction with the
expand system query option, to define the extent of the resource graph to return ($expand) and then specify a subset of
properties for each resource in the graph ($select).

    :return (str) A non-empty string containing the OData query controls to be applied during the filtering request.
    """
```

The **query_controls_builder** function builds standard OData controls to handle results that return. To avoid any misuse of the OData API, this client control forces the number of results to 10 by default. For more results, users can manually set the limit.

The following is a simple sample code snippet demonstrating how to request products from the Copernicus Australasia Regional Data Hub using the **request**, **query_build** and **query_controls_build** functions. As an extension, in this code, **get_count** function is used to get the number of requested products.

```
from pygssearch import OdataSource, query_builder, query_controls_builder

service = 'https://catalogue.copernicus.gov.au/odata/v1'
source = OdataSource(service=service)

query = query_builder(mission=2)
query_controls = query_controls_builder(orders=('ContentLength', ), limit=1, skip=0)

print(source.request(query=query, query_controls=query_controls, include=('Name', 'Id')))

# print the number of products matching the query criteria
```

```
print(source.get_count(query=query, query_controls=query_controls))
```

Downloading products

To download the queried products, the **download** function within the **OdataSource** class is used.

```
def download(self, query=None, query_controls=None, output='.', threads=2, verify=False, quiet=False):
    """
    Download the products matching the query given in the arguments.
    Note: This method retrieves products from direct requests call instead of Drb to bypass its current performances issues.
Once fixed, the previous download that has not been modified can be reused.
    :param query: (Expression) The filter to apply in the query. Default is None.
    :param query_controls: The parameters to manage results. Default is None.
    :param output: (str) Path to a folder to store the downloaded products. Default is the current directory.
    :param threads: (int) Number of threads running. Default is 2.
    :param verify: (bool) Check at the end of downloading if the hash of the downloaded products matches that of the
service. Default is False.
    :param quiet: (bool) Set the quiet mode. Default is False.

    :return: None
    """
```

The following is a simple sample code demonstrating how to download products from the Copernicus Australasia Regional Data Hub using the **download**, **query_build** and **query_controls_build** functions.

```
from pygssearch import OdataSource, query_builder, query_controls_builder

service = 'https://catalogue.copernicus.gov.au/odata/v1'
source = OdataSource(service=service)

query = query_builder(mission=2)
query_controls = query_controls_builder(orders=('ContentLength', ), limit=1, skip=0)

source.download(query=query, query_controls=query_controls)
```

Command line interface

The PyGSSearch Command Line Interface (CLI) comes with many options that can be accessible with **--help** command. This user guide only covers information on those command line options that can achieve the same results as using the Python code illustrated in the previous section. For more extensive usage of PyGSSearch CLI, please check pygssearch · PyPI.

Connect to the service of Copernicus Australasia Regional Data Hub

- **Basic Authentication**

The following command line shows how to connect to the service of Copernicus Australasia Regional Data Hub with the basic Authentication method.

```
pygssearch --service https://catalogue.copernicus.gov.au/odata/v1 --username username --password password
```

Alternatively, the credentials can be configured into a separate file with format .ini, for example named as config.ini.

```
[pygssearch]
service= https://catalogue.copernicus.gov.au/odata/v1
username=username
password=password
```

The configuration file can be loaded using the following command.

```
pygssearch --config /path/to/config.ini
```

- **OAuth2.0 Authentication**

Same as using Python code, **OAuth2.0** authentication is required for downloading the products from the Copernicus Australasia Regional Data Hub.

Users can use command line

```
pygssearch --service https://catalogue.copernicus.gov.au/odata/v1 --username username --password password --token_url https://auth.copernicus.gov.au/realms/gss/protocol/openid-connect/token --client_id copernicus-au-public
```

or a configuration file named as config.ini, for example:

```
[pygssearch]
service= https://catalogue.copernicus.gov.au/odata/v1
username=username
password=password
token_url = https://auth.copernicus.gov.au/realms/gss/protocol/openid-connect/token
client_id = copernicus-au-public
```

Requesting products

To search for products matching the specific criteria, the PyGSSearch CLI provides a list of parameters equivalent to those within the **query_build** function in Python code.

These parameters are summarised in the following table.

Parameter	Description	Example
--filter	OData syntax filter	`ContentLength lt 10000000`
--start	The minimum sensing date of the queried products in the format `YYYY-MM-DD` or an expression like `NOW-1DAY`	`2024-07-05`
--end	The maximum sensing date of the queried products in the format `YYYY-MM-DD` or an expression like `NOW-1DAY`	`2024-07-31`
--geometry	A path to a GeoJSON shape file or a list of coordinates separated by a coma	`'((1.0,1.0),(0.0,1.0),(0.0,0.0),(1.0,0.0),(1.0,1.0))'`

--uuid	A specific product UUID. Can be set more than once.	285cdd67-713d-436a-ae92-df26e376f4d0
--name	Product names.	S2B_MSIL2A_20230704T095559_N0509_R122_T32SMC_20230704T125425.SAFE
--mission	Sentinel mission number (1: Sentinel-1, 2: Sentinel-2...)	2
--instrument	instrument name (SAR, MSI ..)	MSI
--product_type	product type	S2MSI2A
--cloud	maximum cloud cover percentage.	80

Here is an example for searching Sentinel 3 products with 30% maximum cloud cover.

```
pygssearch --service https://catalogue.copernicus.gov.au/odata/v1 --mission 3 --cloud 30
```

Further, to get the number of products that match the search criteria, **--count** option can be added into the command line.

```
pygssearch --service https://catalogue.copernicus.gov.au/odata/v1 --mission 3 --cloud 30 --count
```

The returned value is the number of products matching the configured query.

When many products match the configured filter, it may be necessary to navigate the results among the pages using **--skip** and **--limit** parameters as shown in the following example.

```
pygssearch --service https://catalogue.copernicus.gov.au/odata/v1 --mission 3 --cloud 30 --skip 10 --limit 20
```

Downloading products

To download the filtered products, **--download** parameter is required. The download process can be optimized with **--thread_number** to set the number of parallel downloads. And the **--quiet** parameter can be used to remove the progress information when needed.

To be able to download the requested products, the service connection credentials explained earlier must be included explicitly in the command line either by adding each item individually or adding the configuration file containing these items. The two methods are utilised in the following examples respectively, which download some Sentinel 3 products with 30% maximum cloud cover from the Copernicus Australasia Regional Data Hub.

Example 1:

```
pygssearch --service https://catalogue.copernicus.gov.au/odata/v1 --username username --password password --token_url https://auth.copernicus.gov.au/realms/gss/protocol/openid-connect/token --client_id copernicus-au-public --mission 3 --cloud 30 –thread_number 2 –limit 5 --download
```

Example 2:

```
pygssearch -C config.ini --mission 2 --cloud 30 –thread_number 2 –limit 5 --download
```