European Direction in GCI Enhancements

D3.5

The Enhanced GEOSS Portal – v2.0

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Abstract:

This document describes the GEOSS Portal as the front-end of the GEOSS Platform, the heart of the Global Earth Observation System of Systems, consisting of the GEOSS Portal, the Discovery and Access Broker, the Status Checker and Yellow Pages. It does so in terms of functionalities offered and of step-by-step instructions for carrying them out. The target audience is the wide variety of the GEOSS Platform users, including specific user communities who want to benefit from functions offered by the GEOSS Platform from their portals or applications.

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Executive Summary

This document, (*D3.5, The GEOSS Web Portal User Manual*), describes the Global Earth Observation System of Systems (GEOSS) Portal, in terms of offered functionalities and of step-by-step instructions for using them. It is intended to assist people using the GEOSS Portal. The Portal is one of the components of the GEOSS Platform. It is an online web map-based user interface which allows users to discover and access Earth observation data and heterogeneous collections from satellites, aeroplanes, drones and in-situ sensors at global, regional and local scales, from different providers from all over the world. It connects users to existing databases and portals and provides reliable, up-to-date and user-friendly information – vital for the work of decision-makers, planners and emergency managers.

The other components of the GEOSS Platform are:

- The GEO Discovery and Access Broker (GEO DAB), the primary mechanism by which all data and information is discovered and accessed, built and maintained by the Italian National Research Council (CNR-IIA);
- The GEOSS Service Status Checker, implemented and operated by USGS/FGDC, and
- The GEOSS Yellow Pages, implemented and operated by the University of Geneva.

The target audience of this document is the wide variety of the GEOSS Portal users, including specific user communities. They want to reuse functions of the GEOSS Portal in their portals or applications.

This document describes the enhancements carried out during the whole life span of the *EDGE* (short *for European Direction in GEOSS Common Infrastructure Enhancements*) project.

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1. Introduction

1.1 Purpose and Scope

This document (D3.5 - *The GEOSS Web Portal User Manual*) has been generated in the context of *WP3 - GEOSS Portal and GEO DAB Enhancements* within the *EDGE* (short for European Direction in GEOSS Common Infrastructure Enhancements) project, Grant Agreement no 776136.

This objective of this document is to describe the GEOSS Portal as the front-end of the GEOSS Platform, the heart of the Global Earth Observation System of Systems, consisting of the GEOSS Portal, the Discovery and Access Broker, the Status Checker and Yellow Pages. It does so in terms of functionalities offered and of step-by-step instructions for carrying them out. The new enhancements have been architecturally described in the EDGE-WP3-DEL-D3.4, following the specification as identified and documented in the context of WP2 in the document EDGE-WP2-DEL-D2.4, *Functional and Non-functional Enhancements Specification*, that underpin the user needs to be elicited and analysed in the context of the document EDGE-WP2-DEL-D2.3, *Use Cases Description and User Requirements Document*.

The target audience is the wide variety of the GEOSS Platform users, including specific user communities that want to benefit from functions offered by the GEOSS Platform from their portals or applications.

1.2 Document Organisation

The document is organised as it follows:

- Section 1: Introduction: it describes the purpose and scope of the document and its organization.
- Section 2: Rationale and Context: it contextualizes the content of this document by providing background information and details on the operational landscape encompassing the GEOSS Platform.
- Section 3: The GEOSS Portal: the section describes the GEOSS Portal interface elements and how to use them.
- Section 4: The GEOSS Platform Reusable Components: describes the GEOSS Platform instruments that can be used to connect with the GEOSS Portal and how to configure them.
- Section 5: The GEOSS Portal YouTube channel
- Annex A. References: List the references used in the document.
- Annex B. Figures and Tables: Provides links to figures and tables in the document.
- Annex C: Terminology explains the meaning of the acronyms and definitions used in the document.

2. Rationale and Context

2.1 Background and operational context

The GEOSS Platform, formerly called the GEOSS Common Infrastructure (GCI), had been created to provide the technological tool to implement the Global Earth Observation System of Systems (GEOSS).

The birth of the former GCI was in 2008, as Clearinghouse catalogue, in 2012 the GCI evolved into a Brokering infrastructure with the inclusion of the GEO Discovery and Access Broker (GEO DAB). The first graphical user interface, the GEOSS Portal was initially created in 2010 and 2016 has seen great enhancements in terms of user experience and enhanced discovery, access and visualization functionalities. In 2017 the formerly called GCI evolved into a GEOSS Platform.

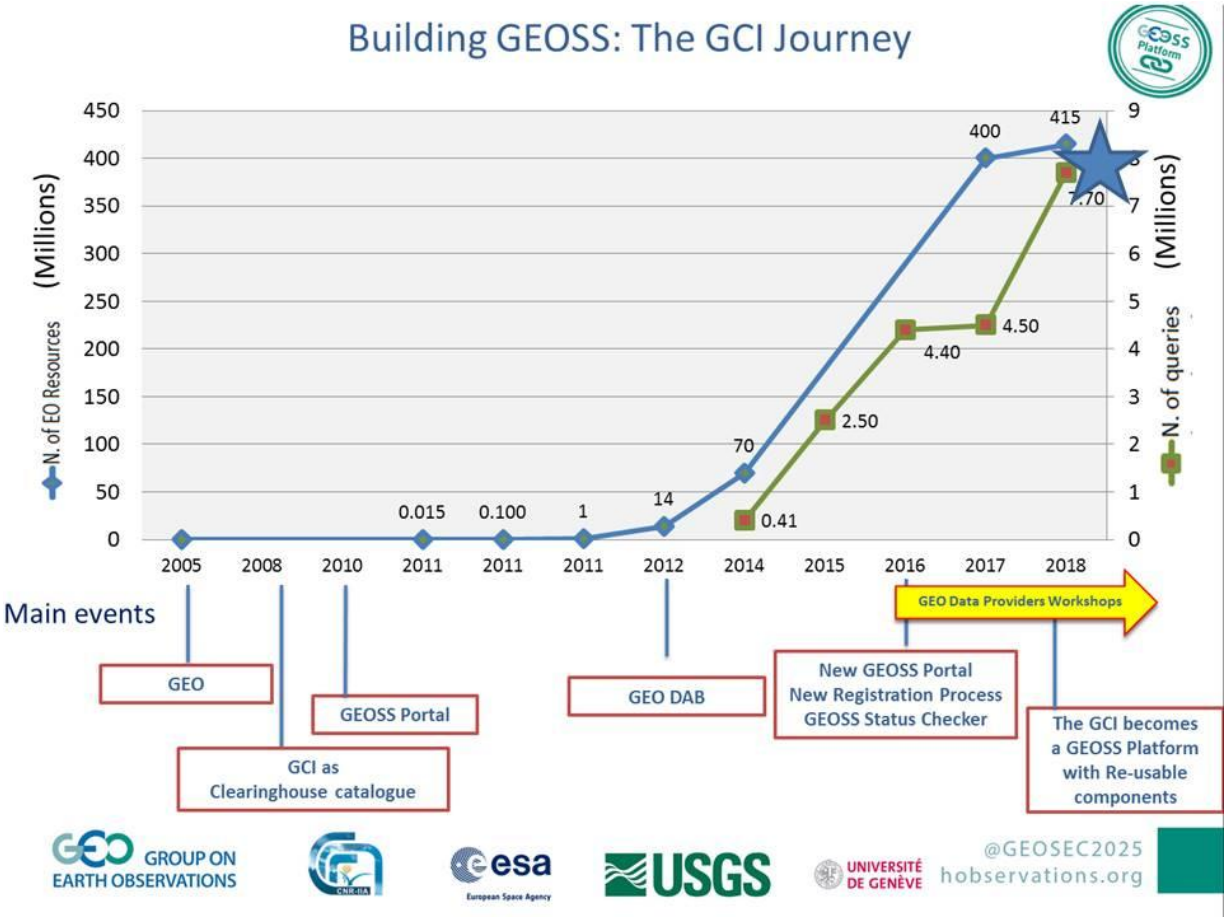


Figure 1 - The GCI Journey

GEOSS is a social and software ecosystem sharing independent and open Earth observation (EO) information and processing services. It connects and coordinates a large array of observing systems, data systems, and processing services to strengthen monitoring of the state of the Earth. It facilitates the sharing of environmental data and information collected by countries and organizations within GEO. GEOSS facilitates data and information accessibility and interoperability to support the Sustainable Development Goals (SDG) agenda, the Paris agreement and the Disaster Risk Reduction framework.

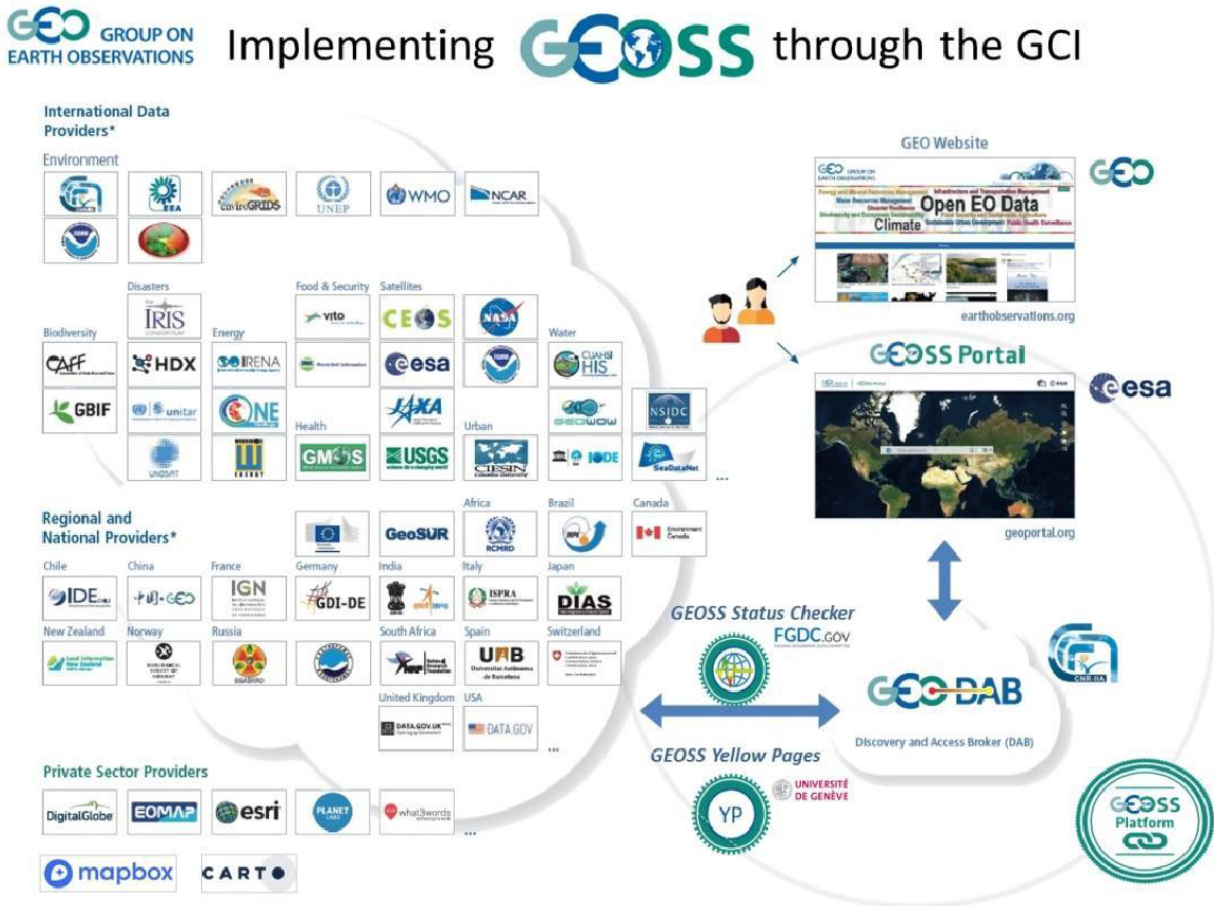


Figure 2 - The Global Earth Observation System of Systems

Any user can have interactive access to GEOSS resources via the GEOSS Portal. The Portal is one of the components of the GEOSS Platform. It is an online web map-based user interface which allows users to discover and access Earth observation data and heterogeneous collections from satellites,

aeroplanes, drones and in-situ sensors at global, regional and local scales, from different providers from all over the world. It connects users to existing databases and portals and provides reliable, up-to-date and user-friendly information – vital for the work of decision-makers, planners and emergency managers.

Figure 3 - GEOSS Platform Components

The portal provides a single Internet discovery and access point to the ever-growing quantities of heterogeneous collections of Earth observations from satellites, aeroplanes, drones and in-situ sensors at global, regional and local scales.

The GEO Discovery and Access Broker (GEO DAB) is the primary mechanism by which all data and information is discovered and accessed. The GEO DAB implements the necessary mediation and harmonization services accessible through Application Program Interfaces (APIs). These APIs allow data providers to share resources without having to make significant changes to their technology or standards.

The other two components of the GEOSS Platform are the GEOSS Service Status Checker, implemented and operated by USGS/FGDC, and the GEOSS Yellow Pages, implemented and operated by the University of Geneva.

2.2 Links with other project activities

EDGE identifies five work packages as follows:

- WP1: Project management

- WP2: User requirements elicitation and functional analysis
- WP3: GEOSS Portal and GEO DAB Enhancements
- WP4: Deployment and user assessment
- WP5: Dissemination and exploitation

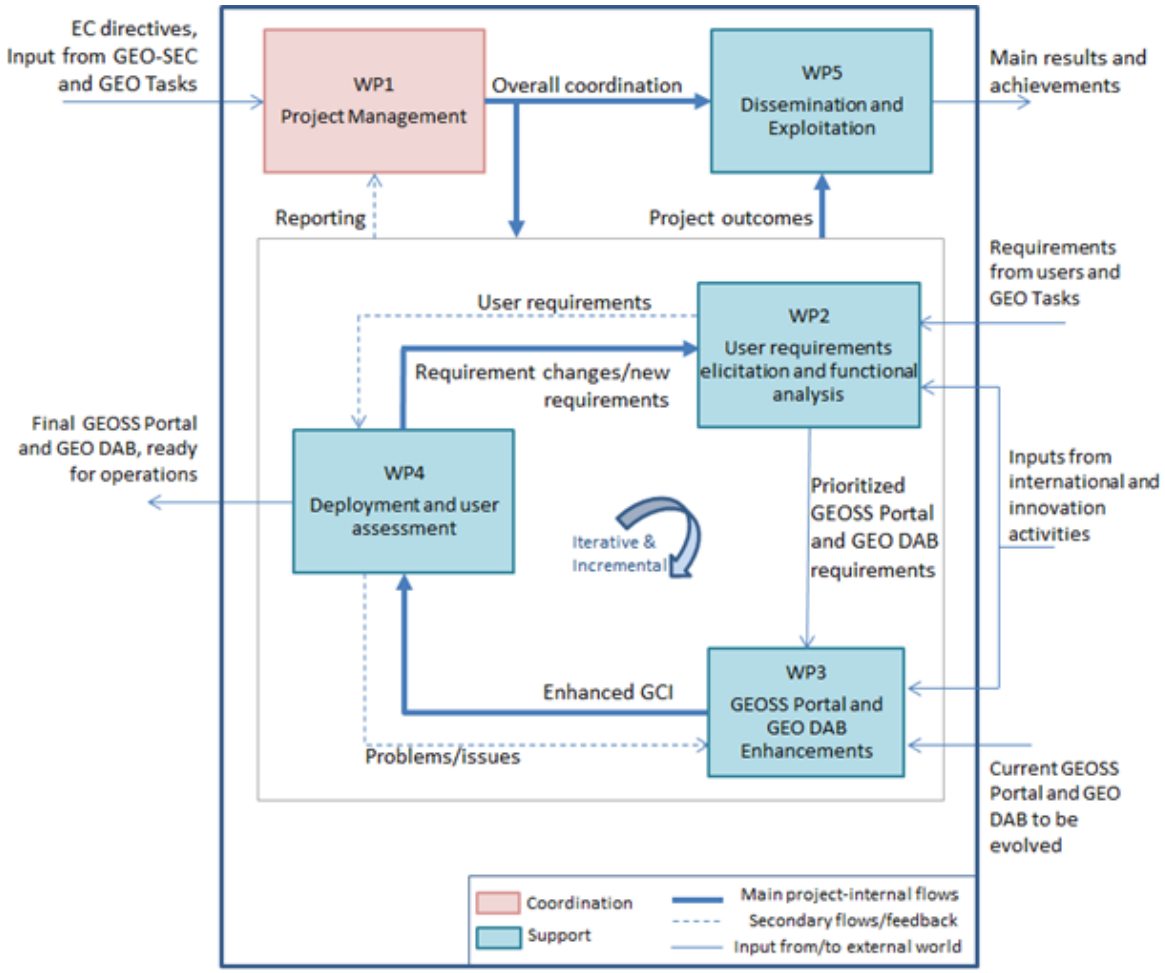


Figure 4 - EDGE Workpackages and their relationships

Workpackage 3 builds on prioritized GEOSS Platform (in particular GEOSS Portal and GEO DAB) requirements as input to the identification of enhancements, their implementation and definition of an integration and verification strategy. The output of WP3 is an enhanced GEOSS Platform (formerly referred to as GEOSS Common Infrastructure – GCI). On top of the requirements resulting from WP2, current work package considers requirements and other inputs as well resulting from other (external activities).

3. The GEOSS Portal

The GEOSS Platform is moving from a data-platform to a knowledge-platform: users not only can discover, inspect and access data, but can also use data to derive information and knowledge. Activities were focusing as well to discover, inspect, access and use information and knowledge and services via the Platform. Experimentation of new functionalities was based on the possible evolution of GEOSS Ecosystem as highlighted in detail in [2]. Consequently, the project developed an operational GEOSS Portal - available at *www.geoportal.org* –, and a parallel proof of concept - available at *https://geoss.uat.esaportal.eu/* - re-using relevant outcomes of European Research and Innovation project. The GEOSS Portal was also extended to implement some of the Knowledge management functionalities. See the section 3.2 on the detailed functionalities available from the proof of concept.

A number of GEOSS Platform features are implemented via Platform Tools (or instruments), e.g. via specific Views and sub-views and can be 'used' via APIs (directly interfacing on a Machine-to-Machine level with the GEO-DAB), via Widgets and Software Development Kits that can support the development of dedicated community portals as well as directly from the Generic GEOSS Portal, or GEOSS Mirrors, in case set-up for the relevant communities or GEO Priority Area, (e.g. for a specific SBA, Copernicus-service, ESA Thematic Exploitation Platform community, Sustainable Development Goals (SDG), Paris Agreement on Climate Change, Sendai Framework on Disaster Risk Reduction, etc.)

3.1 Operational Environment

Below you can find manuals regarding functions, options and modules accessible on Operational Environment, available at *www.geoportal.org*.

3.1.1 Welcome Screen

Figure 5 - The GEOSS Portal Welcome screen

At the top opening of the portal, you will see a map of the world with a search bar in the centre, a series of icons on the right and header on the top of the page.

The header on the top of the page includes:

- The option or hamburger menu icon;
- GEOSec logo – linked to the GEO Site (http://www.earthobservations.org/);
- GEOSS Portal logo – linked to geoportal home page;
- CNR IAA logo linked to the CNR IAA (http://www.iia.cnr.it);
- ESA logo linked to the ESA site (http://www.esa.int);
- The Switch language option.

The Search panel in the centre of the page includes the following options:

- Filters;
- Search button;
- Share search;
- Clear search;
- Move bar.

Icons on the right for basic GIS (Geographical Information System) functionality include:

- Area of interest;

- Layers;
- Base map selection;
- Hide search bar.

Figure 6 - The Map Icons and the base map Carousel

At the bottom right corner, there are also:

- An envelope icon with the "Send Feedback" option (at this link https://youtu.be/LOQwAQBLdas you can find a send feedback tutorial);
- The map scale;
- And the "Take a tour" icon. "Take a tour" icon call to YouTube video specific to the GEOSS Portal version.

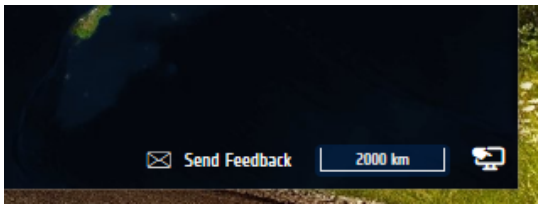


Figure 7 - Bottom right corner interface elements

3.1.2 Options Menu

Click on the "hamburger" icon on the header to open the options menu. You can find:

- Search for Resources – which after clicking transfer User to the home page of GEOSS;
- Info – which has subpages such as About and Help Desk;

- Statistics – leads to a page with the statistic of usage of portal GEOSS. To access it user needs to have an active account on GEOSS Portal;
- Yellow Pages – list of data providers, that GEOSS platform is connected with;
- Community Portals – list of community portals, that are using GEOSS Platform;
- My workspace - personalized workspace and options to retrieve information regarding favourite/ most used searches, possibility to download GEO IDE (widget for your own website powered by GEOSS Platform), access to information editor, view your likes and account details; (list of functions is based on environment you are checking it on).
- Terms & Conditions – page with information about terms and conditions;
- Sign-in.

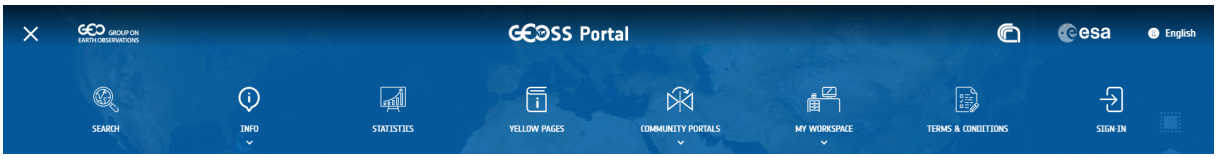


Figure 8 - The GEOSS Portal option menu

3.1.3 Search for Resources - Multi-Criteria Searches

The multi-criteria search panel can be unfolded by clicking “Advanced Search” under the keyword-based search panel.

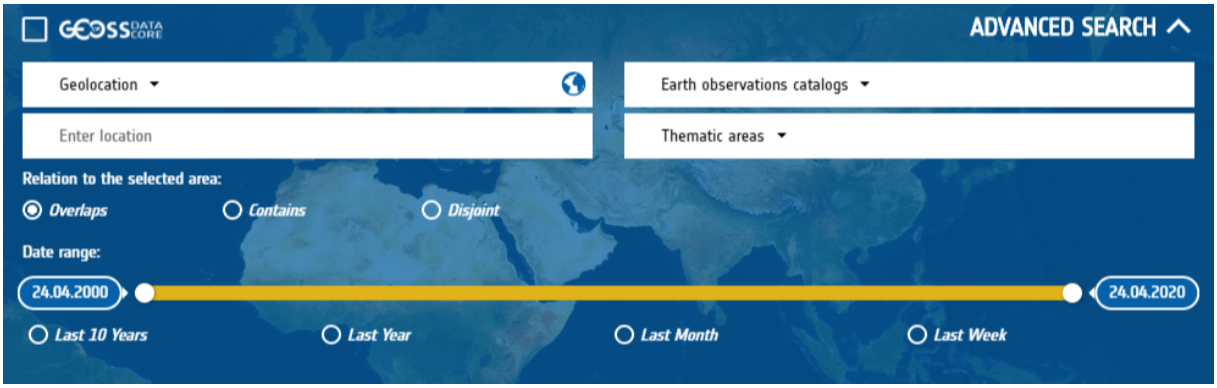


Figure 9 - The multi-criteria search panel

As part of a multi-criteria search, a user can:

- restrict search results to the freely and openly accessible ones only, so-called GEOSS Data CORE[1] resources;

Figure 10 - "GEOSS DATA Core" filter

- limit the search to a limited set of **Earth observation catalogues** of interest to the user;

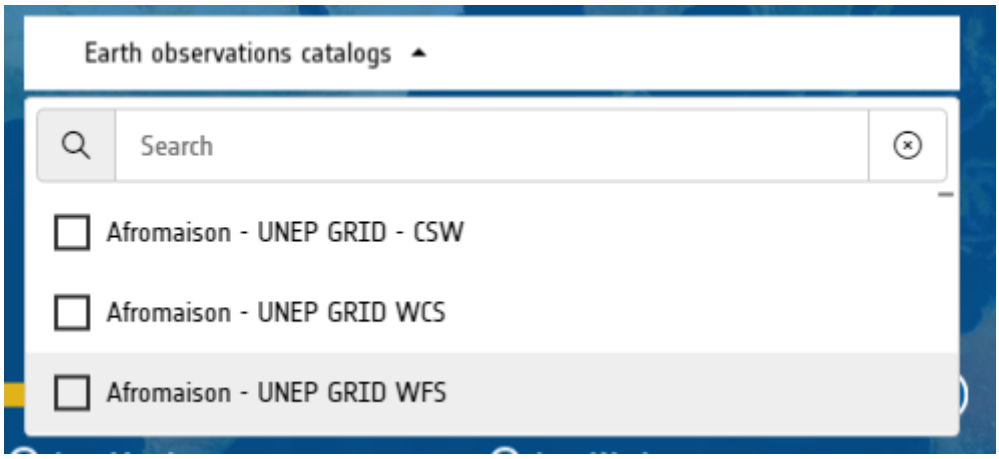


Figure 11 - the Earth Observation Catalogues filter

[1] "The **GEOSS Data C**ollection of **O**pen **R**esources for **E**veryone (**GEOSS Data-CORE**) is a distributed pool of documented datasets with full and open unrestricted access at no more than the cost of reproduction and distribution" where:

- "full access" means that all the data in the GEOSS Data-CORE can be accessed, used and redistributed;
- "open access" means that data providers may charge at most the cost of reproduction and distribution of the data, although it is expected that in most cases the data in the GEOSS Data-CORE will be made available at no cost;
- "unrestricted access" means that no restrictions are placed on the access to, or use and redistribution of the data in the GEOSS Data-CORE. It should be noted that the following two conditions may be placed on data registered in the GEOSS Data-CORE by data providers (i) attribution and (ii) user registration. These are not considered to represent restrictions on the access to, or use and redistribution of the data.

- define the **Geolocation** of interest using one of these options:

Figure 12 - How to specify a location on Earth

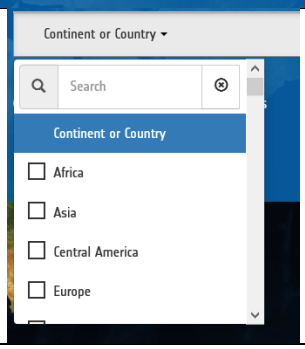
Writing latitude/longitude coordinates	
Selecting a continent or country from a drop-down menu	
Specifying a point of interest (resolved interfacing with the Google Maps API)	

Table 1 - How to specify a geo-location

- Direct the search towards a specific **Thematic/Sub-thematic Area** applying predefined views on the data;

Figure 13 - The thematic areas filters

- Define a timeframe of interest

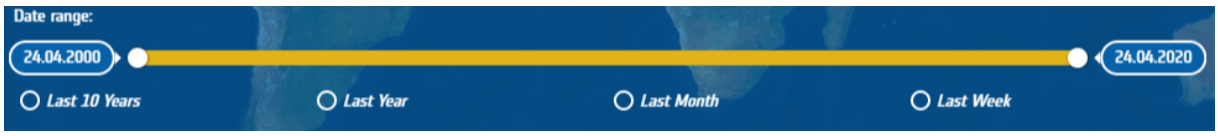


Figure 14 - The temporal criteria search

3.1.4 Results Inspection

After having specified search criteria, you can click on the search button. Results (if any) will appear in the result window.

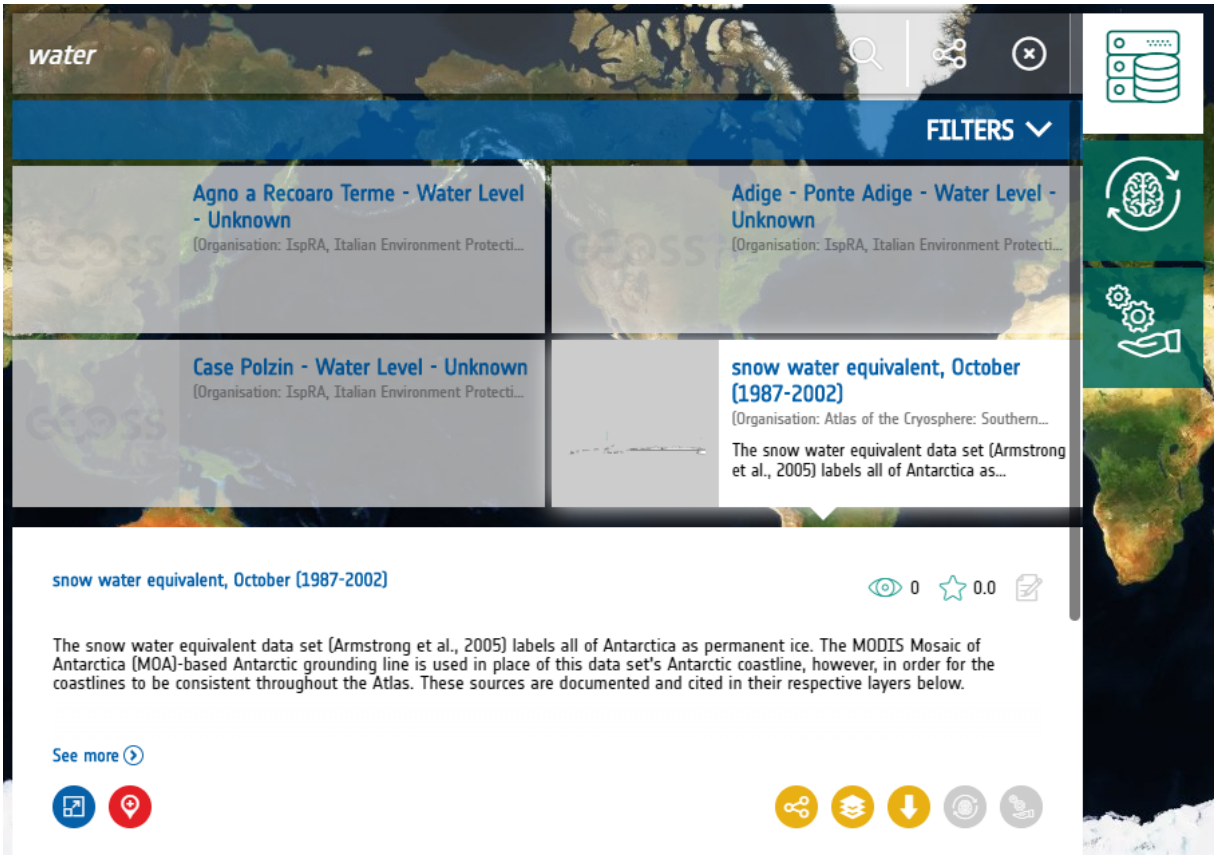


Figure 15 - The resulting window

The first page of results is displayed (twelve resources, by default); users can easily access the next (or previous) page of results by clicking the next (previous, last or first) arrow at the bottom of the panel. Users can also type in the number of the page and press enter to get there. Users can choose at the bottom of the search result window what source they want to check.

Each result item shows a title, a brief description, a browse image (if available), the GEOSS Data CORE flag (which means that the data is freely and openly accessible, according to the GEOSS Data CORE principles), and a series of icons corresponding to applicable functions.

More precisely, the following functions may be available:

Icon	Description	Environment
	Information about how many people viewed this resource	Production
	GEOSS Like (assign stars) and comment on the resource. You can find a video tutorial of the GEOSS Like function at this URL https://youtu.be/Z7W9KP8RfkI.	Production
	This option is offered for a user contribution. It allows for logged users to add more information and links to the resource. The Information that the user adds is reviewed by moderators before they appear on the portal.	Development
	Localization of the data on the map either as a bounding box or as a pin.	Production
	Bookmark the result and save it in the My Workspace section, available if the user has signed in.	Production
	Open extended view of resource with a list of related resources.	Development
	Collaboration and sharing of resources. You can find a video tutorial of this function at this link https://youtu.be/gkv9-oTAZZs.	Production
	Possibility to copy a link to the resource and share it by: Twitter, Facebook, Skype and Linked In.	Production
	Add a layer to the map in case layers are available from the Data Provider.	Production
	Download the data in formats made available by the Data Provider.	Production

	Certain resources have services that can be calculated or run via external systems.	Development

Table 2 - Interface icons Description

3.1.5 Filtering

The GEOSS portal provides the possibility to narrow down the search results to a smaller set by applying filters. The type of filters depends on the actual search and results (facet filters).

Default Filters

Default filters are available for most search results and include filtering of keywords, format, source, protocol and organisation. Filtering is progressive, implementing 'AND' operation and not 'OR'. For each filter, only one value can be selected.

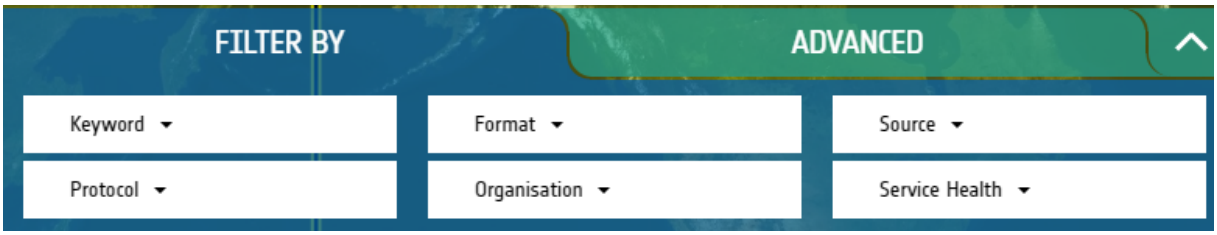


Figure 16 - Default faceted filters

3.1.6 Comparing layers

The GEOSS portal allows its users to compare layers using a dedicated tool (this is only possible for certain resources which contain dedicated layers).

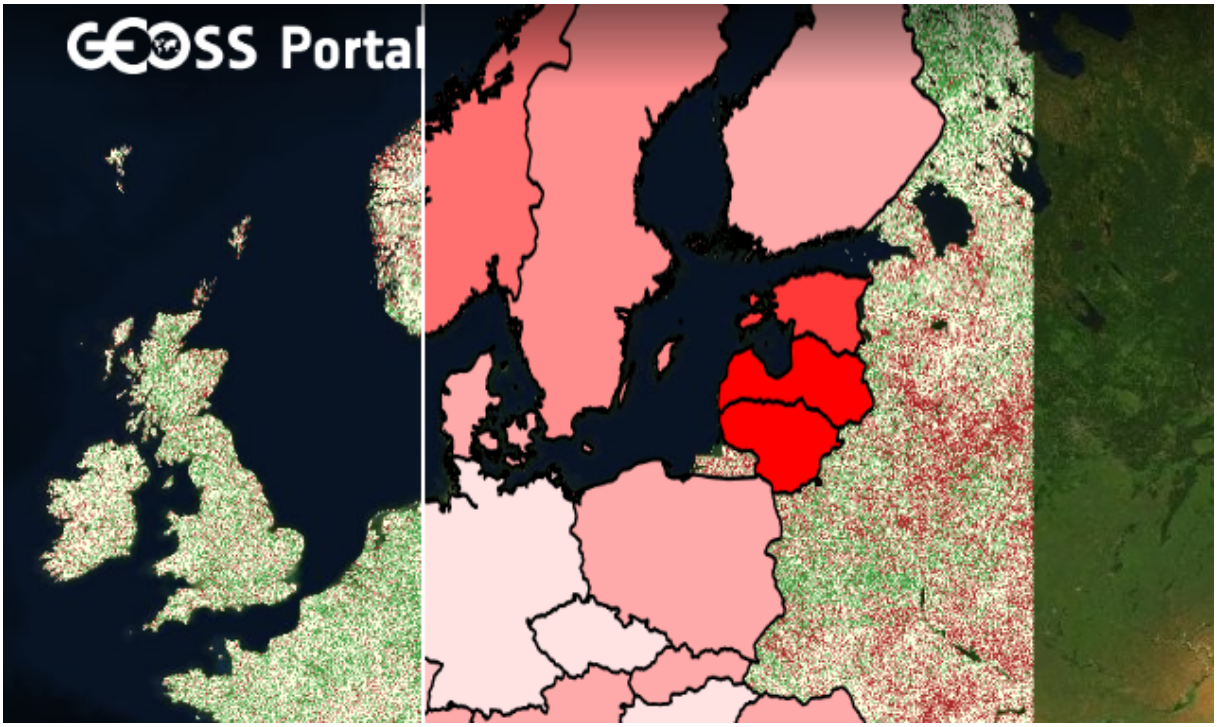


Figure 23 Example of layer comparison

Users can add layers to the layers list by clicking “Layers” button within the resource. The list of layers can be accessed by clicking the “Layers” button displayed on the right side of the map view. At the top of the list window they will see the option called "Compare mode”.

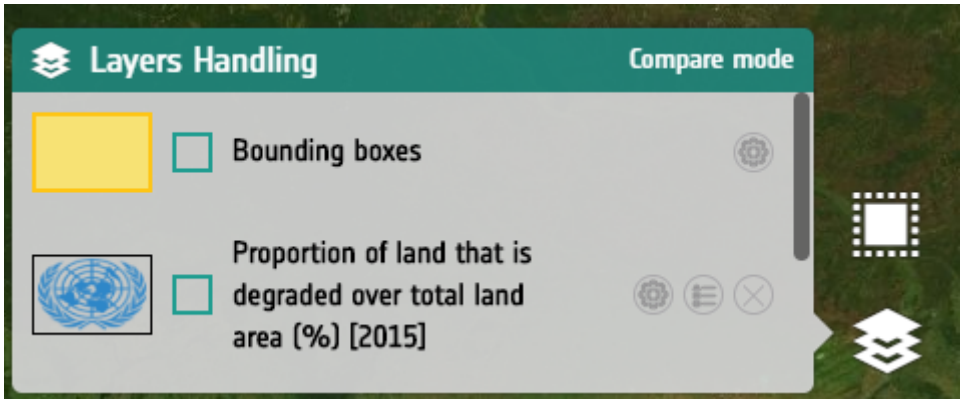


Figure 24 Window with choosing the layers

By clicking it system will allow users to choose 2 layers to compare.

Figure 25 Comparison window

After choosing 2 of layers for comparison a line with arrows will appear on the screen. User can move it left right to see changes in the layers as they appear on one another.

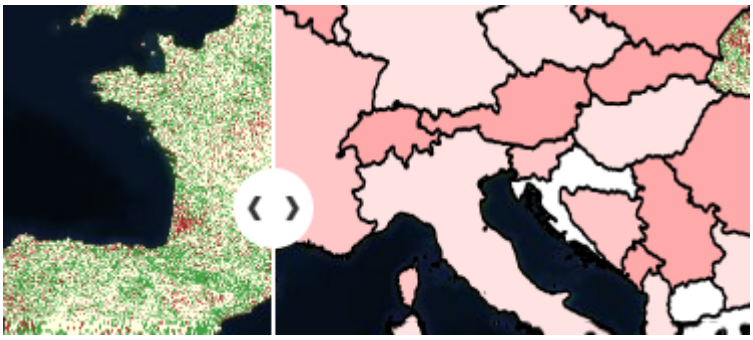


Figure 26 Comparison tool

3.1.7 Signing-in

Figure 27 - The Sign-in item

In order to obtain credentials to log-in open the Hamburger menu on the upper-left corner of the GEOSS Portal website and click on the item Sign-in. There user can log in using their credentials or create a new account.

3.1.8 Languages

The Portal user interface elements are available for English, Polish, Spanish Russian and Chinese languages speakers.

Figure 38 - The language bar

3.1.9 GEOSS Instant Feedback

Users willing to participate in portal improvement can take part in quick survey to share general impression about portal.

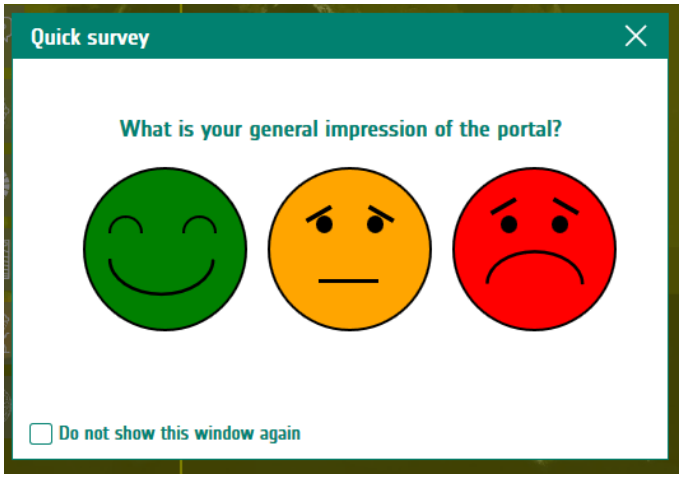


Figure 39 - The instant feedback

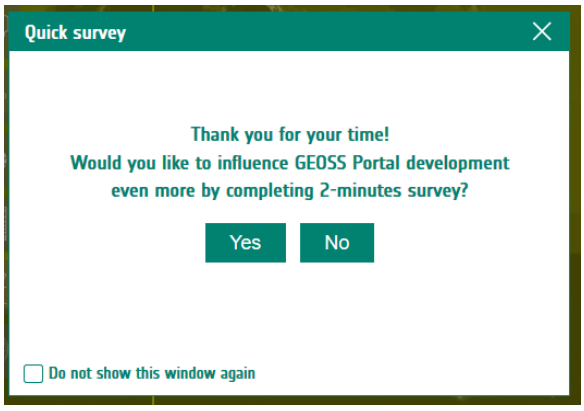


Figure 40 - Survey

3.1.10 Special features for logged users on operational environment

Below are list of actions, which users have access to when they log in to GEOSS Platform.

Saved searches

After performing the search, users can save the searched phrase by clicking on “Save” button displayed on the search bar.

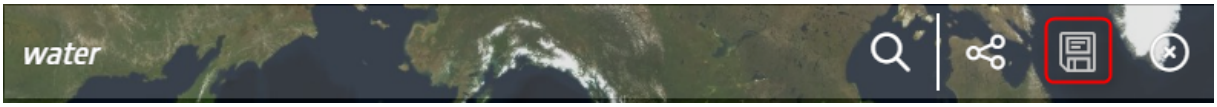


Figure 28 Search bar with save search option (floppy disk icon)

After clicking the icon, a pop-up window will appear with information, that the process was successful and where the saved searches can be accessed.

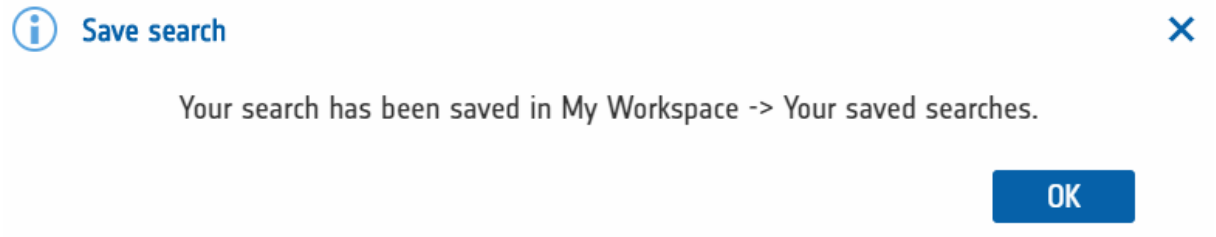


Figure 29 Window with information about successfully saving search results.

Bookmarked results

Logged in user can bookmark the results, that were found for Users search. To do so users have to enter the resource they want to save and then click on red circle with plus in it.

Figure 30 Example of resources view

After clicking it a new pop up window will appear on the screen informing, that the process ended successfully and where saved bookmarks can be found.

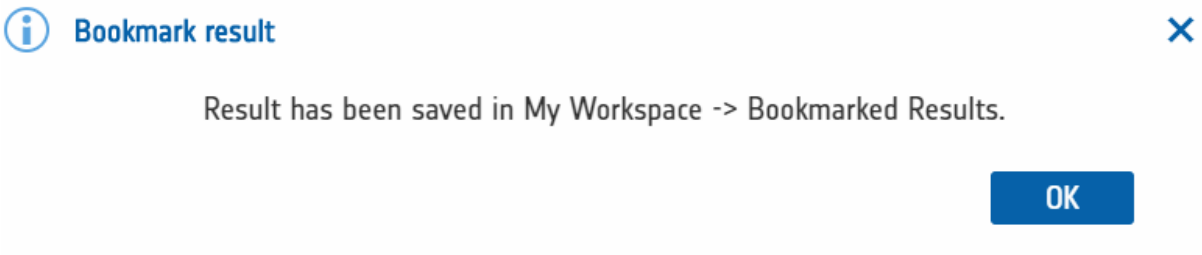


Figure 31 Window with information about successfully saving a bookmark.

Statistics

Registered users can also access the statistics of the GEOSS portal to see various data concerning data and site usage. Statistics page can be accessed through navigation menu opened by hamburger button.

On the Statistics page user can select source of data, analysed period and chart interval. Clicking Show chart button generates and displays the requested chart.

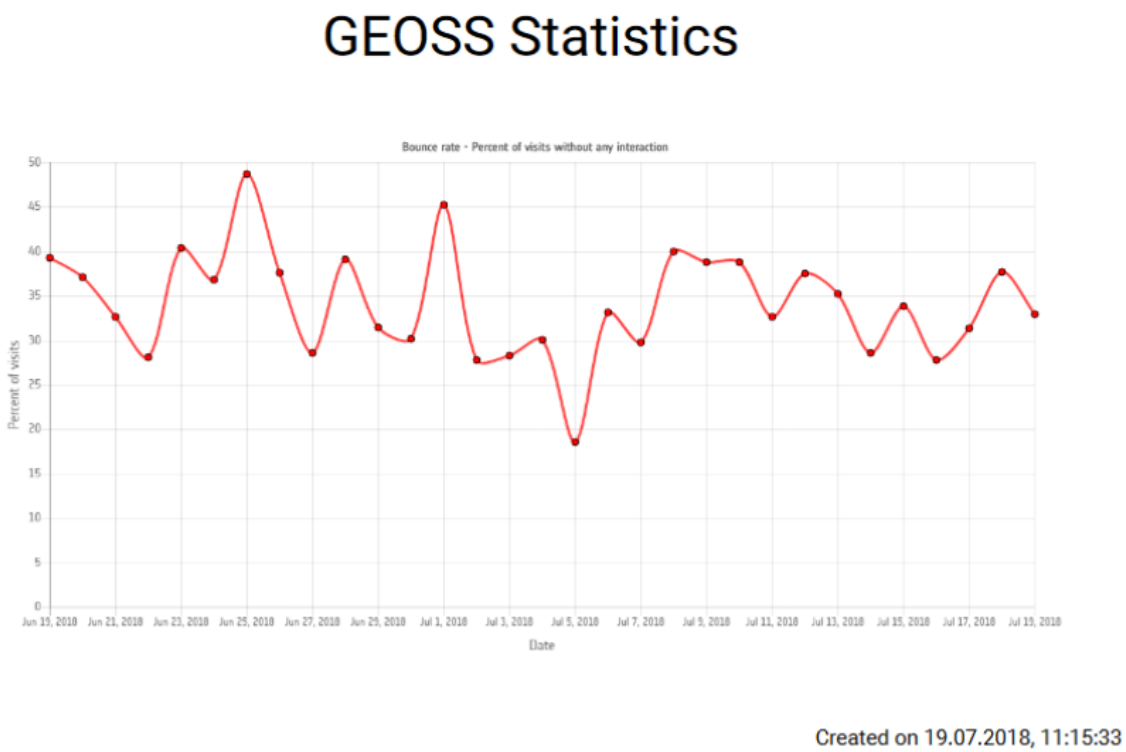


Figure 37 - GEOSS Statistics

3.2 Proof of Concept

In response to a user query, the GEOSS Platform provides a list of all the resources matching the user search criteria. A parallel advanced GEOSS Portal provides a classification of these search results, distinguishing amongst:

- Data - the actual Earth Observation datasets or collections;
- Services - processing services that can be invoked by the users to generate value-added products or indicators;
- Information/Knowledge - the additional information that enables the user to understand a concept (or data, or service) he/she is looking for, and therefore to acquire “knowledge” about it.

To enable the creation of this knowledge, the GEOSS Platform cleverly links one another items belonging to the three different groups.

The figure above shows an example of search results list in the data category. It is possible to switch from one category to another using the icons on the right, which are active only if applicable, i.e. only if at least one result item in that category exists.

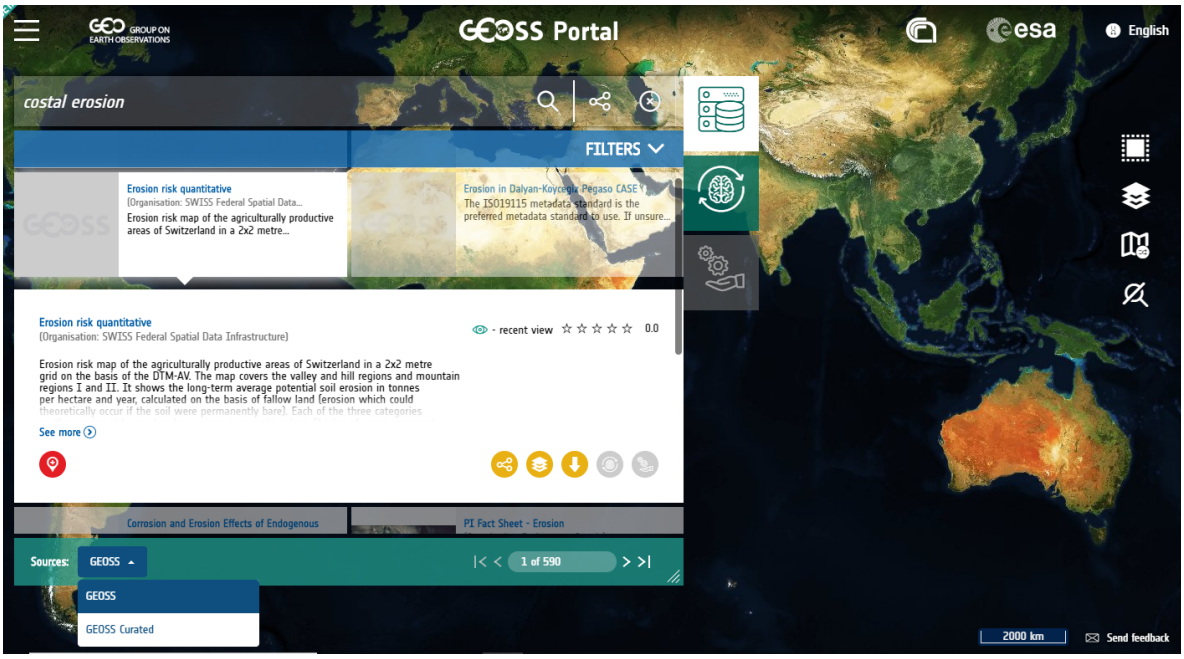


Figure 1 - Results Inspection from the proof of concept of the GEOSS Platform

It is also possible to restrict the result set from the whole GEOSS to a set of “curated” resources, whose integrity and reliability is guaranteed.

When a result item is selected, a set of functions are available and can be activated through dedicated icons. They might include:

- *GEOSS like*, which enables users to rate the result and leave a comment;
- Localization of the data on the map either as bounding box or as a placeholder;
- Bookmark the result and save it in the My Workspace section, available if the user has signed in;
- Collaboration and sharing of resources;
- Add a layer to the map in case layers are available from the Data Provider;
- Download the data, in formats made available by the Data Provider;
- Switch between result sets (from one category to the other two, e.g. to "services" and "knowledge" if the selected result is "data") linked to the selected result item.

In addition to this, if the selected result item is a collection or a hierarchical concept, in general, an arrow is available to drill down the collection/concept. This will be shown in the example scenarios provided below.

Below you can find helps and directions regarding functions, options and modules accessible from the development environment, available at *https://geoss.uat.esaportal.eu/*.

3.2.1 See Also

Part of the search page result is also a tab called "See Also".

Figure 17 Example of See Also list of items

The "See also" panel presents phrase that was typed in the search bar in different configurations using words 'or' and 'and'. Additionally, the module presents related phrases based on thesauri data. Users can click on any phrase and a new search will be performed using the selected item.

3.2.2 Extended View

Each resource has its own option of extended view. To access it user must click the “Explore Extended View” icon within a chosen resource:

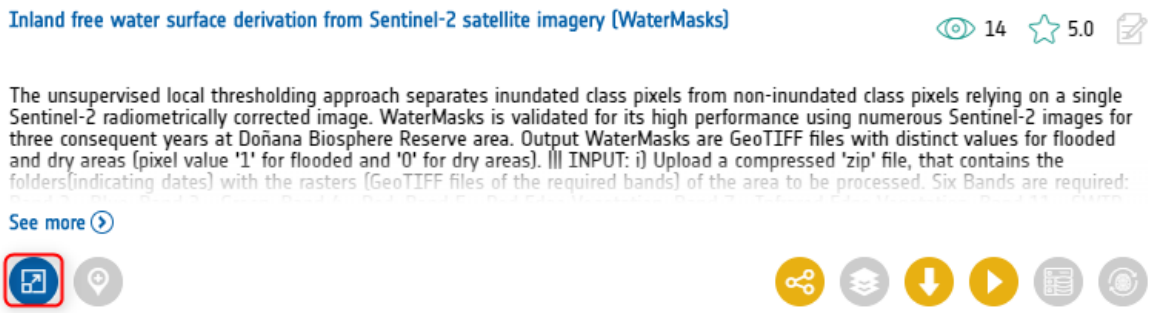


Figure 31 View of resource with marked extended view.

By clicking it User can see expanded information about chosen resource as well as related resources to it within Data, Information and Services categories. Within this view the information from Wikipedia related to the displayed resource is displayed it the upper right window.

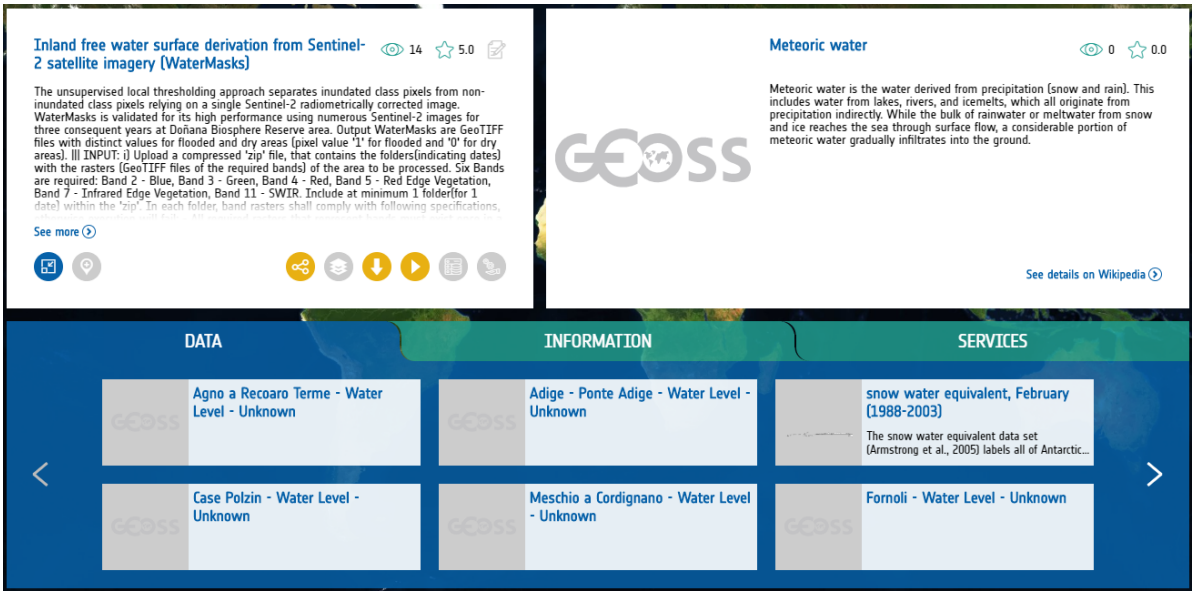


Figure 32 Extended view for resource.

3.2.3 Services

Some of the resources have services associated with them; users can also narrow the search to resources that contain services by clicking “Services” button on the search results page. Services allow to perform calculations based on the data form the resource. To start the service user must

click the "Workflow" button within the resource.

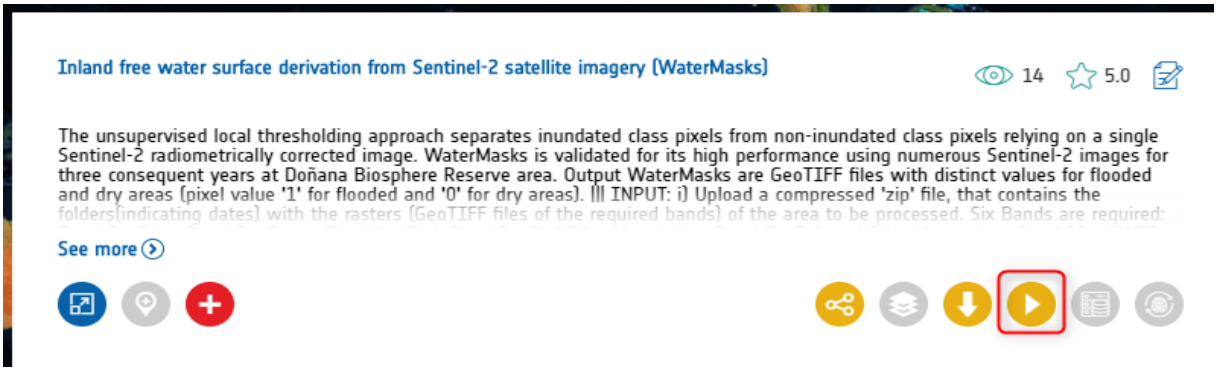


Figure 33 Resource with service icon active

After clicking the workflow button, a pop-up is displayed with a schematic of the workflow, inputs for the workflow, cloud platform selection and run name.

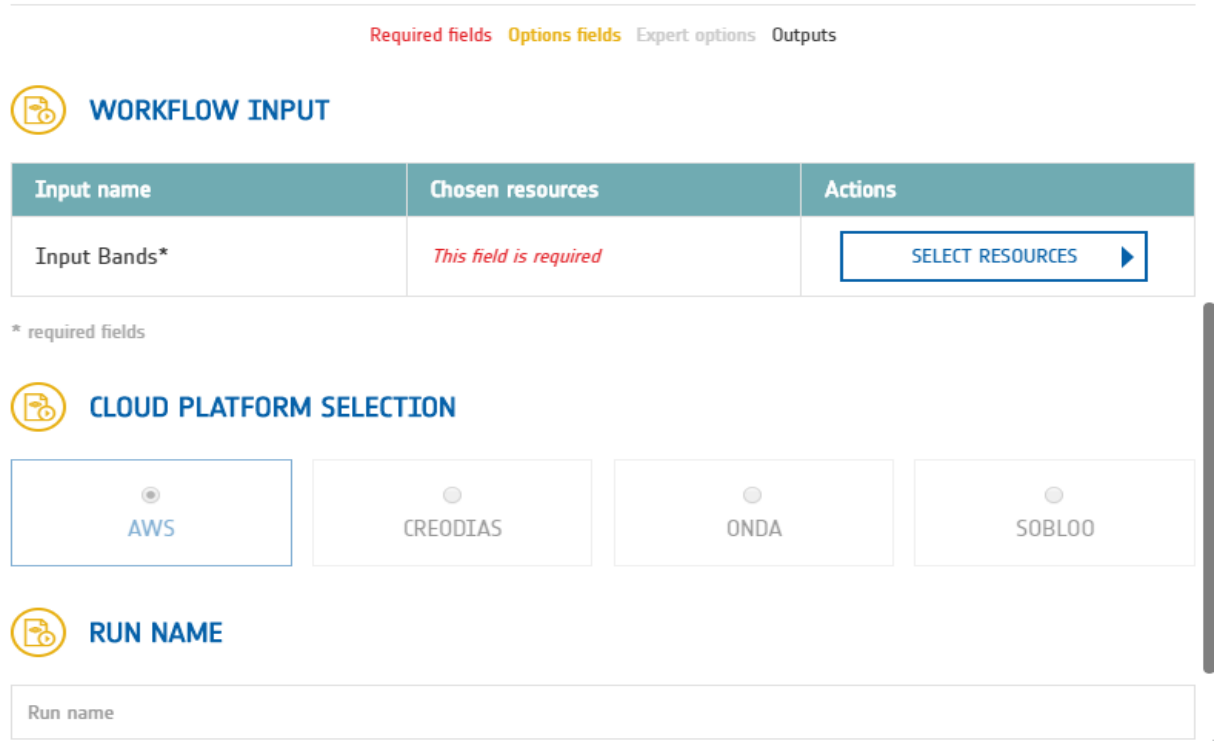


Figure 34 Service run pop up window

After user selects all the desired settings and clicks the “Run” button on the bottom, the calculation status can be viewed in the “Runs” tab.

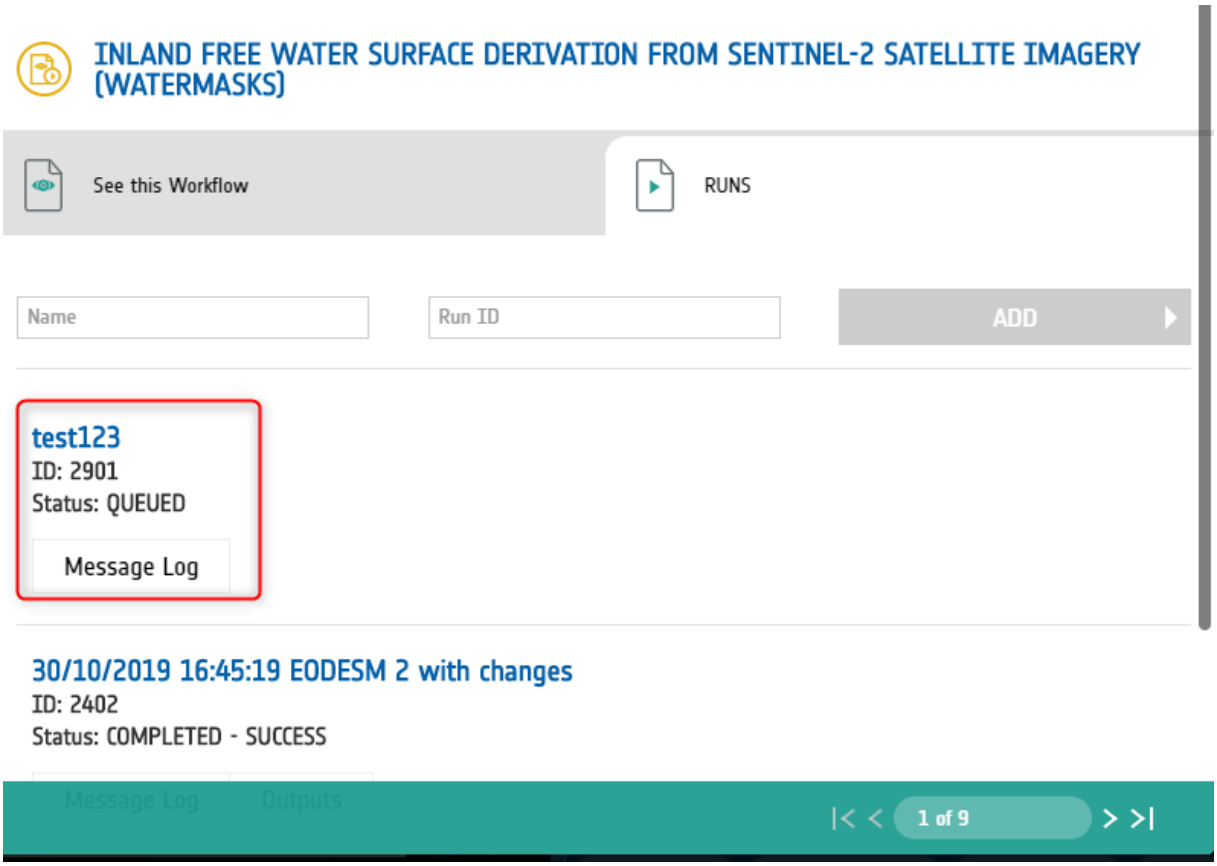


Figure 35 Example of runs, that were done on certain resource.

3.2.4 Special features for logged users on development platform

Below are list of functions, which are accessible for logged Users on development platform.

Saved runs

This option is available for resources that can run services. After making a run as a logged in user the run can be saved in the results within workspace. This allows users to go back to any previous run.

Bulk download

Bulk download allows logged in Users to create a list of files, which can be downloaded after the completing of the list will be done by User. Each download can be done manually by any user but for logged in users option add to download list will be active:

Figure 36 Download options

By clicking it, item to download is being added to the list and we see information on the icon for bulk download about how many items are on the list to be downloaded.

Figure 37 Bulk download icon

This tool works also for customized downloads (a special kind of download within GEOSS Portal).

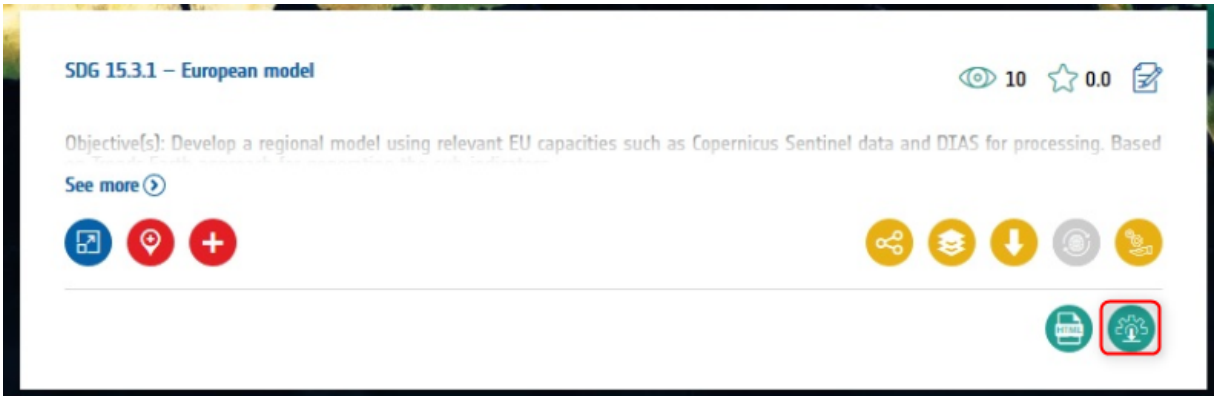


Figure 38 Custom Download

When User clicks Custom Download icon a new window will appear where they can select the parameters of resource that will be downloaded.

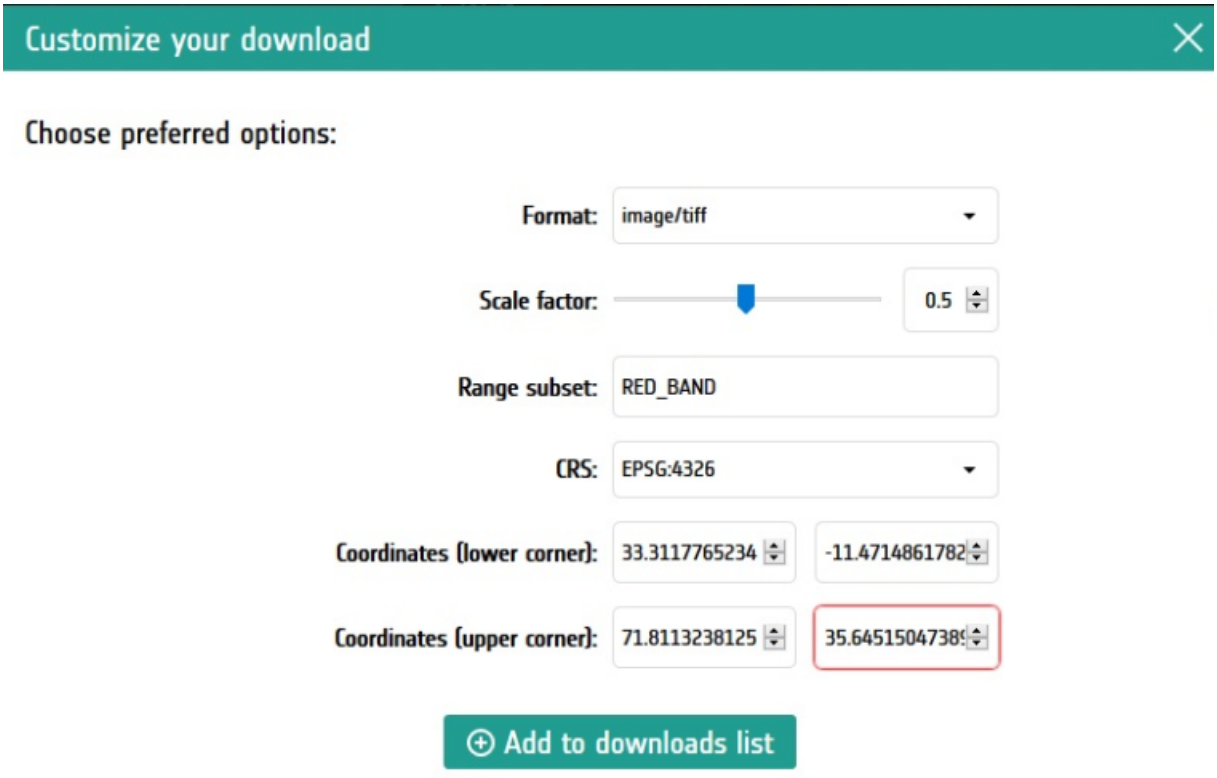


Figure 39 Customized download

After clicking the “add to downloads list” button this resource will be added to the bulk list of files. User can enter the Downloads list view by clicking the icon on the right-hand side of the page.

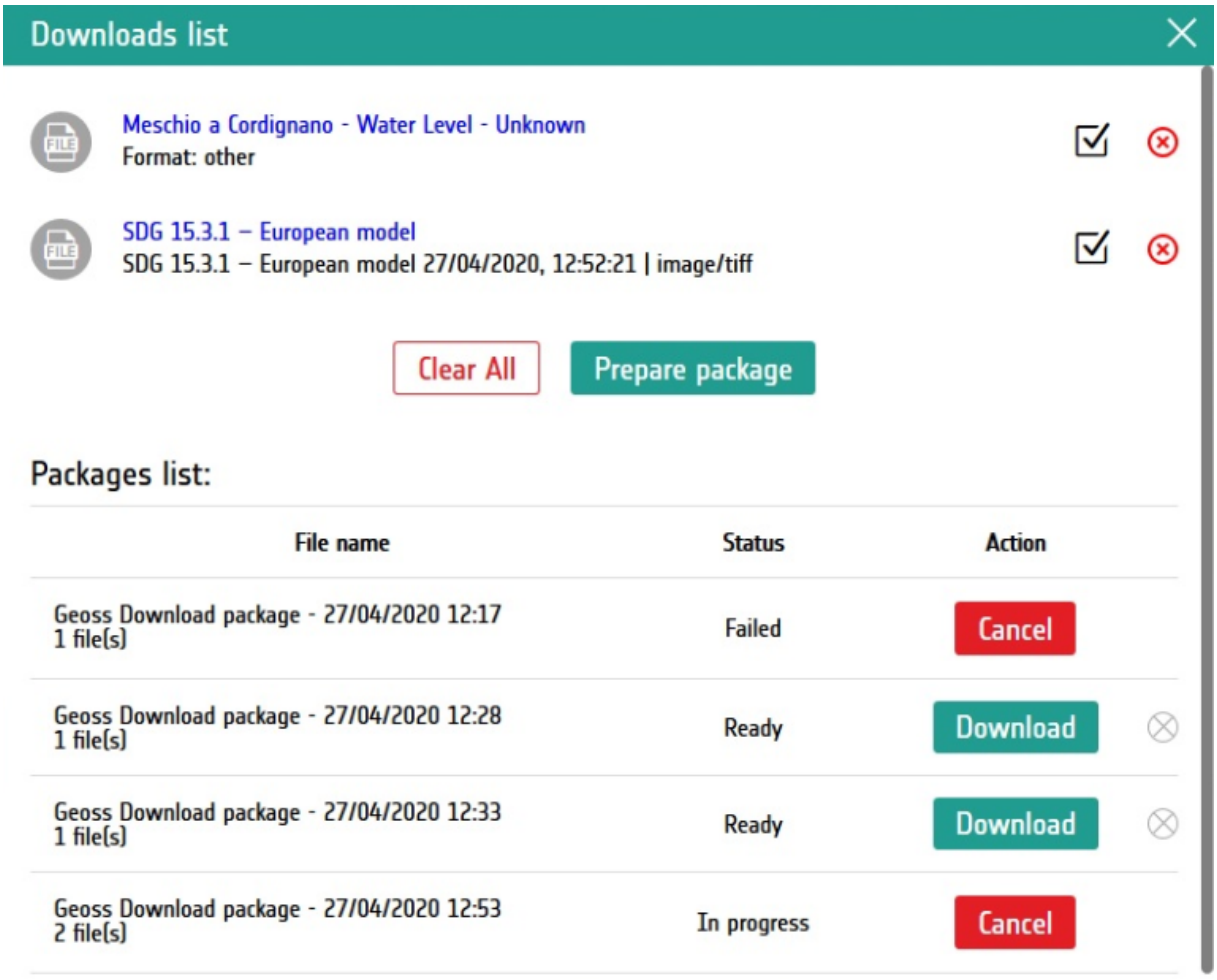


Figure 40 Bulk download list

The list consists of all items added by user. Each item can be removed from the list or selected for download package.

After clicking the Prepare package button the system will prepare a .zip file containing all selected items. Files can get status such as:

- In progress – when package is being prepared
- Ready – when file is ready to be downloaded
- Failed – when the file is not obtainable

When package changes status to Ready user can download the item or remove it from the list of packages.

3.2.5 Information Editor

The Information Editor is a tool for both the users and administrators of GEOSS Platform. Both of them are able to add new content to the platform or update the existing one. Users can also connect selected resources found on GEOSS Platform by using “Related resources” option. Within this tool there is a dedicated workflow that allows administrator to accept user contribution made via website with a proper moderation model.

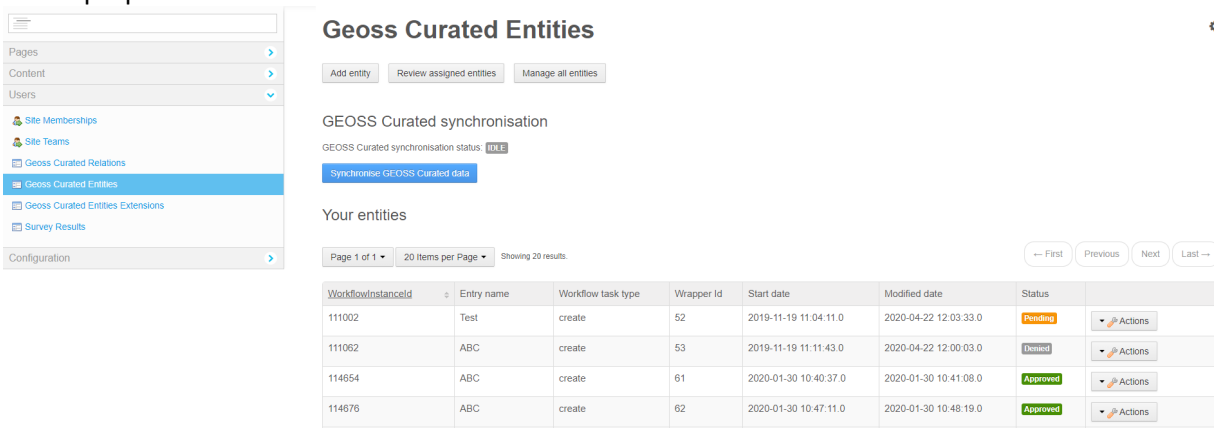


Figure 2 - Administrator View of the Information Editor

How to access Information Editor?

As a normal user go to link and sign-in. As Admin go to link and login to portal, or after signing into account, choose Site Administration and then Users section from dock bar.

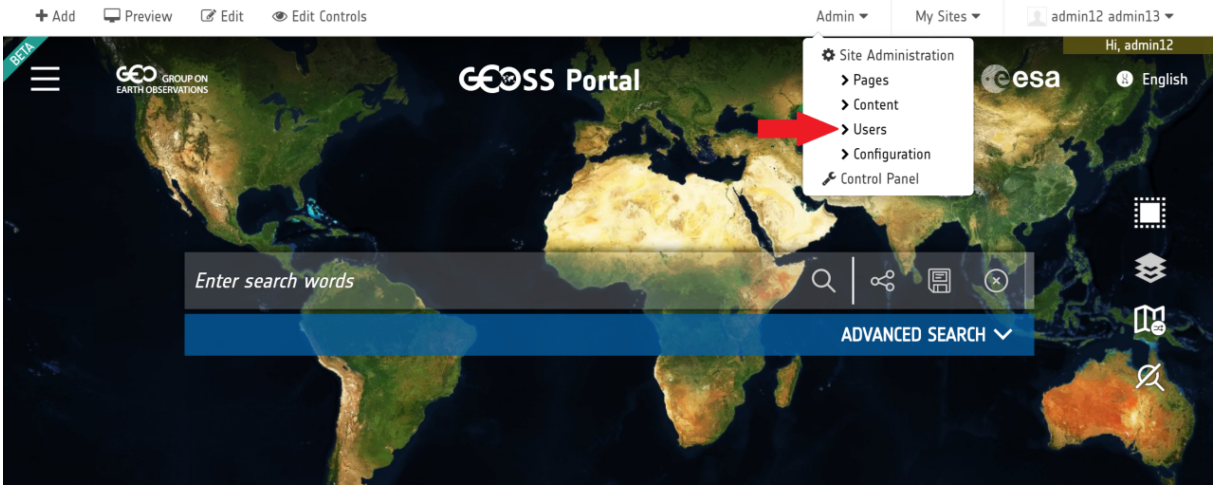


Figure 3 - Panel for admin users

What option does Information Editor give to Users?

The Information Editor gives Users access to 2 functions within the system. We can divide them into:

- Creating new sources,
- Making relation between sources.

After choosing **GEOSS Curated** Entities, the user is redirected to Information Editor menu - there are shown workflow tasks that were created previously by user.
Detailed information about workflow and available actions for every workflow task will be described in Information Editor Workflow further in the document. In the upper part of page there are links, which are used to navigate through different pages inside Information Editor.
Links marked with blue are available to every **User**, but those marked with red are available only for privileged users: **Administrators** and **Portal Content Reviewers**.

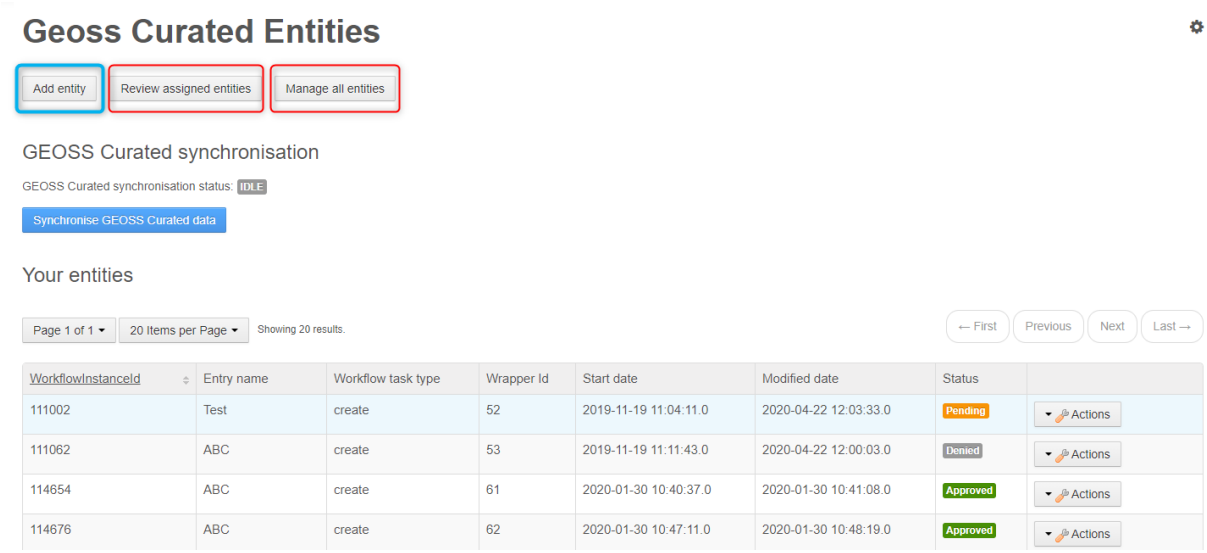


Figure 4 - Main view of GEOSS Curated Entities

Add entity option allows users to create new resource.
Review assigned entities option opens a new page where reviewers can assign workflow tasks to and accept/deny them.
Manage all entities option redirect to section for Content Reviewers, where they can manage all database entries created by users and update/delete them directly (without processing requests through workflow).

Add entity view

After choosing Add entity option, a form for creating new resource is opened.

Some text input has tooltip - after pointing at it, there will be displayed hint about specific data input format.

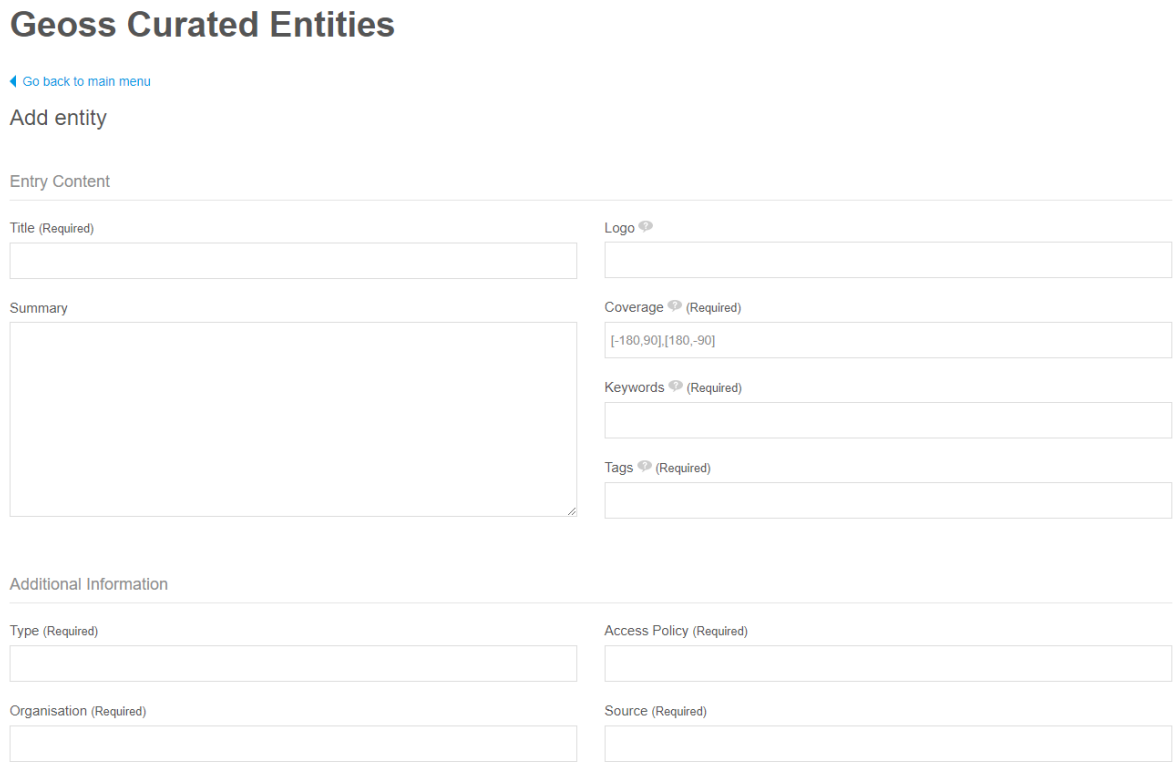


Figure 5 - View of adding new entity to system

Fields marked as required need to be filled in for the entity to be created. List of fields and their purpose is as follows:

- Title – title of resource;
- Summary – description of the resource;
- Logo – url path to the picture;
- Coverage – positioning on the map in dedicated format [-180,90],[180,-90];
- Keywords – words, which User can type into search to find the resource. Keywords should be separated with a comma;
- Tags – descriptive words, used to tag the resource. Tags should be separated with a comma;
- Type – drop down list with option to choose between Service, Data, Information and Download;
- Organisation – drop down list with list of organisations with possibility to add a custom organization;
- Access policy – drop down list with two option: open – all can access, custom policy where User types in the policy;

- Source – selection from which source the resource should be accessible on GEOSS Platform.

After all fields are correctly filled out the entity can be sent for a review by moderator. After moderator accepts the resource, it will be accessible in GEOSS Platform.

Users can also add links to external resources. It can be done in Link Option section of the form:

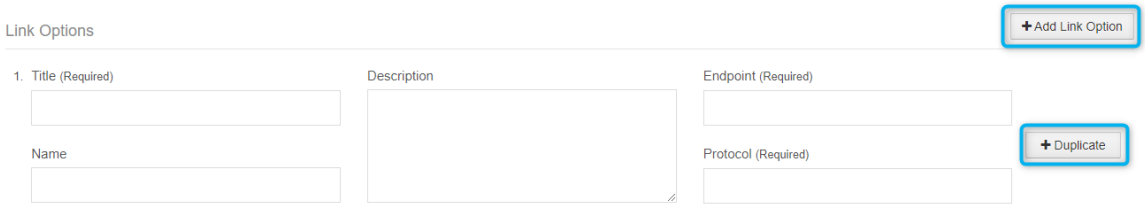


Figure 6 - Linking within new entity

Multiple links can be added to an entity, to add another link user must click “Add Link Option” or “Duplicate”. The first button adds new empty link section while the second option duplicates already created link. List of fields and their functions is as follows:

- Title – title of the link
- Name – name of the link
- Description – description for the link
- Endpoint – URL of the link
- Protocol – type of protocol used for this link (drop down list with ready values and option to add own protocol).

Review assigned entities view

After choosing review assigned entities link user will be redirected to workflow task admin section. There will appear two lists: one with workflow tasks assigned user and one with tasks assigned to Content Reviewer group.

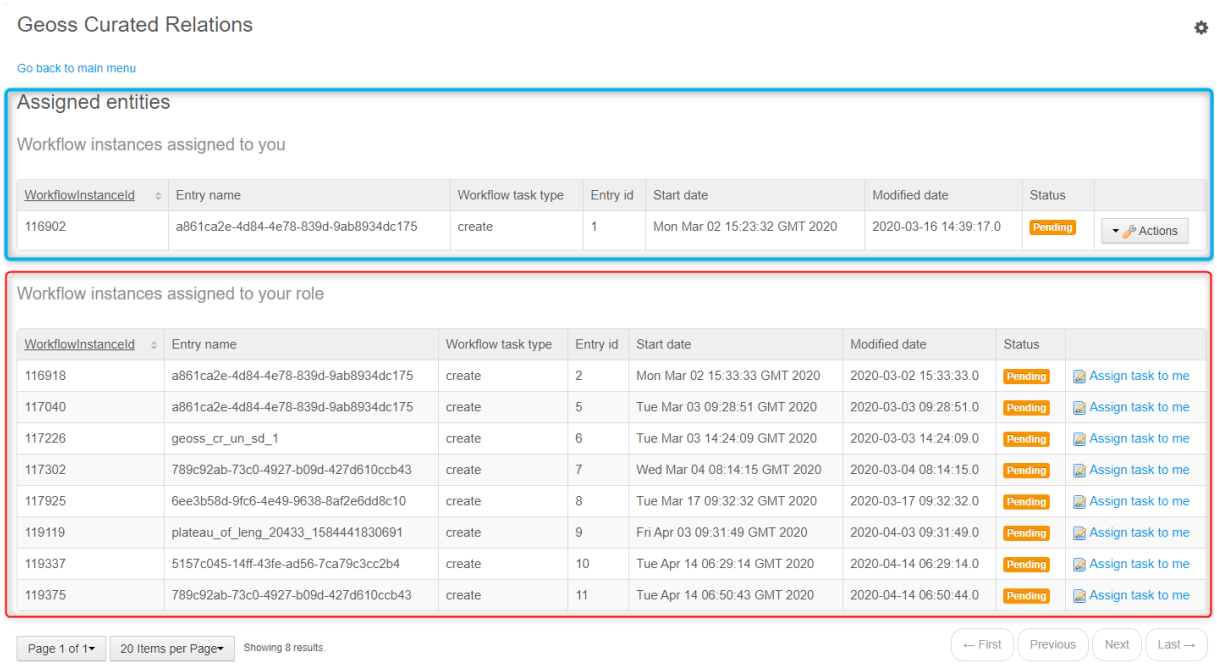


Figure 7 - View with assigned entities

Reviewers can Assign tasks to themselves from Content Reviewers list - it enables further options.

If workflow task type is to update or create there will be option to Review task. After choosing it, user is redirected to form that allows editing entry's data and finally accept/deny it with buttons at the bottom of page.

If workflow task type is to remove entity there is an option to remove data.

Manage all entities view

After choosing to manage all entities link you will be redirected to section where you can manage all database entries created by users and update/delete them directly. List of already created entities will appear and based on deleted status various options will appear. If entity appears as is deleted there will only be option to Restore entities. It will restore data. If entity doesn't appear as is deleted

you will be able to Remove Entities, Update Entities or Add Entry Relation.

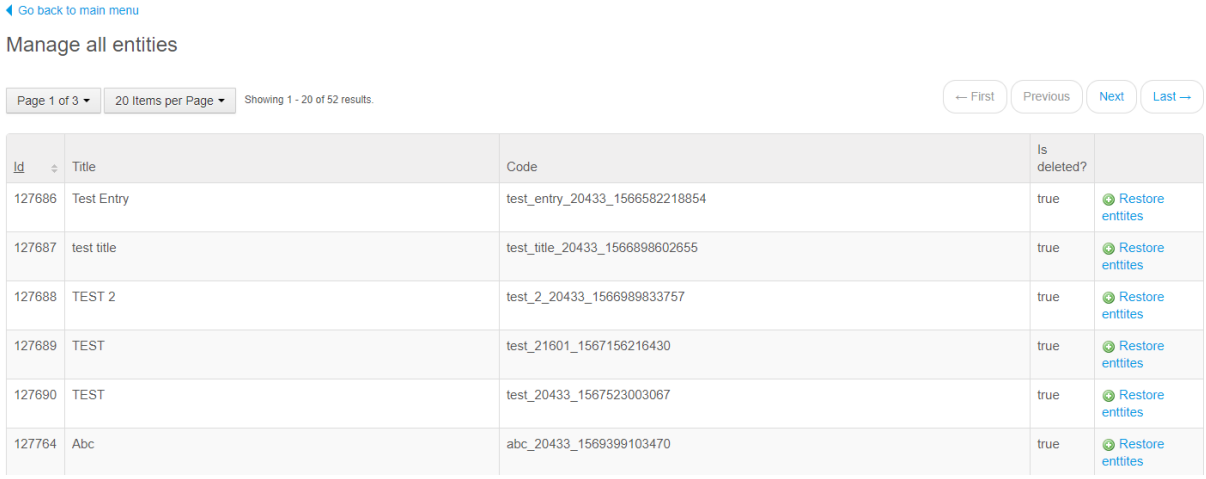


Figure 8 - View of management window for created entities

Adding relation between resources

User can request to make a relation between resources. To do so User has to be logged in and enter Information Editor. After that, User has to click on GEOSS **Curated Relations** and a dedicated view will appear

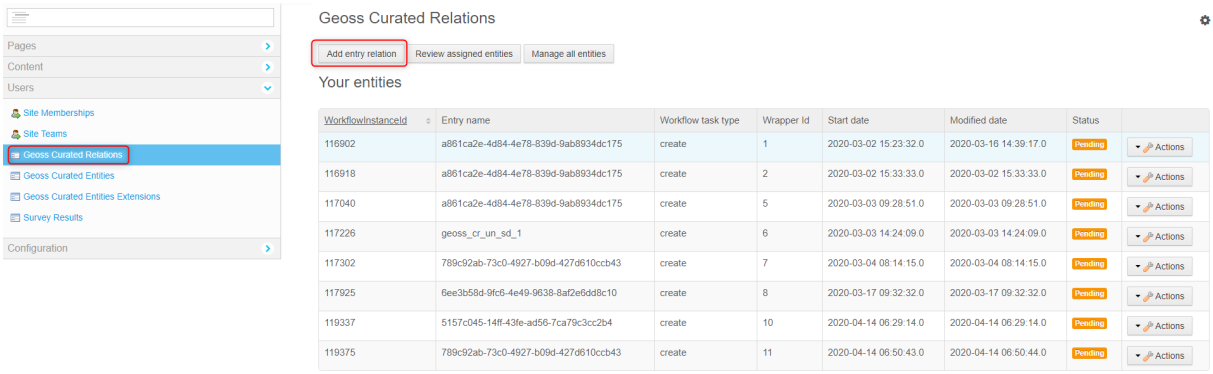


Figure 9 - View of Information Editor in Relation tab

In this view User clicks on Add entry relation. By clicking it User is transferred in relation mode to the page where User has to make a search for a resource that User will mark as a parent:

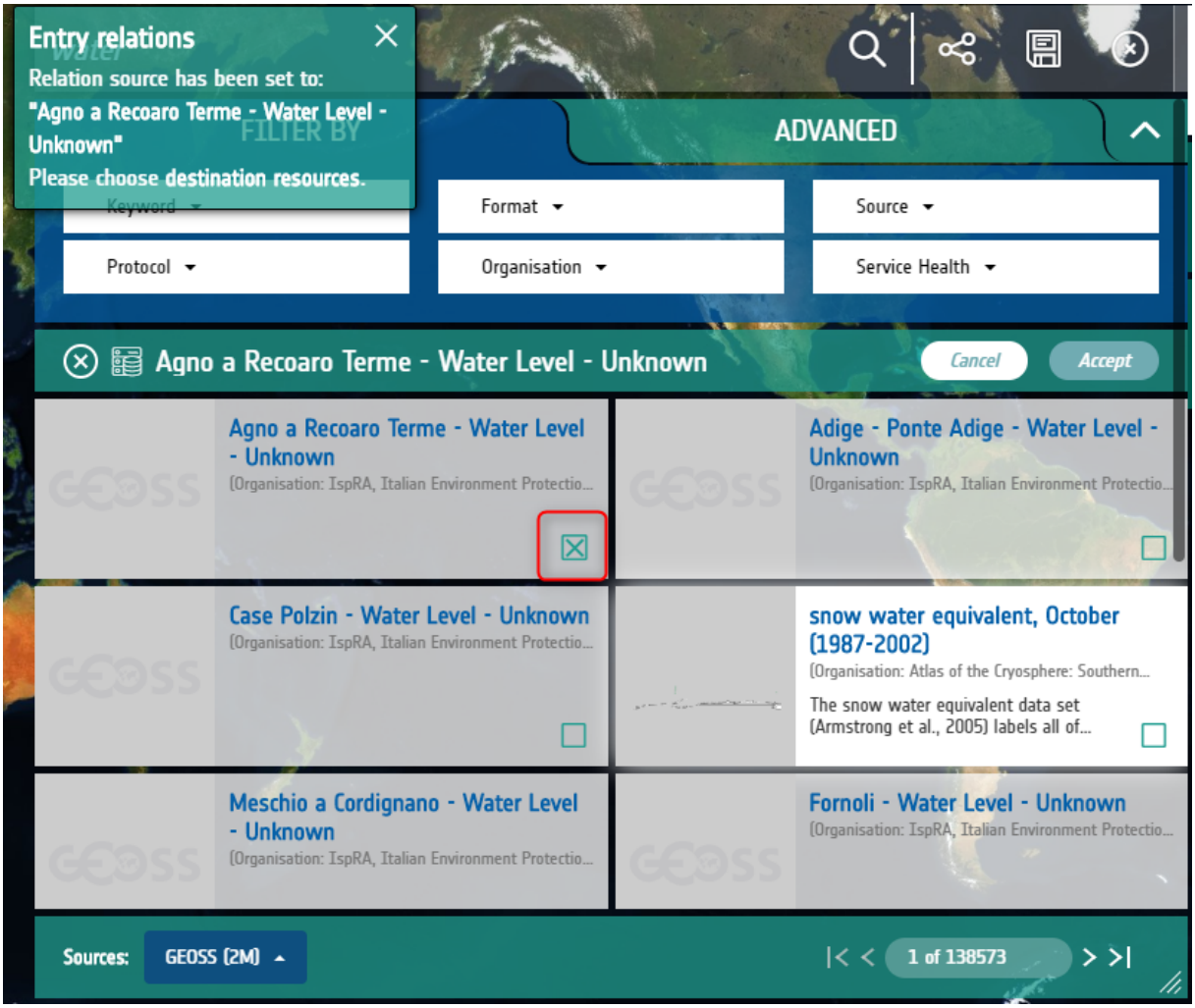


Figure 10 - View of choosing a parent for relation tool

In next steps User needs to mark children resources, which will be in relation to parent resource chosen before.

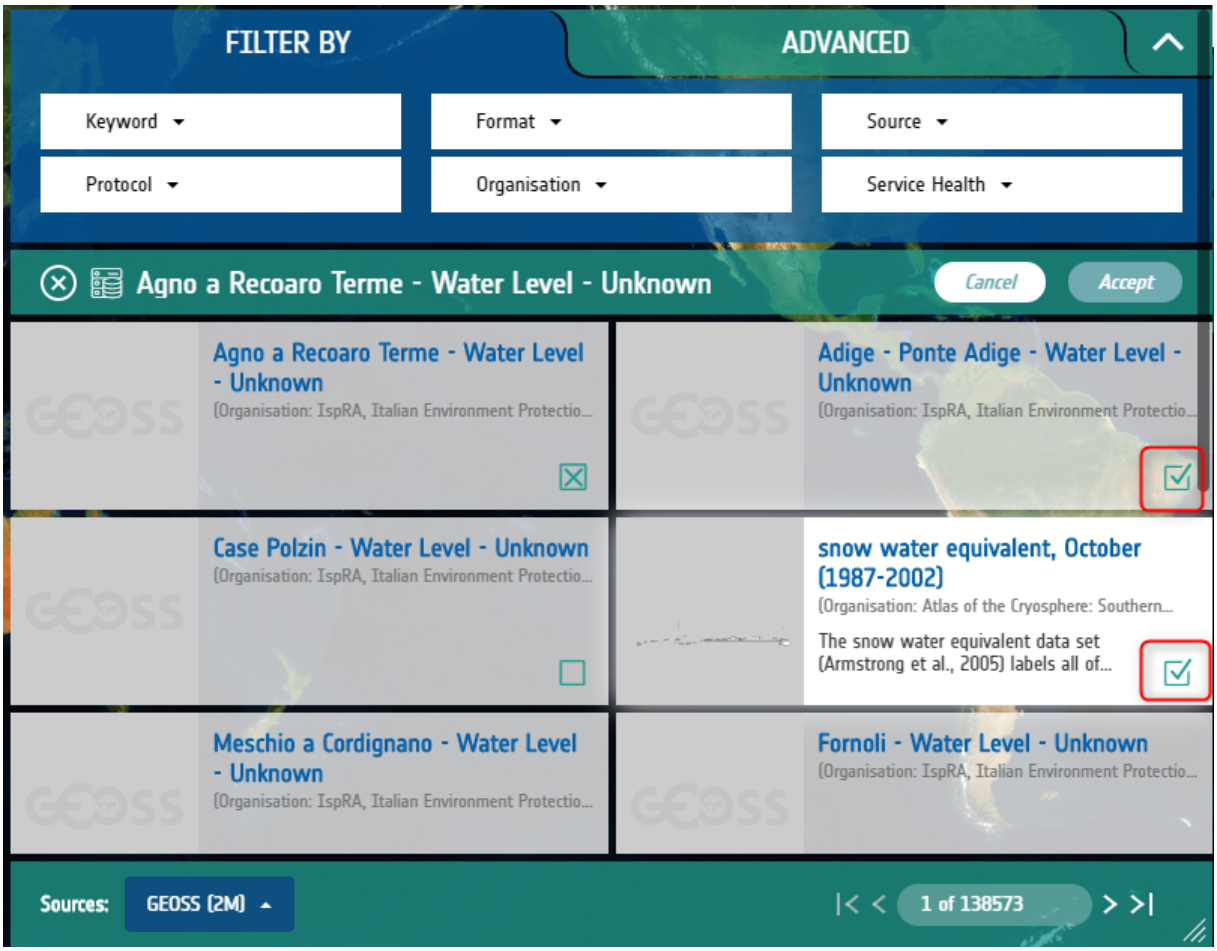


Figure 11 - View of adding child resources to parent resource to create a relation

When this is done User can click on accept and relation will be created but not yet visible. It still needs to go under moderation process (acceptance). What is worth mentioning when making relation there can only be one parent, but it can be related to many child resources.

3.2.6 Complete walk-through scenarios

A set of illustrative step-by-step scenarios are described below to showcase how the GEOSS Platform "proof of concept" is progressively evolving towards a knowledge-oriented platform.

An example of GEOSS curated resources: SDG indicators from the UN Statistics Division

The GEOSS Platform supports the UN 2030 Agenda for Sustainable Development. The following example shows how the GEOSS Portal allows accessing and visualizing the SDG indicators developed by the UN Statistics Division.

Let's access the GEOSS Portal home page and enter the search words, in this case "coastal ecosystem" and then click on the query button. The system replies with a list of results from the whole GEOSS, in the "Data" category (Figure 12).

Figure 12: Search results from the whole GEOSS

We can now restrict the results to the "GEOSS Curated" resources (Figure 13).

Figure 13: "GEOSS curated" search results

The system replies with the SDG 15.1.2 from the United Nations Statistics Division, which is a very reliable source.

We can now select the result item, click on *see more* to visualize the details, share or download the result, by using the dedicated icon buttons (Figure 14).

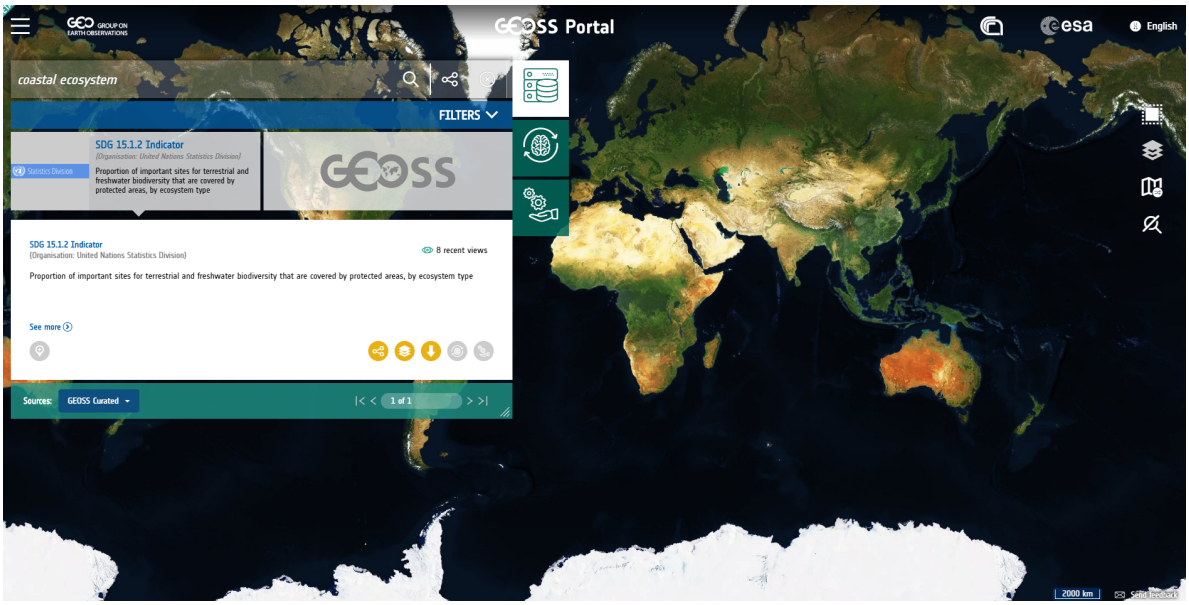


Figure 14: Selection of search result item

In addition, we can click on the *layer* icon: the *layer options* form will appear and we will be able to set the parameters as desired (Figure 15).

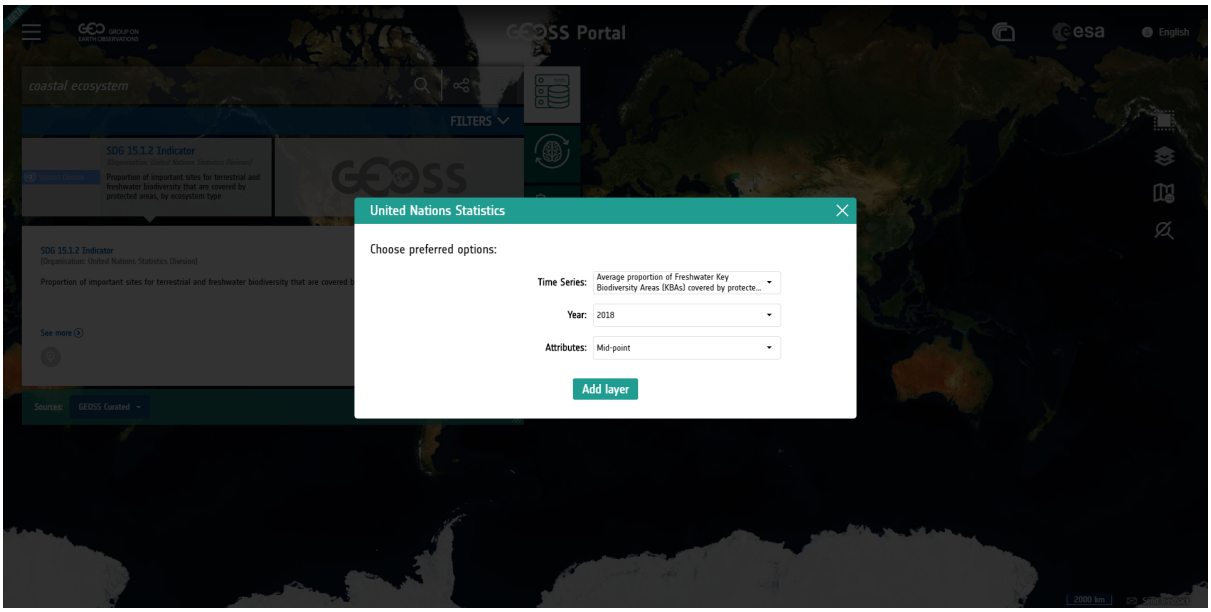


Figure 15: Selecting layer options

At this point, we can finally apply the layer on the map. If desired, we can change the transparency of the layer. The SDG indicator value will be shown when hovering on the country (Figure 16).

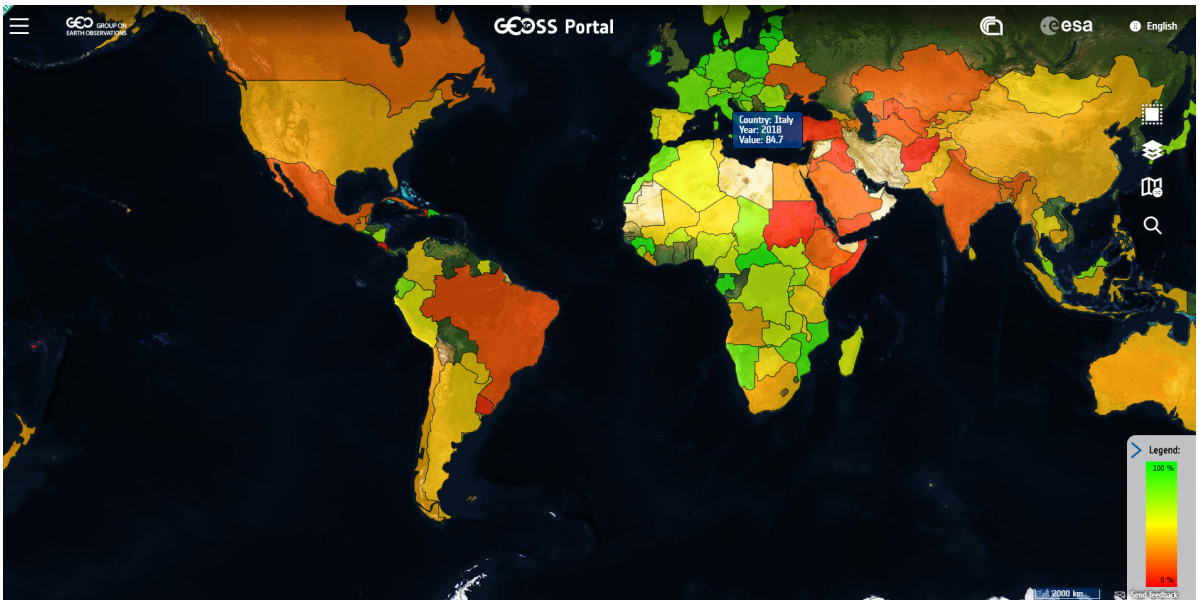


Figure 16: Applied layer

"Knowledge Generation": the ECOPOTENTIAL example

The following is an example of how the GEOSS Platform supports the effective monitoring and modelling of state and trends in ecosystem conditions and services. GEOSS has leveraged the efforts and workflows developed by the ECOPOTENTIAL Project to provide GEOSS users with knowledge production tools in this context.

The GEOSS Platform adopts and can drill down the following knowledge concepts defined by the ECOPOTENTIAL project:

- Ecosystem (e.g. Arid/Semiarid, Coastal/Marine, Mountains);
- Protected Area: internationally recognised Protected Areas in Europe, European Territories and beyond;
- Storyline: narrative that contextualizes the below defined workflows and links real-life issues which have broad relevance to Protected Areas;
- Workflow: The specific model and processor used for deriving knowledge from data.

Let's now perform the same query as above, but let's change the result category (which is "Data" by default) to "Knowledge", by clicking on the "brain" icon on the right of the result window. See Figure 17.

Figure 17: Search results in the "knowledge" category: ecosystems

We can now select one of the ecosystems displayed, e.g. "Coastal/marine" (Figure 18).

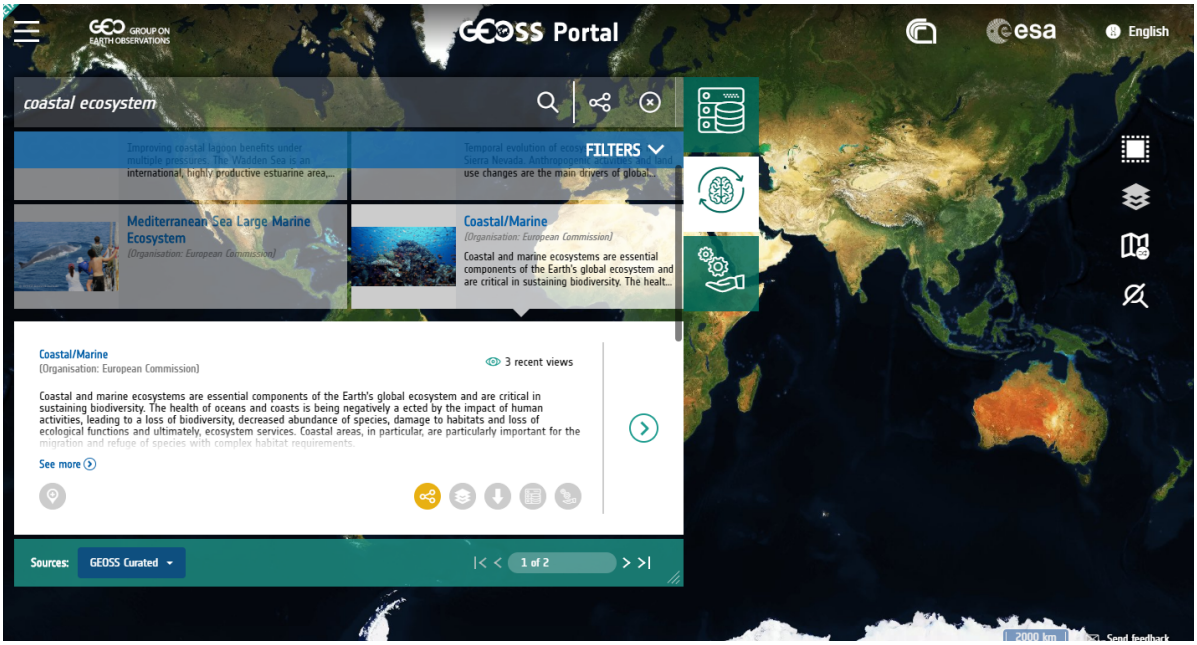


Figure 18: Selection of a result item, which is hierarchical concept (ecosystem)

The arrow icon on the right means that the selected concept is hierarchical, so we can drill down it by clicking on this icon.

As a result, we will get the list of the Protected Areas that host that ecosystem (Figure 19).

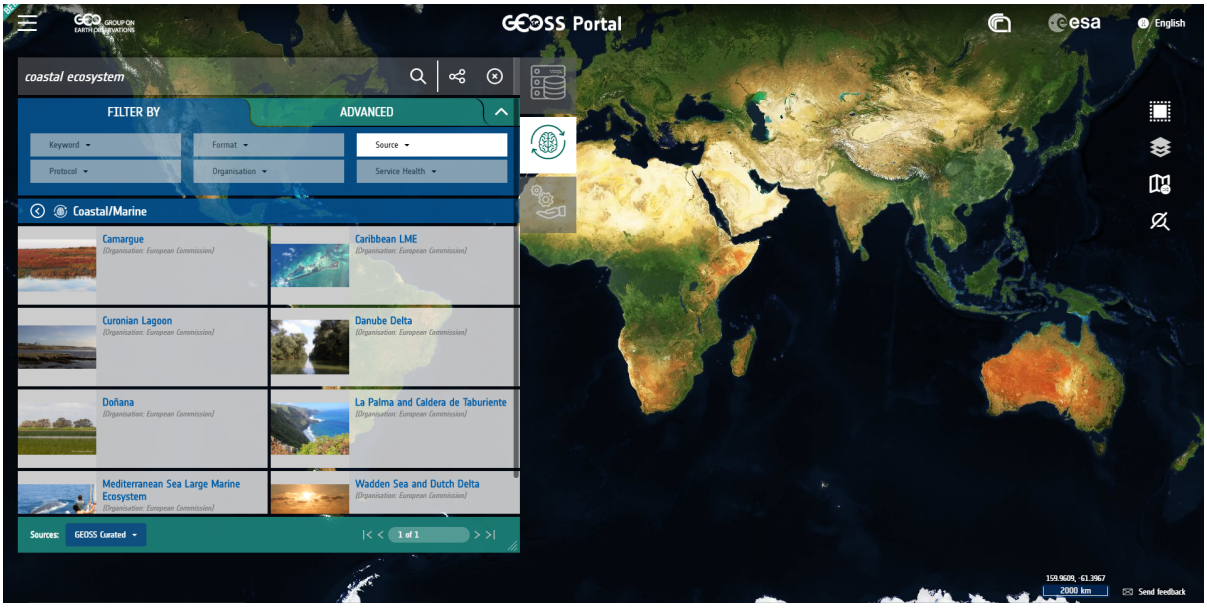


Figure 19: Drilling into the knowledge: Protected Areas

Let's select "Camargue". We will see again an arrow on the right, which will allow us to drill down more and get the list of the storylines that refer to that Protected Area (Figure 20).

Figure 20: Drilling into the knowledge: Storylines

Let's select *Land Cover Change in Camargue*: we will see that the *Switch to Services* button is active (Figure 21), which means that there are services available that enable the computation of land cover change in Camargue.

Figure 21: Selection of a result item (a storyline)

Let's click on this icon: we will see the list of services in relation to the selected storyline (Figure 22).

Figure 22: Services related to the selected item

Let's select the EODESM: we will see that there is now a *Play* button available that enables us to run the service and generate the products (Figure 23).

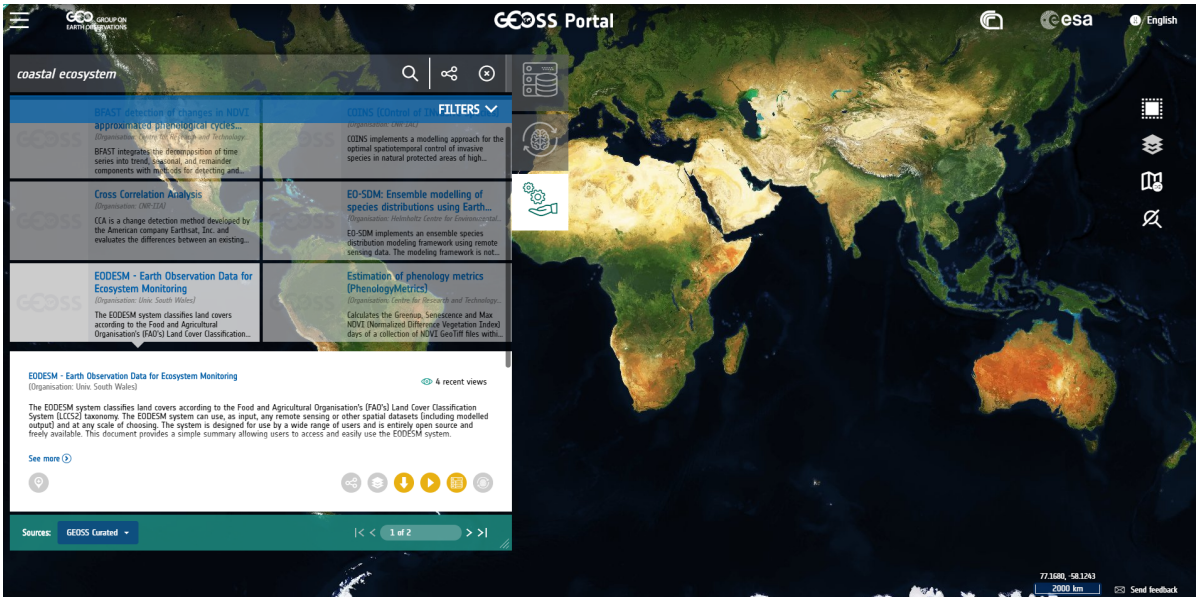


Figure 23: Selection of a service

Let's click on this button: we will see the process workflow (Figure 24) and will be able to select the input data for the processing.

Figure 24: Service workflow

We can see from this workflow that three types of input data will be necessary: Clumps, Thematic Layers for period 1 and Thematic Layers for period 2.

Let's pick "Clumps" from the menu; this will enable the selection of the resources of that type (Figure 25).

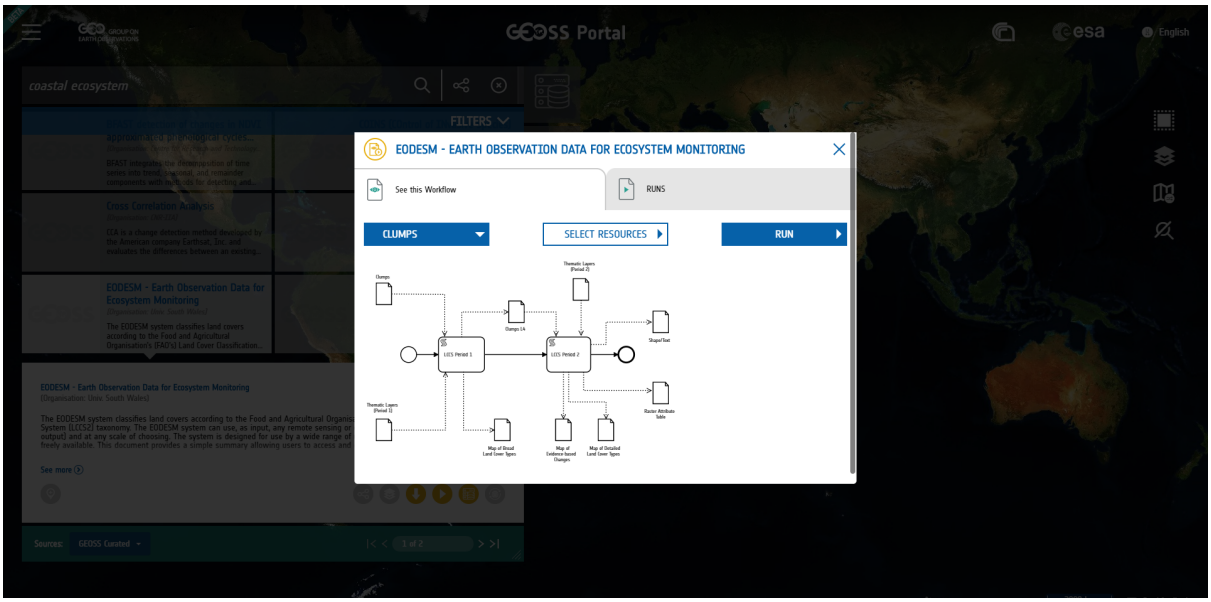


Figure 25: Input data type selection

When clicking on *Select resources*, the system will discover the available resources of that type and we will be able to select the desired ones and then click on *Accept* (Figure 26).

Figure 26: Input data selection

This will take us back to the selection of the resources, to allow us to the select the other two inputs, of the Thematic Layer type, following the same procedure.

Once we have selected all the desired inputs, we will see the list of the selected inputs as in Figure 27 and we will be able to run the processing.

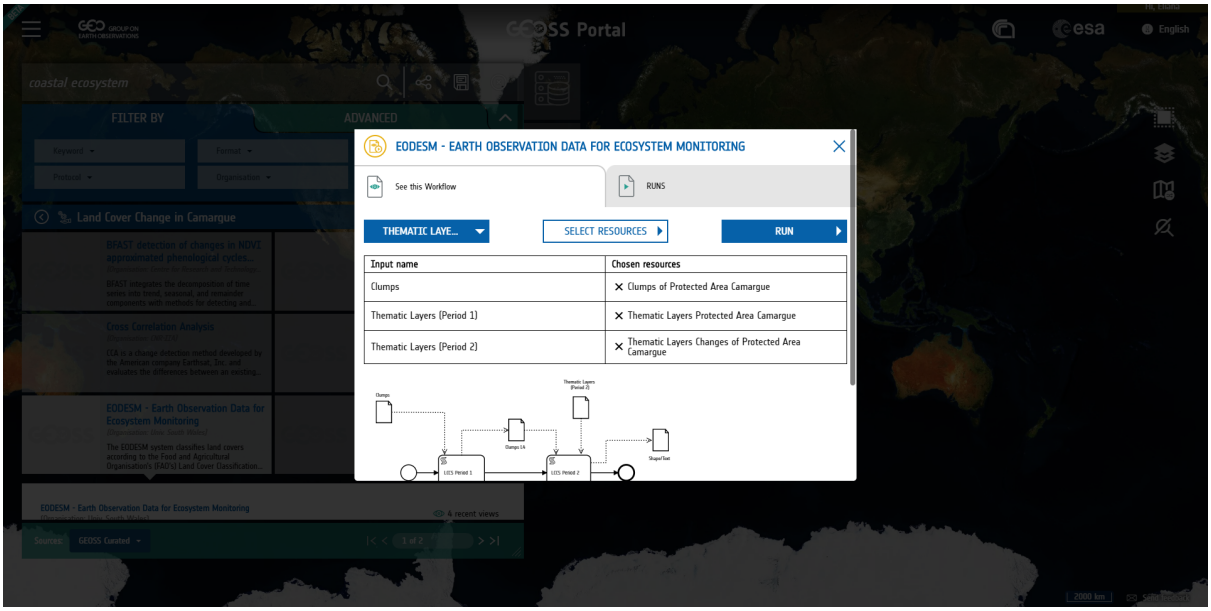


Figure 27: All service inputs selected, service ready for run

Let's click on *Run*. After a while, we will be notified that the processing has ended and that the results are available in our personal workspace, where we can find and manage (download, show, delete) our results.

Browsing knowledge sources: the Zenodo example

In the previous example we have shown how we can browse through a knowledge base (such as the one defined by ECOPOTENTIAL) through the GEOSS Platform. Actually, the GEOSS Platform enables us to browse through several and heterogeneous knowledge sources.

In this example, we will browse through another source of knowledge, Zenodo, the general-purpose open-access repository developed under the European OpenAIRE program which allows researchers to deposit data sets, research software, reports, and any other research related digital artefacts. For each submission, a persistent Digital Object Identifier (DOI) is minted, which makes the stored items easily citeable.

Let's go back to our "coastal erosion" search, select *knowledge* as result category (the "brain" icon) and then select "Zenodo" as knowledge source in the bottom left corner. The result page will look something like in Figure 28.

Figure 28: Search results from a selected knowledge source (Zenodo)

Let's select "Coastline Change at Koh Tao Island, Thailand " and click on *see more (*Figure 29*)*.

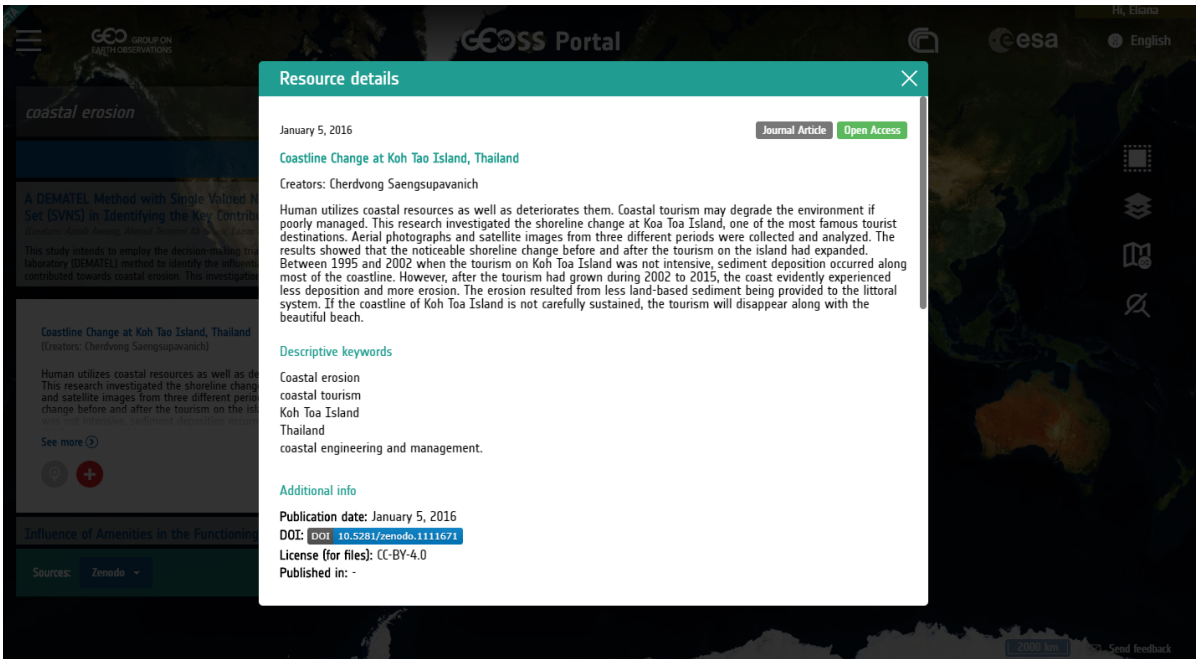


Figure 29: Resource details and DOI from Zenodo, available through the GEOSS Platform

As we can see, we can get the DOI of the journal article in Zenodo, which we can access by clicking on the corresponding link.

4. The GEOSS Platform Re-usable Components

Communities often use their own data and portals and have their own specificities. The GEOSS Platform responded to that and built around the Communities.

To this end, a new concept in supporting User Communities has been developed to help Communities to reuse selected GEOSS Portal components.

A detailed description of this is highlighted in what follows.

4.1 GEOSS Mirror

A GEOSS Mirror is a GEOSS Portal site customisation for SBAs, Flagships, Initiatives and Communities. It is available at www.geoportal.org/community/<CommunityName>

The customisation better serves the specific community interests by filtering:

- Catalogues and search results by a specific theme or GEO DAB view (e.g., cold regions, mountains, etc.);
- Location of interests;
- Services/Processing/Tools (click here for short clip demoing the concept);

This tool is accessible both from the operational and development environments.

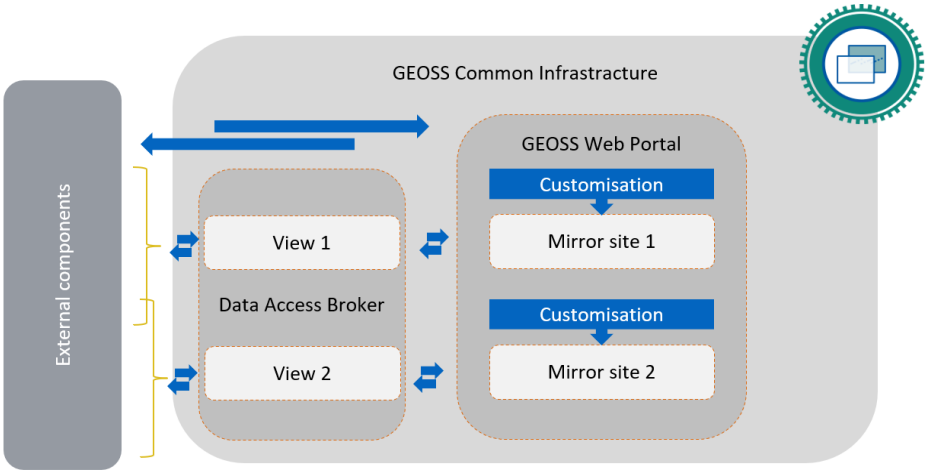


Figure 50 - GEOSS Mirror Architectural Snapshot

The Site Administrator can change header, default base map and default View.

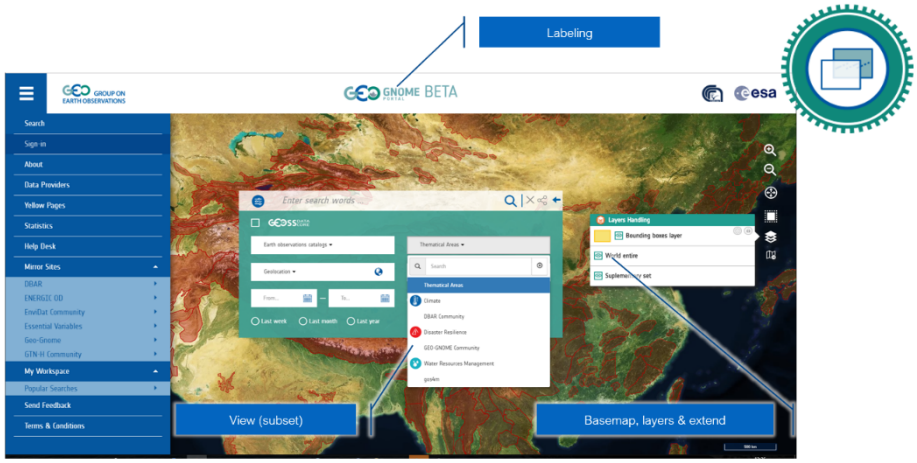
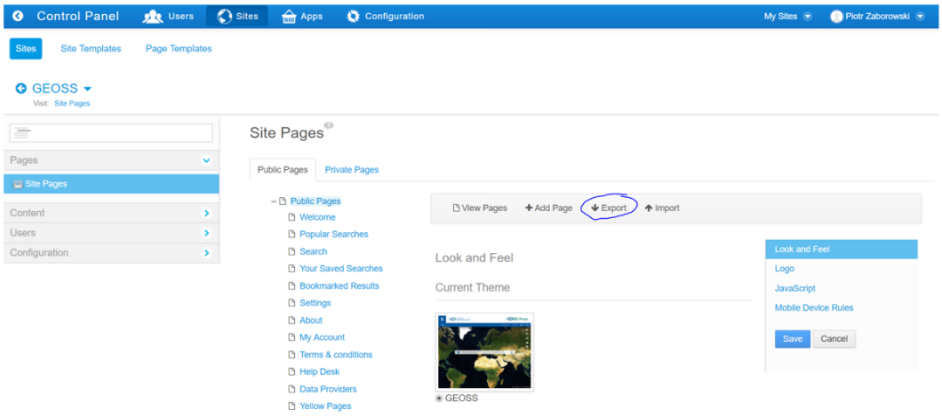


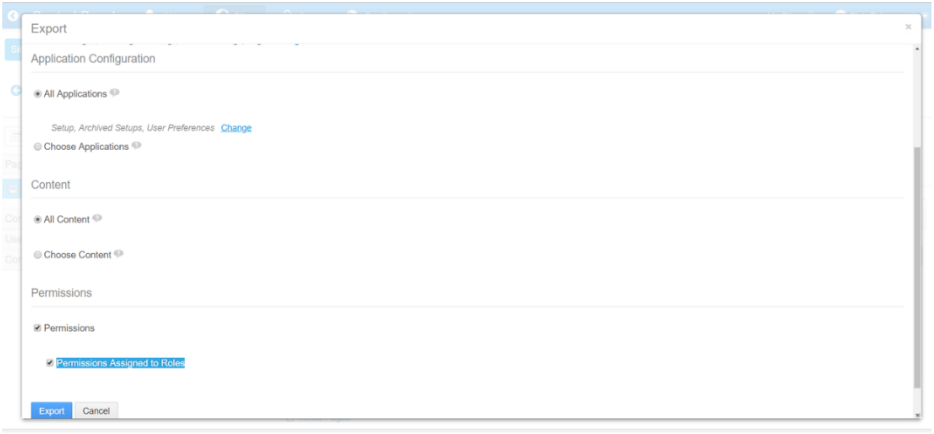
Figure 51 - Mirror site customisable items

How to create a mirror site

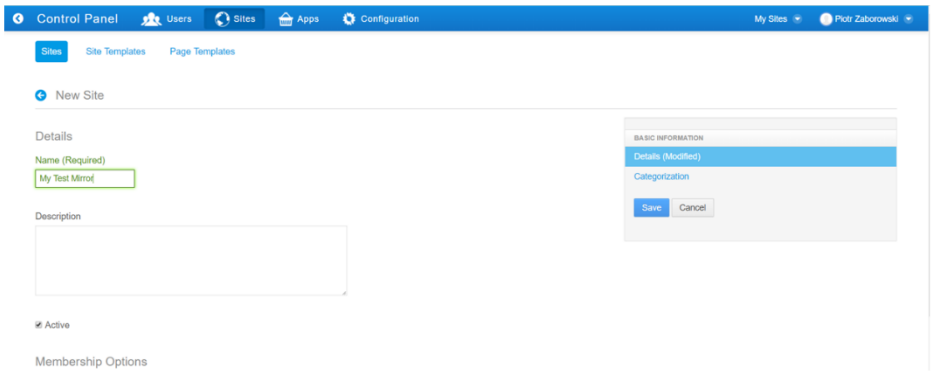
To create mirror site, you should login with admin role and first export configuration: Control Panel->Sites->GEOSS->Export



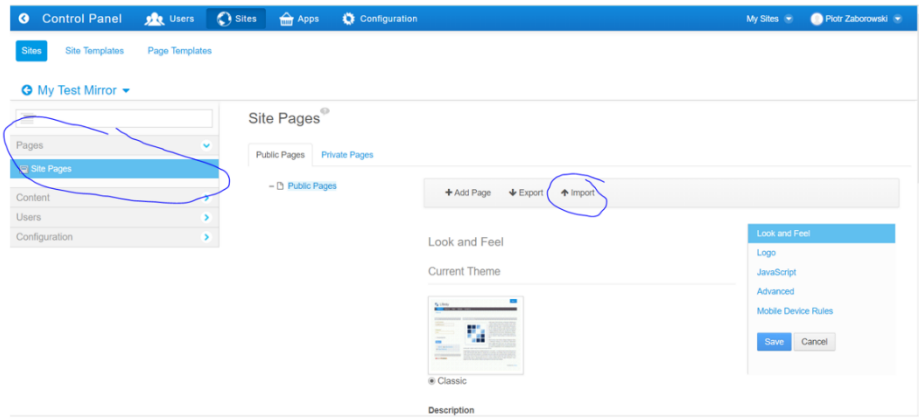
Select All Applications, All Content, Permissions Assigned to Role. Click Export and save the template file to your hard drive



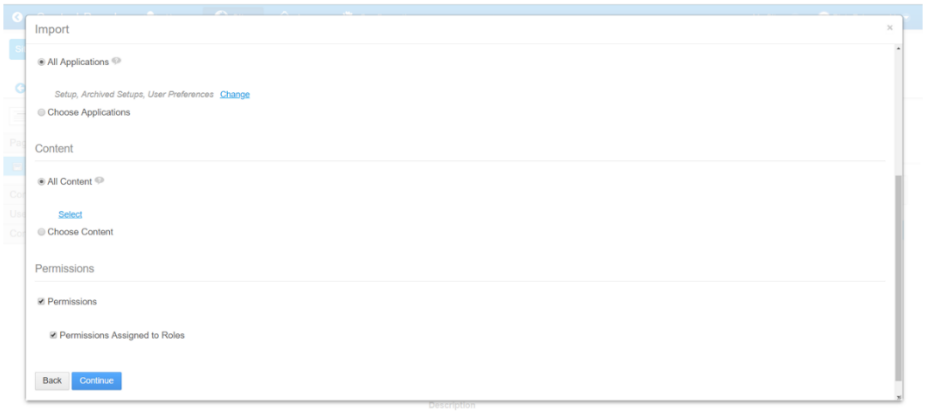
Go back to Sites. Select Add->Blank Site… Give name for new Mirror Site & save.



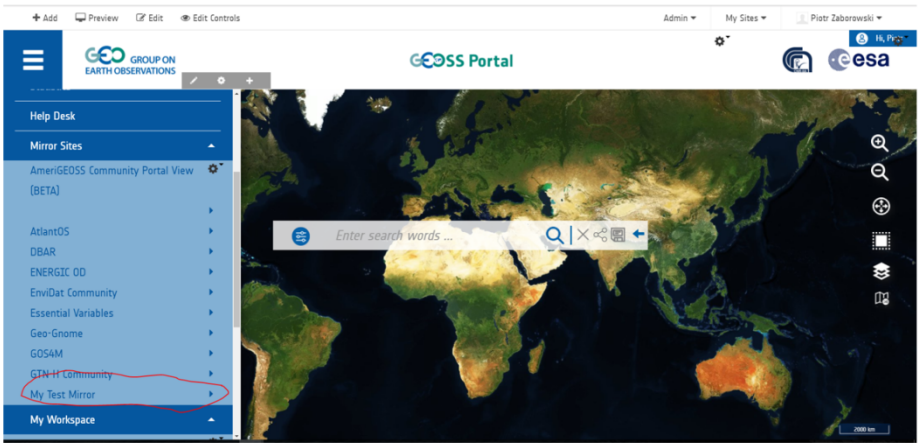
Go to Pages->Site Pages and import previously generated template



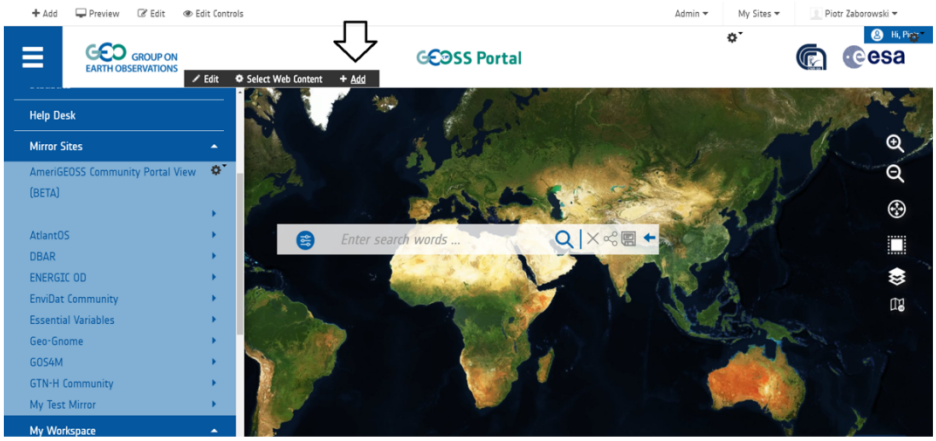
Select All Applications, All Content and Permissions Assigned to Roles. Click Continue and Import. It can take a short time.



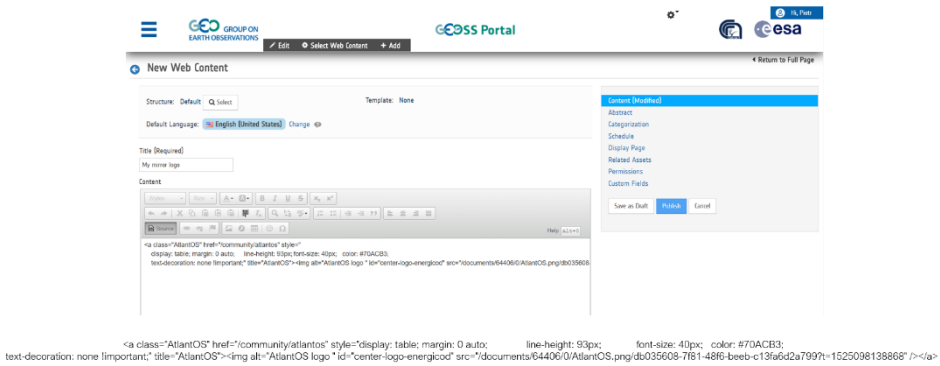
After this operation you have new clear mirror site.



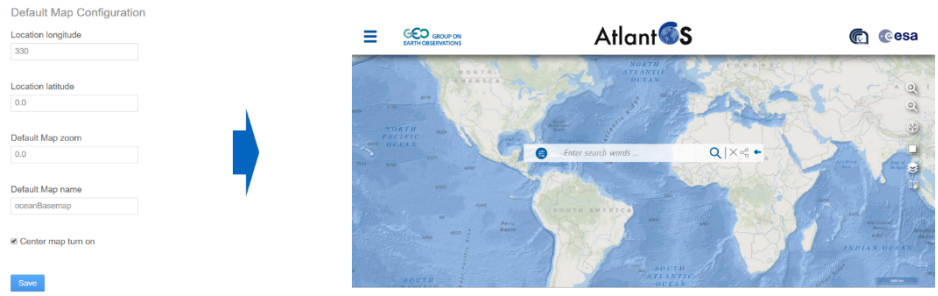
To change branding, move the mouse over the Logo and click "+Add".



Upload your logo, style it and publish



To change default base map:



To set default view or hide view, click configuration -> site configuration and choose option:

Global Views

optionValue	Label	
	Climate	Default Hide
	Water Resources Management	Default Hide
	Disaster Resilience	Default Hide
	AtlantOS	Default Hide
	DBAR Community	Default Hide
	GEO-GNOME Community	Default Hide
	Gos4m Community	Default Hide
	Sustainable Caucasus	Default Hide
	AmeriGEOSS	Default Hide
	EnviDat Communit	Default Hide

4.2 GEOSS Widget

The GEOSS Search Widget (also known as GEOSS IDE) is a plugin that allows exploration of Earth Observation data on your website. The widget provides majority of features of GEOSS Portal like searching and advanced filtering, detailed presentation of results, enabling interactions on your map. Right now its version is only accessible via development platform and tools.

The plugin comes as free JS library that can be easily customise.

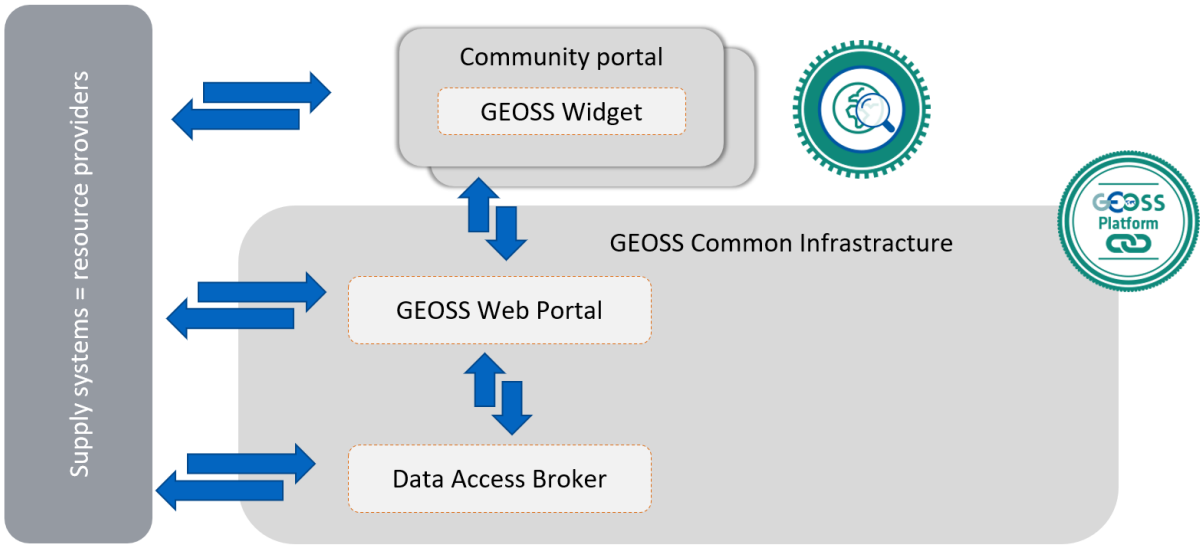


Figure 30 - GEOSS Widget Architectural Snapshot

The GEOSS Search Widget can be treated as external component that connects to:

GWP - it provides access keys for widget users and then it controls the traffic via Apache, so that only registered pages with valid keys can pass requests further to Data Access Broker,

Resource providers - they grant access to variety of data to download e.g. images, documents or maps.

The widget is configurable by the use of call-back functions that trigger user's piece of code. Its design can be customized as well by the means of overridden CSS classes.

The Widget is particularly recommended for people who:

- owns a website with the Open Layers map in it;
- wishes to present GEOSS resources;
- does not want to implement user interface from the scratch.

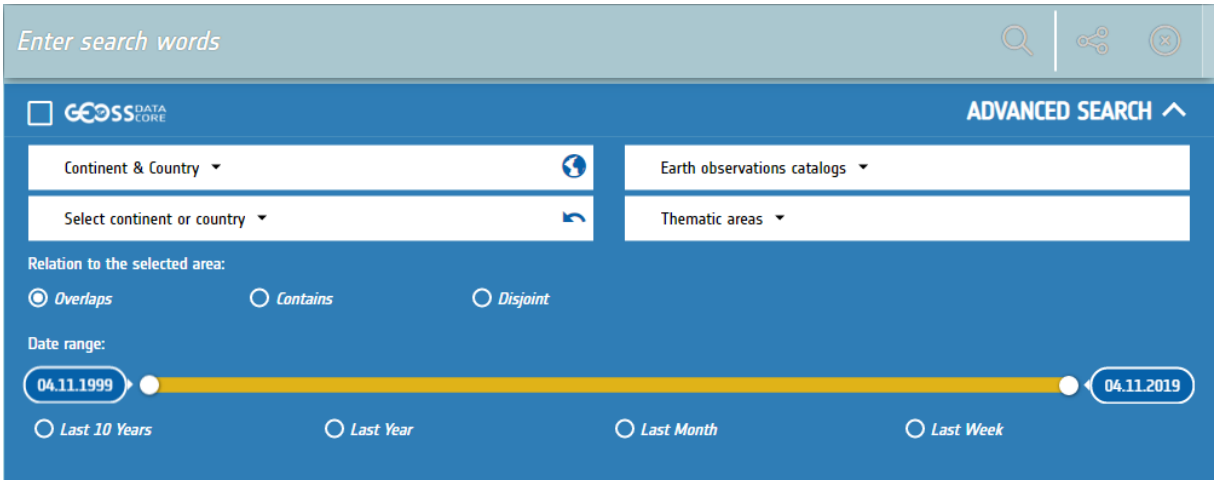


Figure 31 - GEOSS IDE

Installation

1. If you do not have access key you have to fill out a special form which is accessible under this link https://geoss.devel.esaportal.eu/register-widget (you have to be logged in to do so)
2. Download installation package from https://geoss.devel.esaportal.eu/documents/20181/108901/GEOSS+Widget/2dbf8d4a-be9b-4d5d-8ded-6cacb8a65fa9?download=true
3. Extract CSS and JS files to desired directory at your server;
4. Extract 'static' folder to desired place;
5. Import CSS and JS dependencies to your HTML file (see index.html in the package for a reference):
    - preload files and load CSS in <head> section:

```
<link href="/widgets/search-widget.css" rel="preload" as="style">
<link href="/widgets/search-widget.js" rel="preload" as="script">
<link href="/widgets/search-widget.css" rel="stylesheet">
```

- load JS script at the bottom of <body> section:

```
t src="/widgets/search-widget.js"></script>
```

- add HTML element with widget to your <body> section:

```
-search-widget class="geoss"></geoss-search-widget>
```

6. Set basic configuration of widget in your JS file (or <script> section in your HTML file):

   - make widget HTML element as JS variable

```
earchWidgetElement = document.querySelector('geoss-search-widget');
```

   - specify your configuration, e.g.:

```
searchWidgetElement.map = map;
searchWidgetElement.accessKey = 'enterYourKeyHere';
searchWidgetElement.environment = 'dev';
searchWidgetElement.staticFilesPath = '/widgets/static/';
searchWidgetElement.hiddenDataSources = ['services'];
```

7. If you wish to enable Google Places features (e.g. ability to search places by phrase in Advanced Filters > Geolocation - just like on GEOSS website), generate Google Places key https://developers.google.com/places/web-service/get-api-key and add it to the <body> section:

```
t type="text/javascript"
src="https://maps.googleapis.com/maps/api/js?key=enterGooglePlacesKeyHere&libr
aries=places"></script>
```

Configuration

The searchWidgetElement has following fields and callback functions:

- map - (required) Takes reference to your OpenLayers map and adds interactions to it,

- accessKey - (required) Takes access key and enables usage of widget,
- environment - (required) Takes name of GEOSS portal instance on which widget was registered. Possible values: 'dev', 'uat', 'sit', 'prod',
- staticFilesPath - Takes path to 'static' directory which contains images*. Default value: '/widgets/static/',
- hiddenDataSources - Takes array of datasources' names that should be disabled on your page. Array with all possible values: ['dab', 'data', 'amerigeoss','nextgeoss', 'knowledge', 'zenodo', 'services'],
- actionBeforeRequest - Takes function which is called before each request is sent to data providers (on new search, page change, opening folder, opening 'Result Details'),
- actionAfterSuccessRequest - Takes function which is called after response is successfully retrieved,
- actionAfterFailureRequest - Takes function which is called after request failed,
- actionAfterMetadataShow - Takes function which is called after 'Result Details' window is opened,
- actionAfterDownloadPopupShow - Takes function which is called after 'Download Popup' window is opened.

Important: Static Files Path must be changed in CSS file as well. Unfortunately this needs to be done manually in search-widget.css file. By default the path is set to './static/'. If you wish to modify it please find all occurrences of './static/' and replace them with your path.

4.3 GEOSS View

See the EDGE document [3] D3.6 - *The DAB APIs User Manual*

4.4 GEOSS API

See the EDGE document [3] D3.6 - *The DAB APIs User Manual*

5. The GEOSS Portal YouTube Channel

A number of GEOSS Portal tutorials and stories are available at the GEOSS Portal YouTube channel: https://www.youtube.com/channel/UCZwhJZI76s7K9eAcBXAPyrw/playlists.

Annex A. References

[1]. EDGE: European Direction in GEOSS Common Infrastructure Enhancements – Grant Agreement Number 776136

[2]. EDGE-WP3-DEL-D3.4, Version 1: GEOSS Portal and GEO DAB Enhancements

[3]. EDGE-WP3-DEL-D3.6, Version 1: The DAB APIs User Manual (EDGE – M32)

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Annex C. Terminology

C.1 Acronyms and Abbreviations

EDGE	European Direction in GEOSS Common Infrastructure Enhancements
BON	Biodiversity Observation Network
CA	Consortium Agreement
CAMS	Copernicus Atmosphere Monitoring Service
C3S	Copernicus Climate Change Service
CEOS	Committee on Earth Observation Satellites
CLMS	Copernicus Land Monitoring Service
CMEMS	Copernicus Marine Environment Monitoring Service
CNR-IIA	Consiglio Nazionale delle Ricerche – Istituto per l'Inquinamento Atmosferico
CO	Confidential
DESCA	Development of a Simplified Consortium Agreement
DEL	Deliverable
DG	Directorate-General
DN	Direct Negotiation
DOW	Description of Work
EAB	External Advisory Board
EC	European Commission
EGU	European Geosciences Union
EMS	Emergency Management Service

EO	Earth Observation
EOP	Earth Observation Programme
ESA	European Space Agency
ESAW	European Ground System Architecture Workshop
ESRIN	European Space Research Institute
EU	European Union
FP7	Seventh Framework Programme
GA	Grant Agreement
GCI	GEOSS Common Infrastructure
GEO	Group on Earth Observation
GEO DAB	GEO Discovery and Access Broker
GEOSS	Global Earth Observation System of Systems
GFOI	Global Forest Observation Initiative
GLAM	Global Agriculture Monitoring
GPE	GEOSS Portal Enhancements
GSNL	Geohazard Supersites and Natural Laboratories
GWOS	Global Wetlands Observing System
H2020	Horizon 2020
INT	Internal Note
IPR	Intellectual Property Right
JRC	Joint Research Centre
MOM	Minutes of Meeting
OTH	Other

PD	Project Director
PP	Programme Participants
PQMP	Project Quality Management Plan
PRE	Presentation
PSB	Project Strategic Board
PU	Public Usage
QA	Quality Assurance
QAS	Quality Assurance Support
RE	Restricted
SDG	Sustainable Development Goal
SUS	System Usability Scale
TBD	To Be Defined
TEP	Thematic Exploitation Platform
UNICEF	United Nations International Children's Emergency Fund
USGS	United States Geological Survey
UTB	User and Technical Board
WBS	Work Breakdown Structure
WGISS	Working Group on Information Systems and Services
WP	Work Package
WPL	Work Package Leader