MISSIONE 4
ISTRUZIONE RICERCA

ITINERIS

D8.20 - User guide of the operational version of the DOWNSTREAM VRE service on downstream effects of climate and environmental change.

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Author(s) (Partner-OU):	Nydia Catalina Reyes Suarez (OGS-OCE), Alessandra Giorgetti (OGS-OCE), Alessandro Altenburger (OGS-OCE), Rachele Franceschini (OGS-CRS), Giuliana Rossi (OGS-CRS)
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1. USER GUIDE OF THE DOWNSTREAM VRE SERVICE ON DOWNSTREAM EFFECTS OF CLIMATE AND ENVIRONMENTAL CHANGE.

The downstream VRE is hosted by the D4SCIENCE research infrastructure (https://www.d4science.org/). Access is given upon registration in the D4SCIENCE platform and via request to the downstream VRE at the ITINERIS gateway as shown in figure 1.

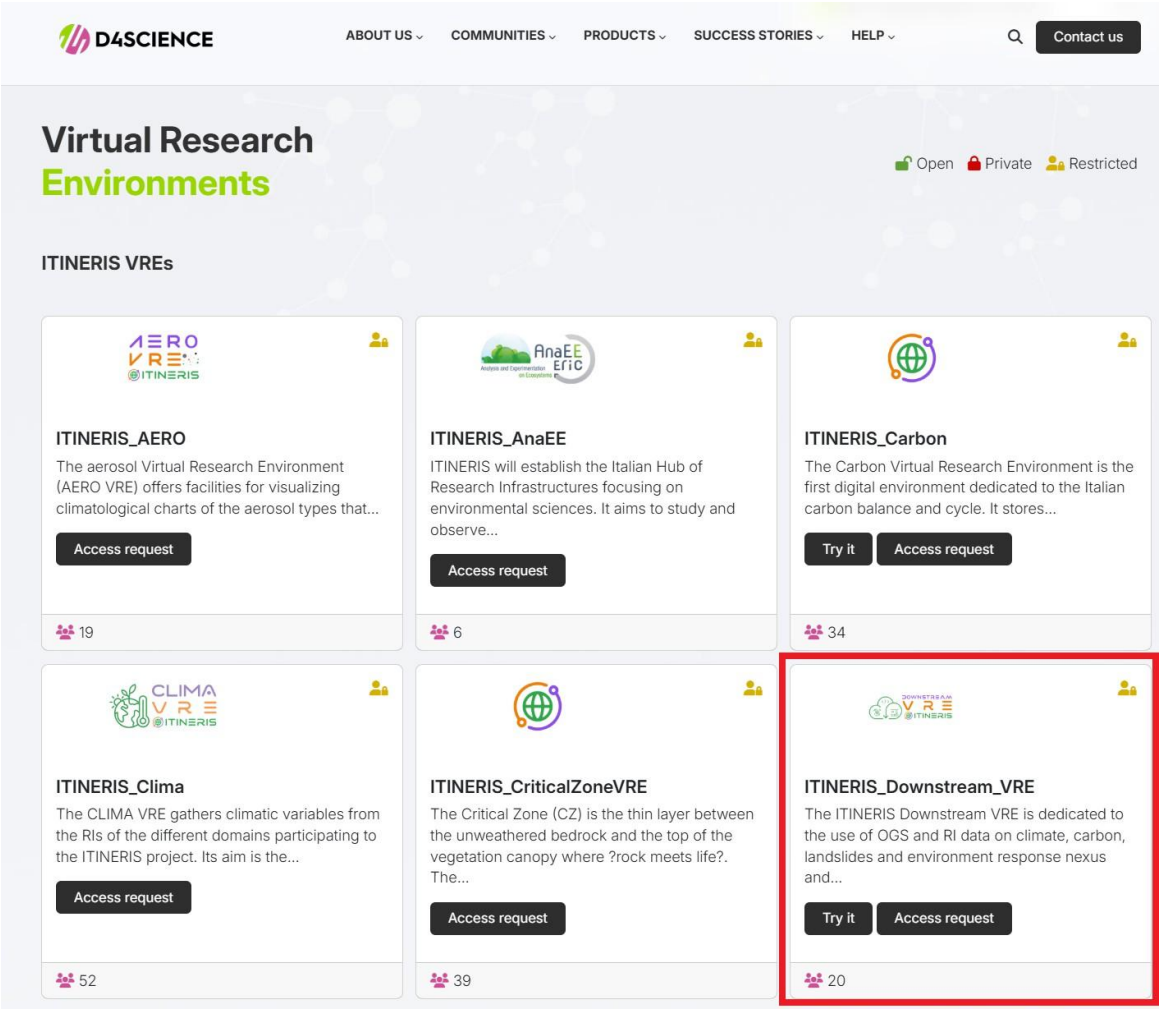


Figure 1. D4SCIENCE landing page (https://www.d4science.org/communities/earth-science-community/itineris-gateway) and pathway to the downstream VRE.

The user can only have access to the Downstream VRE dashboard once the user has been registered and granted access. The VRE dashboard (figure 2) contains useful sections for performing processing and analysis (Figure 2, tab 1) using the Analytics, Python and RStudio. Depending on the internal activity downstream, it is possible to display and query data on the marine domain (figure 2, tab 2) or on ground instabilities such as landslides (figure 2, tab 3). Tab 4 in figure 2, allows you to add tasks in specific folders for each material. For each new activity added to the portal, a message will be displayed in the centre to publish the messages integrated into the virtual environment. Tab 6 in figure 2, is used to request support through a ticketing service.

Figure 2– Downstream VRE's dashboard. Each number explains one section inside VRE.

The following figures show some VRE analytics.

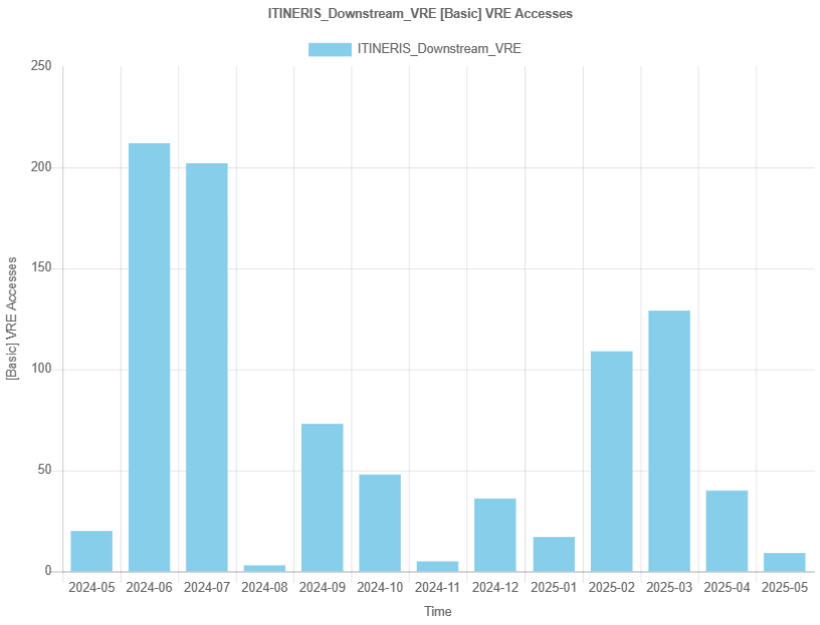


Figure 3– Downstream VRE's analytics: VRE access by 13.05.2025.

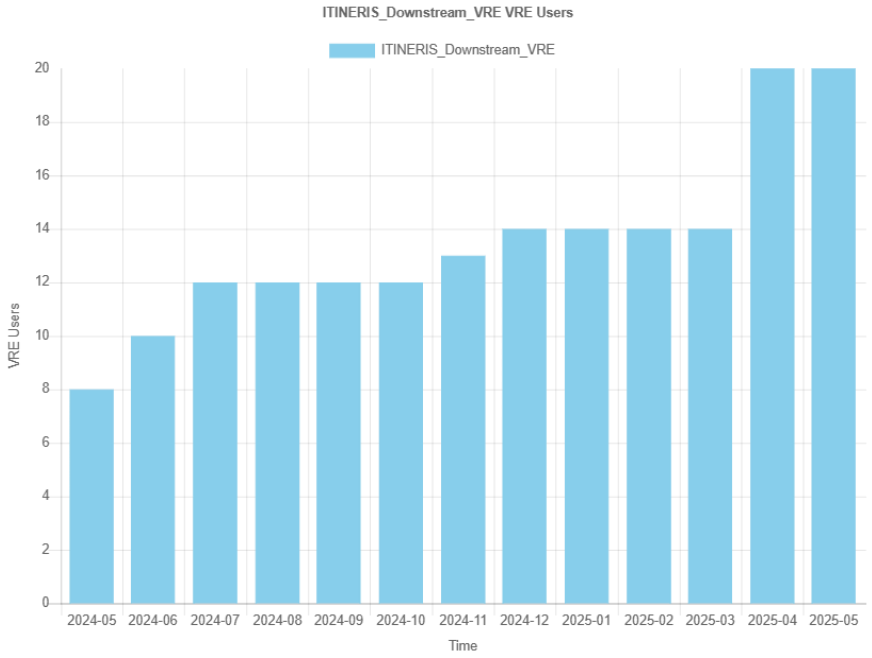


Figure 4– Downstream VRE's analytics: VRE users by 13.05.2025.

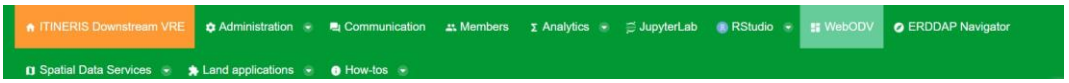
1.1. Marine domain

The marine domain toolbox focuses on carbon cycling and acidification data available in the North Adriatic Sea mainly pH, pCO2, fCO2, temperature and salinity within the different Ris in the ITINERIS project. Three user driven tools have been made available based on different users skills and the most common tools for marine domain users: WebODV access, jupyter notebooks to access ICOS data and the ERDDAP navigator.

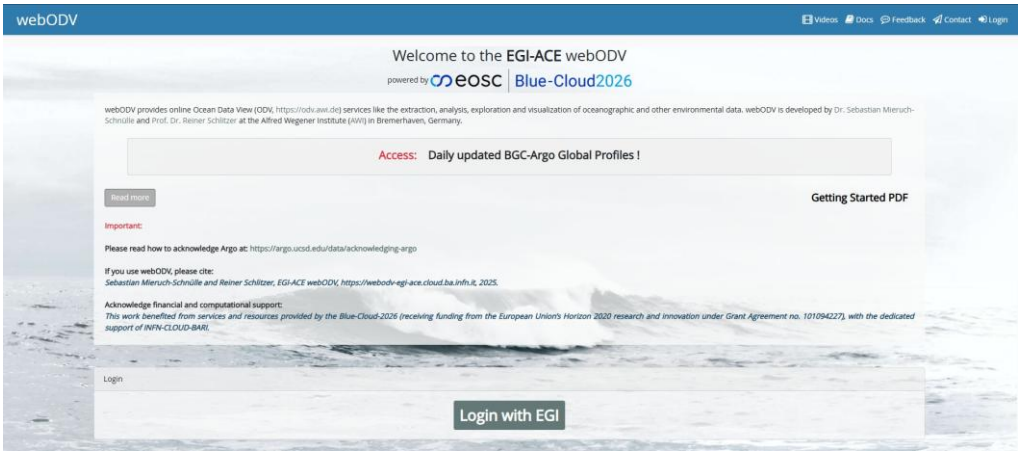
1.1.1. WebODV

The application has been linked to the Downstream VRE for the extraction, analysis, exploration and visualization of oceanographic and other environmental data. This version is restricted for Argo (TS & BGC) and SeaDataNet (TS) products.

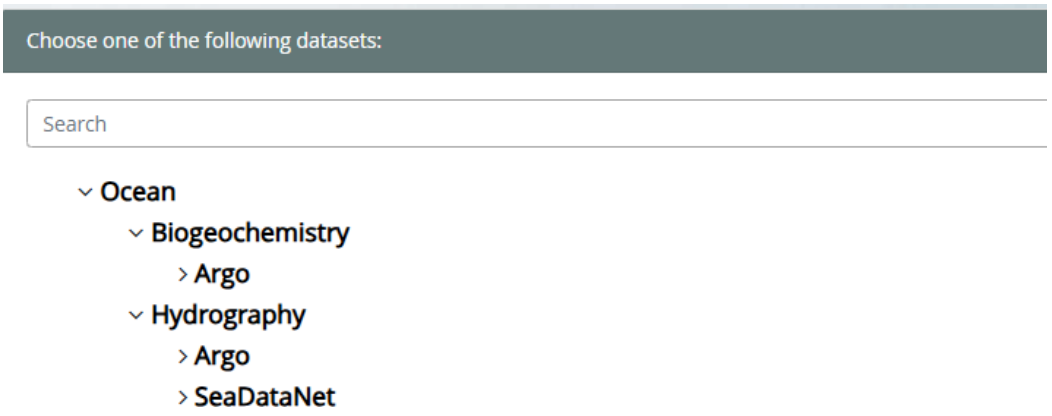
I. To access the service, click on the webODV tab within the dashboard (figure 2, tab 2).



II. This will take you to the landing page shown below, where login is requested. The user can use either D4SCIENCE or EGI login and then agree to the policy and conditions of use.

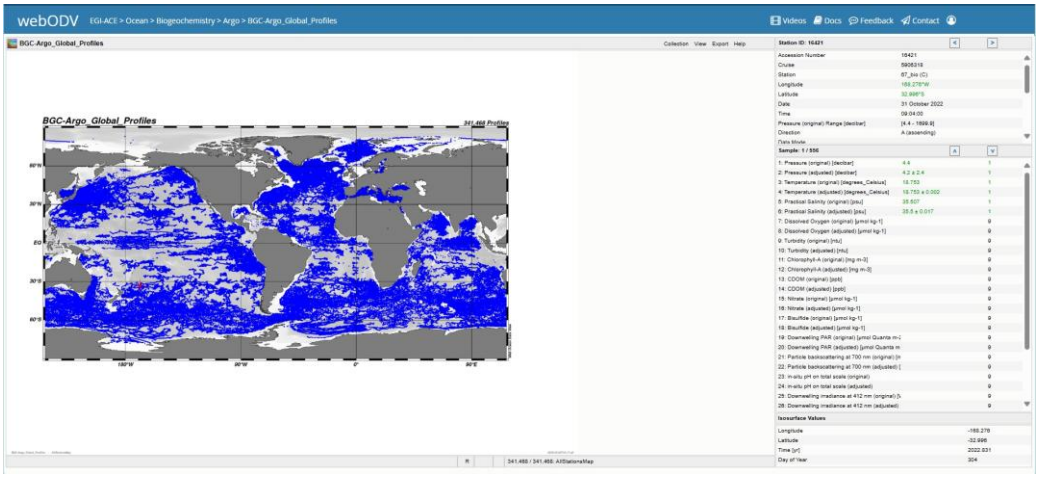


III. Once this step is done you can start using the datasets available in the application:



IV. For example by selecting the path `Ocean>Biogeochemistry>Argo>BGC-Argo_Global_Profiles`, the user will be asked to extract or to explore the dataset.

V. By clicking on “explore dataset” you should be able to obtain the following plot:



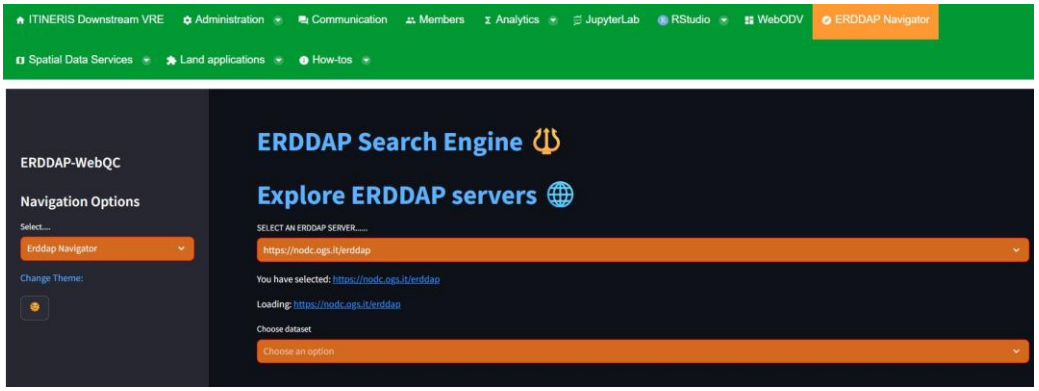
For information about how to use webODV and do further analysis, please refer to the user manual and the documentation provided at https://webodv-egi-ace.cloud.ba.infn.it/webodv/docs.

1.1.2. ERDDAP Navigator

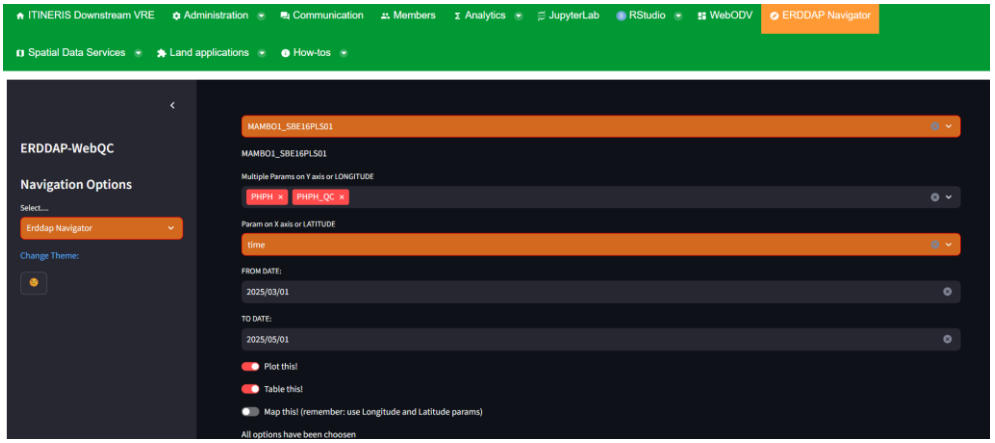
This open-source web application (https://github.com/nodc-it/ERDDAPNavigator) allows the user to navigate within different ERDDAP servers giving the freedom of exploring, merge, load, edit and manually quality control (QC) datasets by exploiting ERDDAP RESTful API.

I. Click on the ERDDAP Navigator button.

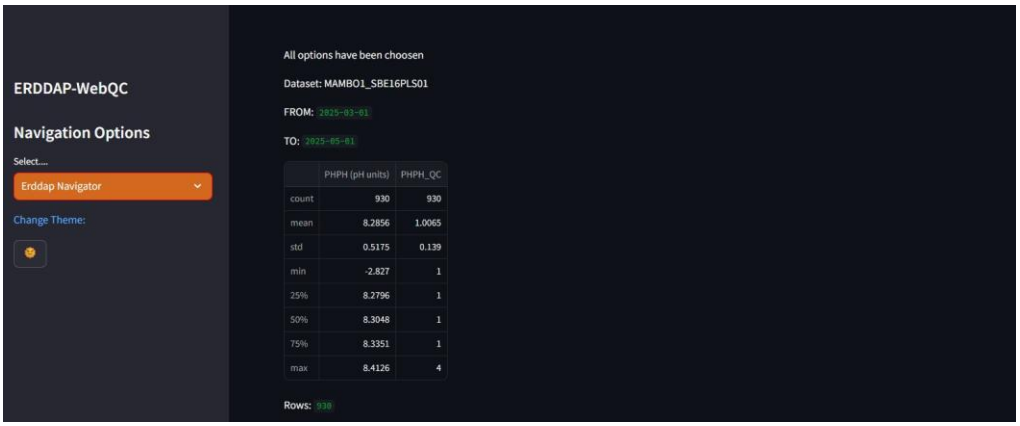
II. The user will be redirected to the search engine, then select an ERDDAP server. For example: ogs ERDDAP.



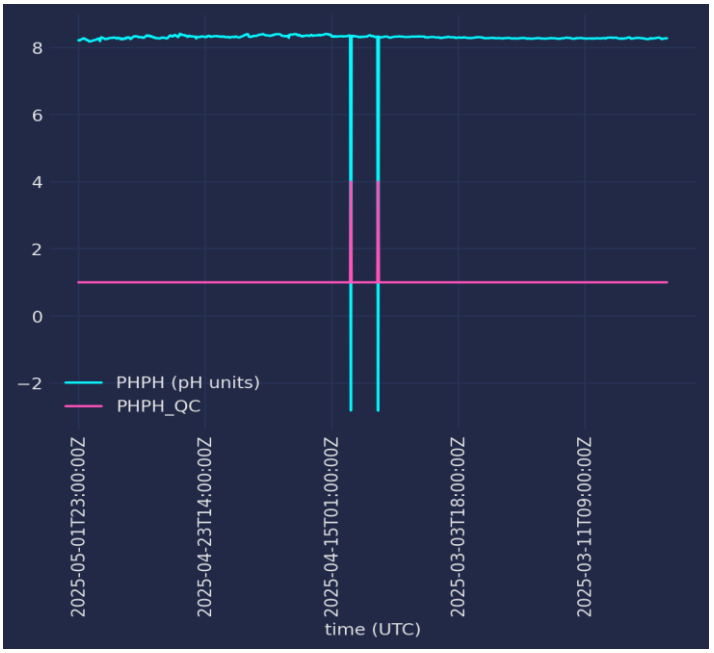
III. Choose a dataset. For this example we will explore the MAMBO1_SBE16PLS01 dataset. Select the parameter to visualize in the X and Y axis, for example pH and time. Select also the time span, in this case the last 2 months of data (01/03/2025 - 01/05/2025) and select “plot this”. The option “table this” will allow the user to download the dataset to further analyse it with the application.



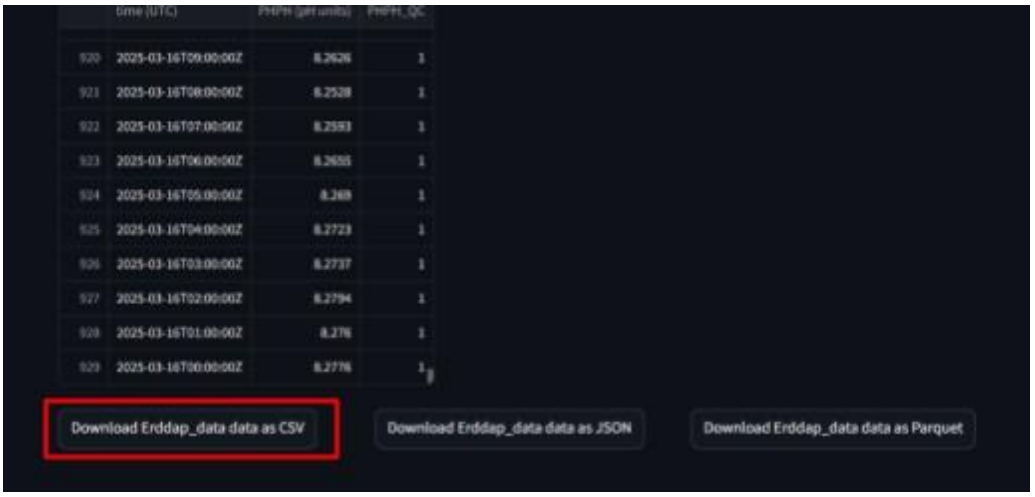
IV. The user will get some statistics and the plot of the selected dataset



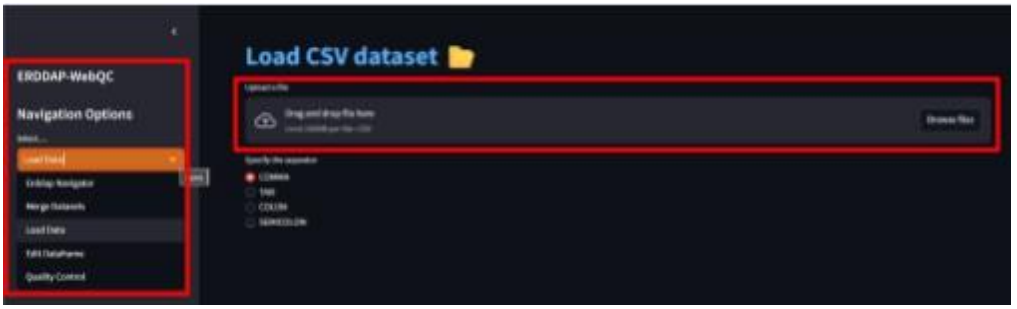
	PHPH (pH units)	PHPH_QC
count	930	930
mean	8.2856	1.0065
std	0.5175	0.139
min	-2.827	1
25%	8.2796	1
50%	8.3048	1
75%	8.3351	1
max	8.4126	4



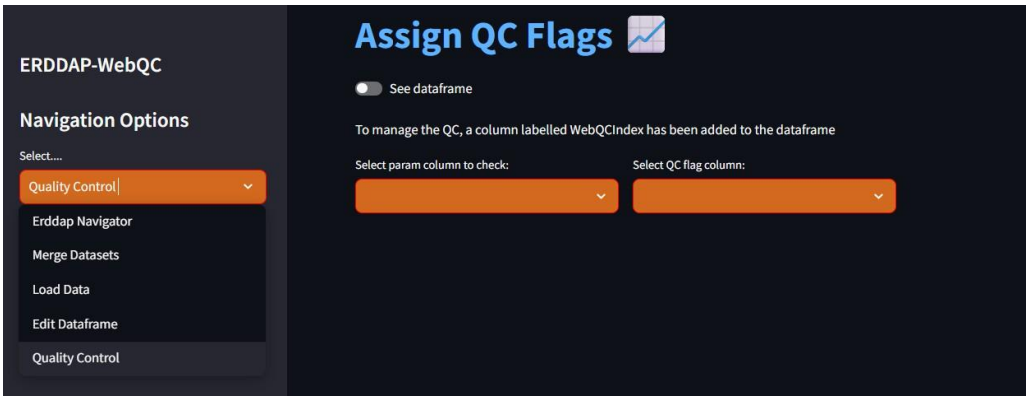
V. It is evident that the spikes have QC=4, meaning that these values are “bad values”. We can download the dataset by using the option “download Erddap_data data as CSV”.



VI. Save the file and then load the data by changing the navigation options to “load data”. Then “browse files” or “drag and drop” the file downloaded previously.

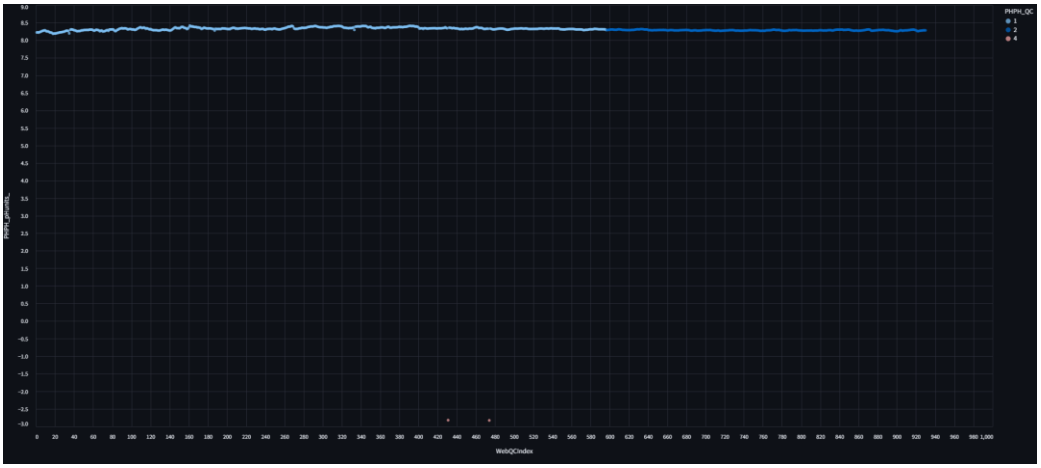


VII. Once the file has been loaded, the user can change the window and select the tool needed. For example: edit data frames or quality control.



VIII. With the quality control option the user can see the QC flags and if needed change them manually by selecting the points needed to be modified (see the image as an example where we purposely changed the QF=1 to QF=2). The user's latest version

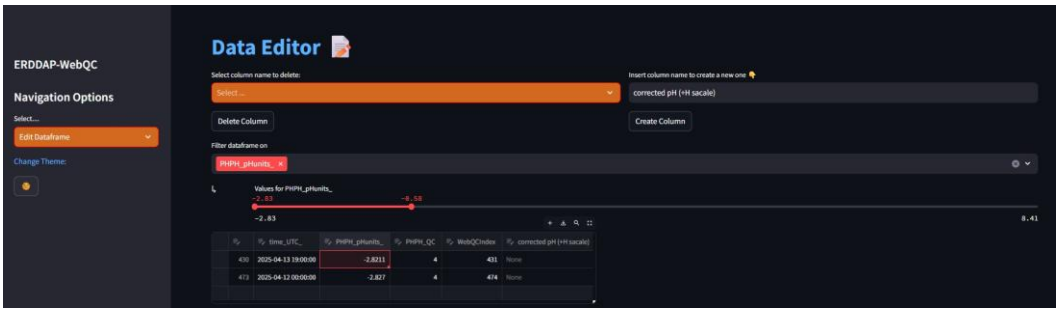
can be downloaded and exported in csv format once the manual QF has been finalized.



IX. Using the "Merge datasets" option, the user can merge more datasets (multiple files can be uploaded):

1. datasets with the same structure: the result will be a dataframe that can be export as CSV
2. datasets with different structure: the files will be merged appending new columns (obviously the values in the data frame will be shifted)

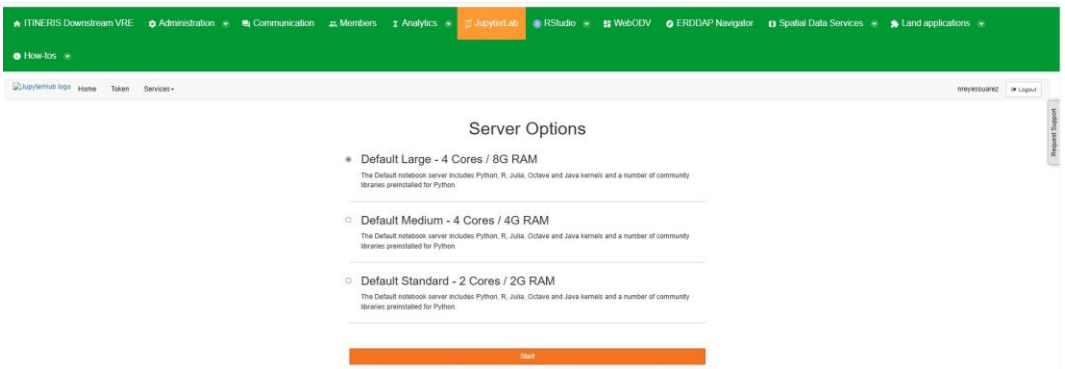
X. The option "edit data frame" allows the user to add or delete columns, edit a value within the data frame, depending on the user's needs.



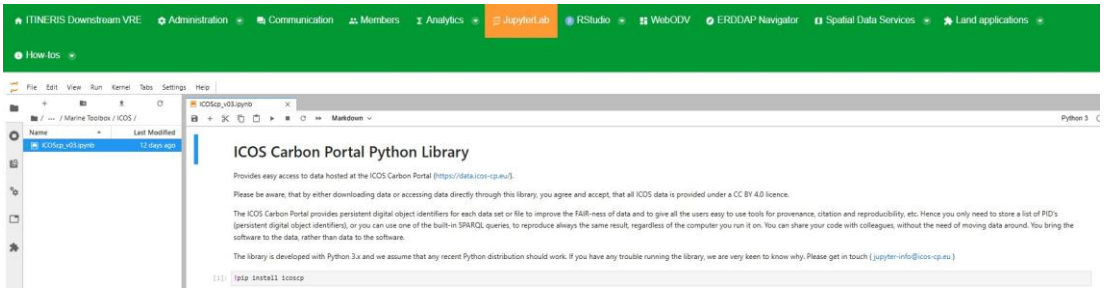
1.1.3. ICOScp Jupyter notebook

Implementing the ICOScp python library in the VRE by means of jupyter notebooks allows the user to explore ICOS data. To access the notebook follow the following path:

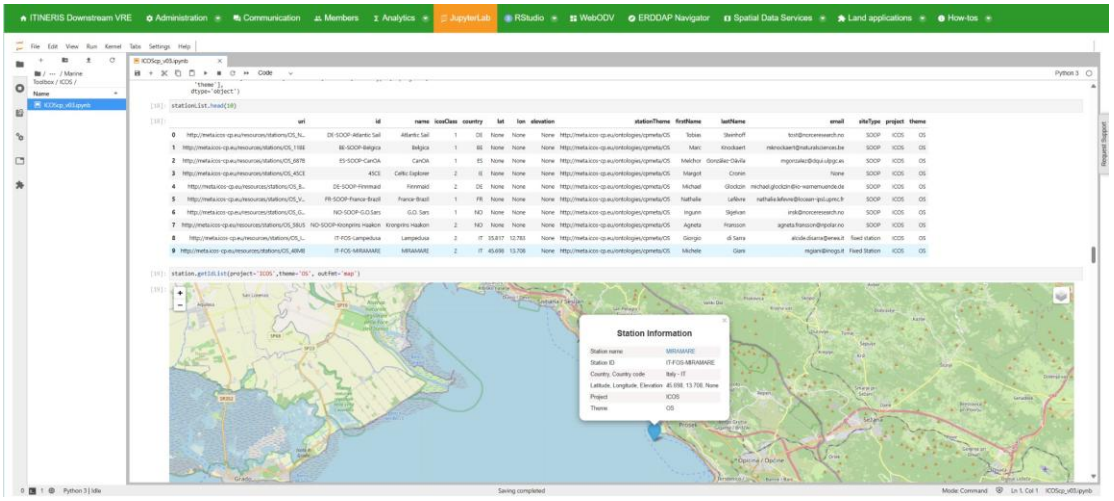
I. Open the JupyterLab application and select a suitable the server option and click on start

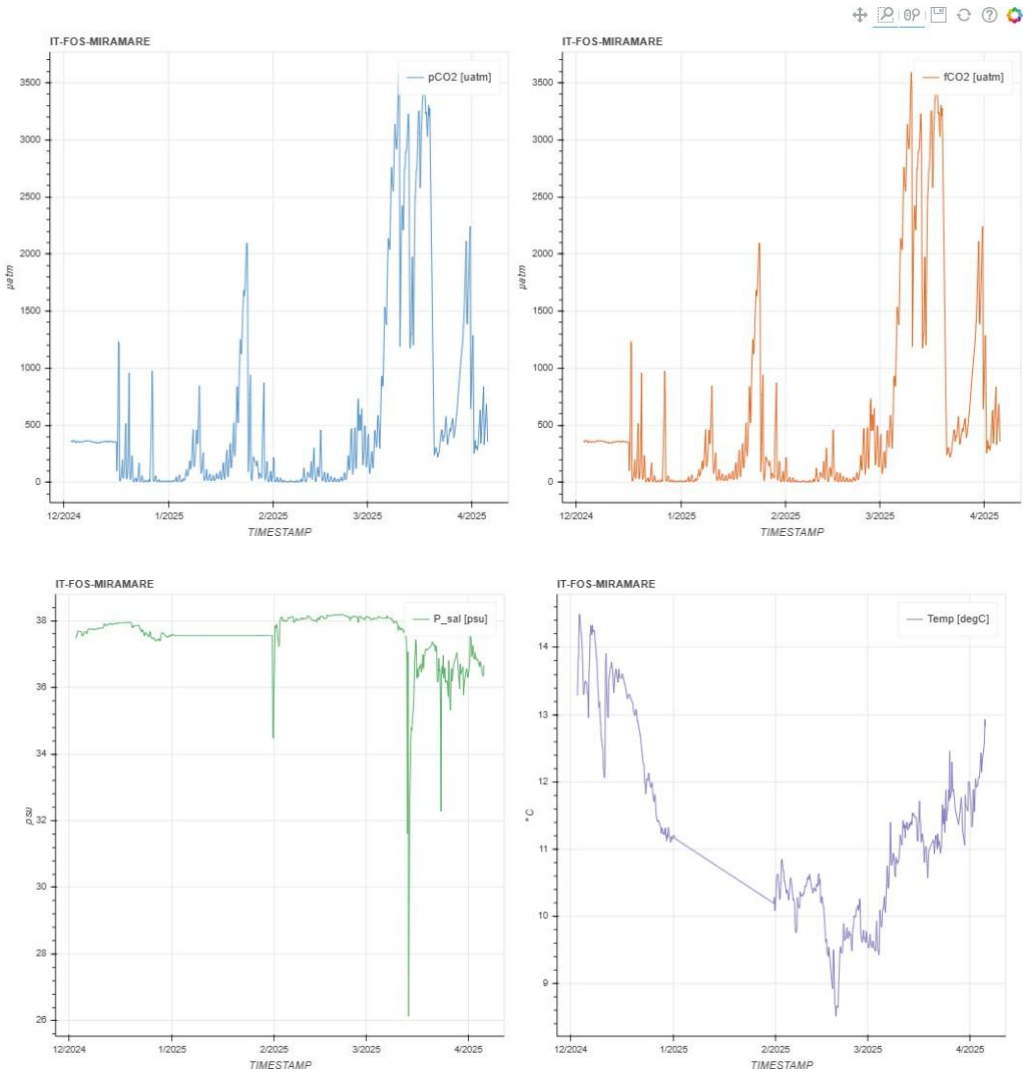


II. Please find the following path within the VRE workspace: https://jupyterhub.d4science.org/user/nreyessuarez/files/workspace/VREFolders/ITINERIS_Downstream_VRE/Marine%20Toolbox/ICOS/



The notebook is self explanatory so please refer to it and follow the steps. The user should be able to get the following interactive plots:





1.2. Land domain

By selecting "Spatial Data Services", it is possible to set up two complementary systems for storing, managing and displaying spatial data on WebGis. The steps that are useful for loading geodata (shapefiles and rasters) into **GeoServer** and then managing and displaying them in the **Geonetwork** are described below.

Furthermore it is possible to investigate a monitoring system installed in a pilot test and realize preliminary analysis using table data by means of plot and advance analysis. For this section, see the sub-charter "1.2. How to see monitoring systems and use applications"

1.2.1. How to load a data inside Geoserver

In this section the first steps to be implemented before loading the geospatial data (shapefile and raster) into the Geoserver are treated. These steps are mandatory and conducive to the loading and display of data. The files, shape and raster, must first be uploaded into QGIS. Within QGis, the legends must be established and the features describing the datasets must be checked.

QGis is a free software that allows you to manage vector and raster data. The software can be loaded within this https://qgis.org/download/ by clicking on the **Download** button.

Figure 2 shows the geological map of the Friuli Venezia Giulia region. In the legend, the colors are specified for each geology present. The legend that is displayed will be the same within the Geoserver and Geonetwork.

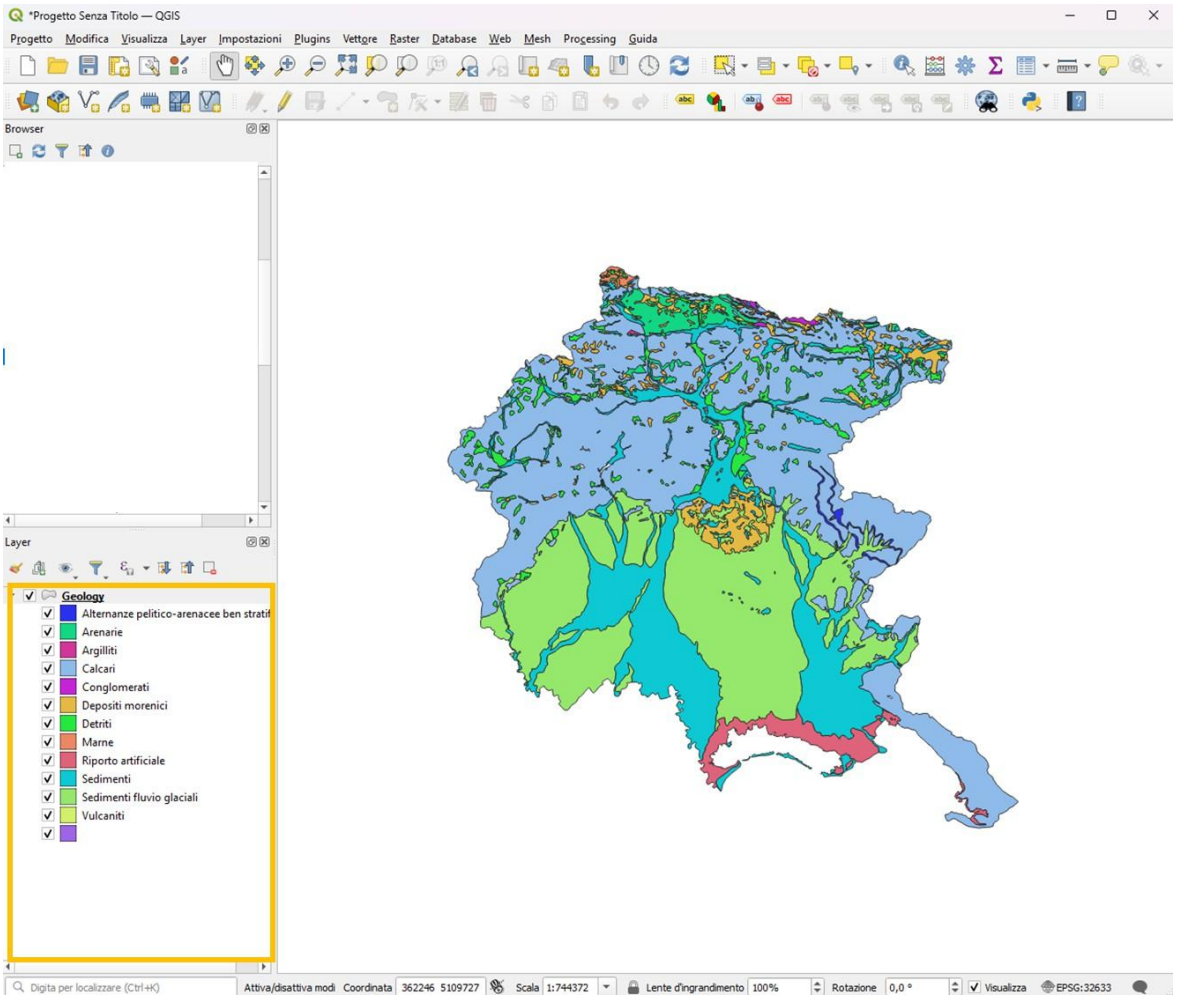


Figure 2 – Shapefile and its legend within QGis.

The Geoserver, depending on the geospatial file needs precise formatting. The specifications are listed below.
For shapefiles (punctual, linear, polygon) (Figure 2):

1. the shapefile extensions: shp, dbf, prj, shx, cpg, qmd;
2. style SLD;
3. all files must be within a zip folder;

For the raster (Figure 3):

1. the raster extensions: TIF;
2. style SLD;
3. all files must be within a zip folder;

To obtain the SLD extension (see Figure 3):

1. right click on the filename;
2. Export;
3. Save as QGis Layer Style File...;
4. From the second panel, click on the drop-down menu "As file style SLD";
5. Click on OK;

Important: The filenames, folders, SLD files must all be the same!

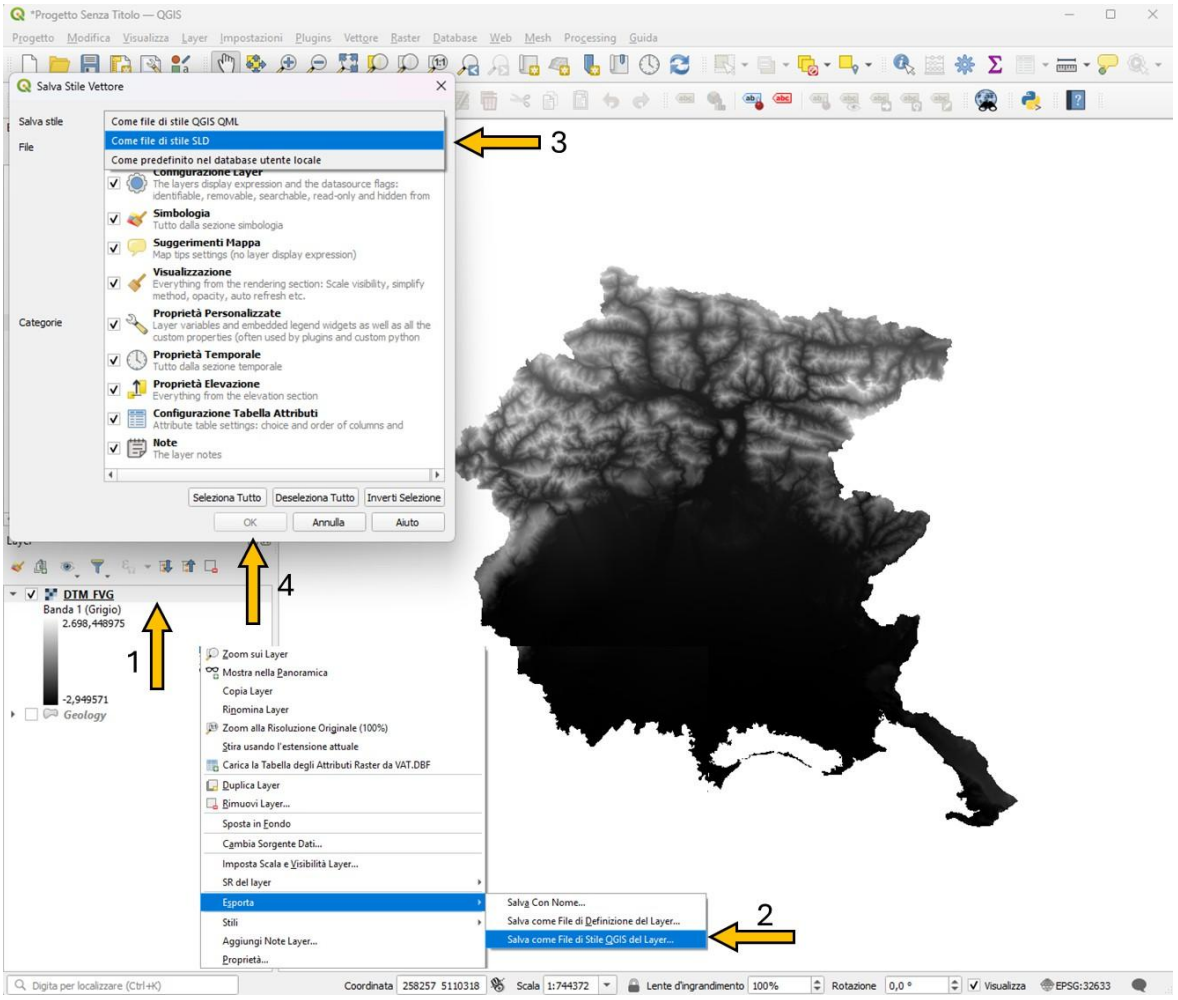


Figure 3 – Raster and sequence for extracting data and SLD. This sequence is the same for shapefile.

The structure of the folder where the files to be uploaded are present must have the structure as in Figure 4.

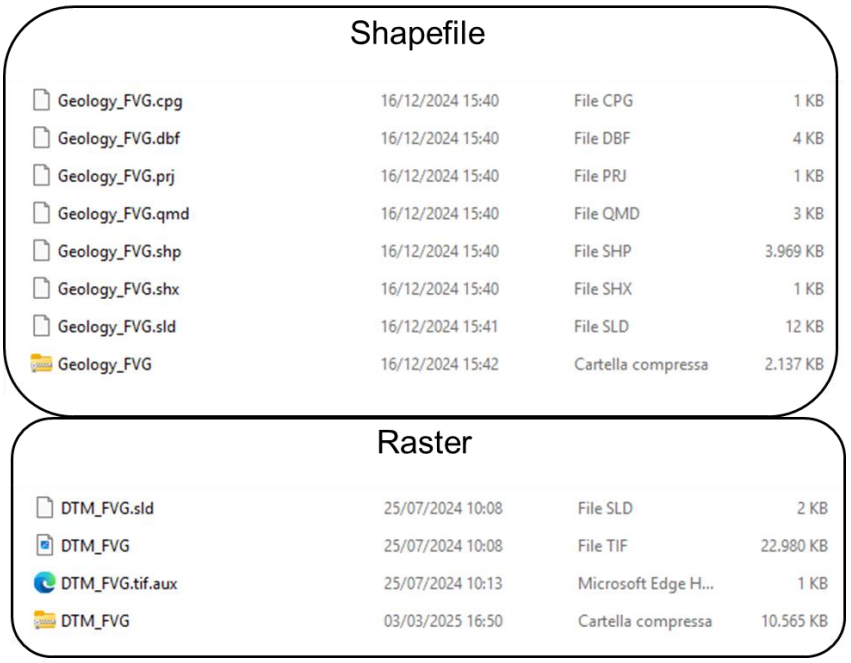


Figure 4 - The structure of the folder.

GEOSERVER

The following guide to the use of Geoserver and Geonetwork is intended to present in a fast and immediate way a service for storing, sharing and managing map data. It does not provide full information on each internal function of the Geoserver. For more information about tools or other issues not covered below, please refer to the reference site https://docs.geoserver.org/ where you can consult the documentation and various tutorials with explanations.
The Geoserver allows to store spatial data, of vector type and restar, inside a database. By clicking on Geoserver, a page appears where you must make the Login. Below are written the logins (Figure 5):

Username: **admin**

Password: **6zenJuurDd3VazwS**

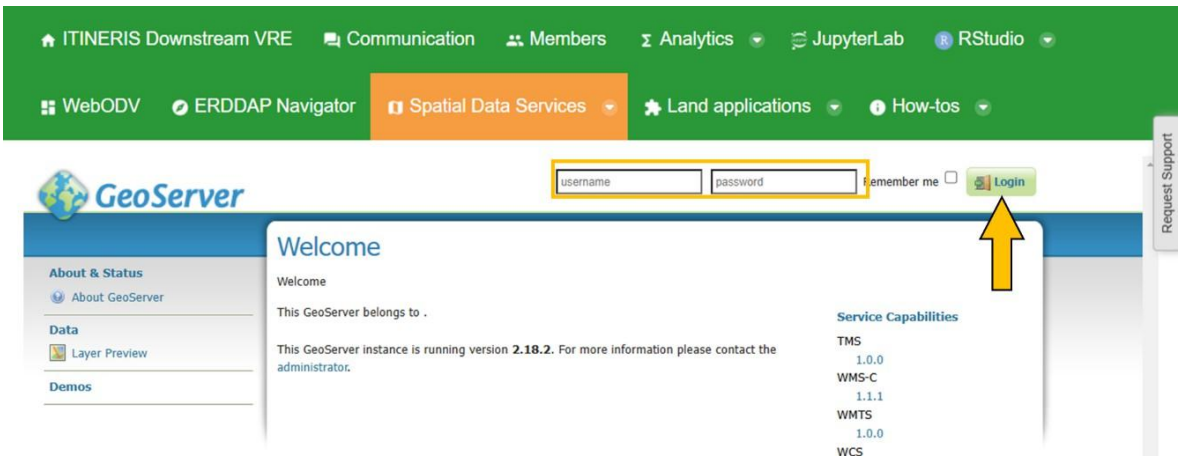


Figure 5 – Login for Geoserver

The first page of the Geoserver is shown in Figure 6. Tab 1 shows the number of **Workspaces** that represent the main folders for loading the data. In this case, a root folder "**land-instability**" was created. Within the folder "**land-instability**" some "**Stores"** have been implemented that refer to loaded "**Layers**". Stores and Layers can be interviewed, but this aspect will see more ahead.

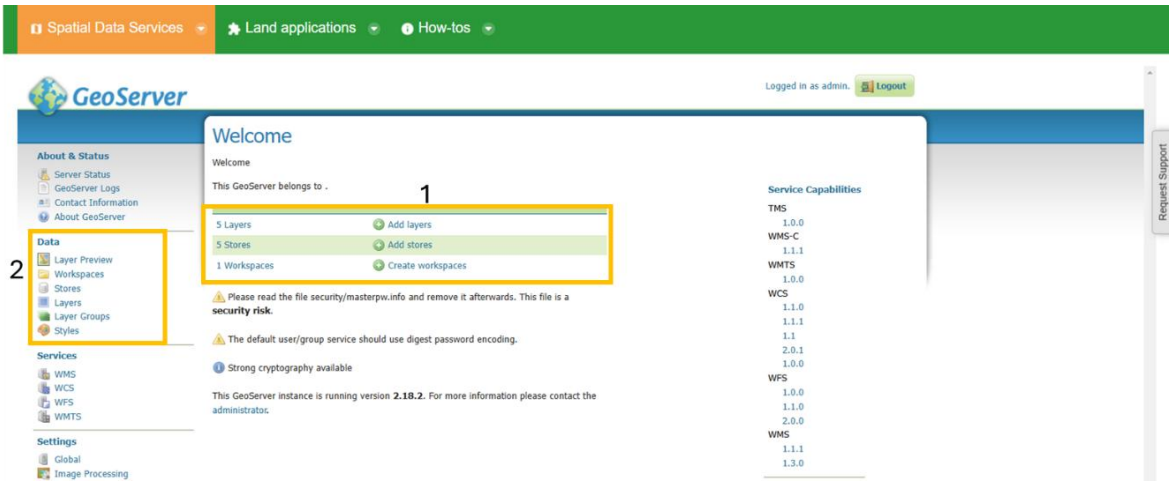


Figure 6 - Geoserver first page.

HOW TO CREATE A WORKSPACE on GEOSERVER

To create a workspace, you must click on the left window where "**Workspaces**" is shown. Then the Workspaces page opens with under the words "**Add new workspace**". The creation of the new workspace must contain the name and a "**URI namespace**" that must be linked to the name. I recommend using the same name and wording. See Figure 7 where the various steps are marked.

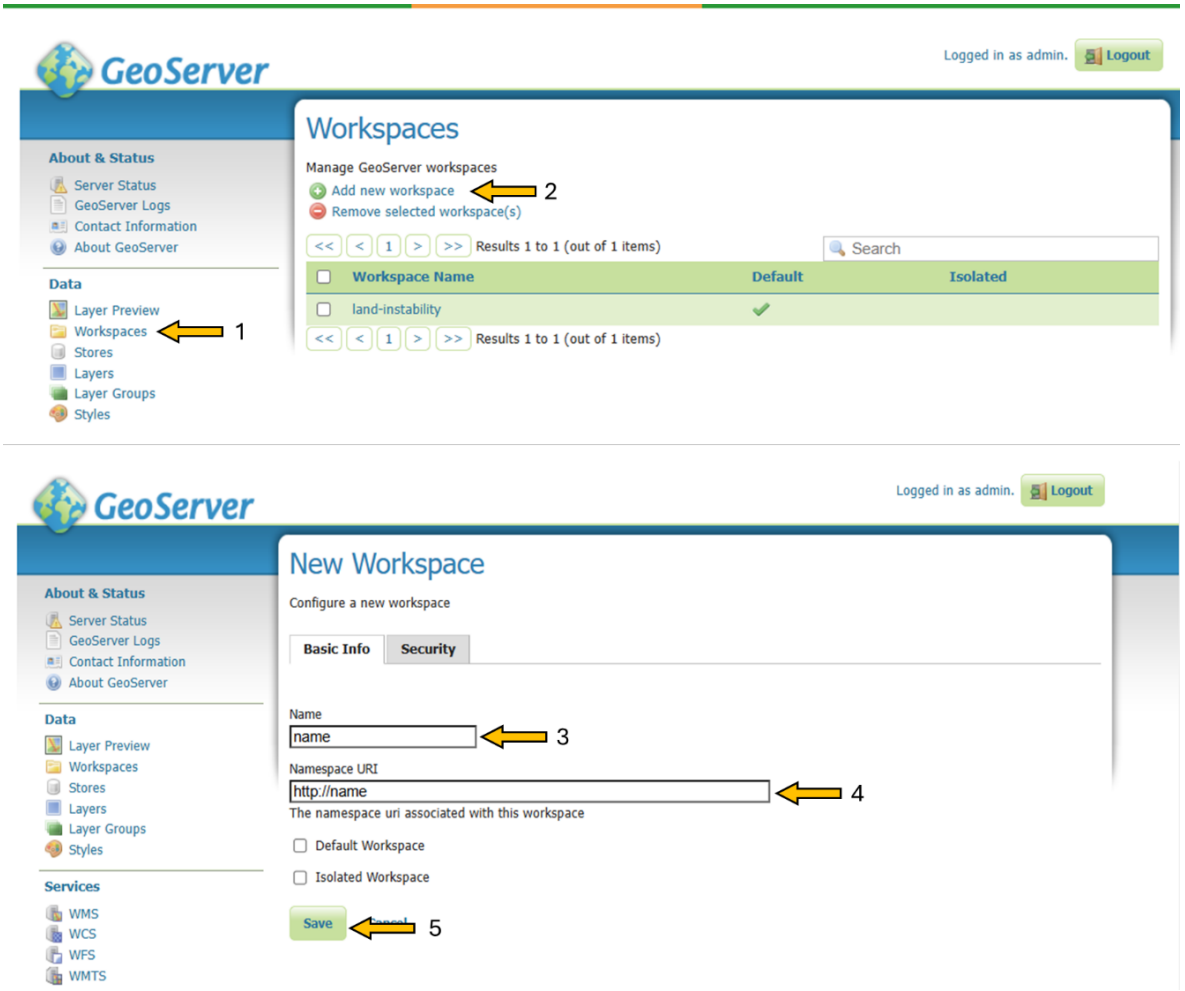


Figure 7 – Creating Workspaces.

HOW TO UPLOAD ON WORKSPACE GEOSPATIAL DATA

To upload our files into the Geoserver, you need to know the language python having it installed on your computer. In particular the advice is to work on the Jupyter system for reading script files. Depending on the geospatial file to be uploaded, you need to use a specific script. Below are the scripts to load shapefiles and the rasters within the workspace created on Geoserver.
The advice is to copy and paste the script for each file format within Jupiter.

SCRIPT FOR SHAPEFILE	DESCRIPTION
!pip3 install geoserver-rest ! gdalinfo --version GDAL 3.4.1, released 2021/12/27	Dependencies
from geo.Geoserver **import** Geoserver **import** glob **import** os **import** requests	Packages

geoserverURL = 'https://geoserver-itineris-downstream.cloud.d4science.org/geoserver' username = **'admin'** password = **'6zenJuurDd3VazwS'**	Login
# Access Geoserver geo = Geoserver(geoserverURL, username=username, password=password)	Access Geoserver
# Create workspace if not exists wsName = ' '	Put workspace name within '___'

# Load SLD on GeoServer 	
def upload_sld_style(style_name, sld_content):
url = f'{geoserverURL}/rest/workspaces/{wsName}/styles"
 	
# Headers 	
headers = {
'Content-Type': 'application/vnd.ogc.se+xml' # If SLD from qgis and SLD v 1.1.0 than se+xml
#'Content-Type': 'application/vnd.ogc.sdl+xml' # else SLD v 1.0.0 sld+xml
}
auth = (username, password)
response = requests.post(url, headers=headers, auth=auth, data=sld_content)
 	
if response.status_code == 201:
print(f"Uploaded style: {style_name} ")
else:
print(f"Error loading style: {style_name}. Status code: {response.status_code}")
print(response.text)
raise Exception(f"Error loading style: {style_name}")	

shp_files = glob.glob('**dataset**/*.shp')	Put name's dataset in "dataset"
for shp **in** shp_files: print(shp) file_name = os.path.basename(shp) *# Removing extension for layer name* temp = os.path.splitext(file_name) layer_name = temp[0] print(layer_name) file_zip=layer_name+'.zip' path_zip=os.path.dirname(shp)+"/"+file_zip print(path_zip) *# Add layer Will overwrite layer if it exists*	

geo.create_shp_datastore(path=path_zip, store_name=layer_name, workspace=wsName) print(f"Uploaded zip: {file_zip} ") # *Add style* file_sld=layer_name+'.sld' sld=os.path.dirname(shp)+"/"+file_sld print(f"File sld: {sld}") print(f"Layer Name: {layer_name}") #geo.upload_style(path=sld, workspace=wsName) **with** open(sld, 'rb') **as** f: sld_content = f.read() *#Attention the style name is same of file name* upload_sld_style(layer_name, sld_content) geo.publish_style(layer_name=layer_name, style_name=layer_name, workspace=wsName) print(f"Published style: {file_sld}")	
geodata/000_basin_limit_epsg4326.shp 000_basin_limit_epsg4326 geodata/000_basin_limit_epsg4326.zip 000_basin_limit_epsg4326.zip uploaded zip to geoserver	Output

SCRIPT FOR RASTER	DESCRIPTION
!pip3 install geoserver-rest ! gdalinfo --version GDAL 3.4.1, released 2021/12/27	Dependencies
from geo.Geoserver **import** Geoserver **import** glob **import** os	Packages
geoserverURL = 'https://geoserver-itineris-downstream.cloud.d4science.org/geoserver' username = '**admin**' password = '**6zenJuurDd3VazwS** '	Login
# Access Geoserver geo = Geoserver(geoserverURL, username=username, password=password)	Access Geoserver
# Create workspace if not exists wsName=' '	Put workspace name within ‘__‘
tiff_files = glob.glob(' **dataset** /*.tiff') + glob.glob(' **dataset** /*.tif')	Put name’s dataset in “dataset”

for tiff in tiff_files:
print(tiff)
file_name = os.path.basename(tiff)
 	
# Removing extension for layer name 	
temp = os.path.splitext(file_name)
layer_name = temp[0]
print(layer_name)
 	
# Add layer Will overwrite layer if it exists 	
geo.create_coveragestore(layer_name=layer_name, path=tiff, workspace=wsName)
print(file_name + ' uploaded to geoserver')
 	
# Add style 	
file_sld=layer_name+'.sld'
sld=os.path.dirname(tiff)+'/'+file_sld
print(sld)
 	
geo.upload_style(path=sld, workspace=wsName)
geo.publish_style(layer_name=layer_name, style_name=layer_name, workspace=wsName)
print(file_sld + ' uploaded style to geoserver')	

geodata/000_basin_limit_epsg4326.shp 000_basin_limit_epsg4326 geodata/000_basin_limit_epsg4326.zip 000_basin_limit_epsg4326.zip uploaded zip to geoserver	Output

RESULTS WITHIN GEOSERVER

When the result of the loading is positive, within the Geoserver, in correspondence to the workspace created, for example with the name "name" or **"land-instability"** are files. An example of the data loading is shown in Figure 8.
At the "**Layer Preview**" you can preview the uploaded file, whether it is a shapefile or raster. Figure 8 shows the sequence to be used to view the file. The first step is to click on "**OpenLayers**", will be followed by the opening of a second page where the geospatial data loaded with the corresponding legend and associated metadata will be displayed.

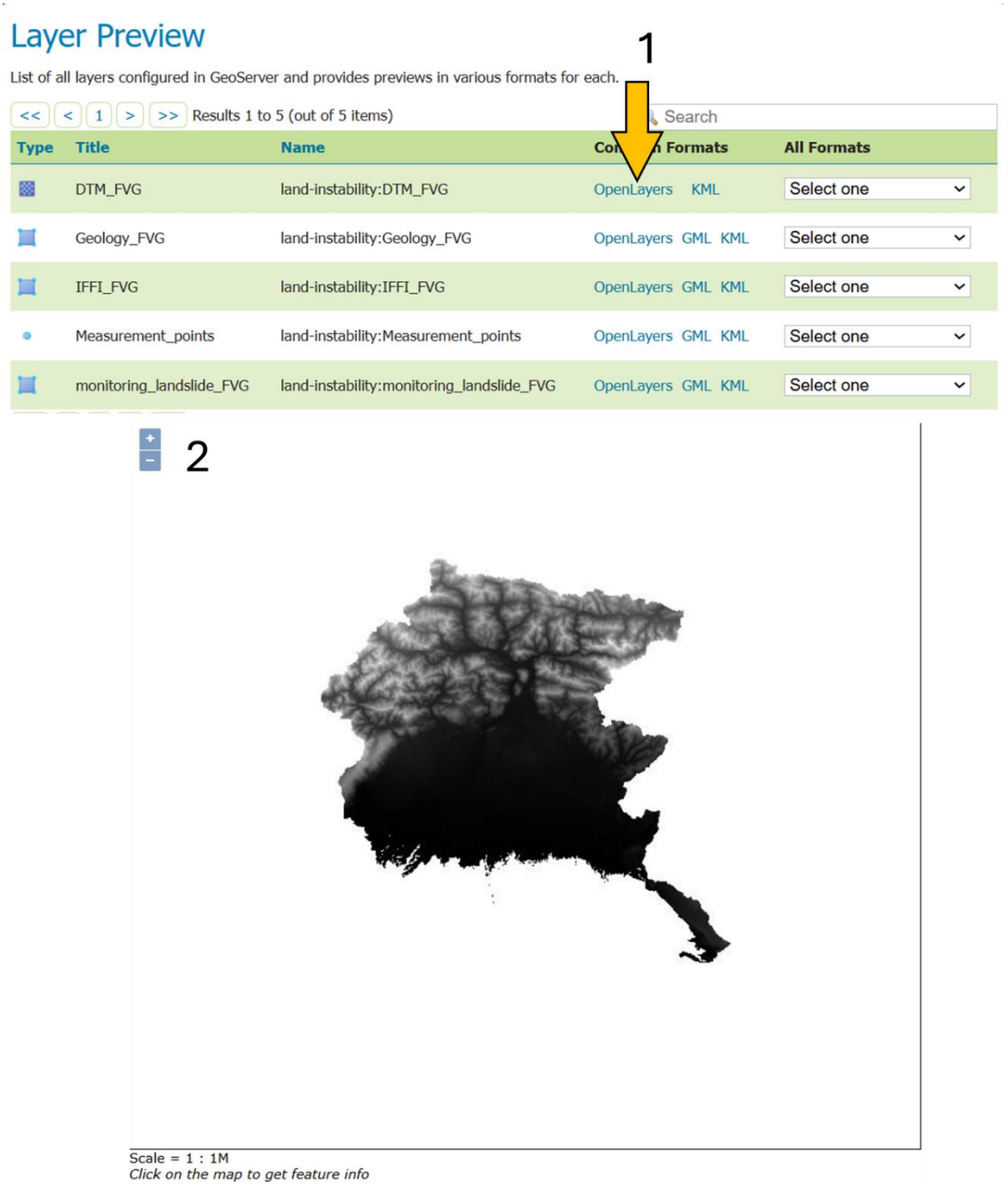


Figure 8 - Preview of the geospatial data loaded within the geoserver, within "Layer Preview".

In Figure 9 under "**Stores**" there is a list on the "**Data Type**" (tab-1), the workspace name (tab-2) of the file and its extension (Tab-3 and 4). If the uploaded file is incorrect you can delete it by clicking on the clickbox on the left (tab-5) of the panel next to the affected file and then click on "**Remove selected Stores**" (tab-6).

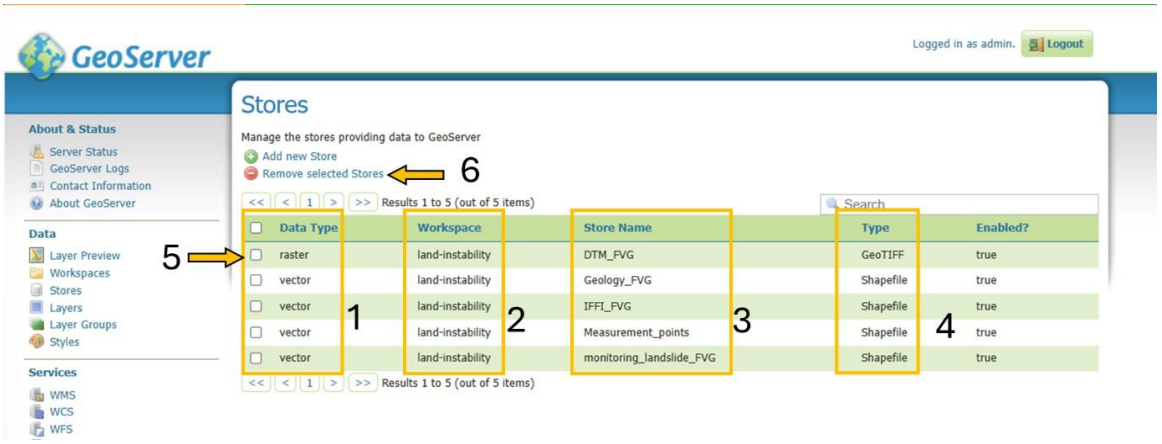


Figure 9 – Data list within Stores section.

In the second panel, the layers are the descriptions of the uploaded files, but by clicking on the "Title" you can view the characteristics of the file and add specific descriptive data related to the file (Figure 10).

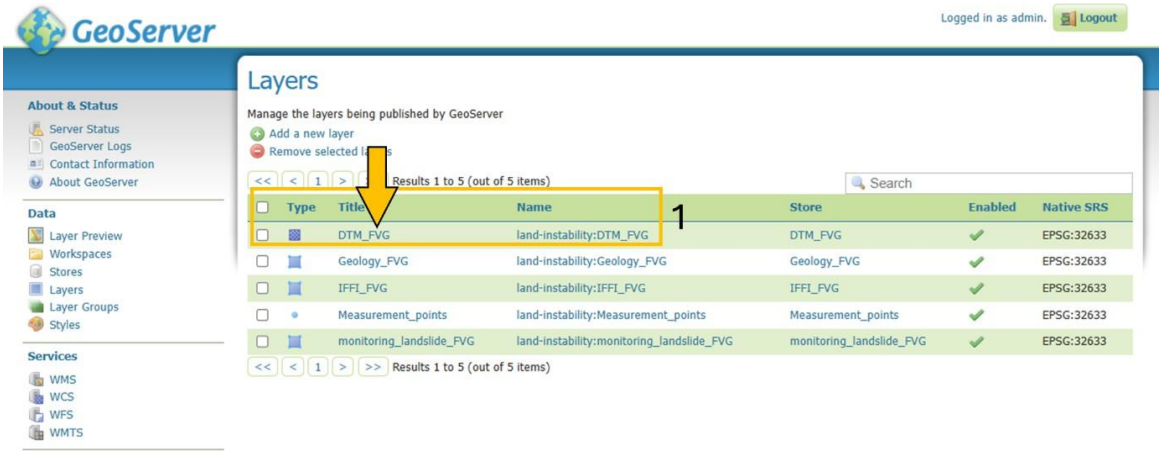


Figure 10 – Data list within Layers section-

For example, by clicking on the file "DTM_FVG", which represents the digital model of the land at regional scale of the Friuli Venezia Giulia Region will be opened the various tabs that describe the file. Tabs are represented in Figure 11 with the following names:

- "**Data**" provides generic indications of the file;
- "**Publisching**" describes the display of the data;
- "**Dimension**" allows to overcome the representation of the time and elevation (if present);
- "**Tile Caching**" allows you to outline the Tile Image formats;
- and "**Security**" outlines the possibility of who can or cannot use the file.

For the sake of simplification, only the first two tabs are presented below. Figure 11 and Figure 12 present the general specifications of the data: "**Name"**, "**Abstract"**, "**keywords"**, "**coordinates"** and **"extensions"**. Once the possible changes are implemented, you must click on "**Save and Apply**".

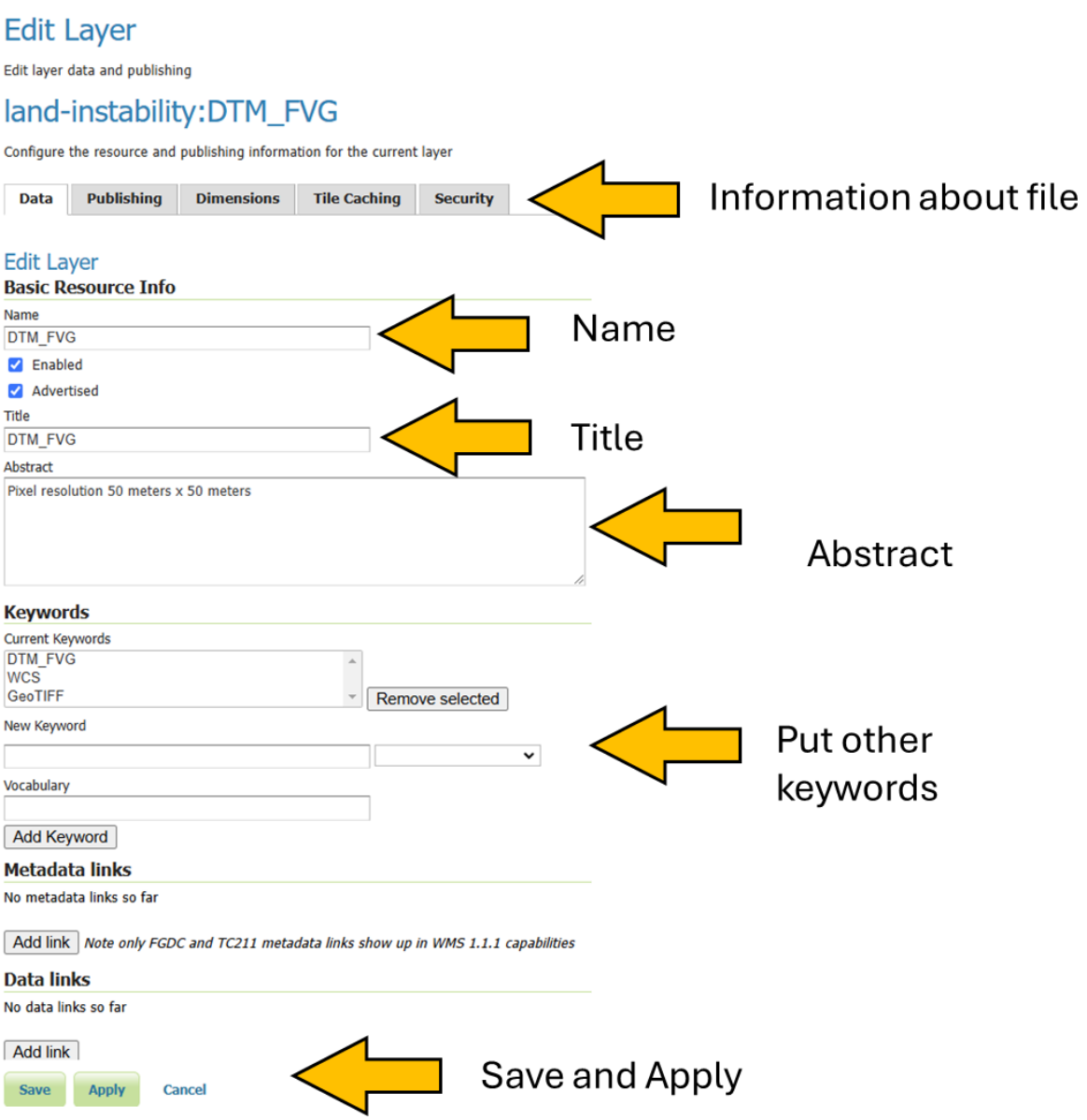


Figure 11 – Data section within Edit Layer.

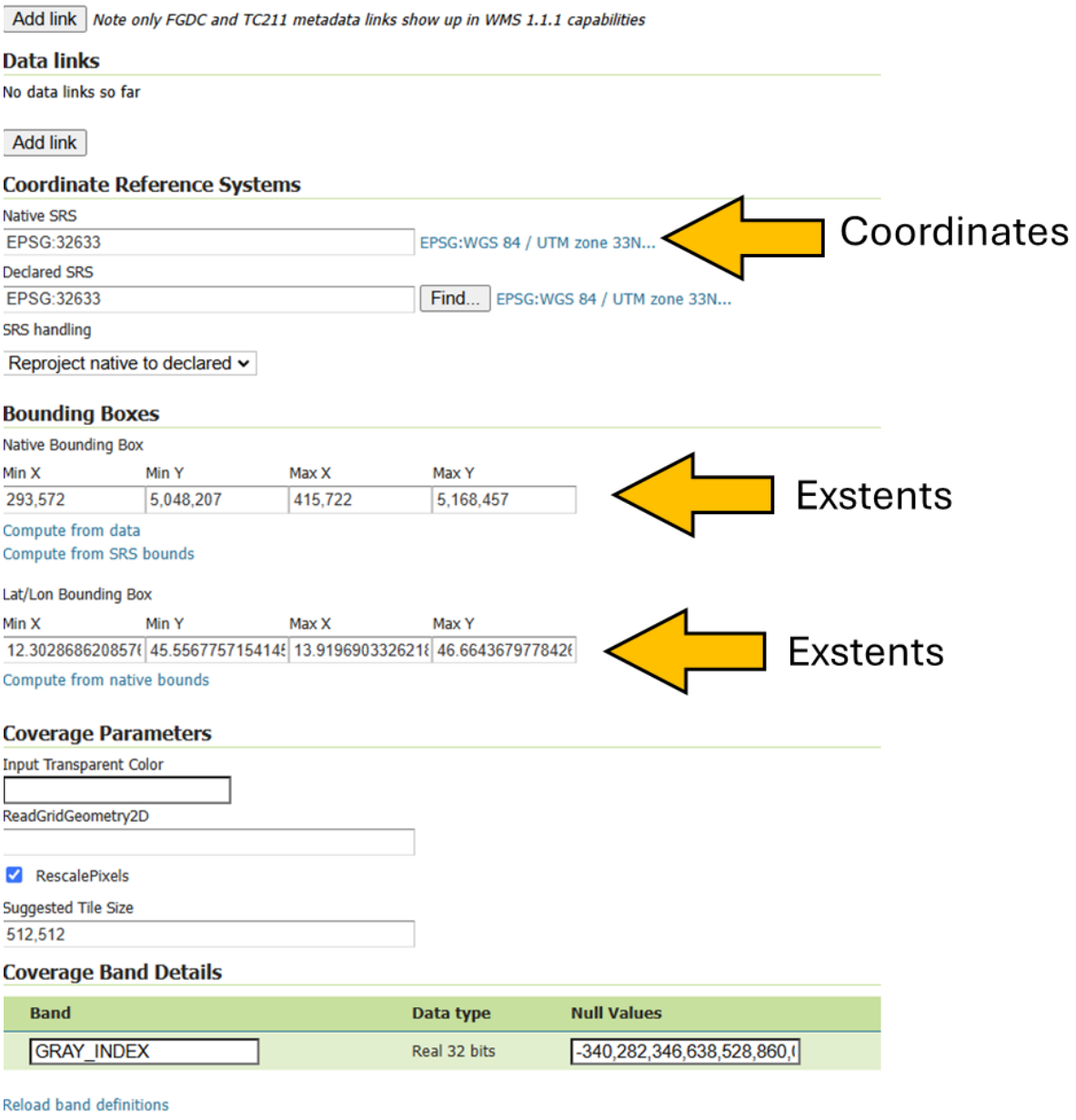


Figure 12 - Data section within Edit Layer.

Figure 13 shows the specifications on the legend and representation of the data.

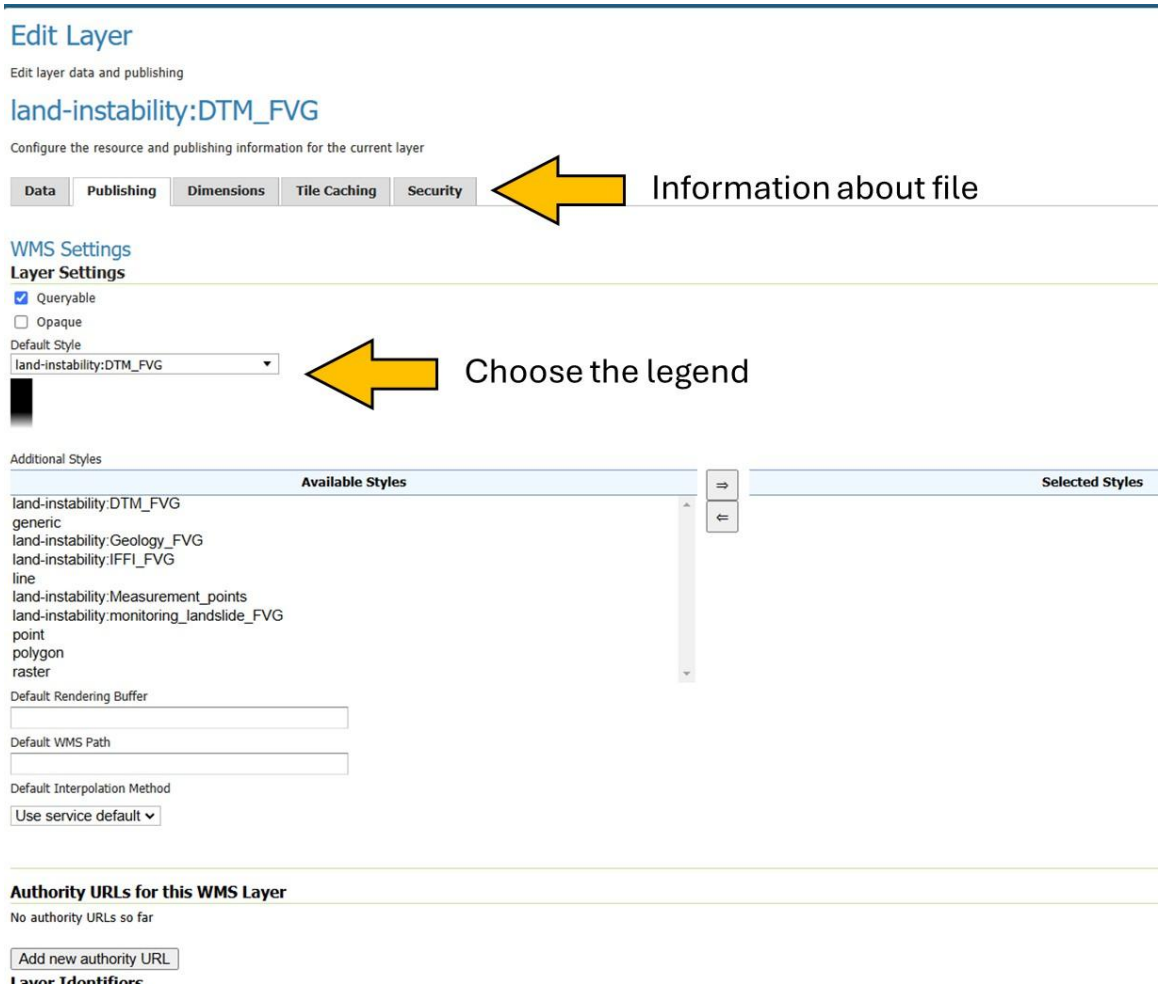


Figure 13 – Edit Layer with Publishing section.

If the uploaded file (Figure 14) is incorrect you can delete it by clicking on the clickbox on the left (arrow 1) of the panel next to the affected file and then click on "**Remove selected Stores**" (arrow 2).

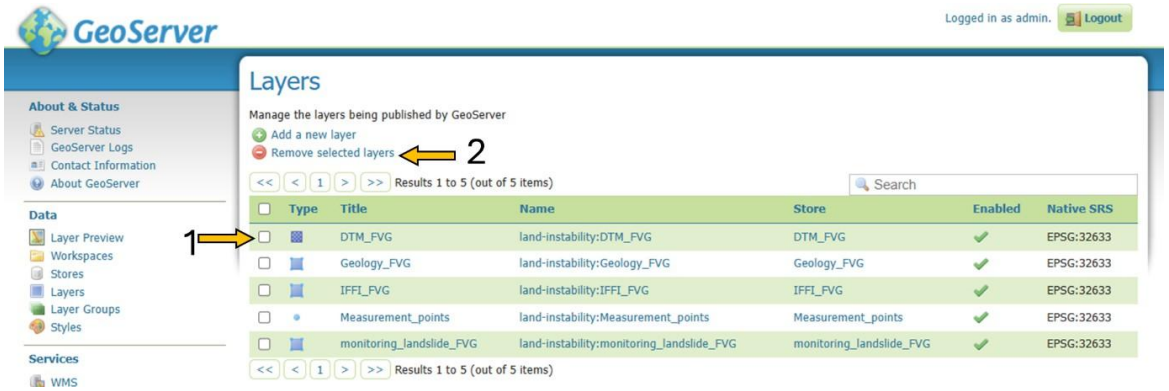


Figure 14 – For removing data.

From "Styles" you can see and set the desired legend (Figure 15 arrow 1). The "Style Editor" will be opened, allowing to view the "**Name**" of the data (**recommendation: do not change the name**)

(Figure 15 arrow 2). The format that will be read will be **SLD** which was loaded in previously with the python script. If you want to change or set a different legend you can retrieve the structure from a data uploaded, by clicking on "**Copy form existing style**" or upload an image from "**Upload to style file**". However the legend will be seen on the right, by clicking on "**Preview legend**" (Figure 15 arrow 3). Where the legend is in raster format, maximum and minimum values shall be specified.

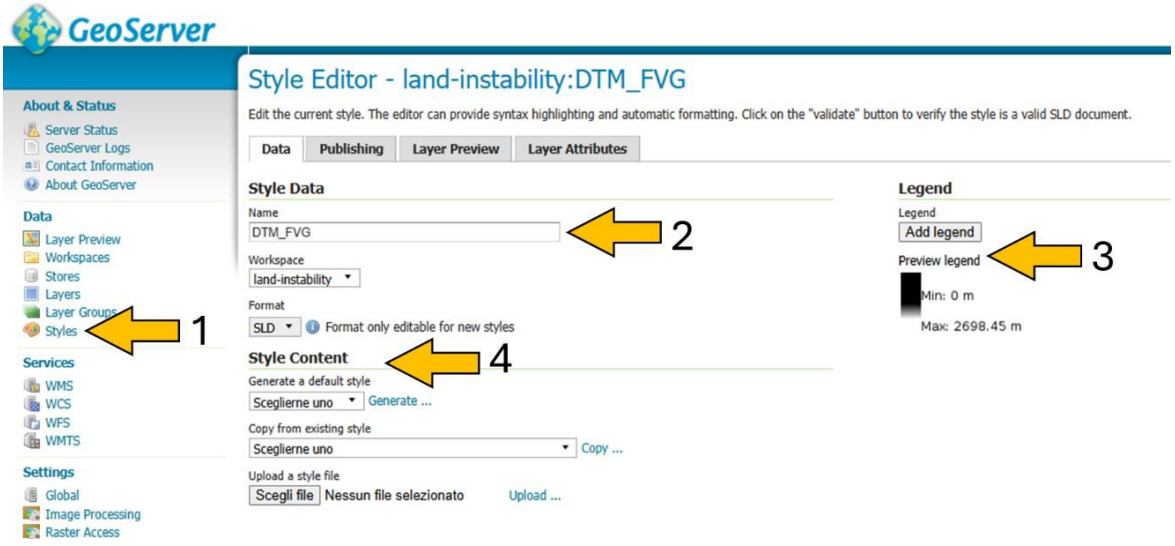


Figure 15 – Stype Editor for legend setting.

In case a raster is loaded it is important to check the presence of correct colors and numbers that indicate the maximum and minimum. To add these parameters you have to make changes to the xlm that is present in the same tab of "**Style Editor**" and add the parameters reported in Figure 16. In our case, a digital terrain model or DTM is loaded where it presents a "**maxValue**" of 2698.45 meters and a "**minValue**" of 0 meters. The representation or "**algorithm**" chosen is "**StrecthToMinimumMaximum**". It can be changed for example by inverting **StrecthToMaximumMinimum** or see also the guidelines of the **Geoserver**.To add the numbers to the legend, you need to add the section "**label="Min: 0 m**"" and "**label="Max: 2698.45 m**".

```
<?xml version="1.0" encoding="UTF-8"?><sld:StyledLayerDescriptor xmlns="http://www.opengis.net/sld"
xmlns:sld="http://www.opengis.net/sld" xmlns:gml="http://www.opengis.net/gml" xmlns:ogc="http://www.opengis.net/ogc" version="1.0.0">
  <sld:NamedLayer>
    <sld:Name>DTM</sld:Name>
    <sld:UserStyle>
      <sld:Name>DTM</sld:Name>
      <sld:FeatureTypeStyle>
        <sld:Name>name</sld:Name>
        <sld:Rule>
          <sld:RasterSymbolizer>
            <sld:ChannelSelection>
              <sld:GrayChannel>
                <sld:SourceChannelName>1</sld:SourceChannelName>
                <sld:ContrastEnhancement>
                  <sld:Normalize>
                    <sld:VendorOption name="maxValue">2698.45</sld:VendorOption>
                    <sld:VendorOption name="minValue">0</sld:VendorOption>
                    <sld:VendorOption name="algorithm">StretchToMinimumMaximum</sld:VendorOption>
                  </sld:Normalize>
                </sld:ContrastEnhancement>
              </sld:GrayChannel>
            </sld:ChannelSelection>
            <sld:ColorMap>
              <sld:ColorMapEntry color="#000000" quantity="0" label="Min: 0 m"/>
              <sld:ColorMapEntry color="#ffffff" quantity="255" label="Max: 2698.45 m"/>
            </sld:ColorMap>
            <sld:ContrastEnhancement/>
          </sld:RasterSymbolizer>
        </sld:Rule>
      </sld:FeatureTypeStyle>
    </sld:UserStyle>
  </sld:NamedLayer>
</sld:StyledLayerDescriptor>
```

Figure 16 – How add number at legend.

1.2.2. How to load data inside Geonetwork

The moment the geoserver presents correctly formatted data, it is possible to switch to map display within the Geonetwork. To enter within the Geonetwork you can click on "**Spatial Data Services**" and then on "**GeoNetwork**." Clicking on "**GeoNetwork**" will open a page where you can upload inxlm data. The sequence of opening the GeoNetwork page is presented in Figure 17 with numerical sequences of the various steps to be followed.

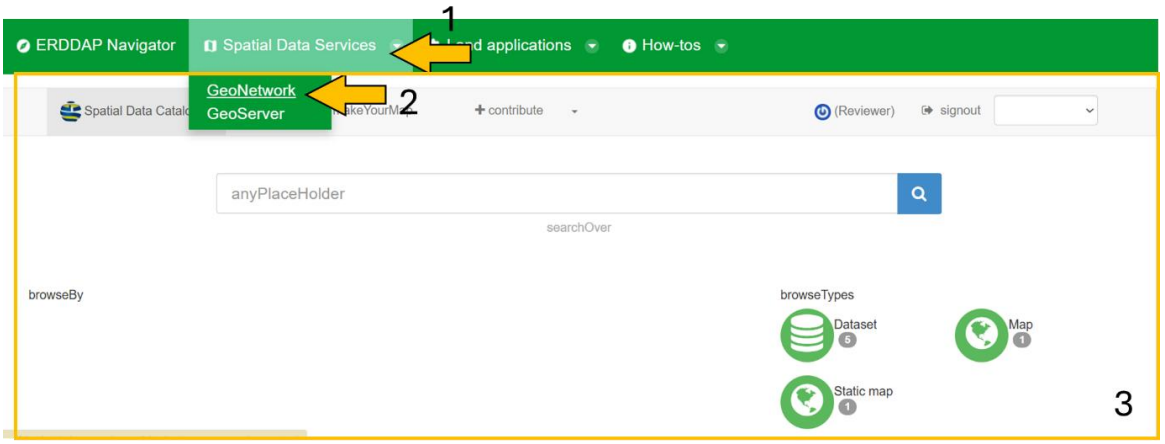


Figure 17 - GeoNetwork opening sequence

Adding a file within the GeoNetwork requires clicking on the small arrow next to "**+ contribute**". A drop-down menu will open and "**+addRecors**" must be clicked. Once the chosen option is clicked, a tab will be opened. Tab is presented in Figure 18. On "**+chooseOnlinesrc**" must be uploaded the xlm file named "**For_Geonetwork_xlm_upload.xlm**" which will be provided as an attachment to the following guideline. Within "**AssignToGroup**" there is a drop-down menu, and "**Context_ITINERIS_Downstream_VRE**" will have to be selected. On the last drop-down menu, it

will have to be specified which category it belongs to: maps and charts, datasets, archives, photographs, applications, case studies, etc.

By clicking on "+ **ImportRecords**" the data will be processed, and next to the main window of ImportRecord the loading will appear an additional window of green color (if the operation was successful), otherwise, the writing will be red and it will signal an error.

Clicking on the pencil symbol will open a page where you can specify all necessary metadata.

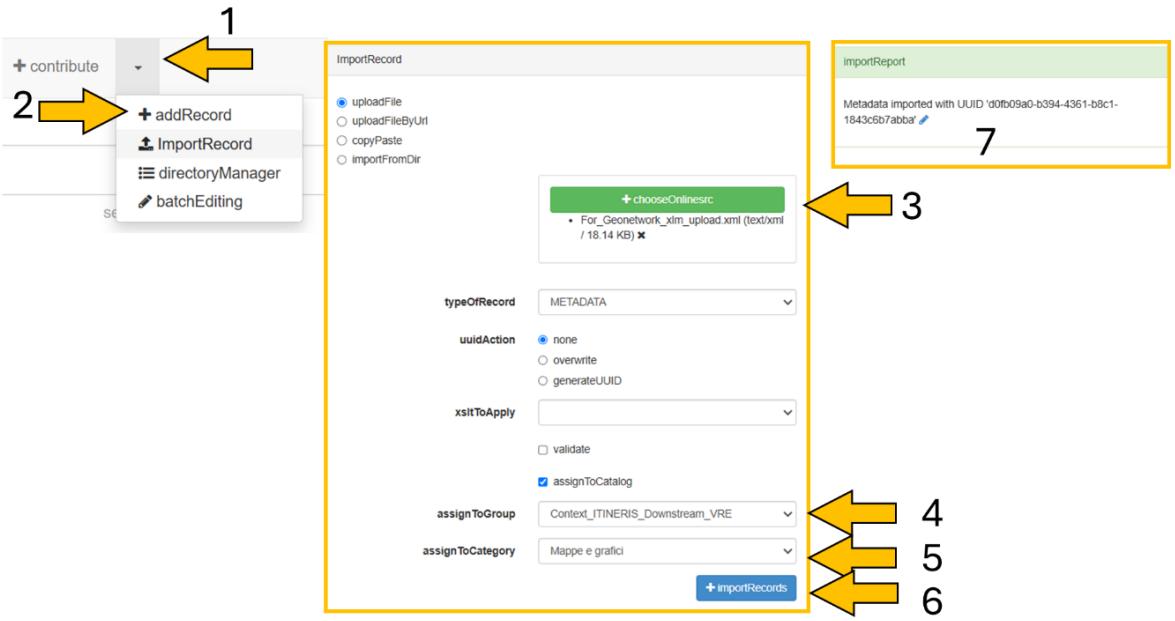


Figure 18 - Sequence of uploading a file within the GeoNetwork.

The same operation can be performed by clicking on "**Spatial Data Catalogue**" and then on the loaded data. A window with xlm descriptions will open. At the top there are several operations including the pencil that allow you to modify the various descriptive metadata of the file (Figure 19).

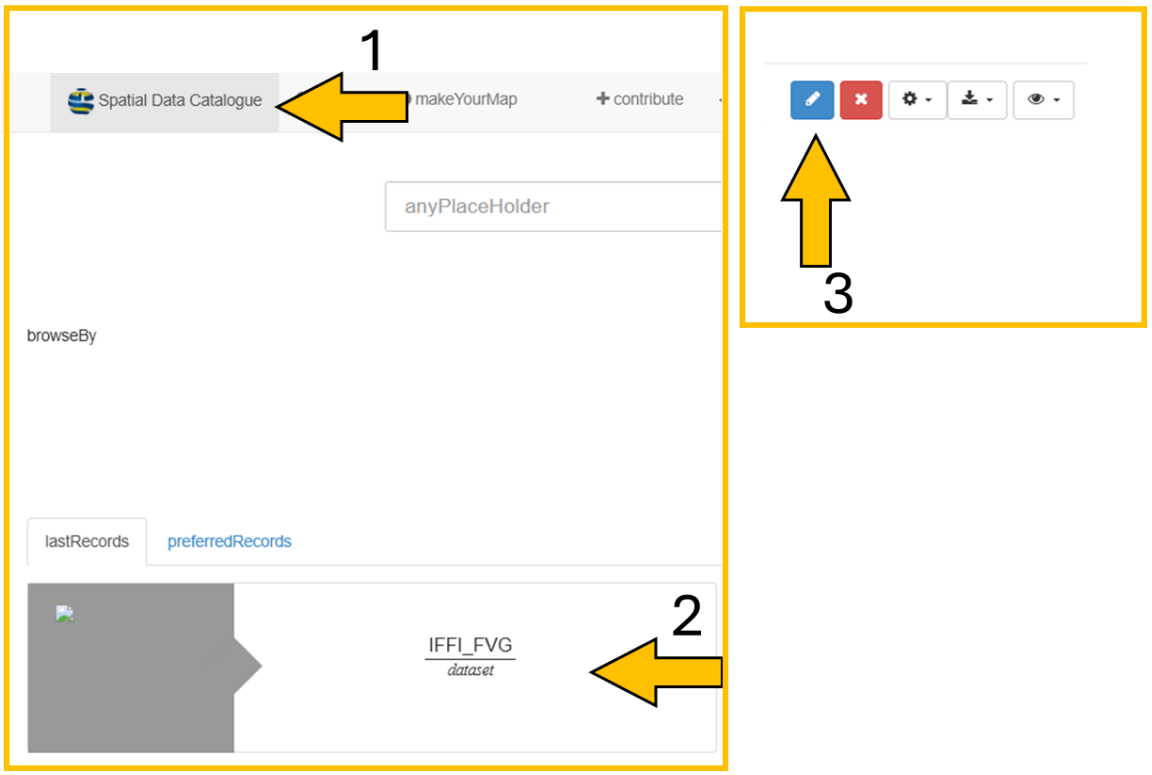


Figure 19 - Sequence of uploading a file within the GeoNetwork.

Once clicked on the "**pencil**" will open a page where all the fields specific to the file are inserted. The "**title**", the "**upload date**", the "**summary**" where you need to enter the specifications of the uploaded file. Through a selectbox it is possible to signal if the modification status is complete or in progress. To load the shapefile or raster is important the table on the right, where are present the "**thumbnails**".

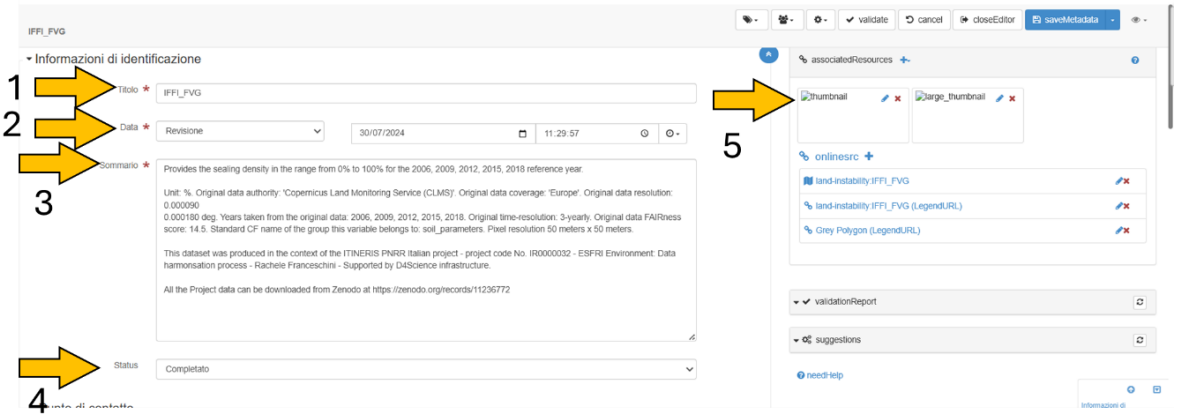


Figure 20 – Sections within Geonetwork for adding shapefile or raster data.

Clicking on the "**pencil**" of the first "**thumbnail**", as shown in Figure 21 and indicated by arrow 2 will open a window where you can upload the file through the url. The "**URL**" of the file can be obtained from the "**Layer Preview**" and "**OpenLayers**" of the Geoserver (see Figure 8). When the preview is opened, on the top bar there is the url address. The url address should look like this:

https://geoserver-itineris-downstream.cloud.d4science.org/geoserver/land-instability/wms?service=WMS&version=1.1.0&request=GetMap&layers=land-instability%3ADTM_FVG&bbox=293572.0%2C5048207.0%2C415722.0%2C5168457.0&width=768&height=756&srs=EPSG%3A32633&styles=&**format=application/openlayers**

The last part, by **format=**, should be changed to: **format=image%2Fvnd.jpeg-png**

The final result of the url should look like this:

https://geoserver-itineris-downstream.cloud.d4science.org/geoserver/land-instability/wms?service=WMS&version=1.1.0&request=GetMap&layers=land-instability%3ADTM_FVG&bbox=293572.0%2C5048207.0%2C415722.0%2C5168457.0&width=768&height=756&srs=EPSG%3A32633&styles=&**format=image%2Fvnd.jpeg-png**

At this point, the address must be pasted inside the URL (shown in Figure 21 by arrow 4). The data preview will be displayed in area 5.
Once you have entered the url, you can see the preview and change the name, always in the same window on "**onlineResourceName**" and then click at the bottom on "**updateLinkAnyway**" (indicated in Figure 21 by arrow number 7).

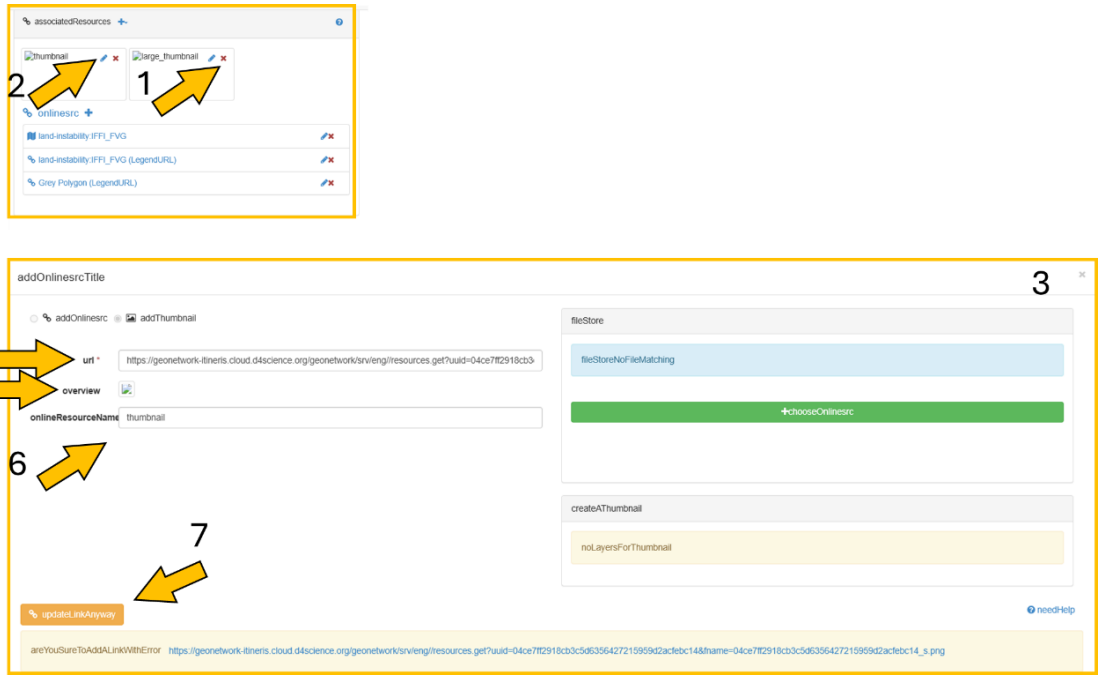


Figure 21 – Adding and see map preview.

On the same panel, you can see a preview of the loaded card. It is important to check "**onlinesrc +**" where the map display and the reference legend are present. Click on the "**pencil**" to check its specifications (Figure 22).

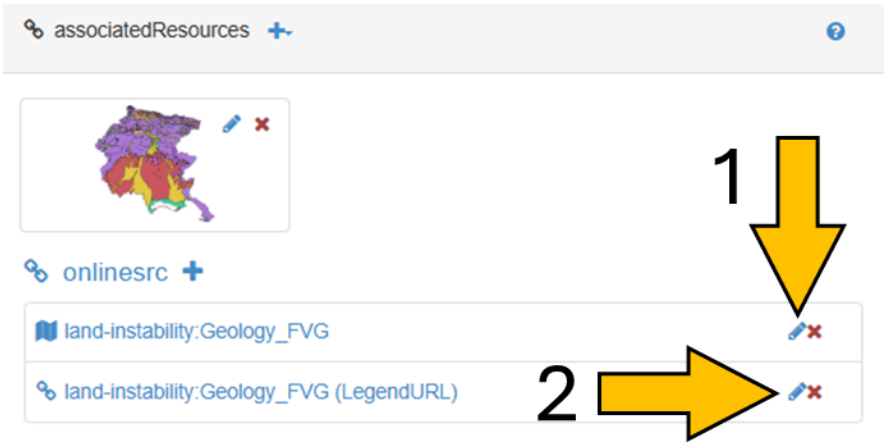


Figure 22 – how setting map and legend.

The arrow 1 in Figure 22 opens panel 1 in Figure 23. In "**protocol**" leave "**OGC Web Map Service (ver 1.3.0)**". The "**url**" can be left alone, and to set "**onlineResourceName**", just click on the cards listed above. In "**Description**" enter the name of the loaded card. Arrow 2 in Figure 22 opens panel 2 in Figure 23. Within the new panel, it must be checked whether the legend corresponds to the uploaded file.

For example, the last part of url (in bold in this sentence), the name of File uploaded has to be inserted: https://geoserver-itineris-downstream.cloud.d4science.org/geoserver/ows?service=WMS&request=GetLegendGraphic&format=image%2Fpng&width=20&height=20&layer=land-instability%3A**Geology_FVG**

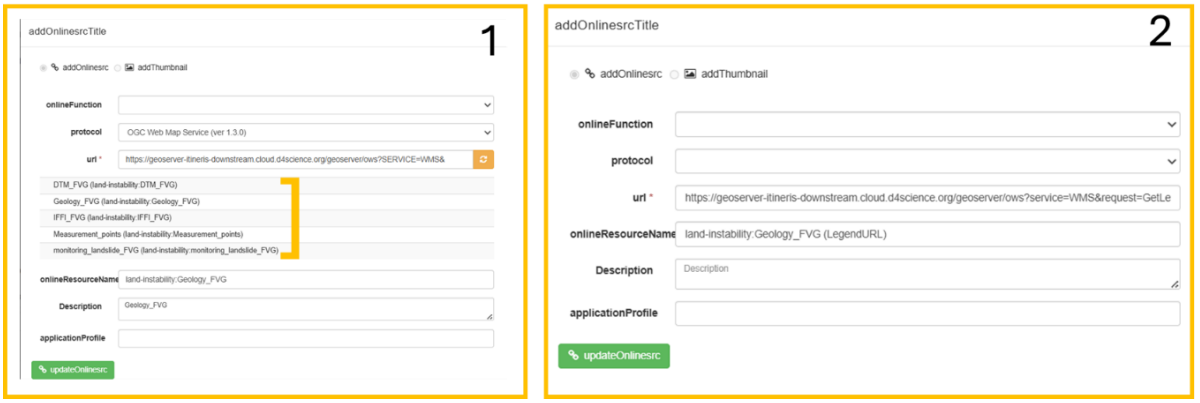


Figure 23 – Legend chose

Returning to the main page, you can see that on the right is the added map, while scrolling through the sidebar, you can fill in additional fields for the specific metadata associated with the uploaded file. In Figure 24, you can add the "**Institution's name**", the "**Responsible's name**" and "**E-mail**" to refer to for the data uploaded. Next, there are the specific parts of the file such as the "**File name**" which is the reference url, "**description file**" (marked with arrow number 3), the "**keywords**" associated with the file that can be added, changed or removed, and the type of "**theme**" to which the uploaded map refers. This specification is also present later in the compilation of metadata.

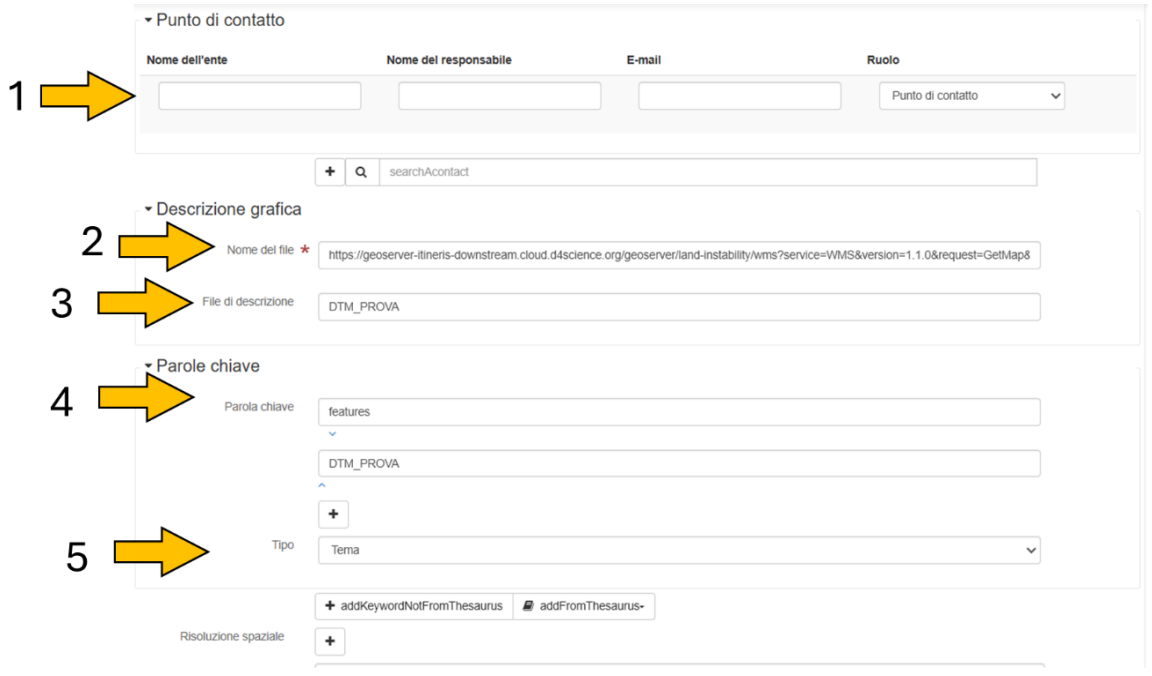


Figure 24 - Sections within Geonetwork for adding shapefile or raster data.

Continuing you can view the "**theme**" that can be changed through the selectbox (arrow 1) and file "**extension**" with coordinates in WGS84 (Figure 25, arrow 2).

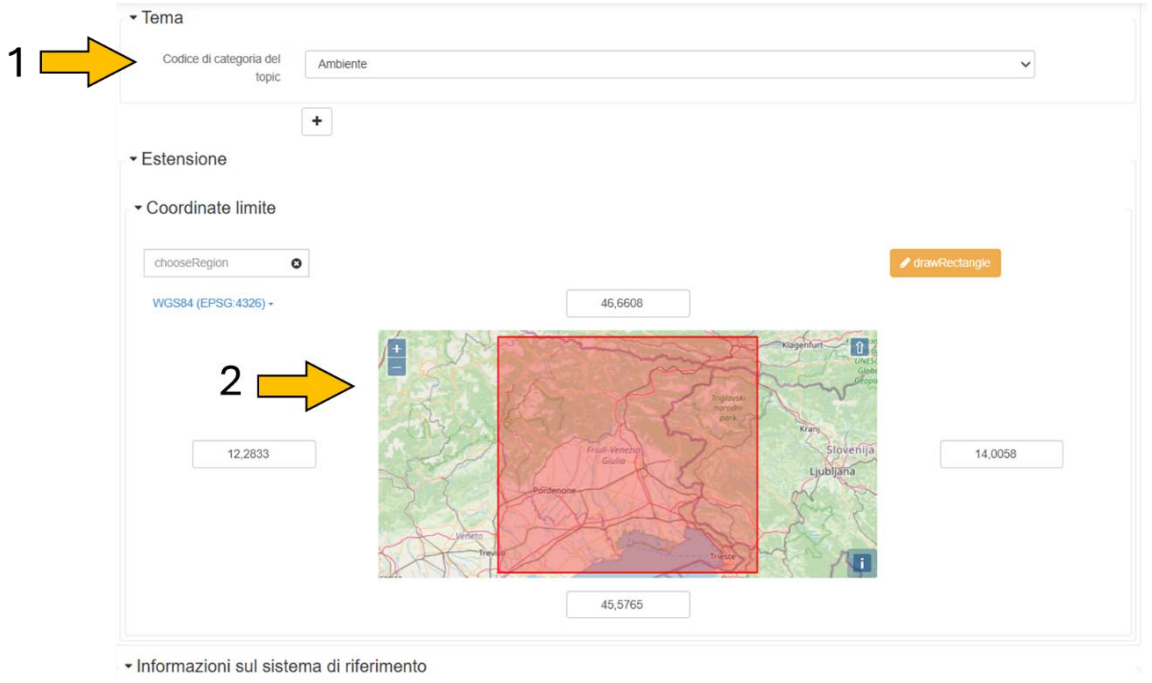


Figure 25 - Sections within Geonetwork for adding shapefile or raster data.

Then there is the information on the "**reference system**" (Figure 26 arrow 1 and 2) and "**metadata**" specifications with important ISO standardization specifications (Figure 26 from arrow 3 to 7). Finally,

the "**contact**" specifications are repeated, to which additional components can be added (Figure 26 arrow 8).

Figure 26 – Sections within Geonetwork for adding shapefile or raster data.

Once you have completed the necessary fields for the description of the map, you can save it by clicking on "**saveMetadata**" and then "**CloseEditor**" (Figure 27, arrow 1 and arrow 2). If you want to add more specifications you can click on the "**wink**" (Figure 27 arrow 3) and be able to choose from the structure "**Full**" or "**XLM**" (Figure 27 arrow 3 and 4). Clicking will open a more complex structure of compilation and description of the data.

Figure 27 – Save and close Editor

Below you will find two examples of a raster (Figure 28) or a shapefile (Figure 29) with their descriptive data specifications.

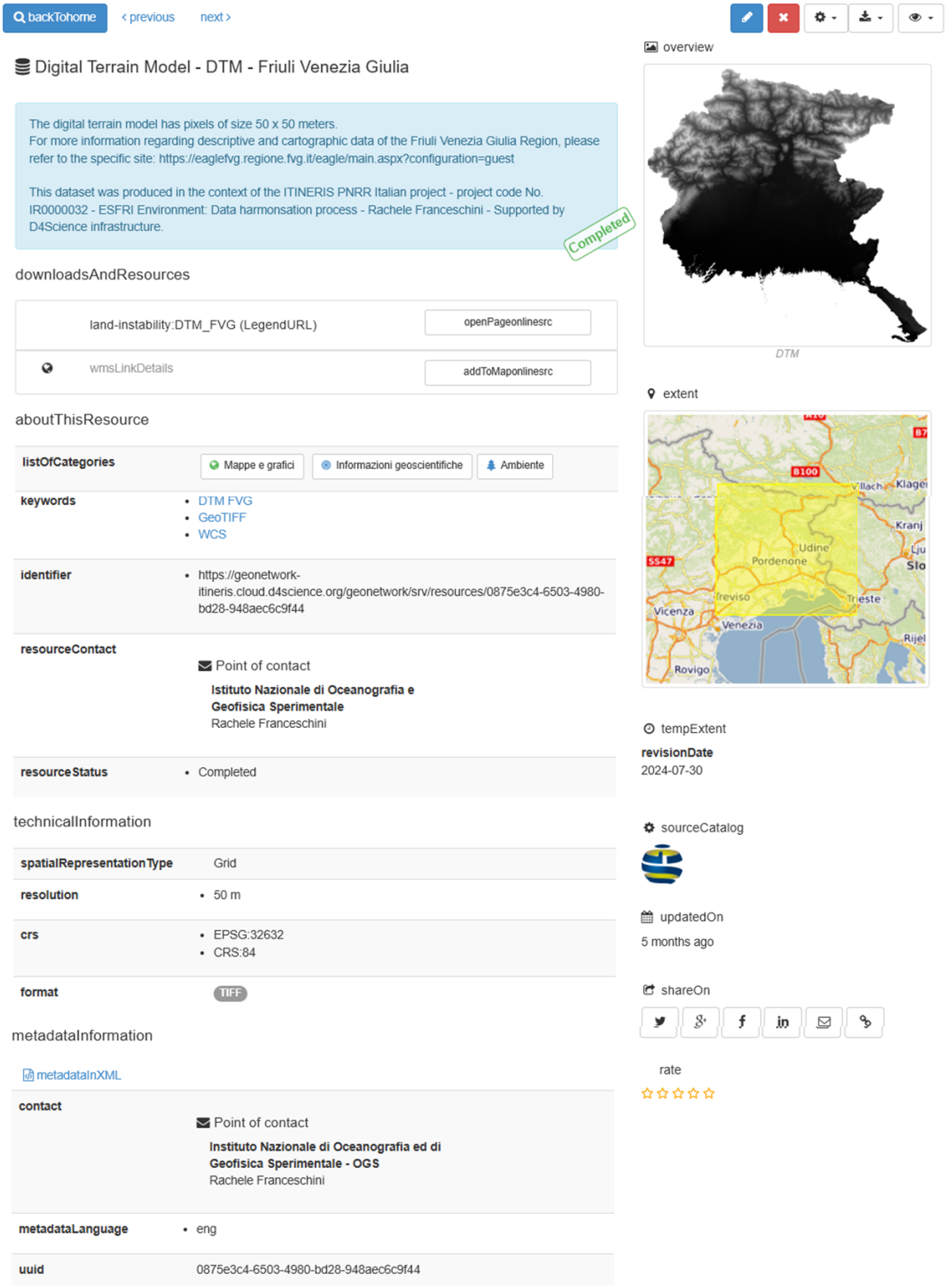


Figure 28 – Raster example

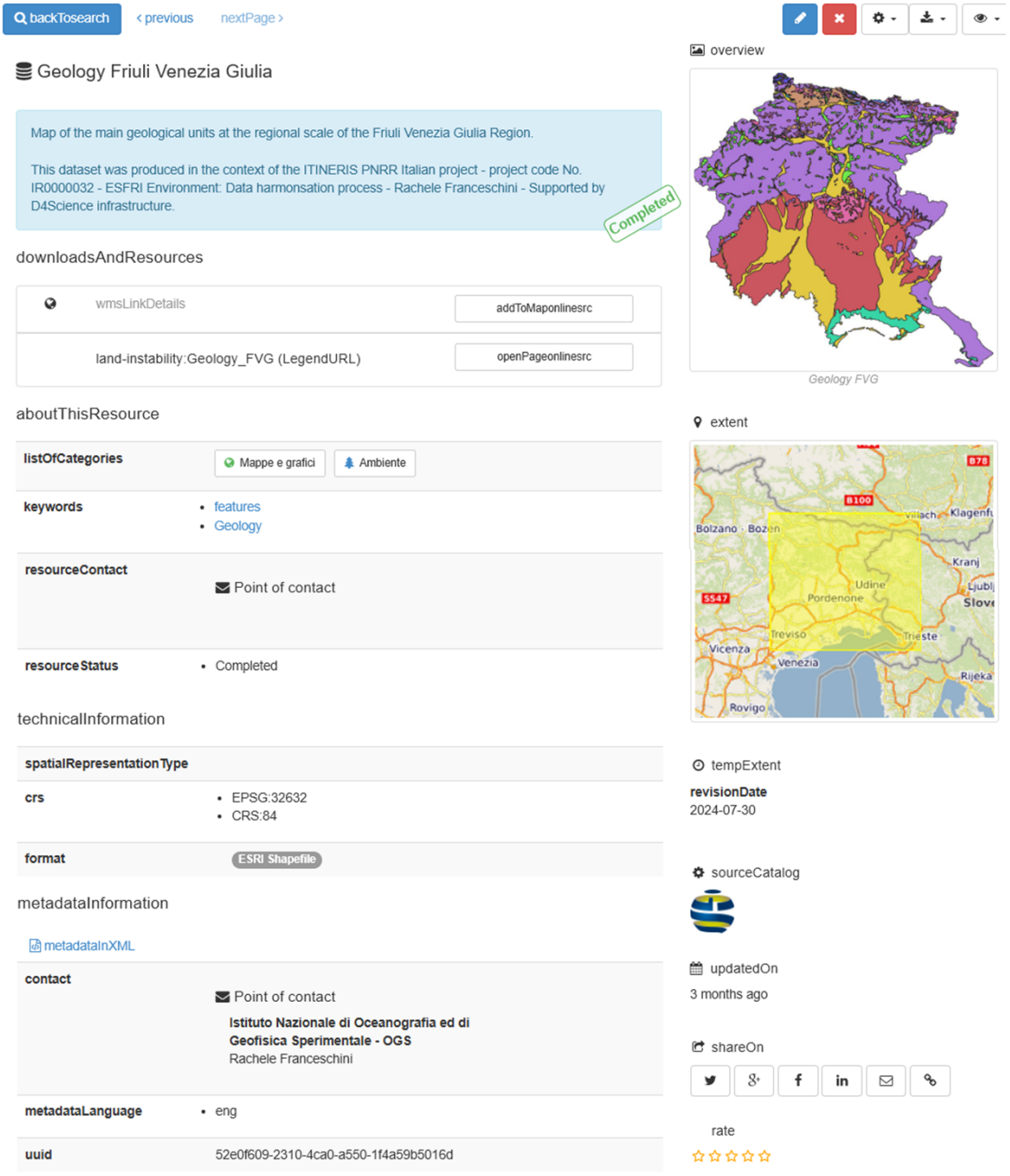


Figure 29 – Shapefile example

HOW TO UPDATE THE MAP ON WEBGIS

To load the map on a WebGis, you have to click on "**addToMaponlinesrc**" (Figure 30 arrow 1) and to view the legend you can click on "**openPageonlinesrc**" (Figure 30, arrow2).

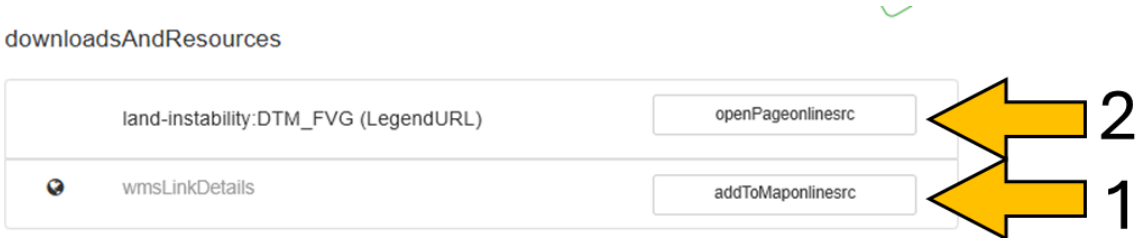
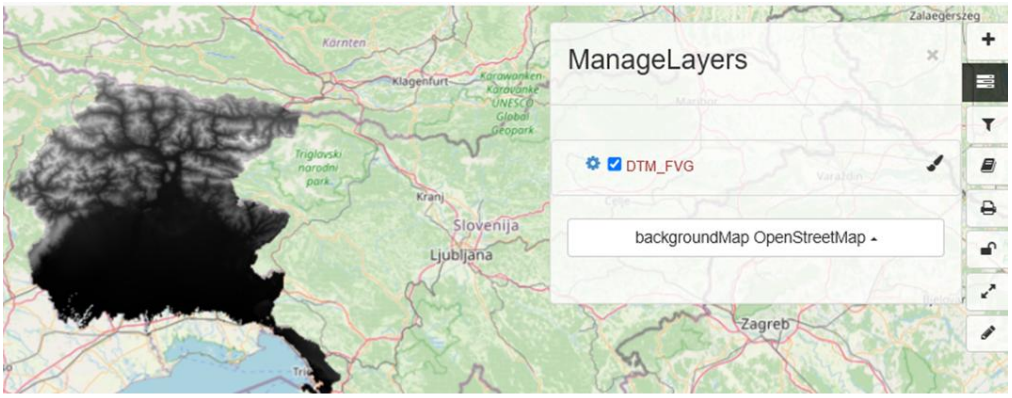


Figure 30 – How to add the map on the webgis (arrow 1) and see the legend (arrow 2)

Below is the map loaded into the webgis. On the right are located various tools that allow you to interact with the data and webgis. Multiple commands can be executed (Figure 31):

- **"Add Layers"** allows you to add KML, WMS, WMTS;
- **"ManageLayers"** allows you to interact with the inserted map, changing the transparency, view the legend, turn off or on the map, correct the extension of the map and view the metadata;
- **"FilterData"** permits you to filter the data;
- **"Contexts"** allows to reset, update or download (in xlm) the current state of the map;
- **"Print"** outlines the printable area;
- **"Measure"** allows you to measure distances;
- Finally, "**Annotations"** allows you to insert points, polygon annotations or load them from your own personal folder.



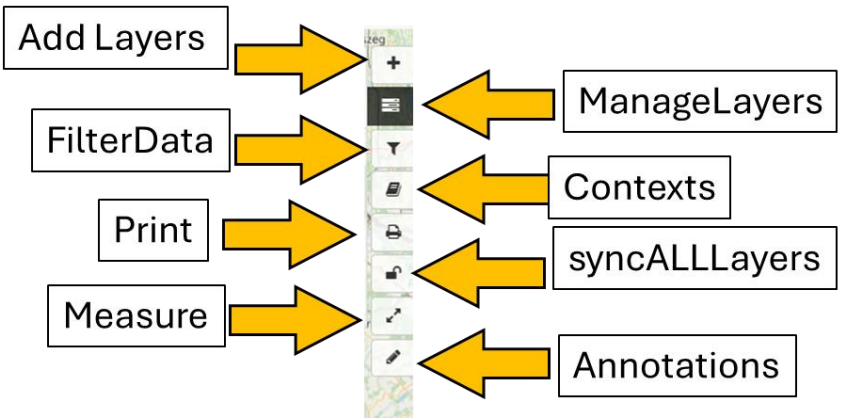


Figure 31 – Tools within WebGis

Within WebGis, it is possible to download the uploaded map files. Within the "**ManageLayers**", a tool inside WebGis, you can click on the small "**cogwheel**" next to the desired data (see Figure 32, arrow 1). This is followed by a selection box in which you can extend the zoom ("**layerExtentZoom**"), set the transparency ("**layerMetadata**") and download the file by clicking on "downloadFeature" (see Figure 32, arrow 2). The various formats in which you can download the data are displayed below: shp, csv, txt, etc.

In addition, inside the " **ManageLayers** " there is a small "**brush**" next to the name of the cartographic data. Click to see the corresponding legend.

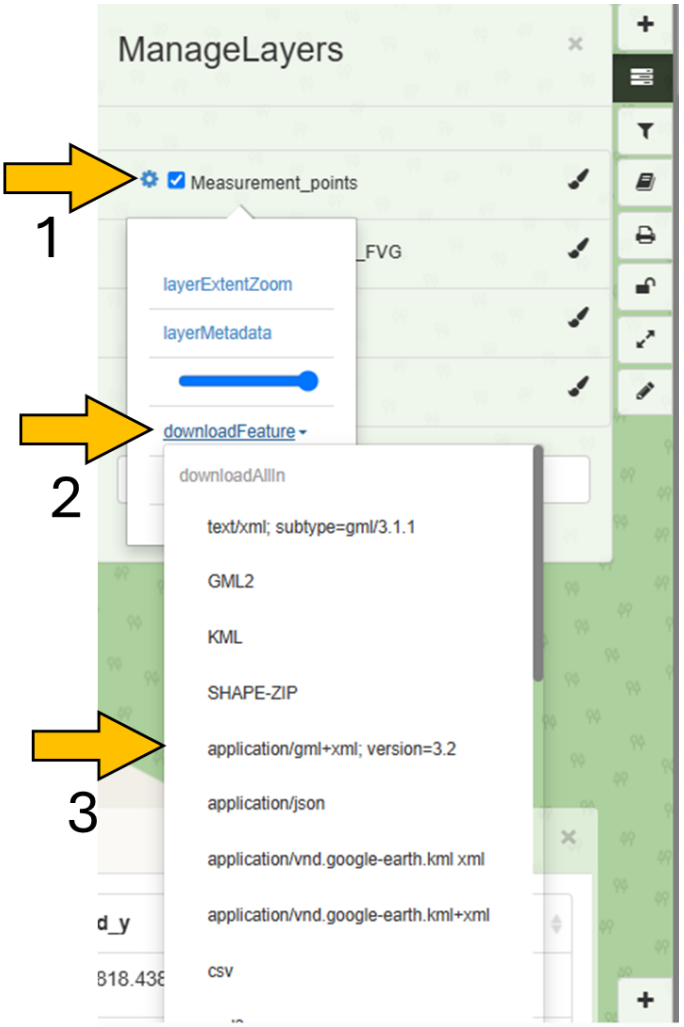


Figure 32 – How downloading data

HOW TO NAVIGATE IN GEONETWORK

The "**GeoNetwork**" mainly consists of 4 tools that allow you to navigate through the archive of uploaded products. Figure 33 shows the different products in the GeoNetwork.

1. If you click on "**Spatial Data Catalogue**" (arrow 1 in Figure 33), you can call up the repository to which the maps have been uploaded. An example of this is tab 6 and arrow 7. Tab 6 quantitatively shows the inserted products and which target they are set to, while arrow 7 shows the maps.
2. **"Search"** allows you to search for a file within the "**GeoNetwork**",
3. "**makeYourMap**" you can enter the WebGis and upload the maps

4. "+ **contribute**", as seen above, allows you to load new geodata.

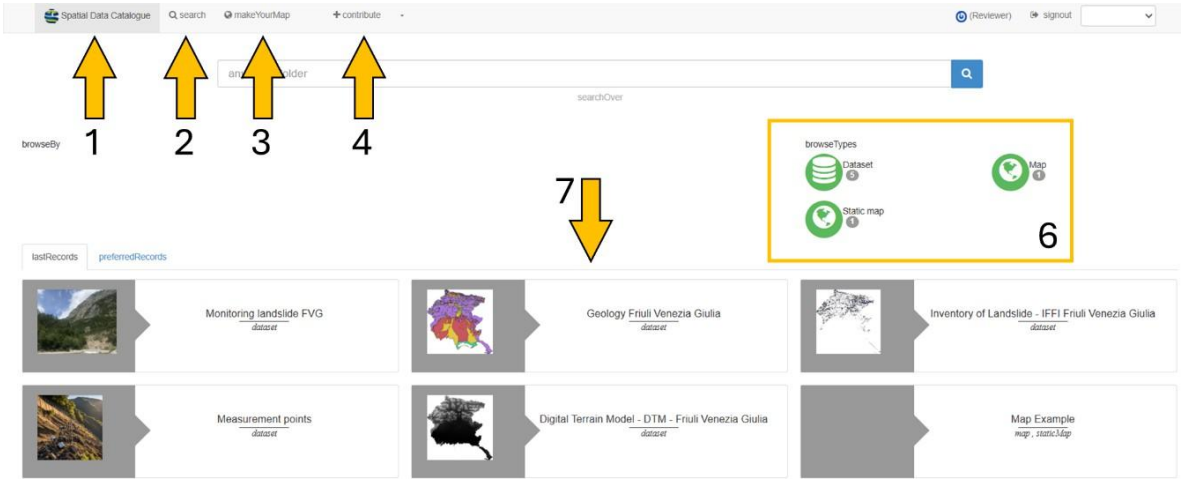


Figure 33 - Within GeoNetwork

If you click on "**Dataset**" in tab 6 of Figure 33, a second page opens, on which all uploaded data is displayed, followed by the respective description. An example is shown in Figure 34, where the geological map of Friuli Venezia Giulia is displayed at regional scale. At the bottom right there are three tools, the first is marked with arrow 1 and allows you to make changes to the uploaded file, then return to the procedure described above (Figure 20), the second arrow allows you to download the data in .kml format (useful for inserting it into Google Earth), finally the third arrow allows you to load the map into WebGis. If you then click on the icon and then on "**makeYourMap**", the map will be displayed.

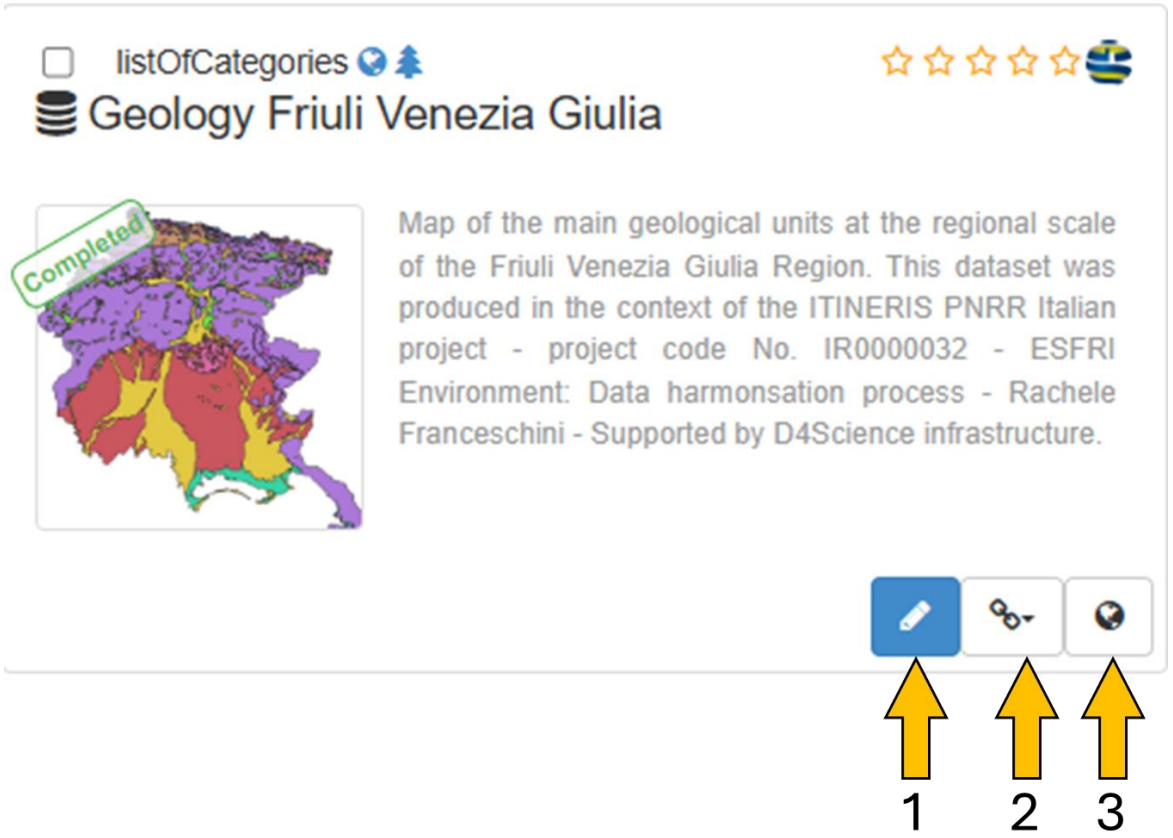


Figure 34 - Tools for each map

1.2.3. How to see monitoring systems and use applications

Within the Downstream VRE it is possible to view the monitoring systems in progress at pilot sites. From the drop-down menu that opens by clicking on "**Land application**" (Figure 35) you can choose whether to view the data monitored in near real-time by GBInSar at the Passo della Morte in Friuli Venezia Giulia (Figure 36), or access the application to quickly create and analyse tabular data from pilot site monitoring systems.

Figure 35 – Tools within Land applications

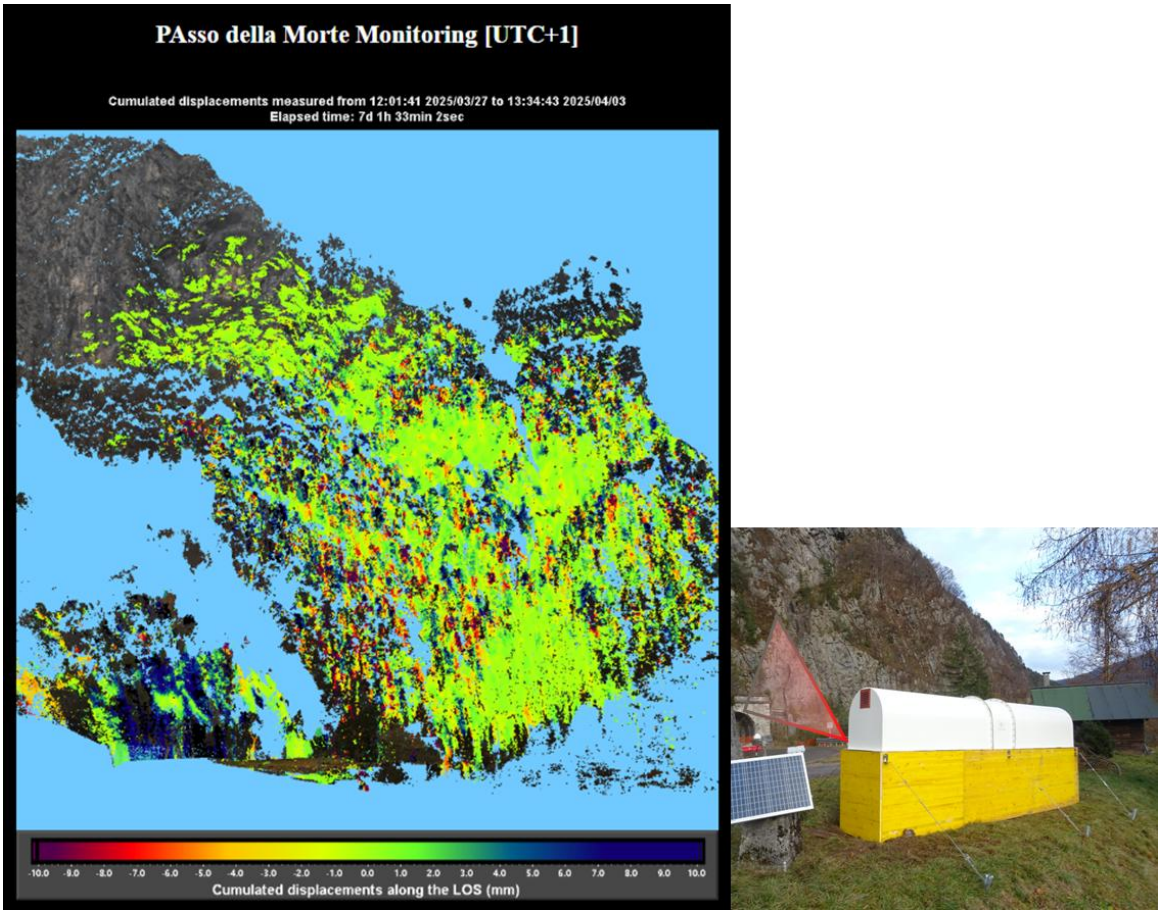


Figure 36 – GB-Insar

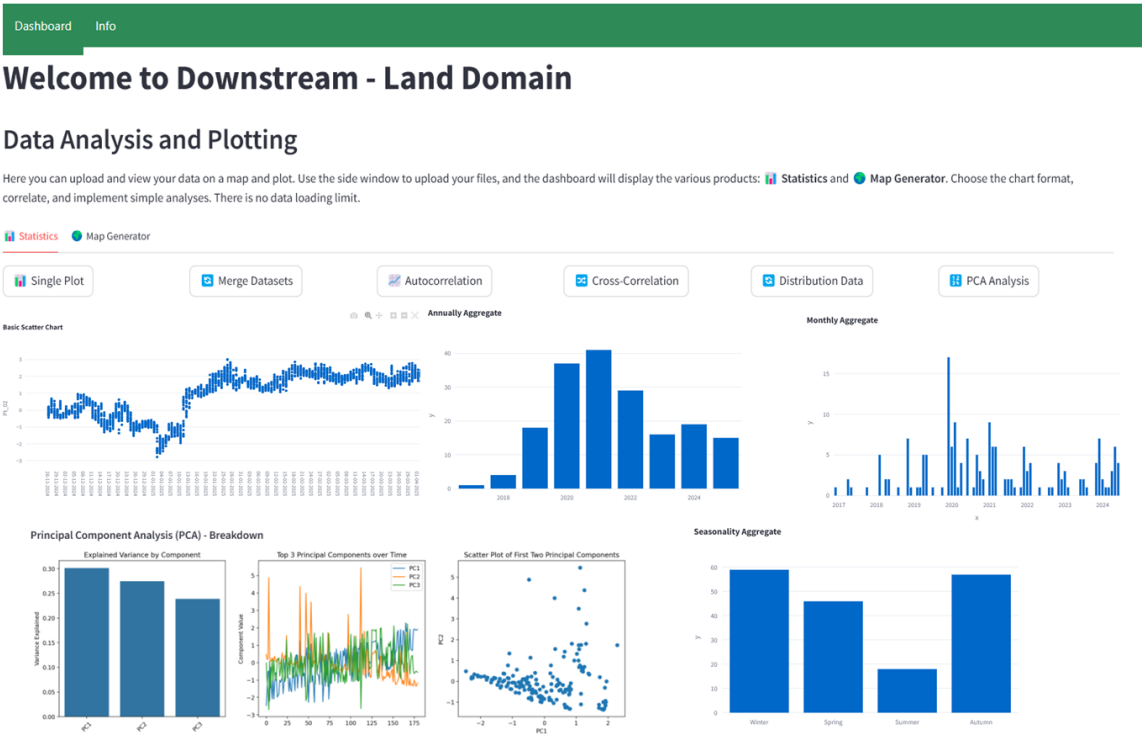


Figure 37 – Some plots for preliminary analysis

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