QUIETMED – Joint programme on noise (D11) for the implementation of the Second Cycle of the MSFD in the Mediterranean Sea.

Deliverable

D4.2. User manual of the Impulsive Noise Register of the Mediterranean Sea Region (INR-MED)

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PP: Restricted to other programme participants (including the Commission Services)	
RE: Restricted to a group specified by the consortium (including the Commission Services)	
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Abstract

This document presents a user manual for Impulsive Noise register of the Mediterranean Sea Region. The manual is divided into different sections separated by page sections (INR-MED page, map, upload data, download data and D11C1). A short description about the purpose is included in each section. Some pages of the noise register have extended functionalities. The functionalities are explained in the respective section of the user manual.

Besides, the user manual provides instructions of how to proceed when error messages come up during the uploading stage.

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Bibliography

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List of Abbreviations

INR-MED	Impulsive Noise Register of the Mediterranean Sea Region
GIS	Geographic Information System
GES	Good Environmental Status
TG	Technical Group

1   Introduction.

The QUITMED Project is funded by DG Environment of the European Commission within the call "DG ENV/MSFD Second Cycle/2016". This call funds the next phase of MSFD implementation, in particular to achieve regionally coherent, coordinated and consistent updates of the determinations of GES, initial assessments and sets of environmental targets by July 2018, in accordance with Article 17(2a and 2b), Article 5(2) and Article 3(5) of the Marine Strategy Framework Directive (2008/56/EC).

The QUIETMED project aims to enhance cooperation among Member States (MS) in the Mediterranean Sea to implement the Second Cycle of the Marine Directive and, in particular, to assist them in the preparation of their MSFD reports by 2018. This is carried out through: i) promoting a common approach at Mediterranean level to update GES and Environmental targets related to Descriptor 11 in each MS marine strategies, ii) development of methodological aspects for the implementation of ambient noise monitoring programs (indicator 11.2.1) and, iii) development of a joint monitoring programme of impulsive noise (Indicator 11.1.1) based on a common register, including gathering and processing of available data on underwater noise. The Project has the following specific objectives:

- ✓ Achieve a common understanding and propose a GES assessment methodology (MSFD, Article 9) , both impulsive and continuous noise, in the Mediterranean Sea.
- ✓ Develop a set of recommendations to the MSFD competent authorities in order to review the national assessment made in 2012 (MSFD, Article 8) and the environmental targets (MSFD, Article 10) regarding the Descriptor 11- Underwater Noise, in a consistent manner taking into account the Mediterranean Sea Region approach.
- ✓ Develop a common approach for the definition of threshold at MED level and impact indicators (in line with TG Noise future work and revised decision requirements).
- ✓ Promote and facilitate the coordination of underwater noise monitoring at the Mediterranean level with third countries of the region (MSFD Article 6). This will be done by promoting building capacities of non-EU countries and taking advantage of the ACCOBAMS-UNEP/MAP cooperation related to the implementation of the Ecosystem Approach Process (EcAp process) on underwater noise monitoring.
- ✓ Coordinate with the Regional Sea Convention (the Barcelona Convention) to ensure the consistency of the project with the implementation of the EcAp process
- ✓ Recommend a methodology to assess the noise indicators in the Mediterranean Sea basin taking into account the criteria and methodological standards defined for Descriptor11 (Decision 2010/477/EU, its revision and Monitoring Guidelines of TG Noise).
- ✓ Establish guidelines on procedures to perform sensor calibration and deployment of mooring systems in order to avoid or reduce any potential inconsistencies while monitoring ambient noise (D 11.2.1). These common recommendations should allow to obtain high quality and comparable data as well as improve the traceability of the sensor in case of unexpected results.
- ✓ Establish guidelines to undertake high quality signal process and obtain the ambient noise indicators (D 11.2.1).

✓ Implement a Joint register of impulsive noise (D11.1.1) and a hotspot map at Mediterranean Sea Region level by gathering impulsive noise national data and joint processing.

✓ Enhance collaboration among a wide network of stakeholders through the dissemination of the project results, knowledge share and networking.

To achieve these objectives, the project is divided into five work packages. The structure and the relation among packages are shown in Figure 1.
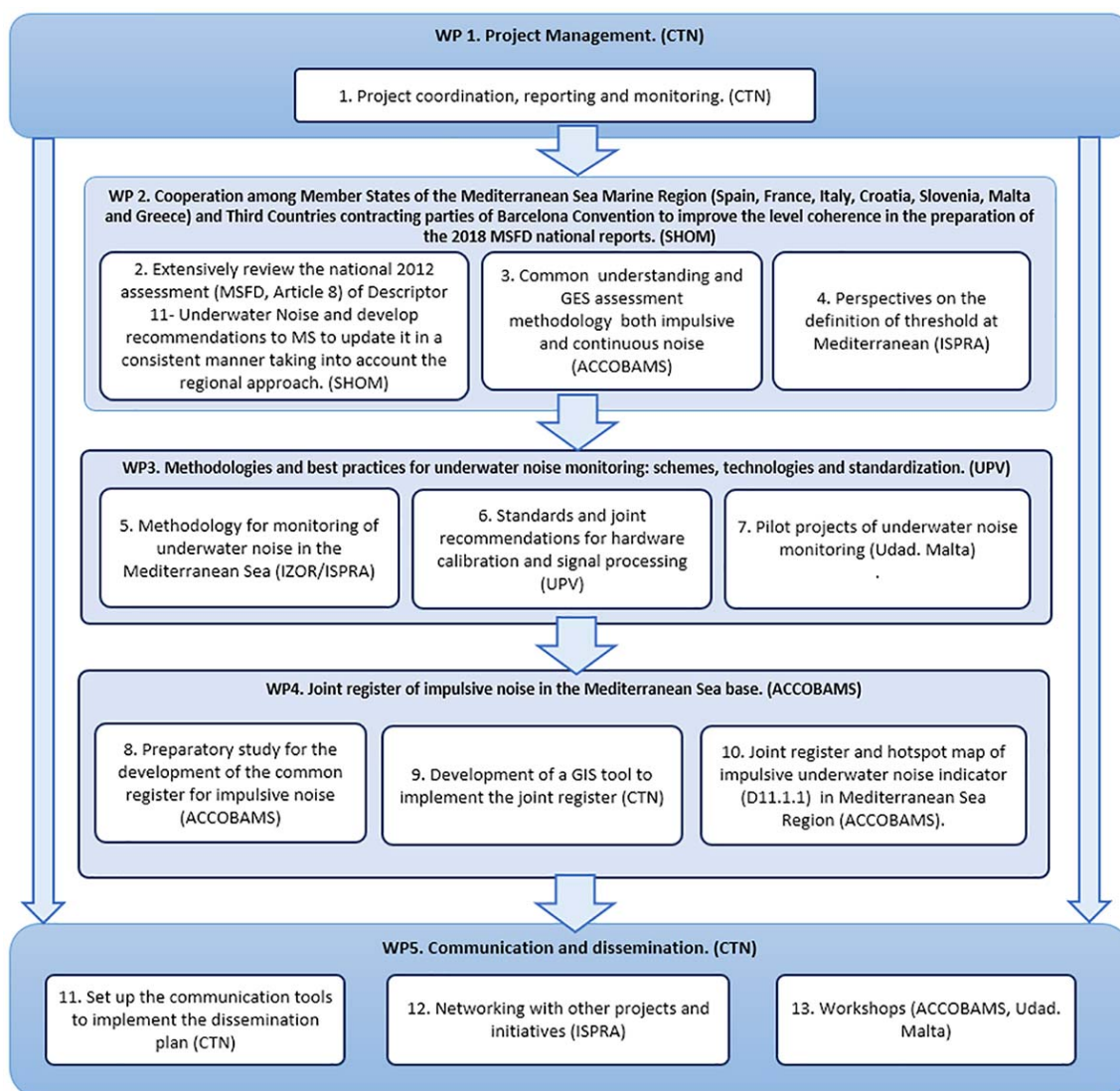

Figure 1. Work Plan Structure

The project is developed by a consortium made up of 10 entities coordinated by Marine Technology Center (Centro Tecnológico Naval y del Mar) and it has a duration of 24 months starting on January 2017.

This document reports the user manual for INR-MED web application.

2 INR-MED What is?

INR-MED is the acronym of Impulsive Noise Register in the Mediterranean Sea region. INR-MED is a tool developed to monitor and assess the underwater noise in the Mediterranean Sea region. The tool provides the location of the underwater noise events in a web map. The georeferenced information for each of these events is used to apply mitigation measures in those areas affected by underwater noise.

The site uses a spatial database to store underwater noise data that has been previously uploaded by Member States. In general, spatial databases provide the ability to store georeferenced information and undertake analysis of the data. The information contained in the database is requested when the user download data or when the geographic information is shown in the map.

INR-MED uses ArcGIS for Server map server technology to show the spatial information in a web map. The map server gets the data from the database and plot it in a map using a custom symbology to represent each feature.

The coding structure of the site is developed in Python. Python is an interpreted, object-oriented, high-level programming language. This programming language provides a high compatibility between GIS tools and web development.

The operations supported by the tool are: visualization, upload and download. The data contained in INR-MED can be visualized in the map application and downloaded by everyone but only institutions of Member States are allowed to upload their underwater noise data.

INR-MED generates D11C1 criteria values taking into account the underwater noise data uploaded to the web application. These criteria values help to asses underwater noise impact and to perform mitigation actions.

3   INR-MED user manual

The procedures on how to use the noise register functionalities are explained in this section as well as the descriptions of each functionality. Additionally, this manual explains how to solve the possible error messages raised during the underwater noise data uploading process.

INR-MED is divided into five parts: Home page, Map, Upload, Download and D11C1 page. Each part corresponds to a different page of the INR-MED web application.

It should be noted that the visualization of some elements contained in each page can be different depending on the web browser used.

3.1   Home page

Marine Directive 2008/56/CE (MSFD) represents a huge progress to preserve marine environment as it aims to achieve Good Environmental Status (GES) by 2020. It highlights the need to establish anthropogenic noise levels that do not adversely affect marine environment (Descriptor 11).

For the MSFD implementation, reporting and monitoring of impulsive underwater noise events is a requirement in national and regional monitoring programmes regarding D11. This web-GIS site has been created as a joint tool to provide and share information regarding anthropogenic impulsive sounds in water in support of the implementation of the second cycle of the MSFD in the Mediterranean Sea Region. This portal is one of the main outputs of the QUIETMED project funded by DG Environment (ENV), European Commission.
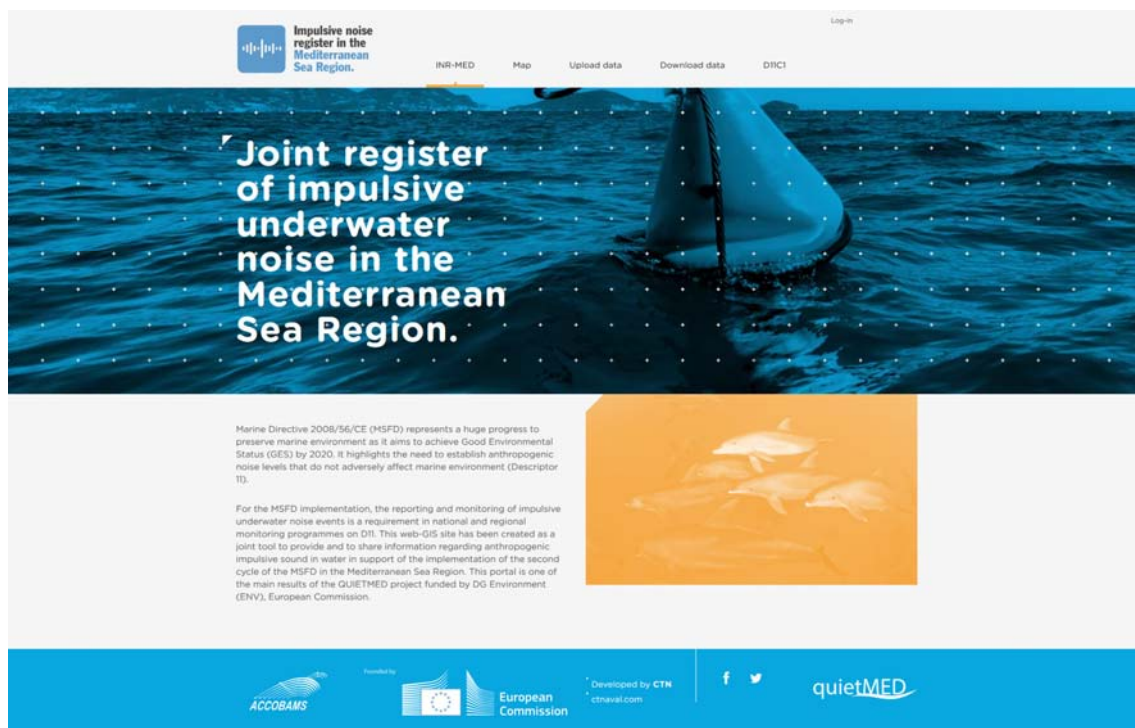

Figure 2. Home page

3.2 Map section

The map section is the main page of the Mediterranean noise register. In this page users can see the underwater noise data over a base map as well as the different marine subregions of Mediterranean Sea.

In addition, the map section has tool buttons to extend its functionality. The tool buttons can be identified in the map area as circular icons. There is a background color difference between tool buttons, the background color difference helps to differentiate between buttons with basic functionality and buttons customized for INR-MED. White background buttons belong to the basic functionality function tools. The blue background buttons correspond to the functionality customized for INR-MED. Explanations about basic functionality buttons and INR-MED customized buttons apart from explanation of each button functionality are provided in next sections.
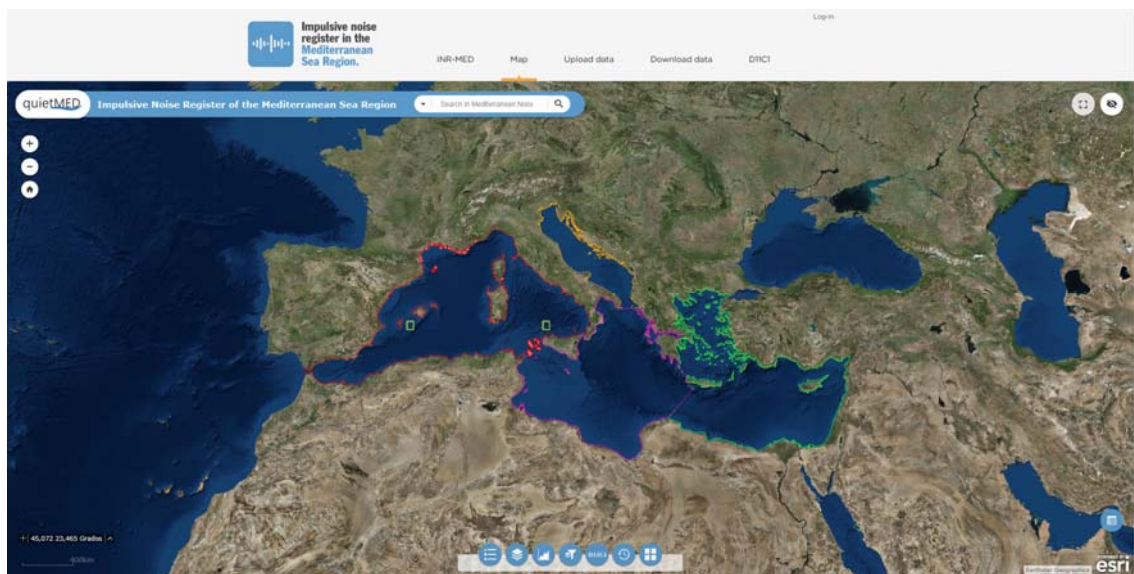

Figure 3. Map page

3.2.1 Basic functionality

The basic functionality is a set of tools to manipulate map properties as zoom level, the map view area or activate full screen mode. The basic functionality is represented as white background buttons in the map area. It is important to mention that basic functionality buttons can be found in two sections of map area. Default view and zoom button tools can be found in the upper left section of the map while overview map and full screen button tools are located in upper right section. Additionally, there are some functionalities that have not an associated button as the panning tool, coordinates bar, scale bar and pop ups functionality.

Basic functionality section explains the performance of the basic functionality buttons of the web map.

3.2.1.1   Panning

Panning tool is used to move the map view to another location. The pan tool is activated by default. To move the map to another location the user must maintain pressed the left button of the mouse and move it to the opposite side of the map area where the user wants to pan.

There are some functions to pan it directly to a location. This can be achieved using the search tool, the pop-up window or the table of attributes functionality.

3.2.1.2   Zoom tool

The user can change the scale of the map interacting with the buttons + and - (+ , −).

- To increase the scale the + button must be pressed. When this button is pushed the level of detail is increased but the extent of the map is reduced.
- To reduce the scale the – button must be pressed. When this button is pushed the map show a bigger extent but the level of detail of features is smaller.

3.2.1.3   Overview map

Overview map can be found in the map section like the next icon: . Thanks to this tool the user has an overall view of the studied area. When the overview map is shown the icon button

changes to a non-cross eye: . This tool allows to change the map view to another location by selecting an area of overview map window.

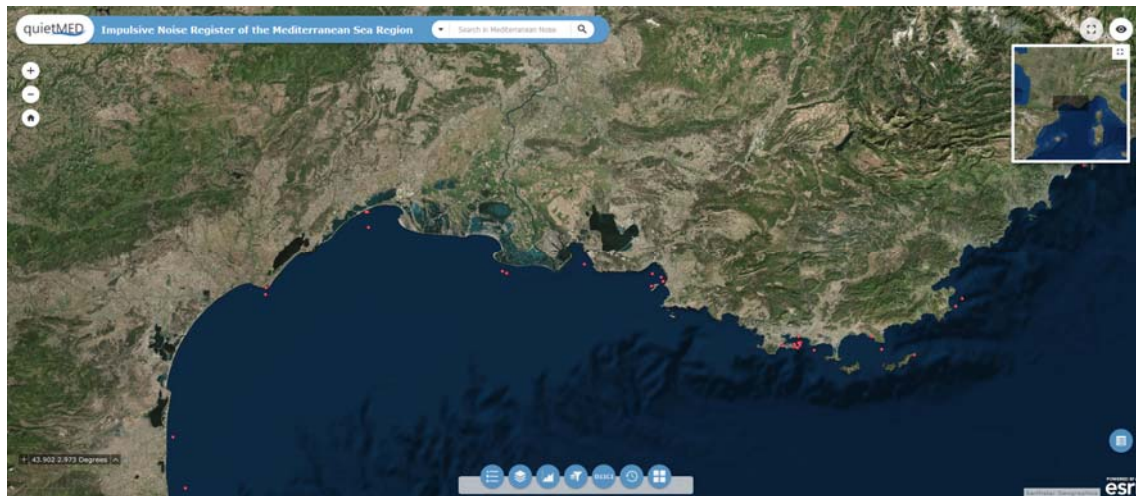**Figure 4. Overview map screenshot**

Figure 5. Map view with overview map activated

As it can be seen in both images the blurred black rectangle represents the current map extent.

The overview map window can be zoomed using the ⛶ button.

3.2.1.4 Default view

The default view button aims to set the initial map view location. The map has a predefined map view position (centered in a coordinate) and a zoom level parameter in which the map is visualized. This button changes the current zoom level and position of the map view parameters

to its predefined value. Default view button has the symbol of a house 🏠.

3.2.1.5 Full screen mode

INR-MED has a function to set the map in full screen mode. This utility is useful to improve the quality of the map view and to optimize the map section to small screen sizes. The full screen

button looks like the next image: ⛶.

3.2.1.6 Coordinates bar
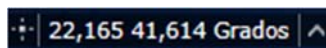
Figure 6. Coordinate bar tool

The coordinates bar is located at the lower left part of the map interface and shows the coordinates in which the pointer mouse is located.

To get a coordinate in a specified point of the world and keep it in the coordinates bar tool, the get coordinates button must be pressed (⊹). Then, user should select with the left button of the mouse a location in the map to obtain coordinates. The output coordinates will appear in the coordinates bar.

In addition, this tool provides a list of geographic reference system to apply transformations directly in the map. The available reference systems are:

- WGS 1984

- WGS 1984 Web Mercator Auxiliary Sphere projection

- ETRS 1989

- ETRS 1989 Lambert Azimuthal Equal Area

The default coordinate system reference is WGS 1984 Web Mercator Auxiliary Sphere projection.

The same process explained before must be followed to obtain transformed coordinates. Firstly, user should choose a coordinate system of the list shown above, then it is needed to click on get coordinates button. Once the button is clicked a desired location in the map must be selected with left mouse button. The transformed coordinates will appear in the get coordinates bar.

3.2.1.7   Scale bar

400km

Figure 7. Scale bar for INR-MED

The scale bar is an element located in the lower left part of the map section. The scale bar indicates the current scale value and is directly related to the zoom level. The number matched with the km units shown in Figure 7 describes the ground distance for a determined scale bar size.

3.2.1.8   Pop-ups

Pop-ups are graphical interfaces that display additional information of noise events, grids and locations contained in INR-MED. The pop-ups are activated when a feature is selected in the map. Only one pop-up window can be activated for each feature in the map. If there are some features overlapped between them the pop-up shown a counter in the upper bar. To see the next or the previous pop-up from the overlapped feature, arrows icons (◀ ▶) can be used.
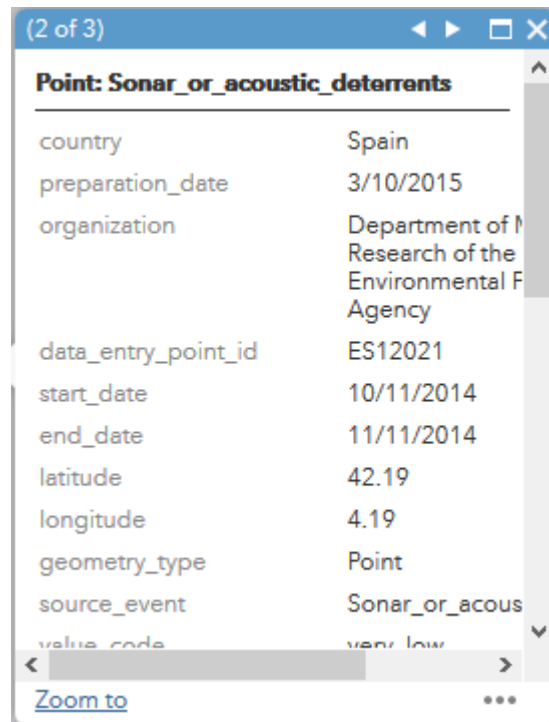
Figure 8. Pop-up tool view for underwater noise point feature

Pop-ups window have some tools and options to work with the selected features. The "Zoom to" tool centers the map view over the selected feature. In addition, there is an option list located at the lower right part of the pop-up (***).

Figure 9. Option list for pop-up widget

- Pan to: moves the map view to the selected feature but do not apply a new zoom parameter.
- Add a marker: adds a marker over centroid feature position.
- View in Attribute Table: shows the selected feature information in the attribute table.

3.2.2   INR-MED tools

This section explains the specific tools for INR-MED. These tools are created or configured to be used in the INR-MED. The button tools belonging to this section are defined as blue background and are generally located in the bottom part of the map. The search tool and attribute table filter has not an associated button but will be described anyway.

3.2.2.1 Legend

Figure 10. Legend widget button

The legend shows and define the layers that are shown in the map and the symbology of each layer. The legend is useful to provide information about the activated layers for visualization. To activate the legend, users should click on the legend button shown in Figure 10.

3.2.2.2 Layer list

Figure 11. Layer list widget button

The layer list widget is a common tool of Geographic Information Systems (GIS) as it allows to see all feature layer elements of the map application as a list view. The elements contained in the layer list are layers that represents a different geometry feature (points, lines, polygons…). One of the functions of the layer list tool is to hide or show the layers of interest in the map. To show a layer, the empty square near layer name must be clicked ( ). If the layer is visible on the map the empty square will be highlighted as a blue check ( ), to hide the layer the highlighted blue cheeked square must be clicked.

It is important to mention that enable D11C1 criteria Value/Calculation contained layers in Layer list widget may cause issues on the visualization experience. Each D11C1 layer has a large amount of information for a different period of time (years and months). When some layers are overlapped, only the top layer will be visualized. It is recommended using filters to show the desired information in the map and show only one layer for each spatial unit. The D11C1 Calculation tool is a good choice to avoid this issue. More information about this tool is explained in Section 3.2.2.5.

This tool has options to apply changes to all layers of the map. To enable these options the button near to operational layers title must be pressed ( ). Once this button is activated, a list of options will be deployed:
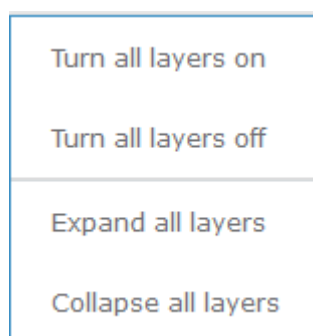

Figure 12. Option set for layer list tool

- Turn all layers on: activate visualization of all layers contained in layer list to be visible on the map.
- Turn all layers off: deactivate visualization of all layers contained in layer list to be hidden in the map.
- Expand all layers: unfold all items in layer list.
- Collapse al layers: fold all items in layer list.

For each element in the layer list, a list of options is attached to interact in the selected layer. The option list for each layer can be visualized by pressing the option button represented as three horizontal points (•••). Each item has different options list. There are three layer types: layer service name, group layers and feature layers.

- Layer service name: This element is located at the top-level item structure of layer list. This element is used to contain all group layers and feature layers of the map service and provides the name of the map service. The available options related to this element of the layer list changes all layers properties contained in it.
- Group layers: These layers are used to group feature layers. The use of this layers aims to organize the layers. It is possible to group other layer groups.
- Feature layers: these layers contain the geometries that are plotted in the map.

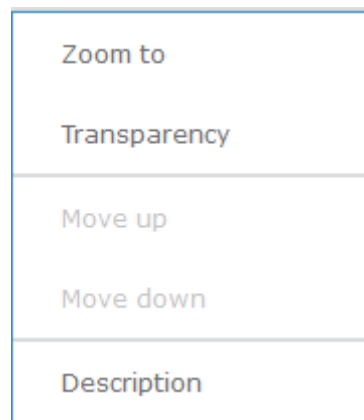The option list for layer service name looks like this picture:

Figure 13. Option list for first order items of layer list tool

- Zoom to: this option changes the zoom and the position of the map view focusing to the features contained in this layer.
- Transparency: establish a transparency value to the layer.
- Move up: changes the visualization layer order one unit upward. The layers located in upper positions overlaps layers under them.
- Move down: changes the visualization layer order one unit downward. The layers located in lower positions are overlapped by layers above them.
- Description: gives the description of the layer. This option shows the service properties like tittle, summary, coordinate system, layers, symbology…

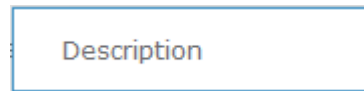In the case of group layers, the available options are as follows:

Figure 14. Options for two or more level order item

- Description: gives the description of the layer. This option shows the service properties like title, summary, coordinate system, layers, symbology…

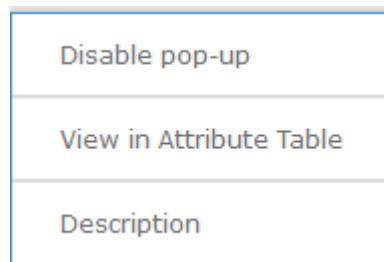Finally, feature layers list options are the next:

Figure 15. Feature layer option list

- Disable pop-up: allows to disable the pop-up window when a feature of this layer is selected in the map. If the pop-ups are disabled, the Disable pop-up option changes to Enable pop-up option.
- View in Attribute Table: this option sends the alphanumeric information of the feature layer to the attribute table.
- Description: gives the description of the layer. This option shows the service properties like title, summary, coordinate system, layers, symbology…

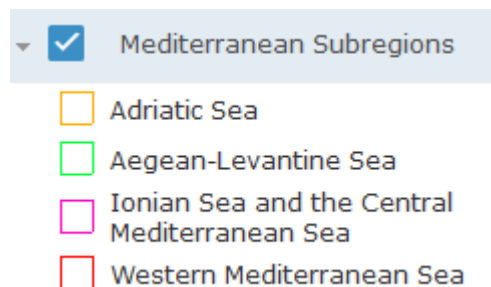Symbology of feature layers are shown unfolding the feature layer item.

Figure 16. Applied symbology for Mediterranean Subregions layer

3.2.2.3   Chart

Figure 17. Chart widget tool

Charts are used to show and compare a dataset closely linked. To use charts in INR-MED the chart icon must be pressed (icon highlighted above).

INR-MED has predefined charts, the predefined charts of INR-MED are the next:

Figure 18. Available chart list for chart widget

To interact with the predefined charts over the data currently updated in the noise register it is needed select a chart of the list shown before. The next step is to select the desired options to plot the graphic.

Figure 19. Options window for charts tool

The last step is to press the apply button and the graphic content will be generated.

Figure 20. Chart results window for charts tool

The chart provided in Figure 20 is interactive. If the mouse cursor cross over a bar chart the features associated with that bar highlighted in the map. In addition, if a bar chart is selected by pressing with left mouse click the map view changes his zoom and position parameters in order to center to the features associated with the selected bar chart.

Charts tool has four kinds of charts: bar chart, pie chart, column chart and line chart. Chart type selection can be done by pressing a dot in the Charts Results window (⚬ ⚬ ⚬ ●).

The chart can be maximized using the icon (🔍) located in the upper right part of the Charts Results window.

Options for customize charts (change color of bars, hide/show axis…) can be found in the settings button (⚙) placed near the maximize chart button.

3.2.2.4   Filter noise data

Figure 21. Filter noise data widget button

Filter noise data widget filters underwater noise data uploaded by the users. The available options for filtering are the following:
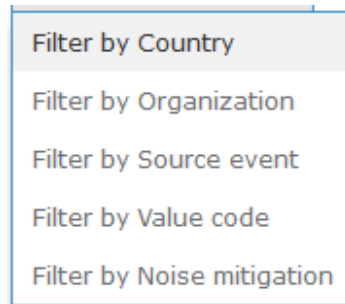
Figure 22. Filter list for Filter noise data tool

In Figure 22 can be appreciated that no filter by date is provided. In case of the desired filter to apply is related with the dates in which impulsive sound sources occurs Time slider widget must be used.

When a filter is chosen the available options for this filter are shown in the select box located below.
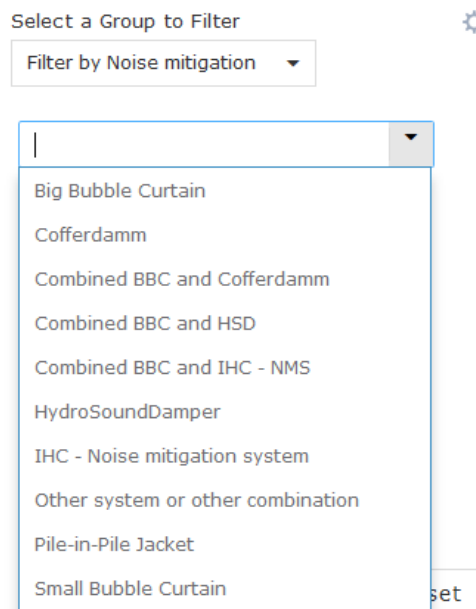
Figure 23. Option list for Noise mitigation field

To apply a filter in the map, the Apply button must be pressed once the option for a filter is selected. If the filter applied wants to be removed the Reset button must be selected.

This tool has an option menu to improve functionality. To see the options menu of the tool, select the (⚙) icon. The next window must appear:
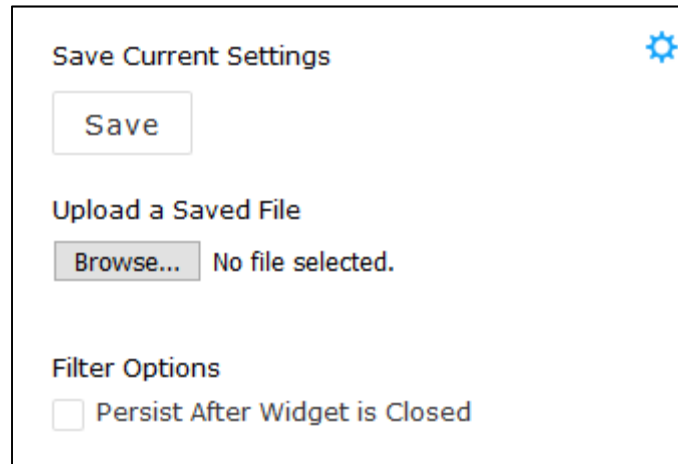
Figure 24. Options window for Filter noise data widget

The save button can save your filters to be loaded later. The file is saved in JSON format.

In addition, a load button is provided to restore the filter saved previously.

The last option (Filter Options) allows to keep the filter even if the tool is closed.

3.2.2.5 D11C1 calculation

Figure 25. D11C1 calculation widget button

D11C1 calculation aims to calculate D11C1 criteria taking into account the uploaded noise data. The tool is divided in three sections: temporal scale, spatial scale and unit of measurement calculation.

Figure 26. Filter D11C1 criteria main view

The spatial scale is used to select the spatial unit to plot the D11C1 values in the map. The available options are: region, subregion and GFCM grid.

Regarding temporal scale options, possible choices are: year and month. Temporal scale is used to show D11C1 results in the selected temporal unit. If the year option is selected, the maximum value that can give D11C1 criteria is 365. Otherwise, when the month option is selected as temporal scale, the maximum values of D11C1 criteria are 28 or 29 for February and 30 or 31 for the rest of the months.

The unit of measurement is intended to show the result in a determinate unit. In the case of D11C1 Days the output result will be the days in a year or month in which noise events occur. In the previous paragraph was explained the possible outputs result for D11C1 Days calculation for some cases. If the option selected is D11C1 Area, the output values are shown in percentage calculated as the ratio between number of blocks with impulsive sources and total blocks count in a specific region. D11C1 Area shows results in subregion and region spatial scales only. The reason of that is because GFCM blocks are used to calculate the percentage of blocks located in these spatial scales.

Once the options explained before are selected it is required to choose in the combo box section a year (and month if the Month option is selected in temporal scale) in which indicator will be shown in the map.

An optional checkbox can be activated if the user chooses to synchronize noise data with the indicator results. Activating this option noise data fulfilling filter requirements will be shown in the map. This is useful when a spatial comparison between D11C1 results and the uploaded noise data is required.

The filtered result will appear in the map by pressing the Filter Data button. The Clear filters button is used to clean all the filters of the tool and restore the default visible layers.

3.2.2.6   Time slider

Figure 27. Time slider widget button

INR-MED provide a tool to filter underwater noise by date. The tool has a slider in which two dates can be selected. The underwater noise events occurred between selected dates will be shown in the map, and non-contained dates will disappear from map visualization.
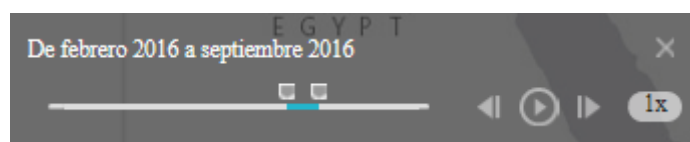
Figure 28. Time slider widget main view

When the tool is opened for the first-time, noise data of a predefined interval is shown in the map. In addition, time slider tool steps up automatically the date interval. The pause button must be pushed to stop the automatic increment date interval ( ), to start the time animation press the button ( ). If the user wants to step up or step down the date interval, there are two buttons to achieve it: skip-previous ( ) and skip-next ( ).

Autoincrement interval can be modified to increase intervals faster or slower. By default, the initial velocity is 1x, but this value can be modified to 0.25x, 0.5x, 1.5x, and 2x.

3.2.2.7   Base map gallery

Figure 29. Base map gallery widget button

The base map gallery is a list of base maps to be used as reference maps. Each base map is selectable by clicking on it. Available basemaps are by default provided by ESRI.

3.2.2.8   Table of attributes

This tool can be found in the lower right part of the INR-MED map interface with the next button appearance: .

The table of attributes provides a view of alphanumeric information from the geographic data. The information contained in the table of attributes describe the phenomena represented in the map. The data that can be found in a table of attributes are heights, areas, qualitative information, percentages… The alphanumeric information of the geographic data is presented in table of attributes as table format. Each field of the table is an attribute of the geographic data.

Figure 30. Table of attributes

By default, five layers are loaded in the table of attributes. These layers correspond to the underwater noise data geometry types of points, lines, polygon and reporting units uploaded by the users to the noise register. The last layer is the Mediterranean Subregions. More layers can be added to the table of attributes in order to see their alphanumeric information (see Section 3.2.2.2 Layer list).

The table of attributes has options to extend its functionality. The button (Options ▼) unfold the available options:
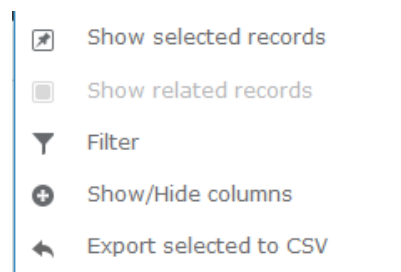
Figure 31. Option list for Table of attributes

- Show selected records: shows only in the table of attributes the selected records. This filtering does not take effect in the map. This option changes when a filter is applied to show all records.
- Show related records: shows related records between tables that are loaded in the attribute table (inactive).
- Filter: this option enables the filter tool of the attribute table (see Section 3.2.2.9 Attribute table filter).
- Show/Hide columns: opens a pop-up that allows to hide or show columns of the selected table.
- Export selected to CSV: exports the selected files of the selected table to a CSV format file.
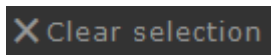
Figure 32. Export to CSV dialog
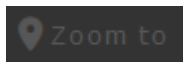
The remaining tools of the table of attributes are the next:

Filter by map extent	Shows only the features in the table of attributes that are in the map view.
X Clear selection	Clear the current selection.
Zoom to	Changes the map view zoom and position parameters to the selected records.
C Refresh	Refresh the selected table to check if new data were added.
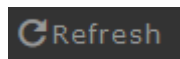
To select a record, the left part of the row record must be clicked. If the selection was successful, the entire row will be highlighted with blue background.

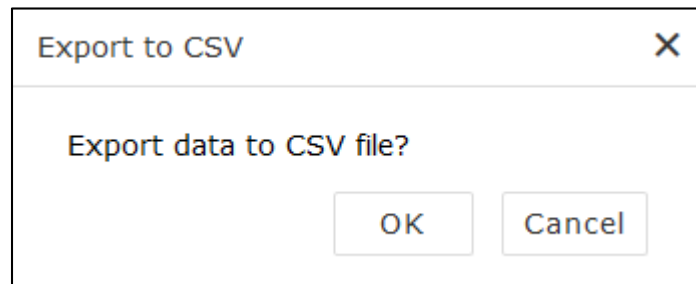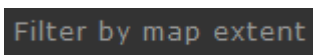If more than one record wants to be selected a key combination must be used. For select a range of records it is needed to select a record which will be the first record of the range and then the Shift key of your keyboard must be pushed and maintained until a new noise record is selected to finish the range to be selected.

To select various records split between them, first you must push the control key of your keyboard and maintain until you select a new record. If the process is successful more than one record will be selected in the table.

Attribute fields can be ordered by sort ascending and sort descending order. Besides, if the field is a numeric field, the tool allows to show statistics about the selected field (maximum, minimum, mean, standard deviation...).

3.2.2.9   Attribute table filter

Attribute table filter window can be opened by clicking in the Filter option list from the Options button in Attribute table tool. The attribute table filter allows to query completely all tables of the noise register.

Figure 33. Attribute table filter main view

To start to play with attribute table filter, click the Add expression button. It creates a new row in the current window. The first field of the generated row shows in a select box all attributes fields of the table to be filtered.

The second field is the operator that will be used to match the condition that will be introduced. Available options for this field depending of the field type selected previously are:

String field	Number field	Date field
Is	Is	Is on
Is not	Is not	Is not on
Starts with	Is at least	Is in
Ends with	Is less than	Is not in
Contains	Is at most	Is before
Does not contains	Is greater than	Is after
Is blank	Is between	Is on or before
Is not blank	Is not between	Is on or after
	Is blank	In the last
	Is not blank	Not in the last

		Is between
		Is not between
		Is blank
		Is not blank

Table 1. Available option operators for each field type

The third field is used to establish the condition that the data will be match considering the previous fields options selected. By opening the field options for this field (⚙), user can choose the different modes:
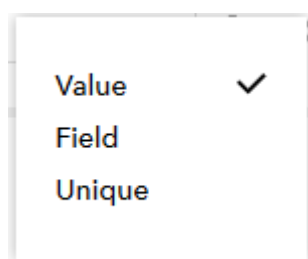
Figure 34. Group of options for query criteria field

- Value (selected by default): allow to introduce a free value condition to be filtered.
- Field: uses a field of the table to do the operation filter.
- Unique: the available options are a unique list provided by the values of the selected attribute field.

For Date attribute field type the unique option is disabled and the Value option allow to introduce a custom date, today date, tomorrow date and yesterday date.
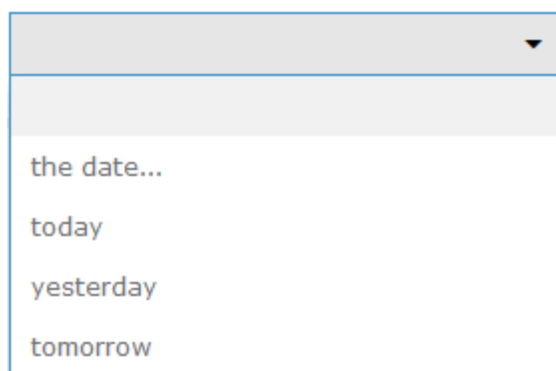
Figure 35. Available query option list for date field type

If more than one condition is desired to apply, the add expression button must be clicked many times as number of conditions to add.

To give more precision querying a table the *Get features in the layer that match All/Any of the following expressions* can be used to add a requirement over the designed expressions. The All

option force to fulfill all the designed expressions to take filtering effect, while Any option will show only features in map for matching expressions.

The *Add set* option adds a group of conditions. This option is helpful to filter between groups of expressions:

Figure 36. Added two set of expressions to Attribute table filter tool

In the Figure 36 there are two sets of expressions. The first group returns true if both expressions found records in the table. If one or more expressions are false, the expression set will return false. This happens because the *All of the following expressions in this set are true* is activated. The second expression set will return true if any expression contained in the set is true. If all expressions are false (not records matching with expression listed in this set) the expression set will return false.

3.2.2.10   *Search tool*

Search tool is a powerful widget to find locations or features in the INR-MED map. The widget can be found in the upper left part of the map section.

Figure 37. Search tool

To start a search, user should just select the search input and type a location, the identifier number of a noise event or the identifier of a grid block used for reporting purposes. The tool will show the finding suggestions taking into account the user inputs. To finish the search, select one result provided by the suggestions with the left mouse button, click on magnifier button (

🔍), or push the enter button of your keyboard.

If a result was found the tool automatically focuses the view on it and a pop-up window will be opened with the information of the result.

The search tool has a list of options to search by specified item. The items are shown when the

(▼) button is clicked near the search input.

| All |
| Point |
| Line |
| Polygon |
| Reporting Units |
| GFCM Grid |
| France National Grid |
| Esri World Geocoder |

Figure 38. Search option list

Each item of the list is referred to a feature layer of the noise register, except the All and the Esri World Geocoder item:

- The All item searches user introduced parameters in all items of the list, this is the selected option by default.
- Esri World Geocoder is a search engine to find places in the world. It can be used for Mediterranean Sea region and allow to search seas, regions and oceans.

The point, line, polygon and reporting units are layers corresponding to the uploaded underwater noise by the users to the register. The search tool allows to find only in the selected geometry type.

The GFCM grid and France National Grid are the approved grids (at the moment) to be used as reporting units in the upload procedure. Each block location can be found by typing his identifier value.

The search tool finds in INR-MED layers the results using the identifier of each record. However, the search tool can find results in the attribute description fields as remarks fields. The search tool differentiates between uppercase letters.

3.3 Upload data
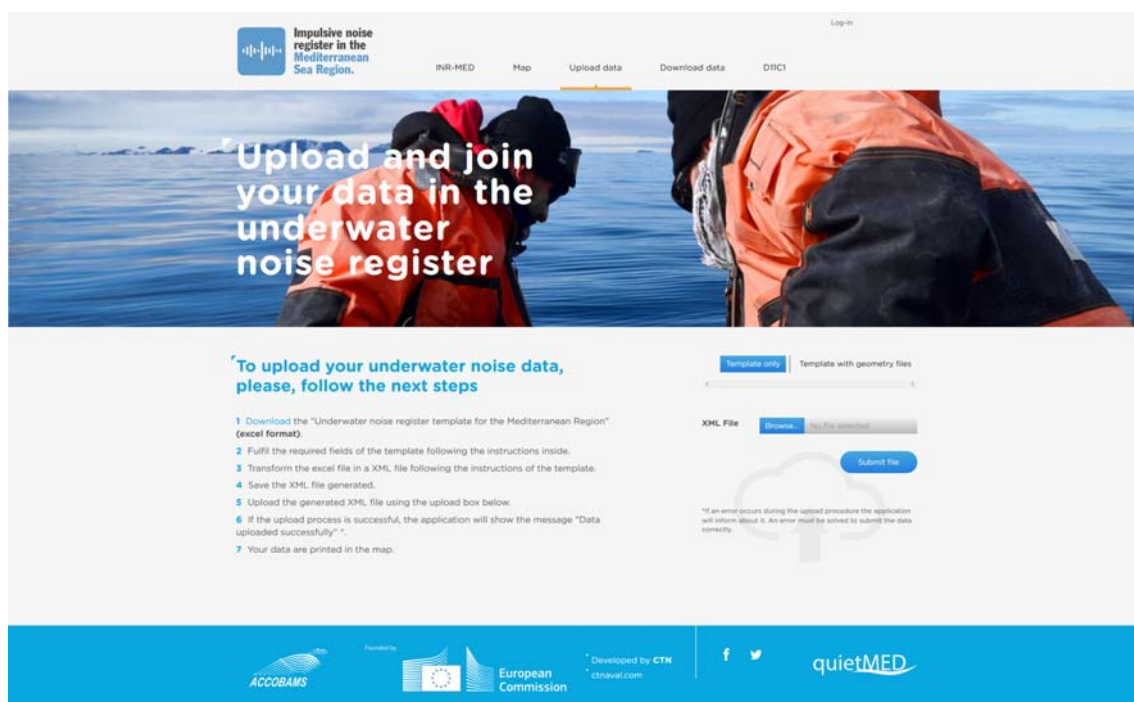
Figure 39. Upload data page

Upload data section aims to save underwater noise data in the noise database for processing plotting in the map application. To upload underwater noise data, the steps to follow are the next:

1. Download the "Underwater noise register template for the Mediterranean Region" **(excel format)**.

2. Fulfil the required fields of the template following the instructions inside.

3. Transform the excel file in a XML file following the instructions of the template.

4. Save the XML file generated.

5. Upload the generated XML file using the upload box.

6. If data include GIS files (shapefiles or KML files) upload them as a zipped folder by selecting the "Template with geometry files" option in the upload box following the instructions described later in this section.

7. If the upload process is successful, the application will show the message "Data uploaded successfully"[1].

8. Your data are printed in the map.

---

[1] If an error occurs during the upload procedure the application will inform about it. An error must be solved to submit the data correctly.

3.3.1 Noise data submissions methods

There are two options for data submissions: using an XML template and using an XML template with attached geometry files.

3.3.1.1 Template only submission

This option requires only one file to report underwater noise data by users and it is the fastest way to share noise data from users. However, this option only allows to upload noise as point and reporting unit's geometry types. If noise data are represented as lines or polygons format, using the Template with geometry files option is required (see Section 3.3.1.2).
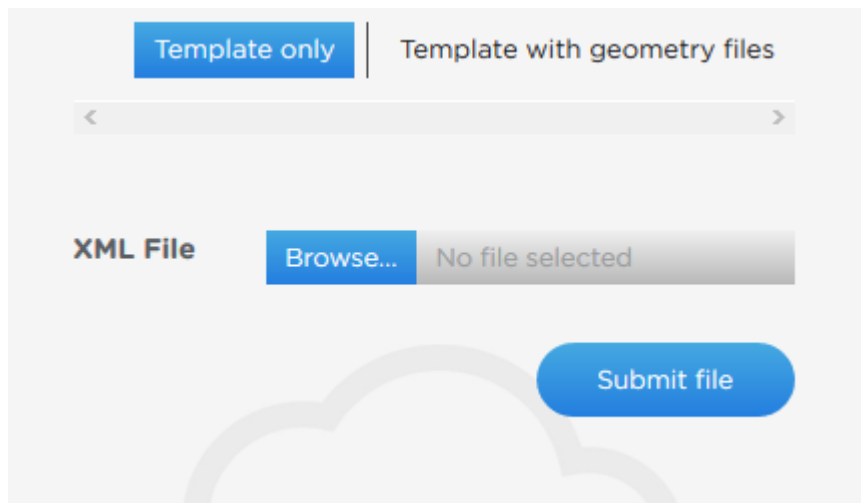

Figure 40. XML file submission method

3.3.1.2 Template with geometry files submission

This submission method allows to upload geometries files to the noise register. The allowed geometries to be uploaded with this option are: point, line and polygon. However, it can be uploaded points and reporting units too simultaneously with geometry files to improve compatibility.

Figure 41. Spatial files reporting method

The spatial files supported by the tool are SHP and KML file formats. In the INR-MED, SHP spatial files are used to upload one or more than one feature per spatial file, while KML is used to upload only one feature per spatial file. SHP files must contain a field named "Name" as an identifier field. The "Name" field is used to identify each feature of the spatial file. The value of the "Name" field must be unique for each feature contained within the spatial file.

To upload spatial files with XML template the next steps must be followed:

1. Fulfill the Excel template with the noise data leaving blank "Latitude", "Longitude", "Geometry_type", "Polygon ID" and "ID of the object filename" in file Excel template fields.

2. In "Geometry_type" field select "Geometry file" option.

3. In "Polygon ID" field must be the same name as the name of the spatial file SHP or KML associated to the desired geometry. If the spatial file is a KML file put the file name and the extension of the file. For example: "myspatialfile.kml".

4. The spatial file must contain a field named "Name". The text contained in the "Name" field is the identifier to be introduced in the "ID of the object filename" in the Excel template field. If the spatial file is KML type, just put 0 value in the ID of the object filename Excel template field.

5. Export data to XML in order to be used for INR-MED.

3.3.2 Excel template description

This part reports the name of fields that are part of the data form and describes the content of such fields. The form (an Excel template) consists on 4 worksheets:

- Instructions Export: shall provide instruction on filling the data form and on how to upload it in the register web portal.

- File information: Additional information concerning the preparation of the form: country, organization, and preparation date.

- Noise register data: worksheet used to fill in the noise data information.

- Vocabularies: this worksheet will present available options for multi-option fields.

Column	Field	Content	Type
A	data_entry_point_ID	String	Mandatory
B	start_date	ddmmyyyy	Mandatory
C	end_date (ddmmyyyy)	ddmmyyyy	Mandatory
D	Latitude	Decimal degrees WGS84	Mandatory
E	Longitude	Decimal degrees WGS84	Mandatory
F	Geometry_type	Point, GFCM Grid, National Grid, other grid system	Mandatory
G	polygon_ID	GFCM sub-rectangle ID, National block ID or spatial object filename	Mandatory
H	source_event	Airgun arrays/Explosions/Pile driving/ Sonar or acoustic deterrent/Generic noise source	Mandatory
I	value_code	NA/very_low/low/medium/high/very_high	Mandatory
J	sound_mitigation_bool	Yes/no	Mandatory
K	data_quality	1 to 4	Mandatory
L	NMS_type	Type of noise mitigation system (from list provided in the vocabularies worksheet / ACCOBAMS Resolution 4.17)	Optional
M	sound_measurement_bool	yes/no	Optional
N	SEL	Sound Exposure Level expressed as dB re $1\mu Pa^2s$	Optional
O	Lpeak	Zero-to-peak level expressed as dB re $1\mu Pa$	Optional
P	distance_to_pile	Decimal metres	Optional
Q	type_hammer	Model number of hammer used, e.g. S-2000, 3000S	Optional
R	max_energy	Kj	Optional
S	source_spectra	Units to be determined	Optional
T	duty_cycle	Decimal	Optional
U	start_time	hhmm	Optional
V	duration	seconds, integer	Optional
W	directivity	decimal	Optional
X	source_depth	metres, decimal	Optional
Y	platform_speed	knots, decimal	Optional
Z	Remarks	Free text	Optional

Table 2. Field description of Excel template for noise data tab

Column	Field	Content	Type
A	Country	ISO 1366 code from list provided	Mandatory
B	Preparation Date	ddmmyyyy	Mandatory
C	Organization	EDMO code from list provided	Mandatory

Table 3. Field description of Excel template for organization tab

3.3.3   Message errors during the uploading process

INR-MED has its own validation system. The application provides information about errors during the uploading procedure. In this section, the errors that can be shown are explained and how to solve these errors. If no errors occur, the returned message will be "File uploaded successfully".

There are two kinds of upload procedures: submissions with XML template and submissions with XML templates with attached geometry file.

3.3.3.1   XML Template submission errors

1. "You must fulfill mandatory fields. Failed to upload. Error found in [noise_id]"

This message indicates that one mandatory field is not filled in. The message identifies in what noise record the error was found. To solve this error, fulfill all required fields is required.

2. "Validation error. Check information fields. Error found in [noise_id]"

This exception is obtained when a field do not match with the available options. This error shows an additional message that helps to solve the problem.

3. "Integrity error. Values must fulfill database requirements. Error found in [noise_id]"

This error message indicates that the introduced data violates database restrictions. The message provides an additional text indicating source problem besides noise id where the problem was located.

4. "Noise data is not inside studied area (Mediterranean Sea). Error found in [noise_id]"

This message indicates that noise record geometry is not within the Mediterranean Sea region. All noise record located outside this region will not be considered or accepted by INR-MED.

5. "Selected geometry type is not supported, available options are Point, GFCM and France National Grid. Error found in [noise_id]"

This message shows up when the geometry type for reporting is not one of the available for INR-MED. The supported geometry types are Point, GFCM Grid and France National Grid. In the future new reporting geometry types can be added.

6. "Wrong file loaded"

In this case this message is thrown when there is a problem with the uploaded file or there is a general error that does not match with the errors mentioned above. The main reasons for this error are a wrong file structure in XML file (missing tag, missing character, unclosed tag…) or wrong file extension type. To solve this problem:

1. Check XML file

2. If not errors are found in XML file contact to an administrator

3.3.3.2   XML Template with geometry files submission

This section shares some errors found in the previous section due to geometry files can be uploaded combined with an XML file.

1. "You must fulfill mandatory fields. Failed to upload. Error found in [noise_id]"

This message indicates that one mandatory field is not filled in. The message identifies in what noise record the error was found. To solve this error, fulfill all required fields are required.

2. "Validation error. Check information fields. Error found in [noise_id]"

This exception is obtained when a field does not match the available options. This error shows an additional message that helps to solve the problem.

3. "Integrity error. Values must fulfill database requirements. Error found in [noise_id]"

This error message explains that the introduced data violates database restrictions. The message provides an additional text indicating source problem besides noise id where the problem was located.

4. "Noise data is not inside studied area (Mediterranean Sea). Error found in [noise_id]"

This message indicates that noise record geometry is not within the Mediterranean Sea region. All noise record located outside this region will not be considered or accepted by INR-MED.

5. "Selected geometry type is not supported, available options are Point, GFCM and France National Grid. Error found in [noise_id]"

This message is raised when the geometry type for reporting is not one of the available for INR-MED. The supported geometry types are Point, GFCM Grid and France National Grid. In the future, new reporting geometry types can be added.

6. "One or more uploaded file(s) aren't corresponding to the information "given in the template. Error found in [noise_id]"

This message appears when the information given in the template does not match the uploaded spatial files. If the ID_object indicated in the Excel template is different to the ID of the spatial object contained in the spatial file, the application will show this error message.

7. "Available spatial formats are Point, LineString or Polygon. You tried to upload a file with [file_format] format. Error found in [noise_id]"

If the spatial file format is different to Point, LineString or Polygon this error is raised. To solve the problem, the file format must be changed to anyone of the formats mentioned above. The format of spatial file can be changed using GIS software as QGIS, ArcGIS or GvSIG.

8. "Spatial reference error. Error found in [noise_id"

This message indicates that the spatial reference of the uploaded file is missing or not supported by INR-MED. The spatial files must be uploaded in WGS 1984 spatial reference system.

9. "Wrong file loaded"

In this case this message is thrown when there is a problem with the uploaded file or there is a general error that does not match the errors mentioned above. The main causes of this error are a wrong file structure in XML file (missing tag, missing character, unclosed tag…) or wrong file extension type. To solve this problem:

1. Check XML file

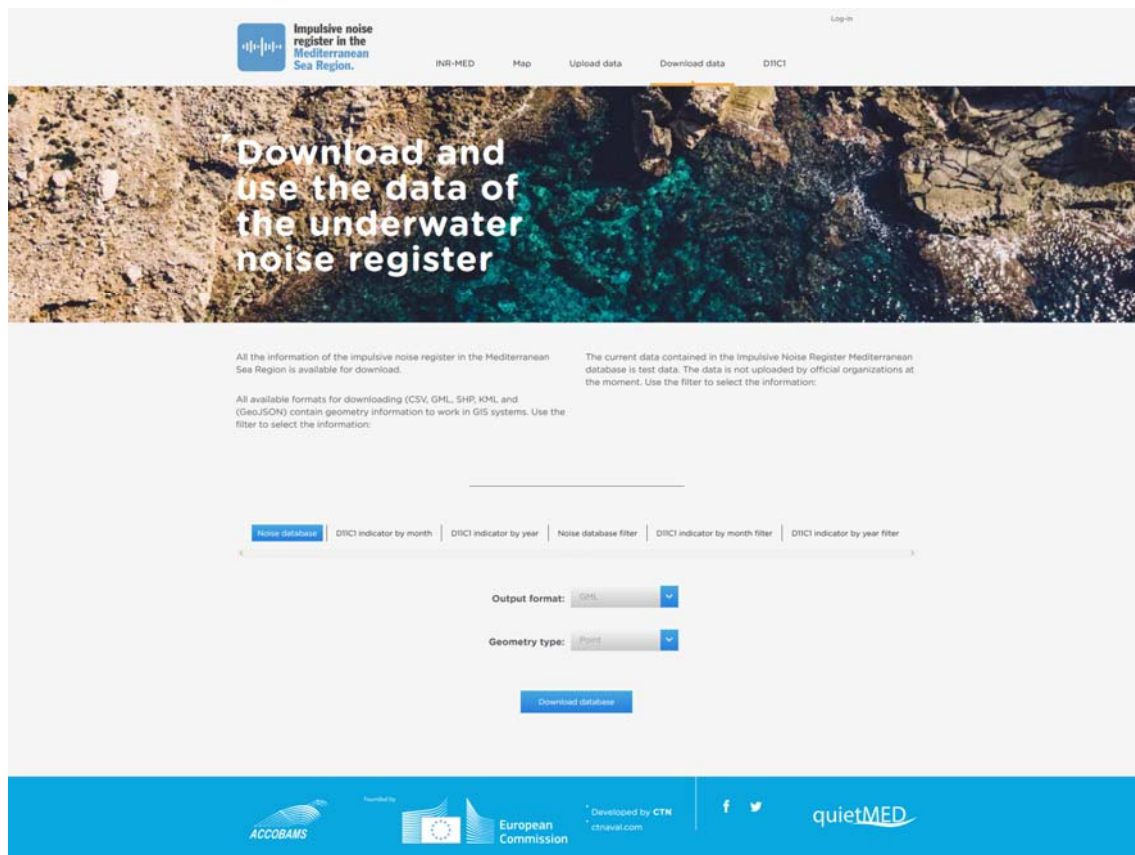2. If not errors are found in XML file contact to an administrator

3.4 Download data

Figure 42. Download data page

Download section is composed about select boxes used for filter data and to customize the output file format.

3.4.1 Download noise database

The available data for download is the underwater noise data and D11C1 criteria generated results by INR-MED from uploaded noise data. The data can be downloaded in the following formats: SHP, KML, GML, CSV and GeoJSON.
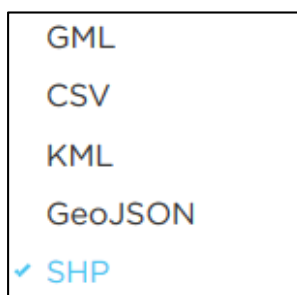
GML

CSV

KML

GeoJSON

✓ SHP

Figure 43. Output format selectable options

In case of CSV file format, there is an option to select the decimal separator (, or .) for latitude and longitude coordinates.

If user's downloaded file in CSV format has a wrong coordinate output, user should change the decimal separator option to the opposite selected in the last downloaded CSV file. This issue happens depending on the regional configuration of user's system.

For noise data, the desired geometry type can be selected for download. The available geometry types are point, line, polygon, reporting unit and all. The all option downloads all geometry types in separated files.

Geometry type: Point ▾

✓ Point

Line

Polygon

Reporting Unit

All
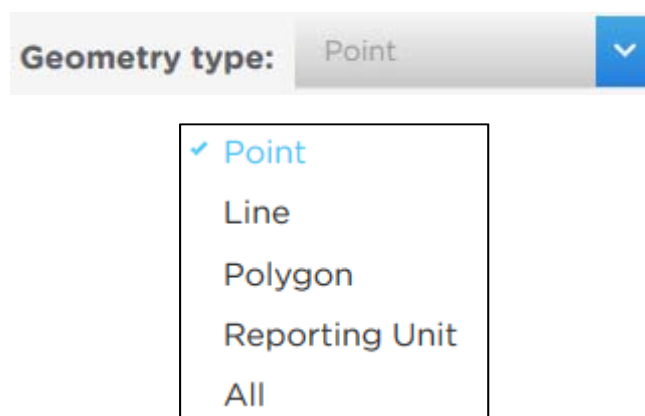
Figure 44. Geometry type selectable options

Conversely, for D11C1 criteria downloads, geometry type is replaced by spatial scale option. Available spatial scales are GFCM Block, Marine subregions, marine regions and all.
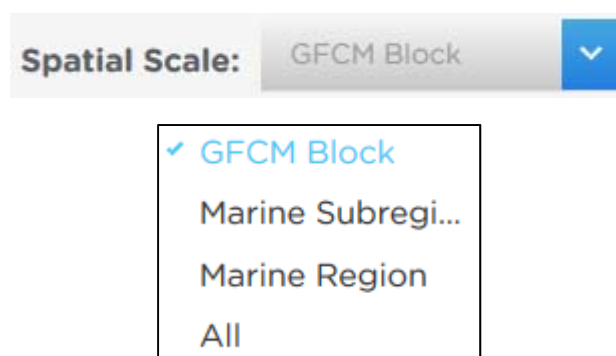
Spatial Scale: GFCM Block ▾

✓ GFCM Block

Marine Subregi…

Marine Region

All

Figure 45. Spatial scale selectable options

The All option downloads GFCM block, Marine subregion and marine region information in separated files.

Marine region and marine subregion data can require longer period of time to download due to the amount of vertex from spatial features.

It is important to note that some files are downloaded in compressed formats. To open these files a software for unzip files is needed.

3.4.2   Filtering data

The download section allows to make filters over the data contained in the database. Filters can be done by clicking in any tab designated as filter tab:
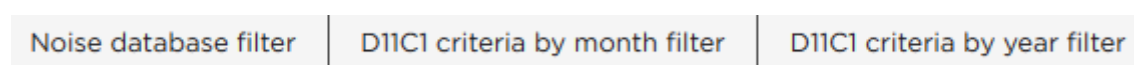
Figure 46. Available filter options for INR-MED database

Filters were developed to decrease the amount of downloaded data and waiting time.

To create filters, it is needed manipulate the next selection boxes:

Figure 47. Query creator panel

The first select box is used to select the attribute field in which the filter will work. This select box contains all the attribute fields for a determined table. In this case, the filters are applied to D11C1 criteria by month and the available options are the next:

Figure 48. Available fields to filter in D11C1 indicator by month

The second select box is the mathematical operator that will be used. Depending of the attribute field type, the available options can change.

The last box is used to establish the filter criteria. For example, if the required result is to obtain all data registered in year 2016, the third box value must show year 2016.

When the filter criteria is introduced, the button Add query must be clicked. Automatically the query made will be sent to the query table list (Figure 40):

Field	Operator	Option	
year	is	2016	Quit

Figure 49. Query table list

It is possible add more than one query in order to achieve the desired result:

Field	Operator	Option	
year	is	2016	Quit
pbd	is at least	12	Quit
month	is not	May	Quit

Figure 50. A group of queries in query table list

3.5 D11C1 section

Figure 51. D11C1 page

This page provides an explanation about what is D11C1 criterion. Besides, this section indicates the measurements units of the D11C1 criterion:

Number of days per quarter (or per month if appropriate) with impulsive sound sources; proportion (percentage) of unit areas or extent in square kilometers (km2) of assessment area with impulsive sound sources per year.