EMODnet Thematic Lot n°1 – Bathymetry

EASME/EMFF/2019/1.3.1.9/Lot1/SI2.836043

Start date of the project: 20/12/2022 (24 months)

Centralisation Phase

D2.1 - Upgraded guidelines for data pre-processing and population of metadata

June 2023

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and its predecessor, Regulation (EU) No. 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

Disclaimer

Document info

Title (and reference)	Upgraded guidelines for data pre-processing and population of metadata (D2.1)
WP title (and reference number)	Gathering of composite DTMs and metadata in Sextant catalogue (WP2.2)
Task (and reference number)	Upgraded guidelines for data pre-processing and population of metadata (D2.1)
Authors [affiliation]	Cécile Pertuisot (Ifremer) Benoît Loubrieu (Ifremer)
Dissemination level	Public
Submission date	30 June 2023
Deliverable due date	30 June 2023

Contents

Upgraded guidelines for data pre-processing and population of metadata

1 Overall approach and explanation EMODnet Bathymetry flowchart

The generation of Regional DTMs is divided over regional sea basin subgroups, each with a Regional Coordinator and a number of contributing data providers. Each Regional Coordinator will be responsible for a quality assessment and selection of the data contributions and the compilation of the Regional DTM using the GLOBE software. This process will start at the begin of the 2nd Contract year, when all data providers have finalized their data gathering and population activities for the CDI and CPRD catalogues and will have undertaken pre-processing and gridding of their data sets for delivery as DTMs to the regional coordinators.

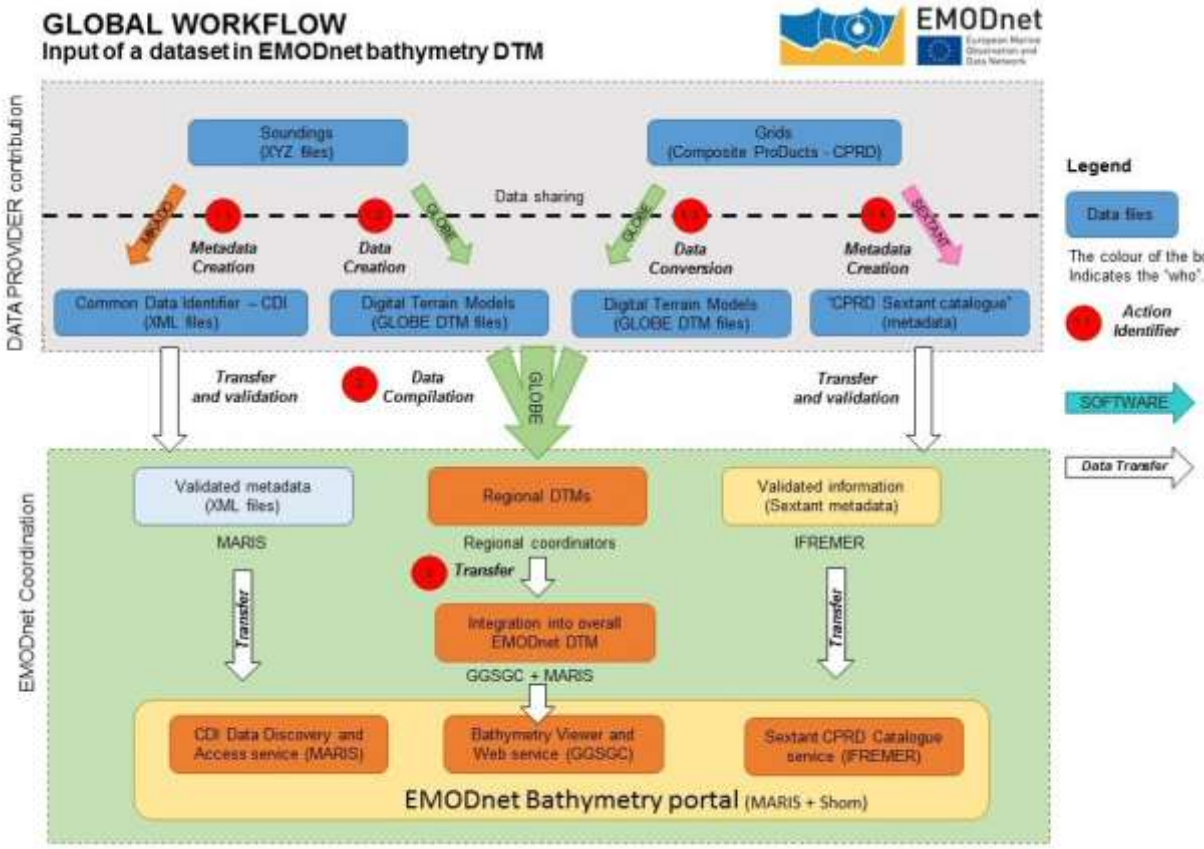


Figure 1. Example of caption which should go below the figure

2 MIKADO for population of CDI entries and related directories

MIKADO is used to generate XML descriptions, it creates XML files using SDN common vocabularies for metadata exchange of:

- CSR - Cruise Summary Reports
- EDMED - Marine Environmental Data sets
- CDI - Common Data Index
- EDMERP - Marine Environmental Research Projects
- EDIOS – Permanent Ocean-observing System

MIKADO is written in Java Language (Version >= 1.8) and is available under multiple environments: Windows, Unix – Solaris, Linux. Users can use either interactive or batch modes. The SeaDataNet common vocabularies web services are used to update lists of values but Mikado works offline once the lists are up-to-date.

2.1 Last versions

3 versions of Mikado have been released

2.1.1 Mikado 3.8 (June 2022)

- Removed
  CSR manual download from BSH, use of CSR list from BSH
- Add-ons
  CDI - EDMED reference becomes multiple
  CDI - VerticalDatum,if specified,needs min and max depth values
- Updates
  EDMED - Download from BODC restored

2.1.2 Mikado 3.8.1 (April 2023)

- Add-ons
  Automatic CDI from Nemo 2.0 export supported
- Bug fixed
  CDI AUTOMATIC - boundingbox, bad completion from point to box (.00 generated)
  PCR : xsd modified to accept https://www.seadatanet.org/urnurl/ instead http://www.seadatanet.org/urnurl/

2.1.3 Mikado 3.8.2 (May 2023)

- Bug fixed
  CDI AUTOMATIC - var11 Instruments: optional variable required (bug found in Nemo CDI summary generation)

2.2 Recommandations

Here are a few recommendations to partners to optimize the use of MIKADO:

2.2.1 Recommendation 1: Vocabularies updates

Figure 2 Vocabulary updates

Automatic check of the version of the vocabulary lists is possible when MIKADO starts:

If "On" is clicked in the Vocabulary Update Menu, then MIKADO downloads locally the latest version of each list. It is possible to enable-disable the automatic check if "Off" is selected. Manual check is also possible using the button "Update once now".

2.2.2 Recommendation 2: CSR and EDMED links in the CDIs

Each CDI can refer to a CSR Reference and an EDMED Reference:

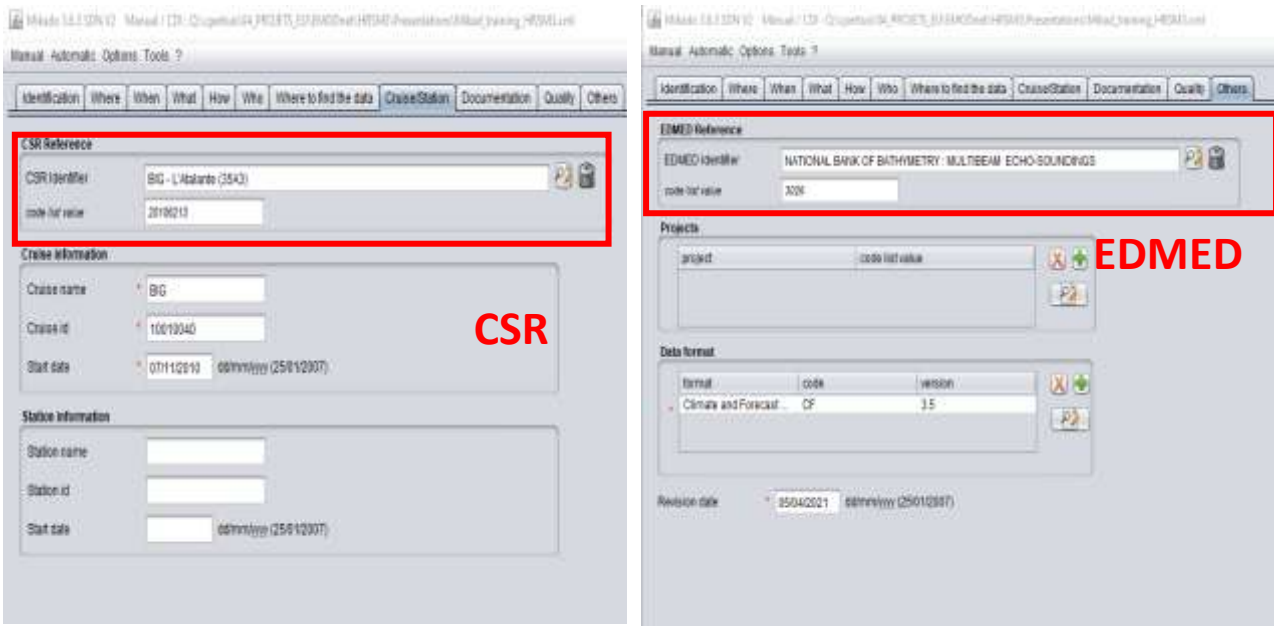


Figure 3 Implementation of the CSR and EDMED references

In Mikado manual: use of dropdown lists via webservices.

In Mikado automatic: use of var80 (EDMED), var81 (CSR).

2.2.3 Recommendation 3: EMODNet Bathymetry Quality Indicators in the CDIs

Quality Indicators (QI) have been implemented in 2017 and are used to qualify each source dataset used in the final DTM. These QI can be used for different purposes: to produce some statistics about the available data, to identify where new data or more recent data need to be acquired, etc …

The QI have been described in the document 'Completing metadata elements for the generation of the Quality Index for the EMODnet DTM.pdf'. 4 QIs have been defined to assess the quality of the datasets:

- QI_Horizontal: related to the positioning system
- QI_Vertical: related to the MBES instrument
- QI_purpose: related to the survey objective
- QI_Age: related to the survey dates

Quality indicators are not part of any SDN lists and have to be written between quote marks, using either manual or automatic modes:

- In Manual mode go to the Quality tab and add 3 distinct entries for QI_Horizontal, QI_Vertical and QI_purpose as follow:
    - Name: QI_Horizontal (free text)
    - Date: date of the QA method reference

- Comment: write down the index of the corresponding QI (free text)
- Status: true

QI_Age: fill the start and end date of the data acquisition in the When tab

- In Automatic mode: from var95 to var98 for QI_Horizontal, QI_Vertical and QI_purpose.

QI_Age: Under the single subqueries folder, define your SQL queries under var28 and var29 to describe the start and end date of your dataset.

3 Sextant for DTM population

Since the EMODnet Bathymetry webportal has been transferred to the EMODnet central portal, Sextant is used as the metadata editor tool and is harvested by the central portal to feed its product catalogue. Each sextant metadata record has also a Landing Page that can be reached from the Map Viewer.

The Sextant Catalogue, portal, and data infrastructure have been developed by Ifremer for the management and the distribution of spatial data, and have been adopted for EMODnet Bathymetry for describing composite DTMs and HR-DTMs from the EMODnet Bathymetry data providers. Moreover, the resulting EMODnet DTM products are included in Sextant together with DOIs.

Sextant is implemented using

- Geonetwork to set-up the Catalogue Service for the Web and the Open Geospatial Consortium (OGC) and ISO TC211 standards.

- the Seadatanet Marine Profile for ISO19139 together with the European Directory of Marine Organisations (EDMO), the European Directory of Marine Environmental Research Projects (EDMERP) and the SeaDataNet Common Vocabularies NVS2.0 (**https://www.seadatanet.org/**) for consistent descriptions of products (DTMs) with the EU SeaDataNet Common Data Index for survey data.

3.1 Sextant API for CPRD, PRODUCT and Tiles metadata population

A Sextant API (Application Programming Interface) has been deployed to respond to the harvesting need of the EMODnet central portal and gathers the 3 catalogues dedicated to EMODnet Bathymetry projects. (https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?from=1&to=30).

Sextant is used to provide a Common Index (Catalogue) and descriptions of the composite products (CPRD catalogue) and the high resolution products (PRODUCT catalogue) delivered by partners and associated providers of EMODnet bathymetry projects who have opted to deliver bathymetric data as products of their own for the construction of the EMODnet final DTM. They are not an observed data files, but a derived product. So they cannot be described in the SeaDataNet catalog.

This table allows to distinguish the differences between these 2 types of DTMs:

Table 1. Distinction between Composite PRoDuct and High Resolution DTMs

	CPRD **(contribution to the regional DTMs)**	**PRODUCT (HR-DTMs)** **(contribution to the HR layer)**
Content	- Historical Composite DTMs in your institution	- Higher resolution DTMs (1/32,1/64 …)

	New composite DTMs at a resoltuion of 1/16 arc minute	- Initially on smaller area or specific area of interest for showcases
Methodology	- Compilation using Globe software - EMODnet Bathymetry methodology - Historical DTMs might differ	- Compilation using Globe software - EMODnet Bathymetry methodology
Use	- Integration in the regional DTM - To be sent to your regional co-ordinator	- Integration in the HR layer of the Map Viewer - To be sent to Benoit Loubrieu (Ifremer), Cécile Pertuisot (Ifremer), George Spoelstra (GGSGC)
Visibility	- Connected to Sextant API - Visible from EMODnet website	- Connected to Sextant API Visible from EMODnet website
Access	- No direct access to the DTMs for the end users - DTMs are stored at each partners	- Public downloading through the EMODnet Map Viewer - DTMs are stored on a centralised cloud

The sextant API also gathers the descriptions of each tile of the EMODnet final DTM in the Tiles catalogue.

Each metadata described in any of these 3 catalogues is given a Landing Page (LP) having the following typology: https://sextant.ifremer.fr/record/UUID (where UUID is the metadata unique identifier constructed for the project needs (see chapter 4.2)).

3.2 Managing spatial data using Sextant

Before creating new metadata, read the EMODnet HRSM specifications documents which contain instructions for filling some of the metadata : "Methodology and guidelines for processing original input data into DTMs" and "Completing metadata elements for the generation of the Quality Index for the EMODnet DTM".

3.2.1 Vocabulary

- Common vocabulary lists and organization identification
  Lists implemented in the EMODnet template use the SeaDataNet Common Vocabularies (https://www.seadatanet.org/).
  Organizations are identified using the European Directory of Marine Organizations (EDMO) maintained by Seadatanet. Organization name and identifier can be querried on the SDN portal at: https://www.seadatanet.org/Metadata/EDMO

- File identifier

  The unique file identifier (UUID) at the top of the metadata information of the form is generated automatically using a combination of metadata edited by the partner. The unicity of the entry is guaranteed by an automatic combination with the EDMO id. The syntax (derived from SeaDataNet practices) is:

SDN_CPRD_**EDMO-Id**_**short-name-of-dataset**

EMOD Id of the holding data center — must be unique

It is requested to rename the DTM file corresponding to your metadata entry as EDMO-Id_ short-name-of-dataset.dtm.

The EDMO_Id of the holding data center and the short name of dataset of the product are also recorded in the "Identifier" layer of the EMODnet DTM (see EMODnet hydrography specifications). This allows viewing services of the EMODnet portal and the 3D viewer of the Ifremer Globe software to generate the URL to access the metadata set of the sextant catalogue.

3.2.2 Log in instructions

Each partner needs an external account. If you don't have any, please contact the Sextant team: sextant@ifremer.fr.

Log in function is available through Sextant API on EMODnet website: https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?from=1&to=30. Sign in with your sextant credentials on the top right hand corner, The "Administration" functionality appears.

3.2.3 Metadata check-list

Here is a "check-list" that the partners can follow in the suggested order to have a quick overwiew of the main steps to describe their products and to see their metadata validated (this is not a exhaustive list of the required metadata but guides you in the process) :

- ✓ **Log in (§4.2)**
- ✓ **Chose the appropriate template (§4.4)**
- ✓ **Start with the Short name of dataset (What) + EDMO-Id o the data holding center (Who) and Save (§4.4.1)**
- ✓ **Continue with all the other fields and with specific attention to:**
  - **Dataset name (different form the short name of dataset) (§4.4.1)**
  - **Project name**
  - **Parameter Discovery/Measure devices/Positioning devices**
  - **Geometry**
  - **Abstract**
  - **QI (§4.4.3)**
  - **Temporal extent (§4.4.5)**
  - **EDMO-Ids**
  - **Licence**
  - **Associated ressources: thumbnail + EMODnet links (§4.4.2)**
- ✓ **Save and close**
- ✓ **Submit for review**
- ✓ ***For HR-DTMs only* : send your HR data files (named as EDMO-Id_ short-name-of-dataset.dtm) to george@ggsgc.eu + cecile.pertuisot@ifremer.fr + benoit.loubrieu@ifremer.fr**
- ✓ ***For CPRDs only*: send the files to the Regional coordinator**

3.2.4 Detailed instruction

To create a new metadata description, a dedicated metadata template has been designed for the purpose of EMODnet projects.

Select "New metadata" in the menu “Administration” (see 4.2.):

- Create a Dataset;
- As Template, select "Template for EMODnet Bathymetry metadata";
- "In": select the appropriate catalogue: "EMODnet hydrography - CPRD" for cDTMs OR "EMODnet hydrography - PRODUCT" for HR-DTMs according to the description in Chapter 3.1;
- And then "Create".

SEXTANT disconnects you automatically if you are inactive. Save regularly what you have edited (every15 mns).

Mandatory fields have been defined not only in function of the ISO and Inspire standards and Directive but also in function of the requirement of the projects. Most of the fields are pre-filled or user friendly and don’t need specific explanation. Attention will be paid to specific or text fields - **more details with corresponding screenshots are given in the dedicated Sextant use manual as an annex of D2.1**. Explanations are given by thematic tabs.

- **What tab**

It is **strongly recommended** to start filling the “Dataset name” and “Short name of dataset” to avoid Sextant to save your entry under a default name. Use the “Save metadata” button and continue.

File identifier: is generated automatically using a combination of metadata edited by the partner. The syntax is: “SDN_CPRD_EDMO-Id_local-product-Id”

Project name: Choose EMODnet HRSM4. This field corresponds to the EDMERP SDN list.

Dataset name: title of the data set that will appear in the catalog.

Short name of dataset (SDN Local Product-ID): Local identifier of the bathymetric grid (according to local rules of Data Center). This is a component of the file identifier. The local identifier must not be longer than 75 characters (this constraint comes from the length of the string used to keep track of the source of data in the DTM NetCDF format.

Parameter Discovery/Measure devices/Positioning devices: metadata are given by default but you can also delete them and/or add others by clicking on “Search” (auto completion search). Use of L05 and P02 lists.

Geometry: fill in the information, and use lists or “Recommended” values when proposed

Pixel size: Select “Arc minute” entry in the Recommended values or write “Arc minute” in the text field close to the value field. To fill the value, please refer to decimal value in the following table:

Table 2. Correspondence table between the pixel size and its decimal value

Grid size	Arc minute
1/512	0,00195313
1/256	0,00390625
1/128	0,0078125
1/64	0,015625
1/32	0,03125
1/16	0,0625

Dataset description abstract: write down a summary about the dataset (cruise/purpose/context description, specific characteristics, valuable details…).

Description of processed data sources: indicate the data sources and ***write down the corresponding CDIs when they exist and/or DOI if needed.***

Description of data processing: any valuable detail about the processing software or processing methodology.

- **Associated ressources** (tab "What" upper right corner) – thumbnail and online resources

It is recommended to attach a thumbnail to illustrate your DTM in the catalogue. Click on the add button of the "**Associated resources**" field and seclect "**Add document**".

Click on "Add a thumbnail" (1), select the thumbnail with the "Choose or drop resource here" tool

(2) and click on your thumbnail in the "metadata file store" to update the URL(3). Click at the very bottom of the page to "add online resource" (4).

For HR-DTMs only: references to the EMODnet viewer and to the WMTS webservice have to be done using the online resources as follow :

Click on the add button of the "**Associated resources**" field and select "**Link an online document**" and enter the followings:

Protocol: Web link (URL)

URL: https://emodnet.ec.europa.eu/geoviewer/

Resource name: EMDOnet viewer

And click on "Add online resource"

Click a second time on the add button of the "**Associated resources**" field and select "**Link an online document**" and enter the followings:

Protocol: Web link (URL)

URL: https://tiles.emodnet-bathymetry.eu/

Resource name: EMODnet Bathymetry WMTS service

And click on "Add online resource"

These links will be attached to your metadata description in the catalogue.

- **Quality tab**

Horizontal accuracy:

Measure description: give any information about the horizontal accuracy of the acquisition system, the positioning system as well as the sounding method.

Value: In case you wish to give a digital estimator of the horizontal accuracy.

Evaluation method description: Reference to standard which have been used to qualify the horizontal accuracy (hydrographic standards, industrial specification…)

Vertical accuracy:

Meaure description: any information about the vertical accuracy of the depth in the file

Evaluation method description: Reference to standard which have been used to qualify the horizontal accuracy (hydrographic standards, industrial specification…)

Shoal bias: tick this field only in case of existing bias and precise details in text field below.

Suitability: precise the type of use that can be made of the datasets (example: not suitable for navigation)

Quality Indicators have been implemented in the EMODnet HRSM project to use further qualitative information (in DTMs and CDIs) related to the data source such as type of sensor. For the DTMs, the data producer has to consider giving each of the quality indicator based on the contribution with the lowest quality. Click on “search” to make appear the appropriate list.

The following document describes the Quality Index proposed in the framework of the HRSM project : "Completing metadata elements for the generation of the Quality Index for the EMODnet DTM". It will help you to verify your entries.

- **Where tab**

The **Geographic Bounding Box** can be created in 3 different ways:

By drawing your own area: click on “Draw region”, select the area and the coordinates will automatically be updated,

By entering the coordinates (decimal degrees) manually in the appropriate fields,

By selecting an area in the international SeaVox list.

Projection: fill in the geodetic system and the projection of the catalogued product. Some of them are listed in the "Add coordinate system" list. You can input additional details in the "Version or custom projection details. As examples, for a latitude/longitude file: Write "WGS84" in the "Projection" field and for a UTM Zone 33 file: Write "WGS84 / UTM" in the "Projection" field then write "Zone 33" in the "Custom projection details.

Vertical Datum uses L11 SDN list.

- **When tab**

Creation date is the date of production of the DTM.

Temporal extent covers the period of datasets used in the DTM.

Measurement frequency can be used in case od periodic acquisition of datasets.

- **Who tab**

The **Originator**, **Data Holding Center** and **Collating Center** contacts are filtered on the EDMO_id list. **The data holding center contact is a component of the file identifier.**

Enter the name of your institute or department and corresponding entries will appear (then click on the corresponding “+” button). If not, click on the binocular, and write in “search for a contact” field or use the proposed filters on the left of the screen (check number of pages). Once you have found the correct entry, click on the “+” button at the bottom left corner. Once you selected the correct contact, Organisation name, Email and EDMO id are automatically filled in.

- **Access tab**

Click on “Add distributor” to enter the **Distributor** contact details (also filtered on EDMO id). And fill in the other information using “Recommended values” when possible.

Version and **Transfer size** are optional.

Intellectual property for CPRD:

Use limitation: free text field that can be used to detail intellectual property like “NOT FOR NAVIGATION”

Access constraints: uses list SDN L08. Gives information about how to get access to the DTM.

Use constraints: gives information about the condition of use of the DTM.

Other constraints: complementary information about the use of the data. This is the appropriate field to enter the DOI of your dataset when existing or the obligation of citation.

Intellectual property for HR-DTM:

Use limitation: for example "NOT FOR NAVIGATION"

Access constraints: set as "unrestricted". Uses list SDN L08. Gives information about how to get access to the DTM. To be set as "unrestricted".

Use constraints: Uses list SDN L08. Gives information about how to get access to the DTM. To be set as "Creative Commons Attribution 4.0 International".

Other constraints: write "EMODnet Bathymetry consortium (2024), EMODnet Digital High Resolution DTM"

3.2.5 Save your metadata

Your sextant template is now complete, you can "save and close" the template. You can check your new entry on the sextant API catalogue: https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?sortBy=relevance&from=1&to=30.

3.2.6 Submit your metadata for validation

A workflow status has been implemented to prevent any inconsistency with EMODnet rules when updating or creating a metadata. Each creation or update has to be validated by a sextant administrator.

To submit your metadata click on the Wheel tool>Submit for review. The sextant catalogue administrator will receive a notification by email and will validate and publish your sextant entry. **This submission has to be done for each new entry and each updated entry.**

3.3 Guidelines for updating an existing entry

If you need to update any of your description, select your sextant entry on the sextant API catalogue:

https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?sortBy=relevance&from=1&to=30 and click on the wheel tool on the upper right hand corner and select edit.

Once updated, do not forget to submit again your entry through the sextant workflow – see chapter 3.2.6.

3.4 Sextant helpdesk

If any problem when using Sextant, you can contact the Sextant team sextant@ifremer.fr. Your question will be routed toward the appropriate person.

4 Globe for pre-processing and gridding of bathymetry data sets

4.1 Introduction

GLOBE (GLobal Oceanographic Bathymetry Explorer) is an innovative application for processing and displaying oceanographic data. GLOBE offers processing and display solutions of multi-sensor data within a single 3D environment represented as a globe.

Currently, the software is mainly used for processing, analysing and displaying acoustic data, as well as moving tectonic plates.

GLOBE software is described and freely available through the Seanoe system (Sea scientific open data publication at the following link : DOI 10.17882/70460).

For the project, Ifremer provides the Globe software for the production (1) of single DTMs by data providers and (2) of merged DTMs by regional coordinators.

During the first year of the project, DTMs processing is focused on the production of single DTMs, one per each dataset, by all data providers.

For supporting this action, a training workshop will be given by Ifremer, consisting of a half day for a general presentation of the Globe software and the dedicated tools for HRSM project, and a second half day for a training based on standard datasets and focused to exchanges between data providers and Globe team. As well additional presentations will focus on extra Globe tools that could help data providers to validate and correct their datasets.

The training will focus on the following main items :

- reminding the methodology adopted by EMODnet Bathymetry for generating DTMs,
- how to process sounding datasets described in the CDI infrastructure ? what are the appropriate Globe tools for that purpose ?
- how to process composite DTMs described in the Sextant CPRD catalogue ? what are the appropriate Globe tools for that purpose ?
- general presentation of helpful Globe tools for the project.

4.2 Type of datasources

As described below for the data collection two types of datasets can occur:

- Sounding files: these are datasets of observed bathymetry data. Their metadata are described in the CDI and they have their own CDI Identifier (CDI Id)
- Composite product (CPRD): these are pre-processed gridded datasets. They are described in the CPRD catalog in Sextant.

For both types of input, data will be processed into a gridded file, regular raster datafile with common properties:

- Latitude longitude coordinates, WGS84 ellipsoïd
- Grid spacing is a divider of arc minute (1/16, 1/32, 1/64,…) and is defined according to the depth ranges and data resolution. Coordinates of the bounding box are aligned along integer minutes,
- If possible, the raster file is a multilayer file including, for each pixel, depth and additional statistical information (as standard deviation, count of valid sounding),
- Identifier layer (CDI Id or CPRD Id) is required for the raster file, in order to link gridded files with metadata of the datasources.

The processing is in accordance with the document “Methodology and Guidelines for integrating data and processing single DTM for each input dataset”.

4.3 Processing of sounding datasets

This case covers all observed data files whom format is csv or asci, 3 rows like :

Latitude / Longitude / Depth

They can be processed in Globe software by using the “Export CSV to DTM“ tool. We provide blow an overview of the Globe tool and the way to fill in the parameters.

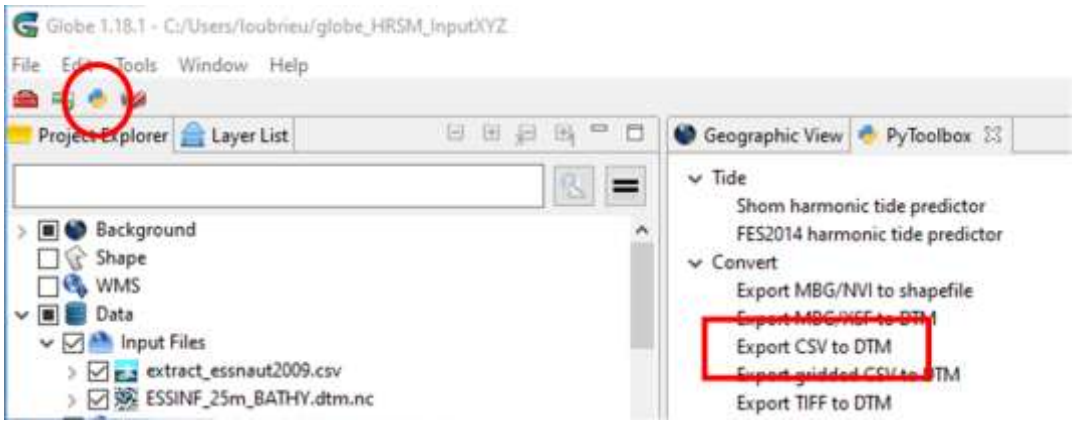


Figure 4: Location of the “Export CSV to DTM tool” in Globe software

The tool presents a set of parameters window, in order to create the grids according to the EMODnet bathymetry specification.

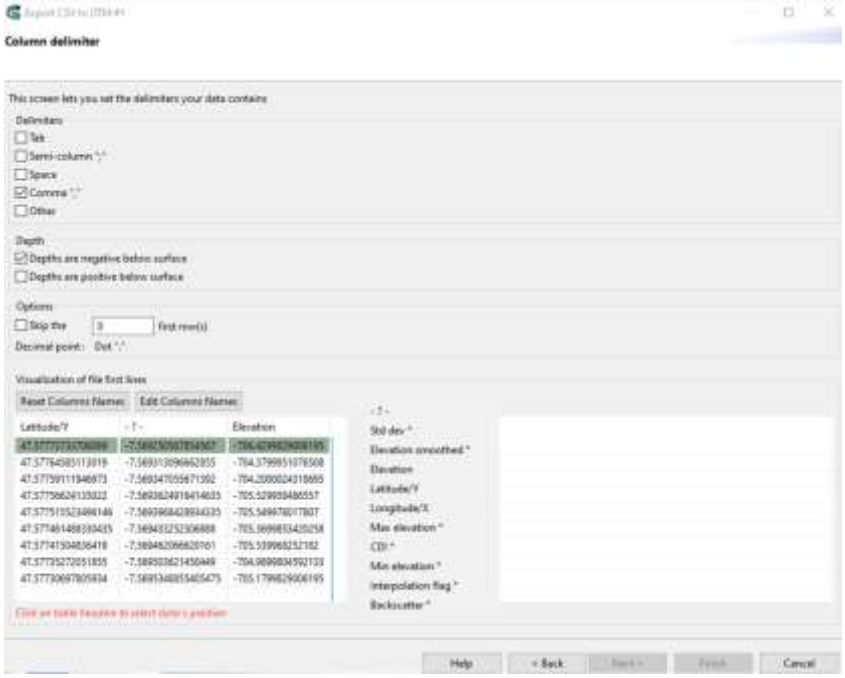


Figure 5: Import of datasets in the CSV to DTM tool

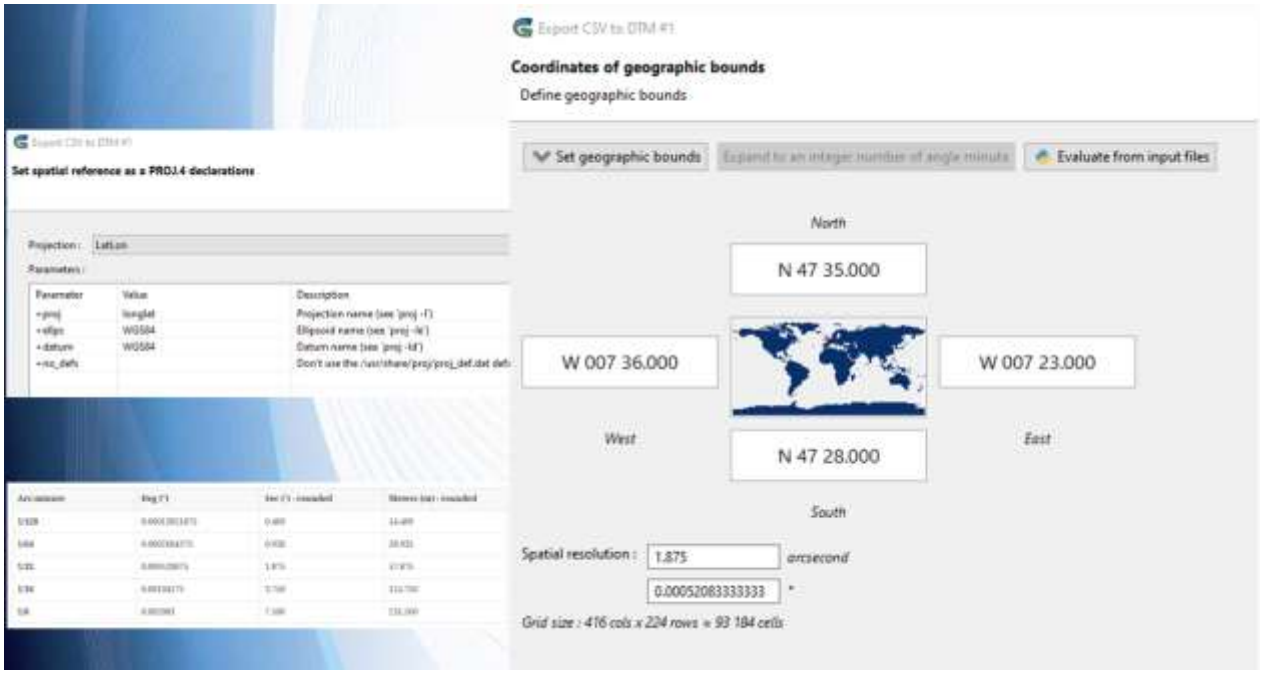


Figure 6 : Windows of the Export CSV to DTM tool for geographical parameters and cell size

Figure 7: Windows of the Export CSV to DTM tool for multilayer parameters

4.4 Processing of CPRD files

This case covers all datasources which are integrated in the EMODnet Bathymetry flow as pre-processed grids.

Their format must be a csv or asci files, XY cordinnates and depth.

They are processed in Globe in 3 steps, associated to 3 tools of Globe :

- Export gridded CSV to DTM : gridded data are imported with their original coordinates system,
- Set CDI : the Id layer is created, with reference to the CPRD Id,
- Reproject into a Lat/Lon : the grid is converted into the latitude/Longitude raster file in accordance with the EMODnet Bathymetry methodology.

Overview of the Globe tools for this case is provided below.

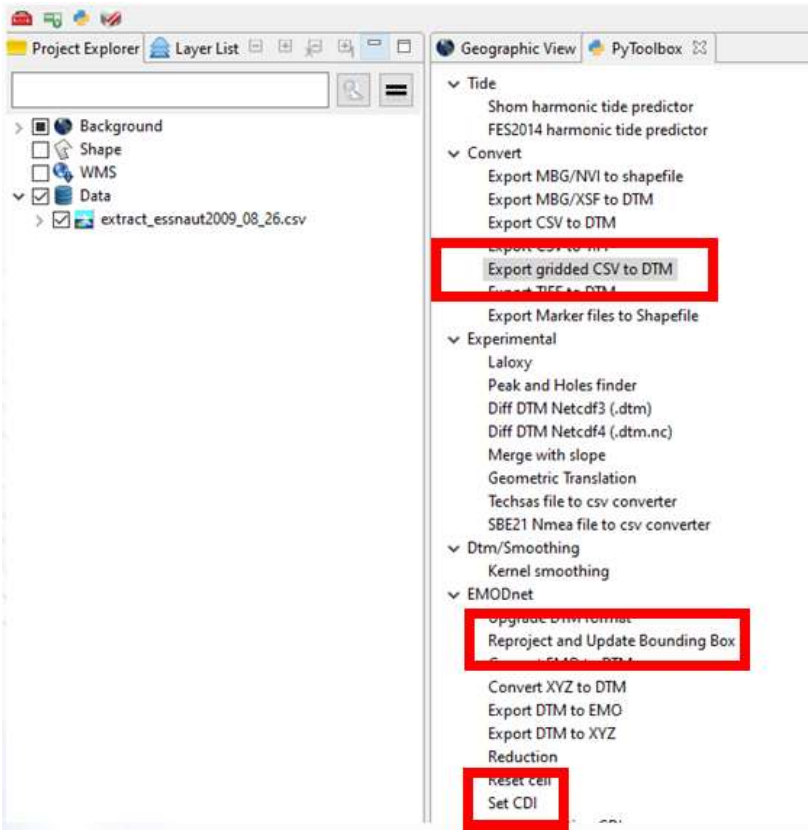


Figure 8: Globe tools for CPRD datasets

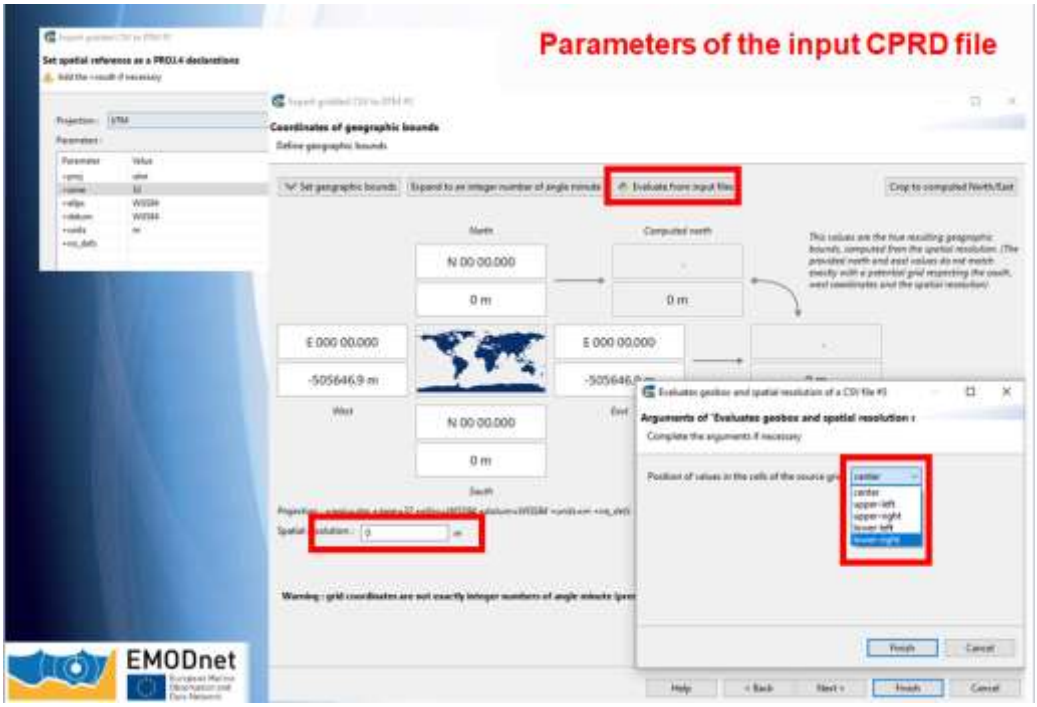


Figure 9: Windows of the Export gridded CSV to DTM tool for defining the input coordinate system

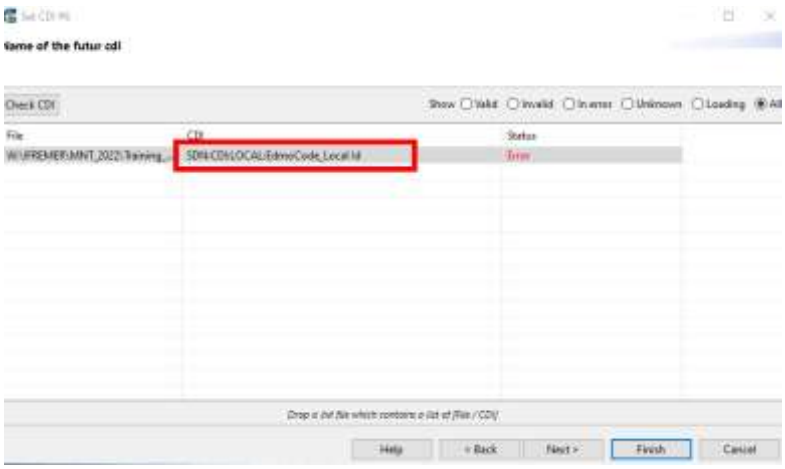


Figure 10: Window of the Set CDI tool for defining the input CPRD Identifier

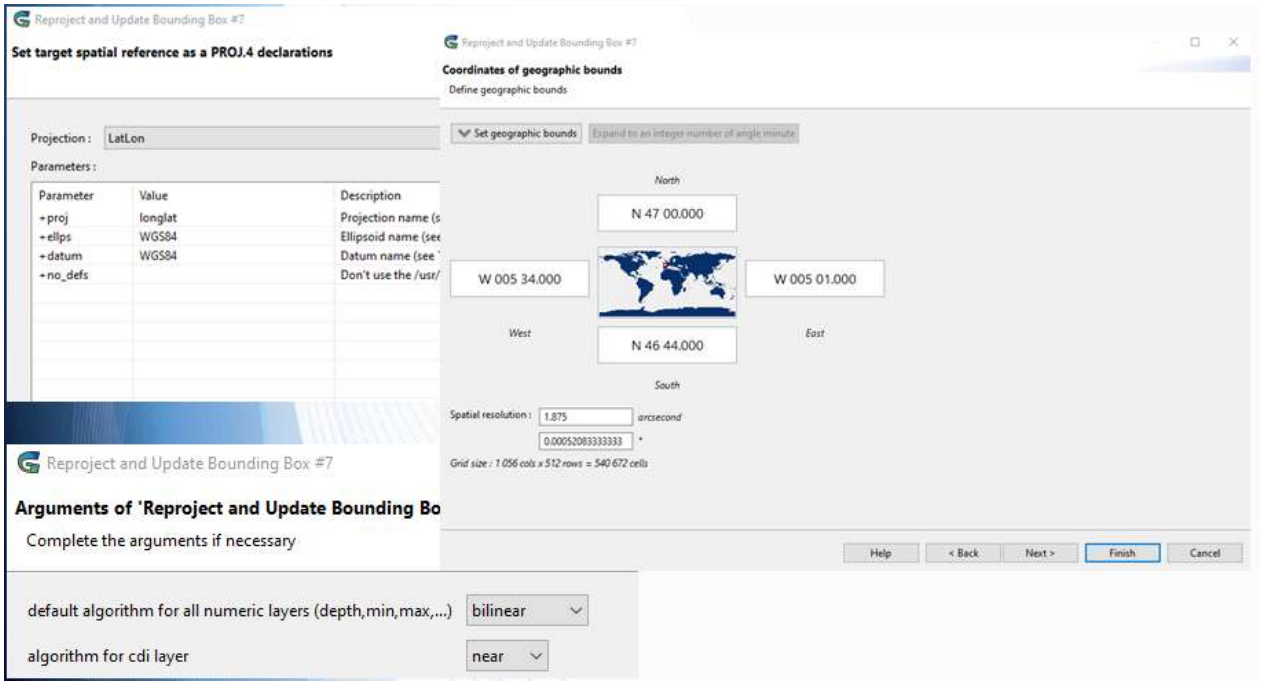


Figure 11: Windows of the Reproject tool defining the output parameters when converting the gridded dataset into a regular geographical grid

4.5 Additional tools and Help function

Additional tools are available in Globe for processing and validating DTMs:

- Reprojection and bounding box update (manual edition, auto shrink…)
- Interpolation or fill gaps tools are available with different algorithms. Algorithms result of the work performed by the Coronis team for data interpolation
- Modification of cellsize
- Smoothing
- Conversion of tiff raster file into NetCDF file as processed in Globe
- Tools for checking and correcting Id layer (CDI or CPRD)
- Statistics for the DTM layers

They are all available in the “Python toolbox” and described in the “Help” manual of Globe software

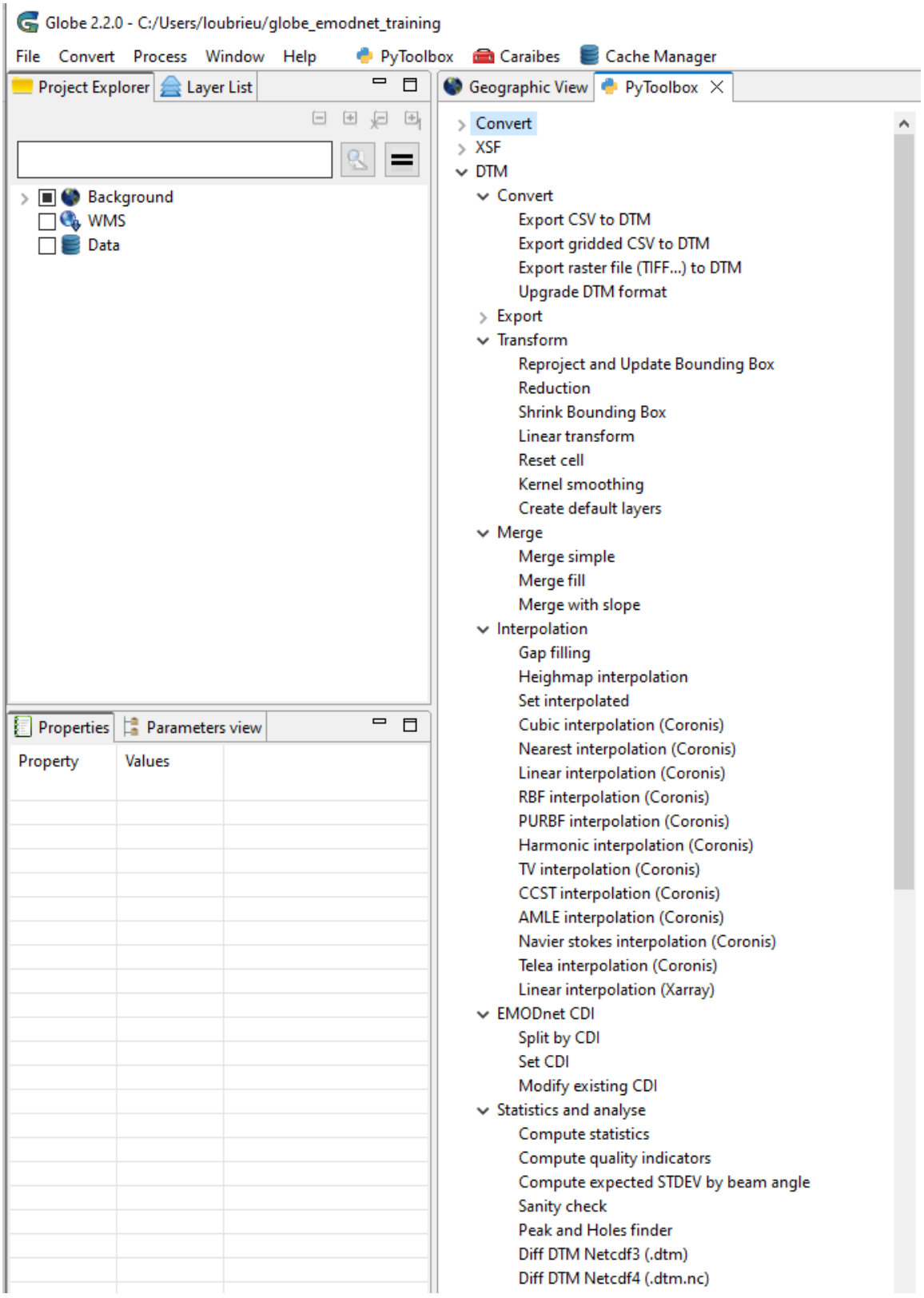


Figure 12: List of available tools in the Python toolbox

Figure 13: Dedicated chapter in the Help guide for the EMODnet tools in Globe

5 Annex: Sextant user manual

Sextant
End-User Manual for DTM management

Cécile Pertuisot (Ifremer)
Benoît Loubrieu (Ifremer)

Author	Status	Date	Comments
Cyril Goasduff	Preliminary version	06/12/2011	Edited for the Geoseas/EMODnet hydrography training
Cyril Goasduff and E.Moussat	1st release on the extranet of the projects	10/01/2012	Miscellaneous corrections
Cyril Goasduff and E.Moussat	Release for EMODnet hydrography	30/01/12	Additional metadata inserted : - type of catalogue (see liste SDN L231) - EDMERP Project identifier - Metadata identifier Miscellaneous modifications related to the address of the catalogue, the terminology and to edit metadata in order to allow a wider use of the editing form.
E.Moussat		06/05/13	Update of the document for the creation of thumbnails using the new Sextant interface
E. Moussat	Release for EMODnet bathymetry	29/01/14	Update of the overall document linked to the new interface of Sextant
C.Pertuisot B.Loubrieu	Release for EMODnet HRSM		Update to Sextant V6 Integration of Sextant API Miscellaneous corrections
C.Pertuisot B.Loubrieu	Release for EMODnet HRSM2		Log in from Sextant API API functionalities
C.Pertuisot B.Loubrieu	Update for EMODnet HRSM Phase2	19/06/2020	Implementation of sextant workflow (§4.6)
C.Pertuisot	Update for EMODnet HRSM Phase3	24/08/2020	Update of sextant workflow (§4.6)
C.Pertuisot	Update for EMODnet HRSM Phase4	10/05/2023	Update since the transfer of the thematic portal to the EMODnet central portal (§1) Agregating the HR-DTMs management (§2) Metadata Check-list (§4.3) Minor updates

Table of content

1. Sextant contribution to EMODnet

Since the EMODnet Bathymetry webportal has been transferred to the EMODnet central portal, Sextant is used as the metadata editor tool and is haversted by the central portal to feed its product catalogue. Each sextant metadata has also a Landing Page that can be reached from the Map Viewer.

The Sextant Catalogue, portal, and data infrastructure have been developed by Ifremer for the management and the distribution of spatial data, and have been adopted for EMODnet Bathymetry for describing composite DTMs and HR-DTMs from the EMODnet Bathymetry data providers. Moreover, the resulting EMODnet DTM products are included in Sextant together with DOIs.

Sextant is implemented using

- Geonetwork to set-up the Catalogue Service for the Web and the Open Geospatial Consortium (OGC) and ISO TC211 standards.
- the Seadatanet Marine Profile for ISO19139 together with the European Directory of Marine Organisations (EDMO), the European Directory of Marine Environmental Research Projects (EDMERP) and the SeaDataNet Common Vocabularies NVS2.0 (**http://www.seadatanet.org/**) for consistent descriptions of products (DTMs) with the EU SeaDataNet Common Data Index for survey data.

2. Sextant API for CPRD, PRODUCT and Tiles metadata population

A Sextant API (Application Programming Interface) has been deployed to respond to the harvesting need of the EMODnet central portal and gathers the 3 catalogues dedicated to EMODnet Bathymetry projects.
(https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?from=1&to=30).
Sextant is used to provide a Common Index (Catalogue) and descriptions of the composite products (CPRD catalogue) and the high resolution products (PRODUCT catalogue) delivered by partners and associated providers of EMODnet bathymetry projects who have opted to deliver bathymetric data as products of their own for the construction of the EMODnet final DTM. They are not an observed data files, but a derived product. So they cannot be described in the SeaDataNet catalog.

This table allows to distinguish the differences between these 2 types of DTMs:

	CPRD **(contribution to the regional DTMs)**	**PRODUCT (HR-DTMs)** **(contribution to the HR layer)**
Content	- Historical Composite DTMs in your institution - New composite DTMs at a resoltuion of 1/16 arc minute	- Higher resolution DTMs (1/32,1/64 …) - Initially on smaller area or specific area of interest for showcases
Methodolgy	- Compilation using Globe software - EMODnet Bathymetry methodology - Historical DTMs might differ -	- Compilation using Globe software - EMODnet Bathymetry methodology
Use	- Integration in the regional DTM - To be sent to your regional co-ordinator	- Integration in the HR layer of the Map Viewer - To be sent to Benoit Loubrieu (Ifremer), Cécile Pertuisot (Ifremer), George Spoelstra (GGSGC)
Visibilty	- Connected to Sextant API - Visible from EMODnet website	- Connected to Sextant API - Visible from EMODnet website
Access	- No direct access to the DTMs for the end users - DTMs are stored at each partners	- Public downloading through the EMODnet Map Viewer - DTMs are stored on a centralised cloud

The sextant API also gathers the descriptions of each tile of the EMODnet final DTM in the Tiles catalogue.

Each metadata described in any of these 3 catalogues is given a Landing Page (LP) having the following typology: https://sextant.ifremer.fr/record/UUID

Where UUID is the metadata unique identifier constructed for the project needs (see chapter 4.2).

3. Sextant API catalogue functionalities

3.1. Access

All the descriptions of composite and high resolution products provided by partners can be viewed using the sextant API: https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?from=1&to=30

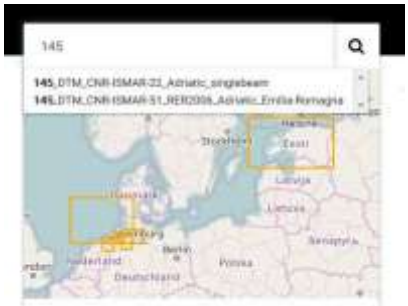
3.2.Filter criterias

3.2.1 Catalogue selection

3.2.1 Free Search

A free text search is carried out on all text fields of the metadata sets. The search tool is based on auto completion and suggests a list of words existing in the metadata sets as far as you enter 3 characters.

First, write your text and then click on the magnifying glass to display the result.



3.2.2 Geographic area

A search by geographical extent is carried out by choosing either the products strictly inside the selected area or the products intersecting with it.

First, click on the pen and draw your geographical area. Then, click on the arrow beside and select the type of spatial search "intersects with" or "within" mode.
You can switch to one or the other type of spatial area as you like.

3.2.3 Predefined content

Each selected filter automatically updates the results display and also updates the other available filters:

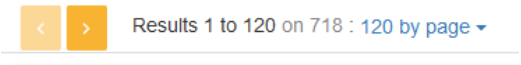
- Keywords
- Years

Note: there is a "Reset Filters" button allowing to reset all the criteria and to start a new selection

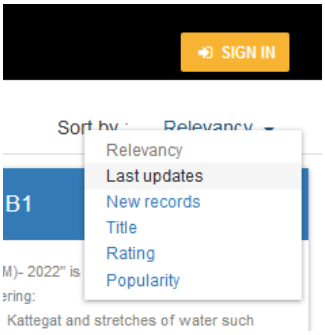
3.3. Metadata display

3.3.1 Results and sorting

The number of results after applying your filters appears on the top left of the display. By default, the first 30 results are displayed but you can choose to display 60 or 120 entries per page:



It is possible to organize the results by "Title" (alphabetic order), "Popularity" (number of consultation of the entry), "Last updates" (last updated entries appear first), "New records", "Rating":



The list of metadata sets is displayed with an optional thumbnail while their bounding boxes are displayed on the map of the left window.

To locate a data set move the mouse to the metadata set entry. The corresponding bounding box is highlighted on the map.

3.3.2 View

To display metadata, click on the title of the metadata set. Metadata are displayed according to the EMODnet Bathymetry template.

Note the file identifier at the top of the metadata information which is generated automatically from metadata edited by the partner using the following syntax : "SDN_CPRD_*EDMO-Id-of-holding-data-center*_*Short-datasetname*".

This identifier contains the EDMO_Id of the holding data center and a short dataset name of the product used as source data for the EMODnet DTM. These Ids are recorded in the CDI layer of the EMODnet DTM. This allow to generate the URL for viewing the corresponding metadataset.

4. Managing spatial data using Sextant

Before creating new metadata, read the EMODnet HRSM specifications documents which contain instructions for filling some of the metadata : "Methodology and guidelines for processing original input data into DTMs" and "Completing metadata elements for the generation of the Quality Index for the EMODnet DTM".

4.1 Vocabulary

Common vocabulary lists and organization identification

Lists implemented in the EMODnet template use the SeaDataNet Common Vocabularies (**http://www.seadatanet.org/**)

Organization are identified using the European Directory of Marine Organizations (EDMO) maintained by Seadatanet. Organization name and identifier can be querried on the SDN portal at:

http://www.seadatanet.org/Metadata/EDMO

File identifier

The unique file identifier (UUID) at the top of the metadata information of the form is generated automatically using a combination of metadata edited by the partner. The unicity of the entry is guaranteed by an automatic combination with the EDMO id. The syntax (derived from SeaDataNet practices) is:

SDN_CPRD_EDMO-Id_short-name-of-dataset

EMOD Id of the holding data center — must be unique

It is requested to rename the DTM file corresponding to your metadata entry as **EDMO-Id_ short-name-of-dataset.dtm.**

The EDMO_Id of the holding data center and the short name of dataset of the product are also recorded in the "Identifier" layer of the EMODnet DTM (see EMODnet hydrography specifications). This allows viewing services of the EMODnet portal and the 3D viewer of the Ifremer Globe software to generate the URL to access the metadata set of the sextant catalogue.

4.2 Log in instructions

Each partner needs an external account. If you don't have any, please contact the Sextant team: sextant@ifremer.fr.

Log in function is available through Sextant API on EMODnet website:
https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?from=1&to=30
Sign in with your sextant credentials on the top right hand corner:

The “Administration” functionality appears.

4.3 Metadata check-list

Here is a “check-list” that the partners can follow in the suggested order to have a quick overwiew of the main steps to describe their products and to see their metadata validated (this is not a exhaustive list of the required metadata but guides you in the process) :

- ✓ **Log in (§4.2)**
- ✓ **Chose the appropriate template (§4.4)**
- ✓ **Start with the Short name of dataset (What) + EDMO-Id o the data holding center (Who) and Save (§4.4.1)**
- ✓ **Continue with all the other fields and with specific attention to:**

  Dataset name (different form the short name of dataset) (§4.4.1)
  Project name
  Parameter Discovery/Measure devices/Positioning devices
  Geometry
  Abstract
  QI (§4.4.3)
  Temporal extent (§4.4.5)
  EDMO-Ids
  Licence
  Associated ressources: thumbnail + EMODnet links (§4.4.2)
- ✓ **Save and close**
- ✓ **Submit for review**
- ✓ **For HR-DTMs only : send your HR data files (named as EDMO-Id_ short-name-of-dataset.dtm) to george@ggsgc.eu + cecile.pertuisot@ifremer.fr + benoit.loubrieu@ifremer.fr**
- ✓ **For CPRDs only: send the files to the Regional coordinator**

4.4 Detailed instructions

To create a new metadata description, a dedicated metadata template has been designed for the purpose of EMODnet projects.

Select "New metadata" in the menu “Administration” (see 4.2.). A window appears:

- Create a Dataset
- As Template, select "Template for EMODnet Bathymetry metadata"
- "In": select the appropriate catalogue: "EMODnet hydrography - **CPRD**" for cDTMs OR "EMODnet hydrography - **PRODUCT**" for HR-DTMs according to the description in

Chapter 2.

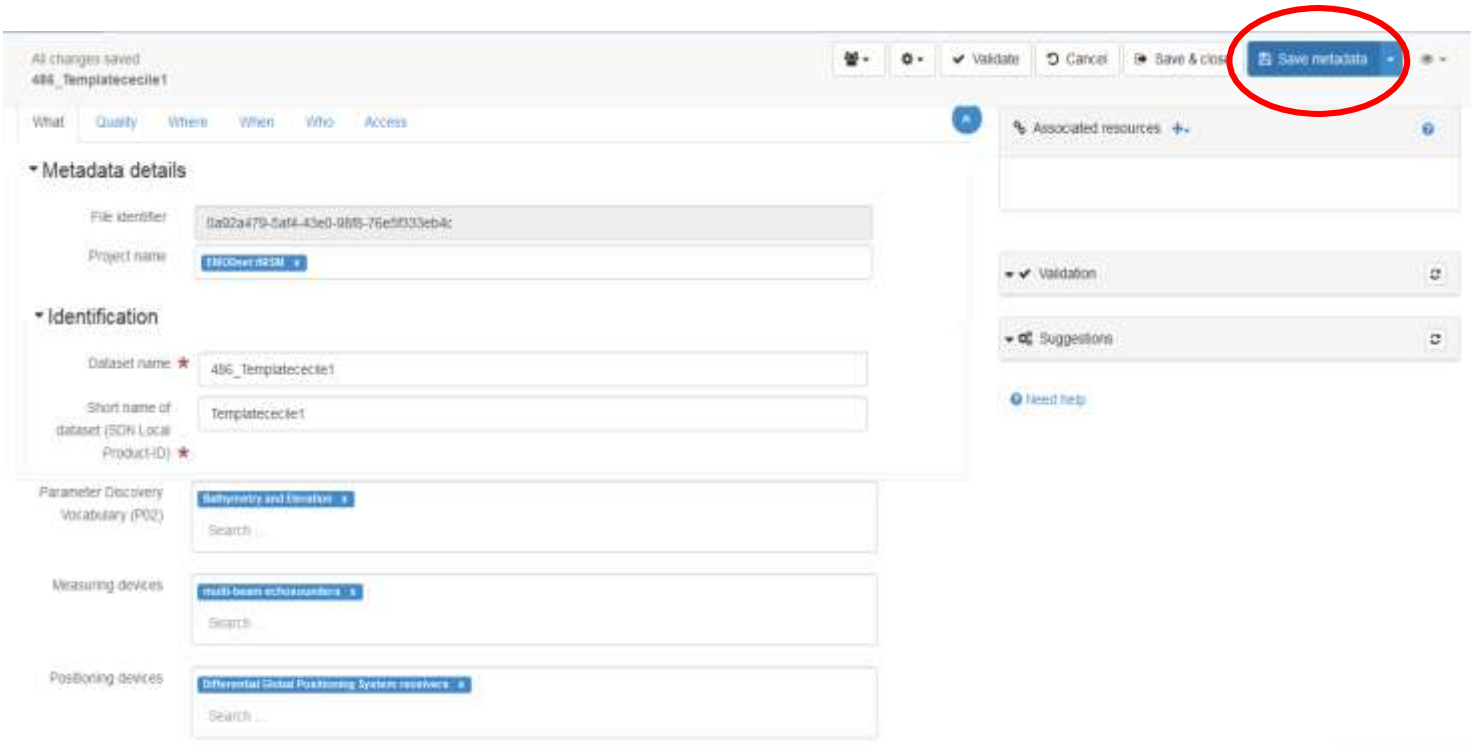
- And then "Create".

SEXTANT disconnects you automatically if you are inactive. Save regularly what you have edited (every15 mns).

Mandatory fields have been defined not only in function of the ISO and Inspire standards and Directive but also in function of the requirement of the projects.

Most of the fields are pre-filled or user friendly and don't need specific explanation. Attention will be paid to specific or text fields. Explanations are given by thematic tabs.

4.4.1. What



It is **strongly recommended** to start filling the "Dataset name" and "Short name of dataset" to avoid Sextant to save your entry under a default name. Use the "Save metadata" button and continue.

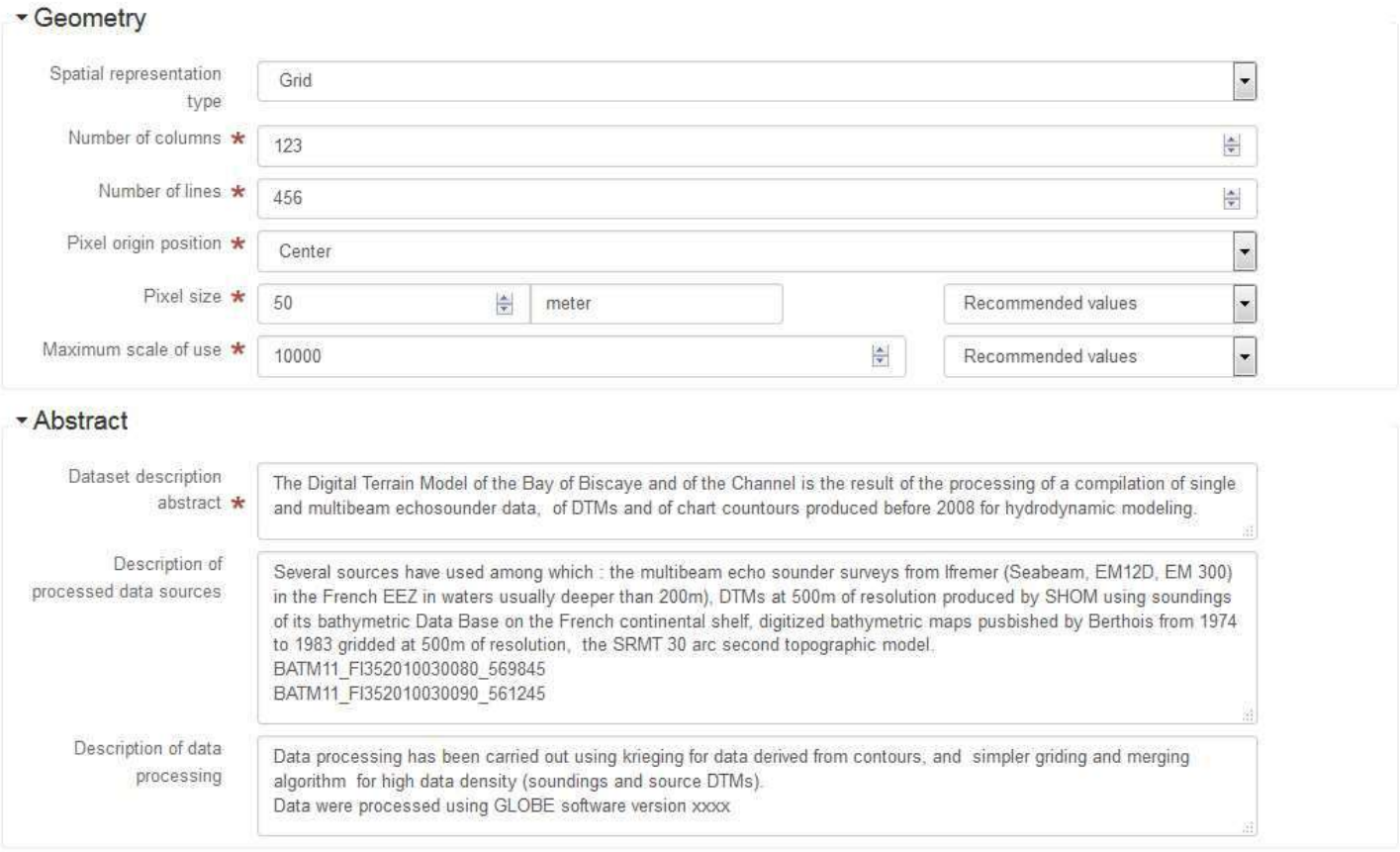
File identifier: is generated automatically using a combination of metadata edited by the partner. The syntax is: "SDN_CPRD_EDMO-Id_local-product-Id"

Project name: Choose EMODnet HRSM4. This field corresponds to the EDMERP SDN list.

Dataset name: title of the data set that will appear in the catalog.

Short name of dataset (SDN Local Product-ID): Local identifier of the bathymetric grid (according to local rules of Data Center). **This is a component of the file identifier.** The local identifier must not be longer than 75 characters (this constraint comes from the length of the string used to keep track of the source of data in the DTM NetCDF format.

Parameter Discovery/Measure devices/Positioning devices: metadata are given by default but you can also delete them and/or add others by clicking on "Search" (auto completion search). Use of L05 and P02 lists.



Geometry: fill in the information, and use lists or "Recommended" values when proposed

Pixel size: Select "Arc minute" entry in the Recommended values or write "Arc minute" in the text field close to the value field.
To fill the value, please refer to decimal value in the following table:

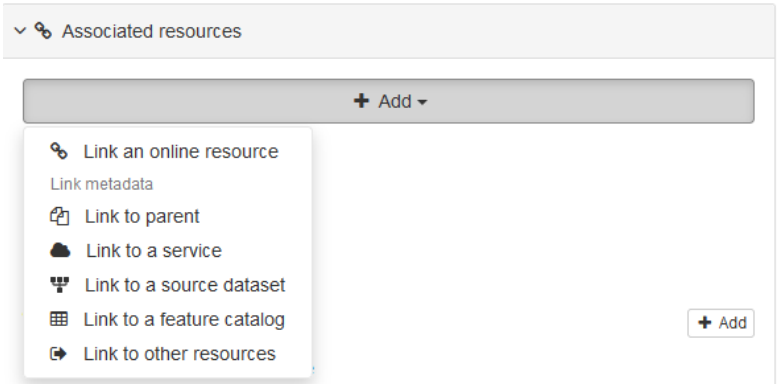
Grid size	Arc minute
1/512	0,00195313
1/256	0,00390625
1/128	0,0078125
1/64	0,015625
1/32	0,03125
1/16	0,0625

Dataset description abstract: write down a summary about the dataset (cruise/purpose/context description, specific characteristics, valuable details…)

Description of processed data sources: indicate the data sources and write down the corresponding CDIs when they exist and/or DOI if needed.

Description of data processing: any valuable detail about the processing software or processing methodology.

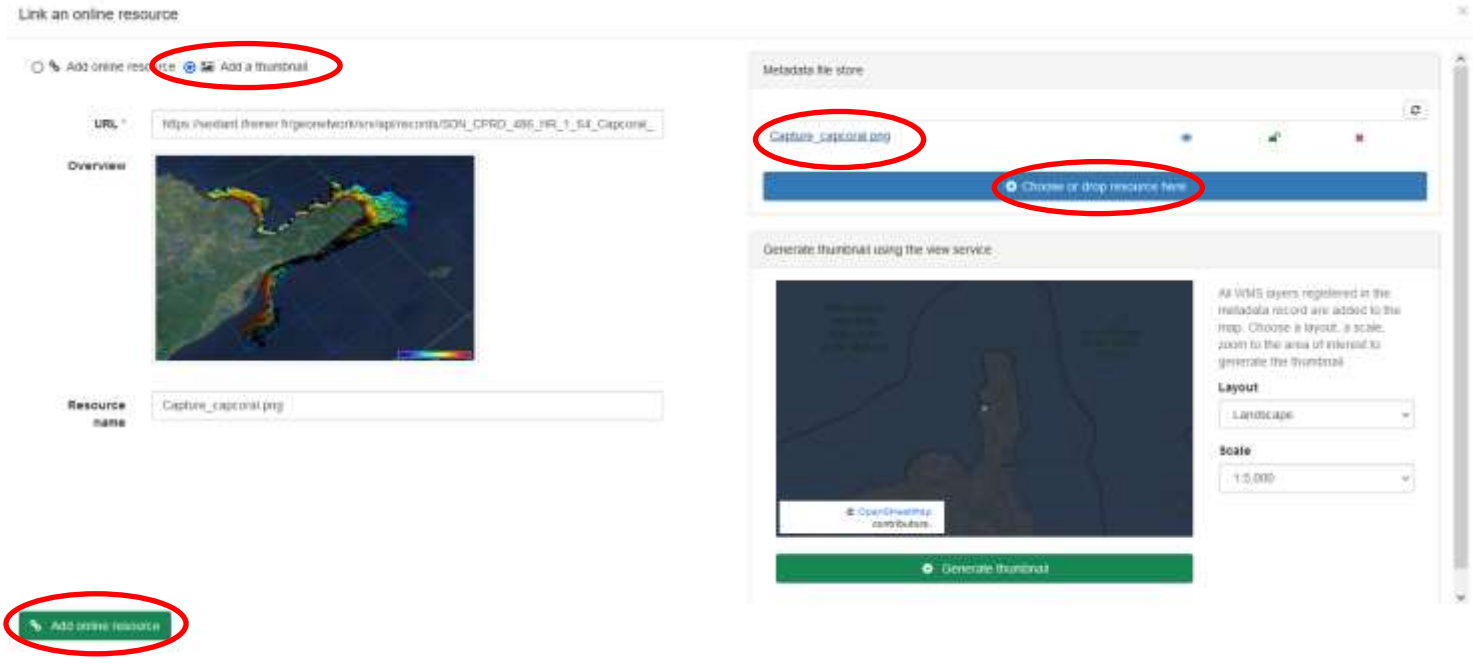
4.4.2. Associated resources (tab “What” upper right corner) – thumbnail and online resources



It is recommended to attach a thumbnail to illustrate your DTM in the catalogue. Click on the add button of the “**Associated resources**” field and seclect “**Add document**”.

Click on “Add a thumbnail” (1), select the thumbnail with the “Choose or drop resource here” tool (2) and click on your thumbnail in the “metadata file store” to update the URL(3).

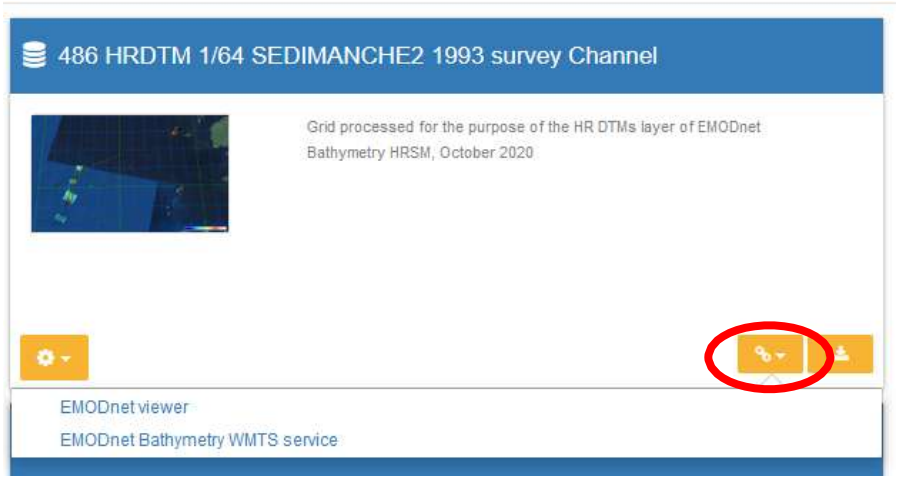
Click at the very bottom of the page to “add online resource” (4).



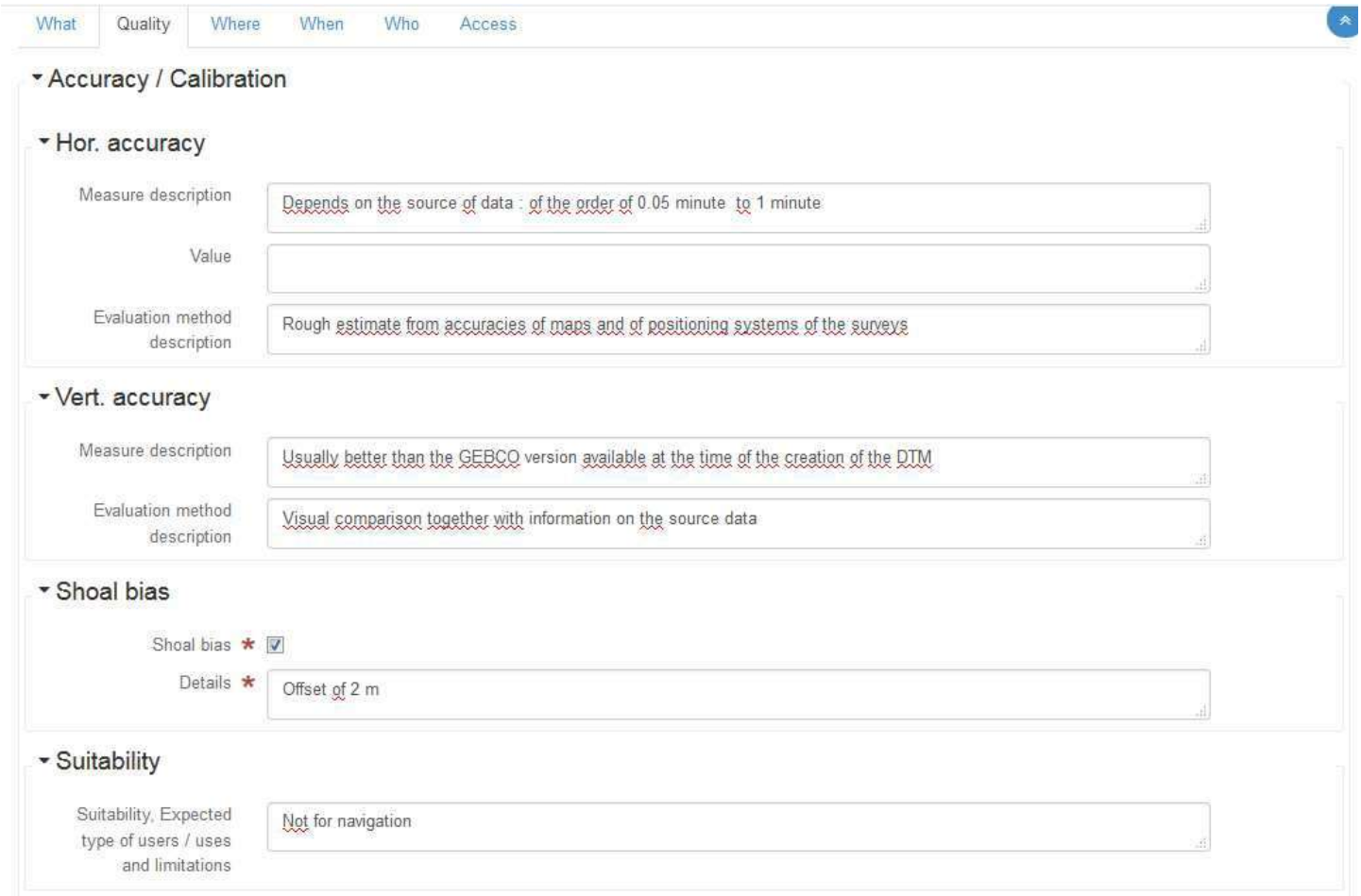
For HR-DTMs only: references to the EMODnet viewer and to the WMTS webservice have to be done using the online resources as follow :

- Click on the add button of the "**Associated resources**" field and select "**Link an online document**" and enter the followings:
  Protocol: Web link (URL)
  URL: https://emodnet.ec.europa.eu/geoviewer/
  Resource name: EMDOnet viewer
  And click on "Add online resource"
- Click on the add button of the "**Associated resources**" field and select "**Link an online document**" and enter the followings:
  Protocol: Web link (URL)
  URL: https://tiles.emodnet-bathymetry.eu/
  Resource name: EMODnet Bathymetry WMTS service
  And click on "Add online resource"

These links will be attached to your metadata description in the catalogue:



4.4.3. Quality



Horizontal accuracy:

Measure description: give any information about the horizontal accuracy of the acquisition system, the positioning system as well as the sounding method.

Value: In case you wish to give a digital estimator of the horizontal accuracy.

Evaluation method description: Reference to standard which have been used to qualify the horizontal accuracy (hydrographic standards, industrial specification…)

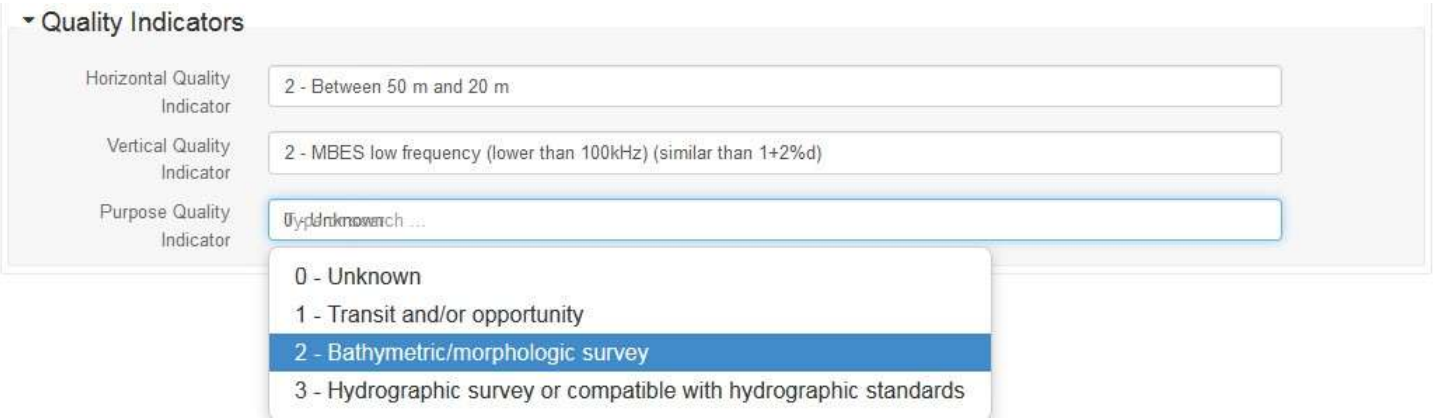
Vertical accuracy:

Meaure description: any information about the vertical accuracy of the depth in the file

Evaluation method description: Reference to standard which have been used to qualify the horizontal accuracy (hydrographic standards, industrial specification…)

Shoal bias: tick this field only in case of existing bias and precise details in text field below.

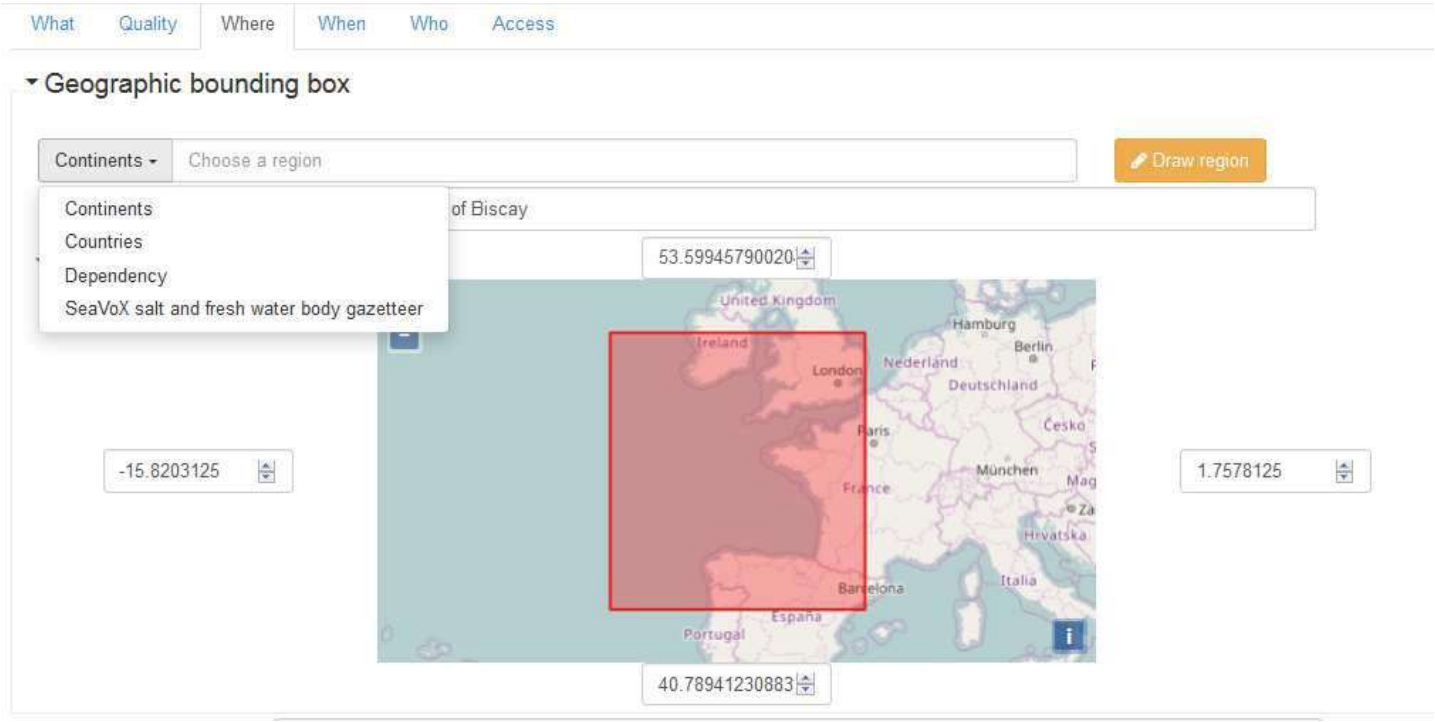
Suitability: precise the type of use that can be made of the datasets (example: not suitable for navigation)



Quality Indicators have been implemented in the EMODnet HRSM project to use further qualitative information (in DTMs and CDIs) related to the data source such as type of sensor. For the DTMs, the data producer has to consider giving each of the quality indicator based on the contribution with the lowest quality.
Click on “search” to make appear the appropriate list.

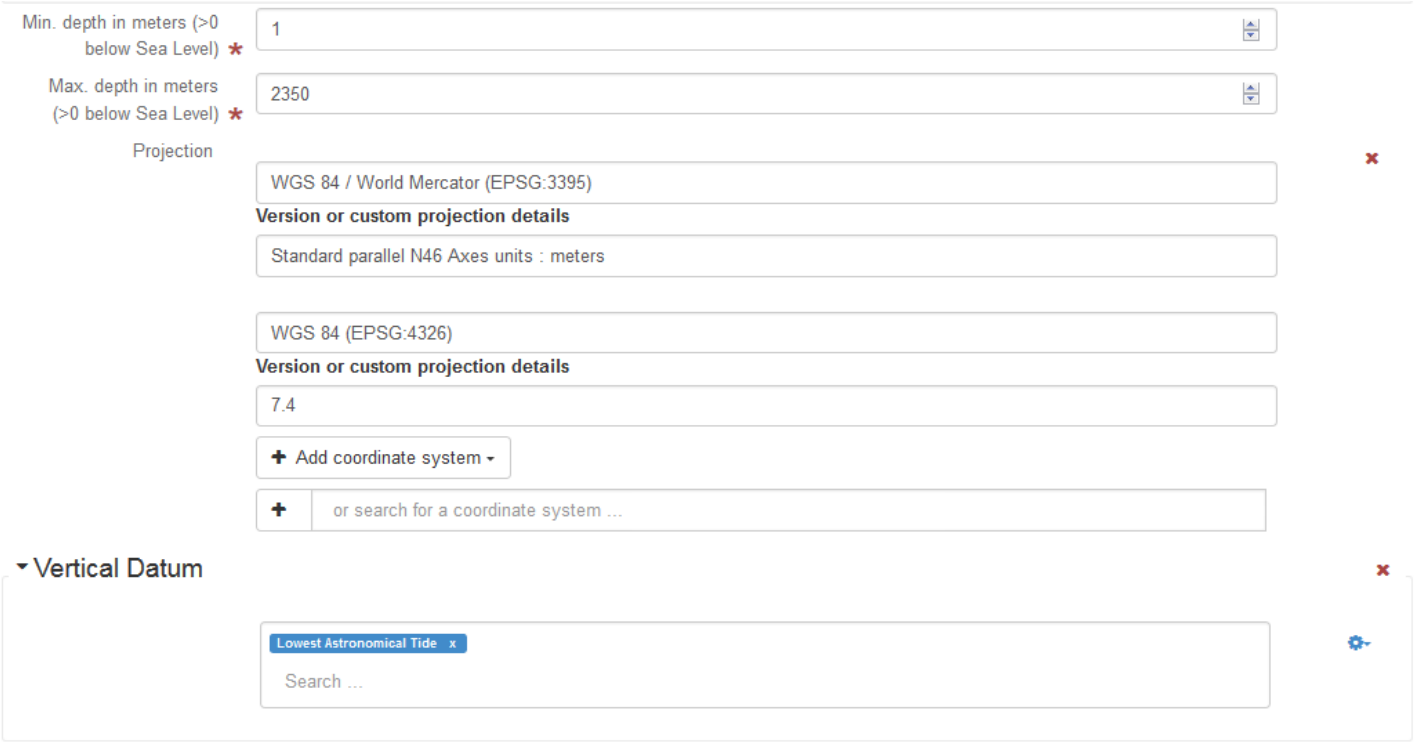
The following document describes the Quality Index proposed in the framework of the HRSM project : "Completing metadata elements for the generation of the Quality Index for the EMODnet DTM". It will help you to verify your entries.

4.4.4. Where



The **Geographic Bounding Box** can be created in 3 different ways:

- By drawing your own area: click on “Draw region”, select the area and the coordinates will automatically be updated
- By entering the coordinates (decimal degrees) manually in the appropriate fields
- By selecting an area in the international SeaVox list



Fill in the information, and use lists values when proposed.

Projection: fill in the geodetic system and the projection of the catalogued product. Some of them are listed in the "Add coordinate system" list.

You can input additional details in the "Version or custom projection details.

As example:

for a latitude/longitude file :

Write "WGS84" in the "Projection" field.

for a UTM Zone 33 file

Write "WGS84 / UTM" in the "Projection" field

Then write "Zone 33" in the "Custom projection details.

Vertical Datum uses L11 SDN list.

4.4.5. When

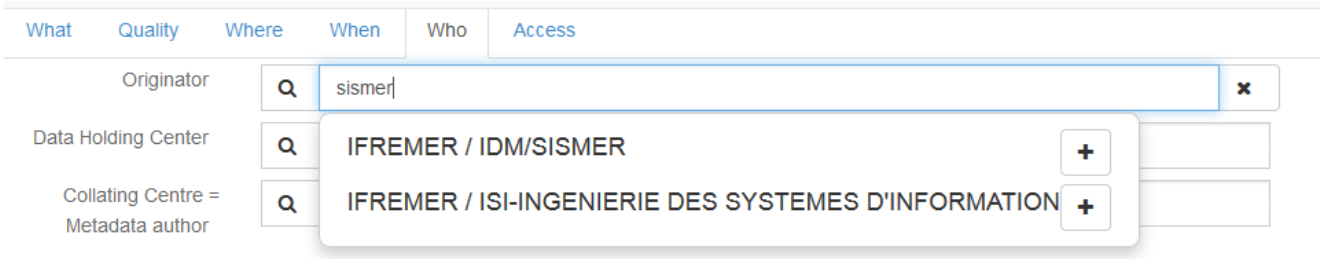
Fill in the date information using the calendar. To go throw years, click the year:

Creation date is the date of production of the DTM.

Temporal extent covers the period of datasets used in the DTM

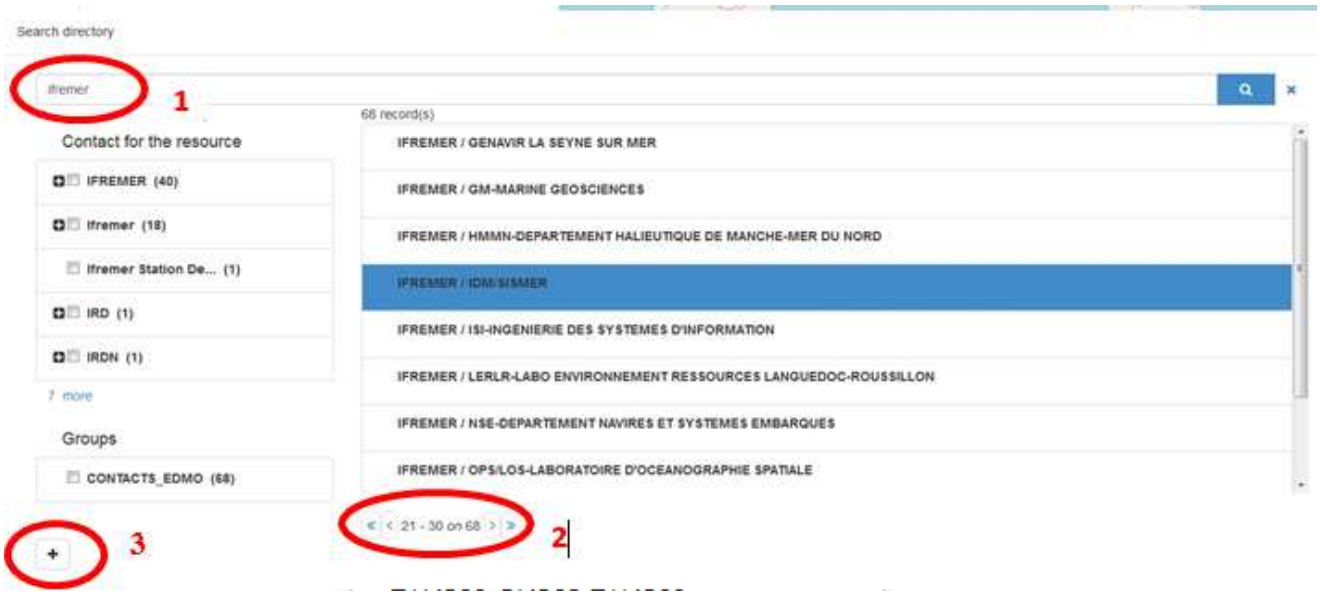
Measurement frequency can be used in case of periodic acquisition of datasets.

4.4.6. Who



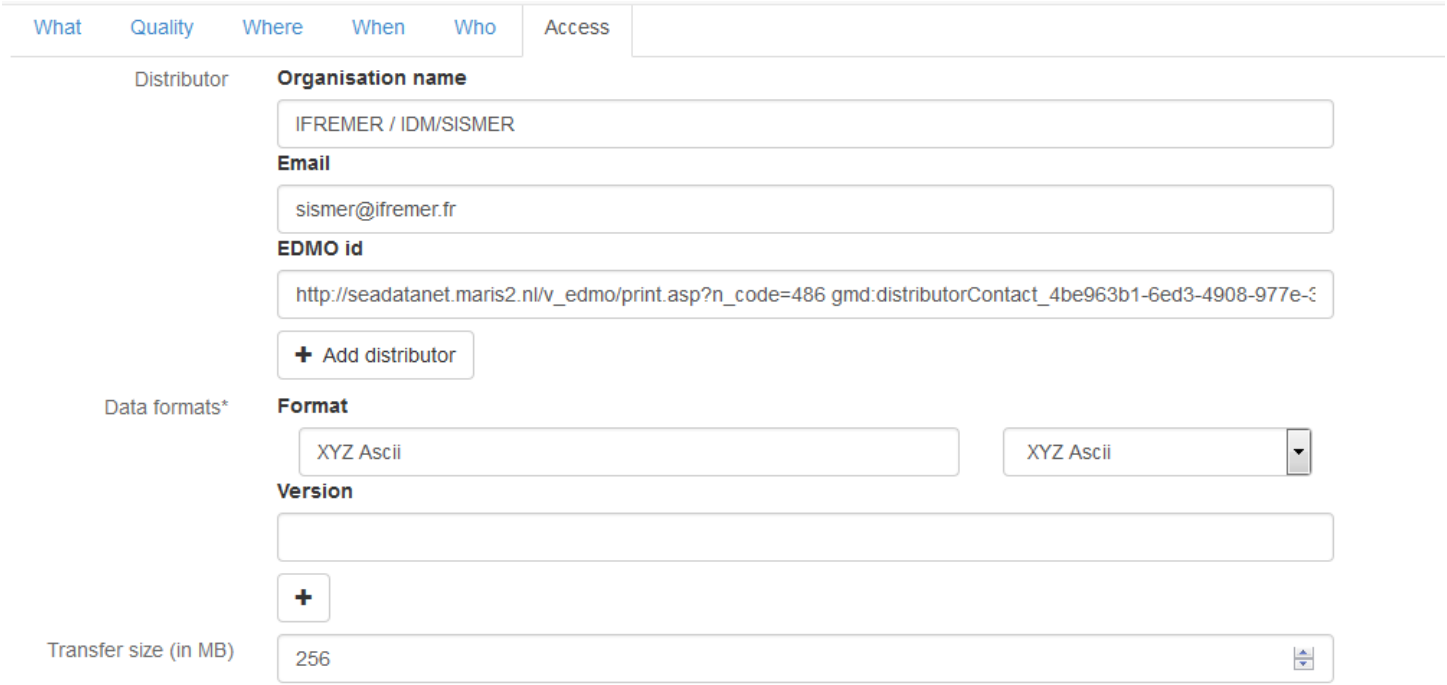
The **Originator**, **Data Holding Center** and **Collating Center** contacts are filtered on the EDMO_id list. **The data holding center contact is a component of the file identifier.**

Enter the name of your institute or department and corresponding entries will appear (then click on the corresponding "+" button). If not, click on the binocular, and write in "search for a contact" field or use the proposed filters on the left of the screen (check number of pages). Once you have found the correct entry, click on the "+" button at the bottom left corner.



Once you selected the correct contact, Organisation name, Email and EDMO id are automatically filled in.

4.4.7. Access



Click on "Add distributor" to enter the **Distributor** contact details (also filtered on EDMO id). And fill in the other information using "Recommended values" when possible.

Version and **Transfer size** are optional.

Intellectual property for CPRD:

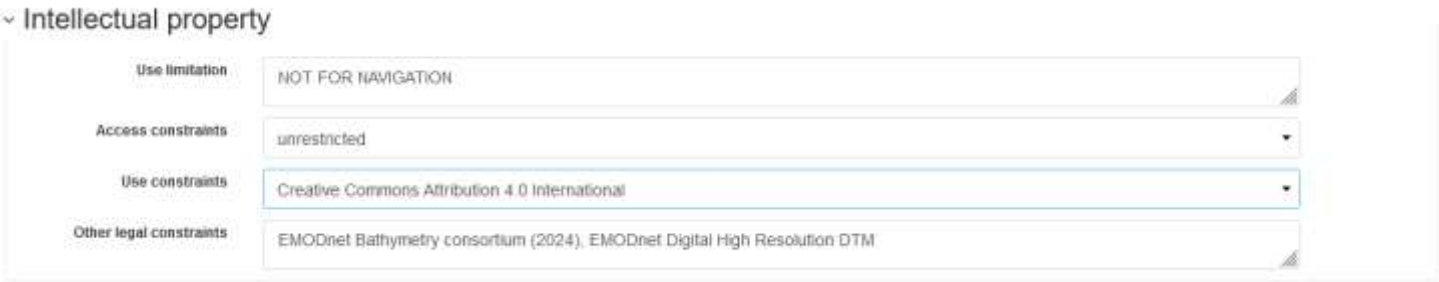
Use limitation: free text field that can be used to detail intellectual property like "NOT FOR NAVIGATION"

Access constraints: uses list SDN L08. Gives information about how to get access to the DTM.

Use constraints: gives information about the condition of use of the DTM.

Other constraints: complementary information about the use of the data. This is the appropriate field to enter the DOI of your dataset when existing or the obligation of citation

Intellectual property for HR-DTM:



Use limitation: for example “NOT FOR NAVIGATION”

Access constraints: set as **“**unrestricted”. Uses list SDN L08. Gives information about how to get access to the DTM. To be set as **“**unrestricted”.

Use constraints: Uses list SDN L08. Gives information about how to get access to the DTM. To be set as “Creative Commons Attribution 4.0 International”.

Other constraints: write “EMODnet Bathymetry consortium (2024), EMODnet Digital High Resolution DTM”

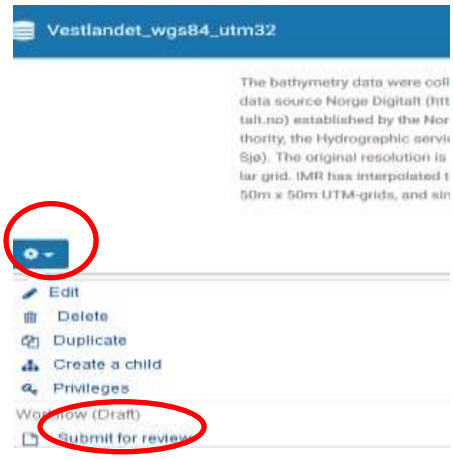
4.5. Save your metadata

Your sextant template is now complete, you can "**save and close**" the template. You can check your new entry on the sextant API catalogue: https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?sortBy=relevance&from=1&to=30

4.6 Submit your metadata for validation

A workflow status has been implemented to prevent any inconsistency with EMODnet rules when updating or creating a metadata. Each creation or update has to be validated by a sextant administrator.

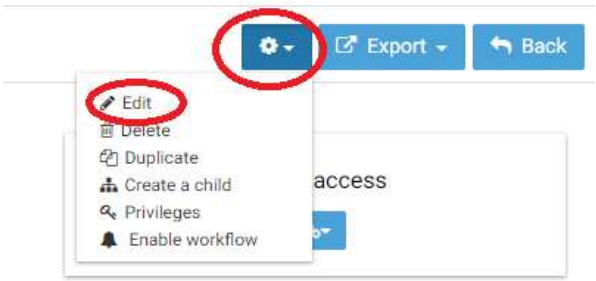
To submit your metadata click on the Wheel tool>Submit for review



The sextant catalogue administrator will receive a notification by email and will validate and publish your sextant entry. **This submission has to be done for each new entry and each updated entry.**

5. Guidelines for updating an existing entry

If you need to update any of your description, select your sextant entry on the sextant API catalogue: https://sextant.ifremer.fr/documentation/emodnet_bathymetry/api/catalogue.html#/search?sortBy=relevance&from=1&to=30 and click on the wheel tool on the upper right hand corner and select edit.



Once updated, do not forget to submit again your entry through the sextant workflow – see chapter 4.6.

6. Sextant helpdesk

If any problem when using Sextant, you can contact the Sextant team sextant@ifremer.fr .

Your question will be routed toward the appropriate person.