EMODnet Thematic Lot n°1 - Bathymetry

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

Start date of the project: 20/12/2020 - (24 months)

Centralisation Phase

D3.1 - Upgraded guideline of EMODnet methodology for DTM production, including using prototype CVE

Technical report

Date: 2/12/2021

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Contents

Disclaimer

1. Overall approach

The overall approach of EMODnet Bathymetry for generating a new release of the EMODnet DTM is indicated in the following flow chart.
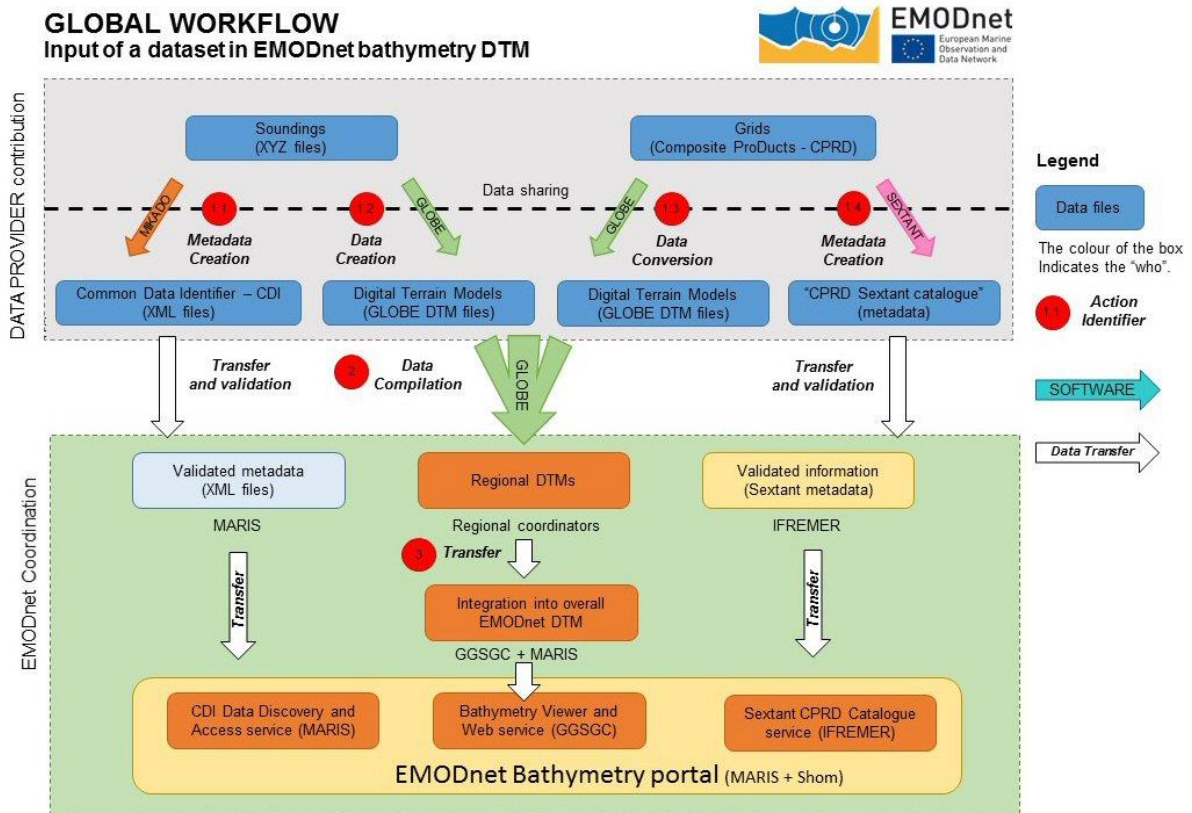

Image: Flow chart of EMODnet Bathymetry approach

The first year of the project is mostly dedicated to data gathering and populating new bathymetric data sets in the EMODnet Bathymetry catalogue services as managed with the SeaDataNet CDI service and the Sextant CPRD service. Moreover, data providers have to pre-process and grid their new data sets using GLOBE and the EMODnet Bathymetry standards and forward these as new inputs to the Regional Coordinators.

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 by Regional Coordinators will start end February 2022 using the latest EMODnet DTM tiles, the previously used data sets and the new data sets. Their task is then to update and improve their Regional section, focusing on updating parts of the DTM with new and possibly higher quality data, and on improving already known and new to be identified anomalies in the latest EMODnet DTM release.

2. Principles for set-up of CVE

For the regional DTM production process, the Regional Coordinators should make use of the latest GLOBE software version, which they run on their local machines. However, to overcome local memory and processing challenges when handling the Regional DTMs, this round Regional Coordinators might also make use of the Collaborative Virtual Environment (CVE) on the DATARMOR computing infrastructure of IFREMER with online Globe software.
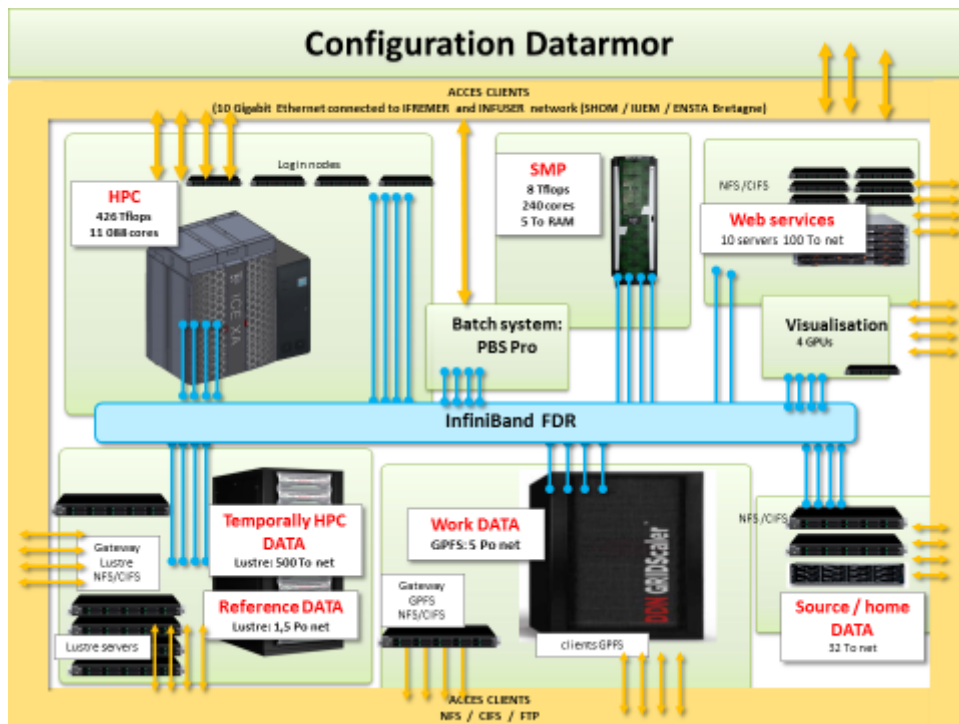

Image: Configuration of DATARMOR

The DATARMOR HPC infrastructure is connected to the French Network for Research and to Geant. The hosting of the EMODnet CVE service in this HPC environment will guarantee a high bandwidth, high performance and high operational availability for consortium members.

As part of WP4, IFREMER has further elaborated the earlier developed prototype for the CVE and made it ready with the latest online GLOBE version for validating regional DTMs by visualisation, checking for anomalies and outliers, which then can be corrected, before files are forwarded to the integrator. Regional Coordinators might inspect the existing EMODnet DTM and their new draft regional DTMs for anomalies. Corrections might include using other data sets, if possible, and using improved interpolation and/or smoothing algorithms as provided in GLOBE. Due to its computing configuration, the CVE should provide the Regional Coordinators more efficient performant handling and visualisation of the full regional DTMs.

The current version of the CVE focuses on 3 main functionalities:

- Display of Regional DTMs

- Implementation of Web processing tools, which are dedicated to the quality analysis of DTMs
- Annotation tools, allowing the regional Coordinators to document and share remaining issues on regional/final DTMs.

3. Current configuration

The CVE as further developed by IFREMER as part of WP4 has the following specifications.

Technical framework

The CVE Website is based on three components which are all based on OGC standards and which all benefit of previous technical choices made by the project (NetCDF grid format, OGC WMS services). The project setting up is based on the free open source QGIS. Display/Delivery of the grid is based on WMS/WMTS functionalities. Dedicated processing tools on the grid are based on the emerging OGC Web Processing Services (WS) technology.

Data input

For the prototype, the four regions of the Mediterranean Sea and Black Sea have been selected. Regional Coordinators of these regions have already been engaged in the tresting and evaluation of the earlier version of the collaborative tools (Globe online in 2020).

Four layers of information are made available:

- both grids of the water depth for 2018 and 2020 DTM grids
- their difference
- the 2020 source reference layer.

Analysis tools

In order to help the Regional Coordinators delineating issues in individual depth grid, tools for the DTMs analysis have been implemented such as the calculation at grid node of the slope, the detection of erratic peaks, artificial hill shading, and iso-value (isobath) contours.

An annotation tool allows observations to be recorded as a geographic object (point/line/polygon) associated with a textual description.

Objective

These annotations are made available to all the partners of the project, so that we all can share a common understanding of remaining issues, which can be then directed to the relevant partner (data provider or regional coordinator, respectively) for actions such as further data processing or modification of the selection of data source used as part of the fusion process. The following screens give illustrations of the current CVE configuration.

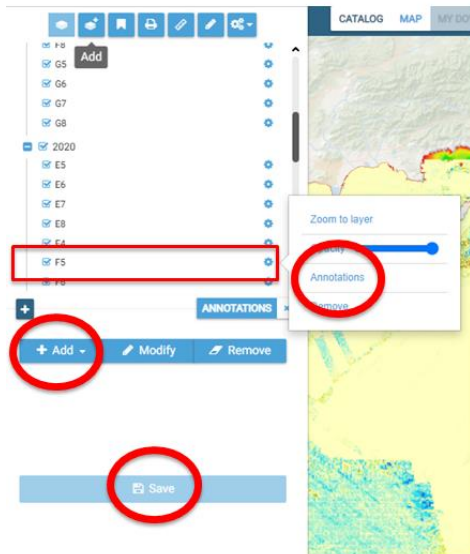Tiles 2020, 2018 and difference are imported in the project
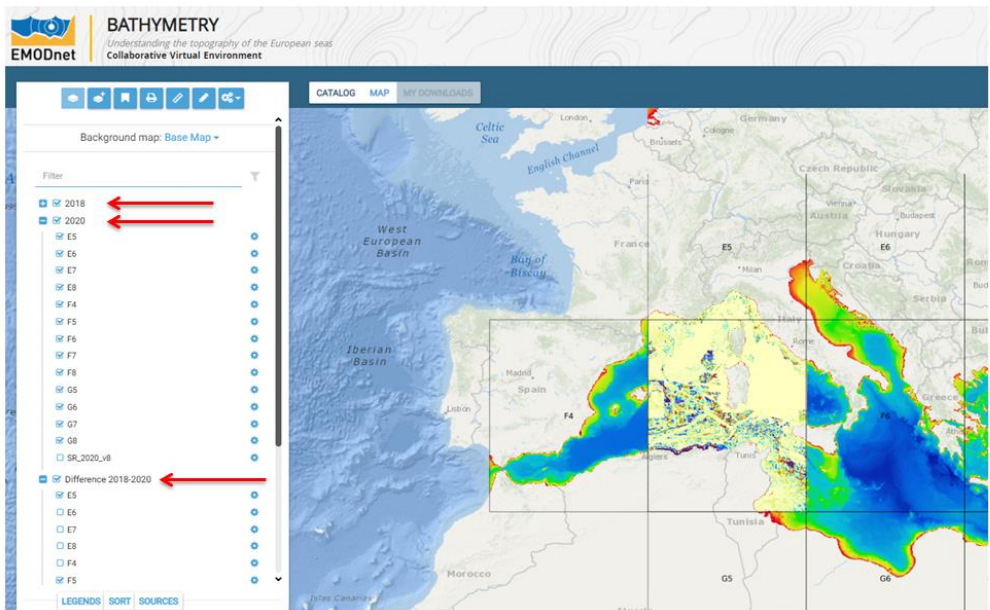
Source reference layer available
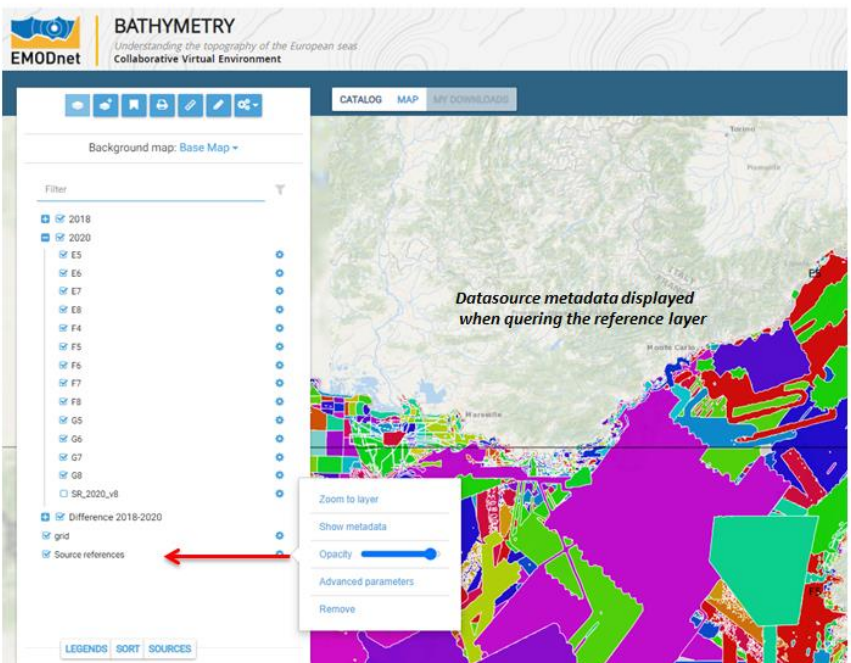
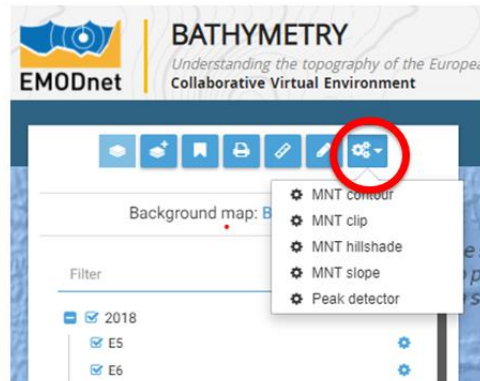Images: Data layers available in the prototype web site

Image: Implemented tools for the DTM analysis

The prototype is available at the following website
https://www.ifremer.fr/sextant_doc/emodnet_bathymetry/api/whole_mediterranean_wmts.html#/map

Connection can be provided only to EMODnet Bathymetry partners and works with an IFREMER Extranet login.

4. Proposed use for Regional DTMs production

This CVE prototype has been developed on the basis of 2 successive versions of the global DTM (2018 and 2020). It allows the principle of comparing each version of the global DTM with its previous one. This gives an indication of latest changes made, but also where improvements might be needed.

Another use is also considered: compare new data provided during the process of a new version with the existing.

As part of the EMODnet Bathymetry project, the latest CVE version will be presented to the full consortium at the next plenary meeting planned in January 2022. Moreover, back-to-back with this plenary meeting a dedicated CVE Workshop will be held in particular for the Regional Coordinators.

During these meetings two options can be discussed:

(1) analysis of the difference between the two most recent versions of the global DTM (namely 2018 and 2020 for the current phase). This means the integration of all the regions/title. This option can also be dedicated to a larger group of external users. It can be made available soon after the delivery of a new grid, until the next one is generated. (2) analysis of the difference between a new draft contribution from one of the Regional Coordinators, during the phase of grid creation and testing, before the full integration into the DTM. Comparison will be made in this case against the latest full version available (2020). For this second option, it is required to produce for each region a preliminary merged DTM of the new single DTMs to be made available for integration into the system.

5. Further development

After the Meeting and CVE Workshop in January 2022, the main further development for the CVE will focus on extending the information layers to the full EMODnet DTM, so covering all regional areas. This will allow all Regional Coordinators to make use of the extra options of the CVE for their Regional DTM activities.

Further functionalities might also be implemented:

- standardization of the annotation tool : author / date /…
- additional algorithm from Globe for the DTM analysis.

One of both options described above will be selected and implemented. The IFREMER team will configure a new QGIS project and open a new Website to make it available in the period of processing for the next Regional DTMs which is planned from February 2022 until summer 2022.

6. Draft presentation of the CVE prototype for January 2022 Project Meeting and Workshop

As indicated, the latest version of the CVE will be presented in an interactive way at the next Plenary Meeting and CVE Training Workshop in January 2022. This will be directed towards informing all partners and making the Regional Coordinators more acquainted with the CVE and how they might use the CVE for validating and improving their Regional DTMs. A series of slides has already been prepared that will be used for that Workshop.

In preparation of these meetings the following set of slides has been prepared.
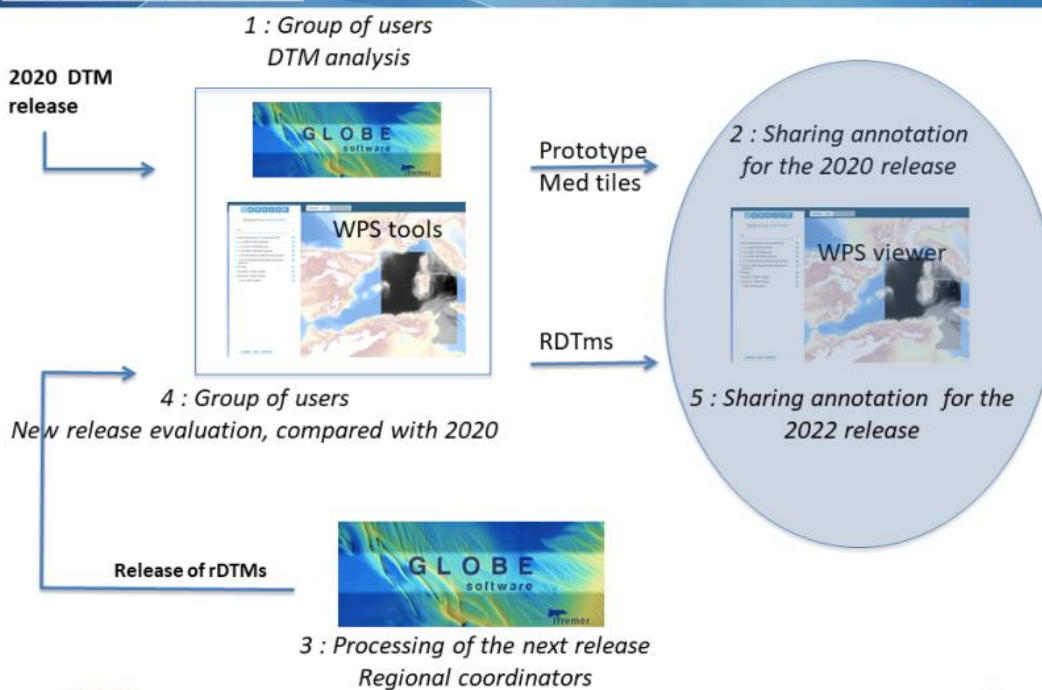
WPS project

2021

- Upgrade of annotation tools
  - Attributes (authors, date, comments,...), Import / export of annotations (exchange with Globe)
- November 2021 : Prototype of the WPS project for the Mediterranean Sea, based on the current version of the EMODnet DTMs

2022

- Update of the WPS project for the global DTM : Integration of new version of the RDTMs when made available by the regional coordinators
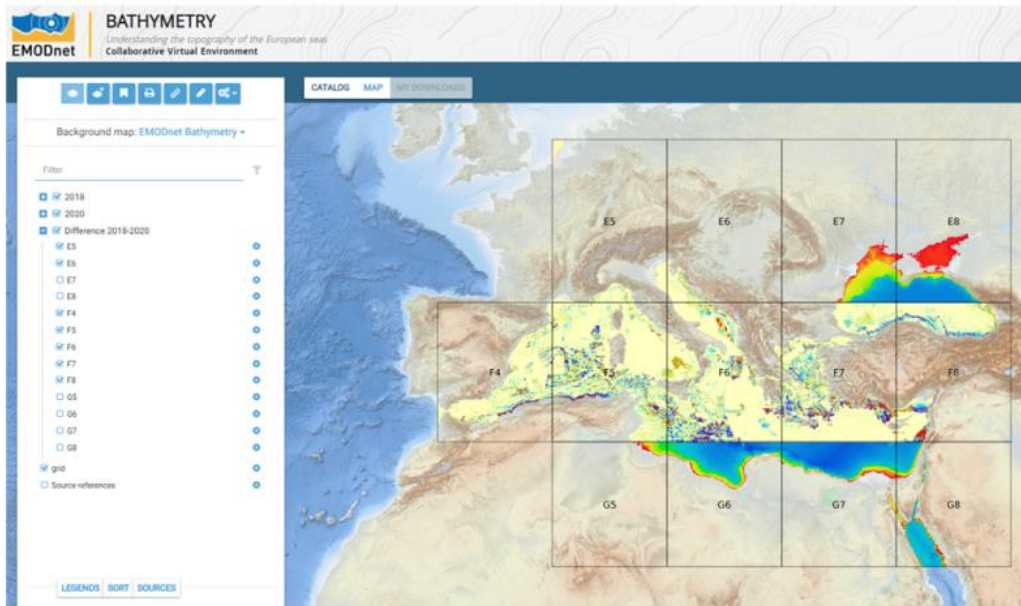 (April / May 2022).

1 : Group of users DTM analysis
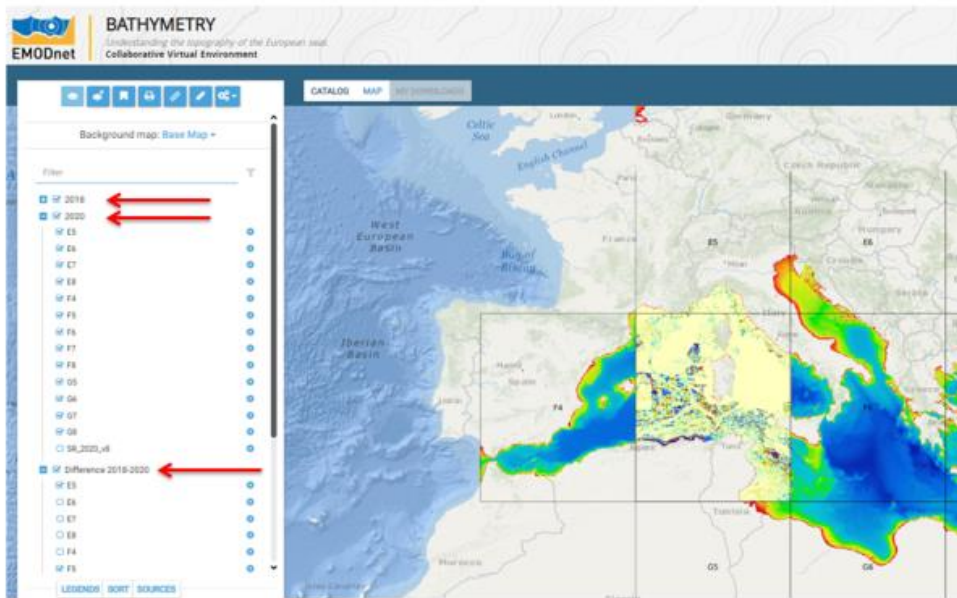
2020 DTM release

GLOBE software

WPS tools

Prototype Med tiles

RDTms

2 : Sharing annotation for the 2020 release

WPS viewer

4 : Group of users New release evaluation, compared with 2020

5 : Sharing annotation for the 2022 release

Release of rDTMs
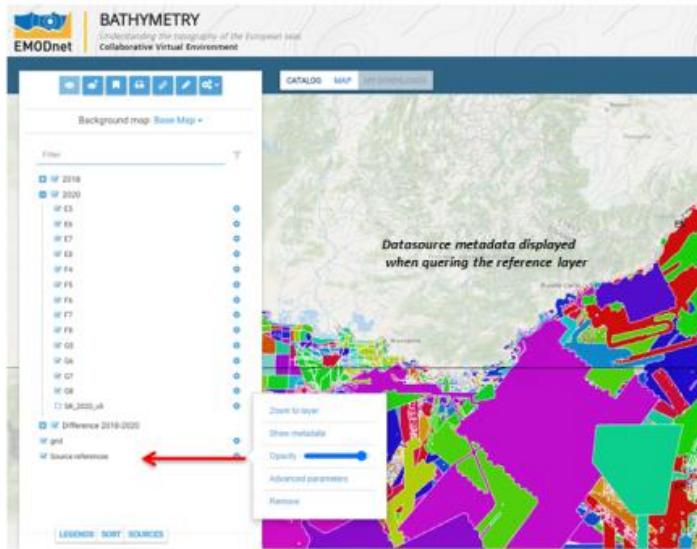
GLOBE software

3 : Processing of the next release Regional coordinators
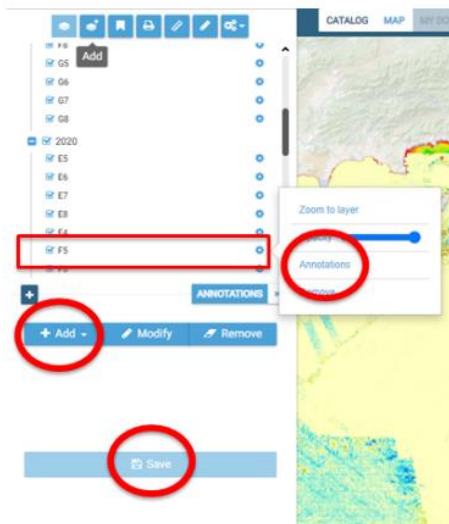
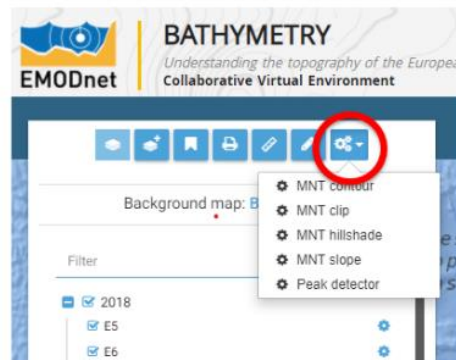Tiles 2020, 2018 and difference are imported in the project

Source reference layer available

DTM Annotation tools

Tools for raster files

Use case

Example of use case
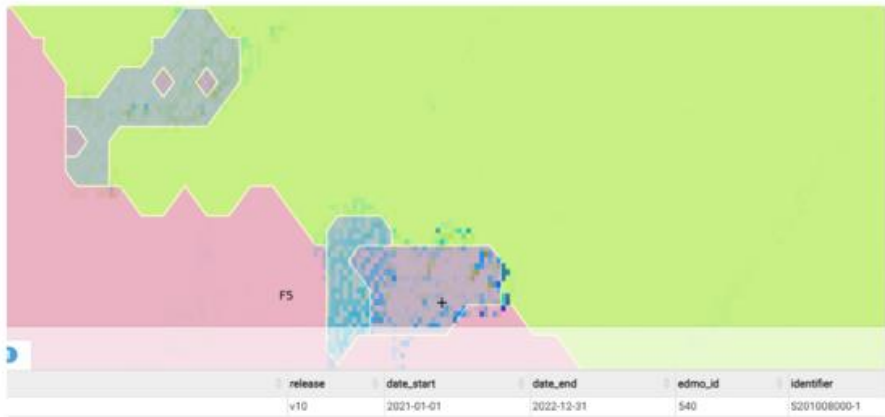**Tile E5 : area of unconsistency between both version 2018 and 2020**

Step 1 : observation with the « Difference » tile
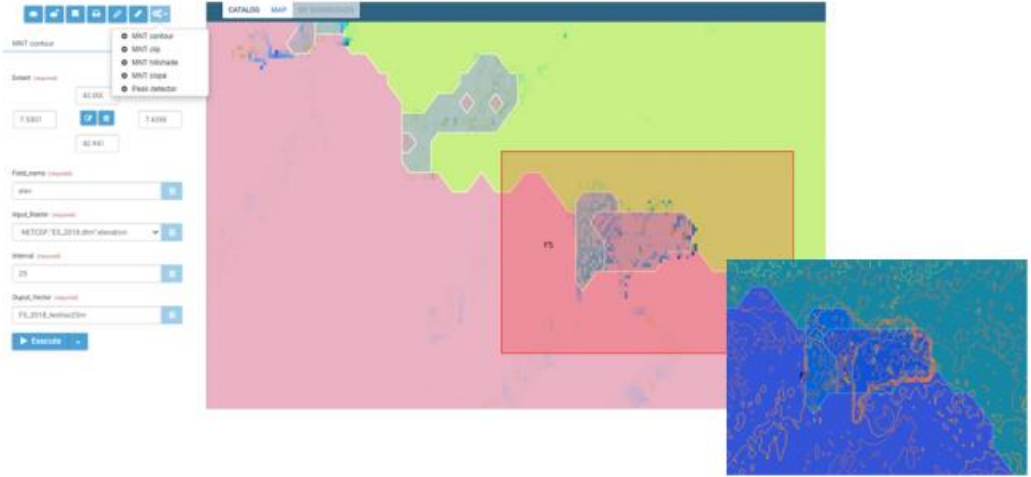

14/01/2022

Example of use case
Tile E5 : zone of unconsistency between both version 2018 and 2020

Step 2 : identification of data sources (source reference layer)

release	date_start	date_end	edmo_id	identifier
v10	2021-01-01	2022-12-31	540	S201008000-1

14/01/2022

Example of use case
Tile E5 : zone of unconsistency between both version 2018 and 2020

Step 3 : local contours for a better understanding

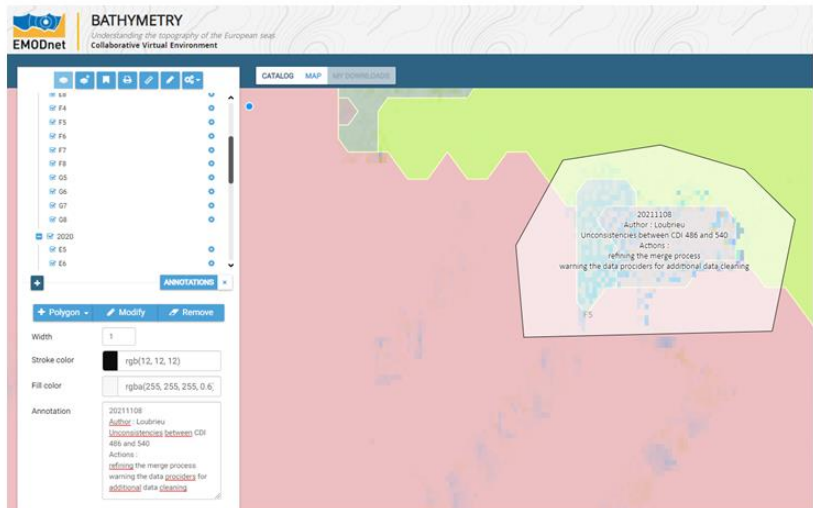Noisy data in the merge area

14/01/2022   12

Example of use case
Tile E5 : zone of unconsistency between both version 2018 and 2020

Step 4 : create an annotation, open an action.

14/01/2022   13