



EMODnet Thematic Lot n°1 – Bathymetry

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

Centralisation Phase

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

October 2023



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1 Overall approach and explanation EMODnet Bathymetry flowchart

The first year of the EMODnet Bathymetry 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 will start during the 1st quarter 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.

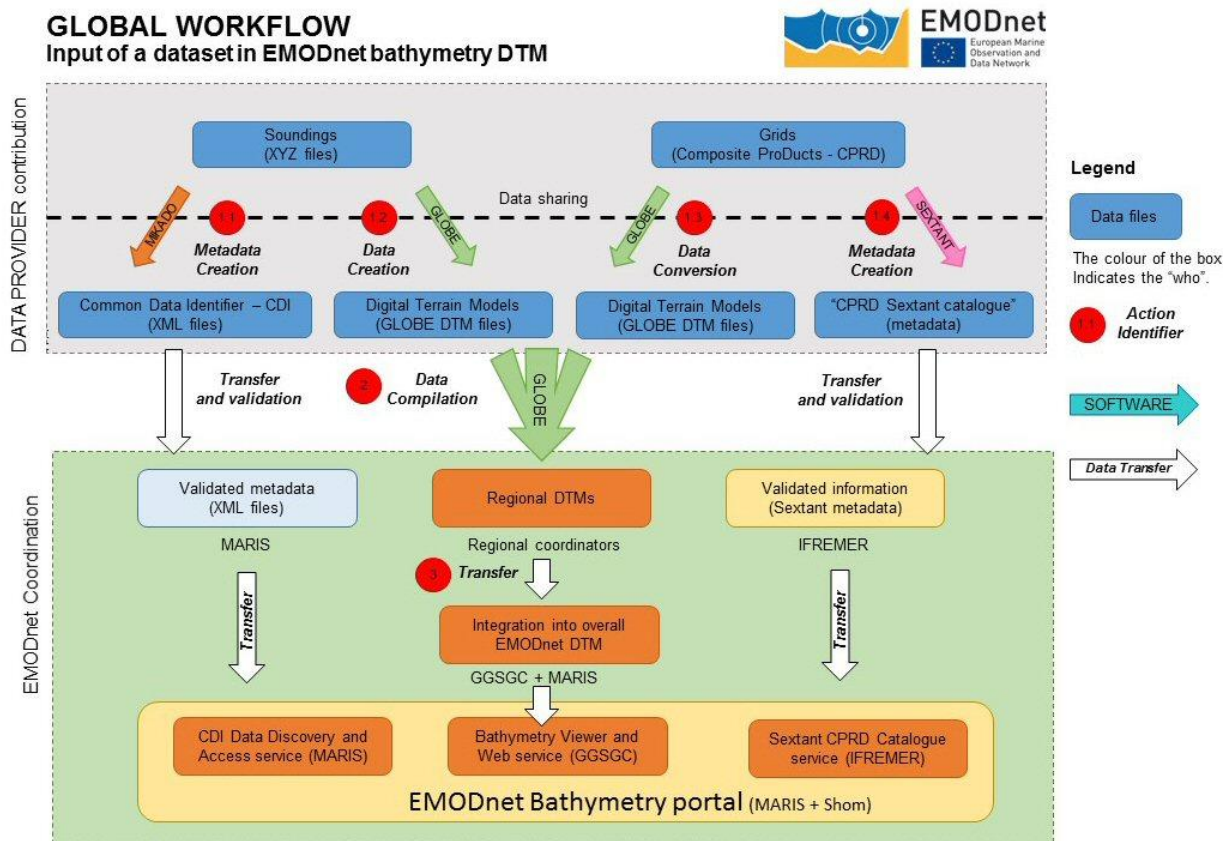


Figure 1. Example of caption which should go below the figure

The Regional Coordinators will make use and review the latest EMODnet DTM tiles, the previously used data sets, and the new data sets as received as potential input. 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

As part of WP4, Ifremer has developed in 2021 a prototype for a Collaborative Virtual Environment (CVE). It then allowed analysis of the difference between the 2018 and 2020 versions of the EMODnet Bathymetry grid. The geographical area of concern were the four regions of the Mediterranean Sea and Black Sea.

The objective of the CVE development is to provide a common environment for the quality control of regional DTMs and to share, between all partners, the analysis of the gaps between 2 successive releases of the regional DTMs. This analysis should contribute to identify and correct remaining issues in the DTMs.

For that purpose, the CVE development project has been extended in 2022 to covering the whole EMODnet DTM for all European seas and North-West Atlantic Ocean, while in 2023 further developments have taken place for optimising and expanding functionalities.

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 latest version of the CVE has the following specifications.

3.1 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 (WPS) technology.

3.2 Data input

All regional DTMs are now part of the CVE project.

For each of them, four layers of information are made available:

- both grids of the water depth for 2020 and 2022 DTM grids
- their difference
- the 2022 source reference layer.

3.3 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.

3.4 Further actions

These annotations are made available to all the partners of the project, so that all stakeholders can share a common understanding of remaining issues, which then can be 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.

Developments in 2023 have been dedicated to implementing additional tools:

- Extra tools for grid analysis, such as QGis tools aspect, rugosity,...
- Export of the observations file (json format) to the Globe software, in order to combine the CVE analysis with the data processing workflow in Globe.

In 2024, a preliminary release of the regional DTMs with the new data provided by the partners, will be made available on the CVE project, for a preliminary analysis of their difference with the current version of the 2022 DTM. For this option, it is required to produce for each region a preliminary merged DTM of the new single DTMs, which are made available for the project.

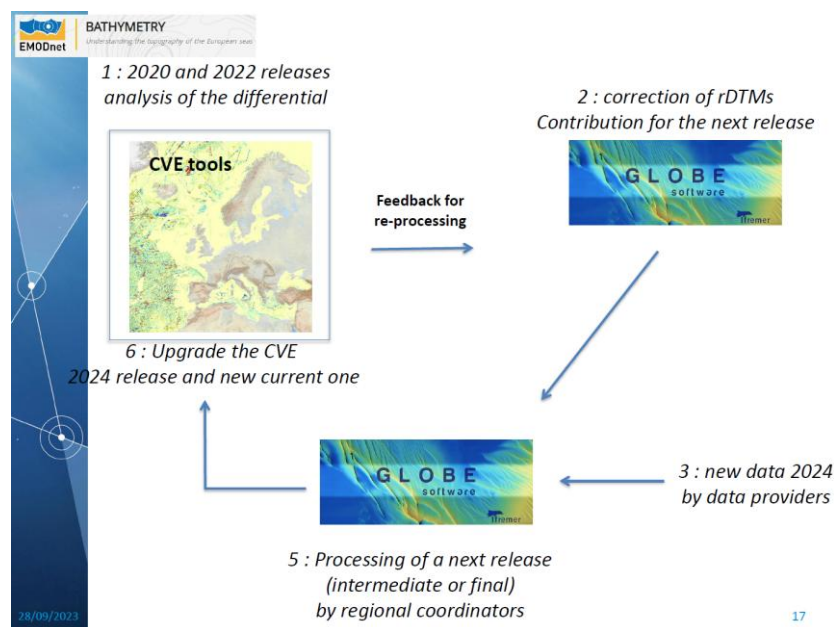


Figure 2: Scheme for a workflow integrating the CVE

There is currently a prototype available at the following website:

https://www.ifremer.fr/sextant_doc/emodnet_bathymetry/api/whole_mediterranean_wmts.html#/map

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

In April 2024 another workshop will be organized with all regional coordinators to discuss progress with the RDTM generation process and to exchange experiences with the use of the CVE as part of that process.

4 Illustrations

The following screens, extracted from a presentation and online demonstration made during the EMODnet Bathymetry meeting in Brest in September 2023, give illustrations of the current CVE configuration.



Figure 3: Presentation screen 1

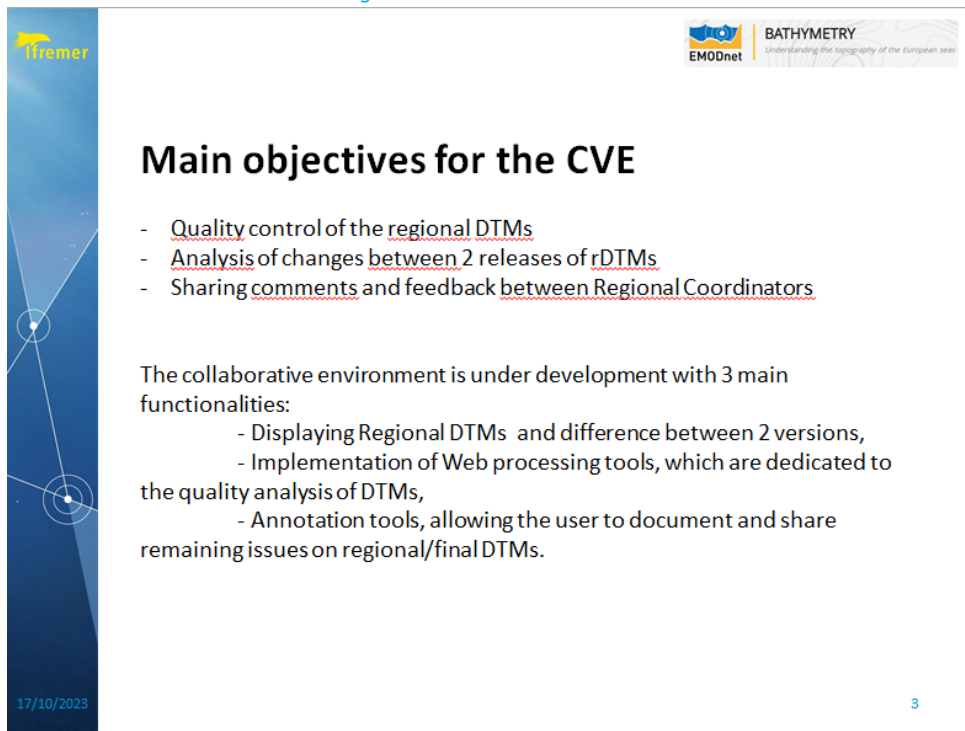




Figure 4: Presentation screen 2





Sextant

- SEXTANT, A MARINE SPATIAL DATA INFRASTRUCTURE
- Provide discovery, viewing and downloading services
- Sextant is used in several EU projects
 - SeaDataNet
 - Copernicus - Marine environment monitoring service (CMEMS)
 - EMODNET (Chemistry, Bathymetry, Checkpoint)
 - Jerico
 - ...

17/10/2023

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Figure 5: Presentation screen 3





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Figure 6: Presentation screen 4



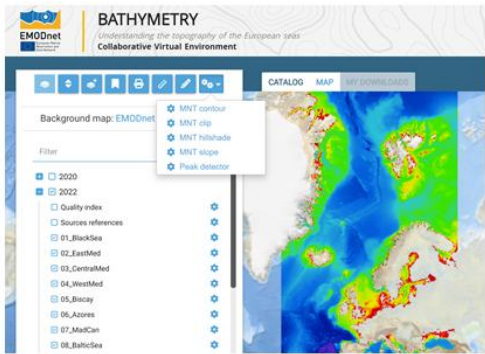
Sextant

In the CVE, the viewing service of Sextant is used

- To display the regional DTMs **WMS** (Web Map Service)
- To execute web process on DTMs **WPS** (Web Processing Service)

The processes available :

- Contour
- Clip
- Hillshade
- Slope
- Peak detector (process from Globe)



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Figure7: Presentation screen 5

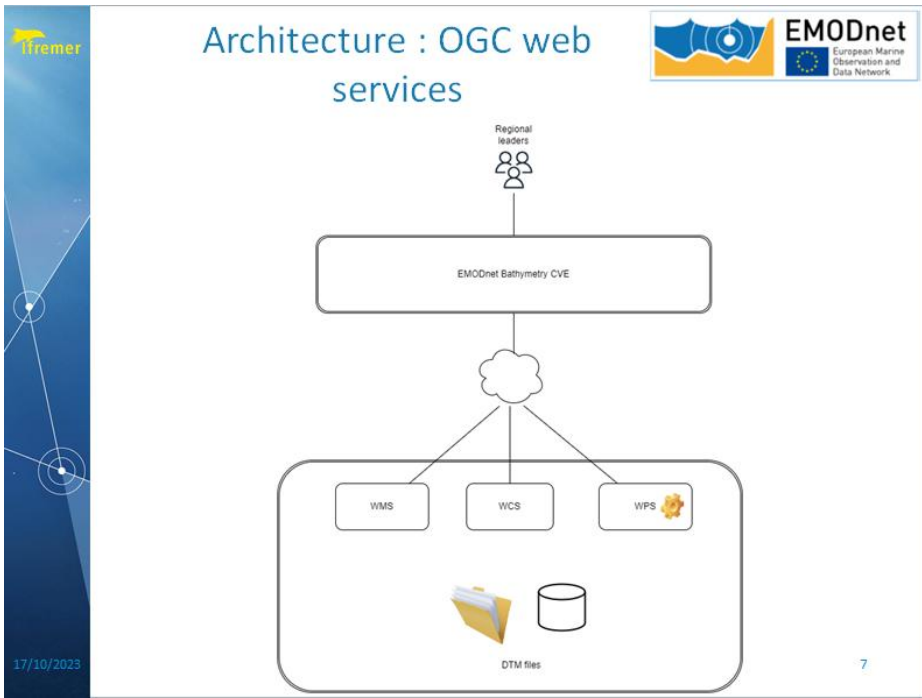


Figure 8: Presentation screen 6



On-line processing services (WPS)



- The aim is to offer on-line processing services
- Using QGIS-Server to create the process and generate the OGC web service
 - QGIS Processing Modeler : GRASS, GDAL/OGR ...
 - Script python, R

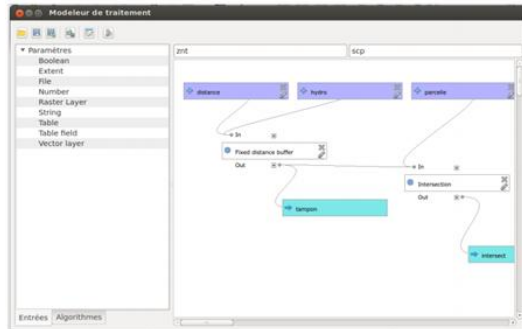


Figure 9: Presentation screen 7



On-line processing services (WPS)



- Example: process on a DTM
 - Isocontours, hillshade and slope process

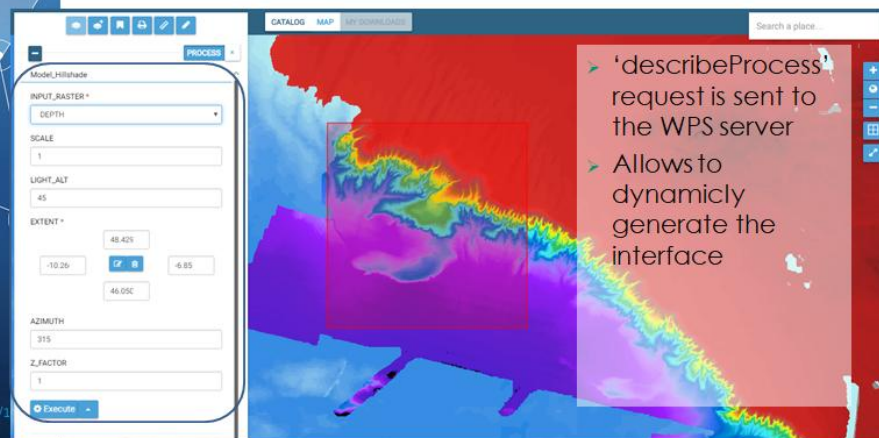


Figure 10: Presentation screen 8

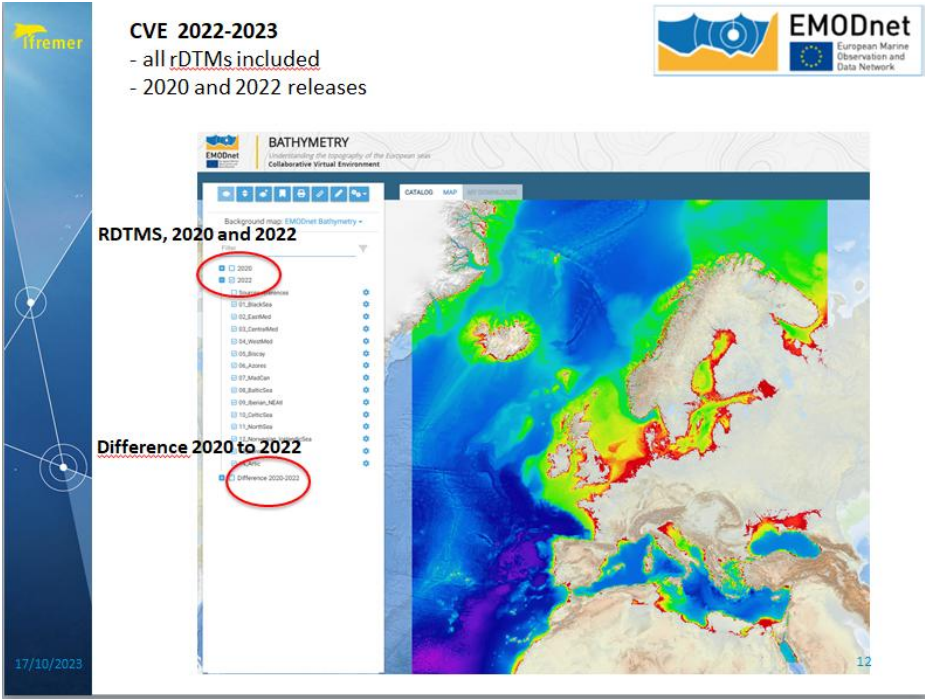


Figure 11: Presentation screen 9

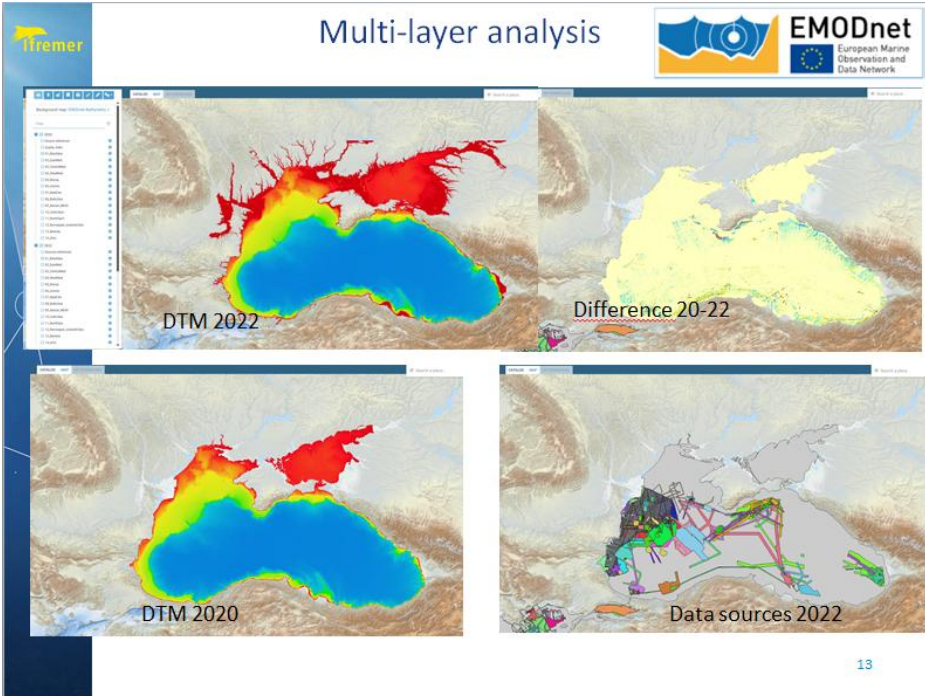


Figure 12: Presentation screen 10

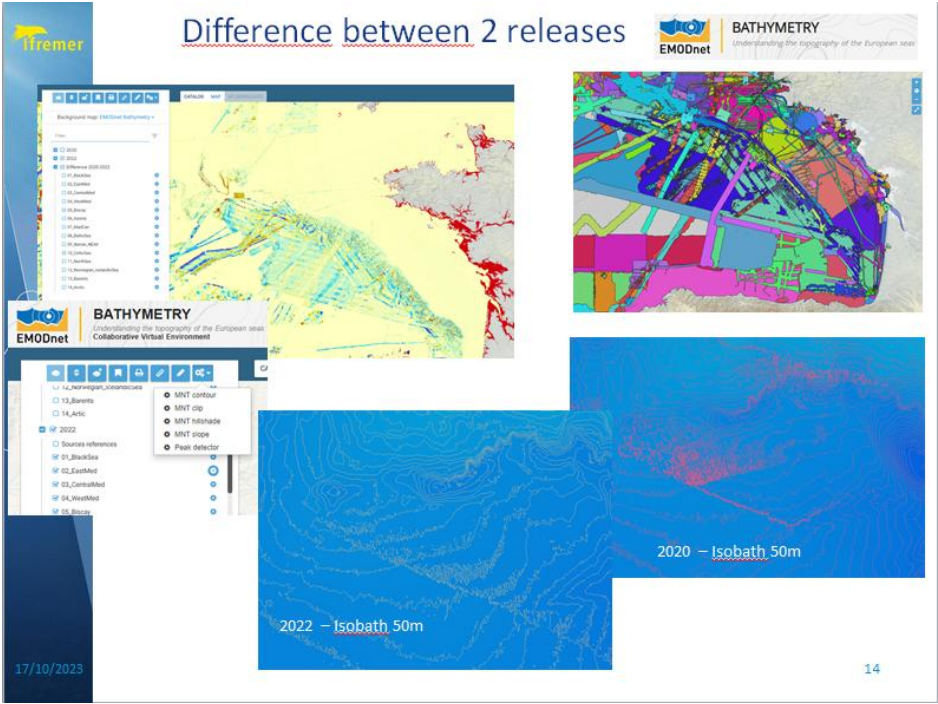


Figure 13: Presentation screen 11

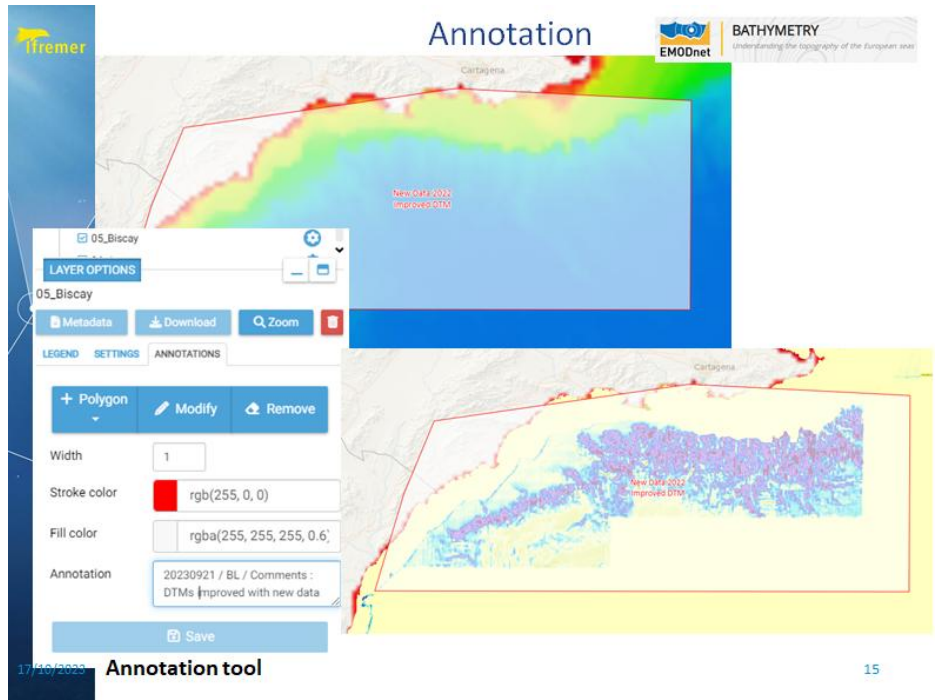


Figure 14: Presentation screen 12