



EMODnet



European Marine
Observation and
Data Network

EMODnet Thematic Lot n°1 – Bathymetry

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

Centralisation Phase

Quarterly Progress Report 8

Reporting Period: 01/10/2024 – 31/12/2024



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1. Highlights in this quarter

Task 1 - Maintain and improve a common method of access to data held in repositories:

During the reporting period, the number of survey data sets has increased again from 43081 to 43092 CDI entries, while the number of Composite DTM entries increased from 294 to 299. New CDI entries for bathymetry survey data sets were contributed by 8 data providers, originating from 8 countries, while 1 data provider activated a set of CDIs because these were duplicates with CDIs as provided by another provider. These new data sets might be used for the next 2026 production as the gathering for the coming 2024 version of the EMODnet DTMs for European seas and Caribbean region has now been completed. In practice, all data providers engaged in the EMODnet Bathymetry contract have populated new data sets to contribute to the planned 2024 DTM new releases for European seas and Caribbean Sea region.

Task 2 - Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space:

EMODnet DTM products:

A plenary meeting with all partners was held 2-3 December 2024 in Bologna – Italy on the premises of CNR-ISMAR. At the meeting all Regional Coordinators presented their Regional DTM which were ready and delivered to the Integrator (GGSGC). For one region, there were residual issues in the Regional DTM due to coordinate system conversions. Therefore, this Regional DTM was regenerated in the following week and provided to the Integrator. As follow-up the Integrator has successfully worked on the overall integration of the RDTMs into a consistent EMODnet DTM for the European Seas and another for the Caribbean Region. Derived from this, a source reference list was compiled, which was compared by MARIS with the existing CDI and CPRD metadata entries, leading to some requests to data providers for providing additional entries/corrections, which were followed up almost immediately. The current CDI and CPRD lists of the DTM 2024 are now fully covered with CDI and CPRD entries in the CDI and Sextant catalogues.

The following activities are underway:

- making the new DTM ready for publishing as downloadable tiles in multiple formats, OGC services, and completing product metadata in Sextant
- including the coastlines, derived from Open Street Map, but using now for the first time also their high-water levels as derived from the Deltares GTSM model in order to get a more realistic profile between the coastline and first available bathymetry depth values
- preparing the MSL vertically referenced version of the DTM and tiles using the LAT-MSL conversions from the GTSM model from Deltares
- making the 3D (Cesium) version of the EMODnet DTM by CORONIS
- generate the associated mapping of the quality indicator layer
- integrating the new EMODnet DTM into the Central Portal – Products Catalogue and Map Viewer service
- preparing report of findings

In addition, activities are concerned with completing the gathering and cataloguing of High Resolution DTMs (HR-DTMs) from data providers, and including this for viewing and downloading via a dedicated map layer.

Refined best-estimate European digital coastlines:

Deltares has produced gridded water index for the Caribbean and European continent based on Sentinel-2 imagery. The resolution of the gridded water index is around 10 meters (native Sentinel-2 resolution). Deltares is well underway with generating coastlines from these datasets in combination with gridded tides height from

GTSM hence creating an updated satellite derived coastline for low-water, mean water-level and high-water. Once ready, this data set will be documented, transferred to GGSGC for inclusion in a map layer, and made available for downloading from the Central Portal Products Catalogue.

Updated Inventory of existing and ratified baselines and registered claims / disputes under UNCLOS, for European countries

This deliverable, consisting of a report and dataset for the baselines and official coastlines is ready. Many countries have contributed updates and there are a few new datasets. The datasets have all been checked and converted to a common format. Comparisons with information known by MarineRegions, have been resolved or clarified. The report will be included in the Reports Catalogue at the Central Portal, while the baselines and coastlines are made available for downloading.

Methodology for assessing bathymetry between coastline and foreshore:

This task has focused on researching and developing a generative deep learning approach that fills bathymetry in areas where there is a gap in the data with the aim of generating plausible bathymetry. Deltas continued with the diffusion technique and improvements were made on two aspects: data preprocessing, and sampling. The improvements have been experimented by means of a few realistic tests, followed by automating the procedure and evaluating the performance more from a user perspective. The findings have been documented in a draft report which will be finalized soon and added to the Reports Catalogue at the Central Portal.

Task 3 - Develop procedures for machine-to-machine connections to data and data products:

EMODnet Bathymetry continued to operate and maintain several catalogue services and web services, which are being harvested and/or directly feeding the Central Portal services. The services are following INSPIRE principles and their operations are being monitored from the Central Portal with good results. EMODnet Bathymetry is regularly testing the functionality of the Central Portal and following up feedback from users. This is aimed at spotting possible bugs in the back-office systems of EMODnet Bathymetry or at the front-office interfaces of the Central Portal. Any identified bugs are reported through JIRA tickets for further action. Also, shortcomings or requests for improved functionality are being gathered from internal consortium testing and following user feedback and these are submitted to the CP team through JIRA and/or at TWG meetings as wishes for future developments. Most will be directed towards optimisation of functionalities, while also additional functionalities might come forward.

Task 4 - Contribute data, data products and content to a central portal that allows users to find, view and download data and data products:

Activities are well underway for finishing all the expected deliverables which then will be published via the services of the EMODnet Central Portal. The planning is to achieve the integration and publishing, with the assistance of the EMODnet Secretariat and Central Portal Team, before mid February 2025, so that the final reporting can be submitted around end of February 2025.

Currently, the bathymetry is also available in the Central Map Viewer with a 3D Viewer service. This extra functionality was developed earlier by Coronis, making use of CesiumJS, a 3D web visualisation library, and creating a multi-resolution pyramid of terrain tiles for visualising the EMODnet DTM in Cesium in a fast and efficient way. Since this initial implementation, there have been multiple updates regarding visualisation features in Cesium. Therefore, Coronis has reviewed new developments for implementing in the EMODnet 3D viewer. This concerns 1) Terrain exaggeration, 2) Real-time editing of colour maps, and 3) Contour lines and elevation bands. The code for this is made available by Coronis on GitHub and EMODnet Bathymetry will submit a request via JIRA for deploying and configuring the latest 3D viewer at the Central Portal. This task will then be done by Biblomatica who are maintaining the Central Map Viewer, with support from Coronis, if needed.

Task 5 - Contributing content to dedicated spaces in Central Portal:

Each thematic has its own dedicated space at the Central Portal where it publishes its so-called 'narrative'. The maintenance is done by sending an updated document through a JIRA ticket which is then processed by the EMODnet Secretariat. During the reporting period, EMODnet Bathymetry has not undertaken updating of the narrative. However, as part of the publishing of the new 2024 products, a number of updates will have to be made to the narrative to keep it in sync with the progress made.

Task 6 - Ensure the involvement of regional sea conventions:

Secretariats of the Regional Sea Conventions are kept up-to-date of the EMODnet Bathymetry services, inter alia through regional partners. The 2024 EMODnet bathymetry products, planned for release by begin 2025, will again provide a good opportunity to reinforce the good relationships with the secretariats of the Regional Sea Conventions who are kept up-to-date of the EMODnet Bathymetry services and products, and where possible, engaged in wider promotion and contributing to mobilising more potential data providers and product users.

Task 7: Contribute to the implementation of EU legislation and broader initiatives for open data:**GEBCO and Seabed 2030:**

On a global scale, good synergy is continued with GEBCO and the Seabed 2030 project. In practice, the EMODnet DTM is considered as the European contribution to Seabed 2030 and as such fully integrated into the GEBCO DTM. This is strengthened by the fact that George Spoelstra (GGSGc) and Federica Fogliani (CNR), both members of the EMODnet Bathymetry consortium, act as Chair and Vice-Chair of the GEBCO subcommittee TSCOM (Technical Subcommittee on Ocean Mapping). This way, EMODnet Bathymetry continues to gain influence in global bathymetry programs and initiatives. Discussions between Seabed 2030 about a potential role of EMODnet Bathymetry as European regional mapping center for Seabed 2030 are ongoing.

Task 8 - Monitor quality / performance and deal with user feedback:

The overall performance of the portal and its services is continuously measured and its results are reported in the separate indicators spreadsheet. It demonstrates that for Bathymetry, its services and products continue to be quite popular. The number of visits and downloads of the full DTM products are again high in the reporting period. User feedback is on the quality of the DTM product and the usability of the portal. Answers are directly provided to the users.

Task 9 - Maintain the existing thematic web portal for a maximum of six months from the start of the project:

EMODnet Bathymetry is maintaining the operation and maintenance of the various Bathymetry catalogues and web services that feed into the Central Portal, which provides the one-stop-shop.

Project management:

Shom and MARIS prepared the Q3-2024 progress report which was reviewed and accepted by the EU CINEA.

| Milestone/Deliverable in numerical order | WP | Date due | Status (To do/ Delivered/ Delayed) | Date delivered | If Delayed: reason for delay and expected delivery date |
|---------------------------------------------------------------------------------------------------|-----|--------------------------------------|----------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------|
| D1.1: Quarterly concise progress reports | WP1 | M4, M7, M10, M13, M16, M19, M22, M25 | Delivered D1.1 a,b,c,d,e,f,g,h | M4, M7, M10, M13, M16, M19, M22, M25 | |
| D1.2: Annual Interim report | WP1 | M12 | Delivered | M14 | |
| D1.3: Final report | WP1 | M24 | Being prepared | | End Feb 2025 |
| D1.4: Plan for service continuity, incl. docs and sources | WP1 | M24 | Being prepared | | End Feb 2025 |
| D2.1: Upgraded guidelines for data pre-processing and population of metadata | WP2 | M6 | Delivered | M6 | Annexed to D1.2 |
| <i>D2.2i: Training Workshop for data pre-processing and metadata population</i> | WP2 | M9 | Delivered as part of meeting 25-26 Sept 2023 in Brest - France | M9 | |
| D2.3: Pre-processed survey data sets and included in CDI Service | WP2 | M12 | Delivered | M15 | |
| D2.4: Pre-processed composite DTMs and included in Sextant service | WP2 | M12 | Delivered | M15 | |
| D2.5: Satellite Derived Bathymetry data sets and included in Sextant Service | WP2 | M12 | Delivered | M15 | |
| D3.1: Upgraded guideline of EMODnet methodology for DTM production, including using prototype CVE | WP3 | M9 | Delivered | M10 | Annexed to D1.2 |
| <i>D3.2i: Upgraded Globe software</i> | WP3 | M9 | Delivered and presented at meeting 25-26 Sept 2023 in Brest - France | M9 | Note that Globe is regularly updated upon request and made available publicly |

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| <i>D3.3i: Training and intercalibration Workshop</i> | WP3 | M11 | Delivered | M16 | Workshop of Regional Coordinators and Integrator in April 2024 |
| <i>D3.4i: Processed and pre-gridded data sets as input for RDTMs</i> | WP3 | M14 | Delivered | M16 | Status has been checked at meeting of Regional Coordinators in April 2024 |
| <i>D3.5i: Regional DTMs with common resolution of 1/16 arc minutes grid</i> | WP3 | M17 | Delivered | M23 | |
| <i>D3.6i: Best version HR DTMs for coastal waters and hotspots</i> | WP3 | M20 | Delivered | M23 | |
| D3.7: New EMODnet DTM incl Quality Index and loaded in EMODnet web services for viewing and downloading | WP3 | M23 | Well underway | | Expected M25 |
| D3.8: HR-DTMs loaded as separate layer in EMODnet web services for viewing and downloading | WP3 | M23 | Well underway | | Expected M25 |
| D3.9: Source reference layer in EMODnet web services to link to CDI and Sextant Catalogue services | WP3 | M23 | Well underway | | Expected M25 |
| D3.10: Refined best-estimate European digital coastlines in EMODnet web services for a range of vertical levels | WP3 | M22 | Well underway | | Expected M25 |
| D3.11: Updated Inventory of existing and ratified baselines and registered claims / disputes under UNCLOS, for European countries at the portal | WP3 | M22 | Finalised | | Delivery M25 |

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| D3.12: Methodology for assessing bathymetry between coastline and foreshore | WP3 | M23 | Finalised | | Delivery M25 |
| D4.1: Standard machine-to-machine services delivered for common functionalities | WP4 | M3 | Delivered | Operational since M0 | |
| D4.2: Dedicated machine-to-machine services adapted / delivered for special functionalities | WP4 | M6 | Delivered | Operational since M0 | |
| <i>D4.3i: CVE optimised for regional coordinators</i> | WP4 | M14 | Delivered | M15 | Status has been demonstrated at meeting of Regional Coordinators in April 2024 |
| <i>D4.4i: Globe software + GGSGC workbench upgraded with extra functionality</i> | WP4 | When required | Following requests and suggestions | | |
| D5.1: Operational Helpdesk | WP5 | continuously | | | |
| D5.2: Monitoring data about visits and usage | WP5 | continuously | | | |
| D5.3: Promotional material and up-to-date thematic space at central portal | WP5 | continuously | | | |
| D5.4: Presentations at relevant conferences | WP5 | Regularly | | | |

2. Identified issues: status and actions taken

| A. Priority issue(s) identified and communicated by CINEA/ DG MARE/ SECRETARIAT | | | | |
|---------------------------------------------------------------------------------|-------------------------------|--------------------------------------------|------------|---------------|
| Priority issue | Status (Pending/ Resolved) | Action(s) taken/ remaining actions planned | Date due | Date resolved |
| EM-1046 2024 release of EMODnet bathymetry | Pending | See report above. | 28/02/2025 | |
| EM-1051 Bathymetry to provide ECAS userid for EMODnet Portal Drupal | Pending | Actions to be undertaken | | |
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| B. Issues / challenges identified by the thematic assembly group itself | | | | |
|-------------------------------------------------------------------------|-------------------------------|---------------------------------------------|----------|---------------|
| Priority issue / challenge | Status (Pending/ Resolved) | Action(s) taken / remaining actions planned | Date due | Date resolved |
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3. Communication assets

[In Table A, list peer reviewed publications directly (co-)authored by consortium and project partners in the reporting period. In Table B, list all non-peer reviewed publications (co-)authored. In all cases, indicate the type of publication, provide the full reference incl. title, volume and issue etc., and whether the publication is open or closed access.]

| A. (Co-)Authored peer-reviewed publications in the quarter | | | | | |
|------------------------------------------------------------|---------------------|----------------|------|-----|------------------------------|
| Date of publication | Type of publication | Full reference | ISBN | DOI | Is it open access? Yes/No |
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| B. Other/non-peer reviewed types of publications (co-)authored in the quarter | | | | | |
|-------------------------------------------------------------------------------|---------------------|----------------|------|-----|------------------------------|
| Date of publication | Type of publication | Full reference | ISBN | DOI | Is it open access? Yes/No |
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| B. Other/non-peer reviewed types of publications (co-)authored in the quarter | | | | | |
|-------------------------------------------------------------------------------|---------------------|----------------|------|-----|------------------------------|
| Date of publication | Type of publication | Full reference | ISBN | DOI | Is it open access? Yes/No |
| | | | | | |

For a comprehensive overview of publications referring to/making use of EMODnet data and/or data products, please consult Google Scholar.

4. Monitoring indicators

[Refer to the standardised monitoring tool, i.e. Europa Analytics, to complete the indicators excel template, and provide a short explanation in the table below on the numbers and trends for each indicator when possible/applicable. Indicate clearly if monitoring was carried out using tools other than Europa Analytics.]

| Comments on the progress indicators in the indicators spreadsheet | | |
|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Progress indicator | Means of collecting figures | Comment |
| 1. Current status and coverage of total available thematic data A) Volume and coverage of available data | CDI catalogue service | There are a few new CDIs delivered from several data providers contributing data sets which will not be used in the selection for the 2024 EMODnet DTM production, but the next release of 2026. Moreover, a correction has taken place as it appeared that a number of CDIs were populated by two organisations, which gave doubles. This explains the negative values in the matrix table. |
| What is your opinion on the data coverage within EMODnet for your thematic? | Considering population of CDI and Sextant catalogues | Overall, EMODnet Bathymetry has brought together an excellent data collection (CDIs and Composite DTMs), covering all European sea regions and compiled by 66 data providers. |
| B) Usage of data in this quarter | CDI RSM shopping ledger service | The number of downloaded CDIs in this quarter is almost the same as in the previous quarter. |
| 2. Current status and coverage of total number of data products A) Volume and coverage of available data products | Statistics from downloading at the Bathymetry system | The 2022 DTMs (Europe and Caribbean) and new HR-DTMs have been released in the first quarter of 2023. The number of these products is then frozen till the new release of the 2024 DTM and HR-DTMs which is planned for early 2025. |
| B) Usage of data products in this quarter | Analysing download statistics | The number of product downloads has increased considerably compared to the previous quarter. These numbers demonstrate the continuing interest of users in these EMODnet products. This concerns not only the HRDTMs and DTM tiles, but also of the Satellite Derived Coastlines package. Also, the number of WMS - WFS requests is again very high. |
| 3. Internal and external organisations supplying/approached to supply data and data products within this quarter | CDI catalogue service | Eight data providers have submitted new entries, which will be used for the 2026 process. While one data provider has de-activated CDIs because these were duplicates with CDIs from another data provider. |
| 4) Online 'Web' interfaces to access or view data | N.A. | No changes |
| 5.1 Daily number of page views of EMODnet Thematic entry page | Europa Analytics | Daily number of page views of the Bathymetry narrative is quite steady and around 135, with some days higher. This quarter it is somewhat higher as previous quarter. This is the static content. Unfortunately, we cannot see how the bathymetry map layers and products are visited |

Comments on the progress indicators in the indicators spreadsheet

| Progress indicator | Means of collecting figures | Comment |
|------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.2 Quarterly total number of visitors, page views, unique page views and percentage of returning visitors | Europa Analytics | The quarterly numbers are reasonable as the bathymetry narrative is a static story. See the earlier remark under 5.1. This quarter the numbers are somewhat higher than in the previous quarter. |

The monitoring numbers reported as part of the progress monitoring of EMODnet performance are collected through Europa Analytics, unless reported otherwise.