EMODnet Thematic Lot n° 0 – High Resolution Seabed Mapping (HRSM)

EASME/EMFF/2015/1.3.1.7/SI2.742125

Start date of the project: 20/12/2016 - (24 months)

EMODnet Phase III – Quarterly Progress Report (7)

Reporting Period: 01/07/2018 – 30/09/2018

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Disclaimer

1 Highlights during the reporting period

- **Task 1 - Gather and give access to bathymetric survey data**: data providers finalised their gathering and making bathymetric data sets ready for transfer and use by the basin coordinators. Globe software was used for processing and pre-gridding. Guidance and support was given by MARIS and IFREMER for populating the CDI and Sextant metadata catalogues. Total number of CDIs has slightly increased from **27078 to 27158** records and Composite DTM entries from **142 to 143.** There are contributions from **51** data providers. A snapshot of the overall CDI coverage shows that also many data sets are now included for the Baltic Sea and the Arctic region.

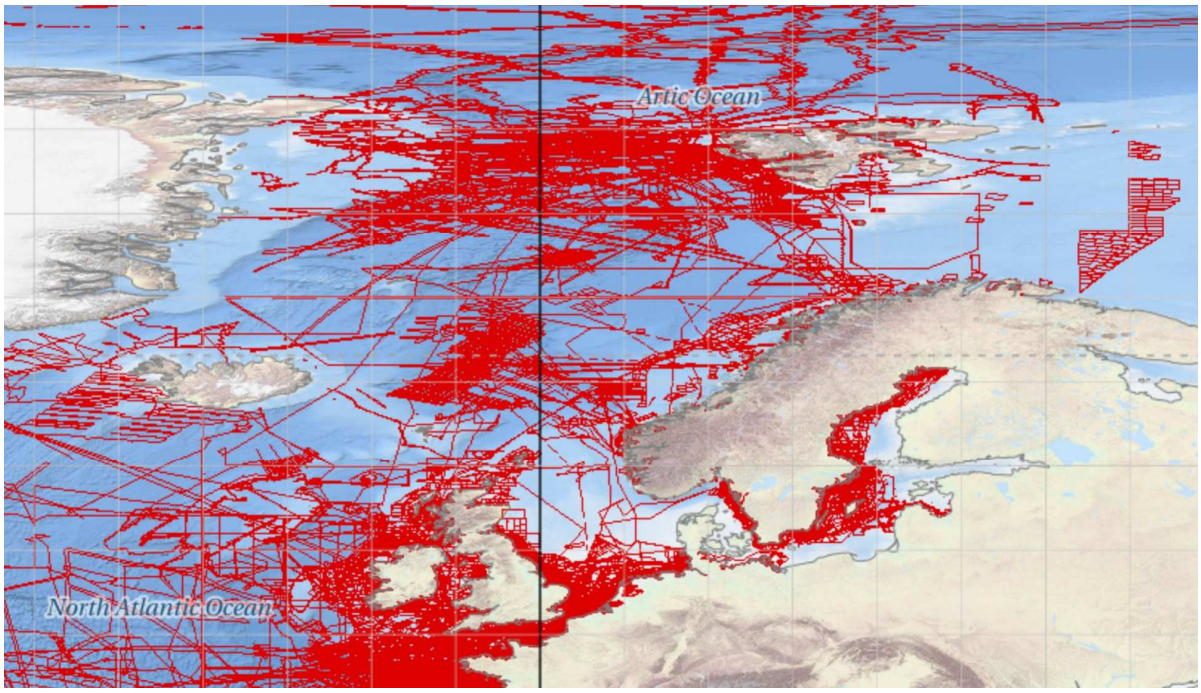

Figure: Snapshot of CDI coverage in Northern Europe

- **Task 2 - Compile a multi-resolution digital terrain model of European seas:** 24th September 2018 a new and upgraded version of the EMODnet DTM (Digital Terrain Model) has been officially released which is the result of a great collaborative effort. Compared to the 2016 release, the grid resolution has improved from 1/8 * 1/8 arc minutes to 1/16 * 1/16 arc minutes (circa 115 * 115 m2). It now contains approx. 12.3 billion grid nodes, organised in 113892 columns and 108132 rows (seabed and terrestrial coverage included) while GEBCO has 933 million grid nodes for worldwide coverage. From all the data sources gathered as part of Task 1 (see above), a total of 9369 unique CDI references and 87 DTM references are used in the overall DTM (6924 in 2016 version). It is available free of charge for viewing and downloading, and sharing by OGC web services from the EMODnet Bathymetry portal. Other new features of the new release are:
    - A powerful 3D visualisation functionality of the bathymetry that can be used in the browser without the requirement of plugins;
    - An expanded coverage including all European seas as well as the European part of the Arctic Ocean and Barents Sea;
    - The inclusion of Satellite Derived Bathymetry data products, in particular for coastal stretches of Spain and Greece.

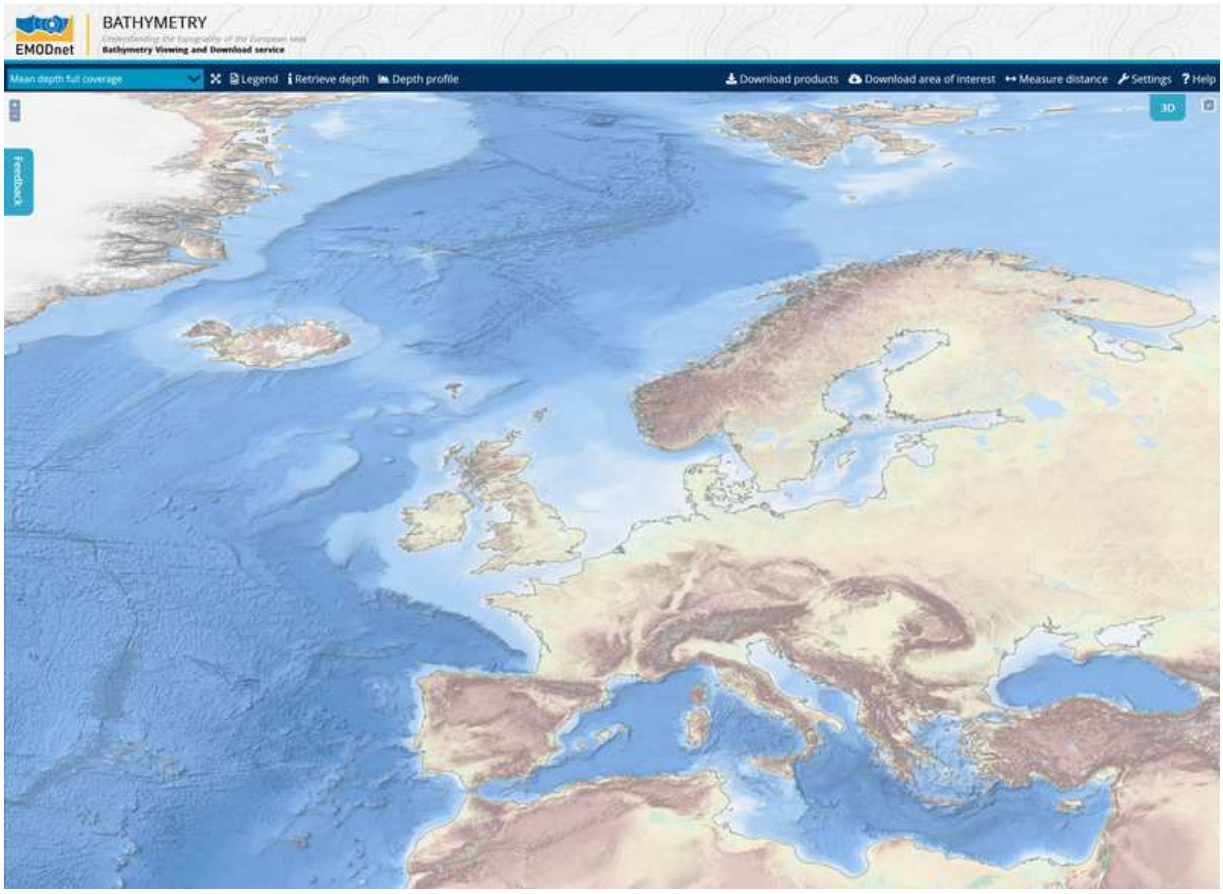

Figure: New EMODnet DTM with higher resolution and including arctic waters

Building the new release was a major challenge with contributions from nearly all consortium members and with considerable efforts in particular from the regional DTM coordinators (SU, SMA, BSH, IPMA, IFREMER, Shom, NOC, HCMR, CNR-ISMAR, and IHPT), the overall integrator (GGSgc) and the coordinating team (Shom and MARIS). The apex was reached during the integration of all the basin contributions:

- **Computer resources and processing time:** with the increase of datasets and DTM grid size, computer resources have been challenged. This was principally solved by tiling the EMODnet coverage in 64 tiles and automating the integration processes. This experience and associated processing steps are taken into account in Task 4 concerning the development of a pilot Collaborative Virtual Environment (CVE) which aims at further improving the overall EMODnet data processing chain;

- **Integration of land and coastal data:** although land terrain is not an official deliverable for the project, the EMODnet viewing portal is enriched with land terrain to enhance the viewing experience. The source for the land data is a downloadable data set available in the open domain with a grid resolution of 3 arc seconds globally. The use of the land terrain is also of prime importance for ensuring the continuity of the bathymetric DEM in coastal areas where no measured (either from conventional sounding measurements or from Satellite Derived Bathymetry) data are available. The result is shown below.

Note that the partner EOMAP has provided satellite derived bathymetry for some areas, which inherently improves the surface continuity between land and sea. This has been described in previous report.

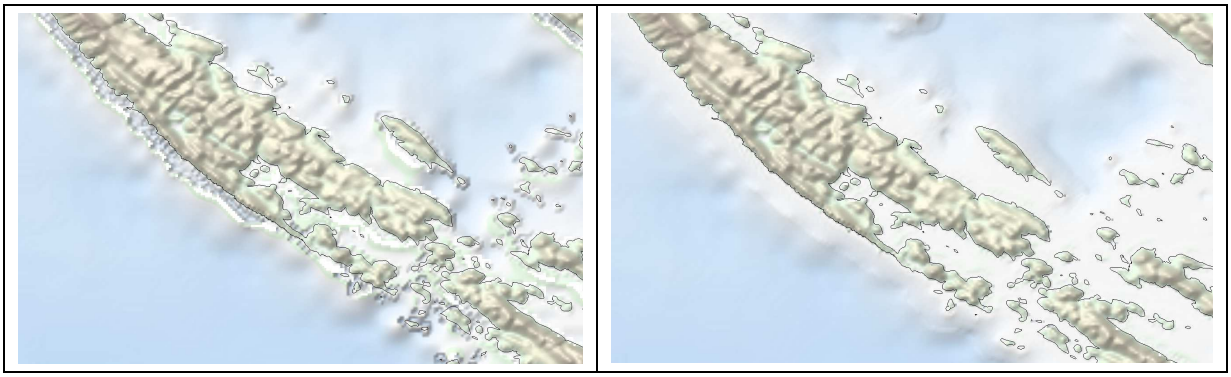

Figure: Poor coastal interpolation without land dataset and use of GEBCO without filtering (left). Same area, as included in the new EMODnet Bathymetry grid, with the integration of land data and filtering of the GEBCO data above 18m (below LAT) (right).

Generating an updated and improved source reference layer: along with the DTM comes a layer indicating the local contribution of each of the data sources. By doubling the resolution of the new DTM, the source reference graph has also become more detailed compared to the 2016 release. Regional coordinators apply different methods when it comes to deconflicting datasets. In areas where a newer data set simply replaces an older, the source reference graph looks rather discrete and the individual datasets are clearly recognizable (see Figure below). However, in some areas where concurrent datasets do not allow for the priorization of one data over the other patchy areas were generated. This effect is more prominent in the 2018 release than the 2016 release; therefore a generalisation of some of these features was applied using a noise reduction algorithm.

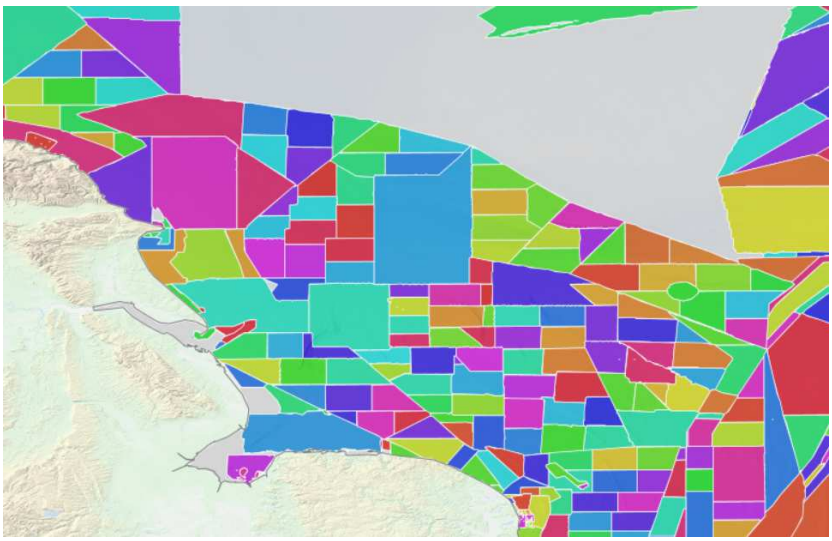

Figure: example of source reference layer in the North Sea. Each colour represents an individual data source.

- **Imperfections, remaining artefacts:** improvement of the resolution of the DTM also introduces further imperfections especially in case data sources are of lower resolution than the target resolution. A preliminary overview of these issues indicates that most of them are originating from the GEBCO gap filling, especially in deep sea areas. Although GEBCO is considered to be valuable, the altimetry derived component (used where no data are available) has not been updated since 2008, which is one of the main reasons of such vertical discrepancies.

All in all, the new EMODnet release provides a much better quality DTM than the 2016 version, while certain imperfections maintain due to lack of better source data. The release of the native, web embedded 3D viewing facility developed by partner Coronis allows a fluid and immersive fly-through over the seabed of the European seas.

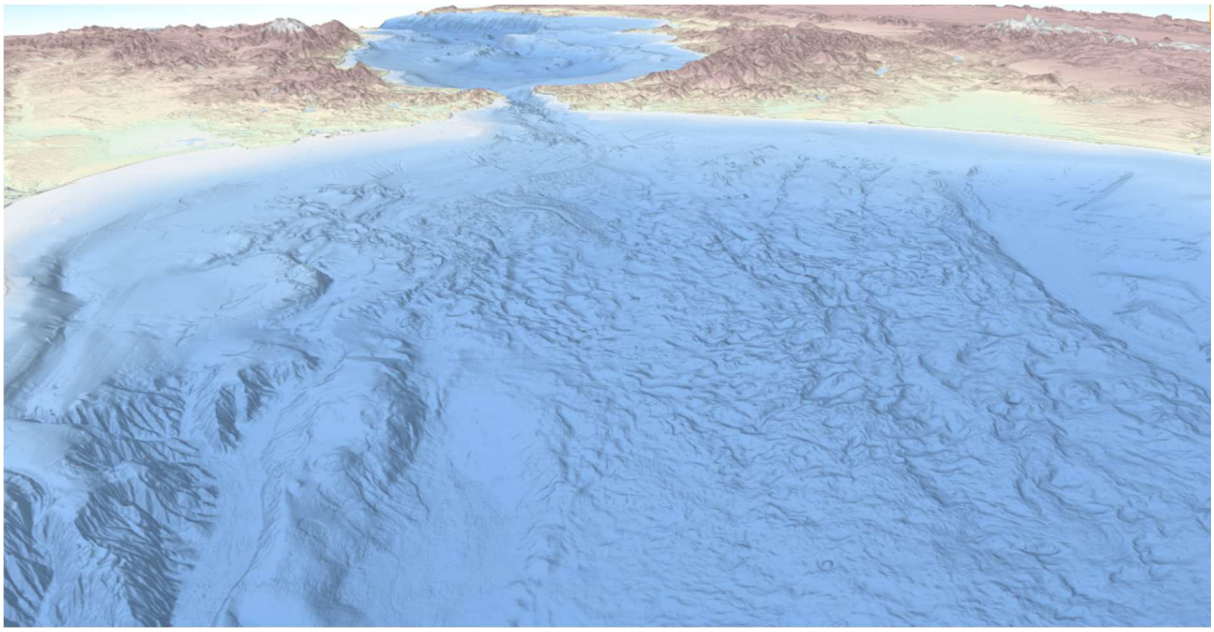

Figure: 3D view of the entrance of the Mediterranean Sea from the Gibraltar Strait.

- **Task 3 - Establish best-estimate European digital coastlines and compile overview of legal baselines**: Deltares circulated a report presenting baseline and coastline data collected from 21 national authorities amongst partners for comments. Numerous partners have provided comments and have updated the data which allows Deltares to finalise the baseline report soon and make it ready for publishing in the EMODnet Bathymetry portal.

  Production of best-estimate coastlines determined from satellite data (described in more detail in previous quarterly reports) associated with tidal level modelling is currently undergoing QC and filtering of lakes, rivers and other waters which are not part of the coastline. Focus is on the refinement of the clean-up process. Although nearly all the European coverage (same coverage as the DTM) has been generated, the current methodology reaches its limits for ice-covered and volcanic coasts (See figure below).

  Deltares works on finalising the digital coastlines for the European seas at MSL, LAT and MHW tidal levels that will be integrated as a layer in the Bathymetry Viewer for viewing and at the portal with documentation and download options.

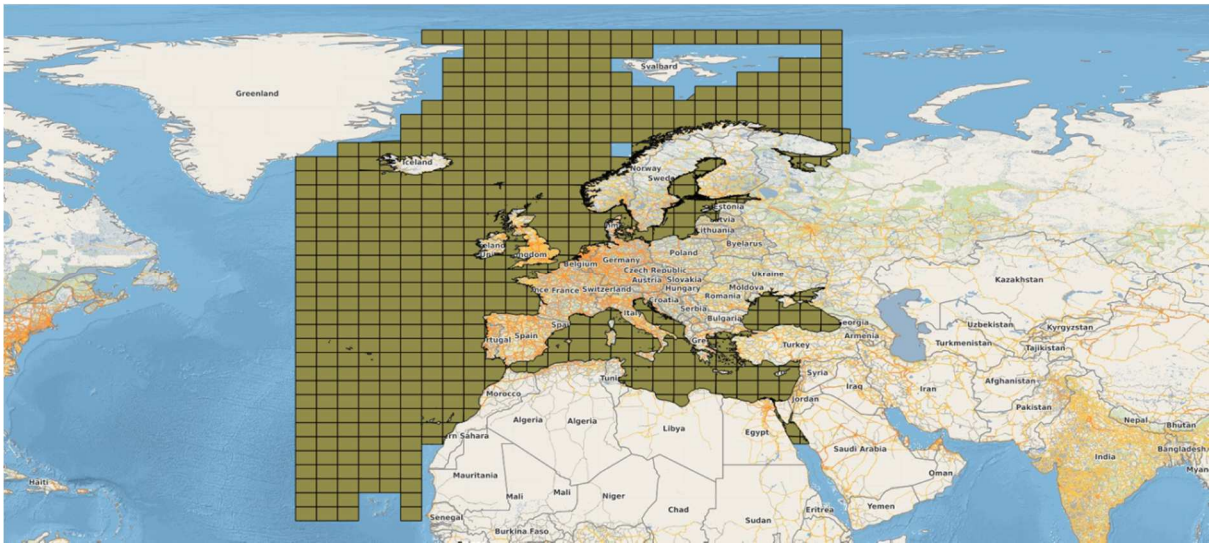

Figure: Production of coastline from satellite data. Only ice-covered and volcanic highlands have not yet been generated.

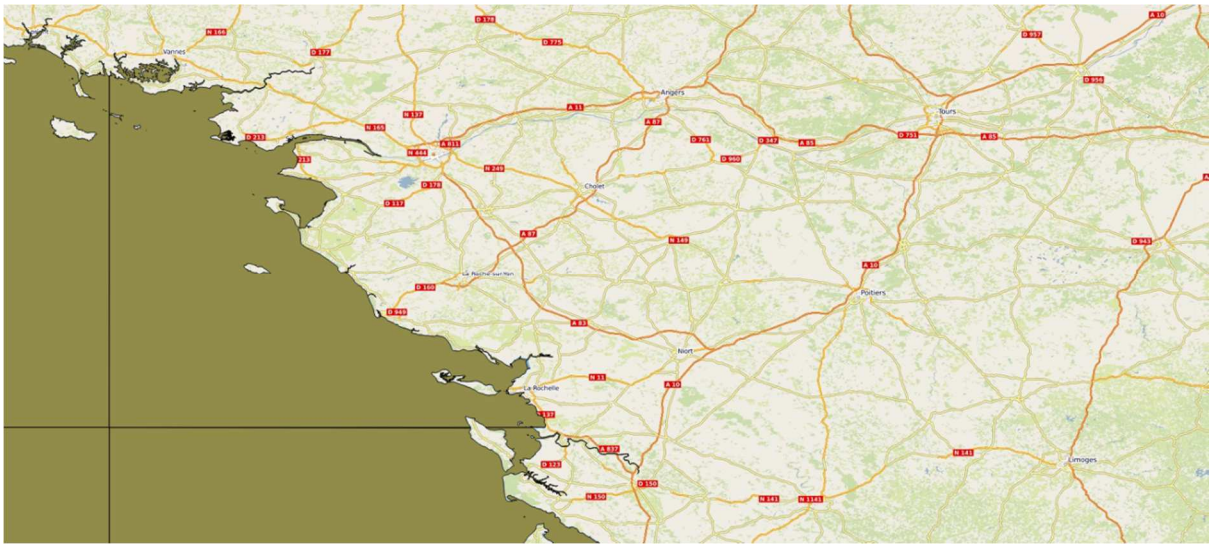

Figure: Sample of shoreline data at mean high-water. Lakes, rivers and other waters not part of coastline have been removed.

In addition further improvements have been undertaken for the Global Tide-Surge Model (GTSM) of Deltares and these are going to be beneficial for the production of the conversion surface between the Lowest Astronomical Tide (LAT) to the Mean Sea Level (MSL) reference. Currently, this surface is being generated and the associated documentation is being prepared. With this conversion surface extra tiles of the new DTM will be generated and published for downloading at MSL reference next to the existing tiles with LAT reference.

- **Task 4 - Establish machine-to-machine connections to data and data products**: MARIS and GGSGC have integrated the new DTM in the Bathymetry Viewing and Download service following their earlier plan. The new common DTM (2018) has replaced the existing common DTM (2016) in the layer menu of the Bathymetry Viewing and Download service for the mean depth layers with 3 colour palettes. Also the source references layer has been replaced. In addition, the OGC

web services (WMS, WFS, WCS, and WMTS) have been updated by including the new DTM and continuing also the old DTM. In the web interface, 3D viewing (in Beta mode) has been added as extra functionality by GGSGC in cooperation with CORONIS who has generated the 3D model from the new DTM. CORONIS is planning to document the developed 3D software for publishing at the EMODnet Bathymetry portal while the software will be made available at GitHub. Furthermore, the download functionality has been upgraded by introducing registration of user details and reasons for downloading. The downloading service now allows to specify the usual file formats, to choose between downloading 16 tiles of the old DTM and 64 tiles of the new DTM, to download user specified areas (using WCS), and to include user details and reasons, before submitting the download requests. Users can choose between logon with Marine-ID (after one-time registration) or entry of free text for their personal details. After submissions users will receive an email with confirmation and URLs for downloading their requested DTM files. Use is made of 64 tiles for the new DTM because the volume of the DTM has largely increased due to the resolution improvement. Finally the HELP section of the Bathymetry Viewing and Download service has been updated to reflect all the changes and new features, and the section on Web Services has been updated too. After careful testing, the new DTM with its viewing and download options has been published on the 21st September 2018 and officially released on the 24th September 2018 supported by a widely circulated press release and promotion campaign in collaboration with the EMODnet Secretariat. This has resulted in circa 700 completed shopping transactions in the first week of operation whereby users have provided their details according to plan.

In a later stage (during November 2018) the Bathymetry Viewing and Download service will be expanded with a layer with high resolution hot spots and the 64 downloadable tiles will also be made available with reference to MSL. For the high resolution layer work data providers in the meantime have identified candidate areas and are now underway with processing and pre-gridding their selected data sets with Globe to the highest resolution (choosing 1/32 or 1/64 or 1/128 or 1/256 or 1/512) which is feasible for them for public release considering their data policies. The plan is that the hot spots layer will be added to the viewer menu and will indicate the contours of the hot spots, while users will be able to zoom in from the common DTM layer as deep as the hotspot resolution allows. The hot spot data products will also be linked to metadata records in the Sextant catalogue and included in the Download service. For the LAT to MSL conversion use will be made of the tidal model of Deltares.

Good progress is being made by Shom, IFREMER and MARIS on the preparation of the new Quality Index for the new common DTM. The starting point is the new source references layer which refers to circa 9.400 data sets (surveys and composite DTMs). The metadata of these have been extracted for age of survey, used survey instrument, and horizontal and vertical accuracy as indicated by their data providers. Work is now ongoing for preparing layers per quality parameter and calculating the quality index adopting the new algorithm. The results will be added as map layers to the Bathymetry Viewing and Download service and published as a story at the portal. This will provide great input for the SeaBed Habitat community for their habitat assessments and also for the EOOS discussions as it not only shows the lack of survey data but also the lack of high quality and recent survey data.

In September 2018 a meeting took place at IFREMER with colleagues of Shom, CNR-ISMAR, IFREMER, GGSGC, and MARIS to monitor the progress and discuss further steps for the development for the **pilot Collaborative Virtual Environment (CVE).** The pilot focuses on generating 2 neighbouring RDTMs (West Med and Central Med) and 1 additional RDTM (Bay of Biscay) using online Globe (in the cloud) and involving only basin coordinators, namely IFREMER, CNR-ISMAR and Shom. IFREMER has reserved a storage space of 3TB on the DATARMOR cloud

infrastructure and all relevant pre-processed and pre-gridded data sets have been loaded that have been used for the new regional DTMs. IFREMER has also set up 2 ways for working with the GLOBE software on the cloud: 1) as a full package and installed as a Docker container instance and 2) as a set of OGC WPS services for selected GLOBE functions. Examples of both had been made available to CNR-ISMAR and Shom as try-out users and their feedback was discussed. Also the overall philosophy for the pilot ToR and what we try to achieve was discussed with all developers present. This has resulted in a refining of the workplan for the coming months. The pilot will provide insights whether the actual processing can be accelerated, how the overall workflow can be improved, and also how the two basin coordinators for the neighbouring regions can collaborate, in particular for establishing seamless boundaries between their two regional DTMs.

- **Task 5 - Maintain a web portal**: under Task 4 already a lot of activities are described which were related to integrating the new DTM into the web portal and its services. In addition editorial activities took place to update several pages of the web portal for announcing and describing the new EMODnet DTM and its extended features. The web portal has been operating without any disturbances, also when there was quite a peak of visitors after the press release circulation. Furthermore news and promotion items have been added regularly.

- **Task 6 - Operate a help-desk**: several questions were received and answered by the helpdesk. The user questions received and answered are detailed in chapter 3 and Annex 1.

- **Task 7 - Achieve international interoperability**: activities are ongoing as earlier reported in the 'Report on Interoperability and International Collaboration' which was submitted to the EU together with the 1st Annual Progress report.

- **Task 8 - Achieve INSPIRE compliance**: a feedback was received from JRC-INSPIRE team concerning the five INSPIRE change requests that were prepared and submitted together with the SeaDataCloud and EMODnet Chemistry projects. These requests concern the metadata validator and the data implementation rules. The received feedback recently has been reviewed at the SeaDataCloud Technical Task Group meeting and it is planned to prepare and submit an official feedback by intermediation of EMODnet – DG MARE. Overall progress seems to be made, although the process is slow which might be improved by more willingness of the JRC – INSPIRE team for close cooperation with the marine community.
- **Task 9 - Monitoring of performance**: the overall performance of the portal and its services is continuously measured and its results are reported in the separate indicators spreadsheet. The new functionality has been added for registering downloading users, downloaded DTM tiles, related formats, and reasons. The first week with high demand demonstrates that the new functionality works well and that users have no objections to giving personal details.
- **Task 10 – Project management**: The coordinator and technical coordinator prepared the 6th quarterly progress report which was accepted by EU (EASME and DG MARE). The final plenary project meeting is planned for end October 2018.

2 Challenges encountered during the reporting period

Main challenge	Measures taken
Establishing a high quality integrated EMODnet DTM	A common methodology is used by all basin coordinators, including all using GLOBE software. That software is also used beforehand by all data providers to process and pre-grid their data contributions according to the EMODnet standards. The integration is done by the integrator who has an additional workflow and software tools for visualisations, checking inconsistencies, identifying artefacts which can be overcome, also in dialogue with basin coordinators, by local smoothing, replacing used data sets and other ways.
Establishing the European coastlines	As major input use is made of satellite images from Sentinel and Landsat, next to in-situ data. A European tidal model is used to cope with tidal elevations and to determine the coastlines at different references. Issues are still areas with ice coverage and complex intertidal areas whereby it is difficult to determine the coastlines.

3 User Feedback

Date	Organisation	Type of user feedback (e.g. technical, case study, etc.)	Response time
2018-07-10	ONEBV, UK	Question about data access for the NL Waddensea. Delivery arranged together with Royal Netherlands Navy, Hydrographic Service	A few days because of interaction
2018-07-19	??, Curacao	Question about the depth of Playa Canoa, Curacao Willemstad (location Caribbean sea).	4 days later due to asking info from partner
2018-08-12	??, ??	Question about higher resolution DTM release	A few days later
2018-08-20	??, Israel	Question about selection by area of interest	Same day
2018-08-22	Caravan-Media, UK	Question about using DTM for a documentary as open source.	1 day later
2018-08-20	NOC, UK	Question about NetCDF format.	2 days later
2018-08-29	Intertek, UK	Question about age of data sets used.	Same day
2018-09-17	TNO, NL	Question about vertical reference level of DTM	Same day
2018-09-19	University of Kiel, Germany	Question about European coastlines.	Same day
2018-09-25	BosKalis, NL	Question: Isue with ArcGrid format.	Same day
2018-09-26	??, UK	Question: Issue with opening EMO files.	Same day
2018-09-16	Atkins Global, UK	Question about European coastlines.	Same day
2018-09-23	??, France	Question about WCS service use	3 days later
2018-09-26	??, ??	Question about ARCGIS format	Same day
2018-09-27	Atkins Global, UK	Question about possibly corrupted tile data	Same day
2018-09-27	3UTECH, USA	Question about download time out	Next day

Annex 1 gives more details.

4 Meetings held/attended since last report

Table: Meetings organised and attended.

Date	Type event (meeting, training (workshop), etc.)	Attended (A) / Organised (O)	Short description and main results (# participants, agreements made, etc.)
7 September 2018	EMODnet Communication webmeeting	A	Meeting of Shom and MARIS with EMODnet Secretariat and TRUST-IT to discuss promotional activities
27 September 2018	Technical Meeting in Brest, France	O	Meeting between Shom, MARIS, GGSgc, CNR-ISMAR, and IFREMER on progress of CVE development
SUM of O		1	**(Total # of meetings organised)**
SUM of A		1	**(Total # of meetings attended)**

5 Outreach and communication activities

Table: Communication activities.

Date	Communication action/material	Short description (of the material, title, ...) and/or link to the activity	Main results (# participants, # views, # press clippings, etc.)
18-20/09/2018	Oral Presentation at the First International Hydrographic Remote sensing Workshop, Ottawa, Canada	EMODnet HRSM was presented and promoted at the HRS workshop, which was organised jointly by the Canadian Hydrographic Service (Canada), Shom (France) and the National Oceanographic and Atmospheric Administration (USA) in Ottawa. This offered a unique opportunity for hydrographic institutions, government and industry to discuss capabilities, data integration, requirements and quality standards. Shom presented EMODnet HRSM and how use is made of SDB for filling gaps in coastal and near shore zones.	Ca 60 participants from for hydrographic institutions, government and industry from northern America and Europe essentially
24/09/2018	Promotions of the new bathymetric grid through web content	The press release of the new DTM has been distributed by EMODnet Bathymetry Consortium coordinators, Partners, EMODnet Secretariat and DG-MARE and international collaborators (IHO/GEBCO).	Ca 4000 – 5000 receivers of the press release
24/09/2018	Promotions of the new bathymetric grid through specialized magazines	The new release of the DTM has been relayed by EMODnet Bathymetry to Hydro International, Dredging News Online, Offshore Services Online OSO	Hydrographic community, offshore and maritime industry and research
24/09/2018	3D fly-through the new DTM video in the Atlantic and Mediterrannean areas	3D Animations, posted on YouTube and linked from the EMODnet Bathymetry portal	Site visitors
27/09/2018	Short article on EMODnet Bathymetry methodology	Published in the IODE Best Practices newsletter	Oceanographic community

6-7/10/2018	Ocean Hackaton, Brest	Promotion by the Secrtretariat and EMODnet bathymetry members of all the EMODnet thematic layers in ordre to fostering innovation through the usage of the information for GIS/IT projects.	Ca 100 participants (professionals IT or sea related administration/organisation, engineering students, national and local press)
SUM …			**(Total # of …)**
SUM …			**(Total # of …)**

Relevant scientific and/or popular publications (scientific papers, book chapters, conference papers, …) you published or of which you know they have been published using/referring to EMODnet data or data products during this reporting period must also be reported here.

[Please, provide information in the table.]

Table: List of known publications using EMODnet data or data products.

Date	Name of journal, conference, …	Publication title	Authors	Organisation(s)
09/2018	Journal of Marine Science and Engineering (Journal)	Numerical Landslide-Tsunami Hazard Assessment Technique Applied on Hypothetical Scenarios at Es Vedrà, Offshore Ibiza.	Tan, H., Ruffini, G., Heller, V., & Chen, S. A	University of Nottingham, UK Wuhan University, CN
09/2018	Transform Plate Boundaries and Fracture Zones (Book Chapter)	Chapter 14 - Plio-Quaternary Extension and Strike-Slip Tectonics in the Aegean	Dimitris Sakellariou, Konstantina Tsampouraki-Kraounaki	Hellenic Centre fo Marine Research, GR University of Patras, GR
09/2018	European Harbour data repository (report)	Within the network of fluvial ports	L. Kröger	University Thueringen, DE
09/2018	European Harbour data repository (report)	Images and imaginations of roman ports	Torsten Bendschus and Stefan Feuser	Heinrich Schliemann-Institut für Altertumswissenschaften, DE
09/2018	*Ethics in Science and Environmental Politics* *(Journal)*	European efforts to make marine data more accessible.	Shepherd, I. (2018).	European Commission, BE
09/2018	*Energies* (Journal)	Modelling Offshore Wave farms for Coastal Process Impact Assessment: Waves,	Stokes, C.; Conley, D.C.	Plymouth University, UK

		Beach Morphology, and Water Users.		
09/2018	*Marine Geology* (Journal)	The role of internal waves in the late Quaternary evolution of the Israeli continental slope.	Reiche, S., Hübscher, C., Brenner, S., Betzler, C., & Hall, J. K.	Aachen University, DE Universität Hamburg, DE Bar-Ilan University, IL Geological Survey of Israel, IL
09/2018	*Fisheries Oceanography* (Journal)	Balancing resource protection and fishing activity: The case of the European hake in the northern Iberian Peninsula.	Pennino, M. G., Vilela, R., Bellido, J. M., & Velasco, F.	Instituto Español de Oceanografía, SP
09/2018	*Scientific reports (Journal)*	Large-scale mass wasting on small volcanic islands revealed by the study of Flores Island (Azores).	Hildenbrand, A., Marques, F. O., & Catalão, J.	Université Paris Sud, FR Universidade de Lisboa, PT
09/2018	*Progress in Oceanography* (Journal)	Benthic deep-sea fungi in submarine canyons of the Mediterranean Sea.	Barone, G., Rastelli, E., Corinaldesi, C., Tangherlini, M., Danovaro, R., & Dell'Anno, A.	Polytechnic University of Marche, IT Stazione Zoologica Anton Dohrn, IT
09/2018	*Ecological Informatics* (Journal)	Seagrass detection in the mediterranean: A supervised learning approach.	Effrosynidis, D., Arampatzis, A., & Sylaios, G.	Democritus University of Thrace, GR
09/2018	*Congresso congiunto SGI-SIMP 2018 'Geosciences for the environment, natural hazards and cultural heritage'.* (Conference proceedings)	3D Architecture and Plio-Quaternary evolution of the Paola Basin: New insights to the Forearc of the Tyrrhenian-Ionian Subduction System.	Corradino, M., Pepe, F., Bertotti, G., & Monaco, C.	UNIPA, IT
08/2018	*Science of The Total Environment* (Journal)	Ecosystem damage from anthropogenic seabed disturbance: A life cycle impact assessment characterisation model.	Woods, J. S., & Verones, F.	Norwegian University of Science and Technology, NO
08/2018	*Anthropocene Coasts* (Journal)	(2018). Risk screening assessment for ranking historic coastal landfills by pollution risk.	Brand, J. H., & Spencer, K. L.	Queen Mary University of London, UK
08/2018	*Renewable Energy (Journal)*	An analytical cost model for co-located floating wind-wave energy arrays.	Clark, C. E., Miller, A., & DuPont, B.	Oregon State University, USA
08/2018	*Quaternary International*	(2018). Narrow shelf canyons vs. wide shelf	Jipa, D. C., & Panin, N.	National Institute of Marine Geology and Geoecology, RO

	(Journal)	canyons: Two distinct types of Black Sea submarine canyons.		
07/2018	Natural Hazards Earth System Sciences (Journal)	From regional to local SPTHA: efficient computation of probabilistic inundation maps addressing near-field sources.	Volpe, M., Lorito, S., Selva, J., Tonini, R., Romano, F., & Brizuela, B.	Istituto Nazionale di Geofisica e Vulcanologia, IT
08/2018	Ocean Science Discussions (Journal)	Wave boundary layer model in SWAN revisited.	Du, J., Bolaños, R., Larsén, X. G., & Kelly, M.	Technical University of Denmark, DK DHI, DK State Oceanic Administration, CN Qingdao National Laboratory for Marine Science and Technology, CN
08/2018	*PloS one* *(Journal)*	Beached bachelors: An extensive study on the largest recorded sperm whale Physeter macrocephalus mortality event in the North Sea	IJsseldijk, L. L., Van Neer, A., Deaville, R., Begeman, L., van de Bildt, M., van den Brand, J. M., et al.	Utrecht University, NL
07/2018	*Journal of Quaternary Science* (Journal)	Ice margin oscillations during deglaciation of the northern Irish Sea Basin.	Chiverrell, R. C., Smedley, R. K., Small, D., Ballantyne, C. K., Burke, M. J., Callard, S. L., van Landeghem, K. et al.	University of Liverpool, UK
07/2018	*Earth and Planetary Science Letters* (Journal)	The role of subsidence in shelf widening around ocean island volcanoes: Insights from observed morphology and modeling.	Quartau, R., Trenhaile, A. S., Ramalho, R. S., & Mitchell, N. C. (2018	Instituto Hidrográfico do Portugal, PT University of Windsor, CA Faculdade de Ciências da Universidade de Lisboa, PT Lamont-Doherty Earth Observatory at Columbia University, USA University of Manchester, UK
07/2018	MSc Thesis	Linking physical oceanography, metapopulation dynamics and human pressures. Toward sustainable hake fisheries in the NW Mediterranean Sea.	RADICI, A. (2018).	Politecnico Milano, IT
07/2018	*ICES Journal of Marine Science*	Drivers of the summer-distribution of Northeast	Nikolioudakis, N., Skaug, H. J.,	National Observatory of Athens, GR

	(Journal)	Atlantic mackerel (Scomber scombrus) in the Nordic Seas from 2011 to 2017; a Bayesian hierarchical modelling approach.	Olafsdottir, A. H., Jansen, T., Jacobsen, J. A., & Enberg, K. (2018).	Gamma Remote Sensing, CH Ecole Normale Supérieure, France Harokopio University of Athens, GR
07/2018	*Geological Society, London, Special Publications*, (Book Chapter)	Submarine landslide catalogue onshore/offshore harmonization: Spain as a case study.	León, R., García-Davalillo, J. C., Casas, D., & Giménez-Moreno, C. J. (2018).	IGME, SP
06/2018	*EUSAR 2018; 12th European Conference on Synthetic Aperture Radar* (Conference Proceedings)	Bathymetry derived from Sentinel-1 Synthetic Aperture Radar data.	Wiehle, S., & Pleskachevsky, A. (2018, June).	German Aerospace Center, DE

6 Annex: Other documentation attached

Feedback from and to users

Subject: Re: EMODnet Bathymetry Feedback form

Date: Tue, 10 Jul 2018 12:45:58 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To:

Dear .....,
I am technical coordinator of SeaDataNet and of EMODnet Bathymetry and we make use of the same CDI service which MARIS is managing and operating. However for the requests for restricted data we are depending on the processing by the data provider, which in your case concerns the Hydrographic Service of the Netherlands (part of the Netherlands Navy and a governmental organisation).
I have already written to them to contact you for further discussion and hopefully release of the requested data sets. Right now it is in their domain to undertake action and to take a decision.
Kind regards
Dick

On 7/10/2018 12:38, Michael Inglis wrote:

Hi Dick,

Okay great, is there any way that this process can be accelerated? I have been looking for a contact number for Seadatanet but have so far been unable to contact them.

If not, could you please provide an indication of how long this process usually takes?

Thanks,

From: Dick M.A. Schaap [mailto:dick@maris.nl]
Sent: 10 July 2018 10:58
To: Michael Inglis
Subject: EMODnet Bathymetry Feedback form

Dear ......,
From the RSM I can see that you already ordered in the CDI service 10 bathymetric data sets from the Hydrographic Service of the Netherlands. They will soon contact you.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 7/10/2018 11:22, Dick M.A. Schaap wrote:
Dear ......,

The EMODnet Bathymetry portal (www.emodnet-bathymetry.eu) features a CDI Data Discovery and Access service which allows users to discover available data sets and if found, to submit requests for access to these data sets:
http://www.emodnet-bathymetry.eu/metadata-and-data.
The data itself can have a restriction in which case a negotiation has to take place between the user and the data provider following the submitted data requests. Users can follow the processing of requests by means of the Request Status Manager service:
http://www.emodnet-bathymetry.eu/metadata-amp-data/request-status-manager-rsm
Note: a user also will receive an email confirmation of its shopping requests. This includes a link to the RSM which you should check regularly to follow processing of your requests.

As helpdesk we are not set up to perform your searches. However we invite you to make use of the provided CDI service to see if there are data sets included which fit your criteria. If so, then please submit your order requests.
If there might be issues, then please contact us again.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 7/10/2018 10:53, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	I am looking for archive Bathymetry data for an area offshore the Netherlands (the Waddensee area) between the years of 1989 and 1997. Is this data something that EMODNET would be able to provide? Thanks in advance, ...

Subject: Re: RE: EMODnet Bathymetry Feedback form

Date: Mon, 23 Jul 2018 13:45:52 +0000 (UTC)

From: .....

To: Administratie <info@hydro.nl>

CC: dick@maris.nl <dick@maris.nl>

Wow, U hebt me enorm geholpen!!

Thanks

....

On Monday, July 23, 2018, 10:49:59 AM GMT+2, Administratie <info@hydro.nl> wrote:
Dear ....,

The Hydrographic Service of the Royal Netherlands Navy is responsible for mapping the seas of the Kingdom in the North Sea and Caribbean Sea. We publish bathymetry (depth data) as part of our nautical products and as separate data sets. For an overview of all online possibilities, please see the memo at https://english.defensie.nl/topics/hydrography/documents/letters/2018/07/13/online-availability-of-data-from-the-hydrographic-service. The best option for you may be to use the MACHC ENC Online service at https://gis.charttools.noaa.gov/MACHC/MACHC%20ENCOnline/. When you zoom in to the appropriate scale, more and more details will become visible.

Best regards,

Leendert Dorst
Hydrographic Service
Royal Netherlands Navy

-------- Forwarded Message --------
Subject:EMODnet Bathymetry Feedback form
Date: Thu, 19 Jul 2018 16:19:51 +0200
From: noreply@maris.nl
To: dick@maris.nl

Name	.....
Email	.....
Feedback / Question	dear sirs. can you please give me information about the depth of Playa Canoa, Curacao Willemstad (location Caribbean sea) ? I need the info from the coast till about 50 meters off the shore. I realy hope yuo can help.

Subject: Re: EMODnet Bathymetry Feedback form

Date: Mon, 13 Aug 2018 09:06:43 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....,
Thank you for your interest. The current version of the EMODnet DTM has an overall resolution of 1/8th arc minutes. However we are well progressing with a new release which will have an overall resolution of 1/16th arc minutes. This will be published during next month (September 2018) and will be based on an increased number of survey data sets as contributed by hydrographic survey agencies, marine research institutes and companies.
The new release will be published at the portal: www.emodnet-bathymetry.eu
Can you inform us somewhat of the reason of your interest?
Kind regards
Dick M.A. Schaap
Technical coordinator

On 8/9/2018 21:13, noreply@maris.nl wrote:

Name	.....
Email	....
Feedback / Question	Do you have any plans/dates for improving this bathymetry resolution from 1/8th arc sec to something better e.g. 1/16 arc sec. Lot of countries in EU already have better resolution data available for their EEZ.

Subject: Re: EMODnet Bathymetry Feedback form

Date: Mon, 20 Aug 2018 10:08:53 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: ....

Dear ....,
You can draw a lat - lon box with the mouse on the map. However do not make the box too large as the service will not deliver then because of data volume.
Kind regards
DMA Schaap
Technical coordinator

On 8/20/2018 9:42, noreply@maris.nl wrote:

Name:	....
Emailaddress:	.....
Feedback:	how do i define an area of interest

Subject: Re: EMODnet Bathymetry Feedback form

Date: Thu, 23 Aug 2018 08:11:58 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....

Thanks for the additional information. Citing EMODnet in the end-credits will be fine. Keep us posted once the documentary is on tv.

The resolution is about 235 * 235 meters.

For using with GIS in fact all formats are ok if you have an expert. However ESRI ASCII and GeoTiff are most common.

Wish you success with your documentary.

Kind regards
Dick

On 8/22/2018 18:18, ... wrote:

Hi Dick,

Thanks very much for the below info. As we're making a documentary we wouldn't be able to cite sources on-screen, but would cite EMODnet in our end-credits. Is that okay?

Here's a bit more information on our project: We have been commissioned by the National Geographic Channel to make a new TV show provisionally titled "The Bible from Space" in which we will apply remote sensing technology to various archaeological and geological sites linked with stories from the Bible. The project will be hosted by remote sensing expert Dr Albert Lin, University of California at San Diego.

Can I ask what spatial resolution 1/8 * 1/8 arc minutes translates to? Is it something like 0.5km?

I've seen that there are a few different formats in which you can downloads tiles. Would RGB GeoTiff be the best format for further manipulations via GIS software etc?

Thanks again,

....

Subject:EMODnet Bathymetry Feedback form

Date: Wed, 22 Aug 2018 17:41:56 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....,
Thanks for your interest in the EMODnet digital bathymetry product. It can be downloaded in tiles and used as open data. However when using the DTM data products in publications, users are requested to include an acknowledgement to the EMODNet Bathymetry portal as follows:
'Digital bathymetry has been derived from the EMODnet Bathymetry portal (http://www.emodnet-bathymetry.eu). This is a European initiative, started in 2009, to compile and maintain a catalogue of available bathymetric data sets and to produce and publish the EMODnet Digital Terrain Model (DTM) for the European sea regions. The latest DTM has a grid resolution of 1/8 * 1/8 arc minutes, was released in October 2016 and has the following reference: http://doi.org/10.12770/c7b53704-999d-4721-b1a3-04ec60c87238 '

We also have a disclaimer, which you can find at:
http://www.emodnet-bathymetry.eu/data-products/disclaimer

Hope this will suit you.

Can you keep us informed when you use it for your productions? So that we can inform other users of your applications.

Kind regards
Dick M.A. Schaap
Technical Coordinator

On 8/20/2018 16:03, noreply@maris.nl wrote:

Name:	.....
Emailaddress:	....
Feedback:	Hello, I hope you're well. I'm writing on behalf of Caravan Media, a production company based in the UK. Can I ask whether your maps are an open source resource? Do we need to seek permission to reuse them? Thanks in advance,

---

Subject: Re: EMODnet Bathymetry Feedback form

Date: Wed, 29 Aug 2018 10:51:16 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....,
Thanks for your interest in EMODnet Bathymetry and its DTM product. Concerning your question: the 'DTM exchange format specification" document describes the DTM layers, which are processed for each cell of the grid. Both file types, EMO and NetCDF, contain these same layers, and there is no other variable related to the gridcells. All other variables or parameters included in the NetCDF file are the general description of the file and the NetCDF structure itself. Please tell us, if you have identified particular variables and parameters for which you require more clarification.
Could you tell us your use application for the DTM?
kind regards
Dick M.A. Schaap
Technical coordinator

On 8/22/2018 16:15, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	Dear sirs, I have downloaded bathymetric data in netCDF format from a region of interest (B3). I have also downloaded documents such as the "Guidelines for metadata, data and DTM QA/QC" and "DTM exchange format specification" in order to understand variables and attributes included in the netCDF. Although "DTM exchange format specification" provides a short description, netCDF file contains significantly more variables and parameters. Is there any document where I can find a detailed description of each variable

and the methodology for calculating it? Kind regards,

Subject:RE: EMODnet Bathymetry Feedback form

Date: Wed, 29 Aug 2018 08:54:04 +0000

From: ....

To: Dick M.A. Schaap <dick@maris.nl>

Hi Dick,

Thanks for the quick reply!

I see it now, I missed the source reference layer on the drop down tab!

Thanks for your help!

Cheers

Subject: Re: EMODnet Bathymetry Feedback form

Date: Wed, 29 Aug 2018 10:42:00 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....,
Thew EMODnet DTM is produced from > 7.000 survey data sets of different ages and methods. Therefore the portal provides a source reference layer which allows you to identify individual surveys that cover specific geo areas. The data references are also included in the downloadable DTM tiles. These point to metadata records in the CDI catalogue (surveys) and Sextant catalogue (Composite DTMs). Both catalogues are also provided at the EMODnert Bathymetry website (www.emodnet-bathymetry.eu) and are dynamically linked to the Source Reference layer in the bathymetry viewer (portal.emodnet-bathymetry.eu).
Oldest data go back to 1800, while the youngest used in the current DTM can be from 2016.
Pretty soon we will release a new EMODnet DTM with higher resolution and even more sources, including also new data from 2017 and 2018.
Kind regards
Dick MA Schaap
Technical Coordinator

On 8/29/2018 10:24, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	Hey Guys, Couple of questions/queries. Could you please tell me the age of the data sets found in your bathy data portal (http://portal.emodnet-bathymetry.eu/), particularly B3 and also how was this Bathy derrived (i.e. compilation of survey data/Lidar etc) Would like to update the metadata for our internal systems Kind regards, ...

Subject: EMODnet Bathymetry Feedback form

Date: Mon, 17 Sep 2018 18:45:39 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear ....,
The datum is indeed LAT.
Mean depth is the average depth of the provided source data within a grid cell with resolution of 1/16 arc minute. The method for calculating this is documented in the QA-QC document:
http://www.emodnet-bathymetry.eu/media/emodnet_bathymetry/org/documents/qa_qc_dtm_specifications_20171123.pdf

Depending on the available source resolution we first determine the mean in a 1/64 (or 1/32) grid and this is followed by processing these to a mean in a 1/32 grid (or the final 1/16) grid.

Hope this helps. Can you inform us about your use interest for the DTM?

Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/17/2018 17:25, noreply@maris.nl wrote:

Name	....
Email	.....
Feedback / Question	For what datum is the bathymetry data provided by emodnet (LAT?) What does "mean depth" on the web portal stand for? Kind regards

---

Subject: Re: EMODnet Bathymetry Feedback form

Date: Wed, 19 Sep 2018 15:31:08 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear ....,
Thanks for your interest. We are working on developing a high resolution digital coastline for Europe which will be made available at the portal. Most probably this will be end November - begin December 2018.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/19/2018 14:24, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	Dear EMODnet, I am looking for data representing the coastline of The Wash embayment in Lincolnshire, UK. The portal sais that a high resolution coastline is available to download, but so far I couldnÂ´t find it. Could you help me? Many thanks in advance and best regards,

==========

Subject: Re: EMODnet Bathymetry Feedback form

Date: Tue, 25 Sep 2018 21:12:51 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....,
Thank you for identifying this issue. Please try again. It should work now.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/25/2018 15:48, noreply@maris.nl wrote:

Name	....
Email	.....
Feedback / Question	Hi Emodnet! A few weeks back I was able to download an ASCII-file for bathymetry from your website. If I try it now, I receive an email. Unfortunately this email gives the following: format ArcGrid is not supported for this coverage Do you know what is going wrong?

Thanks in advance

==========

Subject: Re: EMODnet Bathymetry Feedback form

Date: Wed, 26 Sep 2018 07:11:56 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear ....,
The EMO file is an ASCII file and its format is described in:
http://www.emodnet-bathymetry.eu/media/emodnet_bathymetry/org/documents/euco-0901-002_dtm_exchange_format_specification_v1.6.pdf
You might download otherwise an alternative file type like e.g. ESRI ASCII which is very common.
Hope this helps.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/26/2018 1:32, noreply@maris.nl wrote:

Name	....
Email	.....
Feedback / Question	Dear Sirs, I have downloaded the English channel data and has comes as an EMO file which I cannot open, any advise how to view, Many thanks, ...

Subject: Re: EMODnet Bathymetry Feedback form

Date: Wed, 26 Sep 2018 07:23:46 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear ....,
Thanks for your interest. We are working on developing a high resolution digital coastline for Europe which will be made available at the portal. Most probably this will be end November - begin December 2018.

Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/13/2018 11:44, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	Hi. I am looking to download the coastline data for UK, English Channel and North Sea. I am struggling with the data size as don't have matlab (etc). Can you make any recommendations as to how I can view this data? Many thanks ....

Subject: EMODnet Bathymetry Feedback form

Date: Wed, 26 Sep 2018 07:37:09 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear ....,
Sorry for delay but our technical team had a good look at your reported issue.
The error message indicates that the WCS request tries to store a file on the filesystem while it is out of diskspace. This is most probably caused by including in the WCS request the parameter store=true.

The out of diskspace is odd, because the bbox (43.4872900978428,-2.5319802324929,44.016456764501,-1.6340635658406) should give a raster of 431 * 254 cells. When we do the same request as XML/Post, then all goes fine:

```
<?xml version="1.0" encoding="UTF-8"?>
<GetCoverage xmlns="http://www.opengis.net/wcs/1.1.1" xmlns:gml="http://www.opengis.net/gml"
xmlns:ogc="http://www.opengis.net/ogc" xmlns:ows="http://www.opengis.net/ows/1.1"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" version="1.1.1" service="WCS"
xsi:schemaLocation="http://www.opengis.net/wcs/1.1.1
http://schemas.opengis.net/wcs/1.1.1/wcsAll.xsd">
  <ows:Identifier>emodnet:mean</ows:Identifier>
  <DomainSubset>
    <ows:BoundingBox crs="urn:ogc:def:crs:EPSG::4326">
      <ows:LowerCorner>43.48729 -2.5319802324929</ows:LowerCorner>
      <ows:UpperCorner>44.016457 -1.634064</ows:UpperCorner>
    </ows:BoundingBox>
  </DomainSubset>
  <Output store="true" format="image/tiff">
    <GridCRS>
      <GridBaseCRS>urn:ogc:def:crs:EPSG::4326</GridBaseCRS>
      <GridType>urn:ogc:def:method:WCS:1.1:2dSimpleGrid</GridType>
      <GridOffsets>0.0020081772848672093 -0.0020833346456692954</GridOffsets>
      <GridCS>urn:ogc:def:cs:OGC:0.0:Grid2dSquareCS</GridCS>
    </GridCRS>
  </Output>
</GetCoverage>
```

The differences are in the extra GridOffsets, GridType and GridCS. Most probable the GridOffsets parameter is the one. When we adapt the request and add &GridOffsets=0.0020881772848672093,-0.0020833346456692954 (GridSize EMODnet 2016), then all goes well. Although the default value for GridOffsets is not clear in the OGC implementation specs for WCS 1.1.1 / geoserver manual.

This should work: https://ows.emodnet-bathymetry.eu/wcs?service=WCS&version=1.1.1&identifier=emodnet:mean&BoundingBox=43.4872900978428,-2.5319802324929,44.016456764501,-1.6340635658406,urn:ogc:def:crs:EPSG::4326&store=true&format=image/tiff&request=GetCoverage&GridOffsets=0.0020881772848672093,-0.0020833346456692954

WCS clients can retrieve the default value for GridOffsets by means of the DescribeCoverage request: https://ows.emodnet-bathymetry.eu/wcs?service=WCS&version=1.1.1&identifiers=emodnet:mean&request=DescribeCoverage

Hope this helps you to solve your experienced problem.

Kind regards
Dick M.A. Schaap
Technical Coordinator

noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	Dear EMODnet Bathymetry team, I contact you in relation with the OGC Web Coverage Service (WCS) you put at disposal to query bathymetry data as raster (coverage). I'm currently building a standard programmatic interface R and testing the WCS protocol and its different versions (1.0.0, 1.1.0, 1.1.1, 2.0.1) to query relevant datasources of interest for physical & environmental data. The finality of this is offer an interface to the WCS protocol in the recently released R package 'ows4R'. I've seen that your web portal / download service uses the WCS version 1.0.0. I've been able to try out the WCS 2.0.1 implementation of your server, and everything run fine. However when it comes to use the WCS version 1.1.0 / 1.1.1, i'm struggling. Normally, this request is supposed to work: https://ows.emodnet-bathymetry.eu/wcs?service=WCS&version=1.1.1&identifier=emodnet:mean&BoundingBox=43.4872900978428,-2.5319802324929,44.016456764501,-1.6340635658406,urn:ogc:def:crs:EPSG::4326&store=true&format=image/tiff&request=GetCoverage Similar requests work fine on other WCS 1.1 servers, but it fails with the above, with the following error: javax.imageio.IIOException: I/O error writing TIFF file! I/O error writing TIFF file! No space left on device I would be very grateful if you could have a look to this issue, Looking forward to your feedback, Best Regards, ...

Subject: Re: EMODnet Bathymetry Feedback form

Date: Wed, 26 Sep 2018 22:17:53 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: ……..

Dear ……..,

ArcGIS assumes depths to be negative downwards. The EMODnet convention is positive downwards as is the standard for nautical charting.
Therefore it can be solved by multiplying all values with -1.

Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/26/2018 15:07, noreply@maris.nl wrote:

Name:	….
Emailaddress:	…….
Feedback:	Hi, I downloaded some data in tif and ASCII file format. The data are reversed in ARCGIS 10.4, it means higher area seem deeper and lower areas look higher… something went wrong… have you faced this problem before? thanks

---

Subject: Re: EMODnet Bathymetry Feedback form

Date: Fri, 28 Sep 2018 12:57:32 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: …….

Dear ….,
We have checked by downloading these tiles ourselves and experience no issues with downloading, unzipping and reading the files.
This implicates that the issue must be somewhere at your configuration.

Can you explain better what happened? Do you have issues 'unzipping'? Is your software able to load the files. The ASCII files are > 2 Gb each. Some 32 bit software tools can not handle such file sizes in memory.

Will hear from you again.

Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/27/2018 13:57, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	Hi, I recently downloaded bathymetric tiles D4 and D5. The download data was corrupted, is this a known issue? I am looking for the data in an .xyz format. Regards, ...

Subject: Re: EMODnet Bathymetry Feedback form

Date: Fri, 28 Sep 2018 12:52:29 +0200

From: Dick M.A. Schaap <dick@maris.nl>

To: .....

Dear .....,
We have checked and it appears that you had ordered an Area of Interest in the ESRI ASCII format. We are using WCS/geoserver and this processes geotiff requests quite easy. However requests in the ASC format go very slow. The code 504 is given by the server, when the server determines that geoserver is busy for too long. We have now extended the timeout duration request and hope it will function now. So please try again.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 9/27/2018 19:09, noreply@maris.nl wrote:

Name	.....
Email	.....
Feedback / Question	We tried to extract two sections of bathy data in Central Med area. Got the email with the link but the links timeout Code 504 gateway timeout ??
