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

EMODnet Phase III

4th Trimonthly Report

Reporting Period: 01/10/2017 – 31/12/2017

Date: 10/01/2018

Prepared by: Thierry Schmitt (Shom) and Dick M.A. Schaap (MARIS)

Contents

1. Highlights in this reporting period 3
2. Meetings held since last report 3
3. Work package updates 4
WP0 – Project Management 4
WP1 – Bathymetric data collection and metadata compilation for all maritime basins 4
WP2 – QA-QC, data processings and producing Digital Terrain Models for the basins 5
WP3 – Integration and inclusion of the DTMs into the portal 6
WP4 – Technical Development & Operation of portal, tools and services: 7
WP5 – Coastlines, legal baselines and vertical reference levels: 9
WP6 – Outreach, helpdesk and evaluation 11
4. Specific challenges or difficulties encountered during the reporting period 11
5. User Feedback 11
6. Outreach and communication activities 13
7. Updates on Progress Indicators 14
Indicator 1 - Volume of data made available through the portal 14
Indicator 2 - Organisations supplying each type of data based on (formal) sharing agreements and broken down into country and organisation type (e.g. government, industry, science). 15
Indicator 3 - Organisations that have been approached to supply with no result, including type of data sought and reason why it has not been supplied. 17
Indicator 4 - Volume of each type of data and of each data product downloaded from the portal 17
Indicator 5 - Organisations that have downloaded each data type 18
Indicator 6 - Using user statistics to determine the main pages utilised and to identify preferred user navigations routes 19
Indicator 7 - List of what the downloaded data has been used for (divided into categories e.g. Government planning, pollution assessment and (commercial) environmental assessment, etc.) 22
Indicator 8 – List of web-services made available and user organisations connected through these web-services 22
Indicator 9 – List of publications referencing to EMODnet Bathymetry 25

1. Highlights in this reporting period

- Almost all the data producers have made great progress with producing and populating their expected contribution (new metadata and formatted datasets) according to the agreed methodology and using the latest tools. The total number of CDIs has increased from **14927 to 26875 records.** The total number of Composite DTM entries in the Sextant Products Catalogue has increased from **77 to 115.**
- The Regional Coordinators have started with the process for generating their Regional DTMs, selecting and including the pregridded data sets as received from the data providers.
- An EMODnet HRSM plenary meeting has been held in Heraklion – Greece in October 2017 to refresh the instructions, to monitor the progress and to give a strong impulse for preparing the metadata entries and preprocessing the data sets as well as for gathering and providing data and information on coastlines and baselines.
- Partner EOMAP has generated 18 Composite DTMs from Sentinel satellite data for coastal and near shore zones in the Mediterranean of Spain, Greece and Libya, and include metadata in the Sextant Products Catalogue.
- The EMODnet Bathymetry portal and services have been restyled following the latest EMODnet style guide.

2. Meetings held since last report

Date	Location	Topic	Short Description
25-26 October 2017	Heraklion, Greece	EMODnet HRSM Plenary Meeting	Full project group meeting to monitor and discuss progress of project activities.
15-17 November 2017	Antwerp, Belgium	EMODnet 'Open Sea Lab' hackaton	Participation of GGSGC and Shom to provide support and information about the various EMODnet HRSM products and services as well as to learn from users about their experiences.

3. Work package updates

WP0 – Project Management

A plenary meeting of the EMODnet HRSM consortium took place 25 – 26 October 2017 in Heraklion – Greece, hosted by HCMR. The meeting was dedicated to refreshing the understanding of all data providers about the methodology and tools to be applied for preparing the metadata entries for the CDI and Sextant catalogue services and preprocessing the associated data sets. The progress of gathering and preparing data sets was discussed per region, coordinated by its Regional Coordinator, and with input by all data providers. This also included instructions about updating and enriching existing metadata in order to facilitate the later calculation of the EMODnet DTM Quality Indicator per gridcell. Other topics at the meeting included progress with the technical developments for the portal and services, the methodology for determining coastlines using both in-situ and satellite data as well as tidal model results, and international cooperation. Following the meeting an action list was prepared and circulated to all consortium members urging to meeting the deadlines. The coordinator and technical coordinator prepared the 3rd quarterly progress report which was accepted by the EU (EASME and DG MARE). Preparations have started for the 1st Annual Report and the separate report on International Cooperation which will be submitted by 20th January 2018.

WP1 – Bathymetric data collection and metadata compilation for all maritime basins

In the last quarter of 2017 a major acceleration was achieved in gathering and making bathymetric data sets ready for transfer and use by the Regional Coordinators. The actual process in practice started after the summer, but has gained great momentum following the Plenary Meeting where all data providers were informed and instructed again about the methodology to apply for preparing and updating metadata entries and pregridding associated data sets. Moreover almost daily support has been given by MARIS for guiding the CDI catalogue population process, including regular updates and encouragements to data providers about the status of progress compared to expectations. Also support and guidance was given by IFREMER for the Sextant catalogue population. This has resulted in a major increase of the total number of CDIs from **14927 to 26875** records and Composite DTM entries from **77 to 115.** The latter includes 18 satellite derived Composite DTMs generated by partner EOMAP for the Mediterranean coastal zones of Spain, Greece and Libya. The total number of data providers has increased from **28 to 39.** The metadata compilation and data pregridding has nearly been finished and includes already most of the data providers. There is some delay in populating metadata for the new Arctic region, led by the University of Stockholm; however they are also in charge of the Regional Coordination for the Arctic region and this way will meet the deadline for the Regional DTM and the supporting metadata population.

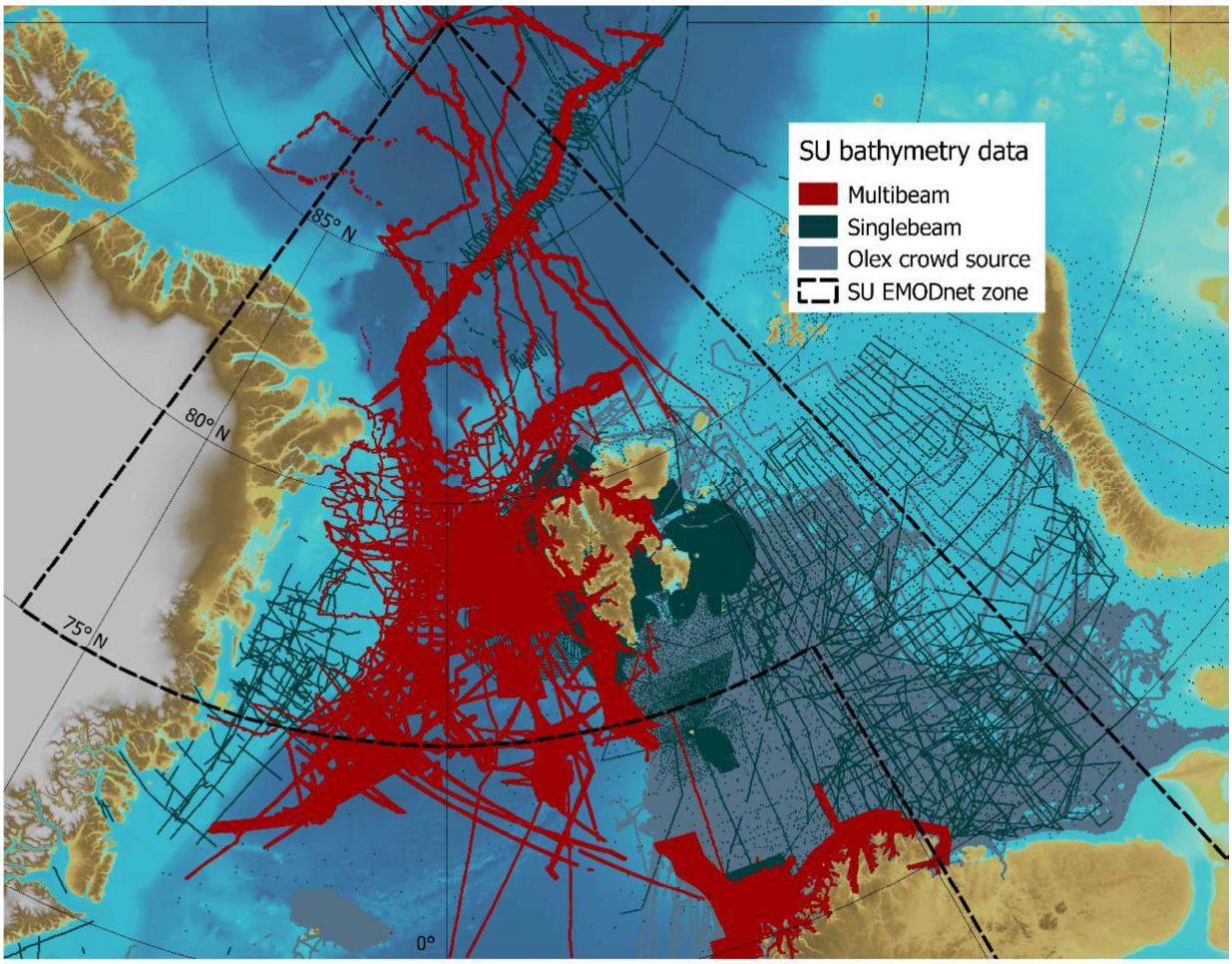


Image: Map of data sets as gathered for IBCAO (Arctic region) and under processing for EMODnet by University of Stockholm.

Real delays are experienced with the data providers from Croatia, Denmark and Slovenia for different reasons; luckily their expected contributions are relatively small. At the same time Shom and MARIS are working on solutions.

WP2 – QA-QC, data processings and producing Digital Terrain Models for the basins

The data providers have also made very good progress with pre-gridding and pre-processing all their dataset contributions, following the EMODnet data processing methodology and using the GLOBE software, in order to serve the Regional Coordinators. The hand-over to Regional Coordinators is well progressing and end of January 2018 a meeting is planned in Haarlem – Netherlands between the core project team and the Regional Coordinators to monitor progress with the hand-over and Regional DTM production process and to discuss possible issues and required tuning. The process for producing the Regional DTMs runs till March 2018.

WP3 – Integration and inclusion of the DTMs into the portal

The integration of the Regional DTMs into the overall EMODnet DTM will be performed by partner GGSGC with support of Regional Coordinators and MARIS. The actual integration will start in March 2018, but GGSGC already has been working on upgrading its software workbench taking into account the larger area and higher grid resolution implicating a challenge of 4 times the data volume compared to the previous EMODnet project. The existing workbench was still relying on manual process management. In other words, the individual steps in the process were all automated but the process as a whole was controlled via a checklist. This work method is no longer feasible for EMODnet HRSM given the huge data volume. In the previous project processing was done based on 4 tiles. To keep things manageable, the number of tiles for EMODnet HRSM is increased to 64. Additional software was developed to allow for a complete automated process in batch with necessary processing ½ arc minute overlap between the tiles. This development of automated process control is also relevant for the future integration of the software into the Collaborative Virtual Environment (CVE) as planned in WP4. User interaction is minimized; however stays necessary to some degree for QA/QC purposes.

Another preparatory activity by GGSGC has been upsampling the existing EMODnet DTM and GEBCO to the new target resolution of 1/16 arc minute. At the kick-off meeting it was agreed to use the existing EMODnet DTM as basis to be enriched with the existing and new bathymetric data sets (surveys and Composite DTMs) with their higher pre-gridded resolution. The upsampling also concerns the areas of the existing EMODnet DTM that have been completed with GEBCO derived data. This is done because there is a greater confidence in the coherence and quality of the existing integrated DTM product than returning to using EMODnet and existing GEBCO next to each other. The increase in resolution requires the existing DTM to be up-sampled from 1/8 to 1/16 of an arc minute without losing existing CDI and DTM references in the data. Furthermore, the interpolated (or resampled) data cells should inherit the CDI or DTM reference from the cell that contributed to the resample process. The up-sampling itself is performed using an Overhauser spline algorithm that uses a moving 4x4 grid in the 1/8 arc minute source to calculate each cell in the 1/16 up-sampled result. Overhauser is used because it is known to respect the controlling data points better than any other spline algorithm (see image below).

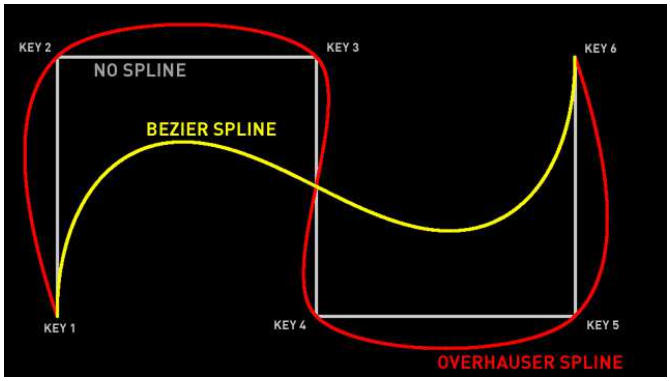


Image: Overhauser spline versus Bezier spline alternative.

The new HRSM area of interest covers a larger area than the existing EMODnet DTM. The basis for the new coverage has to be GEBCO. For this the GEBCO data is upsampled from a 1/2 arc minute resolution to a 1/16 arc minute. As the new area extends all the way to the North Pole, special attention was required for the pole area as GEBCO data is non-projected. Up-sampling the area around the North Pole requires a re-projection of the GEBCO data to a polar projection (EPSG 3996). Later in the process this area will be covered with the Arctic Regional DTM which will be a refined version of IBCAO prepared following EMODnet methodology and including CDI and CDTM referencing.

WP4 – Technical Development & Operation of portal, tools and services:

MARIS has upgraded the EMODnet Bathymetry portal and catalogue services following the new EMODnet styling as agreed at the EMODnet Technical and Steering Committee meetings. Moreover, as part of preparations for the Open Sea Lab hackaton, MARIS and GGSGc have preparing and included in the portal improved instructions for the existing machine-to-machine services. GGSGC has upgraded the Bathymetry Viewing and Download service, also adopting the new EMODnet styling and responsive design. The portal and services now also function well on tabs.

It is an option to migrate the hosting of the Bathymetry Viewing and Download service to the Datarmor hosting and high performance computing facilities at Ifremer in Brest – France. The rationale is that the DTM viewing and download service and the planned Collaborative Virtual Environment (CVE) then might be centralised on the same hosting facility. GGSGc will stay overall responsible for the development and management of the Bathymetry Viewing and Download service. In the previous period Ifremer with support of GGSGc had already configured a mirror of the Bathymetry Viewing and Download service at Datarmor (see http://portal.emodnet-bathy.ifremer.fr/). Testing the performance and uptime of the configuration is ongoing, and if positive, also a number of additions have to be made such as a staging and a production environment in order to support new developments. Moreover practical arrangements are needed between GGSGc, IFREMER and MARIS for maintenance, operation and further developments, respecting the different responsibilities. Operational migration will take place once all is satisfactory arranged.

Concerning the Collaborative Virtual Environment (CVE) further progress has been made with the functional and technical analysis. This is done in synergy with the analyses that are performed in the EU SeaDataCloud project for specifying a generic architecture for a Virtual Research Environment that can provide a platform for hosting a series of workflows for different applications. Recently EU SeaDataCloud has finalised the VRE Specification Deliverable which has studied existing VRE's worldwide, analysed in detail a workflow and tools for a SeaDataCloud use case (T&S climatology using ODV and DIVA software), and specified the SeaDataCloud VRE architecture. This Deliverable provides

an excellent basis for the EMODnet HRSM CVE development which as pilot will focus on the use case of giving access and means to Regional Coordinators of two adjacent regions and the overall Integrator. Among other functions the Regional Coordinators should be able to find and retrieve relevant data sets from the CDI and Sextant catalogue services and store these temporarily in in a cloud data pool; they should be able to import selected data sets into online GLOBE for building a Regional DTM, including functions for viewing and comparing with the previous overall DTM version; and the Integrator together with Regional Coordinators should be able to analyse and elaborate the overlap zone where the two regions meet and the overall consistency of the resulting integrated DTM. The HRSM pilot workflow is being described in greater detail and the first prototypes for specific process steps will be developed in the coming months. As reported under WP3 GGSGC has also made progress with upgrading its integration software workbench that will be made part of the pilot CVE.

GGSgc and Coronis have continued work on the development of a 3D viewing capability in the data portal. The viewer will be based on Cesium. Current open source implementations of Cesium all make use of a height map (raster based) tile structure. Although workable, the performance on an average computer is not optimal and in areas below sea level, artifacts (tile joints) may be visible.

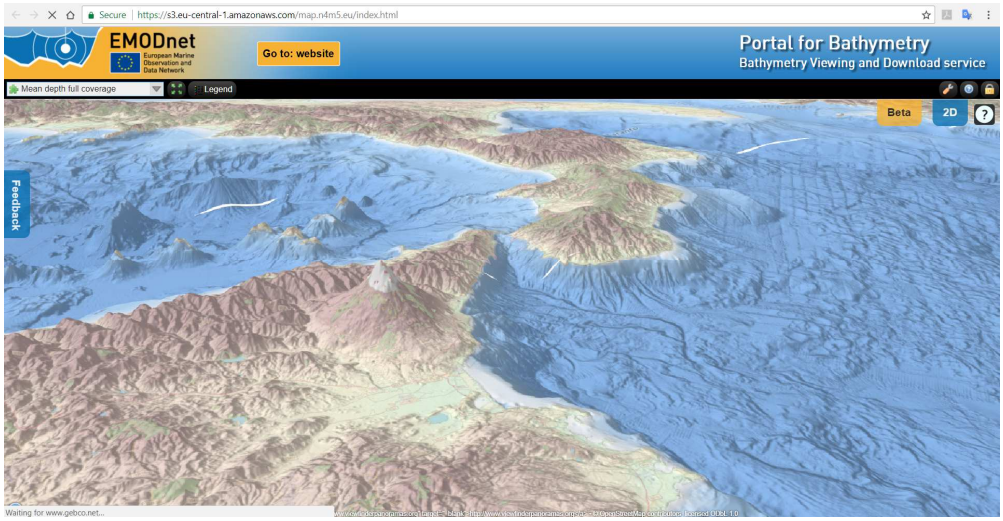


Image: Cesium 3D viewer using a height map data structure

To overcome these issues there are two options: either to acquire an expensive commercial off the shelf solution as a black box with no control or to develop a data structure based on a triangulated irregular network (TIN). After consulting with Coronis it was decided to go for the second option and to use the extensive knowhow of Coronis in the field of TIN data structures.

Having a TIN instead of a regular grid is a better representation of the data, as the complexity of the map (i.e. the number and size of triangles) adapts to the variations of elevations in the scene. The challenge for Coronis is to translate the EMODnet DTMs to the quantized mesh format. However,

there is no open-source tool available nowadays that is able to create tiles in quantized mesh format out of a raster format such as used in EMODnet. Therefore Coronis main challenge is to develop this software itself. This provides the advantage of having full control over the way terrains are simplified, and also opens the door to trying different approaches for simplifying the terrain. Moreover the resulting software can become part of the overall HRSM workflow and thus also of the CVE in a later stage. In the meantime Coronis is making good progress with the analyses how to solve the challenges in practice, also considering computing capacities, and the related software development. It is planned that the software will be ready and tested in time for delivery of the new EMODnet HRSM DTM, which then will be launched together with its new 3D viewing as an extra function of the Bathymetry Viewing and Download service.

WP5 – Coastlines, legal baselines and vertical reference levels:

Deltares together with Shom has been gathering existing national information concerning the national baselines in order to compile an inventory of existing and ratified baselines and registered claims / disputes under UNCLOS. Most countries have also defined an official coastline. Similar to the Legal Baseline, responsible institutes have been contacted to collect these data for all countries in Europe that are not land-locked. The present status of the compilation is illustrated below. More contributions are expected in 2018.

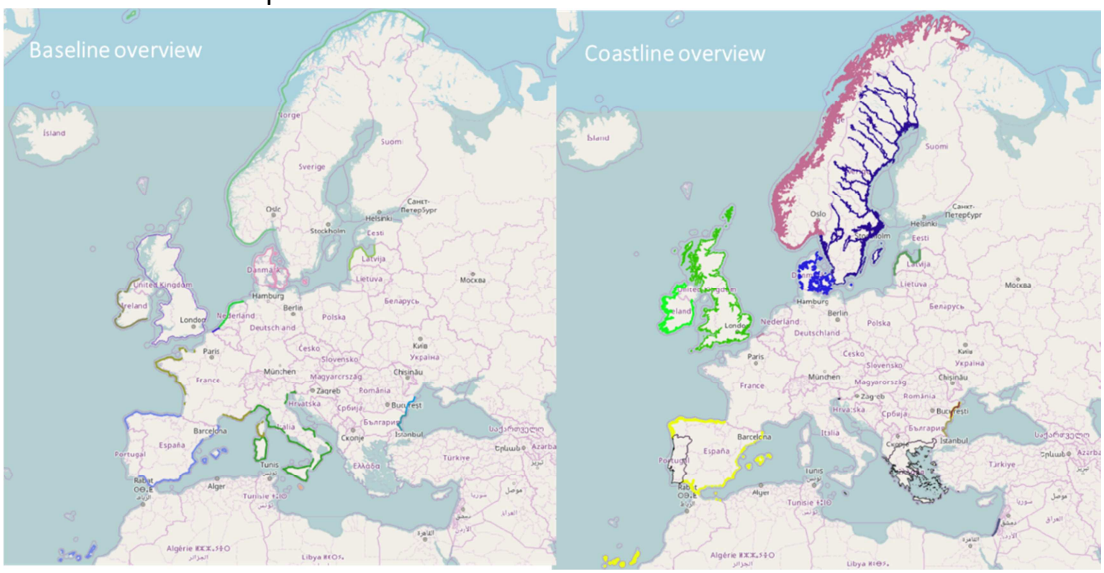


Image: Overview of collected national legal baseline data-sets and coastline data-sets (end December 2017)

In parallel, Deltares has made good progress with developing and implementing a methodology dedicated to the automatic extraction of a coastline from high-resolution bathymetry and from optical satellite images (typically Sentinel-2 and Landsat-8). Since these coastline data will be computed (where possible) for the entire European coastline, this data can be used for comparison and as a more homogeneous dataset. For this purpose a large number of satellite images are retrieved and corrected

where needed. Cells are classified as land or water (Donchyts 2016). This results in cells (10 meter grid) that are always wet, always dry or inter-tidal. The relative frequency can be used to link the horizontal and vertical levels. By linking the satellite images to information about the sea-level at the time and place that the image was taken, one can derive coastlines. Coastline contours will be computed for various levels, such as LAT (Lowest Astronomical Tide), MSL (Mean-Sea-Level), and MHW (Mean-High-Water). The sea-level data will be derived from the Global Tide Surge Model (GTSM) of Deltares. The production on the Satellite Derived Coastline (SDC) is done by dividing the European waters in tiles, running water occurrence algorithm in Google Earth Engine and link the water occurrence to different vertical references. The present status of the tiles production is presented in the figure below.

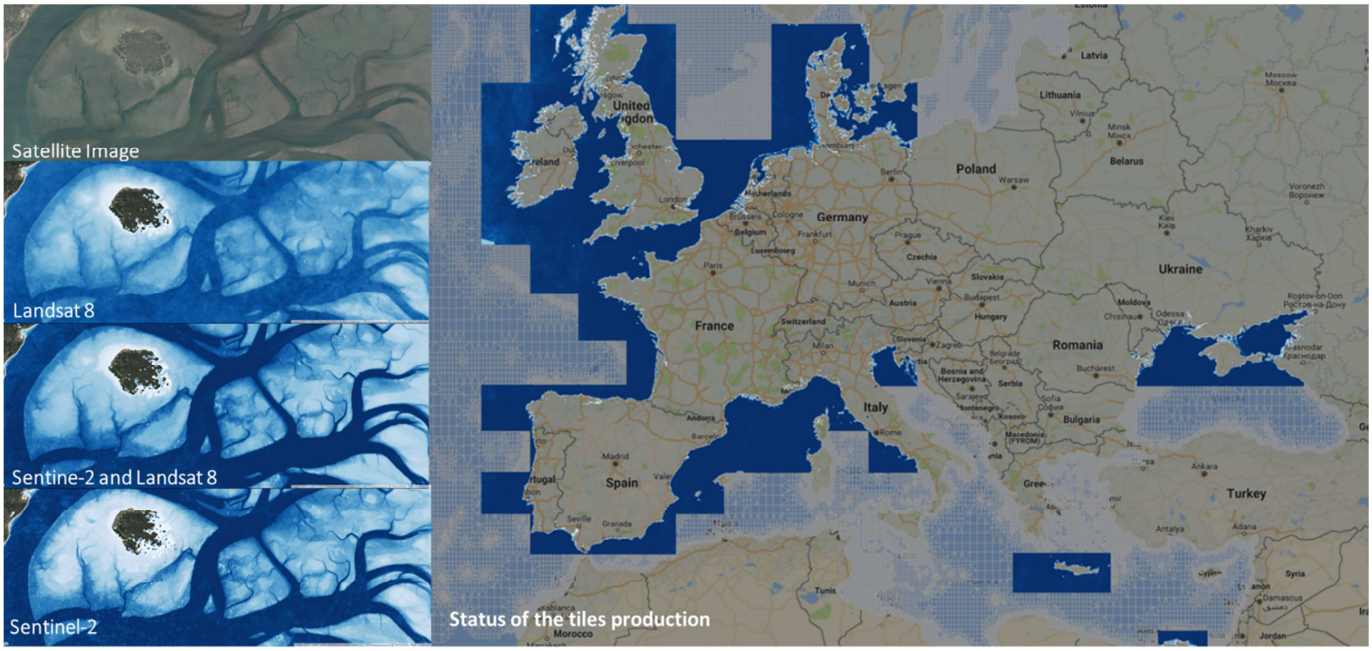


Image: Water index (left) and production status (right)

Activities are also undertaken for improving the Global Tide Surge Model (GTSM). The model is built on a spherical, flexible mesh with a resolution of 5 km in near-shore coastal waters. The tidal information is crucial for the vertical datum harmonization of data. To adapt GTSM for the purposes of EMODnet among others a refinement of the Grid is deployed for capturing better the topography in waters near the coast: 1.25km at European coasts (2.5km at other coasts).

The bathymetric data will be provided relative to chart datum, which according to the IHO should be close to LAT. For various users of EMODnet (such as modellers) MSL is a more convenient vertical reference. The next version of the EMODnet DTM will therefore become available both relative to LAT and MSL. The conversion will be performed with the LAT-MSL differences as computed with GTSM.

WP6 – Outreach, helpdesk and evaluation

During the last three months, the web portal was maintained, statistics about use of portal and services were collected and several questions were received and answered by the helpdesk. The user questions received and answered are detailed in chapter 5 and Annex 1. Coordination with EMODnet central portal allowed unifying the layout in between the overall EMODnet portals family.

The project, its achievements and new challenges were presented at several conferences and meetings, which are listed in Chapter 6. In particular the EMODnet Open Sea Lab Hackaton was very valuable for the EMODnet HRSM Consortium members, as they were able to experience and evaluate how the EMODnet Bathymetry data are used.

Also these include meetings with IHO and GEBCO relevant for the international interoperability and tuning. As part of the GEBCO - Seabed 2030 initiative, collaborations between Seabed 2030 and EMODnet are strongly pursued in order to enable reaching the Seabed 2030 vision to 100% map the World Ocean Floor. Further details about international cooperation will be detailed as part of the "EMODnet HRSM report on interoperability and international collaborations" that will be submitted with the 1st Annual Progress report.

4. Specific challenges or difficulties encountered during the reporting period

Please list specific problems you have encountered during this period, including related to technical and data provision issues

A challenge has been to get all data providers into action with the agreed activities for data gathering, metadata generation and data pre-processing. This was solved as can be seen from the results of WP1. There only remains a delay with delivery by the data providers from Croatia, Slovenia and Denmark. However Shom and MARIS are confident that this can be solved on short term.

5. User Feedback

List any useful feedback you received on your portal, your activities or those of other EMODnet projects/activities. Also provide any suggestions you have received for EMODnet case studies and/or future products/activities/events.

Date	Name	Organization	Type of user feedback (*e.g. technical, case study etc)*	Response time to address user request
2017-10-6	David Harrison	Fugro, USA	Question about Israel EEZ data	Same day
2017-	Dr Babatunde	UK	Question about format	Same day

10-9	Anifowose			
2017-10-10	Steven Bjerring	BP	Question about portal issue	Same day
2017-10-19	Umut Dolaman	?	Question about area of interest	Two days later
2017-10-30	Thijs Lanckriet	IMDC, Belgium	Question about vertical reference	Three days later
2017-10-24	Lymperis Tassopoulos	ERILAW, UK	Question about REST service for site for diving in Greece	A week later. Had to check first.
2017-11-07	Anne Trampe	Student, Germany	Question about waterdepth profiles	Same day
2017-12-06	Guido Schaepman	Periplus, Netherlands	Question about OGC web services	Same day
2017-12-07	Dimitrios Skarlatos	CUT, Cyprus	Wants to use DTM in EU project for Augmented Reality	Same day
2017-12-12	Jithu Jomcy	Mirath Pertogas, Oman	Search for survey companies	One week later
2017-12-19	Esther Minnigin	Cardiff University, UK	In search of current data.	Next day

Annex 1 gives more details.

6. Outreach and communication activities

Please list all the relevant communications activities or products you have developed/executed during this period (including presentations, lectures, trainings, demonstrations and development of communication materials such as brochures, videos, etc.). Relevant scientific and/or popular articles you know have been published using/referring to EMODnet should be reported under indicator 9 in Section 7.

See also WP6 report in Chapter 3.

Date	Media	Title	Short description and/or link to the activity
2017-10-19	Oral presentation	SeaDataCloud Plenary Meeting, Athens - Greece	Presentation by MARIS giving overview and latest progress of the EMODnet HRSM project and portal
2017-11-13	Oral presentation	GEBCO Guiding Committees – Busan – South Korea	Presentation by Shom at the technical committees of the GEBCO annual meeting.
2017-11-15	Participation	EMODnet 'Open Sea Lab' hackaton, Antwerp - Belgium	Participation of GGSGc and Shom on behalf of EMODnet HRSM to give support and information about EMODnet HRSM products and services.
2017-11-15	Oral presentation	IODE – ODIP Best Practices workshop, Paris, France	Presentation by MARIS about SeaDataNet, EMODnet and AtlantOS, also highlighting EMODnet HRSM.
2017-11-16	Oral presentation	Hydro'17 – Rotterdam – The Netherlands	Presentation by RNLN and Shom at the international hydrographic conference HYDRO'17. Two presentations given during this conference referenced the EMODnet Bathymetry portal and product.
2017-12-5	Oral presentation	5th Crowd Source Bathymetry Working Group - Monaco	Presentation by Shom to the members of the IHO - CSBWG, with highlights on the evaluation of the quality of source data and metadata management.
2017-12-6	Demonstration	International Hydrographic Organization - Monaco	Demonstration of the EMODnet Bathymetry portal and EMODnet HRSM current project to the new board of Directors of the International Hydrographic Organisation
2017-12-13	Oral presentation	AGU Fall meeting, New Orleans - USA	Presentation by MARIS and Shom at the American Geophysical Union annual conference giving overview and latest progress of the EMODnet HRSM project and portal

7. Updates on Progress Indicators

Using the indicator as a header list the metrics collated and the time interval. If there was no activity to report leave the section under the indicator header blank.

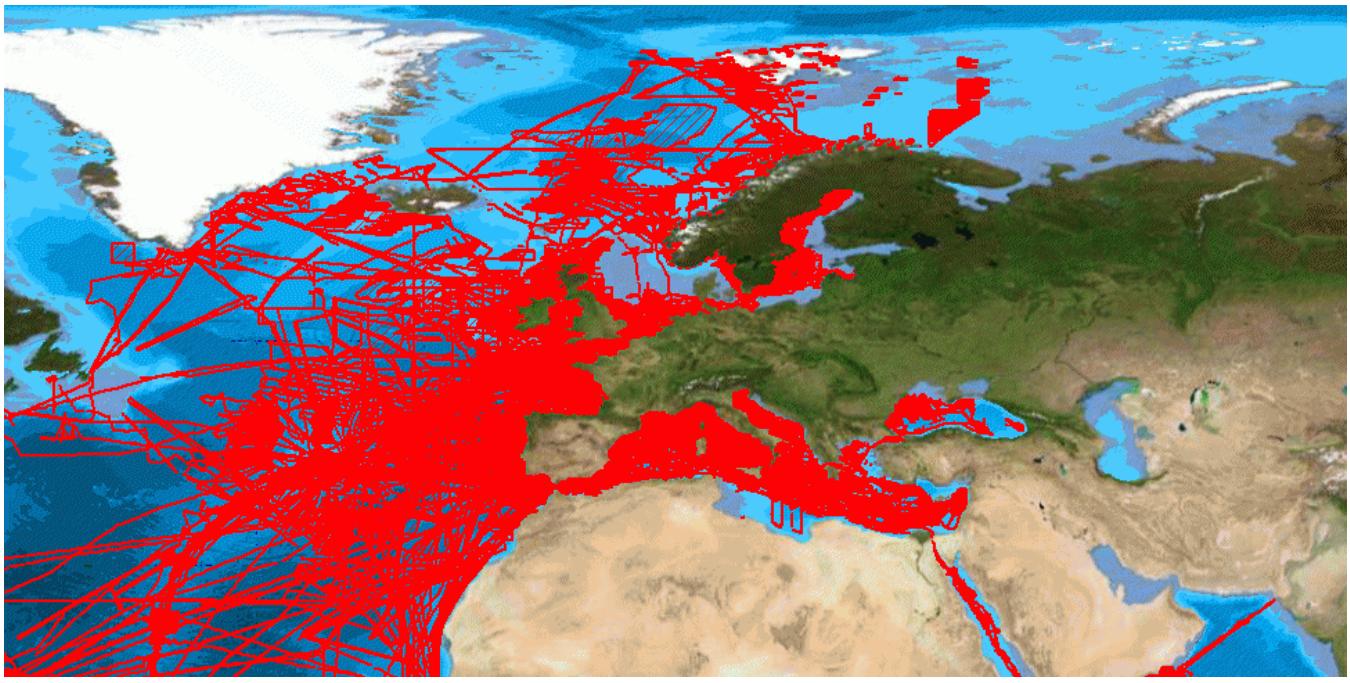
Indicator 1 - Volume of data made available through the portal

The total number of CDIs for bathymetric survey data sets has increased considerably from **14927 to 26875.**

The total in production covers the whole globe. Specifically relevant for European waters has increased from **11622 to 23223.**

Lat Long box**: N80, W-30 ; N20, E45**

Of these **1774** are unrestricted, while all other require negotiation.



The EMODnet DTM covers all European sea regions.

The total number of Composite DTM entries in the Sextant Products Catalogue has increased from **77 to 115.**

Indicator 2 - Organisations supplying each type of data based on (formal) sharing agreements and broken down into country and organisation type (e.g. government, industry, science).

Data Centre	Country	No of CDIs	No restrictions	Restrictions
Shom	France	5811	0	5811
Swedish Maritime Administration	Sweden	5774	0	5774
Rijkswaterstaat Central Information Services	Netherlands	2702	0	2702
OceanWise Limited	United Kingdom	2108	0	2108
Norwegian Hydrographic Service (NHS)	Norway	1222	0	1222
Italian Navy Hydrographic Office	Italy	1073	0	1073
German Oceanographic Datacentre (NODC)	Germany	1004	1004	0
IFREMER / IDM / SISMER - Scientific Information Systems for the SEA	France	744	292	452
Maritime Administration of Latvia	Latvia	580	0	580
Royal Netherlands Navy, Hydrographic Service	Netherlands	331	0	331
Flemish Ministry of Mobility and Public Works; Agency for Maritime and Coastal Services; Coastal Division	Belgium	318	0	318
IHPT, Hydrographic Institute	Portugal	296	0	296
Geological Survey Ireland	Ireland	266	266	0
CNR, Institute of Marine Science (ISMAR) - Bologna	Italy	107	0	107
British Oceanographic Data Centre	United Kingdom	100	98	2
Hellenic Centre for Marine Research, Hellenic National Oceanographic Data Centre (HCMR/HNODC)	Greece	94	0	94
Management Unit of North Sea and Scheldt Estuary Mathematical Models, Belgian Marine Data Centre	Belgium	93	93	0
IEO/Spanish Oceanographic Institute	Spain	87	21	66
Portuguese Institute of Ocean and Atmosphere	Portugal	76	0	76
British Geological Survey, Edinburgh	United Kingdom	62	0	62
Hydrographic Institute of the Navy	Spain	58	0	58
Marum - Center for Marine Environmental Sciences, University of Bremen	Germany	35	0	35
CONISMA, National Interuniversity Consortium for Marine Science	Italy	33	0	33

CNR, Institute for the Marine and Coastal Environment (IAMC) - Napoli	Italy	30	0	30
NIOZ Royal Netherlands Institute for Sea Research	Netherlands	30	0	30
Marine Technology Unit. Mediterranean Marine and Environmental Research Centre	Spain	30	0	30
OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Infrastructures Division	Italy	25	0	25
Bulgarian National Oceanographic Data Centre(BGODC), Institute of Oceanology	Bulgaria	24	0	24
CNR, Institute of Environmental Geology and Geoengineering (IGAG)	Italy	20	0	20
GRID-Arendal	Norway	14	0	14
National Institute of Marine Geology and Geoecology	Romania	14	0	14
Jardfeingi, the Faroe Islands Earth and Energy Directorate	Faroe Islands	13	0	13
SC Marine Research SRL	Romania	10	0	10
OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Division of Oceanography	Italy	10	0	10
IGME, Geological Survey of Spain	Spain	8	0	8
National Institute for Marine Research and Development "Grigore Antipa"	Romania	7	0	7
International Ocean Institute - Malta Operational Centre (University Of Malta) / Physical Oceanography Unit	Malta	6	0	6
Institute of Marine Sciences. Mediterranean Marine and Environmental Research Centre (CMIMA-ICM-CSIC). Department of Marine Science.	Spain	6	0	6
Israel Oceanographic and Limnological Research (IOLR)	Israel	2	0	2
		23223	1774	21449

Most centres are government and research institutes. Industry parties are: OceanWise and SC Marine Research SRL.

Indicator 3 - Organisations that have been approached to supply with no result, including type of data sought and reason why it has not been supplied.

The Croatian Hydrographic Service (HHI) has requested some flexibility with respect to resolution and distribution of their data in order to comply with their national policy on geographic data. A statement document between the Croatian Subcontractor and the Coordinator of EMODnet HRSM has been drafted and will be signed by both parties. Thereafter HHI will undertake immediate action to deliver metadata and data.

There has been regular communication with the Geodetic Institute of Slovenia (GIS) as partner in EMODnet HRSM to undertake the agreed actions for gathering, preparing and delivering metadata and data sets; however this has not yet resulted in contributions. Shom and MARIS will pursue their request, also pointing to the Consortium Agreement.

Indicator 4 - Volume of each type of data and of each data product downloaded from the portal

Time period 1 October 2017 – 31 December 2017:

CDIs:

No of CDI basket transactions: **31**
No of CDIs requested: **499**
Different users: **25**
Different data centres: **19**

Data products – DTMs:

Tile	Downloads
Area of interest	6491
B3	795
C3	580
D3	495
B2	396
C4	375
D4	313
B4	306
C2	291
A4	139
C1	98

D2	89
A1	88
A3	87
A2	85
D1	80
B1	68
	10776

This also includes the WCS service by which users can draw and download their own 'area of interest'. This appears quite popular.

Formats

Format	Downloads
ESRI ASCII	5031
32 bit float GeoTiff	1434
RGB GeoTiff	1282
GeoTiff	1058
XYZ	800
NetCDF	553
EMO	274
SD	228
EMO (without GEBCO data)	116
	10776

Indicator 5 - Organisations that have downloaded each data type

organisation	country
Spanish Meteorological Agency	Spain
DEME	Belgium
?	Greece
LEGOS	France
GEOLOGICAL SURVEY OF IRELAND	Ireland
Ghent University	Belgium
C-Map Italy Srl	Italy
Istituto Idrografico della Marina	Italy
Durham University	United Kingdom
Environment Agency	United Kingdom
Kiel University	Germany

UK National Oceanography Centre	United Kingdom
NERC	United Kingdom
?	Portugal
NARWAL	Netherlands
?	France
University of Heidelberg	Germany
Oceans of Energy	Netherlands
IMS-METU	Turkey
Coastal Science Ltd	United Kingdom
?	Bangladesh
National Observatory of Athens	Greece
Christian-Albrechts Universität zu Kiel	Germany
MARIS B.V.	Netherlands
Deltares	Netherlands

This concerns users of the CDI service. There is no registration for users that download EMODnet DTM tiles.

Indicator 6 - Using user statistics to determine the main pages utilised and to identify preferred user navigations routes

Time period 1 October 2017 – 31 December 2017:

Bathymetry main portal:

Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Oct 2017	12,609	14,754	96,437	205,244	5.42 GB
Nov 2017	15,067	17,695	95,944	171,951	4.44 GB
Dec 2017	13,697	15,896	86,935	164,026	3.97 GB

Visitors in December 2017:

Visitors domains/countries (Top 10) - Full list

	Domains/Countries		Pages	Hits	Bandwidth
	Commercial	com	48,451	77,327	1.25 GB
	Unknown	ip	16,758	34,463	961.11 MB
	Network	net	4,697	10,462	311.19 MB
	Germany	de	1,949	3,842	248.36 MB
	Netherlands	nl	1,858	6,301	226.70 MB
	Spain	es	1,632	4,676	163.93 MB
	France	fr	1,478	4,465	158.11 MB
	Italy	it	1,298	4,031	122.99 MB
	Greece	gr	1,104	2,787	71.07 MB
	Belgium	be	625	1,902	53.20 MB
	Others		7085	13770	470.68 MB

Bathymetry DTM viewer service:

Month	Unique visitors	Pages	Hits	Bandwidth
Oct 2017	3,918	7,470	12,157	136.29 GB
Nov 2017	4,072	7,447	11,789	134.60 GB
Dec 2017	3,093	6,340	9,912	62.73 GB

Visitors

Hosts

Top Hosts

	Host	Country	Hits	Visitors	Bandwidth (KB)
1	u-152-61-192-232.xr.usgs.gov	United States	670	97	4,644
2	u-152-61-128-50.xr.usgs.gov	United States	609	87	4,205
3	google-proxy-66-249-93-3.google.com	United States	88	83	511
4	google-proxy-66-249-93-7.google.com	United States	82	76	471
5	google-proxy-66-249-93-5.google.com	United States	76	68	398
6	ec2-52-27-2-86.us-west-2.compute.amazonaws.com	United States	64	50	2,280
7	unknown.shom.fr	France	57	44	697,686
8	ec2-50-112-194-65.us-west-2.compute.amazonaws.com	United States	47	42	2,111
9	webdefence.cluster-x.websense.net	Netherlands	82	42	3,699,244
10	proxy.acri.fr	France	70	41	282,385
11	109.205.65.214	France	77	41	806,035
12	38.119.188.35.bc.googleusercontent.com	United States	40	38	224
13	lja.lv	Latvia	41	38	196
14	176-140-30-79.abo.bbox.fr	France	214	37	1,023
15	nat-service2.aws.kontera.com	United States	124	34	639
16	1.1.194.35.bc.googleusercontent.com	United States	62	31	378
17	23.237.4.26	United States	60	30	845
18	a83-162-208-60.adsl.xs4all.nl	Netherlands	810	29	773,365
19	a85-138-225-234.cpe.netcabo.pt	Portugal	30	28	145
20	106-179-static.pacwan.net	France	78	27	1,275,841
21	static.kpn.net	Netherlands	48	27	1,626,115
22	a83-163-127-252.adsl.xs4all.nl	Netherlands	298	27	41,586
23	62.172.108.23	United Kingdom	197	27	3,404,775
24	nat.bo.ismar.cnr.it	Italy	57	26	1,738,090
25	91.228.96.214	Russian Federation	46	26	2,157,043
26	195.55.142.49	Spain	62	25	4,307,372
27	129.10.159.27	United States	62	25	321
28	static-5-51-41-68.ftth.abo.bbox.fr	France	129	23	632
29	138.251.202.51	United Kingdom	27	22	136
30	62.61.142.22.generic-hostname.arrownet.dk	Denmark	46	22	228
31	gra94-5-82-226-238-40.fbx.proxad.net	France	140	21	660
32	85-18-36-49.ip.fastwebnet.it	Italy	46	21	434,152
33	212.205.104.200	Greece	49	21	1,066,561
34	86.47.82.209	Ireland	38	21	197
35	snoopy.st-andrews.ac.uk	United Kingdom	46	20	2,167,138
36	ppers.univ-angers.fr	France	52	19	1,278,576
37	user.vliz.be	Belgium	26	19	629,926
38	stargate2.polytechnique.fr	France	48	19	808
39	google-proxy-66-249-93-216.google.com	United States	19	18	125
40	83-244-229-112.cust-83.exponential-e.net	United Kingdom	35	18	301,882
41	193.43.200.201	Italy	25	18	431
42	hidra.hhi.hr	Croatia	25	18	219,402
43	telecoms-lirex.lirex.net	Bulgaria	20	18	53,482
44	89.140.222.2.static.user.ono.com	Spain	29	18	696,680

Indicator 7 - List of what the downloaded data has been used for (divided into categories e.g. Government planning, pollution assessment and (commercial) environmental assessment, etc.)

There is no registration for what purpose users are using the downloaded survey datasets and the downloaded DTM tiles. However generally speaking bathymetry is an important parameter for many applications. Detailed and accurate mapping of the seabed and shallow sub-seabed environment is important for a large number of research, policy, and commercial groups. In particular, the acquisition of swath bathymetry data has become a fundamental dataset for multiple scientific disciplines including physical oceanography, marine geology, and benthic ecology. High-resolution bathymetry data provides an opportunity to characterize the processes which formed and actively govern the physical seabed environment, as well as to provide the necessary boundary conditions for numerical modellers to investigate both active (e.g. oceanographic) and past (e.g. glacial) environmental phenomena. The bathymetry data are also highly complementary to seismic and high-resolution sub-bottom profiler data, together providing a 3-D characterization of the shallow sub-seabed environment.

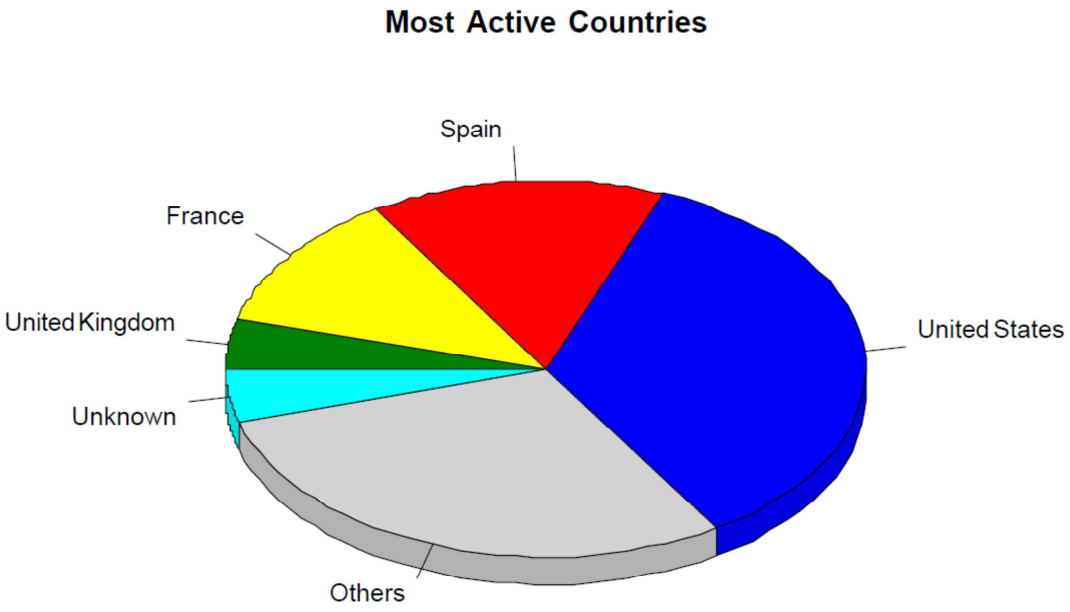
Bathymetry is also an important parameter next to geological and geophysical parameters for companies involved in the planning and construction of offshore windmill farms which need high resolution geophysical and soil information for calculating the stability of the sea bed conditions. The dredging industry needs high resolution bathymetric, geophysical and soil information of the seabed for quantity and quality of the resources and the presence of obstacles in the sea bed for i.e. deepening and widening of shipping routes, beach nourishment and coastal extensions. The oil- and gas industry needs, besides 3D-multichannel seismics for oil- and gas exploration, bathymetric and geophysical information for the stability of platforms and planning of pipeline routes. Companies involved with ecological issues for the determination of habitats in the offshore, need images collected with side scan sonar and multibeam for morphological and characterization of the sea bed.

Indicator 8 – List of web-services made available and user organisations connected through these web-services

Web services concern the Bathymetry Viewing and Downloading service: the OGC compliant web services comprise various layers and their URLs are advertised in the HELP section of the Viewing Service and also at the main portal. The web services concern WMS, WFS, WMTS and WCS and are applied by various users. These services are very popular with more than 25.000 users in the 3 months as can be seen from its statistics in the tables below.

Page Views	
Total Page Views	5,647,952
Average Page Views per Day	61,390
Average Page Views per Visitor	220.93
Visitors	
Total Visitors	25,564
Average Visitors per Day	277
Total Unique IPs	8,447

The total number of pageviews is more than 5.6 million, but these is somewhat misleading as a full page can be composed of multiple views. The top visiting countries and sites are indicated below.



Visitors

Hosts

Top Hosts

	Host	Country	Hits	Visitors	Bandwidth (KB)
1	35.158.136.172	United States	577,091	635	10,268,197
2	52.57.254.59	United States	485,452	514	8,567,580
3	52.56.127.104	United States	354,269	487	6,382,374
4	52.56.127.112	United States	316,110	434	5,691,424
5	35.162.63.225	United States	32,580	364	707,383
6	193.191.134.34	Belgium	150,387	319	2,373,334
7	35.167.191.152	United States	26,229	300	542,383
8	130.206.32.66	Spain	109,827	271	1,978,954
9	34.195.252.170	United States	22,633	243	353,608
10	34.226.14.254	United States	20,797	243	305,619
11	34.195.252.195	United States	22,881	239	362,219
12	35.167.191.158	United States	25,457	234	512,774
13	185.24.184.194	France	6,879	214	8,016,776
14	195.200.179.106	France	46,278	208	1,044,877
15	130.206.32.226	Spain	47,884	201	672,925
16	52.15.127.161	United States	16,918	176	443,874
17	34.195.252.49	United States	21,017	174	315,697
18	52.56.127.85	United States	115,097	163	2,095,013
19	13.59.250.25	United States	16,821	162	433,869
20	13.59.250.3	United States	13,025	148	341,820
21	35.158.136.46	United States	114,105	147	2,078,427
22	134.246.144.44	France	42,842	145	2,320,350
23	150.178.42.5	Italy	5,734	131	279,070
24	134.157.178.120	France	141,968	119	3,300,643
25	213.122.160.70	United Kingdom	1,343	119	1,930,875
26	217.167.130.4	France	74,214	119	3,605,240
27	52.56.127.34	United States	76,484	108	1,306,124
28	160.92.152.213	France	2,060	101	130,553
29	52.56.127.14	United States	43,494	100	784,712
30	35.162.63.199	United States	2,117	95	33,744
31	52.57.254.137	United States	72,258	94	1,156,513
32	54.75.221.91	Ireland	26,466	94	81,089
33	213.122.160.66	United Kingdom	1,721	89	697,031
34	194.176.95.161	United Kingdom	116	87	2,167
35	52.27.2.86	United States	1,807	86	235,485
36	95.211.217.68	Netherlands	11,884	84	36,246
37	50.112.194.65	United States	1,645	84	258,940
38	109.123.101.103	United Kingdom	10,466	80	31,729
39	134.246.157.65	France	1,850	76	798,317
40	188.138.40.20	Germany	9,877	75	30,004
41	83.163.127.252	Netherlands	3,698	72	885,448
42	52.56.127.9	United States	37,153	71	738,504
43	95.97.142.82	Netherlands	10,693	70	6,586,242
44	35.162.63.229	United States	6,383	68	147,593

Indicator 9 – List of publications referencing to EMODnet Bathymetry

The following references to EMODnet Bathymetry can be found using Google Scholar on the 10/01/2018. References are given for accepted papers and edited books from 01/10/2017 onwards. This list is not exhaustive.

December 2017	The Journal of Ocean Technology	Identifying deep-sea target araeas for a pilot atlantic seabed mapping project using GIS techniques	http://www.thejot.net/?page_id=837&show_article_preview=911
December 2017	Geomorphology (peer review journal)	Long-term variability of supratidal coasltal boulder activation in Brittany (France).	https://doi.org/10.1016/j.geomorph.2017.12.028
December 2017	Natural Hazards and Earth System Sciences (peer review journal)	Tsunami run-up estimation based on a hybrid numerical flume and a parametrization of real topobathymetric profiles	https://doi.org/10.5194/nhess-2017-445
December 2017	Global and Planetary Change (peer review journal)	The dyke swarms of the Old Volcanic Edifice of La Gomera (Canary Islands): Implications for the origin and evolution of volcanic rifts in oceanic island volcanoes	https://doi.org/10.1016/j.gloplacha.2017.12.004
December 2017	Comptes rendus Geosciences (peer review journal)	Pockmarks on the South Aquitaine Margin continental slope: The seabed expression of past fluid circulation and former bottom currents	https://doi.org/10.1016/j.crte.2017.10.003
December 2017	Quaternary International (peer review journal)	Reconstruction of LGM faunal patterns using Species Distribution Modelling. The archaeological record of the Solutrean in Iberia	https://doi.org/10.1016/j.quaint.2017.10.042
November 2017	(Proceeding International conference)	Strike - slip deformation behind the Hellenic subduction: The Amorgos	8th International INQUA Meeting on Paleoseismology, Active Tectonics and Archeoseismology (PATA), 13 – 16 November, 2017, New Zealand

		Shear Zone, South Aegean Sea	
November 2017	Climate of the past (peer review journal)	Atlantic Water advection vs. glacier dynamics in northern Spitsbergen since early deglaciation	https://doi.org/10.5194/cp-13-1717-2017
November 2017	Geoscientific Model (peer review journal)	The UKC2 regional coupled environmental prediction system	https://doi.org/10.5194/gmd-11-1-2018
November 2017	The Black Sea (Book Chapter)	Geophysics of the Black Sea Basin.	In: The Black Sea. Springer Geography. Springer, Cham (https://doi.org/10.1007/978-3-319-70855-3_4)
November 2017	Frontiers in Ecology and Evolution (peer review journal)	Early Engagement of Stakeholders with Individual-Based Modeling Can Inform Research for Improving Invasive Species Management: The Round Goby as a Case Study	https://doi.org/10.3389/fevo.2017.00149
November 2017	Science Advances (peer review journal)	The Mediterranean Overflow in the Gulf of Cadiz: A rugged journey	DOI: 10.1126/sciadv.aao0609
November 2017	Nature communications (peer review journal)	Volcanism in slab tear faults is larger than in island-arcs and back-arcs	doi:10.1038/s41467-017-01626-w
November 2017	Scientific Reports (peer review journal)	Intrinsic and extrinsic factors drive ontogeny of early-life at-sea behaviour in a marine top predator	doi:10.1038/s41598-017-15859-8
November 2017	Marine Geology (peer review journal)	Massive Mn carbonate formation in the Landsort Deep (Baltic Sea): Hydrographic conditions, temporal succession, and Mn budget calculations	https://doi.org/10.1016/j.margeo.2017.10.010
November 2017	(Report)	AQUASPACE - Ecosystem Approach to making Space for Aquaculture - Deliverable	http://www.aquaspace-h2020.eu/wp-content/uploads/2017/10/D3.3-AquaSpace-tool-to-support-MSP-tool-manual-2nd-version.pdf

		3.3 AquaSpace tool to support MSP.	(EU Horizon 2020 project grant no. 633476)
November 2017	Geochemistry, Geophysics, Geosystems (peer review journal)	Gravity-Driven Deposits in an Active Margin (Ionian Sea) Over the Last 330,000 Years	DOI: 10.1002/2017GC006950
October 2017	Advances in Space Research (peer review journal)	Validation of CryoSat-2 SIRAL sea level data in the eastern continental shelf of the Gulf of Cadiz (Spain)	https://doi.org/10.1016/j.asr.2017.10.042
October 2017	Ecology and evolution (peer review journal)	Taking movement data to new depths: Inferring prey availability and patch profitability from seabird foraging behavior	DOI: 10.1002/ece3.3551
October 2017	(Doctoral Thesis)	Seabed landscapes of the Baltic Sea: Geological characterization of the seabed environment with spatial analysis techniques	http://urn.fi/URN:ISBN:978-952-217-386-7
October 2017	(Bachelor Thesis)	Wave propagation patterns along the northern catalan coast	http://hdl.handle.net/2117/108165
October 2017	12th International Conference on Parallel Processing and Applied Mathematics (Oral presentation)	Using GPGPU accelerated interpolation algorithms for marine bathymetry processing with on-premises and cloud based computational resources	http://www.dma.unina.it/mamhyp/mamhip17/montella.pdf (oral presentation given as part of H2020 RAPID (H2020-ICT-644312) project)
November 2017	Tectonophysics (peer review journal)	Long-term in situ observations at the Athina mud volcano, Eastern Mediterranean: Taking the pulse of mud volcanism	https://doi.org/10.1016/j.tecto.2017.09.010

Annex 1: Feedback from and to users

-------- Forwarded Message --------
Subject:EMODnet Bathymetry Feedback form
Date: Fri, 6 Oct 2017 21:33:23 +0200
From: Dick M.A. Schaap <dick@maris.nl>
To:dp.harrison@fugro.com

Dear David,
We have IOLR from Israel as a partner in EMODnet and they will bring in additional bathy datasets for their EEZ. Attached is an image of the R/V Bat-Galim multibeam survey conducted in the summer of 2016 that they will contribute. The new Bathy DTM will be released by us in spring 2018 (that is the plan).
BTW: Is Fugro involved in surveys and environmental monitoring for the oil & gas exploration / exploitation in the Cyprus license blocks South of Cyprus? We are in contact with the Cyprus government for structuring the sharing of data from the Cyprus base line studies and environmental impact monitoring and will contact later the organisations collecting the data.
Will hear from you.

Kind regards
Dick M.A. Schaap
Technical coordinator

PS We are now also running the EMODnet Ingestion portal (www.emodnet-ingestion.eu) aimed at getting access to marine datasets from third parties such as industry. Please have a look and discuss in your community whether some submissions might be possible, following up from our earlier discussions.

On 10/6/2017 10:32, noreply@maris.nl wrote:

Name	David Harrison
Email	dp.harrison@fugro.com
Feedback / Question	Good morning, Do you know if any of the publicly available Israeli EEZ data is likely to be built into your bathymetry portal? They have some great data, and it looks like the ascii data is available for public download. http://energy.gov.il/Subjects/OilSearch/Pages/GxmsMniOSReportsBathymetricMap.asp Thanks, Dave Harrison

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Tue, 10 Oct 2017 14:26:07 +0200
From: Dick M.A. Schaap <dick@maris.nl>
To: Babatunde Anifowose <ab2035@coventry.ac.uk>

Dear Babatunde,
Please have a look at:
http://resources.esri.com/help/9.3/arcgisdesktop/com/gp_toolref/spatial_analyst_tools/esri_ascii_raster_format.htm
and

https://en.wikipedia.org/wiki/Esri_grid

with some more information on the ESRI format.

Hope you can solve your issue.
Kind regards
Dick

On 10/10/2017 13:36, Babatunde Anifowose wrote:
Hi there again!
Yes, I did just that and the ASCII file was kind of disorientated 'cos what I was expecting to find is a three column file with long., lat. and depth data. But contrary to this, I have attached herewith what I got.
Your help is highly appreciated.
Cheers,
B.

From: Dick M.A. Schaap [mailto:dick@maris.nl]
Sent: 10 October 2017 11:31
To: Babatunde Anifowose
Subject: Re: EMODnet Bathymetry Feedback form

Dear Babatunde,

I tried it myself for almost the same area as you and this took quite some time to open the XYZ file in notepad, while I have a really powerful notebook with a lot of memory.
Can you try it for a smaller area and see if that works?
Btw the tiff files are much smaller and work faster.
Will hear from you.
Kind regards
Dick

On 10/10/2017 1:11, Babatunde Anifowose wrote:
Dear Dick,

Many thanks for your prompt response. Yes, I did select ASCII file option as it's also an acceptable format but no download was undertaken. After the click, I waited severally and nothing came. I have just repeated the same process and show below the excerpt. Please advice. Many thanks. B.

From: Dick M.A. Schaap [mailto:dick@maris.nl]
Sent: 09 October 2017 07:20
To: Babatunde Anifowose
Subject: Re: EMODnet Bathymetry Feedback form

Dear Babatunde.
These options are the standard output for the OGC WCS service which is driving the area of interest service., However chose the ASCII option which is a form of xyz.
Kind regards
Dick M.A. Schaap
Technical coordinator

On 10/9/2017 0:22, noreply@maris.nl wrote:

Name	Dr Babatunde Anifowose
Email	b.anifowose@coventry.ac.uk
Feedback / Question	Please, how can i "download (bathy data) area of interest" in .xyz format? The only options on offer are ASCII, GeoTiff and RGB GeoTiff. The .xyz file format is what i require to undertake further processing of the bathy data. Thanks for your help. Best wishes, B.

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Mon, 9 Oct 2017 08:19:50 +0200

From: Dick M.A. Schaap <dick@maris.nl>
To:b.anifowose@coventry.ac.uk

Dear Babatunde.
These options are the standard output for the OGC WCS service which is driving the area of interest service., However chose the ASCII option which is a form of xyz.
Kind regards
Dick M.A. Schaap
Technical coordinator

On 10/9/2017 0:22, noreply@maris.nl wrote:

Name	Dr Babatunde Anifowose
Email	b.anifowose@coventry.ac.uk
Feedback / Question	Please, how can i "download (bathy data) area of interest" in .xyz format? The only options on offer are ASCII, GeoTiff and RGB GeoTiff. The .xyz file format is what i require to undertake further processing of the bathy data. Thanks for your help. Best wishes, B.

-------- Forwarded Message --------
Subject:RE: EMODnet Bathymetry Feedback form
Date: Tue, 10 Oct 2017 10:15:27 +0000
From: Bjerring, Steven (ABW) <Steven.Bjerring@bp.com>
To: Dick M.A. Schaap <dick@maris.nl>

Hi Dick,

Yes – big fans! Find it's an nice supplement for where we don't have our own high resolution coverage..

Keep up the good work!

Best regards,
Steve

From: Dick M.A. Schaap [mailto:dick@maris.nl]
Sent: 10 October 2017 10:49

To: Bjerring, Steven (ABW)
Subject: Re: EMODnet Bathymetry Feedback form

Dear Steve,
Thanks. Please check with your IT department and let us know.
Anyway good to know that you as BP like our services!
Greetings
Dick

On 10/10/2017 11:01, Bjerring, Steven (ABW) wrote:
Hi Dick,

Screenshot below. My colleagues also have the same issue – so you may be right in saying it's a local issue. I'll contact our IT department.

Best regards,
Steve

From: Dick M.A. Schaap [mailto:dick@maris.nl]
Sent: 10 October 2017 09:59
To: Bjerring, Steven (ABW)
Subject: Re: EMODnet Bathymetry Feedback form

Dear Steve,
We have checked our logs and could not find any disturbance. Also some colleagues tested with the mentioned browsers and could find no issues.
Can you try again and please send us screengrabs. It might be a local issue with networks.
Will hear from you.
KInd regards
Dick
On 10/10/2017 10:20, Dick M.A. Schaap wrote:
Dear Steve,
Could you send us a screengrab because I do not experience your issue when using any of the named browsers.
Kind regards
Dick M.A. Schaap
Technical coordinator

On 10/10/2017 9:29, noreply@maris.nl wrote:

Name	Steven Bjerring
Email	steven.bjerring@bp.com
Feedback / Question	Hi, You bathymetry portal/download page is currently down - http://portal.emodnet-bathymetry.eu It doesn't display correctly in either IE or Chrome. Any ideas when this will be fixed? Thanks in advance, Steve

==========

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Sat, 21 Oct 2017 13:26:29 +0200
From: Dick M.A. Schaap <dick@maris.nl>
To:umut.dolaman@gmail.com

Dear Umut,
Chose the option: ESRI ASCII format. This can be used for deriving XYZ.
More info on that format can be found at:
http://resources.esri.com/help/9.3/arcgisdesktop/com/gp_toolref/spatial_analyst_tools/esri_ascii_raster_format.htm
and
https://en.wikipedia.org/wiki/Esri_grid
Kind regards
DMA Schaap
Technical Coordinator
PS: Do not make the area too large, because then it will not function.

On 10/19/2017 14:15, noreply@maris.nl wrote:

Name	Umut Dolaman
Email	umut.dolaman@gmail.com
Feedback / Question	Hello, In your website, I wanted to choose a specific area for my work and I clicked on "Download area of interest". However, the site does not show an option like download as .xyz format. It only showed the option, when I chose the "Download product" tab. Can you fix this problem? it is really important for my thesis. Best Regards.

==========

-------- Forwarded Message --------

Subject: Re: EMODnet Bathymetry Feedback form
Date: Fri, 3 Nov 2017 18:32:57 +0100
From: Dick M.A. Schaap <dick@maris.nl>
To:thijs.lanckriet@imdc.be

Dear Thijs,
Thanks for your compliments. The present EMODnet DTM is indeed using LAT as reference. However as part of the new EMODnet High Resolution Seabed Mapping activities we are developing a new EMODnet DTM with an overall higher resolution and it will become available both for LAT and MSL. This will be solved by having a high resolution tidal model for European waters. The publishing is planned mid 2018.
Hope you will look forward.
Kind regards
Dick M.A. Schaap
Technical Coordinator
On 10/30/2017 10:31, noreply@maris.nl wrote:

Name	Thijs Lanckriet
Email	thijs.lanckriet@imdc.be
Feedback / Question	Hi, I am very pleased with the EMODnet Bathymetry, it provides a very useful source of information. From what I can see, the vertical reference level of EMODnet is LAT (Lowest Astronomical Tide). For many applications, including hydrodynamic modelling (storm surges, waves, ...), it is necessary to have a bathymetry referenced to MSL (Mean Sea Level) or a geoid. I can imagine that this a need for many (potential) users. Is there a transformation available to transform the bathymetry to MSL? Or are there any efforts underway to make the Bathymetry dataset available in a geoid reference system, e.g. in conjunction with some of the efforts to develop a Europe-wide vertical reference datum such as EVRS? Many thanks, Thijs Lanckriet

---

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Mon, 6 Nov 2017 15:32:45 +0100
From: Dick M.A. Schaap <dick@maris.nl>
To:l.tassopoulos@erilaw.co.uk

Dear Lymperis,

We provide a REST service to retrieve depth details of a specific point as follows:
http://rest.n4m5.eu/depth/point?geom=POINT(-13.11953125%2058.909375)
with geom is the location in WKT
Please note: %20 is the separator in -13.11953125%2058.909375
This URL retrieves the value table as a JSON file:
{"min":1526.0,"max":1528.4,"avg":1527.4,"stdev":0.52,"elementarySurfaces":11.0,"smoothed":1527.95,"smoothedOffset":0.54992676}
Note: The rest service will return the following in case no min, max and stdev is available:
{"min":null,"max":null,"avg":4382.8,"stdev":null,"elementarySurfaces":null,"smoothed":null,"smoothedOffset":null}

The relevant waterdepth is the avg

Reference level = LAT which is quite equal to MSL in most of the Mediterranean Sea.

Hope this helps you.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 10/24/2017 16:58, noreply@maris.nl wrote:

Name	Lymperis Tassopoulos
Email	l.tassopoulos@erilaw.co.uk
Feedback / Question	Dear all, good evening, we are starting a dive site with collective data of diving spots around Greece mostly and i was wondering if its possible from your behalf and of course if you have the ability to give an api to retrieve depth data from specific locations. Sincerely yours, Tassopoulos Lymperis.

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Tue, 7 Nov 2017 14:08:15 +0100
From: Dick M.A. Schaap <dick@maris.nl>
To:anne.trampe@yahoo.de

Dear Anne,

The waterdepth profile function in the portal viewer only supports images. However you could also download the relevant tiles of the EMODnet DTM in NetCDF format as another function of the portal viewer.
Then you should also download and install the free 3D viewer that is advertised at the website: http://www.emodnet-bathymetry.eu/data-products
This page contains a section as follows:
3D Viewer: the DTM files in NetCDF format can also be visualised by using the 3D visualisation tool (3D Viewer) that has been developed in the EU FP7 Geo-Seas project. This viewer is based on the existing open source NASA World Wind JSK application. This software is freely available after registration and allows the visualisation of Digital Terrain Models (DTM) in the existing GLOBE NetCDF format and Web Map Service (WMS) which are plugged into a virtual globe. More info about the 3D viewer and link to the registration page can be found here.
The mentioned link for downloading the 3D software goes to: http://www.geo-seas.eu/content/content.asp?menu=0290000_000000
This 3D Viewer allows you to import the EMODnet DTM tiles (in NetCDF) and then it gives a lot of functionality for working with the EMODnet DTM in 3D.
It takes some preparation and you have to practice somewhat with the software, but it is quite powerfull and great fun, and might help you in many ways.
Hope this helps.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 11/7/2017 13:42, noreply@maris.nl wrote:

Name	Anne
Email	anne.trampe@yahoo.de
Feedback / Question	Hello, Hello BelÃ©n, I am a student from Germany currently working on a project at the Po river delta (Italy). For the project I would need the water depth of 9 transects, which I want to show in one graph. I have the starting and end coordinate of the transects, but also need the water depths in between those points. Is there format way to download the values of the profile and not only pictures? Is there a way to enter the coordinates at the portal? Going with the mouse is a bit too inaccurate for the project work. Thank you, kind regards, Anne

---

Subject: Re: EMODnet Bathymetry Feedback form
Date: Wed, 6 Dec 2017 09:35:10 +0100

From: Dick M.A. Schaap <dick@maris.nl>
To:g.schaepman@periplus.nl

Dear Guido,
Please have a look at: http://www.emodnet-bathymetry.eu/data-products/web-services-and-standards
which gives you the required information for OGC web services.
The wrecks layer is not included as this is a proprietary layer that we can not redistribute as OGC service.
Kind regards,
Dick M.A. Schaap
Technical Coordinator

On 12/6/2017 9:23, noreply@maris.nl wrote:

Name	guido schaepman
Email	g.schaepman@periplus.nl
Feedback / Question	Dear Sir/Madam, Thank you for starting up this great project to reveal the secrets of the European seas. Very useful indeed. I think it would be a great feature if you could download some of the layers or -even better- link to the layers using a WFS or WMS. For example, this layer (http://portal.emodnet-bathymetry.eu/) would be very handy to have in our own GIS systems, but it cannot be downloaded and there is no WFS/WMS available. The same goes for the 'Wrecks' layer I(http://portal.emodnet-bathymetry.eu/wrecks). Will there be a solution for this in the future? And can you send me the layers in shape format? Thank you for your answer. Kind regards, Guido Schaepman

---

Subject:EMODnet Bathymetry Feedback form
Date: Thu, 7 Dec 2017 15:34:02 +0100
From: Dick M.A. Schaap <dick@maris.nl>
To:dimitrios.skarlatos@cut.ac.cy

Dear Dimitrios,
It is very good to hear that you will use the EMODnet Digital Bathymetry for your project.
As acknowledgement please include: 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

Can you keep us informed about your progress and experiences? And are you willing to participate later in an interview as we are building use cases?
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 12/7/2017 15:15, noreply@maris.nl wrote:

Name	Dimitrios Skarlatos
Email	dimitrios.skarlatos@cut.ac.cy
Feedback / Question	To whom it may concern, I am coordinator of iMARECULTURE a non-commercial research and innovation project funded under Horizon2020 programme of the EU. Projectâ?Ts scope is to raise public awareness of underwater cultural heritage, using Virtual Reality, Augmented Reality applications and Serious Games. One of the deliverables will be an interactive seafaring serious game. In order to create a realistic game, we will be using bathymetric data obtained from your database The game will be open access and free to the public. Please let us know, what credits you wish us to include in the titles. Looking forward to your reply Kind regards

---

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Wed, 20 Dec 2017 12:54:10 +0100
From: Dick M.A. Schaap <dick@maris.nl>
To:jithujomcy@mpetrogas.net

Dear Jithu,
Our portal only brings together existing survey data sets in order to produce a harmonised DTM for the European seas. We are not in the business of performing bathymetric surveys itself.
Kind regards
Dick M.A. Schaap
Technical Coordinator

On 12/12/2017 14:16, noreply@maris.nl wrote:

Name	Jithu Jomcy
Email	jithujomcy@mpetrogas.net
Feedback / Question	Dear Team, We are having an enquiry from a customer of ours in Sultanate of Oman for carrying out Bathymetric survey, Please let us know about your interest to participate in the same so that we can provide you that further details about the tender. With Warm

Regards, Jithu Jomcy Business Development Manager Al Mirath Pertogas LLC Al Wadi Al Kabir Street 58, 381A Muscat, Oman Phone : +968/2481-1243 Fax : +968/2481-2984 Mobile : +968/9783-6523 Email : jithujomcy@mpetrogas.net Website : www.mpetrogas.net

---

-------- Forwarded Message --------
Subject: Re: EMODnet Bathymetry Feedback form
Date: Wed, 20 Dec 2017 09:59:14 +0100
From: Dick M.A. Schaap <dick@maris.nl>
To:minnigine@cardiff.ac.uk

Dear Esther,
The EMODnet Bathymetry portal does not deal with currents, but with bathymetry. Please have a look at www.emodnet-physics.eu which might be useful.
Kind regards,
Dick M.A. Schaap, technical coordinator

On 12/19/2017 12:14, noreply@maris.nl wrote:

Name	Esther Minnigin
Email	minnigine@cardiff.ac.uk
Feedback / Question	Hey there, Ive been looking for some specific tidal stream info for a GIS project , is there any data I could use that you have in more detail for the UK - specifically the Isle of Wight. Many thanks , Esther

---