



EMODnet



European Marine
Observation and
Data Network

Your gateway to marine data in Europe

EMODnet High Resolution Seabed Mapping - further developing a high resolution digital bathymetry for European seas

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Overall aims

- ① To bring together bathymetric datasets as collected by European organisations and to make these available for discovery and access
- ① To produce the best, harmonised, and higher resolution Digital Terrain Model (DTM) of all European seas on the market
- ① To make this European digital bathymetry (DTM) available for users by means of portal viewing and downloading services and OGC machine to machine services
- ① To generate and publish the best estimate digital European coastlines for LAT, MSL, and MHW



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Current consortium

- 41 organisations from 20 countries
- Strong relations with relevant international community (IHO, GEBCO, IBCAO, Seabed 2030, AORA, NSHC, and BSHC)



Hydrographic surveys



Research institutes



Private companies





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Standards are instrumental

- ⦿ Adoption of **SeaDataNet** standards and infrastructure
 - ⦿ **Common Data Index (CDI) service** based upon ISO 19115 – 19139 metadata standard for **bathymetric data sets** (surveys)
 - ⦿ **Sextant products catalogue** based upon ISO 19115 – 19139 for **composite DTMs**
 - ⦿ **Controlled vocabularies** for the marine domain (> 160.000 terms and > 60 lists), with international governance and web services
 - ⦿ Common SeaDataNet **Data Policy** and SeaDataNet License
- ⦿ Adoption of OGC WMS, WFS, and WCS services for machine-to-machine services





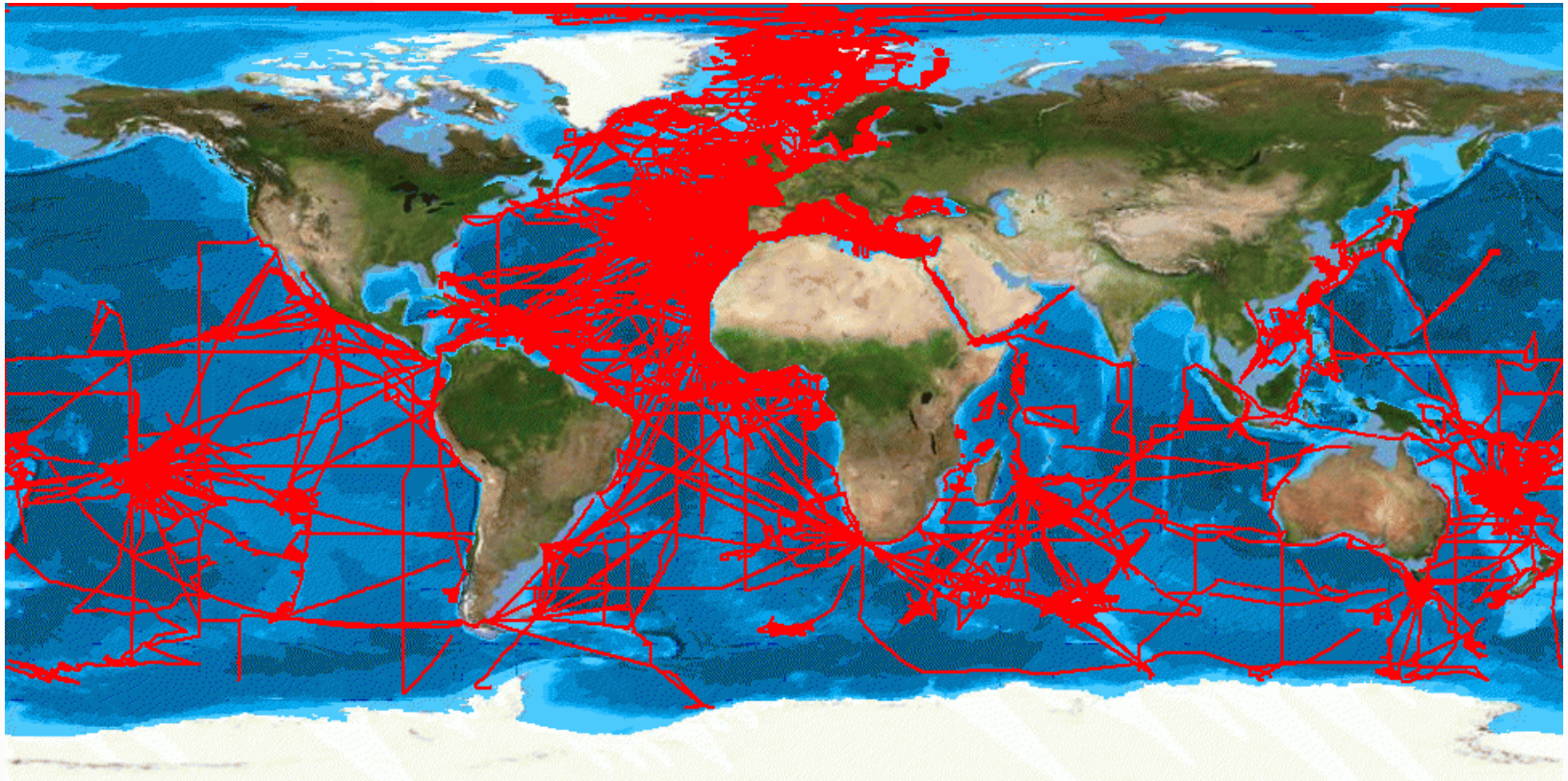
Data gathering results

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- Up till today, **27161** survey CDI metadata records from **42** data centres from **21** countries and **261** data originators from **1816** to **2018** have been collated and imported into the dedicated EMODnet Bathymetry CDI data discovery and access service.





Data gathering results

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- And so far **143** Composite DTM's from **29** data centres from **17** countries have been collated and imported into the dedicated EMODnet Bathymetry Sextant CPRD catalogue service.
- This includes also Satellite Derived Bathymetry products for Spanish and Greek coasts

The screenshot displays the EMODnet Sextant Catalogue service interface. At the top, a dark blue navigation bar contains the following menu items: APPROACH, METADATA & DATA, DATA PRODUCTS, NEWS, PROMOTION, PARTNERS, and HELPDESK. The main content area is titled "Sextant Catalogue service" and is divided into several sections:

- Search and Map:** A search bar with the text "Search ..." and a magnifying glass icon. Below it is a map of Europe with several orange rectangular boxes highlighting specific regions. A "Reset filters" button is located at the bottom of the search area.
- Results:** A navigation bar shows "Results 1 to 20 on 141 : 20 by page". Below this, two search results are visible:
 - Baltic Sea Bathymetry Database:** Includes a small image of a person and text describing the database's purpose in gathering and distributing water depth data for the Baltic Sea countries.
 - 574_EMODNET REGIONAL DTM OF NETHERLANDS CONTINENTAL SHELF:** Includes a small map of the Netherlands and text describing the DTM's resolution and source.
- Product Details:** A detailed view of a product titled "353_291002-Catalan Margin". It features a navigation bar with the same menu items as the top. The content is organized into sections:
 - WHAT:** A section header.
 - Metadata details:** A table with two columns:

| | |
|---------------------|-----------------------------------|
| File identifier | SDN_CPRD_353_291002 |
| Catalogue type | Composite Product Record |
| Project name | EMODNet Hydrography |
| Dissemination level | public |
| Metadata language | English |
| Date stamp | Mon Jan 29 2018 16:31:26 GMT+0100 |
 - Identification:** A table with two columns:

| | |
|--|---------------------------|
| Dataset name | 353_291002-Catalan Margin |
| Short name of dataset (SDN Local Product-ID) | 291002 |
 - Parameter Discovery Vocabulary (P02):** A table with two columns:

| | |
|------------------------------|--|
| SeaDataNet device categories | Bathymetry and Elevation |
| SeaDataNet device categories | multi-beam echosounders |
| SeaDataNet device categories | Differential Global Positioning System receivers |
 - Data access:** A section with a "Data access" button and a small bathymetry map of the Catalan Margin.



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Process flow

- Population of SeaDataNet CDI and Sextant services
- Common method and **GLOBE software** used by all involved
 - Data pre-gridded by data providers
 - Regional Basin Coordinators select datasets and generate Regional DTMs
 - DTM Integrator compiles the resulting EMODnet DTM



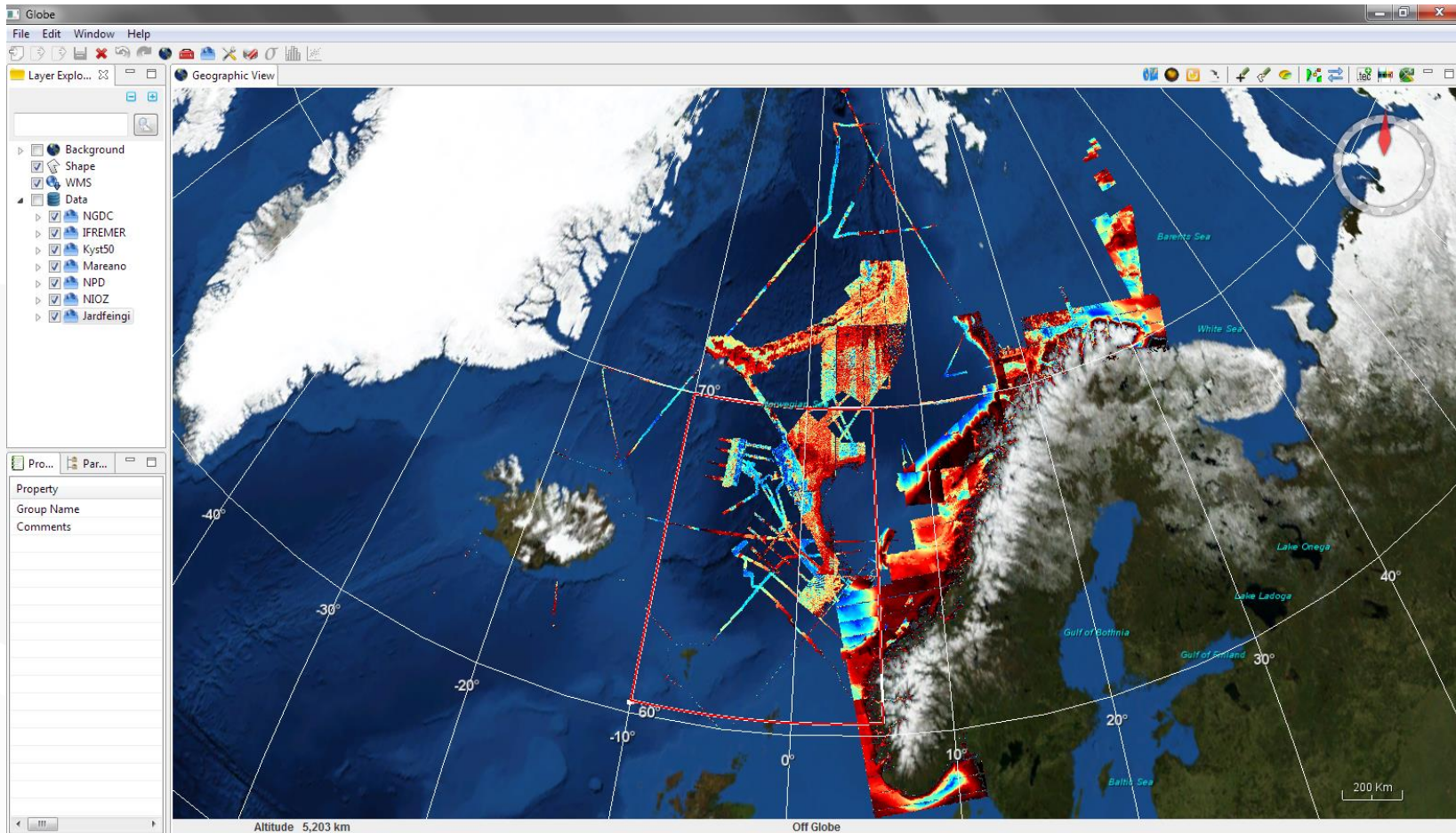


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GLOBE software



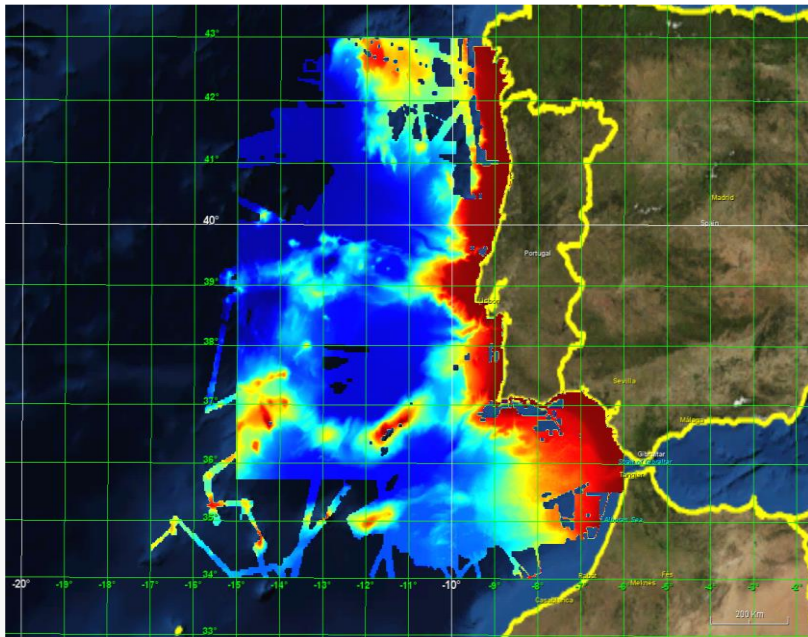
Norwegian and Icelandic seas – Arctic – example



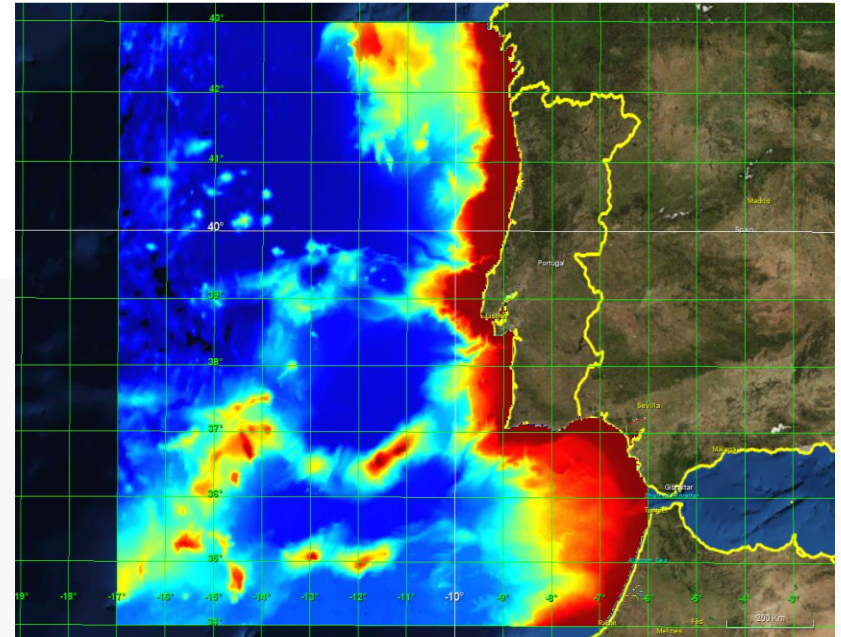
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Regional DTM production - example Atlantic near Iberian peninsula



- ⦿ Average depth for the interpolated DTM (using survey data & CDTM's)



- ⦿ Resulting DTM with average depth after GEBCO integration and smoothing



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DTM releases in time

- ⦿ **May 2010:** first release of EMODnet DTM for selected European seas - $1/4 * 1/4$ arc minutes
- ⦿ **June 2011:** second release of EMODnet DTM for more European seas - $1/4 * 1/4$ arc minutes
- ⦿ **August 2012:** third release of EMODnet DTM for more European seas - $1/4 * 1/4$ arc minutes
- ⦿ **August 2013:** fourth release of EMODnet DTM - $1/4 * 1/4$ arc minutes
- ⦿ **February 2015:** fifth release of EMODnet DTM now covering all European seas - $1/8 * 1/8$ arc minutes
- ⦿ **September 2015:** sixth release of EMODnet DTM now covering all European seas - $1/8 * 1/8$ arc minutes + **3 pilot coastal areas with high resolution DTMs**
- ⦿ **October 2016:** seventh release of EMODnet DTM based upon > 7700 surveys and Composite DTMs

September 2018: eighth release of EMODnet DTM with $1/16 * 1/16$ arc minutes, including coastal zones, with 3D visualisation, and (planned) hot spots with higher resolution



Bathymetry portal



BATHYMETRY

Understanding the topography of the European seas

Free search



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Developing and providing a harmonised Digital Terrain Model (DTM) for the European sea regions

SURVEY DATA SETS

CDI Data Discovery and Access service

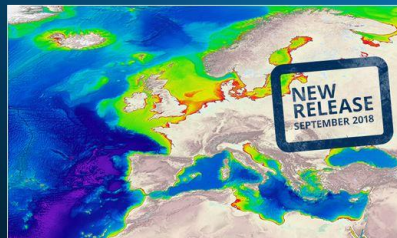
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EMODnet DTM

Bathymetry Viewing and Download service

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COMPOSITE DTM

Sextant Catalogue service

[READ MORE](#)



WELCOME TO THE EMODNET BATHYMETRY PORTAL



<http://www.emodnet-bathymetry.eu>

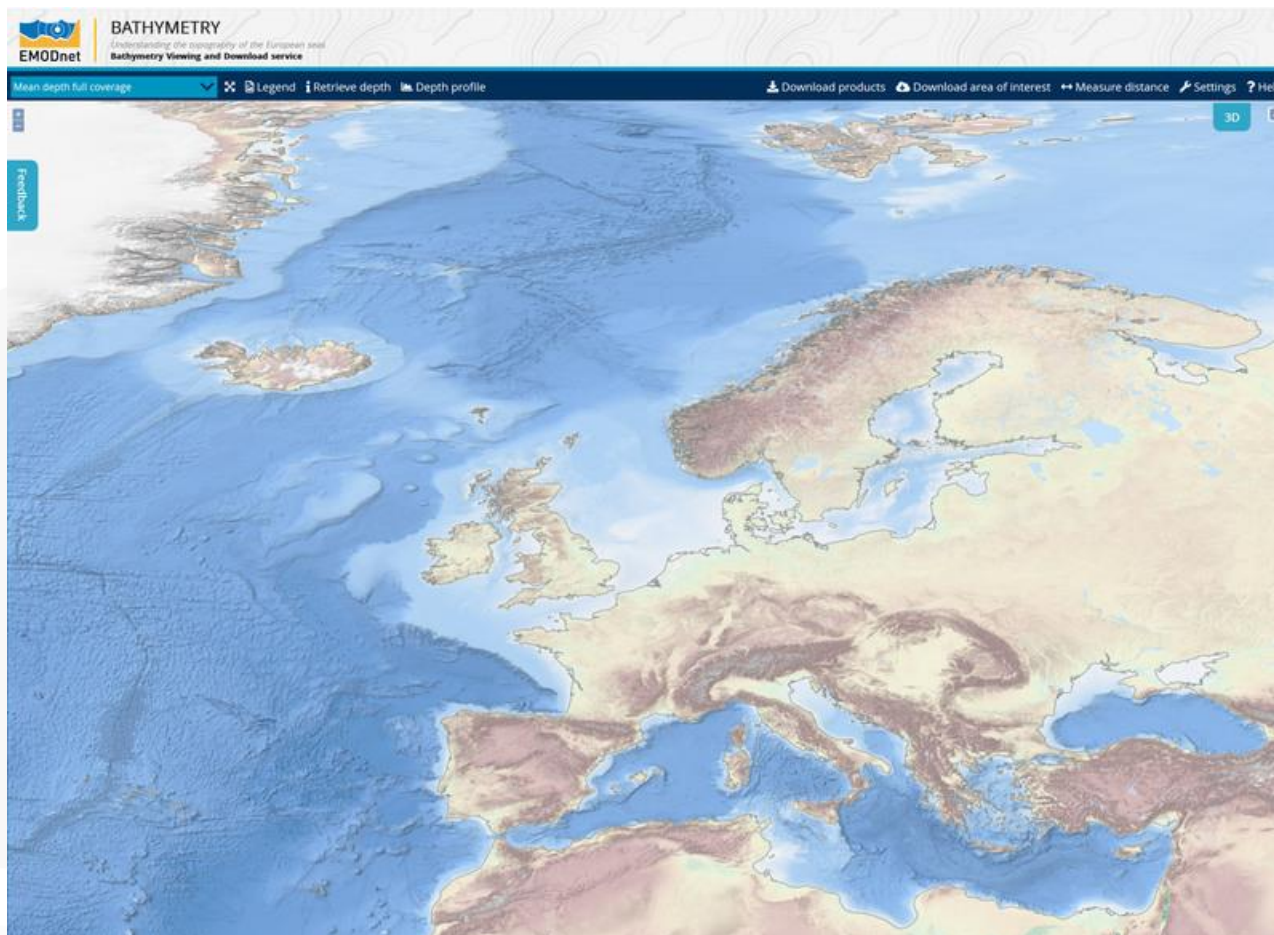


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Bathymetry Viewing and Download service



<http://portal.emodnet-bathymetry.eu>



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Other legend and layer menu

Mean depth full coverage Legend Retrieve depth Depth profile Download products Download area of interest ? Help

| Active | Visible |
|---|-------------------------------------|
| <input type="radio"/> Geographic grid | <input type="checkbox"/> |
| <input type="radio"/> Coastlines | <input checked="" type="checkbox"/> |
| <input type="radio"/> Sea names | <input type="checkbox"/> |
| <input type="radio"/> GEBCO Undersea Features | <input type="checkbox"/> |
| <input type="radio"/> Wrecks | <input type="checkbox"/> |
| <input type="radio"/> Source references | <input type="checkbox"/> |
| <input type="radio"/> Survey tracks/polygons | <input type="checkbox"/> |
| <input type="radio"/> Land geography and topography | <input type="checkbox"/> |
| <input type="radio"/> Coastal areas with high resolution bathymetry | <input type="checkbox"/> |
| <input type="radio"/> Mean depth in multi colour style (no land data) | <input checked="" type="checkbox"/> |
| <input type="radio"/> Mean depth rainbow colour ramp (no land data) | <input type="checkbox"/> |
| <input checked="" type="radio"/> Mean depth full coverage | <input checked="" type="checkbox"/> |
| <input type="radio"/> GEBCO bathymetry basemap | <input checked="" type="checkbox"/> |



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CDI layer with survey tracks / areas

Survey tracks/polygons ⌵ ⌵ i Retrieve metadata 🏠 Order survey data ⬇️ Download products 📍 Download area of interest ↔️ 🔧 ? Help

3D ⌵

Feedback

Metadata

| | |
|------------------------|--|
| Data set name | BASSOIONIO-2007 |
| Discipline | Marine geology Terrestrial |
| Parameter groups | Gravity, magnetics and bathymetry Terrestrial |
| Discovery parameters | Bathymetry and Elevation |
| GEMET-INSPIRE themes | Oceanographic geographical features |
| Abstract | Bathymetry of Calabrian Arc |
| Data format | Climate and Forecast NetCDF Version 3.5 |
| Data set creation date | 20170918 |

WHERE?

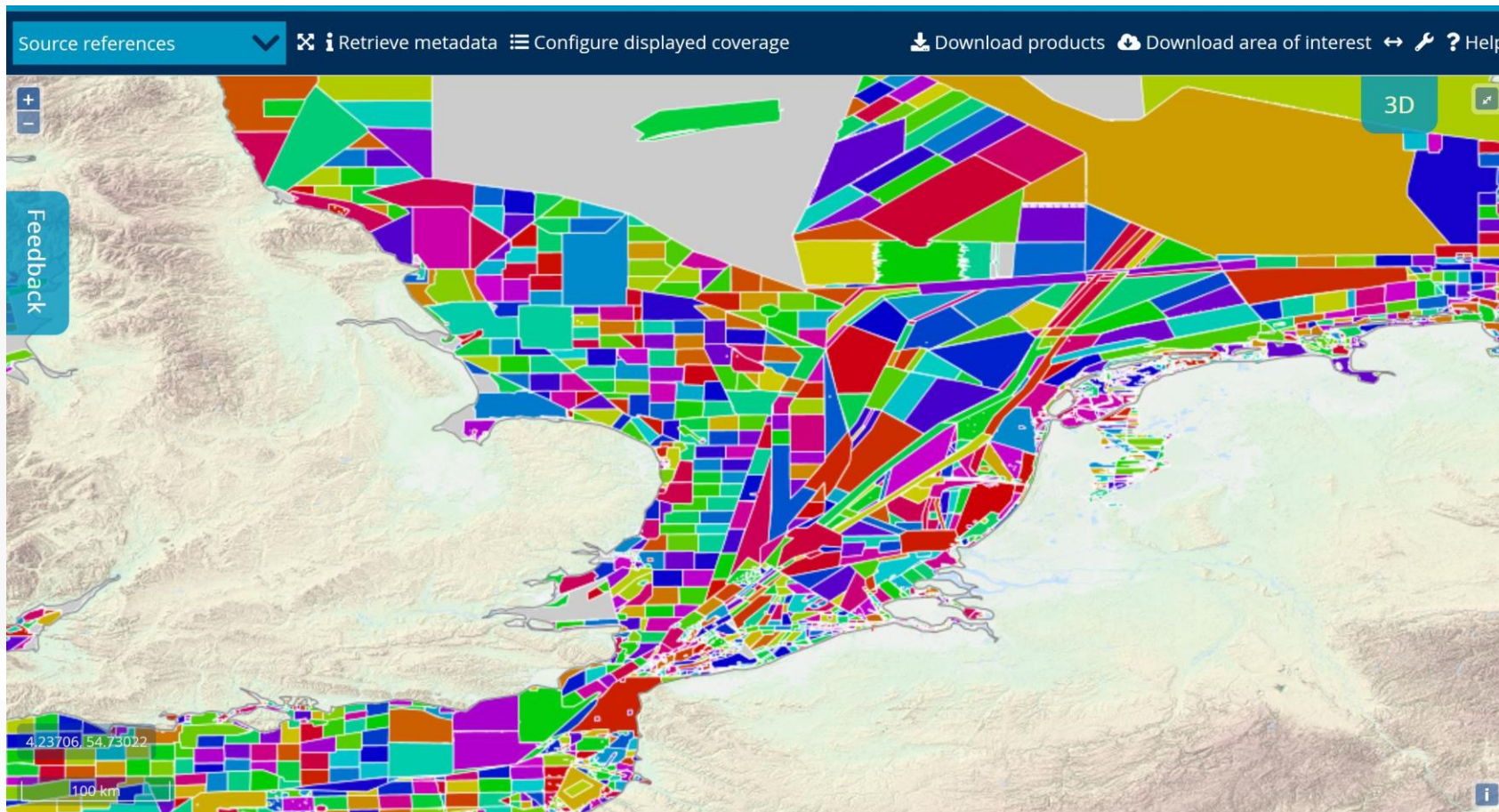
Map



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Source reference layer with metadata





Download DTM-tiles in various formats

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Mean depth full coverage Legend Retrieve depth Depth profile Download products Download area of interest ? Help

3D

Select your area(s) on the map

DTM version 2016 2018

Product selection

| Tile | DTM | Product format |
|------|------|---|
| F5 | 2018 | ESRI ASCII <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| F6 | 2018 | NetCDF <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| F4 | 2018 | ESRI ASCII <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

54.05273, 82.42676

1000 km

Feedback



3D Visualisation

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Web services

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- ⦿ WMS: <https://ows.emodnet-bathymetry.eu/wms>
- ⦿ WFS: <https://ows.emodnet-bathymetry.eu/wfs>
- ⦿ WMTS: <https://tiles.emodnet-bathymetry.eu>
- ⦿ WCS: <https://ows.emodnet-bathymetry.eu/wcs>
- ⦿ More details at: <http://portal.emodnet-bathymetry.eu/services/>

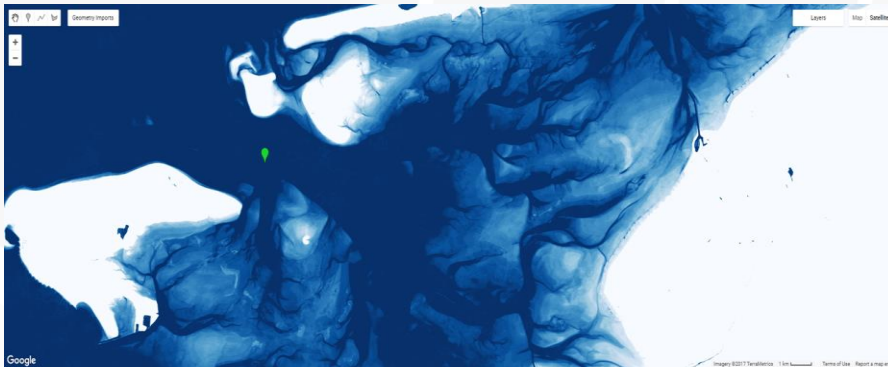


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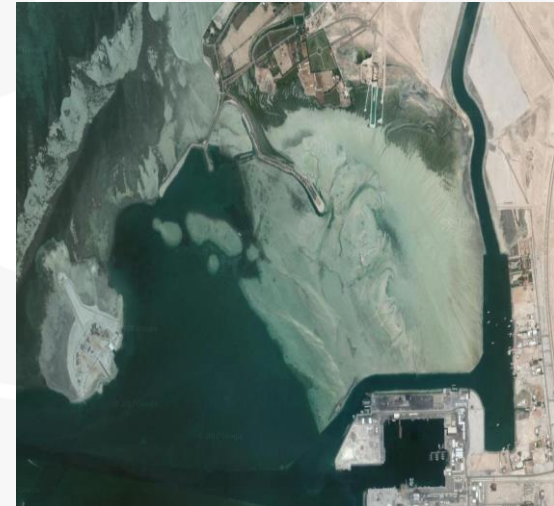


Determining European coastline

- Using satellite images (Sentinel2 and LandSat8): 2013 – 2018
- Different methods have been explored by Deltares in order to overcome the following difficulties when detecting water from satellite images
 - Clouds
 - White sands
 - Snow and Ice
 - Lava (Iceland due to volcanic areas)



Probabilistic cloud removal



Sand, clouds, vegetation

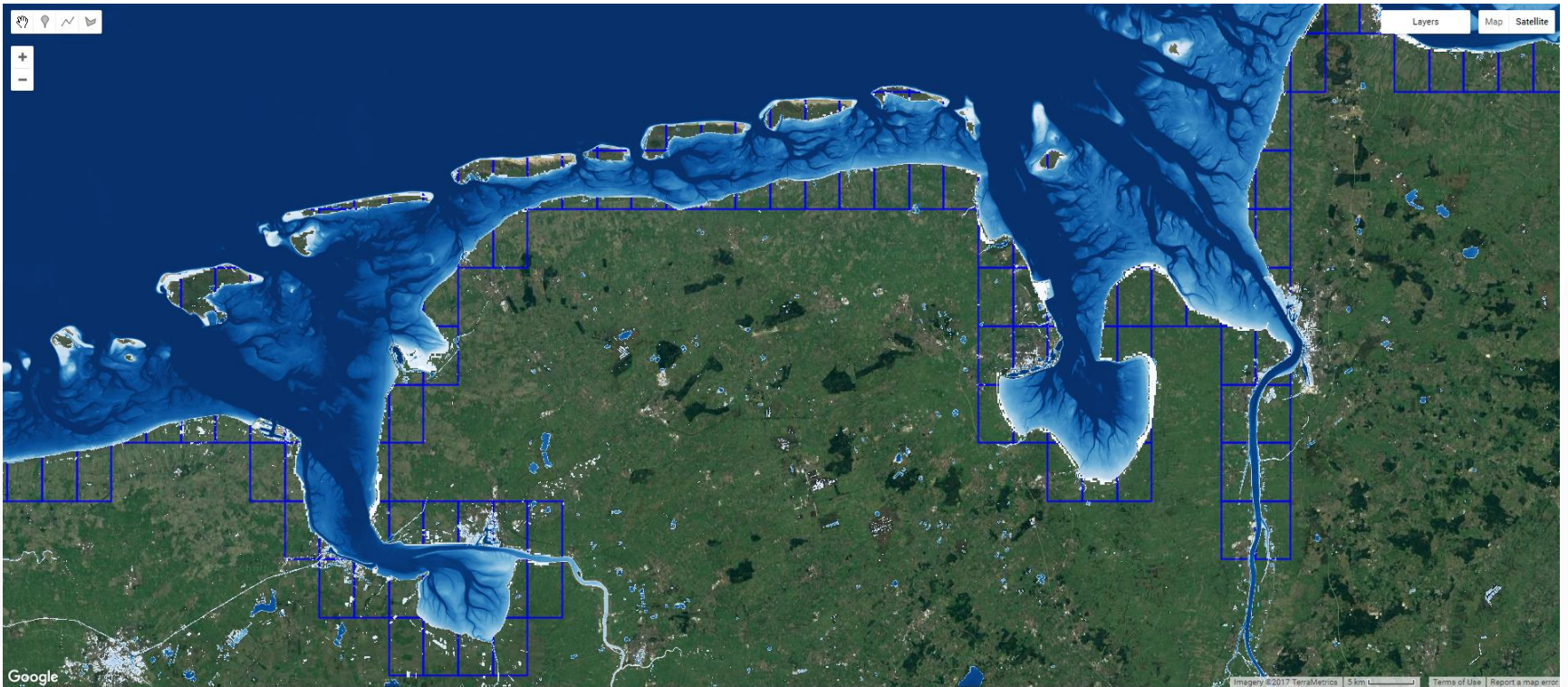


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Determining European coastline



📍 Wadden sea as a test case for refining and testing the methodology

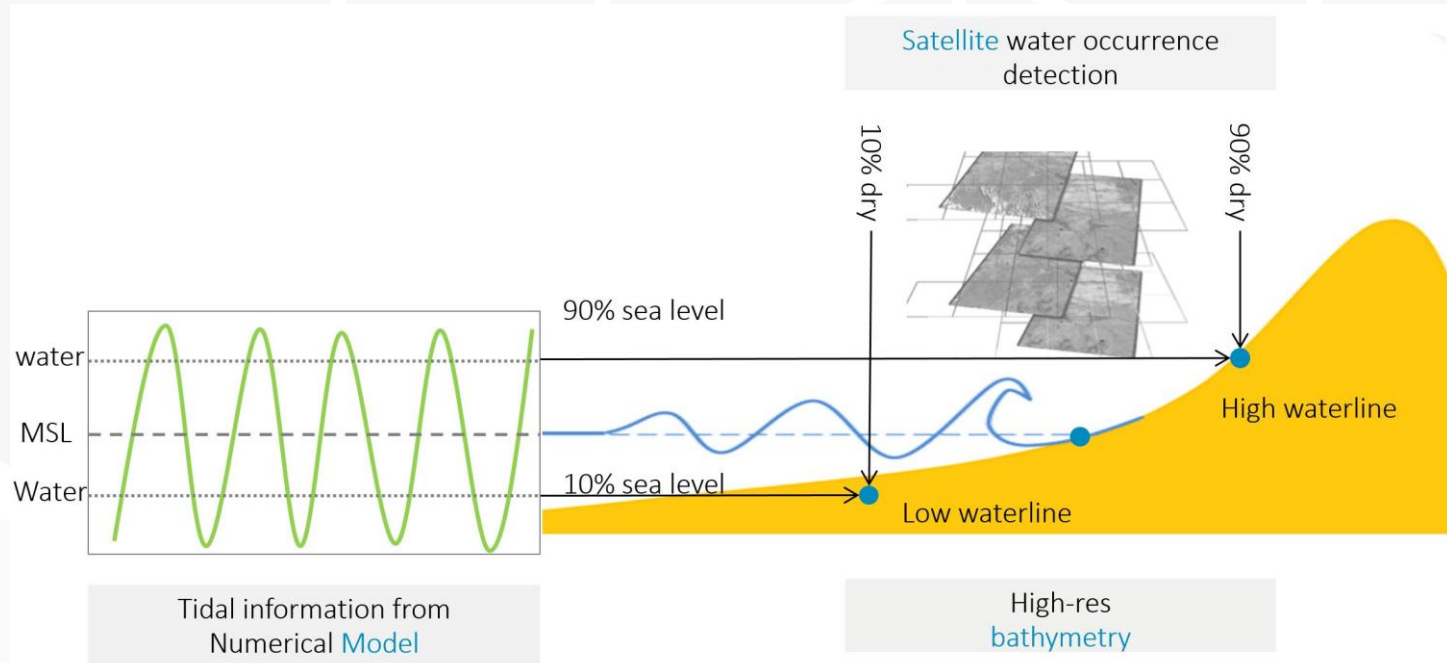


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Determining European coastline

- At different tidal levels (MHW, MSL and LAT) – using the Deltares **Global Tide Surge Model (GTSM) version 2** (Coastal areas (5 km resolution); Open oceans (50 km resolution)); grid has been refined for capturing better the topography in coastal waters: 1.25km at European coasts and 2.5km at other coasts.

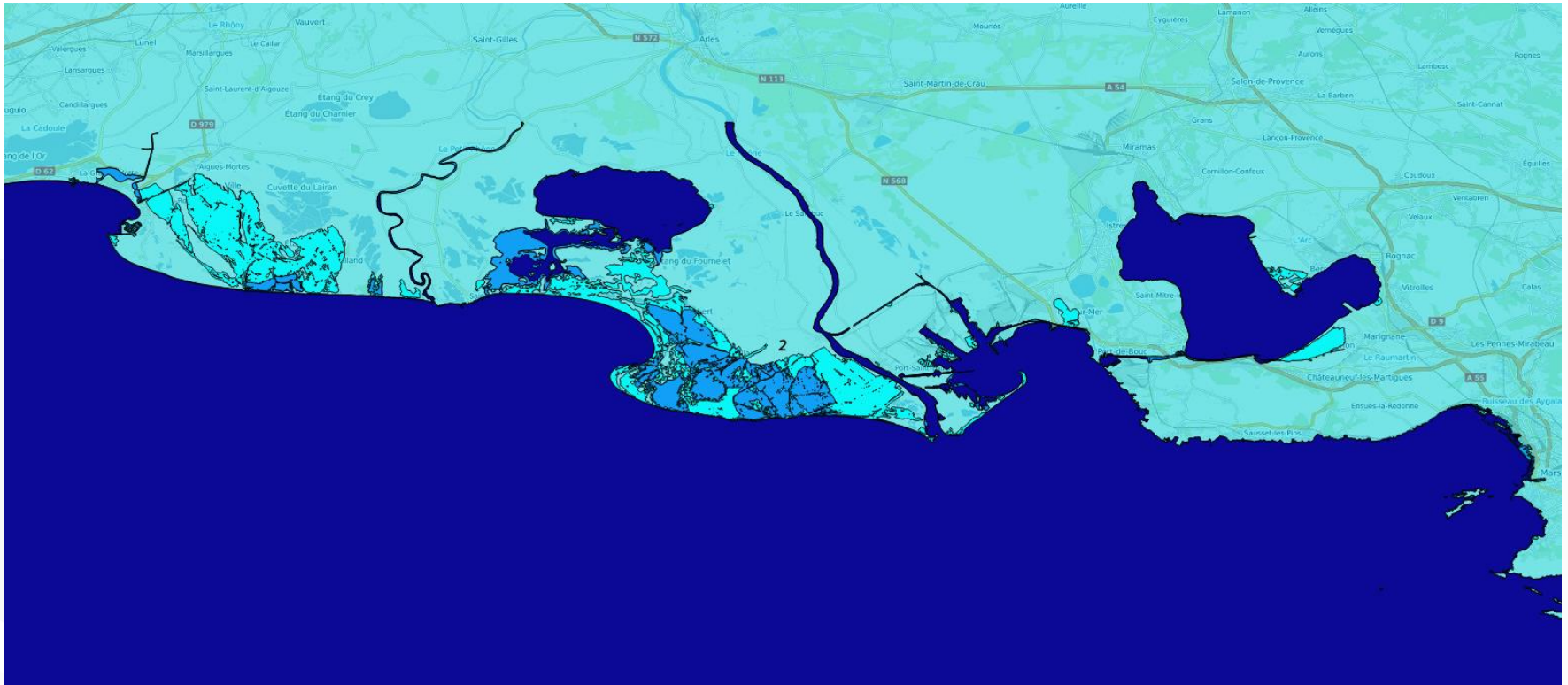




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Resulting European coastlines



📍 Rhone delta near Marseille, France



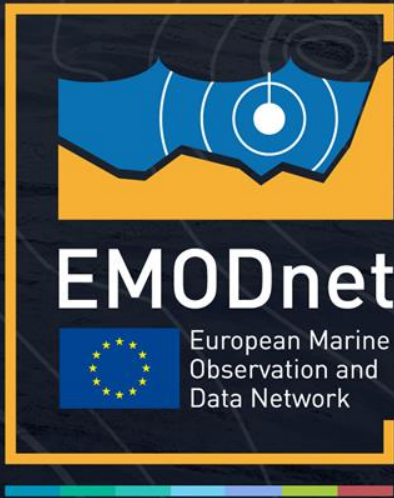
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Closing remarks

- ① EMODnet Bathymetry DTM is a very successful product
- ① Circa 10.000 portal visitors per month
- ① Circa 3.000 – 4.000 DTM tiles downloaded per month
- ① Users from all layers of society and great feedback
- ① More products on their way (digital coastlines; inventory of baselines; overall Quality Index)

Available data covers only 60% of the area => more data is required => additional data providers are very welcome!



www.emodnet.eu

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