EMODnet Bathymetry - building and providing a high resolution digital bathymetry for European seas

By
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On behalf of EMODnet Bathymetry consortium

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EMODNet Bathymetry

EMODnet
European Marine Observation and Data Network

- Ongoing in 3 consecutive projects since 2009 with expanding consortium (at present >30 partners)
- Consortium consisting of bathymetric and IT experts and data providers from National Hydrography Services, marine research institutes and SME's; also including GEBCO

EMODNet Bathymetry

Overall objective:

To bring together bathymetric surveys of European seas and to produce, publish and serve a harmonised and medium resolution Digital Terrain Model of all European seas

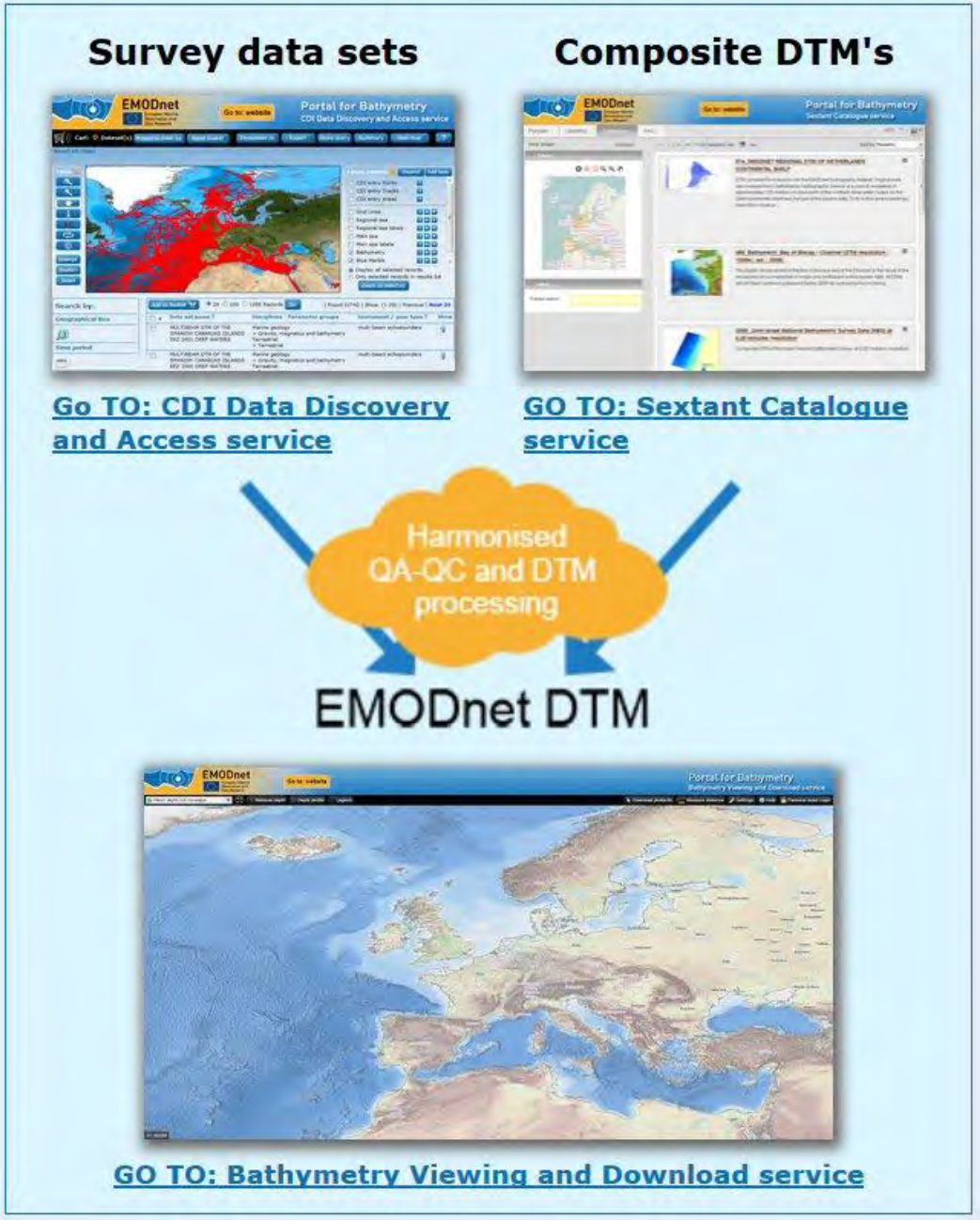
Standards are instrumental

- **Adoption** of SeaDataNet standards and infrastructure
  - **Common Data Index (CDI)** format based upon ISO 19115 – 19139 standard and INSPIRE compliant for describing **metadata** on **bathymetric data sets** (surveys)
  - **Sextant products catalogue** format based upon ISO 19115 – 19139 standard and INSPIRE compliant for describing **metadata** on **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

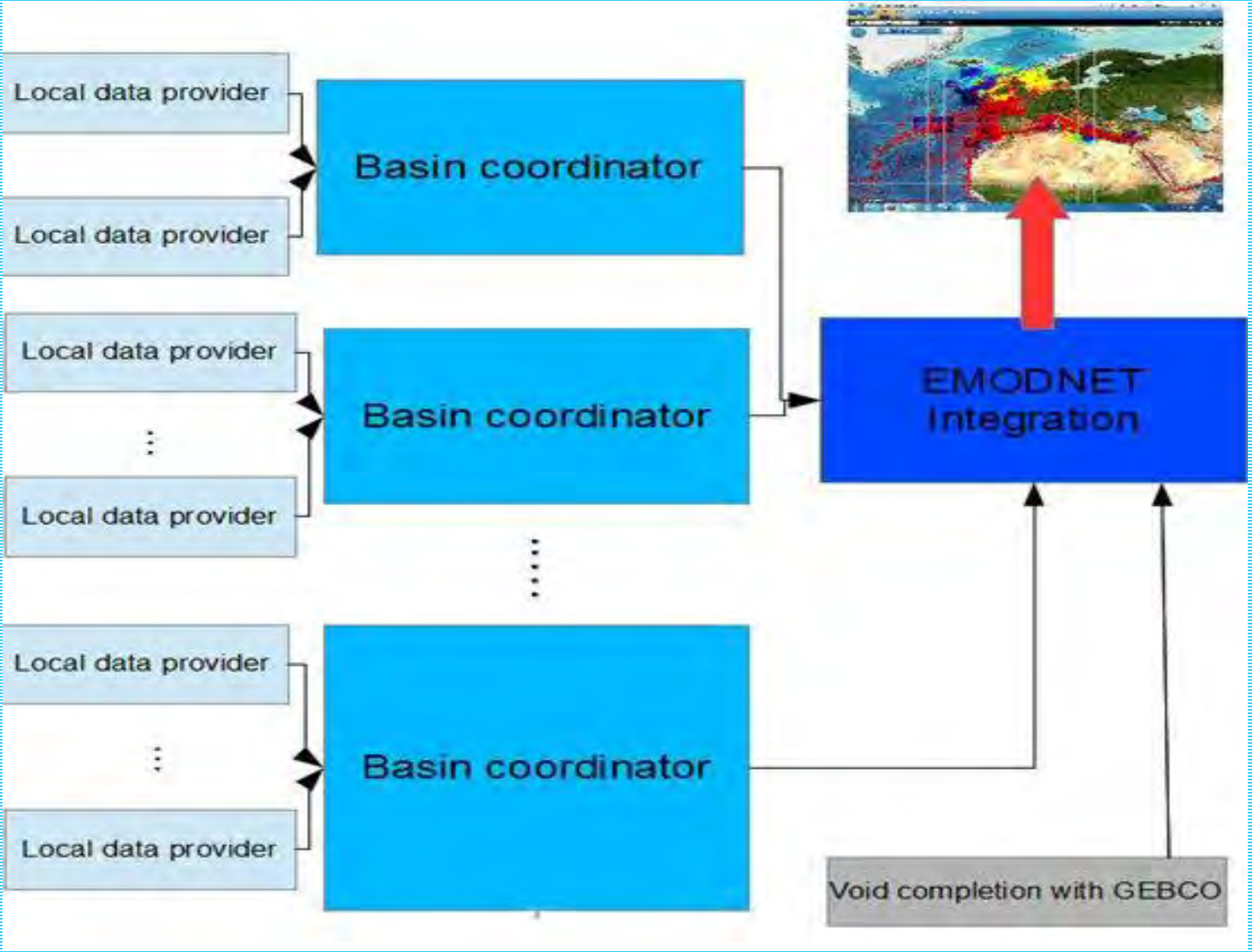
EMODnet Bathymetry process flow

Population of SeaDataNet CDI and Sextant services

Common method and software used by data providers and regional sea coordinators

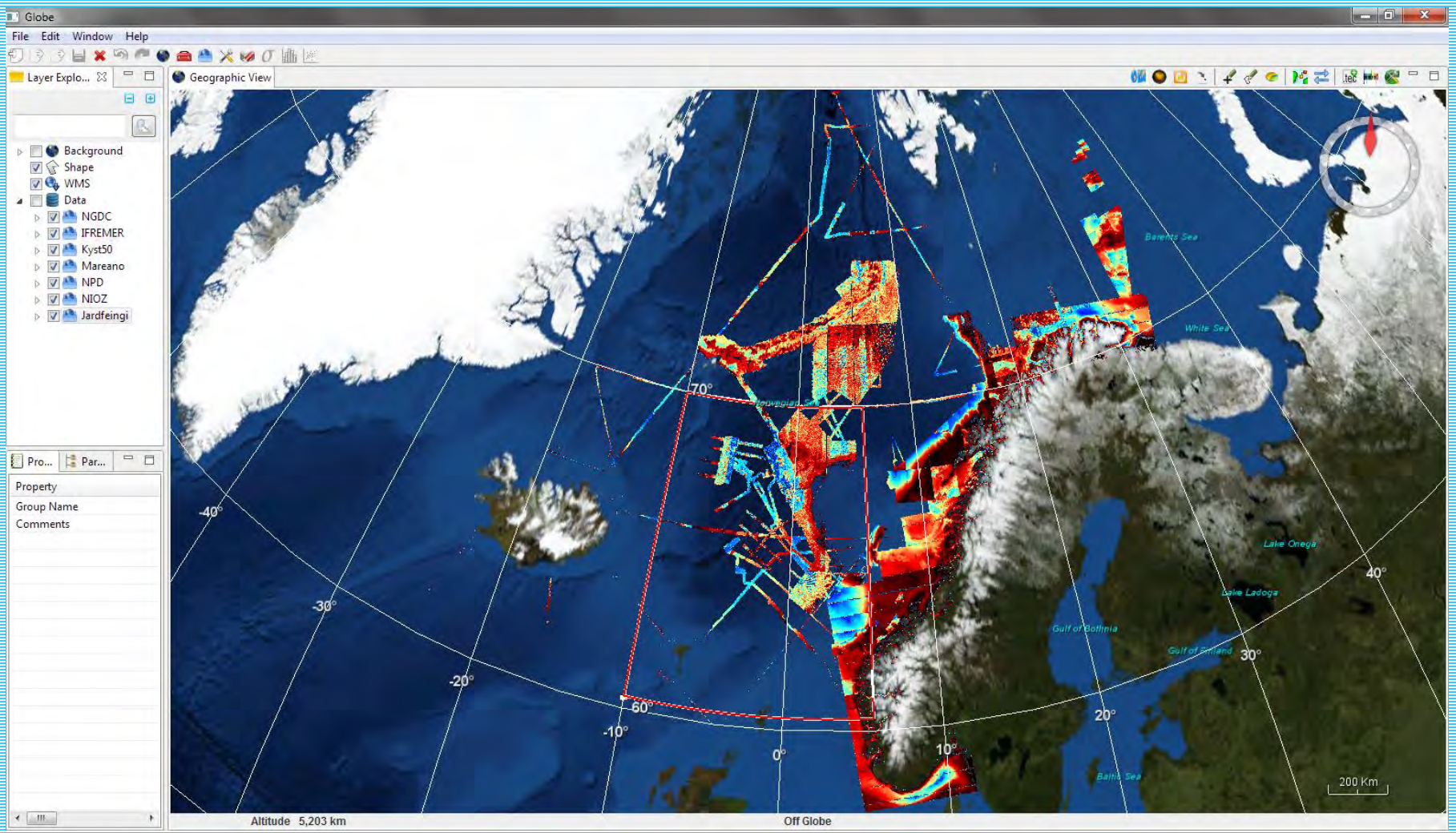


Common Methodology



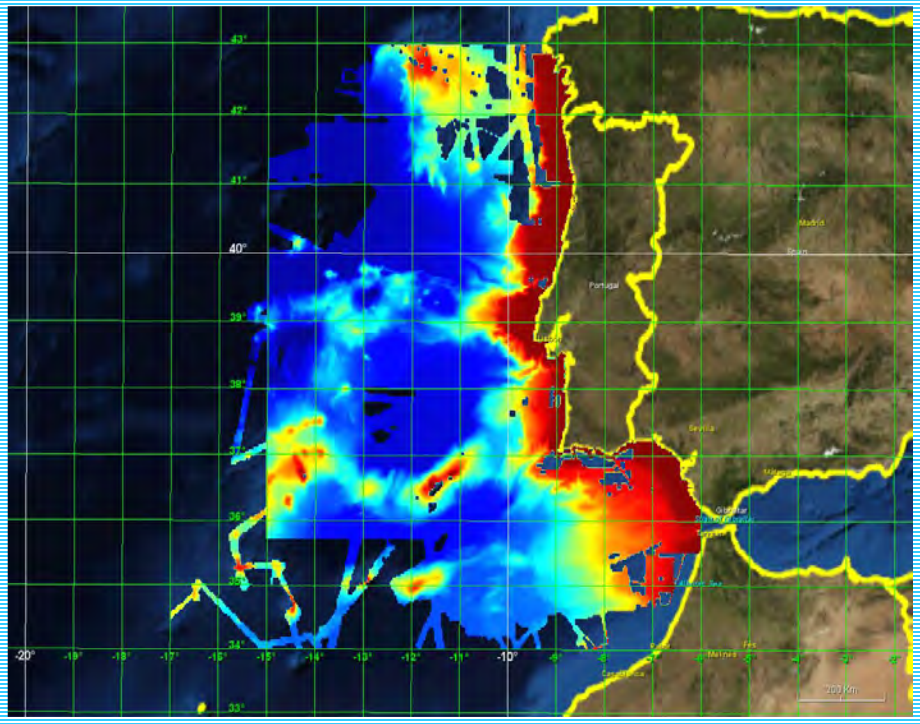
From local data to regional DTMs to EMODnet DTM

Use of GLOBE software (developed by IFREMER) by data providers and regional DTM coordinators

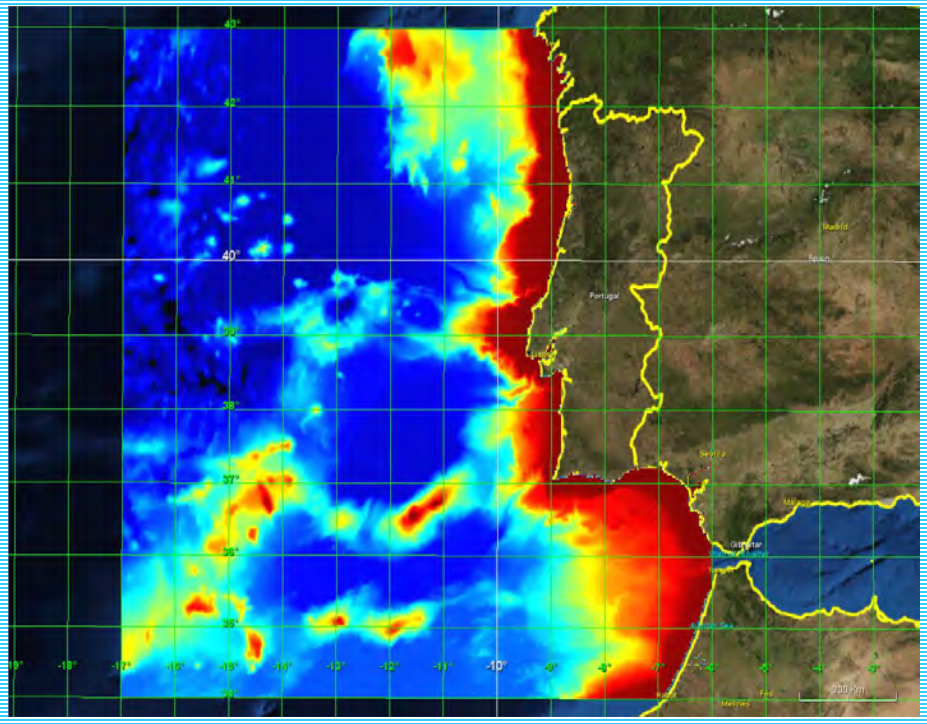


Norwegian and Icelandic seas – Arctic – example

Regional DTM production, including GEBCO for gaps – example Atlantic near Iberian peninsula



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

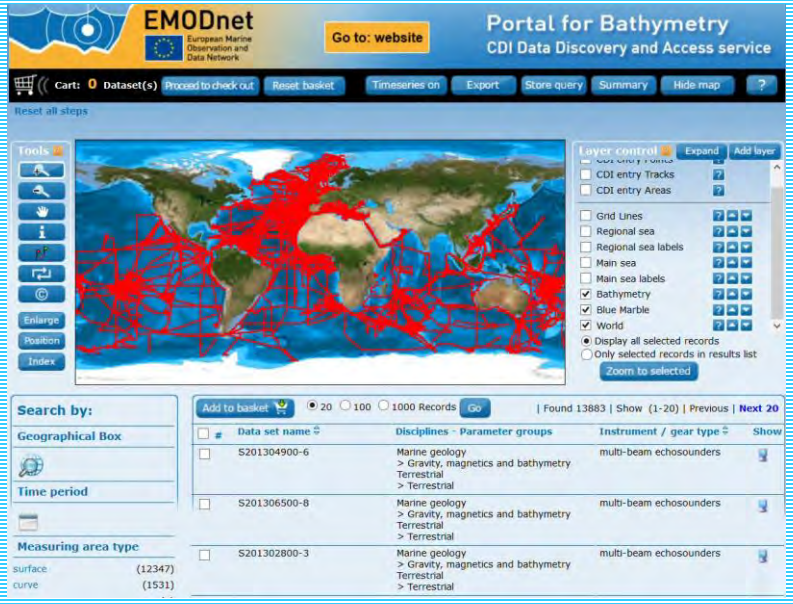


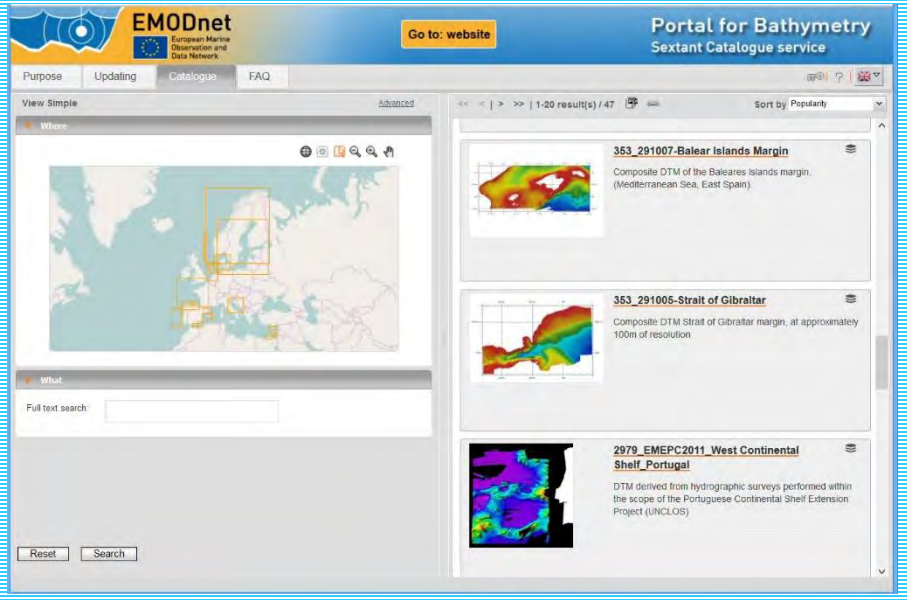
Resulting DTM with average depth after GEBCO integration and smoothing

Data gathering results

- Up till today, **14791** survey CDI metadata records from **27** data centres and **169** data originators **from 1816 to 2016** have been collated and imported into the dedicated EMODnet Bathymetry CDI data discovery and access service. This service was launched in May 2010 and has been upgraded over time with extra functionality

- The SeaDataNet Data Products Catalogue service (Sextant) gives **78** metadata records about composite DTMs that have been used next to survey data sets

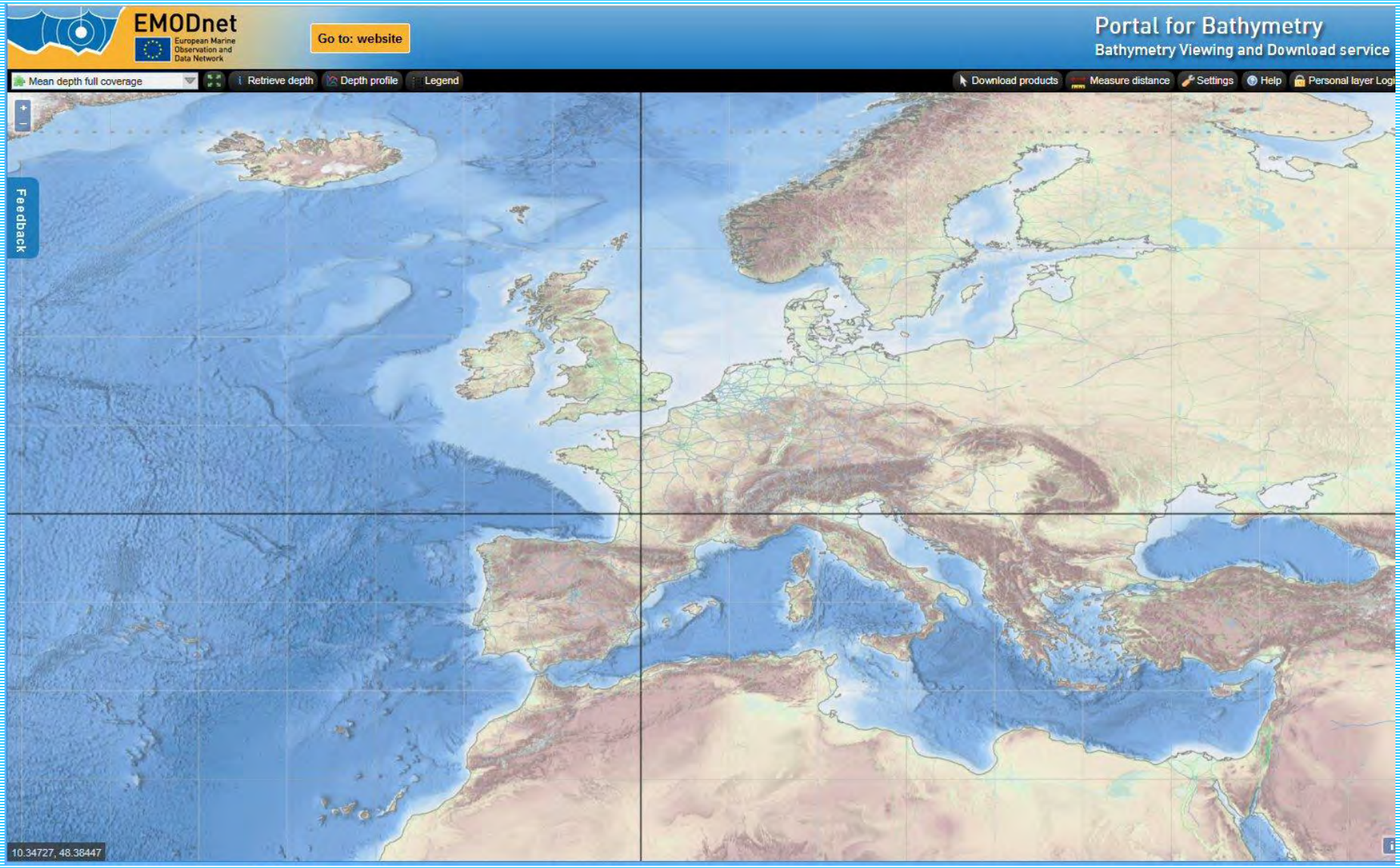




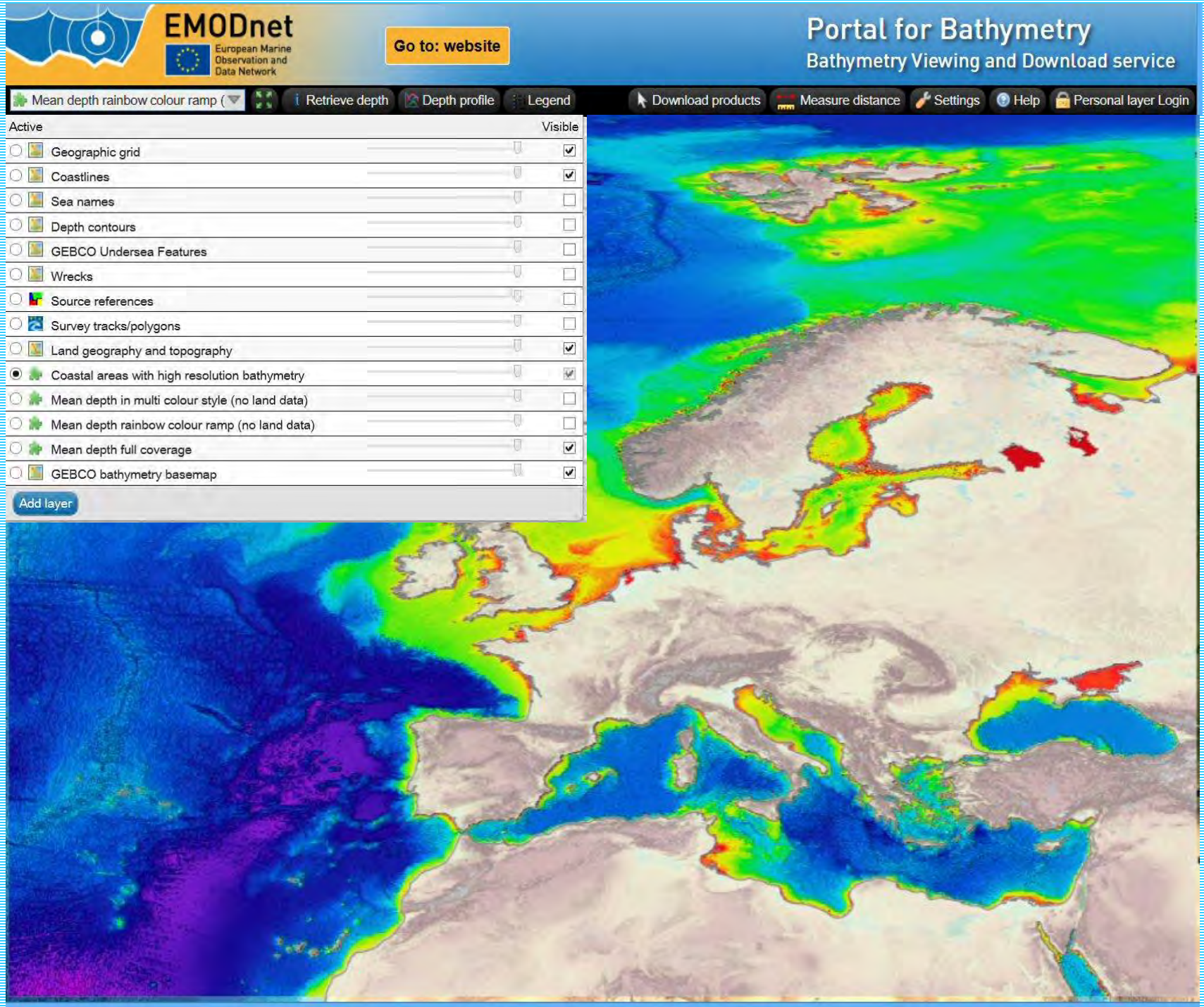
DTM releases in time

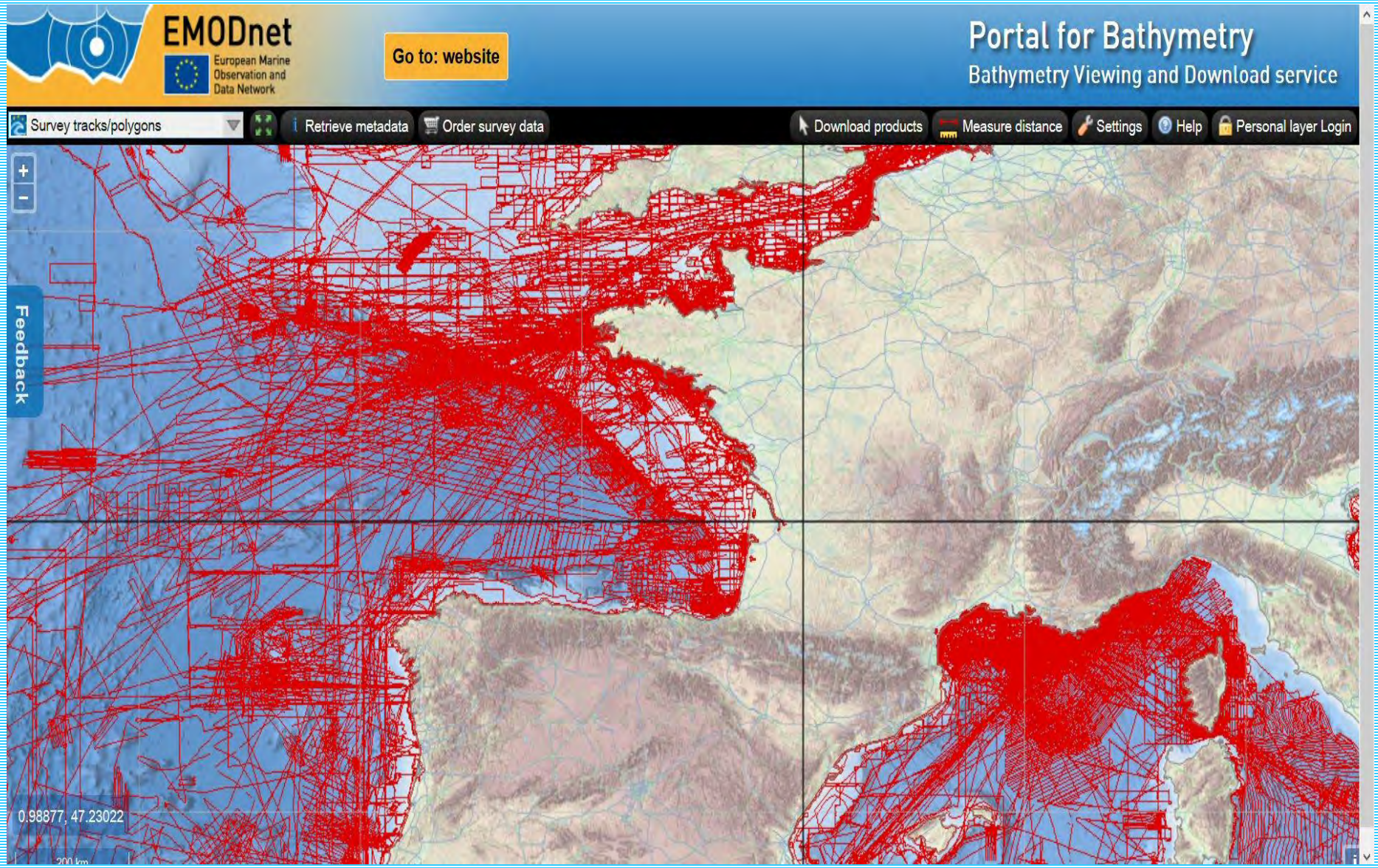
- **May 2010**: first release of EMODnet DTM for selected European seas - 1/4 * 1/4 arc minutes
- **June 2011**: second release of EMODnet DTM for more European seas - 1/4 * 1/4 arc minutes
- **August 2012**: third release of EMODnet DTM for more European seas - 1/4 * 1/4 arc minutes
- **August 2013**: 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

Bathymetry Viewing and Download service with EMODnet DTM

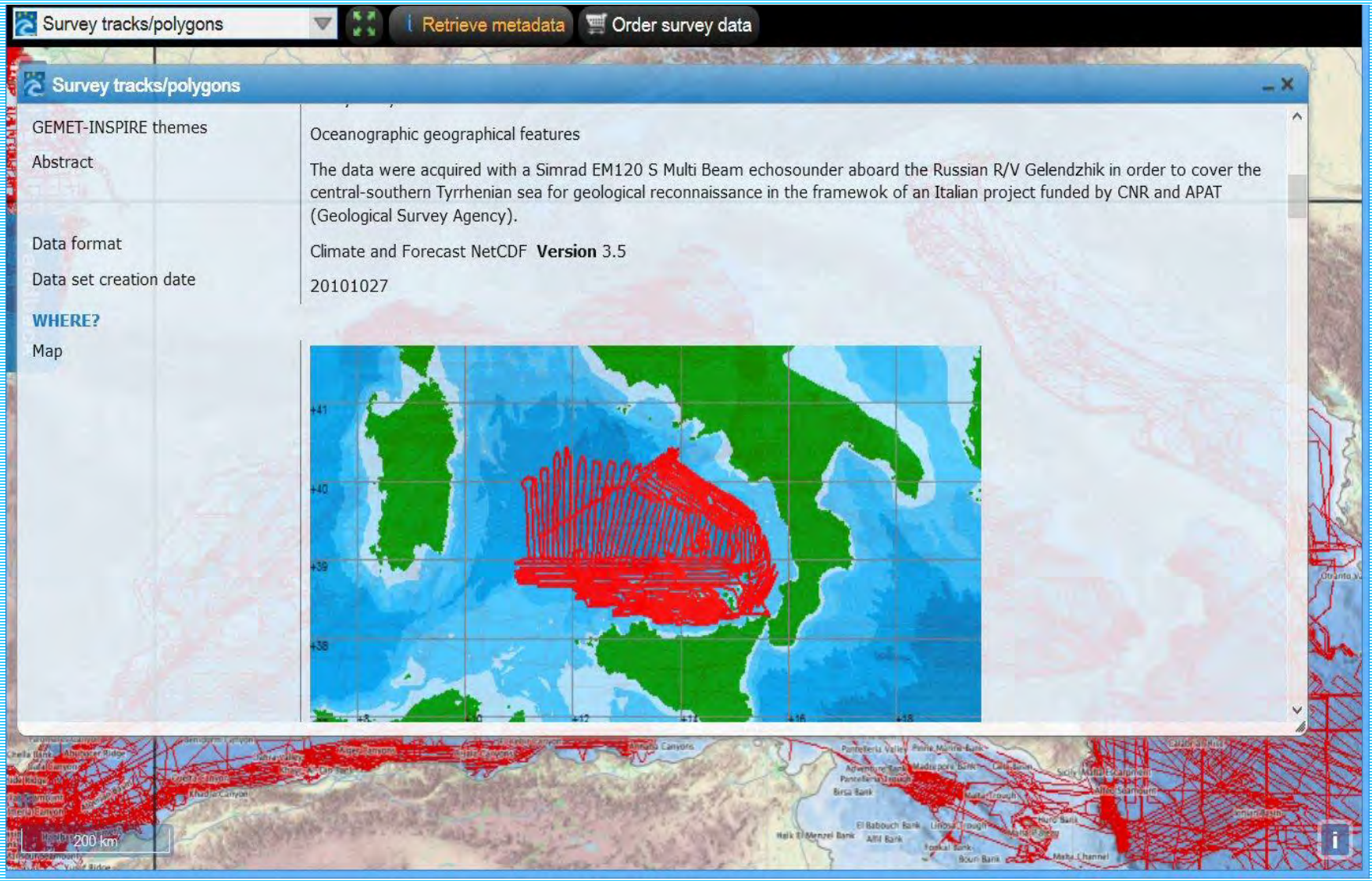


http://www.emodnet-bathymetry.eu

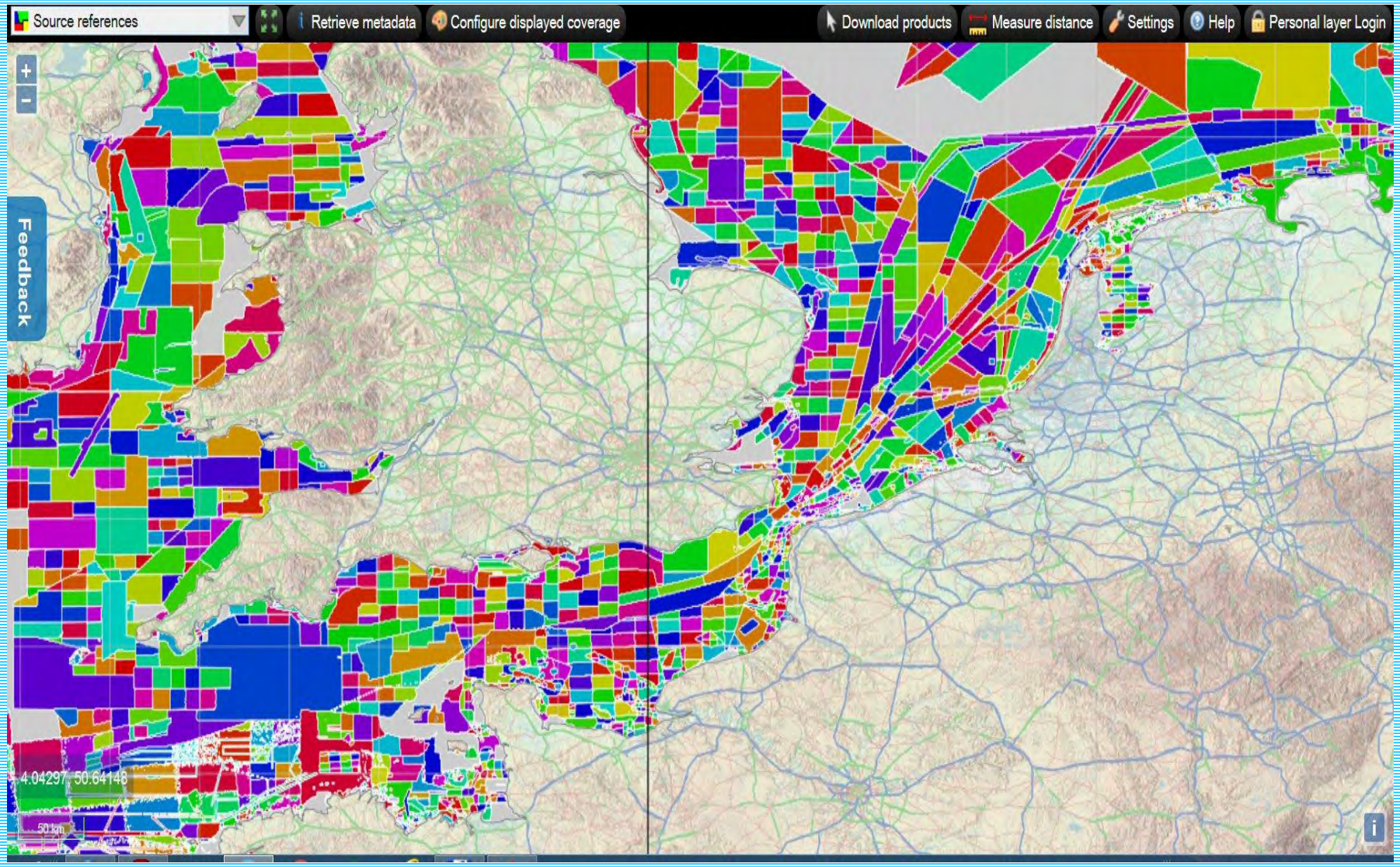

EMODnet
European Marine Observation and Data Network
Go to: website
Portal for Bathymetry
Bathymetry Viewing and Download service
Mean depth rainbow colour ramp (
Retrieve depth
Depth profile
Legend
Download products
Measure distance
Settings
Help
Personal layer Login
Active
Visible
Geographic grid
Coastlines
Sea names
Depth contours
GEBCO Undersea Features
Wrecks
Source references
Survey tracks/polygons
Land geography and topography
Coastal areas with high resolution bathymetry
Mean depth in multi colour style (no land data)
Mean depth rainbow colour ramp (no land data)
Mean depth full coverage
GEBCO bathymetry basemap
Add layer



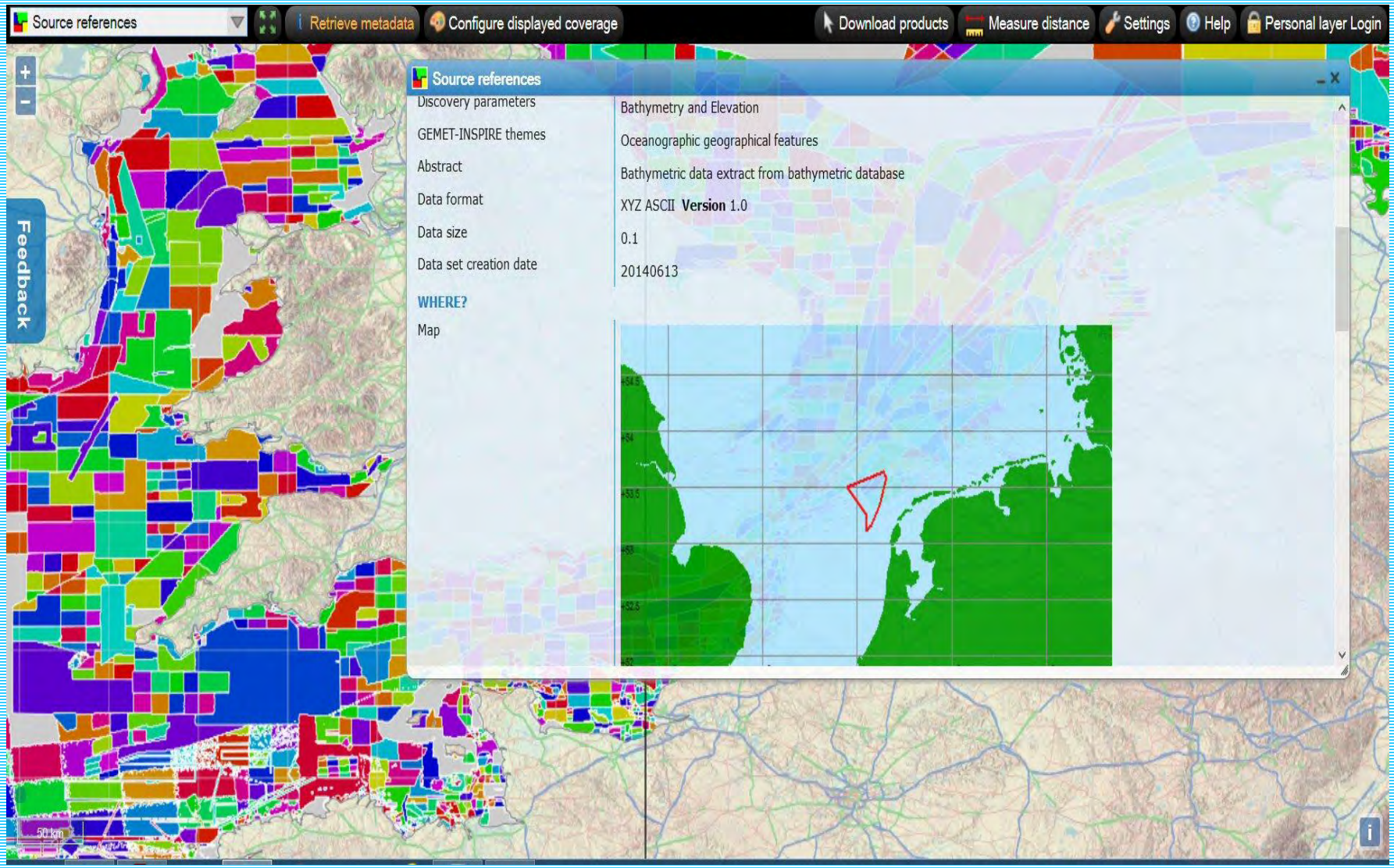
CDI layer of survey data



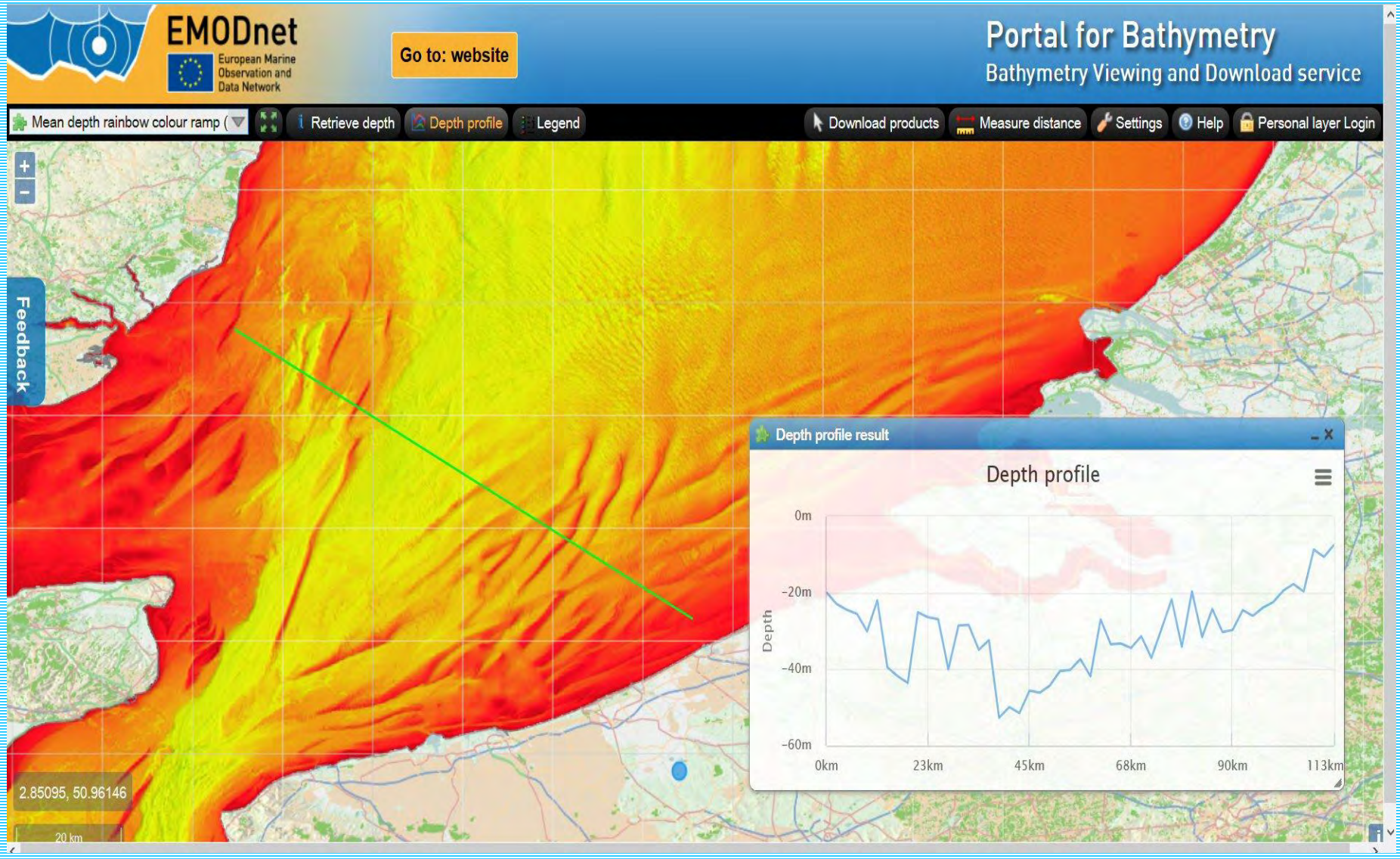
CDI layer of survey data with metadata retrieval



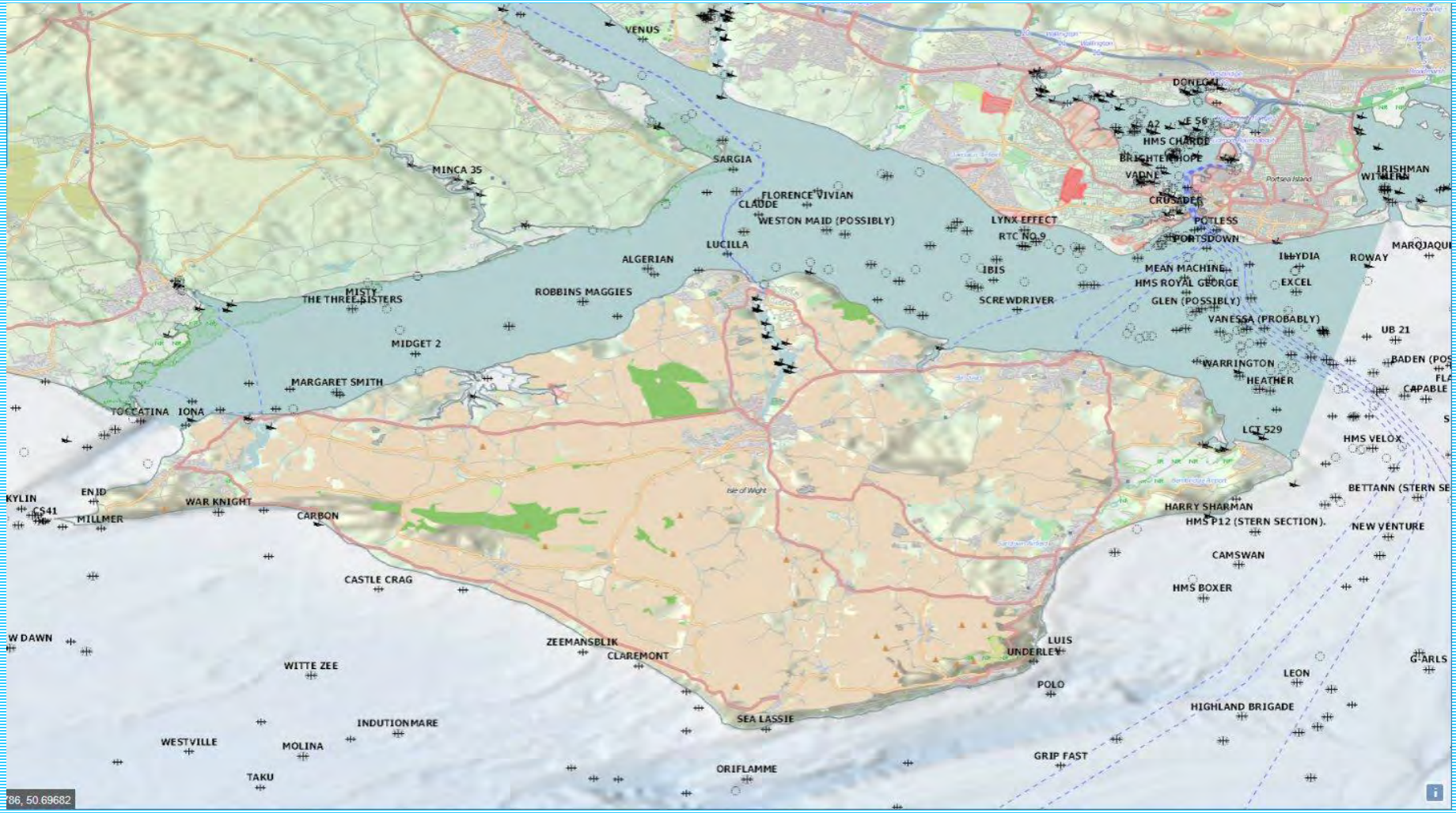
Source references layer to survey data (CDI), composite DTM (Sextant) or GEBCO



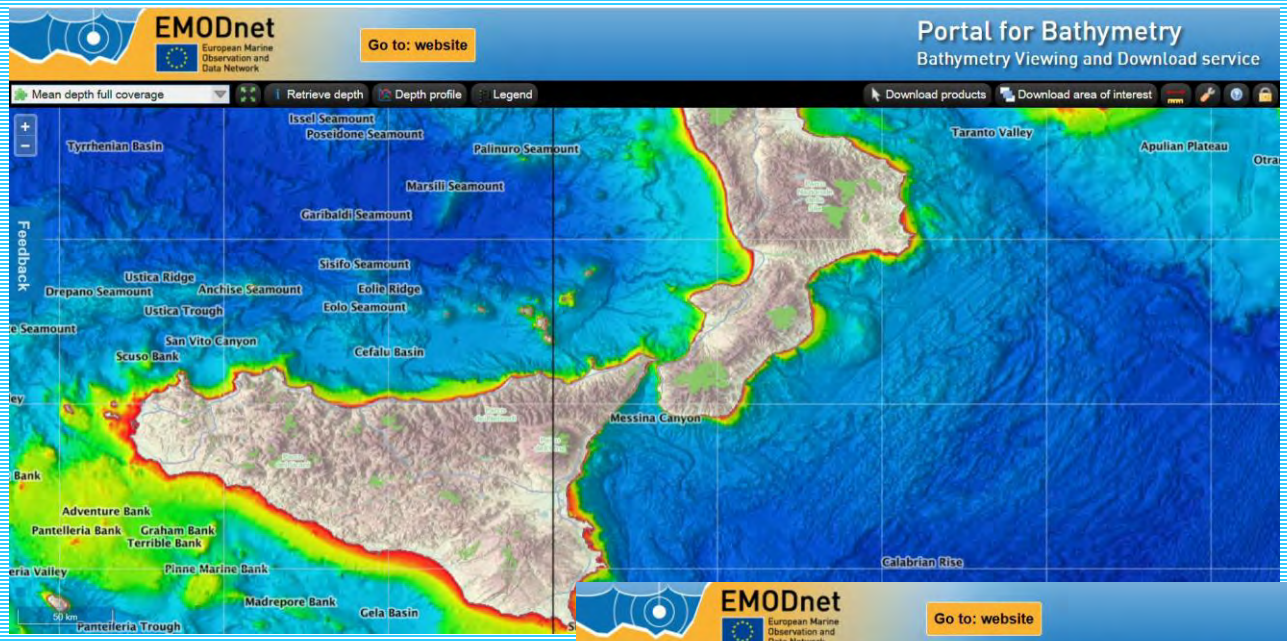
Source references layer with retrieval of metadata

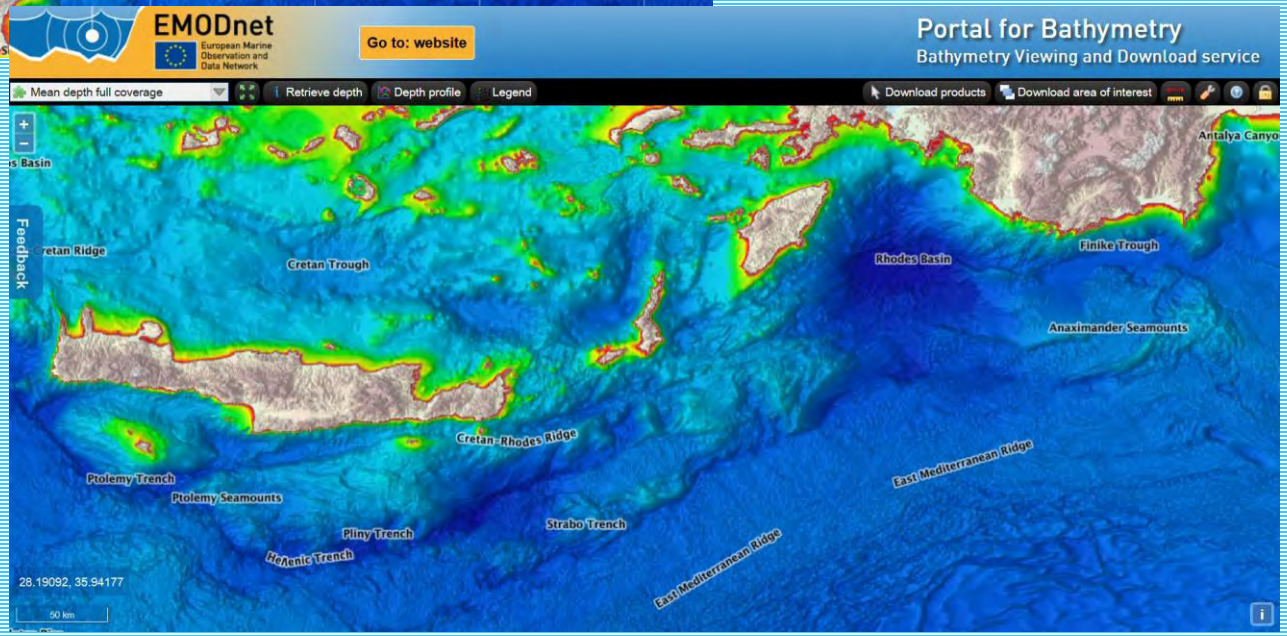


Depth profile following user drawn transect

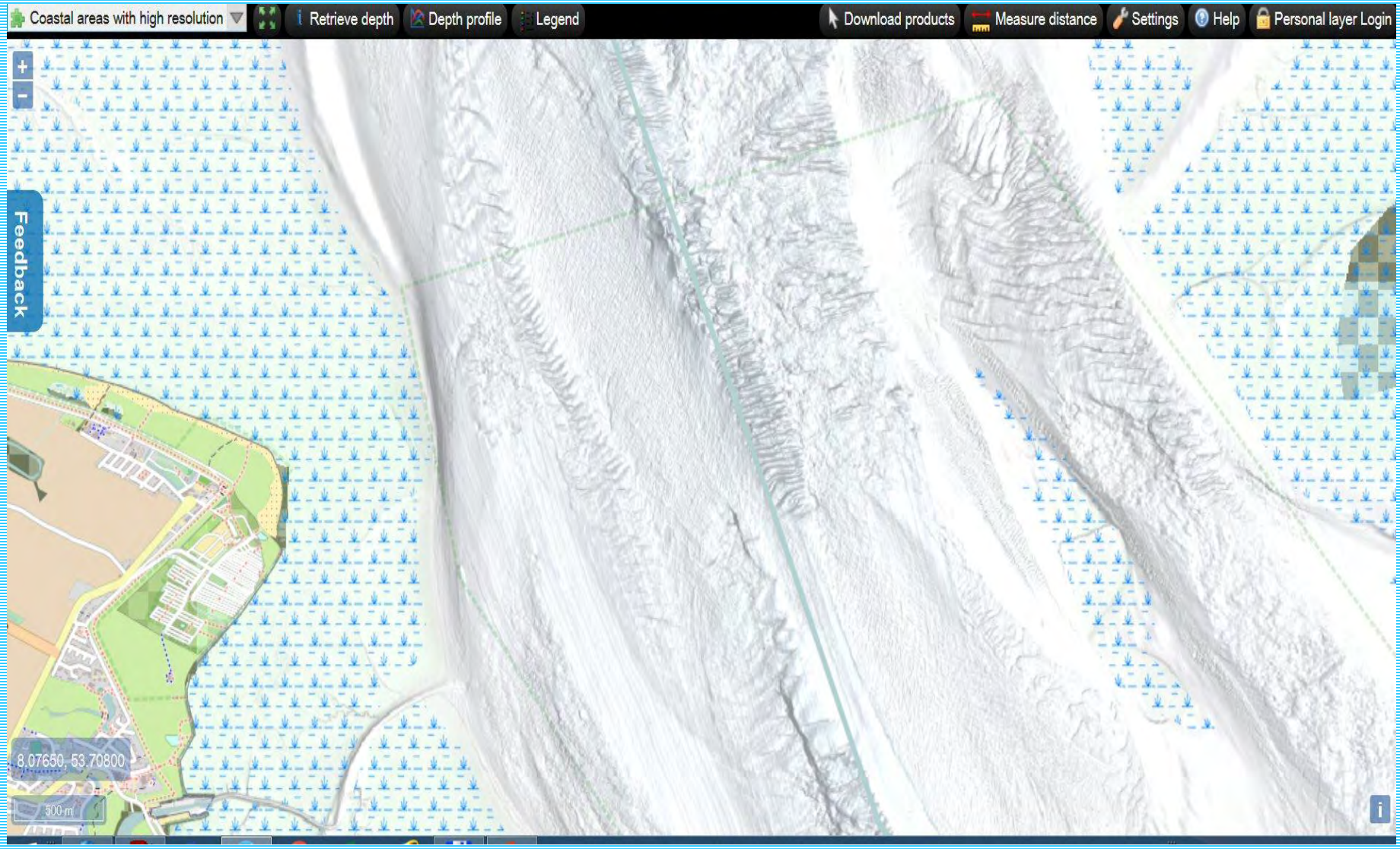


UKHO Wrecks database layer as WMS service (via OceanWise)

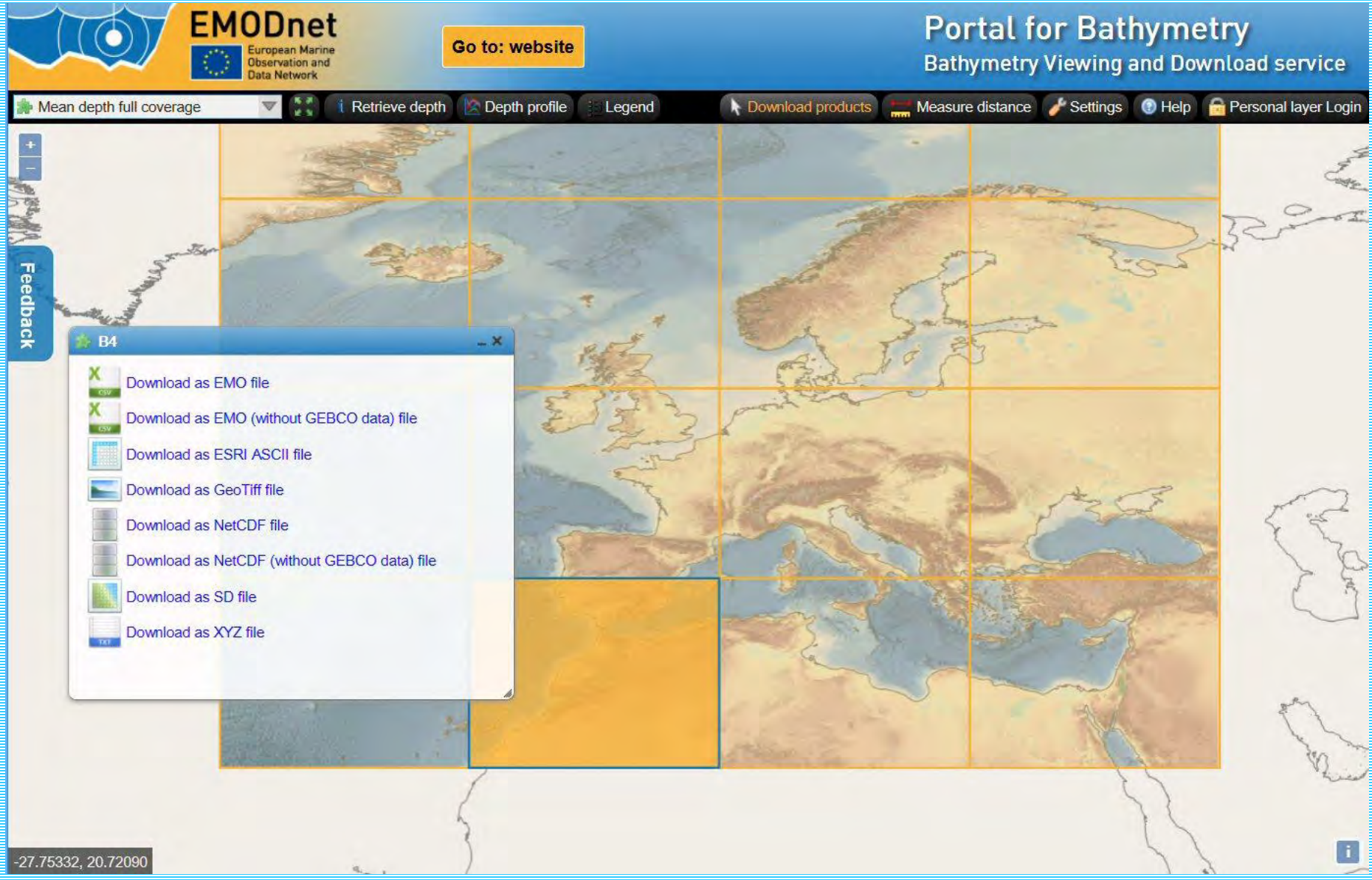




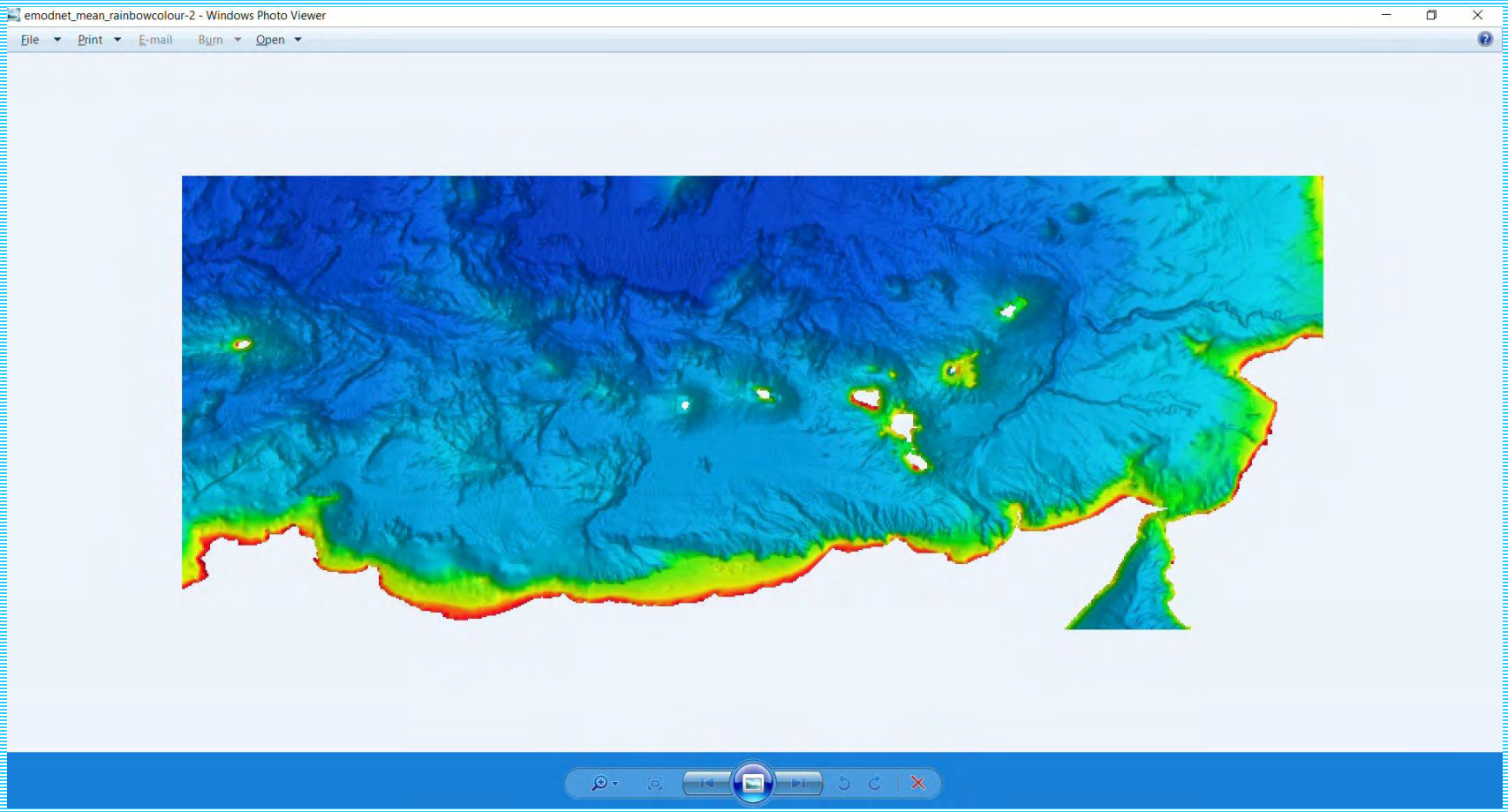
GEBCO Underwater Features layer as WMS service (via GEBCO)



High Resolution DTMs for 3 pilot areas

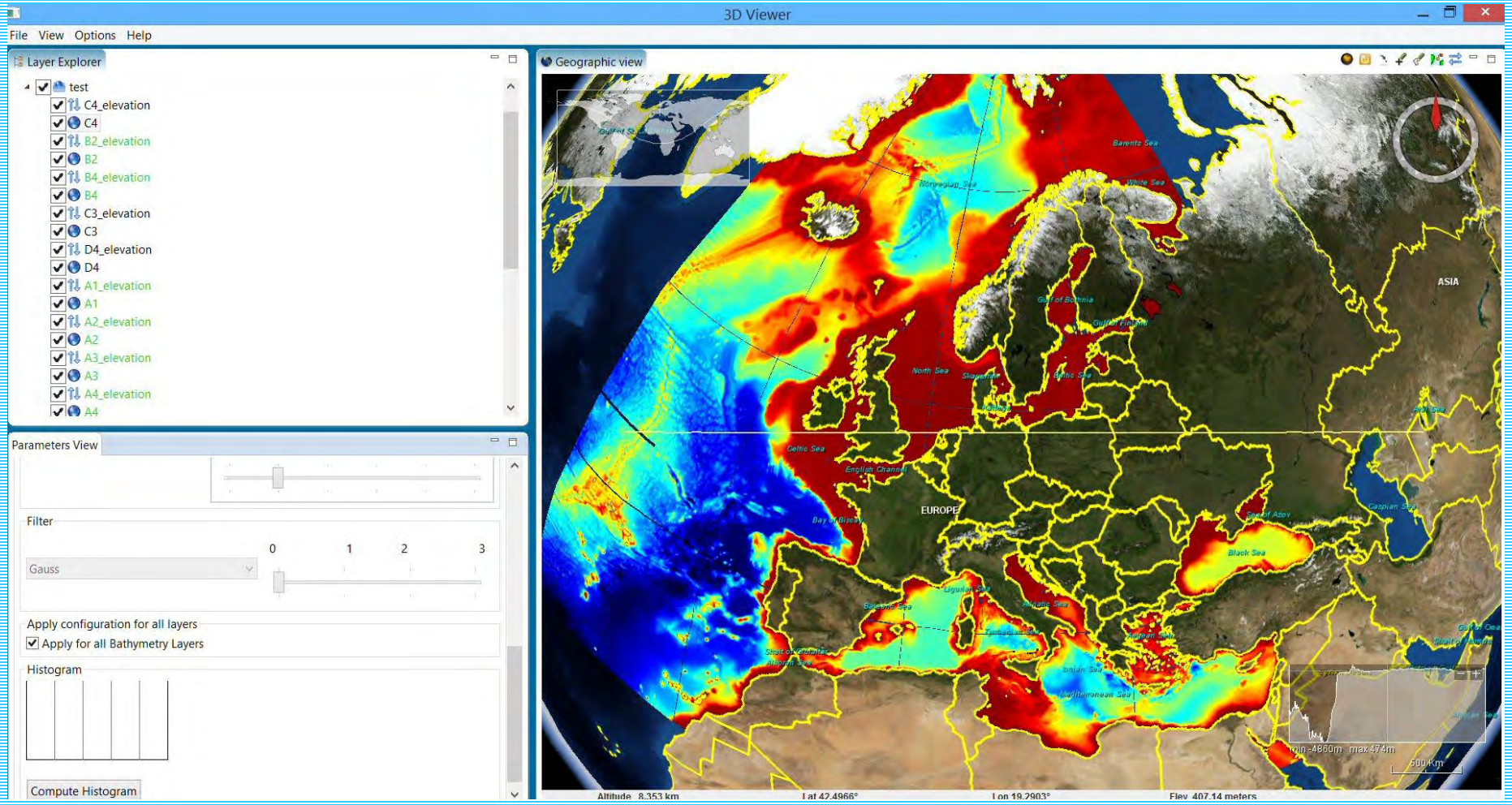


Download DTM tiles in various formats



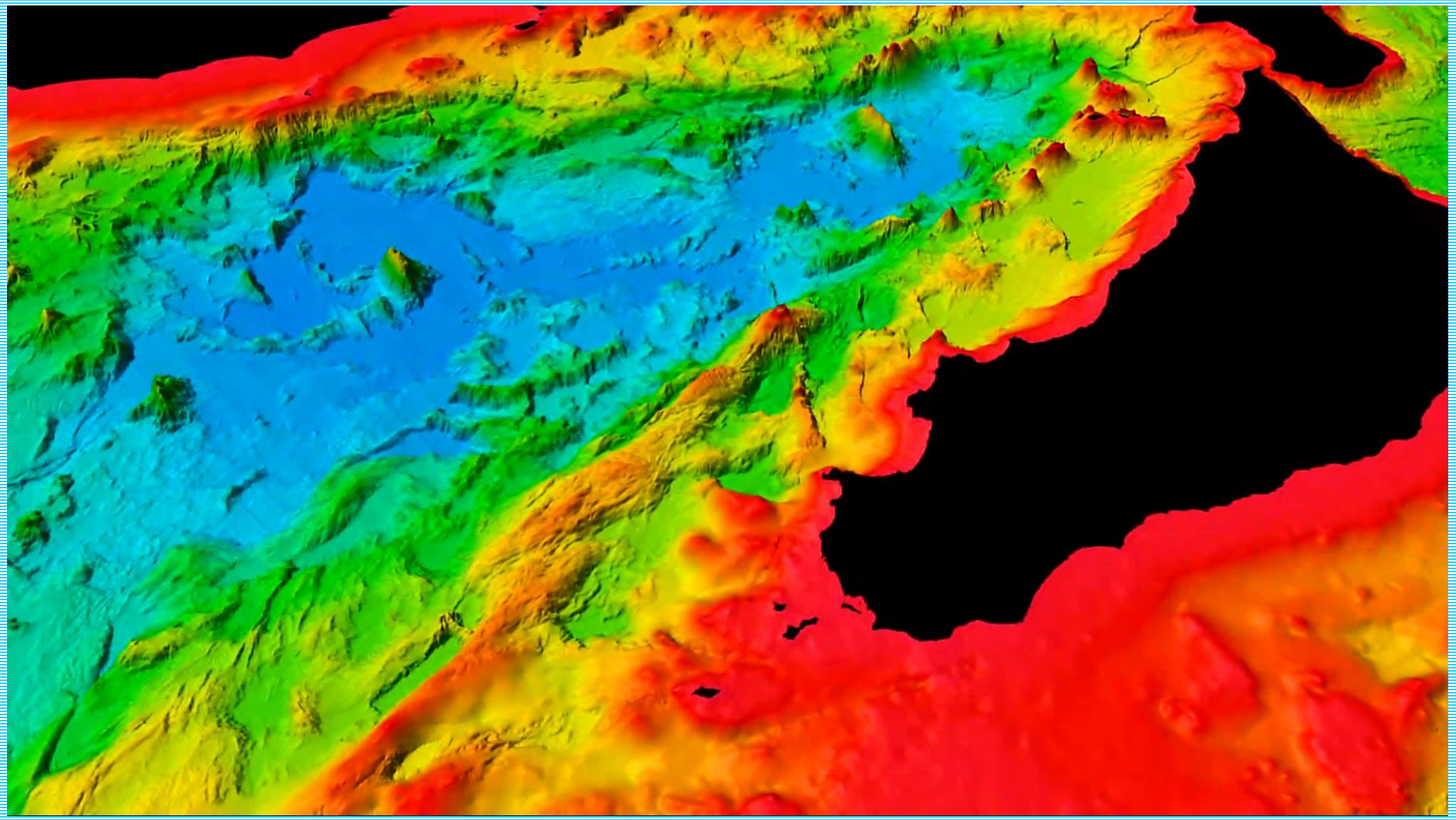
New WCS service

Bathymetric DTM – 3D-Viewer



DTM loaded into 3D-Viewer as developed and freely downloadable from Geo-Seas, based upon NASA World Wind software

Bathymetric DTM – 3D-Viewer



DTM loaded into 3D-Viewer

Comparison with GEBCO

GEBCO – General Bathymetric Chart of the Oceans (IHO – IOC) and EMODnet Bathymetry DTM – example in Tyrrhenian Sea near Sicily – Italy and South Italy – resolution EMODnet is 16 times higher

EMODnet Web Services

- **CDI Data Discovery and Access service:** WMS and WFS service:

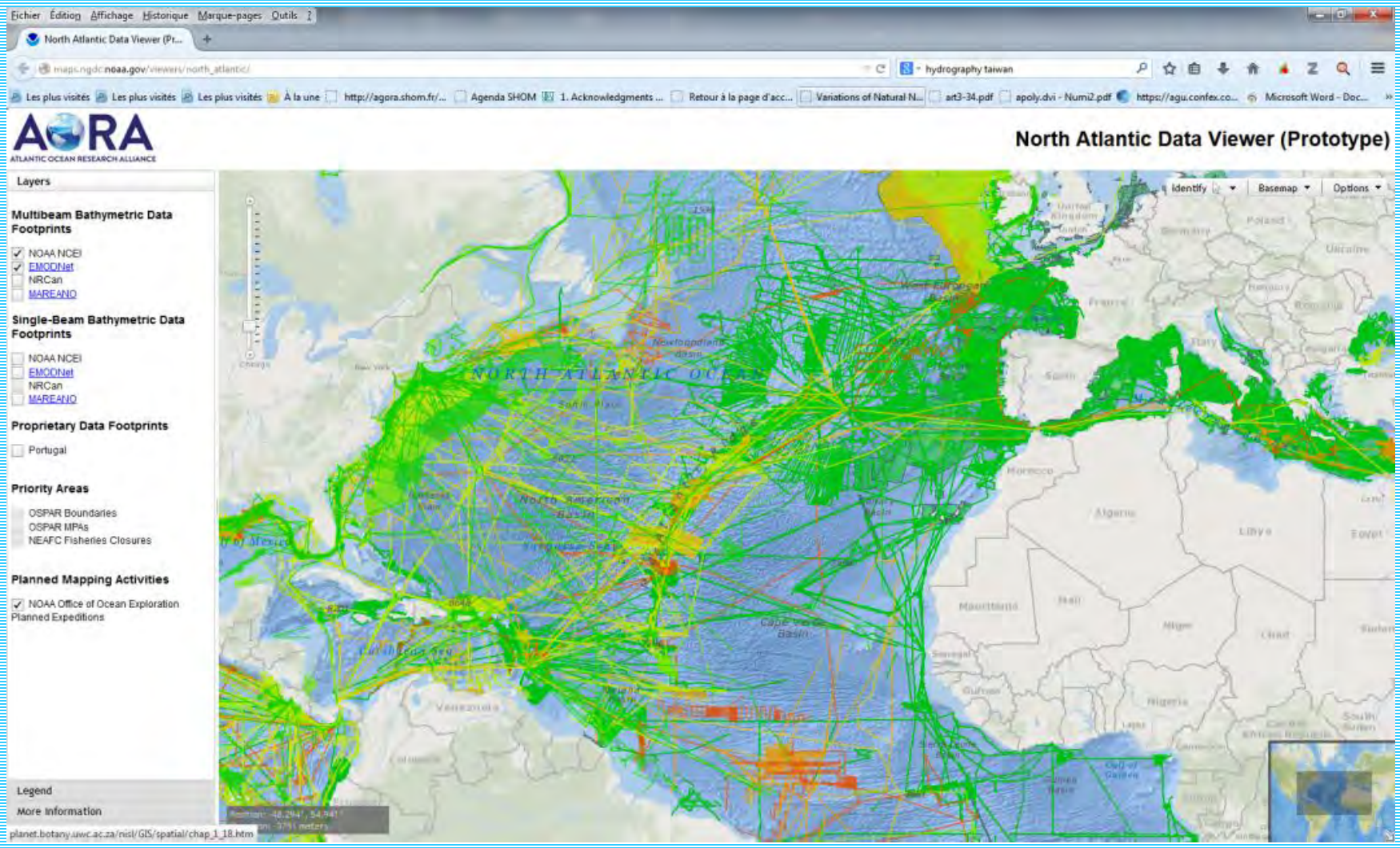
http://geoservice.maris2.nl/wms/seadatanet/emodnet_hydrography

- GetCapabilities

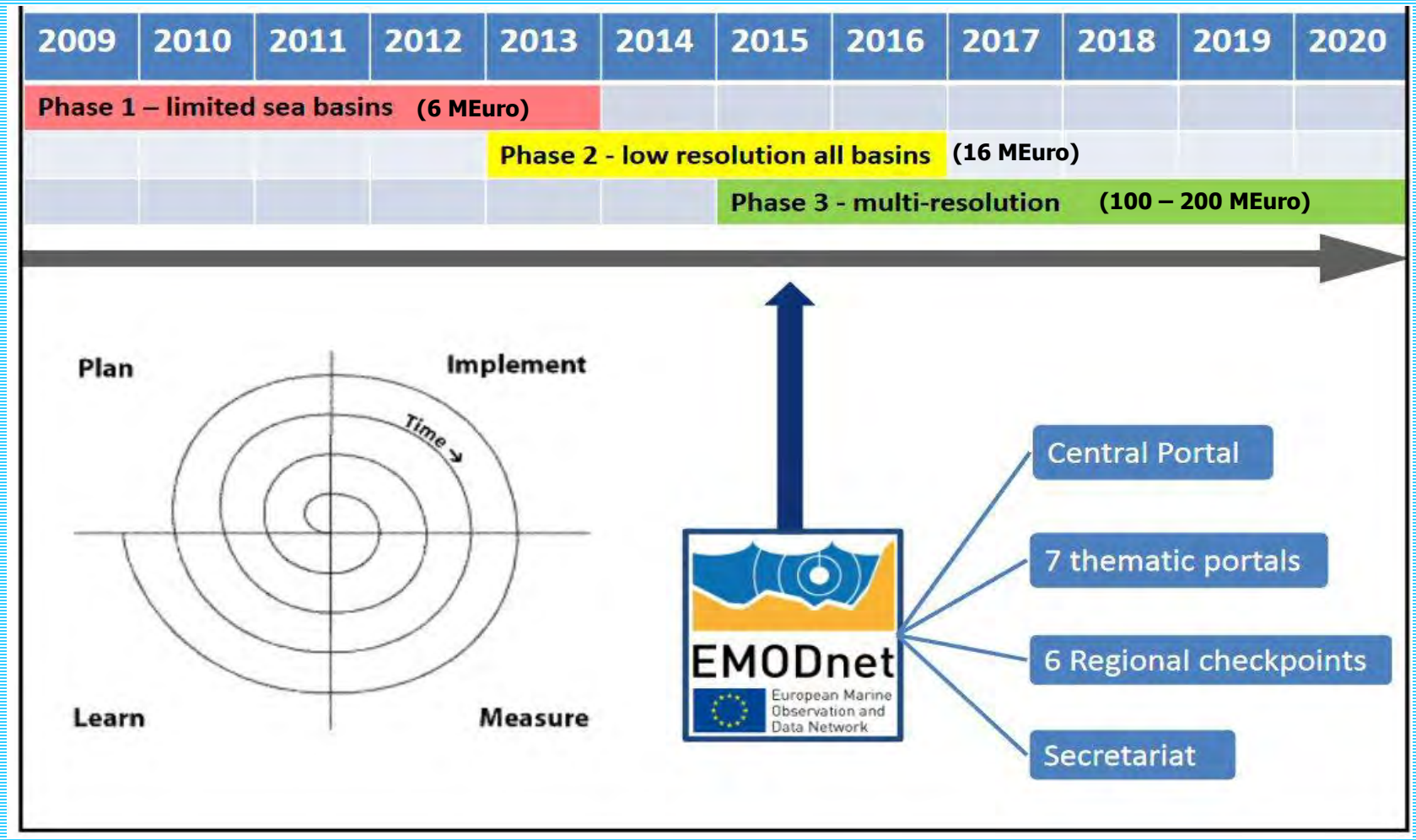
http://geoservice.maris2.nl/wms/seadatanet/emodnet_hydrography?service=WMS&request=GetCapabilities

- **Bathymetry Viewing and Downloading service:**
- WMS: http://ows.emodnet-bathymetry.eu/wms
- WFS: http://ows.emodnet-bathymetry.eu/wfs
- WMST: http://ows.emodnet-bathymetry.eu/wmts
- WCS: http://v7.geosrv.eu/wcs

Atlantic Ocean Research Alliance (AORA)



European Marine Observation and Data Network – Next phase



Proposals submitted for each of the thematic portals (Early August 2016)

EMODNet Bathymetry – next phase proposal (under review)

- Expanding partnership to include more data providers (up to 40 contributors)
- Expanding North to include the Barents Sea and synergy with IBCAO
- Expanding DTM including coastal areas
- Increasing overall resolution (Multiple resolution)
- Including alternative data sources (Satellite Derived Bathymetry)
- Determining best European coastline, also using European tidal model for vertical referencing

Innovation:

- Latest DTM uses > 7.700 survey data sets and composite DTMs from 31 data providers from 18 countries and GEBCO_2015
- Latest DTM contains 1.092.115.678 data points (28.799 rows x 37.922 columns)

⇒Reaching the limit => developing cloud process and VRE around GLOBE for higher performance of computations and improved quality by more interaction between regions and extra viewing and qc services

www.emodnet-bathymetry.eu

http://doi.org/10.12770/c7b53704-999d-4721-b1a3-04ec60c87238