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

IMDIS 2018 Conference, 7 November 2018, Barcelona - Spain

Thierry Schmitt | Shom (FR)
Dick M.A. Schaap | MARIS (NL)
George Spoelstra | GGSGC (NL)

Overall aims

◉ To bring together bathymetric datasets as collected by European organisations and to make these available for discovery and access

◉ To produce the best, harmonised, and higher resolution Digital Terrain Model (DTM) of all European seas on the market

◉ To make this European digital bathymetry (DTM) available for users by means of portal viewing and downloading services and OGC machine to machine services

◉ To generate and publish the best estimate digital European coastlines for LAT, MSL, and MHW

Current consortium

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

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

◉ 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.
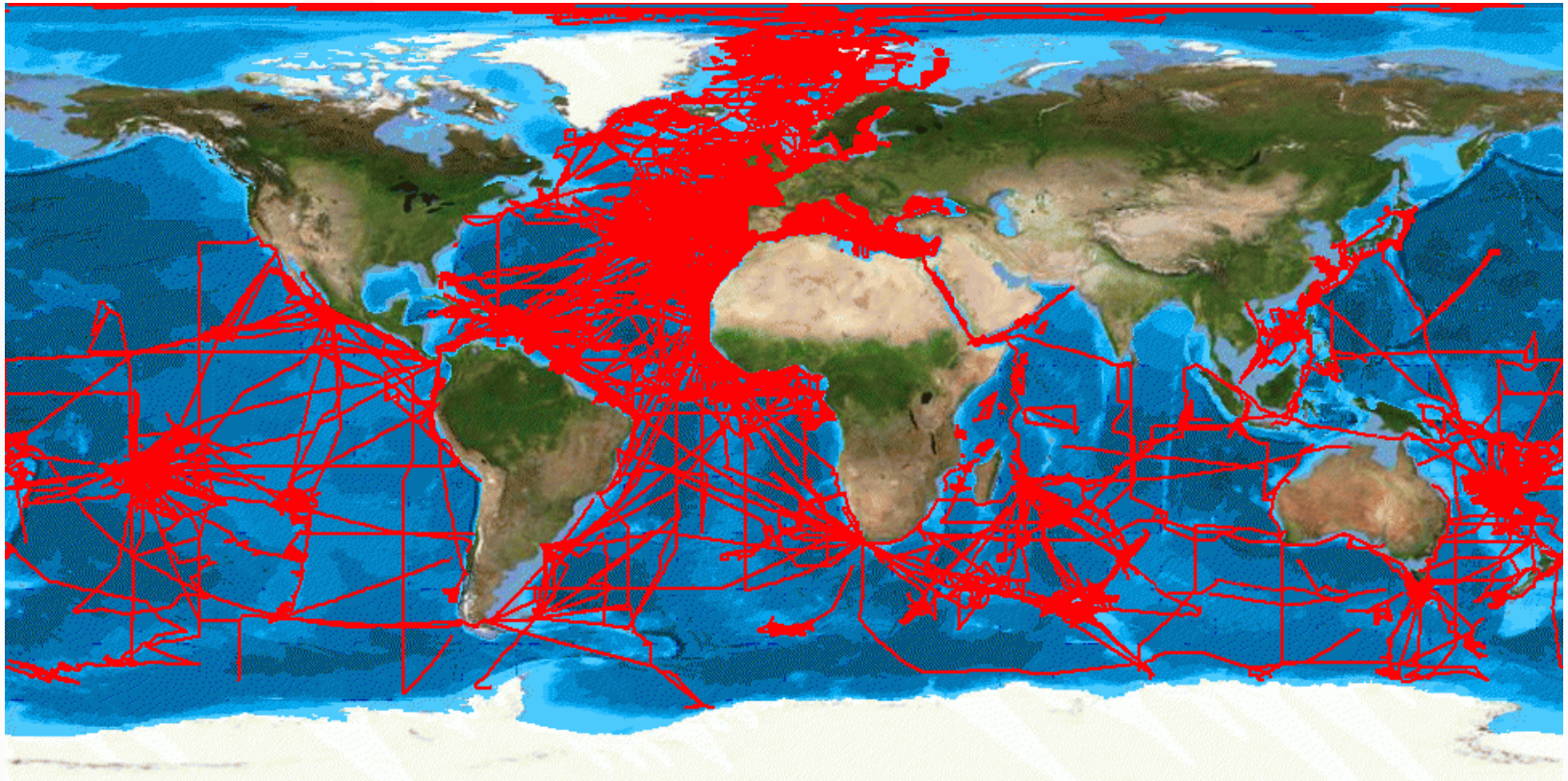
Data gathering results

◉ And so far **143** Composite DTMs 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

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
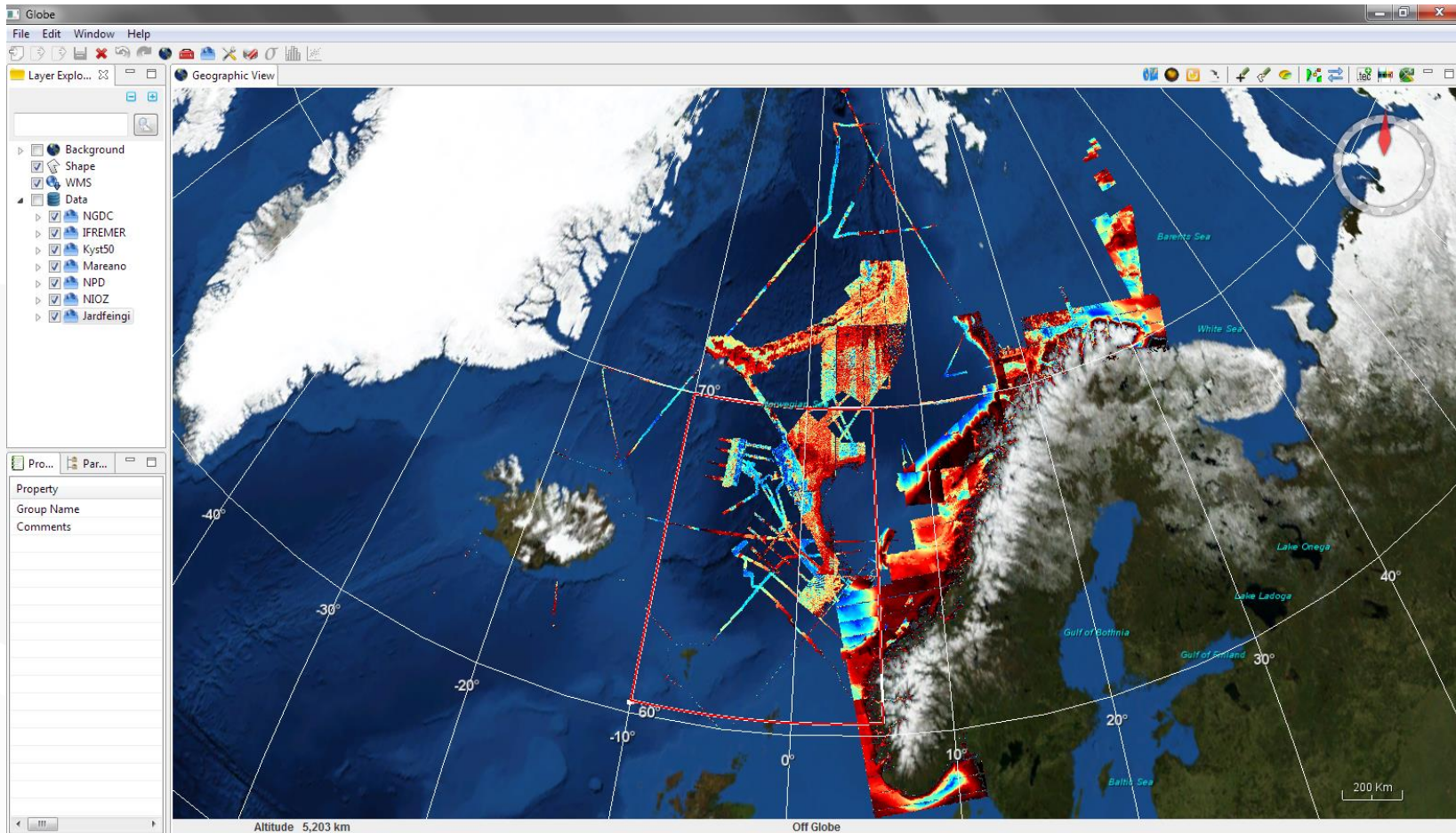 - DTM Integrator compiles the resulting EMODnet DTM

Survey data sets

Composite DTM's

Go TO: CDI Data Discovery and Access service

GO TO: Sextant Catalogue service

Harmonised QA-QC and DTM processing

EMODnet DTM

GO TO: Bathymetry Viewing and Download service

GLOBE software
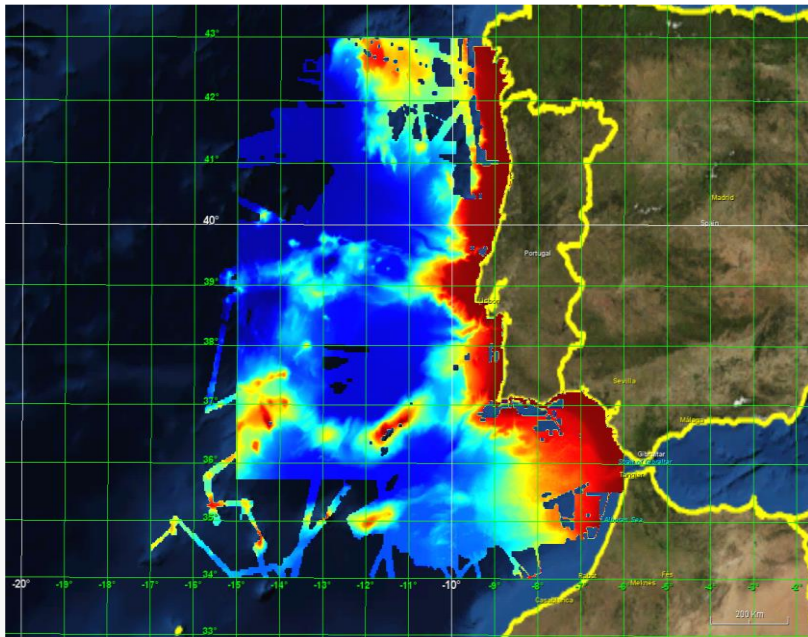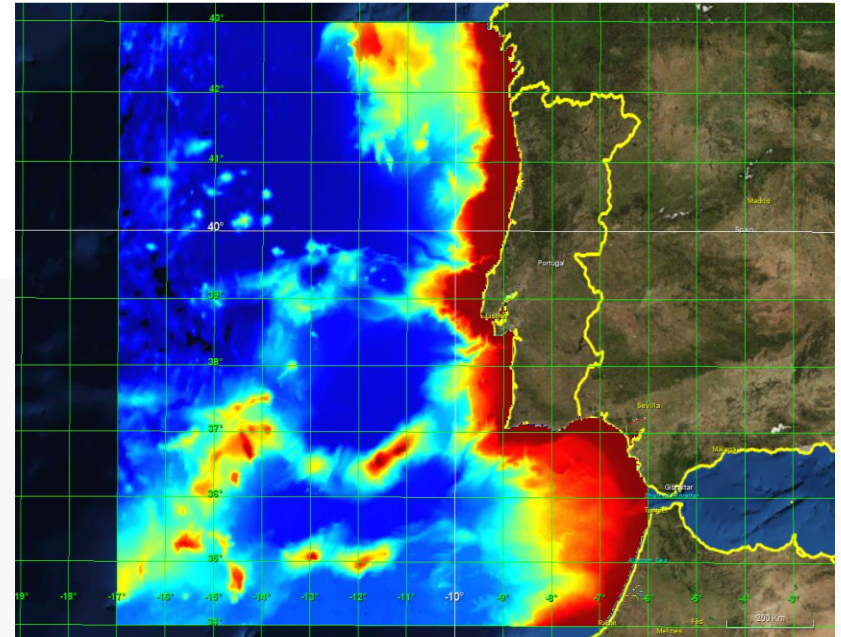

Norwegian and Icelandic seas – Arctic – example

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

9

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

http://www.emodnet-bathymetry.eu

Bathymetry Viewing and Download service

http://portal.emodnet-bathymetry.eu

Other legend and layer menu

CDI layer with survey tracks / areas

Source reference layer with metadata
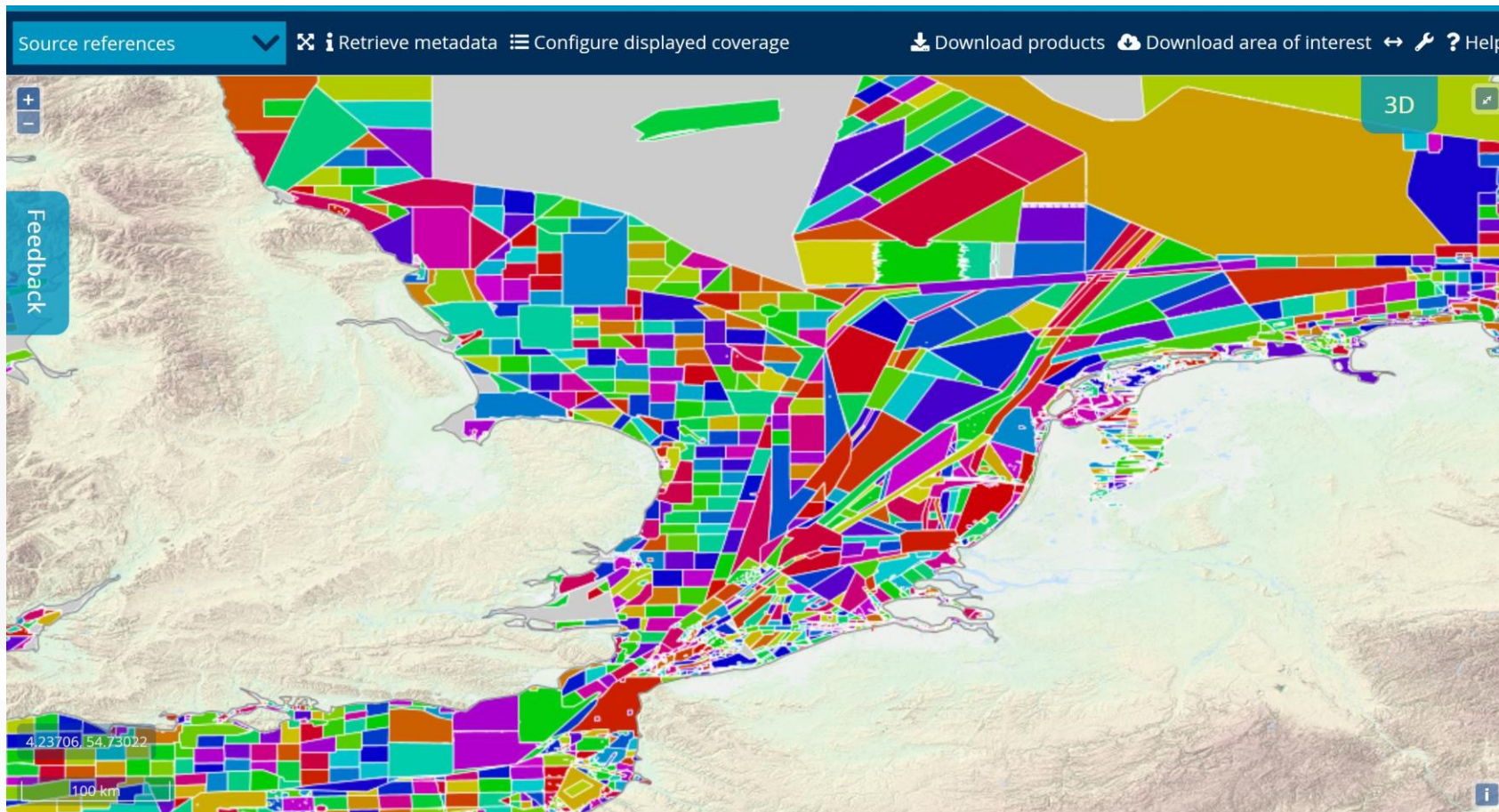
Download DTM-tiles in various formats

http://www.emodnet-bathymetry.eu

3D Visualisation

Web services

- ◉ 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

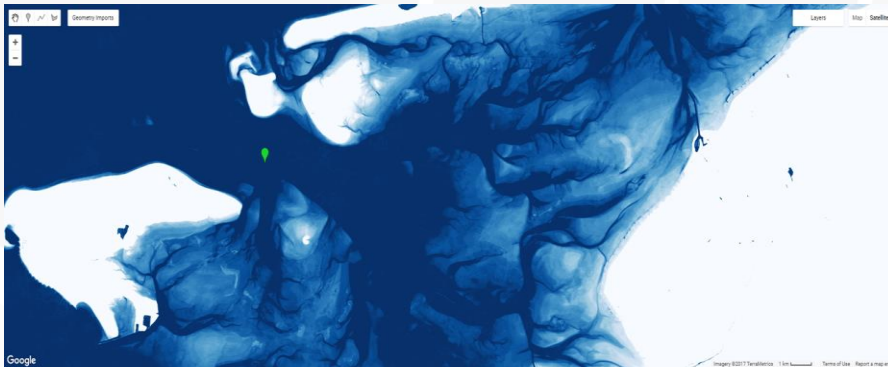- ◉ More details at: http://portal.emodnet-bathymetry.eu/services/

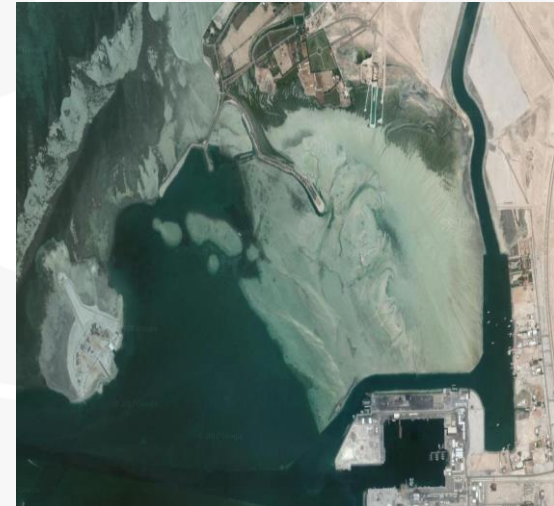# Determming European coastline

- 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)

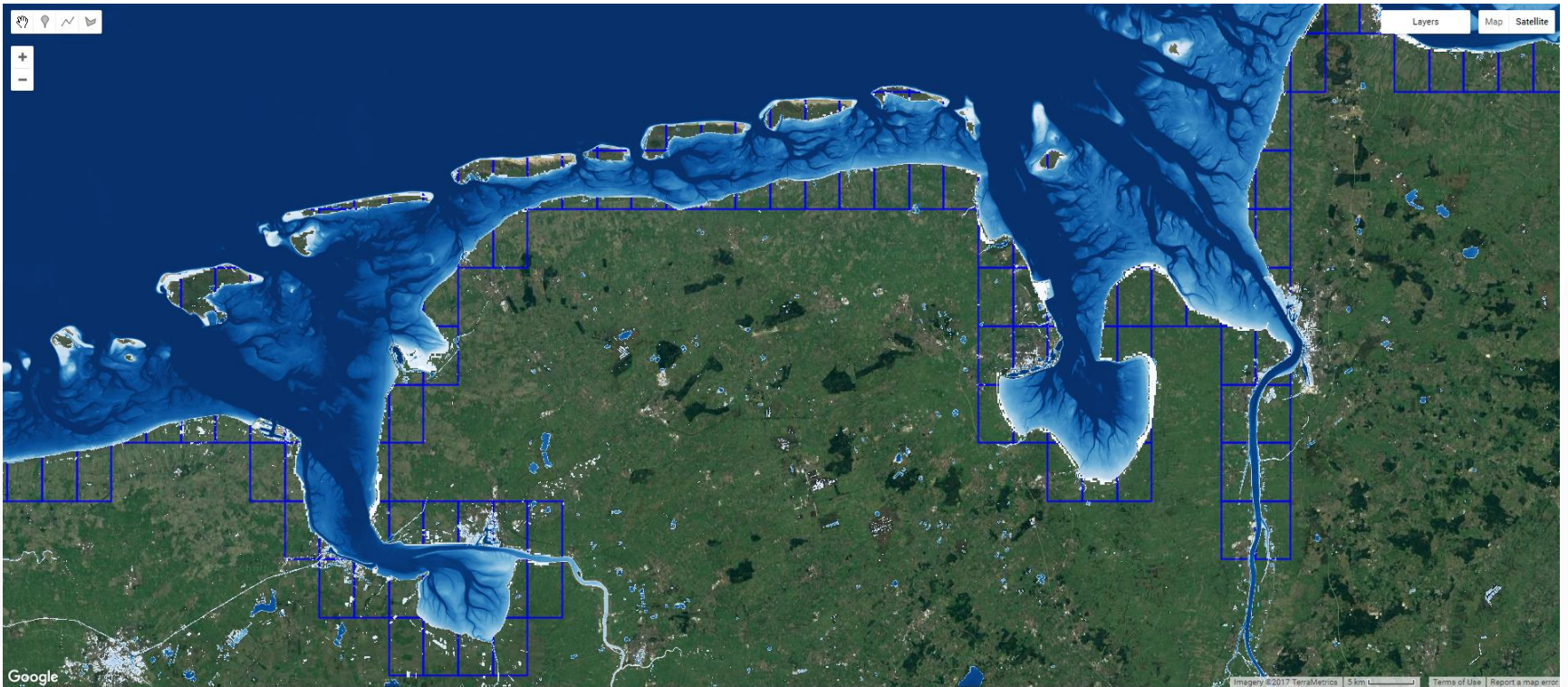- Probabilistic cloud removal

Sand, clouds, vegetation

Determing European coastline

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

Determing 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.
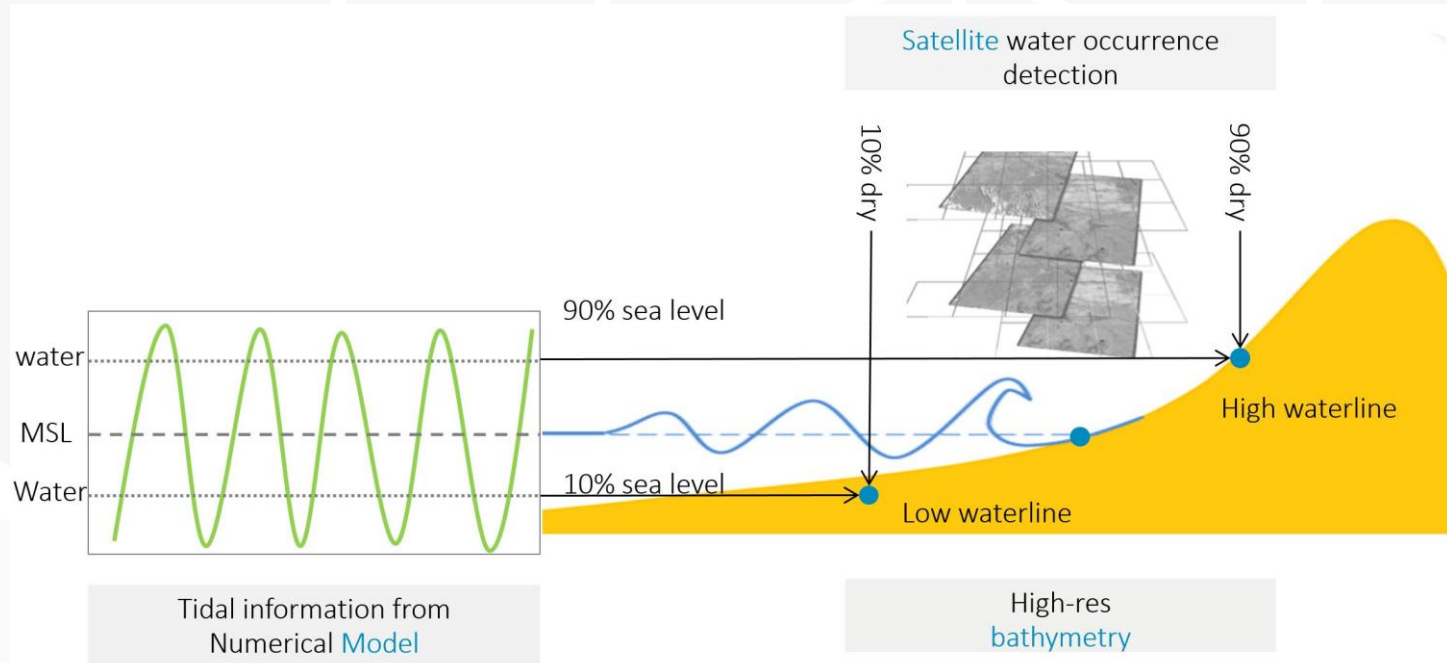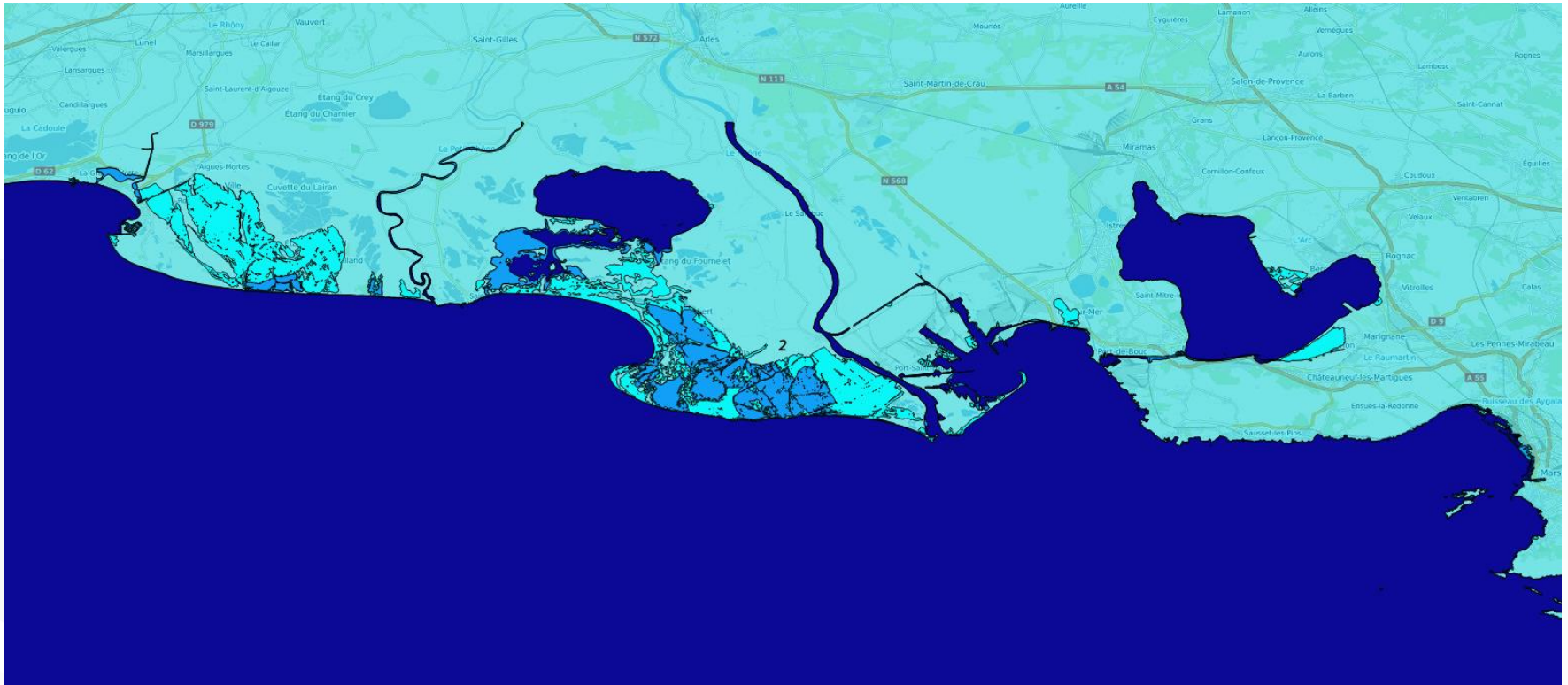
# Resulting European coastlines

◉ Rhone delta near Marseille, France

Closing remarks

◉ EMODnet Bathymetry DTM is a very successful product

◉ Circa 10.000 portal visitors per month

◉ Circa 3.000 – 4.000 DTM tiles downloaded per month

◉ Users from all layers of society and great feedback

◉ 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!
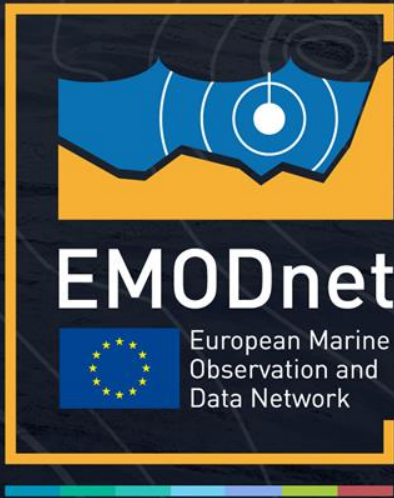
www.emodnet.eu

Your gateway to marine data in Europe