EMODnet Bathymetry: Coastal developments

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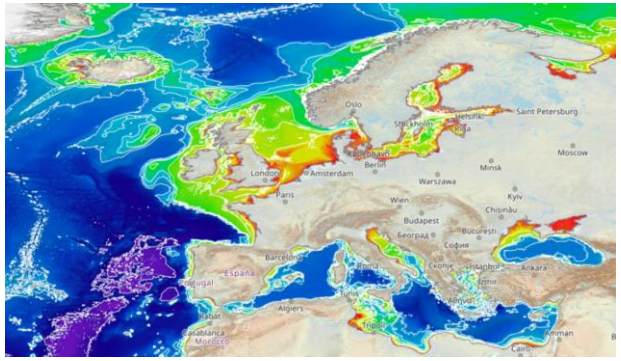
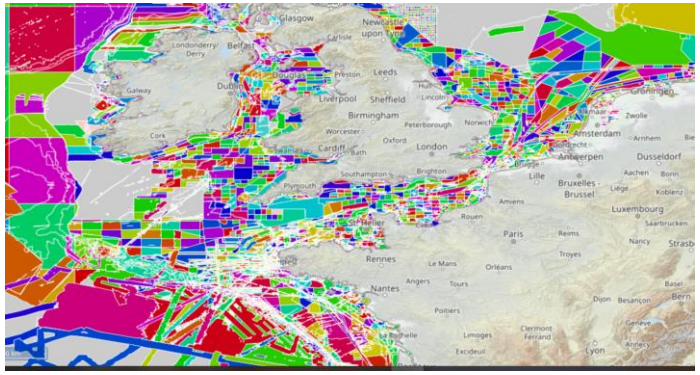
The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) 2021/1139 of the European Parliament and of the Council of 7 July 2021 establishing the European Maritime, Fisheries and Aquaculture Fund and its predecessor, Regulation (EU) No. 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

Introduction

- A major aim of EMODnet Bathymetry is to produce the best **Digital Terrain Model (DTM)** for the European seas including the Caribbean (2022), which is a highly successful product for all kinds of users from government, science, and industry. Completeness and quality are key words.
- This includes gathering bathymetry surveys and composite DTMs from currently **70 European data providers**, involving national hydrographic services, marine research institutes, governmental services, and private companies. This is done independent of sensor type.
- The latest **2020 version** of the EMODnet DTM with a grid resolution of **115 * 115 meters** incorporates **> 16.000 data sets**.





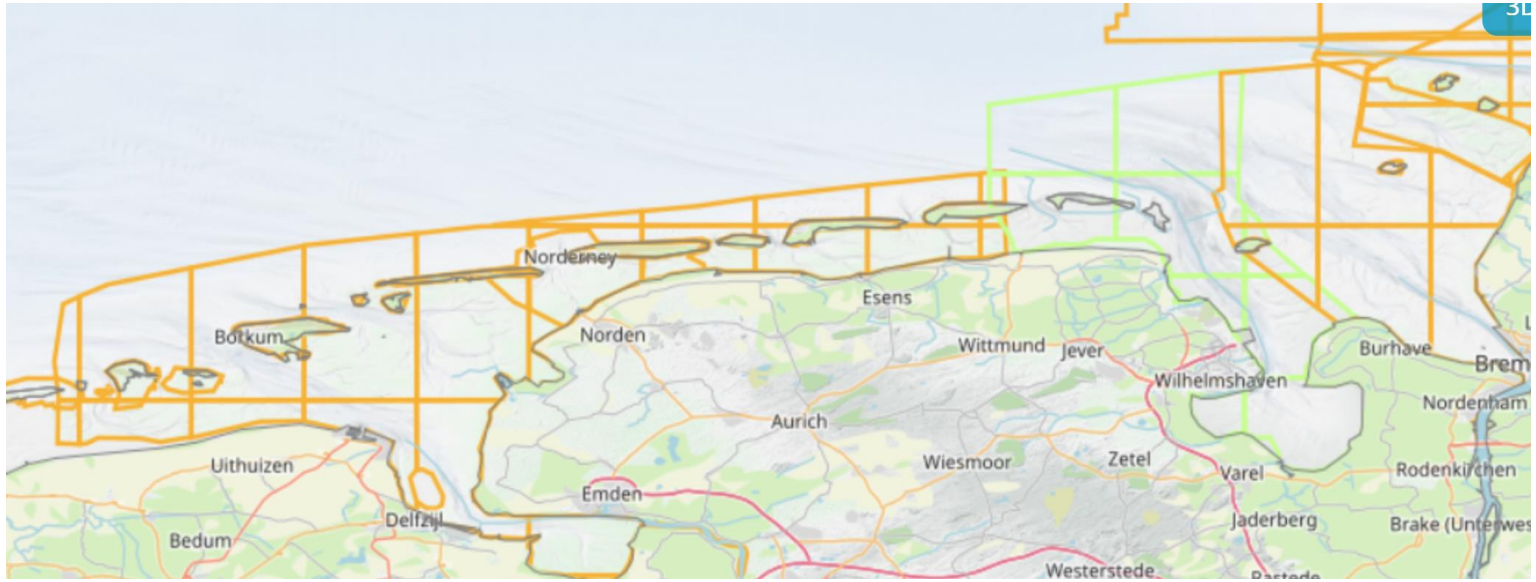
- Transition zone between land and sea is a **challenge** due to a lack of survey data sets and because of higher resolution requirements, combined with tidal dynamics. Therefore, EMODnet Bathymetry has and is undertaken over the years several activities for improving the availability of bathymetry data for the coastal and transition zone:

Properties of the EMODnet Bathymetry DTM

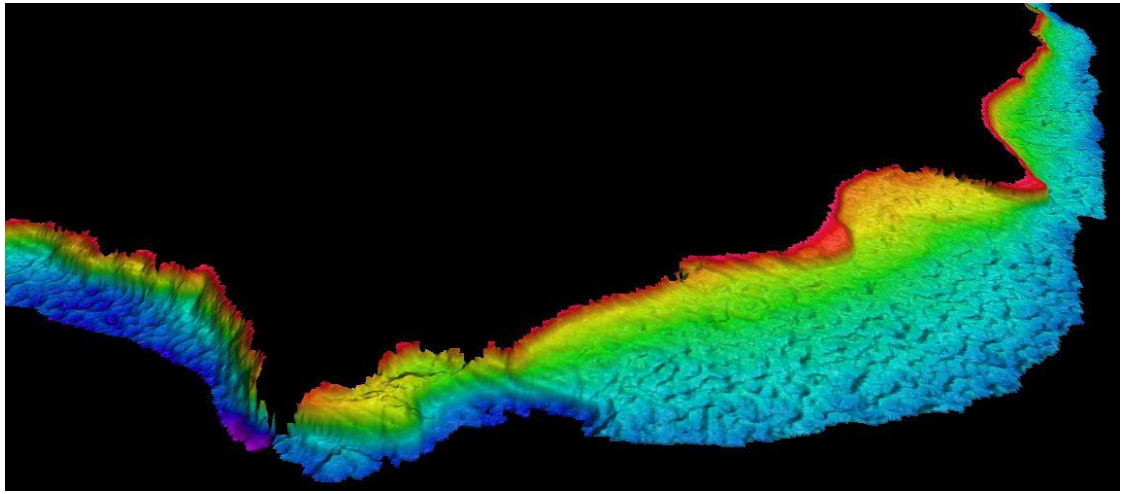
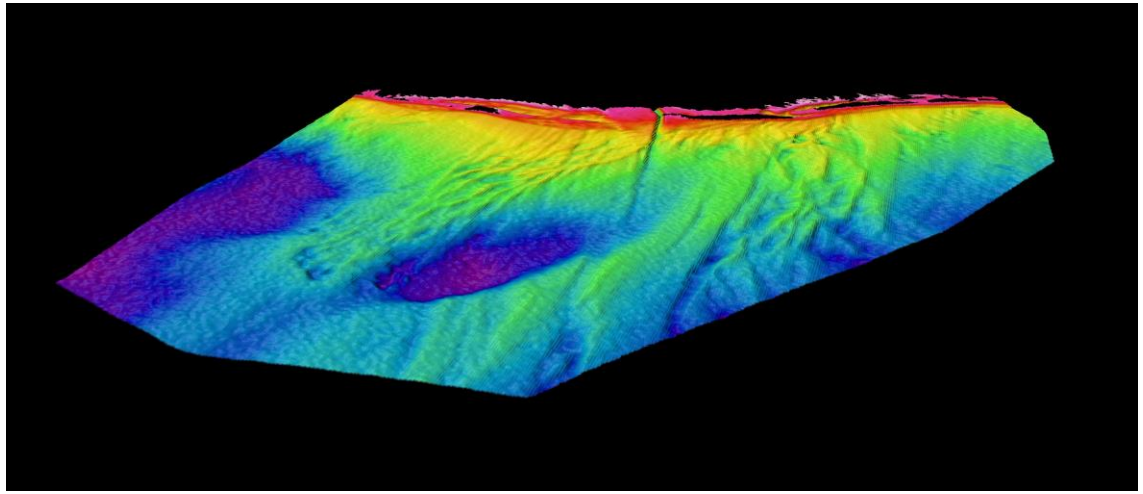
- DTM is produced once every 2 years. Current version is published in January 2021. New edition will be available 1st quarter 2023.
- Resolution is a compromise of available data and is currently set at 1/16 arc minute (appr. 115m)
- EMODnet Bathymetry should look in providing multi resolution products in addition to the separately published HR datasets
- Evolution over time is focused on adding data in no data areas and not so much in improving quality in surveyed areas (exception for data received from Hydrographic offices dealing with dynamic morphology)
- Majority of the 16000 data sets are in-situ or models derived from in-situ data.
- Where possible SDB and intertidal bathymetry is used to fill gaps
- Difficulty is that only a very small portion of EU waters can be covered this way
- Time depending products are useful for shallow areas where significant changes are noticeable within a decade or less
- This workshop should help in finding best practices to create optimal synergy between all sensors.

Gathering and integrating High Resolution DTMs

- **High-Resolution-DTMs (HR-DTMs) are** generated and provided by data providers. The HR-DTM files are focused on the coastal zone and on interesting underwater features and available by separate map layer for viewing and downloading. Resolution varies between 1/32 and 1/512 arc minutes. Currently, there are 244 HR-DTMs available and more underway.

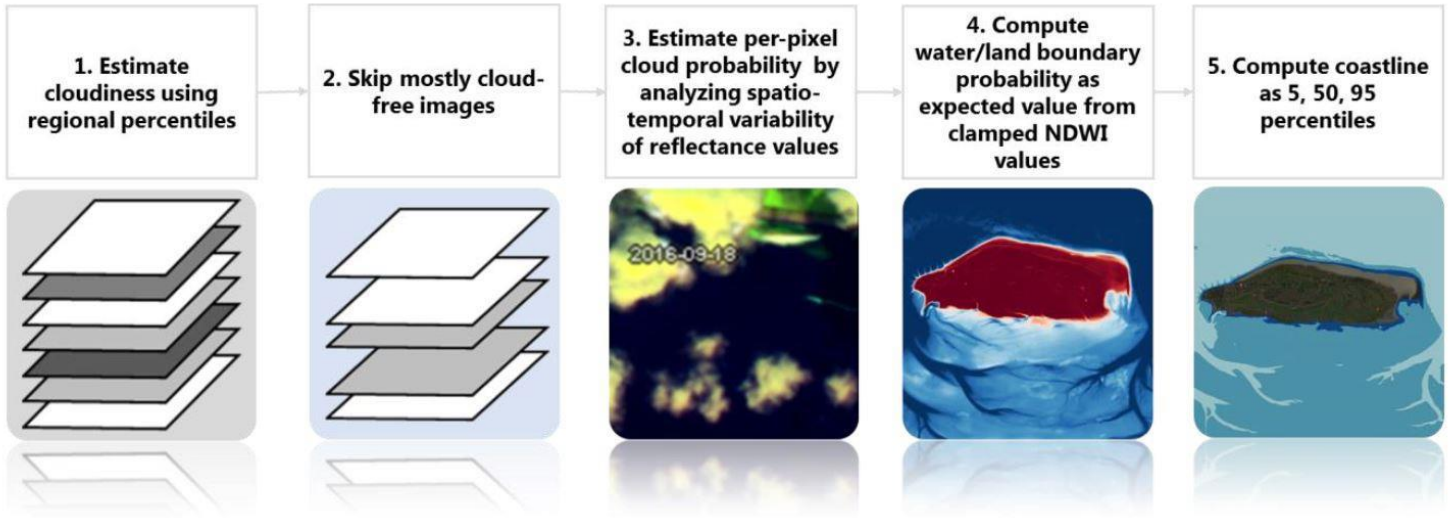


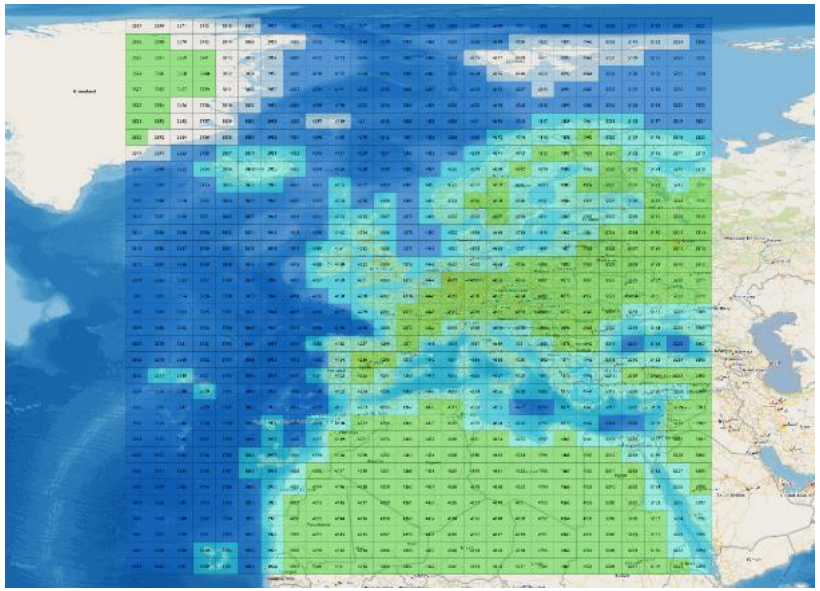
Generating Satellite Derived Bathymetry

- **Satellite Derived Bathymetry (SDB) DTMs** are generated and used by EMODnet Bathymetry since 2016. These are used to fill gaps in coastal and near shore areas. The production is done by partner **EOMAP**, expert in SDB, using **optical satellite data from Landsat-8 and Sentinel-2**. Overall, **39** SDB data sets have been produced and integrated. This concerns coastal areas of Spain, Greece, Croatia, Denmark, Cyprus, Italy, and Libya. Recently, SDB DTMs have been added for the Caribbean region.
- 


Determining Best-Estimate European coastlines

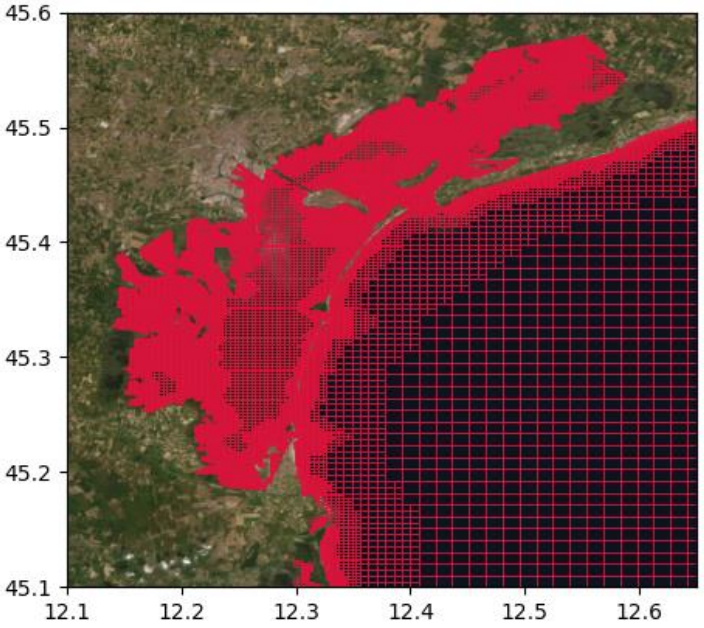
- **Best-estimate coastlines are determined** from satellite data (typically **Sentinel-2 and Landsat-8**) and in combination with the **Global Tide Surge Model (GTSM)** processed into **digital coastlines for the European seas at LAT** (Lowest Astronomical Tide), **MSL** (Mean-Sea-Level), and **MHW** (Mean-High-Water). The level of detail is bound to the resolution of the satellite sensor (e.g. 10m for Sentinel-2). This is undertaken by **Deltares** with a first release in 2018, followed by 2020. Currently, further refinement is underway for the 2022 release. It now covers the entire coastline of Europe and can be viewed as separate map layer and downloaded.

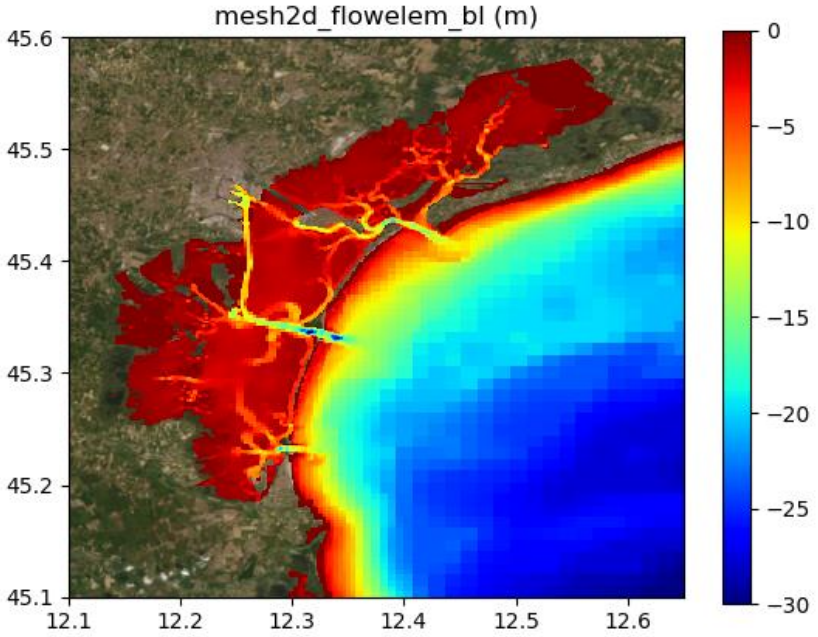


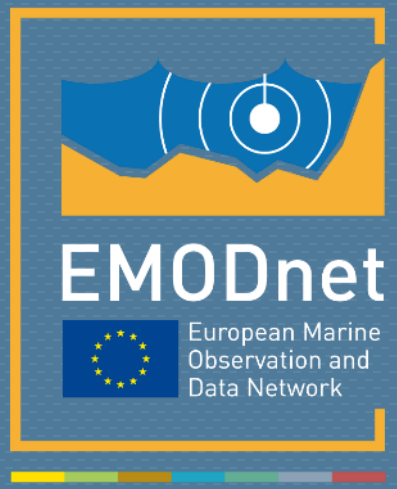


Establishing Tidal Bathymetry for Venice Lagoon

- **Bathymetry for the Venice Lagoon was lacking in the 2020 EMODnet DTM.** Deltares together with CNR-ISMAR have worked on a new high resolution model for the lagoon based on **In-Situ data** and **Tidal Bathymetry.** With the new model LAT values can be calculated in order to improve the regional tide and storm surge models in the region. These models support the acquisition of more accurate SBD in the region. The new data will be included in the 2022 release of the EMODnet Bathymetry DTM. The work provided detailed insight in how HR bathymetry supports the creation of hydrodynamic models and in the value of HR coastal bathymetry in general.







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