

Compiling data on seabed substrates and sedimentation rates from Europe - EMODnet Geology

Background

Seas and oceans are important resources and transport routes for people. However, increased activities in marine and coastal areas have altered marine ecosystems worldwide. To ensure the sustainable use of marine resources and health of the seas, improved management is needed.

The European Union's (EU) Marine Strategy Framework Directive targets to achieve Good Environmental Status (GES) of the EU's marine waters by 2020. It has been acknowledged that the poor access to data on the marine environment is a handicap to government decision-making, a barrier to scientific understanding and a break in the economy. The effective management of the broad marine areas requires spatial datasets covering all European marine areas. As a consequence, the European Commission adopted the European Marine Observation and Data Network (EMODnet) in 2009 to combine dispersed marine data into publicly available datasets covering broad areas.

The EMODnet data infrastructure is being developed through a stepwise approach in three major phases. Currently, EMODnet is in the 2nd phase of development. The EMODnet Geology was initiated in the EMODnet Phase I (2009-2013) through the ur-EMODnet Geology project for Northern European Seas. During the current Phase II (2013-2016), the EMODnet Geology has extended the work to cover all European sea-basins (e.g. the Baltic Sea, the Barents Sea, the North Sea, the Iberian Coast, and the Mediterranean Sea within EU waters). The partners, mainly from the marine departments of the geological surveys of Europe (through the Association of European Geological Surveys – EuroGeoSurveys) have aimed to produce medium resolution geological data products from the sea areas. The partnership includes 36 marine organizations from 30 countries and it is led by the British Geological Survey.

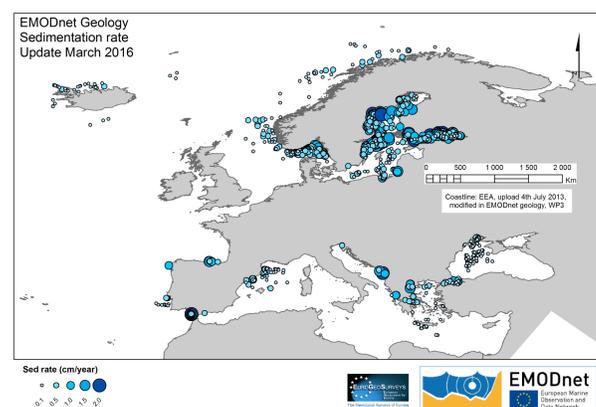


Figure 4. The sedimentation rates (cm/year) in the European Seas.

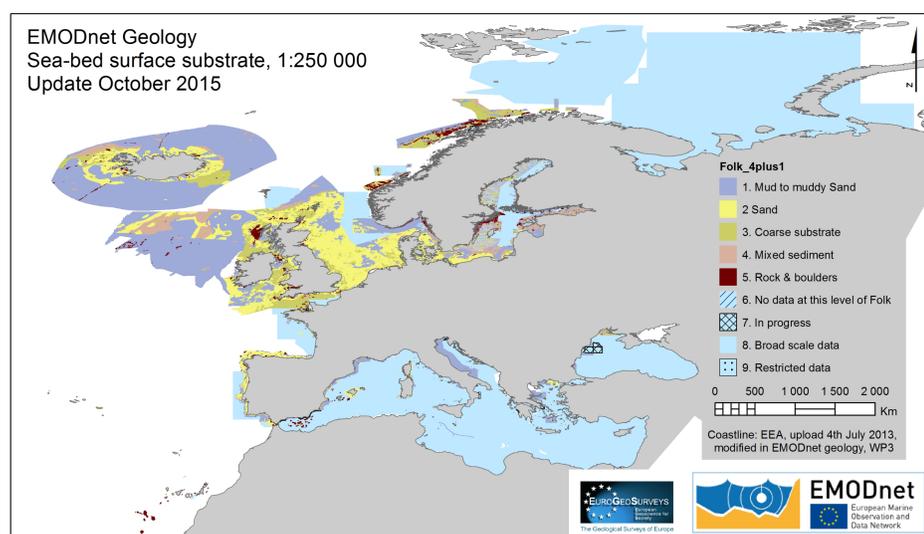


Figure 2. The EMODnet seabed substrate data, 1:250 000.

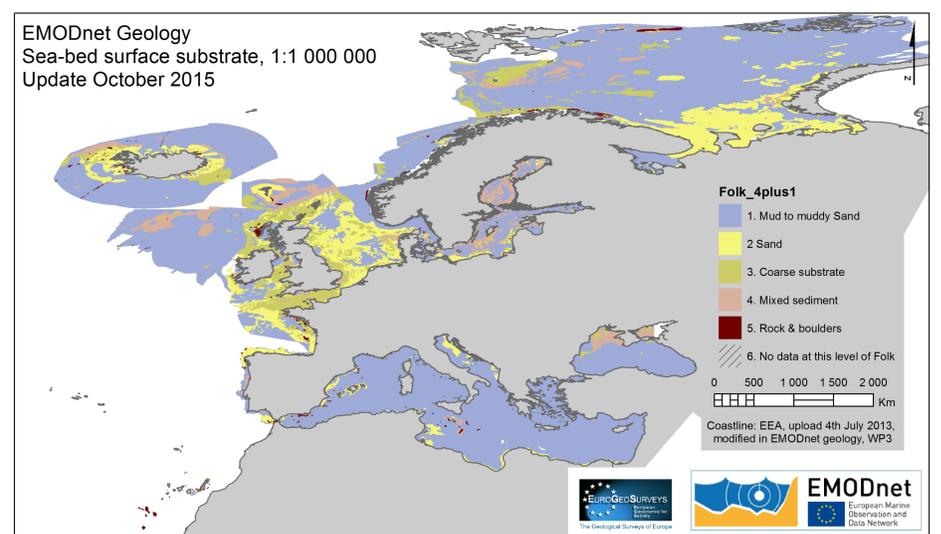


Figure 3. The seabed substrate data, 1:1 000 000, is an additional output of the EMODnet Geology.

Seabed substrate map

The project includes collecting and harmonizing the first seabed substrate map for the European Seas, as well as data showing sedimentation rates at the seabed. The data is essential not only for geologists but also for others interested in marine sediments like marine managers and habitat mappers. A 1:250,000 GIS layer on seabed substrates has been delivered in the EMODnet Geology data portal, in addition to an updated 1:1 million map layer from the previous phase. A confidence assessment has been applied to all areas to identify the information that underpins the geological interpretations.

Traditionally, European countries have conducted their marine geological surveys according to their own national standards and classified substrates on the grounds of their classification schemes. These national classifications are now harmonized into a shared EMODnet schema using Folk's sediment triangle. We have used a hierarchy of Folk classification with 16, 7 and 5 classes (Fig. 1).

Folk, 16 classes	Folk, 7 classes	Folk, 5 classes
5. Rock & Boulders	5. Rock & Boulders	5. Rock & Boulders
4.4.1 muddy sandy Gravel	4. Mixed sediment	4. Mixed sediment
4.3.1 gravelly muddy Sand		
4.2.1 muddy Gravel		
4.1.1 gravelly Mud		
3.3.1 Gravel	3. Coarse sediment	3. Coarse sediment
3.2.1 sandy Gravel		
3.1.1 gravelly Sand		
2.1.2 (gravelly) Sand	2. Sand	2. Sand
2.1.1 Sand		
1.3.2 (gravelly) muddy Sand	1.1 Mud	1. Mud to muddy Sand
1.3.1 muddy Sand		
1.2.2 (gravelly) sandy Mud		
1.2.1 sandy Mud	1.2 sandy Mud	
1.1.2 (gravelly) Mud		
1.1.1 Mud	1.3 muddy Sand	

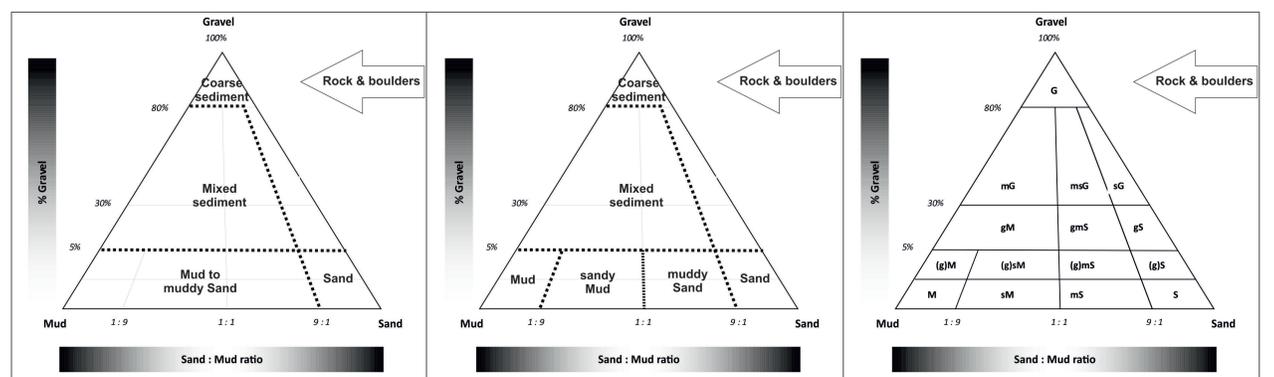


Figure 1. The Folk sediment triangle and the hierarchy of combined Folk classification developed for EMODnet geology.

Seabed substrate data

At the moment, more than 400 individual seabed substrate datasets have been identified from the study area. The datasets represent different scales and only those that are on a target scale or more detailed have been included in the 1:250,000 dataset. As far as we know this is the first seabed substrate map for the European Seas on this scale (Fig. 2). This kind of data is mainly available from the coastal areas and the Atlantic Ocean. Thus a dataset including data on a scale of 1:1,000,000 was produced to extend the coverage (Fig. 3).

The EMODnet Geology partners have harmonized their seabed substrate data according to an agreed scheme and the individual WW maps have been combined into a seabed substrate map of the seafloor. The final versions of the datasets will be available for download in October 2016.

The project partners have collected data on the sedimentation rates as well. Estimations of modern sediment accumulation rates (cm/year) are based mainly on the ¹³⁷Cs or ²¹⁰Pb dating, and some accumulation rates have been estimated from acoustic-seismic and sediment core data. The aim is to update the urEMODnet data that is a point-source map collated from more than 600 seabed sediment sampling sites (Fig. 4).

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