



EMODnet Thematic Lot n° 2 - Geology

4th Bi-monthly Report

Reporting Period: 6 May - 7 July 2014

Date: 27/06/2014

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1. Highlights in this reporting period

Provide a short summary of the key achievements and/or events of interest to a wider audience within this reporting period you wish to highlight – this can be based on the indicators or any other of the reporting sections.

[Provide a bullet list - maximum 5 bullets]

- **Completion of sub-strate maps at 1:250,000 scale and delivery to the habitat-mapping lot.**
- **Compliation of index maps showing available information and scale of mapping at national level.**

2. Meetings held since last report

List here the meetings held since the last bi-monthly report, if relevant add short description

[Provide information in table - Maximum 1 page]

None

3. Work package updates

Using the work package as a header list here the activities that occurred since the last bi-monthly report. If there was no activity to report leave the section blank.

[Provide information - Maximum 1/2 page per workpackage]

WP1 – Project Management.

Alan Stevenson (Project Co-ordinator) attended the EMODnet Steering Committee meeting in Rome on 4-5 June to present progress and contribute to discussion of agenda items.

WP2 – Geological data specification and sourcing.

Completed.

WP3. Sea-bed substrate.

The objective of WP3 is to compile and harmonise all available sea-bed surface substrate information from the study area at a scale of 1:250,000 to deliver the sea-bed substrate component and all available information on the rate of accumulation and sedimentation on the sea floor. The expected outcome is a fully populated GIS layer of harmonised sea-bed substrate information, including confidence information based on the density of the information used to create the geological interpretations (based on principles established during the ur-EMODnet-Geology Project (Stevenson et al. 2011, 2012)). In addition a model for semi-automated classification of acoustic data for spatial modelling of substrate data will be provided by a case study lead by Cefas.

WP3 has focused on identifying the available sea-bed substrate data (index map) as well as creating a scheme for sea-bed substrate classification, translating available data into the scheme, generalizing the data in 1:250 000 if necessary and combining the 1st version of the sea-bed substrate map (data) at the scale of 1:250 000 for the study area. The information on the rate of accumulation and sedimentation and confidence of the substrate map will be provided during later stages of the EMODnet Geology 2 project.

The compilation of the sea-bed substrate map of the WP3 includes several phases (Fig. 1):

1. Index map that aims to visualize the data/map coverage and gap areas.
2. Harmonisation. The national seabed substrate data have been translated into EMODnet substrate classification system.
3. Generalization. The maps have been generalized into a target scale (1:250 000) if not originally at this scale.
4. Compilation. The national seabed substrate maps have been compiled into a European sea-bed substrate map/EMODnet geology substrate map.
5. Confidence analyses of the seabed substrate map (BGS).
6. Update of the map.



Figure 1. The workflow of the EMODnet Geology workpackage 3, Sea-bed substrates.

WP3 has mainly focused on steps from 1 to 4. The first period of the WP3 has been very intensive, because the sea-bed substrate dataset is needed for the EMODnet Seabed Habitat lot in July 2014.

GTK has provided guidelines for partners (Kaskela et al., 2014 a, b), which partners have implemented individually. Project partners have delivered their harmonised and generalized maps to GTK, where they have been combined into a single map. This 1st version of the sea-bed substrate data from June 2014 will serve as base layer that will be updated during later stages of the EMODnet Geology 2 project, when more data comes available.

The first guidance document of the WP3 focused on compiling an index map visualizing the data/maps on seabed substrata that were/are available for the EMODnet Geology 2 project (Kaskela et al., 2014 a). The index map has enabled analysis of the data coverage and available scales as well as sediment classification systems in use.

The second guidance document gave instructions on the harmonisation of national sea-bed substrates into the shared EMODnet substrate classification scheme (Kaskela et al., 2014 b). In addition, if the national data was more detailed than the target scale of 1: 250 000, the data had to be generalized following the principles presented in the Guidelines II.

Index map

The EMODnet Geology 2 Sea-bed substrate work package (WP3) was launched with visualization of data coverage i.e. collating an index map of national sea-bed mapping coverage. Partners have provided information on where and what kind of sea-bed surface substrate data/maps they have available for the project from their national waters including the EEZs (Fig. 2). The index shape file includes an attribute table that contains information about metadata. The index map includes data from more than 50 organizations and there are more than 400 different map types in the version of 12th June 2014. The individual patches describe areas that are congruent by scale and mapping technology.

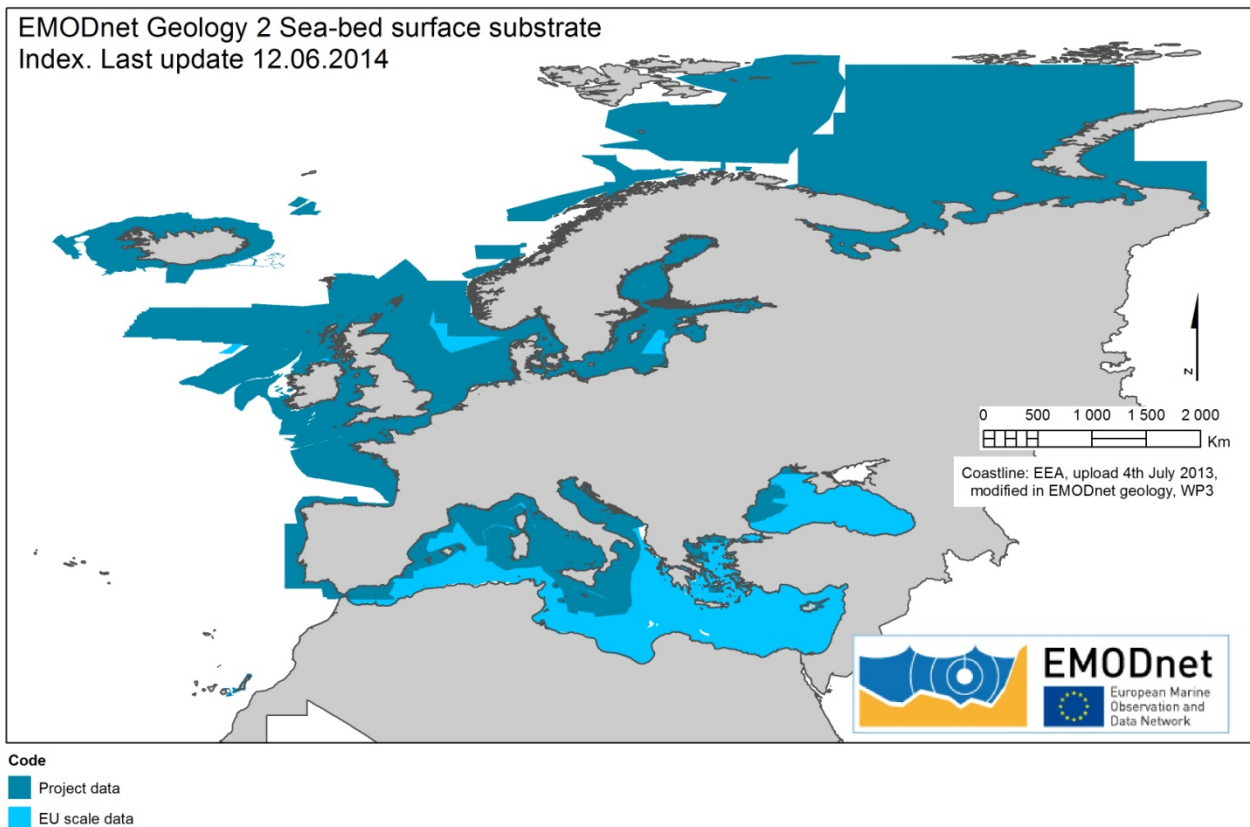


Figure 2. The coverage of the sea-bed surface substrate data that has been available for the EMODnet Geology 2 project, last update 12th June 2014. The light blue areas (EU scale data) refer to broad scale data that are provided by the ur-EMODnet and the EMODnet Seabed habitats lot.

As agreed with the EMODnet Seabed Habitats Lot, WP3 has aimed to produce sea-bed surface substrate data on a scale of 1: 250 000 by June 2014. The index map shows that the sea-bed surface substrate data at a scale of 1:250 000 (or more detailed) is mainly available from the coastal areas and the Atlantic Ocean (Fig. 3). In the next workshop in Malta in September 2014, the EMODnet-Geology group will discuss the compilation of a map on a more general scale (e.g. 1:1 000 000) to expand the data coverage.

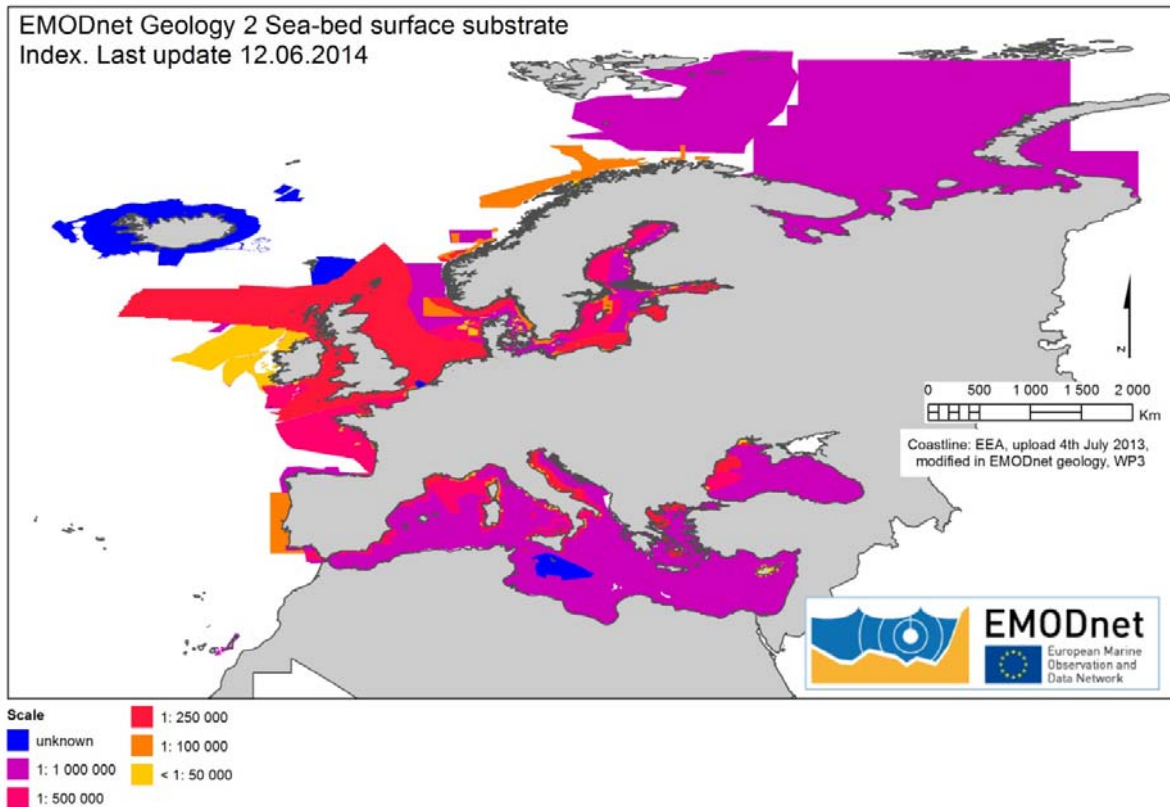


Figure 3. The scales of the available sea-bed surface substrate maps.

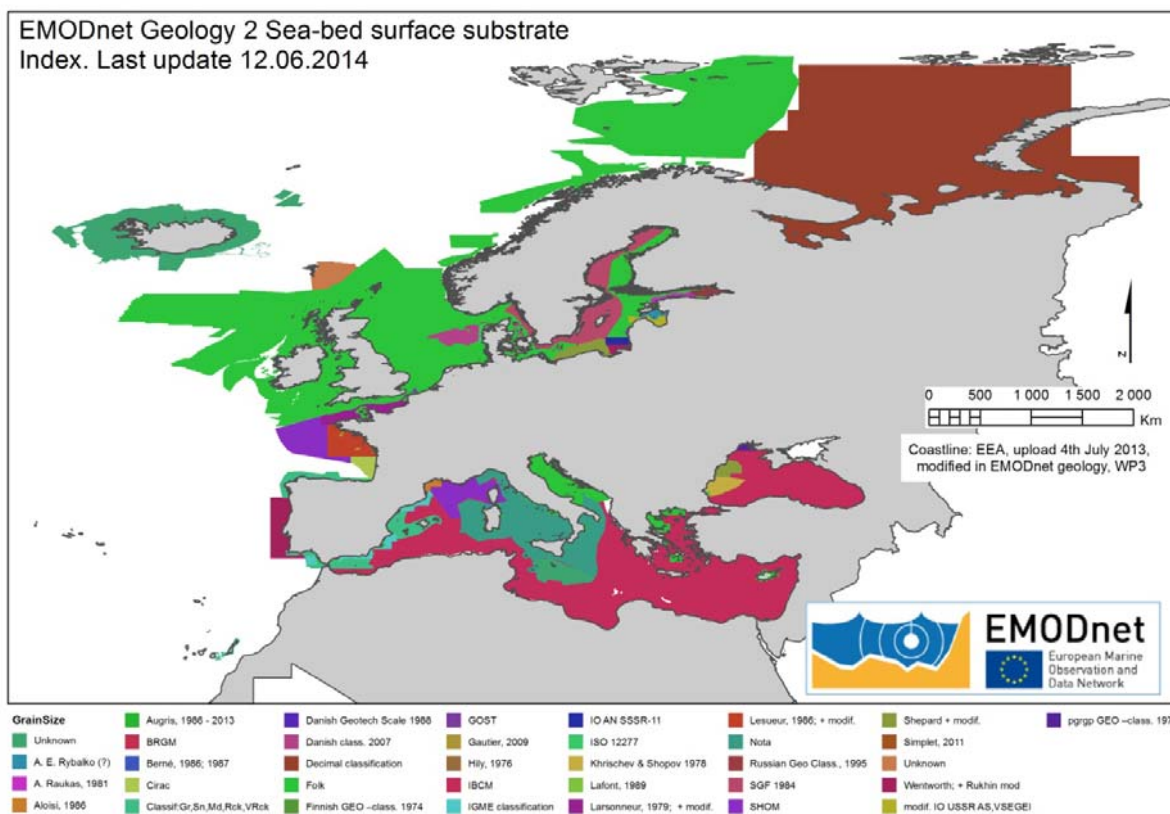
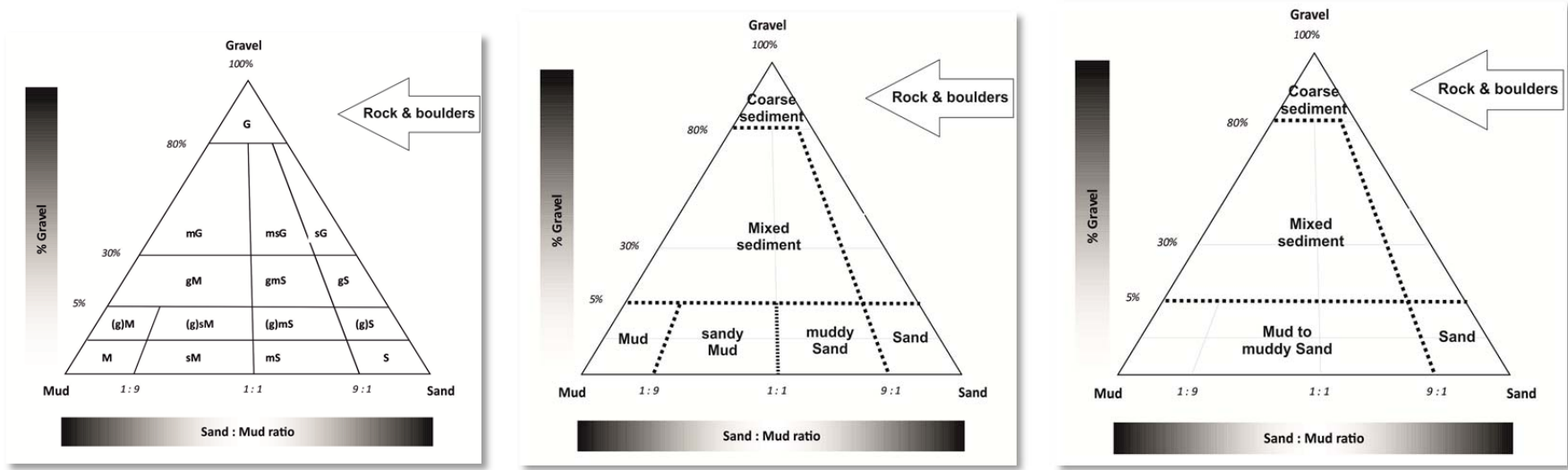


Figure 4. In Europe more than 30 different sediment classification systems are used in seabed mapping .

The WP3 index map shows that a multitude of sediment classification systems are used in sea-bed mapping in Europe (Fig. 4). Traditionally, European countries have conducted their marine geological surveys according to their own national standards and classified substrates on the grounds of their national classification schemes. These national classifications have now been harmonised into a shared EMODnet schema. The harmonisation of data has included evaluation of the different classification schemes used in each country, classification or translation of the national data into the shared EMODnet classification system (takes into account integration with hydrographic, chemical and biological lots) and compilation of maps into a sea-bed substrate map of European sea areas.

During the kick-off meeting held in Lisbon in January 2014 it was decided to follow the Folk sediment classification to include all 15 substrate classes and also data on rock & boulders if possible. As it was expected that it would not be feasible to include all 16 classes from all European seas a hierarchy of Folk classifications (Fig. 5) was created with 16, 7 and 5 classes. All the 16 classes can be united into the 5 classes. The sediment distribution is one of the primary parameters shaping habitats. Therefore, the EMODnet substrate classification schema has been developed in co-ordination with the Physical habitat group. The system with 5 classes is almost the same as in the ur-EMODnet (Stevenson et al. 2011, 2012) with the exception that the cut-off between “Mud to muddy sand” and Sand has been changed from 4:1 to 9:1 to support combination from 16 classes to 5 classes.



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

Figure 5. The Folk sediment triangle and the hierarchy of combined Folk classification developed for the EMODnet Geology 2 project.

Seabed substrate classification

The EMODnet Geology 2 partners have harmonised their available sea-bed substrate data according to instructions provided by GTK. Similar to the index shape file, the sea-bed substrate shape file includes an attribute table that contains information related to the reclassification. Due to the challenging timeline, the substrate reclassification scheme is simple and provides sometimes only a rough estimate for the substrate material from the uppermost 30 cm of the sediment column.

The vertical limit of 30 cm was agreed in the ur-EMODnet as it correlates with the sample resolution in the majority of cases (~ box corer and Van Veen Grap sampler). The reclassification approach is the same as in the ur-EMODnet (Stevenson et al. 2011, 2012) due to its simplicity and transparency. As mentioned above countries have conducted their marine geological surveys according to their own national survey standards. Therefore the "national" sea-bed surface substrate data that was not originally in the Folk classification system has been reclassified. The first step in the reclassification has been to analyze the surface material. At best the substrate content has been examined from the vast archive of surface samples and grain size analysis. If this has not been possible, the partners have done an expert-based prediction of the surface sediments and the predicted surface sediment has been translated into the used Folk classification hierarchy. It has been recommended to use the most detailed Folk classification (16-7-5 Folk classes) as possible (Fig. 5). Due to fundamental differences in data (e.g. grains size limits) it is not always possible to make one-to-one translation of the national substrate category into the Folk category. Thus the resulting class might be more of "compromise" that includes the majority of the substrate variation in that class.

Generalisation

At the moment the EMODnet Geology 2 project provides data at 1:250 000 scale. If not originally compiled at this scale, detailed maps have been generalised according to the principles set by GTK. The generalisation procedure has been implemented in an ArcGIS environment. WP3 has followed the cartographic principles established in the MESH project (Foster-Smith, R. & al., 2007) and tested in the ur-EMODnet (Stevenson et al. 2011, 2012). Accordingly, the smallest cartographic unit (polygon) on a map of the scale 1:250 000 is about 0.3 km². If the sea-bed surface substrate data is on a broader scale, it has not been included in the dataset at present. However the coverage of the broad scale data is visualized in the substrate map (Folk code = 8).

Combining individual maps

Lastly, GTK has combined all available spatial datasets on a scale of 1:250 000 into a sea-bed substrate map of the seafloor. As far as we know this is the first seabed substrate map for the European Seas on a scale of 1:250 000 (Fig. 6, 7 and 8).

The coverage of the current sea-bed surface substrate data does not entirely correlate with area visualized in the index map as a data on a scale of 1:250 000 (or more detailed). There are still some partners who are either collating or digitizing their sea-bed substrate data for the EMODnet Geology 2. In addition there are datasets that are restricted by National reasons. Permission to publish these datasets has been requested but no respond has been received up to date. The aim is to combine these datasets into the EMODnet sea-bed substrate data at a later stage of the project. However, the areas with ongoing mapping efforts and restricted data are included in the visualization (Folk codes 7 and 9). The current version will be updated during the project and should be regarded as a 1st draft not as a final output.

In addition to the data on a scale of 1:250 000, WP3 has received some general sea-bed surface substrate datasets. The datasets covering the Mediterranean Sea and the Black Sea on a scale of 1:1 000 000 have been provided by EMODnet Seabed habitats lot (data distributed by Hellenic Centre for Marine Research, HCMR). These and the ur-EMODnet data will provide a good basis for the production of the broad scale sea-bed surface substrate dataset for the European Seas during the next phase of the WP3.

The EMODnet Sea-bed substrate data is distributed to the project partners as well as to EMODnet Seabed habitats lot on 19th June 2014. The data is not available for the general public yet but it will be uploaded into GTK's WMS server and to EMODnet portal at the later stage of the project.

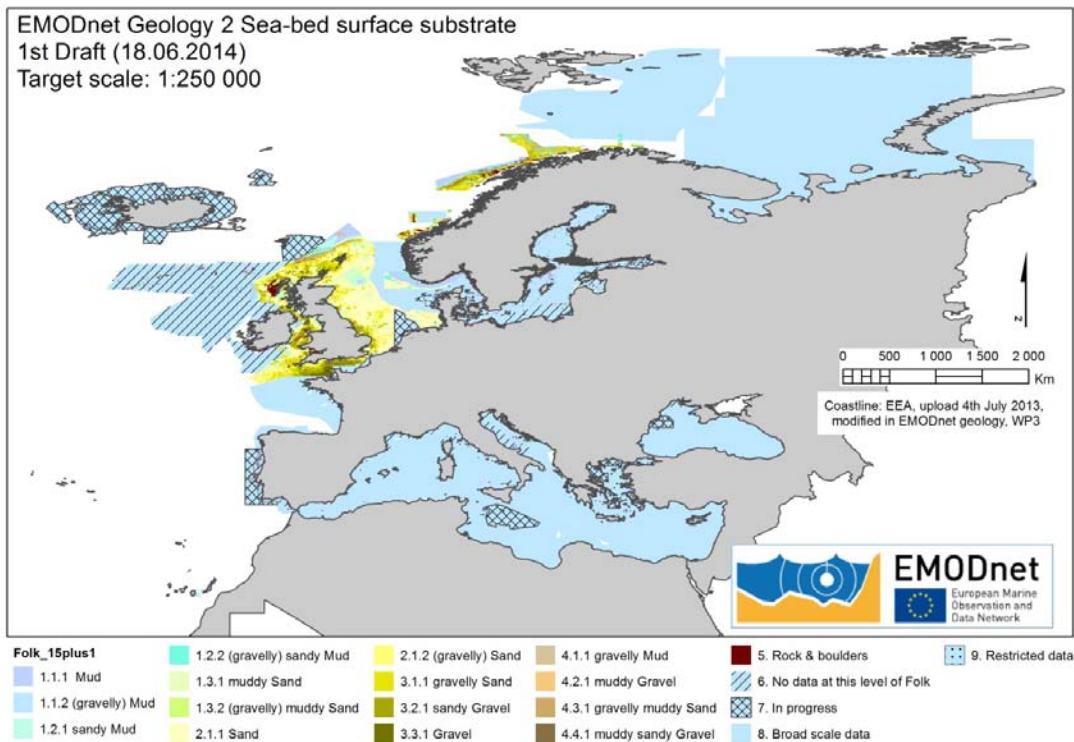


Figure 6. The EMODnet Geology 2 sea-bed surface substrate data on a scale of 1:250 000 for the European Seas, hierarchy of 16 classes.

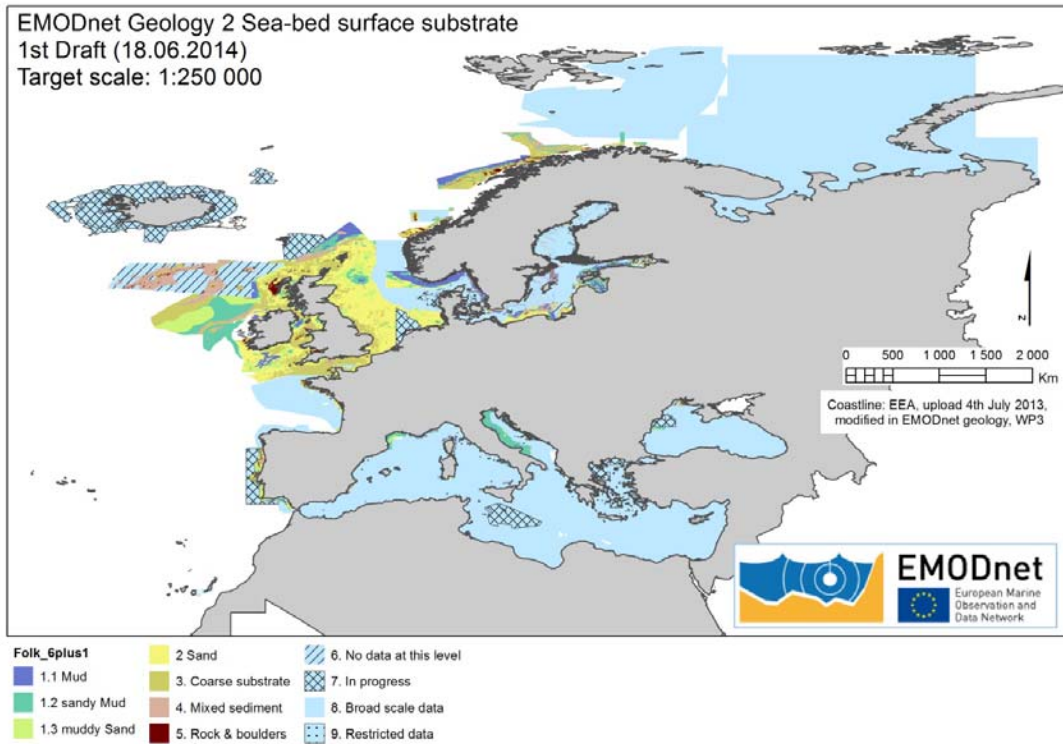


Figure 7. The EMODnet Geology 2 sea-bed surface substrate data on a scale of 1:250 000 for the European Seas, hierarchy of 7 classes.

WP4. Sea-floor geology.

The WP4 leader has distributed further instructions transferring data using 'TeamBeam' an encrypted HTTPS-connection which is accessible via a usual web browser such as Internet Explorer, Firefox or Safari etc.

WP5. Coastal behaviour.

Progress pending meeting with WP5 leader prior to issuing guidelines.

WP6. Geological events and probabilities.

Geological events and probabilities is focusing on submarine landslides, earthquakes and volcanoes. The extension of the European Seas to the Mediterranean and to the North Atlantic draws attention to other geological events connected to the mandatory features. Consequently, the first step was to

enquire about the relevant occurrences considered by each country partner. On the base of the answers received, it was proposed to include information on tectonics and tsunamis. A draft format with a list of the possible characteristics to be represented was circulated to the project partners. Their feedback contributes to the elaboration of the guidelines for the compilation of the WP6 GIS layers, which will be provided in the near future.

WP7. Minerals.

January 2014

The Work Package 7 data requirements were detailed in a presentation given at the EMODnet2-Geology Kick-off meeting in Lisbon. Questions and queries were discussed with all partners in attendance.

March 2014

A comprehensive Task Guide was compiled by the GSI and disseminated to all European partners on March 11th 2014. The Guide details the data and attributes required for WP7.

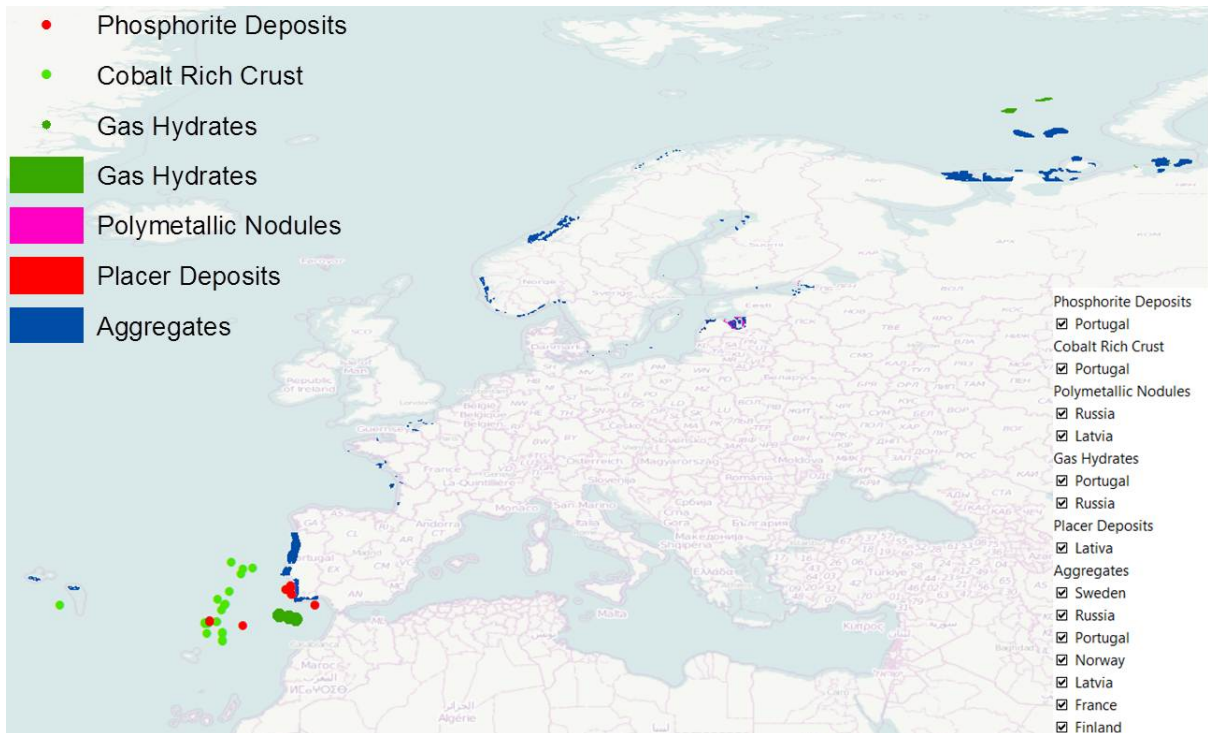
June 2014

Data from partners on the location of a diverse range of seabed minerals is currently being modelled and will be available online in December.

Juy 2014

Propose to;

- Assess all data received in ur-EMODnet-Geology for it's suitability in accordance with the criteria as outlined in EMODnet Geology phase 2, WP7 Task guide document.
- Collate all partner data received into appropriate deposit type layers.
- Assess data modelling requirements to harmonise partner data into deposit type layers.
- Assess data reference systems for harmonisation.
- Integrate WP 3 sediment and substrate sand areas in product layer.



WP8. Web Services and Technology.

Following an assessment of available open-source software for use in the EMODnet-Geology project, it has been decided to use 'GeoNetwork'. This is a catalog application to manage spatially referenced resources. It provides powerful metadata editing and search functions as well as an embedded interactive web map viewer. It is currently used in numerous Spatial Data Infrastructure initiatives across the world. GeoNetwork has been developed to connect spatial information communities and their data using a modern architecture, which is at the same time powerful and low cost, based on the principles of Free and Open Source Software (FOSS) and International and Open Standards for services and protocols (a.o. from ISO/TC211 and OGC).

The software provides an easy to use web interface to search geospatial data across multiple catalogs, combine distributed map services in the embedded map viewer, publish geospatial data using the online metadata editing tools and optionally the embedded GeoServer map server. Administrators have the option to manage user and group accounts, configure the server through web based and desktop utilities and schedule metadata harvesting from other catalogs.

Main features

- Immediate search access to local and distributed geospatial catalogues
- Up- and downloading of data, graphics, documents, pdf files and any other content type
- An interactive Web Map Viewer to combine Web Map Services from distributed servers around the world

- Online editing of metadata with a powerful template system
- Scheduled harvesting and synchronization of metadata between distributed catalogs
- Support for OGC-CSW 2.0.2 ISO Profile, OAI-PMH, Z39.50 protocols
- Fine-grained access control with group and user management
- Multi-lingual user interface

The software will be implemented on the EMODnet-Geology website during July or early August.

4. Specific challenges or difficulties encountered during the reporting period

Please list specific problems you have encountered during this period, including related to technical and data provision issues

[Provide a bullet list - maximum 2 pages in total – where more information needs to be provided state ‘contact XXX for more information’]

No difficulties were encountered during the reporting period.

5. User Feedback

List any useful feedback you received on your portal, your activities or those of other EMODnet projects/activities. Also provide any suggestions you have received for EMODnet case studies and/or future products/activities/events.

[Provide information in table - attach the documentation/full user feedback to the report]

Date	Name	Organization	Type of user feedback (e.g. technical, case study etc.)	Response time to address user request

6. Outreach and communication activities

Please list all the relevant communications activities or products you have developed/executed during this period (including presentations, lectures, trainings, demonstrations and development of communication materials such as brochures, videos, etc.). Relevant scientific and/or popular articles you know have been published using/referring to EMODnet should be reported under indicator 11 in Section 7.

[Provide information in table - Maximum 1 page]

Date	Media	Title	Short description and/or link to the activity
April	EuroGeoSurveys Newsletter	Report from the Marine Geology Expert Group	http://www.eurogeosurveys.org/wp-content/uploads/2014/05/April_2014-Issue-14.pdf

7. Updates on Progress Indicators

Using the indicator as a header list the metrics collated and the time interval. If there was no activity to report leave the section under the indicator header blank.

Indicator 1 - Volume of data made available through the portal

Indicator 2 - Organisations supplying each type of data based on (formal) sharing agreements and broken down into country and organisation type (e.g. government, industry, science).

Indicator 3 - Organisations that have been approached to supply data with no result.

Indicator 4. Volume of each data type downloaded from each portal.

Indicator 5. Organisations that have downloaded each data type.

Indicator 6. User statistics to determine the main pages utilised and to identify products being used.

Indicator 7. List of what downloaded data has been used for.

Indicator 8. List of organisations that have downloaded data from more than one portal.

Indicator 9. Interoperability of data of different types and from different portals.

Indicator 10. Monitoring level of interaction with member states national processes for data stewardship.