EMODnet

European Marine Observation and Data Network

EMODnet Thematic Lot n°1 - Geology

EASME/EMFF/2018/1.3.1.8 - Lot 1/SI2.811048

Start date of the project: 25/09/2019 - (24 months)

EMODnet Phase III –Final Report

Reporting Period: 25/09/2019 – 24/09/2021

The European Marine Observation and Data Network (EMODnet) is financed by the European Union under Regulation (EU) No 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund.

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Disclaimer

Executive summary

The EMODnet-Geology Project started on 25th September 2019, was executed for 2 years, and ended on 24th September 2021. The group consisted of 30 partners and 9 subcontractors who were able to provide geological information from all of the European seas including the North Atlantic Ocean and the margins of the Arctic, Barents Sea and White Sea, as well as the Caspian Sea.

During the first months of the project efforts were put on partner communications and information on actions for the first project year. This was mainly achieved through the kick-off meeting, held in Athens on 22-24. October 2019 at the Hellenic Centre for Marine Research. Later it showed out to be the last face-to-face meeting that we managed to arrange due to the covid-19 pandemic. At the kick-off meeting general work plans for the entire project and detailed activities for the next six to twelve months were decided upon. These were later updated during three separate remote project meetings, in September 2020, April 2021 and June 2021. During the time between the meetings communication between the partners and WP leads was intensified in order to keep up the schedule. This was monitored through an excess of remote Steering group meetings where things were checked up.

Formalised EMODnet Geology standards and protocols were reported in two peer reviewed EMODnet Geology special issues, presenting case studies of coordinated marine-geological mapping. The different published studies represent different marine geological themes from different European sea areas. The red thread of both special issues is that through EMODnet we created European standards to be adopted worldwide. See more in WP10 below and chapter 10 for accepted papers.

The Caspian Sea was included in the geographical scope for our lot in the beginning of this phase. Our Russian subcontractor VSEGEI, who acts as a regional coordinator for the Caspian Sea task, actively cooperated with the Scientific Centre on Geology, Geophysics and Geochemistry of Caspian Research Institute of Atyrau Oil and Gas University with which a subcontract was signed for the creation of geological maps for the Kazakhstan area of the Caspian Sea. Discussions with Institute of Geology and Geophysics of Azerbaijan National Academy of Sciences (IGG ANAS) regarding their participation in EMODnet-Geology were not fruitful, but instead a subcontract with Azerbaijan was signed with Azerbaijan Geographical Society. VSEGEI is continuously working to get a subcontract in Turkmenistan, which however, has failed so far. But luckily that part of the Caspian Sea used to be a part of the Soviet Union and there are a lot of geological material obtained by investigations conducted by the USSR Ministry of Geology before 1991. This allowed to develop sets of geological maps for this part of the Caspian sea. Unfortunately, the Iran sanctions have hindered subcontracting in Iran.

Updates on data from the Caspian Sea have continuously been submitted by the Caspian Sea task leader VSEGEI to all our work packages. At this moment map products from the Caspian Sea are available on the EMODnet Geology portal for all but one EMODnet Geology work package. The last work package 8, Submerged landscapes, will have their first Caspian Sea data added to the portal in the beginning of next phase (data already received from VSEGEI).

Highlights of the different workpackages

WP1. Project Management. Many changes in plans due to the COVID-19 pandemic, see later in report.

WP1. Project Management. At the kick-off meeting in Athens in October 2019 general work plans for the entire project and detailed activities for the next six to twelve months were decided upon. These were later updated during three separate remote project meetings, in September 2020, April 2021 and June 2021. Altogether, project management has worked very well though the remote meetings.

WP1. Project Management. The EMODnet Geology Coordinator has actively coordinated the planning of the work of the Caspian Sea task together with the Russian partner VSEGEI (EMODnet Geology subcontractor). VSEGEI as the regional coordinator of the Caspian Sea task made in early stage contacts with organisations in the Caspian Sea countries Kazakhstan, Azerbaijan, Iran and Turkmenistan. Subcontracts have been signed with parties in Kazakhstan and Azerbaijan, while getting a subcontract in Turkmenistan has failed so far. Moreover, the Iran sanctions have hindered subcontracting in Iran.

WP1. Project Management. 23 scientific contributions from the different WP's to two different Geological Society of London issues presenting in scientific papers the standard EMODnet Geology methodologies and protocols highlighting the work thus far. See WP10 below and for accepted papers chapter 10.

WP2. Geological data specification and sourcing. Partners and subcontractors were at the kick-off meeting asked to report new data and metadata, which have been collected and are now in the process of harmonisation. The same applies to the Caspian Sea subtask where VSEGEI has collected and prepared data from Russia and other Caspian Sea countries, and submitted these to the different work packages, which have harmonised and released these in the new and updated EMODnet products.

WP3. Seabed substrates. Seabed substrate data products have been updated on the EMODnet portal twice during this phase, first in 31.12.2020 and second in 21.9.2021. Both publications included News releases. The updates have added new scales into the multiscale data product with the current data including scales from as detailed as 1:1.500. Also, the latest update has included the Caspian Sea into the broad scale data product (1: 1 000 000/5 000 000).

New update of sedimentation rates data was published in April 2021 together with News Release.

A case study report on "Quantitative spatial prediction of sediment distribution across selected sea-basin(s)" was delivered to WP 3 leader on 6.8.2021 and was released on the portal 21.9.2021.

A close collaboration with the Seabed Habitats Lot has continued. EMODnet Seabed substrate data (draft final version) was distributed to Seabed habitats lot in 30.6.2021.

WP 3 has developed the user friendliness of its data products (e.g. seabed substrate attribute table and the ReadMe files to be more informative about the update history). Seabed substrate product pages were updated in January 2021 with more informative content, e.g., product figures and attribute table explanations.

Dissemination activities include several project presentations as well as scientific publications e.g., in Continental Shelf Journal (Mitchell et al., 2021). In addition EMODnet Geology seabed substrate data (from Finland) is available also via the Finnish Marine portal that opened in April 2020 https://www.marinefinland.fi/en-US.

WP3 has created metadata records according to Technical Guidelines based on EN ISO 19115 and EN ISO 19119 to improve INSPIRE compatibility.

WP4. Sea-Floor Geology.

A Web Viewer for EMODnet WP 4 results on-line via BGR web site has been developed.

WP 4 had provided Guidelines and a booklet of vocabularies to the participants.

The Geological Society of London Special Issue (Asch, K, Kitazato, H. and Vallius, H.: From Continental Shelf to Slope - Mapping the Oceanic Realm with 9: contributions from EMODnet Geology project partners are in its final phase – all papers were reviewed and only one is waiting for acceptance (see chapter 10 of this report).

Considerable progress on Harmonisation in the new prototype area Southern North Sea study area has been achieved.

A collection and comparison of methods to map geomorphology data has been discussed, and as an example the Prototype area "Western Baltic Sea" results were introduced at the EMODnet Jamboree as a poster.

Within the geomorphology theme an additional, new layer "general physiographic features" was compiled and published on the EMODnet Geology Portal.

In order to increase the speed of performance and aid the user to find the data they are interested in, the Quaternary geology layer was subdivided according to its resolution into four new layers:

a) > 100k, b) 100 – 300 k, c) 300 – 1500 k, d) 1500 – 3000 k

All layers are actualized and available at the EMODnet Geology portal and the web viewer of BGR (geoviewer).

WP5. Coastal Behavior. In March 2021, a new shoreline-migration map was released, allowing policy makers, together with national and regional coastal managers, to determine large-scale coastal behavior and identify areas of rapid change. This map is based on field measurements and aerial photography and covers time periods up to decades. The map is particularly valuable for cliffs, which are prevalent along European coastlines. In May 2021, a new coastal type map was released, building on the EUROSION map of coastal type made almost twenty years ago and showing the combined effect of geology and human influence. Together, these have a direct influence on vulnerability and resilience to climate change. The new map fills gaps and gives a first-order indication of vulnerability and resilience for policy makers, identifying areas of potentially irreversible future change. In the summer of 2021, a literature and map inventory of coastal vulnerability studies was finalized as part of student internships at partner Edge Hill University. It forms the basis of a partial-coverage vulnerability map that will be released in the next phase of EMODnet Geology.

WP6. Geological Events and Probabilities. Requirements evidenced by the evaluation of the Secretariat concerning products displayed on the Portal have been fulfilled. Differently from previous phases, in which fluid emissions of volcanic origin had been included into the volcanic centres layers, in this phase they have been considered together with fluid emissions of non-volcanic origin. This was done to overcome overlapping of fluid emission occurrences on top of volcanic occurrences, which would have been difficult to distinguish at the higher resolution requested by the present phase. A map of susceptibility to submarine landslides, based on elaboration of data available within EMODnet Geology and EMODnet Bathymetry, has been produced.

Submitted dissemination papers have been revised and accepted (see chapter 8).

WP7. Marine Minerals. Seabed mineral WMS completed and launched. EMODnet WP7 data was included under marine aggregates and marine minerals subchapters of the EU Blue Economy Report 2020. The Report and its annexes, jointly prepared by DG MARE and the JRC, was published and can be found at: https://blueindicators.ec.europa.eu/. Link to press release (https://ec.europa.eu/commission/presscorner/detail/en/ip_20_986).

WP8. Submerged Landscapes. WP8 released an update to the data product in June 2021. This fully attributed GIS layer now comprises of more than 16,000 features representing 27 classes of submerged landscape and palaeoenvironmental indicators including mapped and modelled palaeocoastlines, evidence for submerged forests and peats, and submerged freshwater springs across all European seas. This update almost doubled the number of features and information compiled previously.

WP9. Data management, web portal and services. The portal was up and running during the contract break and has been running since.

WP9 had four main tasks that were all fulfilled; Manage the web portal and interactive maps, maintaining a metadata catalogue, maintaining data entity indices, enable machine-to-machine connections, develop methodologies for making new datasets available for discovery and download, offer performance monitoring, offer user feedback forms, and manage a help desk.

During this phase, WP9 focus has been on strengthening the web map services with higher metadata compliancy, better service performance (response time) and less service down-time. The positive results can be seen in the quarterly reports.

WP9 has developed three new technical components in this phase; Introducing small-area download feature on the interactive map, enhancing open-source focus for improved user-experience by offering QGIS support to download packages with OGC standard SLD styling, and exploring cross-data products by online workshops and mash-up experiments.

WP10. Dissemination EMODnet Geology has throughout the project been disseminated on different public and scientific fora by our consortium partners, for details see chapter 7.

As a major dissemination effort of the whole consortium formalised EMODnet Geology standards and protocols were reported in two scientific peer reviewed EMODnet Geology special issues, presenting case studies of coordinated marine-geological mapping. The different published studies represent different marine geological themes from different European sea areas. The red thread of both special issues is that through EMODnet we created European standards to be adopted worldwide. The issues are published by the Geological Society of London in Special Publications, 505; “From Continental Shelf to Slope: Mapping the Oceanic Realm”, and an EMODnet Geology thematic issue in the Quarterly Journal of Engineering Geology & Hydrogeology: “Mapping the Geology and Topography of the European Seas”, including altogether 23 accepted scientific papers on EMODnet Geology (16 in SP 505 and 7 in QJEGH 7).

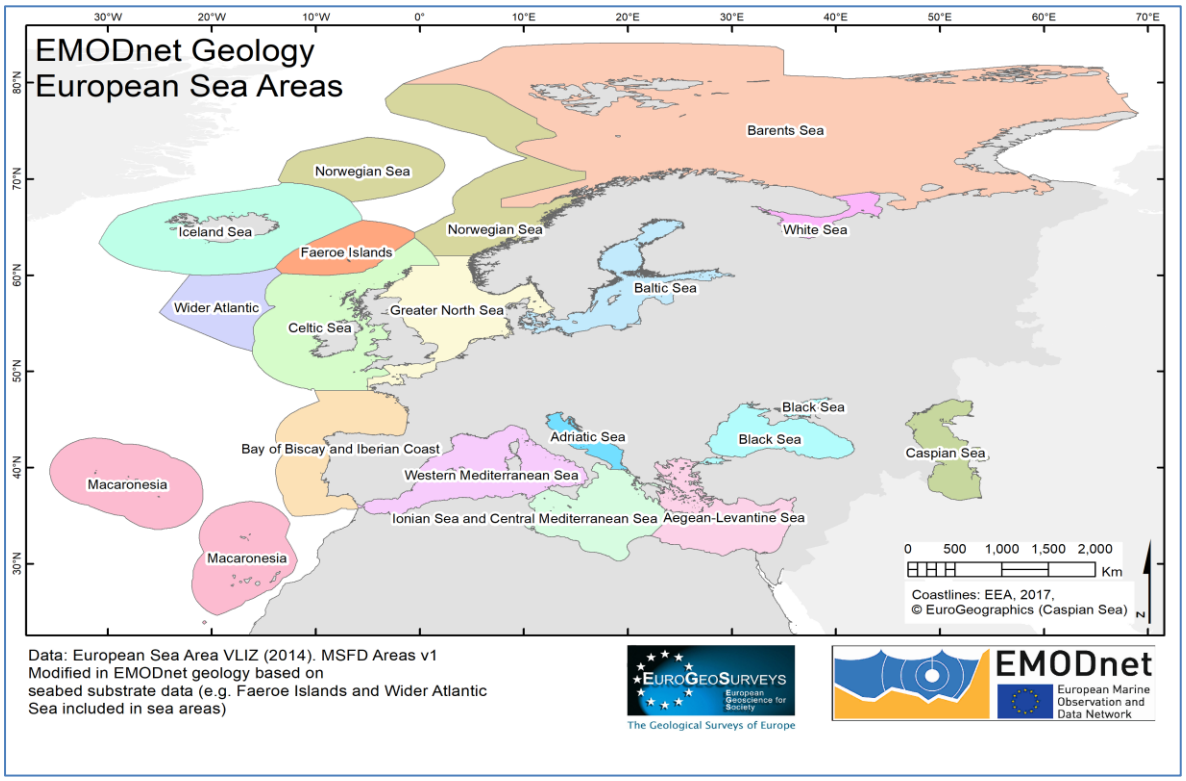
1. Introduction

The EMODnet-Geology Project is one of seven that brings together information on the Geology, Chemistry, Biology, Physics, Bathymetry, Seabed Habitats, and Human Activities in the European marine environment. During the third phase of EMODnet (2017-2019), 39 organisations from 30 countries demonstrated that geological information from all of the European seas could be compiled and harmonised to map products at 1:000 000 scale or finer where the underlying data permit. The EMODnet-Geology Project delivered similar information for the entire European seas, with a multi-scale approach applied when possible. It started in September 2019, was running for 2 years, and ended in September 2021.

The group consisted of 39 partners or subcontractors who were able to provide geological information from all European seas, including the North Atlantic Ocean all the way to the margins of the Arctic (Barents Sea and White Sea) as well as the Caspian Sea (Figure 1). For the Caspian Sea subtask, subcontractors from the Caspian Sea countries were invited to the project. The subtask was coordinated by project subcontractor VSEGEI.

The data that were included in the project were principally that held by the project partners, although other organisations contributed to the geological mapping objectives in some of the participating countries. The geology data products that were compiled in the earlier phases and further in this phase of the project include:

- Sea-bed substrate (sediment layer at the seafloor),
- Sediment accumulation rate
- Sea-floor geology - lithology (bedrock geology beneath the surficial sediment and Quaternary deposits)
- Sea-floor geology - stratigraphy
- Quaternary geology
- Geomorphology and physiographic features
- Coastal behaviour
- Mineral occurrences (e. g. oil and gas, aggregates, metallic minerals)
- Geological events and probabilities (e. g. earthquakes, submarine landslides, volcanic centres).
- Submerged landscapes (LGM landscape, palaeolandscapes across various postglacial timeframes).



The seas included in the geographical scope of the EMODnet Geology Project.

The consortium included the following organisations 1. Geological Survey of Finland (GTK); 2. Geological Survey of Sweden (SGU); 3. Geological Survey of Norway (NGU); 4. Geological Survey of Denmark and Greenland (GEUS); 5. Iceland GeoSurvey (ISOR); 6 Geological Survey of Estonia (EGT); 7. Latvijas Vidas Geologijas un Meteorologijas Centr – Latvian Environment, Geology and Meteorology Centre (LEGMC; Latvia); 8. Lithuanian Geological Survey (LGT); 9. Polish Geological Institute (PGI-NRI); 10. Geological Survey of the Netherlands (TNO); 11. Royal Belgian Institute of Natural Sciences (RBINS); 12. Bureau de Recherches Géologiques et Minieres (BRGM, France); 13. IFREMER (France); 14. Geological Survey of Ireland (GSI); 15. Geological Survey of Spain (IGME); 16. Instituto Português do Mar e da Atmosfera (IPMA, Portugal); 17. Istituto Superiore per la Protezione e la Ricerca Ambientale. Servizio Geologico d'Italia (ISPRA); 18. Geological Survey of Slovenia (GeoZS); 19. Croatian Geological Survey (HGI); 20. Geological Survey of Montenegro (GEOZAVOD); 21. Geological Survey of Albania (GSA); 22. Hellenic Survey of Geology and Mineral Exploration (HSGME, Greece); 23. Hellenic Center for Marine Research, Greece (HCMR); 24. Institute of Oceanology – Bulgarian Academy of Science (IO-BAS); 25. National Research and Development Institute for Marine Geology and Geoecology (GeoEcoMar, Romania); 26. Geological Survey of Cyprus (GSC); 27. Continental Shelf Department, Ministry for Finance and Employment (Malta); 28. Dipartimento Scienze della Terra Università La Sapienza, Roma (UNIROMA, Italy); 29. University of Tartu (Estonia); 30. Foundation for Research and Technology Hellas – Institute of Computer Science (FORTH- ICS); 31. UK Research and Innovation (UKRI - (BGS), United Kingdom); 32. Jardfeingi (Faroe Islands); 33. Centre for Environment, Fisheries and Aquaculture Science (DEFRA - Cefas, United Kingdom); 34. Edge Hill University (United Kingdom); 35. Institute of Geological Sciences, NAS of Ukraine (IGS-NAS-UKR, Ukraine); 36. Institute of Marine Science

and Technology of Dokuz Eylul University (IMST, DEU, Turkey); 37. A.P Karpinsky Russian Geological Research Institute (VSEGEI); 38. Federal Institute for Geosciences and Natural Resources (BGR, Germany); 39. EMCOL Research Centre, Istanbul Technical University (ITU, EMCOL, Turkey).

The partnership consisted mainly of the geological survey organisations of the maritime countries of the European Union, added with expertise from five universities, mainly to fulfill the requirements of work package 8 Submerged Landscapes. Twenty-five of the project partners are also members of the Geological Surveys of Europe (EuroGeoSurveys), which exists to promote the work of the geological surveys and therefore provides a long-term association under which the project partners collaborate.

As the principal holders of marine geological information, the partnership, also ensures that data from all the European regional seas were provided to the project. The project was built on information primarily held by the project partners, but also connected to other owners of information by offering data delivery to EMODnet either through the EMODnet Data Ingestion portal or straight to the EMODnet Geology portal. By doing so, the project would not recreate information that is held elsewhere. This is especially essential in case of the seismic surveys and borings which were partly archived in external databases. The EMODnet Geology portal (http://www.emodnet-geology.eu/) is from the beginning of the third phase of EMODnet hosted by the Geological Survey of Denmark and Greenland (GEUS) in Copenhagen. In order, to ensure sustainability of the EMODnet Geology project, the EuroGeoSurveys' European Geological Data Infrastructure (EGDI) provided an appropriate platform for developing a long-term infrastructure for delivering the best available and up-to-date marine geological information held by the project partners.

2. Update on the Tasks

Start of project phase 25. September 2019.

Task 1: Develop a common method of access to data held in repositories:

We continuously work on improving the services offered through the portal. Relying on OGC standards and building on open source software like Geoserver and GeoNetwork, we offer our data products through WMS, WFS, and CSW. This phase of the project has focused on improving the INSPIRE compliancy on metadata descriptions and services and during the second part of the reporting period on technical coordination with the EMODnet Secretariat on preparing for the next phase of EMODnet with only a central portal.

Task 2: Construct products from one or more data sources that provide users with information about the distribution of parameters in time and space:

Several data products hold temporal components in the form of geological time aspects. Submerged landscapes being last in terms of recent ages. However, in EMODnet Geology there are not actually simply parameters that are handled as we produce map products that mainly are interpretations of a multitude of different geospatial data, which themselves are not presented.

Task 3: Develop procedures for machine-to-machine connections to data and data products:

All data products are listed on the "Services" page with links and examples to web services. Regarding metadata, we have a running service (GeoNetwork) enrolled into nightly harvesting by EMODnet main portal and EGDI MICKA. All data products were quality controlled to improve machine-to-machine connectivity.

Task 4: Maintain and further develop a thematic web portal allowing users to find, visualise and download data and promote the data and data products of the portal:

The web portal continues to be improved. It was improved with the possibility to search for layers by free-text search through layer titles. Also, the base map selection was extended with new Natural Earth theme. The base map selection was moved to the top, for better user experience. Several subtle improvements were introduced to the portal following recommendations from CINEA (formerly EASME) and the EMODnet Secretariat. The web portal continues to be improved in collaboration with other geological EU-projects. GeoERA is currently contributing to the behind-the-scenes management features of the web portal. The EMODnet Geology portal received content updates to reflect the current state of available data products. In cooperation with GeoERA, the web-GIS improved with minor bug fixes and usability improvements.

Task 5: Ensure the involvement of regional sea conventions:

No activity, mainly due to lockdown in Europe. The involvement of RSC's has been discussed with the Secretariat and the different EMODnet lots and plans have been made for common meetings between the EMODnet lots and the RSC's during the next EMODnet phase.

Task 6: Install a process to monitor performance and deal with user feedback:

We are linked to a monitoring system hosted by the main portal (Grafana). Here we can login and extract performance and user statistics. The portal offers users the possibility to write feedback. We participate in all statistical initiatives put forward by the EMODnet Secretariat and Steering Committee.

Task 7: Operate a help desk offering support to users:

We continuously run our help desk according to rules set in the Tender Specifications.

3. Work Package updates

Status of the Milestones and Deliverables listed in the workplan				
Milestone/Deliverable	WP	Date due	Status (Delivered/Delayed)	If Delayed: reason for delay and expected delivery date
M1. Data specification and sourcing ready	WP2	Month 3	Completed by month 3, additional updates during months 4-22.	
M2: Web portal updated T0+3 months	WP9	Month 3	Completed	
M3: Interim report and evaluation of progress	WP1	Month 13	Completed	
D 1.1 – D 1.6 (quarterly) Progress reports	WP1/all	M3, M6, M 9, M12, M15, M18	Delivered on time	
D2.1 Interim report	WP1	Month 12	Delivered 22.9.2020	
D2.2. Final report	WP1	Month 24		
D3.1: First data products/maps updated	WP's 1-9	Month 3	Delivery ongoing (see details for different WP's below)	First data products/maps were updated for internal use and evaluation during M1-M3. After that updates have been gradually added to maps on portal.
D3.1. Seabed substrate information at a scale of 1:100 000 or more detailed from the European Seas, first/ updated product	WP3	31.12.2020	Delivered	
D3.1 pre-Quaternary seafloor geology information up-dated and delivered to the portal	WP4	Dec. 2020	delivered	
D 3.1: New map for coastline migration based on field data and aerial photography	WP5	Originally May 2020	Delivered March 18th	New data from Caspian Sea, Slovenia and Montenegro added in a summer 2021 update
D 3.1: New coastal type map	WP5	27th May	Delivered	Data from Turkey added in a summer 2021 update
D 3.1: New coastal vulnerability map	WP5	Ver. 0 by September 2021	Literature inventory completed, used maps from literature georeferenced	

D 3.1: Updates and new deliveries from Partners including data from the Caspian Sea	WP6	30.09.2020	Delivered	
D 3.1: Construction of harmonized layers	WP6	28.02.2021	Delivered	
D 3.1: Validation of harmonized layers by partners	WP6	30.04.2021	Delivered	
D 3.1: Points layers produced at different scales have been merged into layers without scale specification whenever possible (tsunamis, earthquakes)	WP6	30.06.2021	Delivered	
D 3.1: Preparation of test maps for validation by partners	WP6	30.06.2021	Delivered	
D 3.1: Delivery of data products	WP6	31.07.2021	Delivered	
D 3.1; Delivery of landslides susceptibility map	WP6	31.07.2021	Delivered	
D3.1: Mineral data merged and updated	WP7	31.03.2021	Delivered	
D 3.1: Final merge and update to the portal	WP7	24.9.2021	Delivered	
D 3.1: Submissions received, QC:d and harmonised	WP8	01/06/2021	Delivered	
D3.2. Final data products/maps available	WP's 1-9	Month 24	Delivered by all WP's, examples below	
D3.2. Seabed substrate information at a scale of 1:100 000 or more detailed from the European Seas, final product	WP3	24.9.2021	Delivered 21.9.2021	
D3.2. Sedimentation rates of recent sediments for the European Seas as point data, final product	WP3	30.4.2021	Delivered	
D3.2. Quantitative spatial prediction of sediment distribution across selected sea-basin(s)	WP3	24.9.2021	Delivered by end of project	

D 3.2 All WP 4 themes (pre-Quaternary seafloor geology, geomorphology, and multiscale Quaternary)	WP4	Sept 2021	Delivered	
D 3.2: Updated "Submerged Landscapes" data product 'live' on webportal and social media	WP8	24.06.2021	Delivered	
D3.2 WP8 Submerged Landscapes, Explanatory text/outreach activities. Explanatory text/maps for website.	WP8	1st August 2021	Delivered.	
D3.2 WP8 Submerged Landscapes, Liaison with other EMODnet Work Packages to ensure consistency in common features/elements.	WP8	1st August 2021	Delivered	

WP1 – Project management

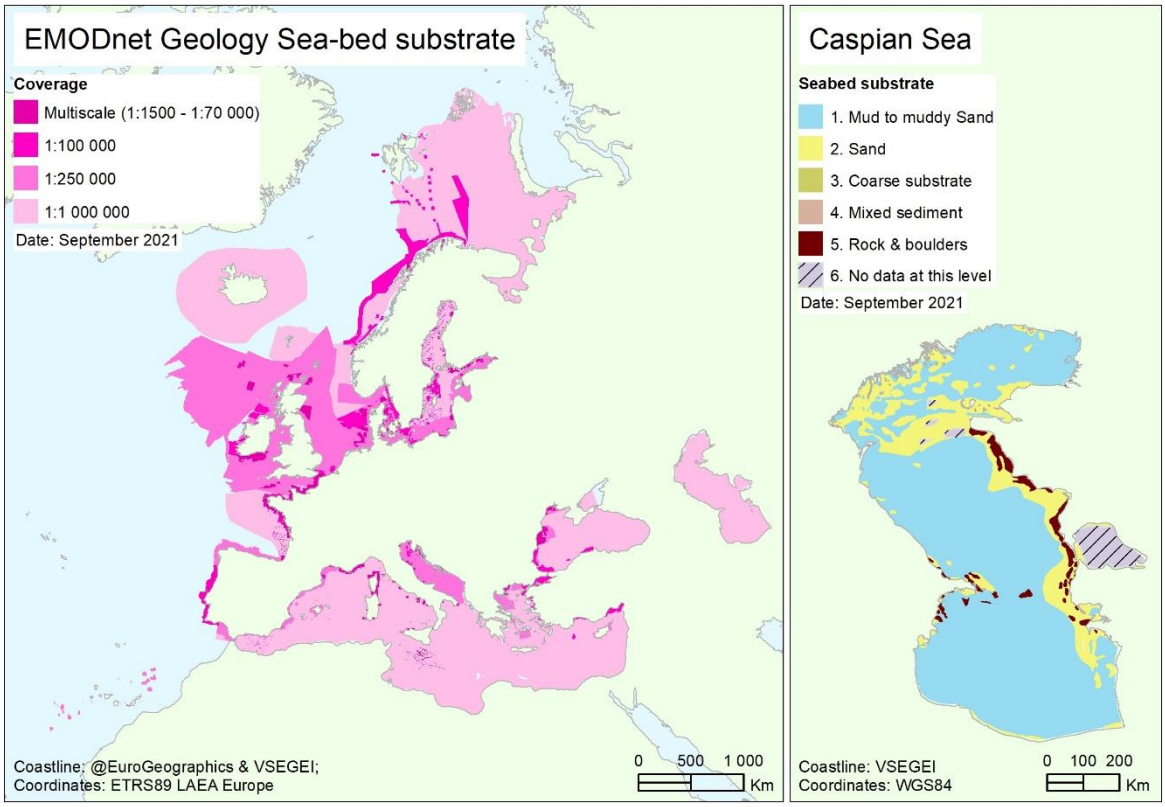
D1.1 – D1.4 Progress reports submitted each quarter according to given schedule. Delivered.

WP2 – Data specification and sourcing

Data specification and sourcing achieved by T0+3

WP3 – Seabed substrate

D3.1 Construction of the seabed substrate data products and services, due autumn 2020. 1st version of updated seabed substrate map/data at a scale of 1:100 000 (or finer) finalized (31.12.2020).
D3.2. Seabed substrate information at a scale of 1:100 000 or more detailed from the European Seas, final product. Finalized and delivered 21.9.2021. In addition, the previous data products at 1:250 000 and 1:1 000 000 scales have been updated and 1M product now includes the Caspian Sea.
D3.2. Sedimentation rates of recent sediments for the European Seas as point data, final product. Finalized and delivered in April 2021.
D3.2. Quantitative spatial prediction of sediment distribution across selected sea-basin(s). Case study report was delivered to WP 3 leader 6.8.2021 and will be released at the portal by 24.9.2021.

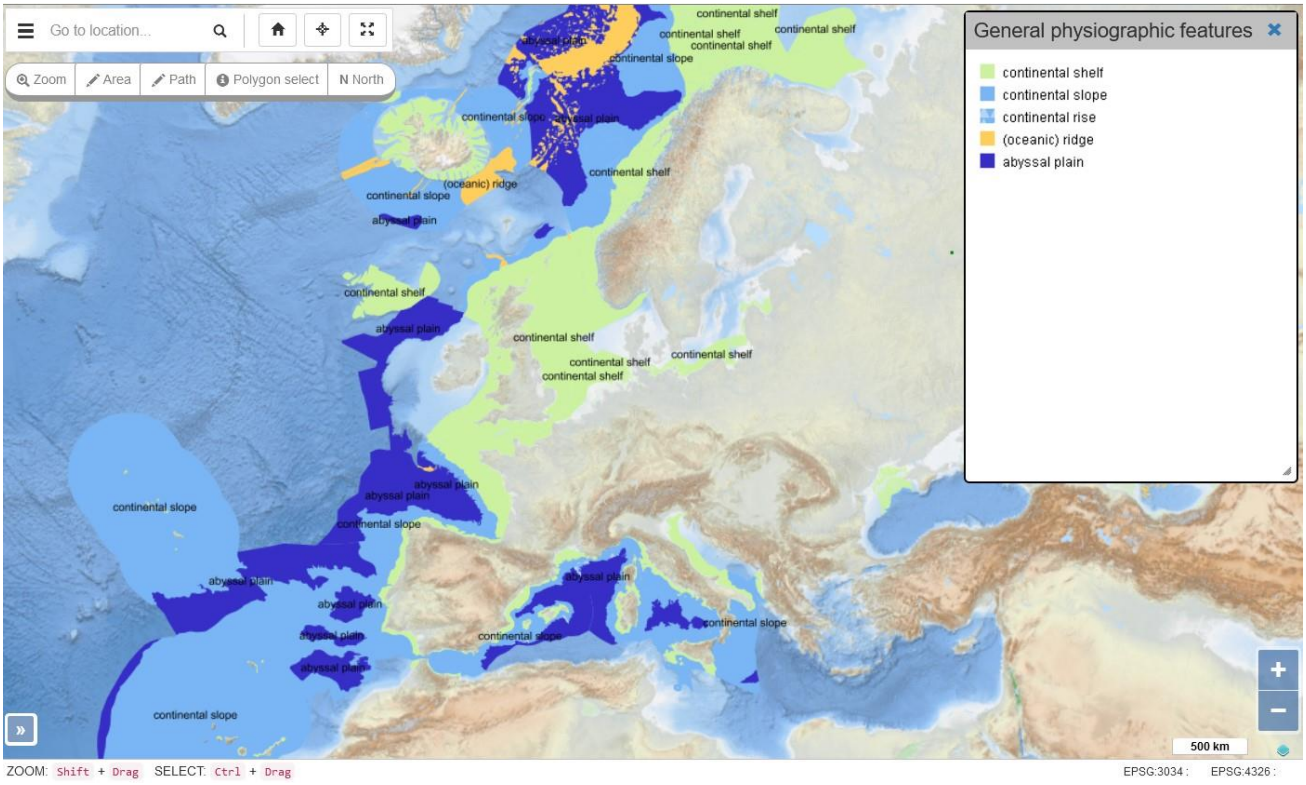


Coverage of seabed substrate data in different scales and seabed substrate map from the Caspian Sea.

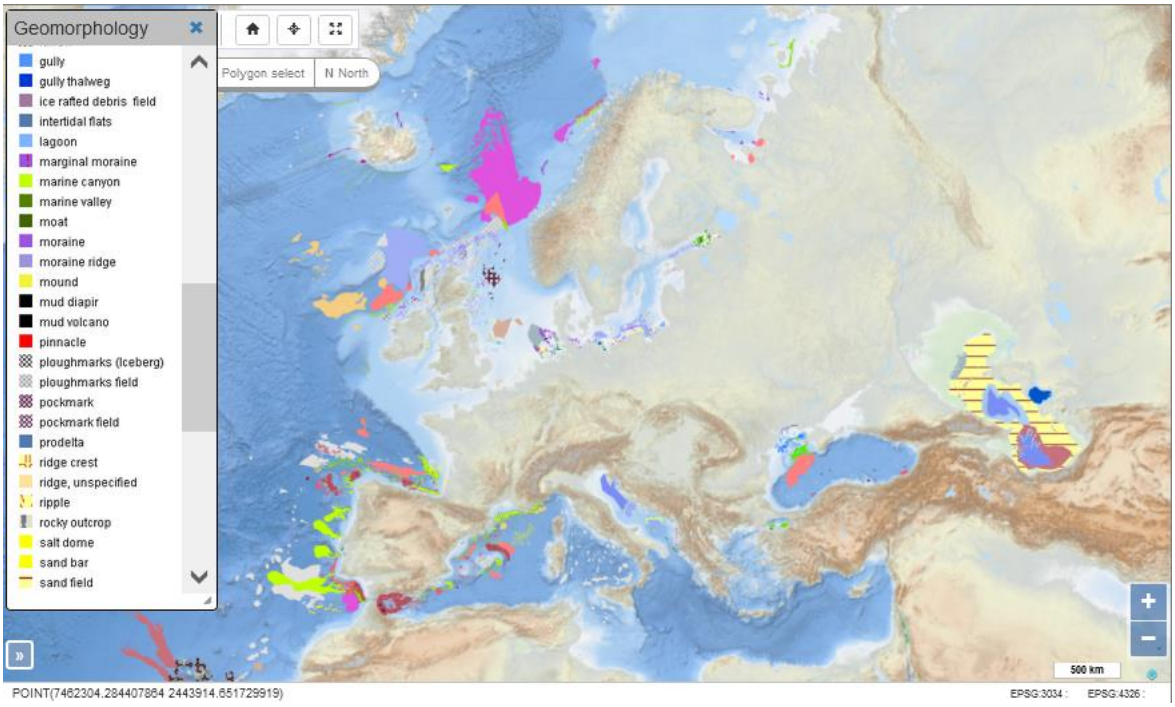
WP4 – Sea-floor geology

D3.1: All data products/maps updated, achieved. Updated guidelines and vocabularies provided to partners. New layer for geomorphology theme created and provided on-line: general physiographic features, new input for the geomorphology and Quaternary theme layers, in addition: subdivision of the Quaternary map layers according to scale, provided on-line, update for pre-Quaternary data delivered.

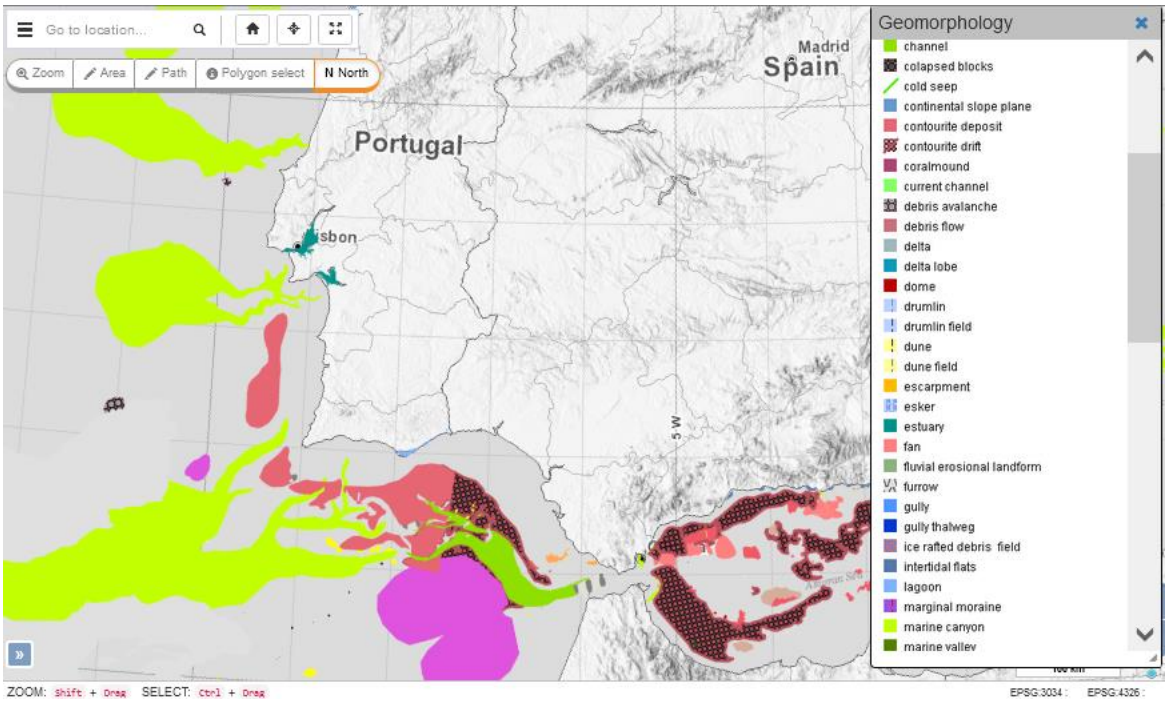
D 3.2 All WP 4 themes (pre-Quaternary seafloor geology, geomorphology, and multiscale Quaternary updated and provided to the portal – achieved



Theme geomorphology: New WP 4 layer: General physiographic features to give an overview on the small-scale geomorphological and physiographic features.



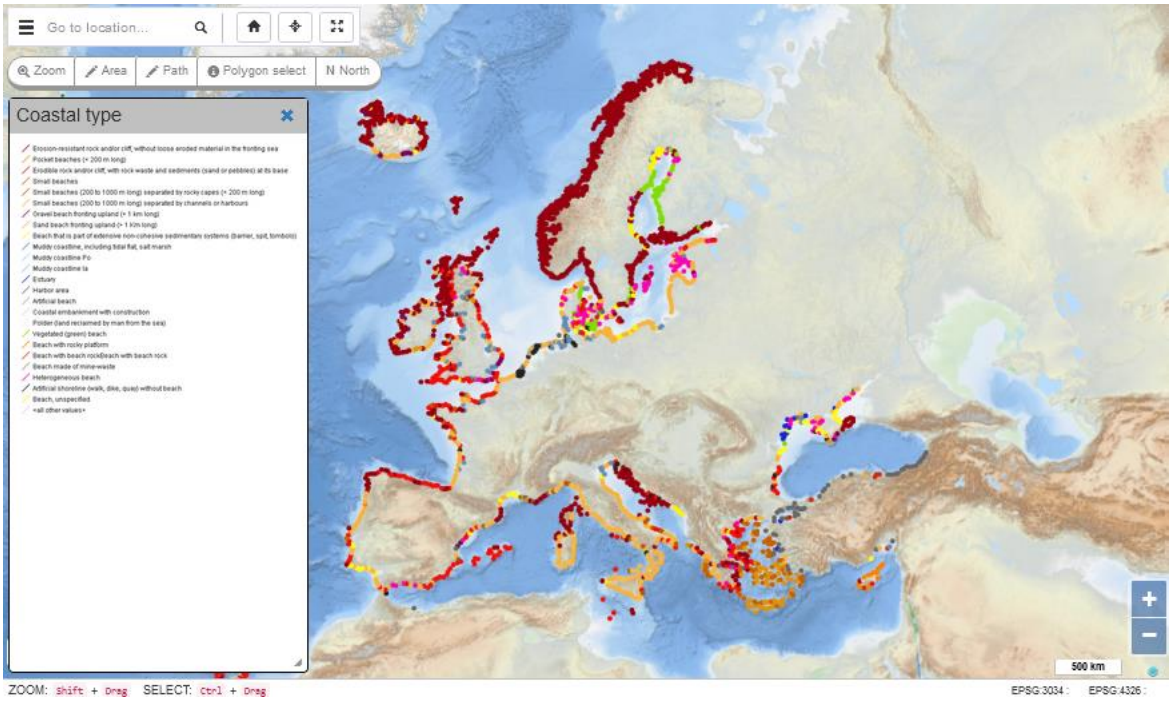
Theme geomorphology: Updated and refined geomorphology of Europe with new details. Only a few features visible in the legend, for complete legend see website https://www.emodnet-geology.eu/map-viewer/



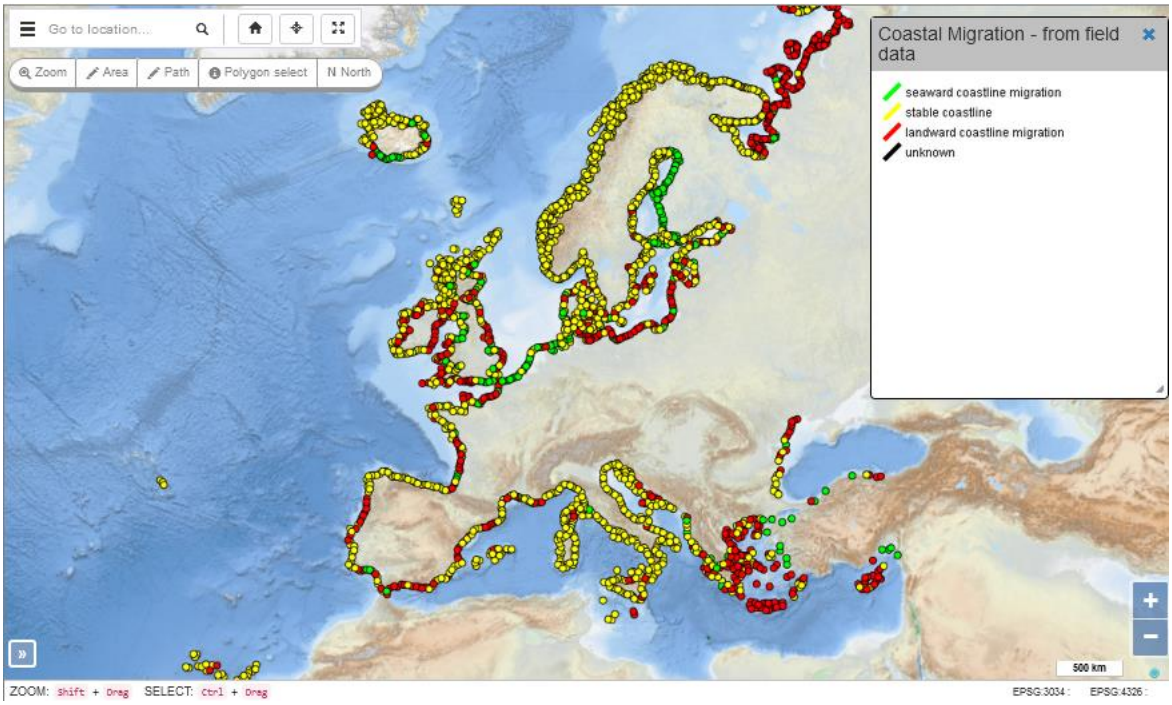
Theme geomorphology, detail view of the Portuguese and Spanish marine areas. Only a few features visible in the legend, for complete legend see website https://www.emodnet-geology.eu/map-viewer/

WP5 – Coastal behaviour

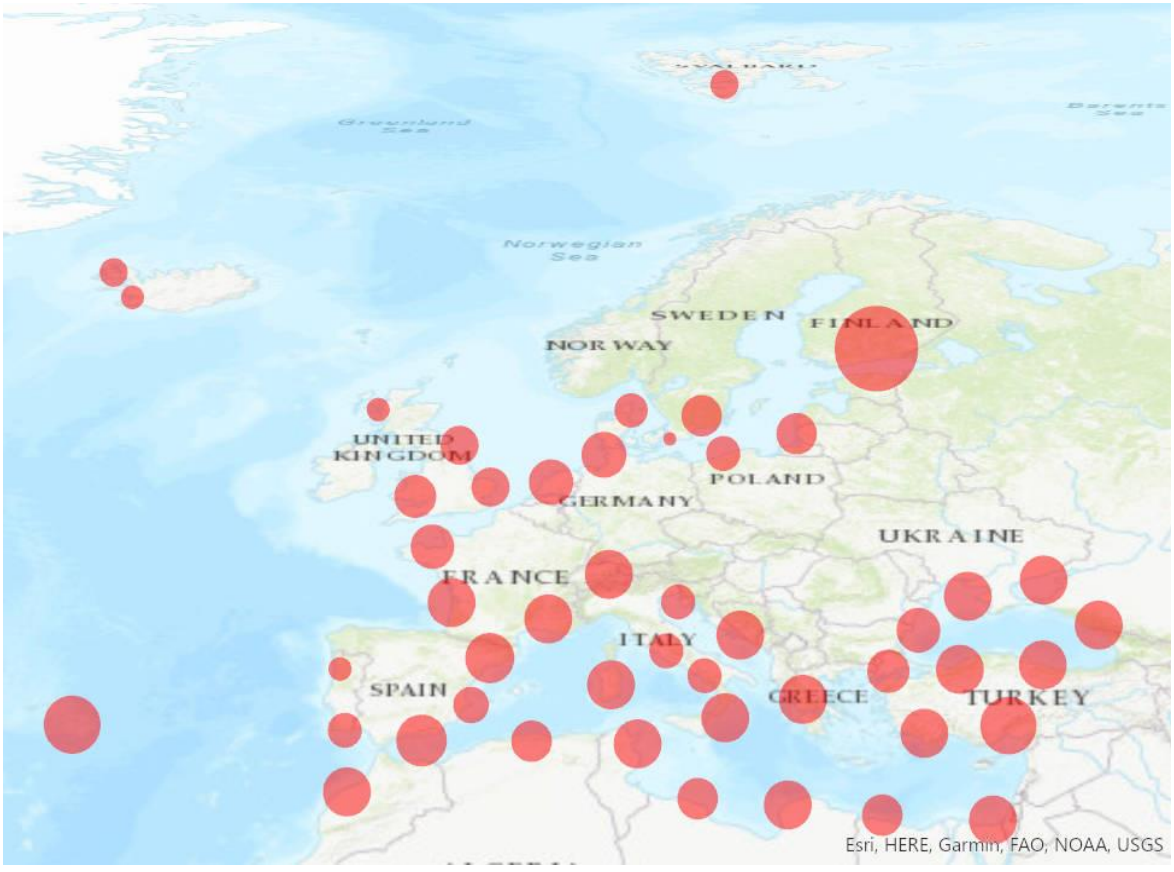
D3.1/3.2: WMSs for coastline migration based on field data/aerial photography and coastal type are operational. The 'final' WMSs will be updated with newly available data periodically. They are 'living' deliverables.



Coastal typology



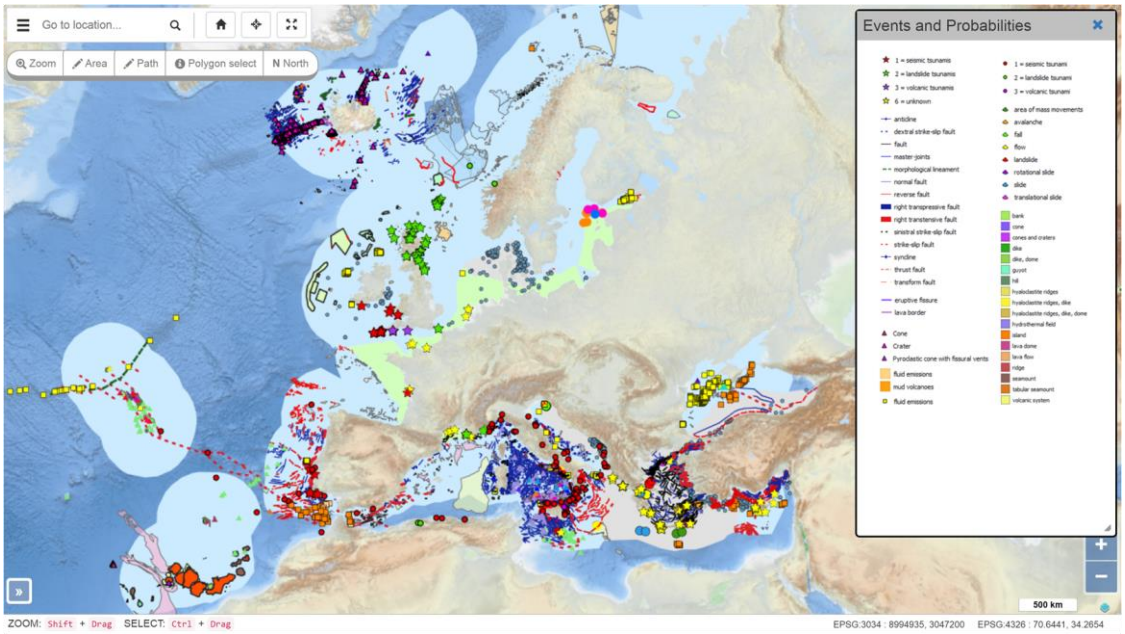
Coastal migration



Inventory map of coastal-vulnerability studies.

WP6 – Geological events and probabilities

D3.1: Data products/maps have been updated with additional deliveries by Partners as well as with new data, including those from the Caspian Sea. Fluid emissions of volcanic origin have been reported together with fluid emissions of non-volcanic origin in the dedicated layers because, at the higher resolution required by the current phase, volcanic fluid emissions may overlap to volcanic structures polygons. Points layers produced at different scales have been merged into layers without scale specification whenever possible, i.e., tsunamis and earthquakes, whereas for other occurrences geometry is also linked to the resolution of data acquired. As an example, landslides point layer at 100k could not be merged with landslides point layer at 250k. A map of submarine landslide susceptibility in European seas was developed, starting from the points, lines, and polygons of the landslide datasets in the EMODnet Geology portal, using the maximum entropy model (MaxEnt) and the bathymetry and slope derived from the EMODnet Bathymetry portal. The model and method used to generate the submarine landslide susceptibility map were described in one of the papers published in the QJEGH Special Issue on EMODnet Geology.

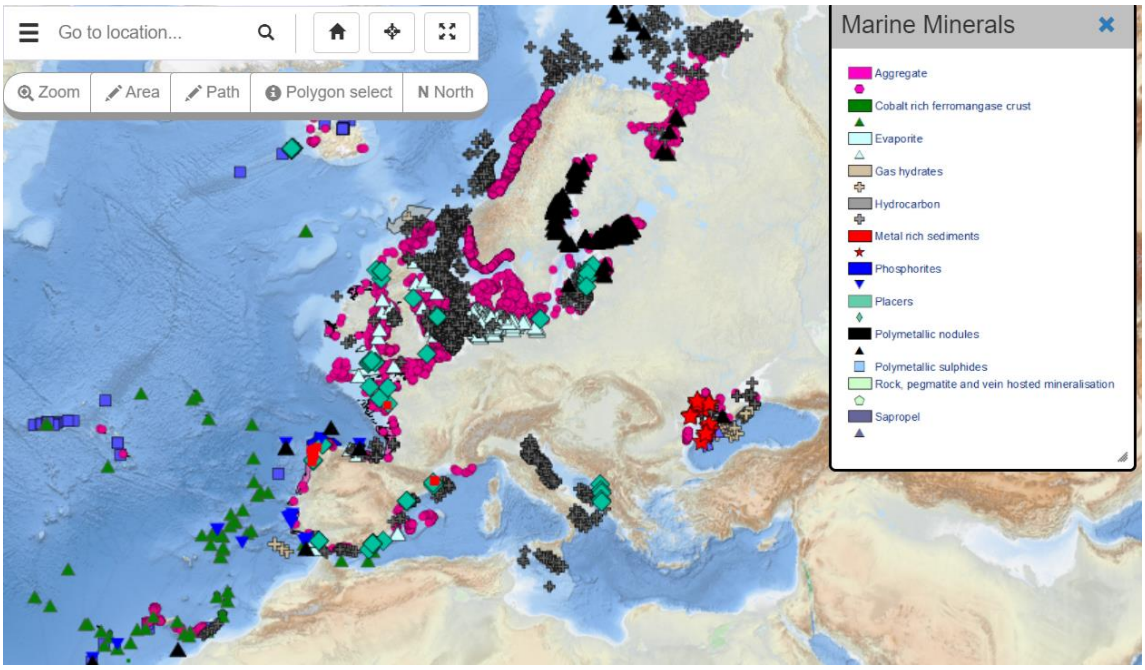


Geological events and probabilities summary map on the EMODnet Geology portal.

WP7 – Minerals

D3.1. 24 partners submitted marine mineral data to WP7. These data were collated and merged producing updated layers for 12 marine mineral types, with associated INSPIRE compliant metadata.

D3.2. The new data is available via the EMODnet Geology portal and is also available as a download package and WMS services

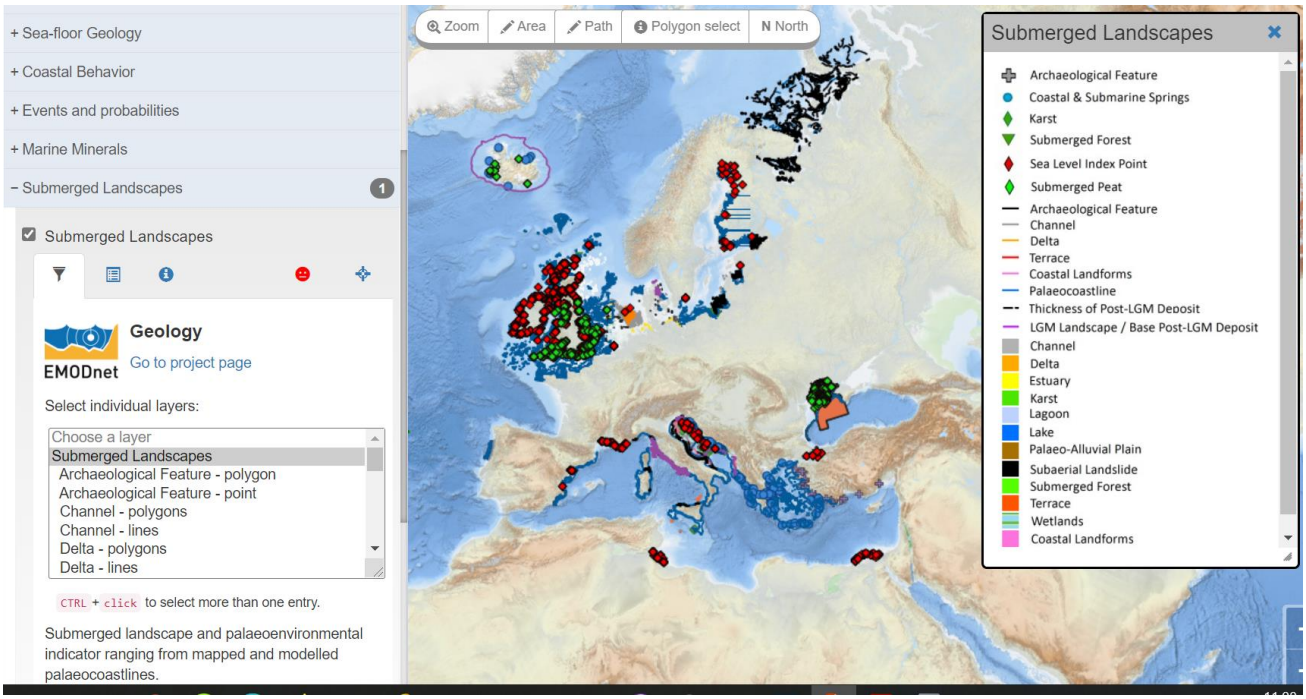


Summary map of Marine minerals on the EMODnet Geology portal.

WP8 – Submerged landscapes

D3.2. WP8 released an update to the data product in June 2021. This fully attributed GIS layer now comprises of more than 16,000 features representing 27 classes of submerged landscape and palaeoenvironmental indicators including mapped and modelled palaeocoastlines, evidence for submerged forests and peats, and submerged freshwater springs across all European seas. This update almost doubled the number of features and information compiled previously. These harmonised products will underpin regional palaeogeographic reconstructions at 20000, 9000, and 6000 years BP during the next development phase.

Products and activities from WP8 have been presented at a number of national and international conferences such as the European Geophysical Union (EGU) 2021 and the Bi-annual Conference of Italian Marine Geologists. A number of peer review articles have also been published that showcase WP8 products (e.g. Bechor, B., et al. doi: 10.1016/j.quascirev.2020.106680). Links have been made with the NEPTUNE project through EMODnet-Geology project partners from Slovenia who are embedded in the NEPTUNE project and a presentation by the Work Package Leader at a dedicated session at EGU2021.



Summary map of Submerged landscapes on the EMODnet Geology portal

WP9 – Data management, web portal and services

D3.2: All data products/maps updated. Participated in all progress reports. In this phase of the project, WP9 has focused on assisting the other work packages in planning and structuring their data product deliverables. Also, WP9 is involved in discussing and planning the future migration of the portal to the central portal.

In addition to the above, the work package has overseen various ad hoc responsibilities:

- Online support and feedback response for external users
- Offering consultation to product developers within the project
- Maintaining and servicing internal applications, portal, web-GIS, and databases
- Assisting other work packages in packaging, describing, parsing, and deploying new products
- Participating in Technical Working Group meetings and other cross-lot initiatives
- Reporting statistics and other KPI quarterly, term and mid-term
- Technical coordination with EGDI and INSPIRE
- Complying with new rules and initiatives involving portal updates

WP10 – Dissemination

There were no planned deliverables or milestones for dissemination, but 23 scientific articles have been accepted and published in two different thematic issues of the Geological Society of London, see chapter 8.

4. Identified issues: status and actions taken

A. Priority issue(s) identified and communicated by CINEA/ DG MARE/ SECRETARIAT				
Priority issue	Status (Pending/Resolved)	Action(s) taken / remaining actions planned	Date due	Date resolved
WP9. Data management, web portal and services. Comment from EASME: Regarding activities on the portal, facilitating machine to machine connections is a key element for the development and dissemination of EMODnet (section 1.3 and 1.4.1 of tender specifications). To facilitate discovery and usage of OGC Web services (WMS, WFS, WCS), the INSPIRE metadata fields (metadata url - pointing to an xml end-point record - and data url - pointing to predefined download link) should be filled.	Resolved	We identified the need for further INSPIRE compliance in our OGC Web Services (WMS, WFS, WCS) where metadata URL (pointing to an xml-end-point record) and data URL (pointing to predefined download link) should be filled. These issues were addressed in 2020 Q1.	Q1 2020	Q1 2020
WP9. Data management, web portal and services. Comment from EASME: As per Section 2.1.3 of Annex I to the contract, and to ensure maximum consistency amongst the different EMODnet portals, please reinforce the alignment of the layout of your portal (and in particular the landing page) with that of the others. Items to consider include the position of the logo, footer, missing text beside the favicon, potentially a big welcoming picture illustrative of the activities of the portal, etc. Please find attached the EMODnet Visual Identity Guidelines and please refer to the EMODnet Secretariat in case you need further guidance on their application.	Resolved	Regarding portal user-friendliness, the EMODnet Secretariat has identified a few recommended improvements for the EMODnet Geology portal. Especially placement of logo and use of correct SoMe-icons is of high importance, where EMODnet Geology is the only portal with a logo in the top left corner instead of having a clear margin to the left and with SoMe-icons in color instead of gray. This was corrected in 2020 Q1.	Q1 2020	Q 2020
Metadata URL in XML format are missing for three layers:	Resolved	Feedback to the Portal manager	Q1 2020	Q 2021

ispra:landslide_pol_100k ispra:geological_event_distribution ispra:tsunami_pt2_250k				
Data URL not identified for the layer: events_and_probabilities	Resolved	Data-URL for Events and Probabilities does not exist, because it is not a layer by itself but it is only the title grouping all WP6 layers	N/A	N/A
Southern Mediterranean coastal behaviour dataset	Pending	Southern Mediterranean won't be added until European QC issues related to satellite-based coastline-migration map are resolved. That work is ongoing, especially for cliff coasts. It will be facilitated now that Deltares has become a full consortium member.	No set date, as the Southern Mediterranean is not part of the core region for which data products are provided	Later phase of EMODnet Geology
WP5. The portal was asked by EASME to put the coastal behaviour map back online, i.e., the one which was based on field-data. The issue was indicated in Q1 2020 to 'hopefully solved by 31 May',	Resolved in several iterative steps.	Corrected data launched on portal on 18. March 2021, well in time during the project period.	May 2020	18.03.2021
WP9 JIRA-85 We were asked to improve our metadata and data URLs.	Resolved	All data products are now provided with metadata and download links, but as new data products arrive, we need to assure the prober registration procedures are followed every time.	31.12.2020	2021.04.01
JIRA-85#2	Resolved	We were requested to offer standard INSPIRE compliant service xml documents to every layer (120) in our WMS and WFS.	2021-04-01	2021.06.30
WP9 JIRA-33 (later 14) We were asked to follow instructions for stress testing our services.	Resolved	We have good corporation with the Secretariat on structuring our OGC services and making orchestrating new data	01.10.2020	2021.03.01

		product releases together with the main portal.		
WP9 JIRA-48 We were asked to make available a CSW for automatic metadata download.	Resolved	CSW available	10.11.2020	21.11.2020
WP9 JIRA-81 We were requested to align our web-GIS with Atlas of the Seas web-GIS.	Pending	We suggested to share an online document, where we keep necessary metadata in sync. This suggestion was postponed to next phase in agreement with the Secretariat.	11.11.2020	11.11.2020
WP9 JIRA-104 We were requested to remove the BREXIT disclaimer from the portal.	Resolved	BREXIT disclaimer removed within 24 hrs.	26.11.2020	27.11.2020
WP9 JIRA-122 We were requested to supply email contact in case of downtime on our OGC services.	Resolved	Informed Secretariat the same day.	14.12.2020	14.12.2020
WP9 JIRA-129 We were asked to split previous quarterly figures to monthly for 2020 and send as a report.	Resolved	Report sent	18.12.2020	05.01.2020
JIRA-140	Resolved	According to JIRA, no further actions necessary.	01.04.2021	01.04.2021
The borehole and seismic indexes need a thorough quality assessment	Resolved	In this quarter, we strengthened the data indexes within EMODnet Geology using the INSPIRE initiative to create a normalised and de-normalised version of the borehole/grab sample index.	30.06.2021	30.06.2021

B. Issues / challenges identified by the thematic assembly group itself				
Priority issue / challenge	Status (Pending/Resolved)	Action(s) taken / remaining actions planned	Date due	Date resolved

The ongoing spread of the **SARS-CoV-2** virus (**COVID-19**) pandemic all over the globe might affect the progress of the project, especially staying on schedule/meeting the deadlines.	Resolved	Meetings changed to teleconferences or postponed. Online meetings on specific WP tasks in small groups. Rescheduling of actions and internal dead-lines.	-	N/A
COVID-19. Some partner or subcontractor organisations have been virtually closed for some time, or it has been difficult to get in contact with them.	Resolved	This issue resolved later when staff were allowed to work in office or managed to start working remotely.	-	N/A
COVID-19. Cancellation of the second EMODnet-Geology meeting in April 2020. Rescheduled remote project meeting in September	Resolved	Remote work meetings, for instance: Partner TNO (WP5 lead) had three meetings on harmonization of WP4 data products for southern North Sea, two meetings on WP4 geomorphological nomenclature and hierarchy.	week 39	EMODnet Geology Full Network Meeting 23-25. September 2020
COVID-19. Cancellation of many meetings and conferences.	Pending	These are essential platforms to showcase the work of the WP and liaise with end-users. Discussion with all WPs to address this 'advertisement', 'end-user' and valuable platform for feedback needs to happen.	-	-
WP5. Coastal behaviour. Finding a way to merge the field-based and satellite-based data products in the portal view, using the field-based data, where available and up to date, and the satellite data where reliable to fill the gaps.	Final solution pending	Currently, focus on technical implementation; quality filters have been defined	Originally Feb 2021, but this turned out to be unrealistic. It will now be part of Q1 in the next phase.	As a temporary solution, the field data can be visualized on top of the satellite data.
WP6/all WPs. Limited remote access to GIS resources	Pending	Concentrate activities during days in office	N/A	
All WPs. Limited access to labs and archives of marine data.	Pending	Dependent of COVID situation	N/A	

All WPs. Earthquake in Turkey and Croatia affect work, mainly communications but also infrastructures, such as offices, laboratories, and archives	Pending	Work is gradually turning to normal	N/A	
WP6. Geological Events and Probabilities. Layers displayed all together or one at a time on the Portal	Resolved	Interaction with WP9 Leader to find a way to select layers to be displayed	Q4 2019	Q4 2019
WP6. Geological Events and Probabilities. Not all symbols display correctly on the Portal	Resolved	A specific library of symbols suitable for Portal tools has been created using an external graphic file (SVG) in combination with the SLD file.	End of 2020	September 2021
A few WP6 polygon layers do not display correctly on the portal	resolved	WP6 polygon layers have to be registered as multipolygon geometry		April 2021
WP6. Fire in the office of WP6 lead. Lead has limited remote access to GIS resources	pending	Refurbishment of ISPRA office after extended fire	January 2022	
WP7. Display of overlapping hydrocarbon and aggregate data	Resolved	was fixed on the WP7 viewer using a "transparency" effect		01.10.2020
WP9. Our data product download function was suddenly unable to send directions to users doing download requests.	Resolved	We migrated to another email-server.	20.11.2020	04.12.2020
There is no uniform digital definition (in GIS format) of the European sea areas and their boundaries used in the EMODnet Lots	Resolved (suggested by GTK)	GTK provided EMODnet Geology Regions shapefile to EMODnet Secretariat (NT)		26.03.2021

5. Allocation of project resources

start of the project phase 25.9.2019.

Information on the allocation of project resources	
Categories	Resource usage[1] (%)
Making data and metadata interoperable and available	20
Preparing data products	35
Preparing web-pages, viewing or search facilities	5
Managing user feedback	5
Project management	20
Outreach and communication activities	10
Others	5

[1] Provide the workings of your calculations, *i.e.* percentage allocation of the total amount awarded.

6. User feedback (Contact us form, online chat & other communication means

Overview of user feedback and/or requests received							
Date	Organisation	Type of user feedback (e.g. technical, case study, etc.) and short description of the feedback received	Means of contact	Response time	Status of user query: resolved/pending	Measures taken to resolve the query	Status: if not (yet) resolved/pending, explain reason why and expected timeline
23.4.2019	Dr A from Wessex Archaeology (UK)	Feedback on the WP8 database compiled during the previous phase of the project. Quote from email: "I have just spent some time looking at the EMODnet submerged landscape outputs for Britain, what a delight! As you can imagine I was always going to review it with an eager eye and I thought some helpful feedback would be good before you make a start on the next phase."	email	Responded within 3 days to the email.	This feedback is invaluable for this new product to the EMODnet family for us to improve and build upon the progress made up to this point. Requested participation in form of contributions to update the database.	Contacted the individual direct who suggested some online databases. These databases were already included in the submission. A number of items turned out to be commercial-in-confidence at this time.	A number of items were already included - no further action. A number of databases under moratorium - WP8 leader to keep in contact with Dr C.M. over course of project. Furthermore Dr C.M. also took maternity career break for a year. WP8 leader to email by end Sept 2020 now individual returned to work. A project not previously included and suggested by Dr C.M. has been followed up and WP8 leader in contact direct with project leader (Prof B below).

October 2019	Prof B from University of Bradford	Feedback on the WP8 database compiled during the previous phase of the project. In person meeting. Informed EMODnet-geology what a fantastic achievement thus far, Prof B is keen to contribute to the current phase of the project.	In person response	Follow-up email in January 2020.	Pending further action. Due to covid-19 lockdowns, many UK universities put their staff on 'furlough' which resulted in that staff were not allowed to 'work'.	Follow-up email sent September 2020. Waiting on discussion resuming following global pandemic lockdown in UK.	Expect tangible products delivered to project by January 2021.
December 2019	Researcher C from JNCC	Data inquiry	email	Response was delayed due to email getting lost in Copenhagen during Christmas rush hour.	Resolved	Response from WP3 (GTK, Finland) on 15th January with apologies.	
11.02. 2020	European Commission, DG GROW	Request for a Pan-European offshore Aggregate map	email	1 week	Resolved	Generate a customized map	resolved
21.04. 2020	NOAA	Problems downloading	email	1 day	Resolved	Error corrected	Resolved
28.04. 2020	Total	Problems downloading	email	14 days	Resolved	Error corrected	The delay of 14 days was due to a spam filter
May 2020	Gavin & Doherty Geosolutions	Case study, question on legend units used	email	4 weeks (due to Covid)	Resolved	Provided the requested infor-	User received a preview of data product that was

						mation and prepared the new data product so that it can be viewed offline.	published on the portal on August 31.
28.05. 2020	Southern Cross High School	in internal assessment; enquiry on map of countries characterized by submarine volcanoes and how eruptions affect water	email	2 h	Resolved	email answer	Resolved
03.06. 2020	GDGEO	Metadata question (units)		1 days	Resolved	Answer with info	Resolved
15.06. 2020	Unive Italy	Download question		0 days	Resolved	Guidance offered	Resolved
14.07.2020	NOR UK	Download problem		1 day	Resolved	Feedback	Resolved
28.07.2020	Payette Expl.	WMS problem		1 day	Resolved	Guidance	Resolved
30.08.2020	Private	Download problem		2 days	Resolved	Feedback	Resolved
10.9.2020	FUGRO	WMS problem		2 days	Resolved	Guidance	Resolved
28.10.2020	Ull.edu.es	Service not responding	Email	2 hrs	Resolved	Service reboot	Resolved
10.11.2020	Lansstyrelsen.se	Product download	Email	2 hrs	Resolved	Bug corrected	Resolved
10.11.2020	MARIS B.V.	Better integration of the SPLASHCOS database into EMODnet WP8 layer.	D S by email	Same day (10th November 2020)	Pending.	Dialogue was at once opened with Mr S. Meeting to be confirmed between Mr S, J H, WP8 lead	Delayed until January/February 2021 due to intervening festive period and return of Covid-19 lockdown measures due to new virulent strain of the virus.

						and EMODnet Geology technical coordinator.	
13.11.2020 **18.11.2020** **20.11.2020** **three separate events**	University of Firenze	Erasmus internship; state of the art map of the hazard and damage produced by submarine landslides at a global scale	email	30 min (each)	resolved	Explanation of how to download data from the portal; probably it was a connection problem which was solved in a few days	Resolved
18.11.2020	Unknown gmail	Product download	Email	1 hr	Resolved	Spam filter info	Resolved
20.11.2020	Unknown gmail	Product download	Email	30 hrs	Resolved	Spam filter info	Resolved
20.11.2020	Hydrographic Institute of the Republic of Croatia	Data on geomorphology of the Adriatic Sea for a publication	email	8 h	Resolved	Feedback on enquiry	Resolved
25.11.2020	Marine Information and Data Centre (IHM)	Curious about use of WP3 data products and update status by the habitat-mapping community	During discussion in person	Immediate	Resolved		Resolved
2.12.2020	NatureScot	Next seabed substrate update	Query trough EMODnet Seabed habitats helpdesk	3.12.2020	Resolved		Resolved
04.12.2020	Inogs.it	Product download	Email	1 hr	Resolved	Spam filter info	Resolved
08.12.2020	Zmmbulgaria.com	WebGIS feature request	Email	1 hr	Resolved	Upgrade browser	Resolved

20.1.2021	DASSH	Request to access the data	email	~2 h	resolved		
19.3.2021	Waterford In Your Pocket	Comment on reliability of new map along the S Irish coast	Twitter	Via Secretariat	comparison of delivered source data to local data	checking and analysing time periods covered by different datasets, definitions of 'stability' and influence of spatial resolution taken time, due end of April	Pending Validation for this area has been postponed till 2022 due to COVID limitations
08.04.2021	University (no additional info)	Technical advice	email	< week	resolved		
19.04.2021	Geodan	Mail exchange to optimize use of seabed-sediment data for Story Map and Web Scene Spatial Use North Sea	Email and phone	Several exchanges during April and may	Attempt to have them participate in Open Conference was unsuccessful because of short notice; they are interested in being a proactive stakeholder.	We will remain in touch.	
26.04.2021	Wageningen University and Research	Technical problem with access to data	email	< week	resolved		
11.05.2021	MARILIM	Download as shapefile request	Portal	< 24 hrs	Resolved	TNO in dialogue with the user	
19.05.2021	TNO	Download as shapefile request	Portal	< 24 hrs	Resolved	GTK created a custom shape for download	
26.05.2021	Artelia Group	Data product contents question	Portal	< 24 hrs	Resolved	BGR in dialogue with the user	
15.06.2021	LAINELA	Data product subset question	Portal	< 24 hrs	Resolved	GTK in dialogue with the user	

25.06.2021	Intertidal Strat.	Hydrocarbon question	Portal	< 24 hrs	Resolved	GEUS in dialogue with the user	
21.07.2021	ISPRA Scientific Committee	Question regarding the possibility to be identi-fied via user IP when accessing a portal to avoid being registered each time to download data	Online meeting	Immediate	Pending	Forward question to portal manager	The issue has to do with all portals, not only EMODnet Geology.

7. Meetings/events held/attended & planned

A. Meetings/events organised and attended					
Date	Location	Type event (internal or external meeting, training/workshop)	Indicate if a ppt was given (yes/no + short description)	Meeting attended (A) / organised (O)	Short description and main results (# participants, agreements made, etc.)
16.10. 2019	Ireland	INFOMAR Seminar 2019, Irelands seabed mapping conference	Yes	A	Oral presentation on general EMODnet Activities. 110 participants
22.10. 2019	Hellenic Centre for Marine Research, Athens, Greece	EuroGeoSurveys Marine Geology Expert Group annual meeting	Yes, several	A	EMODnet Geology presented by many partners. ~25 participants.
23-24. 10. 2019	Hellenic Centre for Marine Research, Athens, Greece	EMODnet Geology project phase 4 kick-off Meeting.	Yes, several	O/A	All necessary planning of the project and decisions for actions during the next 6 – 12 months.
23.10. 2019	Athens	Dedicated 'Submerged Landscape' workshop during the EMODnet Geology project phase 4 kick-off Meeting	Yes	O/A	Dedicated 'Submerged Landscape' workshop attended by all EMODnet-geology partners.

29-30.10. 2019	Ireland	Atlantic Ireland 2019, Irelands annual petroleum conference	No (poster Yes)	A	Poster. 220 attendance. GSI (marine minerals WP lead) had its own stand where the poster was displayed.
18-20.11. 2019	Utrecht	From the North Sea Lowlands to the Celtic Shelf Edge: Reconstructing interconnected environments for the past 500 k yrs. (Marine conference)	Yes	A/O	One of the themes was transnational seabed mapping and subsurface modeling (invited speaker: prof. dr. V v L, RBINS and Ghent University), featuring use cases of EMODnet. For presentations under this theme, see chapter 11 Annex: Other documentation attached.
21.11. 2019	Helsinki	GOOS Workshop on Marine Data during the Polar Data Forum III	No	A	Attended by EMODnet Geology project coordinator. ~30 participants.
26.11. 2019	Norway	MINDeSEA Project meeting	Yes	A	Project planning. One of the GeoERA projects. MINDeSEA will use EMODnet Geology WP7 (GSI, marine minerals) data as baseline datasets. 10 participants.
06.12. 2019	NASA Ames, CA - USA	Meeting		A	Side meeting of the US-Italy bilateral project. Discussion of potential cooperation on events mapping and probability assessment. 7 participants.
12.12. 2019	Italian Consulate, San	Italy-USA bilateral Earth Science		A	Discussion of Earth Sciences topics considered within the bilateral Project, including EMODnet Geology. 50 participants.

	Francisco, CA - USA	Working Group meeting			
9-13.12. 2019	San Francisco, CA - USA	AGU Fall meeting 2019. Session Seafloor Mapping as Critical Data for Understanding Our Oceans.	Yes	A	Two contributions on EMODnet Geology WP6 presented in the session. 28,000 participants.
10.03. 2020	Åbo Akademi, Turku, Finland	FINMARI Researcher Day -conference	Yes	A	EMODnet Geology project and WP3 products were presented and disseminated in the conference, 50 participants
12- 14.02. 2020	Athens, Greece	EMSO-ERIC Conference	Yes	A	Presentation of the EMSO-ERIC preparing for the UN Decade of Ocean Science and planning potential future synergies with other infrastructures. 60 participants.
15.4. 2020	Web/on-line	EMODnet Geology internal Steering group video meeting	Yes	O	Introduction of the different WPs interim results, discussion of practical project issues
21.4. 2020	Web/on-line	Internal WP4 meeting I, organized by RBINS		O/A	Harmonization of mismatching WP4 data products for southern North Sea (pre-Quaternary and Quaternary for BRGM, BGS, RBINS, TNO): state of the art, task list defined.
30.4. 2020	Web/on-line	External WP5 info meeting of TNO and Deltares with DG MARE	Yes	O/A	Citizen science and coastal migration: highlighted citizen-science opportunities linked to WP5, has now been added to agendas of CMEMS and European Atlas of the Seas.

4.5. 2020	online chat	Scientific session "Sub-aqueous mass movements: triggers, dynamics and hazards."		A	EGU 2020 (100 participants)
6.5. 2020	online chat	Scientific session "Sub-marine geo-morphology, and advances in sea-bed mapping and classification"		A	EGU 2020 (100 participants)
7.5. 2020	Web/on-line	SG meeting of the European Atlas of the Seas		A	Citizen science now on the agenda.
12.5. 2020	Web/on-line	EMODnet Geology internal steering group meeting	No	O/A	Discussion on Project progresses and specific issues of each WP (7 participants)
13.5. 2020	Web/on-line	Internal WP4 meeting between TNO and BGR		O/A	Hierarchy of WP4 INSPIRE nomenclature: agreed on highest-level geomorphological units, discussed practicalities of involving INSPIRE community.
18.5. 2020	Web/on-line	EMODnet Geology internal Steering group video meeting	No	O/A	Introduction of the different WPs interim results, discussion of practical project issues
25.5. 2020	Web/on-line	Internal WP4 meeting II, organized by RBINS		O/A	Inventory of units and corresponding descriptions discussed.

16.06.2020	Web/on-line	EMODnet Geology Steering Group meeting	No	O/A	Discussion of EMODnet Geology issues
16.6. 2020	Web/on-line	EMODnet-CMEMS Thematic Work-shop on Coastal Is-sues	Yes	A	Discussion of exchanging EMODnet and Copernicus services and of developments in this thematic area: state of the art, assessing existing capabilities and emerging areas for collaboration. Need for land-sea link emphasized. EMODnet Geology coordinator and 4 WP leads attended as presenters.
19.6. 2020	Web/on-line	Internal WP4 meet-ing III, organized by RBINS		O/A	First maps at different hierarchical levels visualized.
24.6. 2020	Web/on-line	Internal WP4 meet-ing with BGR		O/A	Hierarchy of WP4 INSPIRE nomenclature: set out task to assign absolute hierarchy to INSPIRE nomencla-ture and provide added structure if needed.
29.6. 2020	Web/on-line	Internal WP5 re-lease meeting		A	Agreed with the EMODnet Secretariat of the release data of coastal migration (field data) and coastal type: August 31. Finalized the schedule for prepara-tory steps with WP9 (GEUS).
01.07. 2020	web, on-line	EMODnet Geology internal Steering Group meeting	No	O/A	Introduction of the different WPs interim results, dis-cussion of practical project issues.
16.07. 2020	web, on-line	EMODnet Geology internal Steering Group video meet-ing	No	O/A	Introduction of the different WPs interim results, dis-cussion of practical project issues.

29.7. 2020	Web/on-line	internal WP4 meeting IV, organized by RBINS		O/A	Comparison of different national unit descriptions, with focus on lateral facies changes (with possible solutions).
02.09.2020	On-line	On-line meeting of WP4 Harmonisation Working Group on Southern North Sea	Yes	A	Presentation and discussion of results of Working Group
08.09.2020	On-line	EMODnet Geology Steering Group meeting	No	O/A	Discussion of EMODnet Geology issues
22.9.2020	On-line	A decade of achievements connecting marine data to knowledge. EMODnet 10 years webinar	Yes	A	
23.-25.9. 2020	remote/on-line meeting	EMODnet Geology Project Meeting	Yes, several by the coordinator and the different WP's leaders	O	EMODnet Geology deliverables, deadlines and actions were be discussed.
24.09. 2020	Web/on-line	EMODnet geology WP 4 workshop	Yes	O/A	WP 4 Seafloor geology on-line workshop: Status of the work, work on vocabularies and harmonisation. Discussion of important issues
1.10.2020	Remote, Zoom-meeting	EMODnet – Ingestion and safe-keeping of marine data 2 - plenary meeting	Yes, "EMODnet Data Ingestion 2, Progress Report FINLAND"	A	yearly EMODnet – Ingestion and safe-keeping of marine data 2 project meeting, 57 participants

2.10.2020	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the future work, 4 participants
27.10.2020	online	First (internal) meeting on artificial-intelligence-based seabed-sediment modelling for the southern North Sea	Yes	O	6 (from RBINS, Cefas and TNO), planning of joint activities and agreement on periodic meetings to ensure alignment and added value
03.11.2020	Remote, Teams-Meeting	EMODnet Geology Steering Group meeting	No	A	Information by project coordinator and discussion of EMODnet Geology project issues, exchange of information and discussions related to project progress
5.11.2020	online	External meeting (EMOD-PACE) on coastal erosion in line with EMODnet Geology WP5	No	A	ca. 10, agreement on early activities (inventory of published field studies)
18-19.11.2020	Ireland (virtual)	Geoscience 2020: external meeting	Yes. Marine and coastal update with specific links to EMODnet Geology	O	500 people attended. Geological Survey Ireland organized the meeting
19.11.2020	Remote, Webex-Meeting	External EMOD-PACE (EMODnet PArtnership for China and Europe), WP4 Thematic project meeting (Substrate)	Yes, "Data processing and methods for the creation of a sediment layer in EMODnet Geology"	A	Discussions and presentations about Substrate data for habitat mapping in the project, 13 participants, Chinese (NMDIS) and European partners (GTK, JNCC, IFREMER, EMOD-PACE WP0)
20.11.2020	Lecture, Zoom	Lecture at Åbo Akademi, Marin miljö-	Yes, 1 slide on EMODnet	A	Title of the presentation “How GTK’s activities are related to management, control and protection of the sea. EMODnet was shortly presented among others. About 20 participants.

		övervakning - course			
25.11.2020	online	External meeting on the se of actualized (Dutch) EMODnet WP3 data products to feed OSPAR	No	A	5, agreement on exchange of data and periodic communication
25.11.2020	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the future work, 4 participants
26.11.2020	online	External workshop 'The future of sand'	Yes, 'Offshore aggregate decision-support system'	A	ca. 150, explanation on mapping sand availability, panel discussion on sustainable use
1.12.2020	online	Internal kick-off meeting on coastal resilience and vulnerability	Yes, 'EMODnet interns: tasks'	O	5, planning of search and database activities
02.12.2020	Remote, Teams-Meeting	EMODnet Geology Steering Group meeting	No	O/A	Information by project coordinator and discussion of EMODnet Geology project issues, exchange of information, discussion on project progress, updates and proposals (7 participants)
4.12.2020	online	External meeting on embedding EMODnet in the Digital Twin of the Oceans	No	A	ca. 10, inventory of common ambitions among themes, agreement on coordination (to be done by EMODnet geology) if project is awarded
16.-17.12. 2020	online	International meeting	Yes, Title: EMODnet: Mapping the European Shelf Geology	A	Marginal Seas, past and future. 160 participants,
23.12.2020	videoconference	Meeting of institutions contributing to Italian WP6 deliveries (CNR-ISMAR,	No	O	discussion on characteristics and quality of features at the scale of the current phase of the Project (12 participants)

		OGS, Universities of Genova, Palermo and Roma-TRE)			
24.12.2020.	University of Crete	Interview “Conversations in Human Evolution”.	No. Interview.	A	Prof. N G gave an interview that included the WP8 Submerged Landscapes work. https://conversationsinhumanevolution.wordpress.com/
30.12.2020	online	Annual national EMODnet Geology meeting		O/A	National coordination meeting arranged by the Geological Survey of Estonia (EGT)
08.01.2021	Remote, Teams-Meeting	EMODnet Geology Steering Group meeting	No	O	Information by project coordinator and discussion of EMODnet Geology progress, exchange of information. 8 participants
08.01.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	discussions related to project progress
27.01.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the future work, 5 participants
27.01.2021	Remote, Zoom-Meeting	EuroGeoSurveys (EGS) Marine Geology Expert Group Annual Meeting	Yes, “Marine Geology, Geological Survey of Finland – Activity Report 2020”, 1 slide on EMODnet	A	Discussions and presentations about marine geological surveys and research in European EGS partner countries, and about future collaboration. 20 participants.
02.02.2021	Remote-Meeting	Seabed substrate product meeting with EMODnet Geology and EMODnet Seabed Habitats	No	A	Discussions on EMODnet Geology seabed substrate product, and product delivery to Seabed Habitat Lot. EMODnet Geology (WP3) and EMODnet Seabed Habitats, 7 participants.
08.02.2021	Remote, Teams-Meeting	EMODnet Geology Steering Group meeting	No	O	Information by project coordinator and discussion of EMODnet Geology progress, exchange of information. 8 participants

18.02.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the future work, 5 participants
18.02.2021	Remote-Meeting	meeting of institutions contributing to Italian WP6 deliveries (CNR-ISMAR, OGS, Universities of Genova, Palermo and RomaTRE)	No	O	discussion on characteristics and quality of features at the scale of the current phase of the Project (12 participants)
25-26. 02.2021	Remote-Meeting	IV meeting of Italian marine geologists	Yes, how the CARG Project database contributed to EMODnet Geology	A	State of the art on progresses of research in marine sciences in Italy (over 100 participants)
04.03.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the EMODnet Geology Meeting, 4 participants
09.03.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the EMODnet Geology Meeting, 4 participants
09.03.2021	Remote, Teams-Meeting	EMODnet Geology Steering Group meeting	No	O	Discussion of EMODnet Geology progress, exchange of information and preparation of EMODnet Geology plenary virtual meeting to be held on 10-12 March. 8 participants
10.03.2021	Remote-Meeting	External meeting		O	Dedicated EMODnet Geology CMEMS meeting with 65 attendants from EMODnet Geology, EuroGeoSurveys Earth Observation Expert Group and CMEMS, focus on validation of coastal services
10.03.-12.03.2021	Remote, Teams-Meeting	EMODnet Geology Project meeting	Yes. General project issues and several WP presentations with updates on work package progresses and actions to be undertaken by Partners	O	Update on Project progress and discussion with all Partners of any problem occurred (ca. 60 participants)

11.03.2021	Remote-Meeting	WP 4 international Workshop	Yes. Presentations on the methods different partner organisation are using to create geomorphology data layers	0	Geomorphology of the Germany Baltic Sea: presentation of different approach and outlining advantages and disadvantages of the results
12.03.2021	MS Teams Online	EMODnet-Geology Partner Meeting	Yes. Overview of progress on WP8 to date, milestones, outreach activities, barriers to progress discussed.	A	Attended by all EMODnet-geology project partners online (part of the wider project meeting 10-12th March 2021). The milestones were agreed, and way forward clarified with particular emphasis on the WP8 breakout session taking place 19th April 2021.
17.03.2021	Remote, Teams-Lecture	"Aquatic Sedimentary Environments" lectures at Helsinki University, Department of Geosciences and Geography, Finland	Yes, "Acoustic-Seismic methods", 1 slide on EMODnet	O	20 students
17.03.2021	Remote-Meeting	Internal meeting		O	Strategic meeting of TNO and Deltares on quality filtering of satellite output on the basis of validation results
17.03.2021	Remote-Meeting	Internal meeting		O	Strategic meeting of TNO and Edge Hill University on coastal vulnerability, with status assessment and roadmap to a beta deliverable of georeferenced maps
19.03.2021	Remote-Meeting	meeting of institutions contributing to Italian WP6 deliveries (CNR-ISMAR, OGS, Universities of Genova, Palermo and RomaTRE)	No	O	discussion on characteristics and quality of features at the scale of the current phase of the Project (15 participants)
26.03.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	planning of the future work, 5 participants

29.03.2021	Remote-Meeting	Webinar		A	SEArica event "Water is coming: the EU Strategy on climate adaptation – focus on coastal erosion and sea level rise"; address sand need for working-with-nature solutions in WP7 (volumes)
06.04.2021	Remote, Teams-Meeting	EMODnet WP3, GTK – ISPRA bilateral meeting	No	O	discussion related with seabed substrates and partner data, 4 participants
06.04.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation
07.04.2021	Videoconference	meeting of institutions contributing to Italian WP6 deliveries (CNR-ISMAR, OGS, Universities of Genova, Palermo and RomaTRE)	No	O	discussion on characteristics and quality of features at the scale of the current phase of the Project (15 participants)
22.04.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation
28.04.2021	vEGU 2021 Online	External Conference Presentation	Yes. Presentation summarising the Submerged Landscapes Work package and the EMODnet-Geology project as a whole. Particulate relevance to the NEPTUNE project who hosted the vEGU Session.	A	Submerged Landscapes across European Seas: Harmonising information through the EMODnet-Geology project, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-9217, https://doi.org/10.5194/egusphere-egu21-9217. [39 online participants]

28.04.2021	Remote, Webex-Meeting	EMODnet WP3 - WP4 technical meeting	No	A	Technical aspects of map display for upload data, 4 participants
05.05.2021	On-line	GeoHab 2021 – Europe and Africa node	No	O	multidisciplinary conference to exchange knowledge and ideas for a sustainable ocean management and mapping (120 participants)
05.05.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation
10.05.2021	Videoconference	EMODnet Geology steering group	No	A	Discussion on Project progresses, updates and proposals. Information by coordinator (8 participants)
11.05.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation
18.05.2021	Videoconference	meeting of institutions contributing to Italian WP6 deliveries (CNR-ISMAR, OGS, Universities of Genova, Palermo and RomaTRE)	No	O	discussion on characteristics and quality of features at the scale of the current phase of the Project (19 participants)
21.05.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE/EPOS adaptation
28.05.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	no	O	discussions related to project progress, 5 participants
08.06.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation

14.06.2021	Virtual Conference	EMODnet Open Conference Session 1	Yes, a 5 minutes videopresentation on EMODnet Geology by the coordinator	A	Invited to participate as EMODnet-Geology Coordinator
14.06.2021	virtual EMODnet Open Conference, Session 1, EMODnet thematic/expert live dialogue	External Conference. Invited "Thematic Expert" to participate on the Live Session 1 Thematic Coordinators and Experts.	No	A	Invited to participate along with the EMODnet Geology Coordinator to specifically discuss the achievement of WP8.
14-16.06. 2021	Virtual Conference	EMODnet Open Conference	Yes, 10 different poster presentations related to EMODnet Geology, for a complete list see: https://prod5.assets-cdn.io/event/6627/assets/8376339850-00fad3cccd.pdf	A	About 400 participants. Participation in the conference and the Jamboree as well as discussions during breaks by a majority of EMODnet Geology partners.
14-16.06. 2021	Virtual Exhibition - EMODnet Open Conference 2021	Conference Presentations	Yes	A	Progresses and results after 10 years since the start of the Project (400 participants)
16-18.06. 2021	EMODnet Jamboree	Sessions	No	A	~200 participants
16.06.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation

17.06.2021	On-line	EMODnet Geology project Meeting during the EMODnet Jamboree	Yes, several EMODnet Geology WP presentations	O	Discussions related to project progress, ca. 60 participants. Overview of progress to date, milestones, outreach activities, barriers to progress discussed. Discussion on common features between work packages.
18.06.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	discussions related to project progress, 5 participants
18.06.2021	Remote, Teams-Meeting	EMODnet Geology Steering Group meeting	No	O	Information by project coordinator and discussion of Emodnet Geology issues, exchange of information, preparation of EMODnet spring meeting. (8 participants).
18.06.2021	Remote, Teams-Meeting	A cross-thematic meeting together with EMODnet Geology, Bathymetry and Seabed Habitats lots during the EMODnet Jamboree	Yes, EMODnet Geology WP3 seabed substrates presentation	A/O	Discussions on EMODnet Geology seabed substrate, geomorphology, geodiversity and seabed surface features, and product delivery to Seabed Habitat Lot. More than 50 participants.
25.06.2021	Remote, Teams	WP9 - workshop/ coordination	No	O	INSPIRE adaptation
26.08.2021	Remote, Teams-Meeting	Internal EMODnet 4 Geology WP3, GTK Meeting	No	O	discussions related to project progress, 5 participants
30.08.2021	Remote, Teams-Meeting	Internal future EMODnet Geology, GTK Meeting		O	discussions related to future EMODnet Geology 5 project, 5 participants

13.09.2021	On-line	External workshop organized in cooperation with the Italian Geological Society	Yes (see section 9 Publications).	O	Presentation of a fluid emission database in Italian Seas, including data gathered by the Geological Survey of Italy within EMODnet Geology (56 participants)
SUM				**O**	**Total # of meetings organised =64**
SUM				**A**	**Total # of meetings attended = 61**

B. Meetings/events planned in the future				
Date	Location	Type event (meeting, training (workshop), etc.)	Meeting to be attended (A) / organised (O)	Short description and main expected outcomes
11-12. October 2021	Remote, Teams-Meeting	EMODnet Geology kick-off meeting of the next phase	O	Planning the next 24 months of the project, with main focus on the first six to twelve months.

8. Communication assets

A. Communication assets				
Date	Communication material	Short description (of the material, title, ...) and/or link to the asset	Main results	Name of event at which material was disseminated (if applicable)
16.10.2019	Oral	Overview of EMODnet Geology and Habitat activities	Dissemination of EMODnet for greater audience. 110 in attendance.	INFOMAR Seminar 2019, Ireland's seabed mapping conference.
16.10.2019	Poster	EMODnet Geology IV- WP7 overview	Dissemination of EMODnet for greater audience. 110 in attendance.	INFOMAR Seminar 2019, Ireland's seabed mapping conference.
05.11.2019	Poster	GeoScience 2019, Irelands annual geoscience conference	Dissemination of EMODnet for greater audience. 180 in attendance.	GeoScience 2019
18-20.11. 2019	Keynote presentation WP8 submerged Landscapes formed integral part of Dr V v L presentation at "From the North Sea Lowlands to the Celtic Shelf Edge" conference	Dr V v L gave a keynote presentation entitled "Transnational seabed mapping and subsurface modeling" and included details of the WP8 products.		"From the North Sea Lowlands to the Celtic Shelf Edge" conference.
06.12.2019	Radio interview	Presentation of the volume "Atlas of Italian submarine volcanic structures" at the book fair "Più libri, più liberi" in Rome.	Better public knowledge in submarine volcanism.	Presentation of the volume "Atlas of Italian submarine volcanic structures" at the book fair "Più libri, più liberi"

28.02-01.03. 2020	Poster and stand	Public display of EMODnet WP7 activities at the https://www.gsi.ie/en-ie/events-and-news/events/Pages/IGRM2020.aspx	Dissemination of EMODnet for greater audience.	63rd Annual Irish Geological Research Meeting hosted by Geological Survey Ireland
10.3.2020	Oral presentation (Henry Vallius)	Harmonized geological maps of the European Seas – The EMODnet Geology project	Dissemination of EMODnet for the Finnish research community.	FINMARI Researched Day conference
10.3.2020	Poster presentation (S K)	Compiling multiscale seabed substrate data for European seas – EMODnet Geology	Dissemination of EMODnet WP3 for the Finnish research community.	FINMARI Researched Day conference
2.4.2020	EMODnet seabed substrate maps	EMODnet Geology seabed substrate data is presented and is also available via the Finnish Marine portal that opened in April 2020 (https://www.marinefinland.fi/en-US	Widespread visibility through the portal	Finnish Marine portal
27.8.2020	Oral presentation (AK)	EMODnet seabed substrate maps presented as part of presentation.	Dissemination for general public	Baltic Sea Webinar for general public, Finland.
25.11.2020	blog	Blog ”Tietoa meristä meidän ja meriemme hyväksi” (in Finnish) about marine data advertising EMODnet, EMODnet Geology and EMODnet Data Ingestion. https://www.gtk.fi/tietoa-merista-meidan-ja-meriemme-hyvaksi/		Blog at GTK’s website
5.10. 2020	Recording of TV documentary	Disseminating information on submerged volcanic structures in Italian seas	programme still to be shown	RAI Petrolio – TV documentary series
4.11.2020	Public talk Faroe Islands	Public talk about the EMODnet project with focus on geology and bathymetry as part of the annual Researchers Night event.	Public visibility	Researchers Night
24.12. 2020.	Interview published online	“Conversations in Human Evolution”.	Publicity of the EMODnet-	Prof. N G, University of Crete, gave an in-

			Geology products, in particular WP8 Submerged Landscapes.	terview that included the WP8 Submerged Landscapes work. https://conversationsinhumanevolution.wordpress.com/
January 2021	EMODnet January Newsletter	"EMODnet Geology updated their seabed substrate data products" news in EMODnet Newsletter	Public dissemination	EMODnet January Newsletter published online
25-26.2. 2021	Oral presentation	Archeologia preistorica sulle piatta forme continentali. Risultati del progetto europeo "Spalshcos", del Working Group EMB "Subland" e del WP "Submerged Landscape" dell'infrastruttura "Emodnet-Geology"	Dissemination of Submerged landscapes WP	Bi-annual Conference of Italian Marine Geologists
March 2021	Story map in ISPRA geo-environmental atlas	Raising awareness on the presence of relevant volcanic structures which cannot be seen	Public dissemination	ISPRA website https://sinacloud.isprambiente.it/portal/apps/Cascade/index.html?appid=e575f0eea64e431b8adae8bf6c3f6e16
28.4.2021	Oral presentation	"Submerged Landscaped across European Seas: Harmonising information through the EMODnet-Geology Project" summarised the Submerged Landscapes Work package and the EMODnet-Geology project as a whole	Public dissemination	vEGU 2021 Online https://meetingorganizer.copernicus.org/EGU21/EGU21-9217.html
April 2021	News release	"New update of sedimentation rates data available" news in EMODnet Central Portal, and in EMODnet Geology Portal	Public dissemination	Publication of New update of sedimentation rates data
April 2021	Blog	Blog about new update of EMODnet Geology sedimentation rate data (in Finnish). "Uutta tietoa sedimentaationopeuksista Euroopan merialueilla" at GTK's webpage. https://www.gtk.fi/uutta-tietoa-sedimentaationopeuksista-euroopan-merialueilla/	Public dissemination	Publication of New update of sedimentation rates data
April 2021	Tweets, and posts	Tweets (@GTK_Fi Twitteri) and posts (GTK Facebook) about new update of sedimentation rates data	Public dissemination	Publication of New update of

				sedimentation rates data
14.–16. June 2021	Posters	A total of 10 EMODnet Geology related posters at the conference, only a few in the list here, for full list see link in table 4. A.	Public dissemination	EMODnet Open Conference 2021
14.–16. June 2021	Poster	Kaskela, A.M., Kotilainen, A.T., Kihlman, S., Alanen, U. & EMODnet Geology partners. 2021. Seabed geodiversity of the Baltic Sea - EMODnet cross-product based on seabed substrates, bedrock and bathymetry. Poster presentation. EMODnet Open Conference, 2021.	Poster	EMODnet Open Conference 2021
14.–16 June 2021	Poster at EMODnet Geology Jamboree	EMODnet Seafloor Geology and marine landforms: Building geomorphological data sets of the European Sea Floor	Information about EMODnet Geology WP 4 results and outreach to the EMODnet community	EMODnet Jamboree 2021
14.–16. June 2021	Poster at EMODnet Geology Jamboree	From multi-source seamless mapping to composite maps serving multiple end-users: the southern North Sea case	Information about EMODnet Geology WP 4 results and outreach to the EMODnet community	EMODnet Jamboree 2021
14.-16. June 2021	Poster at EMODnet Geology Jamboree	Towards semi-automated classification of seabed geomorphology using EMODnet bathymetry and seabed substrate data – case study in the Western Baltic Sea	Information about EMODnet Geology WP 4 results and outreach to the EMODnet community	EMODnet Jamboree 2021
June 2021	External Conference Presentations: Panel discussion and poster	Presentation summarise the WP8 Submerged Landscapes part of the EMODnet-Geology project. emodnetconference2021.eu/faq	Public dissemination and outreach to the EMODnet community	vEMODnet Jamboree
June 2021	Poster and pitch	Pan-European coastal vulnerability: translating incomplete data and information for situational awareness	Information of and outreach to the EMODnet community	EMODnet Open Conference
June 2021	Poster and pitch	The relativity of mapped stable coastlines	Information of and outreach to	EMODnet Open Conference

			the EMODnet community	
24.06.2021	Press Release	"New update for download: Submerged Landscapes"	This update has almost doubled the features and information compiled previously	Simultaneously on EMODnet Geology portal and the Central EMODnet portal
24.06.2021	Social Media	Announcement of the new update of WP8 materials	@EMODnet account (5339 Followers) 34 Likes 20 Retweets	Twitter. Not being administrators of the Twitter account, we couldn't access more information on the views and interactions with the announcement
24.06.2021	Social Media	Announcement of the new update of WP8 Submerged Landscapes materials	@EMODnet account (972 followers) 26 Likes.	LinkedIn
15.09.2021	Social Media	Announcement of the new update of WP7 Marine minerals materials on EMODnet Geology portal	Public dissemination	Twitter
15.09.2021	Social Media	Announcement of the new update of WP4 Sea-floor Geology materials on EMODnet Geology portal	Public dissemination	Twitter
Sept. 2021	Press release	Press release(es) on new EMODnet Geology WP 4 products: Quaternary and Geomorphology data layers	It is hoped to receive positive feedback from the community	
21.9.2021	Press release	EMODnet Geology updated its seabed substrate data products – the data now extends to the Caspian Sea", as news in EMODnet Central Portal, and in EMODnet Geology Portal	Public dissemination	

B. Planned communication assets			
Date	Communication material	Short description (of the material, title, ...) and/or link to the asset	Main results expected

Publications

List of known publications using EMODnet data or data products				
Date	Type and name of journal, conference, ...	Publication title	Author(s)	Organisation(s)
09.12. 2019	AGU Fall meeting 2019	Applications of EMODnet Geology harmonised maps of geological events	Andrea Fiorentino, Loredana Battaglini, Silvana D'Angelo	Geological Survey of Italy
09.12. 2019	AGU Fall meeting 2019	Mapping the Landslides Susceptibility in the European Seas	Innocenti Carlo, D'Angelo Silvana, Fiorentino Andrea, Battaglini Loredana	Geological Survey of Italy
2019	Memorie Descrittive della Carta Geologica d'Italia, 104	*Atlas of volcanic seamounts in Italy*	D'Angelo S., Fiorentino A., Giordano G., Pensa A., Pinton A. & Vita L. (eds)	Geological Survey of Italy
2019	Goldschmidt 2019 Conference abstract	Analysing the distribution of marine mineral deposits across European Seas: A new perspective from the EMODnet-Geology project.	T.Medialdea, M. Judge, F.J.Gónzalez, L.Somoza, P.Terrinha, E. Marino.	IGME (Spain), IPMA (Portugal).
2019	Minerals	Hydrogenetic, Diagenetic and Hydrothermal Processes Forming Ferromanganese Crusts in the Canary Island Seamounts and Their Influence in the Metal Recovery Rate with Hydrometallurgical Methods.	E. Marino, F. J. González, T. Kuhn, P. Madureira, A. V. Wegorzewski, J. Mirao, T. Medialdea, M. Oeser, C. Miguel,J. Reyes, L. Somoza, R. Lunar	IGME (Spain), Complutense University of Madrid (UCM), Geosciences Institute (IGEO-UCM-CSIC)(Spain), BGR (Germany), HERCULES Laboratory (Portugal), Leibniz Universität Hannover Institut für Mineralogie (Germany)
13.02.2020	EMSO-ERIC Conference	Potential application of harmonized geological events databases in geohazard assessment	Andrea Fiorentino	EMSO-ERIC

30.04.2020	Memorie Descrittive della Carta Geologica d'Italia, 105	Inventory of fluid emissions in Italian Seas	D'Angelo S., Battaglini L. & Fiorentino A. (eds)	Geological Survey of Italy
2020	European Commission (2020) The EU Blue Economy Report 2020	Chapter 6.4. MARINE MINERALS		Geological Survey Ireland and Geo-ERA MINDeSEA project.
12.06.2020	Geological Field Trips and Maps (GFT&M)	Digital mapping of geological events in European Seas doi.org/10.3301/GFT.2020.01 Geological events and probabilities	Battaglini L., D'Angelo S. & Fiorentino A.	Geological Society of Italy
15.06. 2020	Quarterly Journal of Engineering Geology and Hydrogeology Thematic Issue: Mapping the Geology and Topography of the European Seas (EMODnet)	Technical note: Environmental management; Geohazards	L. Battaglini, S. D'Angelo and A. Fiorentino	ISPRA (Italy)
16.06. 2020	Quarterly Journal of Engineering Geology and Hydrogeology Thematic Issue: Mapping the Geology and Topography of the European Seas (EMODnet)	Research article: INFOMAR data supports offshore energy development and marine spatial planning in the Irish offshore via the EMODnet Geology portal	J. Guinan, C. McKeon, E. O'Keeffe, X. Monteys, F. Sacchetti, M. Coughlan and C. Nic Aonghusa	GSI (Ireland), Marine Institute (Ireland), Irish Centre for Research in Applied Geosciences, Ireland and Gavin and Doherty Geosolutions (Ireland).

09.07. 2020	Geological Society, London, Special Publications Special Publication: From Continental Shelf to Slope: Mapping the Oceanic Realm	Revealing the secrets of Norway's seafloor – geological mapping within the MAREANO programme and in coastal areas	R. Bøe, L. R. Bjarnadóttir, S. Elvenes, M. Dolan, V. Bellec, T. Thorsnes, A. Lepland and O. Longva	Geological Survey of Norway - NGU (Norway)
21.07.2020	Quarterly Journal of Engineering Geology and Hydrogeology	Mapping Geological events in submerged areas. Technical note: "Environmental management; Geohazards " doi.org/10.1144/qjegh2020-031	Battaglini L., D'Angelo S. & Fiorentino A.	Geological Survey of Italy
08.09.2020	Quarterly Journal of Engineering Geology and Hydrogeology	Submarine landslide: mapping the susceptibility in European seas dx.doi.org/10.1144/qjegh2020-027	Innocenti C., Battaglini L., D'Angelo S. & Fiorentino A.	Geological Survey of Italy
23.09.2020	Quarterly Journal of Engineering Geology and Hydrogeology	Mapping Geological events in submerged areas. Technical note: "Environmental management; Geohazards " doi.org/10.1144/qjegh2020-031 Geological events and probabilities	Battaglini L., D'Angelo S. & Fiorentino A.	Geological Survey of Italy
23.10.2020	Quarterly Journal of Engineering Geology and Hydrogeology	Submarine landslide: mapping the susceptibility in European seas. dx.doi.org/10.1144/qjegh2020-027 Geological events and probabilities	Innocenti C., Battaglini L., D'Angelo S. & Fiorentino A.	Geological Survey of Italy
2020	OKEANOS	Pesca, energías marinas, recursos minerales y la planificación espacial marina. Revista de la Sociedad Atlántica de Oceanógrafos	I. Herrera, D. Mentado Rodríguez, F.J. González.	IGME (Spain)

2020	GSLSpecPub2019-100	Integrated geophysical and sedimentological datasets for assessment of Offshore Borrow Areas: The CHIMERA project (Western Portuguese Coast)	Mario Mil-Homens; Pedro Terrinha, Ph.D; Pedro Brito; Vitor Magalhães; Marcos Rosa; Marta Neres; Marta Silva; Emília Salgueiro; Teresa Drago; Ana Isabel Rodrigues; Miriam Tuaty Guerra; Maria José Gaudêncio; Eveline Almeida; Mariana Silva; Mafalda Freitas; Celso Aleixo Pinto	IPMA (Portugal)
2020	Geological Society of London Special Publication (GSLSpecPub) "From Continental Shelf to Slope - Mapping the Oceanic Realm" 2019-102	The Pliocene deposits of the Black Sea shelf east of the Danube river delta	Petro F. Gozhik; Valery Ye. Rokitsky	IGS-NAS-UKR, (Ukraine)
2020	GSLSpecPub2019-127	High resolution geological mapping – towards understanding of postglacial development and Holocene sedimentation processes in the eastern Gulf of Finland (EMODnet-geology case study)	Daria Ryabchuck, Ph.D.; Alexander Sergeev; Vladimir Zhamoida; Leonid Budanov; Alexander Krek; Igor Neevin; Ekaterina Bubnova; Alexander Danchenkov; Olga Kovaleva	VSEGEI, State Budgetary Institution of Kaliningrad Region “Baltberegozaschita”, Shirshov Institute of Oceanology, Russian Academy of Sciences (IO RAS), Kant Baltic Federal University.
2020	GSLSpecPub2019-207	Mapping Ireland’s coastal, shelf and deep water environments using illustrative case studies to highlight the impact of seabed mapping on the generation of blue knowledge	Ronan O'Toole; Maria Judge; Fabio Sachetti; Thomas Furey; Eoin Mac Craith; Kevin Sheehan; Sheila Kelly; Sean Cullen; Fergal McGrath; Xavier Monteys	GSI, Marine Institute (Ireland)

2020	GSLSpecPub2019-208	Discover Europe's seabed geology. The EMODnet concept of uniform collection and harmonization of marine data	Henry Tapani Valdemar Vallius, Ph.D.; Aarno T Kotilainen; Kristine Charlotte Asch; Andrea Fiorentino; Silvana D'Angelo; Maria Judge; Heather A. Stewart; Bjarni Pjetursson	GTK, BGR, ISPRA, GSI, UKRI-BGS, GEUS
2020	GSLSpecPub2019-82	Revealing the secrets of Norway's seafloor – geological mapping in the MAREANO programme and in coastal areas	Reidulv Bøe; Lilja Rún Bjarnadóttir; Sigrid Elvenes; Margaret Dolan; Valérie Bellec; Terje Thorsnes; Aave Lepland; Oddvar Longva	NGU
2020	GSLSpecPub2019-90	Integrated thematic geological mapping of coastal and offshore Japan (by GSJ-AIST): collecting and utilizing the geologic information	Pedro Terrinha, Ph.D; Teresa Medialdea; Luis Batista; Luis Somoza; Vitor Magalhães; Francisco Javier Gonzalez; João Noiva; Ana Lobato; Marcos Rosa; Egidio Marino; Pedro Brito; Marta Neres; Carlos Ribeiro	IPMA, IGME, University of Evora
2020	Quarterly Journal of Engineering Geology and Hydrogeology (QJEGH)	Coastal processes of the Russian Baltic (eastern Gulf of Finland and Kaliningrad area)	Daria Ryabchuk, Alexander Sergeev, Evgeny Burnashev, Viktor Khorikov, Igor Neevin, Olga Kovaleva, Leonid Budanov, Vladimir Zhamoida, Aleksandr Danchenkov	VSEGEI, State Budgetary Institution of Kaliningrad Region "Baltberegozaschita", Shirshov Institute of Oceanology, Russian Academy of Sciences (IO RAS), Kant Baltic Federal University.
2020	Quarterly Journal of Engineering Geology and Hydrogeology (QJEGH)	Mapping the Geology and Topography of the European Seas (European Marine Observation Data Network, EMODnet). Perspective paper.	Cherith Moses, Henry Vallius	Edge Hill University, GTK

2020 With Editor (revision submitted)	Quarterly Journal of Engineering Geology and Hydrogeology (QJEGH)	Uncertainty assessment applied to marine subsurface datasets	Lars Kint, Vasilis Hademenos, Robin De Mol, Jan Stafleu, Sytze van Heteren & Vera Van Lancker	RBINS, Ghent University , TNO
Accepted **19.10.2020** Available online **27.10.2020**	Marine Pollution Bulletin	Sediment quality in the semi-enclosed Lumparn Bay, Åland Islands, Baltic Sea. https://doi.org/10.1016/j.marpolbul.2020.111798 EMODnet Geology Seabed substrate map used.	Henry Vallius	Geologian Tutkimuskeskus (Geological Survey of Finland).
Accepted **25.10.2020** Available online **07.11.2020**	Quaternary Science Reviews	Salt pans as a new archaeological sea-level proxy: A test case from Dalmatia, Croatia https://doi.org/10.1016/j.quascirev.2020.106680 EMODnet Geology Submerged landscapes	Bechor, B., Sivan, D., Miko, S., Hasan, O., Grisonic, M., Rossi, I.R., Lorentzen, B., Artioli, G., Ricci, G., Ivelja, T., Spada, G., Brook, A.	Maritime Civilizations Department, L. Charney School of Marine Sciences University of Haifa, Israel; Croatian Geological Survey (HGI), Zagreb, Croatia; Department of Archaeology, University of Zadar, Croatia; Cornell Tree Ring Laboratory, Department of Classics, Cornell University, USA; Inter-Departmental Research Center for the Study of Cement Materials and Hydraulic Binders (CIRCe), University of Padova, Italy; Department of Geosciences, University of Padova, Italy; Zagreb University of Applied Sciences, Zagreb, Croatia; Diparti-

				mento di Fisica e Astronomia "Augusto Righi", Bologna, Italy; Remote Sensing Laboratory, Department of Geography and Environmental Studies, University of Haifa, Israel
Accepted **29.09.2020** Available online **26.11.2020**	Quarterly Journal of Engineering Geology and Hydrogeology - In: "*Mapping the Geology and Topography*	Uncertainty assessment applied to marine subsurface datasets. https://doi.org/10.1144/qjegh2020-028 EMODnet Geology; seabed substrates, geomorphology, coastal behaviour	Kint, L., Hademenos, V., De Mol, R., Stafleu, J., van Heteren, S. & Van Lancker, V	Royal Belgian Institute of Natural Sciences (RBINS), Renard Centre of Marine Geology, Ghent University, Database, Document and Content Management, Ghent University, TNO – Geological Survey of the Netherlands
13.01.2021	Quarterly Journal of Engineering Geology and Hydrogeology - In: "*Mapping the Geology and Topography of the European Seas (EMODnet)*."	EMODnet collation of geological events data provides evidences of their mutual relationships and connections with underlying geology: a few examples from Italian seas. https://doi.org/10.1144/qjegh2019-147 Geological events and probabilities	Fiorentino A., Battaglini L. & D'Angelo S.	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) - Department for the Geological Survey of Italy. Via V. Brancati 48 - 00144 Roma
21.01.2021	Geological Society of London Special Publication - "*From Continental Shelf to Slope - Mapping the Oceanic Realm*." - K. Asch, H. Kitazato & H. Vallius. (Eds)	Collating European data on geological events in submerged areas: examples of correlation and interpretation from Italian seas https://doi.org/10.1144/SP505-2019-96 Geological events and probabilities	Loredana Battaglini, Silvana D'Angelo, Andrea Fiorentino	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) - Department for the Geological Survey of Italy. Via V. Brancati 48 - 00144 Roma

9.12.2021	Story Map with WP3 seabed-substrate map.	Spatial use North Sea (in Dutch)	Anonymous	Geodan Labs
Accepted **10.12.2020** Available online **14.12.2020** **Published 1.2.2021**	Continental Shelf Research	Sedimentation rates in the Baltic Sea: A machine learning approach https://doi.org/10.1016/j.csr.2020.104325 EMODnet Geology sediment accumulation rate	Mitchell, P.J., Spence, M.A., Aldridge, J., Kotilainen, A.T., and Diesing, M.	Centre for Environment, Fisheries and Aquaculture Science (Cefas), UK; Geological Survey of Finland (GTK); Geological Survey of Norway (NGU).
Accepted **10.12.2020** Available online **14.12.2020**	Continental Shelf Research	Sedimentation rates in the Baltic Sea: A machine learning approach https://doi.org/10.1016/j.csr.2020.104325 EMODnet Geology sediment accumulation rate	Mitchell, P.J., Spence, M.A., Aldridge, J., Kotilainen, A.T., and Diesing, M.	Centre for Environment, Fisheries and Aquaculture Science (Cefas), UK; Geological Survey of Finland; Geological Survey of Norway.
1.2.2021	Continental Shelf Research	Sedimentation rates in the Baltic Sea: A machine learning approach. https://doi.org/10.1016/j.csr.2020.104325	Mitchell, P.J., Spence, M.A., Aldridge, J., Kotilainen, A.T., Diesing, M.	Centre for Environment, Fisheries and Aquaculture Science (Cefas), UK; Geological Survey of Finland (GTK); Geological Survey of Norway (NGU)
In progress, to be published **end of 2021**	Geological Society of London Special Issue: From Continental Shelf to Slope - Mapping the Oceanic Realm	From Continental Shelf to Slope - Mapping the Oceanic Realm	Asch*), K., Kitazato*), H and Vallius*), H.	*) Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Hannover, Germany **) University of Tokyo ***) Geological Survey of Finland (GTK)
Accepted **17.08.2021**	Geological Society of London Special Issue: From Continental Shelf	A first approach to a Geomorphological Map of the German Seas GSLSpecPub2021-24	Breuer, Sonja*) & Asch, Kristine **)	*) Landesamt für Bergbau, Energie und Rohstoffe (LBEG)

	to Slope - Mapping the Oceanic Realm			**) Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Hannover, Germany
Held and published	EGU General Assembly 2021	Small-scale geological mapping on Earth: setting guidelines, standards, and portrayal rules. Experience from pan-European projects	Asch, K. *)	Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), Hannover, Germany
25.02.2021	IV meeting of Italian marine geologists	Dalla banca dati CARG a EMODnet Geology (From the Italian Geological Mapping Project (CARG) database to EMODnet Geology)	Andrea Fiorentino & Loredana Battaglini	Geological Society of Italy
Available online first, official publication date **20.05.2021**	Peer-review publication Quaternary International	Lower Palaeolithic archaeology and submerged landscapes in Greece: The current state of the art.	P. Tsakanikou N. Galanidou D. Sakellariou	University of Southampton, UK University of Crete, Greece Hellenic Centre for Marine Research, Greece
Available online first, official publication date **20.05.2021**	Peer-review publication Quaternary International	Searching for Neolithic sites in the Bay of Kiladha, Greece.	Julien Beck, Despina Koutsoumba, Dimitris Sakellariou, Morgane Surdez, Flavio Anselmetti, Nikos Papadopoulos, Ioannis Morfis, Ioannis Panagiotopoulos, Grigoris Rousakis, Dimitris Oikonomou, Kleanthis Simyrdanis, Gianluca Cantoro, Athanasios Argyriou, Patrizia Birchler Emery, Ayla Krijnen, Konstantina Tsampouraki-Kraounaki,	University of Geneva, Switzerland; Ephorate of Underwater Antiquities, Greece; Hellenic Centre for Marine Research, Greece Tiefbauamt des Kantons Bern, Switzerland University of Bern, Switzerland

				Institute for Mediterranean Studies, Greece Vrije Universiteit Amsterdam, Netherlands
14-16.06.2021	EMODnet Open Conference	Geological events data in submerged areas gathered and harmonized by EMODnet Geology	Andrea Fiorentino, Loredana Battaglini, Matteo Conti & Carlo Innocenti	EMODnet Secretariat
13.09.2021	Workshop at the 90th congress of the Italian Geological Society	An inventory of fluid emissions in Italian seas.	D'Angelo S., Battaglini L., Fiorentino A.	ISPRA and Italian Geological Society
13.09.2021	Workshop at the 90th congress of the Italian Geological Society	Overview of fluid emissions in Italian seas.	D'Angelo S., Battaglini L., Fiorentino A.	ISPRA and Italian Geological Society
14.09.2021	90th congress of the Italian Geological Society	Volcanic and non-volcanic fluid emissions: data from EMODnet Geology	Andrea Fiorentino, Loredana Battaglini & Silvana D'Angelo	Italian Geological Society
16.09.2021	90th congress of the Italian Geological Society	Harmonization of geological data in the Adriatic Sea	A. Fiorentino, L. Battaglini, S. D'Angelo, M. Pantaloni & F. Papasodaro	Italian Geological Society

9. Monitoring indicators

Comments on the progress indicators in the excel template		
Progress indicator	Means of collecting figures	Comment
1. Current status and coverage of total available thematic data A) Volume and coverage of available data **If you don't use the provided sea-basin figures, please indicate why you do not use them, as from when, and what do you use instead and why?**		About 1500 data points on sediment accumulation (sedimentation rate). We don't publish data with coverage, only point information on accumulation rate, no coverage.
B) Usage of data since the start of the project phase		
2. Current status and coverage of total number of data products A) Volume and coverage of available data products **If you don't use the provided sea-basin figures, please indicate why you do not use them, as from when, and what do you use instead and why?**		There is no uniform digital definition (in GIS format) of the European sea areas and their boundaries used in the EMODnet Lots. Therefore, EMODnet Geology has used its own Regions shapefile to assess the coverage of the products (maps) (WP3, WP4). This has been discussed with the Secretariat. WP3. The latest Seabed substrate updates were published on 21September 2021. The update includes 4 data products with seabed substrate data at different scales: 1:1 000 000, 1: 250 000, 1: 100 000 and multiscale. The multiscale data includes 11 layers at varying scales (1:70 000 – 1: 1500). The seabed substrate data at 1 M scale covers about 43 % of the Geology Regions, data at scale 250 k covers about 12 %, and both 100k and multiscale data cover less than 5 %. The coverages by sea-basin are indicated in the excel file (Indicator 2). Please notice that here we have only included seabed substrate data that has extended to new areas. The update due to data quality improvement is not visible in the table. Updated seabed sedimentation rate data was published in April 2021. The current data includes about 1500 data points. There were updates from altogether 7 partners at this phase.

		The Pre-Quaternary Geology data covers almost 100% of the project sea areas. Quaternary Geology data covers from a few percent (Black Sea) up to nearly 80 percent (North Sea) of the different sea areas. Geomorphology data covers from a few percent (Arctic and Mediterranean Seas, both 6%) up to nearly 90 percent (Caspian Sea) of the different sea areas. General physiographic features cover between 8 (Black Sea) and 82 (North Sea) percent of the sea areas, but with an average of nearly 40 percent of coverage.
B) Usage of data products since the start of the project phase		Map requets are implicit in WMS stats. We see a slight increase in usage per quarterly report except for a dip in the last one.
3. Organisations supplying/ approached to supply data and data products since the start of the project phase		No change since last report.
4. Online 'Web' interfaces to access or view data		No change since last report.
6. Statistics on information volunteered through download forms		Due to GDPR we do not register place of origin.
7. Published use cases		None in this reporting period.
9.1. Technical monitoring		Satisfactory both response time and up-time
9.2. Visual Harmonisation score		73
10. Visibility & analytics for web pages		We see a slight increase on all parameters except the contribute page which has moved to a less prominent location on the portal.
11. Visibility & analytics for web sections		Users are more keen to accessing maps and downloads directly. This is a common trend to jump directly from Google to sub pages.
12. Average visit duration for web pages		The numbers show no clear trend for this reporting period. We are averaging on approx 1 minute per page view and 1 hr average per visit which can be seen as satisfactory.

The monitoring numbers reported as part of the progress monitoring of EMODnet performance are collected through Matomo. In some cases, numbers from other monitoring systems may also be reported (e.g. Awstats, Google Analytics). Each system uses different technical approaches and therefore has its strengths and shortcomings. Therefore, results are indicative and care should be taken with interpreting absolute numbers or comparing results from different tools. It is often more sensible to consider trends over time collected by the same monitoring tool.

10. Recommendations for follow-up actions by the EU

Start building 3-D models of the geology of the sea floor in study areas (possibly in cooperation with the physics lot)

Start, in a study area, a reconstruct of the ocean floor in time slices, e.g. of the Baltic Sea (keywords. Palinspastic reconstruction, backstripping)

Identify users who download data by their IP, so that they have to register only once and then can access portals without registering each time. (similar to the way researchgate operates)

Include in the geographical scope of the next phase of EMODnet Geology project, in scale 1:1million, Kara Sea, Laptev Sea, Eastern Siberian Sea, and Chukchi Sea in the Russian high Arctic.

11. Annex: Other documentation attached

[List in Annex if you wish to provide any additional information.]

12. List of abbreviations and acronyms

AGU	American Geophysical Union
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (German Federal Institute for Geosciences and Natural Resources)
BGS	UK Research and Innovation – British Geological Survey
BP	Before present
BSH	Bundesamt für Seeschiffahrt und Hydrography
BSSC	Baltic Sea Science Congress – series
CC	Creative Commons
CGMW	Commission of the Geologicl Map of the World
CSW	Catalogue Service for the Web
DOI	Digital Object Identifier
GeoHab	Marine Geological and Biological Habitat Mapping – conference series
GeoNetwork	a catalog application to manage spatially referenced resources
GeoServer	an open-source server for sharing geospatial data
GEUS	Geological Survey of Denmark and Greenland
GIA	Glacial isostatic adjustment
GIS	Geographical Information System
GSI	Geological Survey Ireland
GSL	Geological Soceity of London
GTK	Geologian Tutkimuskeskus - Geological Survey of Finland
EEA	European Environment Agency
EGDI	European Geological Data Infrastructure
EGDI MICKA	European Geological Data Infrastructure, MICKA metadata catalogue
EGU	European Geosciences Union
EMSO-ERIC	European Multidisciplinary Seafloor and water column Observatory-European Research Infrastructure Consortium
EPOS	European Plate Observing System
EuroGeoSurveys	The Geological Surveys of Europe
FTP	File transfer protocol
GIS	Geographical Information System

INSPIRE	Infrastructure for Spatial Information in Europe
INQUA	International Union for Quaternary Research
IOW	Institute of Baltic Sea Research
IQUAME 2500	International Quatenary Map of Europe, scale 1: 2,5 Million)
ISPRA	Istituto Superiore per la Protezione e la Ricerca Ambientale
IUGS	International Union of Geological Sciences
JRC	Joint Research Centre of the European Commission
LGM	Last glacial maximum
Maxent	Maximum Entropy Modelling
Matomo	tracks online visits to websites and displays reports on these visits for analysis.
OGC	Open Geospatial Consortium
PostgreSQL	object-relational database management system
ProSUM	Prospecting Secondary raw materials from the Urban Mine and Mining waste
QC	Quality Control
QJEGH	Quarterly Journal of Engineering Geology and Hydrogeology
RBINS	Royal Belgian Institute of Natural Sciences
RFG 2018	Resources for Future Generations conference, Vancouver, BC, Canada,
RSC's	Regional Sea Conventions (HELCOM, OSPAR...)
SCU	Smallest cartographic unit
SHOM	Service Hydrographique et Océanographique de la Marine, France
SLD	Styled Layer Descriptor
SPLASHCOS	COST action - Submerged Prehistoric Archaeology and Landscapes of the Continental Shelf
SQL	Structured Query Language
TNO	Geological Survey of the Netherlands
Web-GIS	a pattern, or architectural approach, for implementing a modern GIS. It's powered by web services—standard services that deliver data and capabilities, and connect components.
WFS	Web Feature Service
WMS	Web Map Service
WordPress	a free and open-source content management system
WP	Workpackage