BIBLIOGRAPHY OF SEABED AND HABITAT MAPPING

*Relevant for mapping in the offshore North Atlantic*

Deliverable 9.2 Work Package 9
Seabed & Benthic Habitat Mapping

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Relevant for mapping in the offshore North Atlantic

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INTRODUCTION

This bibliography lists 330 publications classified in 9 main themes. In addition to literature references, relevant web sites and European seabed mapping projects are listed. The list is not complete and publications are selected based on their relevance to the Atlantic deep sea, or because of their general methodological or theoretical relevance. The issue of Seabed and Habitat Mapping covers several research fields, ranging from characterization of biological communities to sediment geology and underwater acoustics. Many of the publications cover several topics and are listed under more than one of the themes below. A list of relevant web sites (project home pages) and on-line resources is also presented.

Classification of Sediments, Habitat, Landscapes and Bioregions
(53 papers)

The term “Habitat” here includes both biotopes and habitats. The terms "habitat" and "biotope" are used almost synonymously in the literature, for describing the environment associated with occurrence of certain species. Here, we recognise the difference of these terms as "biotope" applying to the community's environment and "habitat," to the species' environment (Udvardy 1959; Whittaker et al. 1973). The majority of classification schemes cover both substrates and biological units (dominant species or characteristic communities. Classification schemes or principles dealing only with seabed substrates are listed separately below.

Habitat Classification


Brown, S.K (2002). Our living oceans benthic habitat classification system. NOAA NMFS, Office of Science and Technology, Silver Spring, Maryland.


Joint Nature Conservation Committee, Peterborough, UK (Internet version: www.jncc.gov.uk/MarineHabitatClassification).


JNCC (2015). The Marine Habitat Classification for Britain and Ireland Version 15.03 [Online]. [2015-05-21]. Available online at: jncc.defra.gov.uk/MarineHabitatClassification


Parry MEV (2014). JNCC Marine Habitat Classification for Britain and Ireland: Overview of User Issues, JNCC Report 529, ISSN 0963 8901. Available online at jncc.defra.gov.uk/page-6757


**Marine Landscape Classification**


**Bioregional Classification**


**Seabed Substrate Classification**


STANDARDISATION OF SEABED MAPPING
(27 papers)


EN 16260. Water quality — Visual seabed surveys using remotely operated and/or towed observation gear for collection of environmental data.


The literature presenting techniques relevant for mapping of the seabed and its habitats is immense. The references below are separated in two themes: 1) Field methods, operational procedures, sampling design and data and 2) Post processing and data analysis.

**Sampling strategy, survey design and data interpretation**


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**Post processing and data analysis**


Several coral and sponge species build habitats that are fragile to physical disturbance, such as bottom trawling. Whereas the corals and sponges are made by long-lived species hydrothermal vents are built up by a combination of autogenic and biogenic processes. All these habitat types are species rich and have great value for research, and industry.

**Cold Water Corals**


Deep-Sea Sponge Aggregations


Hydrothermal Fields


Predictive Habitat Mapping
(32 papers)


Gormley KS, Porter JS, Bell MC, Hull AD, Sanderson WG (2013). Predictive habitat modelling as a tool to assess the change in distribution and extent of an OSPAR priority habitat under an increased ocean temperature scenario: consequences for marine protected area networks and management. PloS one, 8(7), e68263


Howell KL, Holt R, Endrino IP, Stewart H (2011). When the species is also a habitat: comparing the predictively modelled distributions of Lophelia pertusa and the reef habitat it forms. Biological Conservation, 144: 2656–2665.


Habitat Descriptions and Maps
(29 Papers)


SEDIMENT MAPPING


Lark RM (2014). Mapping seabed sediments of the Swallow Sand and South-west Deeps (West) MCZs. British Geological Survey Internal Report, OR/14/015. 18pp


BOTTOM TOPOGRAPHIC MAPS


ACOUSTIC CLASSIFICATION


25


Le Bas TP, Huvenne VAI (2009). Acquisition and processing of backscatter data for habitat mapping e comparison of multibeam and sidescan systems. Applied Acoustics 70, 1248e1257.


Sutherland TF, Galloway J, Loschiavo R, Levingr CD, Hare R (2007). Calibration techniques and sampling resolution requirements for groundtruthing multibeam acoustic backscatter (EM3000) and QTC VIEW classification technology. Estuarine, Coastal and Shelf Science 75, 447e458.

**LINKS TO PROJECT WEB SITES AND ON-LINE RESOURCES**

**EXPERT GROUPS AND RESEARCH COMMUNITIES**

Working Group of Marine Habitat Mapping  
[http://ices.dk/community/groups/Pages/WGMHM.aspx](http://ices.dk/community/groups/Pages/WGMHM.aspx)  
ICES Working Group on Marine Habitat Mapping (WGMHM) coordinates the review of habitat classification and mapping activities in the ICES area and promotes standardization of approaches and techniques.

GeoHab (Marine Geological and Biological Habitat Mapping)  
[http://geohab.org/](http://geohab.org/)  
An international association of marine scientists studying biophysical (i.e., geologic and oceanographic) indicators of benthic habitats and ecosystems as proxies for biological communities and species diversity.

Intergovernmental Oceanographic Commission (IOC) of UNESCO. Ocean Biogeographic Information System (OBIS),  
[www.iobis.org](http://www.iobis.org)

**HABITAT MAPS AVAILABLE ONLINE**

European Broad-Scale Seabed Habitat Map  
[www.emodnet-seabedhabitats.eu](http://www.emodnet-seabedhabitats.eu)

UK.  
[http://jncc.defra.gov.uk/seabedhabitatmapdata](http://jncc.defra.gov.uk/seabedhabitatmapdata)

Norway:  
[www.mareano.no](http://www.mareano.no)

Spain  

**DATA PORTALS AND REPOSITORIES**

EMODnet Seabed Habitats (EUSeaMap 2):  
This is one of seven thematic projects under the European Marine Observation and Data Network (EMODnet; [www.emodnet.eu](http://www.emodnet.eu)).  
Access to European habitat maps through an online interactive map:  
[www.emodnet-seabedhabitats.eu/webgis](http://www.emodnet-seabedhabitats.eu/webgis)

The EMODnet Seabed Habitats website provides a single portal for the outputs of the EUSeaMap and MESH projects. Habitat maps from surveys and broad scale predictive habitat maps from European seas are available through the new EMODnet seabed habitats mapping portal. The pages of the MESH website and its excellent guide to marine habitat mapping are still available as an archive. ([http://www.emodnet-seabedhabitats.eu/](http://www.emodnet-seabedhabitats.eu/))
**EMODNET - Geology**

www.emodnet-geology.eu

**Geo-Seas**

An Integrated Infrastructure Initiative of the Research Infrastructures programme within EU FP7 (2009-2013). An e-infrastructure was set-up of 26 marine geological and geophysical data centres, located in 17 European maritime countries. A common data portal (www.geoseas.eu). The aims of Geo-Seas were aligned with European directives and large-scale framework programmes on global and European scales, such as GEOSS and GMES, EMODnet and INSPIRE.

**ChEssBase**


Chessbase A dynamic relational database available online since early 2005. The aim of ChEssBase is to provide taxonomic, biological, ecological and distributional data for all species described from deep-water chemosynthetic ecosystems, as well as information on available samples, images, bibliography and information on the habitats. These habitats include hydrothermal vents, cold seeps, This is a portal under CEOS International Directory Network http://idn.ceos.org/portals/Home.do?Portal=amd&MetadataType=0

**MAJOR EUROPEAN MARINE HABITAT MAPPING PROJECTS**

**OSPAR habitat mapping programme**

This programme collates existing data on the presence of OSPAR listed threatened and/or declining habitats in the north-east Atlantic (also known as ‘special habitats’ under the MSFD). It is part of a wider programme to enable Contracting Parties to identify appropriate measures for the protection of these habitats. The programme is led by the UK Joint Nature Conservation Committee (JNCC) and requires Contracting Parties to collate, standardise and submit habitat records to a single, common dataset.

Available online through the EMODnet Seabed Habitats online interactive map: [www.emodnet-seabedhabitats.eu/webgis](http://www.emodnet-seabedhabitats.eu/webgis)

MAREANO

www.mareano.no

The programme started in 2005 as one of the tools for the process of developing a plan for the integrated management of the marine environment of the Barents Sea. MAREANO aims to map terrain, sediments, benthic habitats, species diversity and sediment pollutants. It is a multi-disciplinary collaboration between the Institute of Marine Research (IMR), the Geological Survey of Norway (NGU), and the Hydrographic Service (SKSD). In addition to collecting new data, the partners collate existing information and present it integrated in the web portal www.mareano.no.

INFOMAR

www.infomar.ie

INFOMAR (Integrated Mapping for the Sustainable Development of Ireland’s Marine Resource) is a joint venture between the Marine Institute and the Geological Survey of Ireland. The mapping programme aims to carry out integrated mapping over the entire shelf and coastal waters of Ireland.

MAREMAP

http://www.maremap.ac.uk/

The Maritime Environment Mapping Programme (MAREMAP) was launched in June 2010 to bring together Natural Environment Research Council (NERC) organisations with common geoscience objectives. It is a joint initiative led by the British Geological Survey (BGS), the National Oceanography Centre (NOC) and the Scottish Association for Marine Science (SAMS) with partners from the University of Southampton, Channel Coastal Observatory, the University of Plymouth, the Maritime and Coastguard Agency (MCA), the Centre for Environment, Fisheries & Aquaculture Science (CEFAS) and Marine Scotland.

CODEMAP

http://www.codemap.eu/

CLASSIFICATION LISTS

The Marine Life Information MarLIN, Network for Britain and Ireland
http://www.marlin.ac.uk/habitats.php

The National Marine Habitat Classification for Britain and Ireland. Version 04.05.
www.jncc.gov.uk/MarineHabitatClassification

EUNIS Habitat Classification. European Environment Agency:
http://eunis.eea.eu.int

BATHYMETRY DATA

GEBCO (2014). General bathymetric chart of the oceans (GEBCO).
http://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_30_second_grid/
**PROCESSING TOOLS**

*dbSEABED: Information Integration System for Marine Substrates:*
http://instaar.colorado.edu/~jenkinsc/dbsebed/

*dbSEABED* creates unified, detailed mappings of the materials that make the seafloor by efficiently integrating thousands of individual datasets. The goal is to bring decades of seabed information - and today's information - from marine geology, biology, engineering and surveys into one seabed mapping that can fulfill the community needs for ocean-bottom information on many spatial scales. The system deals with seabed texture, composition, acoustic properties, colour, geology and biology.