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User Guide for the British Geological Survey DiGHardSubstrate250k Dataset

Open Report IR/11/027

BRITISH GEOLOGICAL SURVEY

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User Guide for the British Geological Survey DiGHardSubstrate250k Dataset

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The British Geological Survey carries out the geological survey of Great Britain and Northern Ireland (the latter as an agency service for the government of Northern Ireland), and of the surrounding continental shelf, as well as basic research projects. It also undertakes programmes of technical aid in geology in developing countries.

The British Geological Survey is a component body of the Natural Environment Research Council.

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Foreword

This report presents a description and review of the methodology developed by the British Geological Survey (BGS) to produce an assessment of the distribution of hard substrate at, or near the sea-bed on the UK continental shelf. The methodology has been developed in collaboration with external partners and is detailed in Developing the necessary data layers for Marine Conservation Zone selection - Distribution of rock/hard substrate on the UK Continental Shelf MB0103 (Gafeira, J., Green S., Dove, D., Morando, A., Cooper, R., Long, D. and Gatliff R. W, 2010). The method has been critically assessed and its fitness for purpose determined by external review by selected specialists. The purpose of this user guide is to enable those licensing this dataset to have a better appreciation of how the data set has been created and therefore an improved understanding of the potential applications and limitations of the dataset.

Contents

FIGURES

TABLES

Summary

This report presents a description and review of the methodology developed by the British Geological Survey (BGS) to produce an assessment of the distribution of hard substrate at, or near the sea-bed on the UK continental shelf. The methodology has been developed in collaboration with external partners and is detailed in Developing the necessary data layers for Marine Conservation Zone selection - Distribution of rock/hard substrate on the UK Continental Shelf MB0103 (Gafeira, J., Green S., Dove, D., Morando, A., Cooper, R., Long, D. and Gatliff R. W, 2010). The method has been critically assessed and its fitness for purpose determined by both external review and by specialists within the BGS.

Acknowledgements

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1 Introduction

Founded in 1835, the British Geological Survey (BGS) is the world's oldest national geological survey and the United Kingdom's premier centre for earth science information and expertise. The BGS provides expert services and impartial advice in all areas of Geoscience. Our client base is drawn from the public and private sectors both in the UK and internationally.

Our innovative digital data products aim to help describe the ground surface and what's beneath across the whole of Great Britain and the United Kingdom Continental Shelf (UKCS). These digital products are based on the outputs of the BGS survey and research programmes and our substantial national data holdings. This data coupled with our in-house Geoscientific knowledge are combined to provide products relevant to a wide range of users in central and local government, insurance and housing industry, engineering and environmental business, and the British public.

Further information on all the digital data provided by the BGS can be found on our website at http://www.bgs.ac.uk/data/digitaldata/digitaldata.cfm or by contacting:

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2 About the Marine DiGHardSubstrate250k Dataset

2.1 BACKGROUND

The distribution of hard substrates such as rock, boulders or cobbles at the seabed, or within 0.5 m is important in dictating the benthic assemblages found in certain areas. Therefore, an understanding of the distribution of these substrates is of primary importance in marine planning and designation of Marine Conservation Zones (MCZs) under the Marine and Coastal Access Act (2009). A number of other users will value these data, including organisations involved in the development of renewable energy, dredging and aggregate companies, and the fishing and oil and gas industries.

In order to address this issue and disseminate updated mapping on the distribution of hard substrate it was necessary to update British Geological Survey sea-bed mapping. New interpretation delineating areas where rock, boulders or cobbles are present at, or within 0.5m of the sea-bed surface has been undertaken. The resultant product is a polygon digital dataset showing areas of rock or hard substrate at, or within 0.5m of the sea-bed within UK territorial waters.

Related products which could be used in conjunction with the hard substrate data include DiGSBS250k, DiGRock250k and DiGBath250k.

2.2 WHO MIGHT REQUIRE THIS DATA?

The Marine Hard Substrate dataset is of value to a wide range of marine users who have an interest in the distribution of rock or hard substrate at the sea-bed. The dataset was developed in order to address a scientific need identified by the Department for Environment, Food and Rural Affairs (Defra), to assist with designation of regional MCZs, in accordance with policy requirements. The geographical scope of the project was later extended to incorporate Northern Ireland's, Scottish and Welsh waters.

In addition to this purpose, the dataset will also be of value to a range of groups, including marine habitat mappers, marine spatial planners, the offshore construction and development sector, the dredging and aggregate industries and the fishing industry.

2.3 WHAT THE DATASET SHOWS?

The Marine Hard Substrate dataset maps areas of rock or hard substrate outcropping or within 0.5m of the sea-bed. The interpretation was based on a variety of data sourced from within the British Geological Survey and externally. Data consulted includes archive sample and seismic records, side scan sonar, multibeam bathymetry, Admiralty charts and Olex datasets. Individual polygon attribution indicates the data source used during interpretation.

3 Technical Information

3.1 DEFINITIONS

Hard Substrate: For the purposes of this project, hard substrate was defined as cobbles, boulders and rock recorded at, or within 0.5 m of the sea-bed. These textural classes were defined in accordance with the Wentworth scale, where particles with a diameter > 64mm (cobble) were considered in the interpretation. The definition includes sediment veneer overlying hard substrate in some areas. This was used in order to include both infaunal and epifaunal communities and was considered beneficial for habitat mappers..

The maps indicate hard substrate at 0.5m depth. This depth figure was selected rather than restricting it areas of known hard substrate at the seabed because superficial sediments may be thin and/or migratory, creating a heterogenous surface layer. As sampling and data collection is often very sparse the recovered material may not be representative. This particularly evident when MBES data is available as it can show the effects of rock in the seabed topography but recovered samples may be of a thin cover over the rock surface. To collect evidence of rock at the seabed requires a limited range of gear such as rock drill or visual inspection, and these data are very sparse on the UKCS. Areas where hard substrate is present within 0.5m of the seabed may well have areas, albeit local, where the hard substrate outcrops at the seabed.

3.2 SCALE

The Marine Hard Substrate dataset is produced for use at 1:250,000 scale. This scale data should not be relied on for local or site-specific geology, or navigation.

The British Geological Survey should be contacted if more details are required as additional geological information may be available in BGS files, or we may be able to direct enquirers to other bodies or third parties.

The scale of the original information is indicated by the nominal scale attribute (NOM_SCALE: 250000) embedded in the data. Do not over-enlarge the data; for example, do not use 1:250 000 nominal scale data at 1:100 000 or 1:50 000 working scale.

The compilation of geological lines (i.e. the cartographical accuracy) is probably no better than 1 mm on the 1:250 000 base map which equates to 250 m on the ground.

3.3 FIELD DESCRIPTIONS

Table 1 Attribute table field descriptions

FIELD NAME	FIELD TYPE	DESCRIPTION
SeaBed	TEXT	Polygon classification – Rock and Hard Substrate.
DataSource	TEXT	Lists the range of data sources used to interpret each hard substrate polygon.
BGS_ID	TEXT	Unique ID for each polygon.
Area_km2_30N	DOUBLE	Area in square kilometres (WGS 84 UTM 30N).
Version	TEXT	Version of the digital data.
Nom_Scale	DOUBLE	Nominal scale of the published (or compiled) information used to prepare the digital data: e.g.250000 for 1:250 000
Released	DATE	Date released.

3.4 CREATION OF THE DATASET

A polygon shape file showing areas of rock or hard substrate at, or within 0.5m of the sea-bed has been developed using ESRI ArcGIS software. The interpretation was based on a variety of data sourced from within the British Geological Survey and externally. Data consulted includes archive sample and seismic records, side scan sonar, multibeam bathymetry and Olex datasets.

3.5 DATASET HISTORY

Version 1: Released 1st April 2011

3.6 COVERAGE

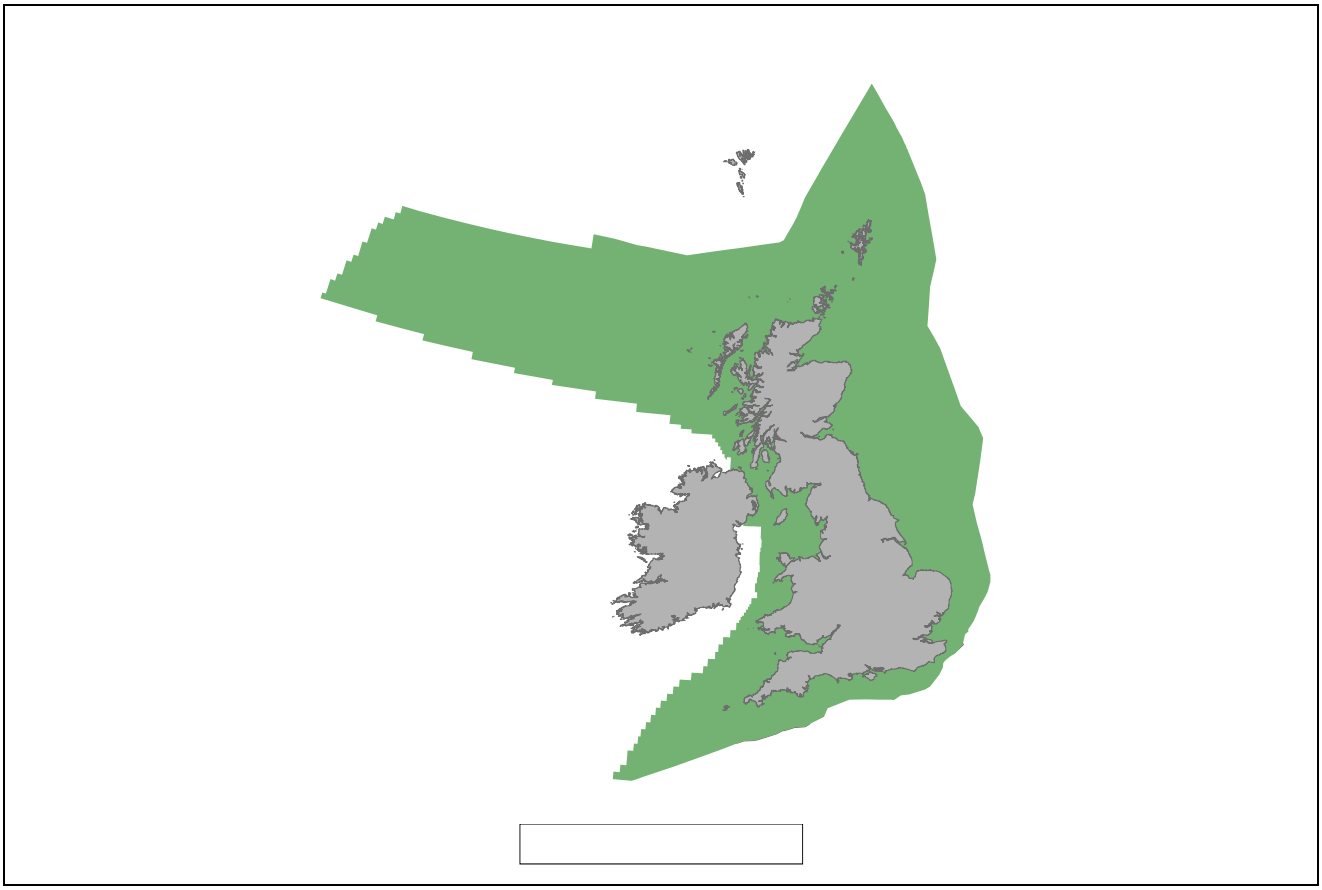

Figure 1. The coverage of the DiGHardSubstrate250k dataset

3.7 DATA FORMAT

The Hard Substrate dataset has been created as vector polygons and are available in a range of GIS formats, including ArcGIS (.shp), ArcInfo Coverages and MapInfo (.tab). More specialised formats may be available but may incur additional processing costs.

3.8 LIMITATIONS

- The Hard Substrate data set has been developed at 1:250 000 scale and must not be used at larger scales. All spatial searches against the data should therefore be conducted using a minimum 250 m buffer.
- Hard Substrate interpretation is based on, and limited to, an interpretation of the records in the possession of The British Geological Survey at the time the data set was created.
- It should be noted that the definition of Hard Substrate applied, includes but is not limited to, rock at outcrop. When using these interpretations it is important to consider that areas mapped as hard substrate include regions such as boulder fields and sediment veneers up to 0.5m thick may be present. In order to appreciate the distribution of rock at the sea-bed it is useful to view this dataset in conjunction with sea-bed sediment mapping.
- The scale of features mapped varies according to the data quality and availability. It should be noted that the level of detail possible for areas with high data density was considerable greater than in less surveyed regions.

- Shoreward polygons are clipped to the low water mark

4 Licensing Information

The British Geological Survey does not sell its digital mapping data to external parties. Instead, BGS grants external parties a licence to use this data, subject to certain standard terms and conditions. In general, a licence fee will be payable based on the type of data, the number of users, and the duration (years) of a licence.

All recipients of a licence (potential licensees) are required to return a signed digital data licence document to us before authorisation for release of BGS digital data is given.

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- reproduce extracts from the data up to A3 for use in external analogue (paper/hard copy) or non-queryable electronic (e.g. secured .pdf) format: to meet a public task duty; fulfil a statutory requirement; and/or as part of academic or other non-commercial research

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- sell, assign, sublicense, rent, lend or otherwise transfer (any part of) the dataset(s) or the licence
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When the BGS digital datasets are revised any upgrades will be automatically supplied to the licensee, at no additional cost. Geological map datasets are revised on a periodic rather than on an annual basis, licensees will therefore not automatically receive a new dataset each year unless changes have been made to the data.

These are general comments for guidance only. A licensee of BGS's digital data is provided with full details of the basis on which individual BGS datasets licensed to them are supplied.

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References

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GAFEIRA, J., GREEN S., DOVE, D., MORANDO, A., COOPER, R., LONG, D. AND GATLIFF R. W. 2010. Developing the necessary data layers for Marine Conservation Zone selection - Distribution of rock/hard substrate on the UK Continental Shelf. The British Geologocal Survey