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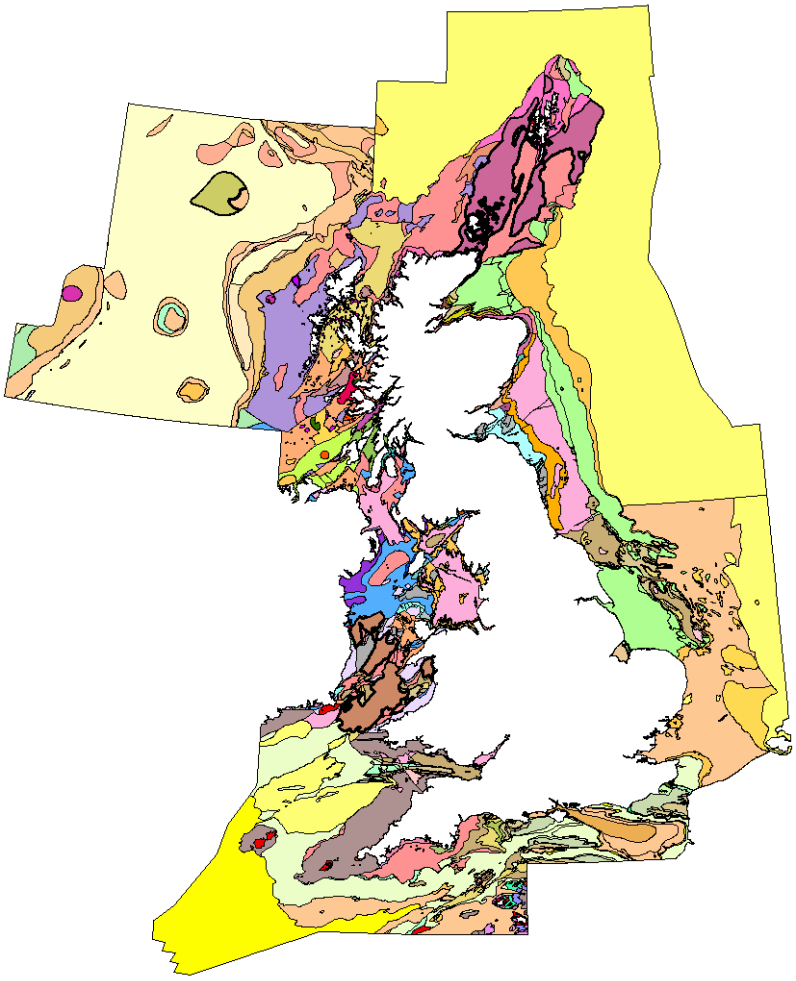
User Guide for the British Geological Survey DiGRock250k Dataset

Open Report OR/13/038



BRITISH GEOLOGICAL SURVEY

OPEN REPORT OR/13/038

User Guide for the British Geological Survey DiGRock250k Dataset

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Keywords

Bedrock, UKCS, Marine.

Front cover

DiGRock250k polygon layer projected on WGS84 UTM 30N.

Bibliographical reference

Westhead, R.K., Diaz Doce, D., Cooper, R. and Stevenson, A. 2013. User Guide for the British Geological Survey DiGRock250k Dataset. *British Geological Survey* Open *Report, OR/13/038*. 13pp.

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BRITISH GEOLOGICAL SURVEY

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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.

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Foreword

This report represents a description of the BGS DiGRock250k digital geological map of the UK offshore area, to help users of the GIS dataset understand how it was derived, what it means and how best to use it.

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Summary

This report represents a description of the BGS DiGRock250k digital geological map of the UK offshore area, to help users of the GIS dataset understand how it was derived, what it means and how best to use it.

Acknowledgements

The current revision and release of the DiGRock250k dataset represents the end point of a number of years of work, including the original digitisation from paper maps and subsequent digital editing and updates. This included work by numerous BGS digital cartographic and GIS specialists, including in particular Rob Armstrong, Tony Myers, Rhys Cooper, Diego Diaz Doce

A number of individuals in the Information Products and the Marine programmes have contributed to the project and helped compile this report. This assistance has been received at all stages of the study. In addition to the collection and processing of data, many individuals have freely given their advice, and provided their local knowledge.

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 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 DiGRock250k Dataset

DiGRock250k is a digital geological map showing the distribution of bedrock types in the UK Continental Shelf (UKCS) area. (see Figure 1 for coverage), representing the natural continuation of the onshore bedrock geology into the offshore. The bedrock geology below the sea-bed is of importance to a range of groups, including marine habitat mappers, marine spatial planners, the offshore construction and development sector, and the dredging and aggregate industries.

The bedrock divisions on the map represent the principal lithostratigraphical units (e.g. formations and groups) in the UK, ranging in age from Proterozoic to Cainozoic, as defined in the BGS Lexicon of Named Rock Units.

The offshore bedrock geology was mapped using a range of remotely sensed (e.g. seismic, bathymetry) and physical ground truthing data (e.g. rock drills, cores). This mapping was first published in printed form on the bedrock offshore 1:250 000 map series (Universal Transverse Mercator projection series maps, each sheet covering an area of 1 degree of latitude by 2 degrees of longitude; still available via the BGS Bookshop). The geological linework used to create the paper maps was used as the basis for the first version of the DiGRock250k digital map, published in 2000. This digital map has been put through a further checking and updating cycle in 2013 to produce the newly released DiGRock250k version 3.

This dataset can be used in conjunction with other BGS offshore datasets that include DiGSBS250k (Sea-Bed Sediments) and DiGBath250k (Bathymetry) datasets.

3 Creation of original 250k scale offshore bedrock mapping

The 250k scale bedrock geology maps of the UK Contintental Shelf (or ‘solid geology’ as the series was known) were compiled based on sub-seabed seismic information supplemented by cores acquired from boreholes or shallow rock cores. The locations of the seismic profiles and cores are available on GeoIndex. The mapping programme was principally at reconnaissance level therefore the data from which the maps were compiled could be several kilometres apart. The interpretations are consequently the result of extrapolation between quite widely distributed information. To improve the details on bedrock geology wherever possible, the geologists were able to make use of information provided by the offshore industry, such as site investigation reports. Complete coverage of the UKCS was carried out as part of the BGS Offshore Mapping Programme funded by the Department of Energy as it was then (1970s-1980s); however in the deep-water areas to the west of Scotland the bedrock geology was compiled during industry co-funded projects such as the Rockall Consortium.

4 Technical Information

4.1 SCALE

The DiGRock250k 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.

4.2 FIELD DESCRIPTIONS

The following tables run through the fields (columns) in the database tables associated with the two GIS layers that make up DiGRock250k – the polygon (Table 1) and linear (Table 2) layers.

FIELD NAME	FIELD TYPE	DESCRIPTION
LEX	**TEXT**	Lexicon (or LEX) code. First part of the LEX_RCS label. Up to 5 characters (mostly letters). An abbreviation of the rock unit or deposit as listed in the BGS Lexicon of Named Rock Units : e.g. LI
LEX_D	**TEXT**	Description of the Lexicon code above giving the name of the unit: e.g. LIAS GROUP is the full name of the unit coded as LI
LEX_RCS	**TEXT**	The two-part code, LEX & RCS, used to label each polygon of DiGRock250k data
RCS	**TEXT**	The RCS code (or an abbreviation for the string of RCS codes given in full in RCS_X)
RCS_X	**TEXT**	RCS codes. An alternative code abbreviation (or a string of such codes joined by + signs with square brackets used for subordinate types), each up to 6 characters, for the type of rock or lithology as based on the hierarchical BGS Rock Classification Scheme (RCS): e.g. MDST + LMST
RCS_D	**TEXT**	Description of the RCS code(s) above giving the lithology of the unit: e.g. MUDSTONE and LIMESTONE
RANK	**TEXT**	Rank of the unit in the lithostratigraphical or lithodemic hierarchy: e.g. GROUP
MAX_TIME_D	**TEXT**	Maximum or oldest age of the unit, to the most accurate time (or geochronological) division possible: e.g. ALBIAN
MIN_TIME_D	**TEXT**	Minimum or youngest age of unit, to the most accurate time (or geochronological) division possible: e.g. APTIAN
MAX_TIME_Y	**NUMERICAL**	Maximum age, in years, of the oldest time division during which the geological unit was formed: e.g. 333800000

MIN_TIME_Y	**NUMERICAL**	Minimum age, in years, of the youngest time division during which the geological unit was formed: e.g. 320710000
MAX_INDEX	**NUMERICAL**	Maximum index. A number representing the maximum age (earliest or oldest time) of the unit: MAX_TIME_D field: e.g. 1322120
MIN_INDEX	**NUMERICAL**	Minimum index. A number representing the minimum age (latest or youngest time) of the unit: MIN_TIME_D field: e.g. 1321340
MAX_AGE	**TEXT**	Maximum age. Name of the age of maximum geochronological time applicable: e.g. RYAZANIAN
MIN_AGE	**TEXT**	Minimum age. Name of the age of minimum geochronological time applicable: e.g. BARREMIAN
MAX_EPOCH	**TEXT**	Maximum epoch. Name of the epoch of maximum geochronological time applicable: e.g. CARADOC
MIN_ EPOCH	**TEXT**	Minimum epoch. Name of the epoch of minimum geochronological time applicable: e.g. ASHGILL
MAX_SUBPER	**TEXT**	Maximum sub-period. Name of the sub-period of maximum geochronological time applicable: e.g. DINANTIAN
MIN_SUBPER	**TEXT**	Minimum sub-period. Name of the sub-period of minimum geochronological time applicable: e.g. SILESIAN
MAX_ PERIOD	**TEXT**	Maximum period. Name of the period of maximum geochronological time applicable: e.g. CARBONIFEROUS
MIN_ PERIOD	**TEXT**	Minimum period. Name of the period of minimum geochronological time applicable: e.g. PERMIAN
MAX_ERA	**TEXT**	Maximum era. Name of the era of maximum geochronological time applicable: e.g. PALAEOZOIC
MIN_ERA	**TEXT**	Minimum era. Name of the era of minimum geochronological time applicable: e.g. MESOZOIC
MAX_EON	**TEXT**	Maximum eon. Name of the eon of maximum geochronological time applicable: e.g. PROTEROZOIC
MIN_EON	**TEXT**	Minimum eon. Name of the eon of minimum geochronological time applicable: e.g. PHANEROZOIC
VERSION	**TEXT**	Dataset name and version number
RELEASED	**DATE**	Date of dataset release
NOM_SCALE	**NUMERICAL**	Nominal scale of the published (or compiled) information used to prepare the digital data: e.g. 250000. Also gives an indication of scale-dependant accuracy
LEX_ROCK	**TEXT**	A two-part code, LEX & ROCK, formerly used as the primary label for each polygon of DiGRock250k data and for creating map keys or legends

Table 1. Polygon information fields on DiGRock250k version 3

FIELD NAME	FIELD TYPE	DESCRIPTION
CATEGORY	TEXT	Geological unit category e.g. FAULT used for geological units that form thin beds too narrow to be shown as polygons carrying a colour on the traditional printed map face
FEATURE	TEXT	Geological feature, in abbreviated form, e.g. Fault_at_rockhead
FEATURE_D	TEXT	Description of FEATURE above in full e.g. Fault at rockhead
VERSION	TEXT	Dataset name and version number
RELEASED	NUMERICAL	Year of dataset release
NOM_SCALE	NUMERICAL	Nominal scale of the published (or compiled) information used to prepare the digital data: e.g. 250000. Also gives an indication of scale-dependant accuracy

Table 2. Linear information fields on DiGRock250k version 3

4.3 CREATION AND UPDATING OF THE DATASET

The original version of DiGRock250k, created in 2000 and revised in 2007, was the result of digitising the existing paper 1:250 000 series of geological maps described in section 3. Details of the printed map sheet names, numbers and publication dates are available from the BGS online catalogue.

In 2013, the dataset was put through a further comprehensive geological and GIS checking process to create its third version. The principle objective of this geological checking was to smooth out, as much as possible, join-up issues between the various 'sheet' areas inherited from the sequentially published paper maps. In particular, efforts were made to ensure the rock descriptions (see Table above) across contiguous outcrops of particular rock units are consistent and best representative of the regional lithologies. The geological checking has also included removal of any remaining cartographic or polygon coding errors from the original digitising process, which were generally minor in nature.

Two completely new map sheets were also added to the original DiGRock250k digital linework. These two sheets were Central and Northern Rockall. The incorporation of the former map sheets involved merging them to the original dataset, changing their coastline to match that of DiGRock250k and, where possible, performing minor modifications on the geometry of the boundary polygons of the new map areas to allow for a better transition with the original map area. In addition, the St George's Channel area was updated following the St George's Channel printed map sheet, published in 2009.

The GIS stage of the 2013 update also included implementing the geological corrections on both, linear and polygon datasets.

- Polygon layer: The revision of this layer targeted firstly the geological attribution held on the data, i.e., to harmonize the LEX-ROCK attribution; their units, inconsistencies and their descriptions. Secondly, where possible we dissolved the legacy 'sheet boundaries' and boundaries between polygons of the same LEX-ROCK code. And thirdly and final step, was a review of the attribute table fields; this included a migration from LEX-ROCK to LEX-RCS classification, and makes the DiGRock250k consistent with a similar suite of BGS offshore products.

- Linear layer: The revision of this layer included the elimination of features “at depth”, a check on the correct orientation of thrusts and monoclines, improvement of layer symbolisation, and a field review similar to that carried out on the polygons dataset.

Finally, the corrections were followed by a geometrical testing phase to eliminate any potential GIS polygon or linear errors (e.g. overlaps, gaps, slivers).

4.4 COVERAGE

The dataset covers the majority of UKCS, but does not include coastal waters.

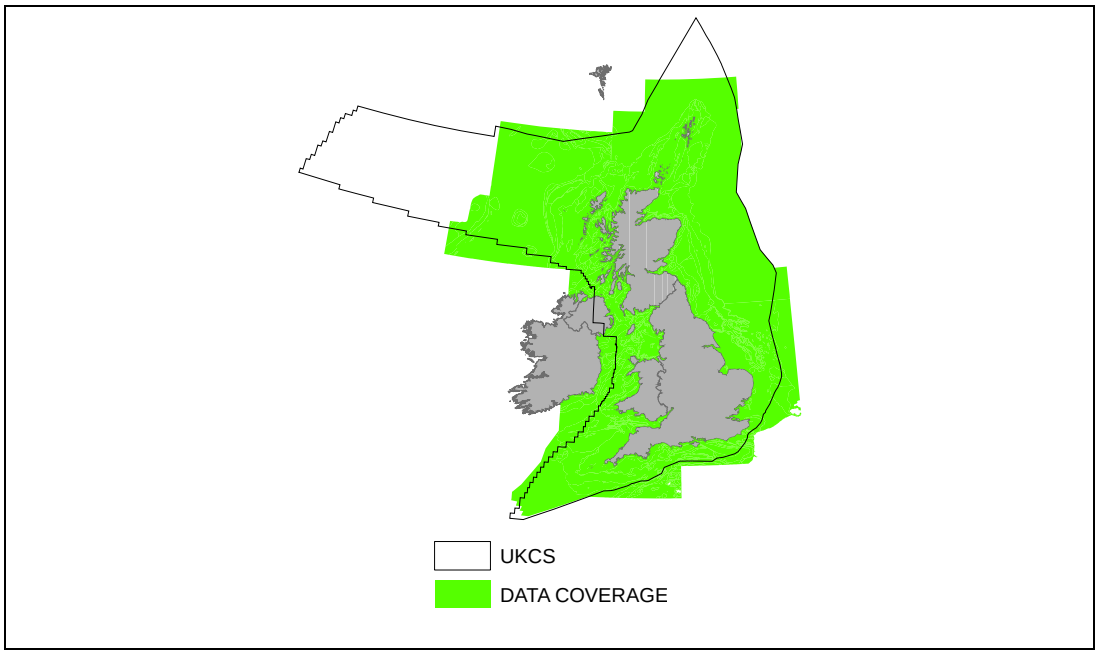

Figure 1. Coverage of DiGRock250k version 3 dataset

4.5 DATA FORMAT

The DiGRock250k dataset has been created as vector polygons and is 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.

4.6 LIMITATIONS

- DiGRock250k 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.
- DiGRock250k is based on, and limited to, an interpretation of data in the possession of The British Geological Survey at the time the dataset was created.

5 Licensing Information

The latest information on access to and the licensing of DiGRock250k and other BGS Information Products can be found on the Our Data area of the BGS Website (http://www.bgs.ac.uk/data/home.html?src=topNav).