



COLIN BLACKBURN, EDWARD LEWIS, MARTIN NAYEMBIL, MARY MOWAT, ANNE RICHARDSON, JOHN STEVENSON

BGS & MEDIN OGCAPI-EDR Pilot



British
Geological
Survey

Content

- Conclusions
- Intro to BGS
- Intro to BGS DAC & NGDC
- Current Data Access
- Development Plan
- pygeoapi
- Features
- CQL
- OGC API – ESRI/QGIS etc
- OGC API & Python
- Thoughts

Huge Thanks to the BGS team:

- Colin Blackburn
- Edward Lewis
- Martin Nayembil
- Mary Mowat
- Anne Richardson
- John Stevenson



ADD YOUR SUBTITLE HERE

Conclusions First!

Conclusions

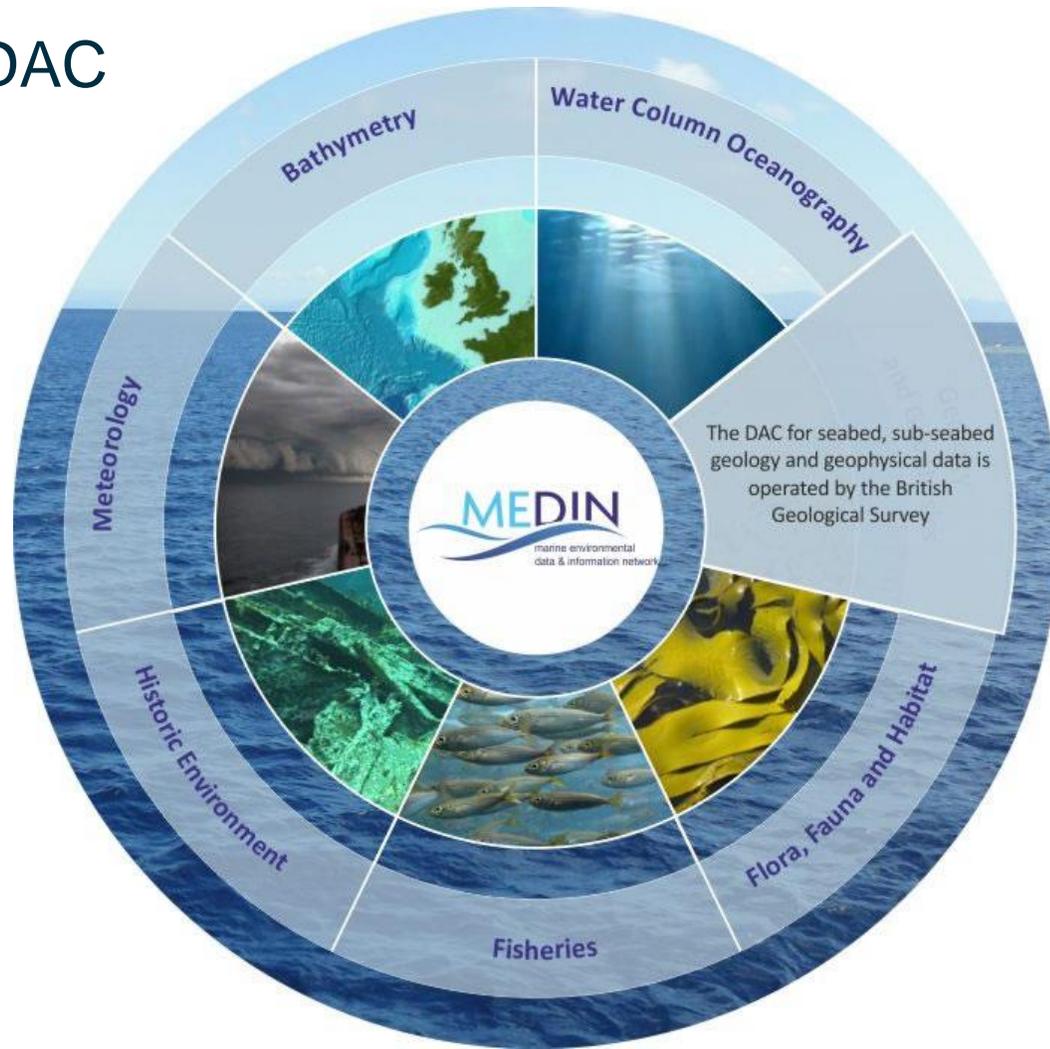
- Unfortunately we were **unable** to deliver an OGC-API-Environmental Data Retrieval standard endpoint in this Pilot Project.
- We were able to deliver an OGC-API-Features endpoint with Common Query Language Functionality
 - This offers equivalent functions to the EDR but with a different syntax
 - It also offers greater query options than EDR alone can provide
 - All OGL BGS DAC data is currently available
- Important Learnings working with Free & Open Source Software (FOSS)
 - Engage with steering committee & devs early
 - Expect things may take as longer or longer than working from scratch
- Allowed us to make significant contribution to FOSS benefiting the wider community.
 - “Game Changer” - USGS Integrated Modelling and Prediction Division Geo-Intelligence Branch
 - “Fantastic work! Thank you for your contributions!!” - Meteorological Service of Canada



British Geological Survey DAC

OUR ROLE & DATA

BGS DAC



- Marine Geology and Geophysics - includes data from the **seabed and sub-seabed**.

British Geological Survey

- National geological survey founded in 1835
- UK custodian of geoscientific information
- Independent
- 600 staff
- Part of UKRI, a not-for-profit public sector research establishment
- Funded by Government & external income
- Offices at Keyworth, Edinburgh, Wallingford & Cardiff. GSNI in Belfast
- Includes the NERC Environmental Data Service for Geoscience.

OGL



F_{indable} A_{ccessible} I_{nteroperable} R_{eusable}



Geospatial
Commission

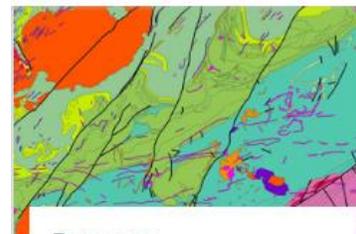


About BGS

Research

Data

Discovering Geology



Datasets

We have a wide range of licensed geoscience data. The datasets range from the geological data family (BGS Geology) to offshore data, ground stability datasets and 3D models.

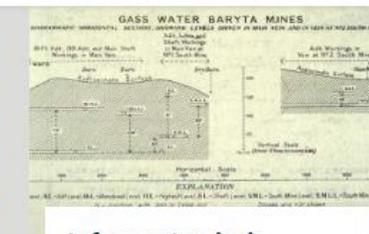
→ [Show more](#)



Map viewers

Data published through map viewers allowing you to reveal more about the ground beneath your feet.

→ [Show more](#)



Information hub

Data collections, publications, scanned records and other data gathered by BGS and provided by external organisations.

→ [Show more](#)



Technologies

Applications, software and online services created by the BGS and our collaborators.

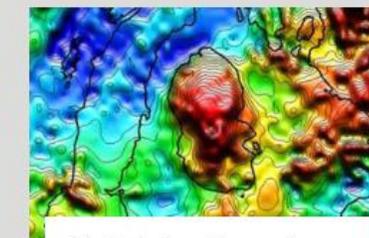
→ [Show more](#)



Digital geoscience

The BGS is a data-rich organisation. Our data science and data infrastructure are fundamental to our future research and underpin our strategic challenges.

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Digital data licensing and resellers

If you are interested in an information product and the Open Government Licence is not applicable, we encourage the use and exploitation of our information products by providing a wide range of licences.

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NGDC

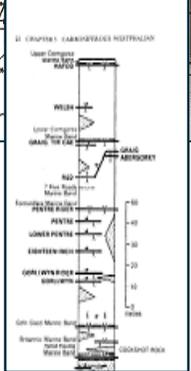


SD3 10
4-3NW
Exploratory Boring ES.
for sale of
Phosphorus Farm
Stappell
PLEEFWOOD
GSM

The actual pit is 15 ft deep SW of Phosphorus Farm along the banks of the lagoon.
 Surface level **+ 33.5 ft** O.D. **One-inch Map 66 (Pleefwood)**
 Commenced **to the Survey by LC (Alkali) Limited, Northwick & Redwood**
 Date of sinking **about 1940** Bore **R.C. (Alkali) Hastings**
 Specimens **see bottom of bore**

Description	TECHNICAL		DEPTH	
	Feet	Inches	Feet	Inches
Silt, (under clay, gravel and sand)	158	0	158	0
Red and blue sand with gypsum	6	0	273	6
Red and grey sand, gypsum and rust	45	6	325	0
ROCKHEAD				
Silt, bit. sand, marl, grey sand				
4 in. layer of g.				
BOTTOM OF BORE				
Red and blue sand, shale with gypsum				

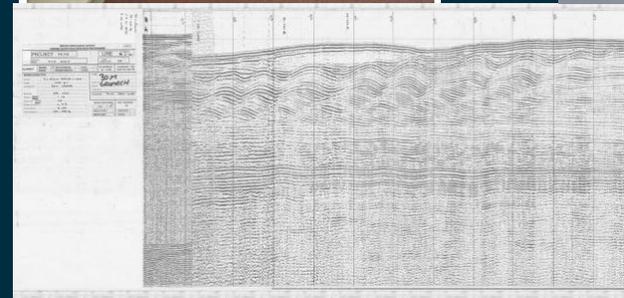
Full details on attached



Sampling	Properties	State	Depth	Level	Legend
0-30	0	MSD (Bore): Hardness	0-30	0	
0-30-1.00	50	MSD (Bore): Hardness	0-30	0	
1-30	0	MSD (Bore): Hardness	1-30	0	
1-30-2.00	100	MSD (Bore): Hardness	1-30	0	
2-30	0	MSD (Bore): Hardness	2-30	0	
2-30-3.00	150	MSD (Bore): Hardness	2-30	0	
3-30	0	MSD (Bore): Hardness	3-30	0	
3-30-4.00	200	MSD (Bore): Hardness	3-30	0	
4-30	0	MSD (Bore): Hardness	4-30	0	
4-30-5.00	250	MSD (Bore): Hardness	4-30	0	
5-30	0	MSD (Bore): Hardness	5-30	0	
5-30-6.00	300	MSD (Bore): Hardness	5-30	0	
6-30	0	MSD (Bore): Hardness	6-30	0	
6-30-7.00	350	MSD (Bore): Hardness	6-30	0	
7-30	0	MSD (Bore): Hardness	7-30	0	
7-30-8.00	400	MSD (Bore): Hardness	7-30	0	
8-30	0	MSD (Bore): Hardness	8-30	0	
8-30-9.00	450	MSD (Bore): Hardness	8-30	0	
9-30	0	MSD (Bore): Hardness	9-30	0	
9-30-10.00	500	MSD (Bore): Hardness	9-30	0	
10-30	0	MSD (Bore): Hardness	10-30	0	
10-30-11.00	550	MSD (Bore): Hardness	10-30	0	
11-30	0	MSD (Bore): Hardness	11-30	0	
11-30-12.00	600	MSD (Bore): Hardness	11-30	0	
12-30	0	MSD (Bore): Hardness	12-30	0	
12-30-13.00	650	MSD (Bore): Hardness	12-30	0	
13-30	0	MSD (Bore): Hardness	13-30	0	
13-30-14.00	700	MSD (Bore): Hardness	13-30	0	
14-30	0	MSD (Bore): Hardness	14-30	0	
14-30-15.00	750	MSD (Bore): Hardness	14-30	0	
15-30	0	MSD (Bore): Hardness	15-30	0	
15-30-16.00	800	MSD (Bore): Hardness	15-30	0	
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16-30-17.00	850	MSD (Bore): Hardness	16-30	0	
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18-30	0	MSD (Bore): Hardness	18-30	0	
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20-30	0	MSD (Bore): Hardness	20-30	0	
20-30-21.00	1050	MSD (Bore): Hardness	20-30	0	
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58-30	0	MSD (Bore): Hardness	58-30	0	
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68-30	0	MSD (Bore): Hardness	68-30	0	
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69-30-70.00	3500	MSD (Bore): Hardness	69-30	0	
70-30	0	MSD (Bore): Hardness	70-30	0	
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84-30	0	MS			

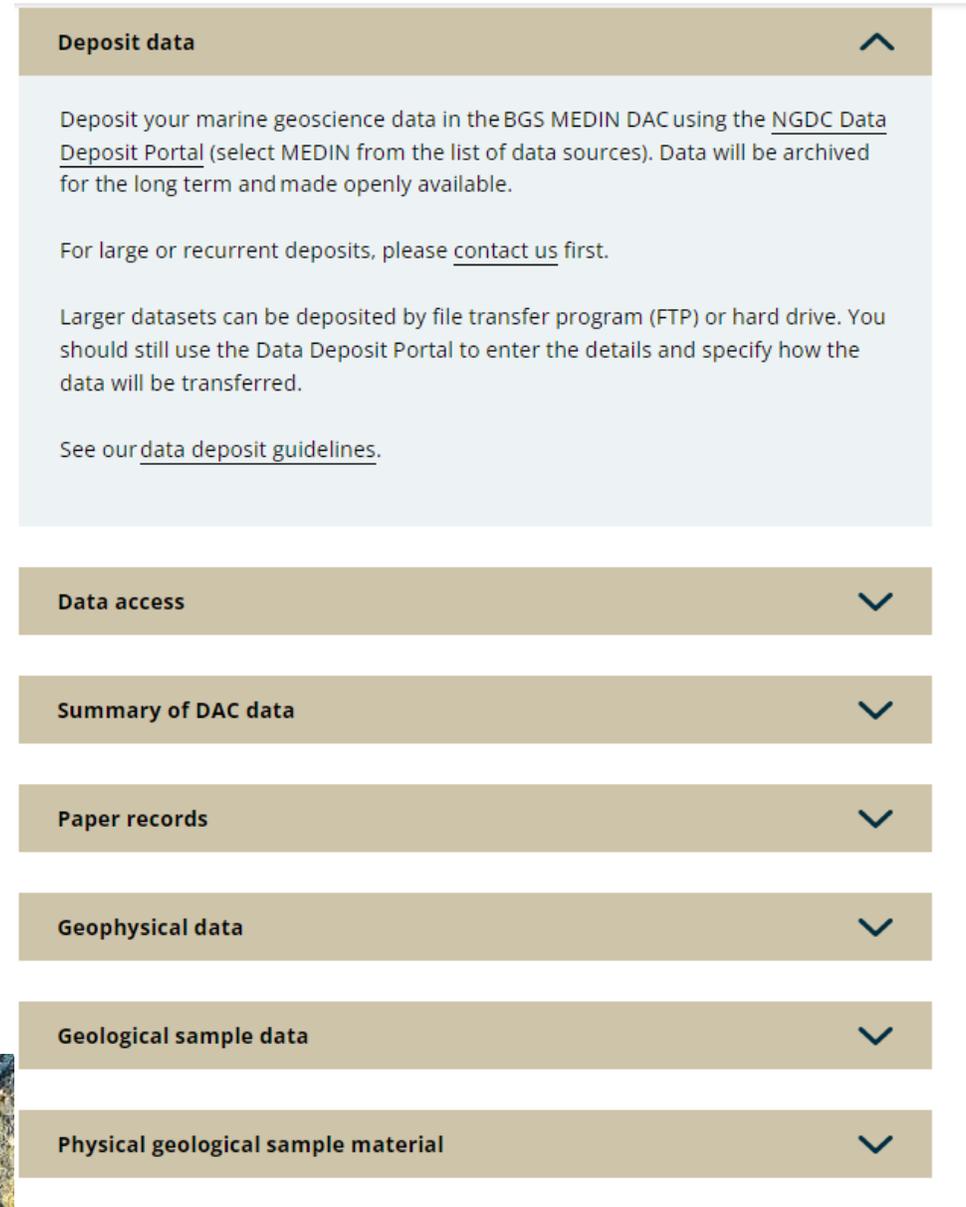
BGS DAC – Huge Variety of Data!

- Seabed Sample Data - Grabs, cores incl. geological descriptions, geotechnical, geochemical, and Particle Size Analysis
- Geophysical Data - Shallow seismic, backscatter, sidescan sonar



BGS DAC Homepage

- How to view and access our data
- How to Submit relevant data
- All findable through the MEDIN portal
 - Using the MEDIN discovery metadata standard



The screenshot shows a vertical navigation menu on the right side of the page. The menu items are: 'Deposit data' (with an upward arrow), 'Data access' (with a downward arrow), 'Summary of DAC data' (with a downward arrow), 'Paper records' (with a downward arrow), 'Geophysical data' (with a downward arrow), 'Geological sample data' (with a downward arrow), and 'Physical geological sample material' (with a downward arrow). The 'Deposit data' section is expanded, showing text about depositing marine geoscience data in the BGS MEDIN DAC using the NGDC Data Deposit Portal, instructions for large or recurrent deposits, and a link to data deposit guidelines.

Deposit data 

Deposit your marine geoscience data in the BGS MEDIN DAC using the [NGDC Data Deposit Portal](#) (select MEDIN from the list of data sources). Data will be archived for the long term and made openly available.

For large or recurrent deposits, please [contact us](#) first.

Larger datasets can be deposited by file transfer program (FTP) or hard drive. You should still use the Data Deposit Portal to enter the details and specify how the data will be transferred.

See our [data deposit guidelines](#).

Data access 

Summary of DAC data 

Paper records 

Geophysical data 

Geological sample data 

Physical geological sample material 



Current Data Access

Current BGS Data Delivery

- File Download (Variety of formats - GeoPackage, CSV, ESRI, MapInfo)
- Geoportals – GeoIndex Onshore, GeoIndex Offshore, BGS Geology Viewer
- Online Viewers – Scans of Maps, Logs, Notebooks, Photos
- Web Services
 - Web Map Services
 - Web Feature Services
- API's
 - SensorThingsAPI
 - OGC API - Features

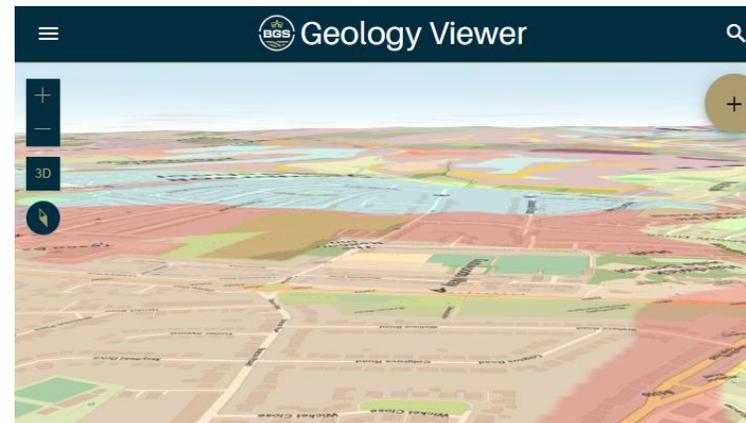
This server provides OGC API endpoints for a selection of BGS OpenGeoscience geospatial data. The BGS has a wide range of datasets and wants to provide this data under Open Government Licence.

geospatial data api ogc geology

Terms of service	https://www.bgs.ac.uk/legal-and-policy/terms-of-use/
License	Open Government Licence

Collections

View the collections in this service

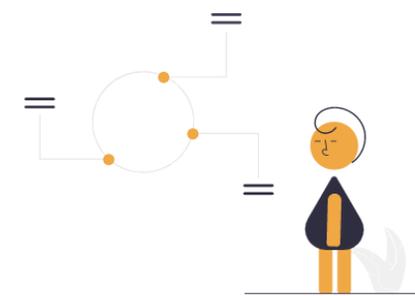


BGS Sensor Data Service

This service provides an application programming interface (API) for data scientists, software developers and software applications to query and download BGS-hosted sensor data in machine-readable JSON format.

The API is powered by FROST Server and conforms to the OGC SensorThings API specification. See the [documentation](#) below for details.

Access the API



```

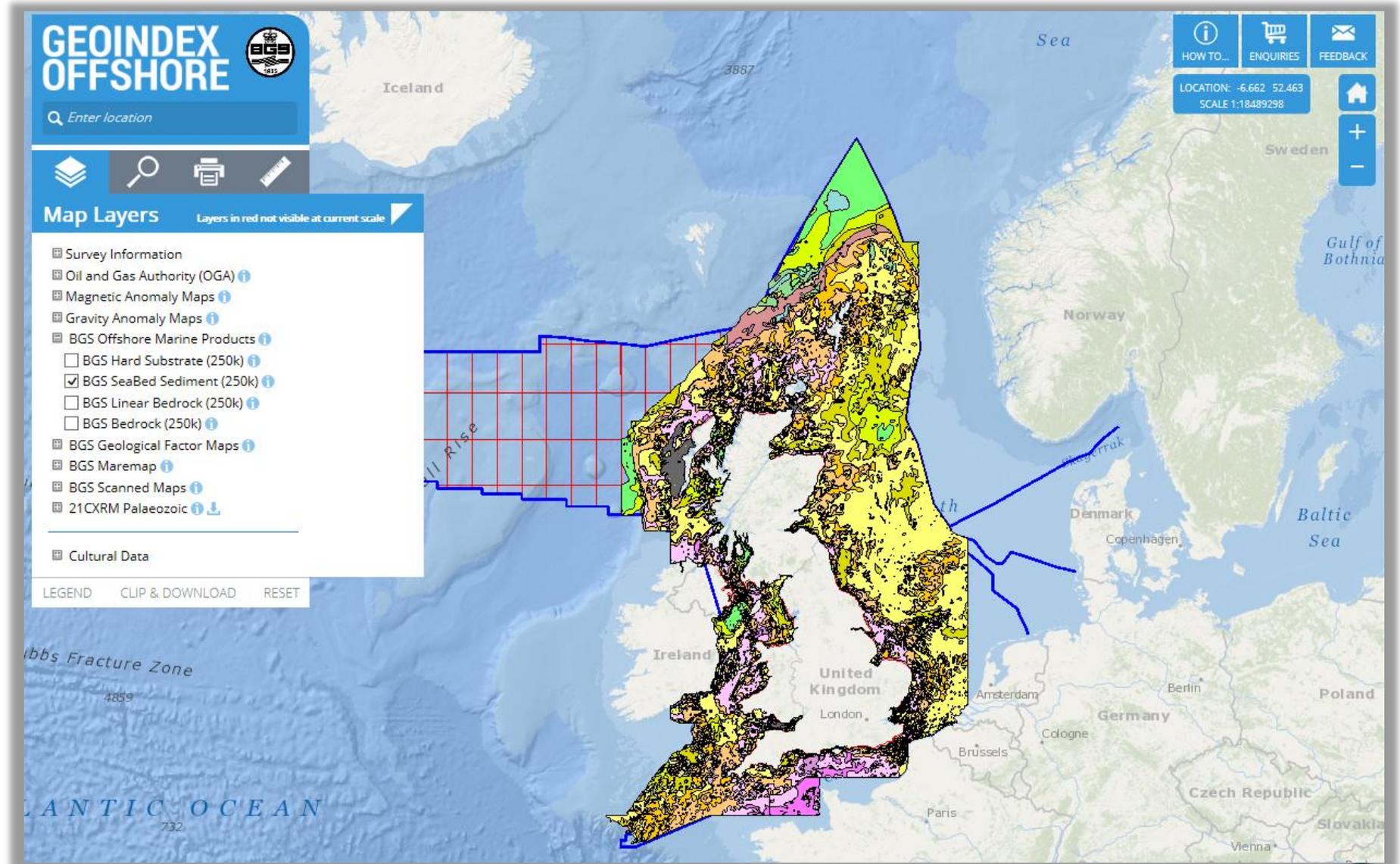
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scale digital geology</Title>
taset is designed for 1:50000 scale but can be viewed in this WMS below 1:100000. Separate bedrock ge
out more of the British Geological Survey's maps that are available digitally please visit http://ww
nlarchives.gov.uk/doc/open-government-licence/), subject to the following acknowledgement accompanyi
at could benefit others usingbgsdata@bgs.ac.uk.</Abstract>
Keywords
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Kingdom/Keyword>
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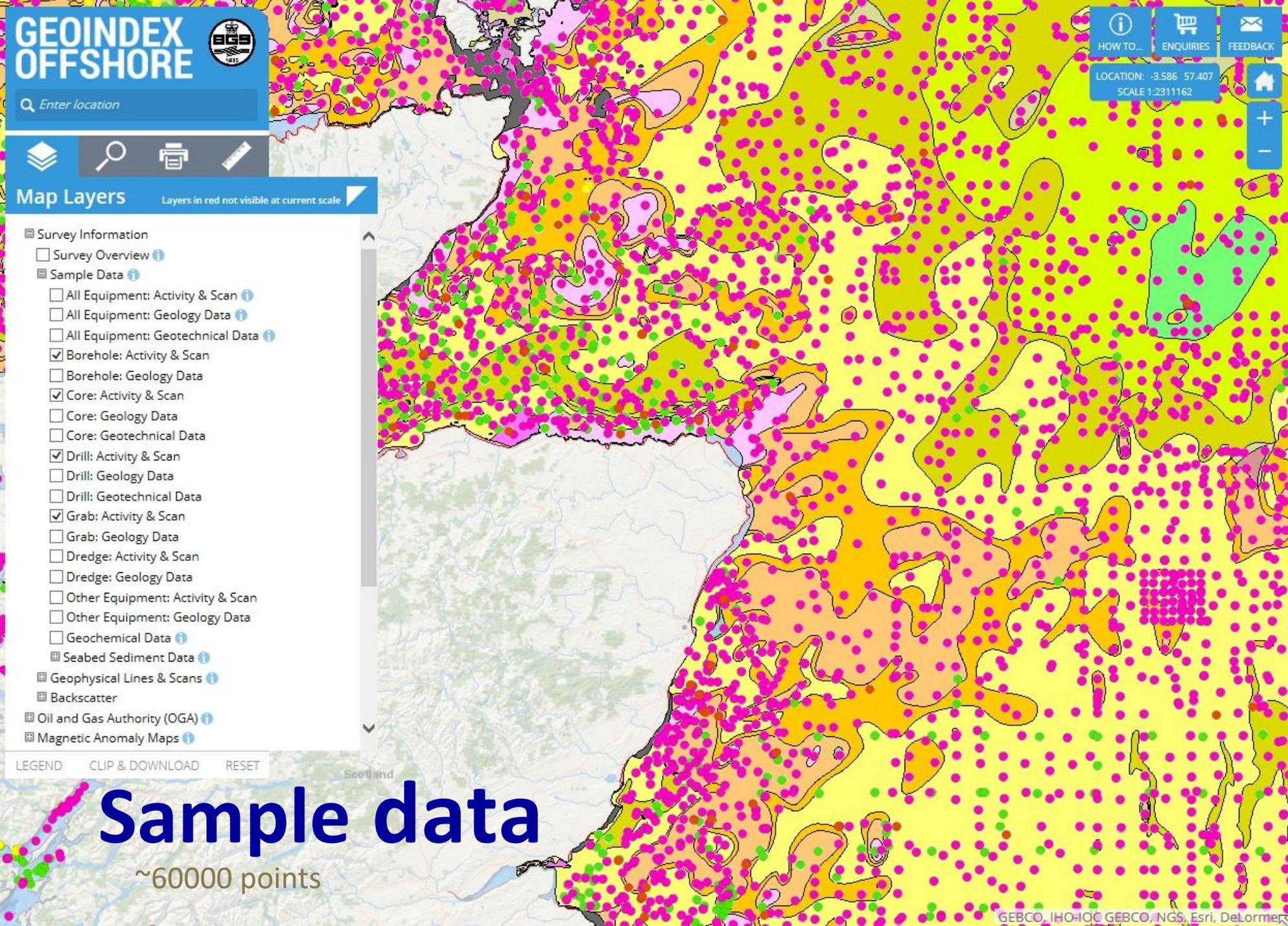
```

Offshore GeoIndex

Uses OGC
WMS as input

WMS is
available openly







Enter location



Map Layers

Layers in red not visible at c

- Survey Information
 - Survey Overview
 - Sample Data
 - All Equipment: Activity & Scan
 - All Equipment: Geology Data
 - All Equipment: Geotechnical Data
 - Borehole: Activity & Scan
 - Borehole: Geology Data
 - Core: Activity & Scan
 - Core: Geology Data
 - Core: Geotechnical Data
 - Drill: Activity & Scan
 - Drill: Geology Data
 - Drill: Geotechnical Data
 - Grab: Activity & Scan
 - Grab: Geology Data
 - Dredge: Activity & Scan
 - Dredge: Geology Data
 - Other Equipment: Activity & Scan
 - Other Equipment: Geology Data
 - Geochemical Data
 - Seabed Sediment Data
 - Geophysical Lines & Scans

56-07 76 1/63 COPY NOT TO BE REMOVED FROM THE OFFICE

Empty. Dredge jolted heavily at start, then appeared to run on sediment.

Approx 16 cwt rubble, 3 boulders (up to 18")

Large N of large mussels, a few sea urchins, many brittle stars. The whole covered in a thin smear of muddy silt.

Bag ① Clips from 3 boulders
1 cobble all of which had fairly sharp joint planes & may have been in situ.
All are basic igneous rocks.

Bag ② Random selection (3) of stones from remainder of sample. Very from rounded to angular.

Probable % of basic igneous rocks.

Bank Examination 21-11-63
Bank used a 1/2 inch diameter in center. Cut at 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.

14 Specimens. Sand/Gravel, fine-grained/med grain, interstitial/retained.

1 Specimen. Sub-gran, medium grain? plastic.

ECHO SOUNDER
No trace - depth c. 60-80 metres (bathy)
(current low tide - depth in use).

Anchor/Berth Site	Bearing (°)	Distance (ft/km)	Vessel
Colt Island (Point of View)	0.5 to 0.3	0.5 to 0.3	1005
North-west corner	2.0 to 2.2	2.0 to 2.2	4-8 60
Beam Clin			RD/1D
Beam Position	Red	Green	Purple
			Sample No. SH 78

Record 1 of 2

Dredge: Activity & Scan

ACTIVITY_ID: 1988587
 SAMPLE_NAME: +56-007/76/RD/1
 IMAGE_URL: [See PDF](#)
 TERMS_OF_USE: Available under the Open Government Licence subject to the following acknowledgement accompanying the reproduced BGS materials "Contains British Geological Survey materials ©NERC [year]"
 TERMS_OF_USE_URL: [Read](#)
 SAMPLE_ALIAS: SH 78
 DGSQ: +56-007
 NUM: 76
 CRUISE: 1969/MW/1

All Equipment: Activity & Scan (71)

ACTIVITY_ID	SAMPLE_NAME	IMAGE_URL	TERMS_OF_USE	TERMS_OF_USE_URL	SAMPLE_ALIAS	DGSQ
2001806	+56-006/86/GS/1	See PDF	Available under the Open Government Licence subject to the following acknowledgement accompanying the reproduced BGS materials "Contains British Geological Survey materials ©NERC [year]"	Read	SH 330	+56-006
1954317	+56-006/81/GS/1	See PDF	Available under the Open Government Licence subject to the following acknowledgement accompanying the reproduced BGS materials "Contains British Geological Survey materials ©NERC [year]"	Read	SH 325	+56-006
2013809	+56-006/82/GS/1	See PDF	Available under the Open Government Licence subject to the following acknowledgement accompanying the reproduced BGS materials "Contains British Geological Survey materials ©NERC [year]"	Read	SH 326	+56-006
1954318	+56-006/83/GS/1	See PDF	Available under the Open Government Licence subject to the following acknowledgement accompanying the reproduced BGS materials "Contains British Geological Survey materials ©NERC [year]"	Read	SH 327	+56-006



Enter location

HOW TO... ENQUIRIES FEEDBACK

LOCATION: -5.536 58.402
SCALE 1:2311162

Home, Zoom in (+), Zoom out (-) icons



Map Layers

Layers in red not visible at current scale

- Survey Information
 - Survey Overview
 - Sample Data
 - Geophysical Lines & Scans
 - Shot Points
 - Seismic Reflection
 - Sonar
 - Backscatter
 - Oil and Gas Authority (OGA)
 - Magnetic Anomaly Maps
 - Gravity Anomaly Maps
 - BGS Offshore Marine Products
 - BGS Hard Substrate (250k)
 - BGS SeaBed Sediment (250k)
 - BGS Linear Bedrock (250k)
 - BGS Bedrock (250k)
 - BGS Geological Factor Maps
 - 21CXRMPalaeozoic
-
- Cultural Data

LEGEND CLIP & DOWNLOAD RESET

Geophysical data

~23000 lines





Enter location

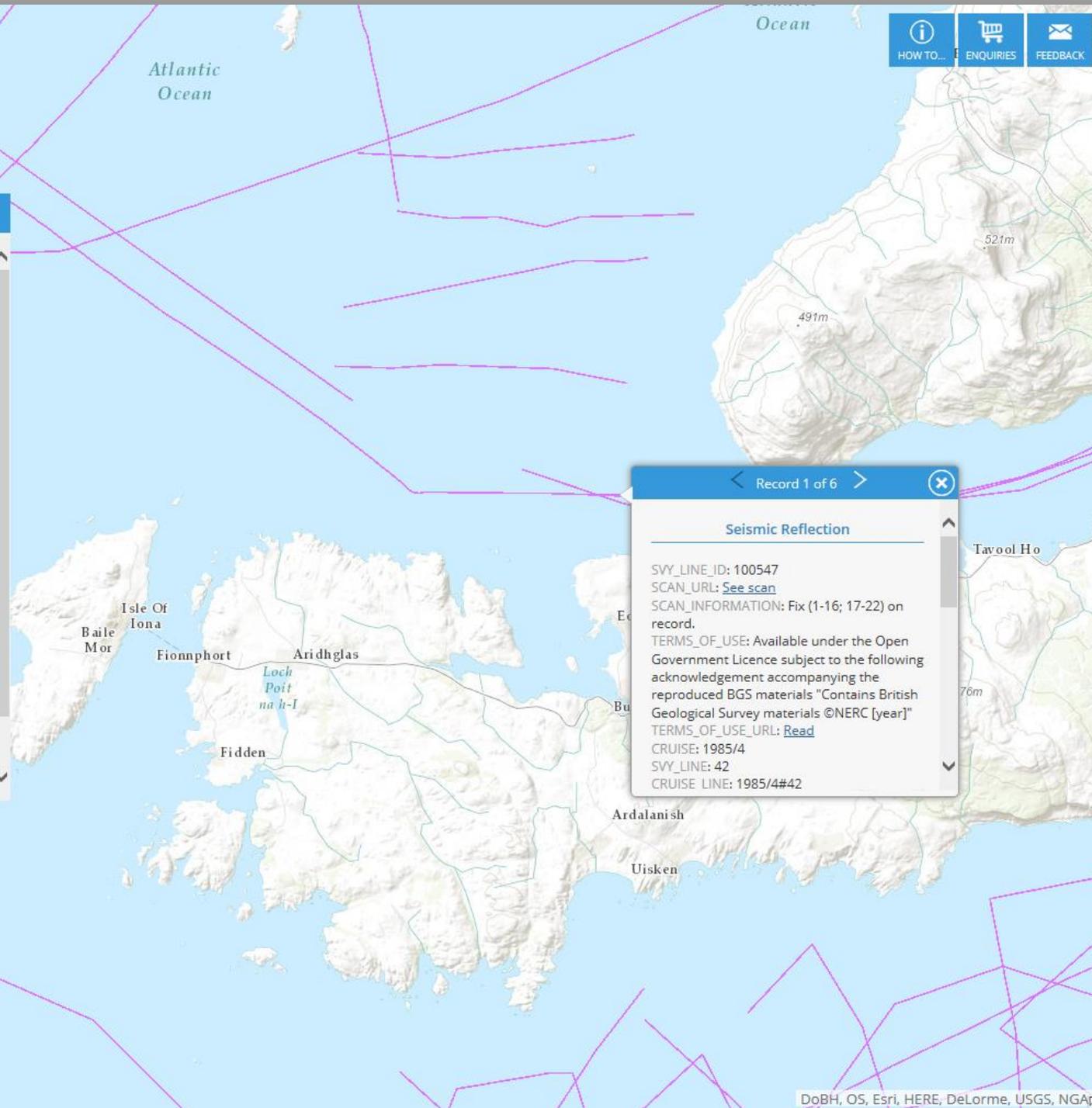


Map Layers

- Survey Information (Open)
 - Sample Data
 - Sampling Activity: Overview & Scanned Records
 - Geochemical Data
 - Geological Data
 - Geotechnical Data
 - Seabed Sediment Data
 - Sediment: Folk Classification
 - Gravel Sand Mud Data
 - Carbonate Data
 - Geophysical Data
 - Shot Points
 - Survey Lines: Overview & Scanned Records
 - Seismic Reflection
 - Sonar
 - Survey Data
 - MEDIN
 - Oil and Gas Industry Site Surveys
 - Oil and Gas Authority (OGA)
 - Hydrocarbon Wells
 - Magnetic Anomaly Maps
 - Gravity Anomaly Maps
 - BGS Offshore Marine Products
 - BGS Geological Factor Maps

Median lines

LEGEND CLIP & DOWNLOAD



Record 1 of 6

Seismic Reflection

SVY_LINE_ID: 100547
SCAN_URL: [See scan](#)
SCAN_INFORMATION: Fix (1-16; 17-22) on record.
TERMS_OF_USE: Available under the Open Government Licence subject to the following acknowledgement accompanying the reproduced BGS materials "Contains British Geological Survey materials ©NERC [year]"
TERMS_OF_USE_URL: [Read](#)
CRUISE: 1985/4
SVY_LINE: 42
CRUISE LINE: 1985/4#42

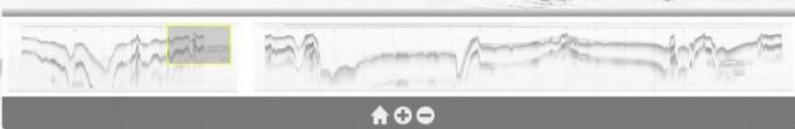
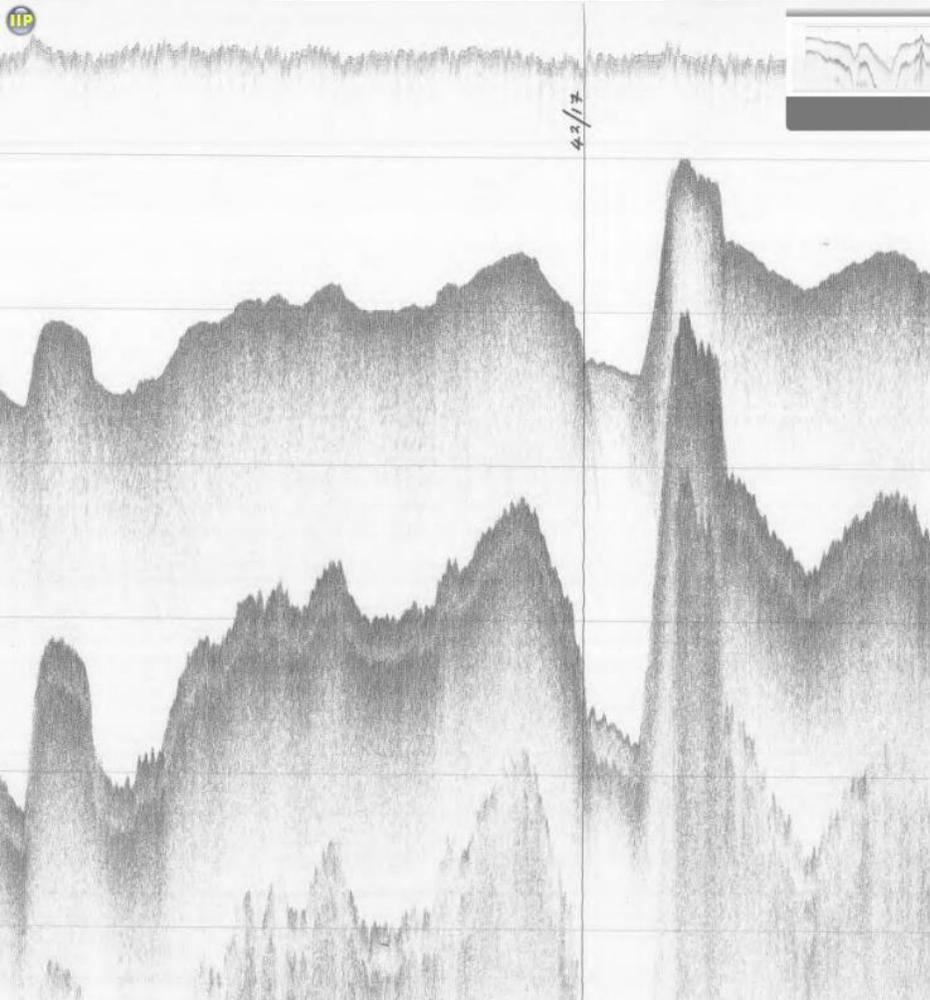


LOCATION: -6.314 56.34
SCALE 1:144448





Enter location



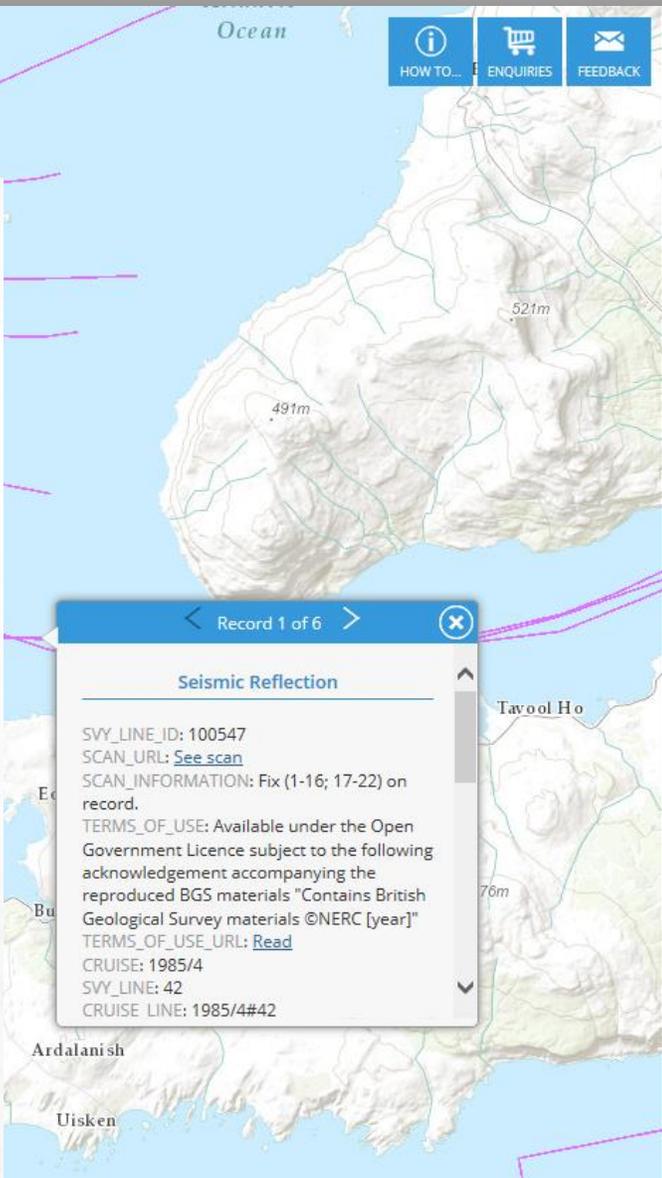
BRITISH GEOLOGICAL SURVEY
MARINE GEOPHYSICS RESEARCH PROGRAMME (Fix17-22)

PROJECT 85/04 **LINE** 42(284)

SURVEY AREA MUNCHES/SEA OF HEBRIDES LINE DIRECTION W-NW

EQUIPMENT	SEISMIC <input checked="" type="checkbox"/> SONAR	GRAVITYMETER <input type="checkbox"/> MAGNETOMETER	P.D.R. <input type="checkbox"/> OTHER	FIX INTERVAL 10 MIN	JULIAN DAY 202 DATE 21/7/85
SEISMIC/SONAR TYPE	EDC FINGER				
Source	HULL MOUNTED				
Power	100W				
Hydrophone					
Recorder	EPC 3200				
Sweep	Millisec	250 msec			
Scale lines	Metres	25 msec			
Display Direction	Metres	R-L			
Firing interval		1/2 sec			
Filter passband					
SIGNAL PROCESSING			TAPE-RECORDED		
TVG <input checked="" type="checkbox"/>			ANALOGUE <input type="checkbox"/>		
SWELL FILTER <input checked="" type="checkbox"/>			DIGITAL <input type="checkbox"/>		
DEPTH COMP. <input type="checkbox"/>					

British Geological Survey © NERC



Record 1 of 6

Seismic Reflection

SVY_LINE_ID: 100547
 SCAN_URL: [See scan](#)
 SCAN_INFORMATION: Fix (1-16; 17-22) on record.
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 TERMS_OF_USE_URL: [Read](#)
 CRUISE: 1985/4
 SVY_LINE: 42
 CRUISE LINE: 1985/4#42



LOCATION: -6.314 56.34
SCALE 1:144448



Project Development Plan

1. Choose an existing FOSS platform to work with
2. Add data to internal database if not present
 1. Some data in folders in proprietary formats
3. Make OGC-API-Features available
 1. ogcapi.bg.ac.uk
4. Add Common Query Language (CQL) functionality
5. Add EDR functions (using CQL functions)
 1. Area
 2. Radius
 3. Corridor
6. Create Pull Request to add our code to the source software

```
...
a.fn.scrollspy=d,this},a(window).on(
y),+function(a){"use strict";function b(b){return this.each(function(a,b){
le(b)})}var c=function(b){this.element=a(b)};c.VERSION="3.3.7",c.TRANSITION_DURATION=150,c.p
topdown-menu"),d=b.data("target");if(d||(d=b.attr("href"),d=d&&d.replace(/.*(?=#[^\s]*$)/,"")
st a"),f=a.Event("hide.bs.tab",{relatedTarget:b[0]}),g=a.Event("show.bs.tab",{relatedTarget:e[0]
faultPrevented()}{var h=a(d);this.activate(b.closest("li"),c),this.activate(h,h.parent(),function(b,d,e){func
rigger({type:"shown.bs.tab",relatedTarget:e[0]}))},c.prototype.activate=function(b,d,e){func
u > .active").removeClass("active").end().find("[data-toggle="tab"]').attr("aria-expanded",!1),
ia-expanded",!0),h?(b[0].offsetWidth,b.addClass("in")):b.removeClass("fade"),b.parent(".dropdo
().find("[data-toggle="tab"]').attr("aria-expanded",!0),e&&e())}var g=d.find("> .active")
le")||!d.find("> .fade").length;g.length&&h?g.one("bsTransitionEnd",!0,e&&e())}var g=d.find("> .active")
;var d=a.fn.tab,a.fn.tab=b,a.fn.tab.noConflict=a.fn.tab.constructor=c,a.fn.tab.activate=function(b,d,e){func
se strict";function b(b){return this.each(function(a,b){this.element=a(b)};c.VERSION="3.3.7",c
,a.proxy(this.checkPosition(),this).on("click.bs.affix",f).emulateTransitionEnd
null,this.pinnedOffset=null){var d=a(this),e=d.data("bs.affix"),f="ob
State=function(a,b,c,d){var e=this.$target,e=d.data("bs.affix"),f="ob
ll=c&&e<c?"top":null=d&&i+j?>a-d&&"bottom":!(e+g<=a-d)&&"bottom"
.RESET).addClass("affix");var a=this.$target,f=this.$element.offset(),g=this.$target
WithEventLoop=function(){setTimeout(a.proxy(this.checkPosition(),b=this.$element.offset(),f=d
nt.height(),d=this.options.offset,e=d.top,f=d.bottom
nt.css("top")

```





- Certified OGC Compliant and an OGC Reference Implementation
- Python Server
- Open Source under MIT
- In use/active development at Meteorological Service of Canada & US Geological Survey
- Geospatial data Web API framework via OGC API
- REST/JSON/OpenAPI/Swagger
- OGC Compliant
- OSGeo Project
- International team (Canada, Netherlands, Greece, Italy, New Zealand, United States, Spain)
 - Numerous core contributors
- Easy config & deployment suited to our infrastructure

Implements suite of OGC API services:

- Features (Elasticsearch, PostgreSQL/PostGIS, CSV, GeoJSON, OGR, MongoDB, Esri)
- Coverages (xarray, rasterio)
- EDR (xarray)
- Tiles (MinIO, ZXY directory tree)
- Records (Elasticsearch, TinyDB)

British Geological Survey - OGCAPI Server

This server provides OGCAPI endpoints for a selection of BGS OpenGeoscience geospatial data. The BGS has a wide range of datasets and wants to increase access to these, publishing as many as possible as OpenGeoscience under Open Government Licence.

[geospatial](#) [data](#) [api](#) [ogc](#) [geology](#)

Terms of service	https://www.bgs.ac.uk/legal-and-policy/terms-of-use/
License	Open Government Licence

Collections

[View the collections in this service](#)

API Definition

[Documentation: Swagger UI ReDoc](#)

[OpenAPI Document](#)

Conformance

[View the conformance classes of this service](#)

Powered by  pygeoapi 0.13.dev0

BGS OGCAPI Server / Collections / Offshore Geochemical Data

json jsonld

Offshore Geochemical Data

This layer provides geochemical analysis associated with offshore sampling activities. It contains analysis of 38 elements and should be used as a baseline for chemical element concentrations in seabed sediments, against which samples collected in the future may be assessed. Related data in Offshore Sample Data - Activity & Scan collection.

[offshore](#) [medin](#) [britain](#)



Common Query Language



“fundamental operation performed on a collection of features is that of filtering in order to obtain a subset of the data which contains feature instances that satisfy some filtering criteria.”

- Filter using
 - Comparisons (equals, like, between, in)
 - Spatial (intersects, crosses, contains etc)
 - Temporal (before, between)
- CQL allows queries like Get all sea sediment data, in X area, where water depth > 100 m after 2018
- EDR Comparison:
- Get all sea sediment data, in X area
- [https://ogcap.bgs.ac.uk/collections/offshore-seabed-sediment-data/items?filter=INTERSECTS\(geometry,POLYGON\(\(-4.724%2050.238,-5.021%2050.351,-5.394%2050.393,-5.735%2050.238,-5.812%2050.041,-5.416%2049.921,-4.988%2049.886,-4.724%2050.238\)\)\)&limit=100](https://ogcap.bgs.ac.uk/collections/offshore-seabed-sediment-data/items?filter=INTERSECTS(geometry,POLYGON((-4.724%2050.238,-5.021%2050.351,-5.394%2050.393,-5.735%2050.238,-5.812%2050.041,-5.416%2049.921,-4.988%2049.886,-4.724%2050.238)))&limit=100)
- EDR allows a more user-friendly query syntax without needing to know CQL filter predicates
- [https://ogcap.bgs.ac.uk/collections/offshore-seabed-sediment-data/area?coords=POLYGON\(\(-4.724%2050.238,-5.021%2050.351,-5.394%2050.393,-5.735%2050.238,-5.812%2050.041,-5.416%2049.921,-4.988%2049.886,-4.724%2050.238\)\)\)&limit=100](https://ogcap.bgs.ac.uk/collections/offshore-seabed-sediment-data/area?coords=POLYGON((-4.724%2050.238,-5.021%2050.351,-5.394%2050.393,-5.735%2050.238,-5.812%2050.041,-5.416%2049.921,-4.988%2049.886,-4.724%2050.238)))&limit=100)



EDR

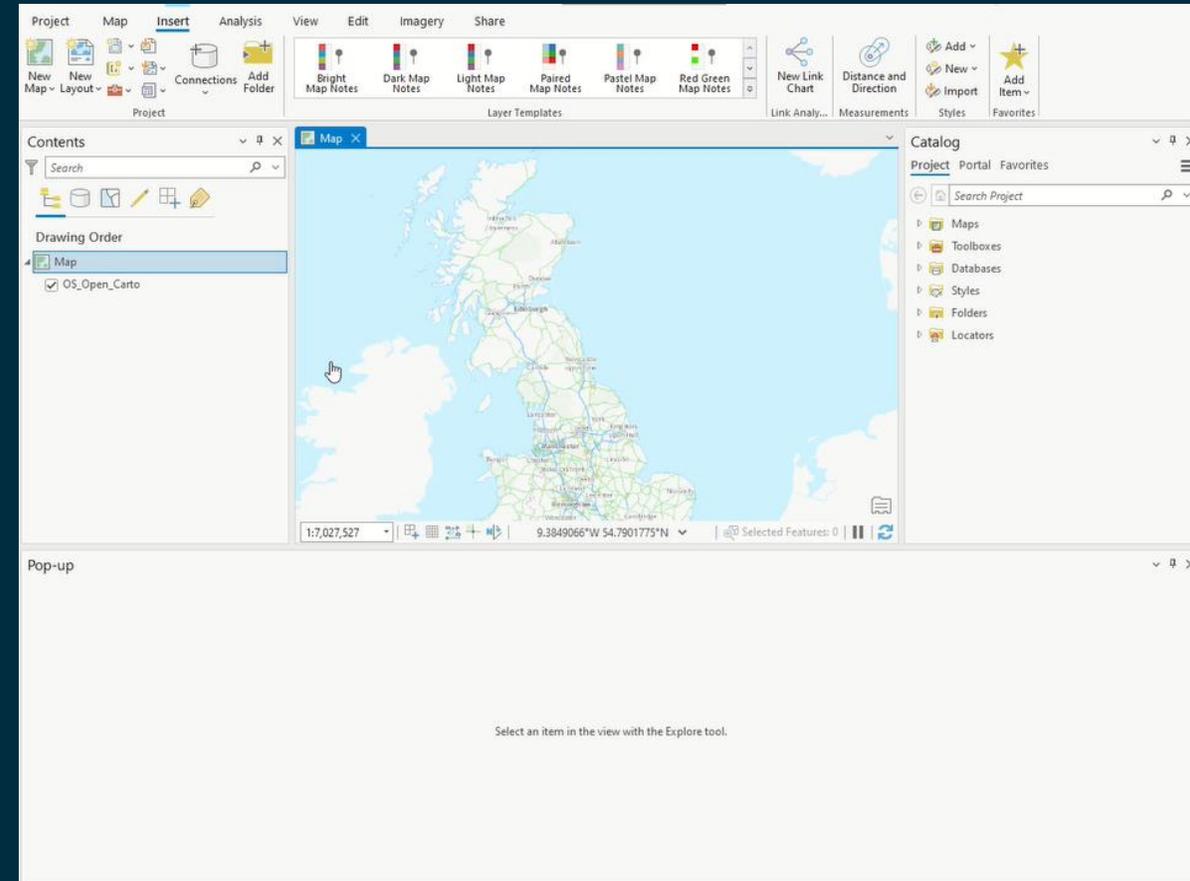


- Planned to add EDR functionality to pygeoapi for data from PostGres + PostGIS
- Would have been set of templates mapping EDR queries to the CQL equivalents
 - EDR: /area?coords= /radius?coords= /corridor?coords=
 - CQL: /items?filter=INTERSECTS(geometry...
 - Cube & Trajectory more challenging but same approach
- BGS also see significant value in supporting the EDR `instances`
 - Allows versioning of datasets
 - BGS Geology v7 & BGS Geology v8 both available at the same endpoint.



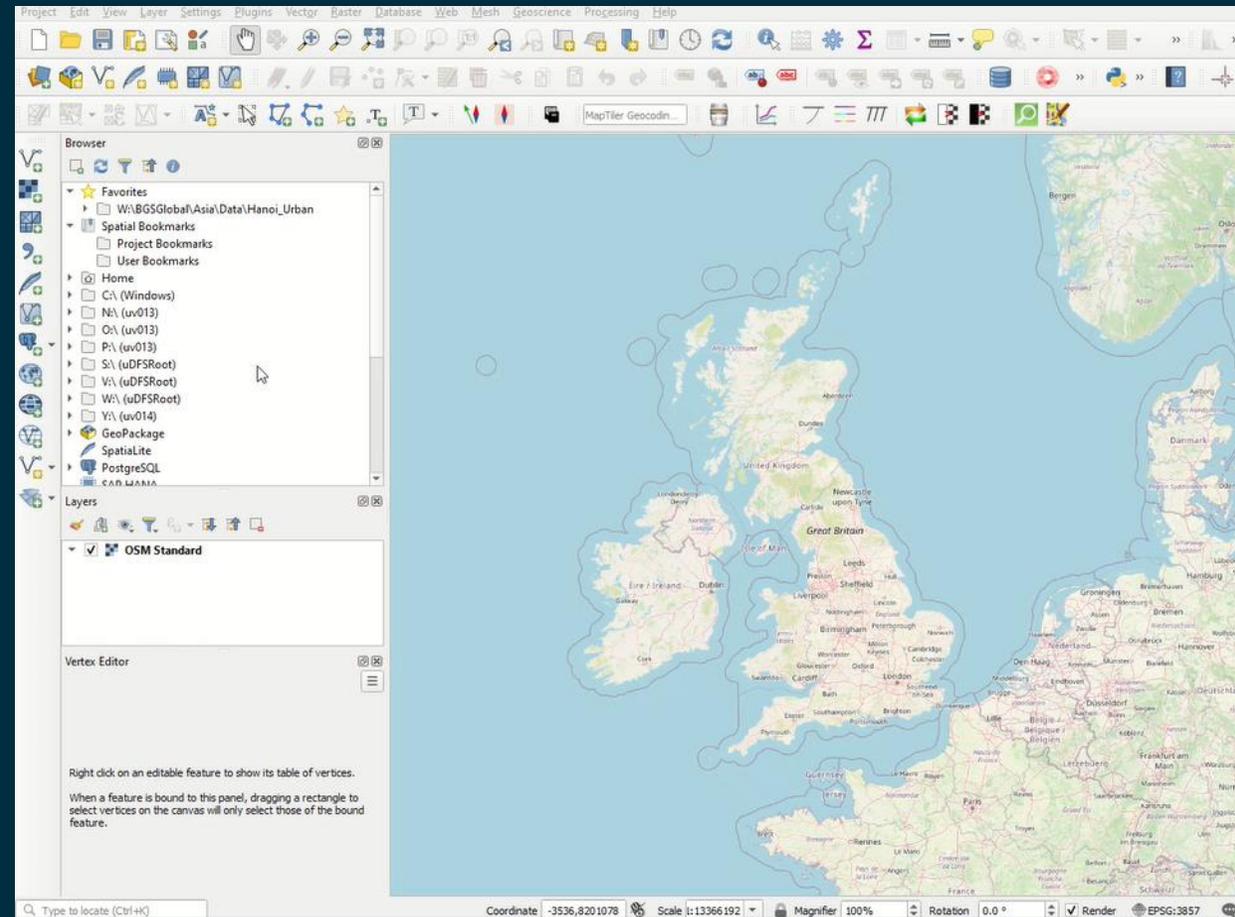
Accessing Data in GIS

- Connect to OGC API- Features Service
- “Live” link to data
- Useful for dynamic/frequently updated datasets
 - Saves repeat downloading
 - Always using the most current data
- This will work with EDR endpoint **IF** Items response is available



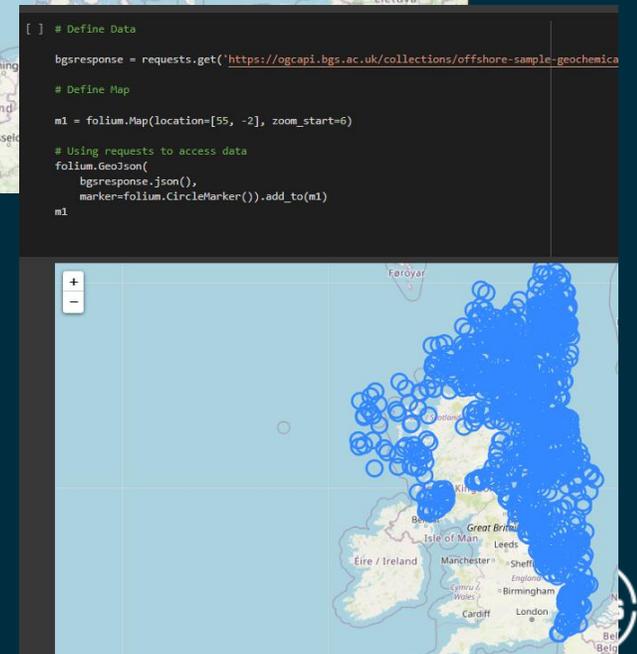
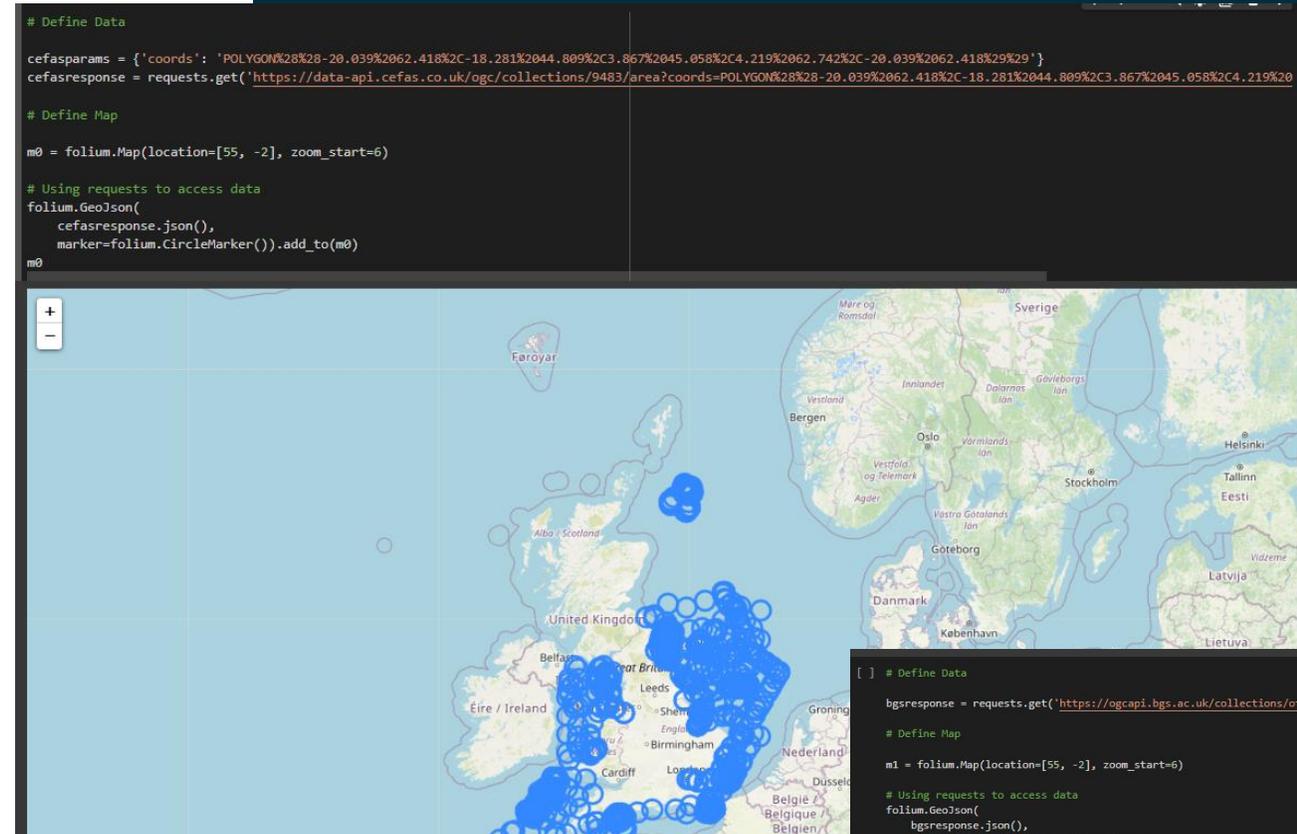
Accessing Data in GIS

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- “Live” link to data
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 - Saves repeat downloading
 - Always using the most current data
- This will work with EDR endpoint **IF** Items response is available



Accessing Data using Python / Jupyter Notebooks

- Using Requests library we can access OGC API services
- Works for both Features & EDR endpoints
- Can then get data into whichever data modelling library you use for analysis or visualisation.



Future Work / Thoughts

- Additional Features for pygeoapi
 - NumberMatched & NumberReturned
 - Additional CRS
 - Additional Formats (.gpkg)
- Features / EDR provide potentially very large datasets
 - Affects performance for visualisation/web delivery (GeoJSON could be GB's!)
 - For very large datasets, using OGC-API-Tiles (Vector or Map) might be more appropriate
 - Using Features/EDR for extracting & working on a subset of the data

THANK YOU

Any questions?