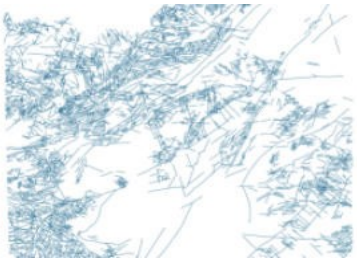
Magnetic Lineaments NW Midlands Ireland (ROI/NI) ITM

Type File Geodatabase Feature Class



Tags Ireland, Geology, IE/GSI, Tellus, Minerals, Exploration, MPM, Geophysics, Lineaments, Magnetics

Summary

This survey measures, from an airplane, the magnetic strength of rocks below. Because different rock types have different magnetic strengths, the survey allows us to map different types of rocks, even in areas were rocks are covered by soil. The findings tell us about the rocks in the ground. This is useful if you want to drill for water or to help find minerals (materials taken from the ground used for things we need from mobile phones to the stones used to build roads and houses).
When maps of magnetic strength are looked at carefully, clear lines in the maps can be seen that show where the rocks have been broken or fractured. These lines in the maps are called lineaments. Identifying and mapping lineaments can help understand the history of the rocks and can help in searching for minerals.

Description

Structural lineaments (linear features) have been identified and mapped from magnetic maps of the Northwest (NW) Midlands of Ireland. The study area includes the south western part Northern Ireland. These magnetic maps show the magnetic field strength of rocks. This allows us to observe and map different types of rock beneath the soil. Linear features (lineaments) can also be mapped. These may be sharp margins (faults) between rock types, or fractures (breaks) in the rocks. The magnetic data in the NW Midlands of Ireland were collected between 2005 – 2017. They consist of a merge of data collected during a number of Tellus survey phases: Northern Ireland (NI), Tellus Border (TB), Cavan (CAV), North Midlands (TNM), A1, A2 and A3 survey blocks. The NW Midlands study area covers a total area of approximately 21,500 km2.

The magnetic data were collected using an airplane. The airplane flies at 60 m flight height along lines that are 200 m apart. Magnetic data are recorded at around 6 m intervals along the flight lines. The magnetometer system mounted on the airplane records the magnetic field strength of the rocks. The magnetic field changes depending on the type of rock beneath the aircraft. Iron rich rocks (for example, basalt) are strongly magnetic and have a strong magnetic field, while rocks with low iron content (for example, limestone) are weakly magnetic.

The data are collected as points in XYZ format. X and Y are the airplane coordinates. Z is the different recorded data, which include magnetic field strength and aircraft flight height. The XYZ data for each line contains thousands of points. The data from separate lines are merged to create a magnetic grid (map) for each survey block. Individual survey blocks are then merged to create a final magnetic grid for Ireland. The magnetic grid was cut to provide a window of data corresponding with the extents of the Northwest (NW) Midlands project area.

A number of different image enhancement filters are then used to improve the resolution of

the magnetic grid and to help in identifying and mapping structural lineaments in the grids. This is a vector dataset. Mapping of lineaments in the magnetic grids was done using ArcGIS Pro software. The lineament datasets are made available in a file geodatabase and shapefile format.

The Tellus project is a national survey which collects geochemical and geophysical data across Ireland. It allows us to study the chemical and physical properties of our soil, rocks and water. It is managed by the Geological Survey Ireland.

Credits

Use limitations

Extent

West	-9.760967	East	-7.223653
North	54.441692	South	53.251129

Scale Range

Maximum (zoomed in)	1:5,000
Minimum (zoomed out)	1:150,000,000

Topics and Keywords ►

Themes or categories of the resource Environment, Geoscientific, Location

Content type ⇔ Downloadable Data

Export to FGDC CSDGM XML format as Resource Description No

Theme keywords Soil

Thesaurus ►

Title GEMET - INSPIRE themes, version 1.0
Alternate titles GEMET INSPIRE
Publication date 2008-06-01 00:00:00
Resource location online
Online location (URL) https://inspire.ec.europa.eu/theme/so
Connection protocol text/html
Name INSPIRE theme register
Function performed information
Application profile INSPIRE theme register

Place keywords Ireland

Thesaurus ►

Title Metadata Registry of the Publications Office of the EU Named Authority Lists - Country
Alternate titles MDR-COUNTRIES
Publication date 2015-03-18 00:00:00
Edition 20200624-0
Resource location online
Online location (URL) https://op.europa.eu/en/web/eu-vocabularies/concept/-/resource?uri=http://publications.europa.eu/resource/authority/country/IRL
Connection protocol text/html
Name Name authority list
Description Name authority list
Function performed information

Other keywords IE/GSI

Thesaurus ►

Title Global Change Master Directory (GCMD) Data Center Keywords 9.1.5
Alternate titles GCMD Data Center Keywords
Publication date 2016-08-04 00:00:00
Edition 9.1.5
Resource location online
Online location (URL) https://vocabs.ardc.edu.au/repository/api/lda/ardc-curated/gcmd-providers/9-1-5-2020-02-06/resource?uri=https://gcmdservices.gsfc.nasa.gov/kms/concept/4bdbb012-4aed-485b-8ee8-16519985681e
Connection protocol text/html
Name GCMD Data Center Keywords
Description GCMD Data Center Keywords
Function performed information

Citation ►

Title Magnetic Lineaments NW Midlands Ireland (ROI/NI) ITM
Creation date 2022-06-24 00:00:00
Publication date 2022-06-28 00:00:00
Revision date 2022-06-24 00:00:00
Presentation formats ⇔ digital map
FGDC geospatial presentation format vector digital data
Resource identifier

Value
GE_AirborneGeophysicalSurvey_IE_GeologicalSurveyIreland_Magnetic_Lineaments_NW_Midlands_IE32_ITM
Reference that defines the value ►

Title GSI
Creation date 2022-06-24 00:00:00
Publication date 2022-06-28 00:00:00
Revision date 2022-06-24 00:00:00

Citation Contacts ►

Responsible party - point of contact
Individual's name Tellus Project
Organization's name Geological Survey Ireland
Contact's position Tellus Project Manager
Contact information ►

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Voice +353-1-6782896
Address
Type both
Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock
City Dublin
Postal code A94 N2R6
Country IE
e-mail address support@geodata.gov.ie
Online resource
Online location (URL) https://www.gsi.ie
Connection protocol text/html
Name GSI Website
Description GSI Website
Function performed information

Resource Details ►

Dataset languages ⇔ English (IRELAND)
Dataset character set utf8 - 8 bit UCS Transfer Format
Status on-going
Spatial representation type vector
Spatial resolution
Dataset's scale
Scale denominator 50000
Ground sample distance
Precision of spatial data 500 m (meter)
Processing environment Esri ArcGIS 12.6.0.24783
Credits
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ArcGIS item properties
Name ⇔ NW_MPM_Magnetic_Lineaments_ITM
Size ⇔ 0.000

Extents ►

Extent

Geographic extent
Bounding rectangle
Extent type Extent used for searching
West longitude ⇔ -9.760967
East longitude ⇔ -7.223653
North latitude ⇔ 54.441692
South latitude ⇔ 53.251129
Extent contains the resource ⇔ Yes

Temporal extent
Beginning date 2021-03-19 00:00:00
Ending date 2021-06-14 00:00:00

Extent in the item's coordinate system
westBL ⇔ 485739.734100
eastBL ⇔ 650362.621200
southBL ⇔ 723675.403700
northBL ⇔ 854795.658500
exTypeCode ⇔ Yes

Resource Points of Contact ►

Point of contact - point of contact
Individual's name Tellus Project Manager
Organization's name Geological Survey Ireland
Contact's position Tellus Project Manager
Contact information ►

Phone
Voice +353-1-6782896
Address
Type both
Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock
City Dublin
Postal code A94 N2R6
Country IE
e-mail address support@geodata.gov.ie
Online resource
Online location (URL) https://www.gsi.ie
Connection protocol text/html
Name GSI Website
Description GSI Website
Function performed information

Resource Maintenance ►

Resource maintenance
Update frequency irregular

Resource Constraints ►

Legal constraints
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Use constraints license
Security constraints
Classification unclassified
Additional restrictions
no limitations to public access

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Spatial Reference ►

ArcGIS coordinate system
Type ⇔ Projected
Geographic coordinate reference ⇔ GCS_IRENET95
Projection ⇔ IRENET95_Irish_Transverse_Mercator
Coordinate reference details ⇔
ProjectedCoordinateSystem
WKID 2157
XOrigin -5022200
YOrigin -15179500
XYScale 10000
ZOrigin -100000
ZScale 10000
MOrigin -100000
MScale 10000
XYTolerance 0.001
ZTolerance 0.001
MTolerance 0.001
HighPrecision true
LatestWKID 2157
WKT PROJCS["IRENET95_Irish_Transverse_Mercator",GEOGCS["GCS_IRENET95",DATUM["D_IRENET95",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER["False_Easting",600000.0],PARAMETER["False_Northing",750000.0],PARAMETER["Central_Meridian",-8.0],PARAMETER["Scale_Factor",0.99982],PARAMETER["Latitude_Of_Origin",53.5],UNIT["Meter",1.0],AUTHORITY["EPSG",2157]]

Reference system identifier
Value 2157
Version ⇔ 6.5.1(8.1.2)
Codespace ⇔ EPSG
Reference that defines the value ►

Title European Petroleum Survey Group (EPSG) Geodetic Parameter Dataset
Alternate titles EPSG
Publication date 2004-04-07 00:00:00
Edition 9.8.12
Resource location online
Online location (URL) http://www.opengis.net/def/crs/EPSG/0/2157
Connection protocol text/html
Name EPSG
Description EPSG
Function performed information

Spatial Data Properties ►

Vector ►

Level of topology for this dataset ⇔ geometry only
Geometric objects
Feature class name NW_MPM_Magnetic_Lineaments_ITM
Object type ⇔ composite
Object count ⇔ 4155
ArcGIS Feature Class Properties ►

Feature class name NW_MPM_Magnetic_Lineaments_ITM
Feature type ⇔ Simple
Geometry type ⇔ Polyline
Has topology ⇔ FALSE
Feature count ⇔ 4155
Spatial index ⇔ TRUE
Linear referencing ⇔ FALSE

Data Quality ►

Scope of quality information ►

Resource level dataset

Data quality report - Domain consistency ►

Conformance test results
Test passed No
Result explanation
The INSPIRE Directive or INSPIRE lays down a general framework for a Spatial Data Infrastructure (SDI) for the purposes of European Community environmental policies and policies or activities which may have an impact on the environment.

Product specification ►

Title D2.8.III.3 Data Specification on Soil – Technical Guidelines
Alternate titles INSPIRE Data Specifications v3.0
Publication date 2013-12-10 00:00:00

Data quality report - Domain consistency ►

Conformance test results
Test passed Yes
Result explanation
See the reference specification

Product specification ►

Title COMMISSION REGULATION (EC) No 1205/2008 of 3 December 2008 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata
Publication date 2008-12-04 00:00:00

Data quality report - Domain consistency ►

Conformance test results
Test passed No
Result explanation
See the reference specification

Product specification ►

Title Regulation 1089/2010 COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services
Publication date 2010-12-08 00:00:00

Lineage ►

Lineage statement

Electromagnetic Data Quality\Lineage:
Airborne electromagnetic data were recorded and processed by Sander Geophysics Ltd. and delivered to Geological Survey Ireland, where they were further processed and gridded prior to data release. Airborne survey specifications and the data processing routines applied to the data are described below.
Airborne Survey Specifications (Tellus airborne survey):
1) Electromagnetics (four-frequency (0.9 kHz, 3 kHz, 12 kHz and 25 kHz), wing-tip mounted transmitter-receiver system).
2) Flight-line spacing: 200 m.
3) Flight altitude (ground clearance): nominal 60 m, increasing to 214 m over sensitive areas (e.g., livestock farms) and 305 m over larger population centres.
Electromagnetic Data Processing:
The following corrections and calculations were performed on the recorded electromagnetic data by Sander Geophysics Ltd. using purpose-developed, proprietary software. More detail on each data processing step may be found in, for example, Sander Geophysics Limited's document "Technical Report – Fixed-Wing High-Resolution Aeromagnetic, Gamma-ray Spectrometric and Frequency-Domain Electromagnetic Survey – Tellus A1 Block, Republic of Ireland 2015 – For Geological Survey Ireland".
1) Conversion of the recorded EM responses from volts to parts per million (ppm) for four frequencies and two data components (in-phase and quadrature), providing eight data components in total.
2) Non-linear drift corrections – to correct for drift effects, largely due to temperature variation during flight, on the zero level of the recorded data.
3) De-rotation of the data – to correct for data phase errors and ensure orthogonality between in-phase and quadrature data components.
4) Hanning low-pass filter application (10 samples, 1 second) – to reduce noise levels in the data, leaving the geological response signal in place.
5) Levelling - line-to-line data levelling of each of the eight data components to bring each flight line to a matching amplitude level with neighbouring lines, using DC shifts and differential polynomial levelling (following the method of Beiki et al., 2010, Geophysics, Vol. 75, No. 1, L13-L23).
Electromagnetic data conversion to ground resistivity values, gridding and merging:
The following corrections and calculations were performed on the final eight-component electromagnetic response data by GSI using Geosoft Oasis Montaj software.
1) Data conversion to resistivity. Conversion of in-phase and quadrature data (jointly) for each frequency to apparent resistivity using Geosoft HEM software.
2) Micro-levelling of four apparent resistivity data sets (at each frequency: 0.9 kHz, 3 kHz, 12 kHz and 25 kHz) – to remove residual linear line-to-line artefacts in the data.
3) Gridding of apparent resistivity data for each frequency using inverse distance weighted method with a grid cell size of 50 x 50 m.
4) Merging of all completed survey block grids into one all-island grid for each data frequency. The 3 and 12 kHz frequency data provide coverage of both Ireland (Republic) and Northern Ireland, while the 0.9 and 25 kHz frequencies are only available in the Republic.
5) Resampling of the merged apparent resistivity grids for each frequency back to a final master database.
Preparation of the data for structural lineament picking:
The following steps were carried out by GSI using Geosoft software to prepare the 3 and 12 kHz apparent resistivity data for lineament picking.
1) The 3 and 12 kHz resistivity data from GSI's two-frequency "2F_MERGE_2019B" dataset were gridded using inverse distance weighted method with a grid cell size of 50 x 50 m.
2) The resistivity grids were cut to provide a window of data corresponding with the extents of the Northwest (NW) Midlands project area.
3) Computation of fractional vertical derivatives of the apparent resistivity grids, for each frequency, to sharpen and enhance features in the grids. Fractional derivatives of order = 0.25 and order = 0.75 were applied. In the case of the 0.75 order vertical derivative, a Butterworth low-pass filter (rejecting wavelengths less than 250 m) was applied to the resistivity grids beforehand, to attenuate cultural noise present in the grids
4) Output of geotiff map images of the resistivity and vertical derivative grids for both 3 and 12 kHz. Geotiff pixel resolution: 23.911 x 23.911 m in ground units.
Lineament picking:
The following steps were carried out by GSI using ArcGIS Pro software.
1) Import of geotiff images.

2) Lineaments visible in the map images were digitised as “polylines”. The objective was to pick structural/tectonic lineaments exclusively and to avoid linear features associated with stratigraphic layering (where possible and using geological knowledge provided by the GSI 1:100,000 bedrock geology map). A number of different “types” of lineaments were picked (but not explicitly classified): (i) lineaments associated with disruption of a series of resistivity anomalies along the length of a fault/fracture, (ii) lineaments associated with sharp and distinct, straight or curved edges to anomalies, (iii) lineaments in an otherwise uniform resistivity host “background” and (iv) lineaments where the geometry of juxtaposed resistivity anomalies, with different orientations, suggest the presence of a fault between the anomalies.
3) Vector data was saved in a file geodatabase. The polyline lineament feature class was exported as a shapefile, with the following attributes:

Field | Data Type | Description
OBJECTID | Number | Object ID
Shape | Text | Polyline
GUID | GlobalID | Unique Global ID
Shape_length | Number | Length of polyline

Final Dataset: NW_MPM_Geophysical_Lineaments_Vector_Data.gdb
Shapefile: NW_MPM_em_lineaments.shp
Projection: IRENET95 / Irish Transverse Mercator (ITM); EPSG:2157

Distribution ►

Distributor ►

Contact information - publisher
Individual's name Information Management
Organization's name Geological Survey Ireland
Contact's position Head of Information Management
Contact information ►

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Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock
City Dublin
Postal code A94 N2R6
Country IE
e-mail address support@geodata.gov.ie
Online resource
Online location (URL) https://www.gsi.ie
Connection protocol text/html
Name GSI Website
Description GSI Website
Function performed information

Distribution format
Version 10.7
Name ⇔ File Geodatabase Feature Class
Transfer options
Online source
Online location (URL) https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b8576fe6efca43058953573dbbd71f25
Connection protocol text/html
Name Webmapping Viewer
Description Webmapping Viewer

Function performed information

Online source
Online location (URL) https://www.gsi.ie/en-ie/data-and-maps/Pages/Geochemistry.aspx
Connection protocol application/vnd.shp
Name Data Download
Description Data Download
Function performed download

Online source
Online location (URL) https://gsi.geodata.gov.ie/server/rest/services/Geochemistry
Connection protocol text/html
Name REST Service
Description REST Service
Function performed information

Fields ►

Details for object NW_MPM_Magnetic_Lineaments_ITM ►

Type ⇔ Feature Class
Row count ⇔ 4155
Definition
Magnetic Lineaments

Definition source
MPM Project

Field OBJECTID ►

Alias ⇔ OBJECTID
Data type ⇔ OID
Width ⇔ 4
Precision ⇔ 0
Scale ⇔ 0
Field description ⇔
Internal feature number.

Description source ⇔
Esri

Description of values ⇔
Sequential unique whole numbers that are automatically generated.

Field Shape ►

Alias ⇔ Shape
Data type ⇔ Geometry
Width ⇔ 0
Precision ⇔ 0
Scale ⇔ 0
Field description ⇔
Feature geometry.

Description source ⇔
Esri

Description of values ⇔
Coordinates defining the features.

Field GUID ►

Alias ⇔ GUID
Data type ⇔ GlobalID
Width ⇔ 38
Precision ⇔ 0
Scale ⇔ 0
Field description
Unique Global ID

Description source
MPM Project

Field Shape_Length ►

Alias ⇔ Shape_Length
Data type ⇔ Double
Width ⇔ 8
Precision ⇔ 0
Scale ⇔ 0
Field description ⇔
Length of feature in internal units.

Description source ⇔
Esri

Description of values ⇔
Positive real numbers that are automatically generated.

Metadata Details ►

Metadata language ⇔ English (IRELAND)
Metadata character set utf8 - 8 bit UCS Transfer Format
Metadata identifier
MD_GE_AirborneGeophysicalSurvey_IE_GeologicalSurveyIreland_Magnetic_Lineaments_NW_Midlands_IE32_ITM
Scope of the data described by the metadata ⇔ dataset
Scope name ⇔ dataset
Last update ⇔ 2022-06-24
ArcGIS metadata properties
Metadata format ArcGIS 1.0
Created in ArcGIS for the item 2020-07-28 09:07:20
Last modified in ArcGIS for the item 2022-06-24 15:55:06
Automatic updates
Have been performed Yes
Last update 2022-06-24 15:55:06

Metadata Contacts ►

Metadata contact - point of contact
Individual's name Information Management
Organization's name Geological Survey Ireland
Contact's position Head of Information Management

Contact information ►

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Address
Type both
Delivery point Block 1, Booterstown Hall, Booterstown Avenue, Booterstown, Blackrock
City Dublin
Postal code A94 N2R6
Country IE
e-mail address support@geodata.gov.ie
Online resource
Online location (URL) https://www.gsi.ie
Connection protocol text/html
Name GSI Website
Description GSI Website
Function performed information

Metadata Maintenance ►

Maintenance
Update frequency as needed

Metadata Constraints ►

Legal constraints
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Thumbnail and Enclosures ►

Thumbnail

Thumbnail type Image file