getech

Notes to Accompany Getech's 1:1m Structural database

Getech, Kitson House, Elmete Hall, Elmete Lane, Leeds LS8 2LJ, UK
Getech Inc., 3000 Wilcrest Dr. Suite 155, Houston, TX 77042, USA
UK. +44 113 322 2200 USA. +1 713 979 9900 info@getech.com www.getech.com

Notes to Accompany Getech's 1:1m Structural database

Lineaments are drawn in ArcGIS using potential field (different derivatives of gravity and magnetics), digital elevation model (DEM) and Landsat data. Following an analysis of critically reviewed public-domain data and other studies, these lineaments are assigned a kinematic attribution for the Present Day. The structures are thoroughly researched, with full attribute information logged relating to their geological history. This information includes: sense of movement through time; interval dates of activation and inactivation throughout geological time, and the first appearance age of the fault. The global structural coverage is compiled at a scale of 1:1,000,000.

Schema for the 1:1m Structures Feature Class

Activation ID

The Activation ID is a unique identifier that links individual structures to their activation histories.

Feature Name

This field displays the name of a structure, e.g. the Shetland Spine Fault.

Alternative Name

If the feature is referred to by an alternative name in the literature, this name is noted in the Alternative Name field.

Association

The Association field is used to group structures that are either related to the same tectonic event (e.g. the Caledonian Orogeny) or lie within the same tectonic region. It is also used to indicate smaller, subsidiary features that are related to a larger structure (e.g. splays of a major fault zone).

Fault Category

This field illustrates the tectonic importance of a fault, from plate-boundary scale to small-scale faults with minimal offsets within the sedimentary pile. The categories are as follows:

Category	Description
A	Major features of crustal significance, including plate boundaries and principal basin bounding faults.
B	Features that cut basement but are not of crustal scale: basin and sub-basin bounding faults.
C	Minor, usually outcropping, features, whose deformation is limited to the sedimentary sequence.
D	Lineaments, such as outcropping basement fabric, usually with unknown kinematics.

Getech Symbology ID

This is so the structure can be represented as a symbol when viewed in ArcGIS.

Legend Description

This field defines the type of structure that it is; it is generated from Getech's symbology ID.

First Appearance

The First Appearance field indicates when the structure first became active.

First Appearance (Ma)

This field specifies when the structure first became active. The number relates to millions of years.

Last Activity

The Last Activity field indicates when the structure was last active.

Last Activity (Ma)

This field specifies when the structure was last active. The number relates to millions of years.

Notes

Additional tectonic information can be found in the Notes field, for example:

"Pre-Caledonian structures reactivated as transfer zones during Mesozoic extension. Wyville-Thomson Ridge lineament probably experienced sinistral strike-slip faulting. Folds represent fault-controlled Cenozoic inversion structures."

Outcrop or Subcrop

This field indicates if the structure is present in the outcrop or subcrop.

Data Source

The Data Source field provides a high-level list of the datasets used to capture the structure. High confidence features are likely to be captured using multiple data sources.

Explanation

The Explanation field expands on the datasets used to capture a structure, for example:

"Interpreted from Getech gravity (ISO; THD; 1VD). Calibrated against seismic lines in Dore et al. (2002), Underhill (2015) and Hopper et al. (2014) and fault array maps in Larsen et al. (2010), Mark et al. (2018) and McLean et al. (2017)."

Mapping Confidence

The following table shows the definitions used for the Structural Elements Database (1M). The aim is to give the user a qualitative assessment of the mapper's confidence in the feature as defined.

Map Confidence	Summary	Explanation	Detailed Description
5	Strongly Confident	Strong confidence from high-resolution primary data (gravity/magnetic/SRTM/Landsat)	Features with defined kinematics, which are based on the interpretation of multiple high-resolution primary data sets (including Landsat, high-resolution gravity, high-resolution magnetics, SRTM, etc.) and are constrained by additional information from multiple independent sources (e.g. seismic, fieldwork, literature).
4	Very Confident	Strong confidence from primary data (gravity/magnetic/SRTM/Landsat)	Features with defined kinematics, which are based on the interpretation of primary data sets (e.g. Landsat, gravity, magnetics, SRTM, etc.). They are preferably constrained by additional information from independent sources (e.g. seismic, literature).
3	Confident	Confidence from Getech data that have been extrapolated from better constrained areas	Features with defined kinematics, which are based on the interpretation of primary data (specifically gravity and magnetics), with some supporting published information (e.g. literature).
2	Mildly Confident	Some confidence from Getech data, with limited supporting information	Features with uncertain kinematics, which are based on the interpretation of lower resolution primary data (specifically gravity and magnetics), with limited supporting information inferred from better constrained areas.
1	Inferred	Inferred from third-party geometries	Features taken from publications, but with no supporting information from primary data sources.

Table 1: Getech's Mapping Confidence Scheme.

Mapping Confidence Summary

See the Explanation field in Table 1.

Compilation Scale

This field defines the mapping scale of an individual feature.

Reference Citations

Any third-party references are listed in this field, along with Getech's internal datasets (e.g. gravity and magnetic data, surface geology, DEM).

Schema for the 1:1m linked activation history table

The Linked Activation History field details phases of tectonic activity and inactivity for an individual feature through time. The activation history comprises multiple entries for a single feature.

Activation ID

The Activation ID is a unique identifier that links individual structures to their activation histories.

Fault Category

As in the main attribution table; however, the tectonic importance of a fault may change through time.

Getech Symbology ID

This is so the structure can be represented as a symbol when viewed in ArcGIS. The Symbology ID is unique to a given period of activation, e.g. active normal fault during the Valanginian; inactive normal fault from the Valanginian to the Cenomanian.

Legend Description

This field defines the type of structure that it is; it is generated from Getech's symbology ID.

Start Age and Start Age (Ma)

The Start Age and Start Age (Ma) indicate the initiation of an individual period of tectonic activity or inactivity for a given structure.

End Age and End Age (Ma)

The End Age and End Age (Ma) indicate the end of an individual period of tectonic activity or inactivity for a given structure.

Tectonic Regime

This field gives a high-level indication of the tectonic regime in which a given feature formed. The Tectonic Regime changes throughout a feature's activation history.

Tectonic Regimes include: Active, Inactive, Extensional, Oblique Extensional, Contractional, Oblique Contractional and Strike-slip.

Tectonic Notes

Additional tectonic information for each phase of structures activation history can be found in tectonic notes, for example:

"Plate reorganisation as spreading in the Labrador Sea terminates 47–33 Ma. In the NE Atlantic, ocean spreading transfers from Aegir Ridge to Kolbeinsey Ridge, and thus promotes a change from a segmented/transform margin to a continuously spreading margin (orthogonal to oblique spreading). Many authors also attribute this compressional phase to coincide with the timings of hotspot-influenced ridge push and Alpine and/or Pyrenean compression."

Notes

This field often contains additional supporting information for the Tectonic Notes field, for example:

"Linked biostrat data with magnetic anomaly pattern in the adjacent ocean basin indicate that this was coincident with the change from a segmented/transform margin to a continuously spreading margin during chron C21 (49–45 Ma)."

Age Confidence

This table shows the Getech definitions of age confidence based on the source of the age assignment. These definitions have been modified from the scheme developed by the Palaeogeographic Atlas Project (Ziegler et al., 1985, Paleogeographic interpretation: with an example from the Mid-Cretaceous. Annual Review of Earth and Planetary Sciences, 13, pp. 385-425).

Age Confidence		For continental crust	
	Summary	Explanation	Detailed Description
5	Strongly Confident	Isotopic age	Ar-Ar or other precise radiometric age determination gives the absolute age for crust and clear evidence of the appearance age and/or activity age.
4	Very Confident	Magnetostratigraphy; seismic; cross-cutting/stratigraphic relationships	Magnetostratigraphic assignment; chrons recognised, cross-cutting relationships and/or stratigraphic relationships recognised on seismic data.
3	Confident	Biostratigraphy; Present Day earthquakes, GPS, plate motions	Biostratigraphic information for overlying rocks indicates the minimum age for the underlying crust. Present Day earthquake solutions indicate activity and kinematics. Present Day GPS measurements indicate relative movement with kinematics; activity is added for consistency with the plate model.
2	Mildly Confident	Geological inference	Correlation with an area that has more precise age confidence information.
1	Inferred	Secondary information	Data from other authors available but with no explanation available as to the methods used to obtain the data.

Table 2: Getech's Age Confidence Scheme.

Dating Method

See the Explanation field in Table 2.

Activation Explanation

The Activation Explanation field expands on the datasets/references used to capture information about a given period of activation during a feature's activation history, for example:

"Late-Ypresian unconformity identified. Dated using several wells in the Rockall-Faroe area. This compressional U/C also inferred in the Hatton-Rockall Basin (Tuitt et al., 2010). Thinning and onlap of basaltic or sedimentary successions onto the U/C."

References

Any third-party references relating to a given period of activation are listed here, along with Getech's internal datasets (surface geology, plate model, magnetic picks).