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Explanation of Fields in AusAEM Interpretation Text Files

Sebastian Wong

Contents

1.1 AusAEM Interpretation Text File Field Description

Below are descriptions of the header row and fields within the AusAEM interpretation text files (Table 1):

Table 1: Description of AusAEM interpretation fields

Field	Description
Vertex	Unique vertex identification number for each vertex of a certain "Type" within a specific "SURVEY_LINE".
SegmentID	Defines the line segment that the "Vertex" belongs to. All horizons or features are made up of line segments that have multiple vertices. "SegmentID" links all the vertices of a single line segment via a unique number.
X	Eastings of the "Vertex". (The UTM Grid Zone is given in the file name. E.g. the file "*AEMdata_z54_20191129.asc*" is for data in zone 54).
Y	Northings of the "Vertex". (The UTM Grid Zone is given in the file name. E.g. the file "*AEMdata_z54_20191129.asc*" is for data in zone 54).
ELEVATION	Elevation of the "Vertex" in metres above mean sea level.
PixelX	X location of the "Vertex" in pixel space on the interpreted JPEG.
PixelY	Y location of the "Vertex" in pixel space on the interpreted JPEG.
AusAEM_DEM	Ground surface elevation in metres above mean sea level above the location of the "Vertex". (This digital elevation model was acquired during acquisition of the airborne electromagnetic data).
DEPTH	Depth of "Vertex" below the "AusAEM_DEM" ground surface. ("DEPTH" equals difference between "AusAEM_DEM" and "ELEVATION").
Type	Type of chronostratigraphic boundary or feature. For chronostratigraphic boundaries, "Type" describes overlying and underlying unit ages. (See 1.2 Digitised (Type) Field Explanation for details)
BoundaryNm	Interpreted age of boundary separating stratigraphy above and below the "Vertex". (See 1.3 Age Boundary Name (BoundaryNm) Field Explanation for details).
BoundConf	Confidence level for "BoundaryNm". L (confidence level is low); M (confidence level is moderate); H (confidence level is high). (See 1.4 Confidence Level Explanations for details).
BasisOfInt	Data and/or information used to interpret the stratigraphic position of the "Vertex". (See 1.5 Basis of Interpretation (BasisOfInt) Field Explanation for details).

OvrStrtUnt	Name of stratigraphic unit overlying the "Vertex".
OvrStrtCod	Stratigraphic number assigned to stratigraphy above the "Vertex". Number field, with value derived from GA's Stratigraphic Units Database.
OvrConf	Confidence that the stratigraphy above the "Vertex" is that given in the "OvrStrtUnt" and "OvrStrtCod" fields. L (confidence level is low); M (confidence level is moderate); H (confidence level is high). (See 1.2 Confidence Level Explanations for details).
UndStrtUnt	Name of stratigraphic unit underlying the "Vertex".
UndStrtCod	Stratigraphic number assigned to stratigraphy below the "Vertex". Number field, with value derived from GA's Stratigraphic Units Database.
UndConf	Confidence that the stratigraphy above the "Vertex" is that given in the "UndStrtUnt" and "UndStrtCod" fields. L (confidence level is low); M (confidence level is moderate); H (confidence level is high). (See 1.2 Confidence Level Explanations for details).
WithinType	Within geological era. For a boundary or feature that is within a stratigraphic unit.
WithinStrt	Name of stratigraphic unit that the boundary or feature lies within.
WithinStNo	Stratigraphic unit number used if boundary or feature is located within a stratigraphic unit. Value derived from GA's Stratigraphic Units Database.
WithinConf	Confidence that the unit containing the "Vertex" is that given in the "WithinStNo" field. L (confidence level is low); M (confidence level is moderate); H (confidence level is high). See 1.2 Confidence Level Explanations.
InterpRef	Reference to paper/data used to interpret the stratigraphic position of the "Vertex".
Comment	Additional comments.
Annotation	During interpretation, notable observations that could be visually identified could be marked with this category. (This field is used as a visual aid for the interpreters only. This field can be removed from or disregarded by any further analysis).
NewObs	This field documents if the chronostratigraphic boundary or feature is a new (previously undocumented) observation or discoveries derived during this study.
Operator	Full name of the person performing the interpretation.
SURVEY_LINE	AusAEM survey line number.

1.2 Digitised (Type) Field Explanation

The digitised field is attached to the 'Type' attribute. This field has been selected as the digitised field, as it has adequate general information to inform the interpreter or user what the interpretation lines are delineating. This is also the information that is stored with the lines when the lines are converted to 3-dimensional space.

The table below (Table 2) identifies the different categories and associated colour scheme for the 'Type' field. These colours are maintained during the conversion from 2-dimensional to 3-dimensional space.

Table 2: Categories and associated colours for the digitised 'Type' field.

Boundary identified in 'Type' field	Red	Green	Blue	Hex
BASE_Cenozoic_TOP_Mesozoic	255	250	195	#FFFAC3
BASE_Cenozoic_TOP_Paleozoic	255	230	155	#FFE69B
BASE_Cenozoic_TOP_Neoproterozoic	255	180	105	#FFB469
BASE_Cenozoic_TOP_Pre-Neoproterozoic	175	110	45	#B06F2E
BASE_Mesozoic_TOP_Paleozoic	0	205	255	#00CDFF
BASE_Mesozoic_TOP_Neoproterozoic	50	155	255	#329BFF
BASE_Mesozoic_TOP_Pre-Neoproterozoic	50	100	205	#3264CD
BASE_Paleozoic_TOP_Neoproterozoic	50	205	50	#32CD32
BASE_Paleozoic_TOP_Pre-Neoproterozoic	0	130	0	#008200
BASE_Neoproterozoic_TOP_Pre-Neoproterozic	255	100	255	#FF64FF
WITHIN_Cenozoic	255	255	205	#FFFFCD
WITHIN_Mesozoic	205	255	255	#CDFFFF
WITHIN_Paleozoic	100	255	100	#64FF64
WITHIN_Neoproterozoic	255	155	205	#FF9BCD
WITHIN_Pre-Neoproterozoic	255	115	255	#FF73FF
Major_conductor	255	205	205	#FFCDCD
Major_resistor	155	205	255	#9BCDFF
Major_fault	255	0	0	#FF0000
Minor_fault	255	80	80	#FF5051
Annotations	0	0	0	#000000

1.3 Age Boundary Name (BoundaryNm) Field Explanation

The age boundary name (BoundaryNm) field is used to describe the type of boundary that is being interpreted. This field is similar to the 'Type' field; however, the 'BoundaryNm' field is mandatory for upload into the EGGS database. This field identifies if the interpretation line is delineating the base of the overlying geological era, or if it is within a geological era. The main difference between the 'BoundaryNm' and the 'Type' fields is that the 'BoundaryNm' field identifies the geological era above the line only, or which geological era the line falls within; whereas, the 'Type' field identifies the geological era above and below the line, or which geological era the line falls within.

Despite the similarities, the 'Type' field was created as the field the interpreter digitises, as it assist the interpreter by identifying the geological eras above and below the line. The 'BoundaryNm' field is a requirement for the EGGS database and must also be populated.

Below is an explanation of the 'BoudaryNm' codes (Table 3).

Table 3: Explanation of age boundary codes to be entered into the 'BoundaryNm' field. These fields are from the EGGS database, and must be entered during the interpretation.

Age Boundary Codes (to be entered into 'BoundaryNm' field)	**'Type' field equivalent(s)**	**Description**
CEN-B	BASE_Cenozoic_TOP_Mesozoic BASE_Cenozoic_TOP_Paleozoic BASE_Cenozoic_TOP_Neoproterozoic BASE_Cenozoic_TOP_Pre-Neoproterozoic	Base of Cenozoic
CEN-W	WITHIN_Cenozoic	Within Cenozoic
MES-B	BASE_Mesozoic_TOP_Paleozoic BASE_Mesozoic_TOP_Neoproterozoic BASE_Mesozoic_TOP_Pre-Neoproterozoic	Base of Mesozoic
MES-W	WITHIN_Mesozoic	Within Mesozoic
PAL-B	BASE_Paleozoic_TOP_Neoproterozoic BASE_Paleozoic_TOP_Pre-Neoproterozoic	Base of Paleozoic
PAL-W	WITHIN_Paleozoic	Within Paleozoic
NPR-B	BASE_Neoproterozoic_TOP_Pre-Neoproterozic	Base of Neoproterozoic
NPR-W	WITHIN_Neoproterozoic	Within Neoproterozoic
MPR-B	N/A	Base of Mesoproterozoic
MPR-W	WITHIN_Pre-Neoproterozoic	Within Mesoproterozoic
PPR-B	N/A	Base of Paleoproterozoic
PPR-W	WITHIN_Pre-Neoproterozoic	Within Paleoproterozoic
ARC-B	N/A	Base of Archean ☺
ARC-W	WITHIN_Pre-Neoproterozoic	Within Archean

1.4 Confidence Level Explanations

As the interpretation is being performed, the interpreter must integrate and interrogate a range of datasets to support their interpretation. The availability of these data in the area being interpreted will affect the level of confidence. An area with a large amount of useful data will give the interpreter a higher level of confidence than an area that is lacking supporting data. In order to reduce the subjective nature of ascribing a level of confidence to certain features, lists of what constitutes low to high levels of confidences have been compiled.

1.4.1 Boundary-related level of confidence (BoundConf)

This level of confidence category applies to the boundary that is being identified, therefore, it is related to the 'Type' and 'BoundaryNm' fields. This level of confidence is attached to the actual boundary line that is being interpreted/drawn, and is an important component of the interpretation, as this is intended to be used in Cover Thickness Mapping. This level of confidence is captured in the 'BoundConf' field.

1.4.2 Stratigraphic unit and geological era related levels of confidence (OvrConf, UndConf and WithinConf)

This level of confidence category applies to the stratigraphic units and geological era. This level of confidence field stores the interpreters level of confidence of the within geological era, and the overlying, underlying and within stratigraphic units fields. This level of confidence is related to the 'OvrStrtUnt', 'OvrStrtCod', 'UndStrtUnt', 'UndStrtCod', 'WithinType', 'WithinStrt' and 'WithinStNo' fields. This level of confidence is captured in the 'OvrConf', 'UndConf' and 'WithinConf' fields.

There are three confidence levels related to the above (Table 4):

Table 4: Level of confidence codes

Level of confidence code	Description
L	Confidence level is low
M	Confidence level is moderate
H	Confidence level is high

The table below (Table 5) identifies what mandatory or available information/data constitutes a L, M or H confidence level for both the boundary-related, and the geological era or stratigraphic unit related levels of confidences. These values must be completed in the 'BoundConf' field for all interpretation lines, or the 'OvrConf', 'UndConf' and 'WithinConf' fields for all interpretations of within geological era or for stratigraphic units.

Table 5: Mandatory or available data that constitutes a L (low), M (moderate) or H (high) level of confidence for the interpretation of boundary features. These values must be completed in the 'BoundConf' field for all interpretation lines, or the 'OvrConf', 'UndConf' and 'WithinConf' fields for all interpretations of within geological era or for stratigraphic units.

Code	Level of confidence	Mandatory or available data
L	Low	• AEM data ○ AEM data is poor to moderate quality. Signal is noisy and boundaries are not easily discernible • Interpretation is at depth away from surface geology maps • No stratigraphic borehole or water bore data nearby OR • Regional understanding without constraining data of the geology and with correlation with additional data (e.g. magnetics, gravity, literature, seismic)

M	Moderate	• AEM data
		  ○ AEM data is moderate to good quality. Signal noise may be present, but boundaries can still be discerned
		• Interpretation is nearby boreholes with moderate to good quality stratigraphic or lithological data. Electromagnetic data must be good quality and continuous between borehole and interpretation
		• Interpretation with a good quality surface geology map nearby, with:
		  ○ Well mapped geology
		  ○ Structural data, e.g. strike and dip direction, folds, faults and plunges and trends
		  ○ Usable cross-section parallels or nearby AEM section
		Optional
		• Some additional data (e.g. magnetics, gravity, literature, seismic) consistent with AEM signal may be used to guide interpretation

H	High	• AEM data
		  ○ AEM data is good quality with minimal signal noise and boundaries are easily discernible
		• Interpretation intersects or is nearby boreholes with good quality stratigraphic or lithological data
		• Interpretation is near the surface, with good quality surface geology map nearby, with:
		  ○ Well mapped geology
		  ○ Structural data, e.g. strike and dip direction, folds, faults and plunges and trends
		  ○ Geological cross-sections parallels AEM section
		Optional
		• Useful seismic data available e.g. depth surfaces, cross-section interpretation
		• Some additional data (e.g. magnetics, gravity, literature, seismic) consistent with AEM signal may be used to guide interpretation

1.5 Basis of Interpretation (BasisOfInt) Field Explanation

The basis of interpretation (BasisOfInt) field is used to identify the data that the interpretation line was based on. This field is to be filled in using the Interpretation Basis Codes table described below (Table 6). This field allows for multiple codes to be entered based on the number of datasets used to support the interpretation. If multiple datasets are used, the codes for these must be separated by a semicolon (;).

Table 6: Interpretation Basis Codes table.

Interpretation Basis Codes	**Description**
NW	Nearby wells
IMI	Interpretation of magnetic imagery
IRS	Interpretation of reflection seismic
IAEM	Interpretation of AEM
IOGD	Interpretation of other geophysical data
GIOG	Geological inference based on outcrop geology
RGI	Regional geological inference
SGI	Solid geology interpretation
IAP	Interpretation of aerial photography
UNK	Unknown

Example 1: if an interpretation line was based on (1) interpretation of the AEM data, (2) nearby wells and (3) surface geology mapping, the 'BasisOfInt' field would read as below (Table 7):

Table 7: Basis of interpretation field ('BaseOfInt') Example 1

BasisOfInt
IAEM;NW;GIOG

Example 2: if an interpretation line was based on (1) interpretation of the AEM data, (2) interpretation of other geophysical data, (3) solid geology interpretation and (4) surface geology mapping, the 'BasisOfInt' field would read as below (Table 8):

Table 8: Basis of interpretation field ('BaseOfInt') Example 2

BasisOfInt
IAEM;IOGD;SGI;GIOG