Enhancement filtering, interpretation and exploration targeting

EPM 19020 Queensland
WEJV

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February 2012

CONTENTS

Summary

Exploration permit for minerals (EPM) 19020 sits within the Yarrol Province of the New England Fold belt (NEFB) of Central Queensland, covering approximately 310 km^2. Most of the EPM is covered by Permo-Triasic granitoids which have intruded the older forearc basin sequence. There are no recorded mineral occurences within the EPM, but the immediate surrounds host small occurances of copper and gold. The tenement is relatively unexplored.

A high resolution aeromagnetic and radiometric survey was flown over the EPM in late 2011. These data have been filtered and enhanced using Fathom Geophysics' standard, structure detection and radial symmetry filters. A basement geology interpretation was carried out.

Selected processing results were combined using deterministic targeting routines to generate targets for iron-oxide copper gold (IOCG-U), magnetic skarn, Intrusion related Gold (IRG), non-magnetic skarn and porphyry Copper-Gold exploration. A total of 20 target zones have been identified and require follow-up.

Introduction

The Yarrol Province consists of a fore-arc basin sequence of Late Devonian to Carboniferous age. The basin fill mainly comprises volcaniclastic sedimentary rocks. These rocks are only sparsely mineralised, except in the vicinity of later intrusives (EPM 19020 is mostly covered by Permo-triassic arc-related granitoids). Immediately surrounding the EPM there are many small occurances of Copper and Gold, related to the intrusive event.

A high resolution airborne magnetic and radiometric survey was flown over the EPM in late 2011 by Thomson Aviation. The survey specifications were as follows:

- fixed wing magnetic and radiometric survey, total 9406 line kms
- 50m line spacing, NE (45 degrees) line direction, 40m mean terrain clearance (not achieved over entire tenement due to terrain issues and safety concerns)
- Aircraft PAC750

These survey data have been processed and enhanced and used to generate structure and intrusion maps. Data used to generate a basement geology interpretation, targeting models and a robust understanding of the EPM's potential are as follows:

- 2011 high resolution Airborne Magnetic and Radiometric Survey (Thomson Aviation for WEJV)
- Geological Survey of QLD P790 Rockhampton-Monto airborne survey data (Regional context)
- Geological Survey of QLD geological mapping: Biloela 9049 1:100K sheet
- Geological Survey of QLD *central QLD geology* compilation
- Geological Survey of QLD MINERAL RESOURCE ASSESSMENT OF THE YARROL PROVINCE
- Various GA Australia-wide datasets (such as tectonic domains and structure)
- Various reports on previous exploration available from Queensland Digital Exploration Reports system (QDEX)

EPM 19020 sits within the Biloela 1:100K sheet (9049) and the Monto 1:250K sheet (SG56-01)

All data, deliverables and Figures are provided in **GDA94 MGA56**

Regional Geology and tectonics

EPM 19020 sits within the Yarrol Province of the New England Fold belt (NEFB). Figure 1 shows the tectonic units within and surrounding the EPM. The tectonic history of the NEFB is believed to be relatively well understood. It was the site of extensive and repeated eruption of calc-alkaline volcanics from Late Silurian to Early Cretaceous time. The oldest rocks may have formed in a volcanic island arc. From the Late Devonian, the fold belt was a convergent continental margin above a west-dipping subduction zone. For Late Devonian- Early Carboniferous time, parallel belts representing continental margin volcanic arc, forearc basin (EPM 19020), and subduction complex can be recognised (Holcombe 1).

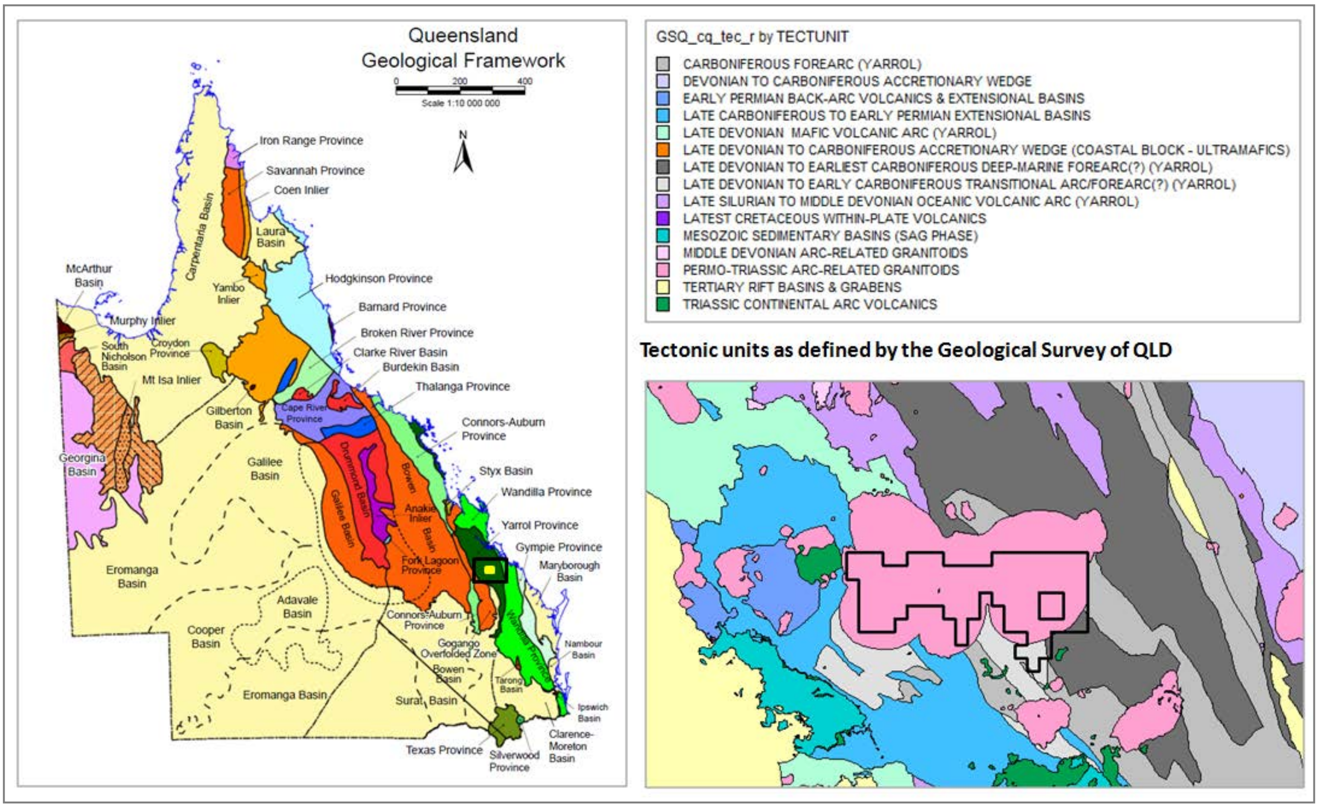

Figure 1: Regional Context and tectonic units (Geological Survey of QLD)

Broadly speaking, these terranes of differing tectonic affinity are separated by N to NW trending faults that are mostly gently east dipping. Late Permian to Late Triassic uplift of the NEFB (particularly the Yarrol Province) was associated with the emplacement of I-type (hornblende-bearing) granitic plutons. These plutons range in size from small stocks to large composite batholiths and show considerable variability in composition. Granodiorite is the dominant rock type, but granite, diorite and gabbro are also found. In composite intrusions, the more basic phases were emplaced first, and now commonly occur around the margins of the bodies (GSQ 5).

Previous Exploration

Various parts of the EPM have been explored by previous tenement holders. The top image in Figure 2 shows the EPM's held over the area most recently (1990, 2000+) . The edge of the large plutons have been the focus of exploration. EPM 10716 was explored by Resolute Limited (GSQ 2), and shallow RAB drilling was carried out over a prospect called T9 that sits in the metasediments between the Bocoolima and Rocky Point Granodiorite. No significant mineralization was found. The various public domain data collected by the GSQ is shown in Figure 2 (BOTTOM). No significant anomalies have been recorded within the EPM (note the limited coverage).

Filtering and Interpretation

Introduction

During the 19th Century, many mineral deposits (small and large) were discovered by prospectors 'sniffing around', traversing valleys and ridges, noticing gossans and veins and alteration responses of deposits that were at or just below surface. Often, these surface deposits had depth extent and could be ecomonically mined. It is likely that most (if not all) deposits of this nature have been found in Central Queensland, and exploration today requires the collection of data that allows the explorer to investigate what is happening below the surface, combined with effective processing and interpretation of these data.

Certainly there may be a surface expression of deposits under cover (and that is what we hope for when sending a geologist out to specific locations to look for 'indicators'); but the process of focusing in on prospective target zones today requires careful manipulation of data and knowledge of how and where other deposits formed; so that effective exploration can be undertaken.

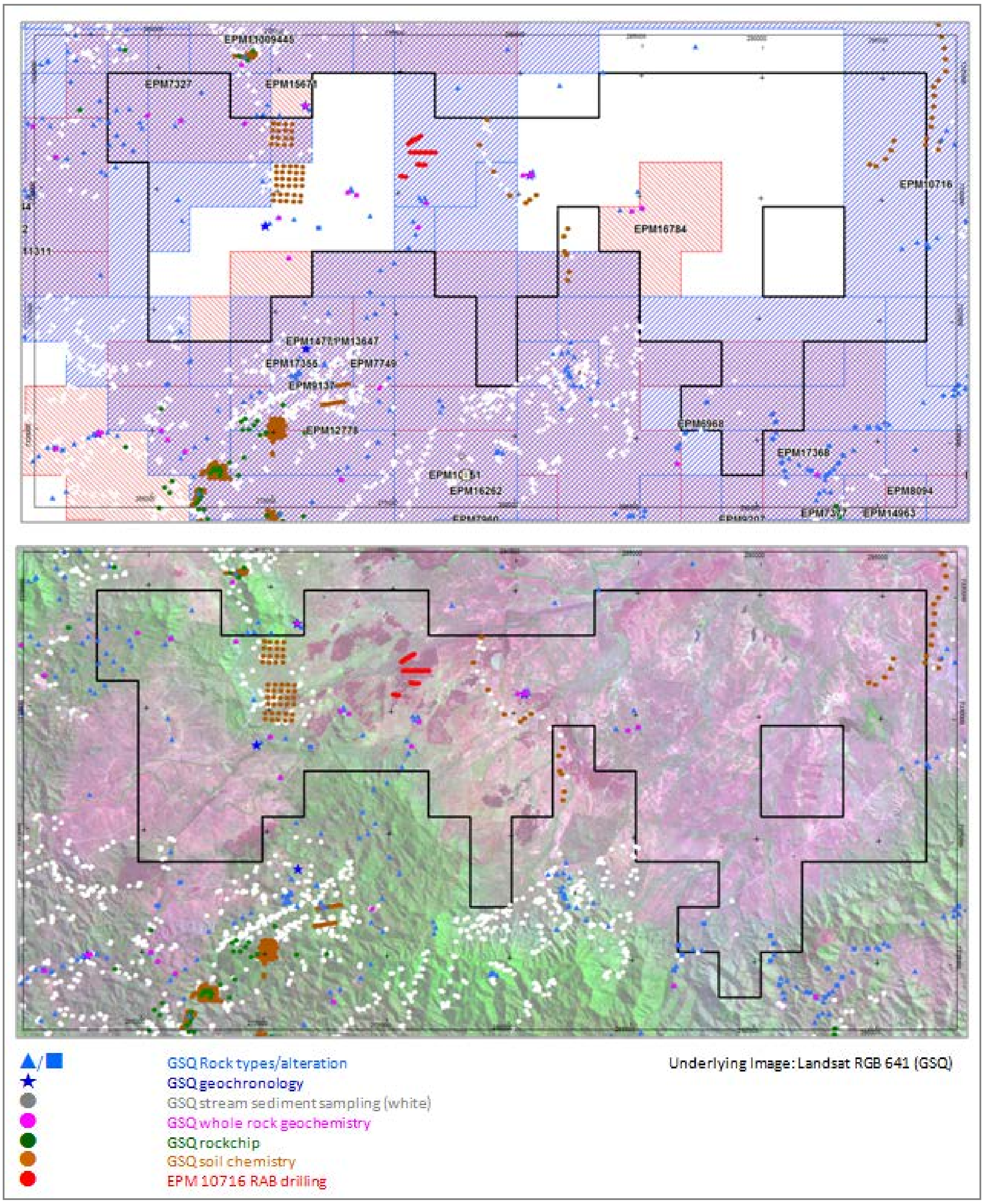

Figure 2: Previous Exploration. TOP: blue hashing = hEPM_1990 and red hashing = hEPM_00. BOTTOM: public domain GSC data (as well as digitized RAB drilling) over Landsat RGB 641 Image

Of course, there is no guarantee that mineral deposits exist in any given project area; and statistically, chances of finding an economic deposit are very low. The best outcome an explorer can hope for is to find the mineralization IF it exists within the project area. Towards that end - you need to collect good data and use that data effectively. WEJV have collected good quality, high resolution aeromagentic and radiometric data. These data have been processed and interpreted and targets generated. The various filtering that has been applied and the interpretation of these data are described below.

Enhancement filtering

There are certain properties of magnetic data that allow it to be manipulated to emphasize features of interest, such as deep and shallow sources, pertinent structures and discontinuities, and locations of unit edges. Fathom Geophysics has developed a suite of enhancement filters specifically designed to highlight such features in magnetic data, to assist in the interpretive process.

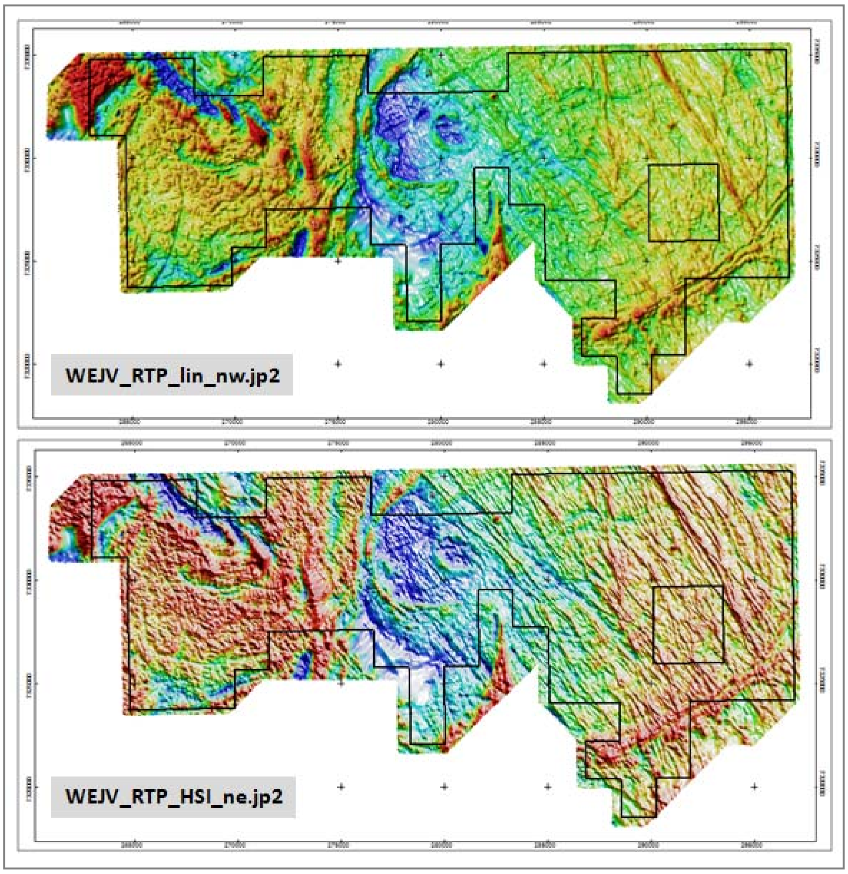

Figure 3: The RTP magnetic data

Several different types of filtering have been applied to the RTP (reduced to the pole) magnetic grid. The data are (almost) always reduced to the pole to shift anomalies over their sources, and simplify the interpretation of the data. Various assumptions are made when doing this, and sometimes (when the body is remanent - it has its own 'in built' magnetic field) these assumptions are not valid. But overall, the RTP grid is a good starting point for all subsequent processing.

When you look at an RTP magnetic image (see Figure 3) you can see many interesting features in the data. The most striking features are the magnetic rims around the edges of the intrusive bodies, the strongly magnetic gabbro in the far NW corner of the EPM, and the four small and isolated magnetic highs running in a SE belt on the western side of the EPM. There is much information to be gleaned from interrogating the RTP image, but for specific goals, specific filters are required.

Some examples of the filtering products are shown in Figure 4. Appendix 1 (separate document) details all the filters that have been applied, the purpose of each filter and a snapshot of the geo-referenced images created for each filtered grid.

The top image in Figure 4 was desinged to separate distinct units and features from one another to allow identification of key elements. You can see how well the circular intrusion in the centre of the EPM is imaged. Its elevated rim is clearly highlighted (compare this to the RTP images in Figure 3).

The middle image in Figure 4 is designed to highlight high amplitude magnetic units and to locate them correctly. Some rock units within the survey area have been remanently magnetized, causing the location of the magnetic anomaly relative to the source body to be offset (the assumptions about magnetization direction made using the RTP operator are invalid). This image is of the analytic signal of the vertical integral of RTP, (rather than just the RTP). The analytic signal filter is (to a large extent) independent of magnetization direction and places magnetic anomalies about their sources. The vertical integral filter acts as a smoothing filter so that the noise and high frequency amplification in the analytic signal operator is moderated. Results provide a good image for mapping key features.

The bottom image in Figure 4 is the directional derivative image, highlighting structure and subtle changes in the magnetic character of the area, independent of amplitude. The interpreters eye is not directed toward the high amplitude responses (as it is in the image above), but rather, towards the breaks in continuity and the texture of the units.

Why filter the magnetic data?

Explorers spend considerable money acquiring high resolution aeromagnetic data, it is important to extract as much information as possible from the data. Looking at the TMI or RTP image alone will not show you everything there is to see.

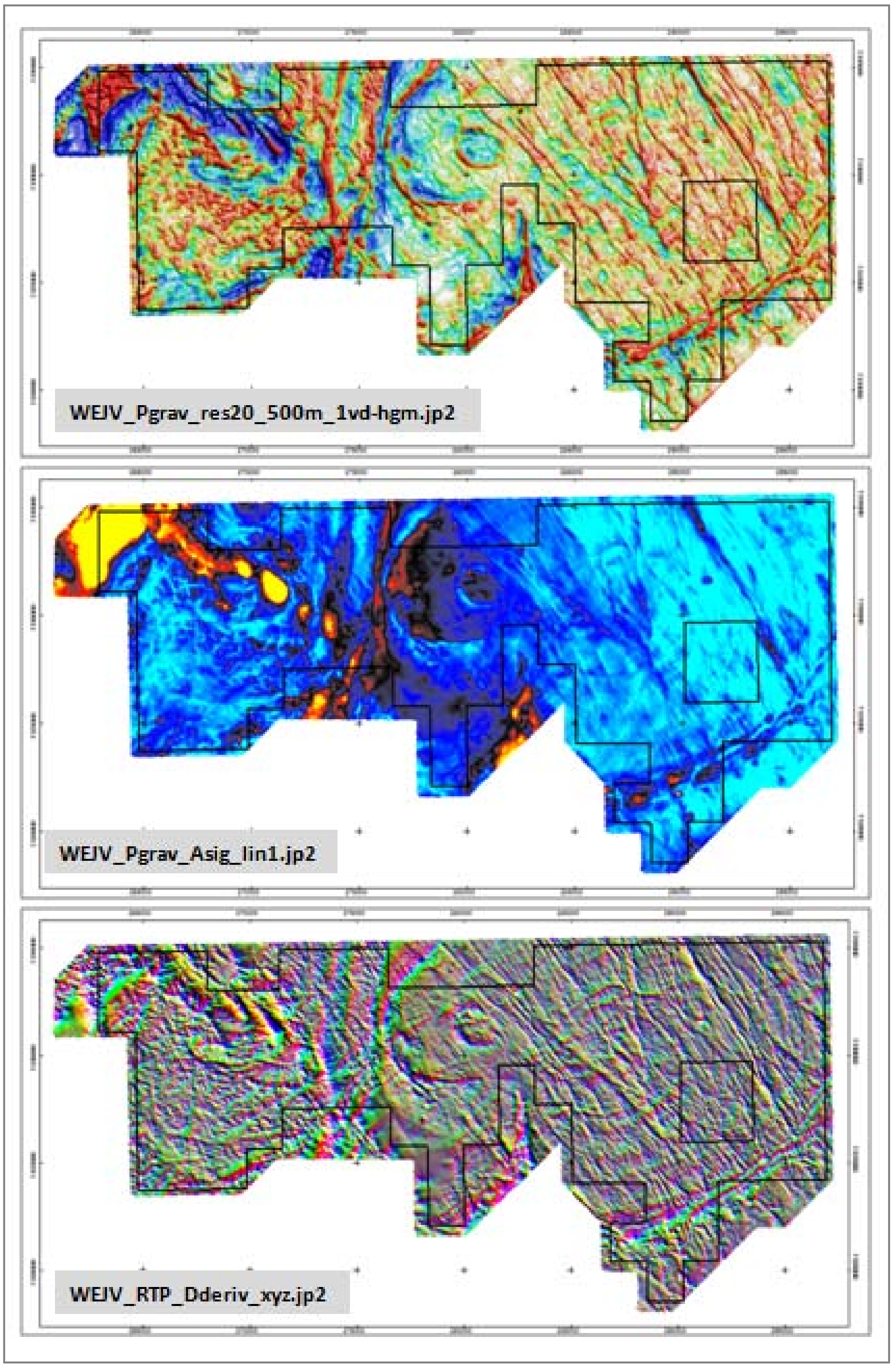

Figure 4: Examples of enhancement filters applied to the RTP magnetic data

Structure Detection

Almost all mineral deposits have some degree of structural control. The mapping of strucutre is a critical part of any interpretation or targeting exercise. Commonly, structure is manually mapped by an interpreter, using the various magnetic images available. The problem with this approach is that it is very subjective. The structures mapped by one person will be different to those mapped by another, and the degree of detail and consistency will vary across the map, depending on the concentration and enthusiasm of the interpreter (and whether he or she has had a good nights sleep!).

Fathom Geophysics has developed a method of grid based, semi-automated structure detection. The goal in developing structure detection was to move towards automated interpretation of magnetic data that would be most similar to an interpretation by a person. The structure detection is based on log Gabor filters, which are thought to closely mimic human vision.

The structure detection filter is an edge detection filter but the results are significantly different from those produced by standard edge detection methods. Perhaps the biggest difference is that the results are a measure of asymmetry regardless of amplitude. This means that structures in areas of low contrast are highlighted just as well as those in areas of high contrast as long as the frequencies are present. This is important for areas such as EPM 19020 where structures in intrusive sequences may have very subtle responses.

This structure detection method is multi-scale by design. For structures to be highlighted, they must be present at more than one scale. This eliminates more minor edges that may be present over a narrow frequency range.

Structure detection was first run on the regional GSQ data in an attempt to map the crustal scale faults, to define the broader tectonic setting, and try to determine which structural zones may be important for mineralization. Figure 5 shows the GSQ mapped faults for the region surrouding EPM 19020, as well as the results from the automated structure detection (colored by orientation). The N to NW trending regional faults, controlling basin fill prior to emplacement of Permo-Triassic intrusives, can clearly be seen. The bottom image in Figure 5 shows the structure detection results applied to the 2011 detailed survey data, using the same detection wavelength. This result was used as an input to the deterministic targeting runs (discussed below).

Structures occur at various scales across all terranes, and it is useful to separate these structures into several sets so that the interpreter can more readily determine which faults are fundamental (crustal scale faults may provide pathways for mineralized fluids) and which are more localized (providing a focussing mechanism for mineralization). Figure 6 presents the three scales of structure extracted from the RTP magnetic data. The bottom right image shows the detailed structure over the RTP image, highlighting the importance of running such filters - not all structures are readily apparent in the RTP image.

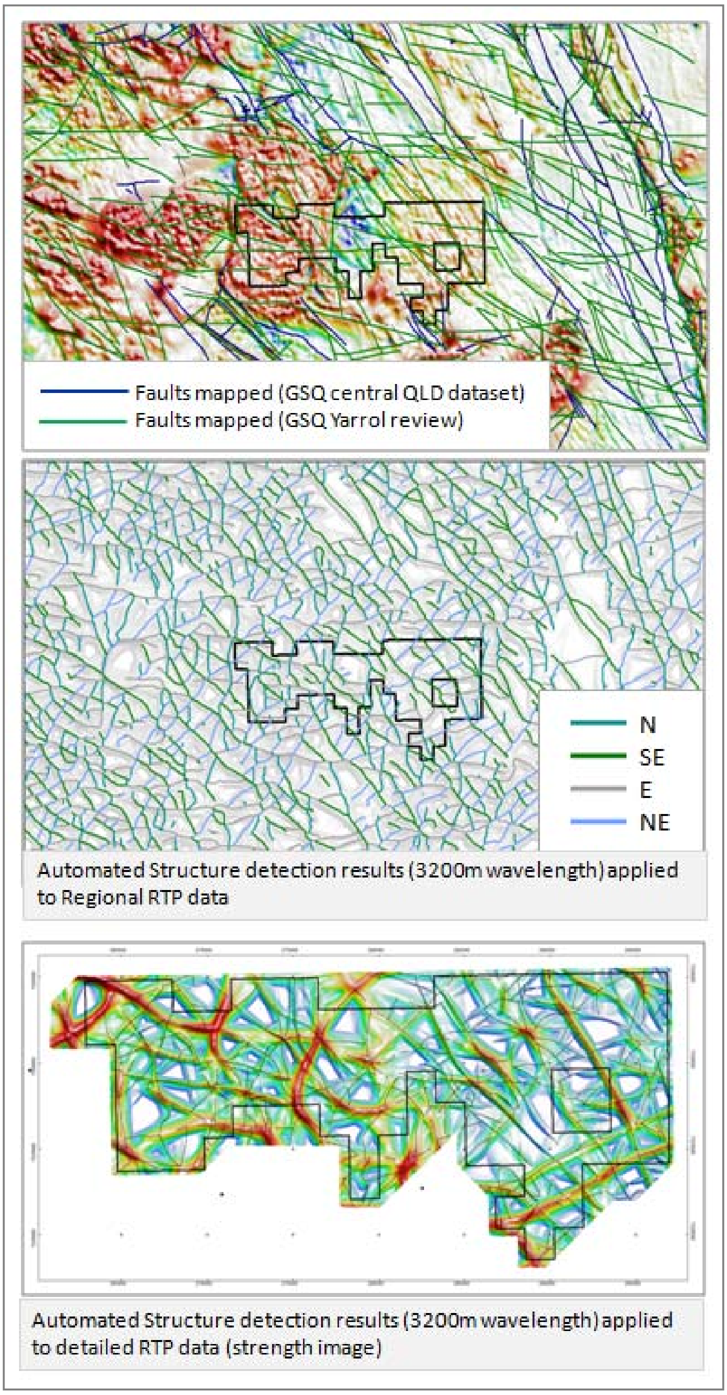

Figure 5: Structure Detection Results

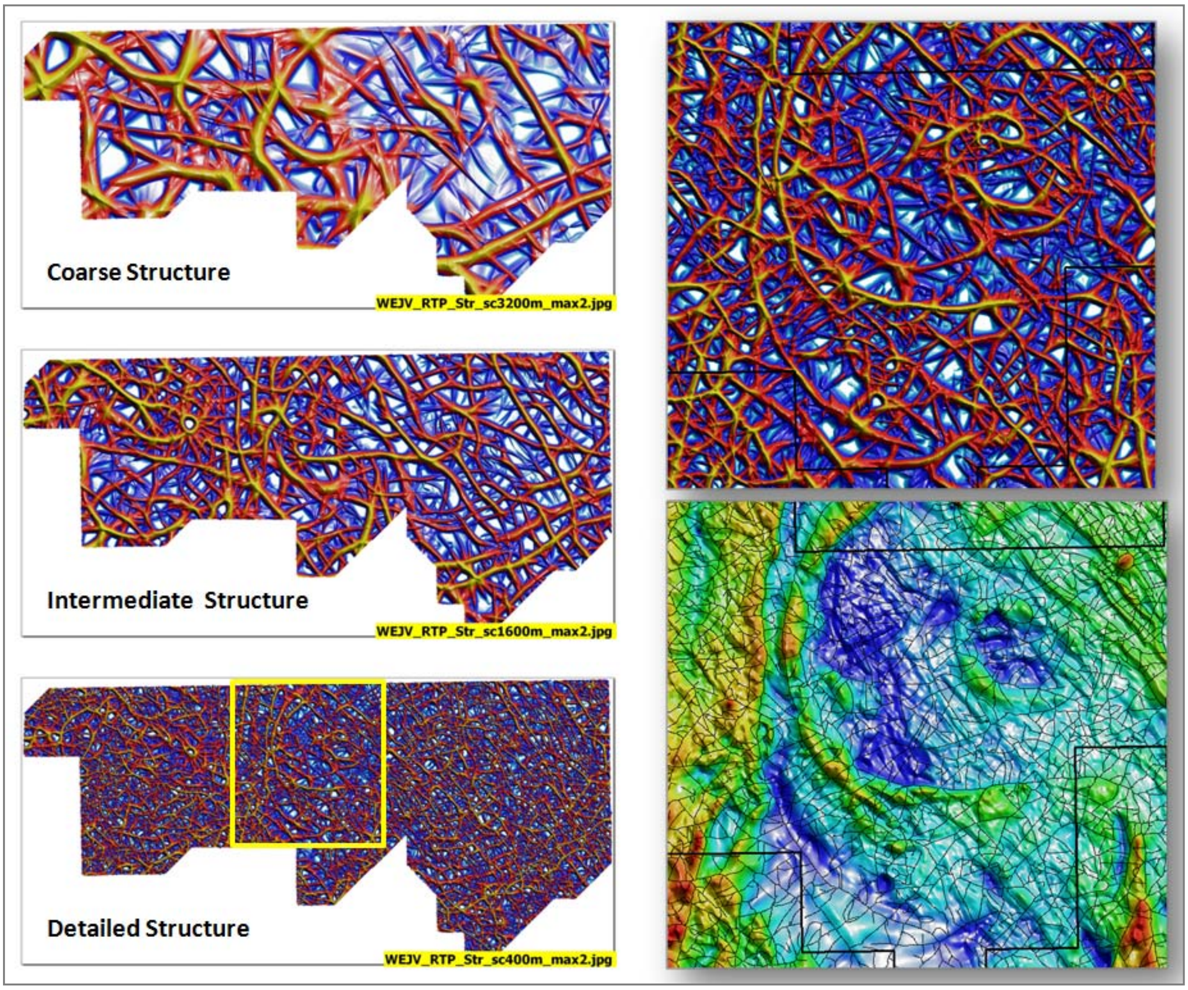

Figure 6: Structure Detection Results

Why is it important to detect structure?

Almost all mineral deposits are structurally controlled - meaning that structure (faults) are important in their formation. Mineralized fluids travel along structures - they are the pathways for minerals to reach their destination. Mineralization can be concentrated where there is a high density of structures - the structures act as a focusing mechanism. Knowing where these structures are is critical to targeting mineralization.

Intrusion Detection

Finding discrete (circular-like, isolated) anomalies in magnetic data is useful in exploration for many types of deposits. Fathom Geophysics has developed a suite of filters designed to locate discrete bodies, based on the detection of radial symmetry. These filters can be useful for detecting discrete alteration zones associated with Iron Oxide Copper Gold (IOCG) mineralization or discrete intrusive bodies associated with intrusion related mineralization.

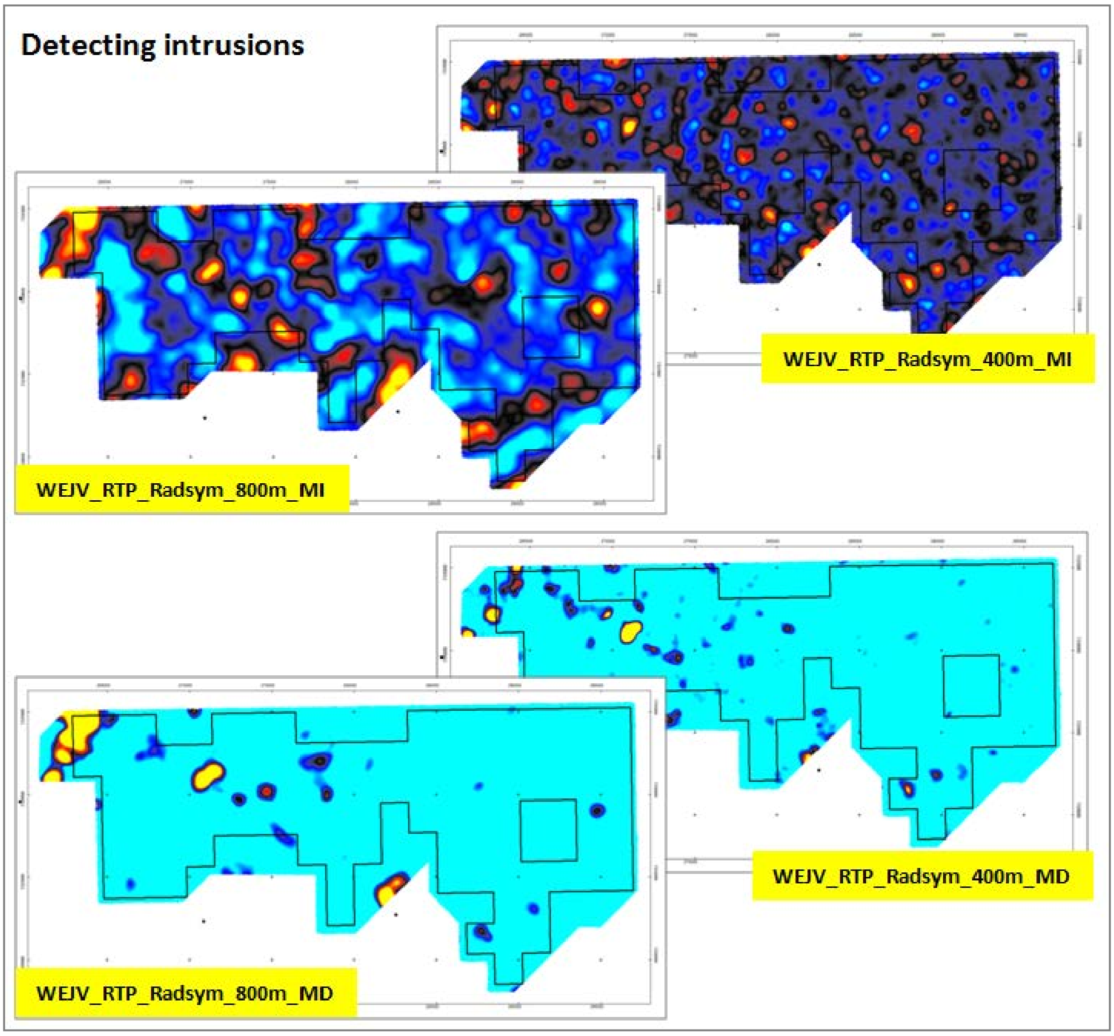

Figure 7: Intrusion detection results

Radially symmetric bodies of varying diameter can be detected using the filter. Commonly, a range of scales (i.e. search diameters) is selected and results generated. This produces a map of discrete anomalies of varying sizes.

Radially symmetric anomalies can be detected using both the magnitude dependent (MD) and magnitude independent (MI) settings. The magnitude dependent results have values that are the product of the symmetry and the amplitude of the anomaly; whereas the magnitude independent results are based on symmetry alone.

It is likely that any mineralization found in the EPM will be associated with the smaller intrusions that have been emplaced within or at the boundary of the larger (more exposed) batholiths. The larger plutons probably have too deep a level of exposure to have focused enough fluid to form a deposit at current erosion levels. So it is important to map out the smaller intrusives within the EPM.

Discrete magnetic bodies are a mappable criteria for the target models considered in this targeting exercise. A standard suite of results was generated using the RTP grid as input. Additional results were generated using the analytic signal of the RTP vertical integral to account for body mislocation due to remanence (Figure 8 shows these results).

Structural Complexity

An important component of many ore deposit models is the presence of structural complexity. Geological settings indicative of structural complexity (such as highly-fractured or faulted regions) are commonly reflected in magnetic data as zones of higher frequency and amplitude variations. They are 'busy' magnetic zones.

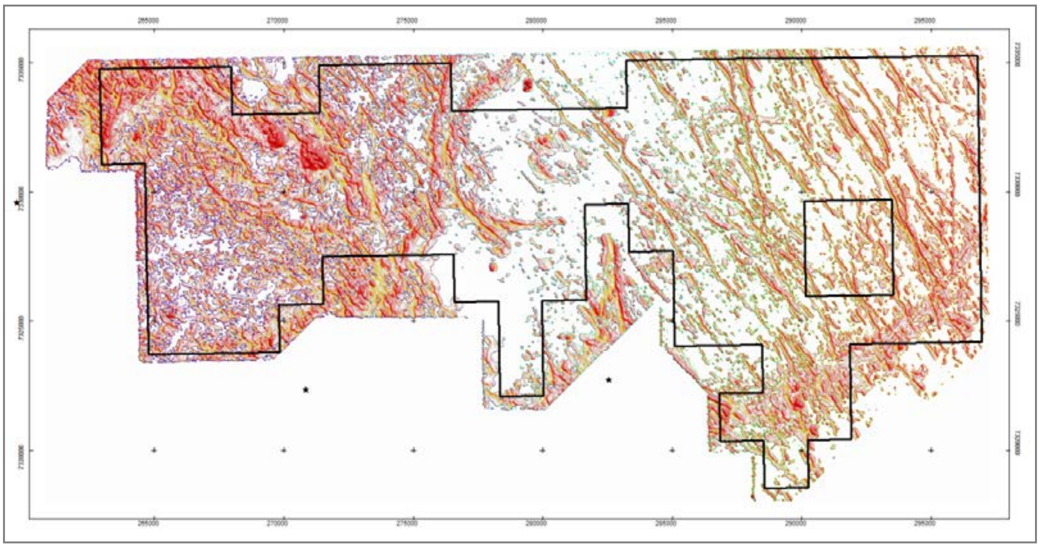

Figure 8: Structural Complexity Map

Fathom Geophysics has developed a filtering method to highlight regions of structural complexity in potential field data. The method uses prediction error filters to identify zones that are most different to the general frequencies and orientations present in the grid. A 'flat', quiescent magnetic zone will produce a lower amplitude response from the prediction error filter than a complex zone. The results are normalized using the analytic signal magnitude to highlight structural complexity independent of amplitude, so that subtle but complex zones are not overlooked.

The structural complexity map is presented in Figure 9. Red indicates zones of high structural complexity.

Interpretation

A map of basement geology derived from the magnetic data and previous mapping in the area was generated to assist in the targeting process. The interpretation is presented in Figure 10.

The interpretation consists of four layers:

Layer Name	Description
WEJV_interp_lithology.TAB	Polygons of lithological units attributed by unit name (as per the GSQ nomenclature) and unit age. Polygons colored by unit name.
WEJV_interp_structure.TAB	Polylines of faults mapped across the project area. Grey faults predate the Permo-triassic intrusive episode. Black faults represent reactivated grey faults or more recent faults.
WEJV_interp_fractures.TAB	Pertinent discontinuities with no obvious offset have been placed in this layer.
WEJV_interp_dykes.TAB	Two sets of dykes have been mapped. Green = NE trending rhyolite dyke swarms (magnetic). Purple = non-magnetic dyke like features (perhaps pegmatite dykes?)

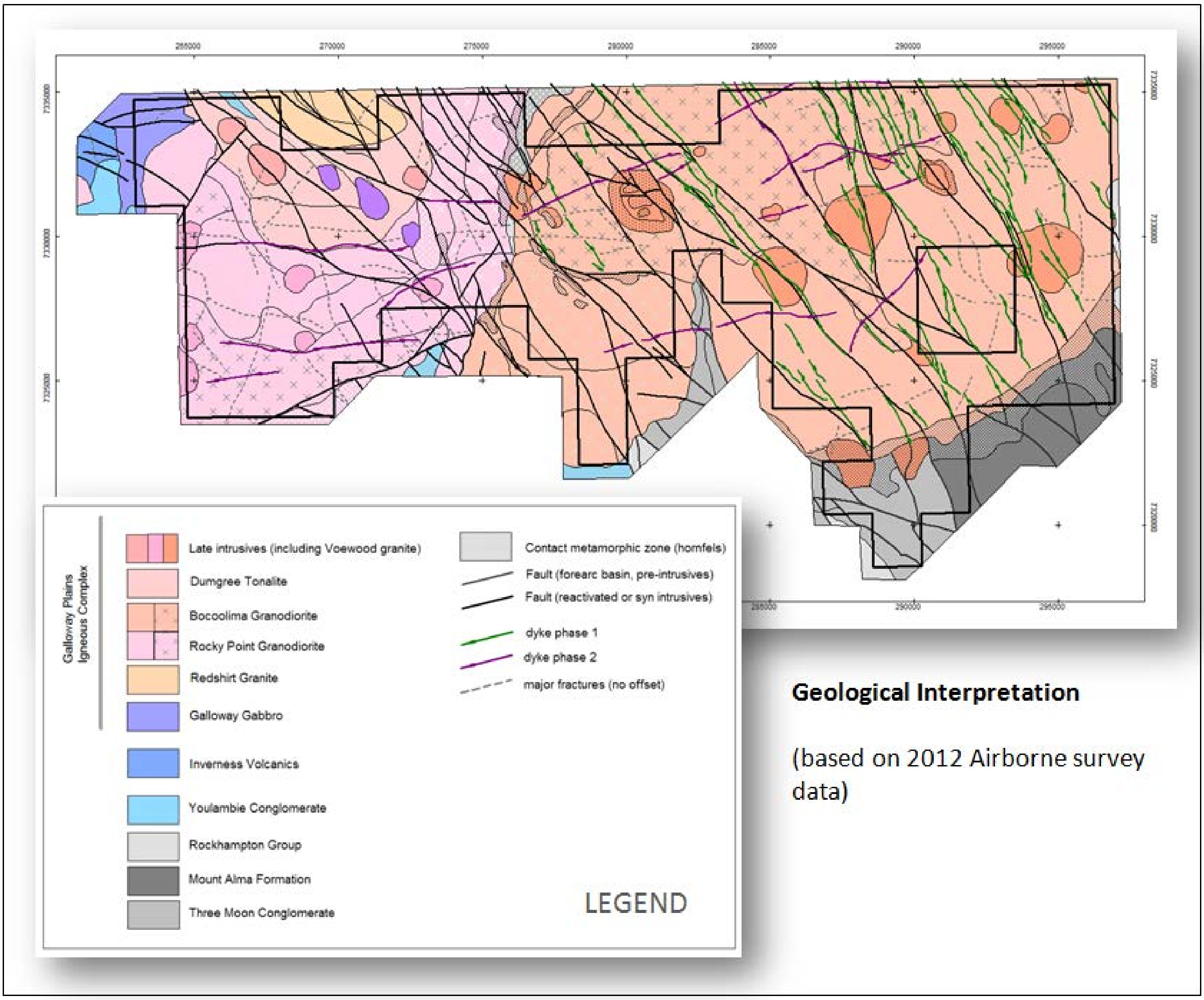

Figure 9: Interpreted basement geology

A brief consideration of the units follows. The forearc basin sequence displays a characteristically quiet magnetic response, except where the rocks have been altered (due to contact metamorphism). Similarly, the radiometric response is subdued - an exception to this is the Youlambie Conglomerate which gives a remarkably high response for a sedimentary unit, and is easily distinguished. This may reflect a more felsic detrital component from granites or silicic volcanics (GSQ 5).

- The oldest rock unit in the EPM is the Three Moon Conglomerate (*andesitic to basaltic polymictic conglomerate, feldspatholithic sandstone, siltstone, mudstone, andesite, fossiliferous limestone*). This unit has been mapped in the Southernmost extent of the EPM as well as the central 'finger', and is interpreted to possibly still occur in the central northern part of the EPM (see the dotted intermediate grey unit in Figure 10).
- The overlying Mount Alma Formation lacks a calcareous component (required for skarn formation) and has been mapped (and interpreted) only in the SE corner of the EPM (dark grey in Figure 10).
- The Rockhampton Group contains oolitic limestone (*as well as mudstone, siltstone, felsic volcaniclastics sandstone*) and occurs at the south-central boundary of the EPM; and as a small segment in the central part of the area between the Bocoolima and Rocky Point granodiorites.
- The Youlambie conglomerate, mapped in the far western corner of the survey, hosts the Day Dawn deposit (currently being explored by Signature Gold) and consists of *polymict conglomerate, volcaniclastics, sandstone and mudstone*. This unit has been interpreted to occur in two other locations within the survey area (see the Blue unit in Figure 10).
- The Inverness Volcanics have a strong magnetic signature and occur outside the EPM in the far western corner of the survey. There is no evidence to suggest this unit extends into the EPM (unfortunately, as it hosts the Last Chance mineralization currently being explored by Signature Gold).

All these units above were deposited in a forearc basin setting. During the Permian to mid-triassic, I-type granitoids were intruded into the basin sequence. These granitoids exhibit a strong radiometric response (the Galloway Gabbro gives a very low response and the Redshirt granite a particularly high response) and a characteristic elevated magnetic response around their rim.

- The Redshirt Granite has been dated and precedes the Bocoolima and Rocky Point Granodiorites. These intrusions are composite as evidenced by the variation in magnetic character. The rims of the plutons are quite magnetic (hornfels/skarn) The Dungree tonalite is the youngest of the larger plutons.
- Some of the smaller plutons in the interpretation have been previously mapped and other haven't.
- There are two sets of dykes evident in the data. The GREEN dykes (Figure 10) are assumed to be rhyolitic (based on limited rock observation data) and the PURPLE ones are less obvious and maybe pegmatite dykes (low magnetic response).

The prominent magnetic rims (yellow dashed lines in Figure 12) around the western margin of the Bocoolima Granodiorite and the eastern margin of the Rocky Point Granodiorite are most likely hornfelsed rims (as mapped at the southern end of the Bocoolima intrusion) and/or skarn (where there were calcareous sediments). The Rockhampton Group contains limestone and is interpreted to have sat between these granodiorites prior to intrusion (grey unit in Figure 12).

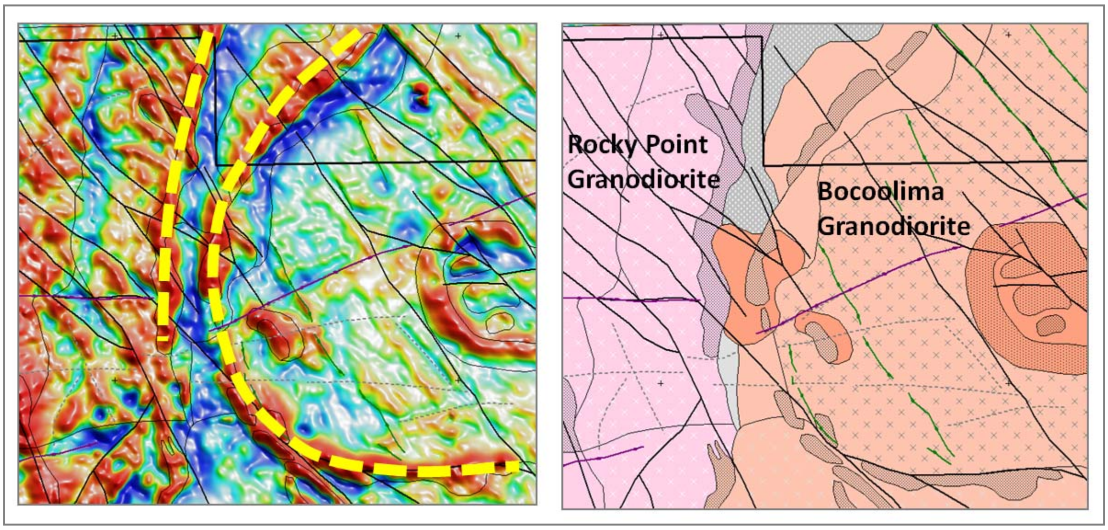

Figure 10: Magnetic signature of hornfels rims and/or skarn

Targeting

Introduction

The goal of collecting and interpreting detailed aeromagnetic (and radiometric) data was to 'see' the geometry and structural framework of the rocks; allowing the selection of target zones exhibiting key characteristics, which can then be followed up with ground based investigations (mapping, gravity & IP surveying, geochemistry) prior to drilling.

The type, distribution and geological setting of mineralization in the surrounding area provides an insight into what might be found within the EPM. Intrusive rocks within the Yarrol province, having the same age and composition as those found in the EPM are host to several different types of ore deposits (Figure 13 and 14).

Primarily, the Yarrol province is a gold and gold-copper province, with one large producer (Mount Morgan), one medium producer (Mount Chalmers), and several small producers. Most potential therefore exists for the discovery of base metal-gold (particularly copper-gold) and gold deposits (GSQ 5).

Table 1. Mineral deposit types related to Triassic magmatism in the New England Orogen
Granitoid-related deposits
Sn (W) deposits (veins, sheeted veins, stockworks, disseminations, pegmatites)
Topaz-W (LiBe) deposits (silexite alteration zones in microgranite)
Mo (BiSnWAu) deposits (pipes, veins, sheeted veins, disseminations)
Au deposits (disseminations and veins)
Cu-dominant mesothermal veins (commonly with AuMoWZnPbAg association)
Polymetallic veins (commonly with AsCUZnPbAgSn association)
Hydrothermal kaolinite
Porphyry and breccia-hosted deposits
Cu (MoAu) porphyry systems
Mo (Sn W) porphyry and breccia systems
Au (Ag CuPbZnBi) breccia masses
Skarns
Cu (Au) skarns
Zn skarns
Magnetite (AuCuBi) skarns
Sn (CuAgAs) skarns
W (Mo) skarns
Epithermal veins and breccias
Low-sulphidation, precious metal and base metal types
Low-sulphidation, precious metal types
Layered mafic to ultramafic intrusions
Magnetite-ilmenite cumulates
Sulphide-bearing PGE occurrences
Mesothermal AuSb WHg veins (indirect association with igneous rocks)
Au veins
AuSb (W) veins
Sb veins
Hg veins

Figure 11: Source: Ashley 1 (Table 1)

In more detail, the types of mineralization related to intrusives found in the region surrounding the EPM are as follows:

- *Gold-bearing quartz or quartz-calcite veins* are the most numerous deposits. The hydrothermal veins which fill joints are concentrated at intrusive contacts, and occur in granitic intrusions or in adjacent sedimentary and volcanic country rocks, and are commonly associated with silicic to intermediate dykes. These veins usually contain small amounts of sulphides as well as gold. In composite plutons, the gold mineralization is preferentially located in the older, more basic phases. However, gold-bearing veins are also associated with silicic granitoids (Whitaker 1). [INTRUSIVE RELATED GOLD]
- *porphyry copper-molybdenum deposits* are associated with smaller intrusions either within or near the margins of larger plutons. Most of the mineralizing stocks are non-magnetic, although some are surrounded by a magnetic hornfels rim. All the known porphyry copper and molybdenum deposits are currently uneconomic because of low grades. [PORPHYRY COPPER MOLYBDENUM (GOLD)]

- Copper and iron-bearing skarn deposits are developed where granitoids intrude calcareous sediments. [MAGNETIC SKARNS]
- Several relatively small replacement or vein type copper deposits occur in non-calcareous rocks at intrusive contacts.
- Quartz vein and pipe deposits with tungsten, molybdenum and bismuth are associated with granitoids at several localities
- layered gabbros occur within the Permo-triassic intrusions. These intrusions contain magnetite layers and anomalous Platinum Group elements (PGE's).

Within the orogenic sequences of the NEFB (the sediments and volcanics that existed within the EPM before the granites were intruded) Volcanogenic massive sulphides (VMS) are the most important deposits. It is unlikely that these deposits would be found in the EPM considering the paucity of orogenic sequence rocks.

Some specific deposits worth mentioning due to proximity or size:

- *Last Chance & Day Dawn (Signature Gold)* Gold mineralization at Last Chance-Day Dawn occurs in quartz sulphide veins as well as disseminations and quartz stringers within sheared and brecciated andesitic volcanics and sediments of the Inverness Volcanics and Youlambie Conglomerate respectively. (Signature Gold Prospectus). [There is no mapped occurrence of the Inverness volcanics within EPM 19020, there are three locations where remnants of the Youlambie Conglomerate may still occur within the EPM (target locations 17 and 20 below)]
- *Maxwellton (Signature Gold)* A brief reconnaissance of the northern end of the Maxwellton line of gold workings revealed sub-volcanic dacite porphyries hosting the vein mineralization. These intrusive rocks could be related to the younger Permo-Triassic volcanic rocks mapped 1,500 m to the south. This throws into doubt the full extent of Late Devonian – Early Carboniferous age volcanoclastics delineated on the 1:100,000 scale geological map sheet. A small, discrete NE trending magnetic body, peripheral to the granodiorite contact, may well be part of a skarn (Signature Gold Prospectus).
- *Specimen Hill (Mt Rainbow Goldfields)* Mineralization occurs in deep leads beneath Tertiary basic lavas, and as reefs within the Galloway Plains Tonalite. The reefs are narrow, and contain arsenical sulphides. Oolitic limestones occur at the Mount Rainbow copper prospect (GSQ 5). Currently held by China Australia Mining (except MDL 313).
- *Mount Morgan* The major gold–copper orebody at Mount Morgan (Middle Devonian) is considered to be of volcanic origin, but is not a typical volcanogenic massive sulphide (Murray 1). It occurred within a narrow belt of siliceous Middle Devonian volcanics which formed a roof pendant in a Late Devonian tonalite intrusion (GSQ 5). The much smaller (negligible production) Ajax Copper mine (40 km SE of Mount Morgan) is hosted by a similar volcanic sequence and is a typical VMS (GSQ 5).

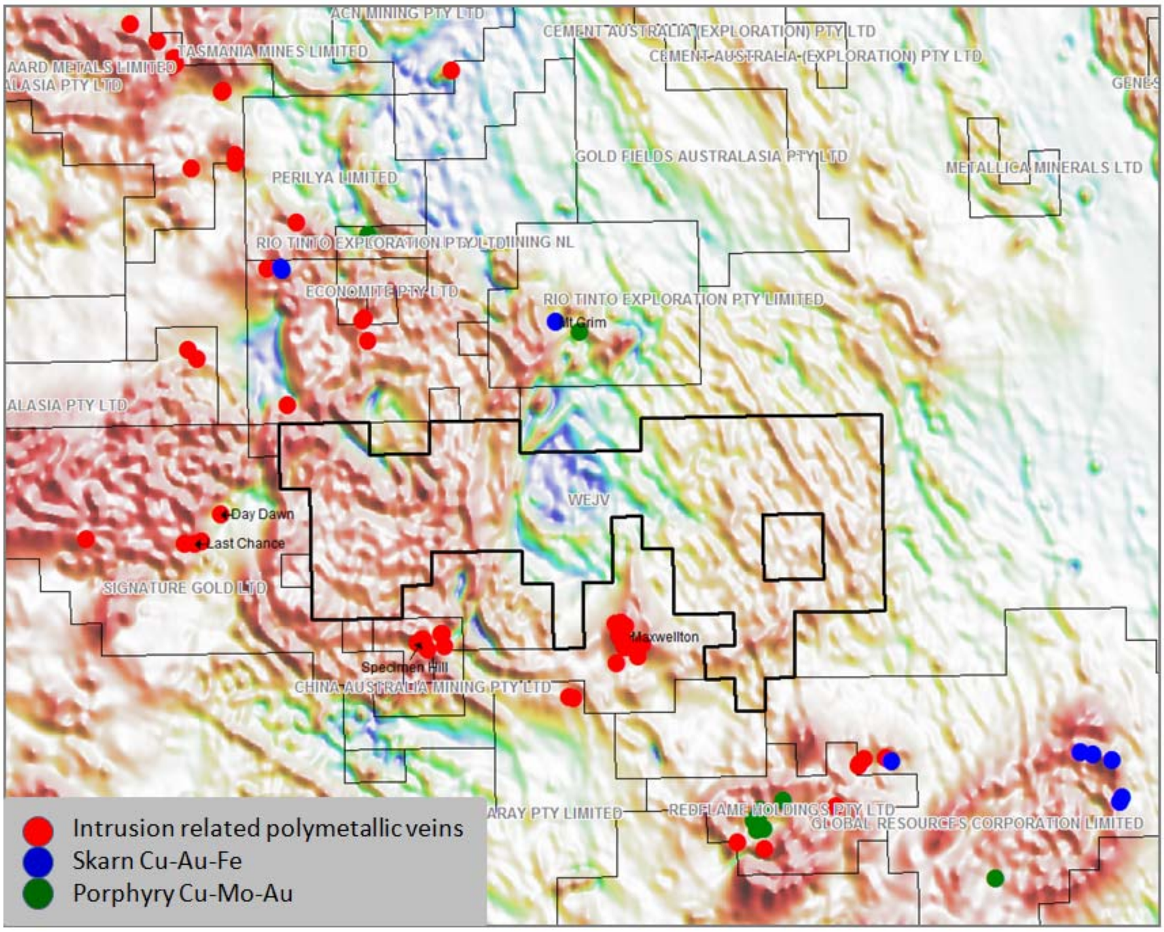

Figure 12: Location of mineral occurrences in the vicinity of EPM 19020

Methodology

Fathom Geophysics has developed a method of deterministic targeting for greenfields mineral exploration. For each deposit style: a model is designed (based on available literature and our targeting experience); layers are generated using available data to represent those model components; buffer zones and appropriate spatial errors and weights are assigned to the layers; and the layers are combined (deterministically) to give a final prospectivity layer for each deposit style.

Defining the model for each deposit style involves translating the critical ore forming components/processes into a mappable entity and processing available data in a way that best highlights that entity. If fluids must flow along major crustal scale structures to facilitate a deposit style, then a method for extracting the major structures must be developed;

and those structures would form a part of the model (i.e. a layer). The goal of this type of targeting is to rapidly generate model-backed target zones (which also reduces the search area) that can then be ground truthed and followed up with appropriate techniques.

Considering the geology of the EPM, the mineralization found in the surrounding area and the magnetic signature of the rocks, two broad deposit models were developed and results generated. Each of these models encompass several specific deposit types. The reason for this is that the mappable entities representing the ore forming processes for several deposits are the same (using the available data). Whether you are searching for IOCG's or magnetic skarn deposits, you are looking for the same features in the magnetic data - very high discrete magnetic anomalies, proximal to major structure, with considerable structural complexity. Of course, the indicators for these deposit types on the ground would be quite different (composition, alteration etc) but in terms of their magnetic data signature, we can look for both deposit types using one model.

IOCG/Magnetic skarn Model

IOCG/Magnetic skarn model *[Gold, Copper, Uranium, Iron Ore]*

Targeting inputs

- discrete magnetic anomalies: 400m magnitude independent radial symmetry HIGHS [derived from the analytic signal of pseudogravity]
- major structures defined in magnetic data (3200m scale)
- structural complexity

Iron Oxide Copper Gold Uranium (IOCG-U)

This class of deposits is actually quite diverse; and each deposit has its own unique characteristics. However, when exploring for IOCG's there are some criteria that can be sought after. For regional IOCG exploration, the usual approach is to locate *coincident discrete magnetic and gravity highs*. The magnetic high arises from the presence or magnetite and the gravity high is due to the high density of Iron and Sulphides.

Most IOCG deposits (if not all) have a strong structural control, making high resolution magnetic data an essential exploration tool. The iron-oxide is denser than the surrounding units, making gravity data a suitable method for target discrimination. A model for IOCG targeting is to locate coincident discrete magnetic and gravity highs along major structures and to find where they are coincident with structural complexity. In the absence of adequate gravity data (the present case), the magnetic data alone must be relied upon.

There are no IOCG deposits proximal to the EPM.

Magnetic skarns (Copper and Iron bearing)

Skarns are coarse-grained metamorphic rocks composed of calcsilicate minerals that form by replacement of carbonate-bearing rocks (in most cases) during contact or regional metamorphism and metasomatism. Skarn deposits are important sources of base and precious metals as well as tin, tungsten, and iron. Skarns are relatively high-temperature mineral deposits related to magmatic hydrothermal activity associated with granitoid plutons in orogenic tectonic settings. They generally form where a granitoid pluton has intruded sedimentary strata that include limestone or other carbonate-rich rock (Hammarsto 1).

Local magnetic highs may indicate skarn deposits with significant abundances of pyrrhotite and (or) magnetite (magnetic skarns). Precious metal skarns that contain abundant pyrite and quartz may lack this distinctive magnetic signature (non-magnetic skarns). These deposits are typically associated with contact zones around batholiths or plutons, including some relatively isolated small bodies, that intrude sedimentary strata. ((Hammarsto 1).

The Mt Grim poly-metallic magnetite skarns is 6kms north of the EPM.

Intrusion Related Au/Porphyry Cu-Mo-Au/Non-magnetic skarn model

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Intrusion Related Gold/Porphyry Cu-Au_Mo/Non-magnetic skarn model *[Gold, Copper, Molybdenum, Uranium]*

Targeting inputs

- discrete magnetic anomalies: 400m magnitude dependent radial symmetry HIGHS [derived from the analytic signal of pseudogravity]
- major structures defined in magnetic data (3200m scale)
- structural complexity

** Potassic alteration is also a favorable criterion, but targets cannot be downgraded due to the absence of a Potassium (K) anomaly.

Porphyry copper

Porphyry copper deposits contain copper, molybdenum, and gold minerals, disseminated or in a stockwork of small veinlets within a large mass of altered rock. The host rock is commonly a pyrite-rich porphyry ranging in composition from granodiorite to tonalite. Porphyry deposits exhibit a characteristic pattern of hydrothermal alteration (Cox 1).

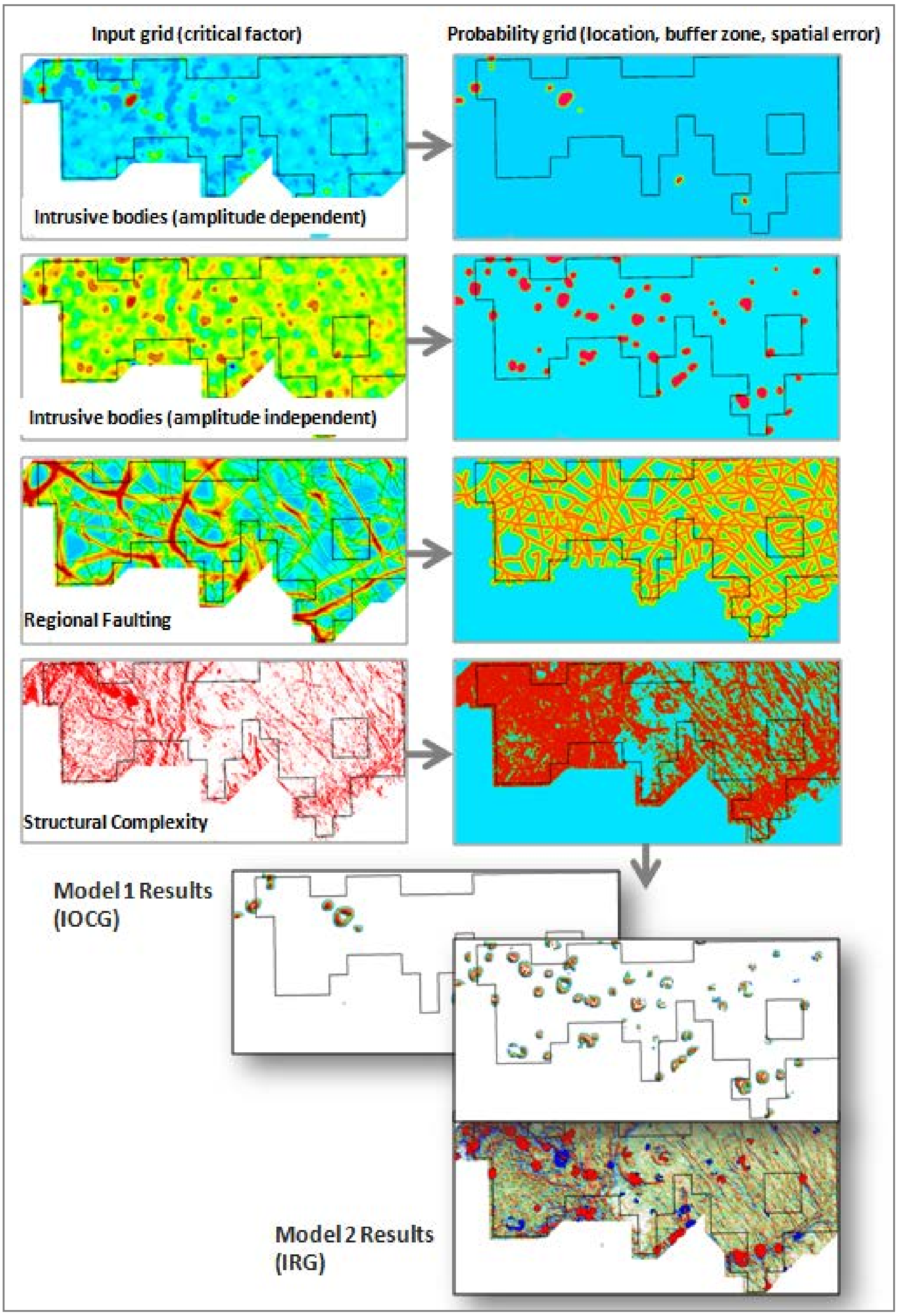

Figure 13: Deterministic Targeting results

Intrusion Related Gold Model

Intrusion Related Gold (IRG) refers to a class of gold deposits associated with felsic intrusions. The deposits sit within or near the vicinity of granite intrusions, and include stockwork and vein deposits. This model was only developed in 1999. It was based on the study of gold deposits in or near granite intrusions, but now it encompasses a large range of intrusive rocks. Before 1999 the deposits were called names such as *Breccia-porphyry* (for example the Kidston deposit in QLD), *disseminated granite-hosted* (such as the Timbarra deposit in NSW).

Intrusive-related gold deposits rely on there being gold in the fluids that are associated with the magma that forms the intrusion, and these fluids being discharged into the surrounding rocks. The gold mineralization can occur in multiple parallel veins and stock-works that have a high likelihood of continuing at depth. In the area surrounding the EPM, there are old gold workings at or near the surface and the types of intrusions favorable for the presence of IRGS.

Because these gold systems occur as sheeted, breccia, stockwork, flat-vein, and disseminated deposits, fractures and faults and small discontinuities are important; and it is therefore critical that we assess areas based on structural complexity.

Results

The results for the deterministic targeting runs for model 1 and 2 are shown in Figure 13. Final targets were generated considering:

- deterministic targeting results
- manual selection of prospective zones based on magnetic basement geology interpretation and knowledge of lithology (from reports)
- radiometric signature of the EPM
- locations of known mineral occurrences in the area surrounding the EPM

Final targets are shown in Figures 14 and 15; and described in Table 1. A total of 20 areas have been selected for follow-up, reducing the EPM to approximately 7% of its total area. The goal of target generation for multiple deposit types such as this is to reduce the prospective area of the tenement down to a manageable size. Stage 2 exploration (discussed below) should reduce the area even further, moving towards having robust drill targets.

A mention of Target 1 should be made. This anomaly displays considerable amplitude (approximately 5000 nT) and has the potential to model well (we have modeled targets for clients that have a lower amplitude and have confirmed IOCG mineralization when drilled).

number		Type	Evidence	Follow_up
1		IOCG/magnetic skarn	Proximal to major structure, structural complexity, discrete HIGH magnetic anomaly	Modeling of existing magnetic data (depth, susceptibility, likely magnetite content) - if within range, gravity survey, if dense DRILL
2		IOCG/magnetic skarn	Proximal to major structure, structural complexity, discrete HIGH magnetic anomaly, elevated K (alteration)	Modeling of existing magnetic data (depth, susceptibility, likely magnetite content) - if within range, gravity survey, if dense DRILL
3		IOCG/magnetic skarn	Proximal to major structure, structural complexity, discrete HIGH magnetic anomaly	Modeling of existing magnetic data (depth, susceptibility, likely magnetite content) - if within range, gravity survey, if dense DRILL
4		IOCG/magnetic skarn	Proximal to major structure, structural complexity, discrete HIGH magnetic anomaly	Modeling of existing magnetic data (depth, susceptibility, likely magnetite content) - if within range, gravity survey, if dense DRILL
5		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, elevated K (alteration)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
6		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, elevated K (alteration), elevated U	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
7		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, elevated K (alteration)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
8		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, elevated K (alteration)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
9		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
10		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
11		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
12		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
13		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
14		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, reactive units (sed/granite contact proximal)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
15		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, reactive units (sed/granite contact proximal)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
16		IRG/non-magnetic skarn/porphyry	Proximal to major structure, structural complexity, discrete magnetic anomaly, reactive units (sed/granite contact proximal)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
17		IRG	Possible sediment/intrusive contact, structural complexity (conceptual target)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
18		IRG	Possible sediment/intrusive contact, structural complexity (conceptual target)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
19		IRG	Possible sediment/intrusive contact, structural complexity (conceptual target)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry
20		IRG	Possible sediment/intrusive contact, structural complexity (conceptual target)	Ground truth - evidence of alteration, structure, rock type, if positive - IP survey and geochemistry

Table 1: Targets to follow-up

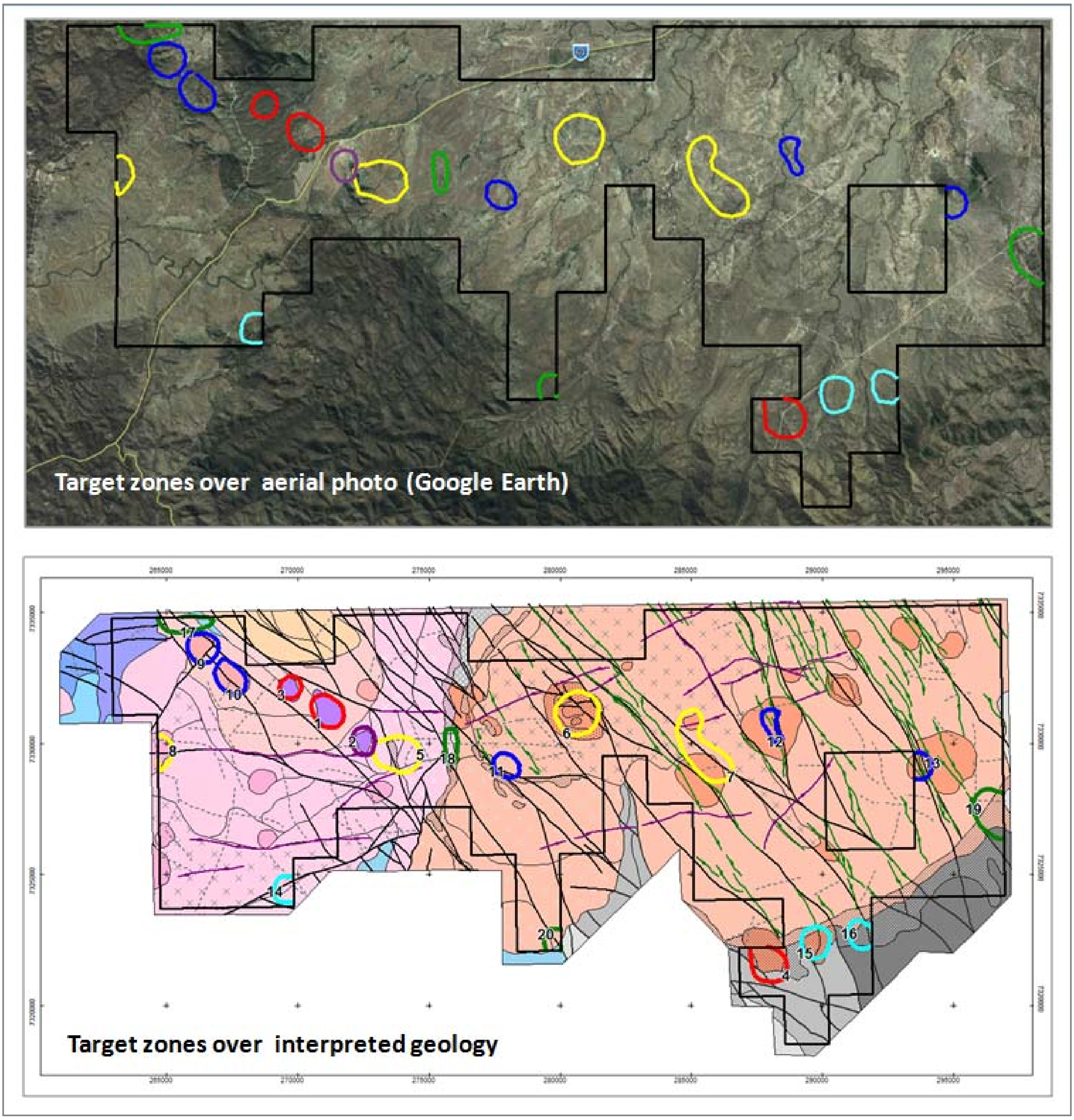

Figure 14: Resultant target zones shown over aerial photo (TOP) and interpreted basement geology (BOTTOM)

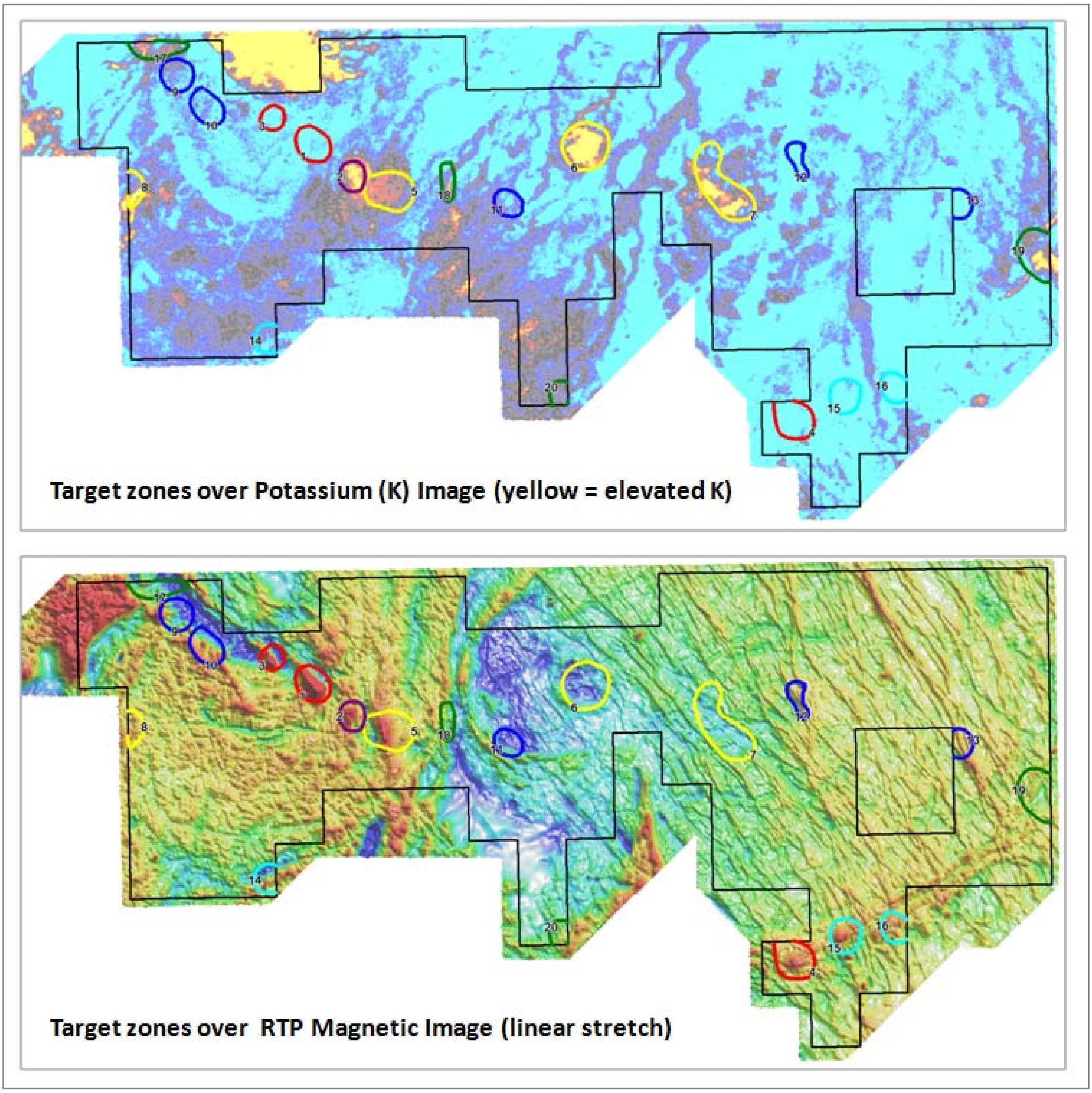

Figure 15: Resultant target zones shown over Potassium Image (TOP) and RTP Magnetics (BOTTOM)

Discussion & Recommendations

I would recommend the following plan for ongoing exploration:

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1. OFFICE BASED: Conduct a thorough and systematic review of all QDEX reports for all EPM's held over the current EPM to ensure all data collected (especially drilling) is considered; and to ensure that future drilling is well planned (you don't want to drill where others have already drilled!). This task was beyond the scope of current work, and was not carried out by AMC during their review of the EPM's prospectivity. I have reviewed the reports I could find on the GSQ website through QDEX (and digitized the drilling I found in the report on EPM 10716) but we need to be certain that ALL reports and data are collated. This should probably be carried out by a geologist, preferably the person who will undertake the field work (but this is not essential). This will probably take between 1 and 3 days depending on the volume of reports and data found.
2. OFFICE BASED: The IOCG/Magnetic skarn targets need to be modeled to approximate depth to source (depth below surface) and possible susceptibilities (proportional to magnetite content). If the values are high enough, flag the anomalies for ground follow-up and gravity surveying (1 days work)
3. Consider purchasing ASTER data that can be used to interrogate the targets identified in this report (looking for characteristic alteration above and surrounding the target areas)
4. FIELD BASED: Contract a field geologist to visit the IRG targets and document observations.
5. FIELD BASED: Acquire gravity data over any of the IOCG targets that modeled well.
6. OFFICE BASED: Model the gravity data and determine an appropriate density and depth range for the source. Flag anomalies for drilling
7. FIELD BASED: Collect IP and ground geochemistry (soil and/or rock chips) over IRG anomalies that looked good on the ground
8. OFFICE BASED: Process the geochemistry data, process and invert the IP data; flag successful anomalies
9. FIELD BASED: Drill test the anomalies still on the list - drill locations defined as the best IP or geochemistry response.

Additional Q&A

WHY USE GRAVITY AND INDUCED POLARIZATION (IP)?

The disseminated pyrite alteration associated with IRG/Po deposits is chargeable and usually mappable using IP/resistivity surveying. Reports from the mineral occurrences surrounding the EPM state that gold mineralization in both granitic and sedimentary units occurs in narrow veins, composed of quartz, or quartz and calcite, and is accompanied by abundant sulphide mineralization (pyrite, arsenopyrite, chalcopyrite) - perfect IP targets. IP is a good way to determine whether alteration exists below ground, particularly if outcrop is poor. It also provides a way to focus a drill target - drill where the highest response is in the inverted (depth converted) section.

IOCG deposits are usually dense as well as magnetic (some have demagnetization zones). Gravity data will provide an effective way of screening the targets, because the data can be used to model a density for the rock. If the density is not high enough (for Iron Oxide), it's not filled with FeO and is unlikely to be an IOCG deposit.

WHY NOT LOOK FOR URANIUM ON ITS OWN?

The Yarrol province is not known as a uranium province. That's not to say that Uranium can't be found. However, consideration of the rock types in the EPM would suggest that it is unlikely that an economic Uranium deposit exists. Accumulations of Uranium do exist where sedimentary rocks are in contact with granite (such as the area in the SE corner of the EPM). The uranium moves from the granite into the sediments along structures and precipitates out, usually due to a redox change. The uranium would therefore be in the sediments, and proximal to the granite.

However, the timing is probably wrong for this to happen. The intrusion of the granites into the sediments produced significant hornfels (a fine-textured metamorphic rock formed by contact metamorphism). This process most likely dramatically decreased the porosity of the sediments; and porous sediments (for example a very porous sandstone or maybe a limestone) are required for the fluids to move. The best chance of finding Uranium is in association with Copper and Gold at a replacement deposit (IOCG-U).

A point worth making with respect to Uranium exploration is that it is a difficult commodity to explore for. Electromagnetic (EM) data is an effective tool because it can effectively map structure in sediments (difficult with magnetic data) and can directly detect the reducing environment required to precipitate Uranium along the basement-sediment contact. Most commonly, the reducing environment is caused by the presence of graphite, which is highly conductive and a perfect EM target. The drawback of EM is that it is expensive to acquire (an airborne EM survey would cost at least 5 times that of the 2011 airborne survey).

One approach to Uranium exploration is to target the highs in the Uranium channel of an airborne radiometric survey. The use of the uranium channel provides some solid evidence of the presence of uranium, however it has serious limitations (namely that 98% of the radiation measured originates from the top 35 cm of the Earth's crust). Fortuitously, the main highs in the 2011 survey are coincident with several targets identified for follow-up. So in effect, Uranium is being considered as a commodity (indirectly).

WHY DO WE NEED A GEOLOGIST AND WHAT SHOULD THEY BE LOOKING FOR?

Targeting using available public domain data and high resolution magnetic and radiometric data is a sound *stage 1* approach to exploration. There are however, serious limitations to what you can learn about the mineralization potential of specific target zones using only such data. This body of work has identified target zones that should be the focus of *stage 2* exploration.

Each of the target zones need to be traversed and inspected for mineralization indicators. If there is adequate outcrop (exposed or accessible fresh rock), features typically associated with mineralization should be sought out and recorded in detail. These features include alteration, fracturing, brecciation, replacement and infill textures, type of quartz veining, dyke presence and composition, and mineralization (however minor).

Such information will help rank the targets for follow-up ground geophysics and/or drilling. Drilling aeromagnetic targets directly can work in some limited cases (kimberlite [diamond] exploration for example) but for most deposit styles (particularly IRG), cost effective drilling requires a staged exploration program.

WHY DO YOU RECOMMEND ASTER DATA

ASTER data will be of use where there is outcrop. It is difficult to assess what proportion of each individual target is under cover. We would recommend purchasing the ASTER data anyway and having the targets assessed for alteration signatures, because all of these deposit styles have distinct alteration zones. This will reduce the time required for a geologist to be in the field (reduce program cost).

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Appendix 1

APPENDIX 1

Enhancement filtering , structure detection and semi-automated interpretation

of the

EPM 19020 Airborne Survey data

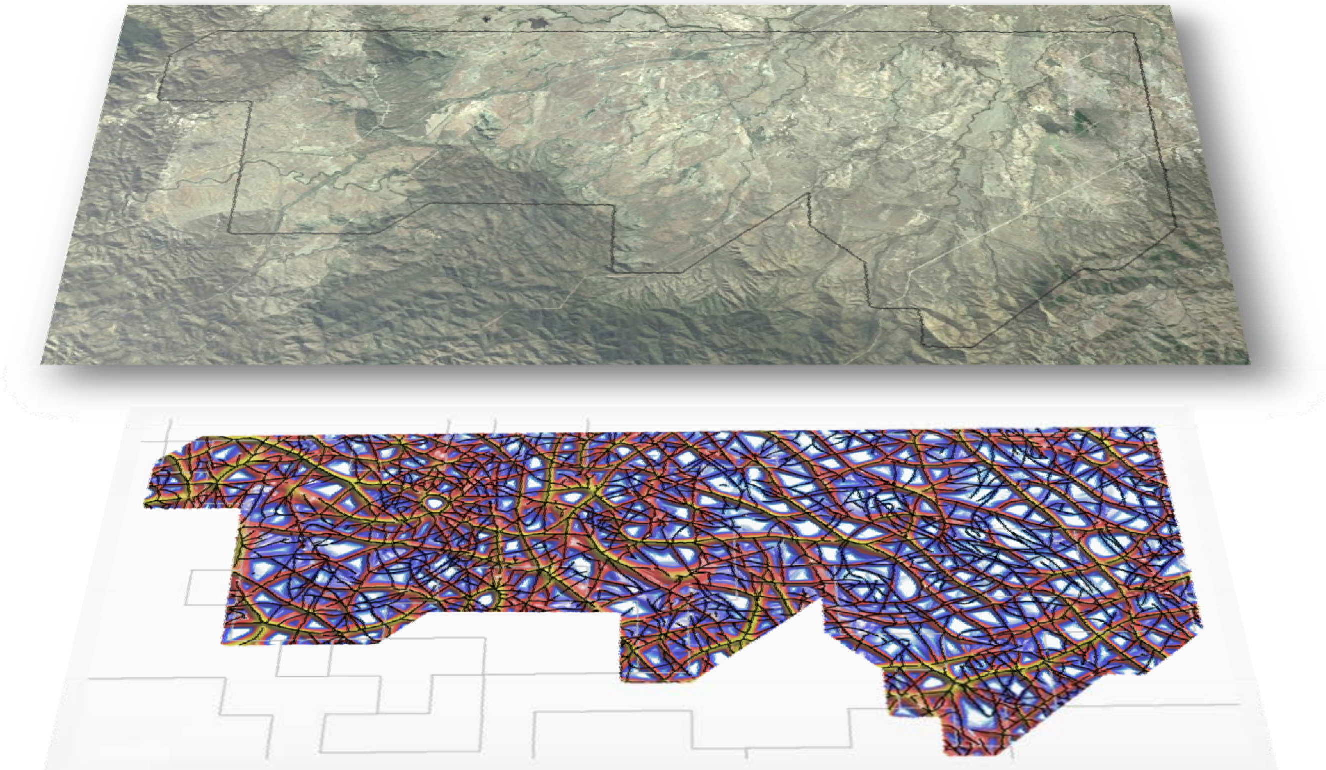
by

Amanda Buckingham of Fathom Geophysics

for

Spear Doherty of WEJV

February 2012



Enhancement filtering of Magnetic Data

Reduction to the Pole (RTP)

The reduction to the pole operation produces a field which would be observed if the given field had been observed with vertical polarization, that is, as though observed at one of the Earth's magnetic poles. If strong remnant magnetization is present in directions other than that of the Earth, the transformed field will be in error. TMI data are routinely reduced to the pole to shift anomalies directly over their source and produce symmetric anomalies. The location of sources, particularly source edges, can more readily be determined when the magnetic data has been reduced to the pole.

RTP Residuals using the differential upward continuation method (res)

Separation filtering using differential upward continuation can be used to approximate the magnetic response arising from different depth intervals below surface. Complete separation of responses is not possible, however, the method is useful for discerning "shallow" from "deep" sources. In effect, band-pass filters (with a physical meaning) are being applied to the data.

First Vertical Derivative (1VD)

The first vertical derivative transform has the effect of accentuating the shorter wavelength (shallower source) components at the expense of longer wavelength (generally deeper) features. Noise is also enhanced in this process.

Horizontal Gradient Magnitude (HGM)

The Horizontal Gradient Magnitude is calculated from the orthogonal *x* and *y* derivatives of the magnetic field. The filter highlights the location of contrasts in susceptibility (source body edges), assuming vertical sided sources. Note however, that this filter is not independent of the direction of magnetization, as is the case for the analytic signal filter. Additionally, the location of a peak (ridge) in the HGM image will be offset in the down-dip direction, if the source body is dipping.

Analytic Signal (ASig)

The local amplitude of the analytic signal is calculate from the x, y and z derivatives of the grid. The analytic signal peaks over the edges of wide bodies and over the centre of narrow (dyke-like) bodies. Source body edges can be located by tracing the peaks in the analytic signal amplitude.

Enhancement filtering of Magnetic Data

Directional Derivatives (Dderiv)
The three orthogonal derivatives are combined in a ternary display to highlight changes in gradient in all three directions.

Difference 1vd & HGM (1vd-h)
The difference between the first vertical derivative and the horizontal gradient magnitude enhances the high frequency component of the signal; emphasising detail and highly magnetic near surface sources.

Ternary Representation (Tern)
This representation of the magnetic field combines three of the best known approaches to highlighting source edges and structure. The purpose of this filter is to highlight pertinent structures, emphasize breaks in continuity and enhance the textural character of units.

Red = First vertical derivative
Green = tilt angle filter
Blue = horizontal gradient magnitude

Cyan = First vertical derivative
Magenta = tilt angle filter
Yellow = horizontal gradient magnitude

Automatic Gain Control (AGC)
The automatic gain control filter equalizes the range of amplitude variations across the grid. Subtle features in the magnetic data may be obscured or overwhelmed by the amplitude variations due to anomalies from highly magnetized sources. This filter gives equal emphasis (in terms of amplitude) to anomalies of all frequencies, allowing the interpreter to notice subtle responses.

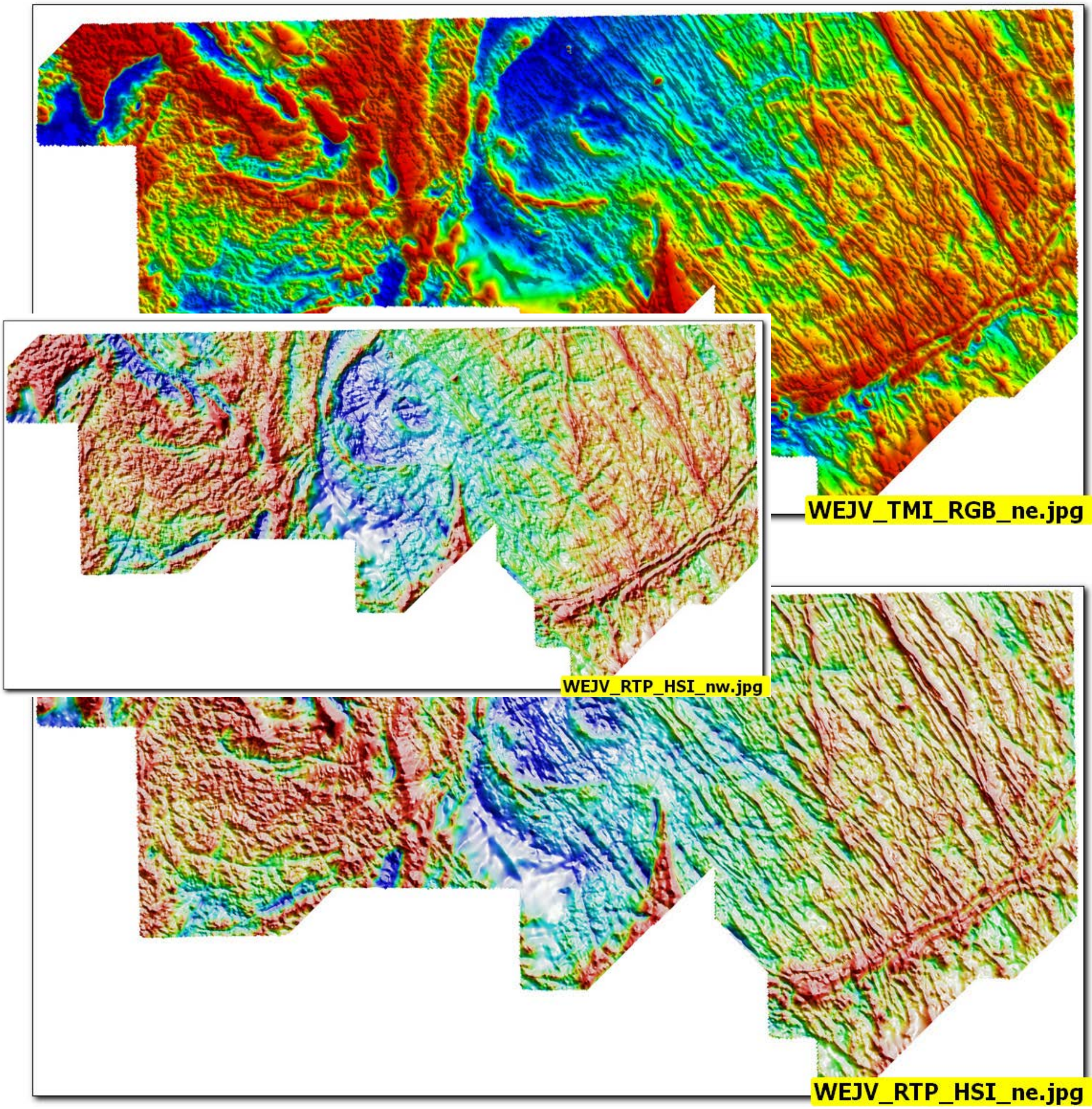
Tilt angle filter (tilt)
The tilt angle filter is defined as the arctangent of the ratio of the vertical derivative to the horizontal gradient magnitude, of the field. For isolated sources, the tilt angle is positive over the source, crosses through zero at or near the edge of a vertical sided source, and is negative outside the source region. The tilt angle filter is excellent for highlighting structure in magnetic data. It responds equally well to shallow and deep sources.

Image Name	Filtering Applied
WEJV_TMI_RGB_ne.jp2	Original Total Magnetic Intensity (TMI)
WEJV_RTP_RGB_ne.jp2	TMI Reduced to the Pole (RTP)
WEJV_RTP_RGB_nw.jp2	TMI Reduced to the Pole (RTP)
WEJV_RTP_HSI_ne.jp2	TMI Reduced to the Pole (RTP)
WEJV_RTP_HSI_nw.jp2	TMI Reduced to the Pole (RTP)
WEJV_RTP_1vd_HSI.jp2	First Vertical Derivative (RTP)
WEJV_RTP_1vd_RGB_ne.jp2	[1vd] First Vertical Derivative (RTP)
WEJV_RTP_1vd_RGB_nw.jp2	[1vd] First Vertical Derivative (RTP)
WEJV_RTP_hgm_lin.jp2	Horizontal Gradient Magnitude (HGM) of RTP
WEJV_RTP_hgm_RGB_ne.jp2	Horizontal Gradient Magnitude (HGM) of RTP
WEJV_RTP_ASig_1.jp2	Analytic Signal Amplitude of RTP
WEJV_RTP_ASig_2.jp2	Analytic Signal Amplitude of RTP
WEJV_RTP_ASig_3.jp2	Analytic Signal Amplitude of RTP
WEJV_RTP_1vd-hgm_HSI.jp2	Difference between the 1vd and HGM (RTP)
WEJV_RTP_1vd-hgm_RGB.jp2	Difference between the 1vd and HGM (RTP)
WEJV_RTP_res0-50m_HSI1.jp2	Shallow Residual [0-50m]
WEJV_RTP_res0-50m_AGC.jp2	Automatic Gain Control applied to the shallow residual
WEJV_RTP_res50-250m_HSI1.jp2	Intermediate Residual
WEJV_RTP_res250-1km_HSI1.jp2	Deeper Residual
WEJV_RTP_rescombo_CMY_123.jp2	Combination of the three residuals
WEJV_RTP_rescombo_RGB_123.jp2	Combination of the three residuals
WEJV_RTP_tilt_RGB_lin.jp2	Tilt angle filter
WEJV_RTP_tilt_RGB_ne.jp2	Tilt angle filter
WEJV_RTP_DDeriv_xyz.jp2	Directional Derivative
WEJV_RTP_DDeriv_yzx.jp2	Directional Derivative
WEJV_RTP_DDeriv_zxy.jp2	Directional Derivative
WEJV_RTP_TernCMY.jp2	Ternary Display RTP
WEJV_RTP_TernRGB.jp2	Ternary Display RTP
WEJV_PGrav_ASig_HSI.jp2	Analytic Signal of Pseudogravity
WEJV_PGrav_res0-1km_RGB_ne.jp2	Pseudogravity Residual
WEJV_PGrav_res0-50m_RGB_ne.jp2	Pseudogravity Shallow Residual
WEJV_PGrav_res0-50m_RGB_nw.jp2	Pseudogravity Shallow Residual

Enhancement filtering

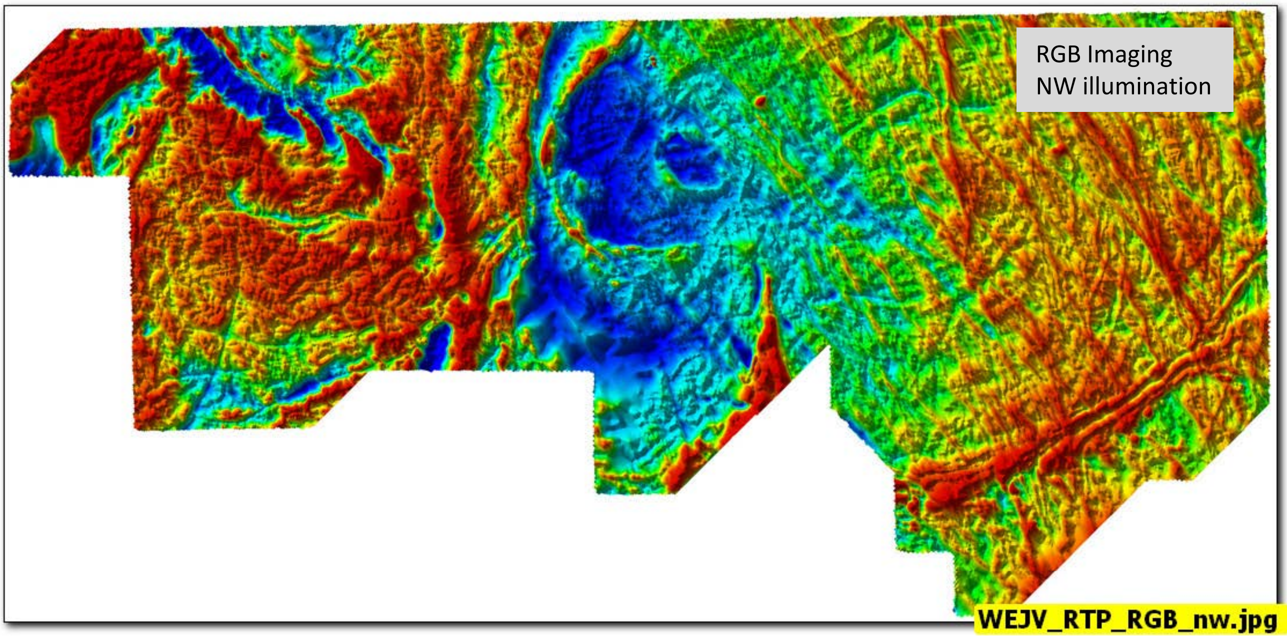
Magnetic Data

Reduced to the Pole

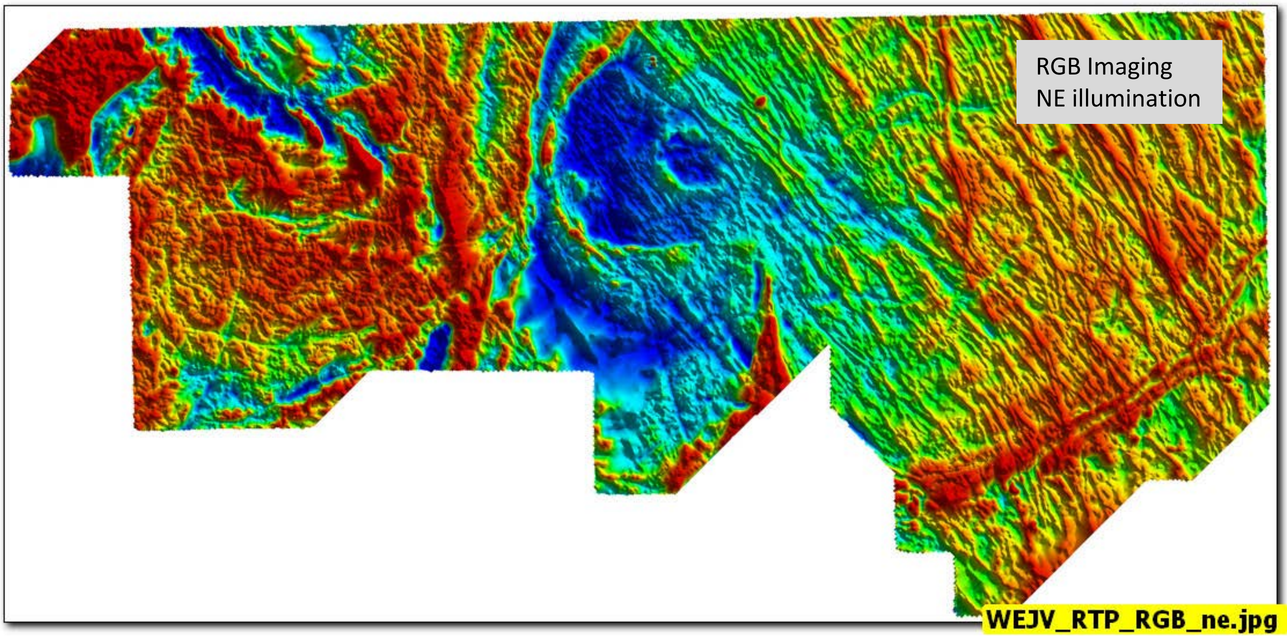


Enhancement filtering

Reduced to the Pole

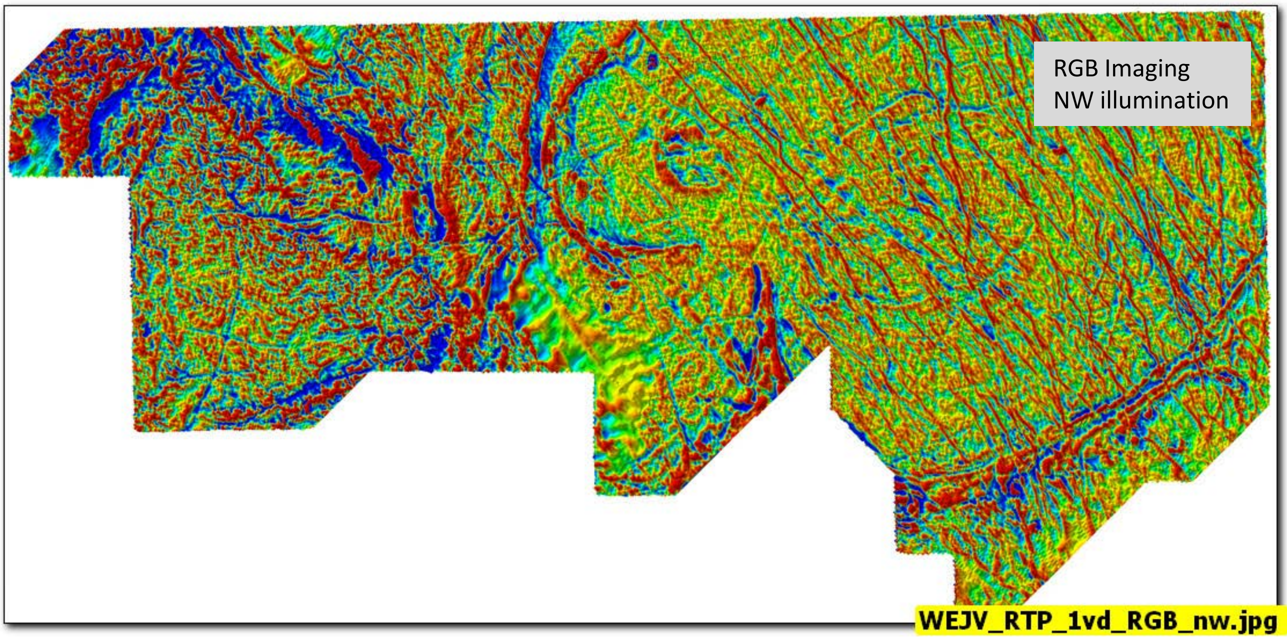


Reduced to the Pole

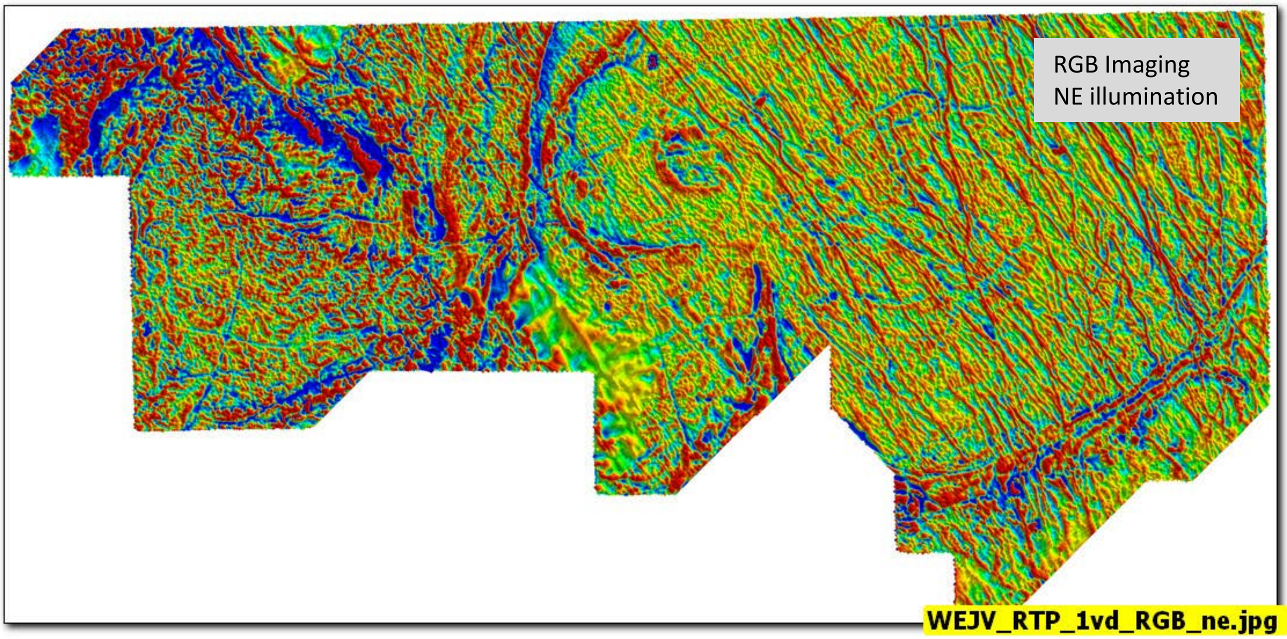


Enhancement filtering

First Vertical Derivative



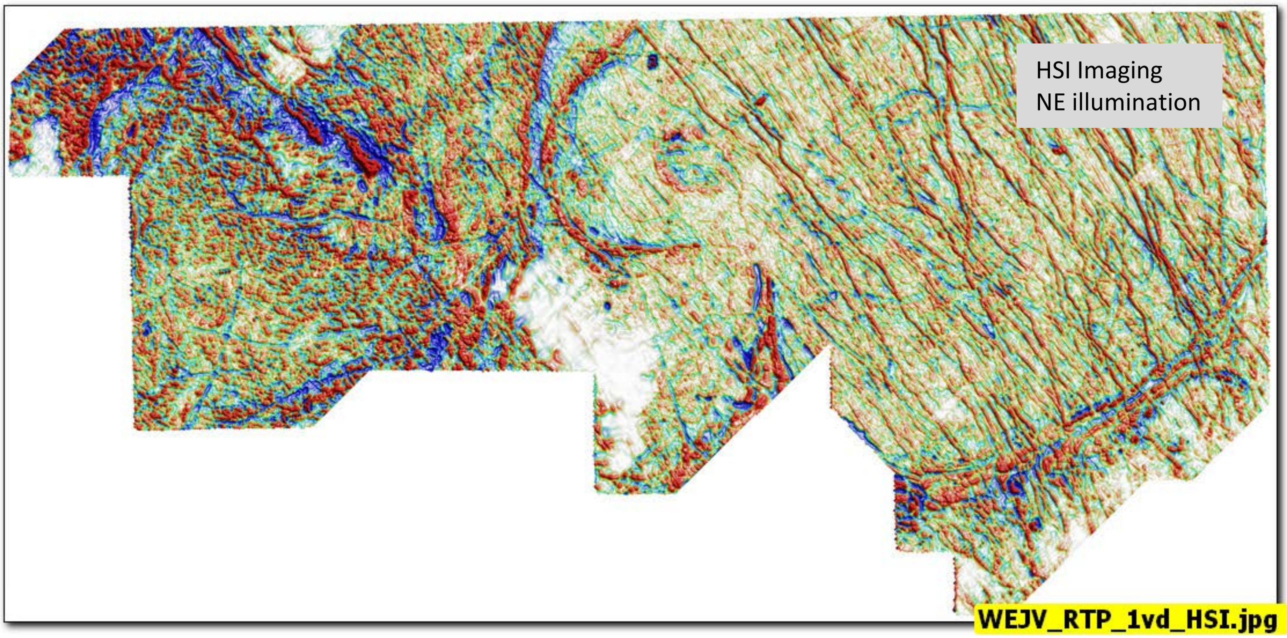
First Vertical Derivative



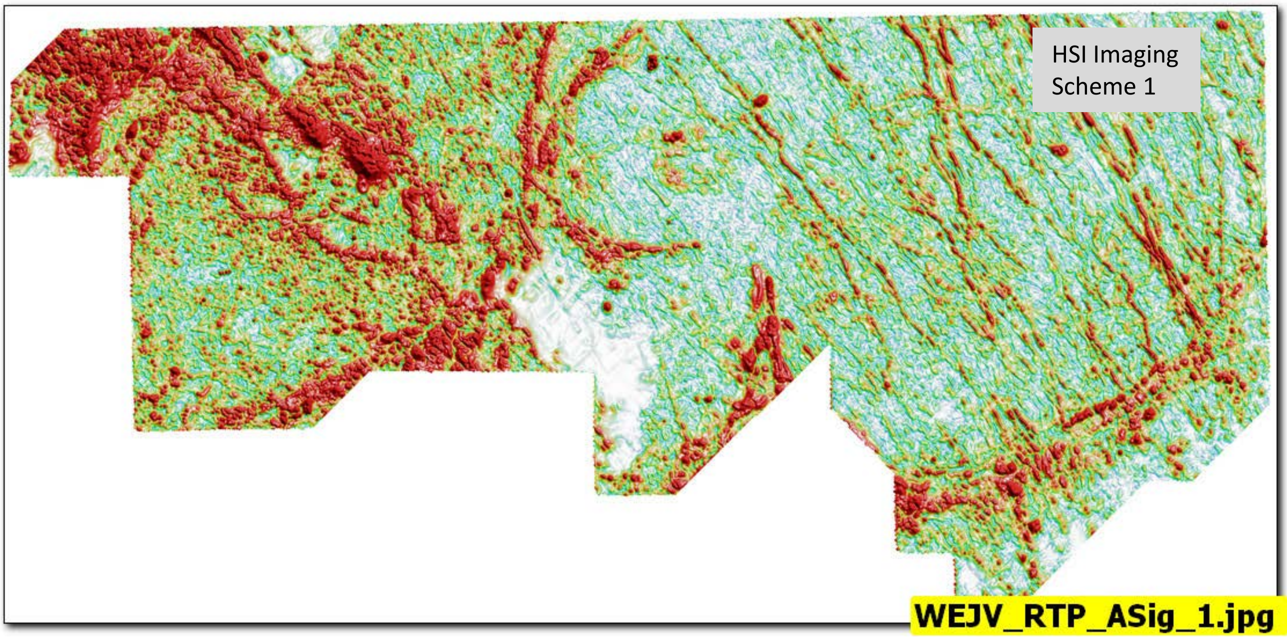
Enhancement filtering

Magnetic Data

First Vertical Derivative

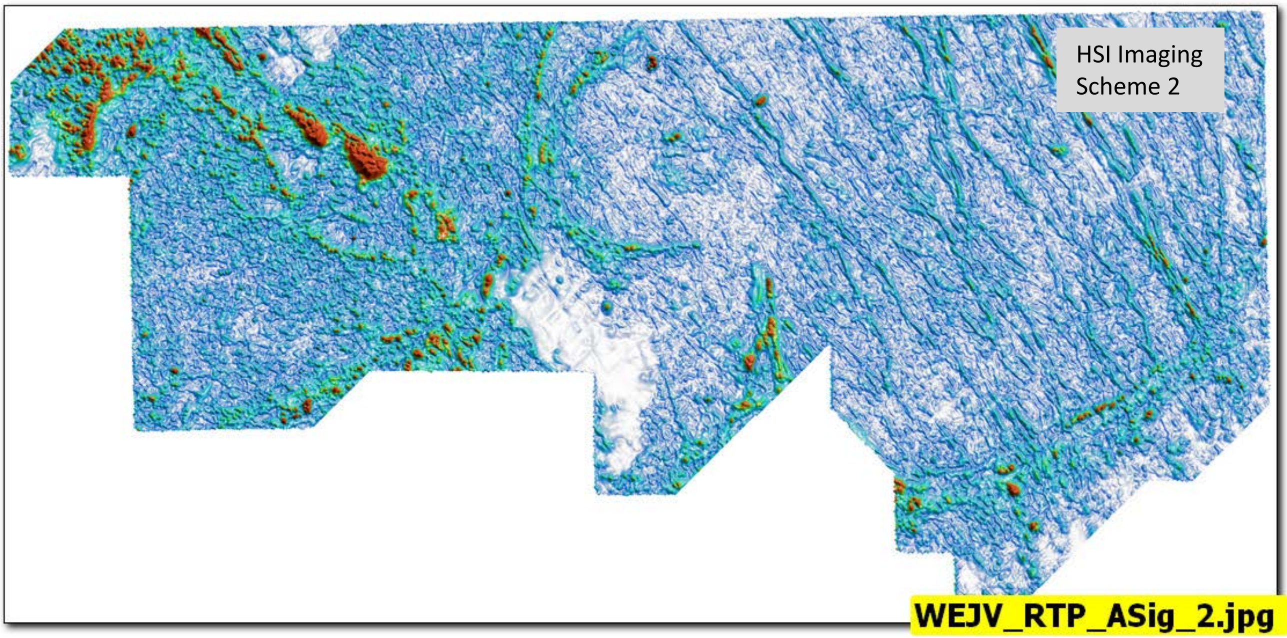


Analytic Signal Amplitude

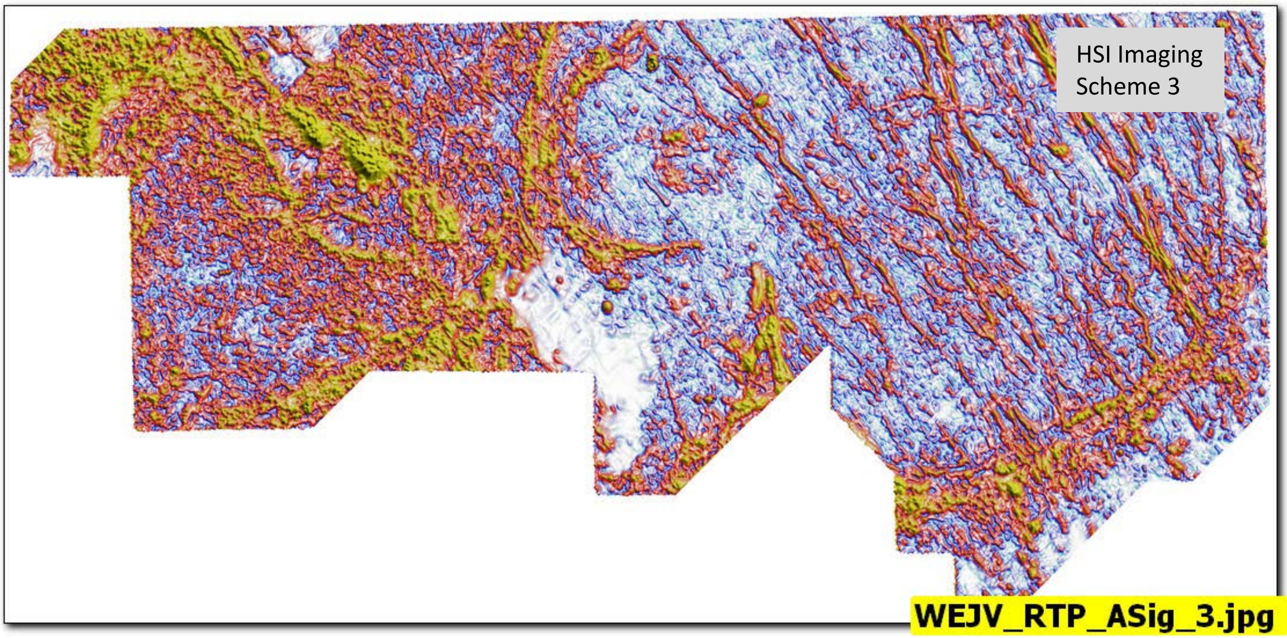


Enhancement filtering

Analytic Signal Amplitude



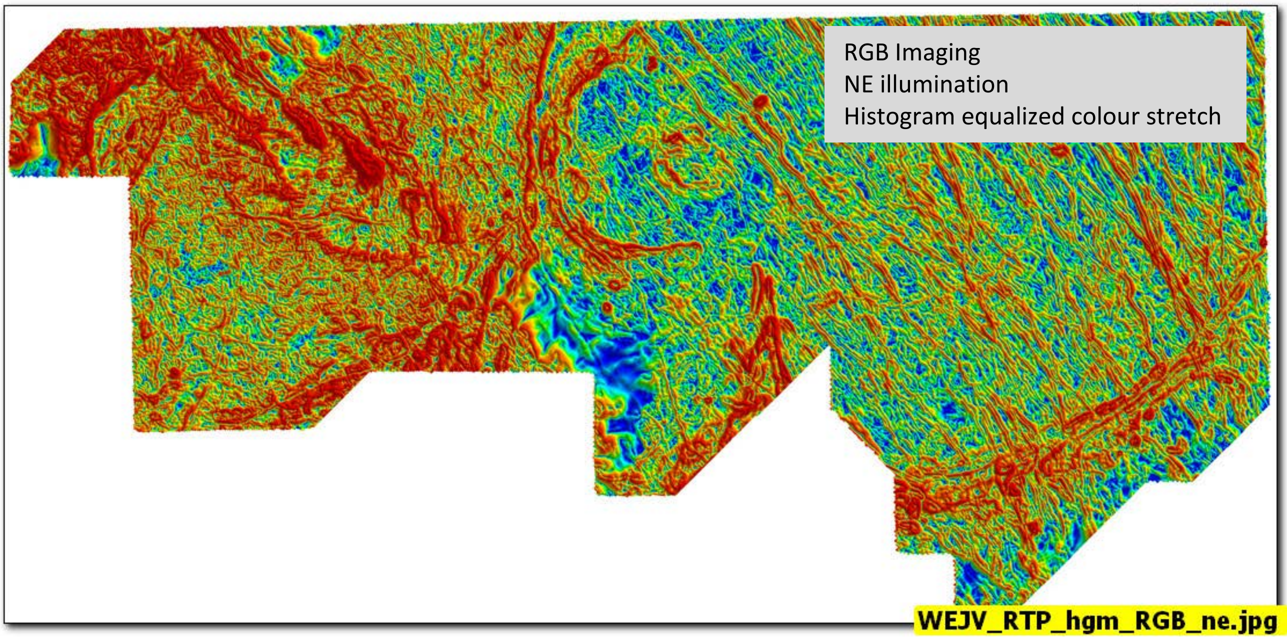
Analytic Signal Amplitude



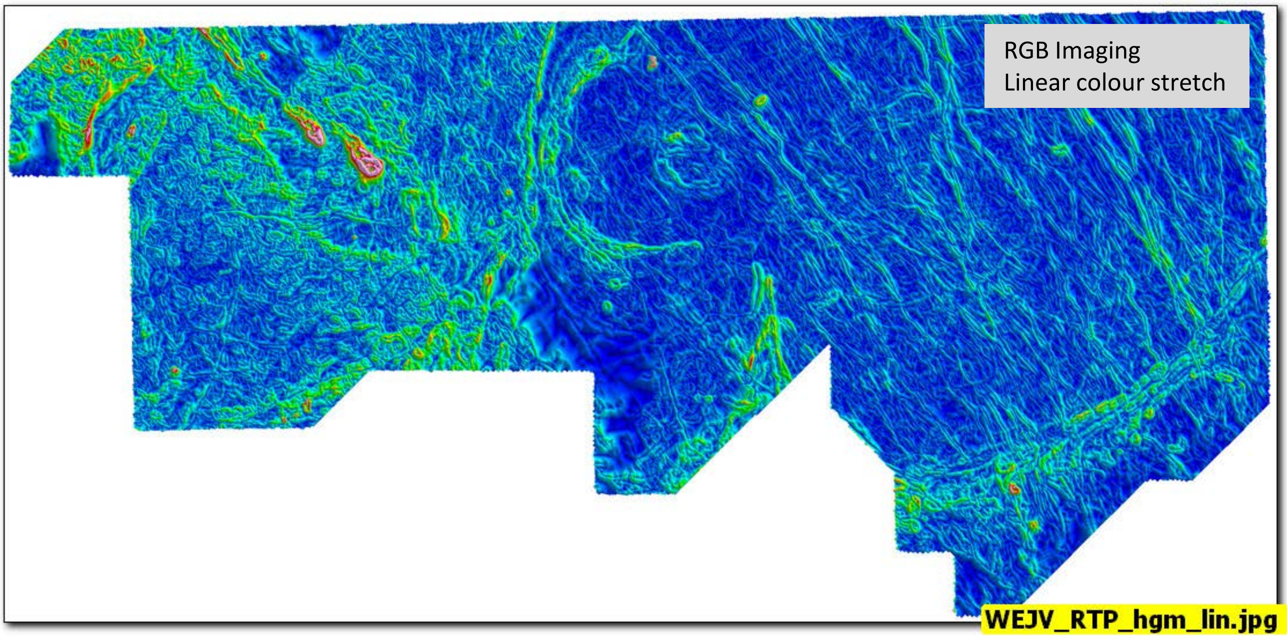
Enhancement filtering

Magnetic Data

Horizontal Gradient Magnitude

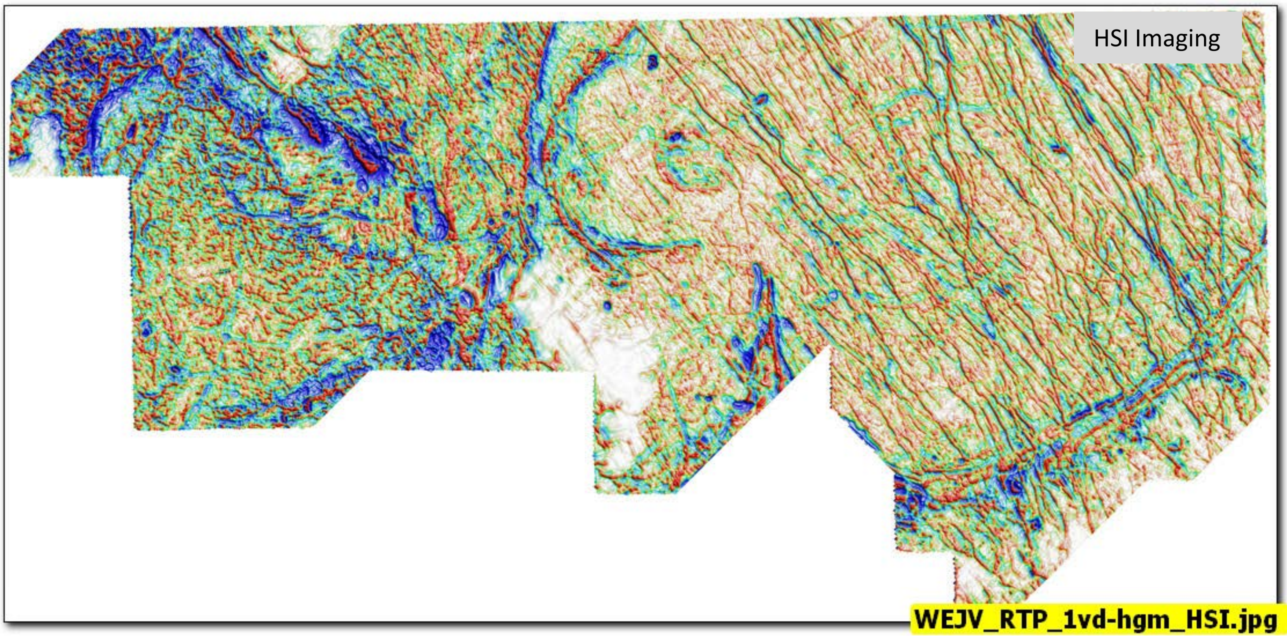


Horizontal Gradient Magnitude



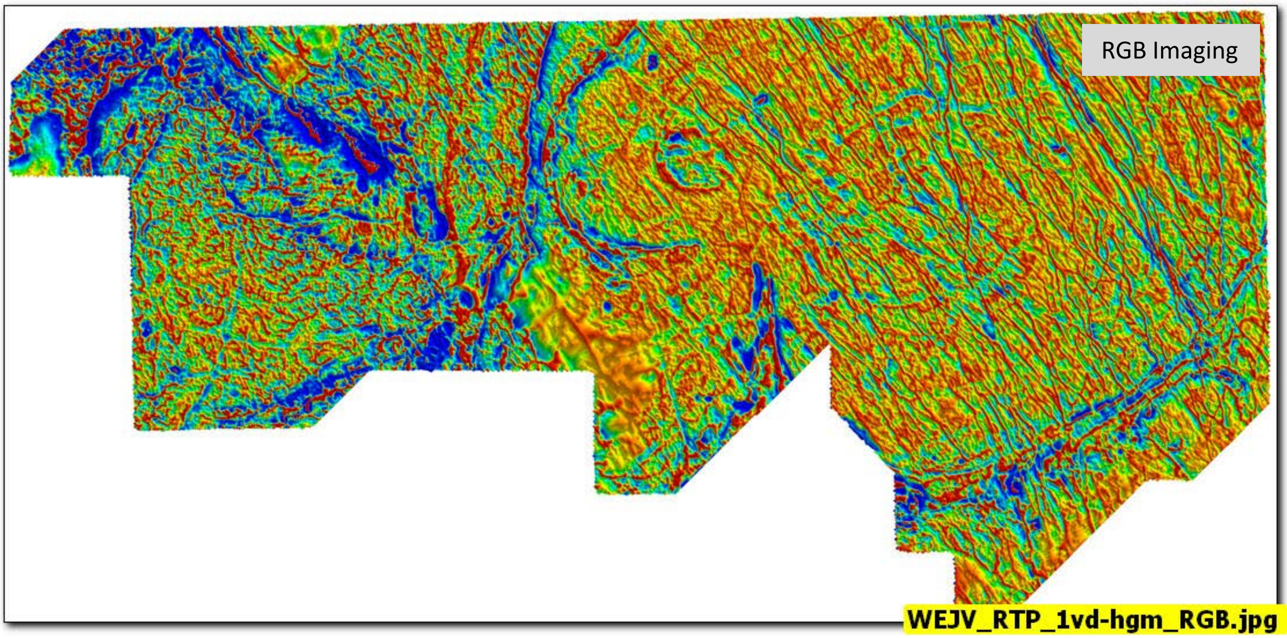
Enhancement filtering

Difference between the first vertical derivative and the horizontal gradient magnitude



WEJV_RTP_1vd-hgm_HSI.jpg

Difference between the first vertical derivative and the horizontal gradient magnitude

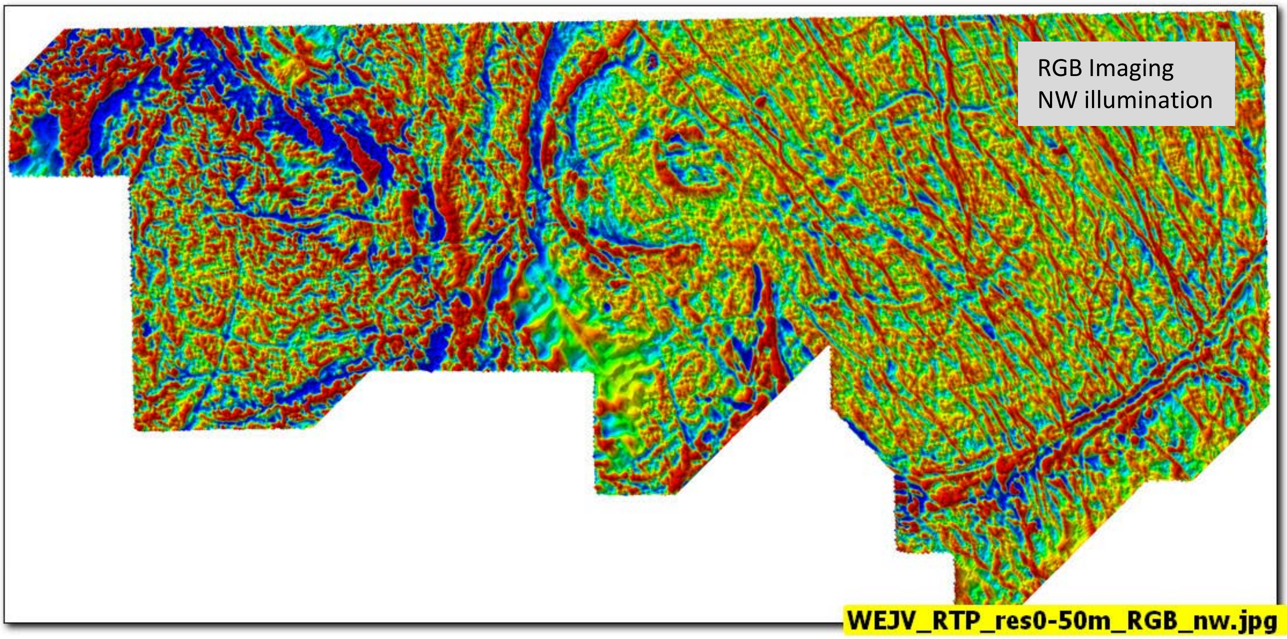


WEJV_RTP_1vd-hgm_RGB.jpg

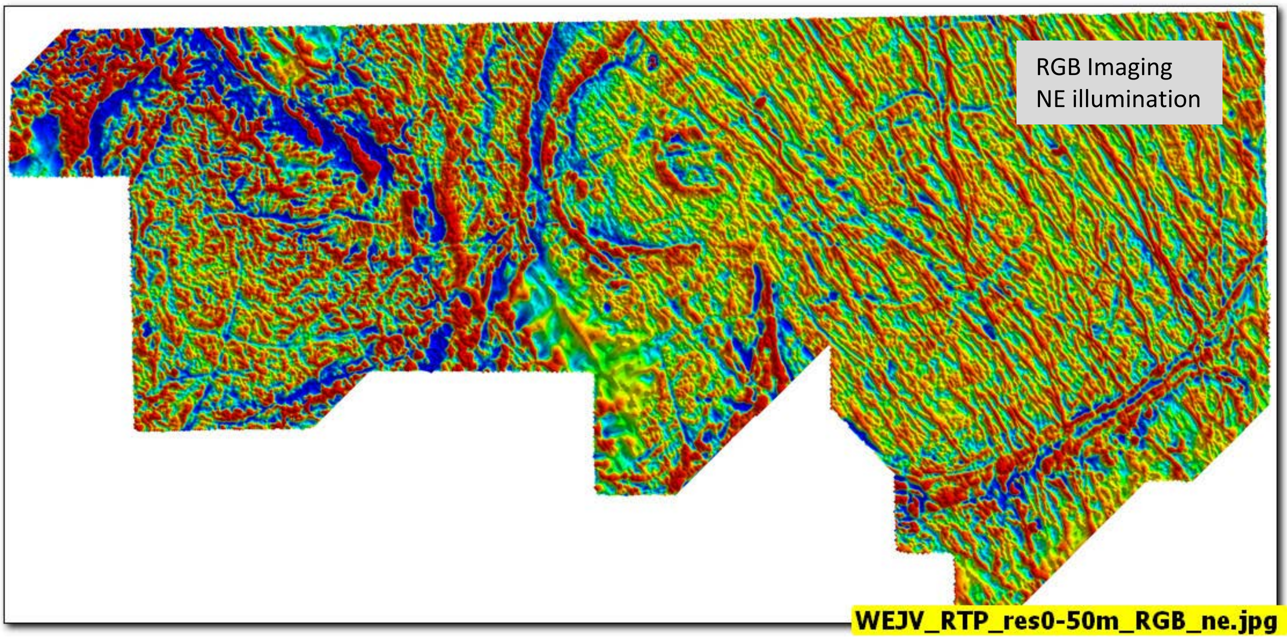
Enhancement filtering

Magnetic Data

Shallow Residual

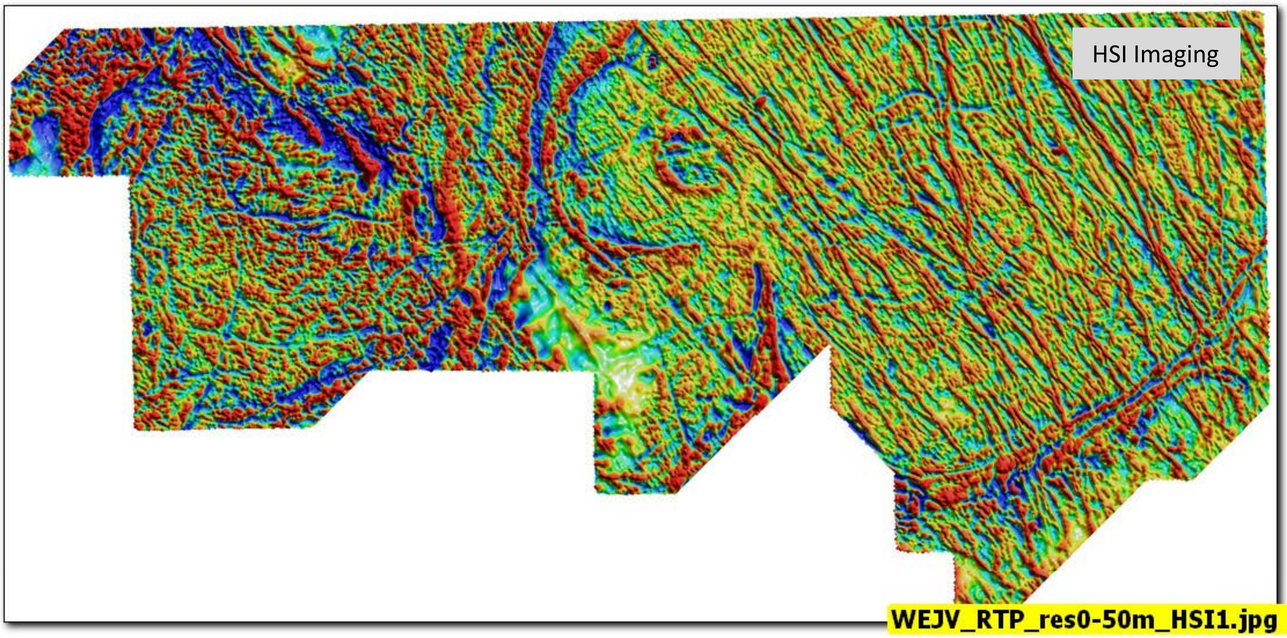


Shallow Residual



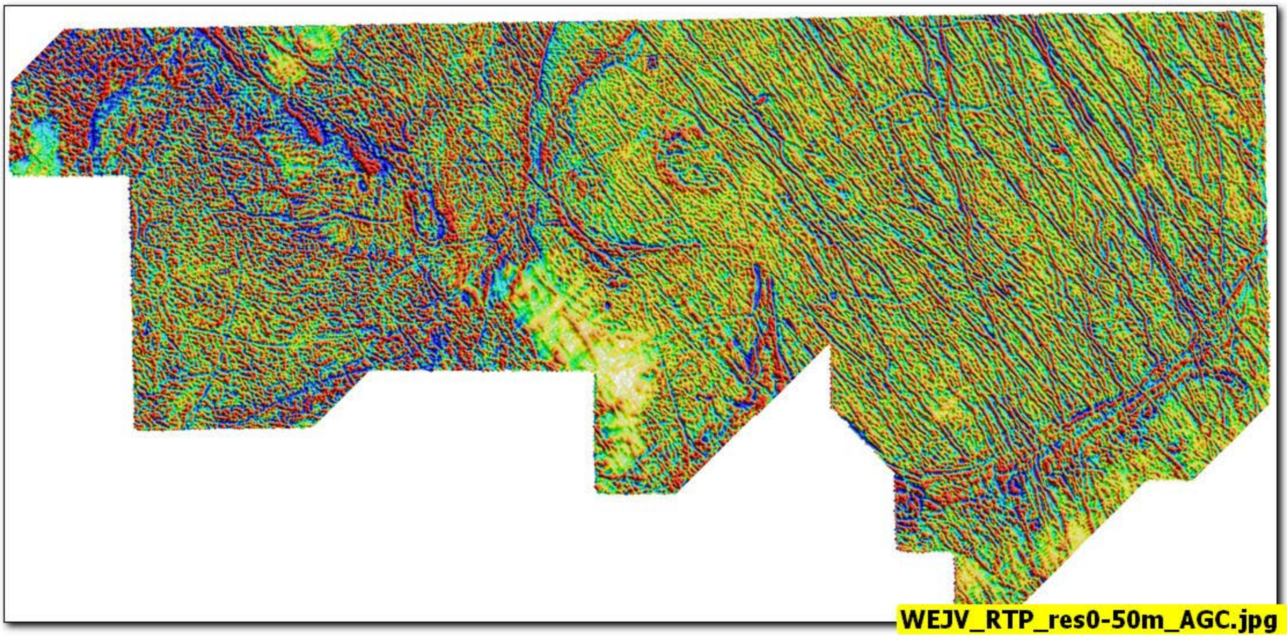
Enhancement filtering **Magnetic Data**

Shallow Residual



WEJV_RTP_res0-50m_HSI1.jpg

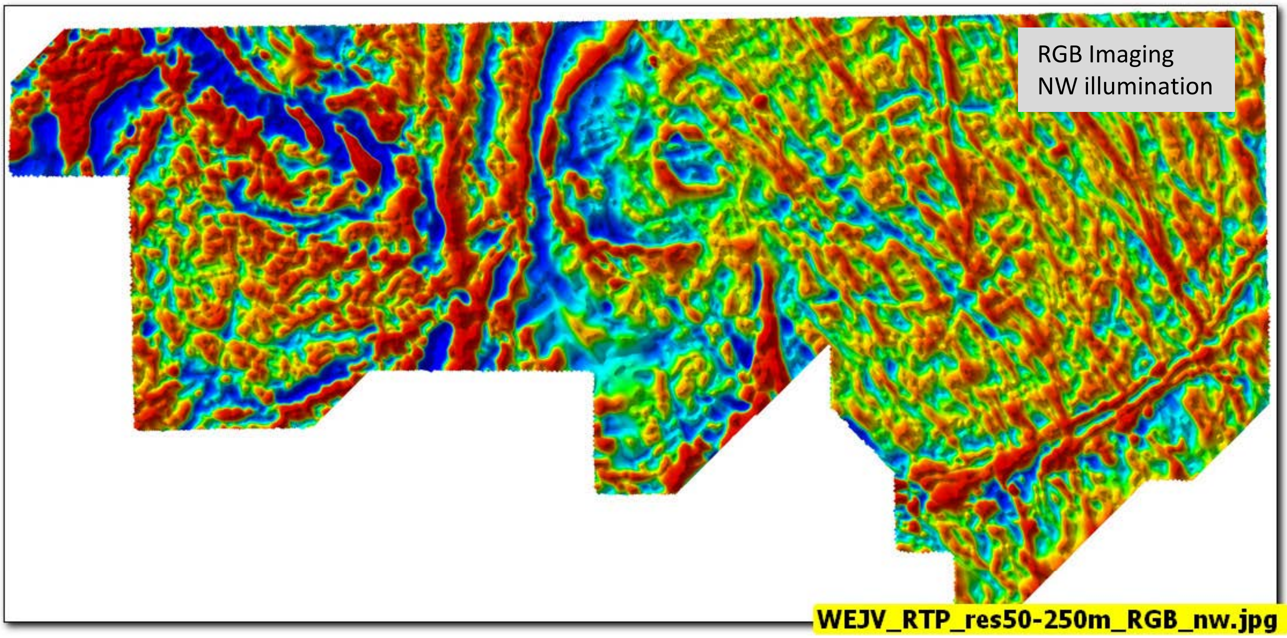
Shallow Residual - Automatic Gain Control (AGC)



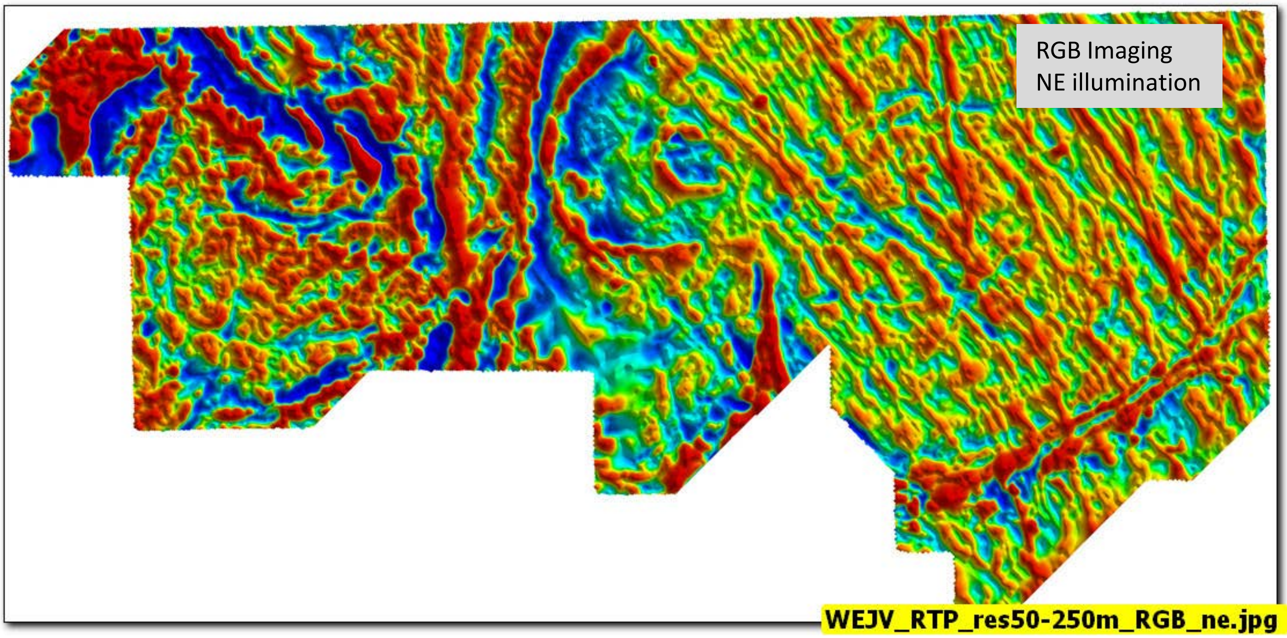
WEJV_RTP_res0-50m_AGC.jpg

Enhancement filtering

Intermediate Residual

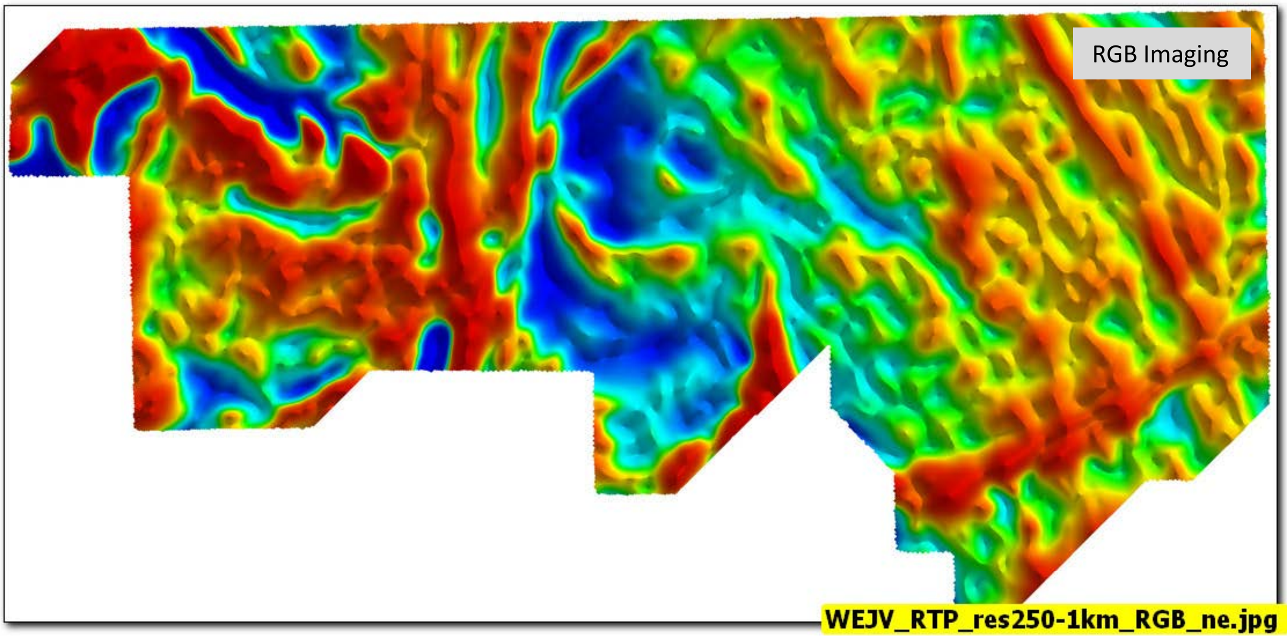


Intermediate Residual

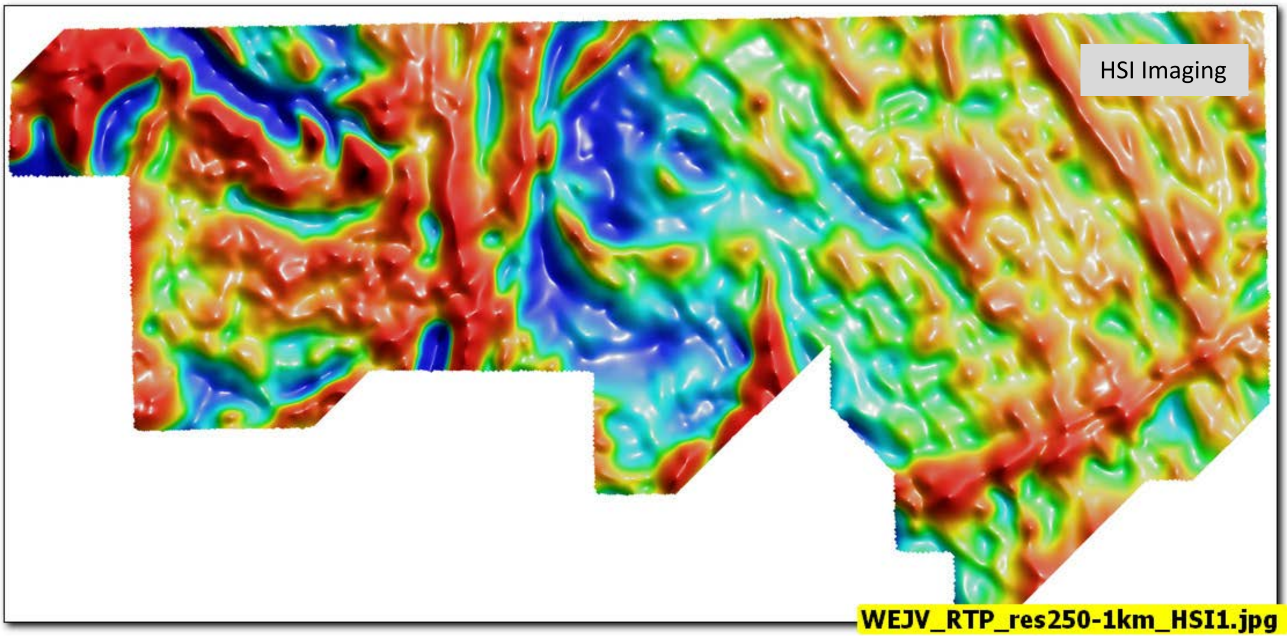


Enhancement filtering

Deep Residual



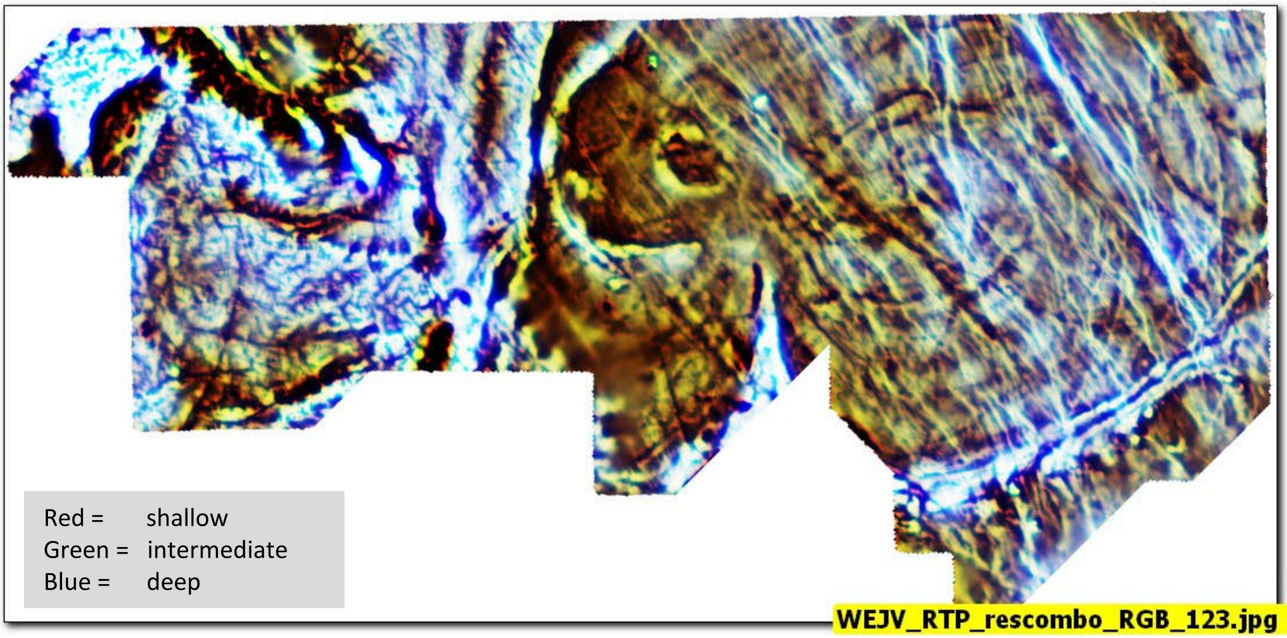
Deep Residual



Enhancement filtering

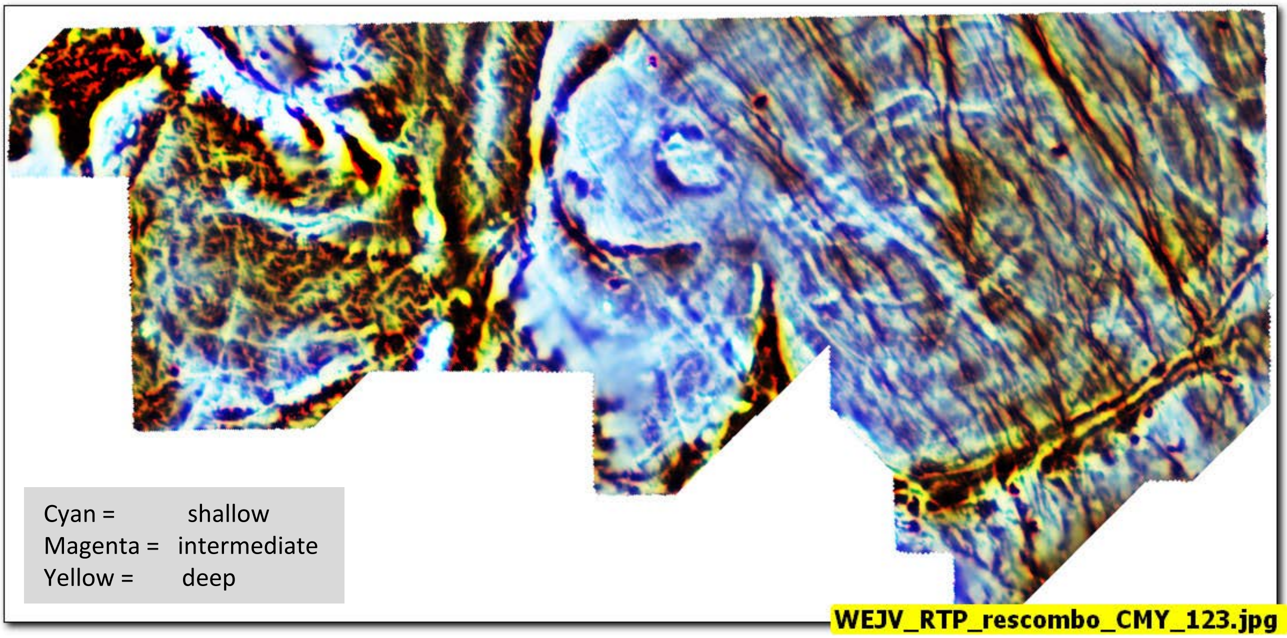
Magnetic Data

Ternary Combination of residuals



WEJV_RTP_rescombo_RGB_123.jpg

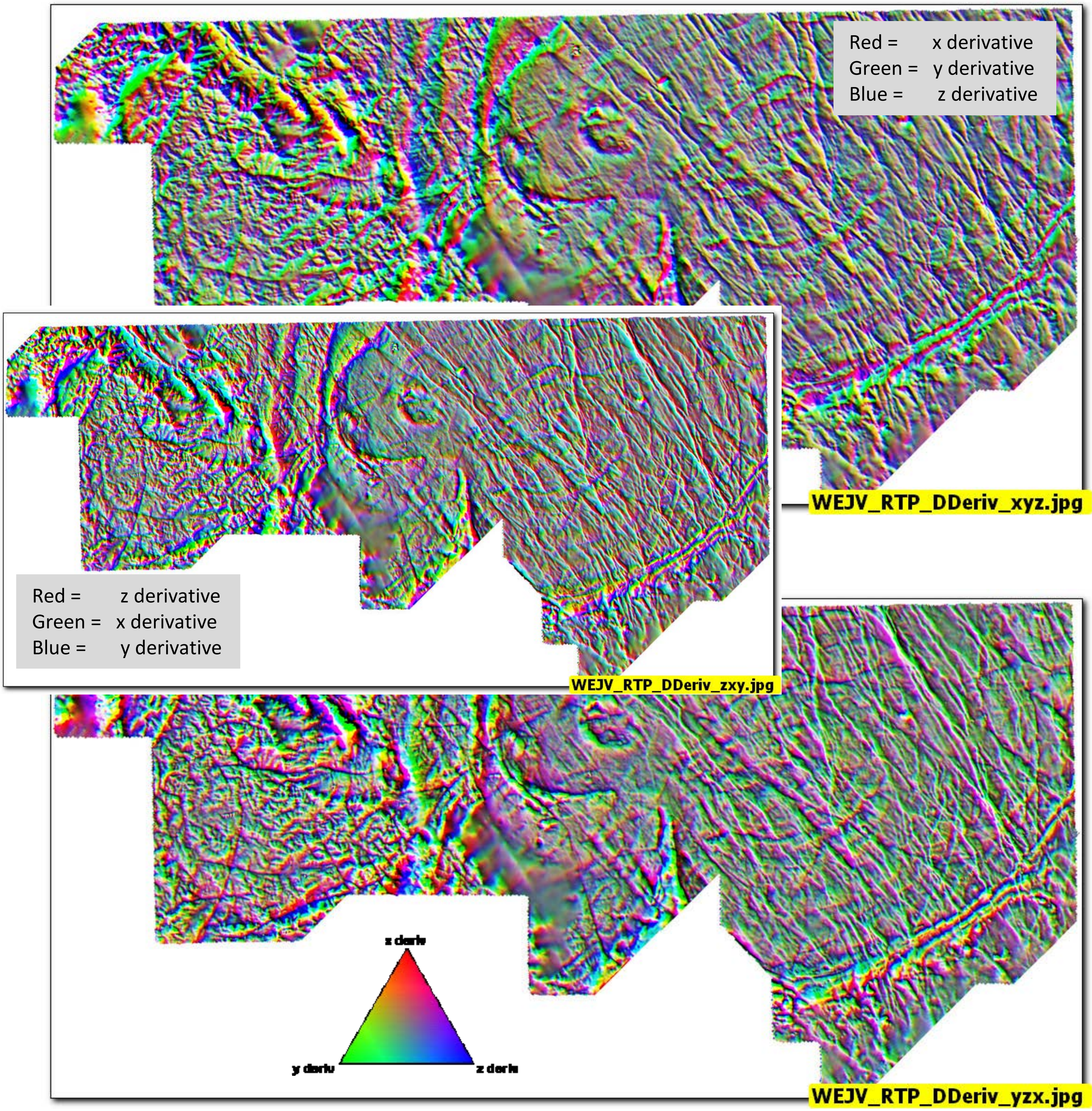
Ternary Combination of residuals



WEJV_RTP_rescombo_CMY_123.jpg

Enhancement filtering

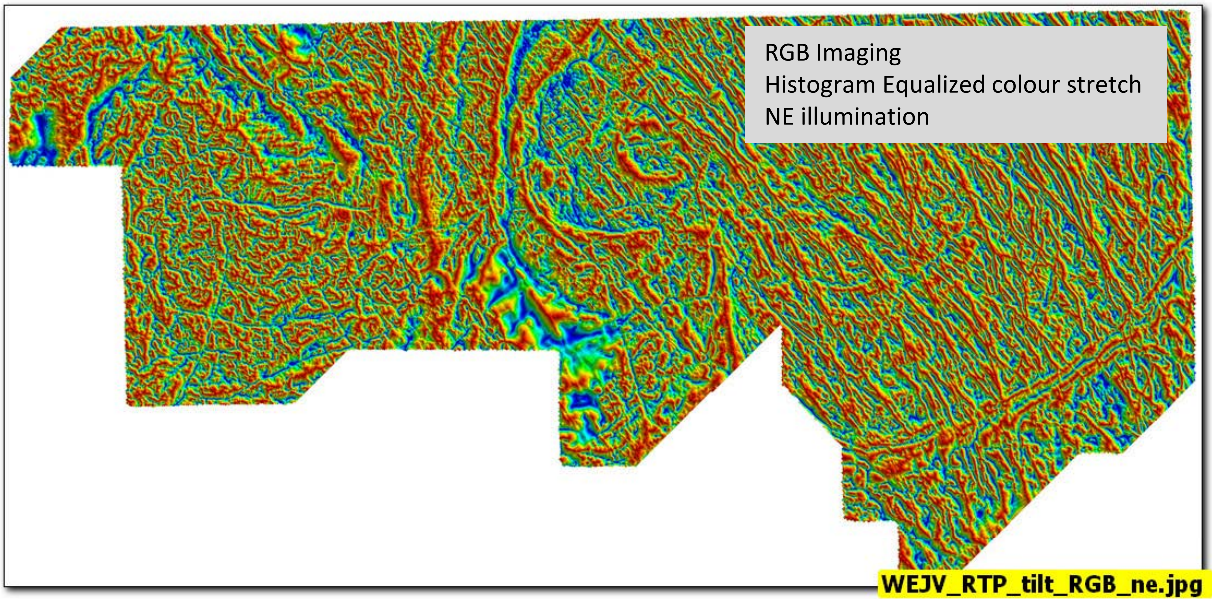
Directional Derivatives



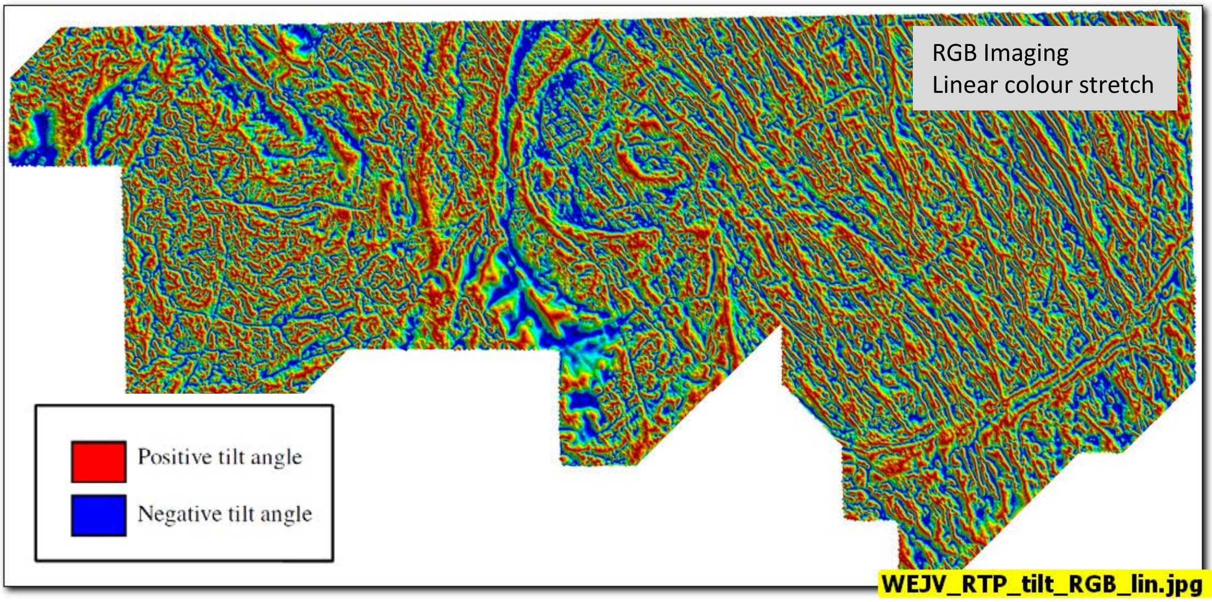
Enhancement filtering

Magnetic Data

Tilt Angle filter

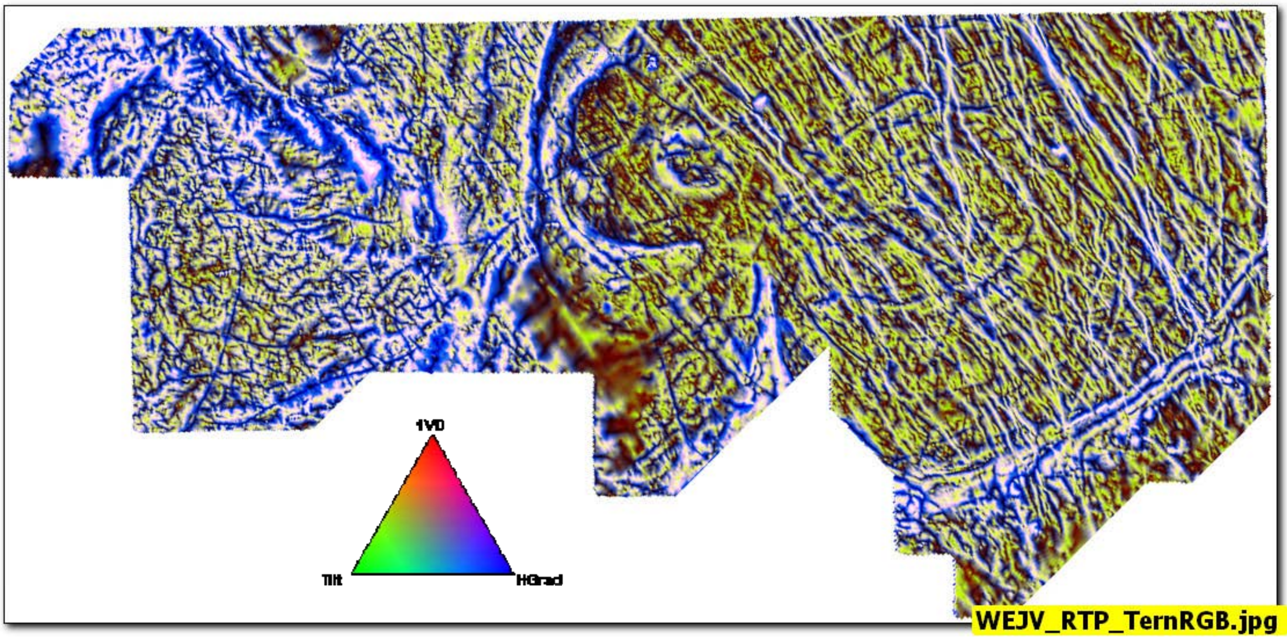


Tilt Angle filter



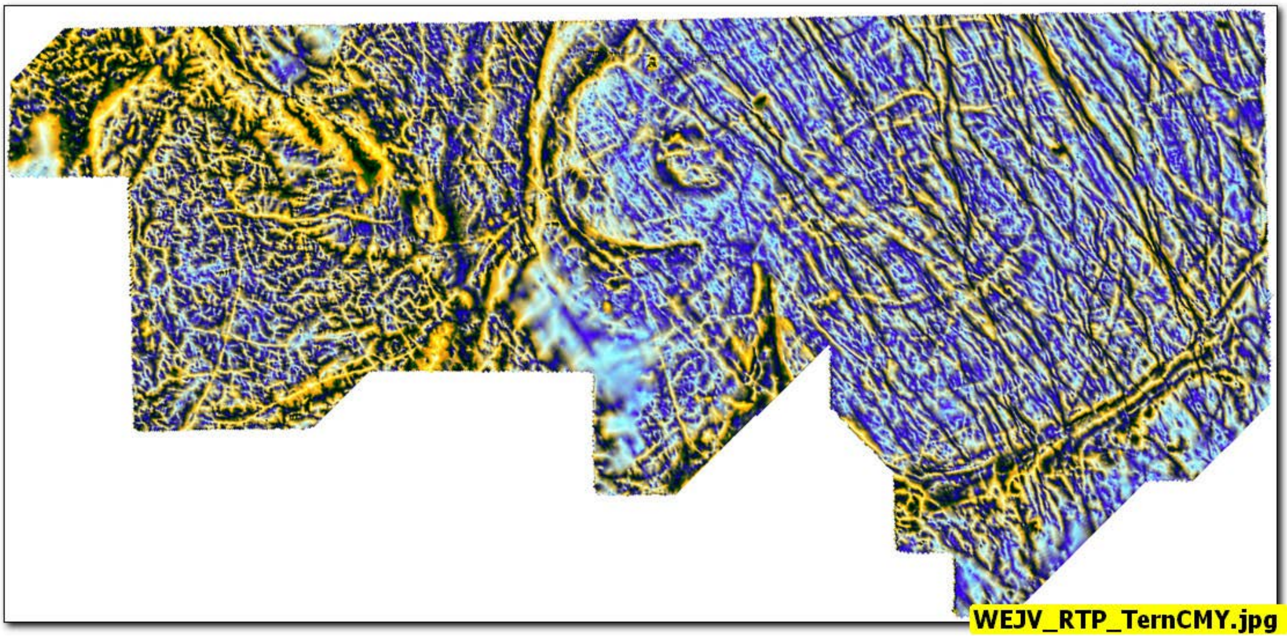
Enhancement filtering

Ternary Representation RGB



WEJV_RTP_TernRGB.jpg

Ternary Representation CMY

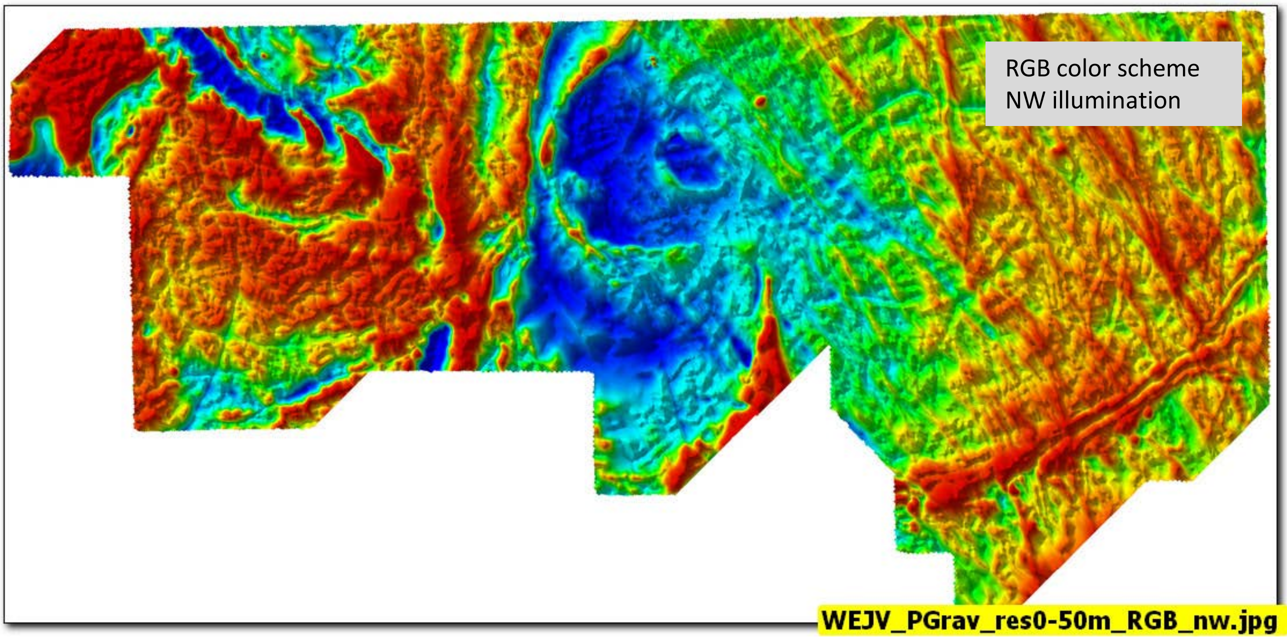


WEJV_RTP_TernCMY.jpg

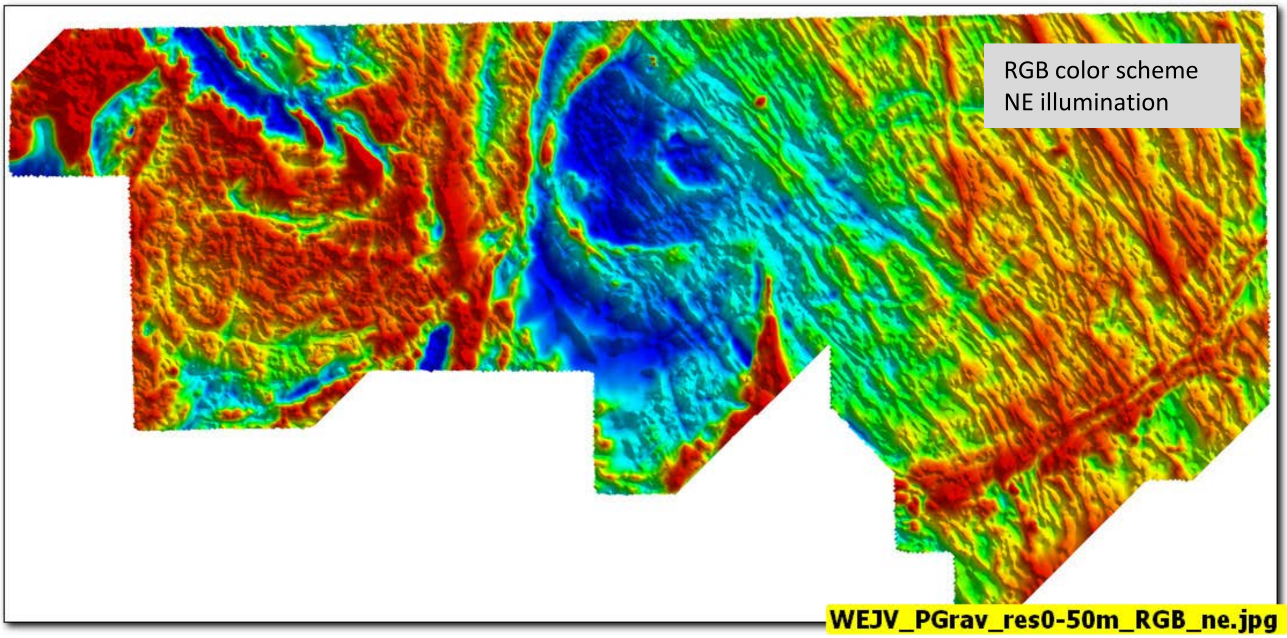
Enhancement filtering

Magnetic Data

Pseudogravity Shallow Residual

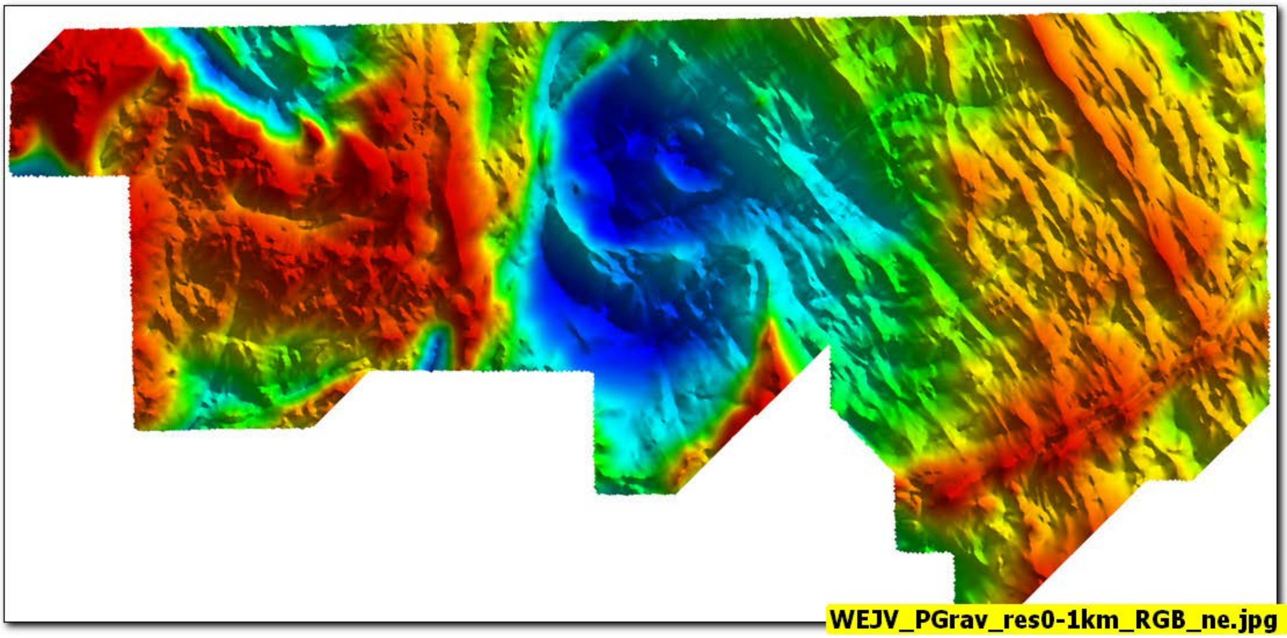


Pseudogravity Shallow Residual



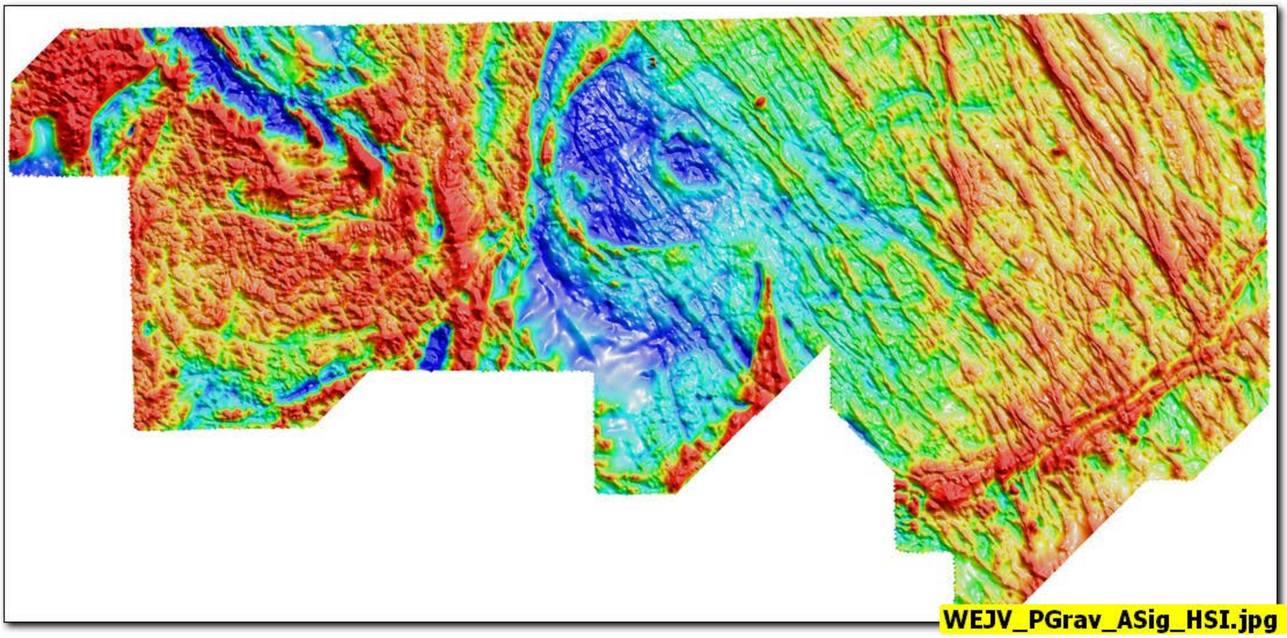
Enhancement filtering

Pseudogravity Residual [0-1km]



WEJV_PGrav_res0-1km_RGB_ne.jpg

Analytic Signal of Pseudogravity



WEJV_PGrav_ASig_HSI.jpg

Presentation of Radiometric Data

Ternary Display

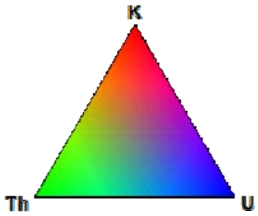
The ternary ratio image provides the relative proportion of potassium, thorium and uranium response by assigning each channel to a given colour:

potassium = red, thorium = green, uranium = blue

The relative proportion is useful for mapping the variations in the mineralogy of the surface materials and shows a strong correlation to geology and soils. A strong red colour does not necessarily mean that the rock or soil is rich in potassium, but rather that the proportion of radioactive potassium is much higher than thorium or uranium.

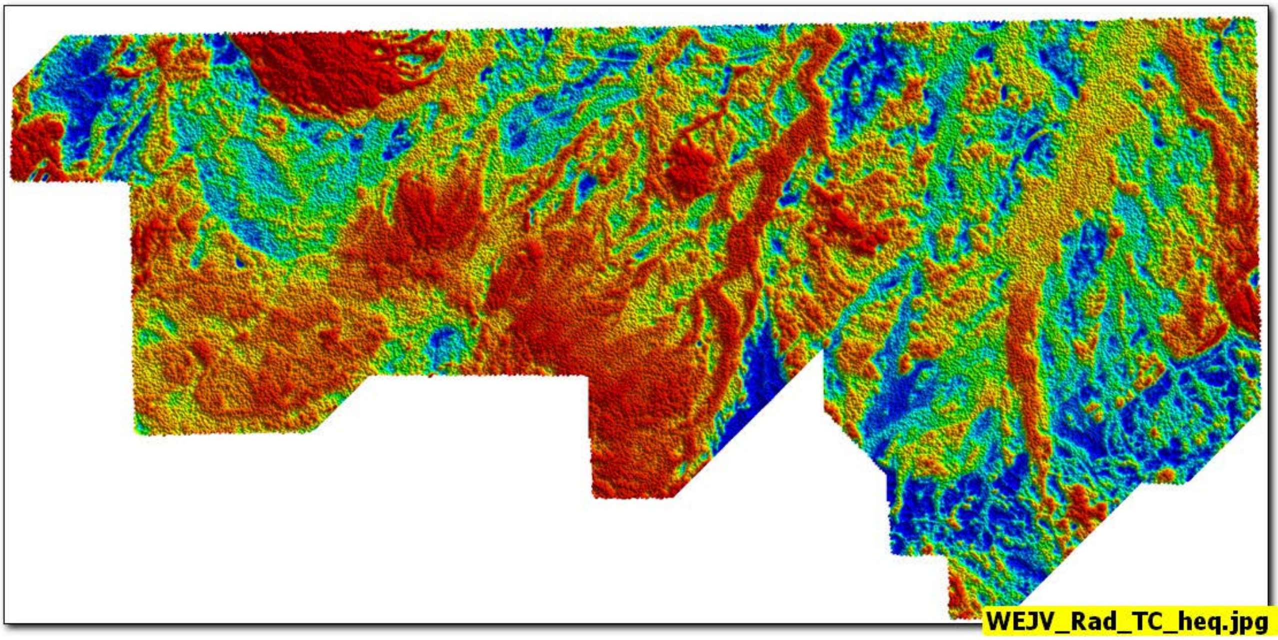
Radiometric Ratio Images

Often, depending on the complexity of the geology, subtle variations in K, U and/or Th may not be readily apparent. Ratio images can enhance or reinforce subtle variations in the measured values. The eTh/K ratio image can be a sensitive indicator of Potassium alteration associated with Porphyry deposit mineralization . IOCG(U) exploration can be aided by the use of K/Th, U/Th and U2/Th ratio grids.

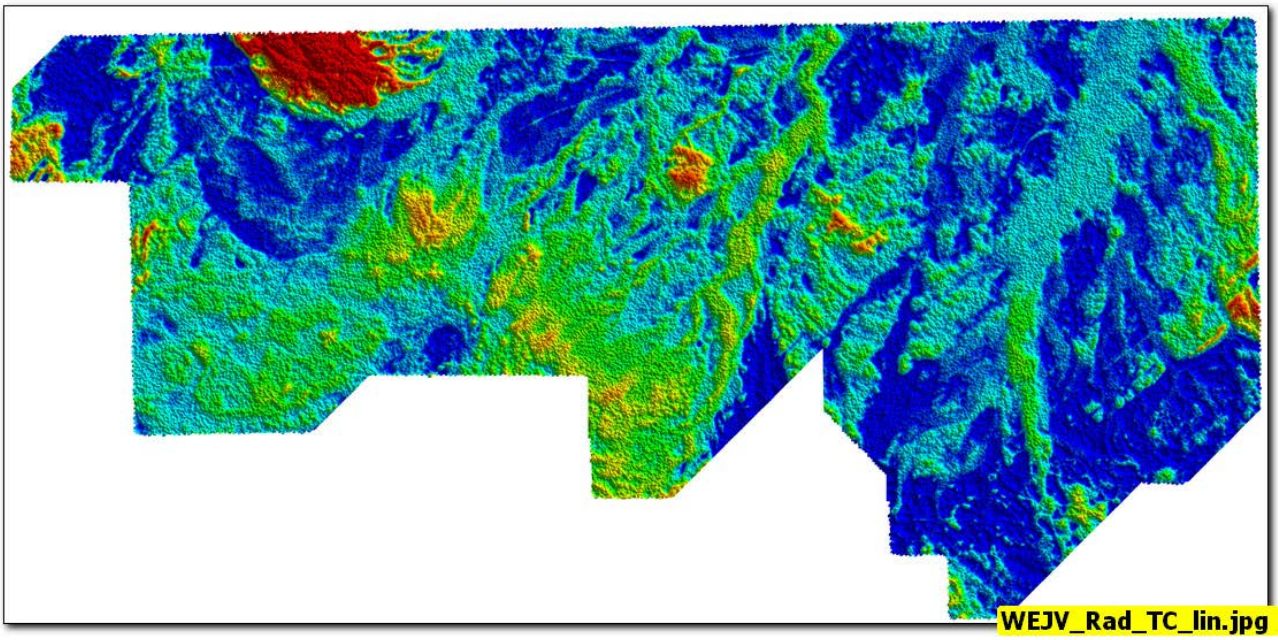


Enhancement filtering

Radiometric Data



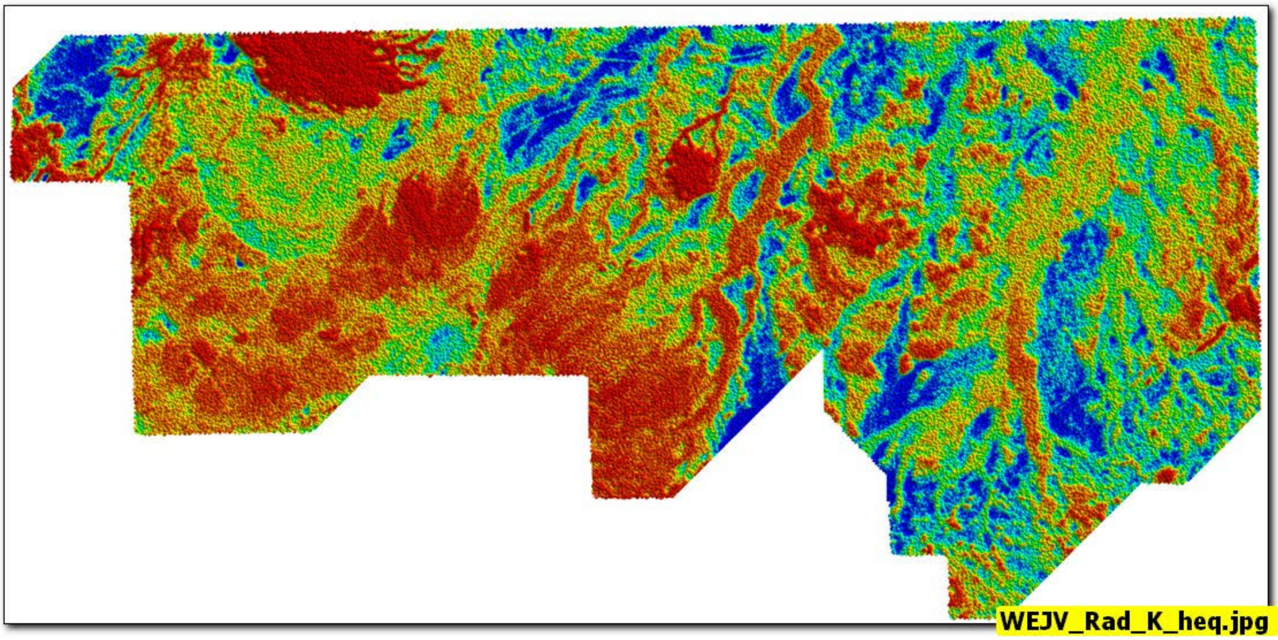
WEJV_Rad_TC_heq.jpg

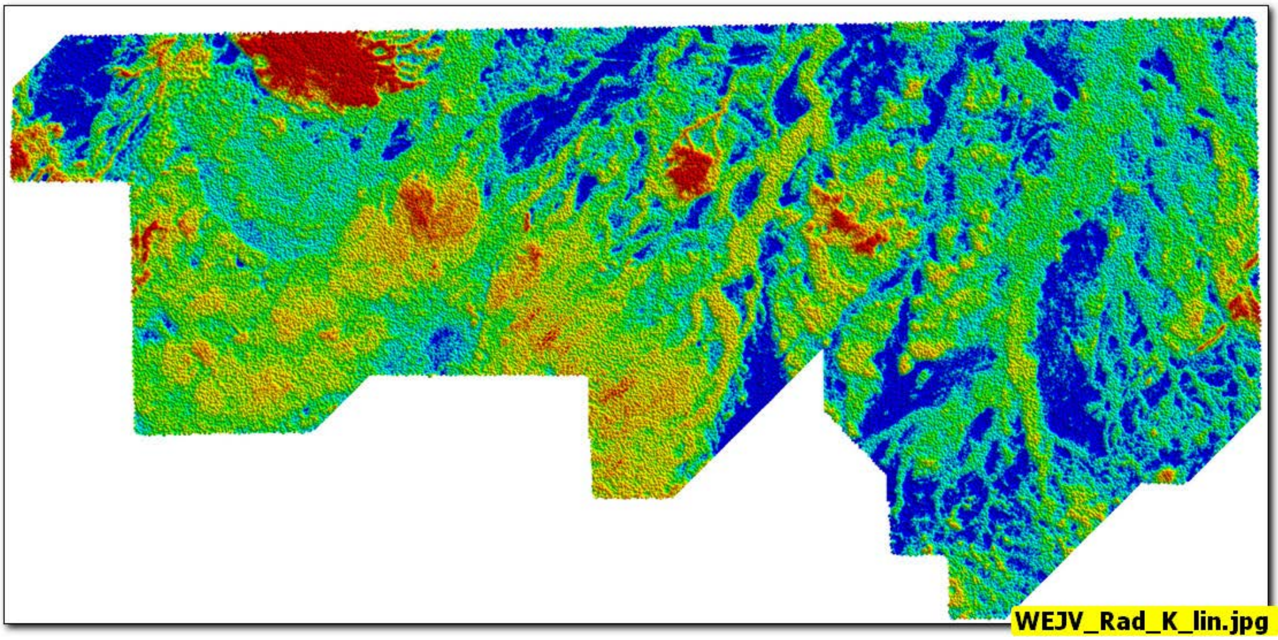


WEJV_Rad_TC_lin.jpg

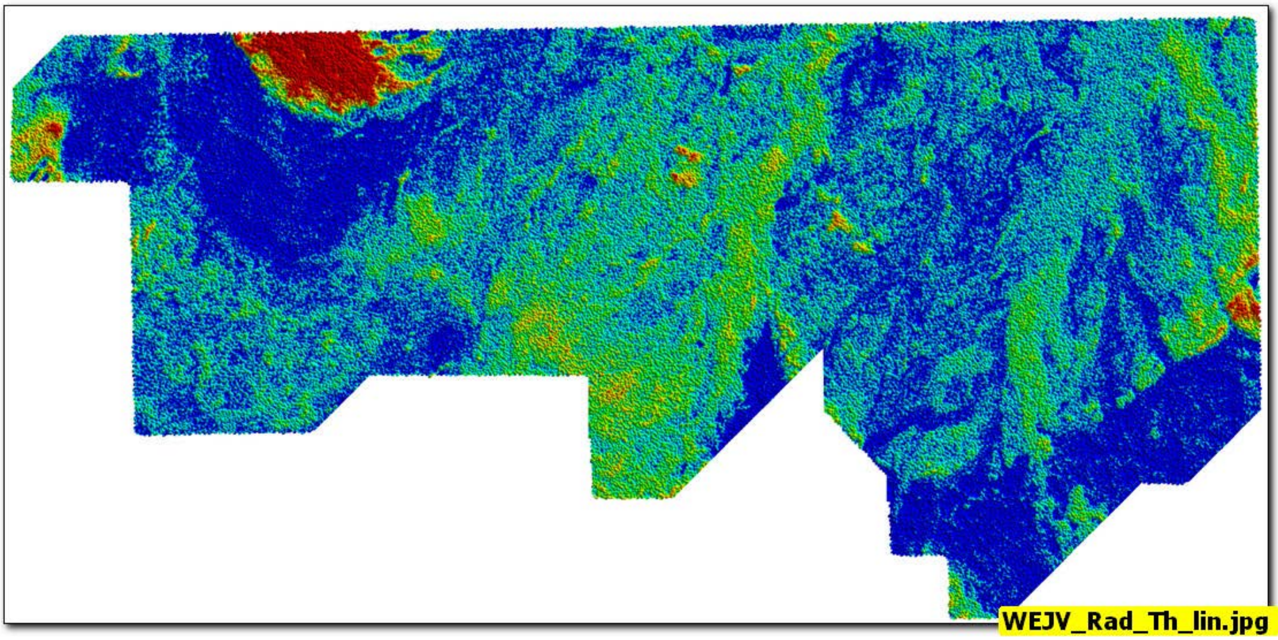
Enhancement filtering

Radiometric Data

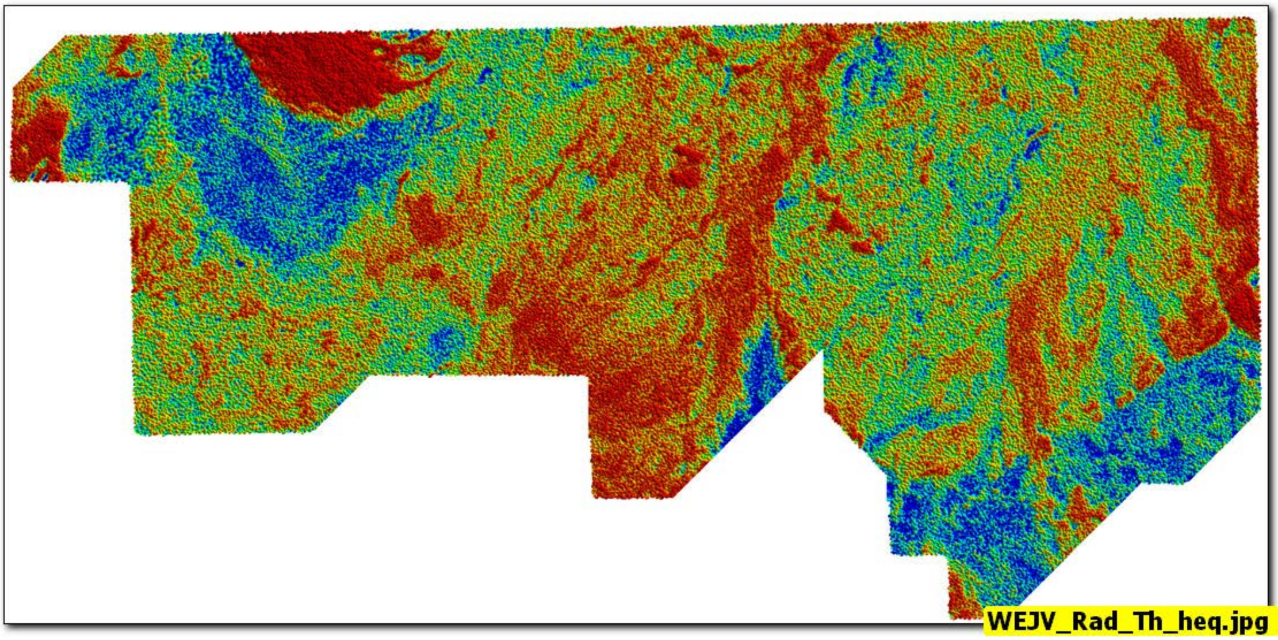

WEJV_Rad_K_heq.jpg


WEJV_Rad_K_lin.jpg

Enhancement filtering **Radiometric Data**



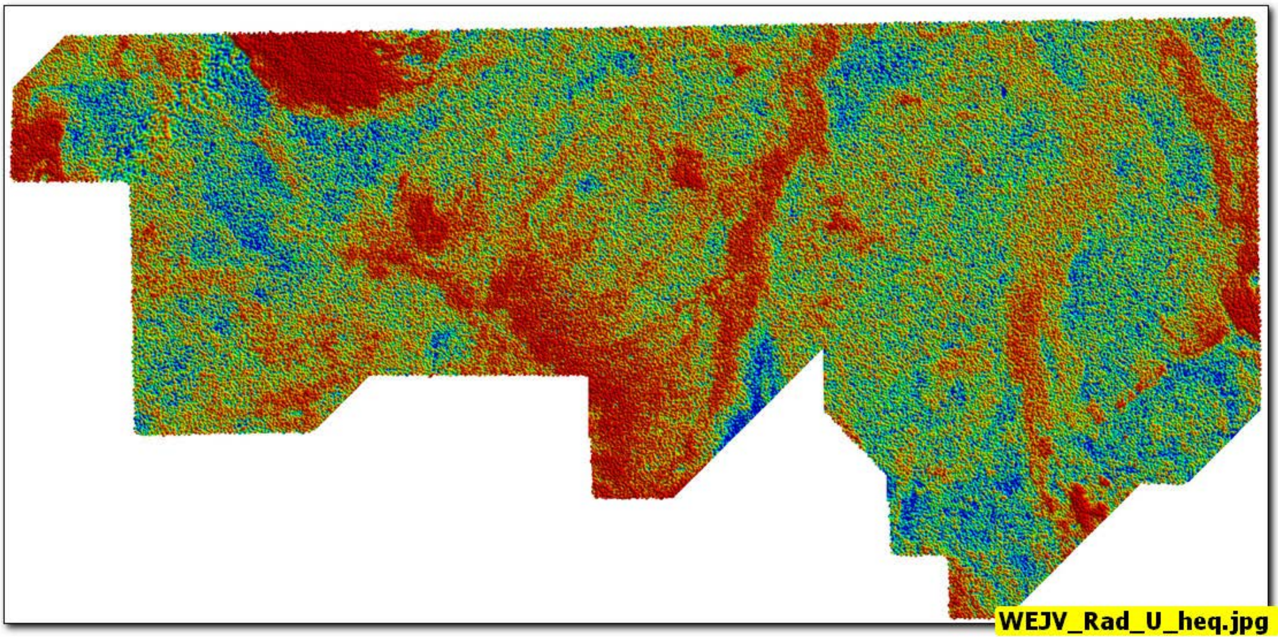
WEJV_Rad_Th_lin.jpg



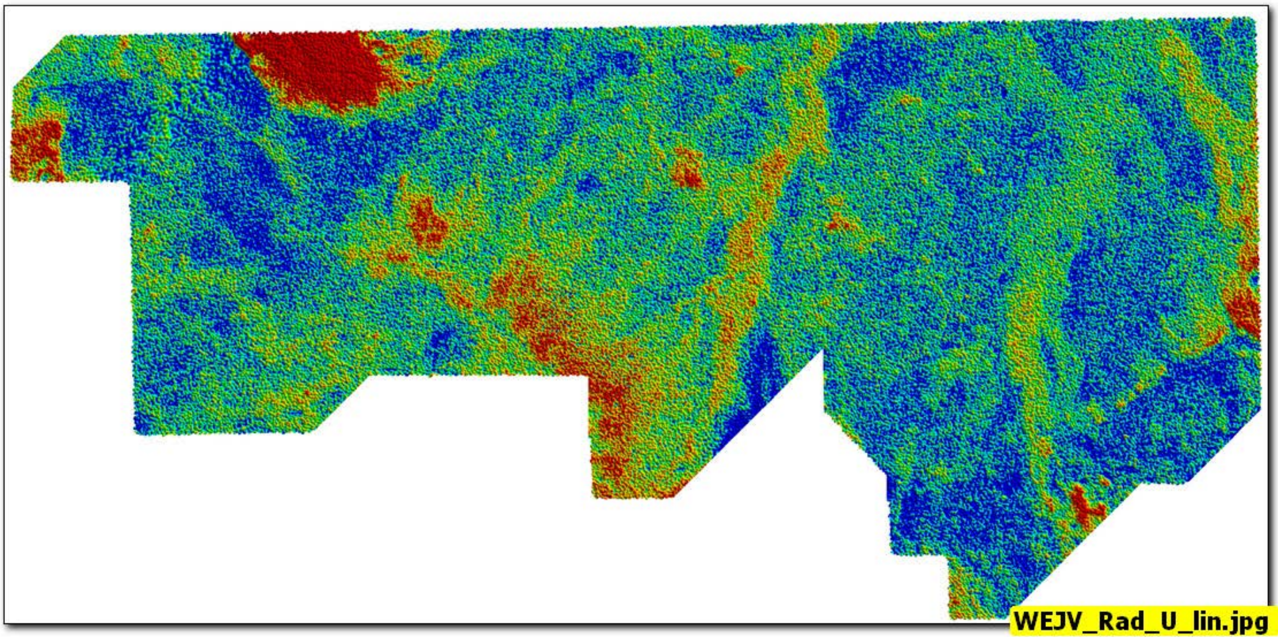
WEJV_Rad_Th_heq.jpg

Enhancement filtering

Radiometric Data

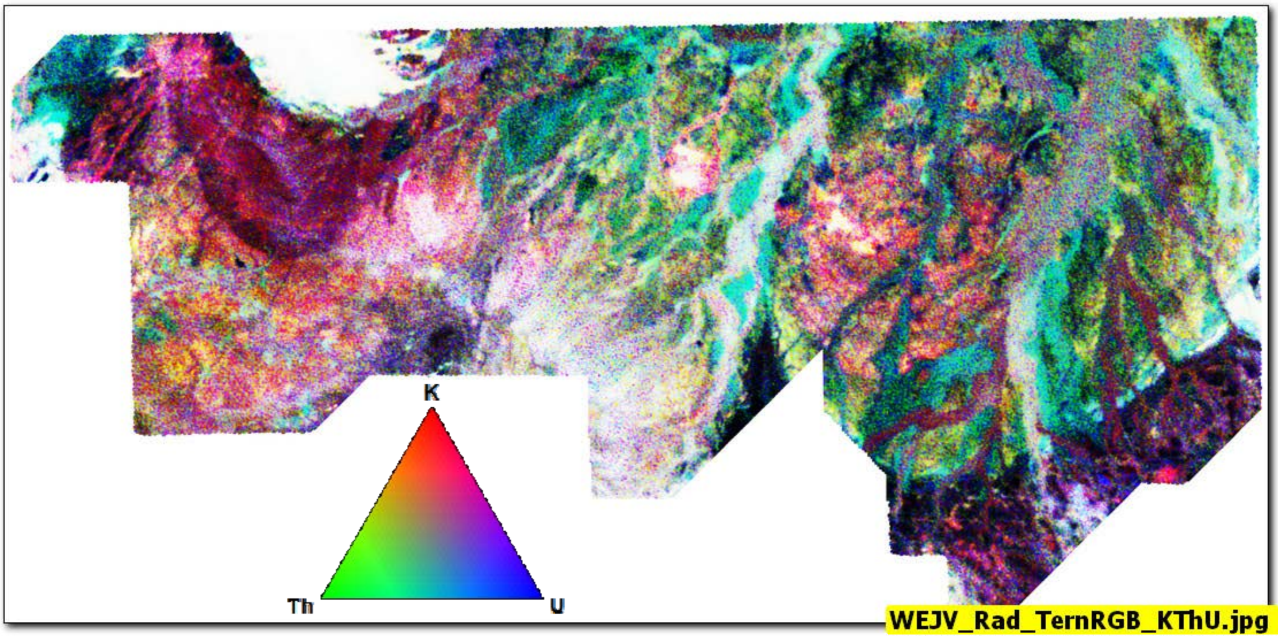


WEJV_Rad_U_heq.jpg

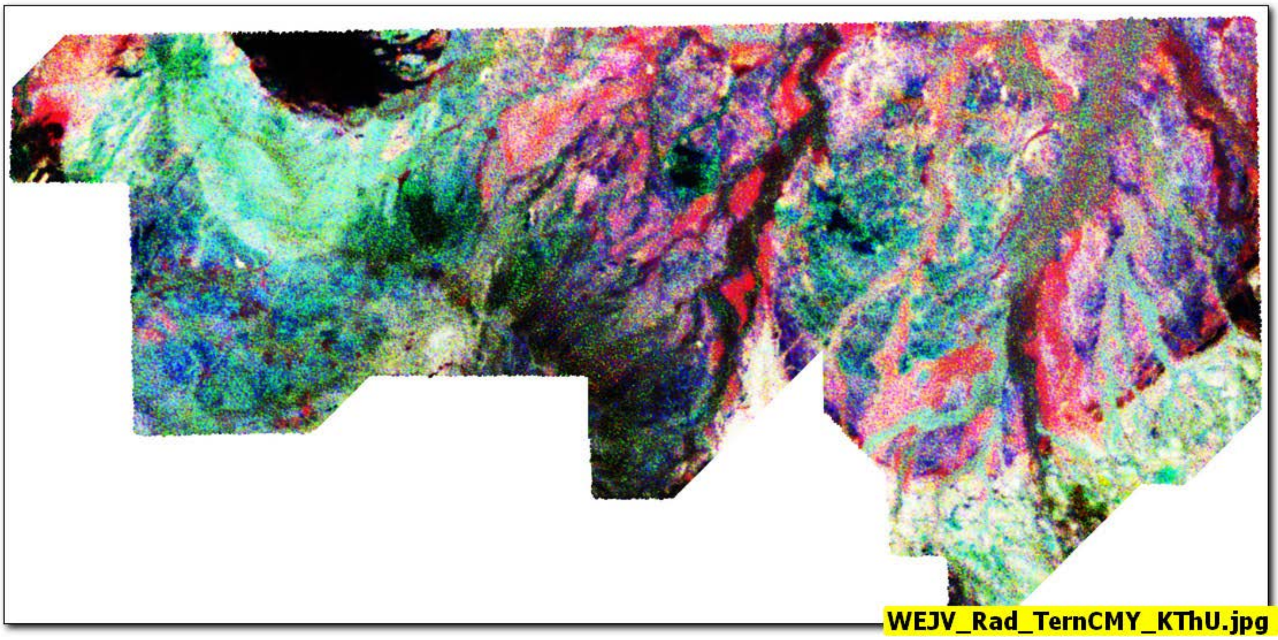


WEJV_Rad_U_lin.jpg

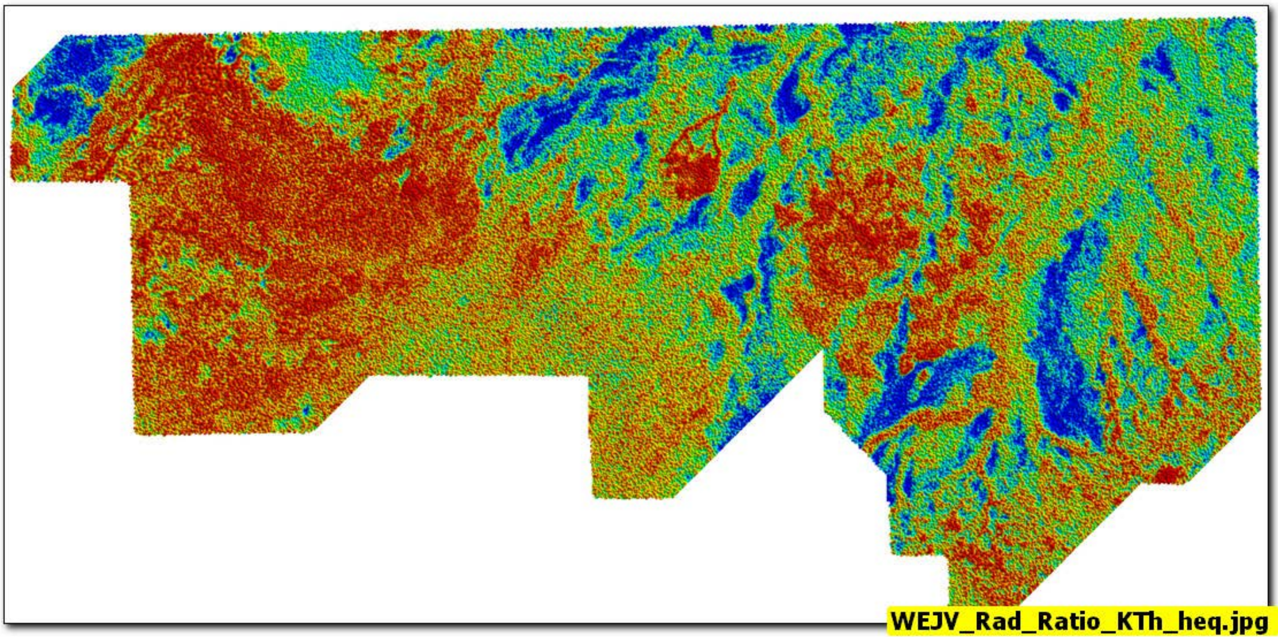
Enhancement filtering **Radiometric Data**



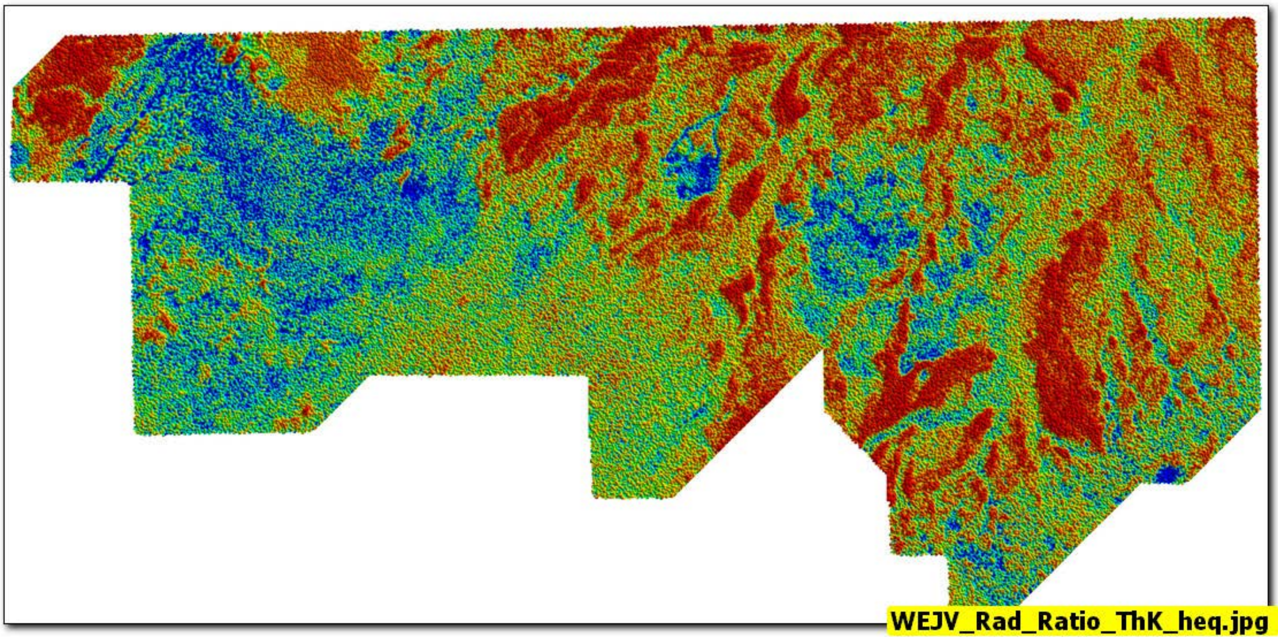
WEJV_Rad_TernRGB_KThU.jpg



WEJV_Rad_TernCMY_KThU.jpg



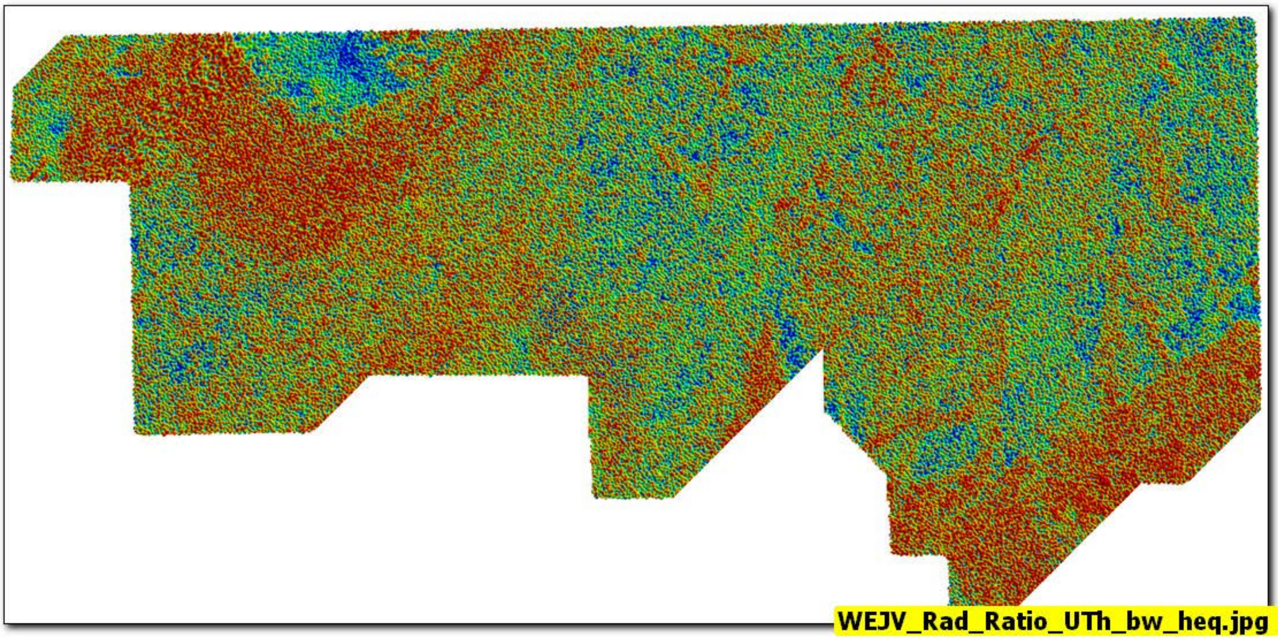
WEJV_Rad_Ratio_KTh_heq.jpg



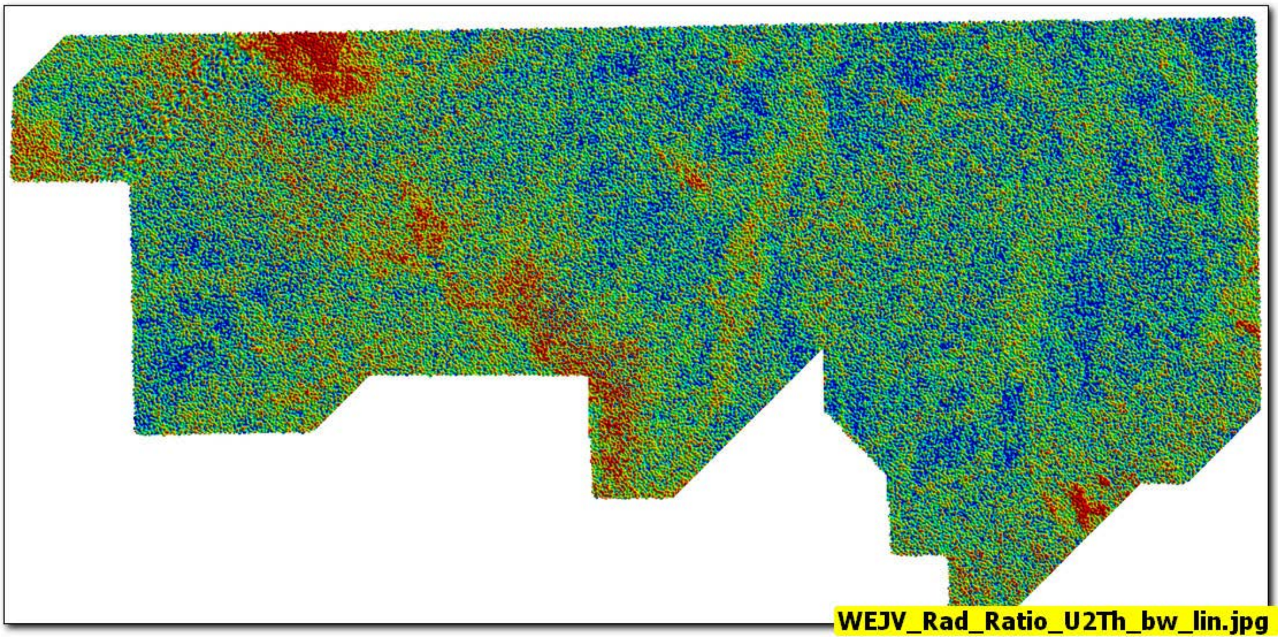
WEJV_Rad_Ratio_ThK_heq.jpg

Enhancement filtering

Radiometric Data

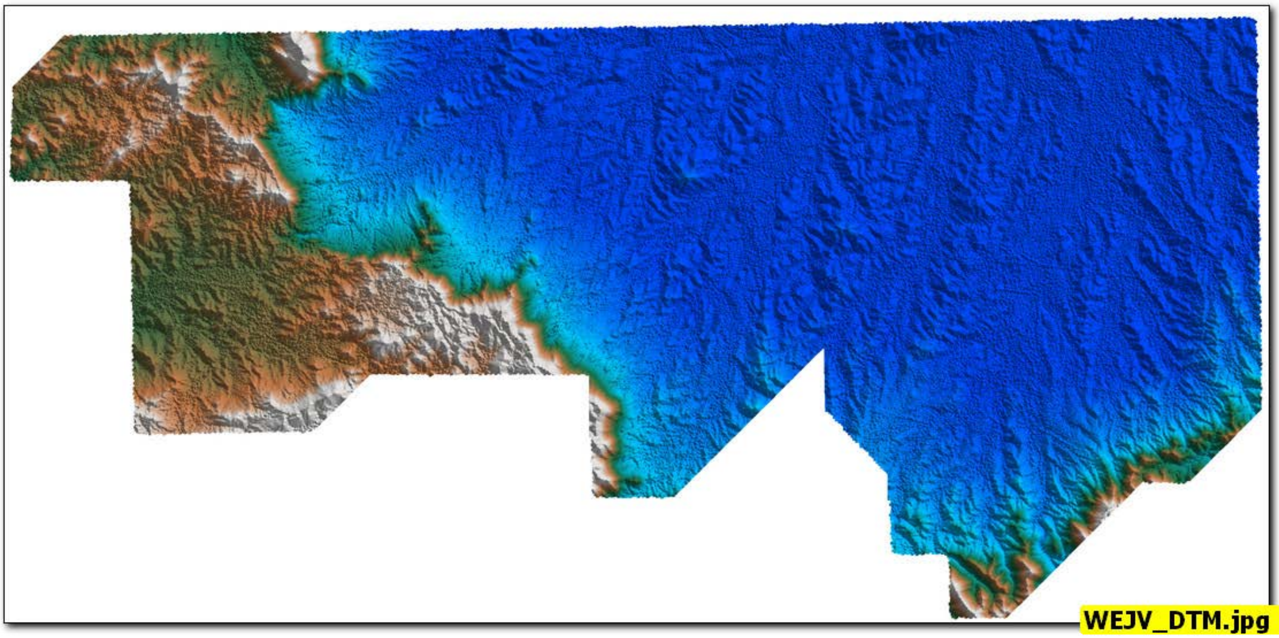


WEJV_Rad_Ratio_UTh_bw_heq.jpg

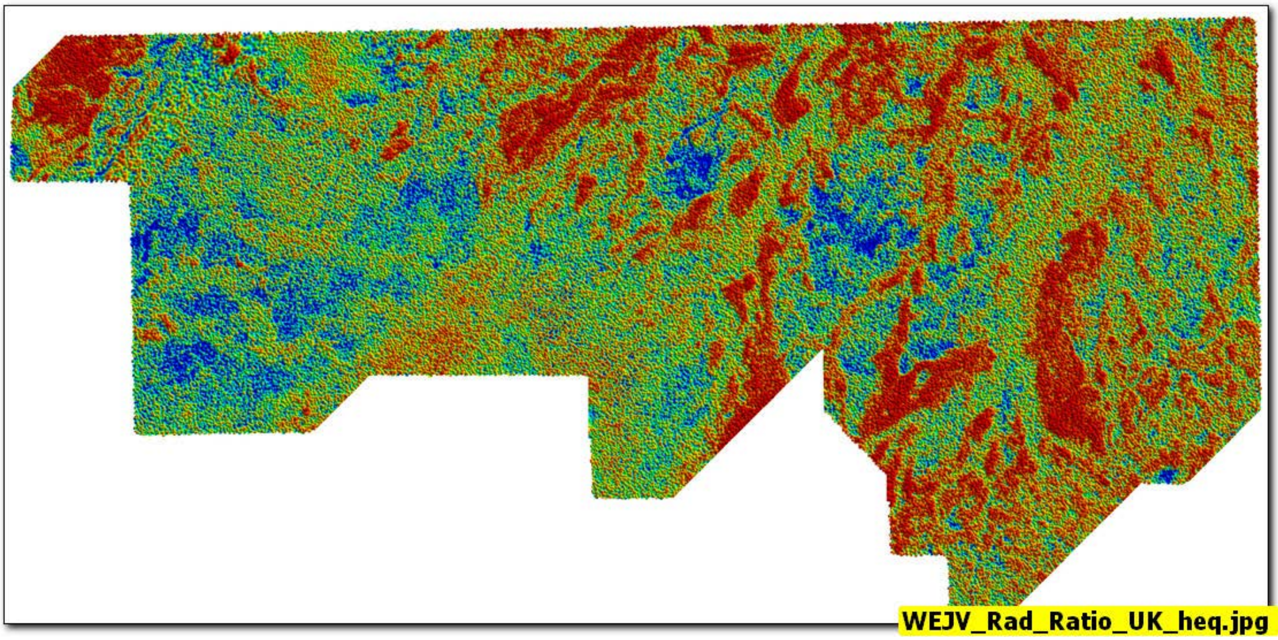


WEJV_Rad_Ratio_U2Th_bw_lin.jpg

Enhancement filtering



WEJV_DTM.jpg

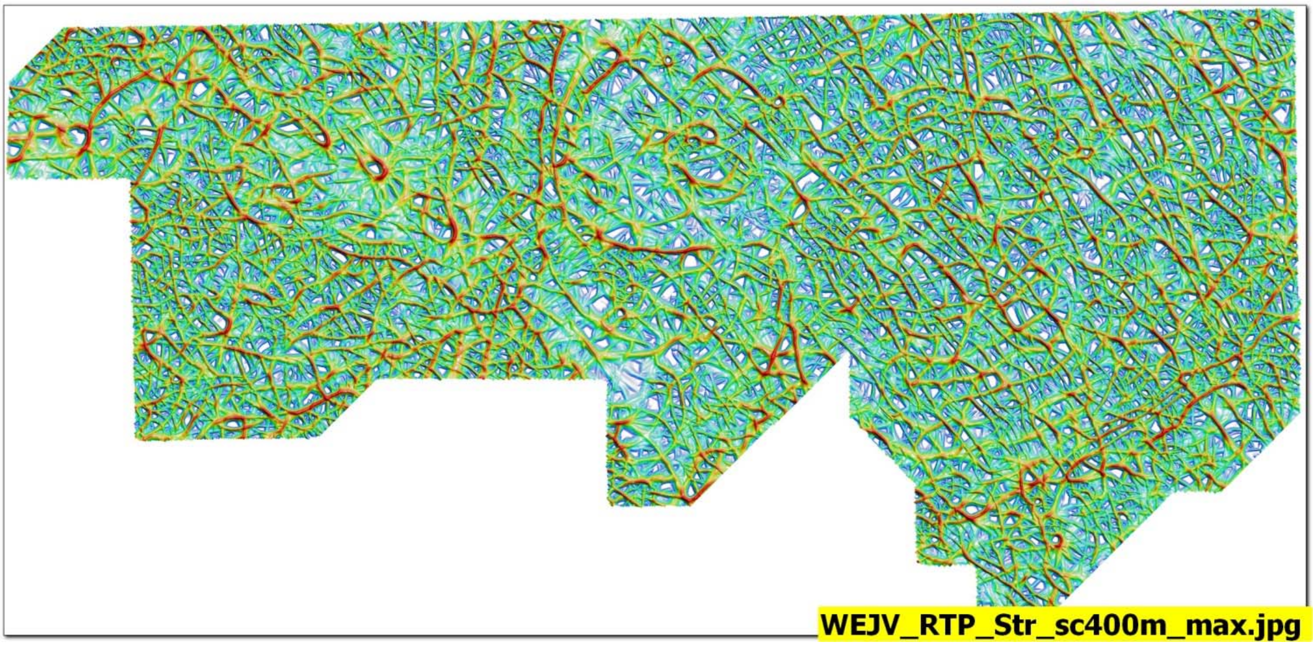


WEJV_Rad_Ratio_UK_heq.jpg

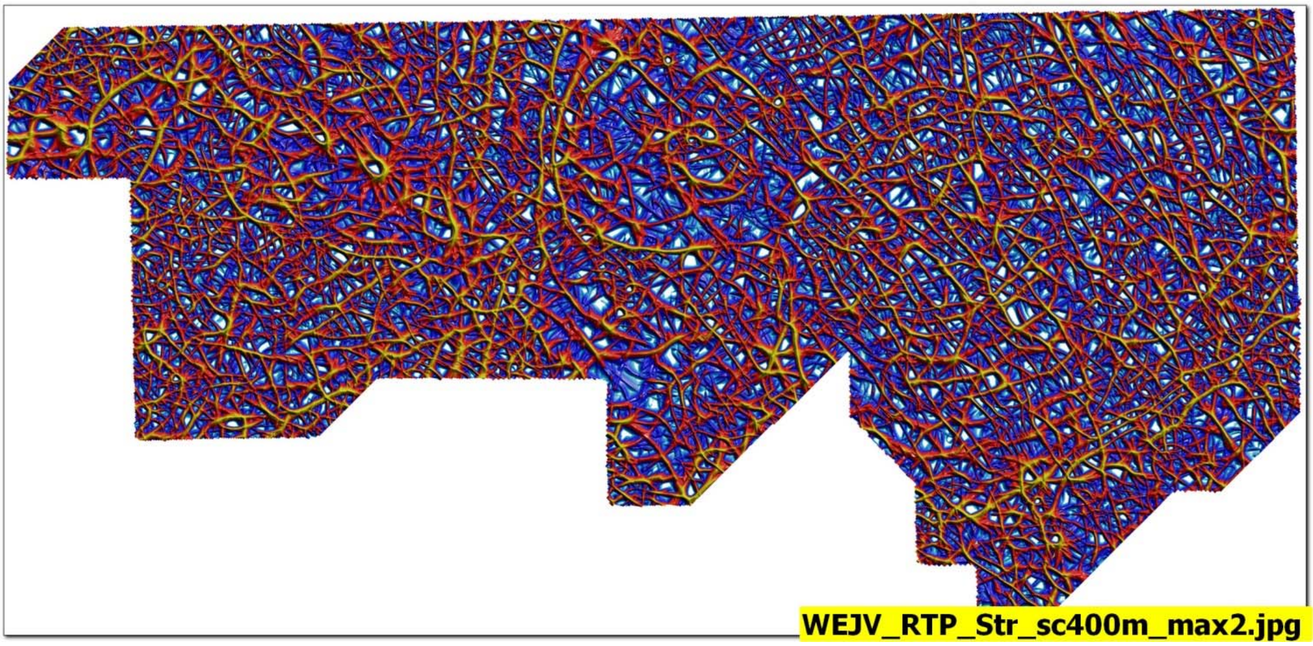
Structure Detection – edges TOTAL

Scale 400m

Magnetic Data

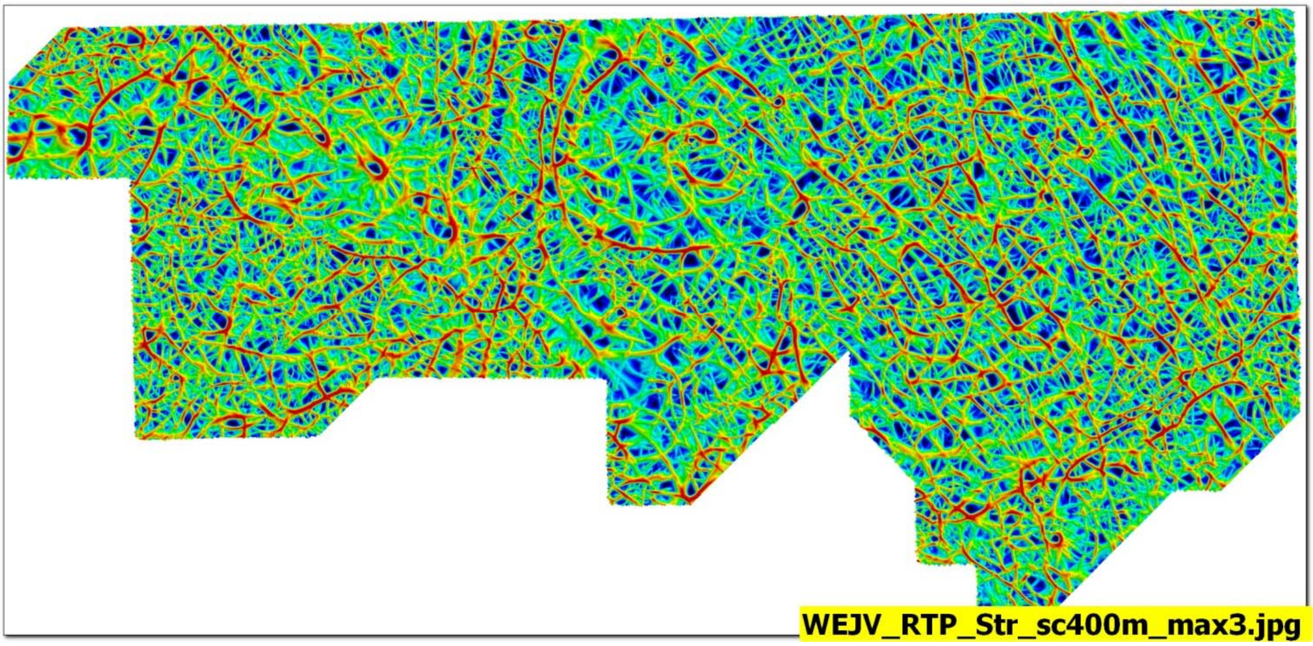


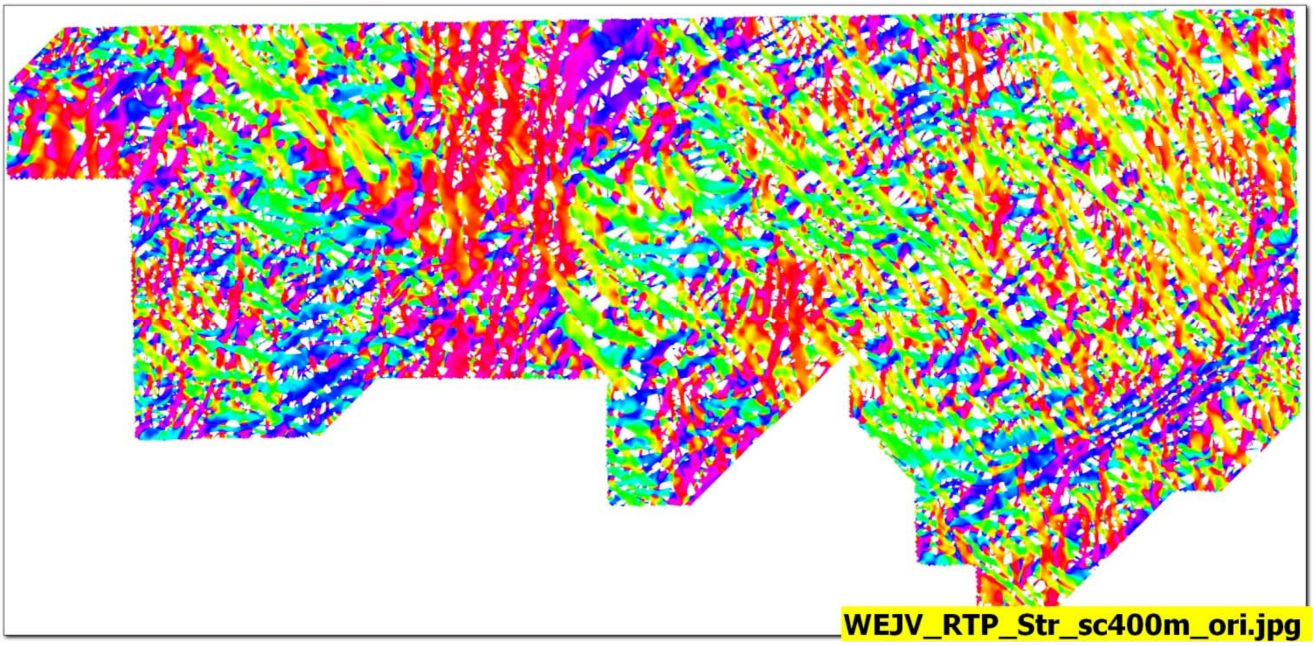
WEJV_RTP_Str_sc400m_max.jpg



WEJV_RTP_Str_sc400m_max2.jpg

Structure Detection – edges TOTAL **Scale 400m** **Magnetic Data**

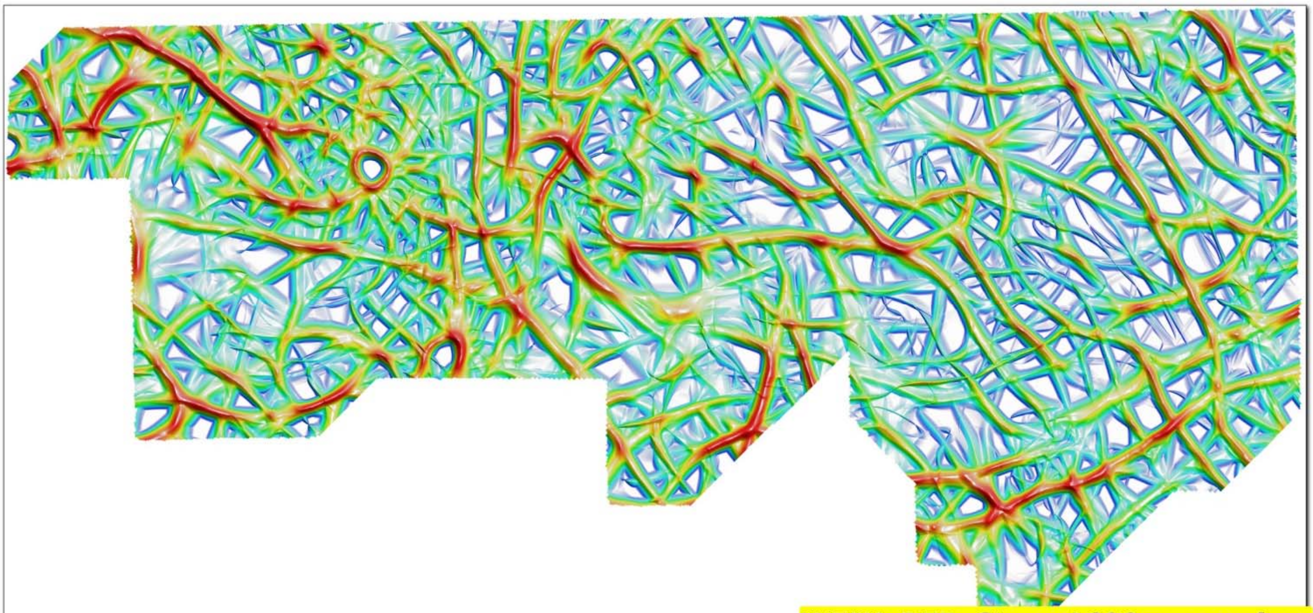




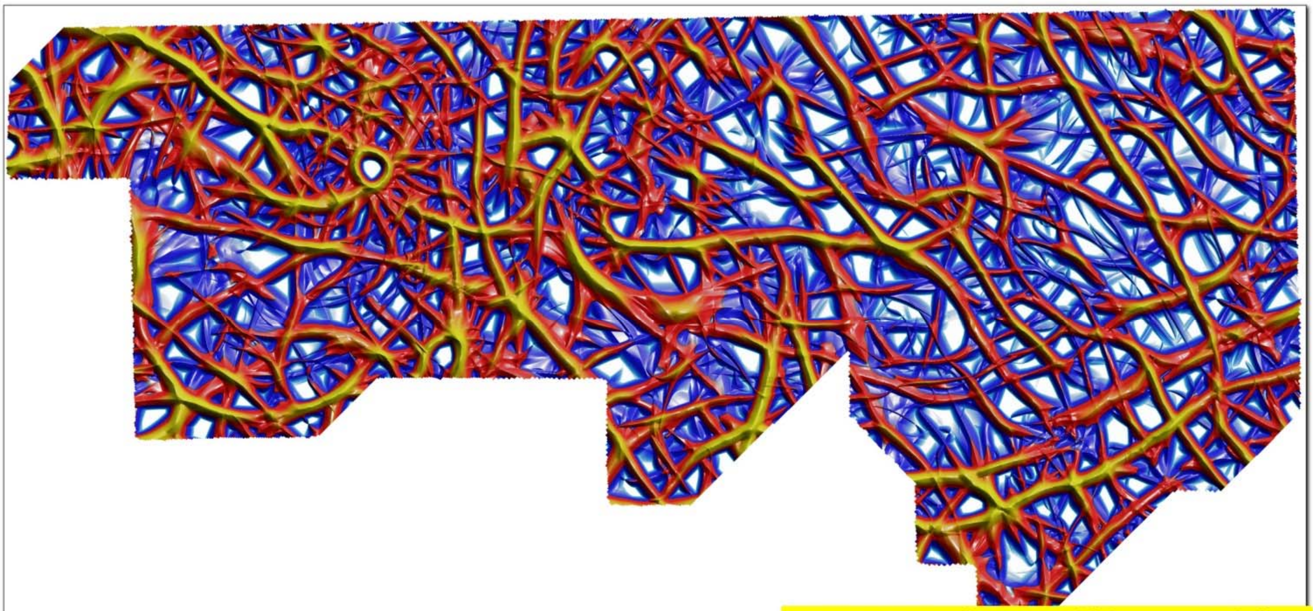
Structure Detection – edges TOTAL

Scale 1600m

Magnetic Data



WEJV_RTP_Str_sc1600m_max.jpg

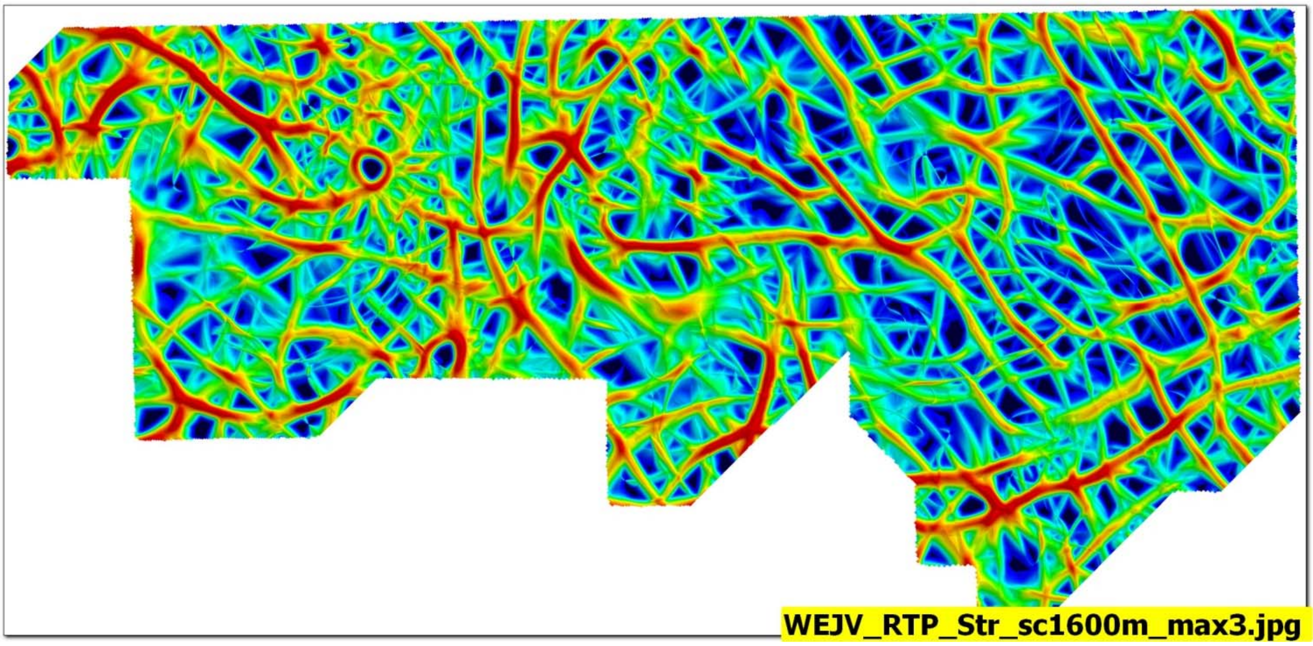


WEJV_RTP_Str_sc1600m_max2.jpg

Structure Detection – edges TOTAL

Scale 1600m

Magnetic Data



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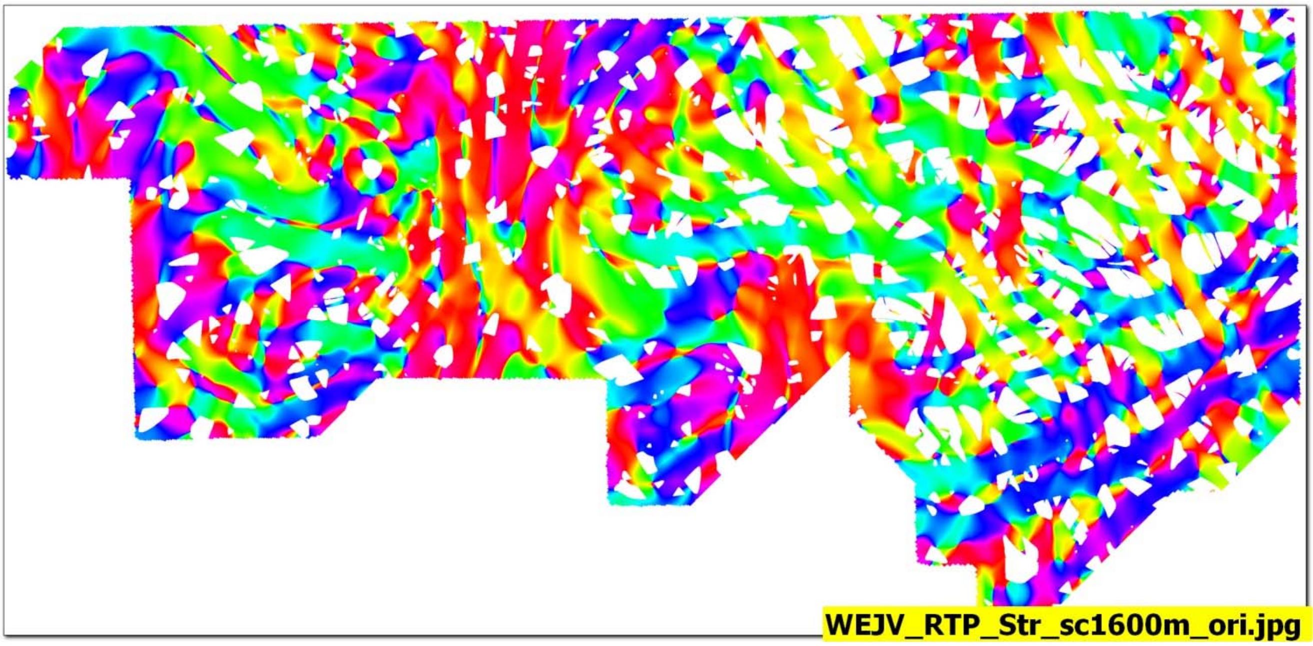
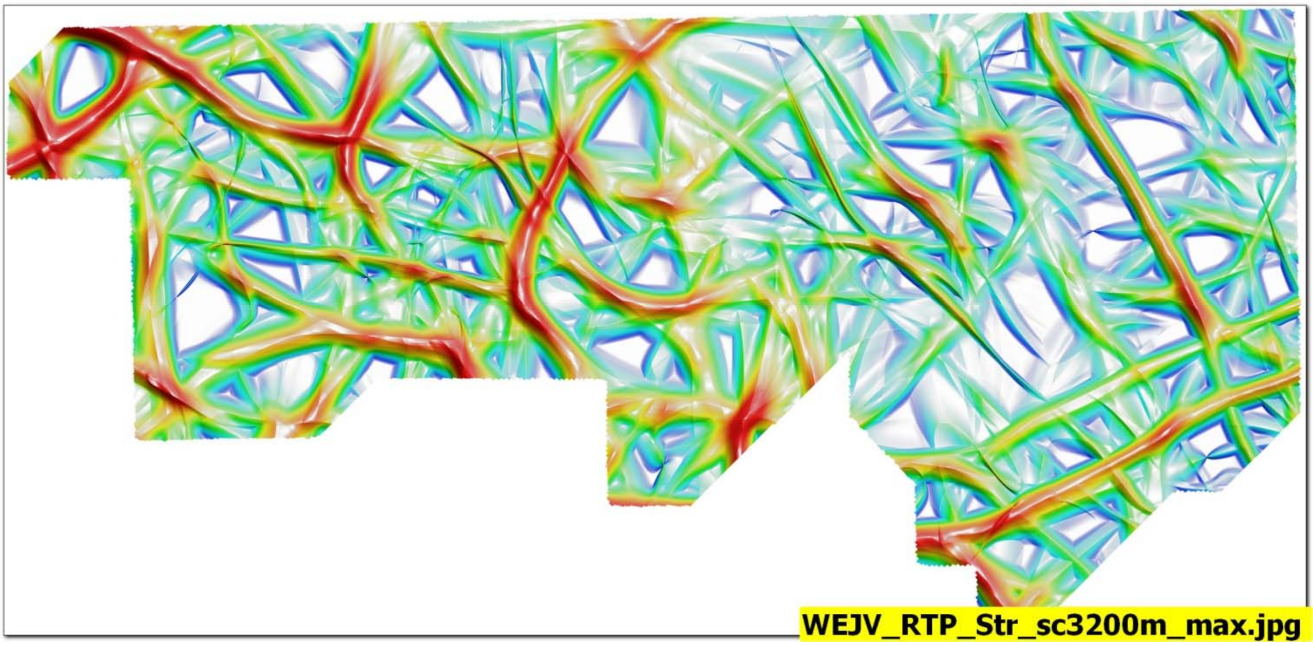


WEJV_RTP_Str_sc1600m_ori.jpg

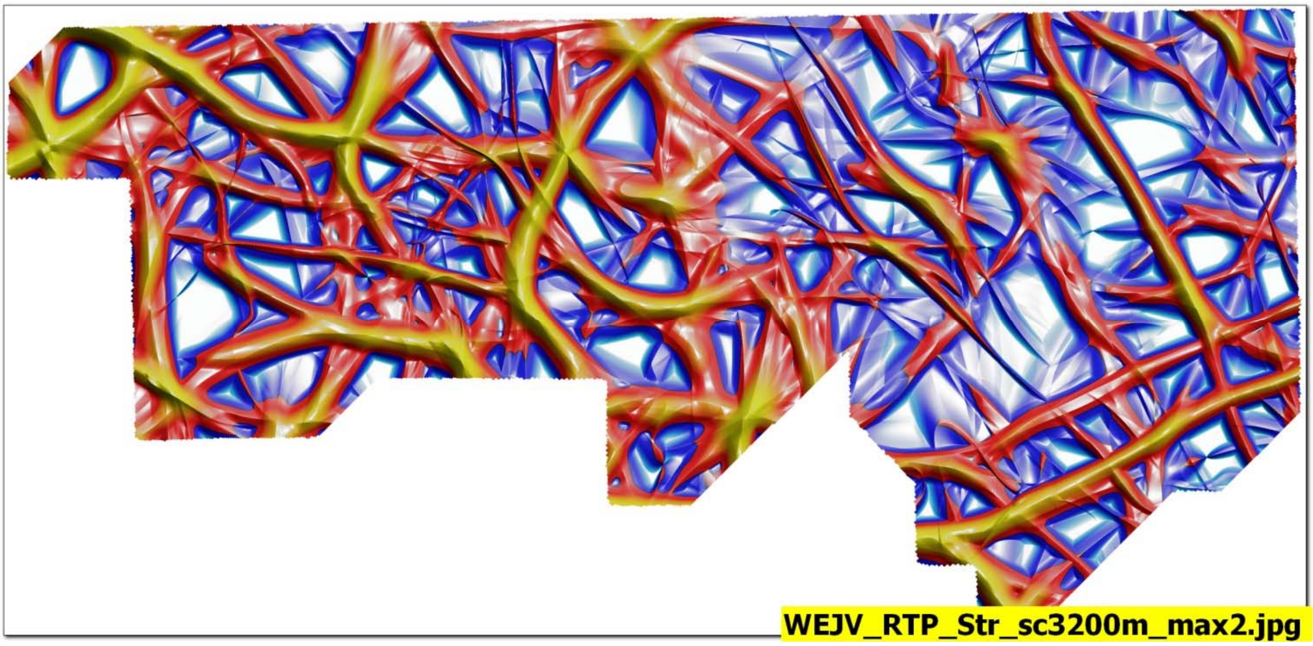
Structure Detection – edges TOTAL

Scale 3200m

Magnetic Data

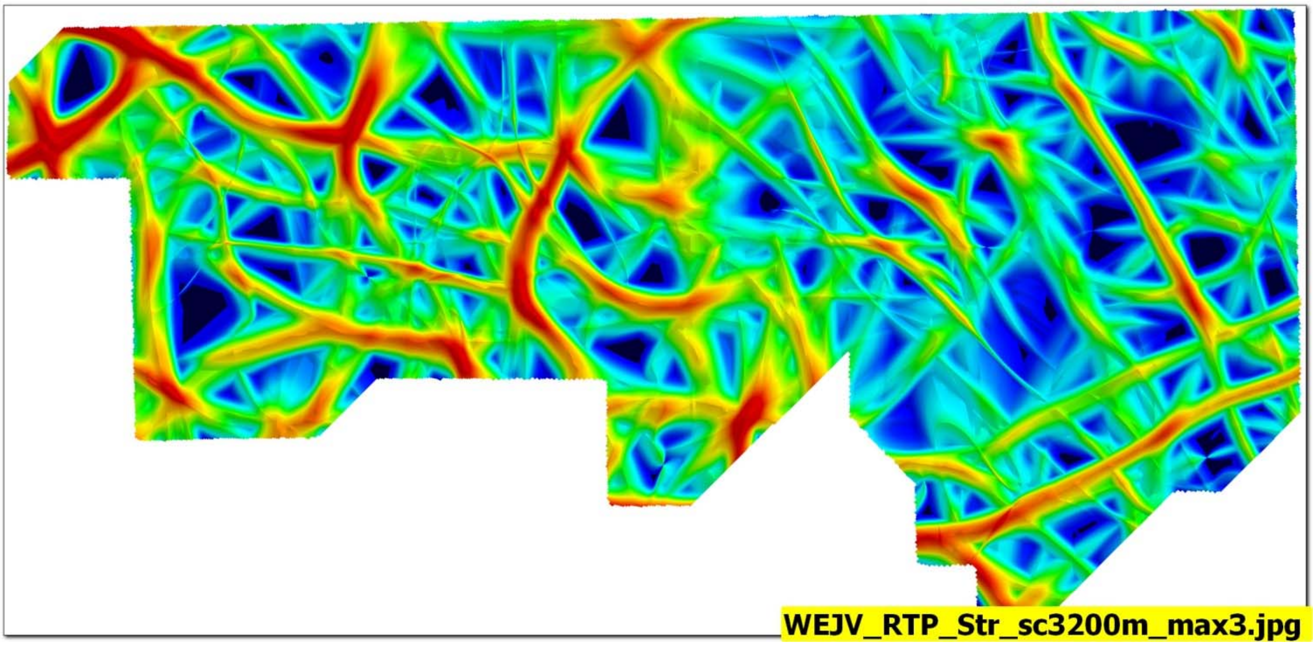


WEJV_RTP_Str_sc3200m_max.jpg

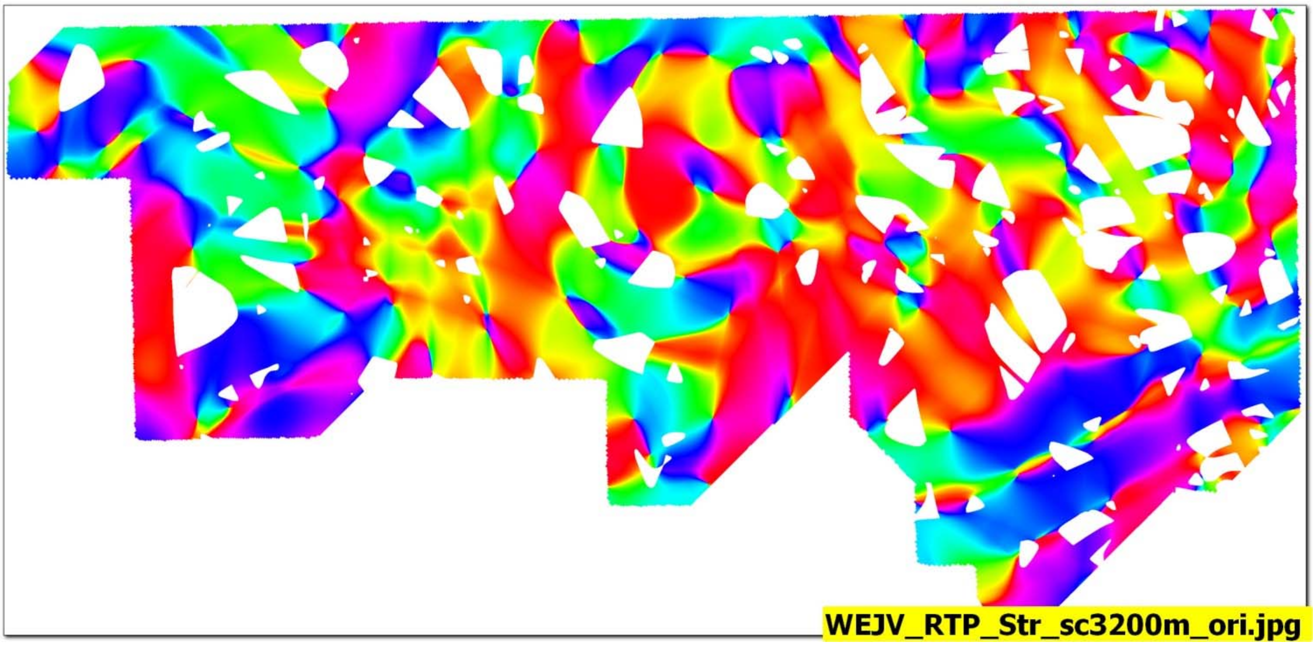


WEJV_RTP_Str_sc3200m_max2.jpg

Structure Detection – edges TOTAL **Scale 3200m** **Magnetic Data**

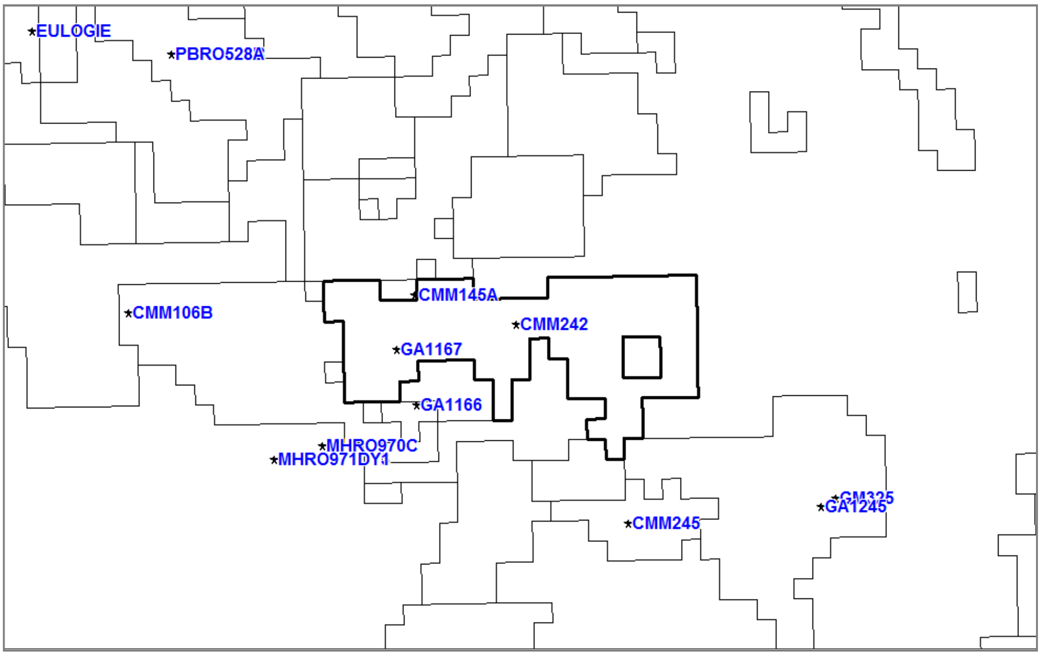


WEJV_RTP_Str_sc3200m_max3.jpg



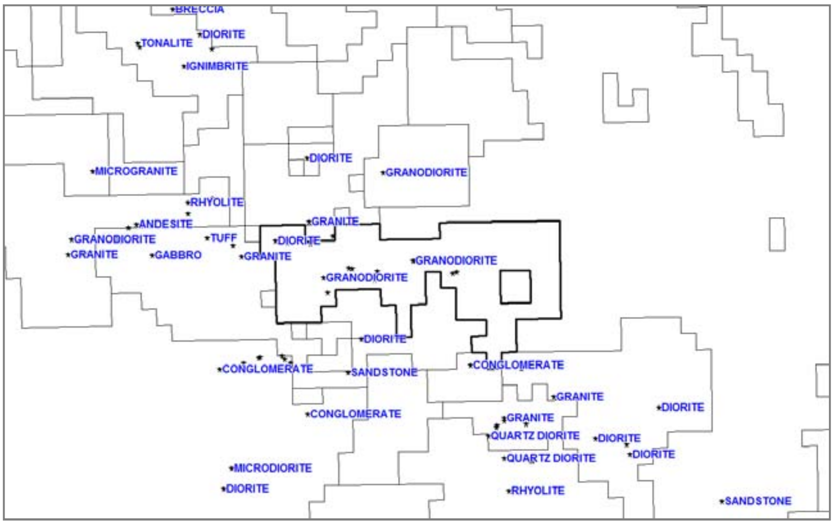
WEJV_RTP_Str_sc3200m_ori.jpg

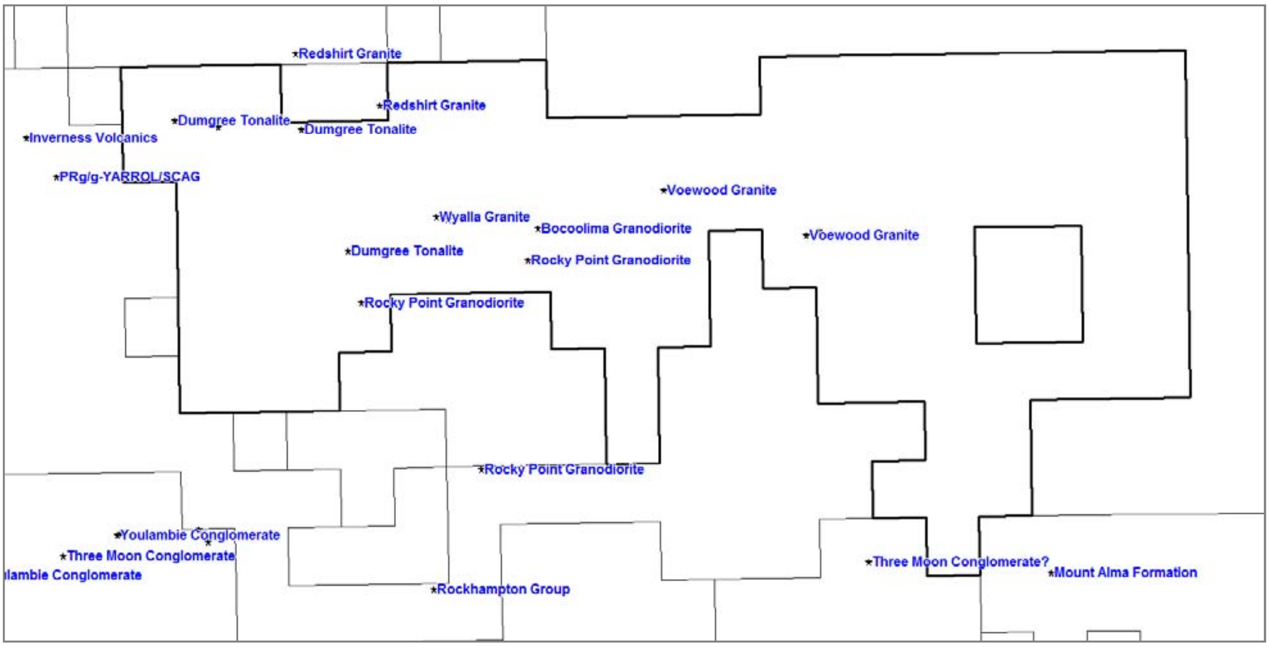
Additional Data used to generate targets



SAMPLE_ID	N	A	E	N	L	L	STRU_UNIT	ROCK_UNIT	K	ROCK_TYPE	COMMENTS	L	N	N	RESULT_VAL
EULOGIE	0	6	4	6	4	2	UNDIFFERENTIATED MESOZOIC VOLCANICS	Kib-YARROL/SCAG	9	BASALT		A	F	V	68.6
CMM106B	9	6	3	1	1	3	PERMO-TRIASSIC IGNEOUS PROVINCES	Craiglands Quartz Monzodiorite	2	DIORITE	BIOT-HB	A	L	Z	256.8
PBRO528A	0	6	5	7	1	6	MOUNT MORGAN SUBPROVINCE	Pomegranate Tonalite	8	TONALITE		A	F	H	417.0
MHRO971DY2	9	6	0	7	3	1	ROCKHAMPTON SUBPROVINCE	Youlambie Conglomerate	0	RHYOLITE		A	L	Z	300.0
MHRO970C	9	6	0	2	5	4	ROCKHAMPTON SUBPROVINCE	Youlambie Conglomerate	0	RHYOLITE		A	L	Z	300.8
GA1167	9	6	2	7	7	2	PERMO-TRIASSIC IGNEOUS PROVINCES	Rocky Point Granodiorite	0	GRANODIORITE		A	F	H	240.0
CMM145A	9	6	1	3	4	9	PERMO-TRIASSIC IGNEOUS PROVINCES	Redshirt Granite	4	GRANITE	HB-BI	A	L	Z	251.0
GA1166	9	6	8	5	5	9	PERMO-TRIASSIC IGNEOUS PROVINCES	Rocky Point Granodiorite	0	GRANODIORITE		A	F	H	247.0
CMM242	9	6	0	7	8	4	PERMO-TRIASSIC IGNEOUS PROVINCES	Voewood Granite	6	GRANITE	-> GRDI	A	L	Z	233.6
CMM245	9	6	5	9	8	7	PERMO-TRIASSIC IGNEOUS PROVINCES	Mount Seaview Igneous Complex/g	8	GRANITE		A	L	Z	252.6
GA1245	9	6	6	6	6	1	PERMO-TRIASSIC IGNEOUS PROVINCES	Diglum Granodiorite/t	7	TONALITE		A	F	E	221.0
GM325	9	6	6	6	5	2	PERMO-TRIASSIC IGNEOUS PROVINCES	Diglum Granodiorite/t	7	GRANODIORITE		L	A	E	222.0
PBRO528B	0	6	5	7	1	6	MOUNT MORGAN SUBPROVINCE	Pomegranate Tonalite	8	TONALITE		A	L	Z	369.0
MHRO971DY3	9	6	0	7	3	1	ROCKHAMPTON SUBPROVINCE	Youlambie Conglomerate	0	RHYOLITE		A	L	Z	303.1
GA1167	9	6	2	7	7	2	PERMO-TRIASSIC IGNEOUS PROVINCES	Rocky Point Granodiorite	0	GRANODIORITE		A	F	E	244.0
GA1166	9	6	8	5	5	9	PERMO-TRIASSIC IGNEOUS PROVINCES	Rocky Point Granodiorite	0	GRANODIORITE		A	F	E	244.0
GA1245	9	6	6	6	6	1	PERMO-TRIASSIC IGNEOUS PROVINCES	Diglum Granodiorite/t	7	TONALITE		A	F	H	217.0
PBRO528A	0	6	5	7	1	6	MOUNT MORGAN SUBPROVINCE	Pomegranate Tonalite	8	TONALITE		A	F	H	415.0
MHRO971DY1	9	6	0	7	3	1	ROCKHAMPTON SUBPROVINCE	Youlambie Conglomerate	0	RHYOLITE		A	L	Z	303.6

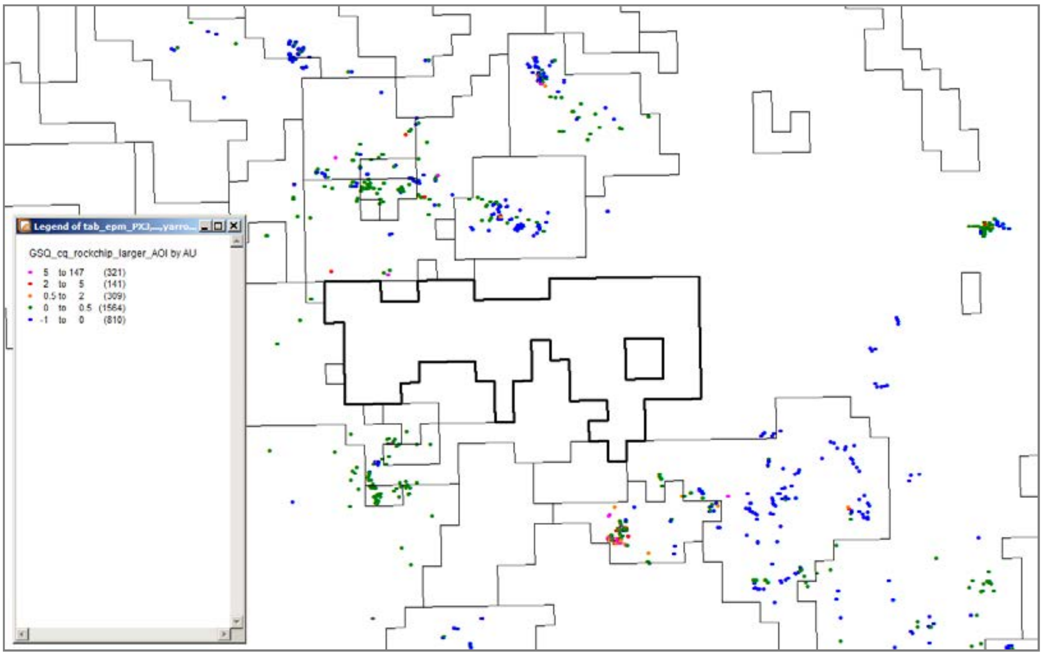
GSQ_cq_geochronology_larger_AOI.tab





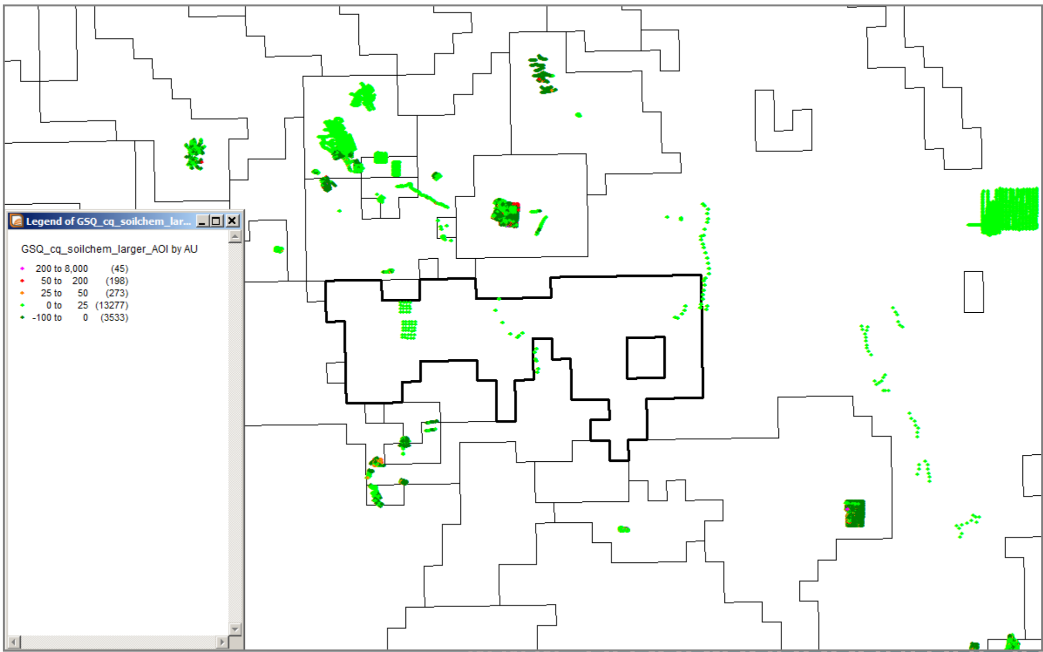
GSQ_cq_whole_rock_geochemistry_larger_AOI.tab

GSQ_cq_rockchip_larger_AOI.tab

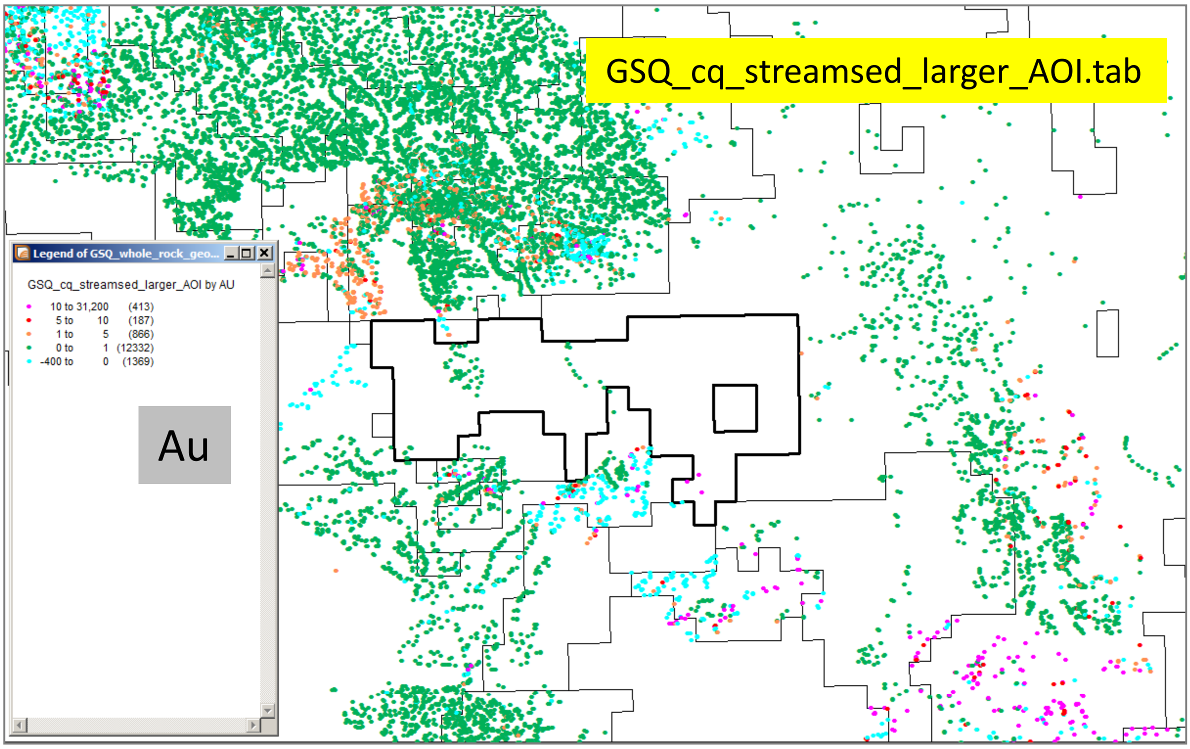


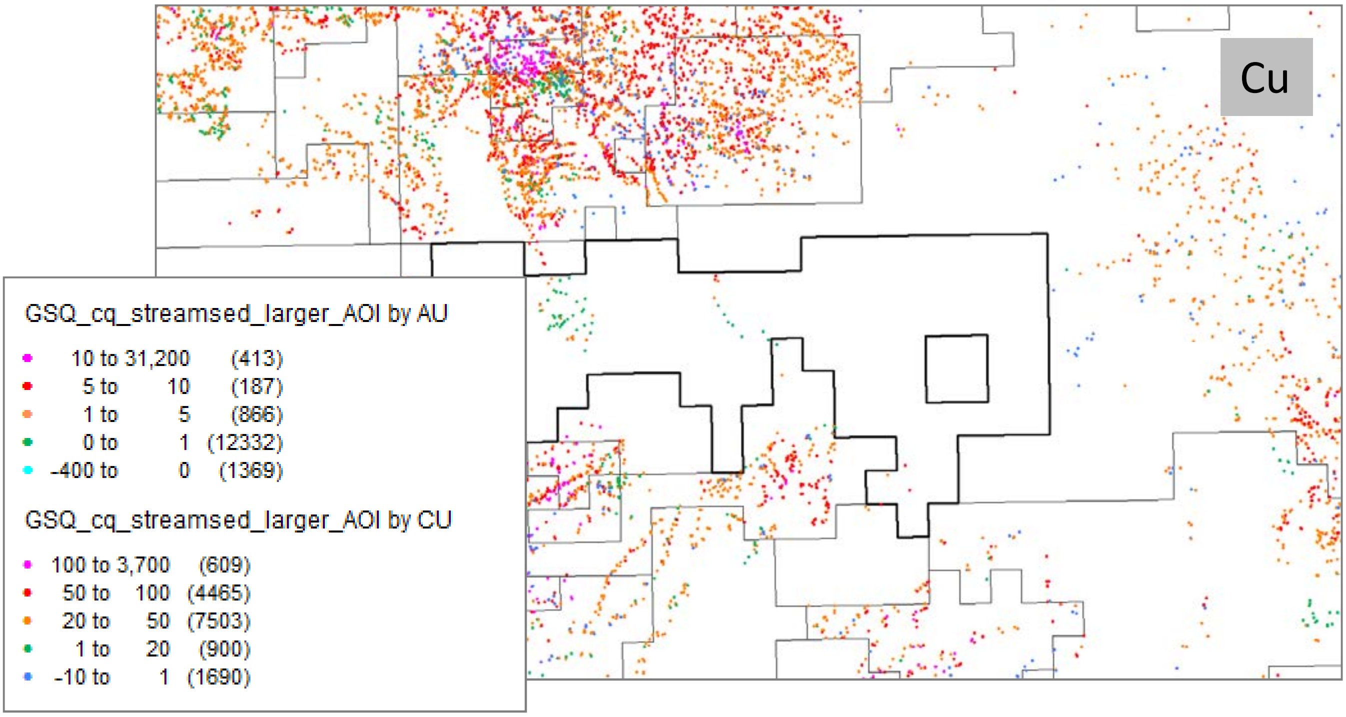
Au

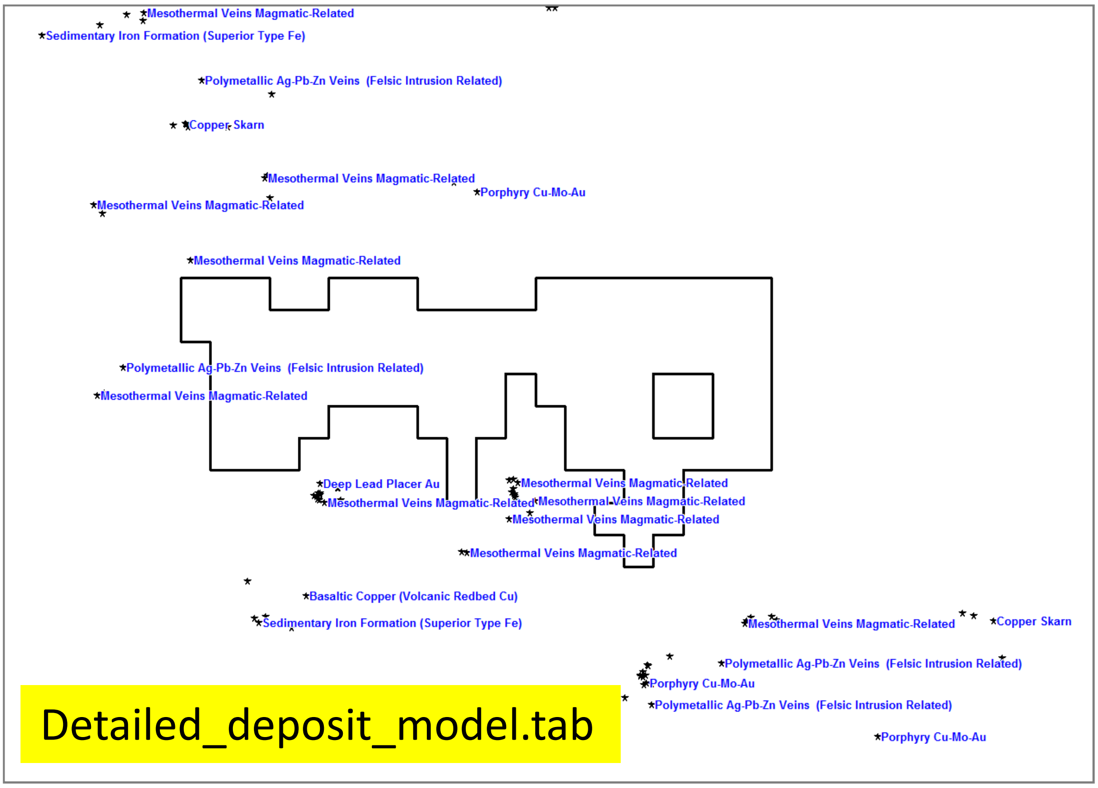
GSQ_cq_soilchem_larger_AOI.tab

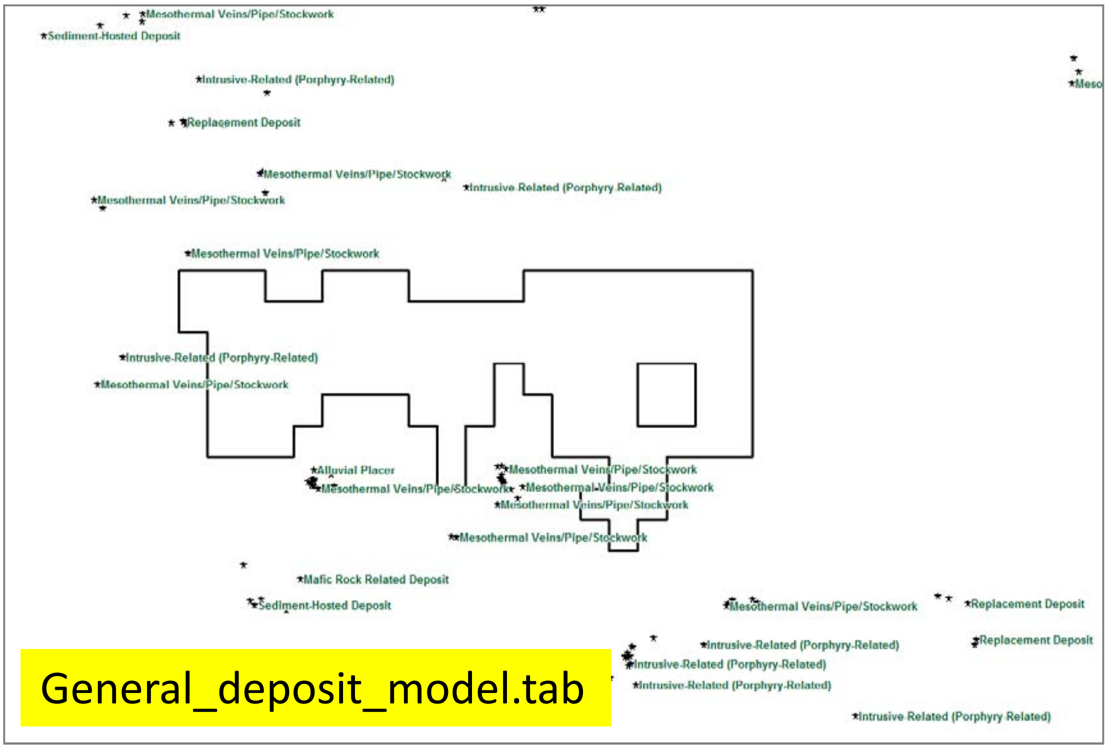


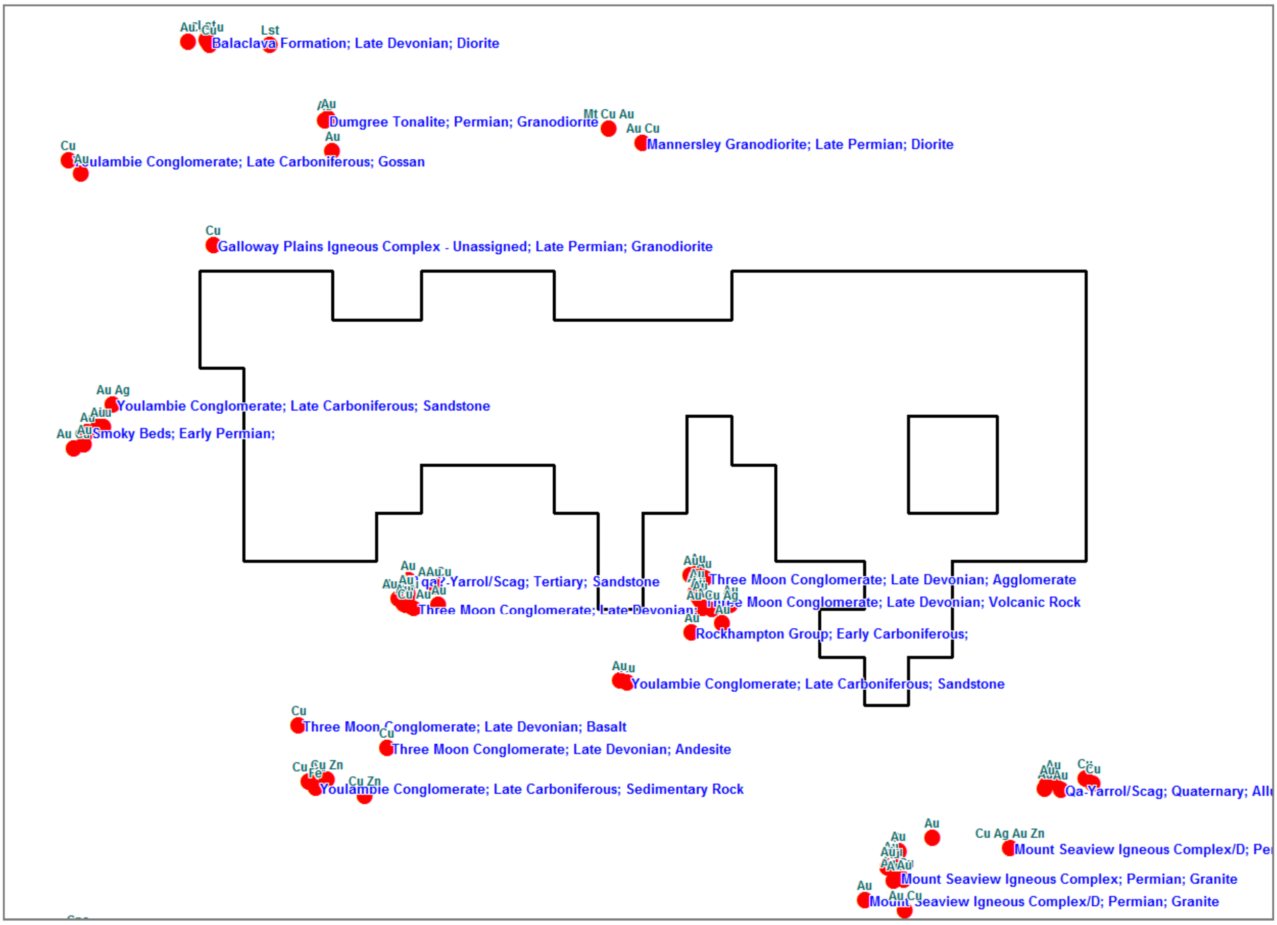
Au


GSQ_cq_streamsed_larger_AOI.tab
Au


Cu
GSQ_cq_streamsed_larger_AOI by AU
10 to 31,200 (413)
5 to 10 (187)
1 to 5 (866)
0 to 1 (12332)
-400 to 0 (1369)
GSQ_cq_streamsed_larger_AOI by CU
100 to 3,700 (609)
50 to 100 (4465)
20 to 50 (7503)
1 to 20 (900)
-10 to 1 (1690)

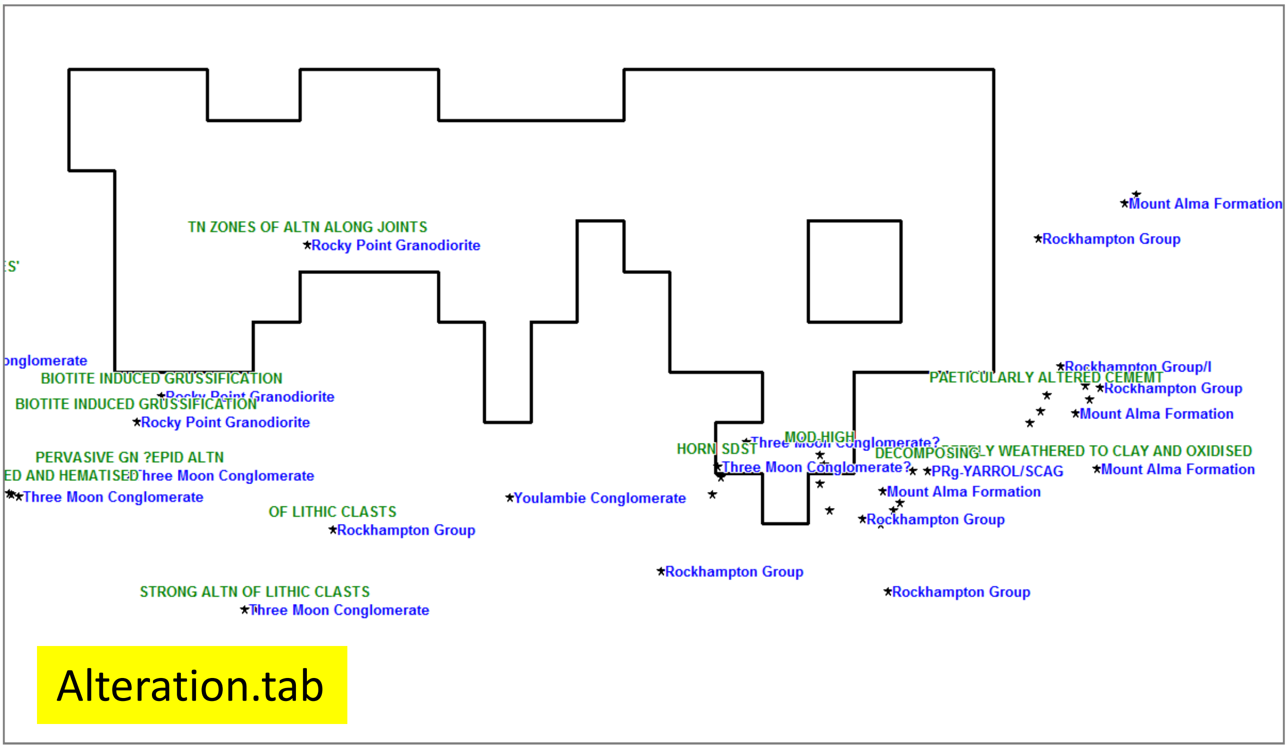

Mesothermal Veins Magmatic-Related
Sedimentary Iron Formation (Superior Type Fe)
Polymetallic Ag-Pb-Zn Veins (Felsic Intrusion Related)
Copper Skarn
Mesothermal Veins Magmatic-Related
Porphyry Cu-Mo-Au
Mesothermal Veins Magmatic-Related
Mesothermal Veins Magmatic-Related
Polymetallic Ag-Pb-Zn Veins (Felsic Intrusion Related)
Mesothermal Veins Magmatic-Related
Deep Lead Placer Au
Mesothermal Veins Magmatic-Related
Mesothermal Veins Magmatic-Related
Mesothermal Veins Magmatic-Related
Mesothermal Veins Magmatic-Related
Mesothermal Veins Magmatic-Related
Basaltic Copper (Volcanic Redbed Cu)
Sedimentary Iron Formation (Superior Type Fe)
Mesothermal Veins Magmatic-Related
Copper Skarn
Polymetallic Ag-Pb-Zn Veins (Felsic Intrusion Related)
Porphyry Cu-Mo-Au
Polymetallic Ag-Pb-Zn Veins (Felsic Intrusion Related)
Porphyry Cu-Mo-Au
Detailed_deposit_model.tab

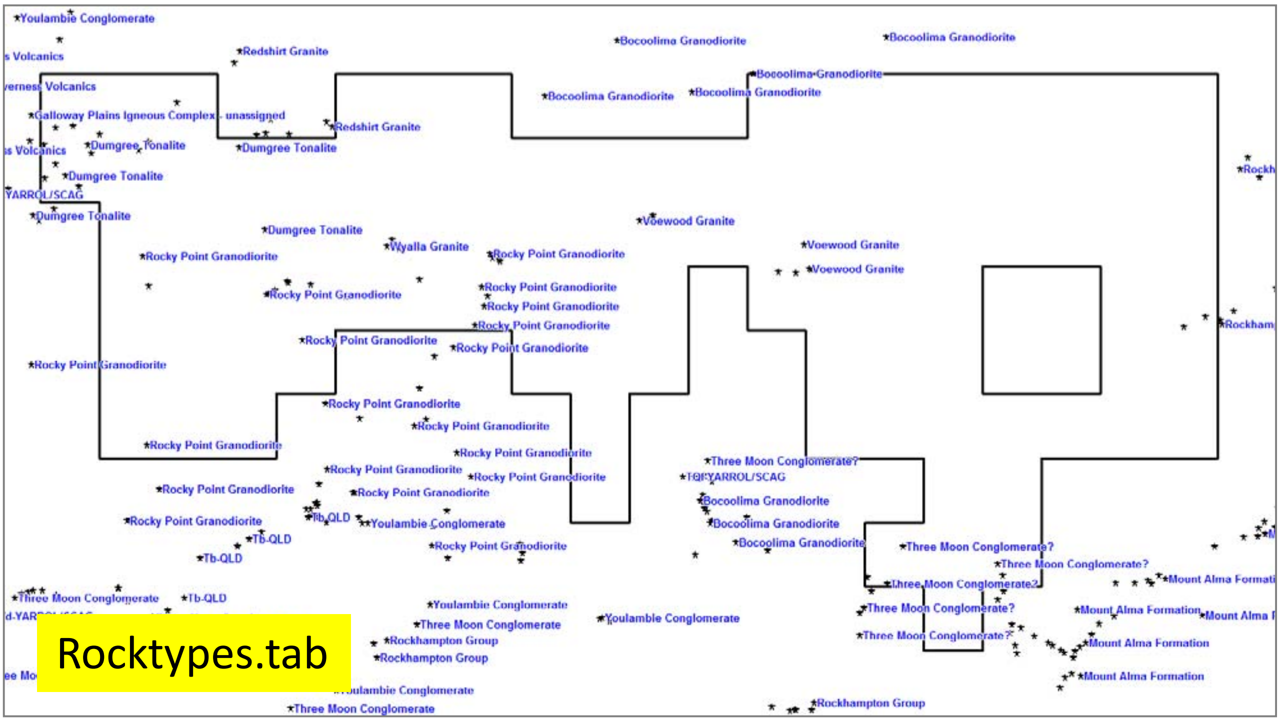

Mesothermal Veins/Pipe/Stockwork
Sediment-Hosted Deposit
Intrusive-Related (Porphyry-Related)
Meso
Replacement Deposit
Mesothermal Veins/Pipe/Stockwork
Intrusive-Related (Porphyry-Related)
Mesothermal Veins/Pipe/Stockwork
Mesothermal Veins/Pipe/Stockwork
Intrusive-Related (Porphyry-Related)
Mesothermal Veins/Pipe/Stockwork
Alluvial Placer
Mesothermal Veins/Pipe/Stockwork
Mesothermal Veins/Pipe/Stockwork
Mesothermal Veins/Pipe/Stockwork
Mesothermal Veins/Pipe/Stockwork
Mesothermal Veins/Pipe/Stockwork
Mafic Rock Related Deposit
Sediment-Hosted Deposit
Mesothermal Veins/Pipe/Stockwork
Replacement Deposit
Intrusive-Related (Porphyry-Related)
Replacement Deposit
Intrusive-Related (Porphyry-Related)
Intrusive-Related (Porphyry-Related)
Intrusive-Related (Porphyry-Related)
General_deposit_model.tab

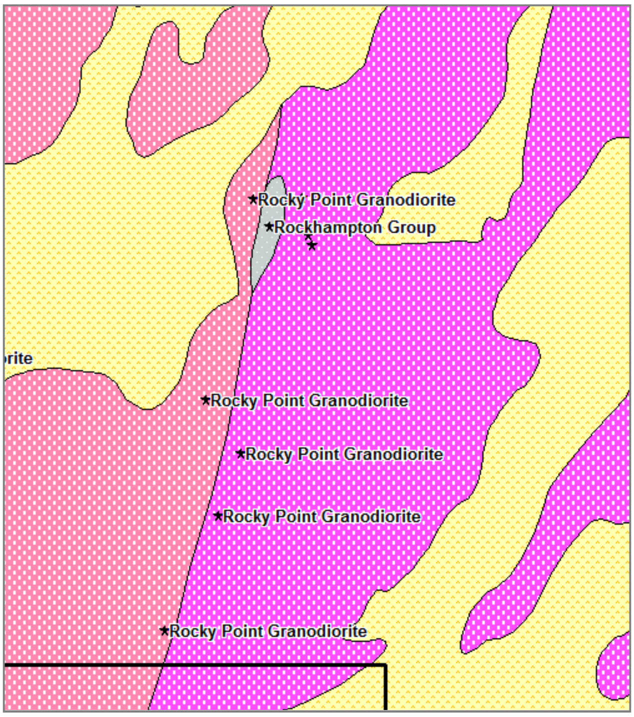


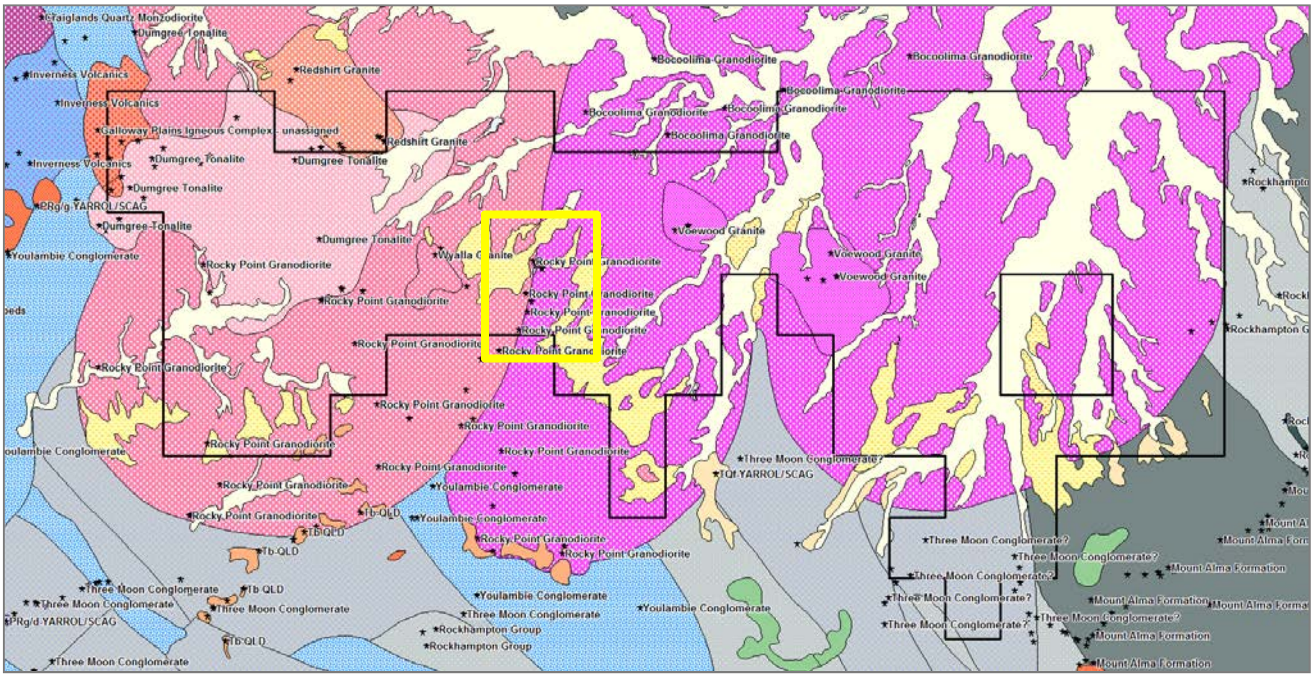
Host_Rocks.tab (host_1)

Mine_locations.tab (all_commod)

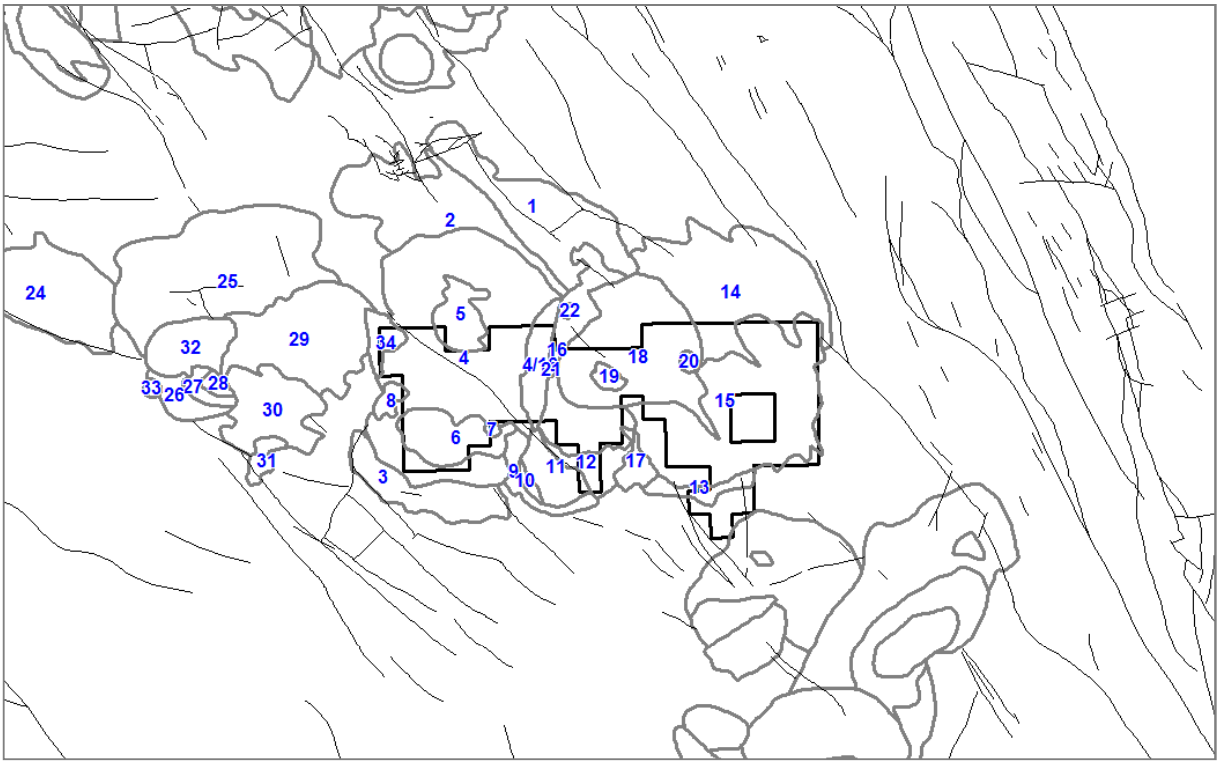

Alteration.tab
TN ZONES OF ALTN ALONG JOINTS
Rocky Point Granodiorite
Mount Alma Formation
Rockhampton Group
BIOTITE INDUCED GRUSSIFICATION
PERVASIVE GN ?EPID ALTN
Three Moon Conglomerate
OF LITHIC CLASTS
Youlambie Conglomerate
STRONG ALTN OF LITHIC CLASTS
HORN SDST
DECOMPOSING—LY WEATHERED TO CLAY AND OXIDISED
PRg-YARROL/SCAG


Rocktypes.tab

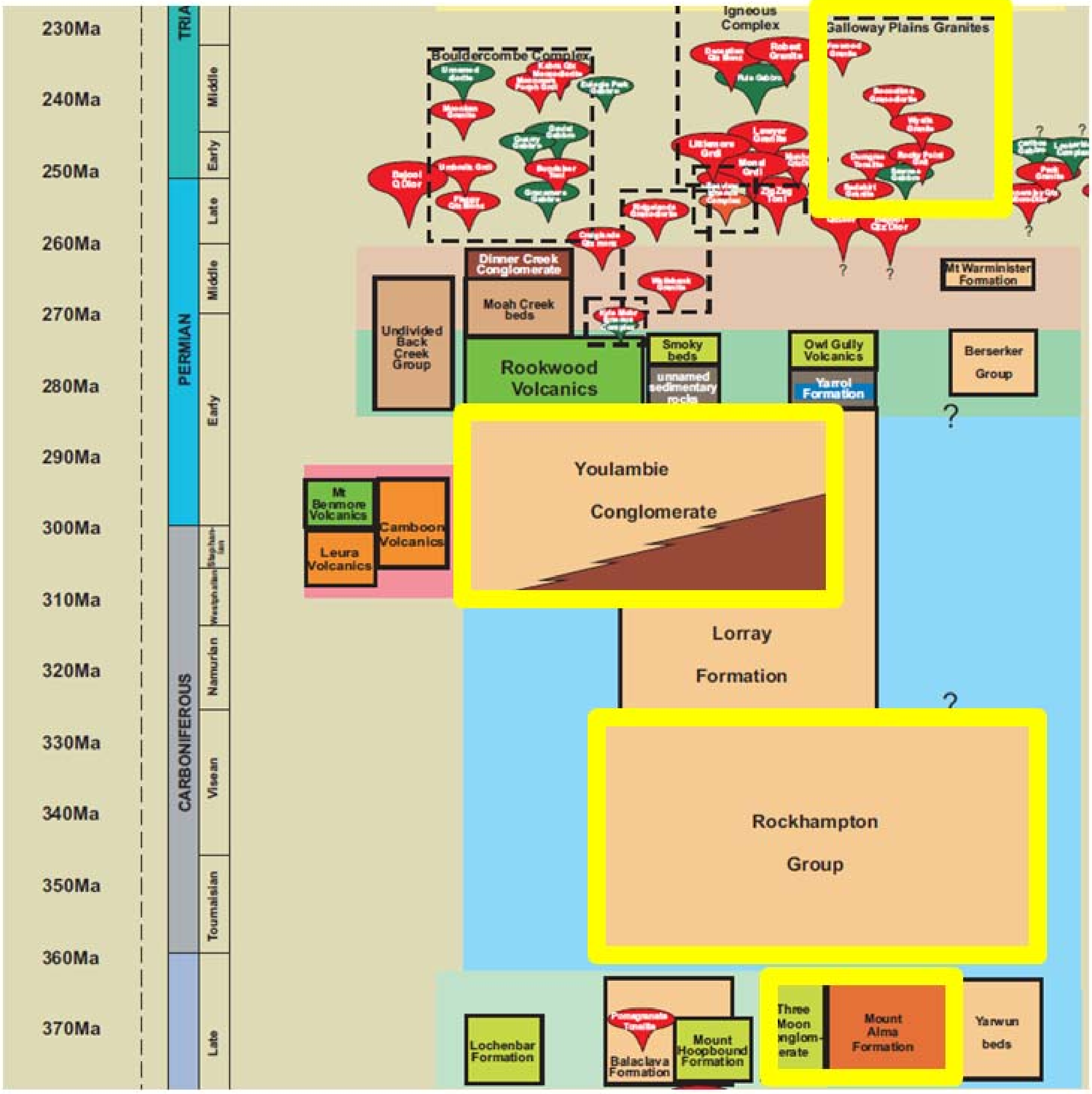




Site_observation_summaries.tab



Interpreted timing of intrusive events (GSQ Yarrol Prospectivity Project)



Stratigraphic chart modified from GSQ 5.