TECHNICAL MEMORANDUM:

To: CSA- Graham Jeffress, Simon Dorling, Peter Muhling
From: Southern Geoscience Consultants – Dave Isles
22 September 2009

ASSESSMENT OF REGIONAL AEROMAGNETIC DATA ALBANY FRASER PROVINCE, WA FOR NORSEMAN GOLD LTD

SUMMARY

SGC was engaged by CSA to provide an interpretation of newly released WA government aeromagnetics covering tenements held by CSA's client, Norseman Gold Limited (NGX), in the southern part of the Albany Fraser province. The exercise was limited by time available ahead of decision points on these tenements, but included a regional conceptual view of the locations of known mineralisation north east of NGX's tenements (especially 'Tropicana') as well as a 1:250,000 scale interpretation over the tenements themselves.

The principal conclusion is that northern block of EL's lies in a quite compelling tectonic setting within likely deformed Archaean rocks, and has some similarities with the settings of the known gold occurrences to the NE. Within these EL's, areas of greater and lesser exploration interest have been inferred and portions which could be relinquished are identified. The southern ELs occur in much more highly deformed and (following the recent GSWA work) likely much younger rocks. There are features of interest in the aeromagnetics within the southern EL's which are worthy of further investigation, but overall these would rank lower than the areas of interest identified on the northern EL's.

INTRODUCTION

The writer was engaged to assess WA government, semi regional aeromagnetic data as part of CSA's appraisal of tenements held by NGX in the Albany Fraser province. A quite short time frame was made available for the work owing to tenement deadlines and looming decision points in the tenements. An important part of the exercise was to look at the regional characteristics of known mineralisation in the province and identify any potential 'controls' which could also be present in the area of the NGX tenements.

Detailed and comprehensive interpretation procedures were not practicable within the allotted time frame, so the exercise comprised sketches and commentary on key observations based on the writer's (substantial) experience in the application of aeromagnetics to gold exploration programmes.

MEGA SCALE VIEW

The images and Interpretation sketch at the very regional scale (figures 1,2 &3) illustrate the inter-relationships between the crustal architecture of the Yilgarn Block and the 'Fraser' section of the Albany-Fraser 'orogen'. The views expressed here are those of the author and do not necessarily conform with the conventional views held by GA and GSWA workers.

The key points are:

- NW structural Corridors
- The 'underlying' controls on the granite greenstone architecture are NW and NS and these are not explicitly expressed in the patterns of near surface exposure and interpreted, major near-surface faults.
- Three of the NW structural corridors are of particular interest in this study.
    - The 'Yamarna Corridor' transects the general 'Tropicana' district and appears to continue beneath the younger metamorphic rocks to the SE.
    - The 'Leonora Corridor' has a potential link to the 'Beachcomber' group of gold occurrences.
    - The Widgiemooltha Corridor is inferred to be the major fracture ('transfer') zone controlling the southern limit of the Fraser Zone. The northern group of NGX tenements lie within this corridor.

Cundeelee Fault and Munglinup Zone (Northern Foreland)

Although unquestionably a fault in many localities, this feature is often only evident as a weak change in the magnetisation of rocks. In many areas, Yilgarn Block granite-greenstone trends are continuous across the 'fault' and these often persist for large distances southeast into the 'Northern Foreland/ Munglinup Gneiss. In the author's view this suggests that the 'fault' represents the limit of alteration/metamorphism inflicted on the Yilgarn during the Fraser orogenic event. Southeast from the 'Cundeelee Fault' deformation and metamorphism appear to increase but for the most part, the Munglinup zone appears to be 'cooked up Yilgarn'. Nearly all of the mineralisation discovered to date in the Fraser Orogen lies within the author's version of the 'Mulglinup Zone'. In the Tropicana district a broad magnetic high associated with Yilgarn granitoid rocks shows apparent continuity across the Cundeelee Fault.

Large Linear Gravity Low (Greg Hall's Granite Belt)

A very striking feature of the gravity data (fig2) is a broad but linear belt of strong low gravity. It is not related to near surface granite-greenstone trends. It is trangressive to these, paralleling the Fraser Orogen. The source of the gravity low straddles the Cundeelee fault, ie it partly underlies 'unaltered Yilgarn' and partly underlies the Munglinup Zone. The simplest explanation of this feature has been offered by Greg Hall (unpublished, but often espoused e.g. 'Muruntau' talk to MEGWA). His view is that the low is a massive granitic pluton belt (at substantial depth) associated with the development of the Fraser Orogen. No clear relationship between this gravity low belt and known mineralisation is apparent, although many of the occurrences lie close to the eastern margin of the belt.

Belt of Remnantly Magnetised intrusives

'Inboard' from the gravity low belt, immediately east and south of Tropicana, there is a >200km long, ~8km wide belt of very distinct, localised magnetic lows. These, almost certainly, are remnantly-magnetised mafic ± ultramafic intrusives. Isolated, similar bodies occur outside this tightly confined belt. The possible genetic links between these intrusives, the inferred granite belt and the development of the Fraser Orogen deserve some thought, but this level of 'arm waving' is beyond the scope of this exercise. Of strong relevance, however is that the Corvette group of gold occurrences plus the 'Hurricane' and 'COV' prospects lie within this belt.

Large Scale Dykes

While dykes, and particularly EW (+/-) oriented dykes abound through much of the Yilgarn Block, there are a number which stand out due to their extraordinary scale (500km +/-) and in places their very significant volumes. These very large dykes predate the Fraser Orogen (the Jimberlana Dyke is dated at 2411Ma) and form an integral part of the cratonic fabric. Isles & Cooke (1990) have suggested potential links between the dykes and pre-existing structures which influence gold localisation. Although relevance of the dykes, (or more importantly the fractures which the dykes occupy) is not clear, there is sufficient empirical evidence to suggest a link and keeping an open mind as to their significance is recommended.

Setting of NGX Tenements in the Mega Scale Context

In the vicinity of NGX's northern EL's, the NW trending 'Widgiemooltha Corridor' is interpreted as a deep seated 'transfer fault', which has caused around 50km of dominantly left lateral displacement on the leading edge of the 'Fraser Zone'. At a local scale this translates into some most interesting structural scenarios (refer notes by S Dorling, CSA). As mentioned, the northern group of EL's lies predominantly within the inferred zone of 'cooked up Yilgarn' material (Munglinup Zone), and straddles the contact (Coramup Fault Zone) between the Munglinup and the younger Proterozoic metamorphics.

The southern ELs are located within these younger and much more highly deformed Proterozoic metamorphic.

CHARACTERISTICS OF KNOWN MINERALISED AREAS

As part of the current exercise, a 'district scale' analysis was undertaken on the four main areas of known gold mineralisation to facilitate some potential comparisons with the NGX areas.

The Tropicana area comprises several kilometres of geochemical anomalism and significant gold intercepts and a reported 5MOz resource. The other areas of interest have been identified by CSA from a variety of public releases and at this stage constitute 'mineralised prospects' rather than 'known deposits', so the observations made below should be considered in this context.

Tropicana District (figures 4 & 5)

At the very regional scale, the potential influence of the Yamarna Structural Corridor and the strategically located craton-scale EW dyke cannot be ignored.

The latter fracture appears to propagate into the Munglinup Zone as a fault with several kilometres of (apparent) left lateral offset.

In keeping with the massive texture of the Tropicana host rocks (IGO presentation, 2007) the Munglinup Zone shows limited evidence of relict greenstone belt texture, appearing more like massive granitoid.

Also at the very regional scale a broad, deep magnetic zone, likely to be associated with Yilgarn granitoid rocks can be inferred to show continuity across the Cundeelee Fault. The inference that Tropicana is hosted by 'cooked up Yilgarn' rocks seems the most tenable. The Cundeelee Fault Zone is generally considered a thrust/ high angle reverse fault, although it is evident locally as a normal fault with a significant thickness of Permian sediments on the west side.

A NE structural control is reported on the Tropicana mineralisation. Parallel and in part coincident fractures are evident in the aeromagnetics as is a swarm of dykes which appears to terminate at the eastern limit of the Munglinup Zone, indicating that the dykes predate the Fraser Orogen. No surprises there.

The key points for Tropicana?

- Massive Archaean 'granitoid' host
- Large scale NW and EW fractures possibly providing 'crustal scale' control
- Smaller scale NE fractures localising mineralisation.

Corvette District (figures 6 & 7)

The Corvette group of prospects lies within the distinct tectonic belt defined by the linear 'chain' of (inferred) mafic-ultramafic complexes. The Major thrust contact between the Munglinup Zone and the younger, high grade metamorphics (Fraser Zone, etc) lies at or near the eastern margin of the mafic-ultrmafic belt, and the Corvette group appears associated with a distinct (~5km) jog in this thrust. There is also the eastern 'tail-end' of one of the major EW dykes in the neighbourhood.

The key points for Corvette?

- Munglinup Zone host, but close association with the mafic-ultramafic belt
- Close proximity to 'terrain-bounding' fault with major jog near mineralised areas
- Possible influence of crustal scale EW fracture

Beachcomber District (Figures 8 & 9)

The Beachcomber group is located in an area where the 'Cundeelee Fault' is indistinct, appearing in regional imagery to comprise a gradual 'demagnetising' of Yilgarn Block material toward the SE. There is good evidence of well preserved 'greenstone belt' linear magnetic units. Beachcomber itself sits on a clear jog in a major NW fault zone (probably the main manifestation of the 'Cundeelee Fault'. Ambrosia lies in a featureless section of the Munglinup Zone and Katinka lies in an area of strong linear mag units (probable Archaean greenstone units) with indications of well developed NW fractures.

The key points for the Beachcomber District?

- Munglinup Zone host, well preserved Archaean greenstone belt units
- Large scale structural controls, NE and NW

Similkameen District (Figures 10 &11)

Similkameen lies within a very well defined Proterozoic high strain zone. It dominated by extended NE trending linear mag features and looks almost certainly to comprise high-grade, strongly foliated gneisses. There is no evidence of any pre-existing Archaean rocks.

The western margin of this 2-3 km wide high strain zone may be the boundary between the Proterozoic "Biranup" and (cooked up) Archaean "Munglinup" Zones and notably there is a 15 km long 'string' if small negative magnetic features which may well be related to the similar, but larger scale belt which hosts the Corvette group.

Also of note are copper occurrences in the same high strain zone at Yardilla South, Yardilla East and Simons Hut

The key points for the Similkameen?

- Hosted with major fault zone. No evidence of 'lateral' controls
- Possible ('distal') association with ?mafic-ultramafic intrusive as at Corvette

NORSEMAN GOLD TENEMENT AREAS (see interpretation maps & GIS layers)

Methodology

Imagery prepared by GeoDiscovery were analysed at 1:250,000 scale in order to capture both regional and local features of the semi-detailed (400m spaced) aeromagnetic data. Observations were focused on differentiating discrete linear magnetic units which appeared likely to reflect original rock units from those more likely due to magnetic mineral segregation due to foliation. Although subjective and by no means definitive, this differentiation enabled the writer to postulate areas of preserved Archaean granite greenstone terrain, which from the above analysis of known mineralisation in the region, appears the most prospective. The other 'textural differentiation' which assisted in defining areas of likely 'Archaean from the Proterozoic gneiss belts was the recognition of higher vs. lower strain in the areas of more 'massive' magnetic character.

Fault and fracture patterns also formed an important part of the observation set.

Using the above observation layer in the context of studies of the mineralised areas above, a 'lithostratigraphic' interpretation layer was compiled, following as much as practicable, the interpretive work of the GSWA (Spaggiari et al Record 2009/10). The simplistic differentiations, discussed above formed the basis for this map which concentrated in more detail on the NGX tenement areas.

Interpretation

A descriptive account of the interpretive work contained in this map is not attempted here. The reader is referred to the maps.

The principal points, pertinent to the NGX tenements are:

- The Coramup Fault Zone transects the two main blocks of ELs, but Archaean rocks are only preserved in significant amounts on the northern block.

- The northern block of ELs lies within the influence of the major NW fracture zone (Widgiemooltha Corridor) and the structural style of the inferred greenstone belt rocks reflects this. At the broad scale, this structural corridor could well represent a regional 'dilation zone' and so provide a focus of interest for gold exploration.
- A number of specific areas of structural interest are identified on this basis.

- The southern ELs have little, if any preserved Archaean and the structural fabric through them looks strong, but uniform and 'uninteresting' for the most part. A number a possible areas of interest are identified but these are ranked well below the 'greenstone' areas in the northern ELs.

There are several specific 'anomalies' which warrant mention and likely field investigation. These have been previously recognised by G. Mackee of GeoDiscovery but are worth restating in this memo.

1. In E63/957 there is a strong, narrow, linear (~2km) mag high close to the major Coramup Fault Zone. It may be a remnant of Archaean ironstone or may represent some form of alteration/ mineralisation.
2. At the southern margin of E 63/1232 there is a differentiated magnetic intrusive body. The magnetic data would suggest a mafic or ultra mafic source, and potential for nickel or PGM's but it may well equally be a differentiated felsic intrusive.
3. Within E63/0952 there is an 'odd' equidimensional (~2km in diameter) mag feature which looks 'discordant'. It sits within a massive zone of 'granitoid texture' and may also be situated on a fold axis.

None of these represents a compelling exploration target, but 1. in particular is worthy of field investigation.

RECOMMENDATIONS

The priority areas for exploration are discussed above and comprise very largely areas of interpreted Archaean granite greenstone terrain.

The features and areas noted in the northern block of ELs far outrank those suggested in the southern ELs to the extent that the writer, on the basis of the data used in this report, would consider relinquishing the southern ELs.

The methodology of field follow up of the higher priority areas in the northern ELs will be driven by the nature of the regolith and the thickness of cover. More in-depth analysis of the aeromagnetics may assist in defining the depth to fresh 'bedrock' for this purpose. Analysis of the aeromagnetics at a more detailed scale (down to 1:50,000) would be warranted in local areas of interest where other information (geochemistry, geology, drill hole data) suggested some degree of 'prospectivity'.

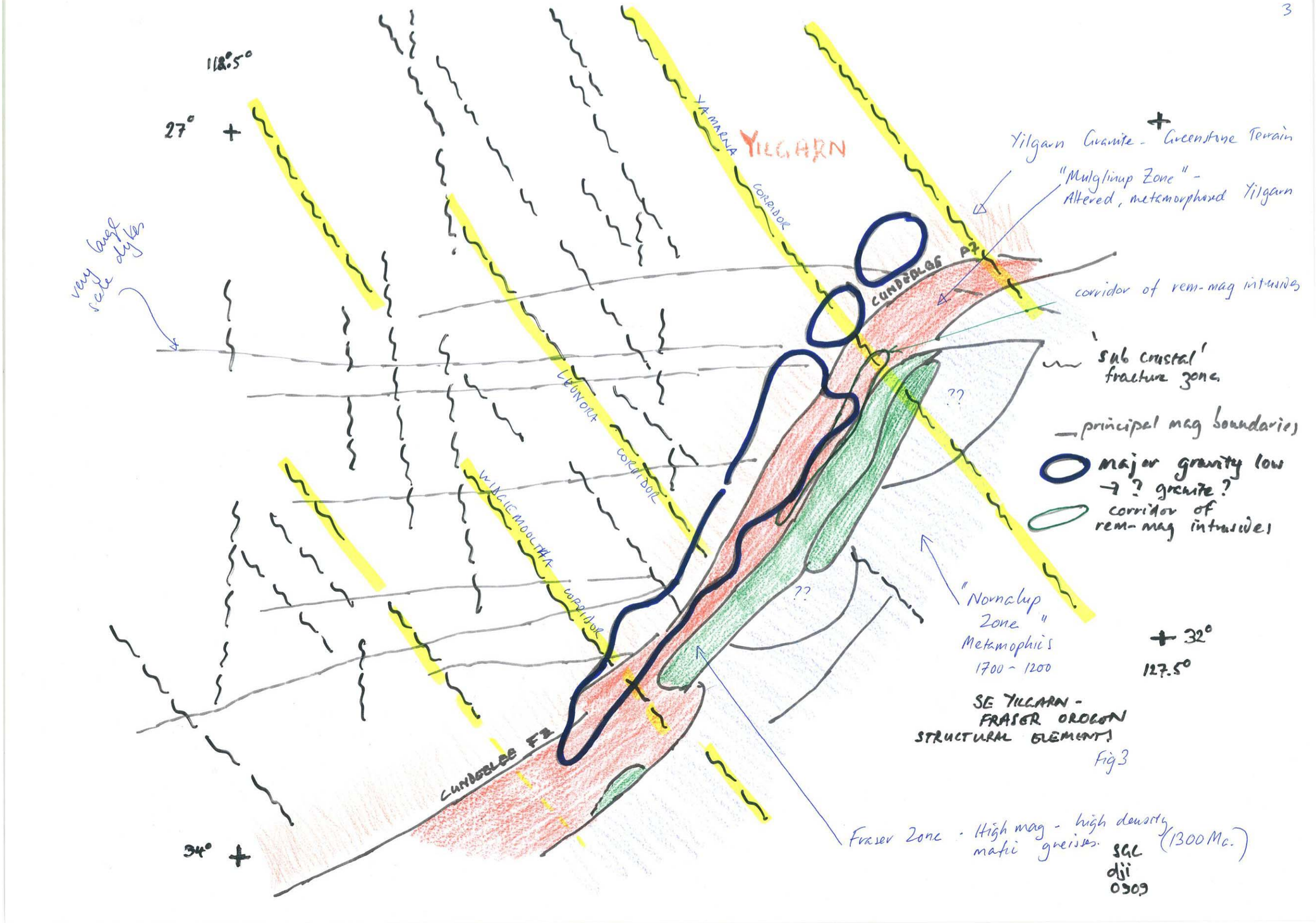
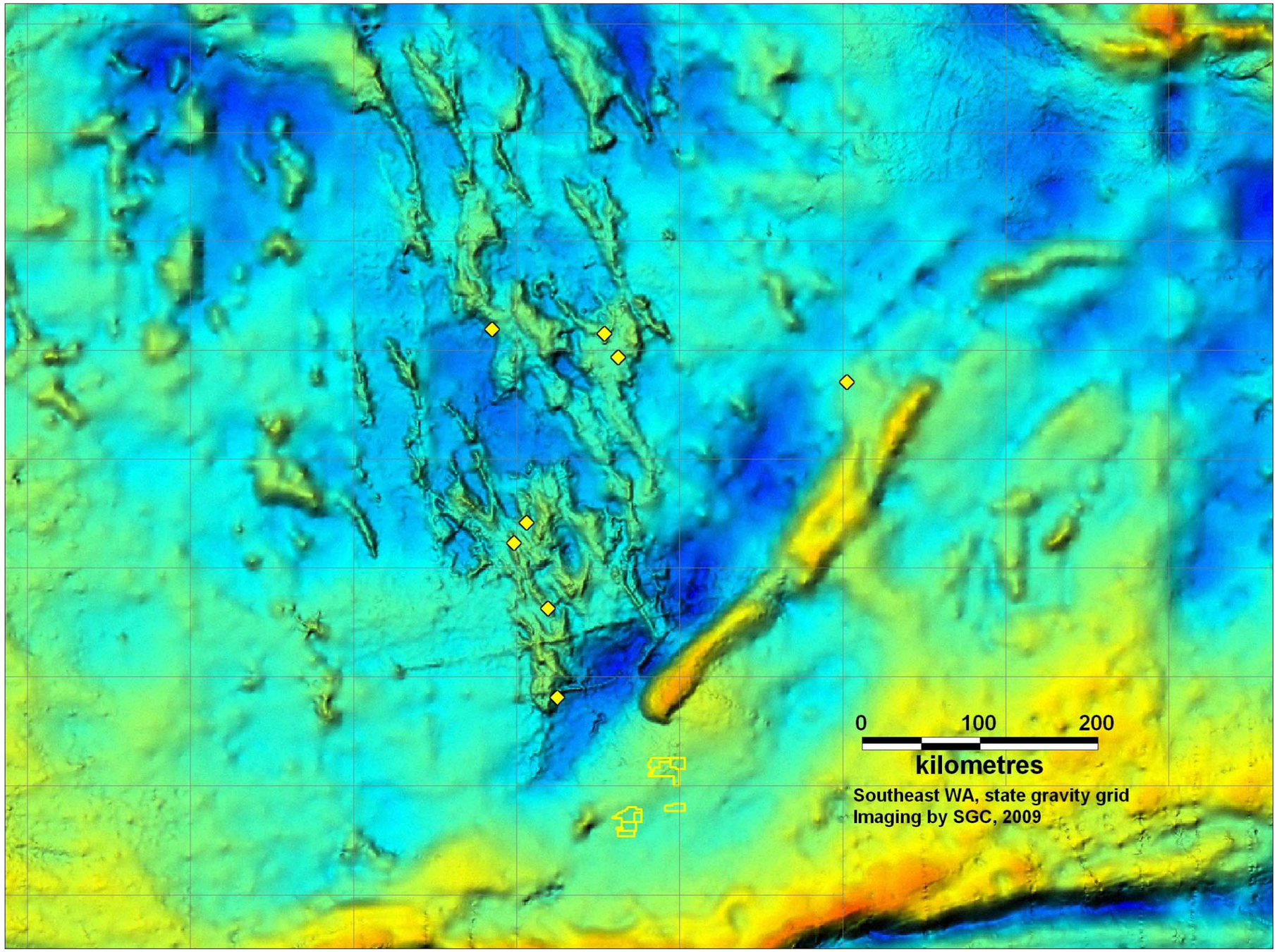

118.5°
27°
very large size dykes
YILGARN
YARRAMA CORRIDOR
LEEUWIN CORRIDOR
WILGALIA MOOLTHA CORRIDOR
CUNDEELEE F2
Yilgarn Granite - Greenstone Terrain
"Mulglinup Zone" - Altered, metamorphosed Yilgarn
corridor of rem-mag intrusives
'sub crustal' fracture zone
principal mag boundaries
major gravity low → ? granite ?
corridor of rem-mag intrusives
"Nornalup Zone" Metamorphics 1700 - 1200
32°
127.5°
SE YILGARN - FRASER OROGEN STRUCTURAL ELEMENTS
Fig 3
Fraser Zone - High mag - high density mafic gneiss. (1300 Ma.)
SGL dji 0309
34°

Figure 1


0
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kilometres
Southeast WA, state gravity grid
Imaging by SGC, 2009

Figure 2

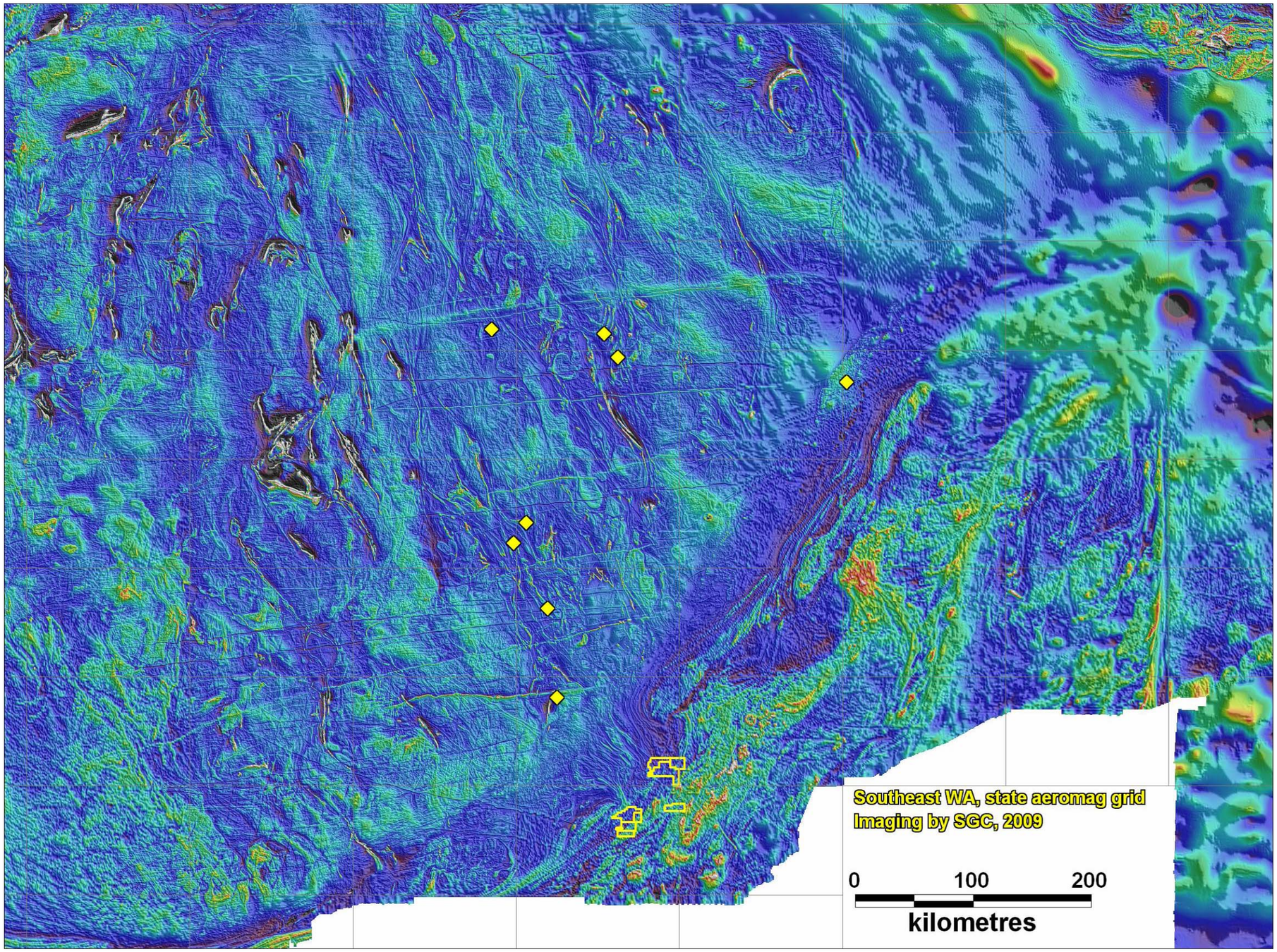
Southeast WA, state aeromag grid
Imaging by SGC, 2009
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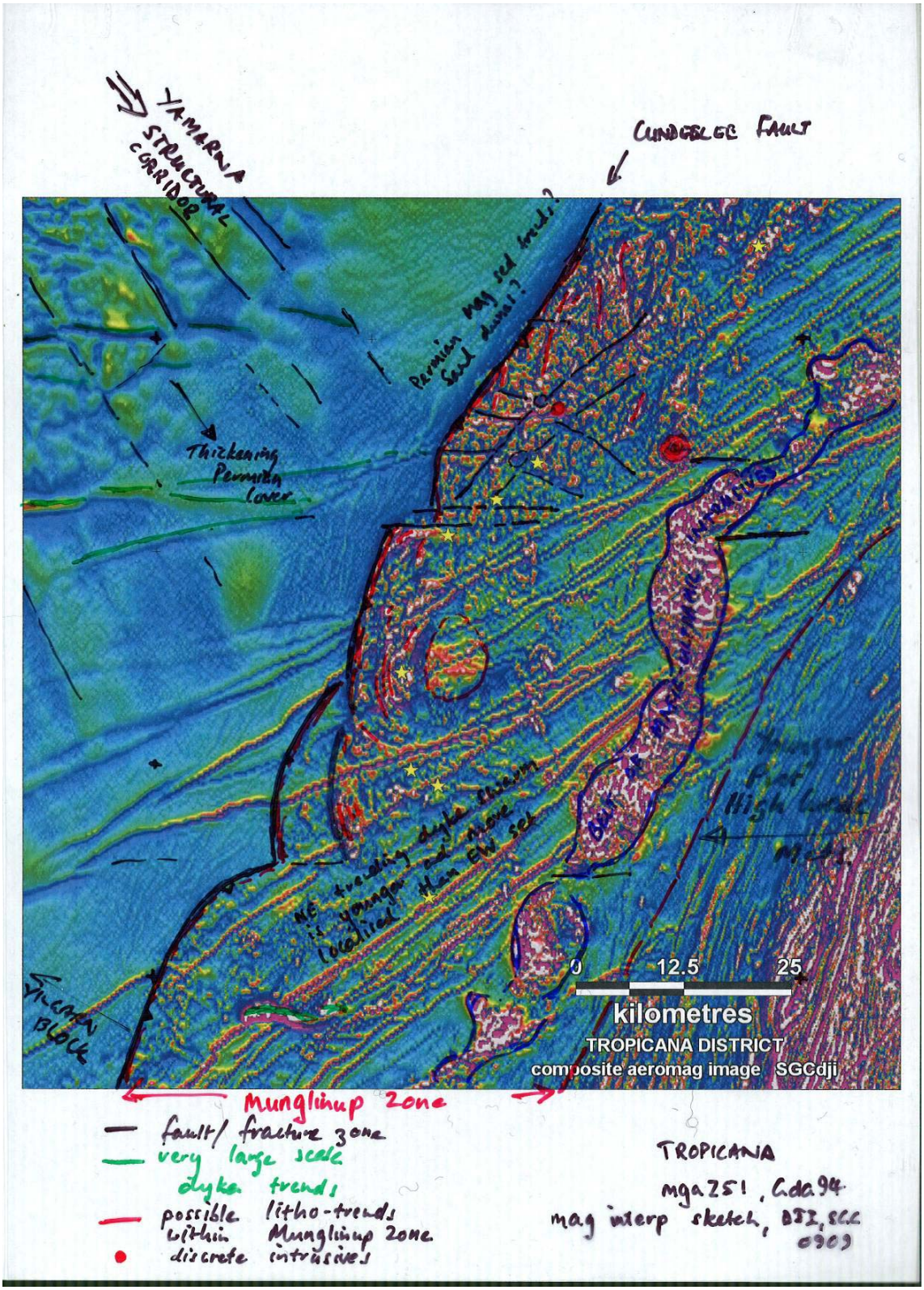
Figure 3


YAMARNA STRUCTURAL CORRIDOR
CUNDERDIN FAULT
Permian mag sed trend?
Thickening Permian cover
NE trending dyke swarm
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kilometres
TROPICANA DISTRICT
composite aeromag image SGCdji
Mungliinup zone
fault/ fracture zone
very large scale dyke trends
possible lithin discrete
litho-trends Mungliinup zone intrusives
TROPICANA
mga251, Cda94
mag interp sketch, DJI, SGC 0909

Figure 4

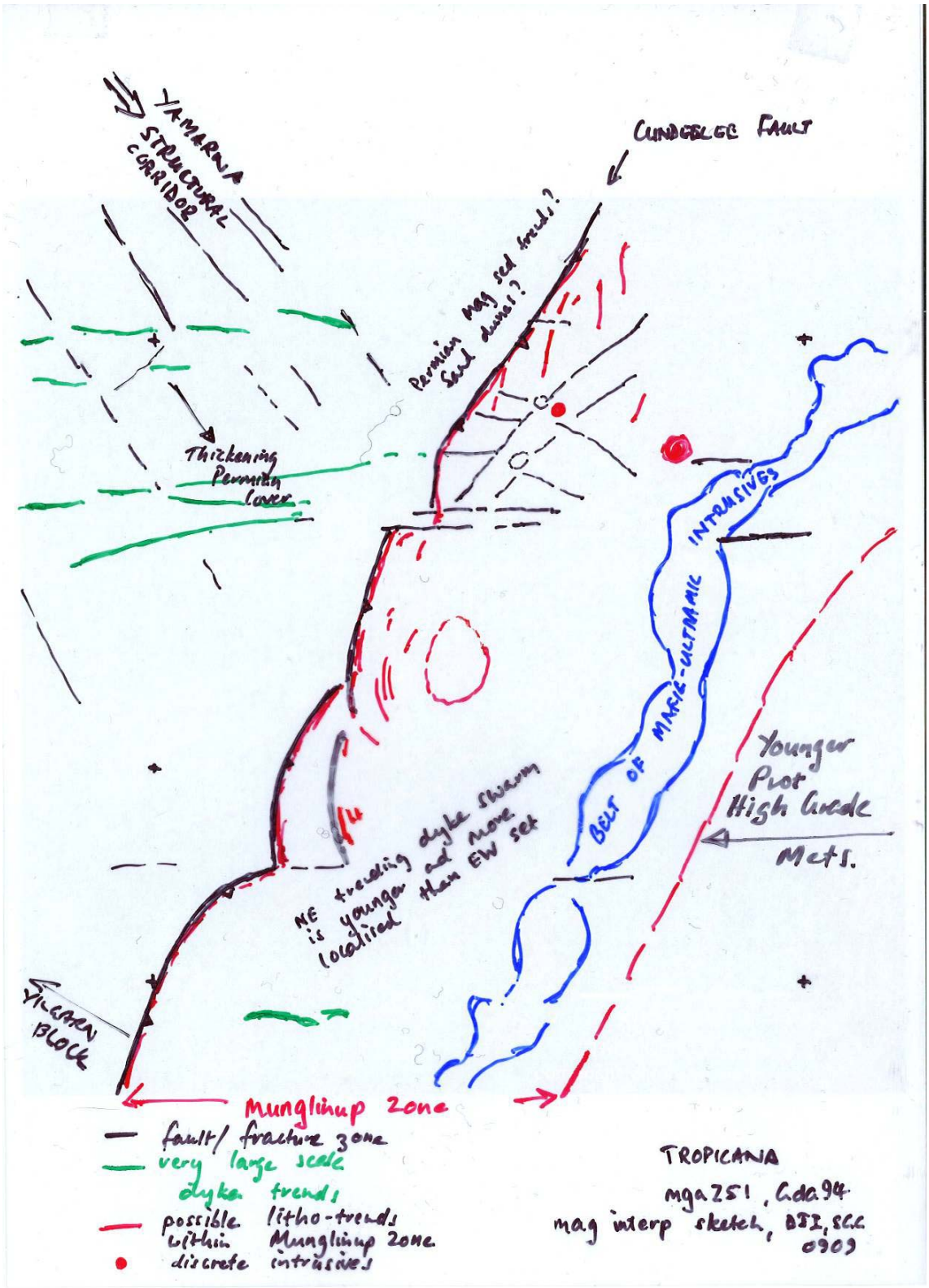

YAMARNA STRUCTURAL CORRIDOR
CUNDERDIN FAULT
Permian mag sed trends?
Permian Sand dunes?
Thickening Permian cover
BELT OF MAFIC-ULTRAMAFIC INTRUSIVES
Younger Prot High Grade Mets.
NE trending dyke swarm is younger and more localised than EW set
YILGARN BLOCK
Mungliinup zone
fault/ fracture zone
very large scale dyke trends
possible litho-trends within Mungliinup zone
discrete intrusives
TROPICANA
mga251, Cda94
mag interp sketch, BII, SCC
0909

Figure 5

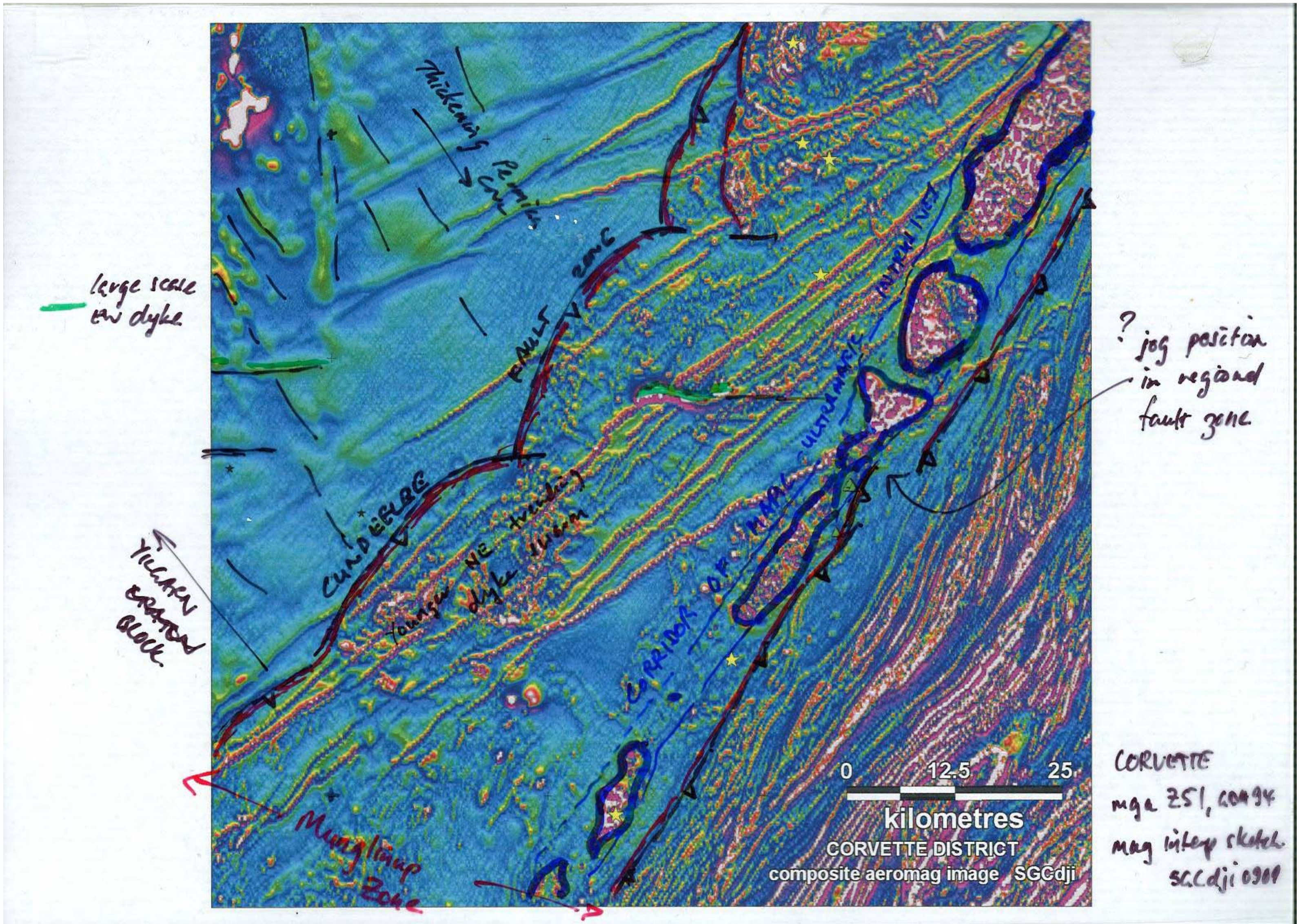

0
12.5
25
kilometres
CORVETTE DISTRICT
composite aeromag image SGCdji
large scale EW dyke
? jog position in regional fault zone
YILGARN CRATON BLOCK
CUNDEELEE
FAULT ZONE
Younger NE trending dyke swarm
CORRIDOR OF MAFIC ULTRAMAFIC

Figure 6

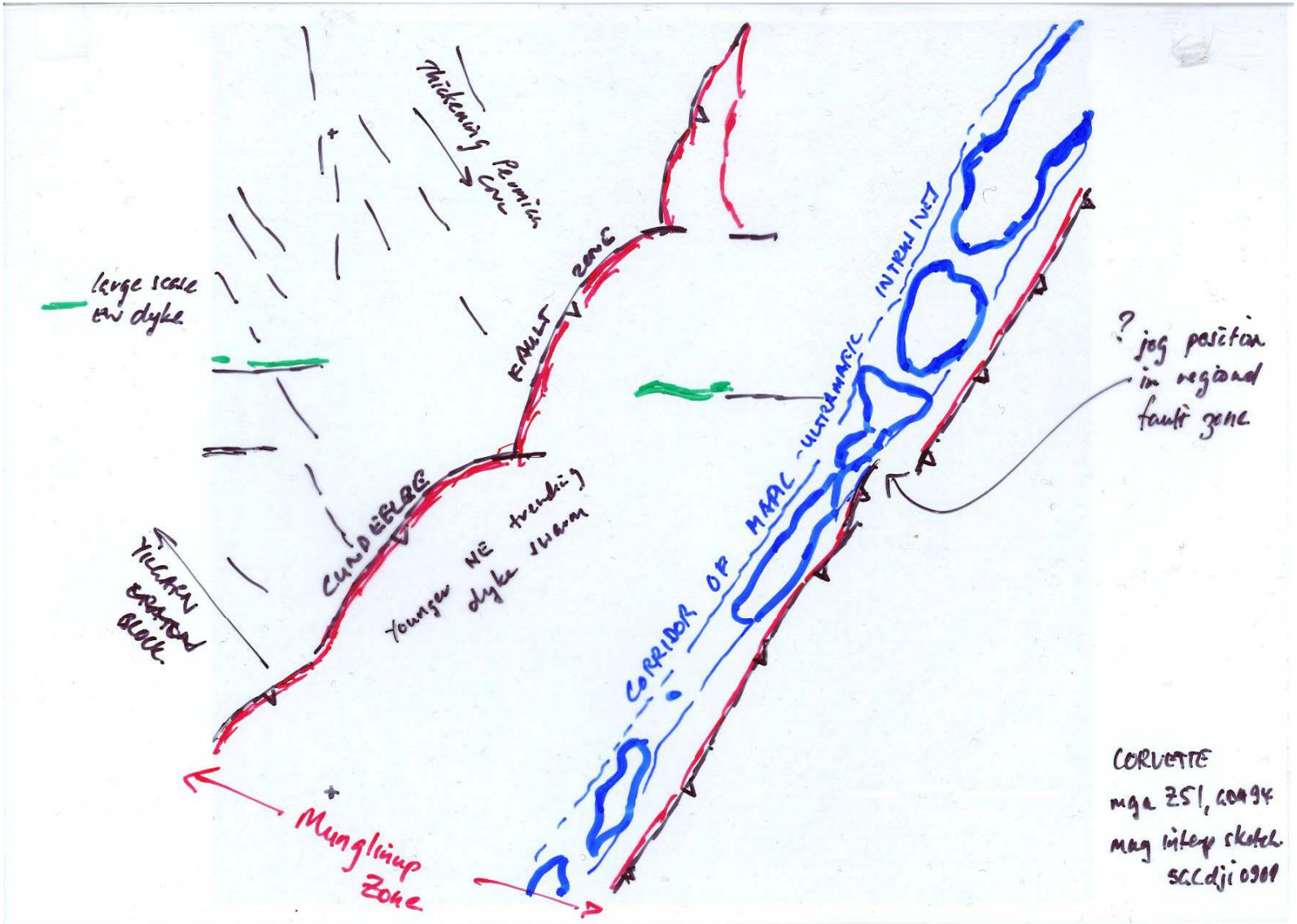
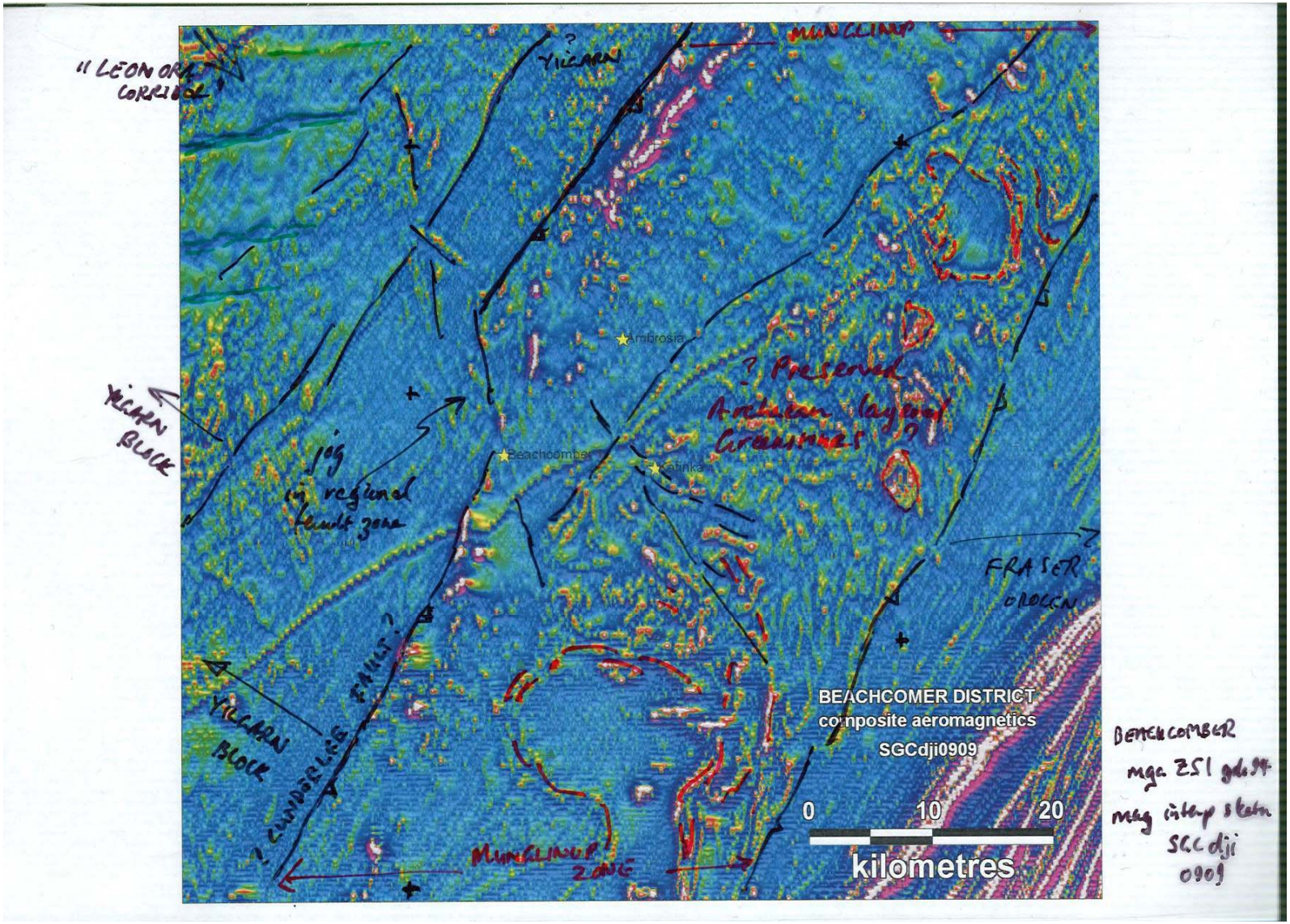

large scale EW dyke
Thickening Permian Cover
FAULT zone
CUNDERDIN
Youngw NE trending dyke swarm
YILGARN CRATON BLOCK
CORRIDOR OF MAFIC - ULTRAMAFIC INTRUSIVE
? jog position in regional fault zone
Mungliup Zone
CORVETTE
mga 251, 20494
mag interp sketch
SCC dji 0909

Figure 7


MUNGLINUP
YILGARN
Ambrosia
Beachcomber
Katinka
? Preserved Archean layered Greenstones
FRASER OROGEN
BEACHCOMBER DISTRICT
composite aeromagnetics
SGCdji0909
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BEACHCOMBER
mga 251 gda94
mag interp skeln
SGC dji
0909

Figure 8

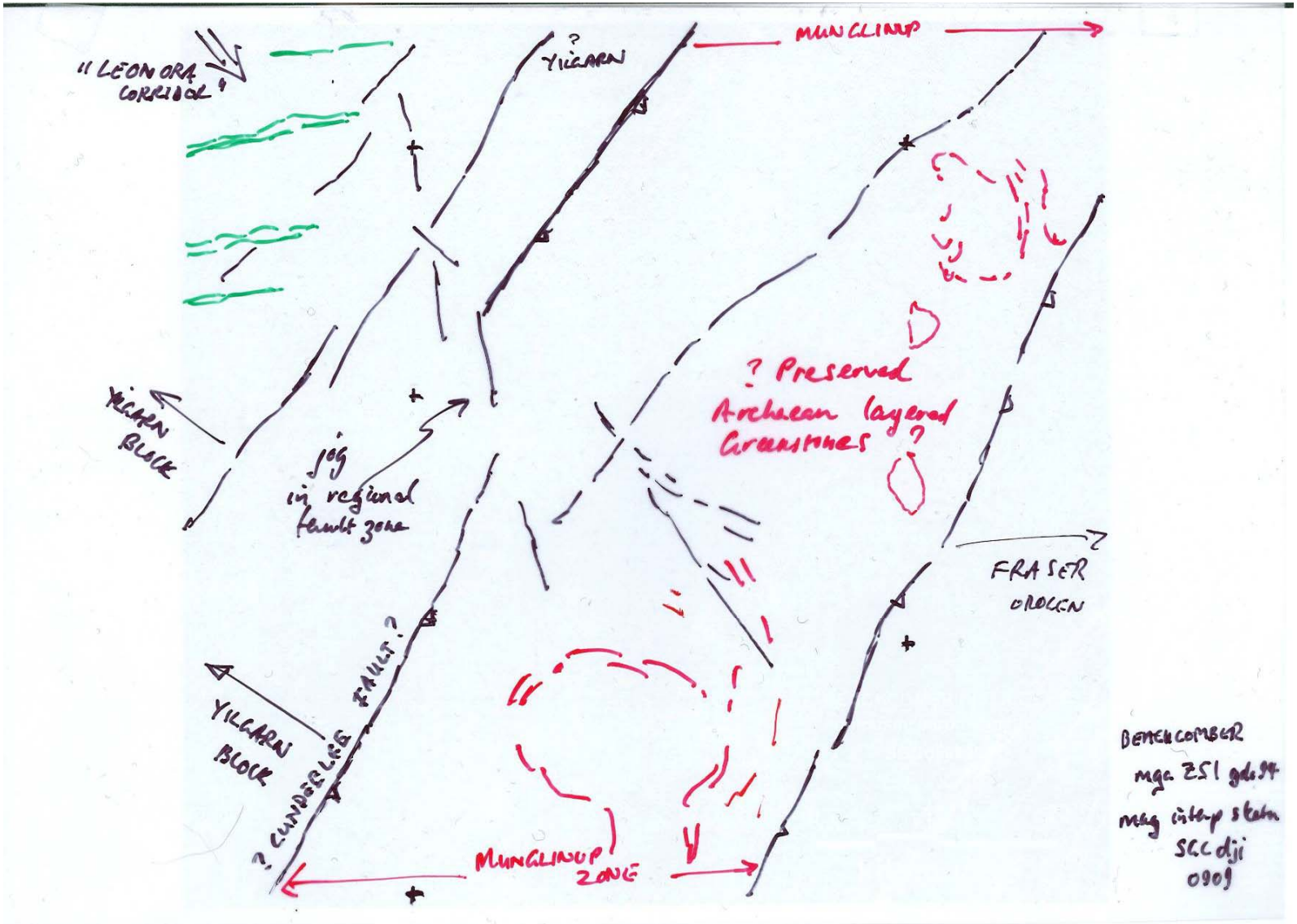
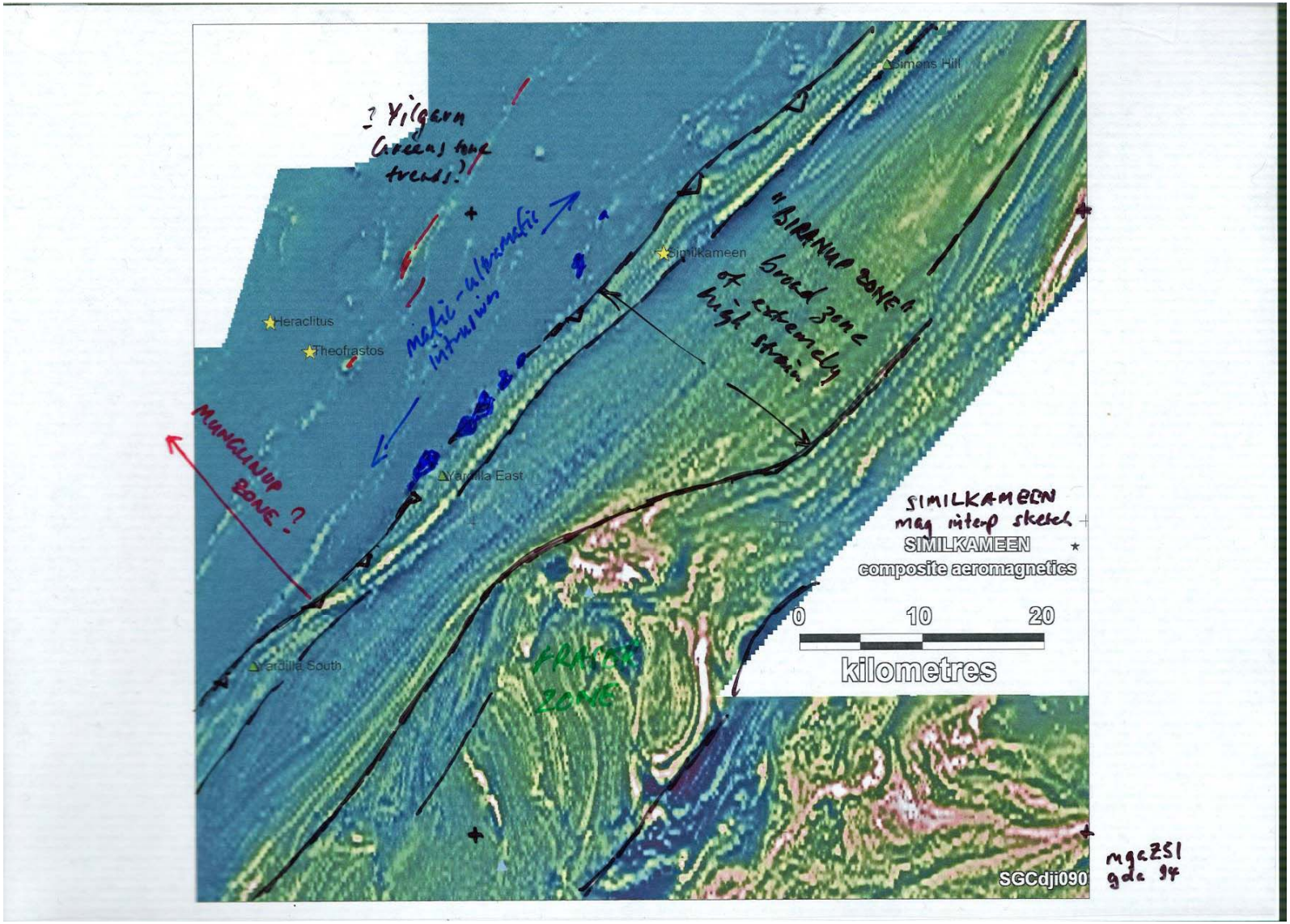

"LEONORA CORRIDOR"
YILGARN
MUNGLINUP
YILGARN BLOCK
jog in regional fault zone
? Preserved Archaean layered Greenstones ?
FRASER OROGEN
YILGARN BLOCK
? CUNDELEE FAULT ?
MUNGLINUP ZONE
BENCHCOMBER
mga 251 gda94
mag interp skm
SCC dji
0909

Figure 9


? Yilgarn Archaean trend trends?
Heraclitus
Theofrastos
mafic-ultramafic intrusion
"BIRRIMUP ZONE" broad zone of extremely high strain
Simons Hill
Similkameen
Yardilla East
MUNGALINUP ZONE ?
Yardilla South
FRACTURE ZONE
SIMILKAMEEN mag interp sketch
SIMILKAMEEN
composite aeromagnetics
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10
20
kilometres
SGCdji090
mga251 gda 94

Figure 10

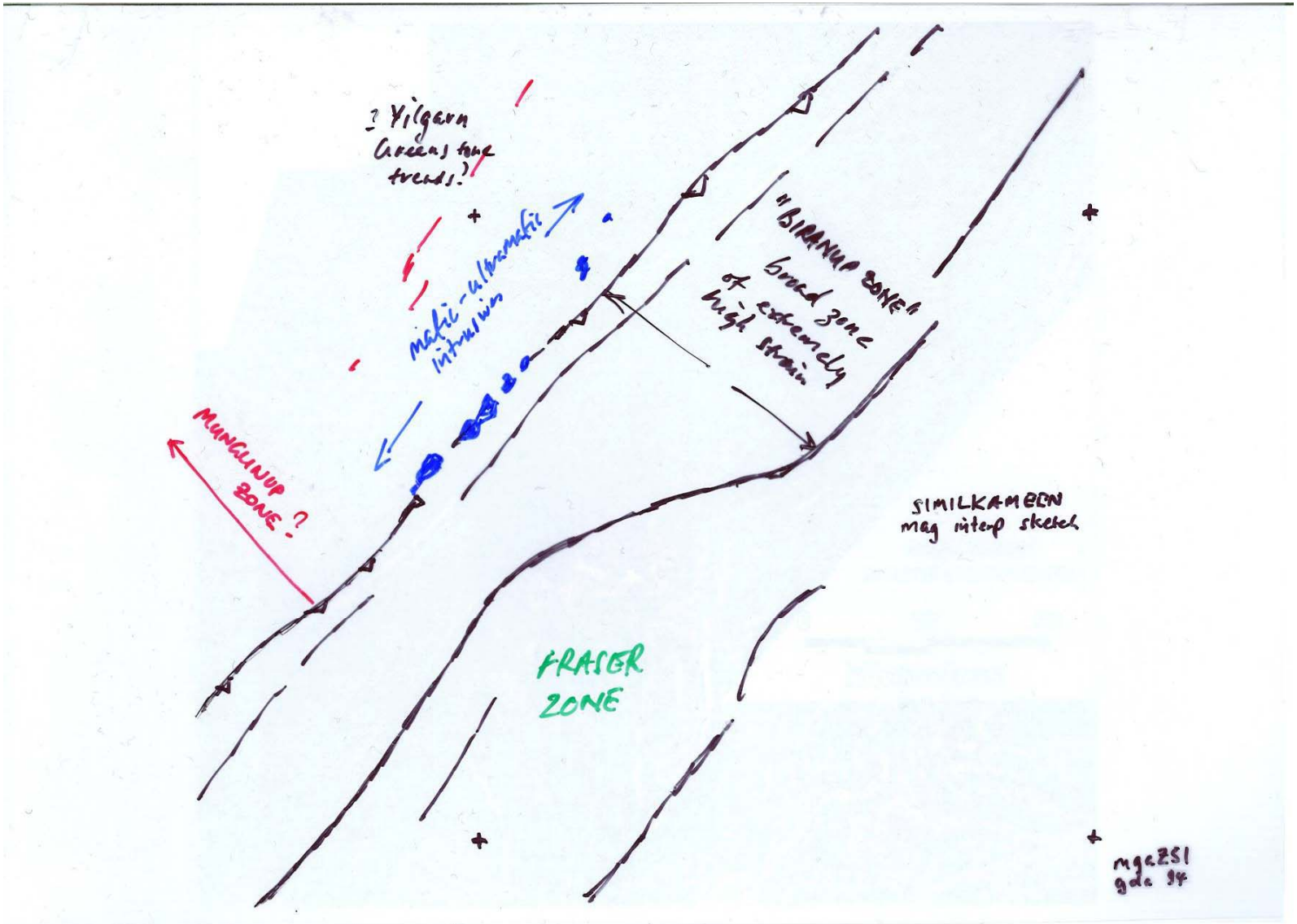
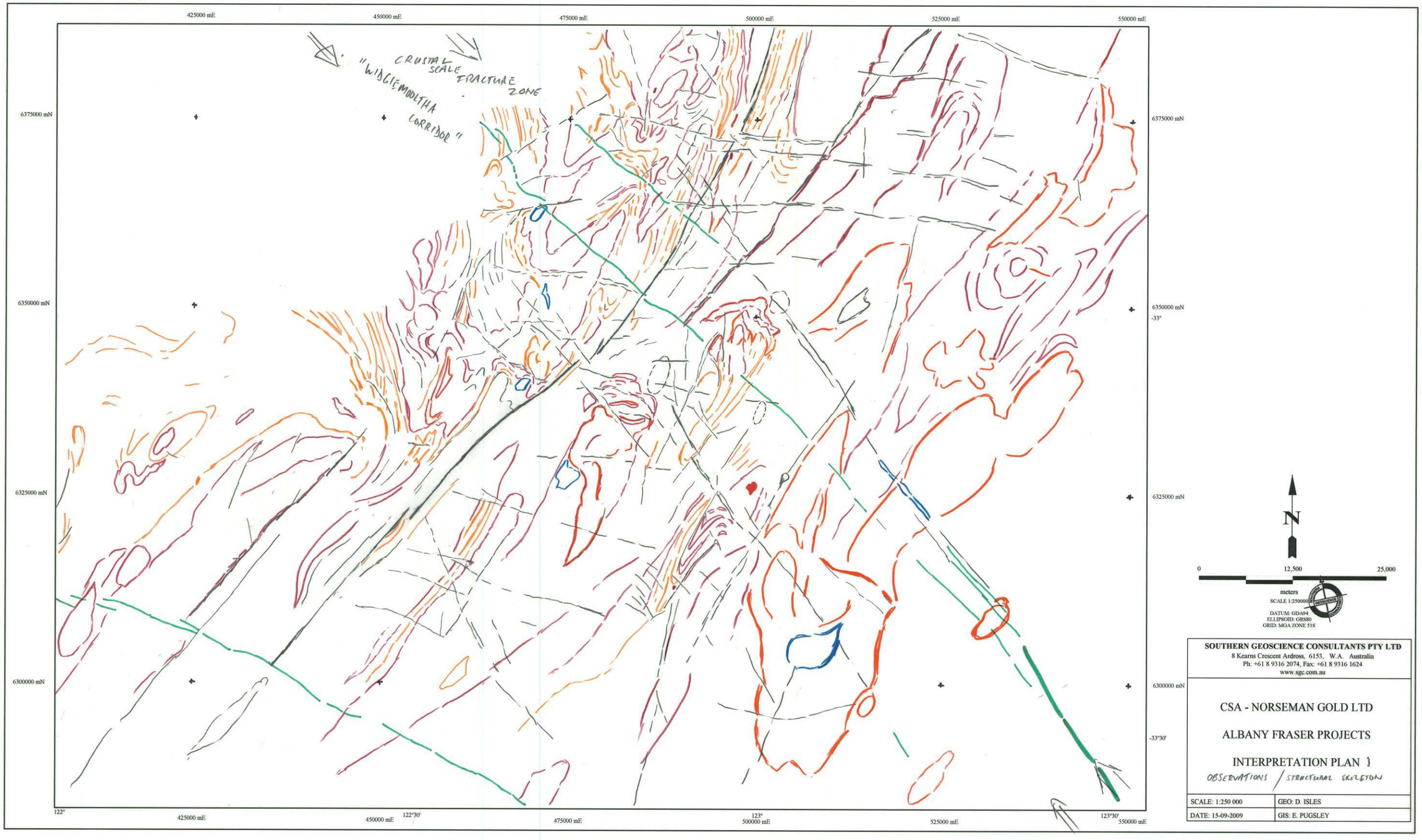

? Yilgarn Archean trend trends?
mafic - ultramafic intrusives
"BIRRIMIAN ZONE"
broad zone of extremely high strain
MUNGALINUP ZONE ?
SIMILKAMEEN mag interp sketch
FRASER ZONE
mga251 gda 94

Figure 11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450000 mE
475000 mE
500000 mE
525000 mE
550000 mE
6375000 mN
6350000 mN
6325000 mN
6300000 mN
-33°
-33°30'
122°
122°30'
123°
123°30'
CRUSTAL SCALE FRACTURE ZONE
"WISCIEMODLTHA CORRIDOR"
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12,500
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meters
SCALE 1:250000
DATUM: GDA94
ELLIPSOID: GRS80
GRID: MGA ZONE 518
SOUTHERN GEOSCIENCE CONSULTANTS PTY LTD
8 Kearns Crescent Ardross, 6153, W.A. Australia
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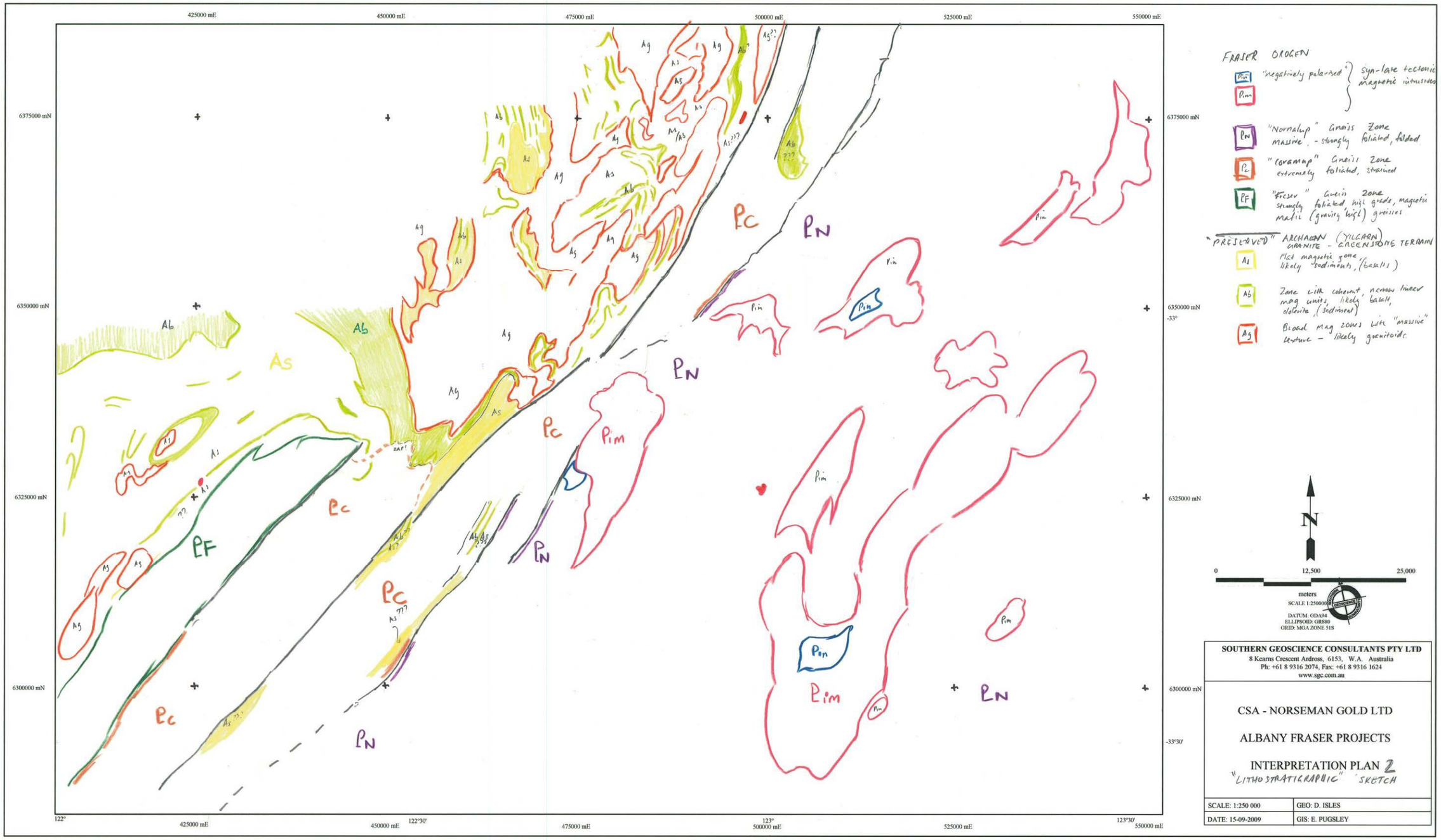
www.sgc.com.au
CSA - NORSEMAN GOLD LTD
ALBANY FRASER PROJECTS
INTERPRETATION PLAN 1
OBSERVATIONS / STRUCTURAL SKELETON
SCALE: 1:250 000
GEO: D. ISLES
DATE: 15-09-2009
GIS: E. PUGSLEY

Figure 12


425000 mE
450000 mE
475000 mE
500000 mE
525000 mE
550000 mE
6375000 mN
6350000 mN
6325000 mN
6300000 mN
-33°
-33°30'
122°
122°30'
123°
123°30'
FRASER OROGEN
Pim
"negatively polarised"
syn-late tectonic magnetic intrusives
Pim
PN
"Normalup" Gneiss Zone
massive, - strongly foliated, folded
Pc
"coramap" Gneiss Zone
extremely foliated, strained
PF
"Fraser" Gneiss Zone
strongly foliated high grade, magnetic mafic (gravity high) gneisses
"PRESERVED" ARCHAEAN (YILGARN) GRANITE - GREENSTONE TERRAIN
A1
Flat magnetic zone
likely sediments, (basalts)
Ab
Zone with coherent, narrow linear mag units, likely basalt, dolerite, (sediment)
Ag
Broad mag zones with "massive" texture - likely granitoids
N
0
12,500
25,000
meters
SCALE 1:250000
DATUM: GDA94
ELLIPSOID: GRS80
GRID: MGA ZONE 51S
SOUTHERN GEOSCIENCE CONSULTANTS PTY LTD
8 Kearns Crescent Ardross, 6153, W.A. Australia
Ph: +61 8 9316 2074, Fax: +61 8 9316 1624
www.sgc.com.au
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ALBANY FRASER PROJECTS
INTERPRETATION PLAN 2
"LITHOSTRATIGRAPHIC" SKETCH
SCALE: 1:250 000
GEO: D. ISLES
DATE: 15-09-2009
GIS: E. PUGSLEY

Figure 13


425000 mE
450000 mE
475000 mE
500000 mE
525000 mE
550000 mE
6375000 mN
6350000 mN
6325000 mN
6300000 mN
122°
122°30'
123°
123°30'
-33°
-33°30'
localities of specific structural interest
Preserved Archaean
very strong, local magnetic body in high strain zone
"Possible" zone of preserved Archaean G-G terrain
COEARUP FAULT ZONE
differentiated and deformed magnetic intrusive
"odd" magnetic feature
"Possible" belts of highly strained Archaean G-G terrain
N
0
12,500
25,000
meters
SCALE 1:250000
DATUM: GDA94
ELLIPSOID: GRS80
GRID: MGA ZONE 51S
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INTERPRETATION PLAN
AREAS OF INTEREST
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Figure 14