

# SILVER CITY MINERALS LIMITED

ABN 68 130 933 309



ASX Code: SCI

## SMEDG PRESENTATION

23 March 2017

### ***Lithogeochemistry of Pegmatites at Broken Hill : Vectors to Mineralisation***

Glenn Coianiz: Exploris Pty Ltd

Chris Torrey: Silver City Minerals Limited

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Information in this document that relates to Exploration Results, Mineral Resources or Ore Reserves is based on information compiled by Christopher Torrey, who is the Managing Director and full-time employee and shareholder of Silver City Minerals Limited, and a Member of the Australian Institute of Geoscientists. Mr Torrey has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the “Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves”. Mr Torrey consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

# ACKNOWLEDGEMENTS

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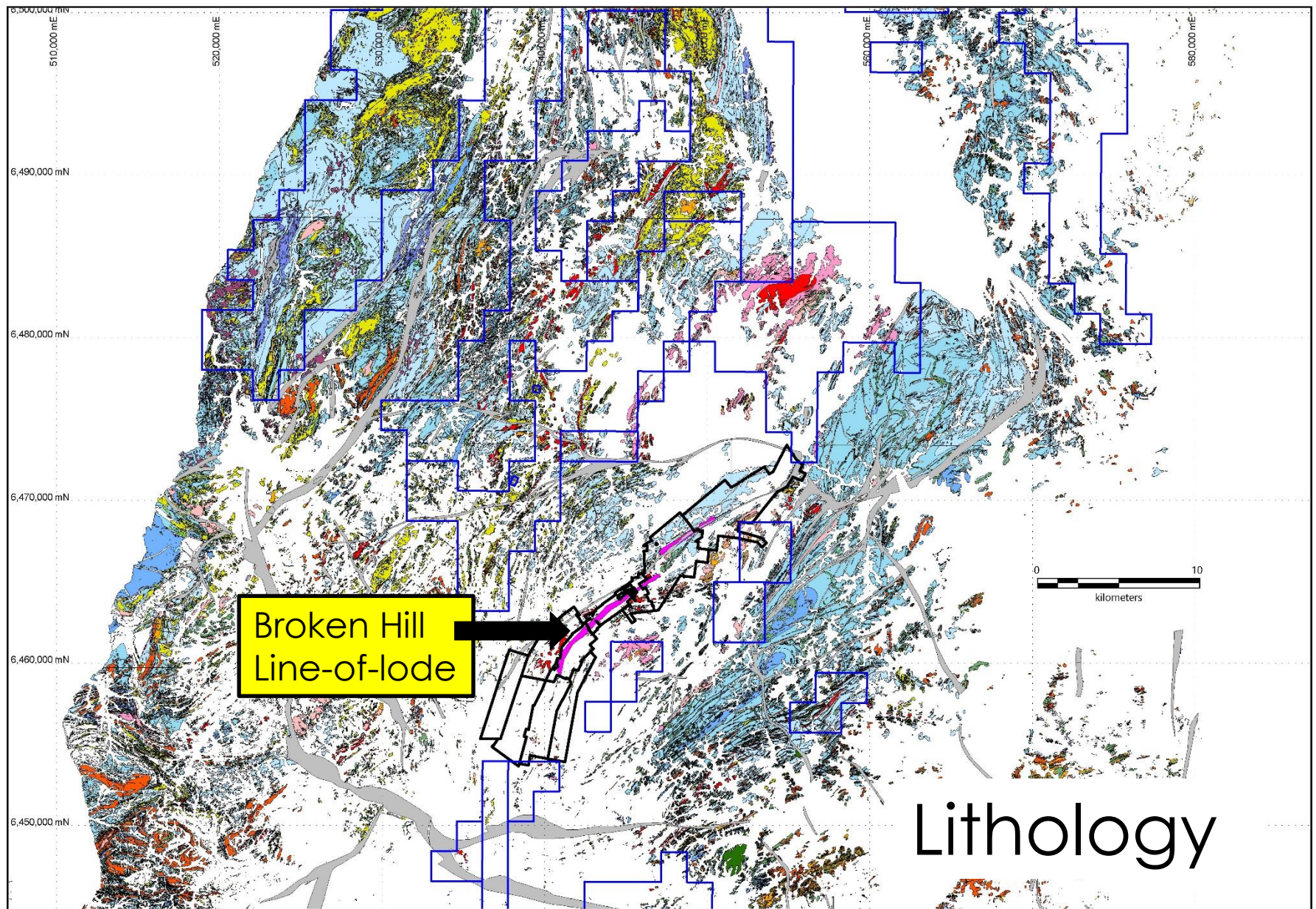


# OUTLINE

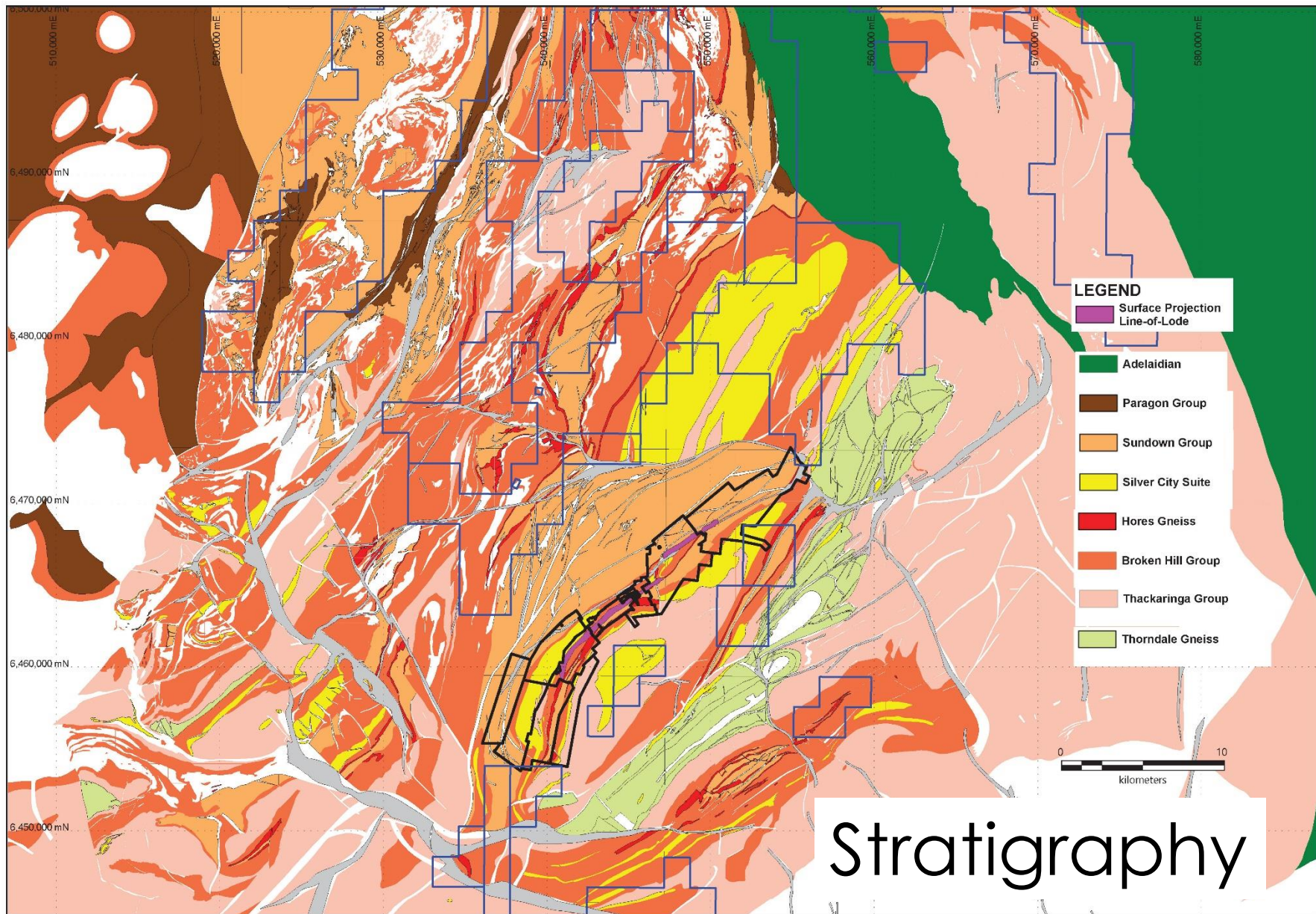
- Geological Framework
- Olarian Metamorphism
- Sampling Rationale
- Pegmatite Styles
- Geochemistry
- What we think











# GEOCHRONOLOGY

Silts, black shales:  
deep marine ,  
turbiditic: cap  
rocks, deep burial

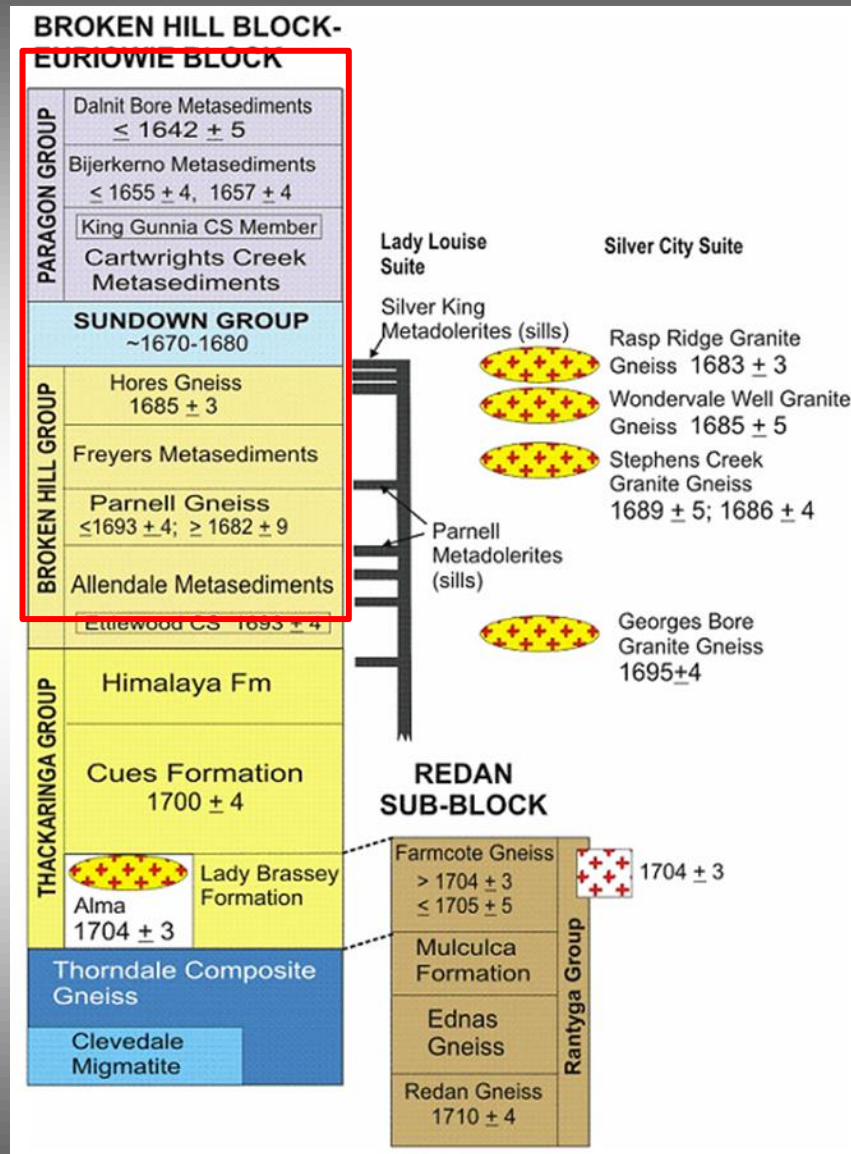


RAPID SUBSIDENCE

quartzo-  
feldspathic: shallow  
marine-shelf  
(maybe lacustrine)



Albitic, quartzo-  
feldspathic: fluvial  
to estuarine





# GEOLOGY

- Rift sedimentation and volcanism (1850 to 1670Ma).
  - Narrow Rift.
  - Mineralisation 1685-1670Ma
- 
- At least four deformations, two thermal events

## Key units

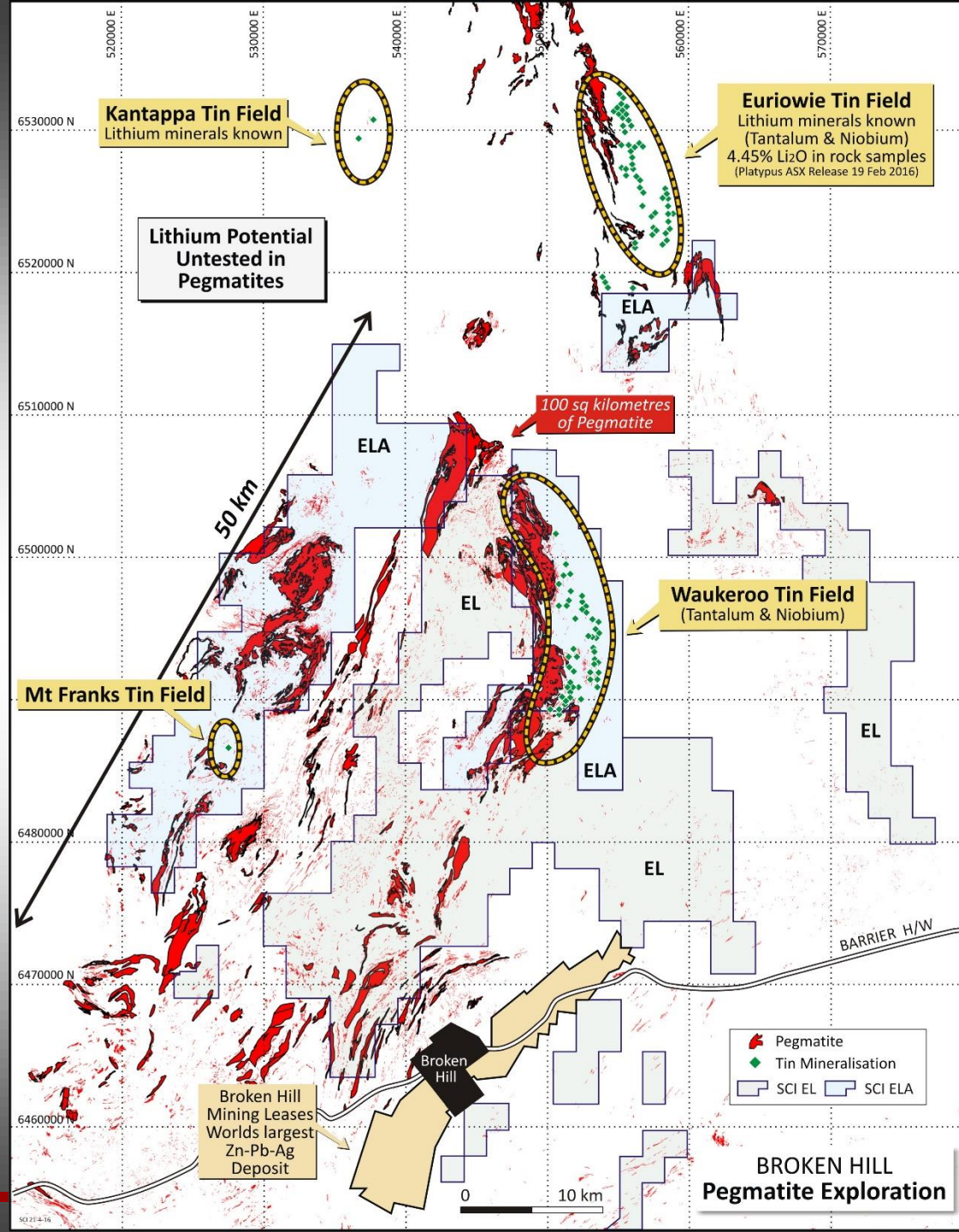
- |                                  |   |
|----------------------------------|---|
| 1. Thackaringa Group:            | Source of metals and saline fluids.   |
| 2. Broken Hill Group:            | Ore host especially in upper parts.   |
| 3. Silver City Suite:            | Granitic intrusions, metadolerites, mafic volcanics penecontemporaneous with ore. Sulphur source. |
| 4. Sundown Group:<br>activity.   | Cap rock. Evidence of waning hydrothermal   |
| 5. Paragon Group:<br>turbidites. | Carbonaceous shales, deeper marine,   |

# PEGMATITES

Where did it start?

- Lithium
- Documented occurrences of Li minerals (amblygonite)
- GIS data indicates almost 10% of tenure area occupied by outcropping pegmatite
- 50% tenure under cover.
- Suggests pegmatite rock volume in district might be as much as 20%

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**BROKEN HILL  
Pegmatite Exploration**

# PEGMATITES

- Provide a sample medium ubiquitous to the district
- Often the only outcropping rock in areas of sub-crop or cover
- Many more occurrences of pegmatite than mapped
- Are they products of anatexis and largely *in situ*?
- Are they allochthonous and intrusive?



**METAMORPHIC  
ZONE**

**Zone of  
Lithium-rich pegmatites  
Broken Hill**

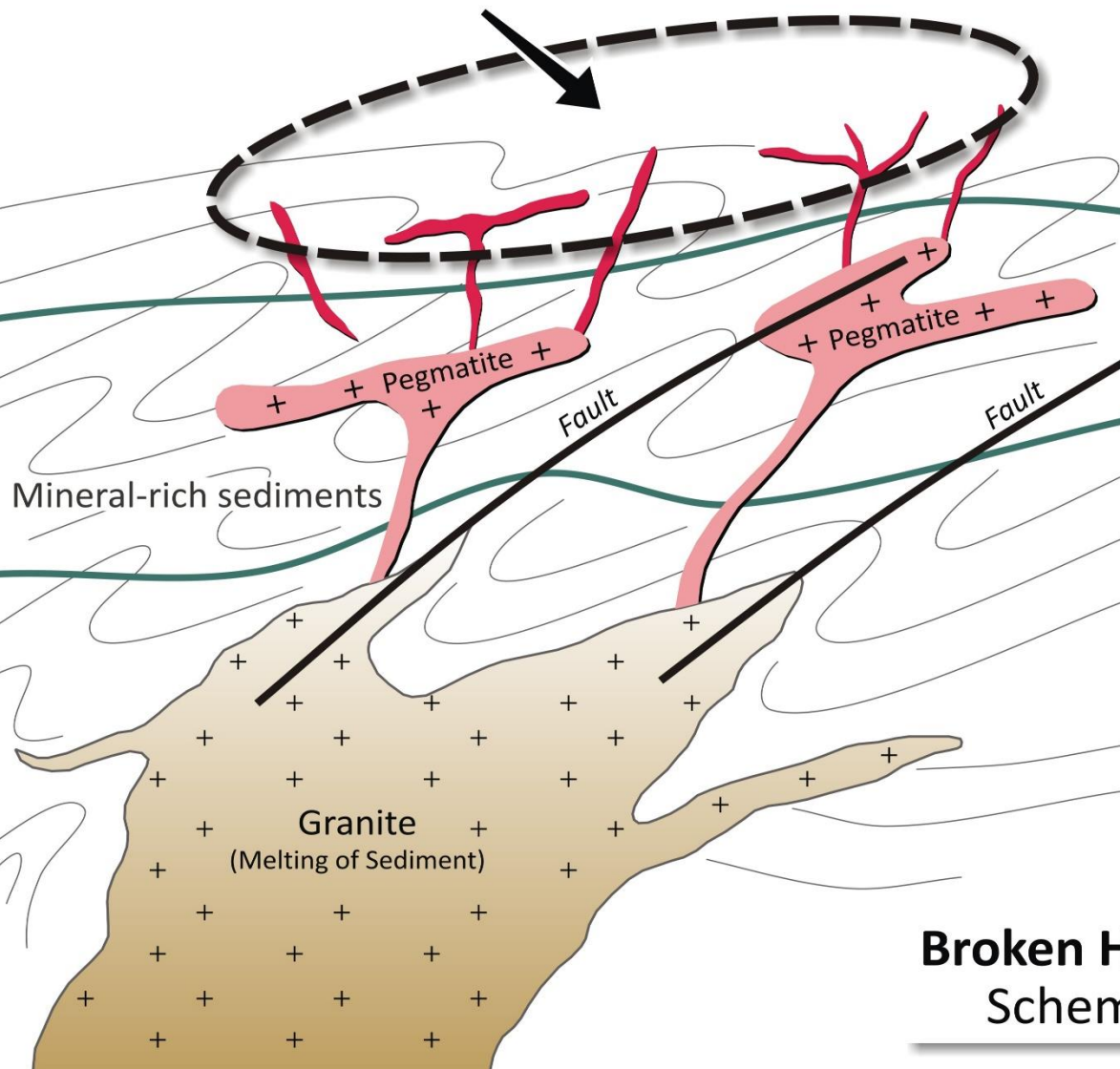
**METALS**

Decreasing  
temperature and pressure  
↑

Greenschist

Amphibolite

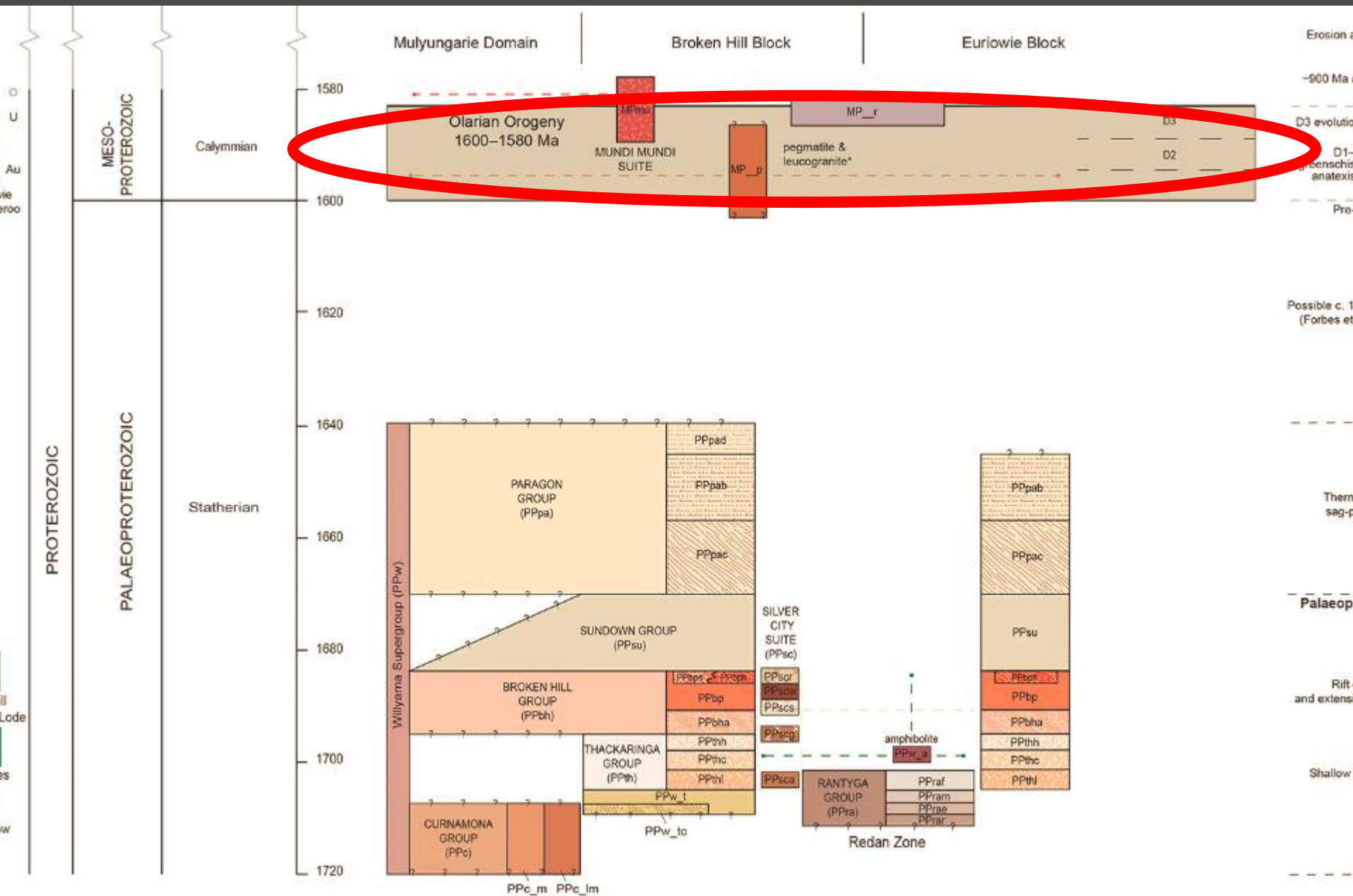
Granulite



B Li Be Sn W Nb Ta  
↑ ↑ ↑ ↑ ↑ ↑ ↑

**Broken Hill Pegmatites  
Schematic Model**

SCI 14-5-16



# METAMORPHISM

Olarian Orogeny: 1600 -1580Ma

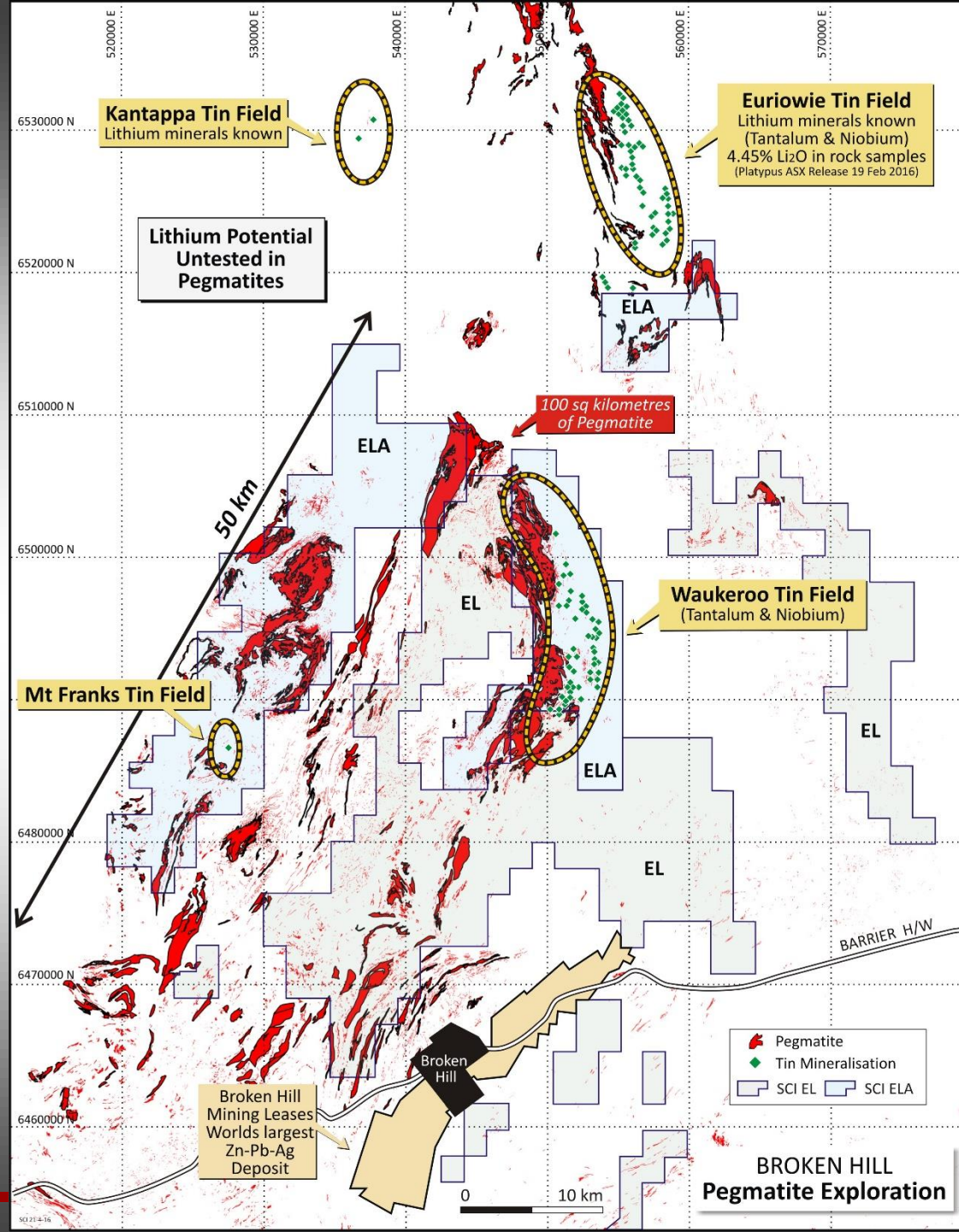
Pegmatites: 1600-1590Ma

Mundi Granite: 1590-1580Ma

“In a regional sense some pegmatites appear to be large sill-like bodies which are stratabound”



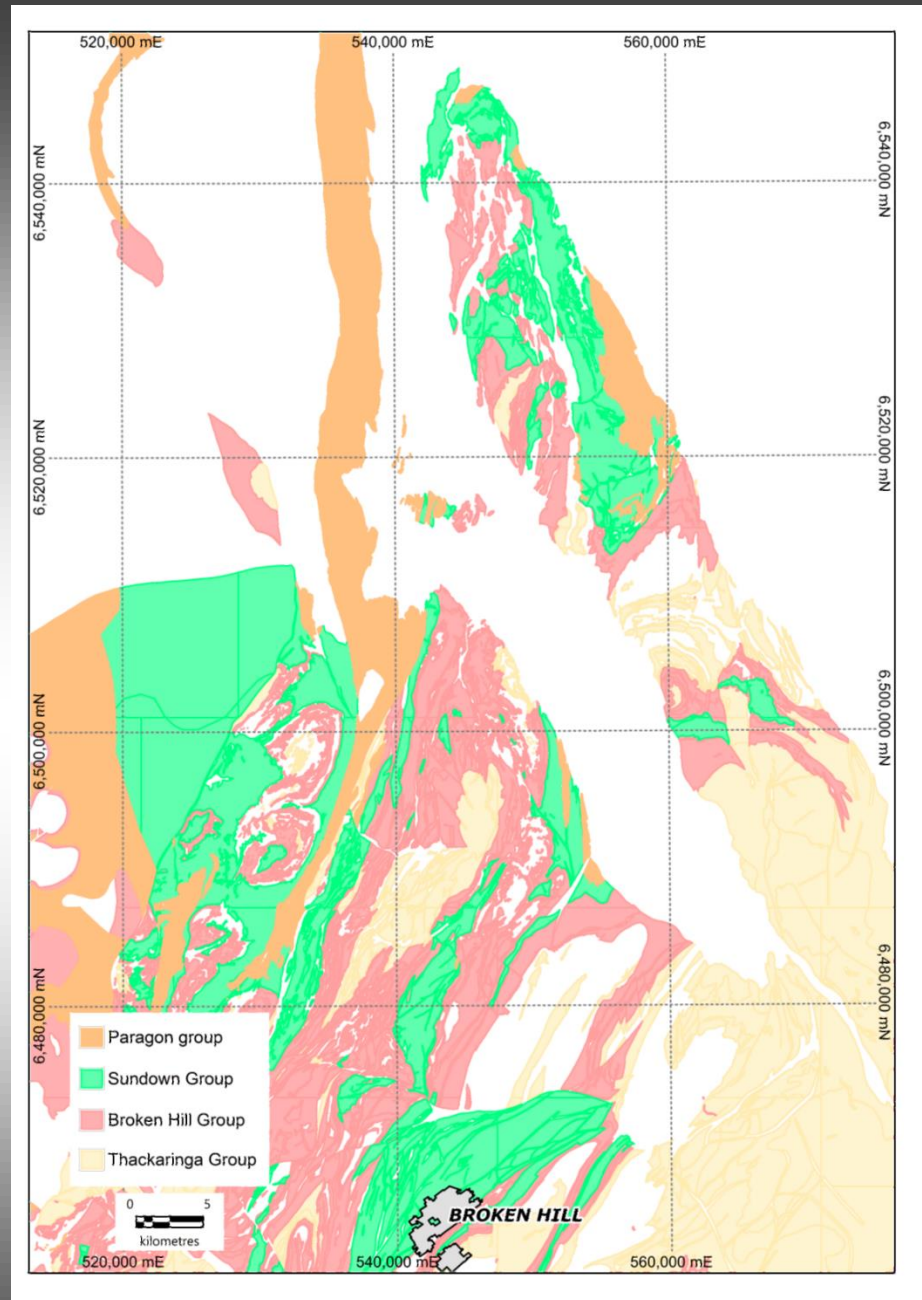
# Pegmatites stratabound?





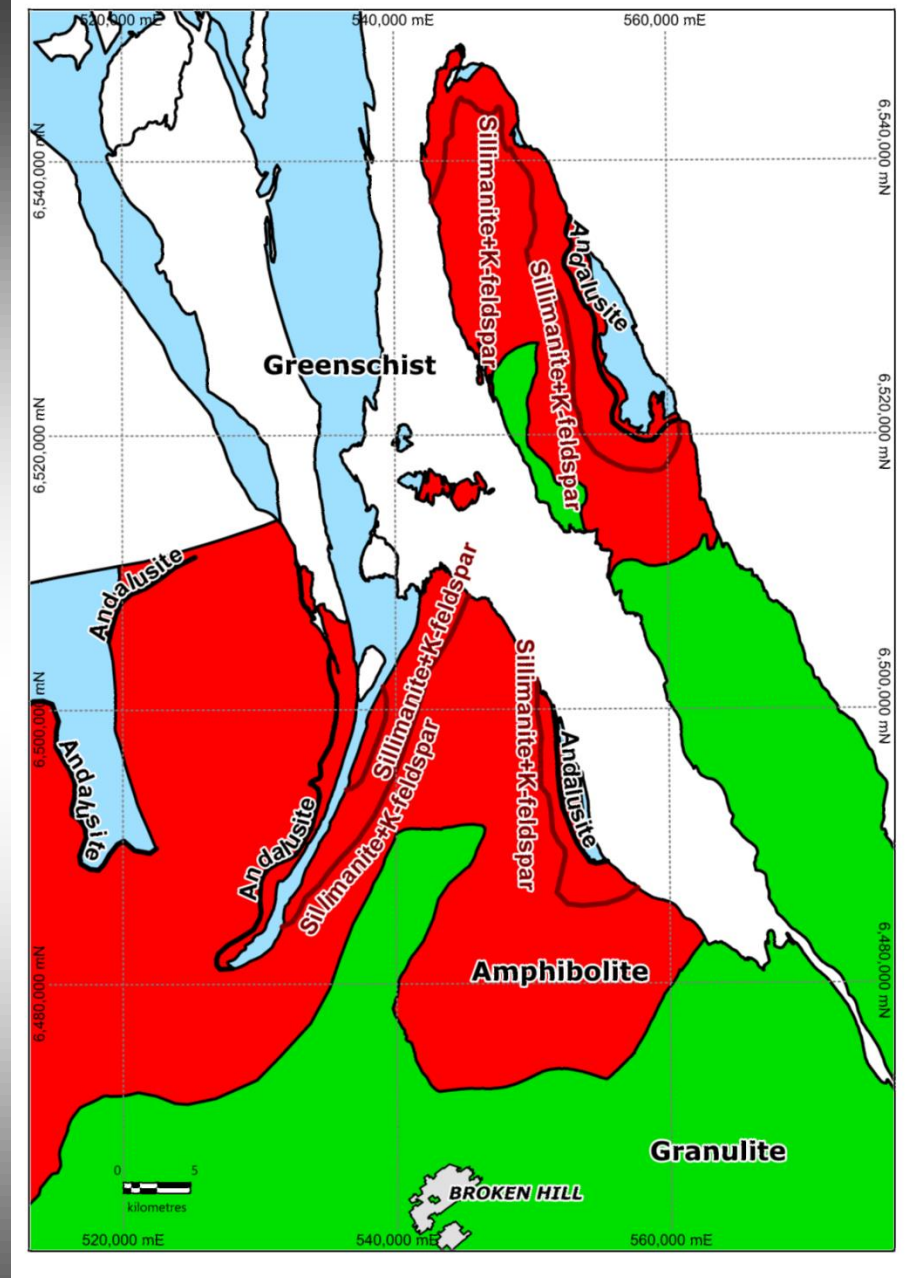


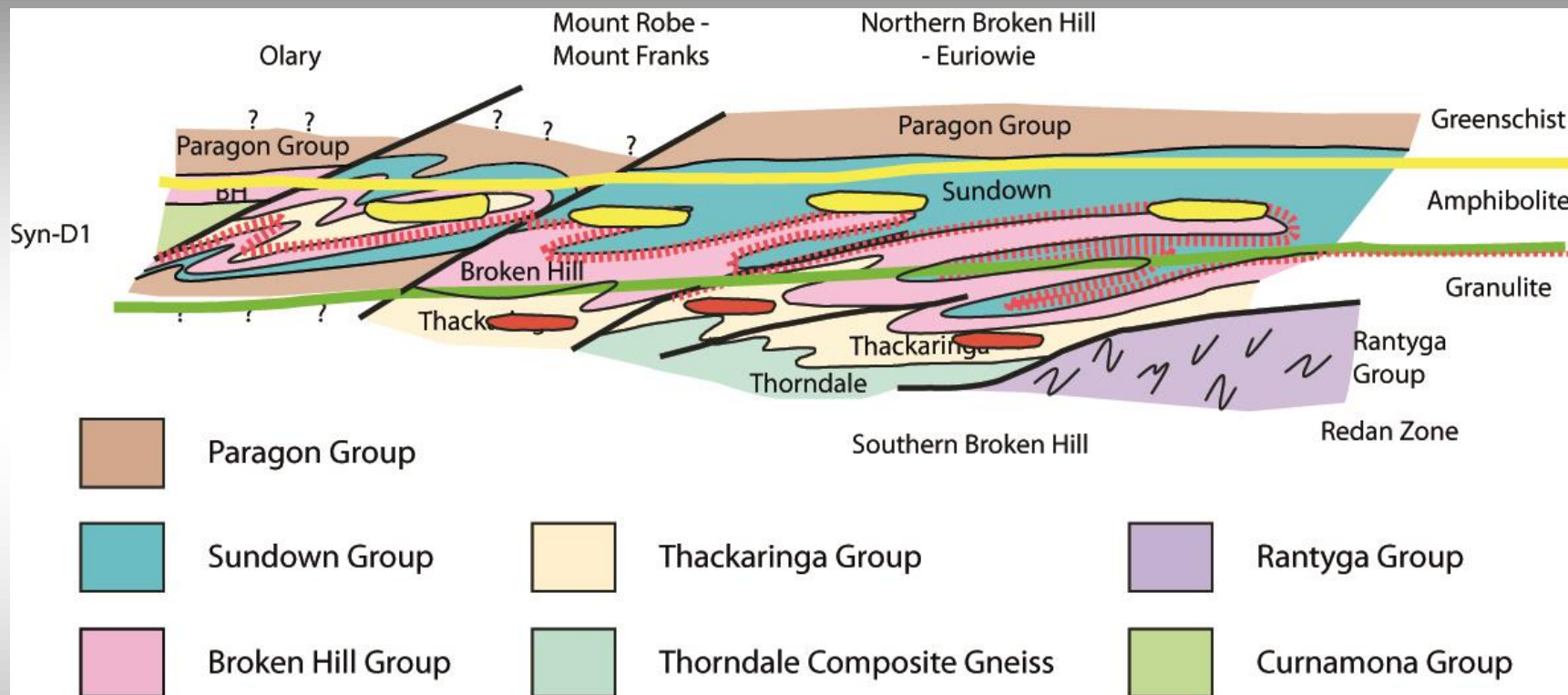
“Due to the stratabound nature of the metamorphic field gradient there is also an association with metamorphic facies zones and isograds”.....  
(Fitzherbert 2015)





Metamorphic isograds generally conform with the stratigraphy





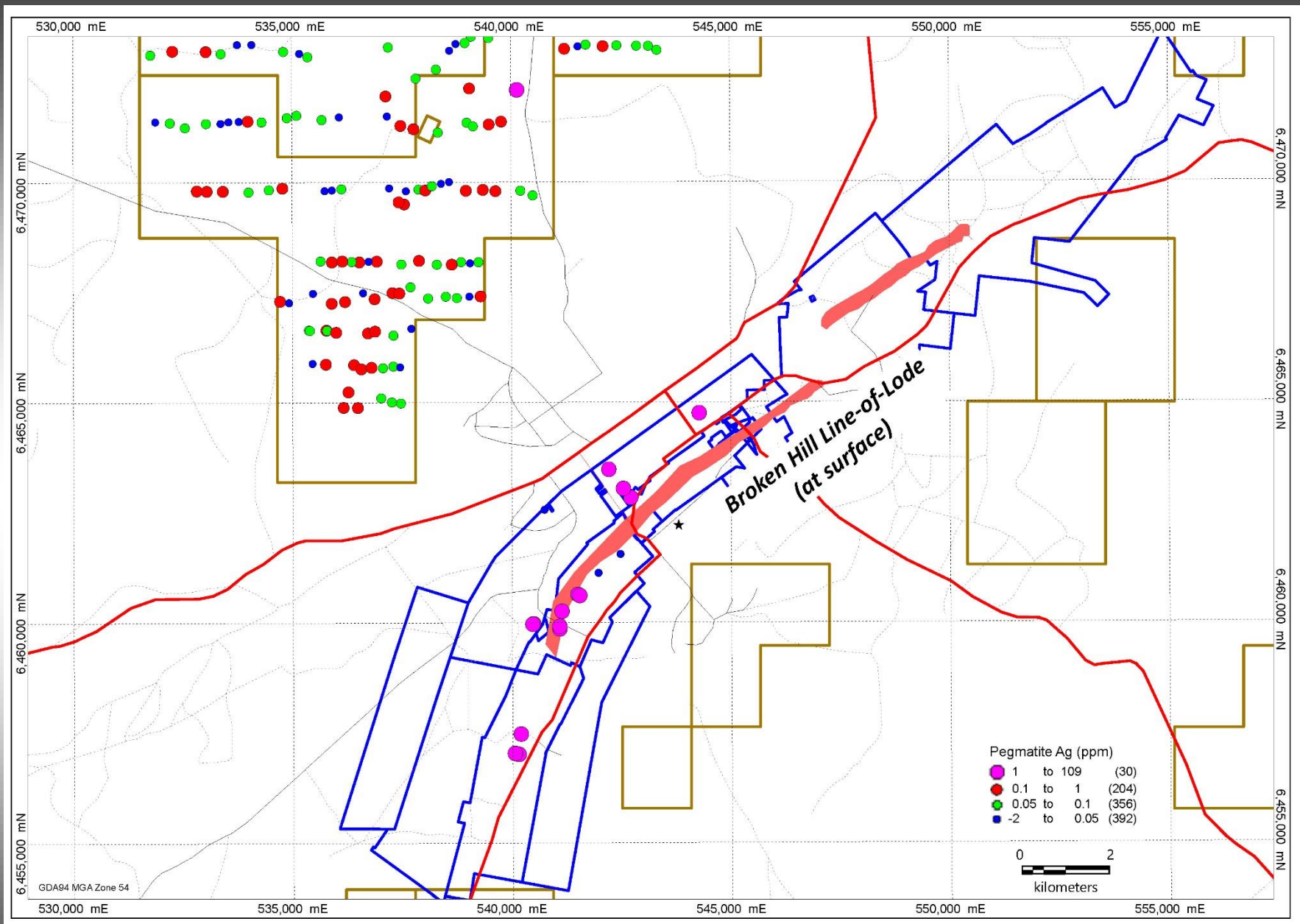
*Fitzherbert 2015*

# BROKEN HILL “LINE-OF-LODE” PEGMATITES

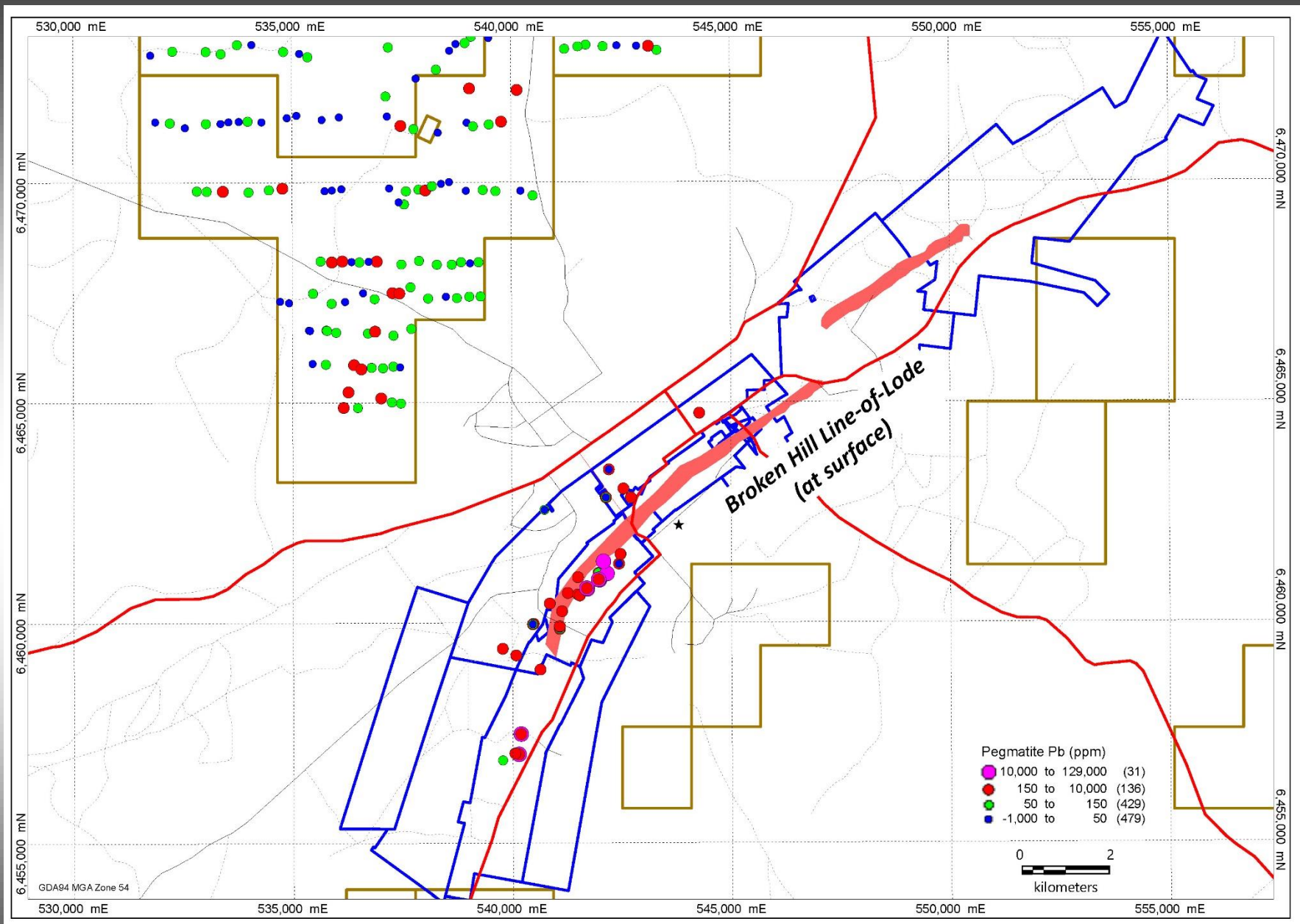
Mineralogy documented to occur within pegmatites includes:

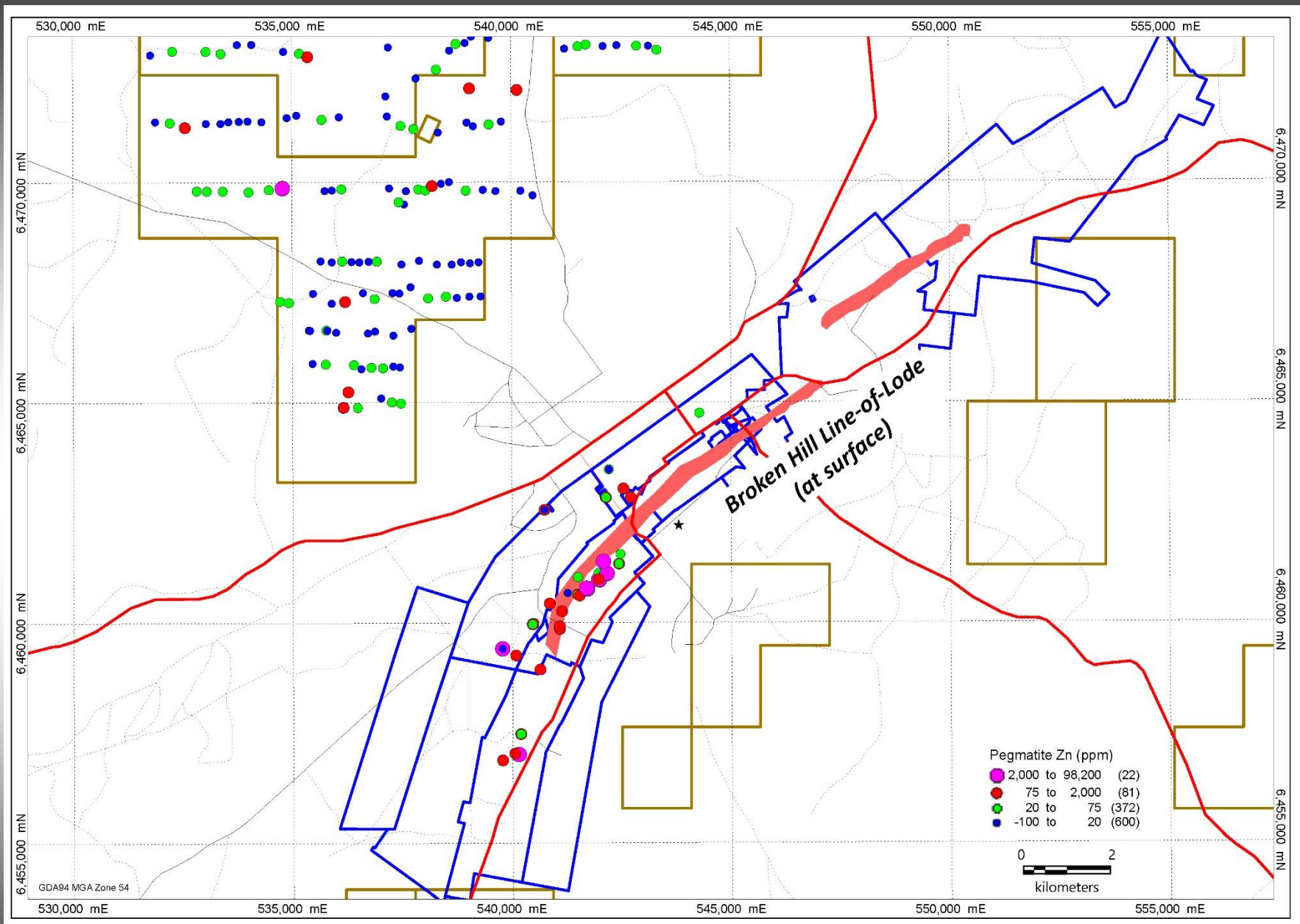
- amazonite (green lead-rich feldspar)
- zinc-rich micas
- sulphides.













# SAMPLING

- Sample weight 2.5-3kg
- 2 objectives
  - Minerals
  - Representative
- Area sampled dependent on meeting objectives
- Range 5x5m to 50x50m





# ANALYSIS

## Lab

- ALS Orange
- 4 acid digest
- 48 element ICP-MS
- Representative sample

## Scanner

- Minerals only
- XRF + 10mm window
- LIBZ < 5mm window
- Need flat surfaces
- No comparison with Lab
- Similar trends
- We had a go but data was largely inconclusive & not suitable





## Pegmatite Type 1

- “Leucogranites”
- Fs-qtz in f.g. fs groundmass
- Fs + Qtz <2mm - <10mm
- Coarser sized accumulations
- Perthitic
- Musc +/- biotite, tourmaline, garnet
- Outcrop >50m
- Variable contacts
- Granite-like + coarse pegmatite segregations
- + Pb and Zn, - Cu
- +/- immobile + average or slightly depleted LCT.





## Pegmatite Type 2

- Fs-Qtz-Musc
- Fs+ Qtz < 20cm – 30cm
- Musc < 2cm – 5cm
- +/- Tour ( $\leq 10$ cm)  
Garnet  $\leq 5$ cm
- Garnet to sediment contacts.
- Concordant and discordant
- <1-5m wide to 5-10+m long
- All units and facies
- + Pb, Zn, U and in many LCT elements





## Pegmatite Type 3

- Qtz-Musc only
- Mapped Qtz veins
- Musc often green (Rb and Li-rich?)
- Waukeroo tin field
- < 2m wide + 10m long
- Concordant, often sheared
- Tour locally abundant margins of pegmatites
- Host rocks intensely replaced by tourmaline, preserving fine sedimentary detail
- Freyers Metasediments, Hores Gneiss (Broken Hill Group), Sundown Group and Paragon Group
- + LCT elements + Cu & Zn, - Pb.





## Pegmatite Type 4

- Zoned across + along strike
- Across - white, translucent Qtz core with Qtz + Fs + Musc on margins
- Along – Qtz vein to Qtz+Fs+Musc pegmatite
- Qtz & Fs phenocrysts to 15cm
- <2m x 5m - 10m x 15m
- All units, concordant and cross-cutting
- Visually Type 2 but zoned and coarser
- - Pb, Ag, Zn, +/-Sn and Cs

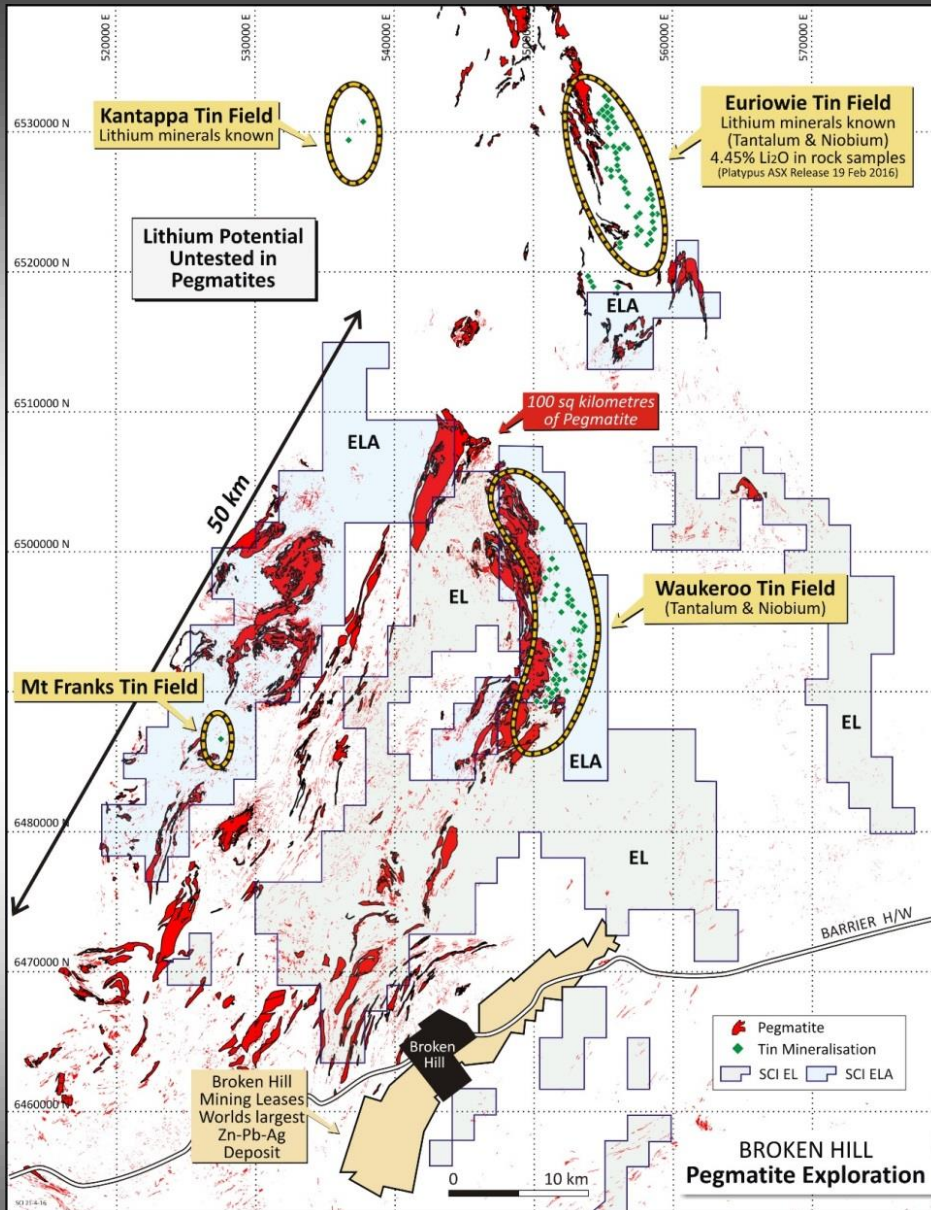




## Pegmatite Type 5

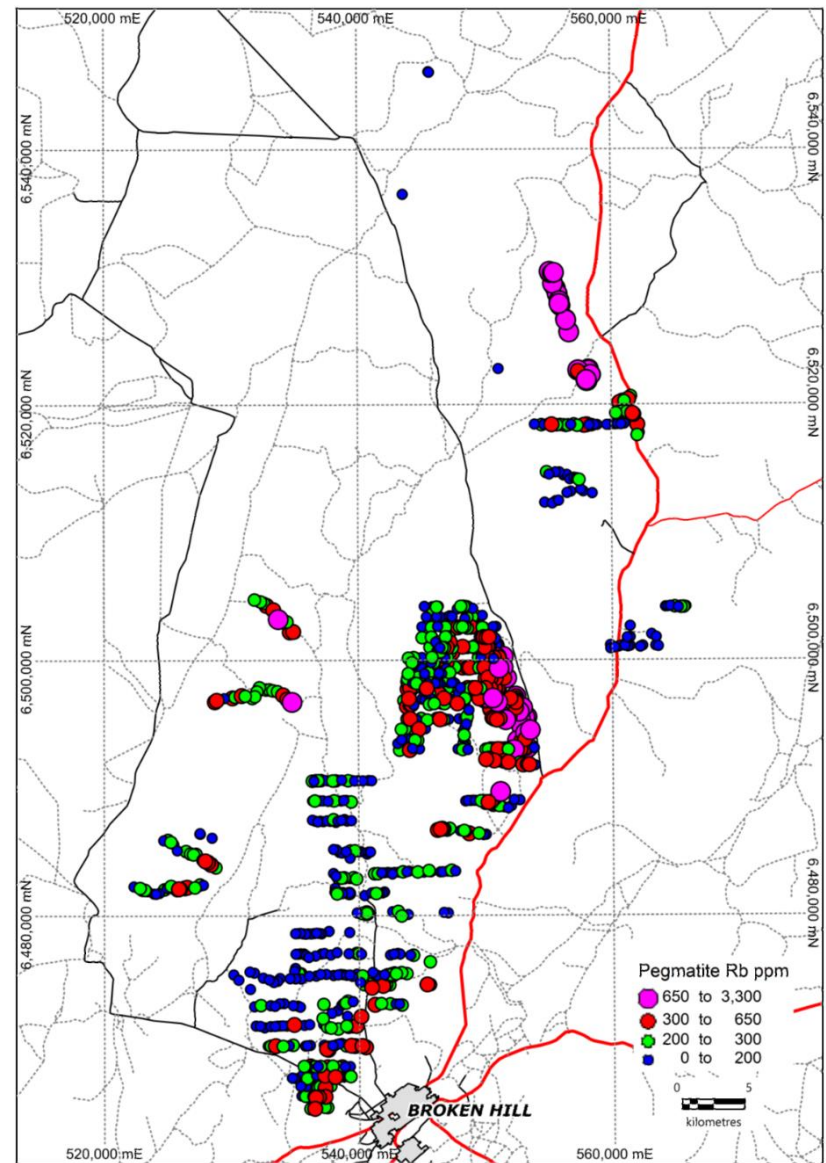
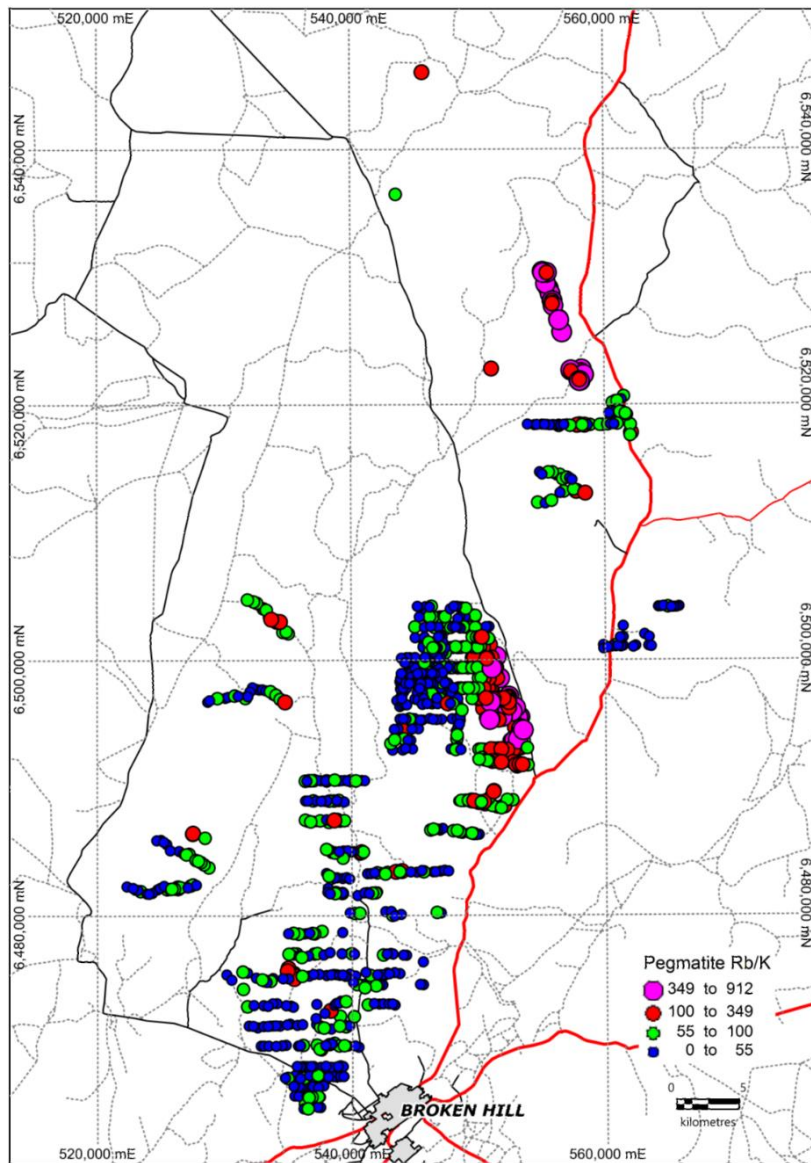
- White Fs dominant
- Fs crystals to 1.5m
- Qtz < 15%
- Musc + Gnt uncommon, Tour rare
- Recorded as beryl-bearing
- Discordant
- Locally offset suggesting earlier phase
- -- most elements except Ag, Co, Cr, Pb, Th, V and W.

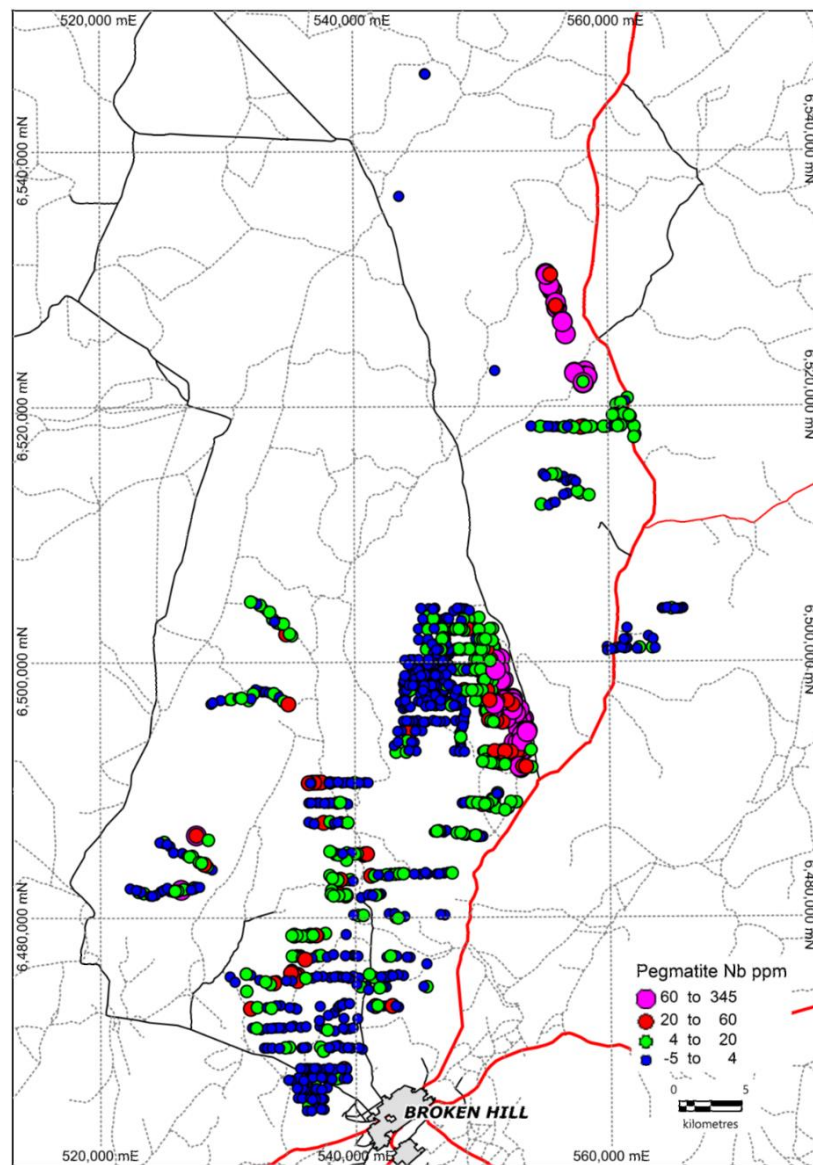
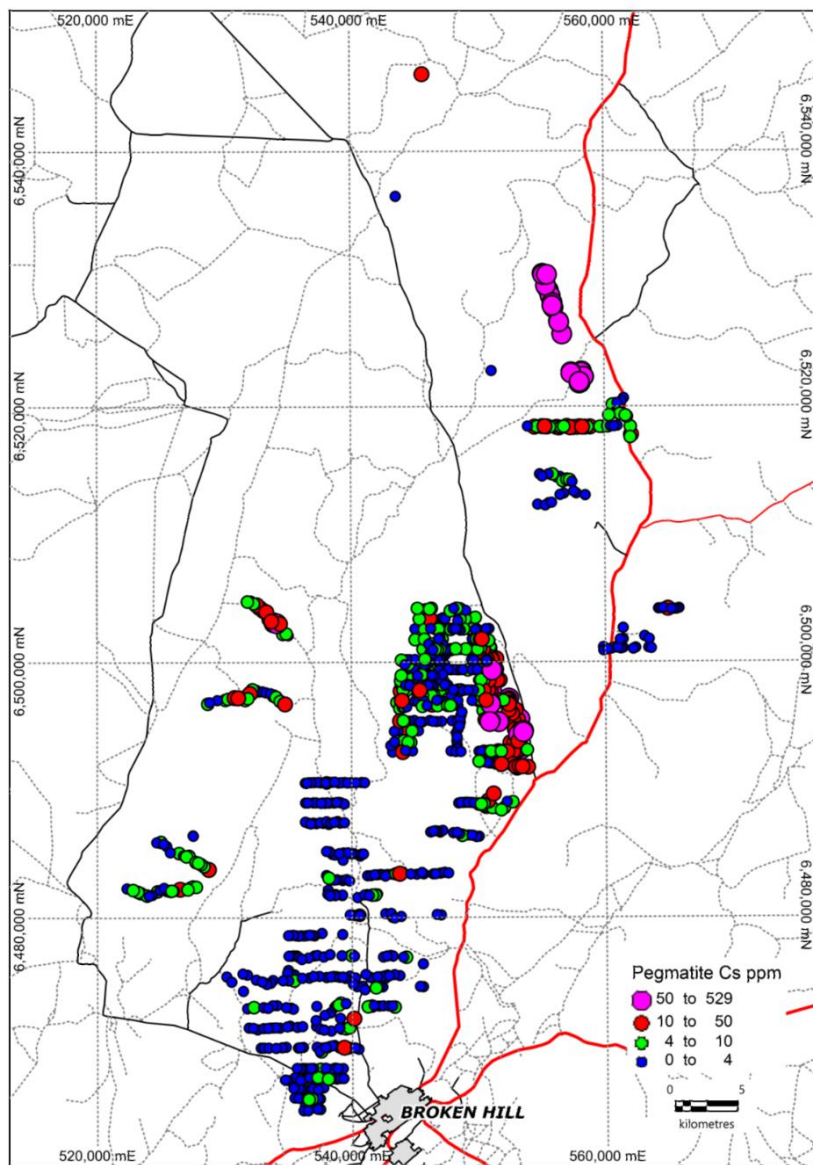


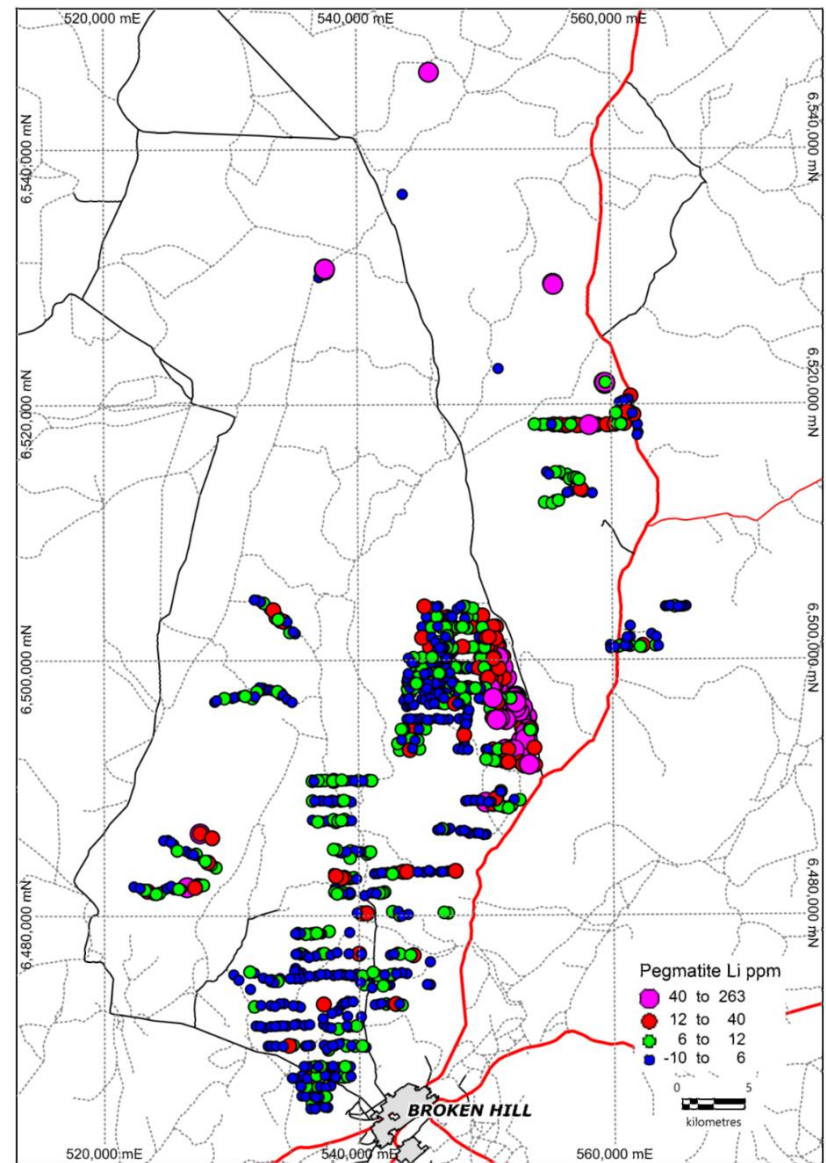
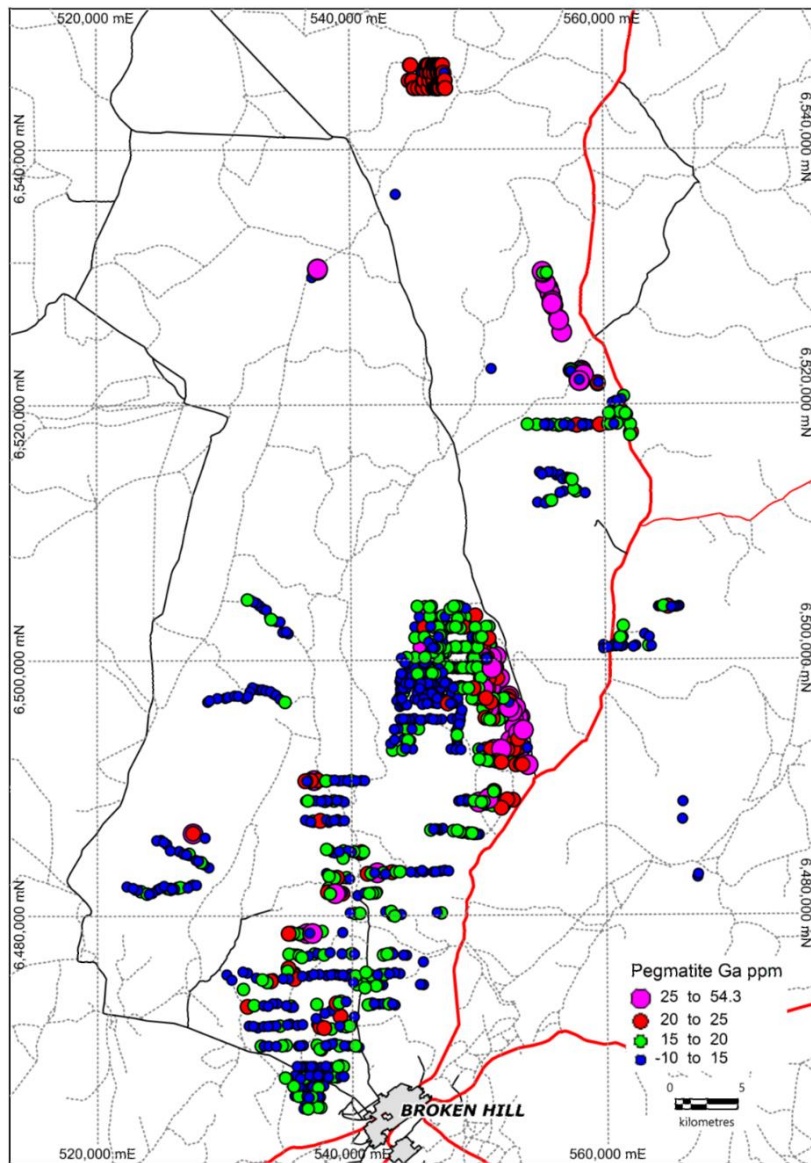


## Tin Deposits

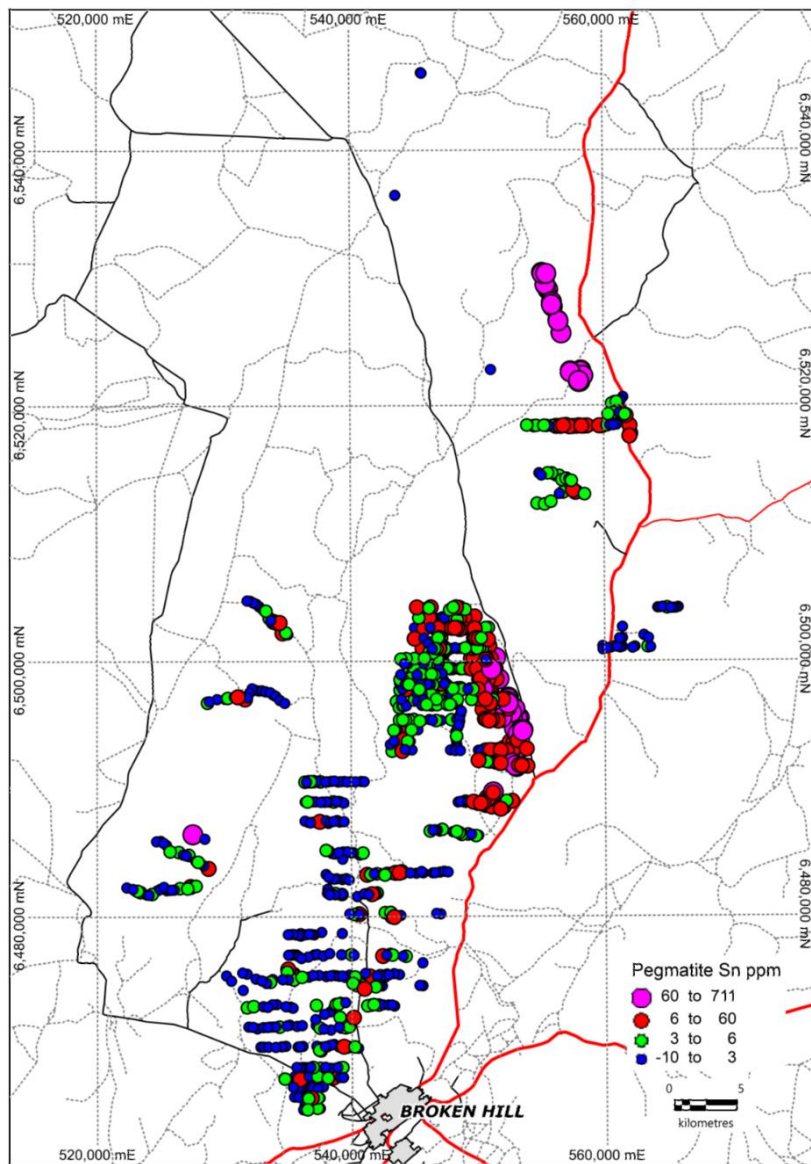


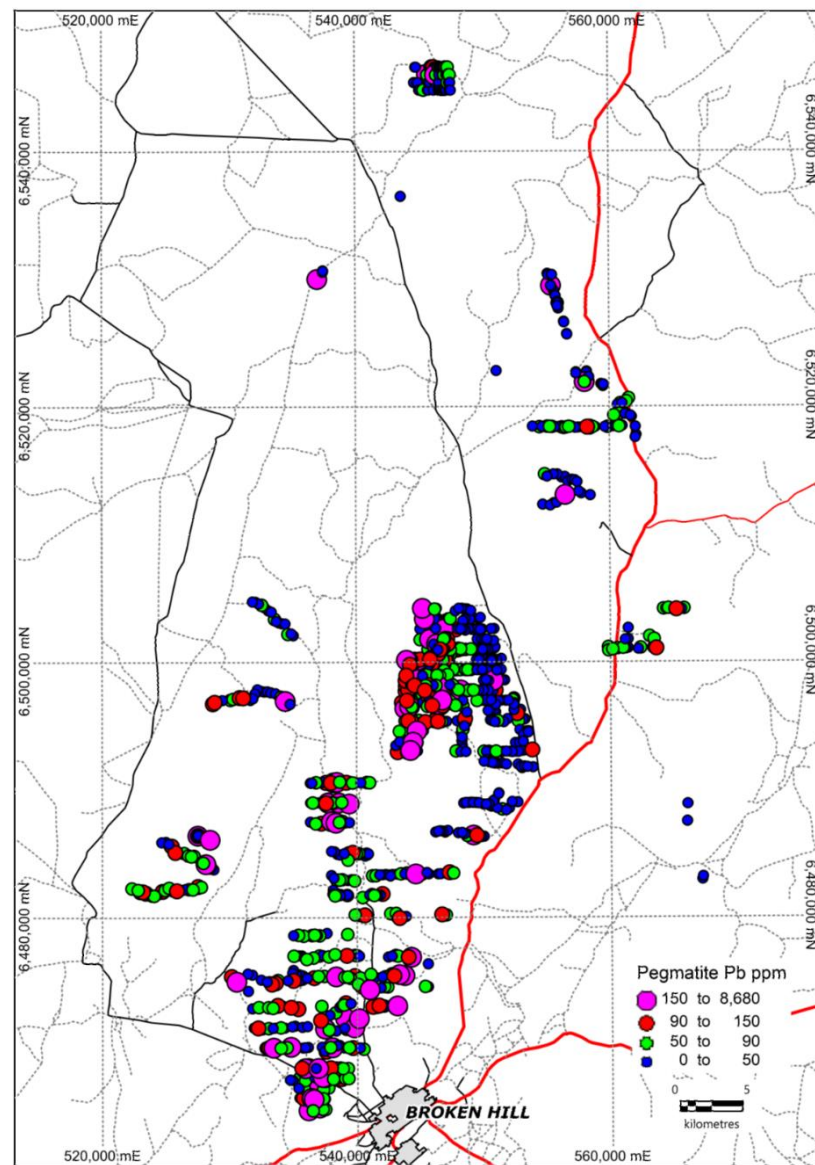
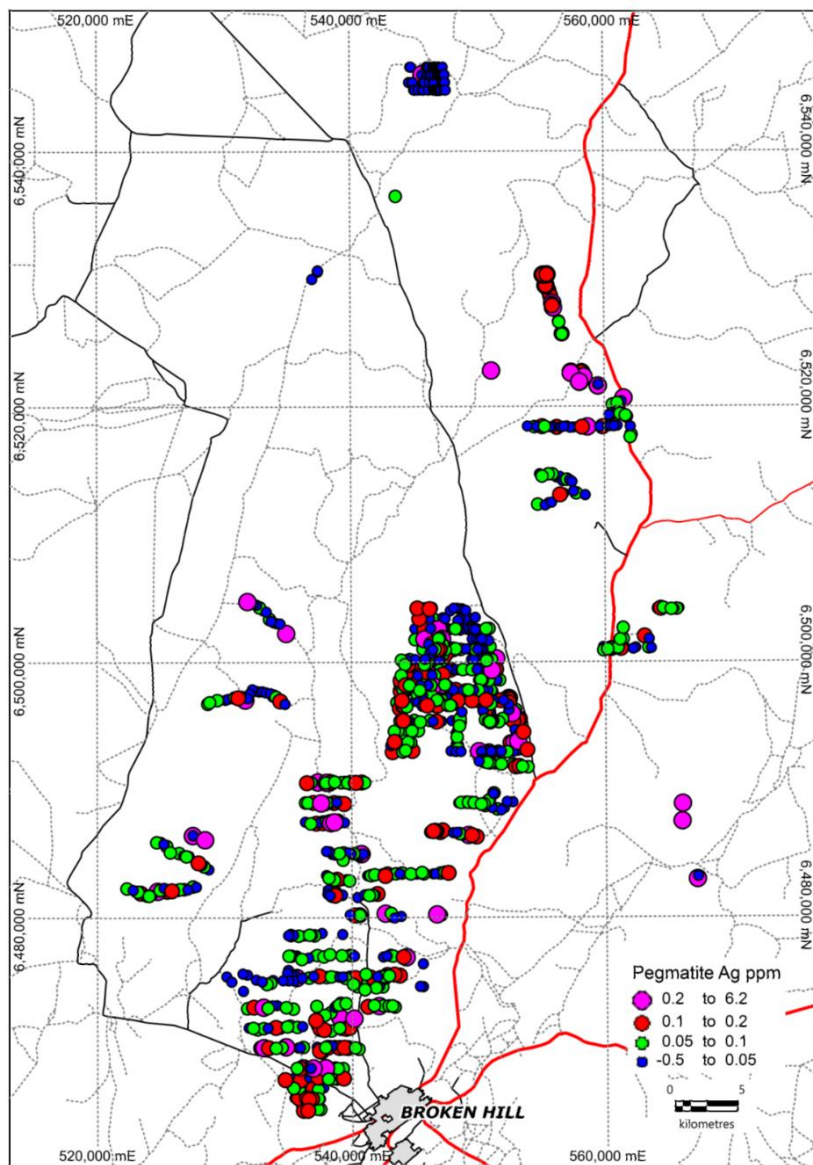




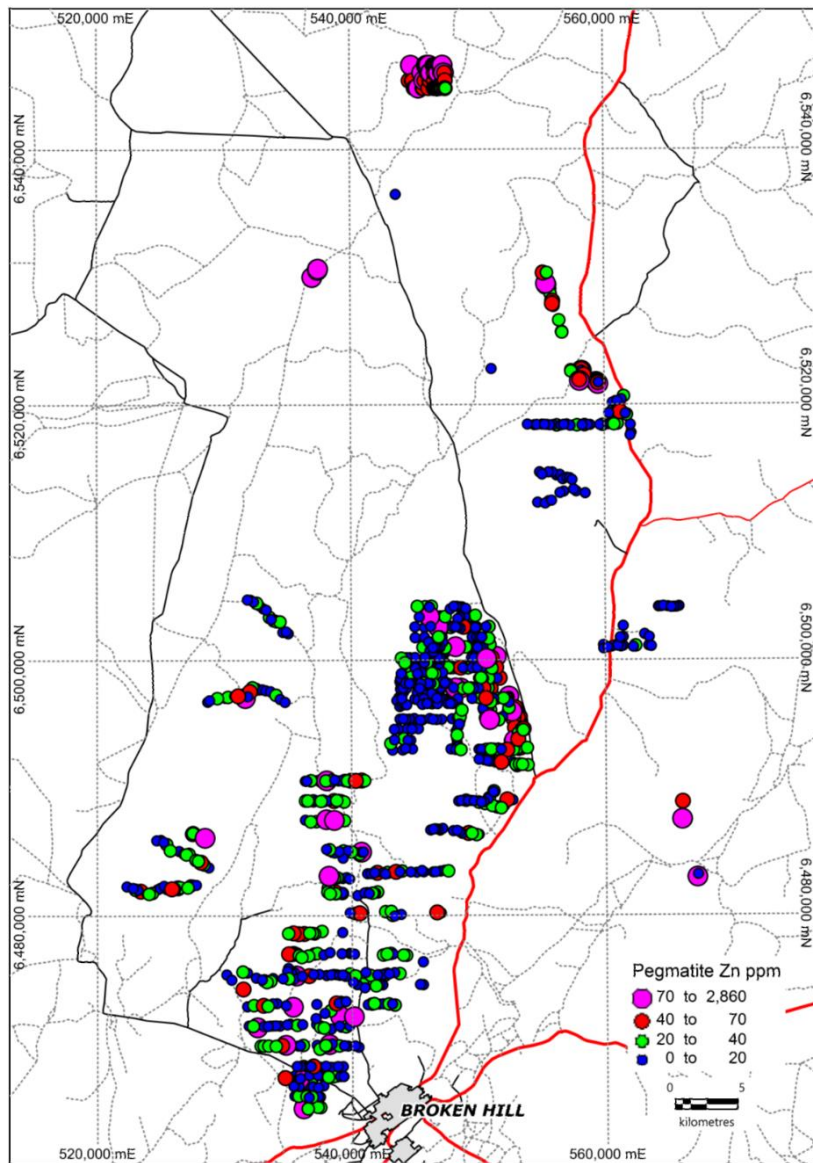








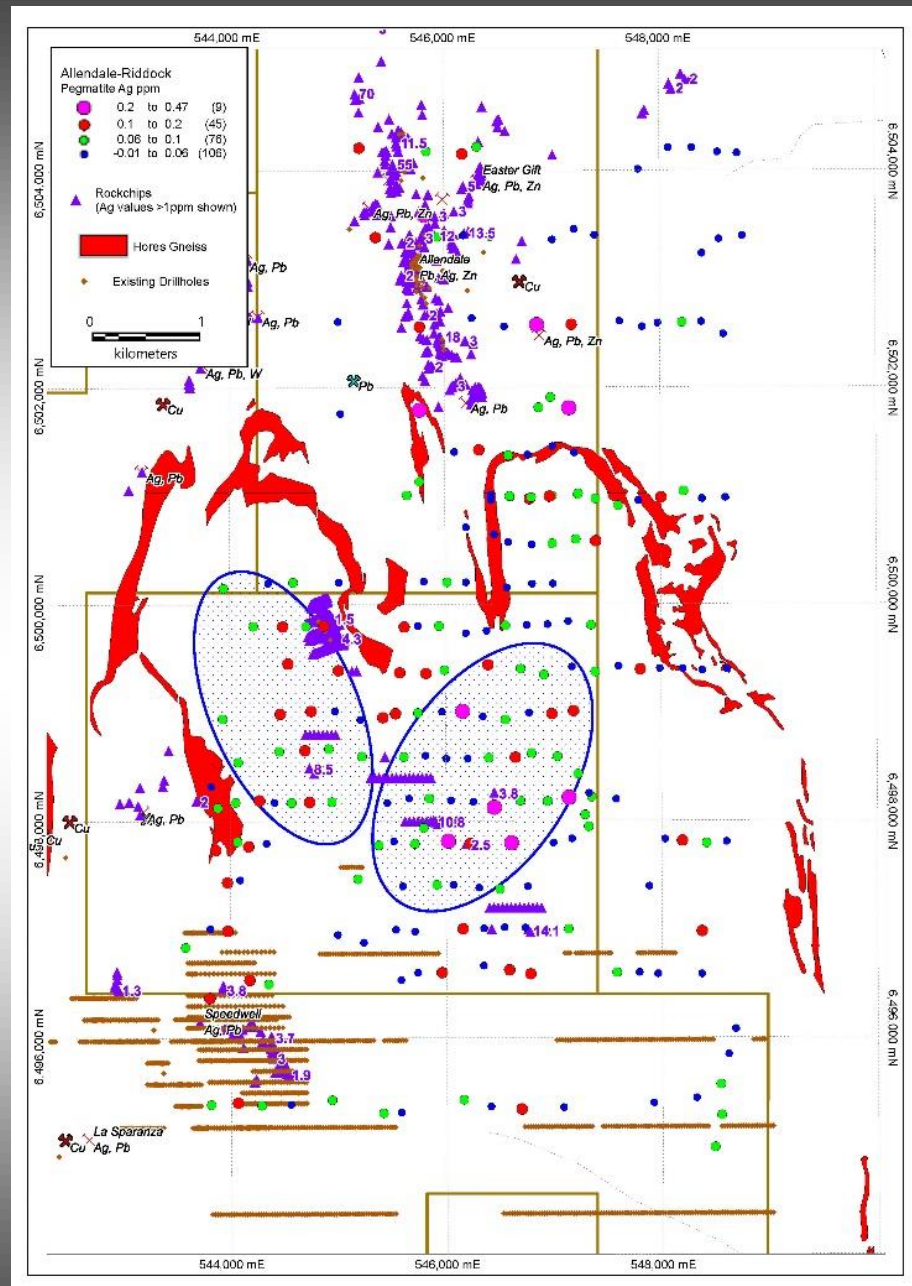




# Riddock

- + Ag, Pb, Mn, Zn
- Anomalous rock
- Little surface exploration
- Limited drilling
- Poor outcrop
- Complex geology

Silver distribution





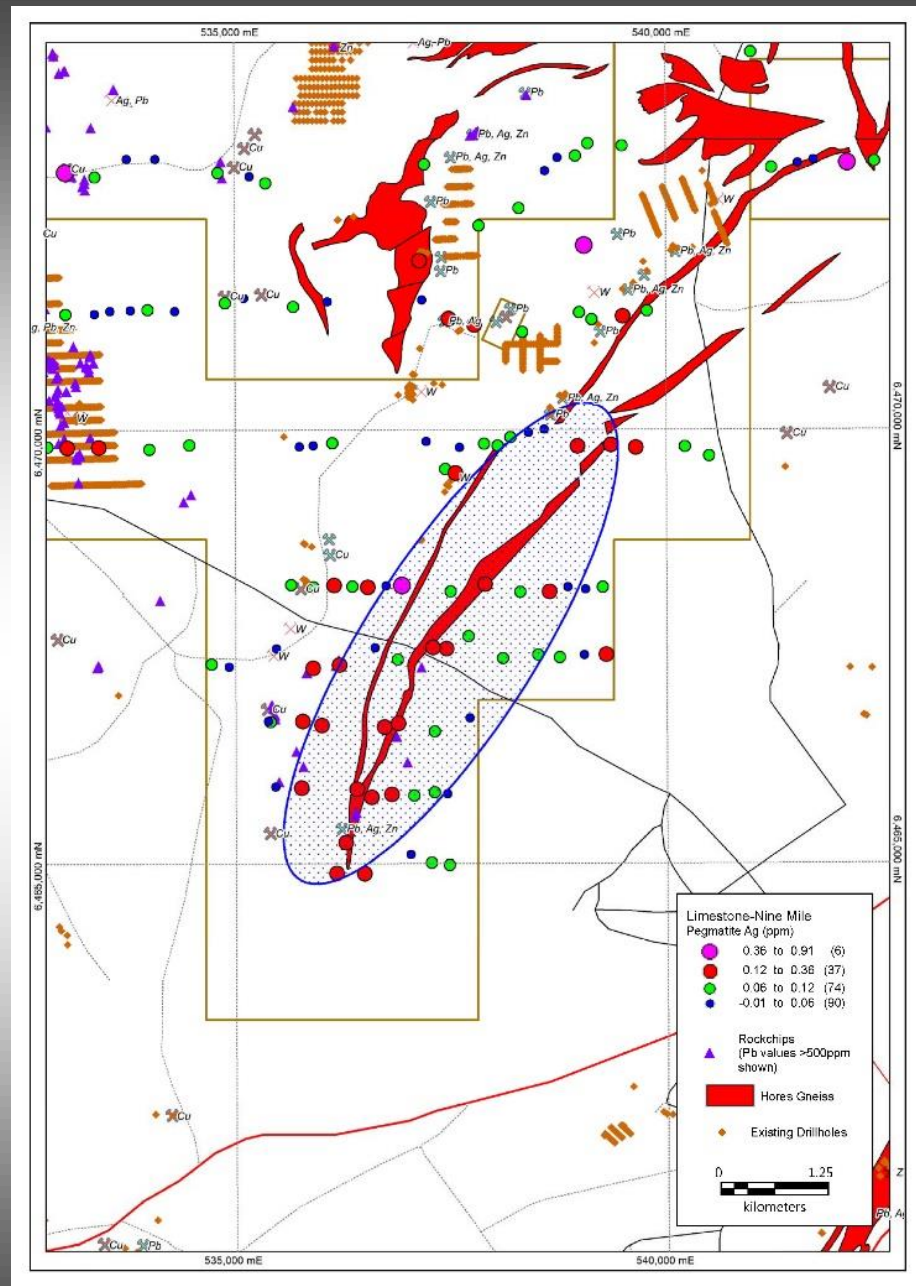
- ## Lead distribution



# Limestone

- + Ag, Pb, Mn
- Limited surface exploration
- No drilling
- Poor outcrop
- Some historical soil contamination - XRF
- Good correlation with geology

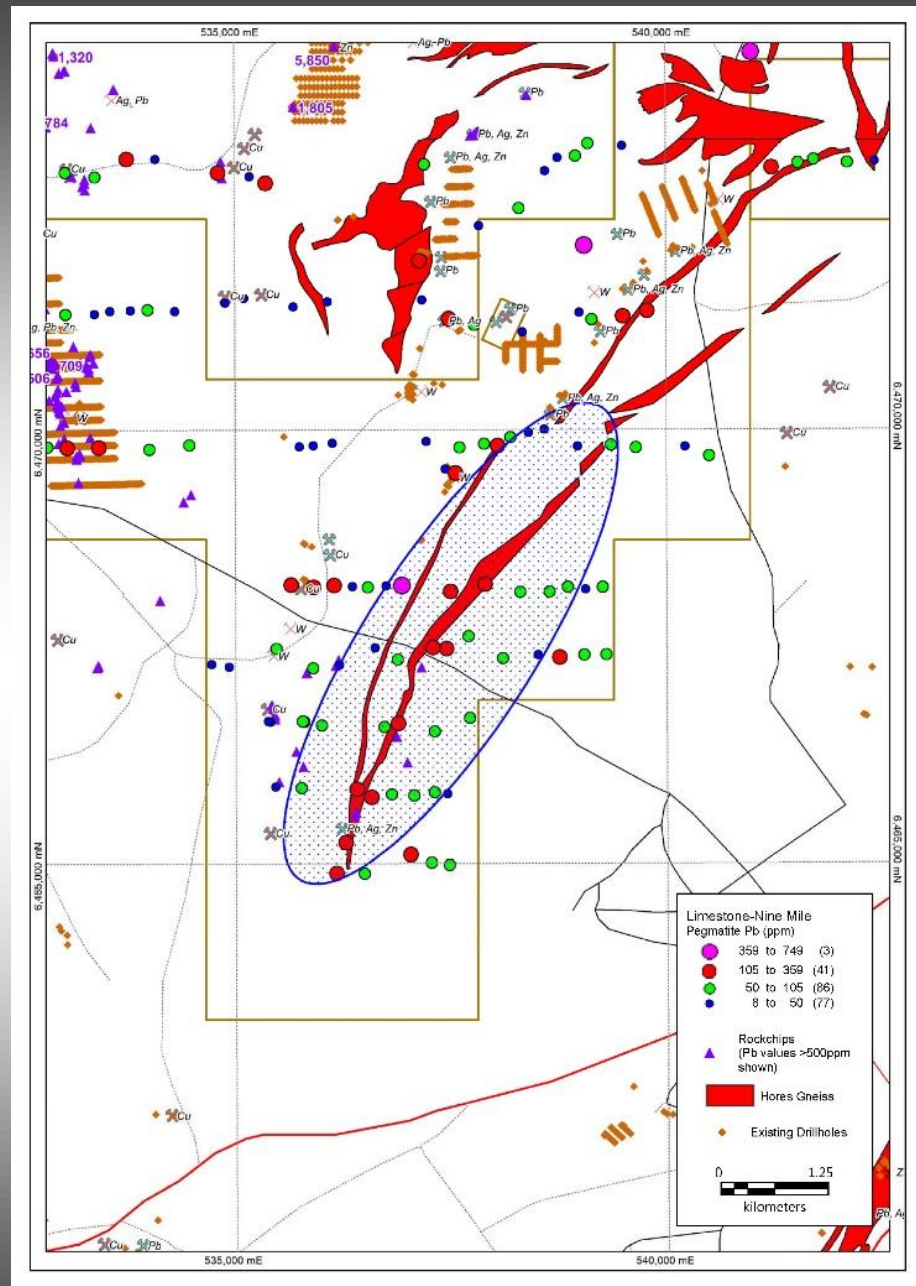
Silver distribution





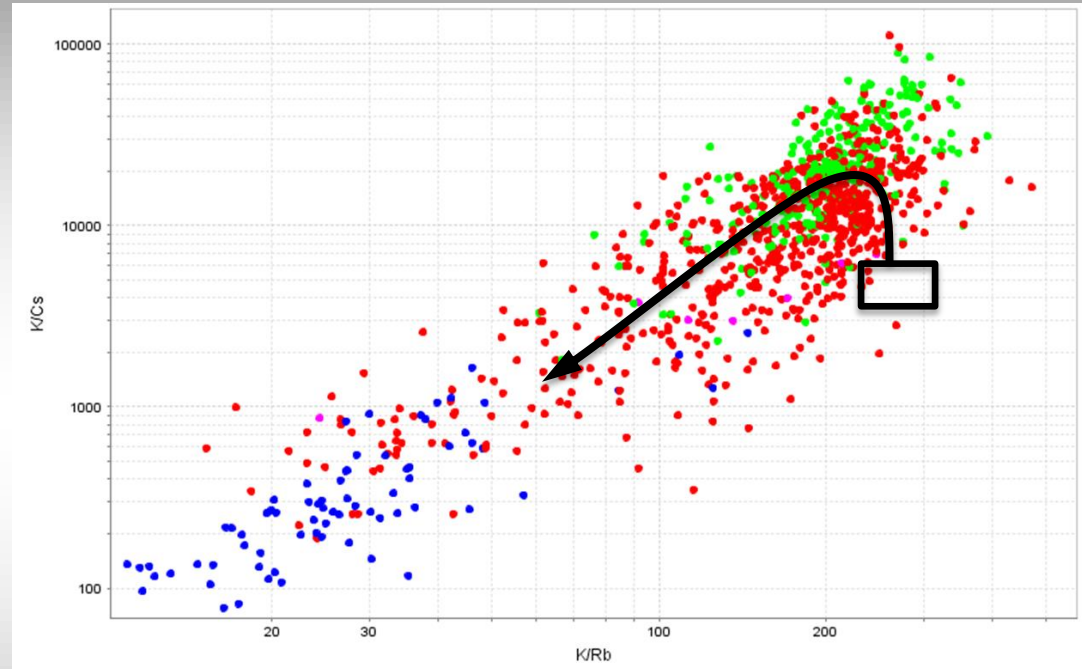
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Lead distribution



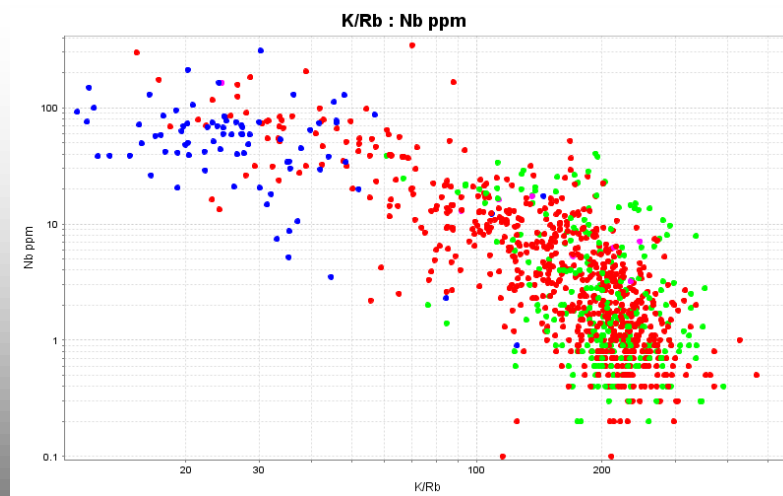
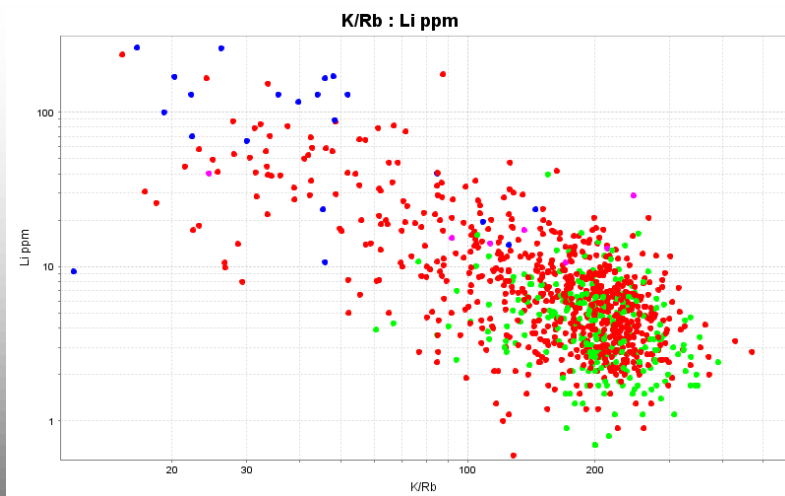
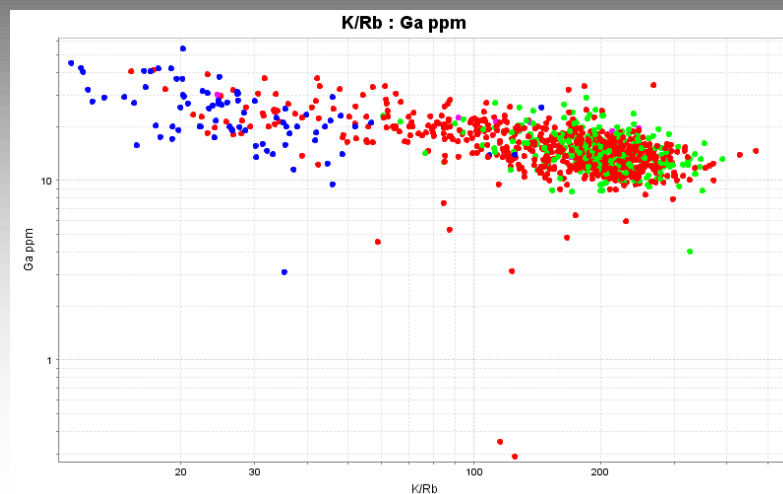
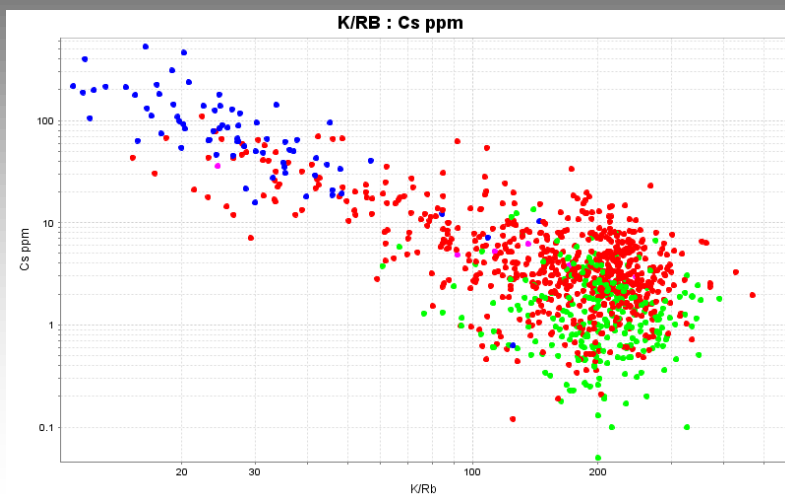
# FRACTIONATION TRENDS

- Defined by K/Rb and K/Cs ratios
- Square = avg upper crust and North American Shale Composite
- Green - granulite, red – amphibolite, blue – greenschist
- Initial loss of Cs at granulite grade
- Single fractionation series

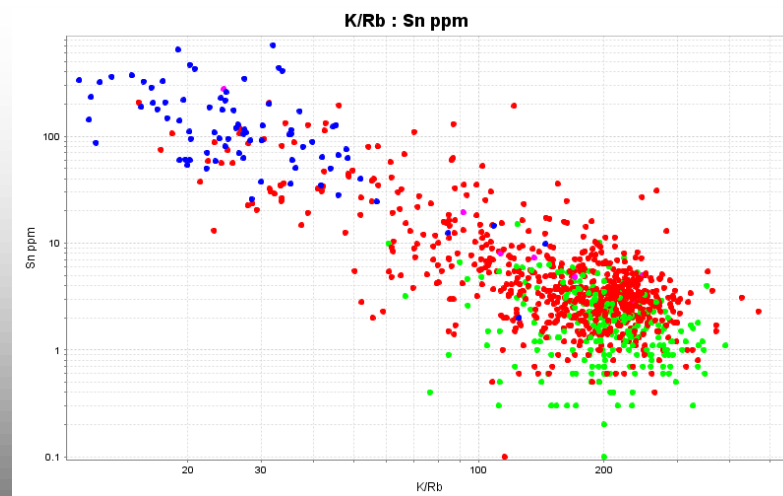
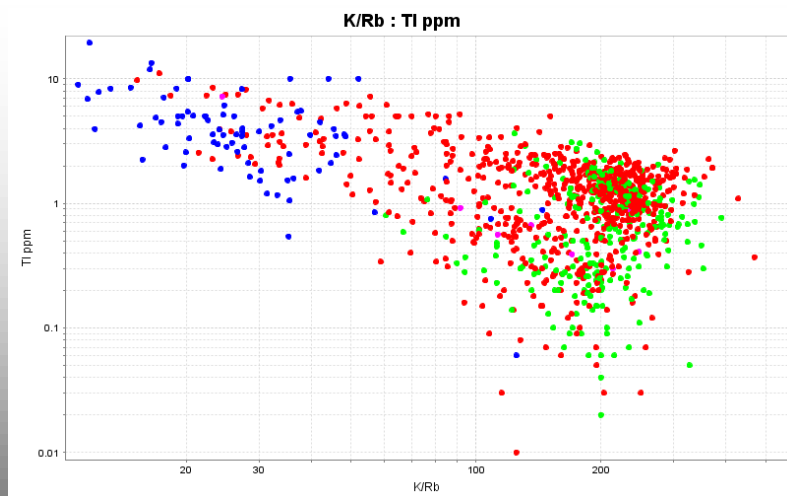
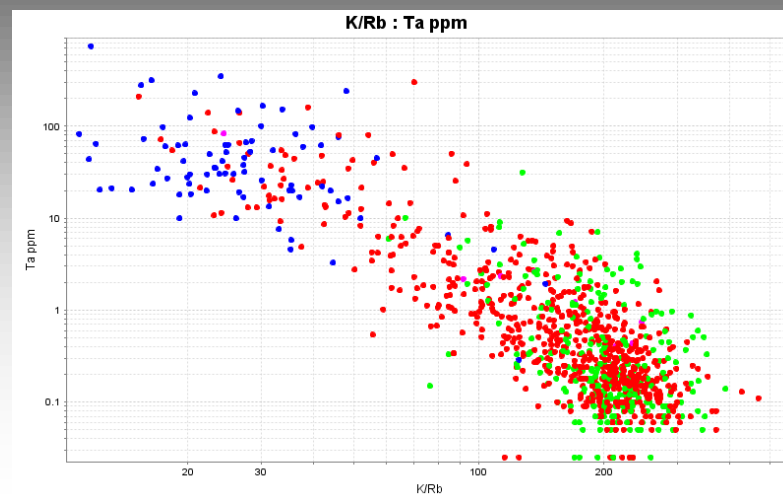
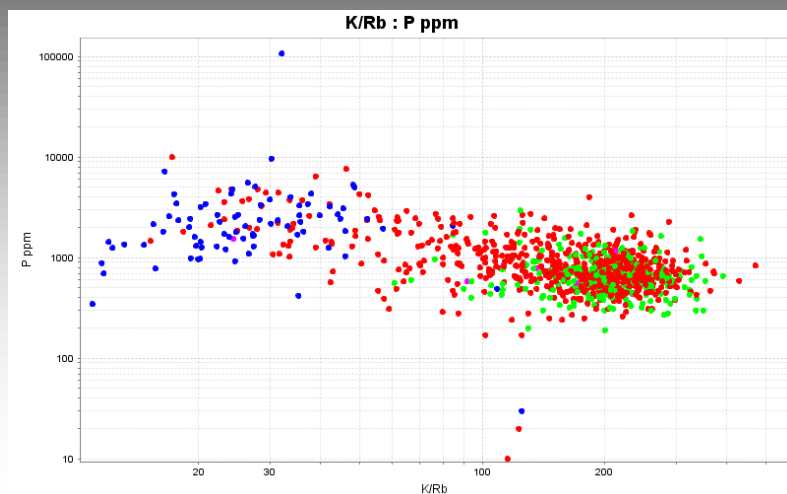




# Elemental Fractionation

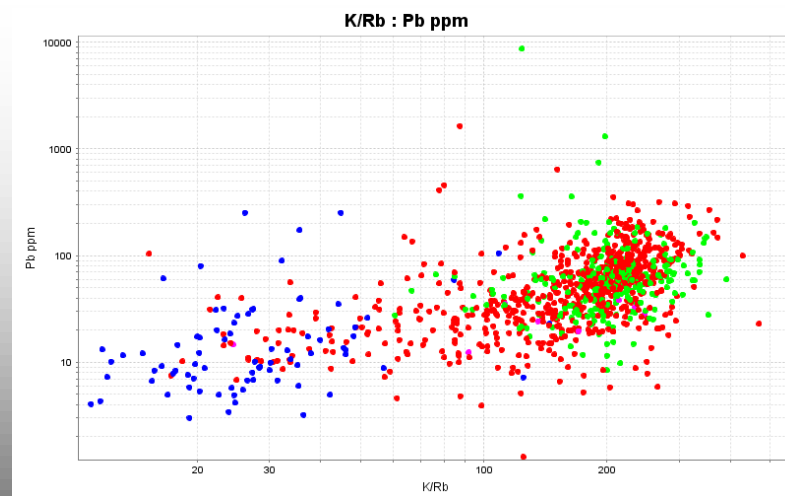
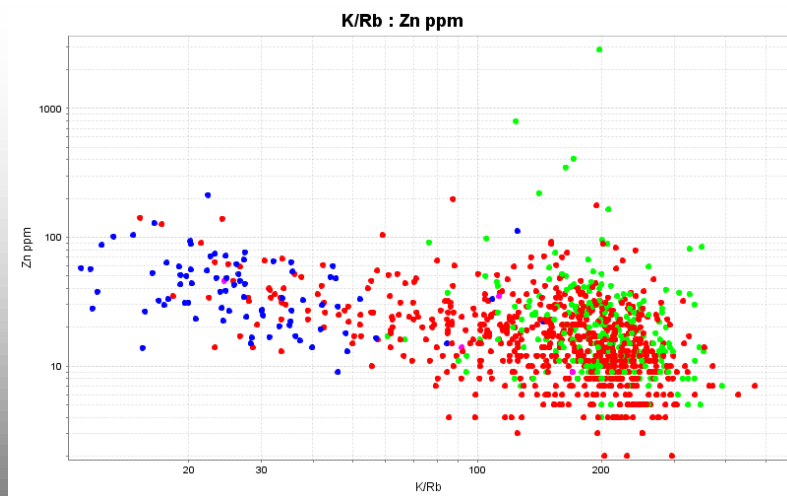
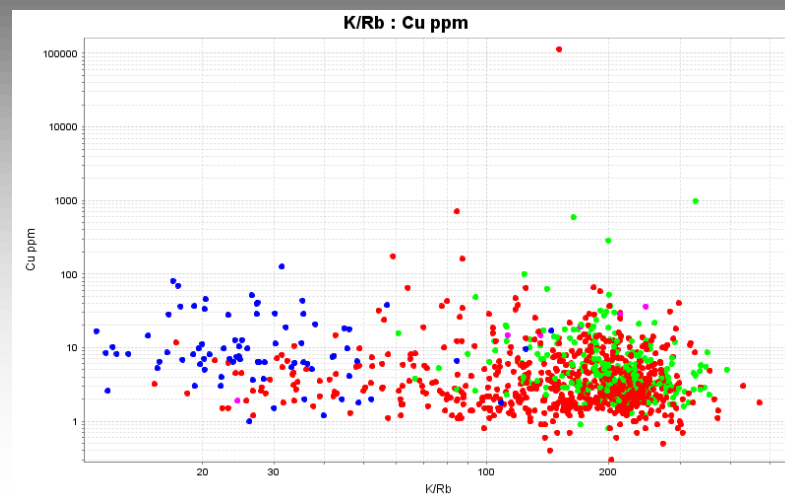
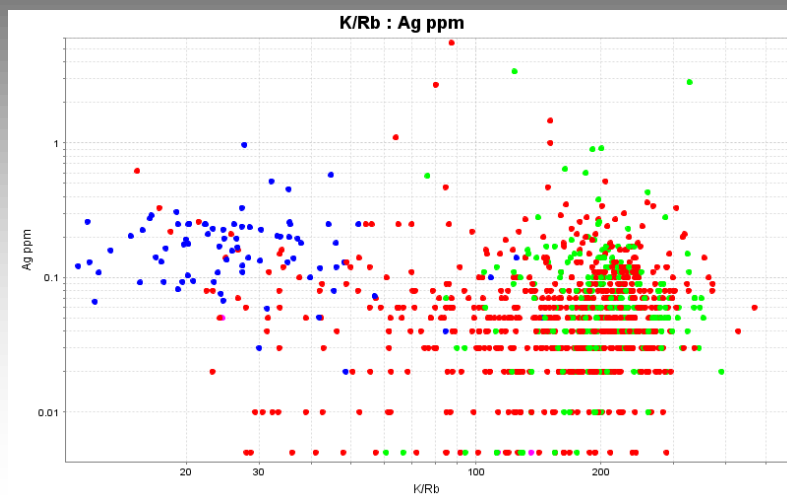


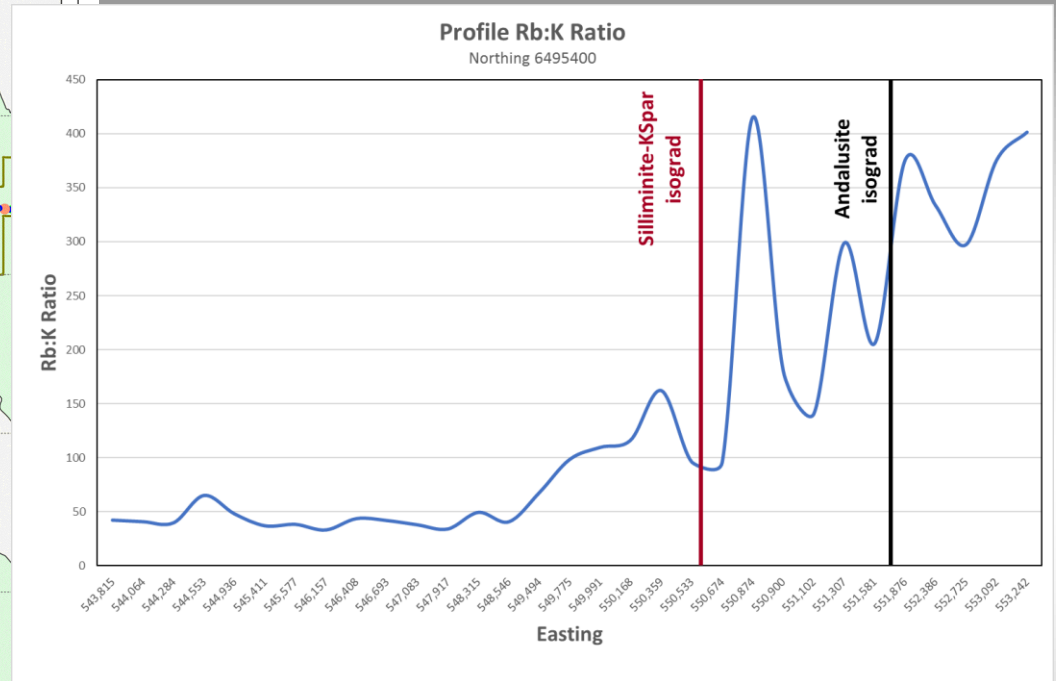
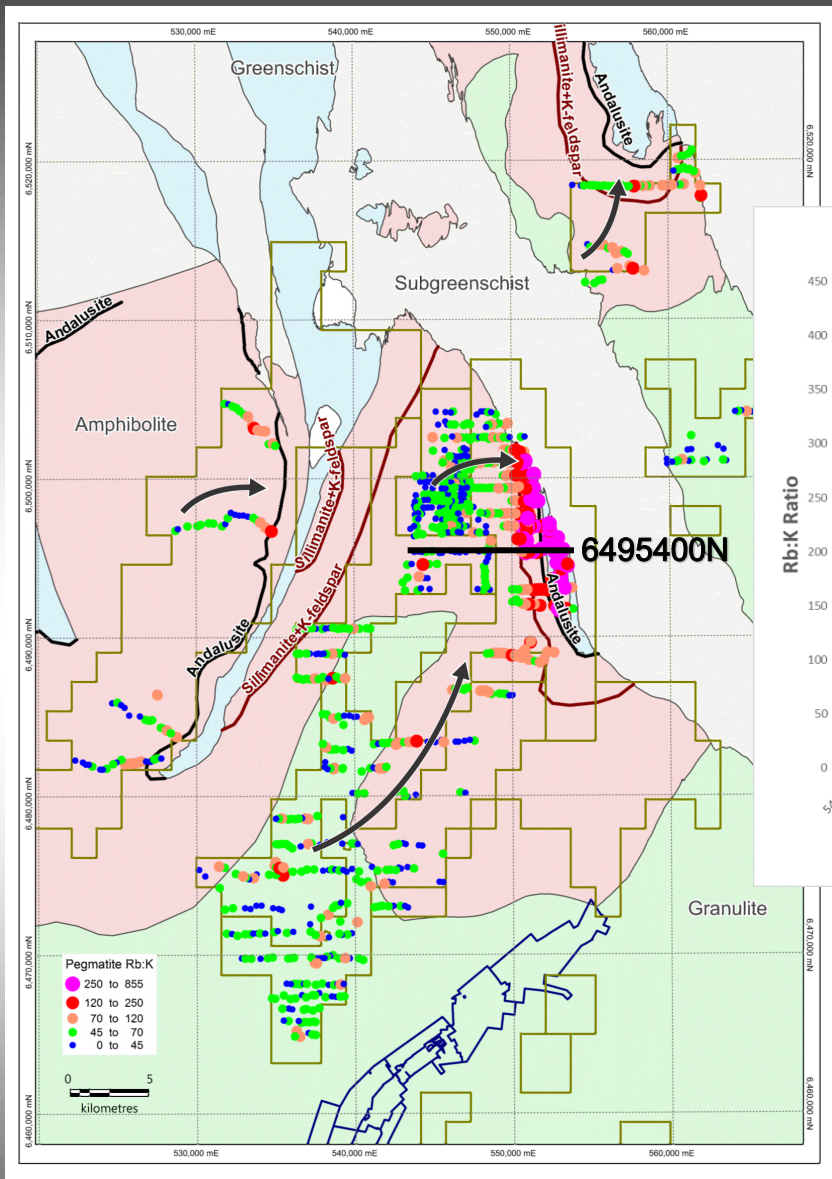
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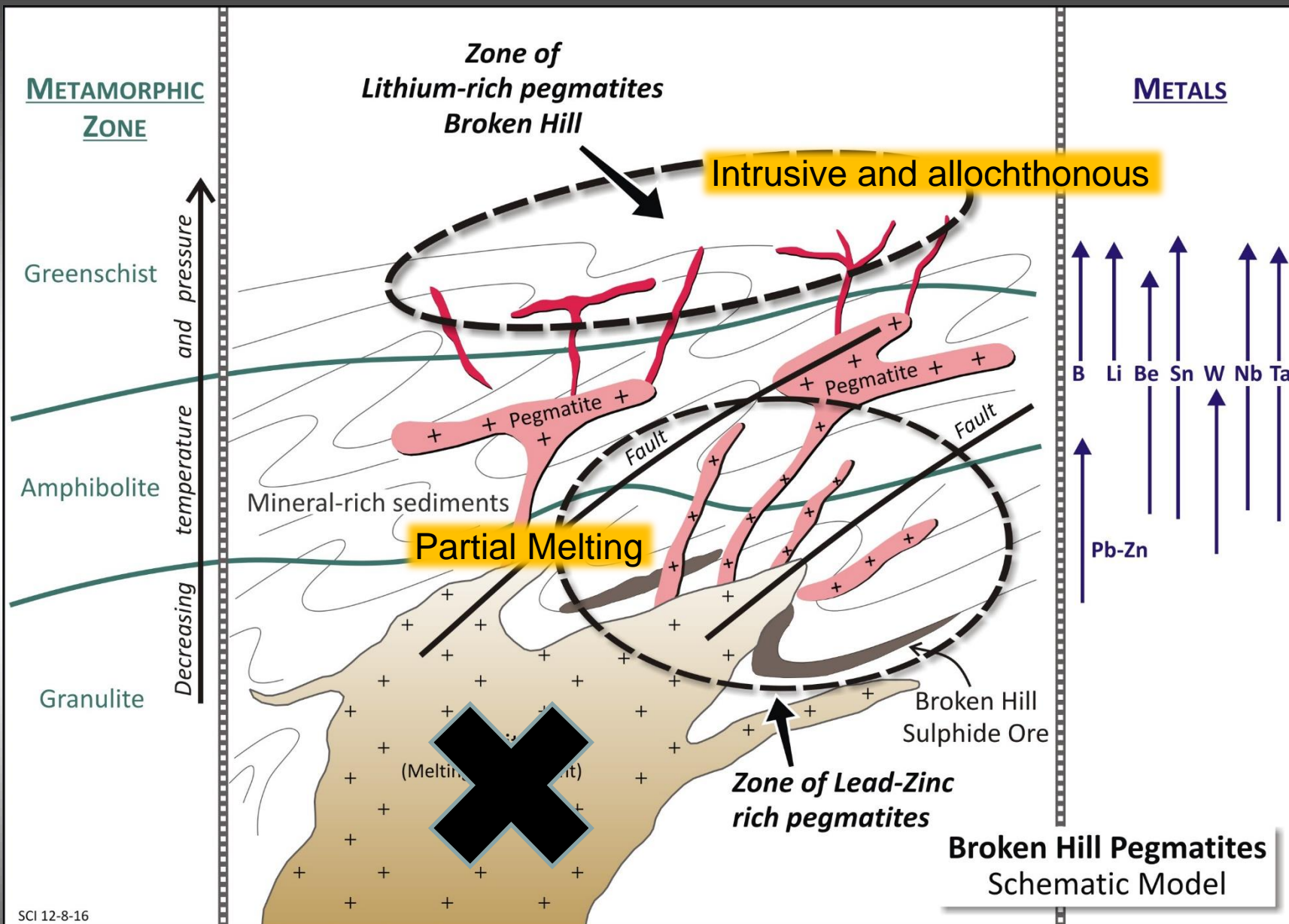




# Elemental Fractionation







SCI 12-8-16



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