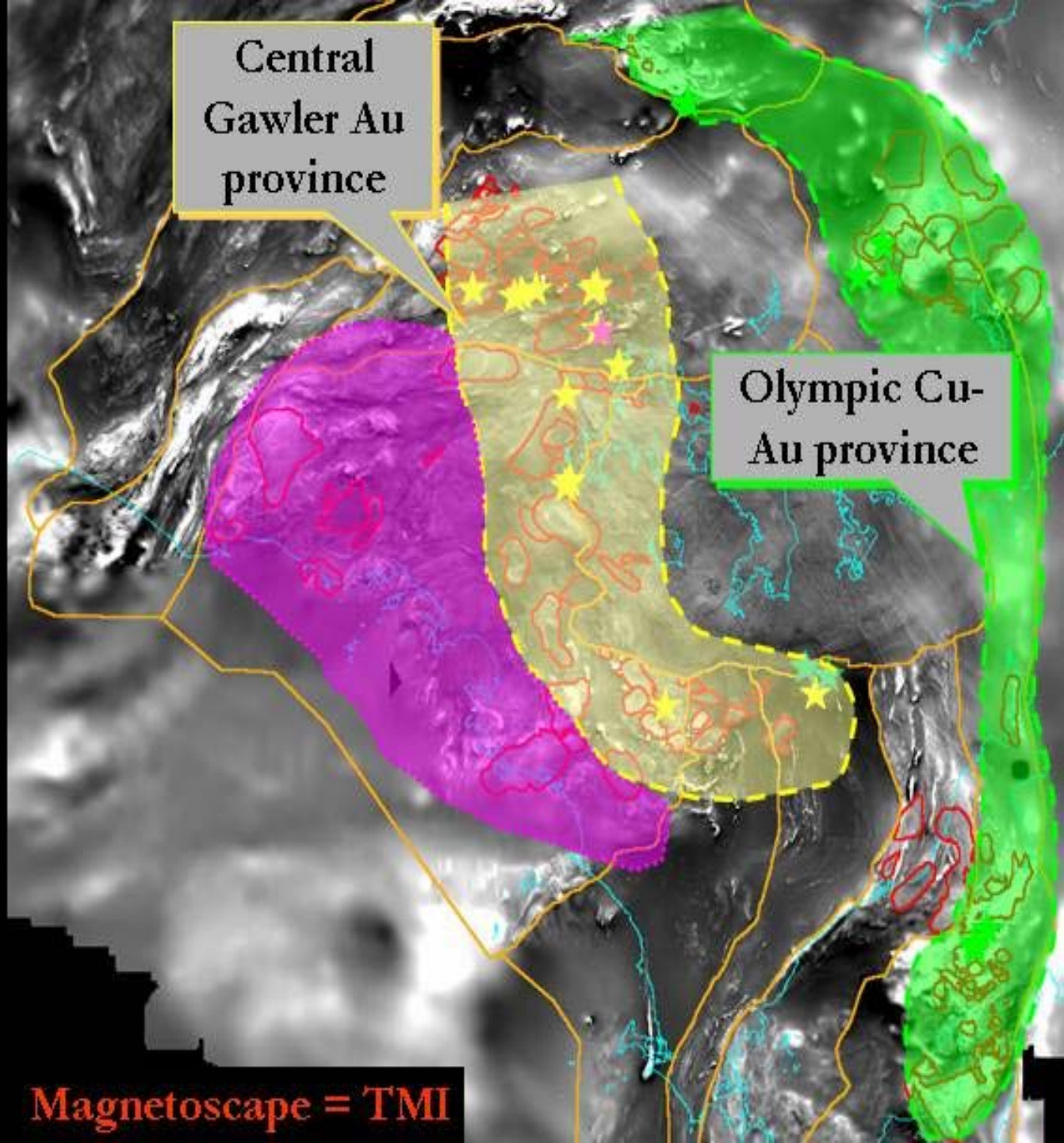
Hiltaba Suite magma composition

A regional-scale guide to location of Cu-Au versus Au-only mineralisation

- Background to project/study
- Relationship between granites & mineralisation
- Geochemical variations across the suite
- Implications for exploration & ongoing research

Background to study

- MPAPG
- Hiltaba - two subsuites
- East = Cu-Au
- Central = Au
- Two mineral styles assoc. with 1 granite?
- What's the difference?



Magnetoscape = TMI

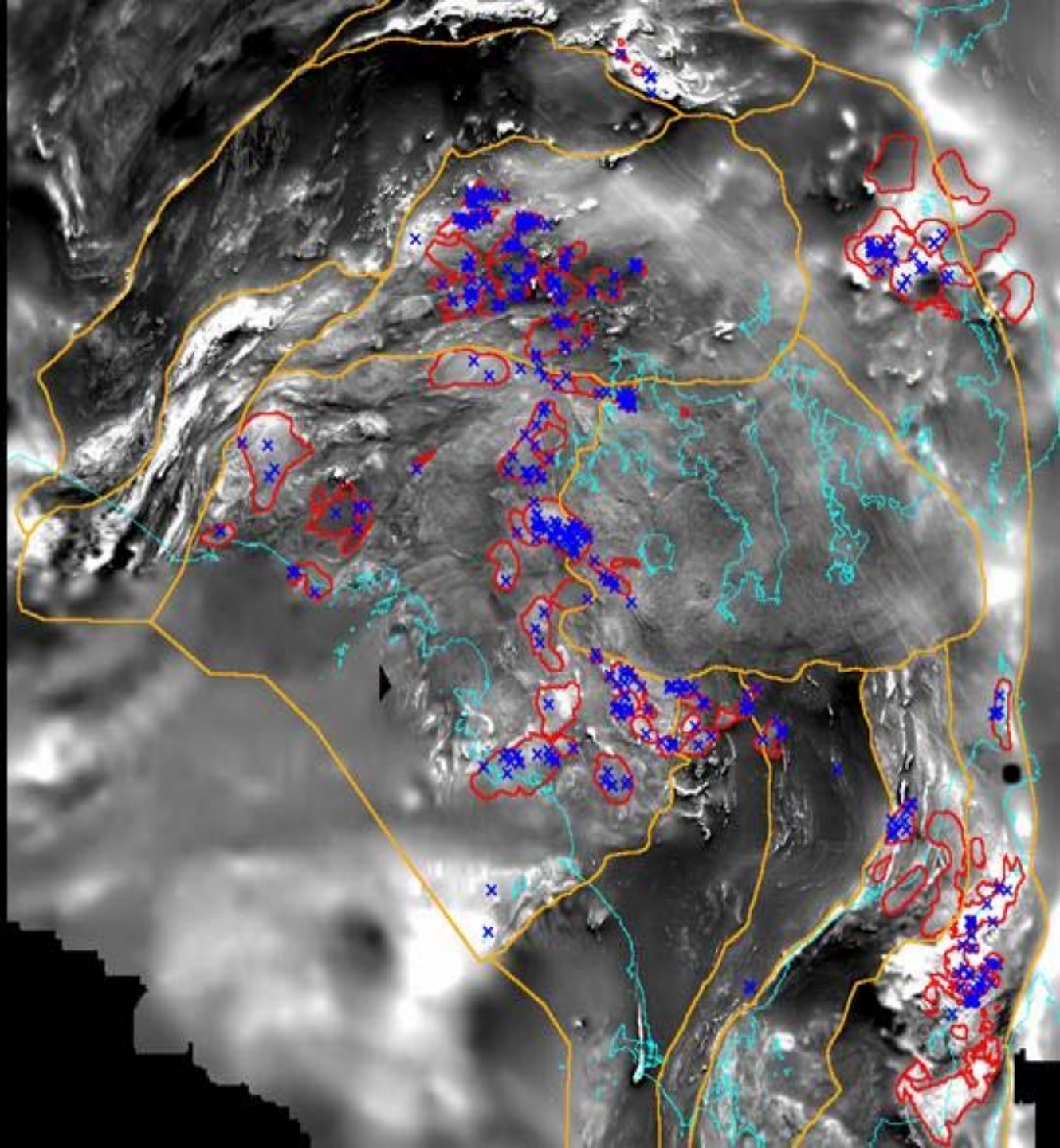
Variations across the Hiltaba Suite

- The dataset
- A new method for comparing plutons
- Some maps
- Interpretation *(just a little bit of armwaving)*

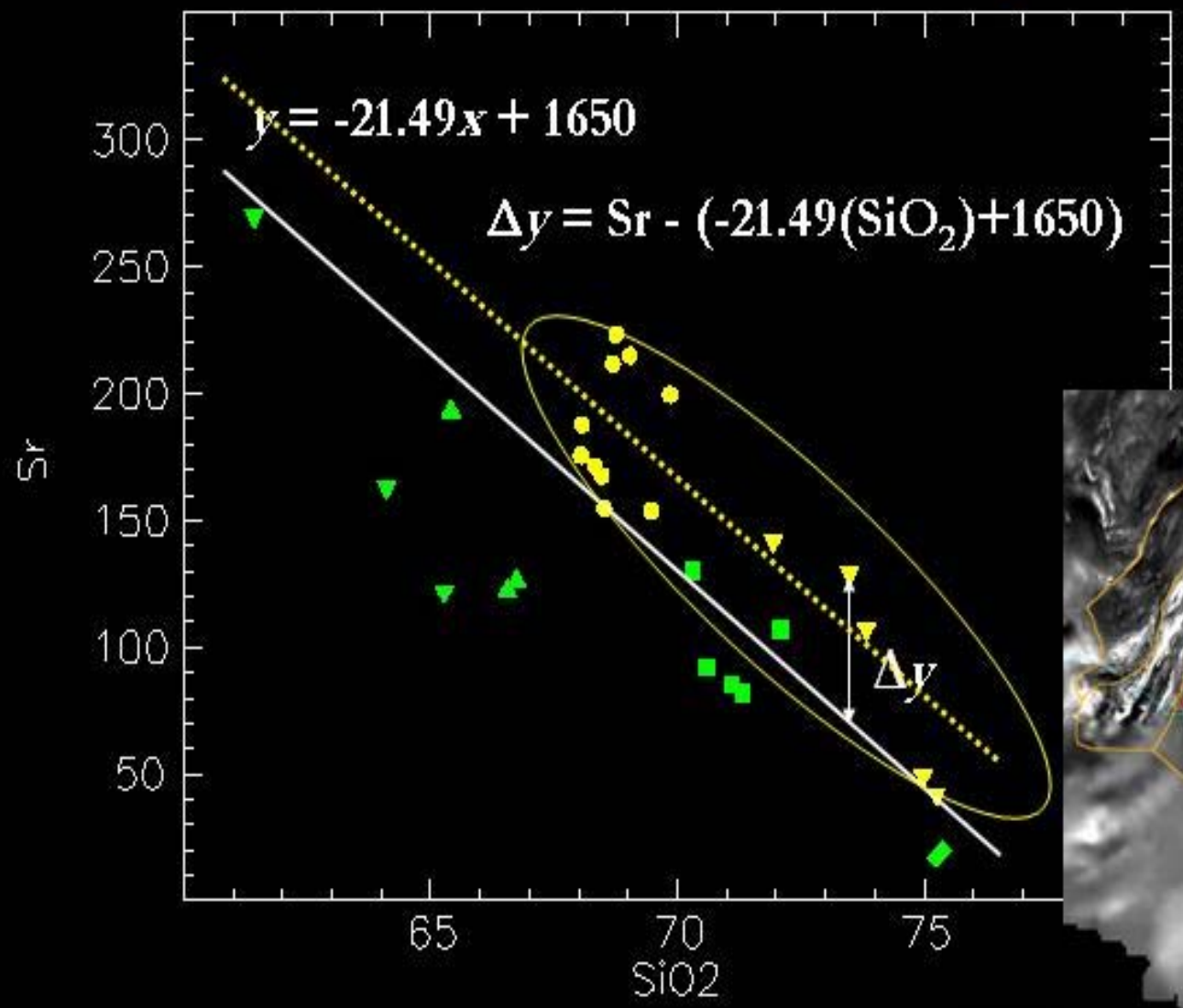
GEOSCIENCE AUSTRALIA

The dataset

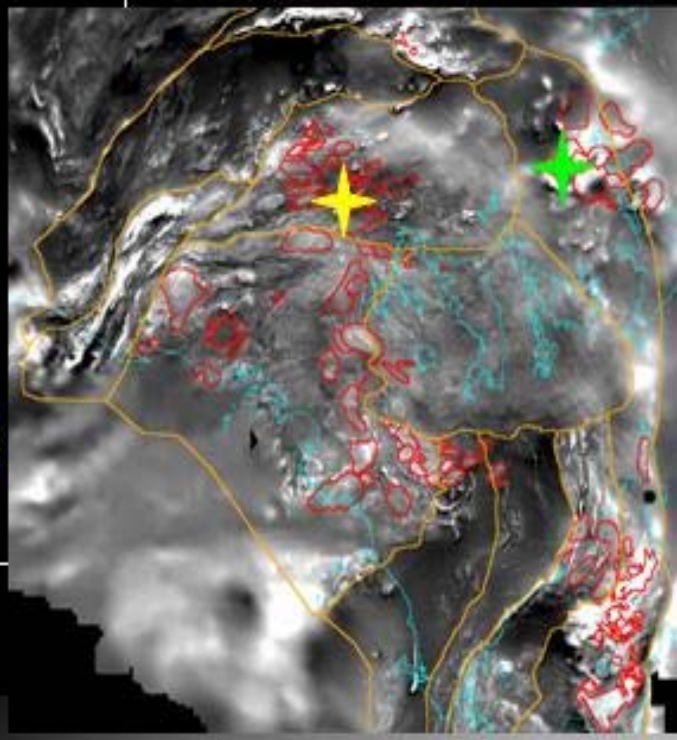
- ~ 660 points
- Varying quality

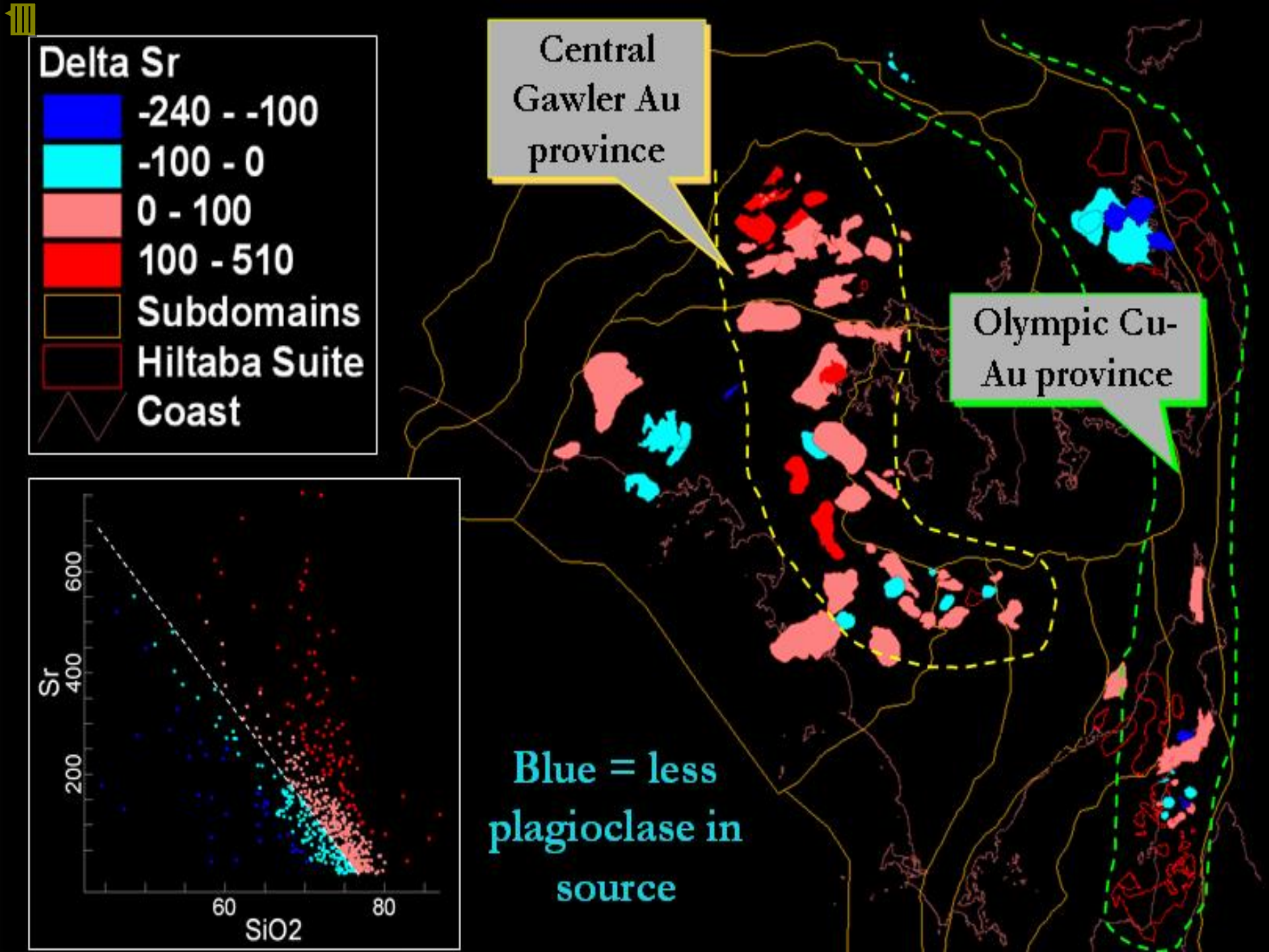


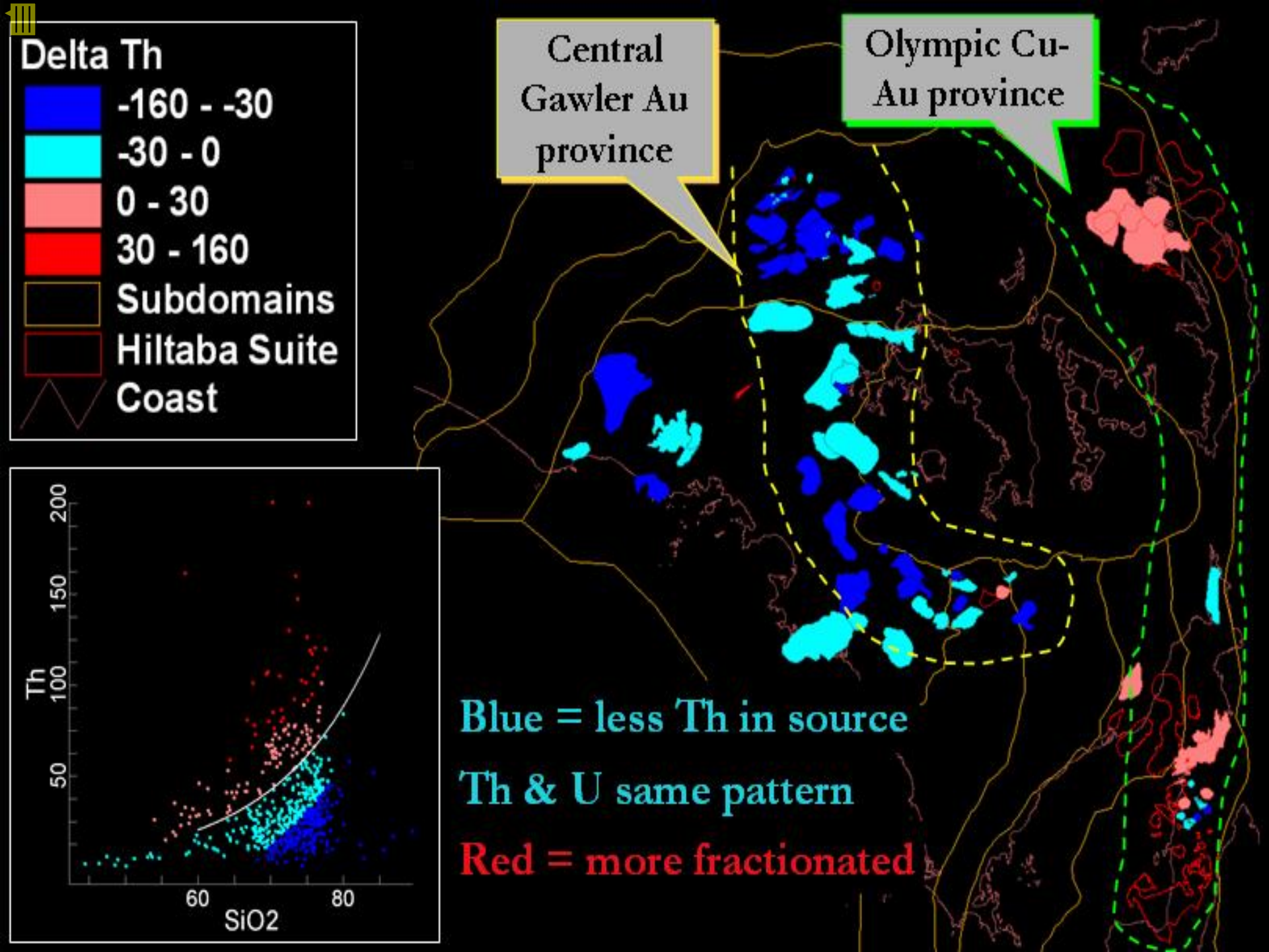
The method - Perseverance and Wirrda subsuite templates

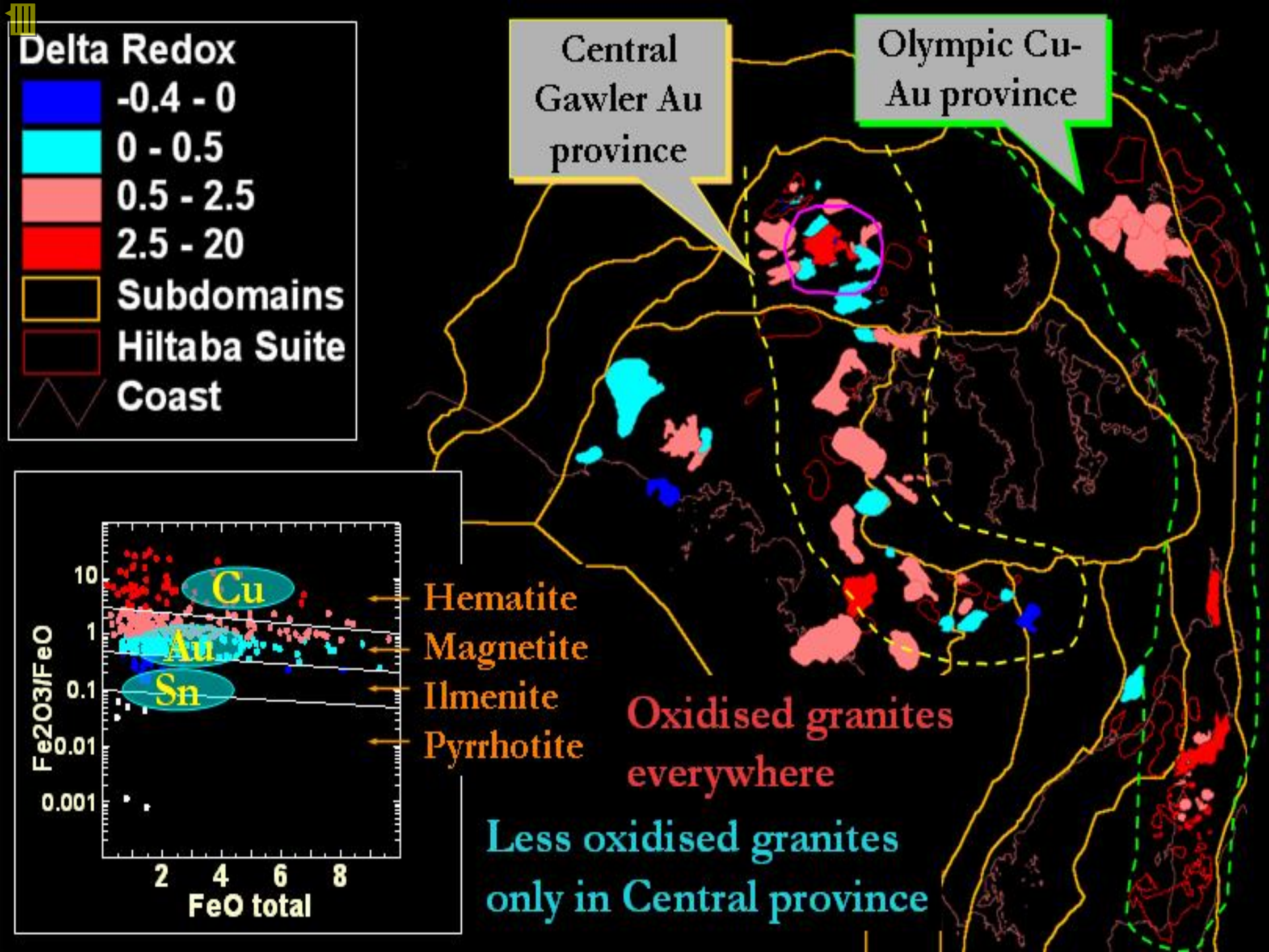


- Perseverance
- Paxton
- Wirrda QLAT
- Wirrda QMZN
- Wirrda GRT
- Wirrda APL




Delta Sr
-240 - -100
-100 - 0
0 - 100
100 - 510
Subdomains
Hiltaba Suite
Coast
Central Gawler Au province
Olympic Cu-Au province
Sr
600
400
200
60
80
SiO2
Blue = less plagioclase in source


Delta Th
-160 - -30
-30 - 0
0 - 30
30 - 160
Subdomains
Hiltaba Suite
Coast
Central Gawler Au province
Olympic Cu-Au province
Th
200
150
100
50
60
80
SiO2
Blue = less Th in source
Th & U same pattern
Red = more fractionated


Delta Redox
-0.4 - 0
0 - 0.5
0.5 - 2.5
2.5 - 20
Subdomains
Hiltaba Suite
Coast
Central Gawler Au province
Olympic Cu-Au province
Fe2O3/FeO
10
1
0.1
0.01
0.001
2
4
6
8
FeO total
Cu
Au
Sn
Hematite
Magnetite
Ilmenite
Pyrrhotite
Oxidised granites everywhere
Less oxidised granites only in Central province

Variations across the Hiltaba Suite

Conclusion:

- Difference in compositions between eastern and central granites
- Due to different basements (see also Nd data)
- Don't yet know the role of granites in mineralisation, so can't rule out possibility of finding Fe-Ox Cu-Au mineralisation in the central Gawler craton

GEOSCIENCE AUSTRALIA

Developing an exploration model for the Central Gawler Au-province

- Twenty years of research at Olympic Dam
- Tarcoola principal example of central Gawler Au-dominated mineralisation
- Tarcoola: intrusion-related (Fort Knox, Yukon) or later epizonal lode-gold event
- Tarcoola, Barns & Tunkillia similar
- Research @ Tarcoola: dating, tracing metals and fluids, deposition mechanisms
- Template of granite composition for prioritising area selection at exploration lease level