GEOPHYSICAL RESPONSE OF ALTERATION AND MINERALISATION AT THE CADIA PORPHYRY DISTRICT, NSW, AUSTRALIA

Talk Outline

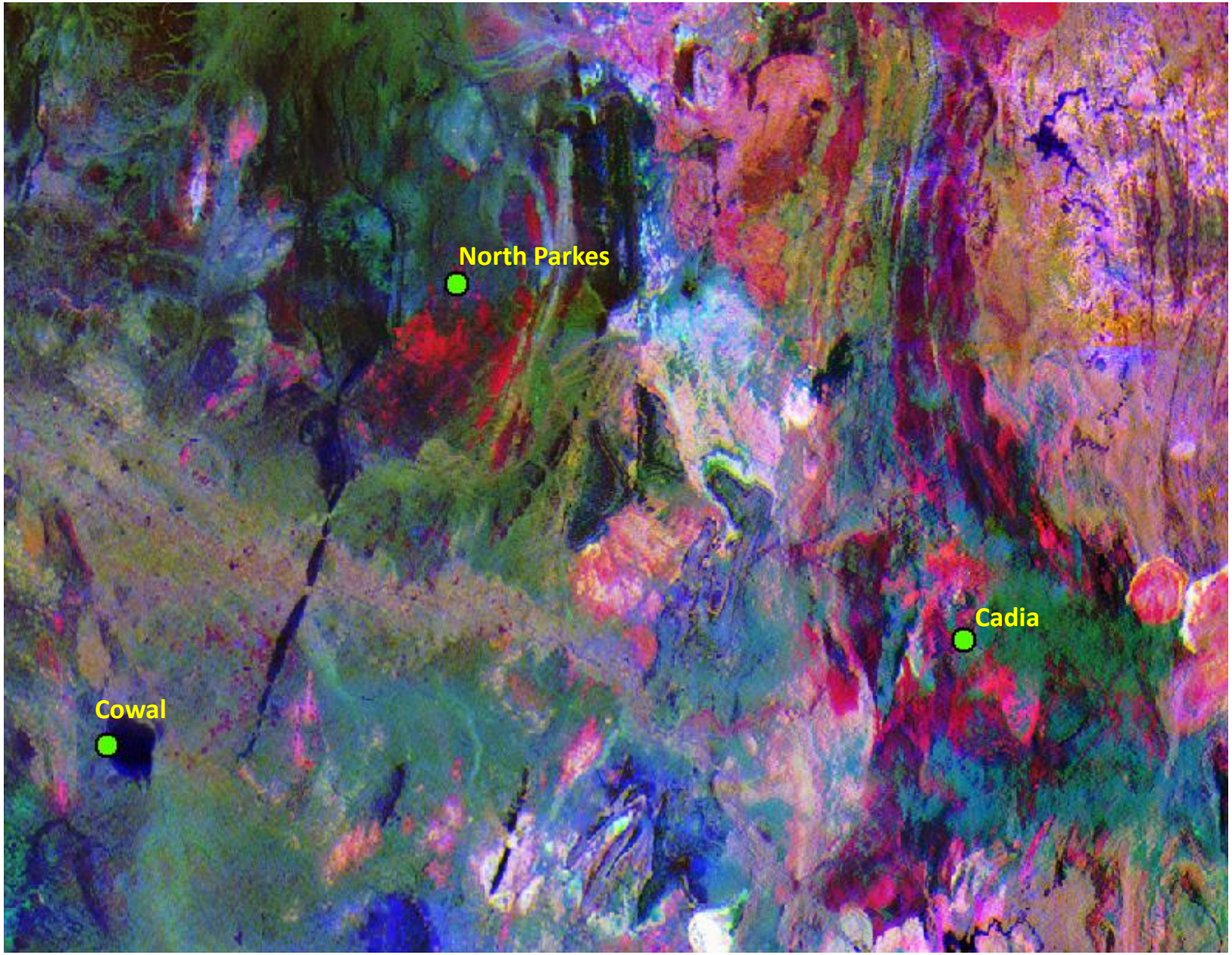
Location

Regional Geophysics

Cadia

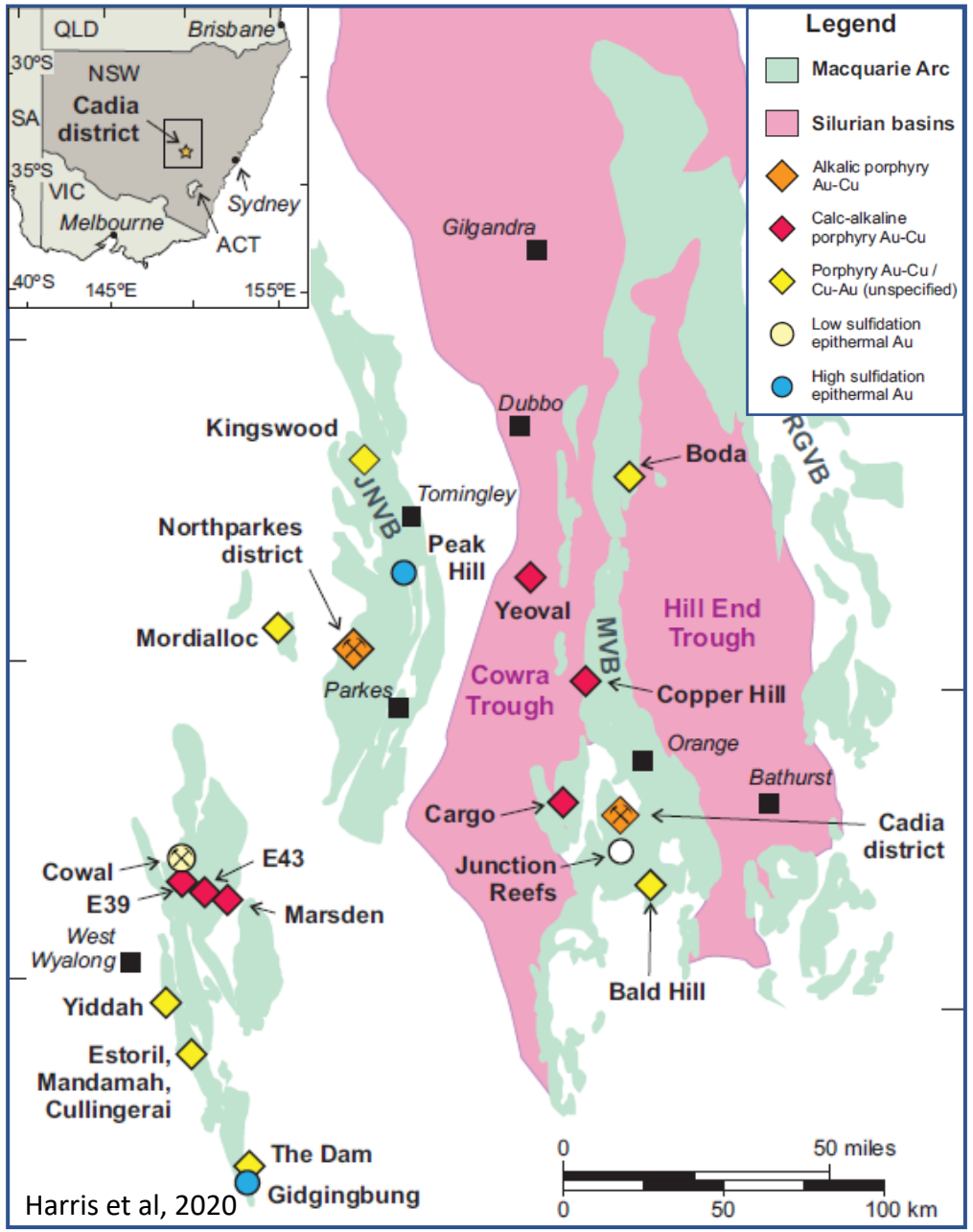
- Exploration History
- Geology
- District Gravity
- Magnetics
- Cadia Hill
- Ridgeway
- Cadia East

Conclusion

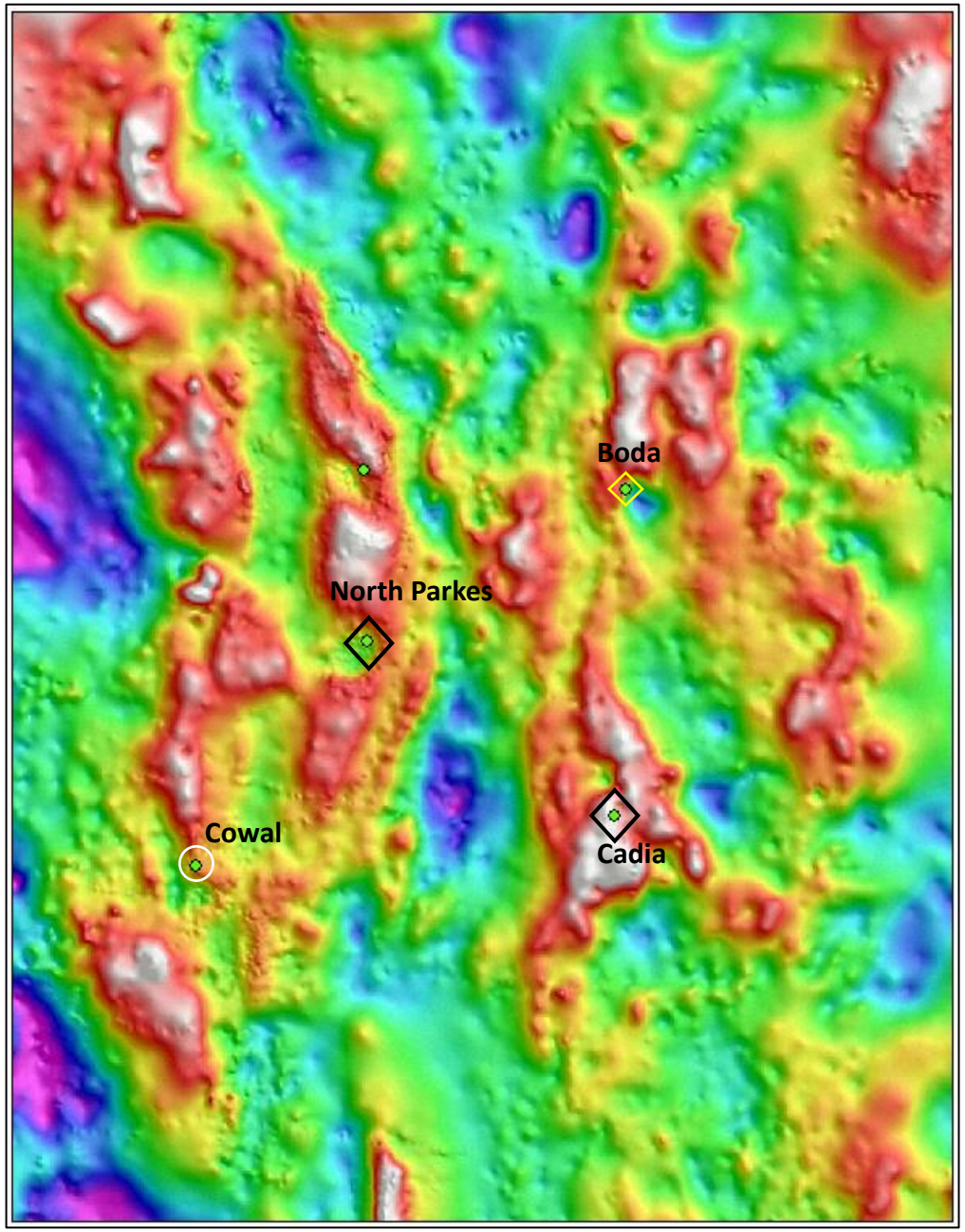


Radiometrics K-red, Th-green, U-blue

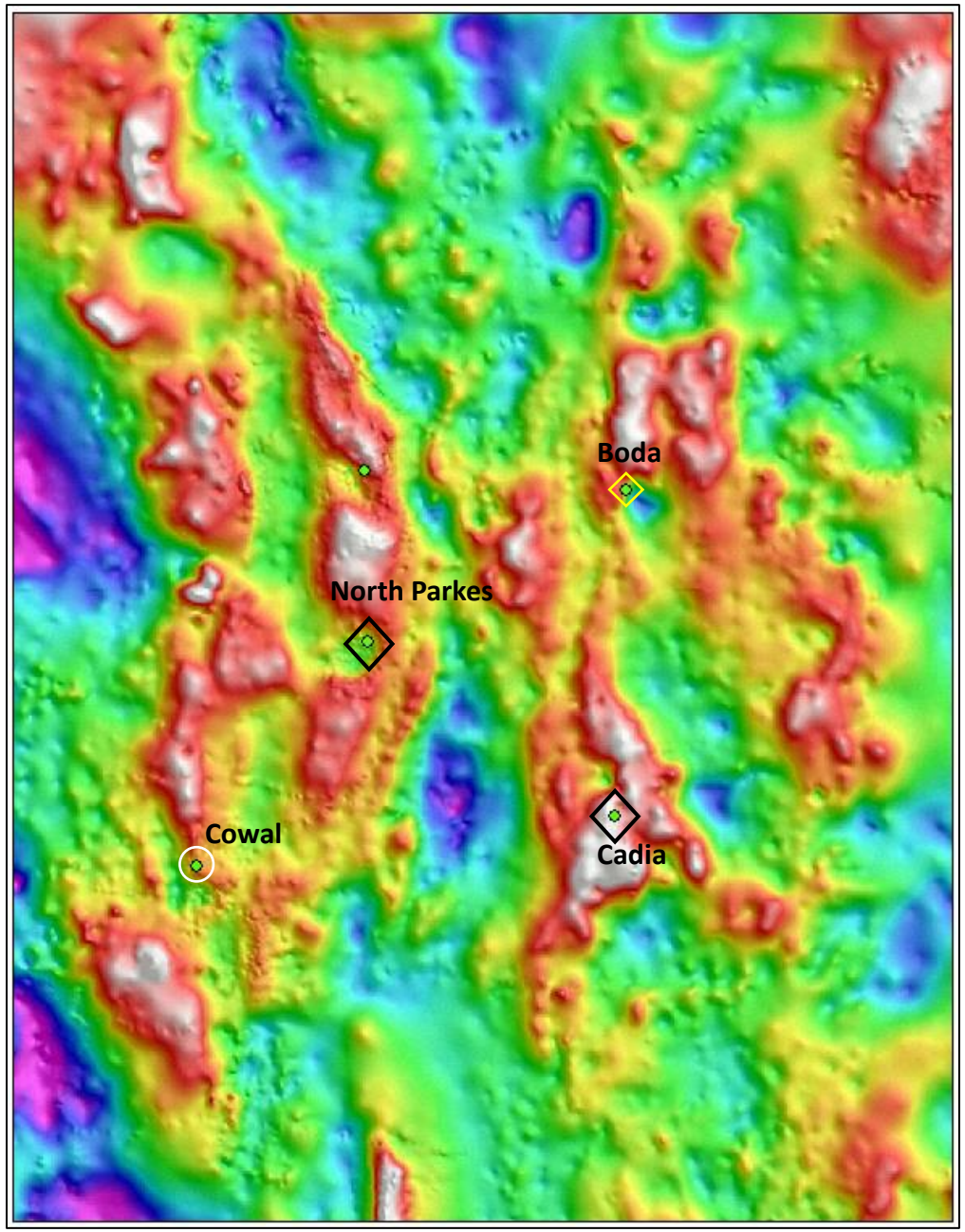
Lachlan Fold Belt – Deposit Location

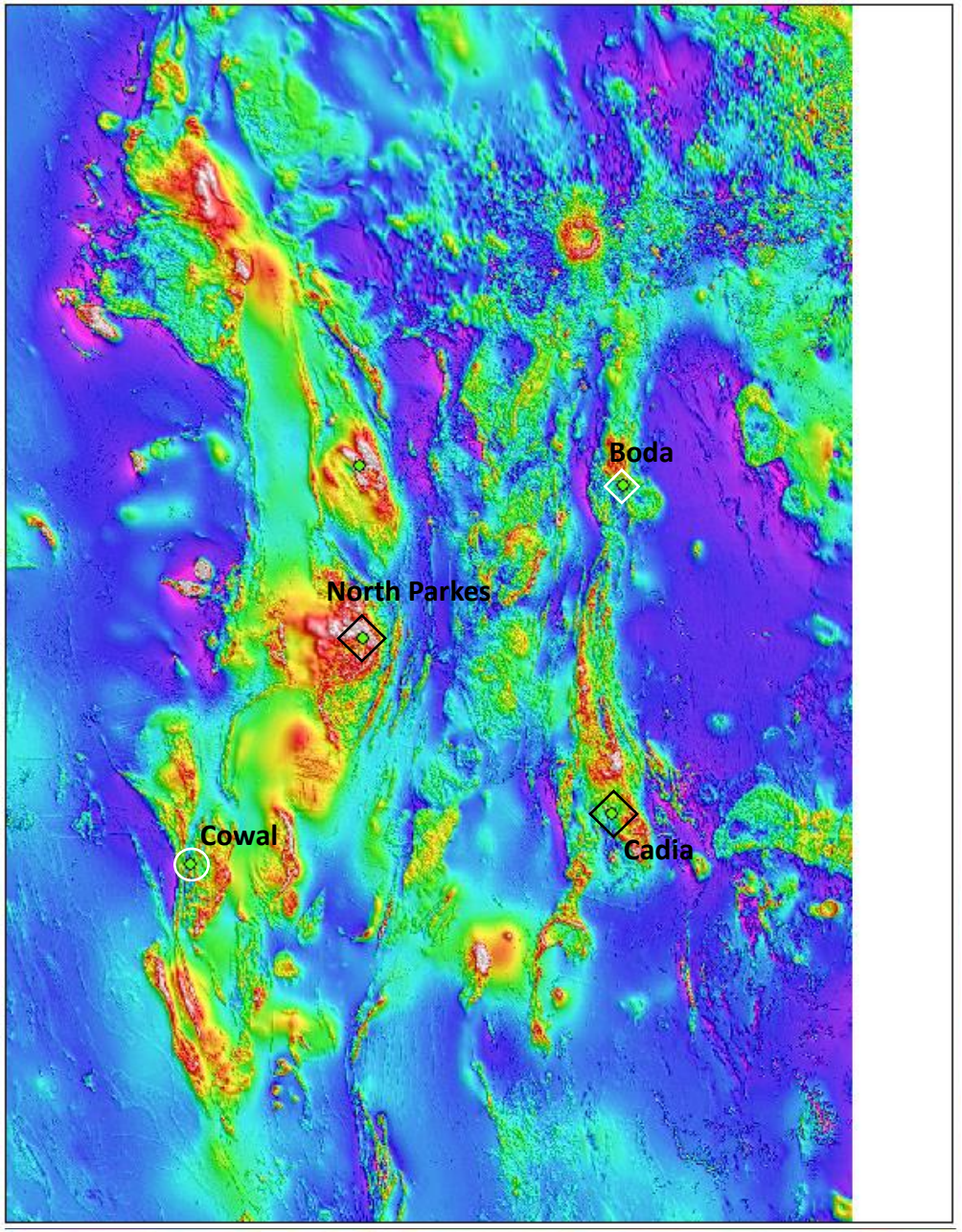


Harris et al, 2020



Lachlan Fold Belt – Regional Geophysics





Cadia District History

1850s

minor Au production from Cadia Quarry

early 1900s:

Fe production from Big Cadia skarn

1960-80s:

evaluation of bulk tonnage skarn potential

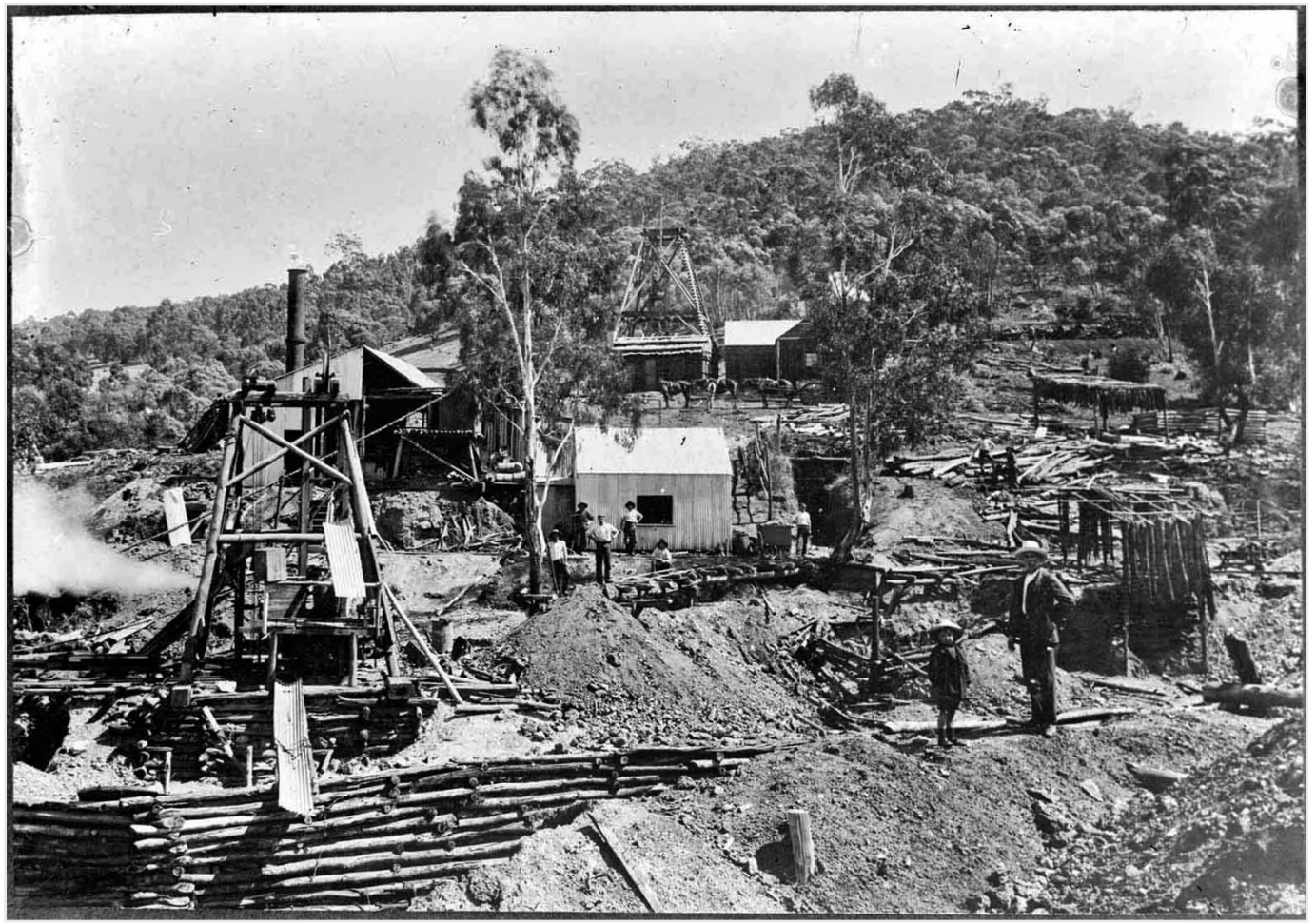
1990:

Cadia Hill drilled (96m @ 0.6 g/t Au)

porphyry-potential not recognized

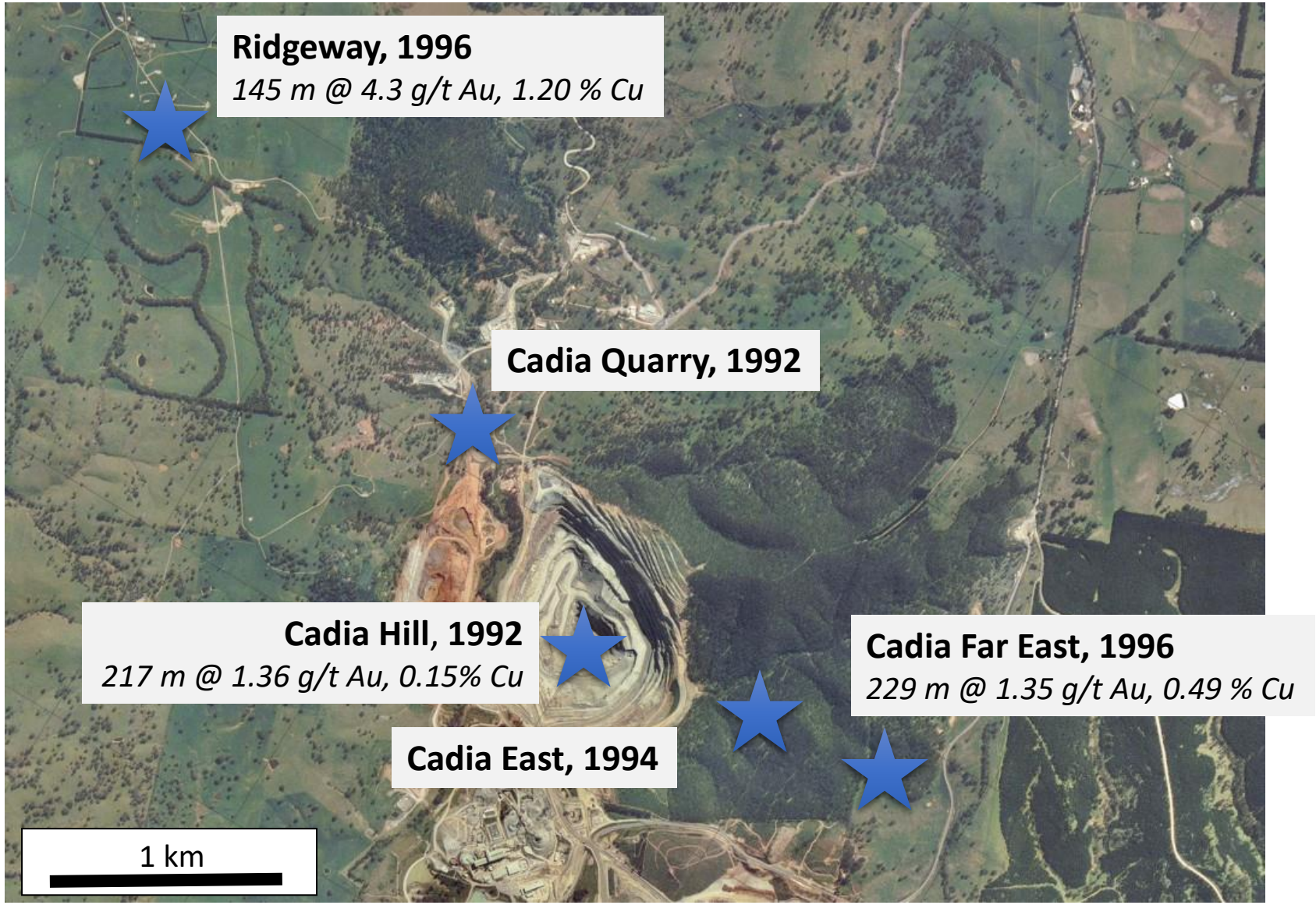
1991:

Newcrest purchases Cadia

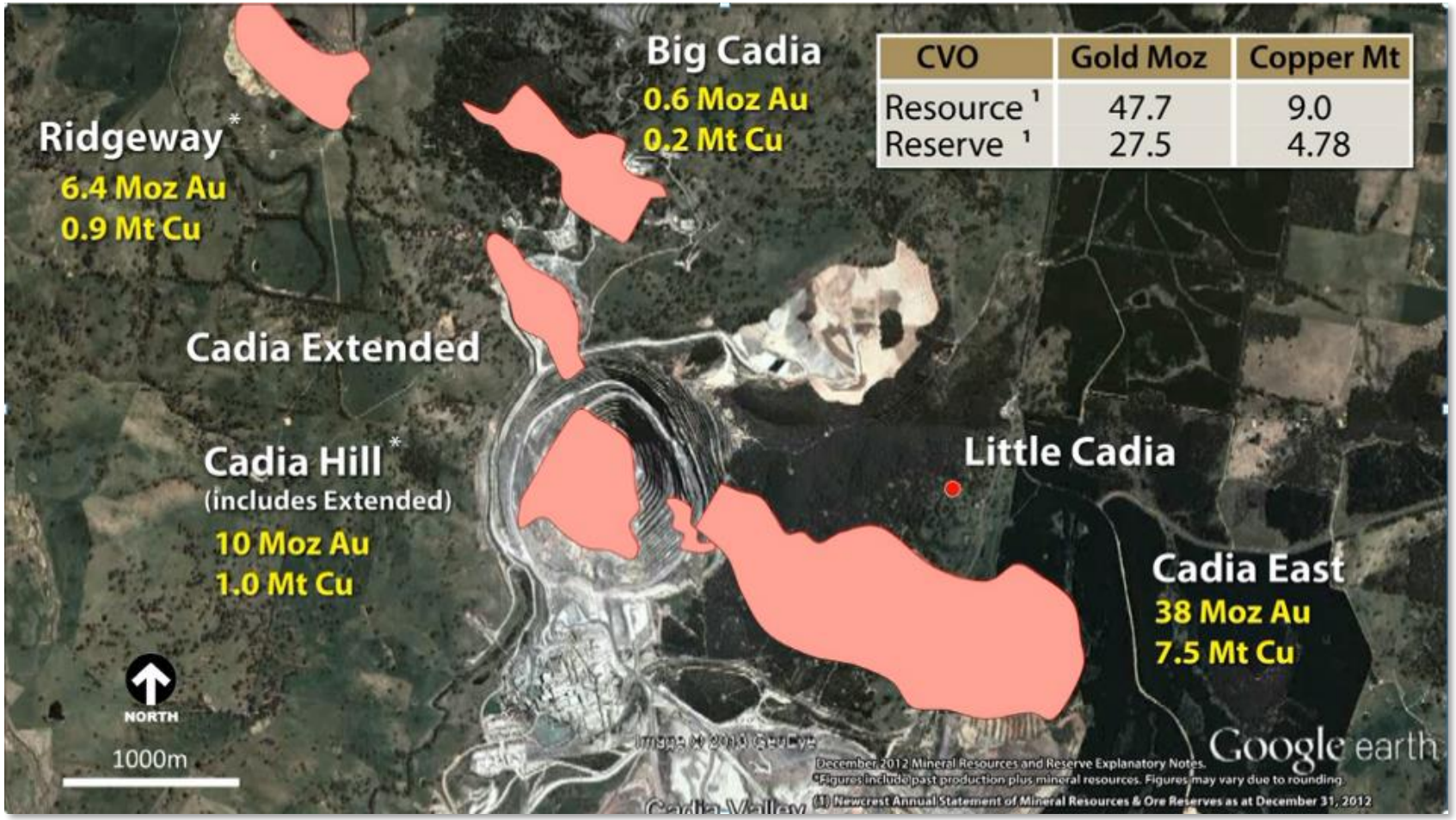


Cadia Copper Mine at base of Iron Duke – Circa 1908

Newcrest Discovery History



Cadia Resources



CVO	Gold Moz	Copper Mt
Resource [1]	47.7	9.0
Reserve [1]	27.5	4.78

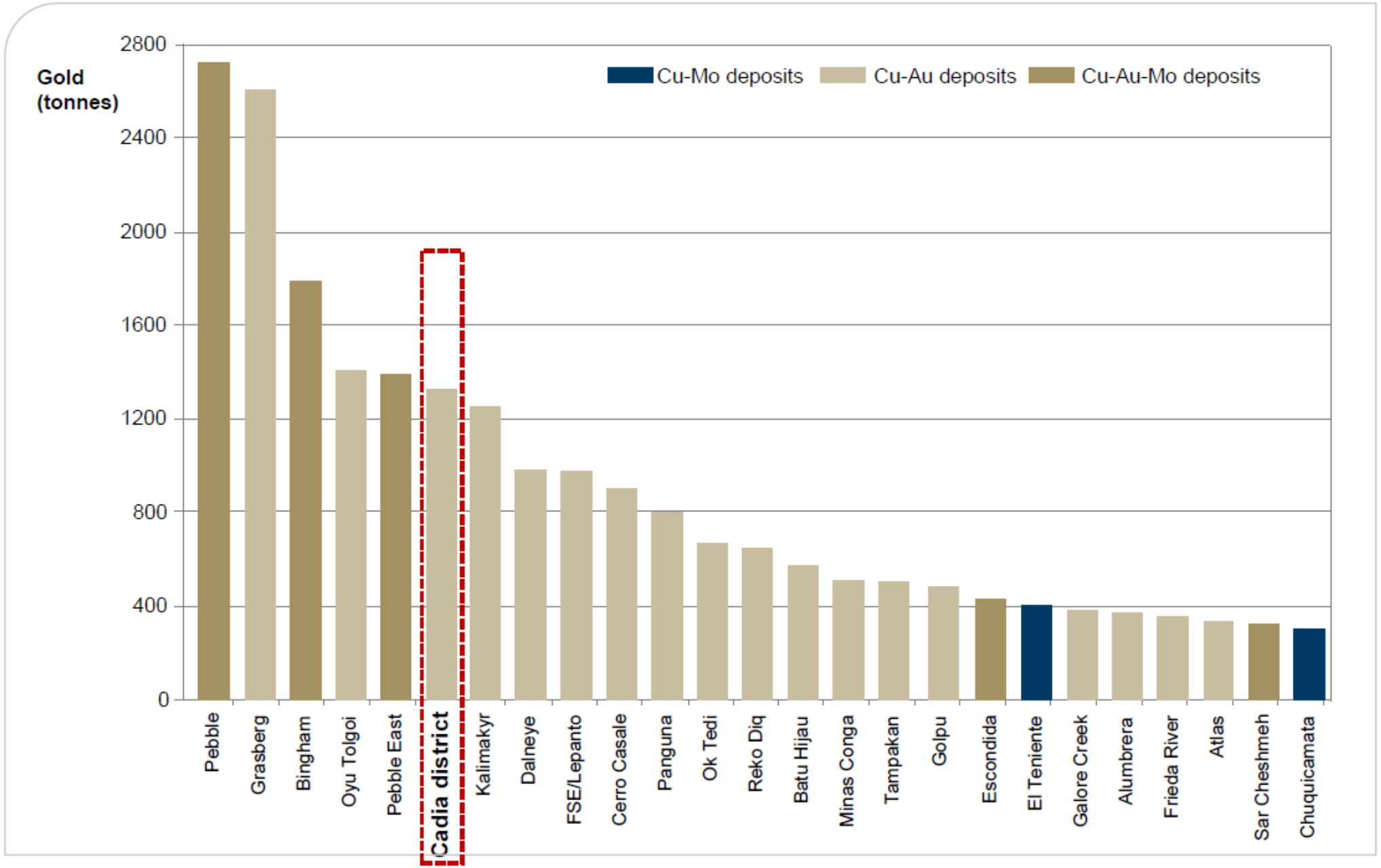
>52MOz Au / 8.7 Mt Cu / 68MOz Ag (Total Resource; Newcrest 2017)

Cadia Hill: 260Mt @ 0.70g/tAu, 0.16% Cu (Total Resource, Newcrest, 2003)

Ridgeway: 157Mt @ 0.80g/t Au, 0.39% Cu (Total Resource, Newcrest, 2008)

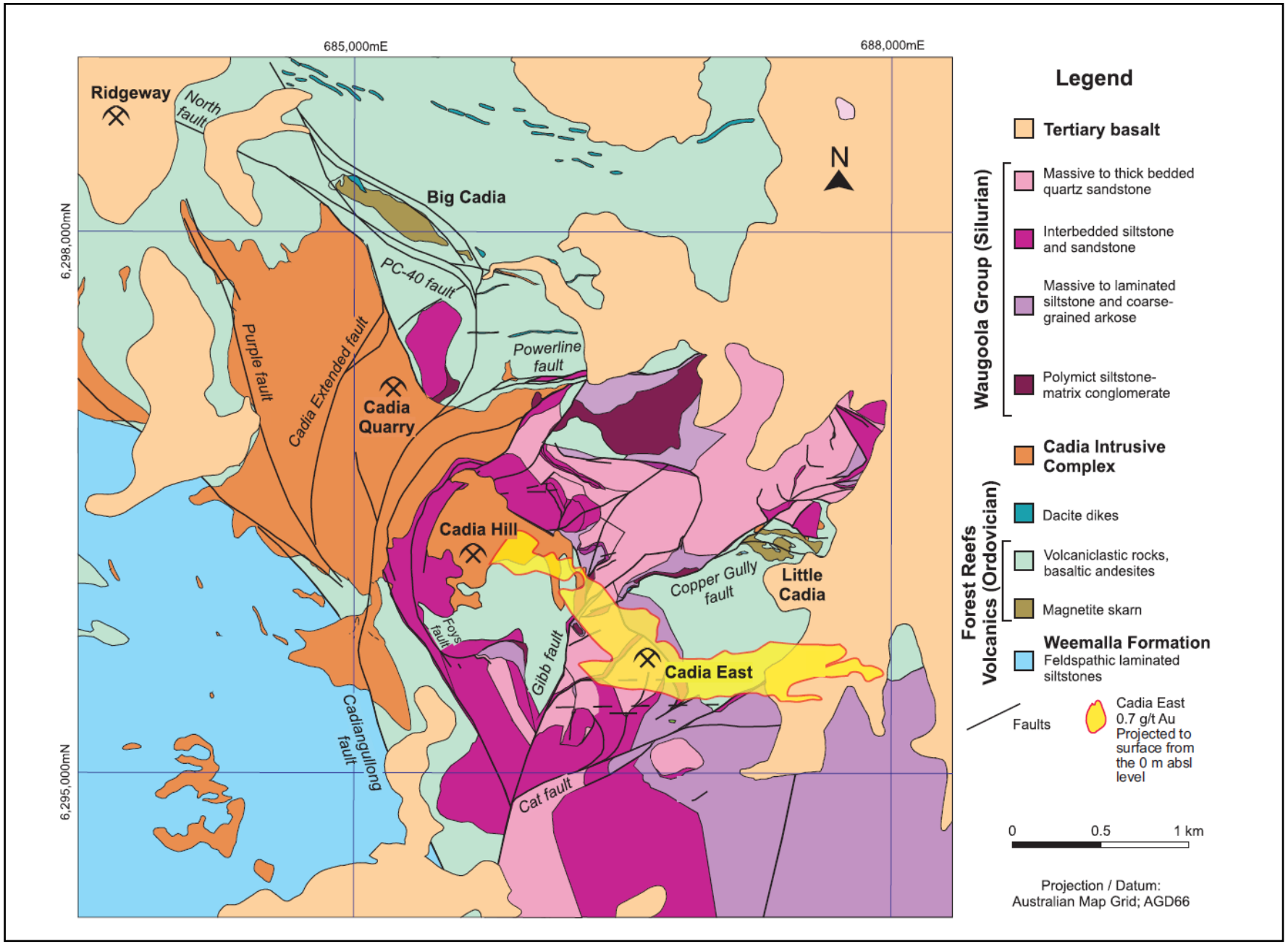
Cadia East: 3000Mt @ 0.38g/t Au, 0.26% Cu (Total Resource, Newcrest, 2017) 200m x 2000m x 1500m

Size of Giant Porphyry Deposits



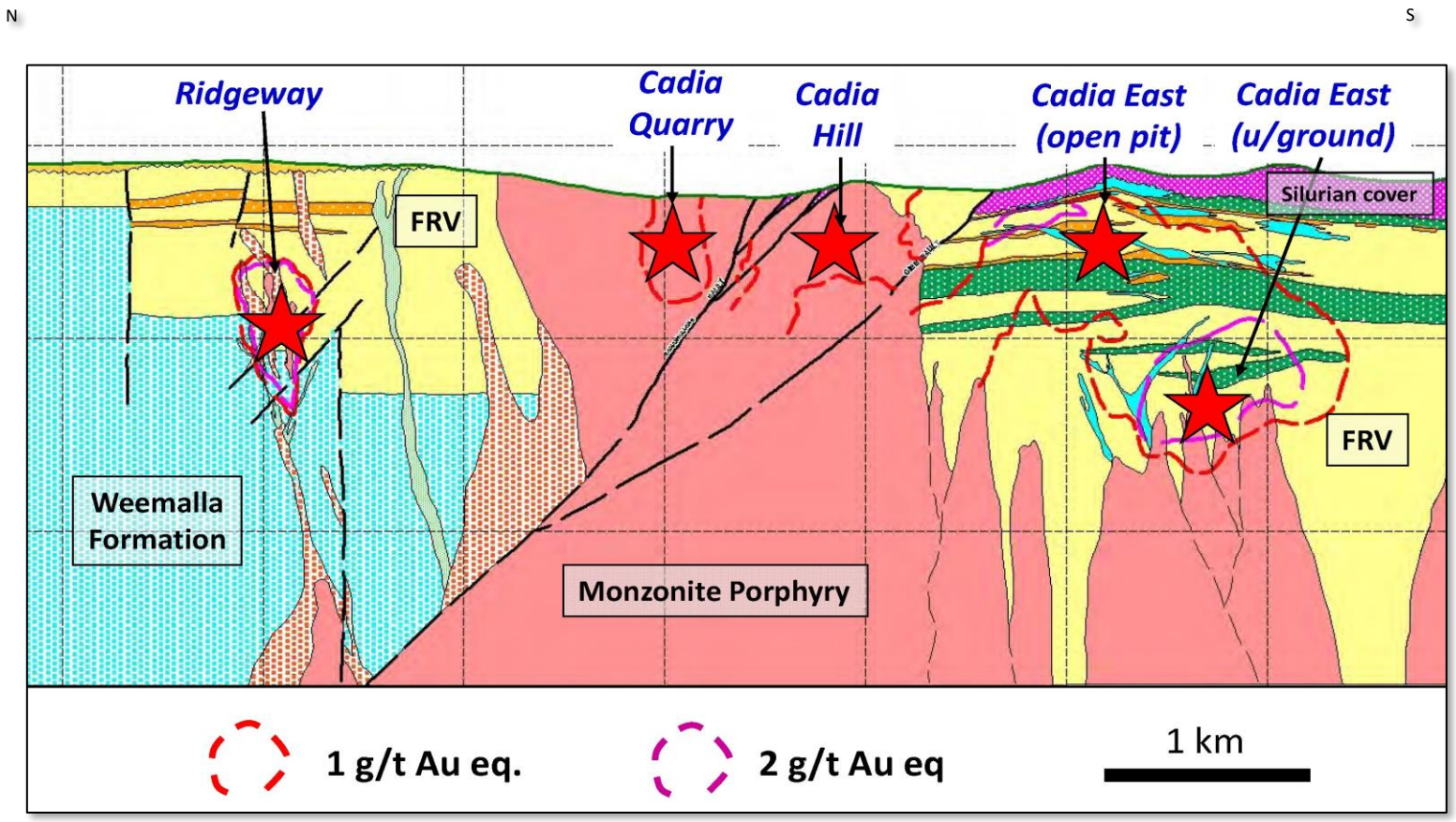
Source: Modified from USGS porphyry ore deposit database.

Cadia Geology



Harris et al, 2020

Cadia Geological Cross Section

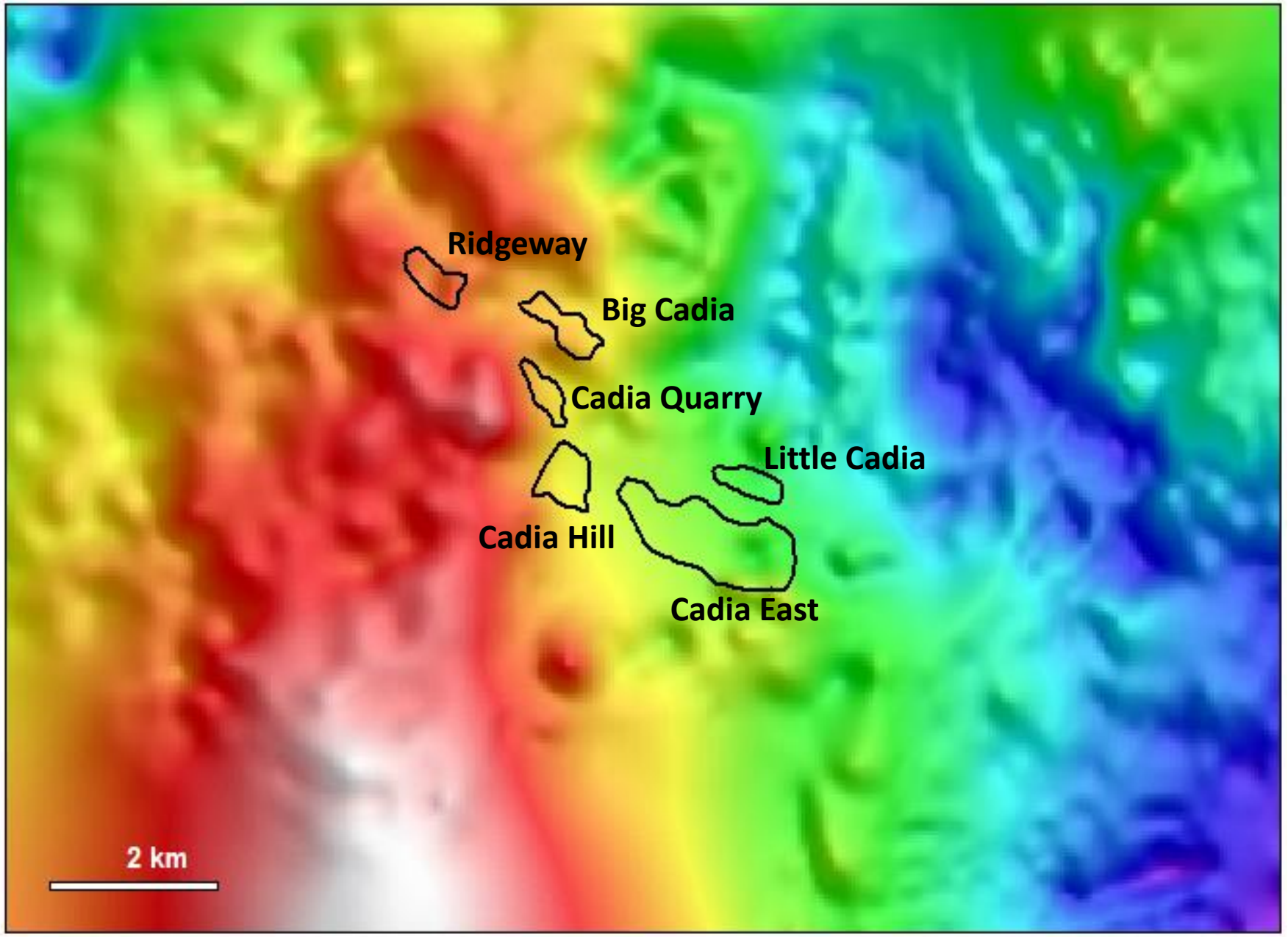


Two main porphyry groups:

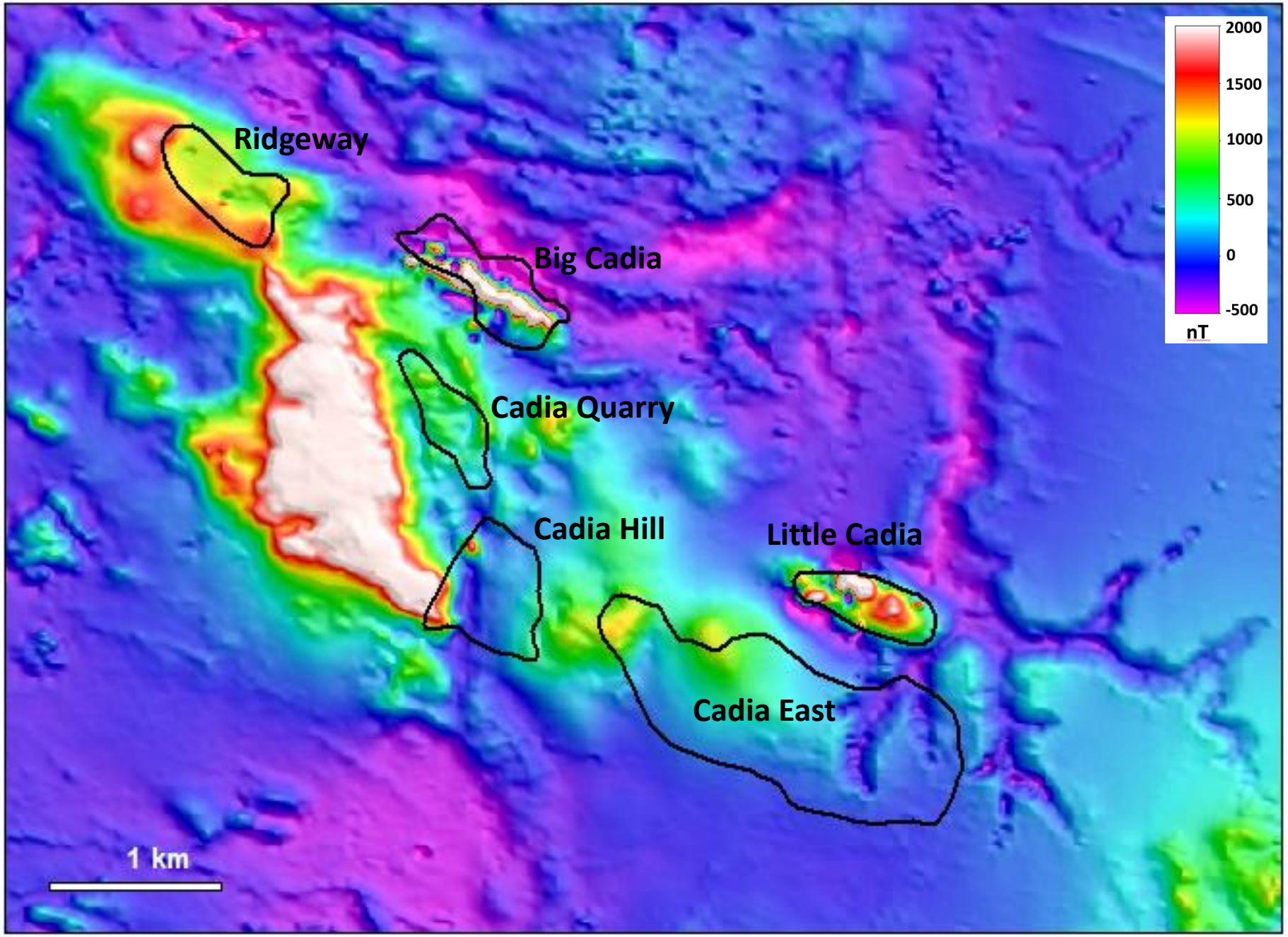
Intrusion-centred
hosted outside main intrusive/magnetic complexes, high-grade, pipe-shaped (Ridgeway) and elongate dyke (Cadia East) porphyry geometries

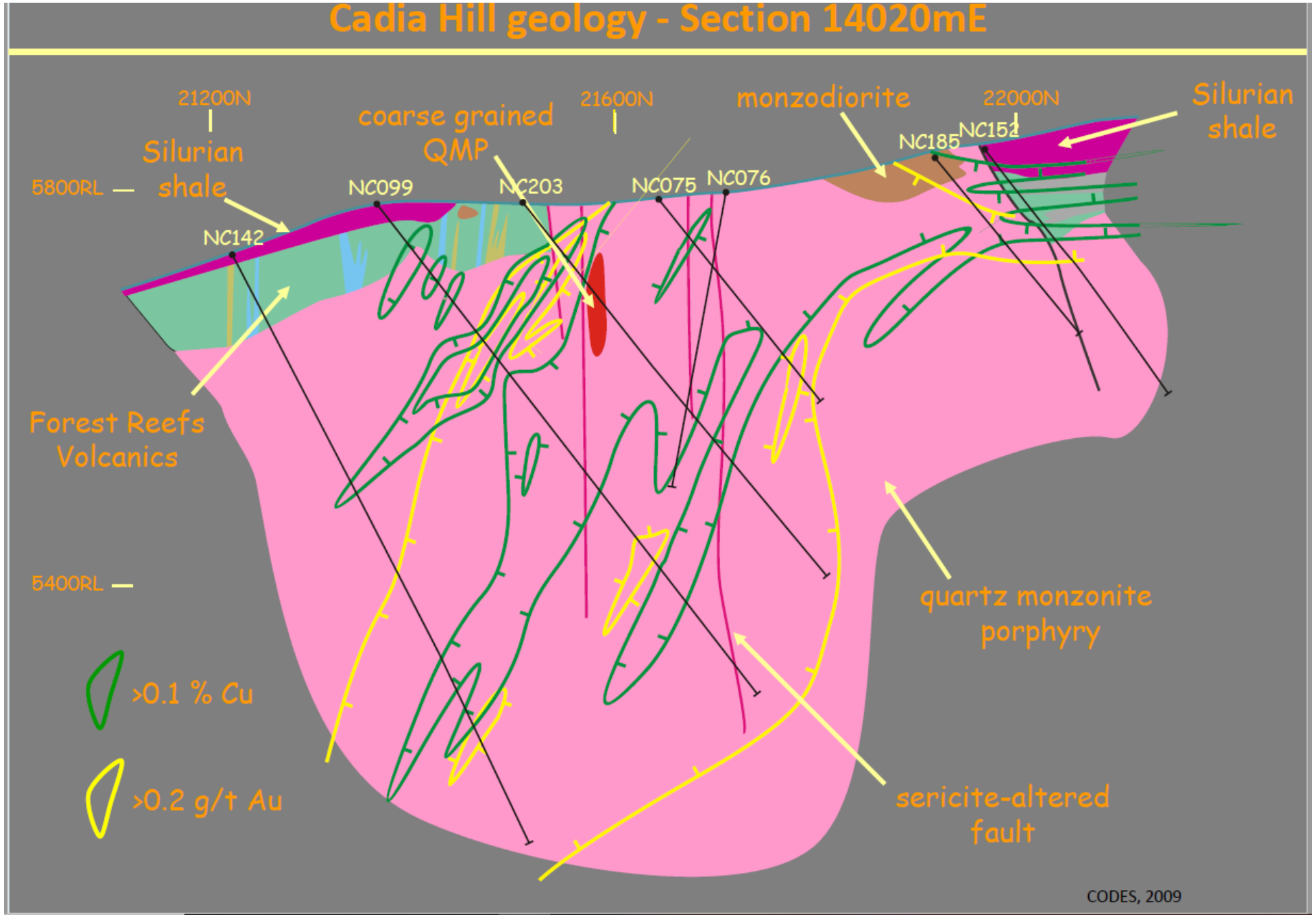
Intrusion-hosted
hosted inside main intrusive/magnetic complexes, lower grade, sheeted veins (Cadia Hill)

Cadia Gravity 1994, 1995 500m spacing

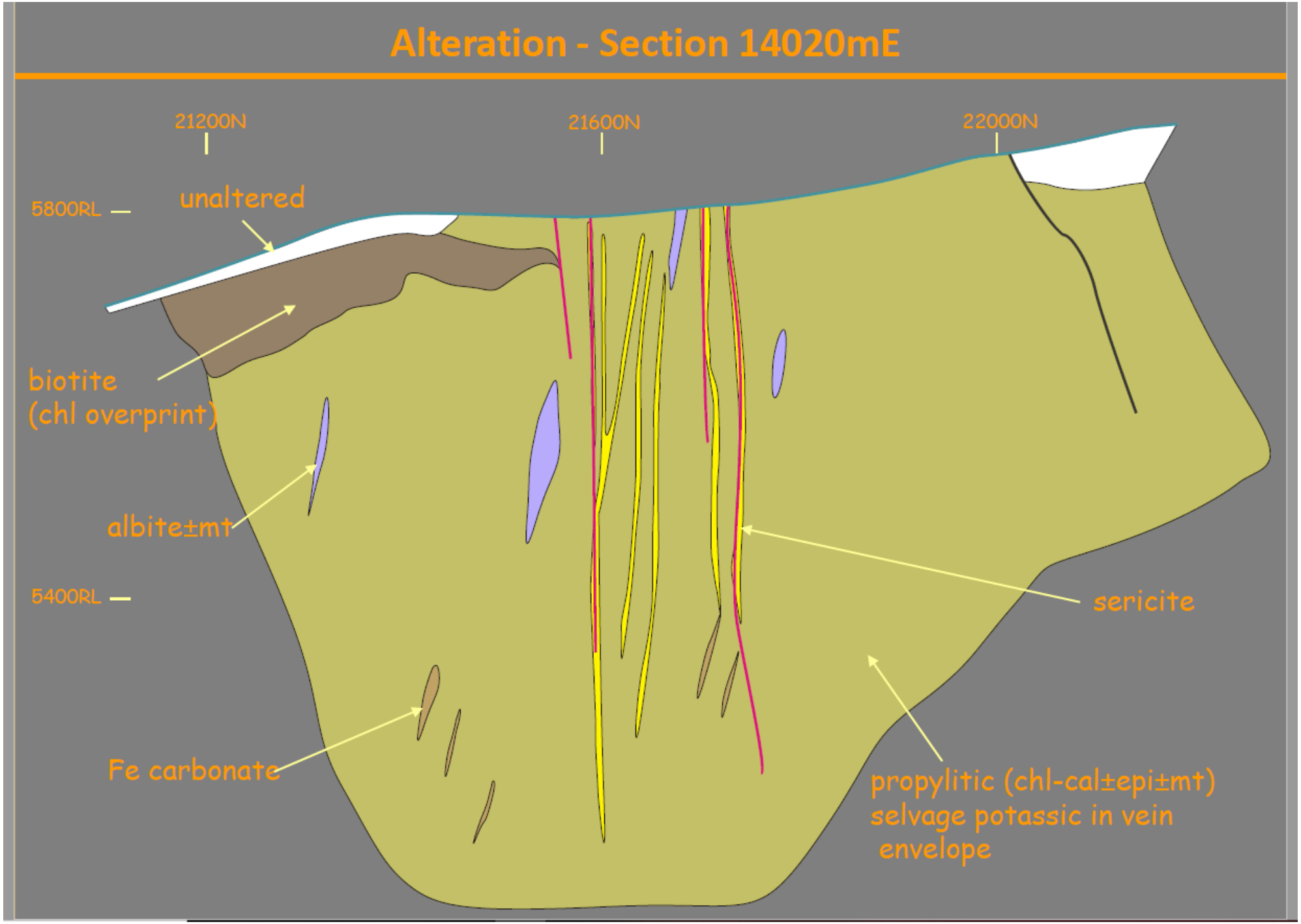


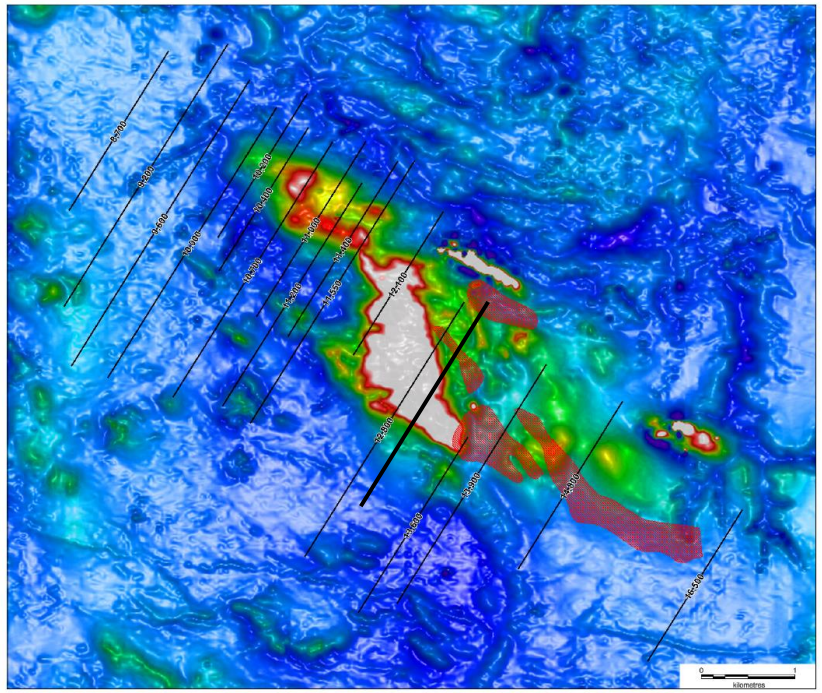
Cadia Magnetics 1996 (50m line spacing)




Cadia Hill geology - Section 14020mE
21200N
21600N
22000N
Silurian shale
coarse grained QMP
monzodiorite
Silurian shale
5800RL
NC099
NC203
NC075
NC076
NC185
NC152
NC142
Forest Reefs Volcanics
5400RL
quartz monzonite porphyry
>0.1 % Cu
>0.2 g/t Au
sericite-altered fault
CODES, 2009

Alteration - Section 14020mE

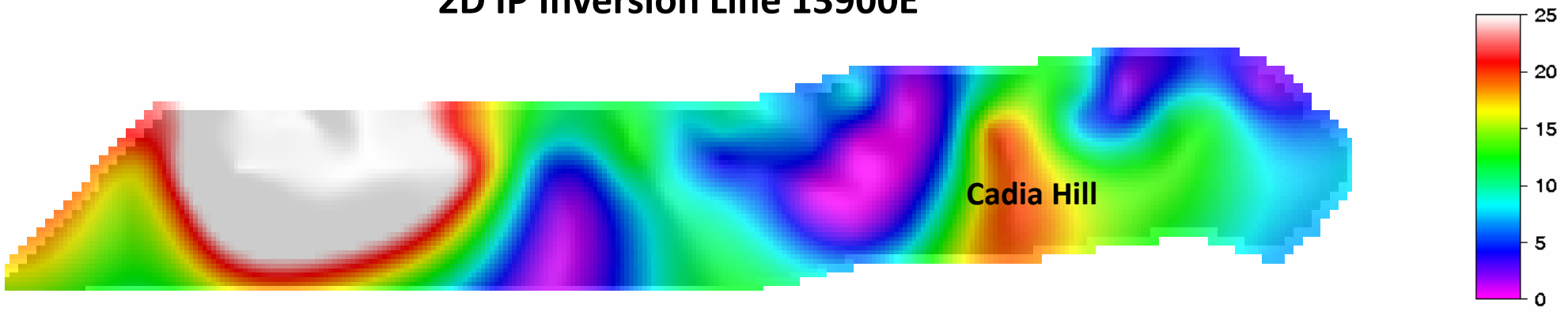




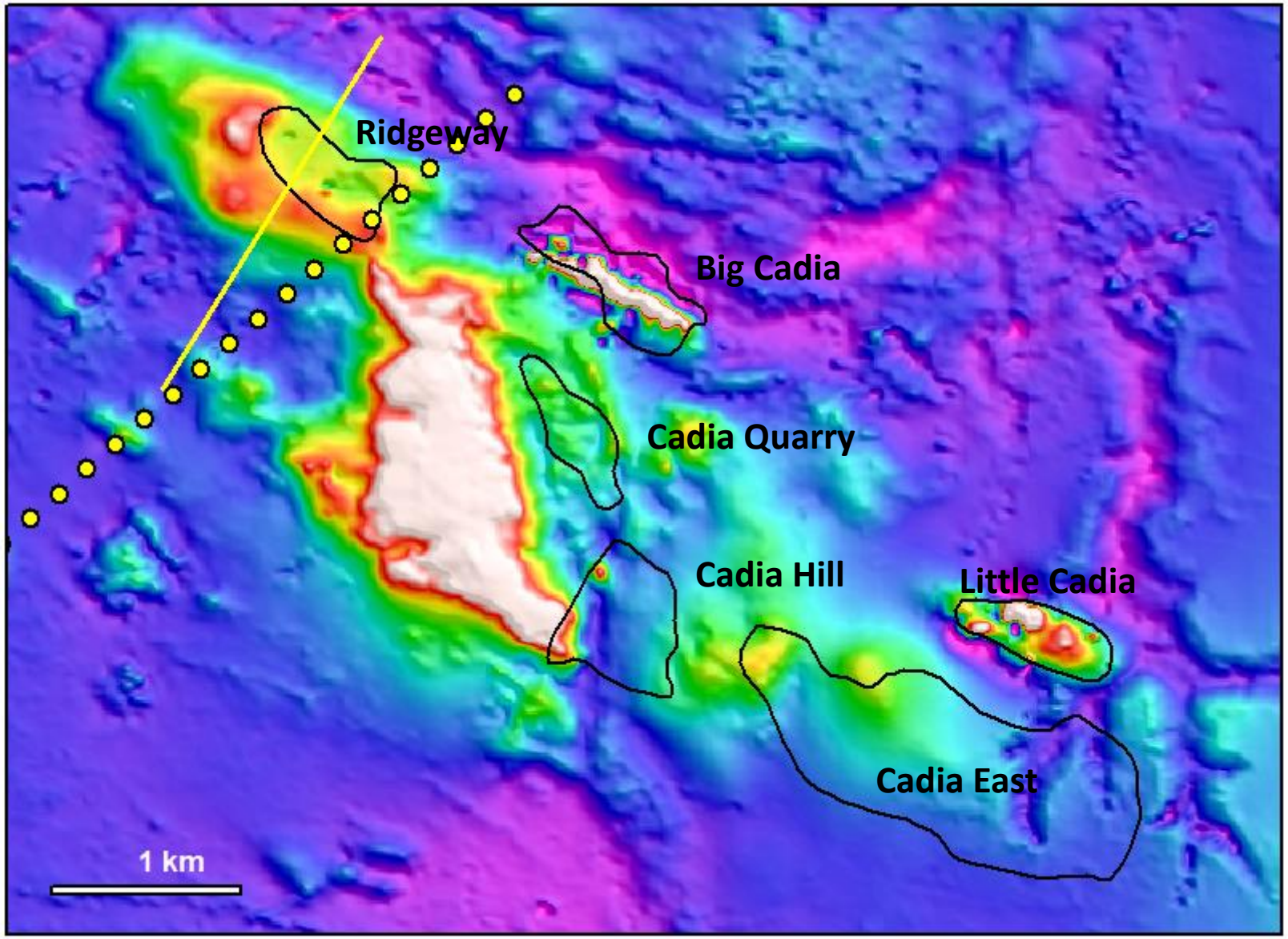
Cadia Hill

Outcropping
Hosted in monzonite
Little magnetite
Some sulphides associated with mineralisation

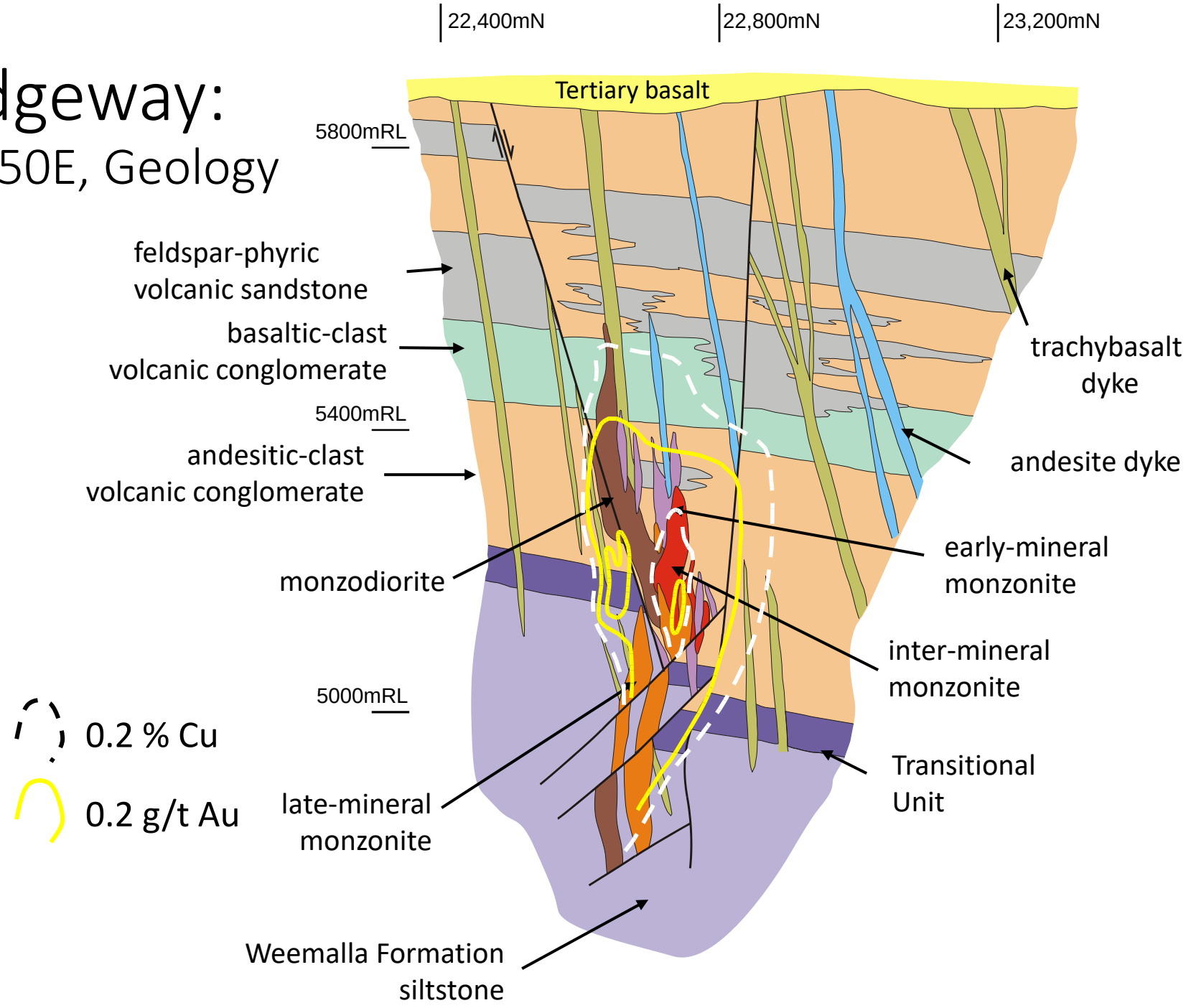
2D IP Inversion Line 13900E



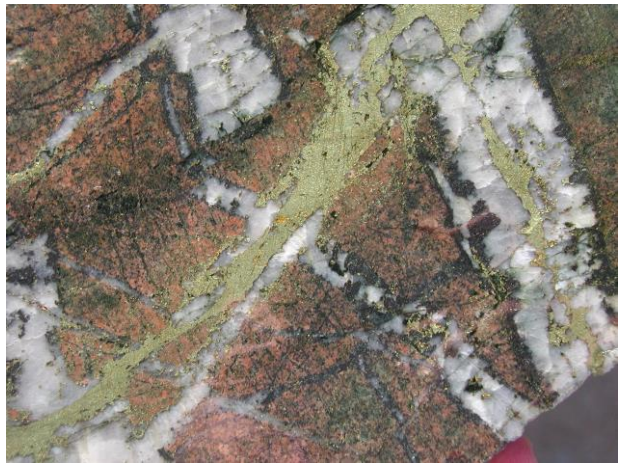
Ridgeway IP Line Location

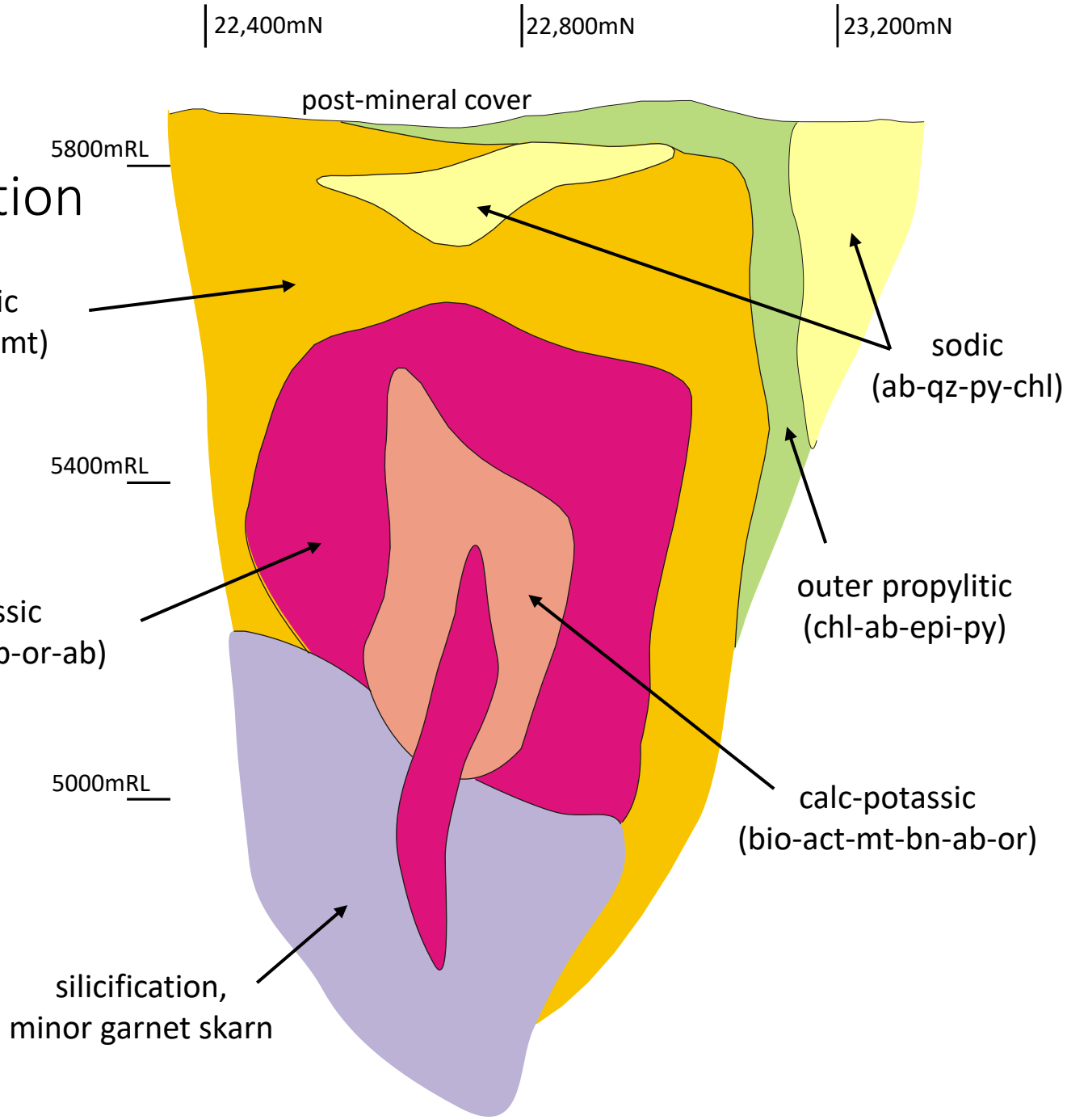


Ridgeway:
11050E, Geology

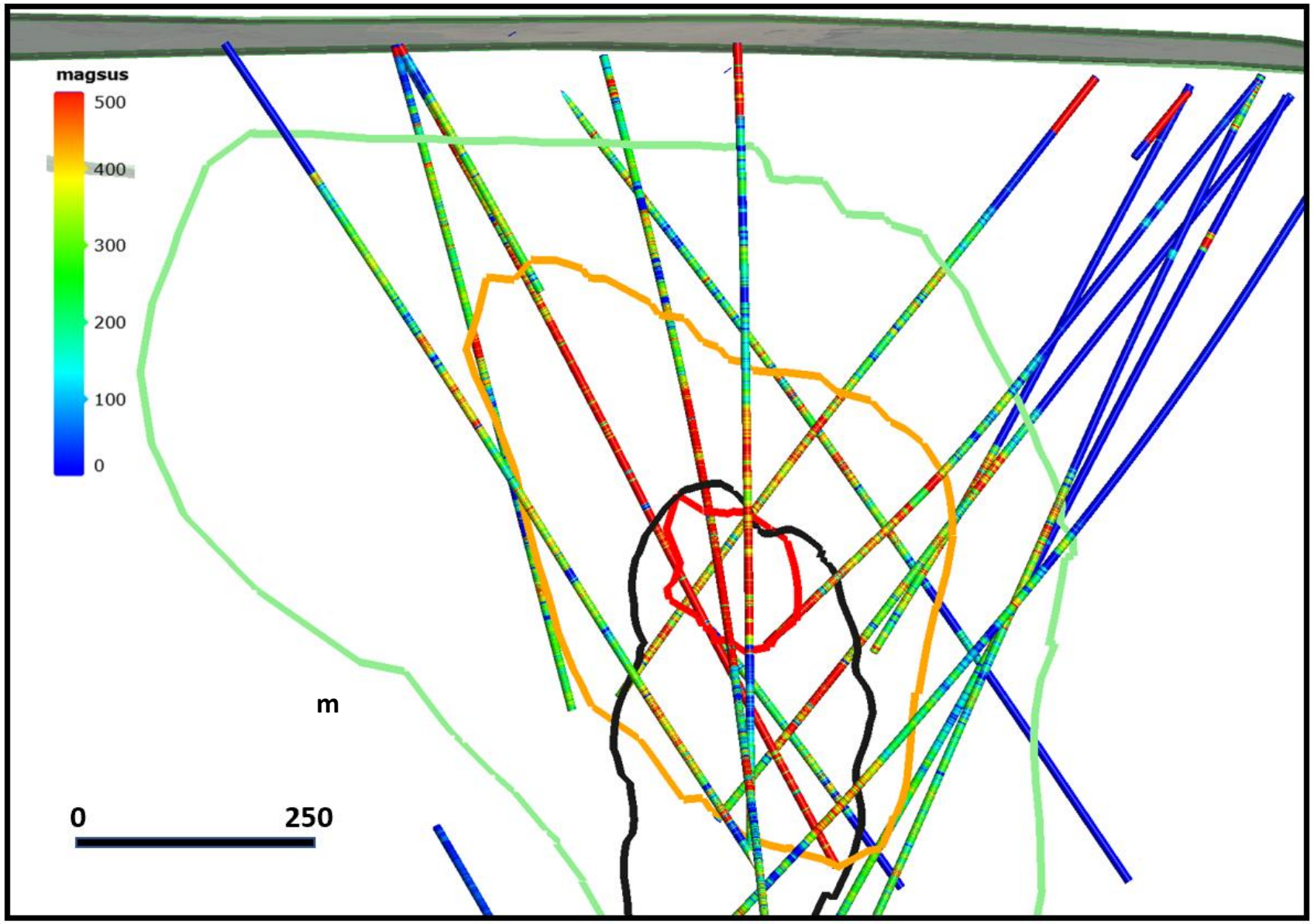


Ridgeway:
11050E, Alteration



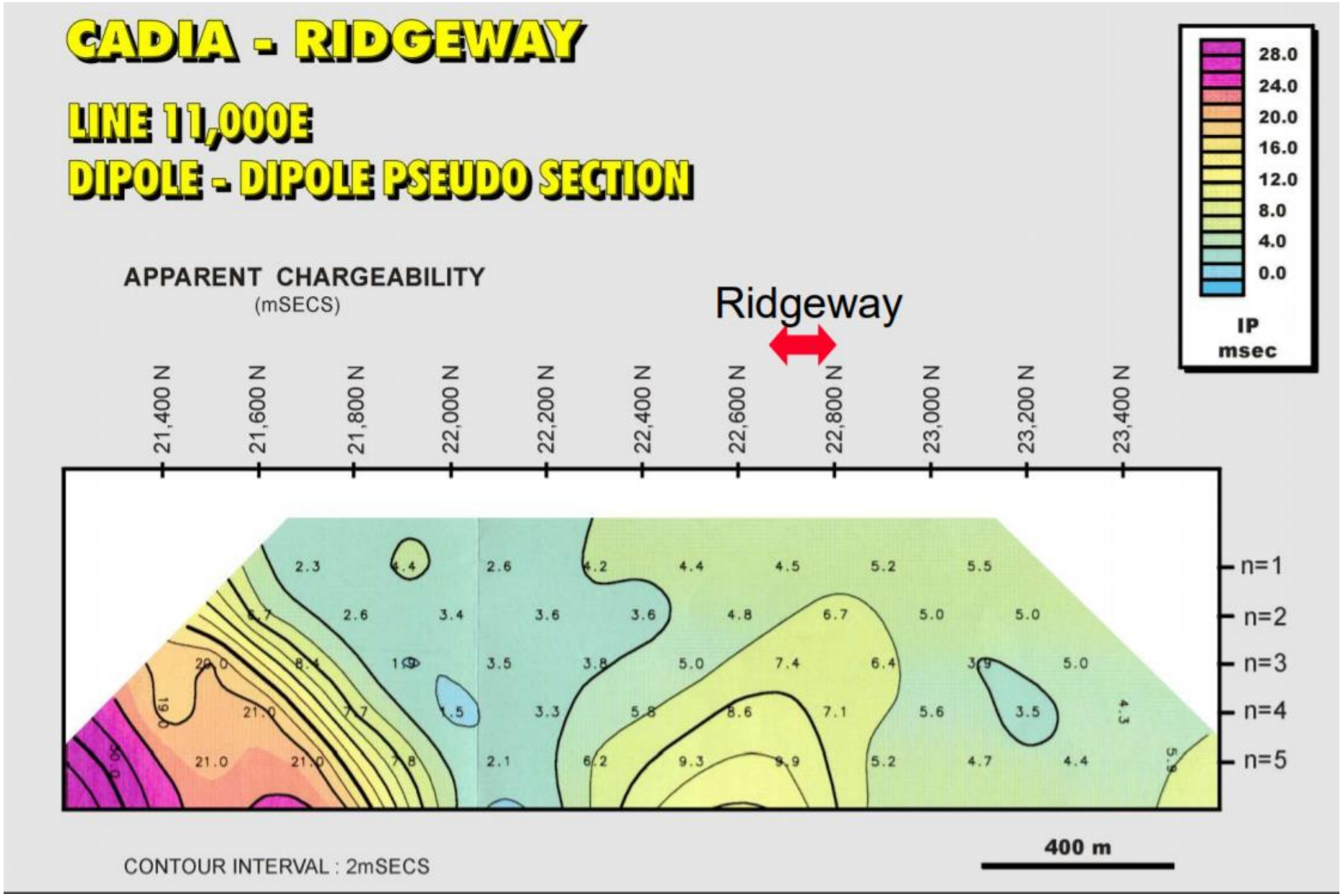


Ridgeway Magnetic Susceptibility

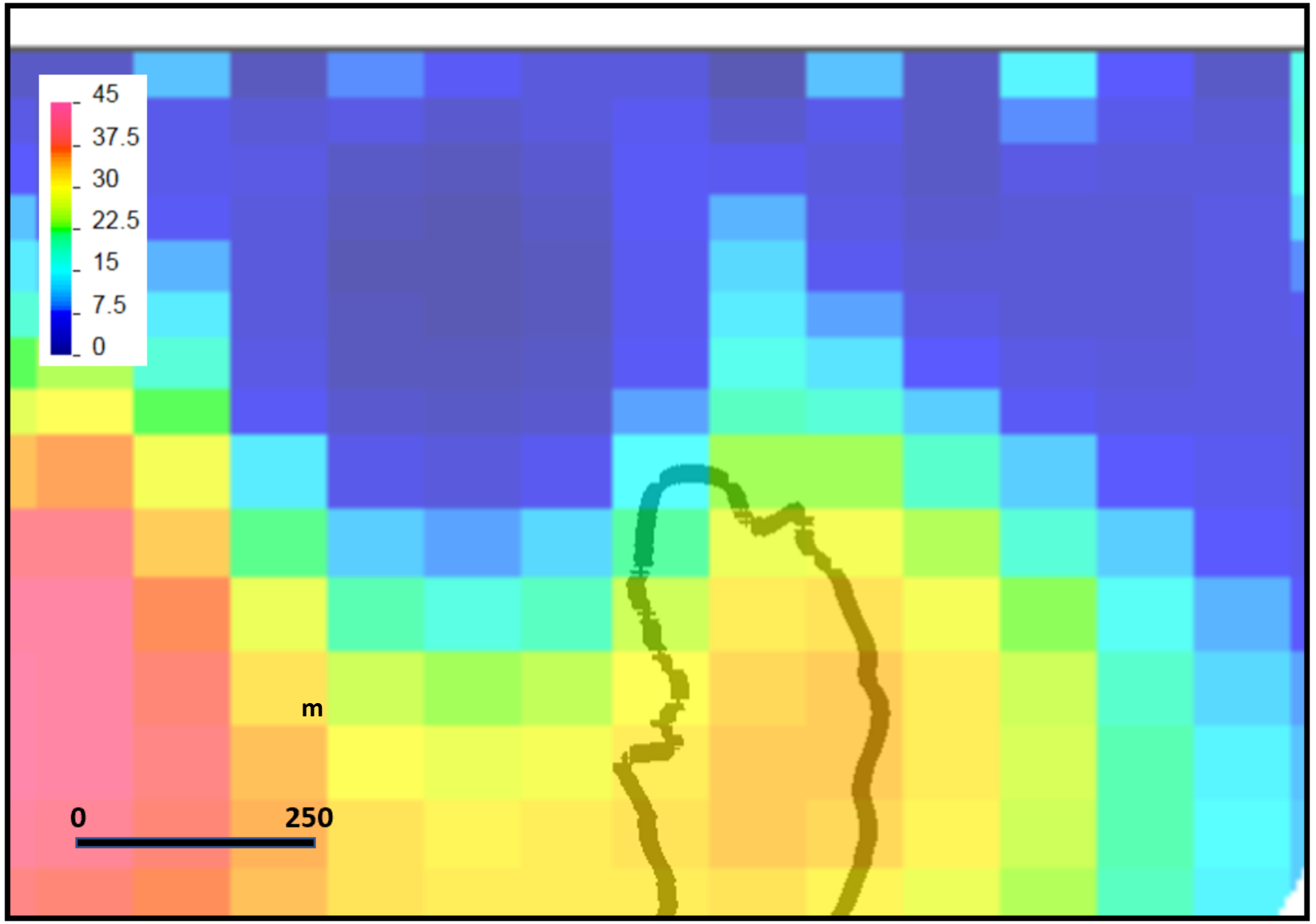


Units are 10^{-3} cgs. Ridgeway mag sus 0.05 to 0.3 SI (Close, 2000)

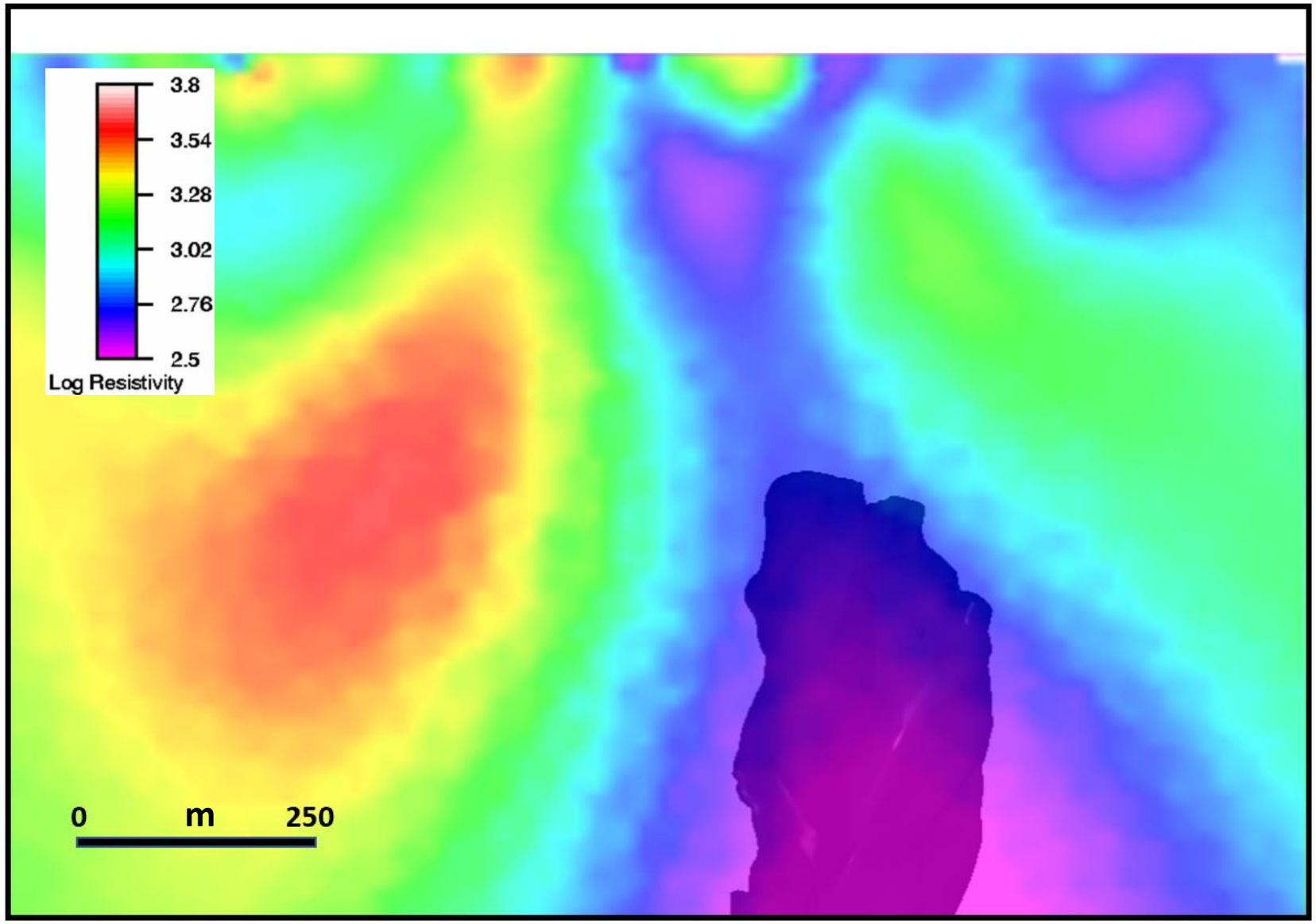
Ridgeway 1995 IP (200m dipole-dipole)



Ridgeway 11000E 2DIP Inversion

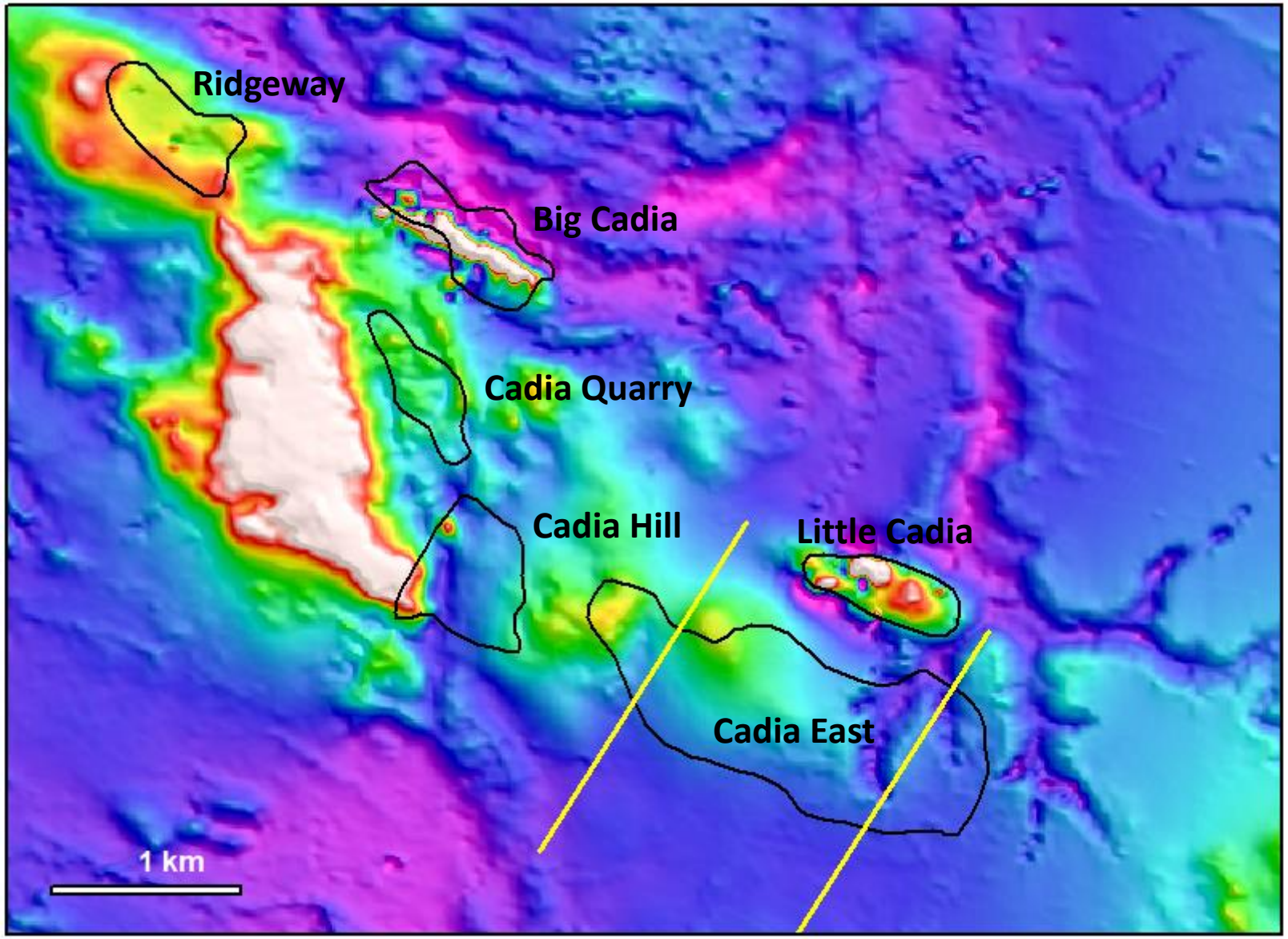


Ridgeway Resistivity Inversion



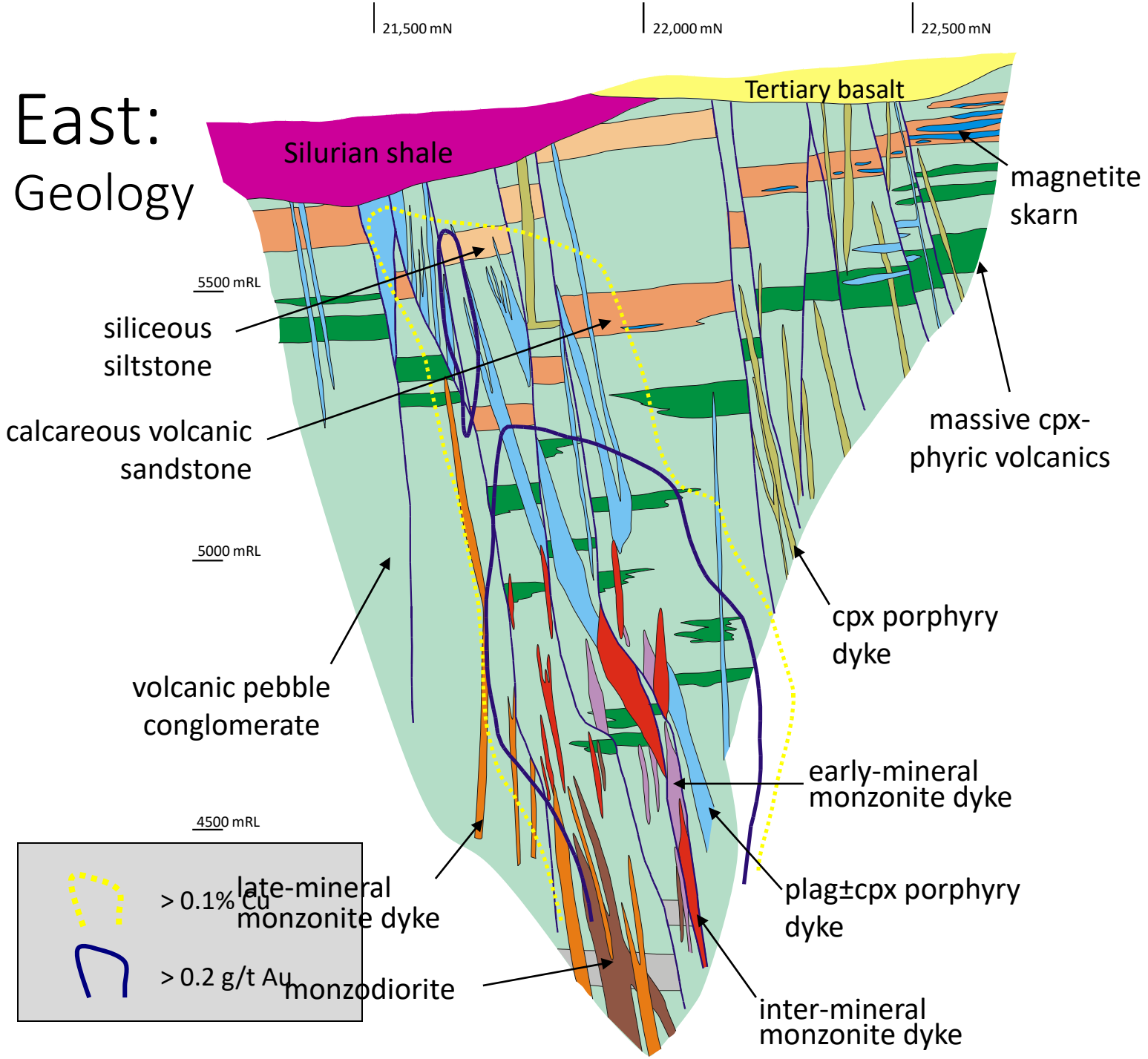
There is a clear conductive zone associated with mineralization (<~200 ohm-m). This is consistent with Close(2001) obtaining measurements of 10-100 ohm-m from in situ and laboratory measurements. The conductive zone is flanked by highly resistive zones (>~2000 ohm-m) due to feldspar alteration

Cadia East Section Locations

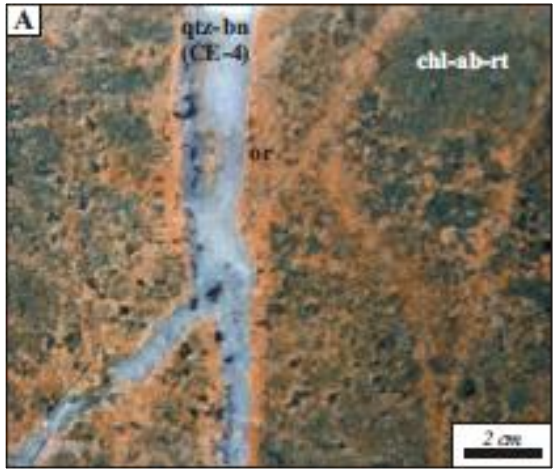


Cadia East - Orebody dimensions of 2000m by 600m by 1500m depth

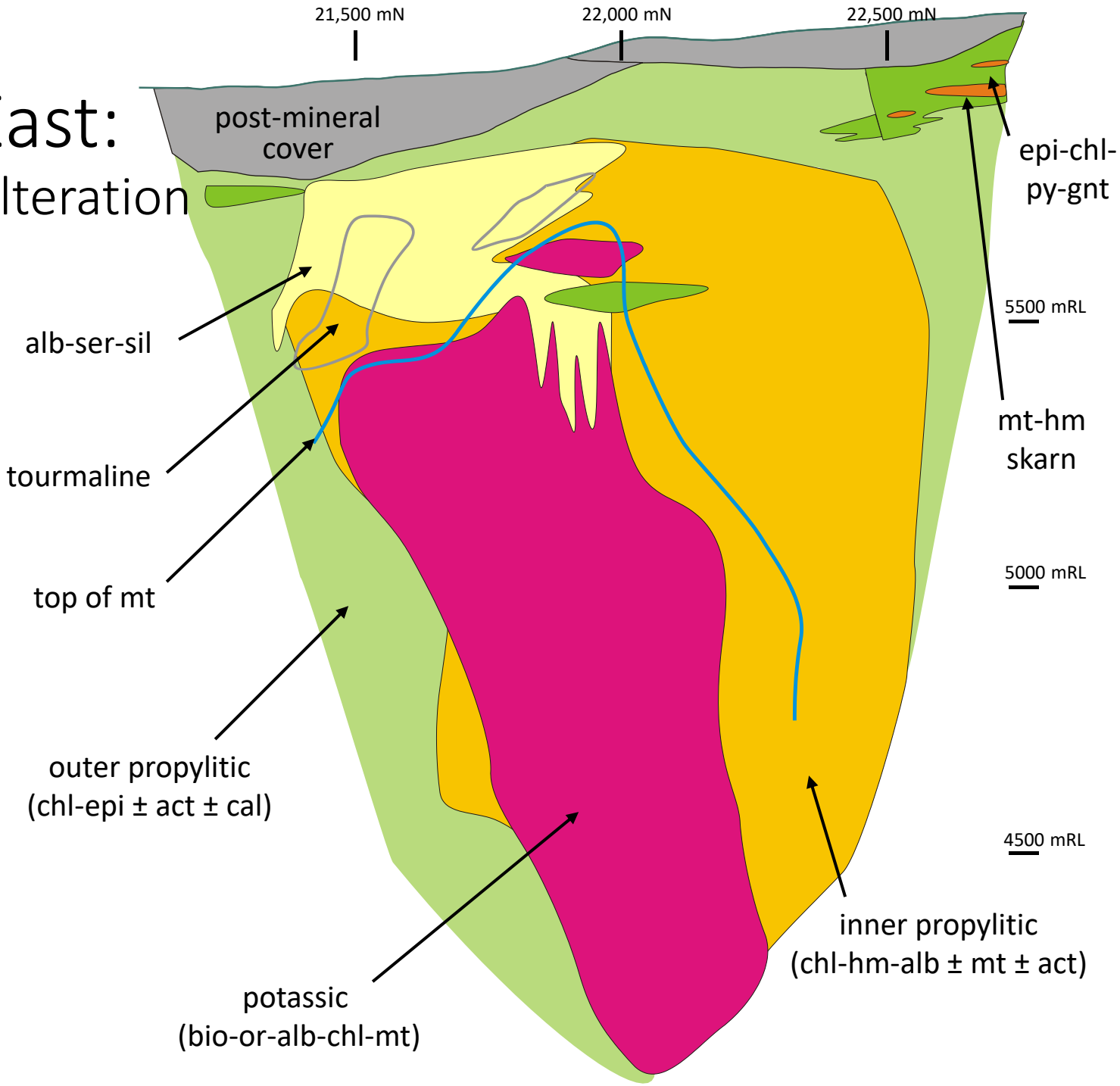
Cadia East:
15820E, Geology



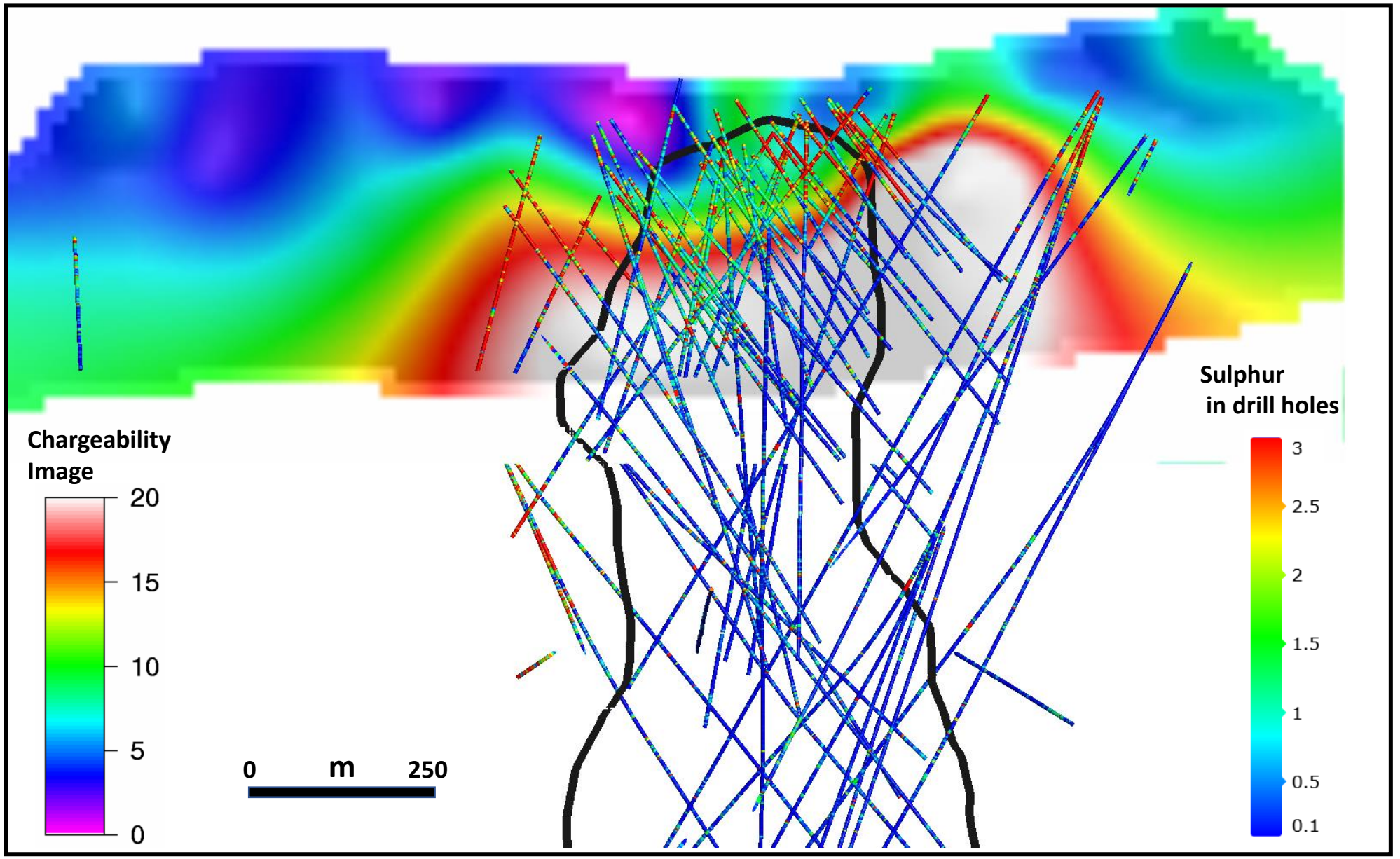
Cadia East:
15820E, Alteration

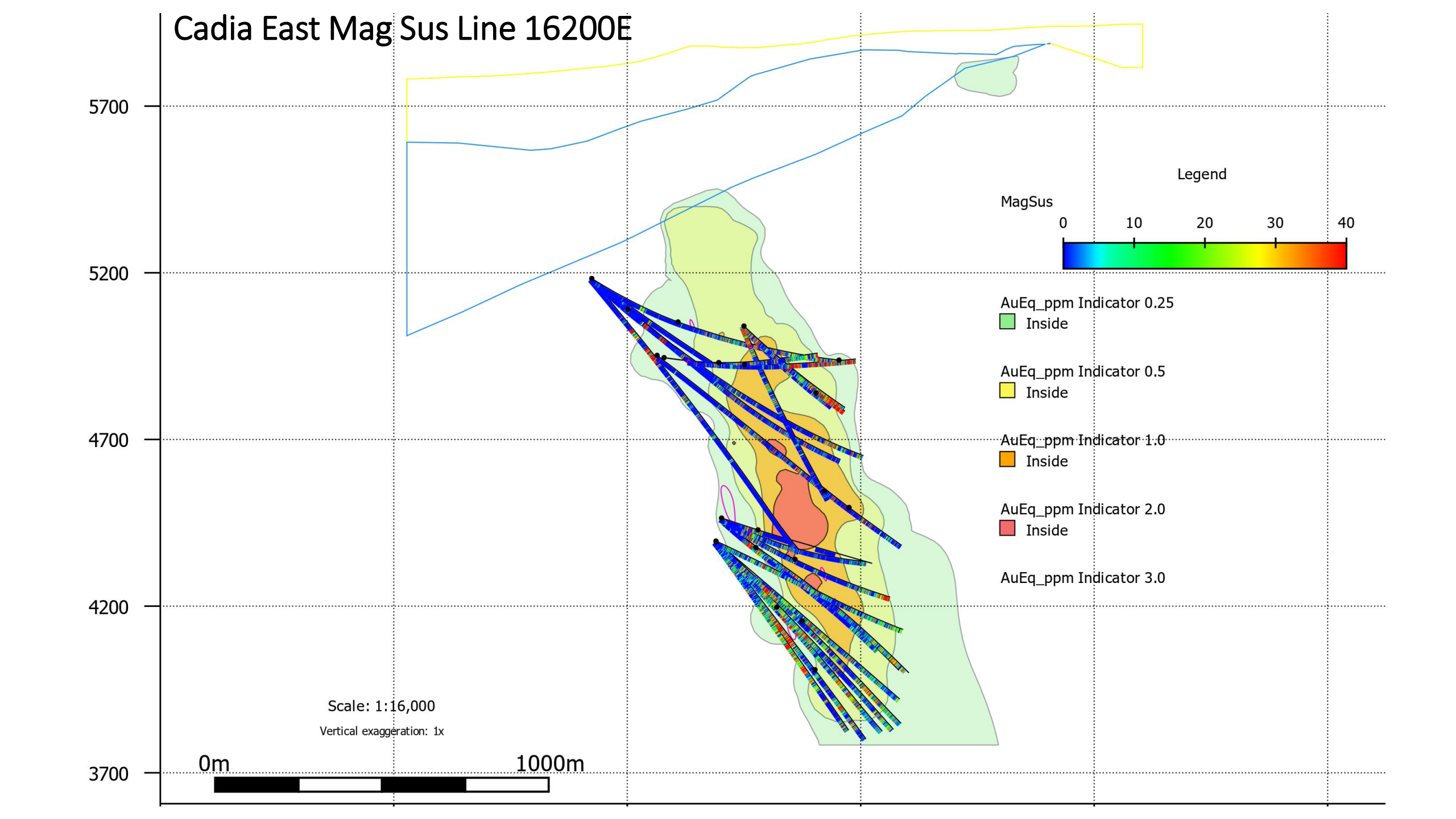


(Wilson, 2003)

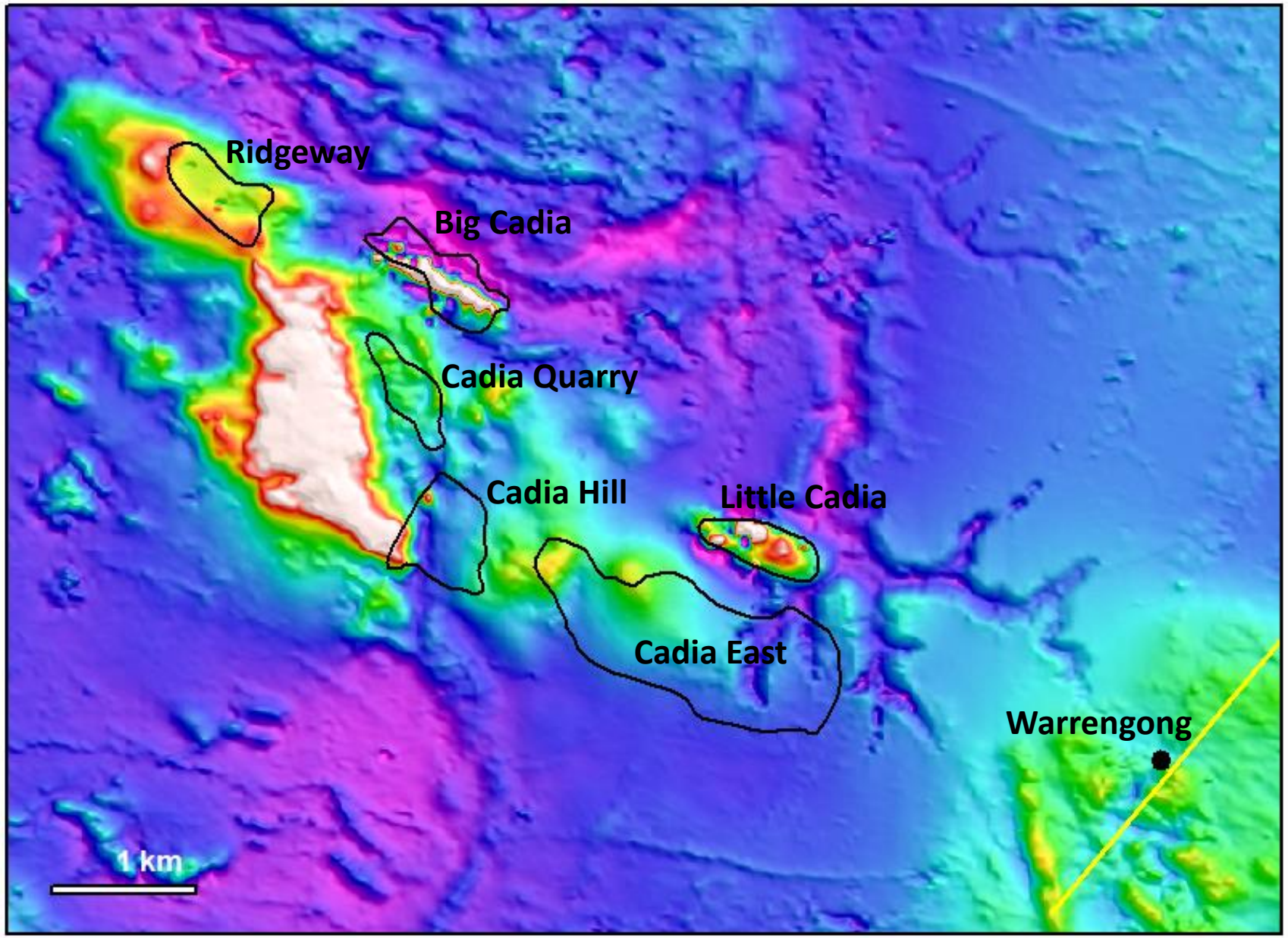


Cadia East IP Inversion with S Assays




Cadia East Mag Sus Line 16200E
5700
5200
4700
4200
3700
Legend
MagSus
0
10
20
30
40
AuEq_ppm Indicator 0.25
Inside
AuEq_ppm Indicator 0.5
Inside
AuEq_ppm Indicator 1.0
Inside
AuEq_ppm Indicator 2.0
Inside
AuEq_ppm Indicator 3.0
Scale: 1:16,000
Vertical exaggeration: 1x
0m
1000m

Warrengong IP Line Location



Cadia Geophysics - Summary

	Ridgeway	Cadia Hill	Cadia East
Ore Zone	conductive sulphide veining chargeable Magnetic Pipe-like geometry?	resistive sheeted veins in monzonite Non/weakly magnetic weakly Chargeable	resistive non/weakly Magnetic weakly Chargeable
Proximal	magnetite halo chargeable pyrite/chalcopyrite	No well-developed alteration	magnetite halo chargeable pyrite/chalcopyrite
Distal	resistive feldspar alteration chargeable pyrite halo		resistive feldspar alteration chargeable pyrite halo

Acknowledgments

Newcrest
Anthony Harris
Alan Wilson