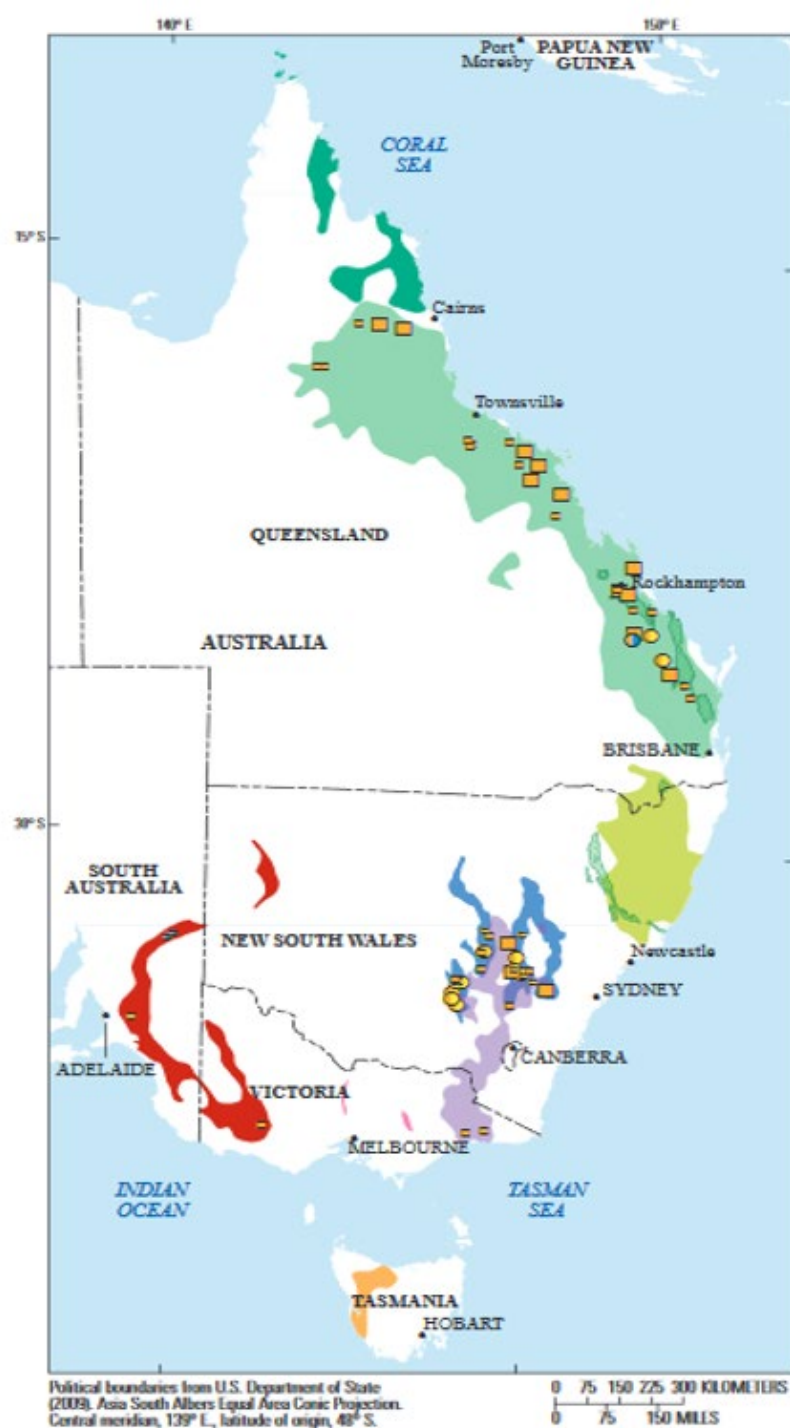


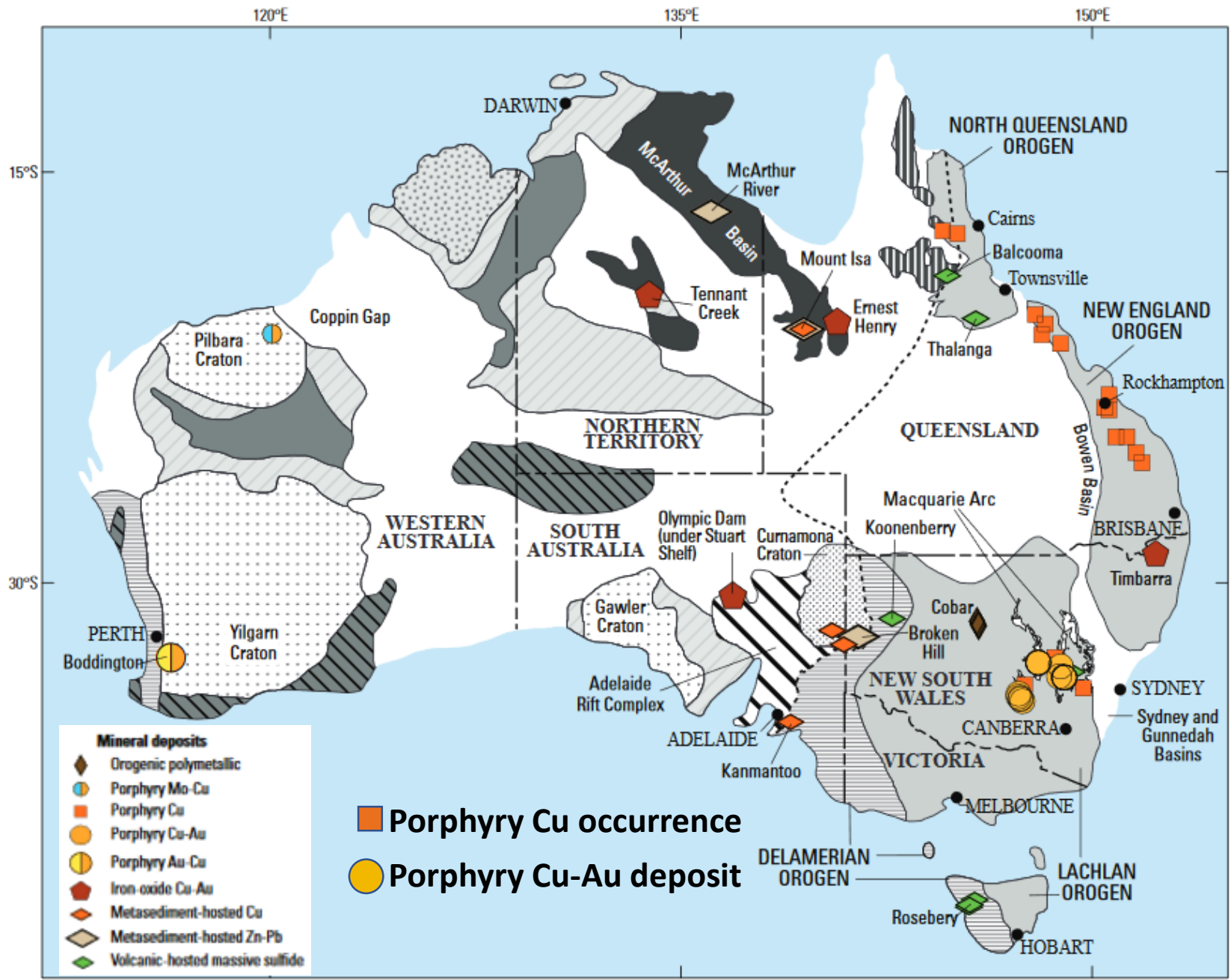
# Porphyry Copper Exploration in Phanerozoic of Eastern Australia

Dan Wood AO  
QEC Technical Forum  
19 February, 2020

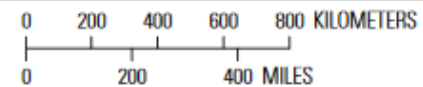


# Introduction

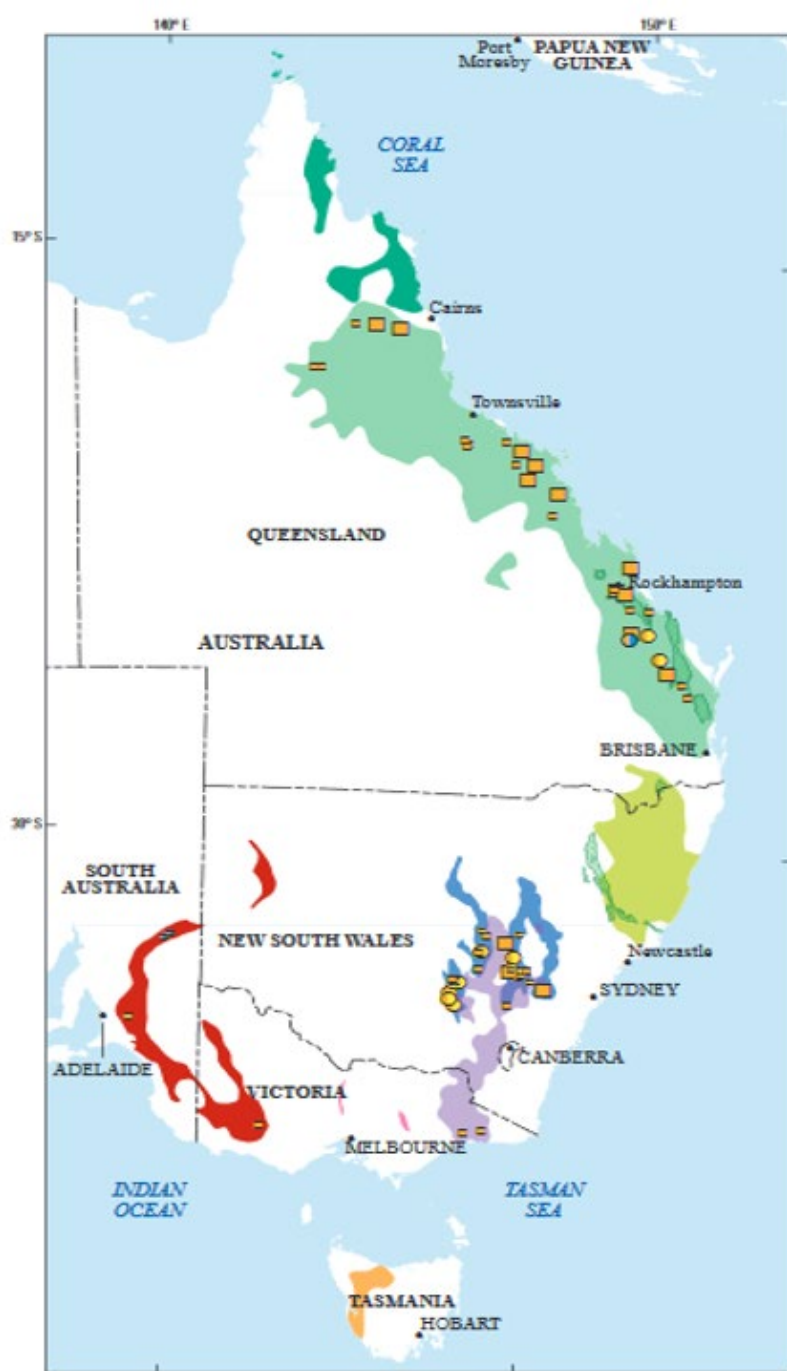
- Exploration for porphyry Cu deposits in Eastern Australia from early-1960s onwards
- In 1970, I was told by U.S. “expert” that Eastern Australia was too deeply eroded to host an economic porphyry deposit
- “Expert” was patently wrong
- He knew nothing about the Phanerozoic history and porphyry deposits of Eastern Australia



Geographic Coordinate System.  
Geocentric Datum of Australia 1994



Geology modified from Betts and others, 2002



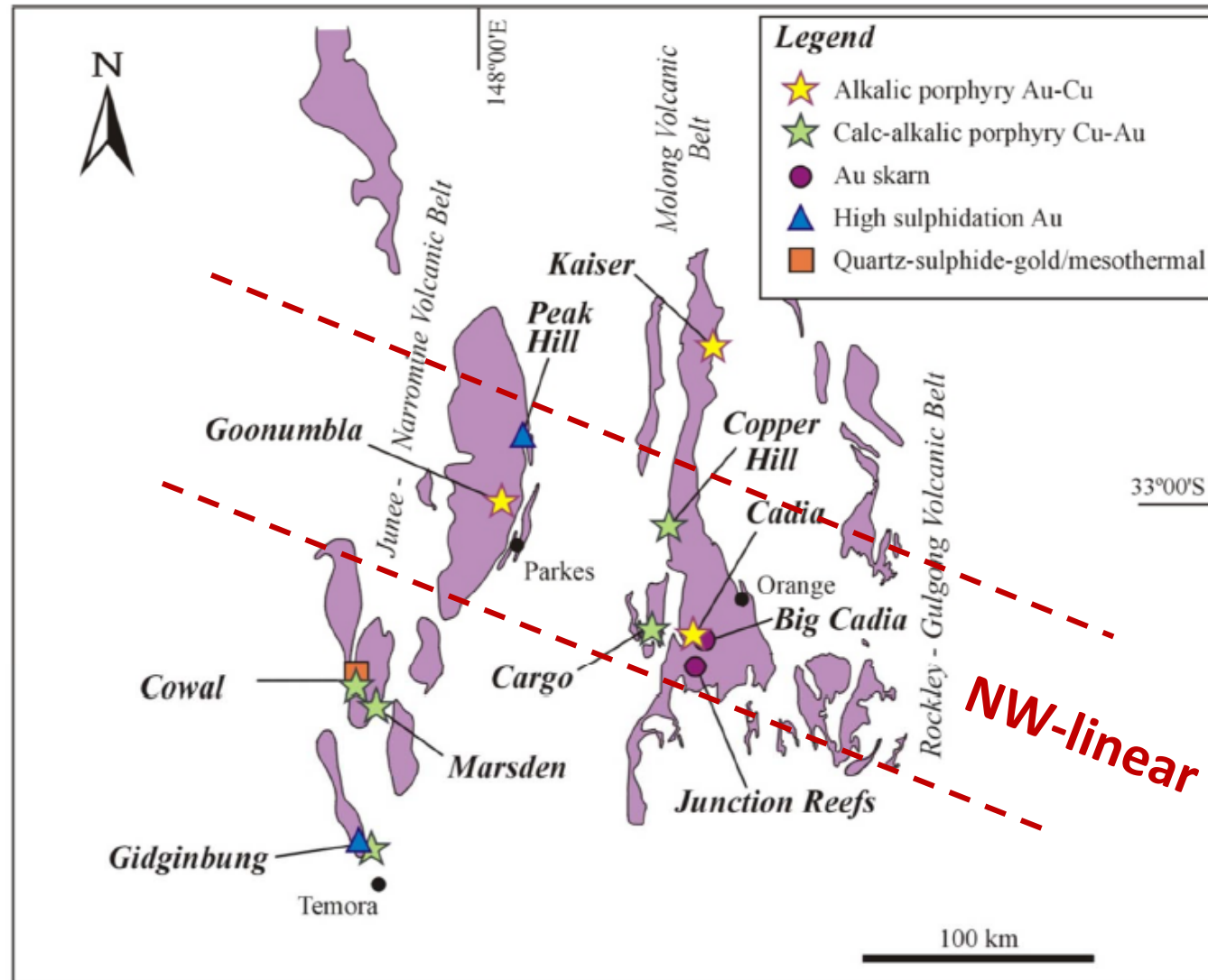
Political boundaries from U.S. Department of State (2003). Asia South Albers Equal Area Conic Projection. Central meridian, 139° E., latitude of origin, 40° S.

0 75 150 225 300 KILOMETERS  
0 75 150 MILES

# Discoveries

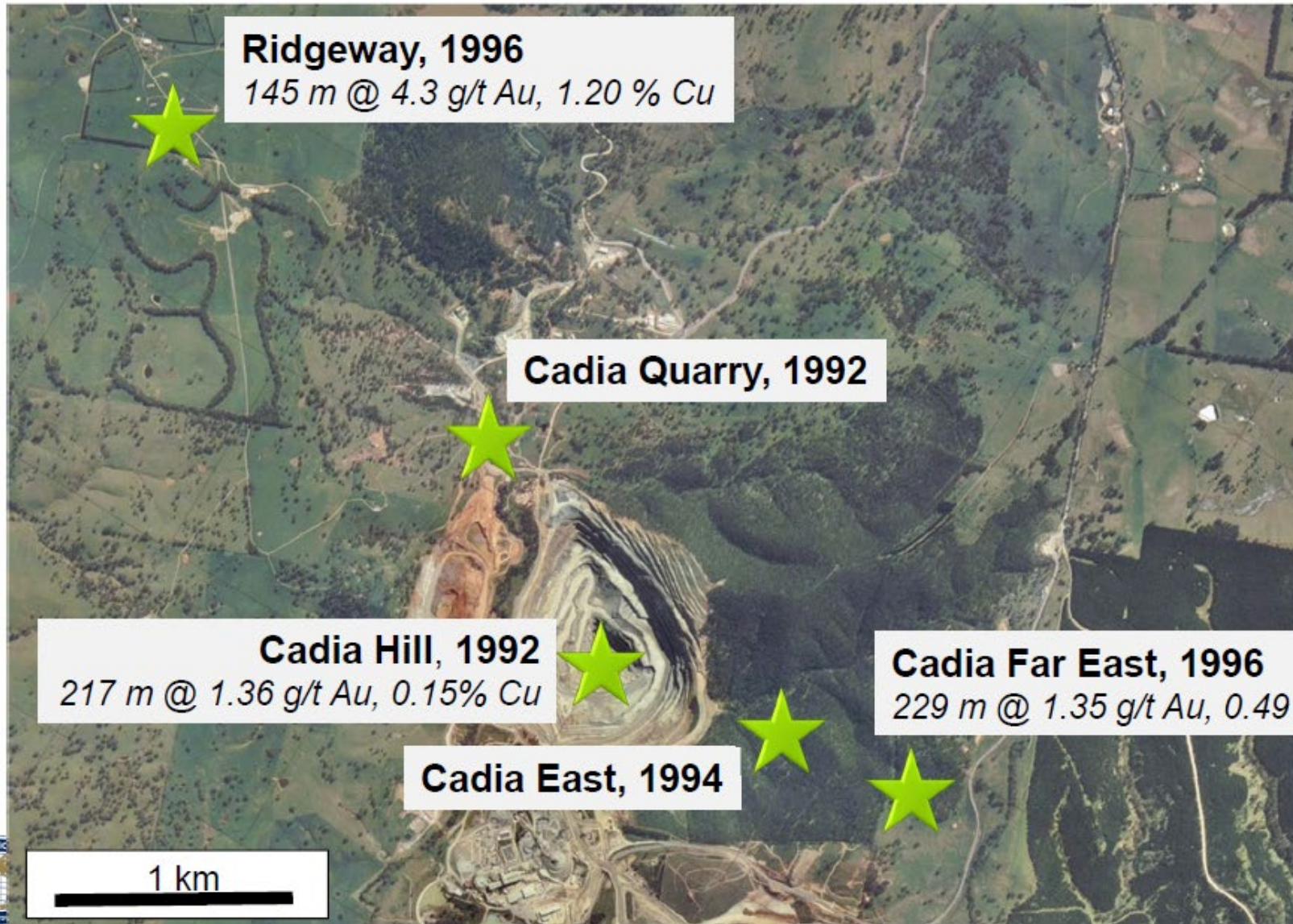
- **1977: first Goonumbla porphyry Au-Cu deposit discovered near Parkes, NSW – Northparkes Deposits**
- **1992: the Cadia Hill porphyry Au-Cu deposit discovered near Orange, NSW – Cadia Deposits**

# Goonumbla and Cadia Deposits





# Cadia Discovery History



www.sageweb.org

1 km





**Ridgeway 2004**



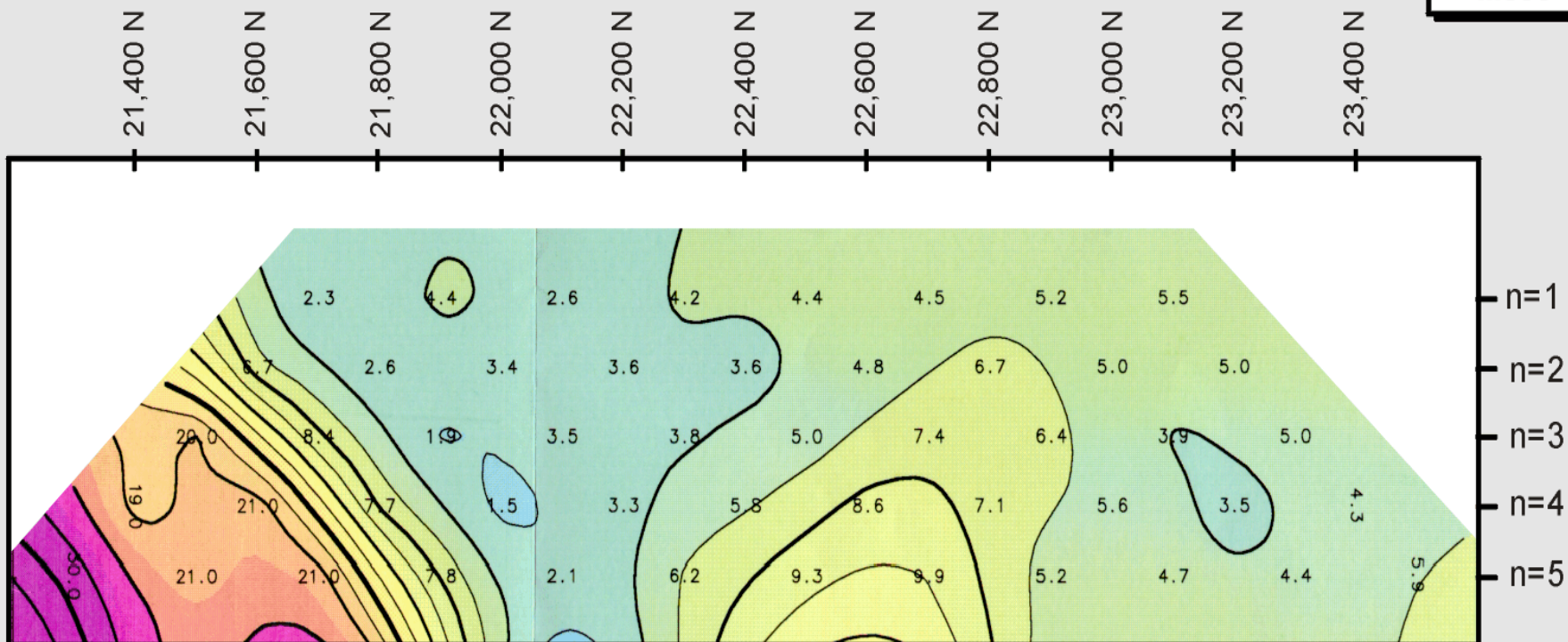
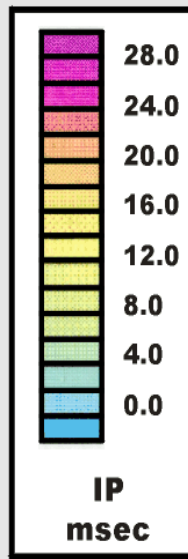
# CADIA - RIDGEWAY

## LINE 11,000E

## DIPOLE - DIPOLE PSEUDO SECTION

APPARENT CHARGEABILITY  
(mSECS)

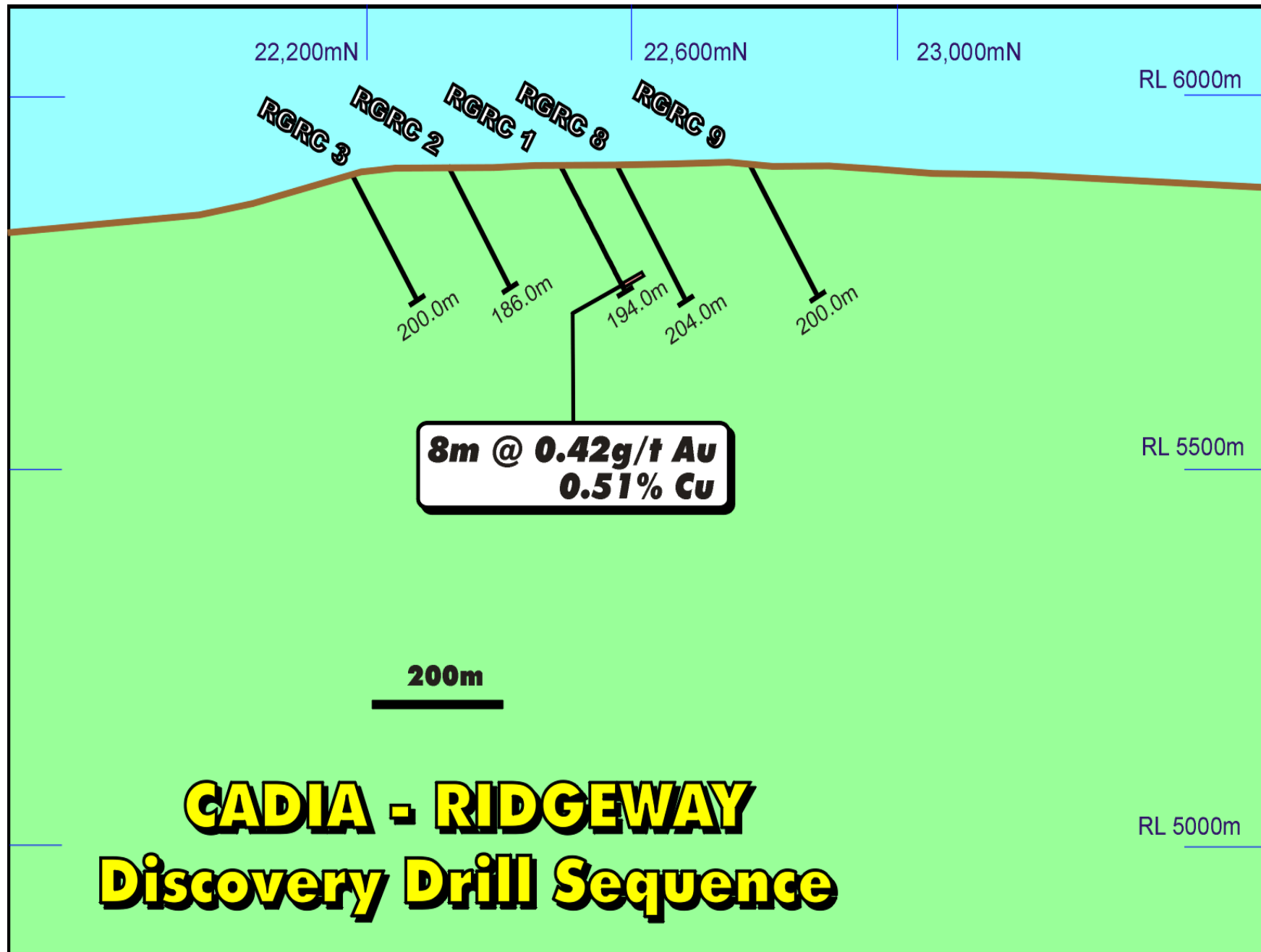
Ridgeway

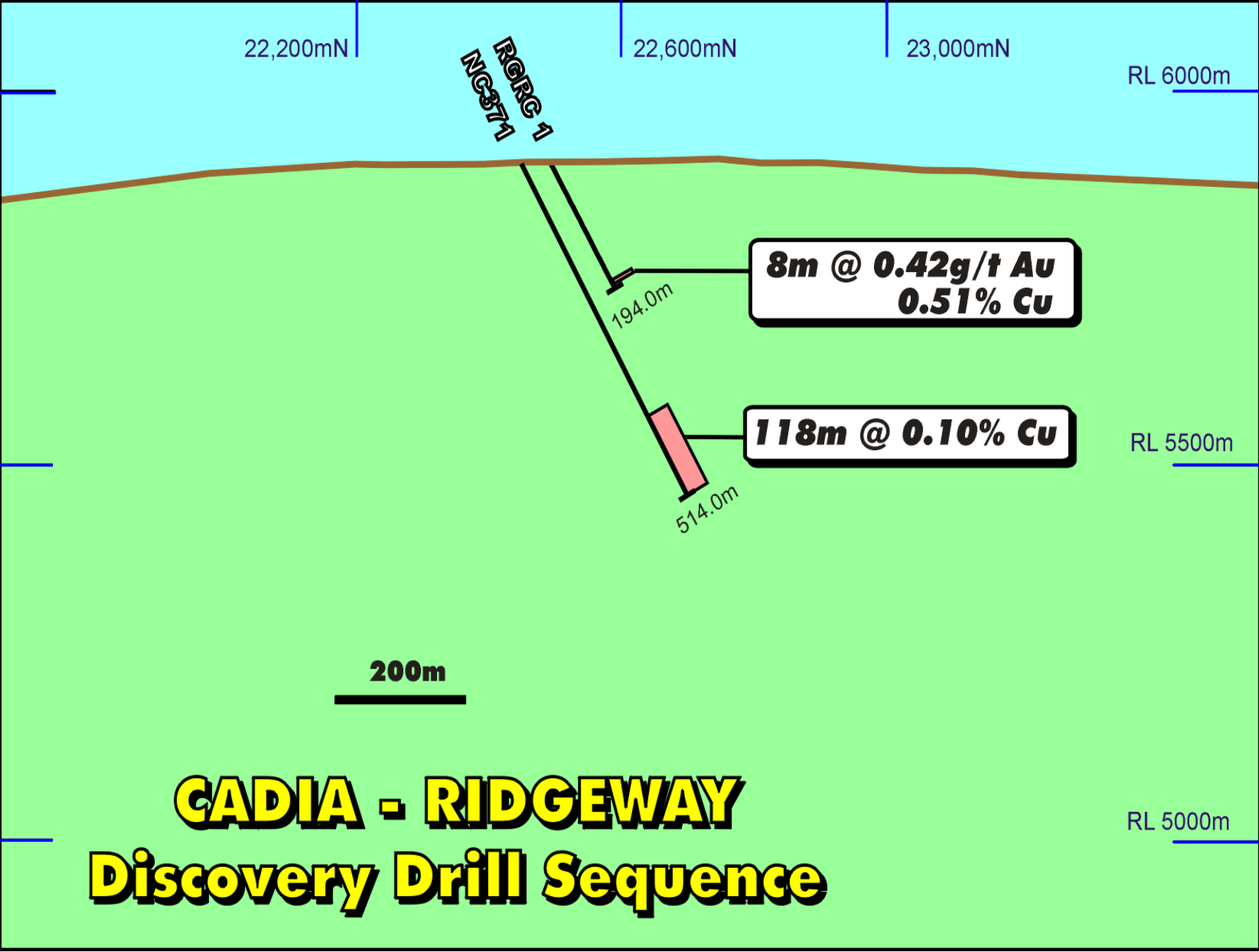


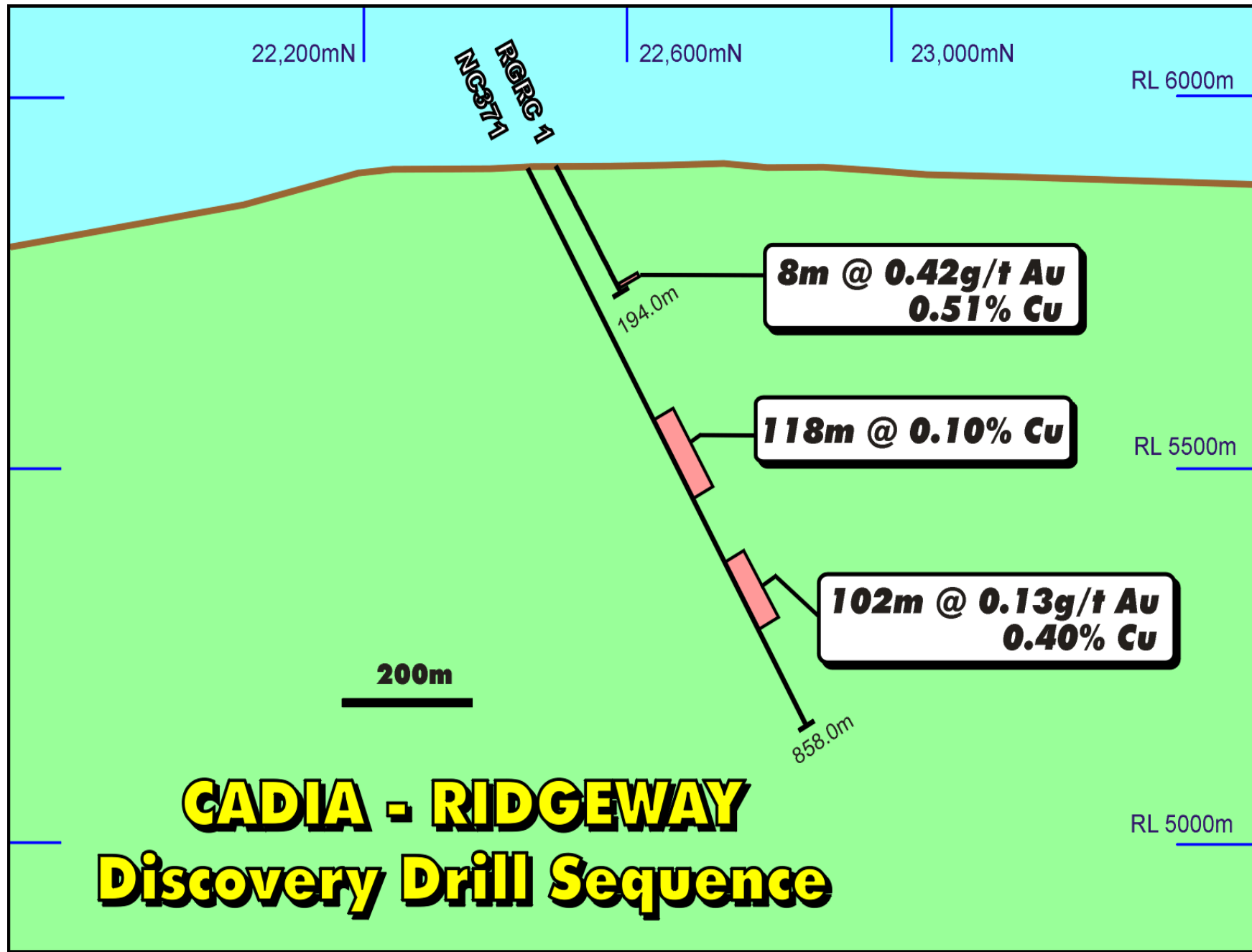
CONTOUR INTERVAL : 2mSECS

400 m

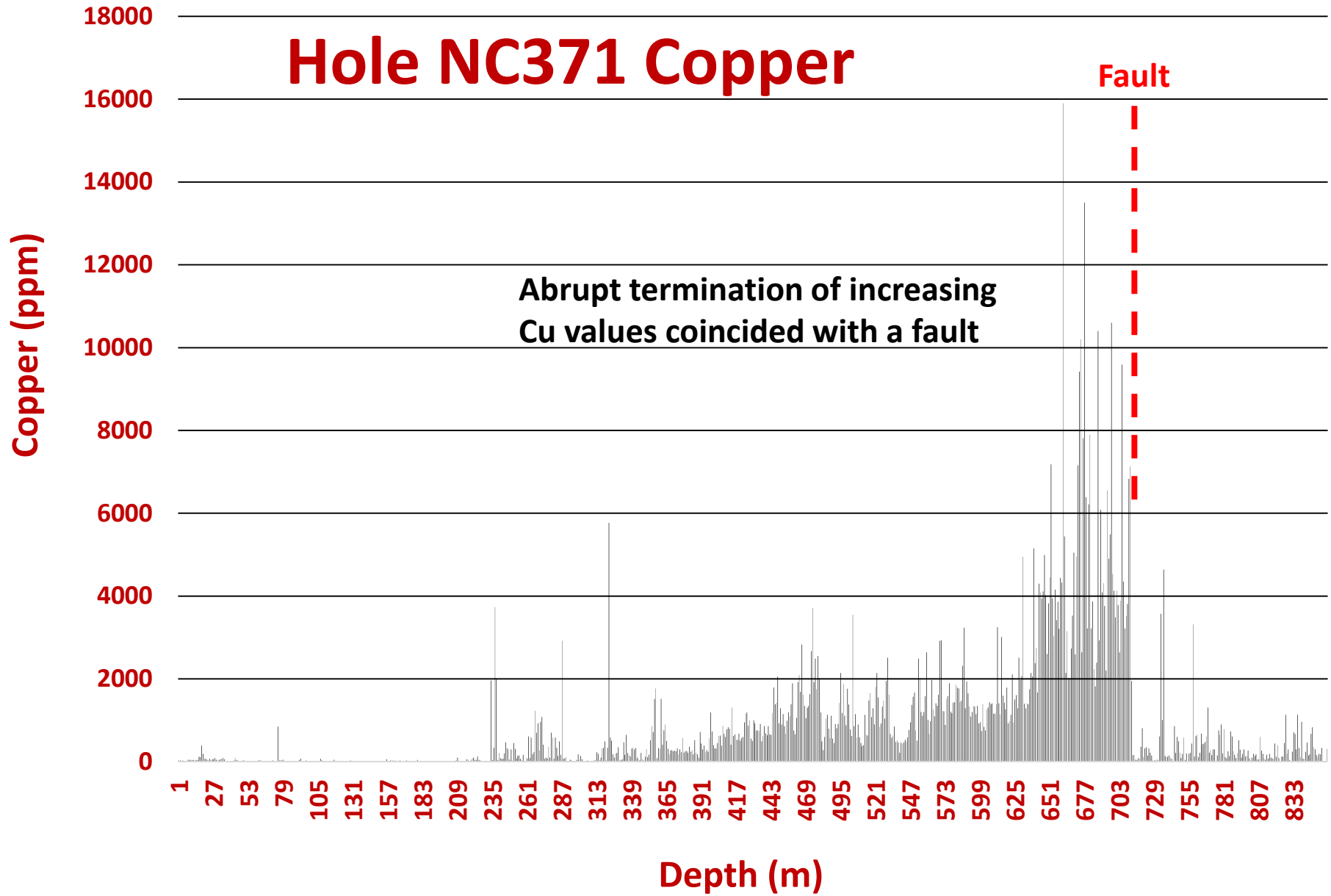




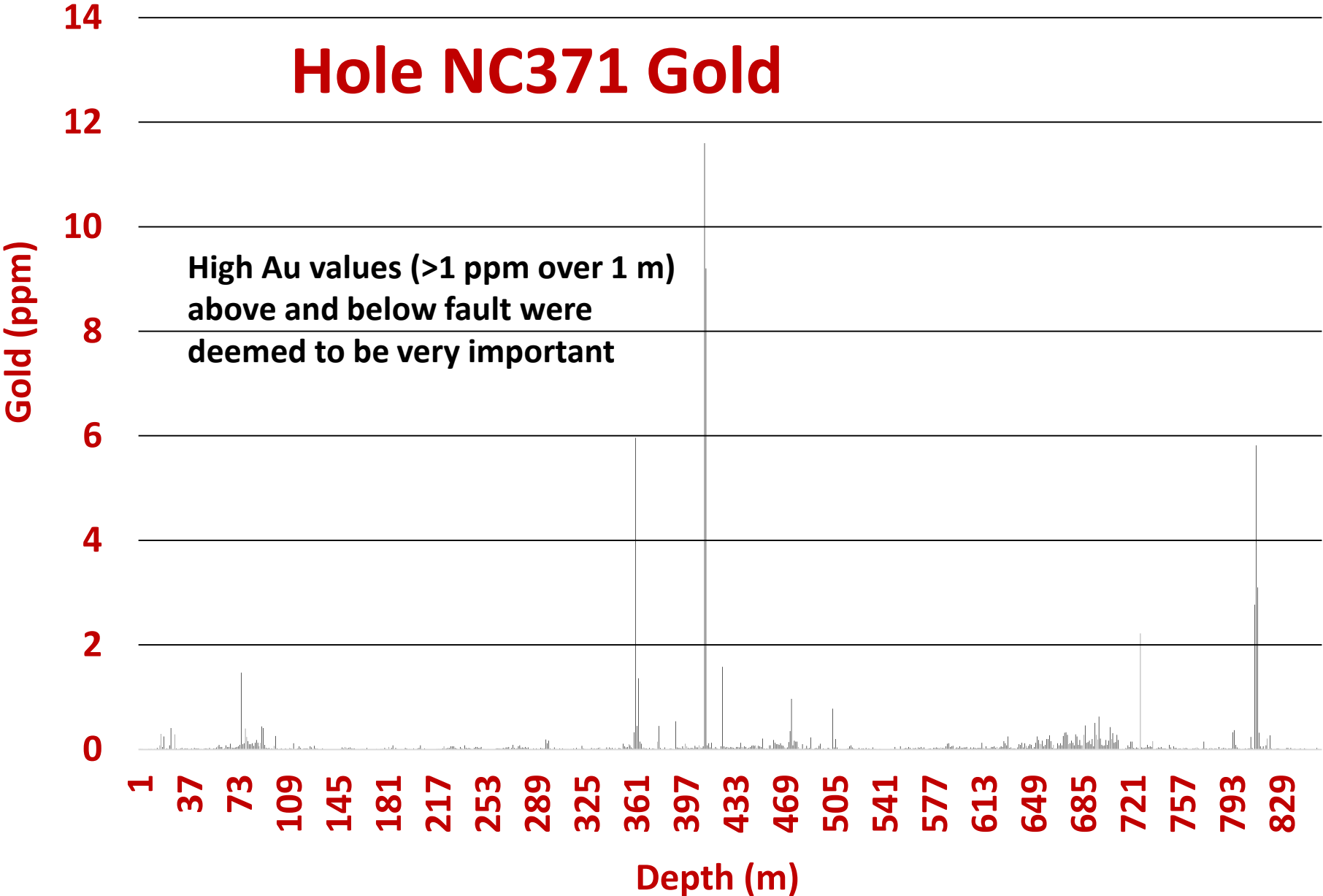


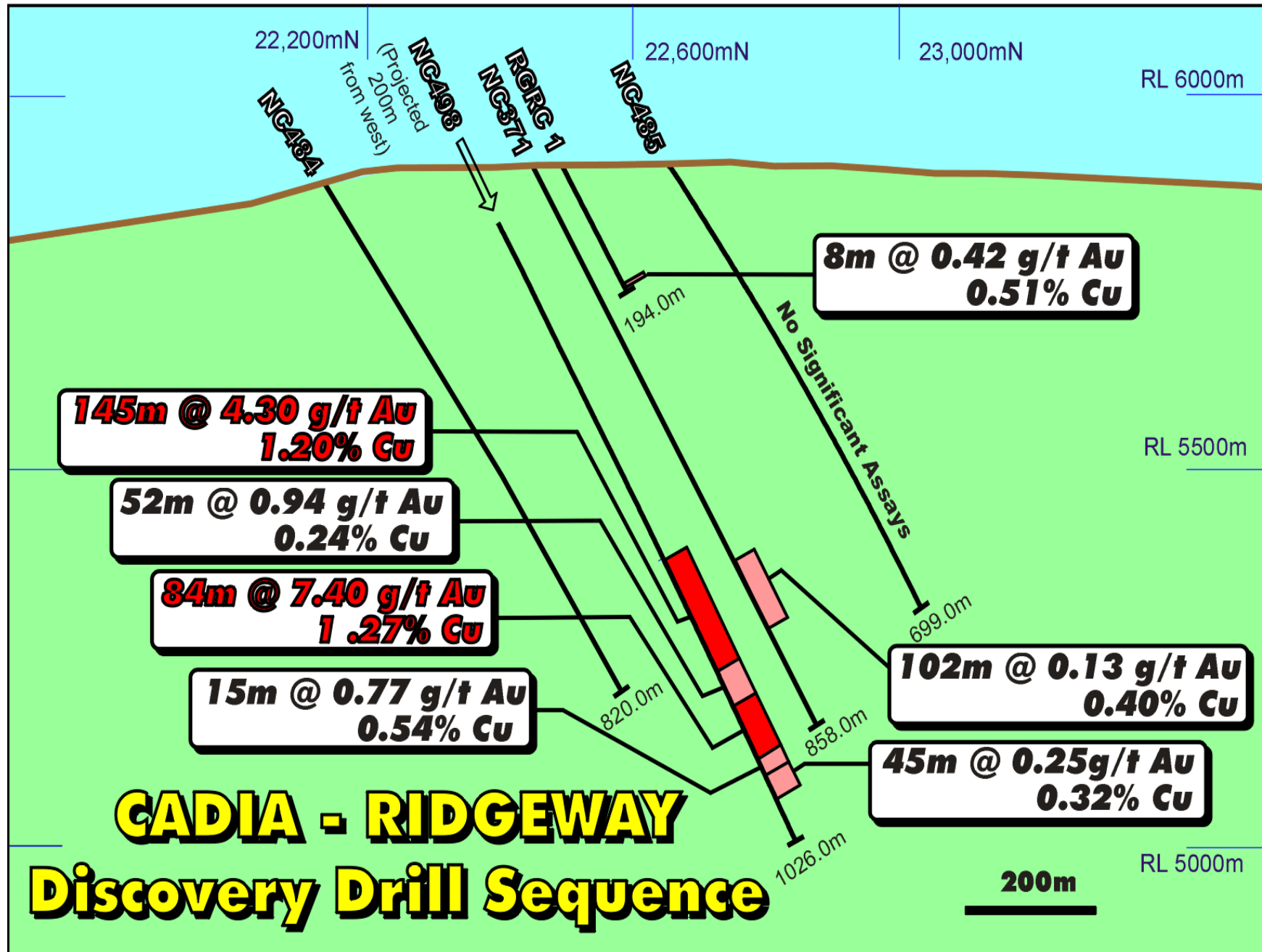




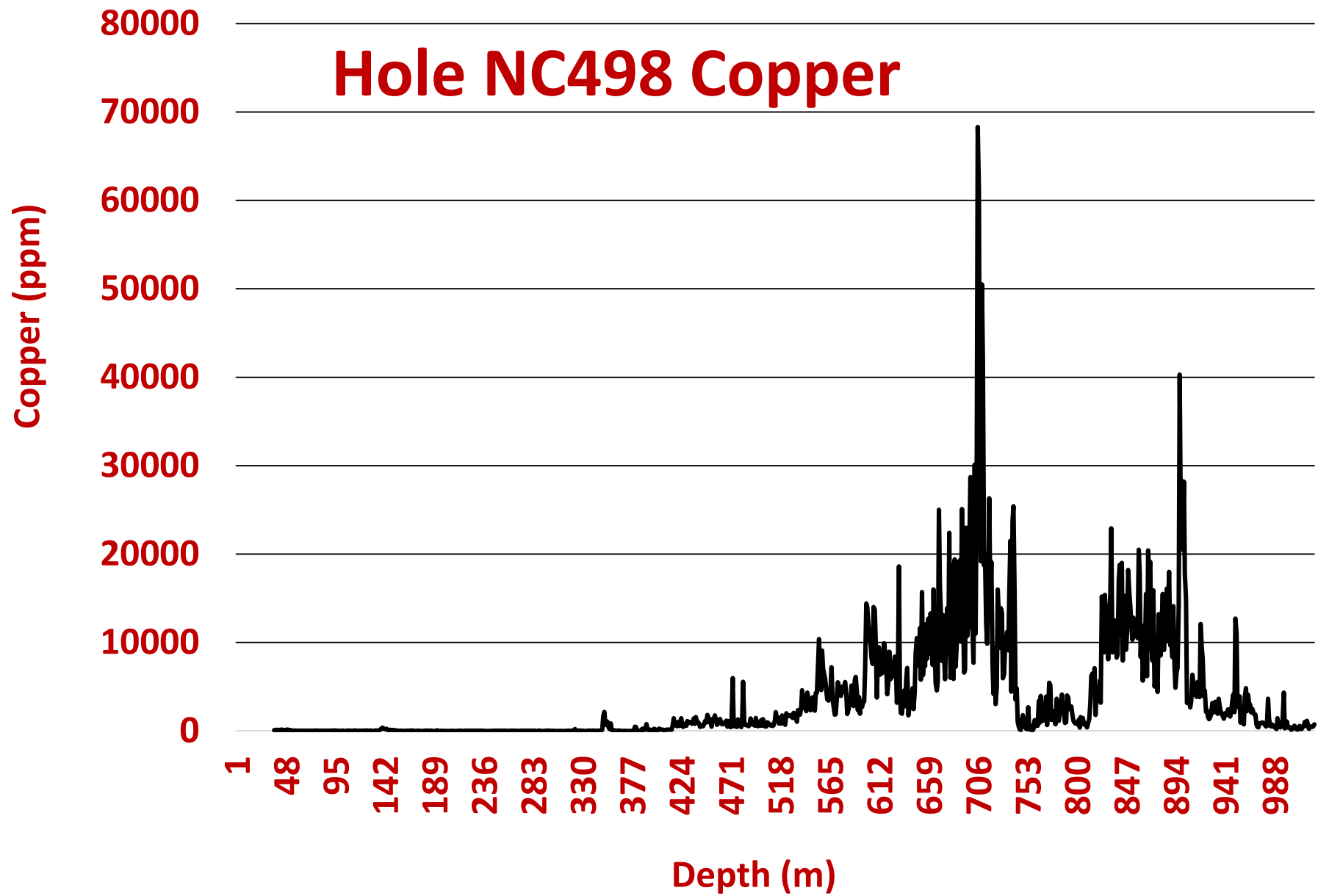


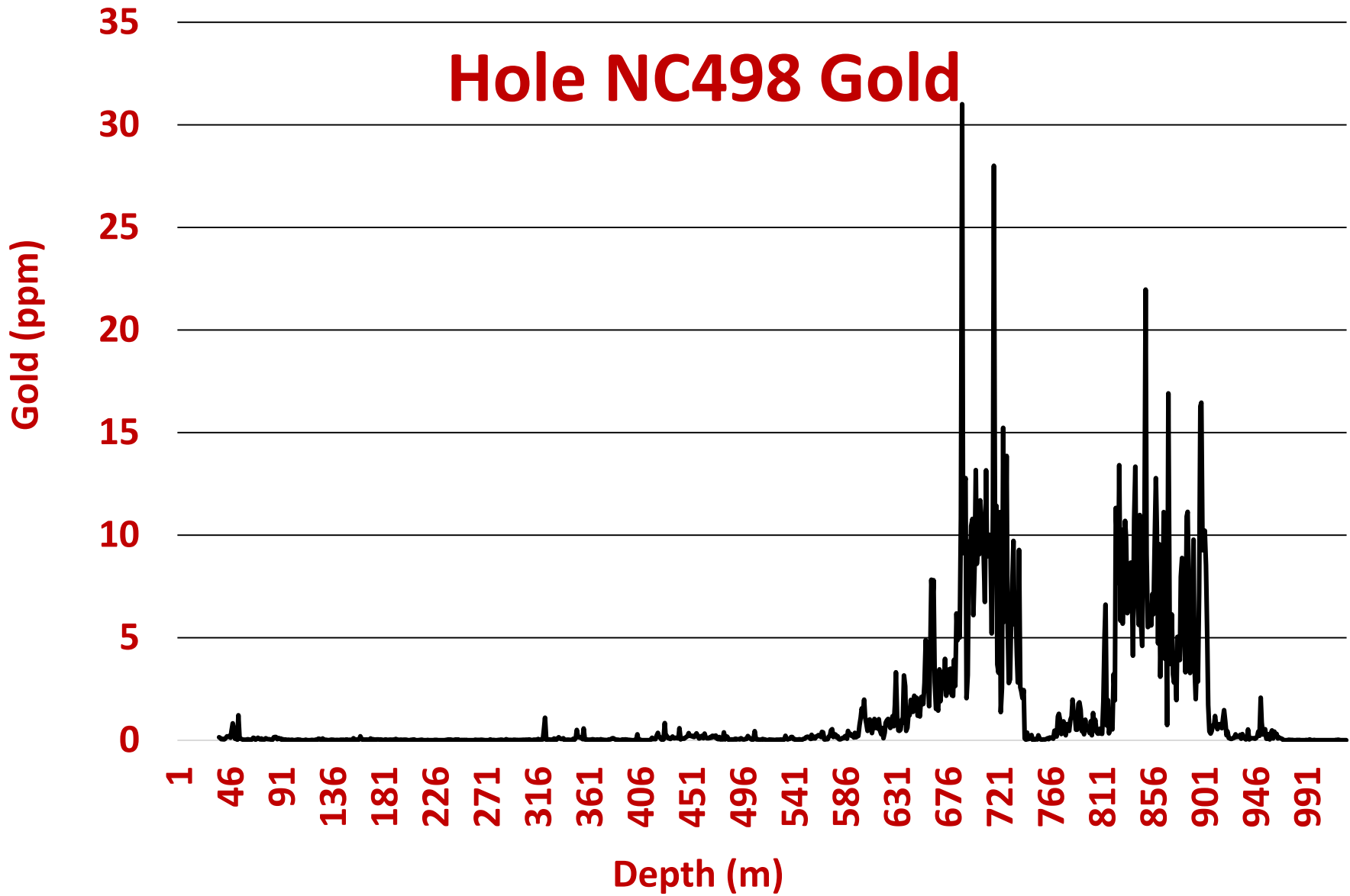
# Hole NC371 Gold











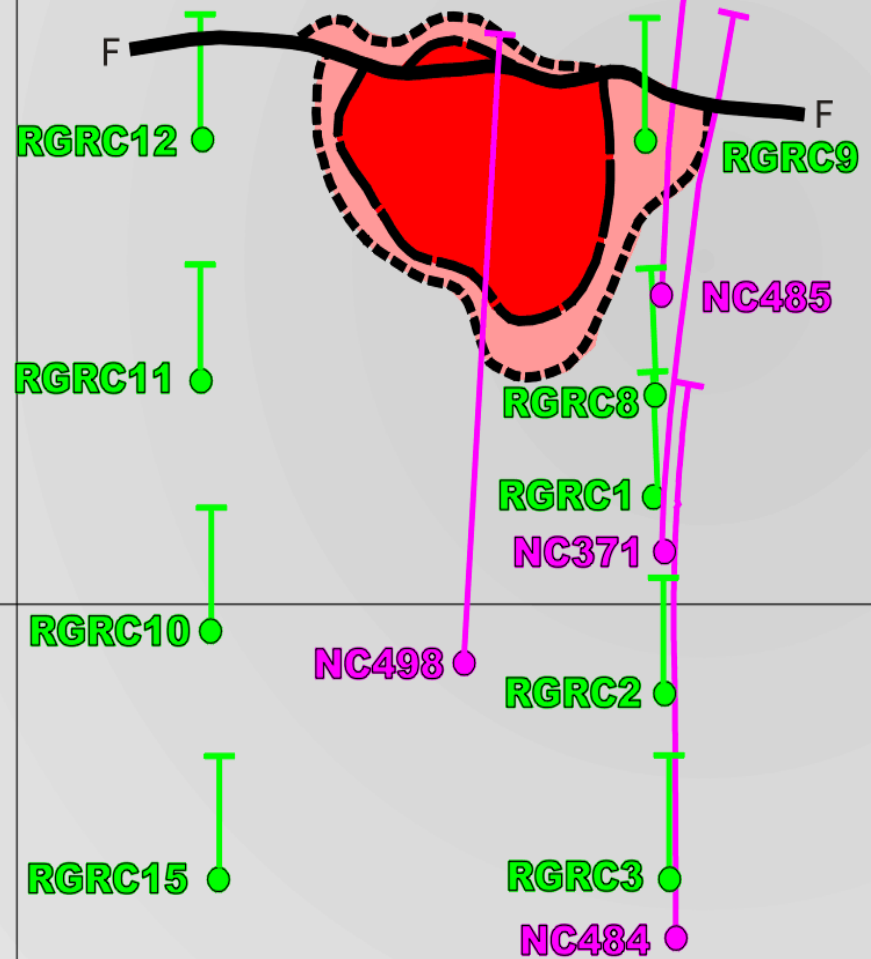
10,600mE

11,400mE

# DISCOVERY DRILLING CADIA RIDGEWAY

23,000mN

22,400mN

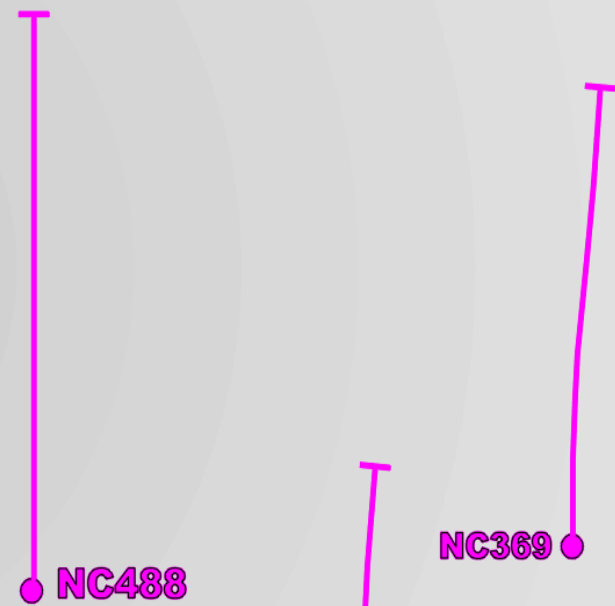


Mineralisation Outline 5250mRL

- 1 g/t Au eq
- 2 g/t Au eq

NC498 ● Newcrest Diamond Hole

RGRCS8 ● Newcrest RC Hole

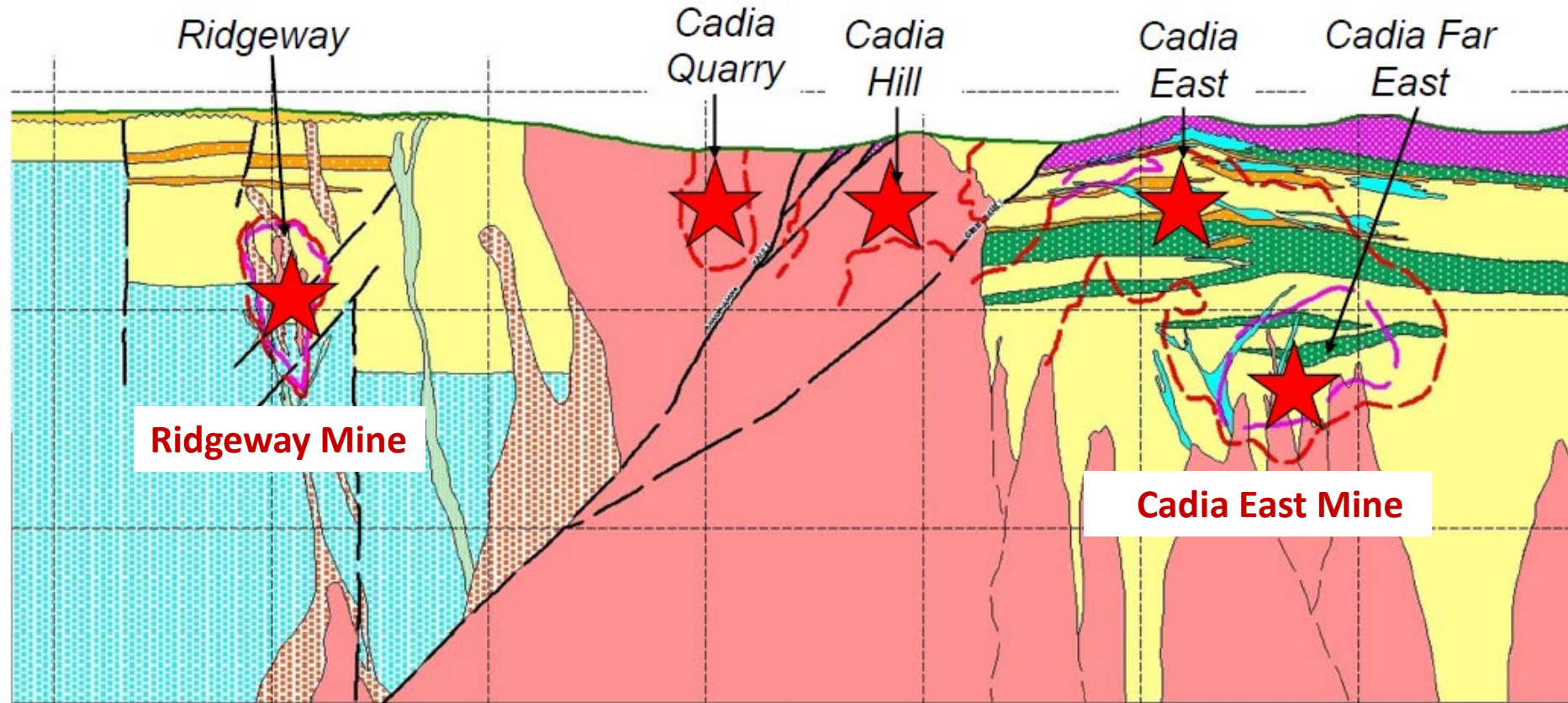


200m





# Cadia District Long-section



 1 g/t Au eq.

 2 g/t Au eq

 1 km



# Cadia District Total Metal Endowment

<b>Deposit</b>	<b>Mt</b>	<b>Au (g/t)</b>	<b>Au (Moz)</b>	<b>Cu (%)</b>	<b>Cu (Mt)</b>
Cadia Hill	543	0.54	9.51	0.16	0.88
Cadia Quarry	59	0.47	0.89	0.24	0.28
Cadia East	3,066	0.39	38.0	0.26	8.01
Ridgeway	243	0.98	7.64	0.47	1.13
<b>TOTAL</b>			<b>56.0</b>		<b>10.3</b>

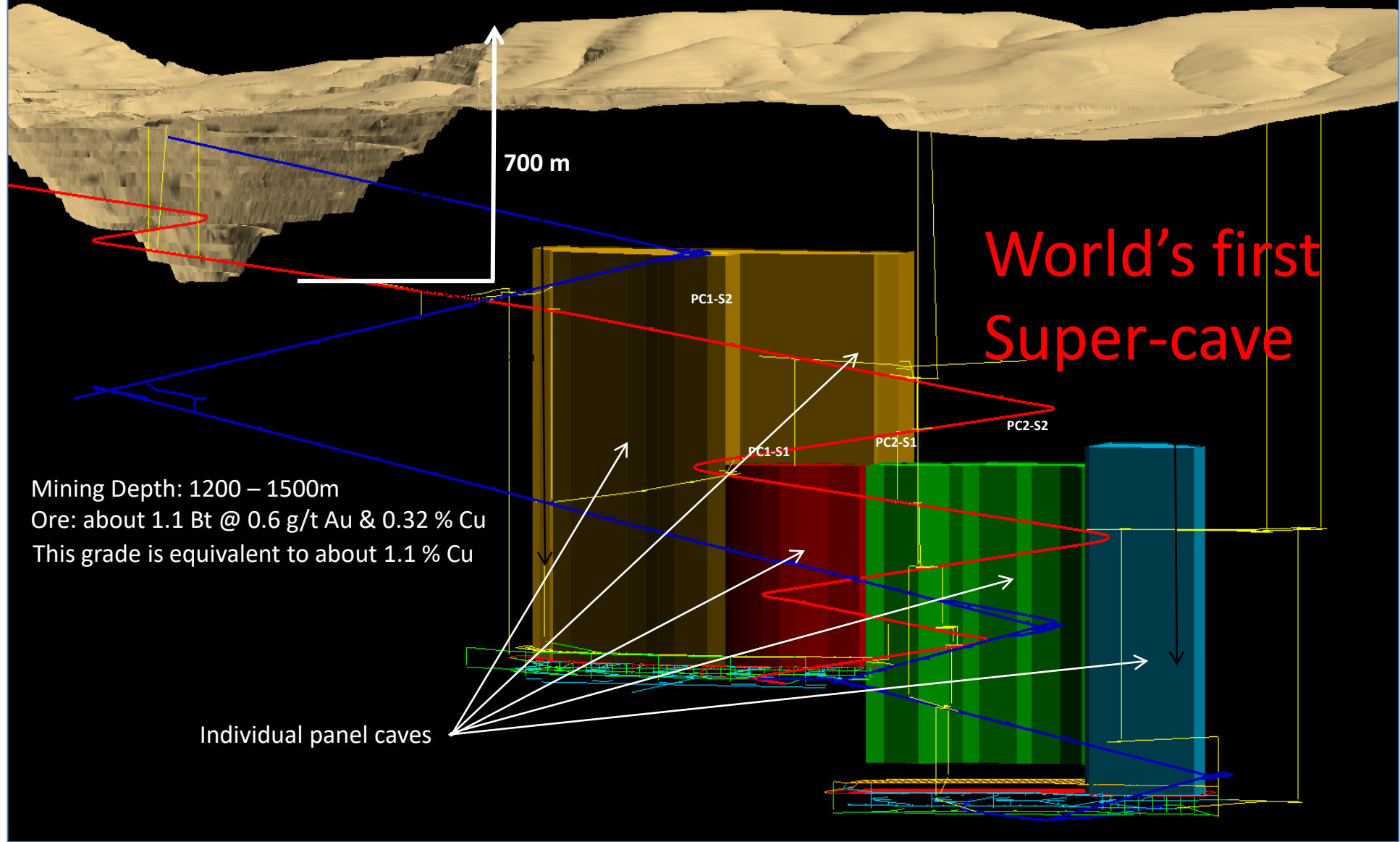
**A world-class Au-Cu porphyry district**



Courtesy Alan Wilson

# Cadia East Mine

(Image courtesy Newcrest Mining Limited)

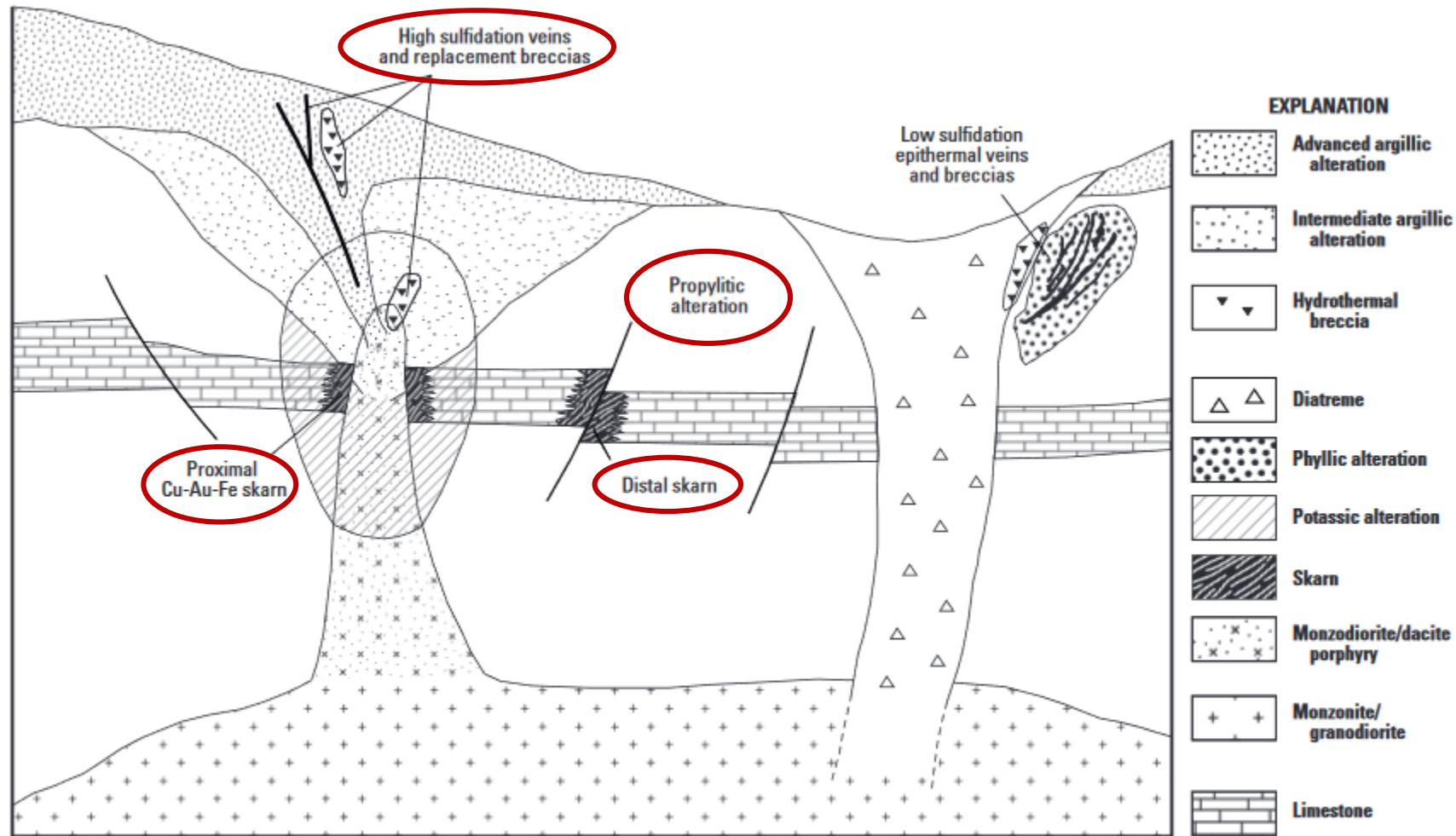


World's first  
Super-cave

Mining Depth: 1200 – 1500m  
Ore: about 1.1 Bt @ 0.6 g/t Au & 0.32 % Cu  
This grade is equivalent to about 1.1 % Cu




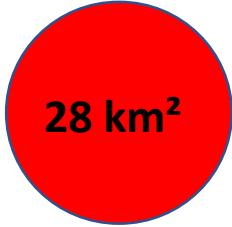
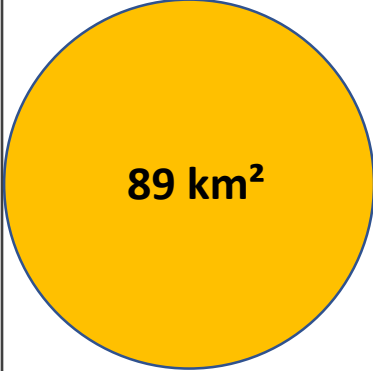

Individual panel caves

# What to Look For when Exploring



**Figure C6.** Schematic ore deposit model for western Pacific porphyry Cu-Au deposits, showing possible associations with carbonate-hosted skarn and replacement deposits, high-sulfidation and low-sulfidation epithermal veins and breccias, and diatremes (after Cooke and others, 1998; and Sillitoe, 1989).

# Porphyry Copper Size

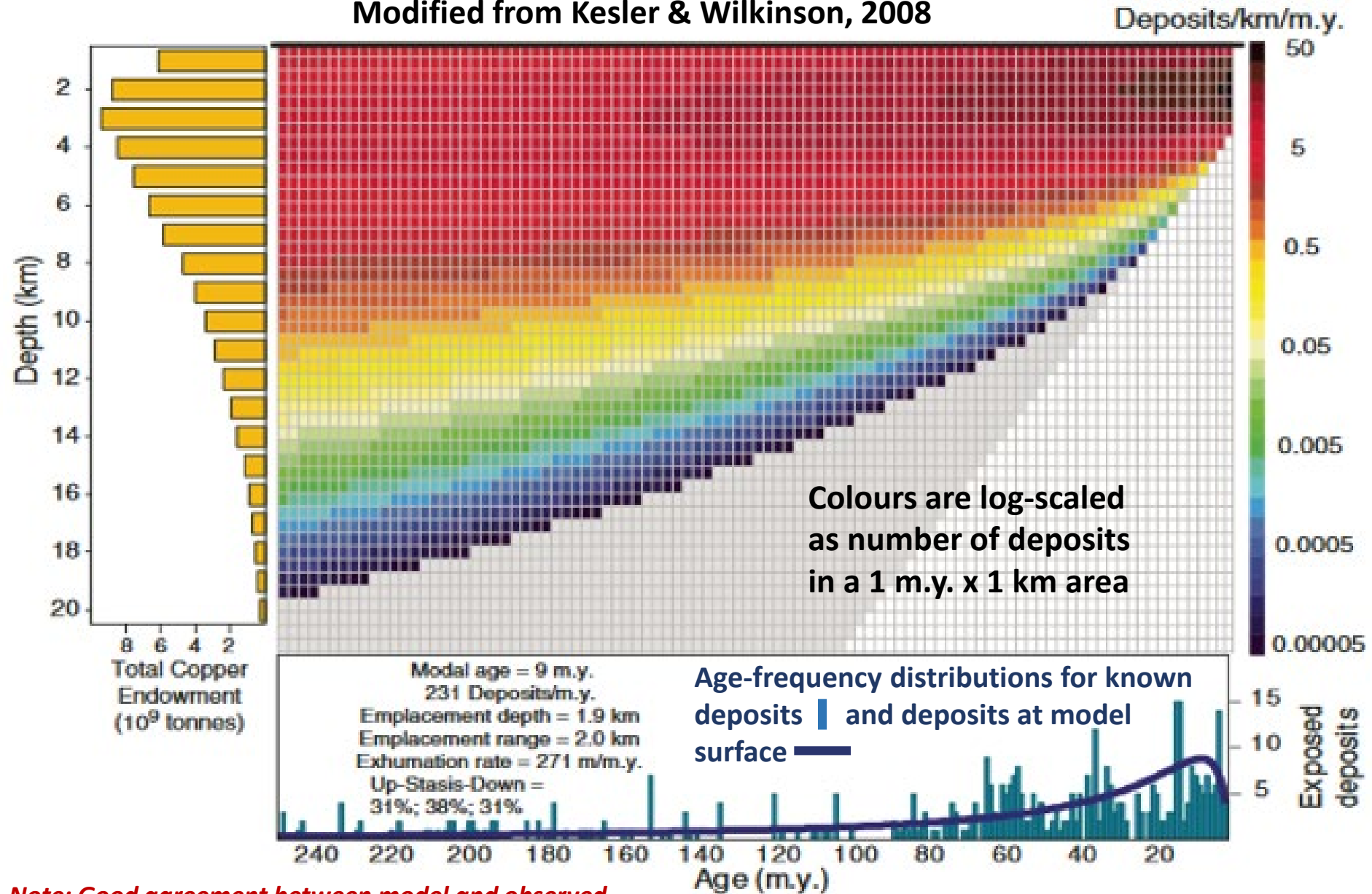
Statistic	Area of ore	Area of sulphides	Area of alteration
Mean (km <sup>2</sup> )	1.25	7.4	8.9
Median (km <sup>2</sup> )	0.6	3.7	5.1
Maximum (km <sup>2</sup> )	28	89	82
Minimum (km <sup>2</sup> )	0.02	0.18	0.24
Number of deposits	174	173	184
<b>Median</b>			
<b>Maximum</b>			

Compiled from Singer et al., 2008: Porphyry copper deposits of the World, USGS report 2008-1155



# Distribution of Porphyry Copper Deposits in Age & Depth

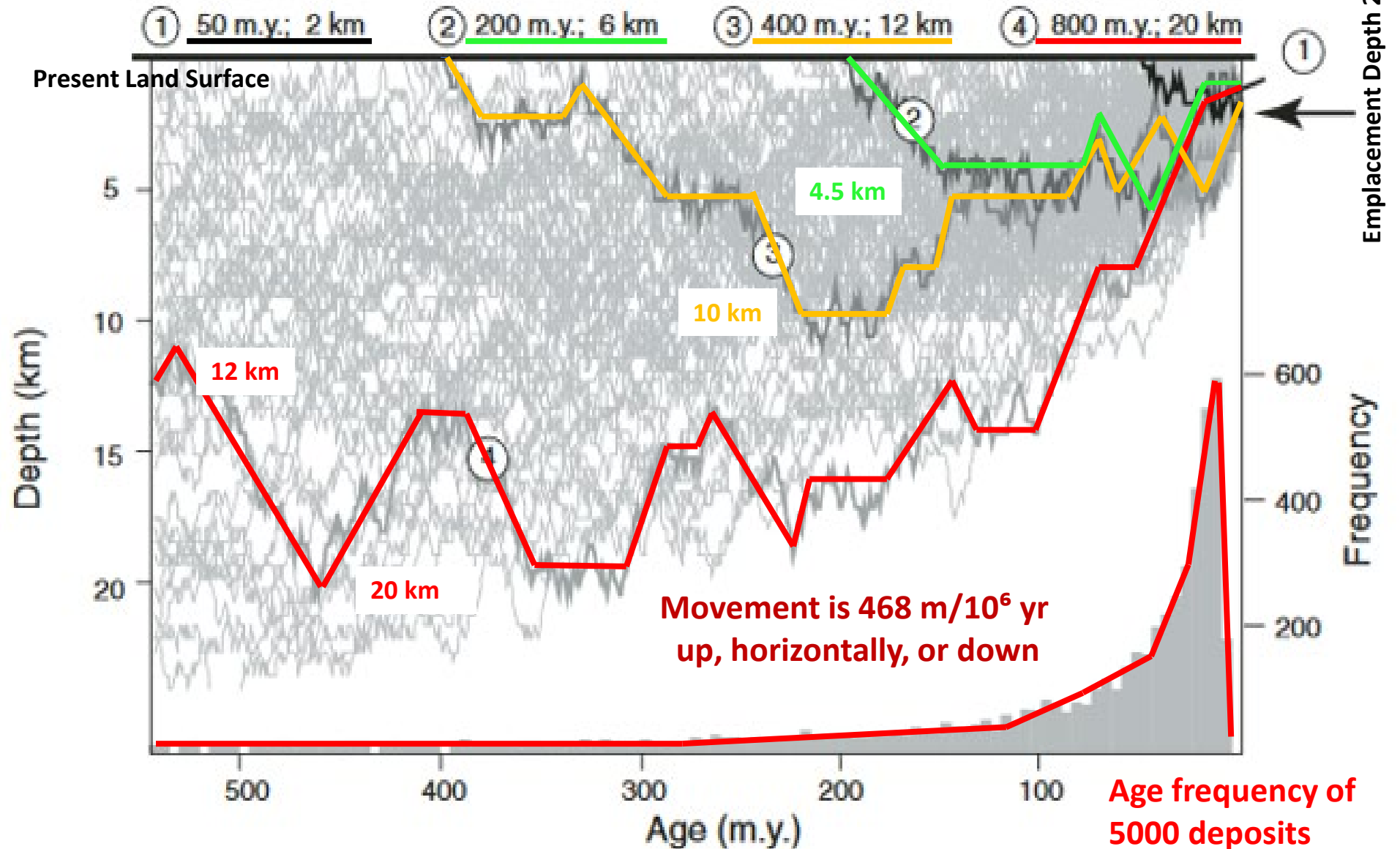
Modified from Kesler & Wilkinson, 2008



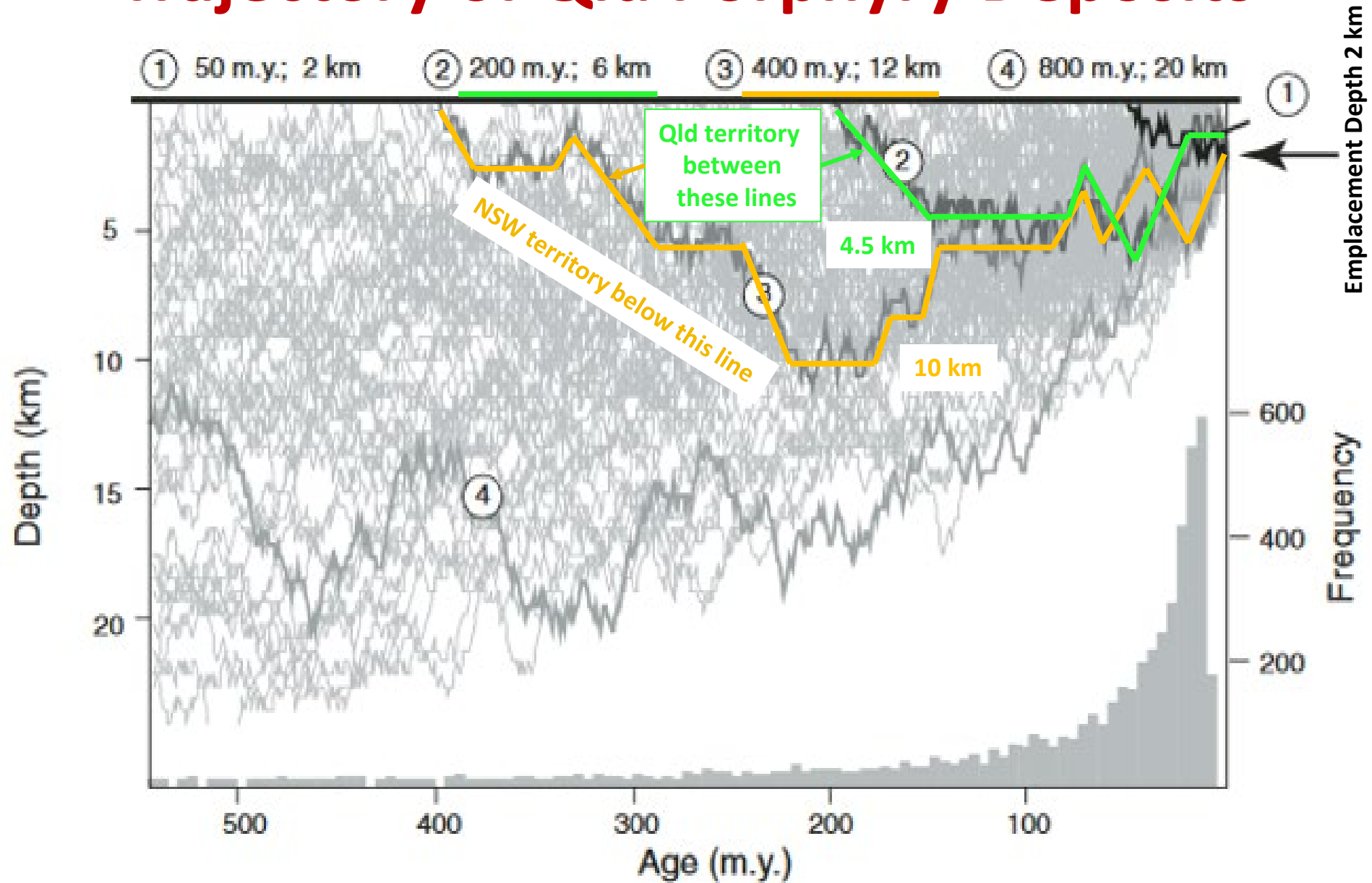
*Note: Good agreement between model and observed age frequencies indicates that 231 deposits formed every million years, over the past 545 m.y.*



# Time-space Trajectories of 231 (theoretical) Phanerozoic Porphyry Copper Deposits



# Trajectory of Qld Porphyry Deposits

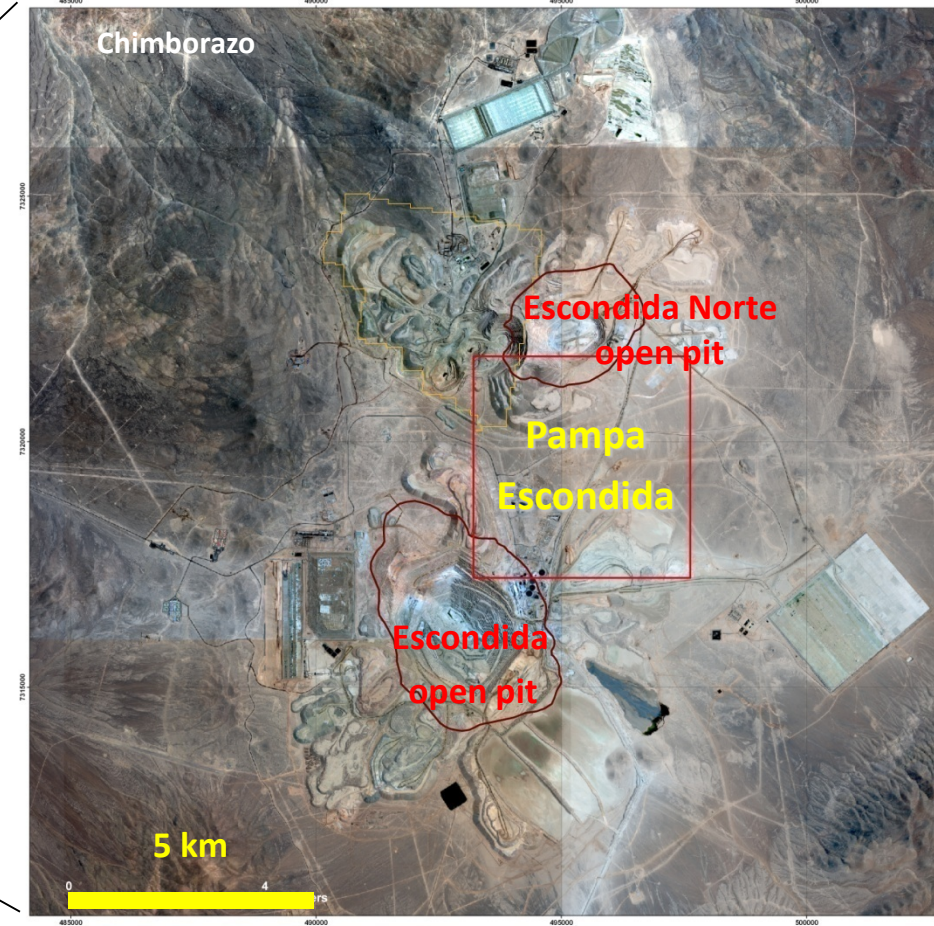


# Pampa Escondida Discovery



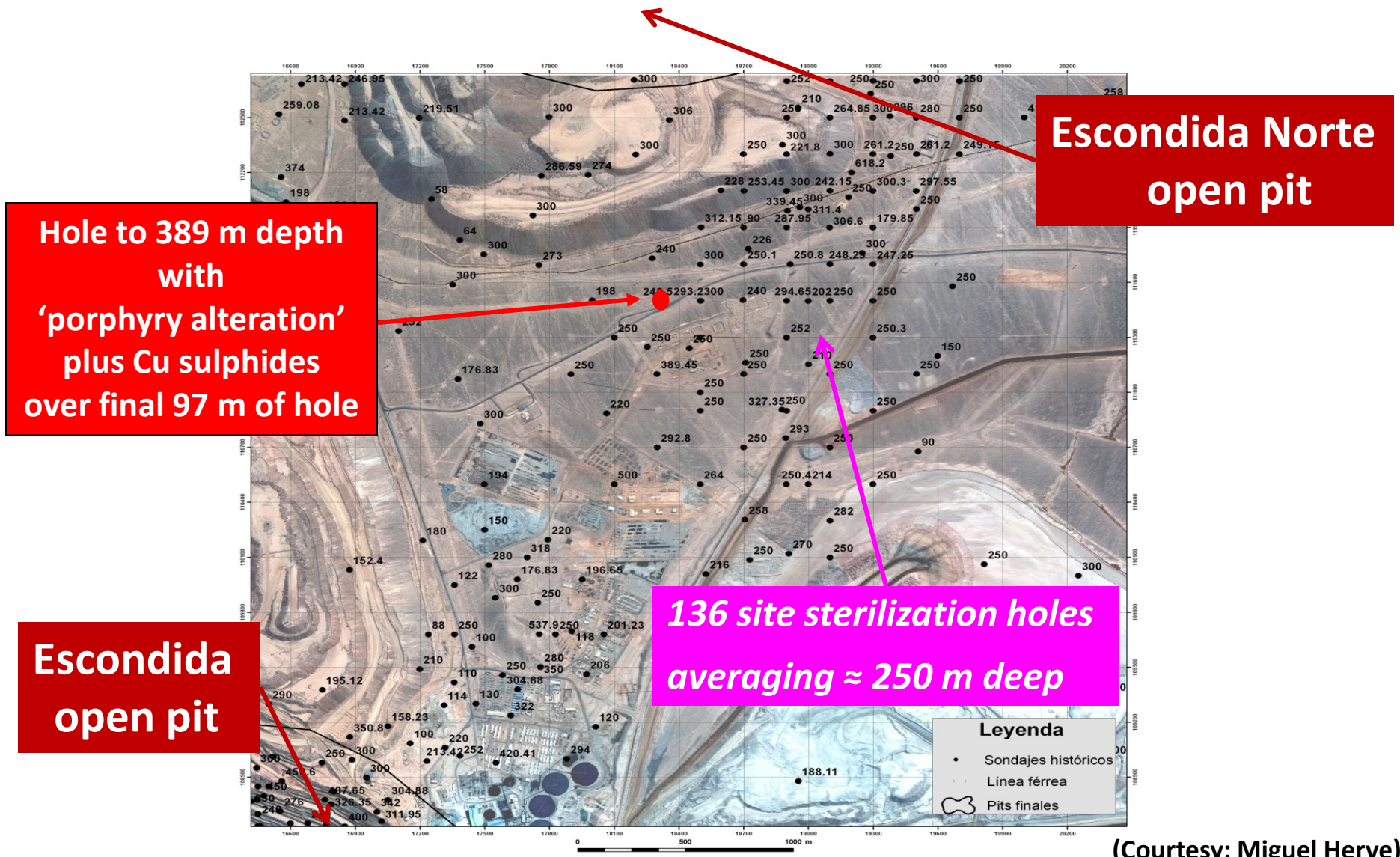


# Pampa Escondida, Chile



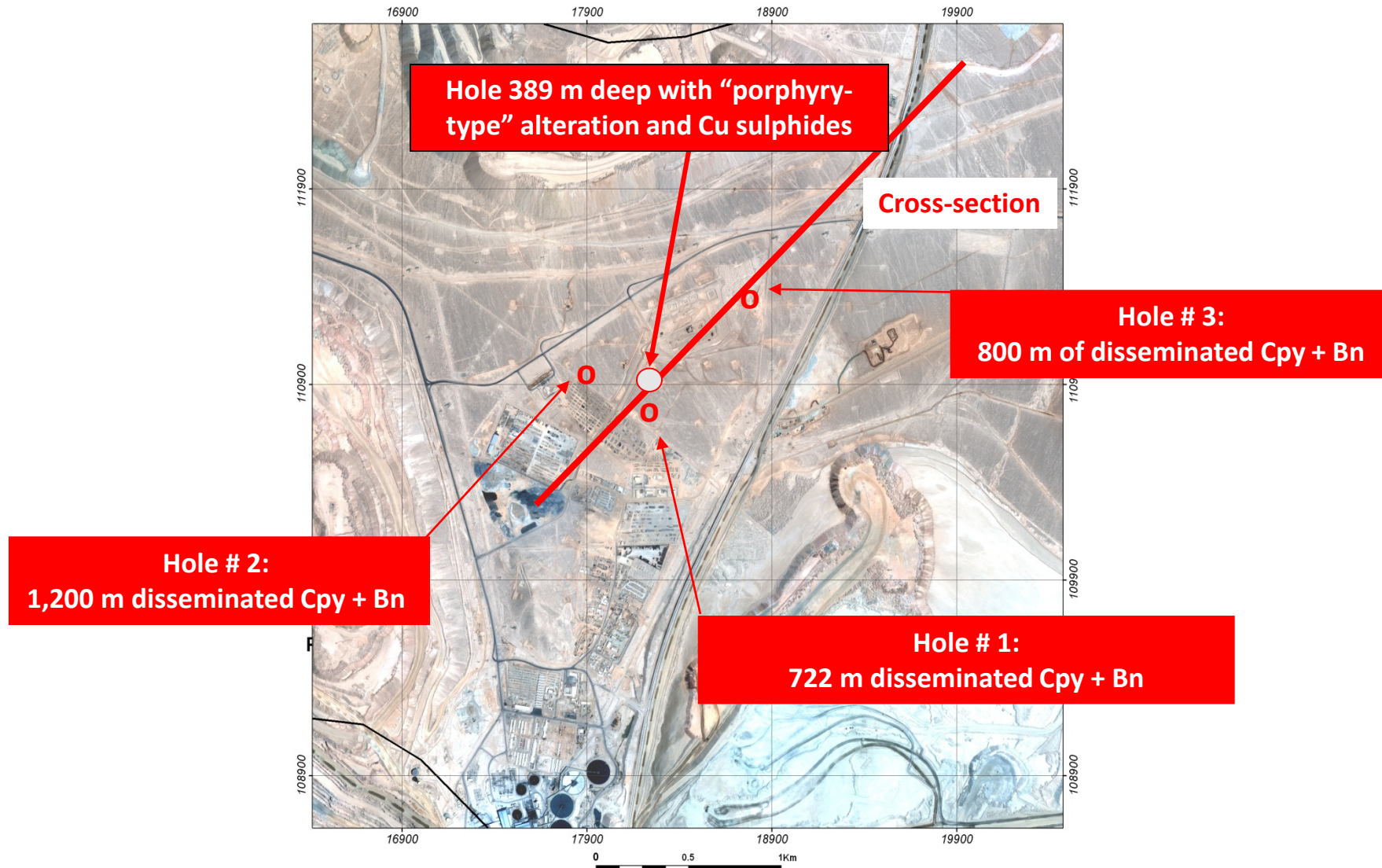
(Courtesy: Miguel Herve)

# Pre-discovery Drilling





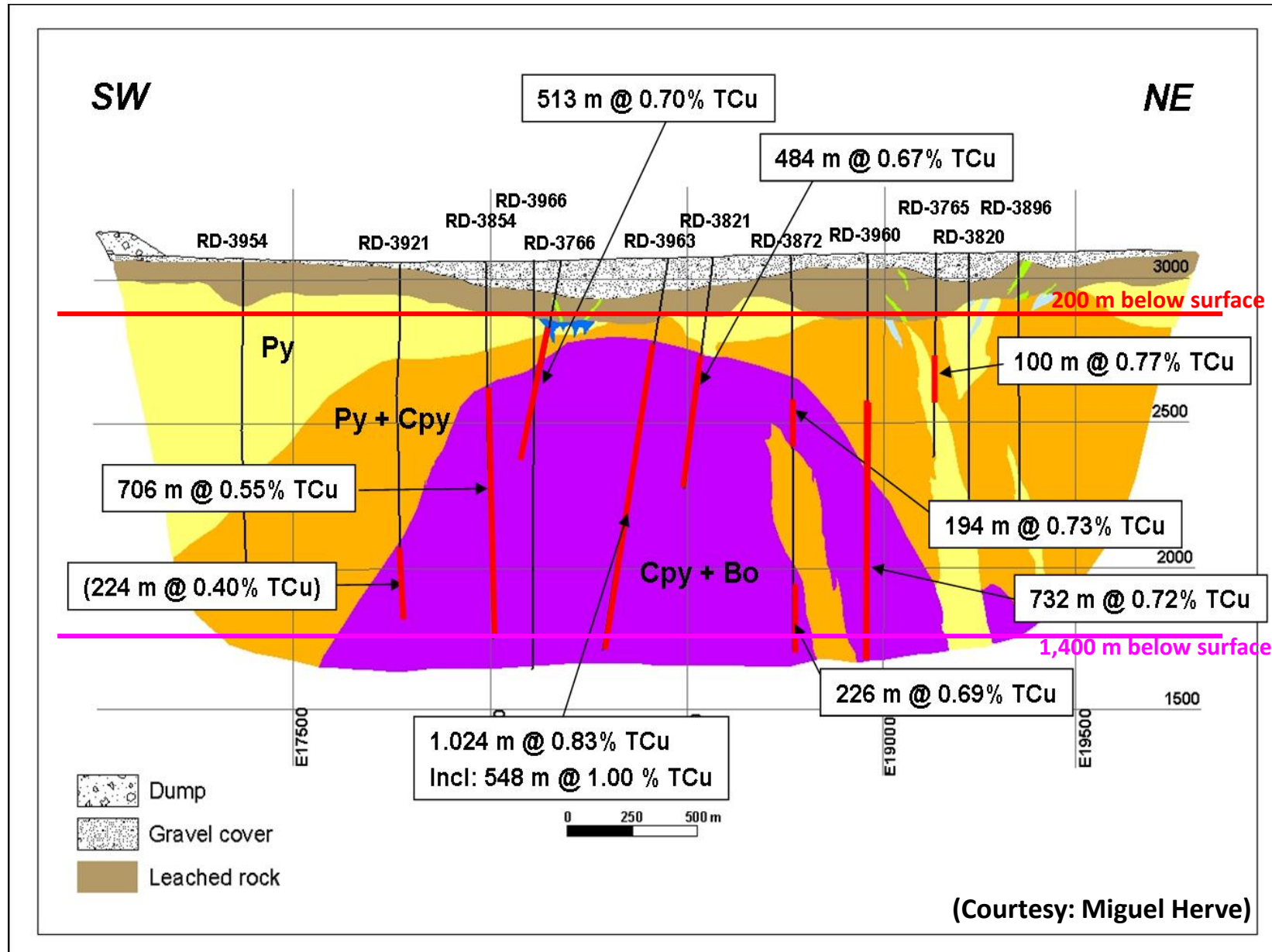
# First three holes *(January – June 2007)*



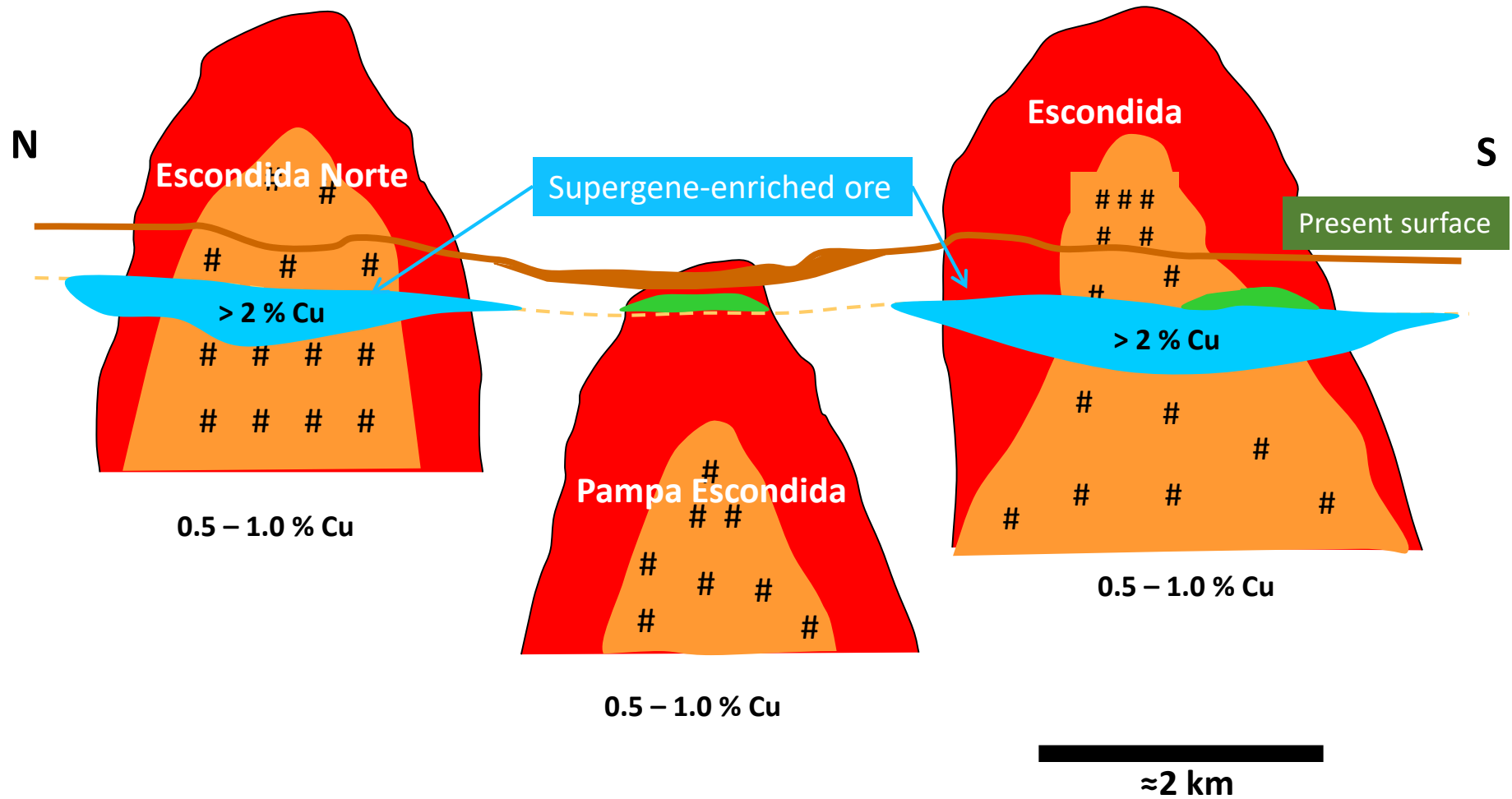
(Courtesy: Miguel Herve)



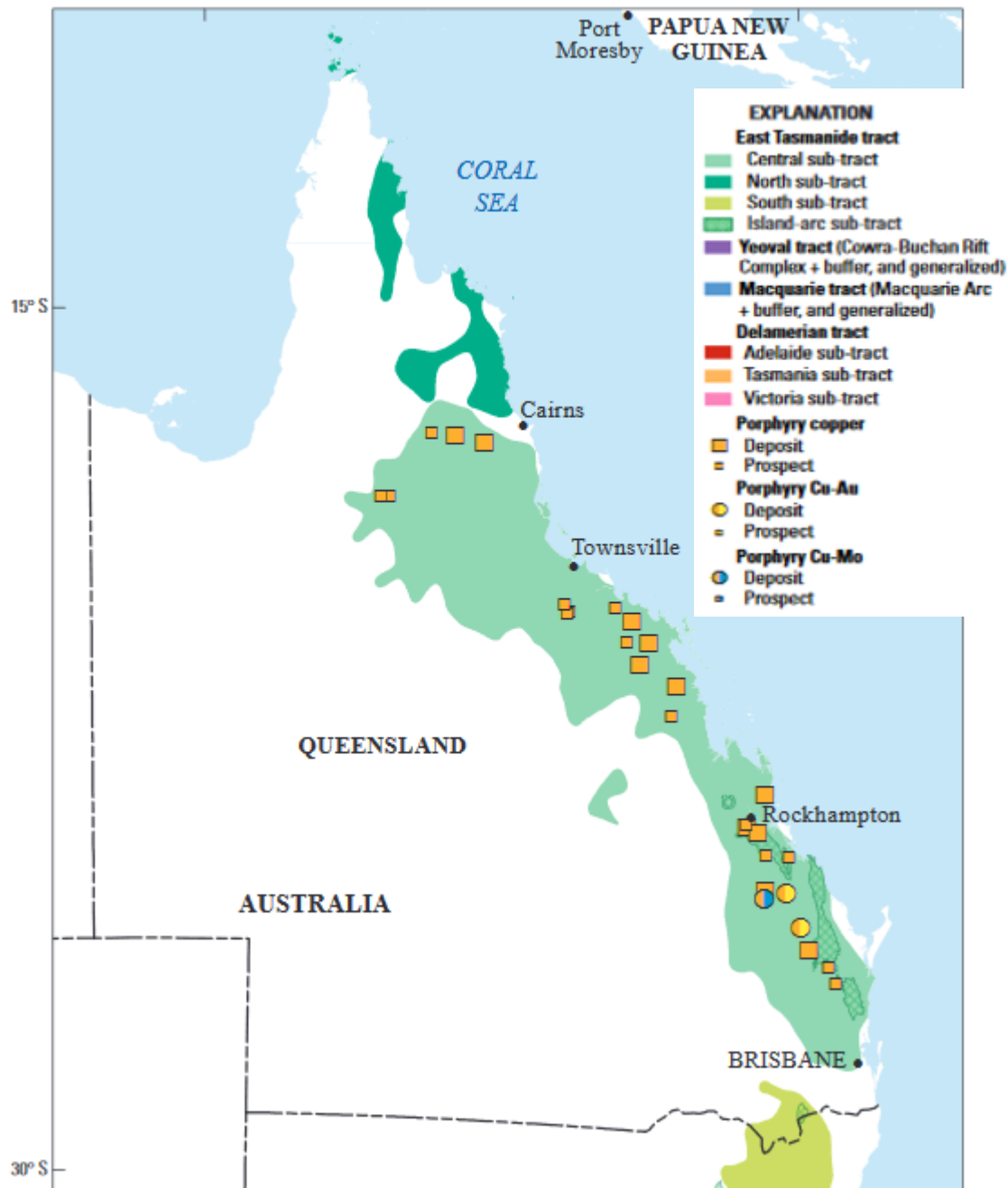
# June 2008 Intersections



# Schematic N-S Section



(Courtesy: Miguel Herve)



## Why not Qld?

- There is no reason why not
- The first economic deposit has yet to be discovered
- There are at least 25 porphyry Cu occurrences in Qld

# Some Concluding Remarks



## Follow Sig Meussig's canons:

- Look for ore, not mineralisation
- To find an ore body, you need to drill holes
- There needs to be room for the ore

## Deeper is the new Greenfield

- Deeper only means >300 m depth
- In seeking underground mining targets, know what is required for mining

- **Above all, Drill Holes!** *(The worst outcome of drilling is failure to discover ore, which is essentially guaranteed in exploration, anyway!)*

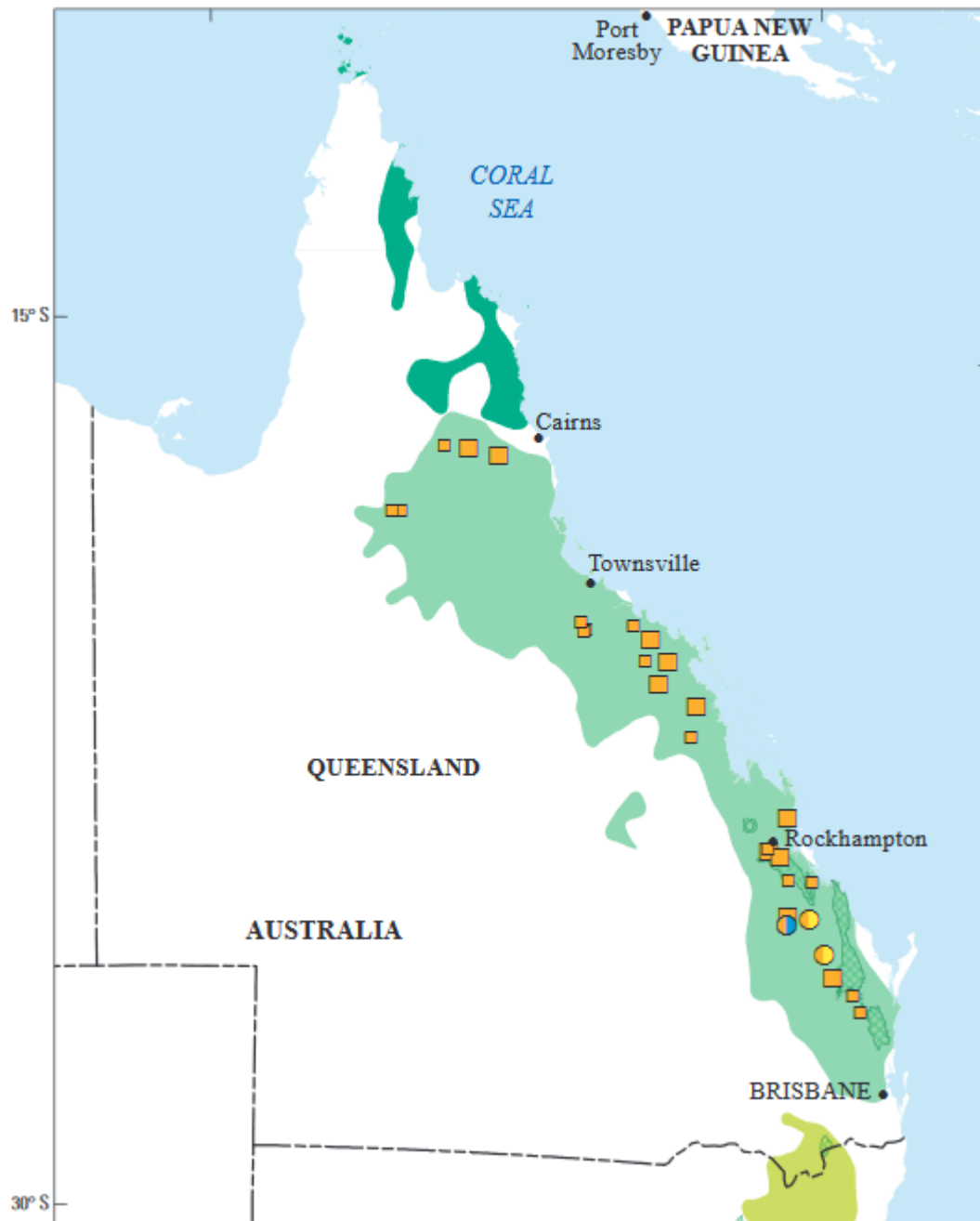


# Sig Meussig's Canons

**“IQ gets you there, but NQ finds it!”**

- Exploration is not a science
- **Go with the facts, forget the theory**
- Try for the definitive test
- **The odds are best in the shadow of the headframe**
- Save the agonising for mineralised trends
- **Look for ore, not mineralisation**
- **To find an ore body, you have to drill holes**
- **There needs to be room for the ore**
- Improve it or drop it
- Do not chase spurious anomalies
- Do not be preoccupied with explaining anomalies
- **Do not be preoccupied with pathfinders**
- **Do not be preoccupied with stereotyped concepts**
- **Do not be technology driven**
- Acquire first, study later
- Disregard competitor's previous actions
- Go for the jugular
- It's the drill hole, stupid!

*DREGS 1993*



**Thank You**