

GSSA's new ventures across the Eyre Peninsula

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**GEOLOGICAL
SURVEY OF**
South Australia

DISCOVERY DAY



Why the Eyre Peninsula?

Co-location of mineral and energy resources

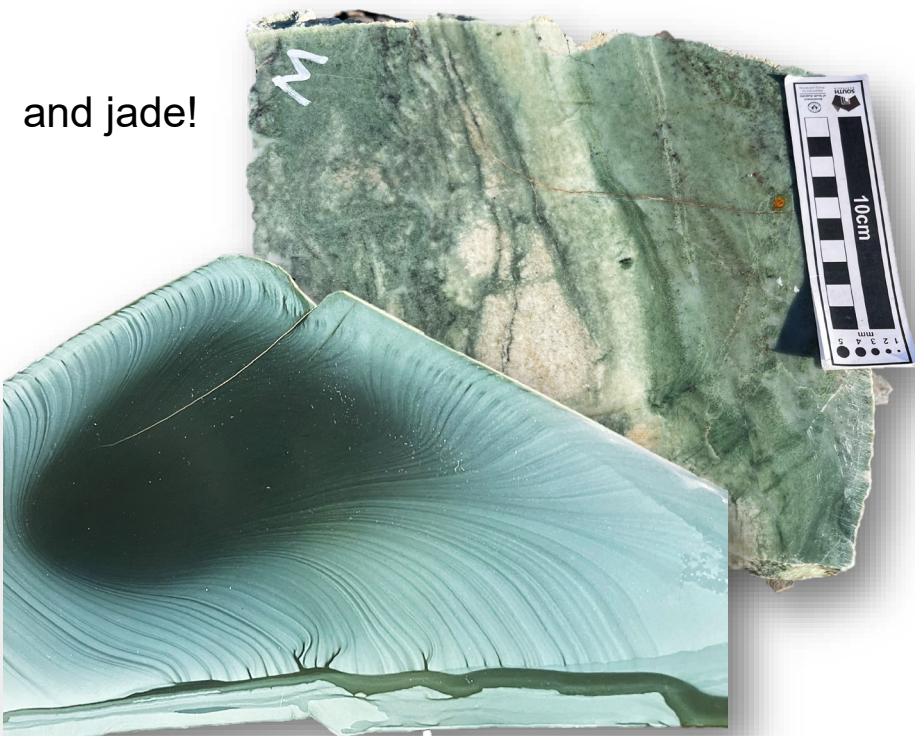
- Upper Spencer Gulf region is a **strategic location** and at the centre of SA's **State Prosperity** project.
- Located within South Australia's highly prospective **Gawler Craton** and overlain by **prospective basins** containing a wide variety of mineral & energy resources.
- **Mineral and energy resource prospectivity is high** and is increasing due to the emerging magnetite, critical minerals, and hydrogen sectors.
- **Exploration activity is strong** and continues to expand especially in the field of critical minerals, magnetite, copper, uranium and hydrogen.
- **No systematic regional pre-competitive geoscience acquisition over >20 years.**



Eyre Peninsula

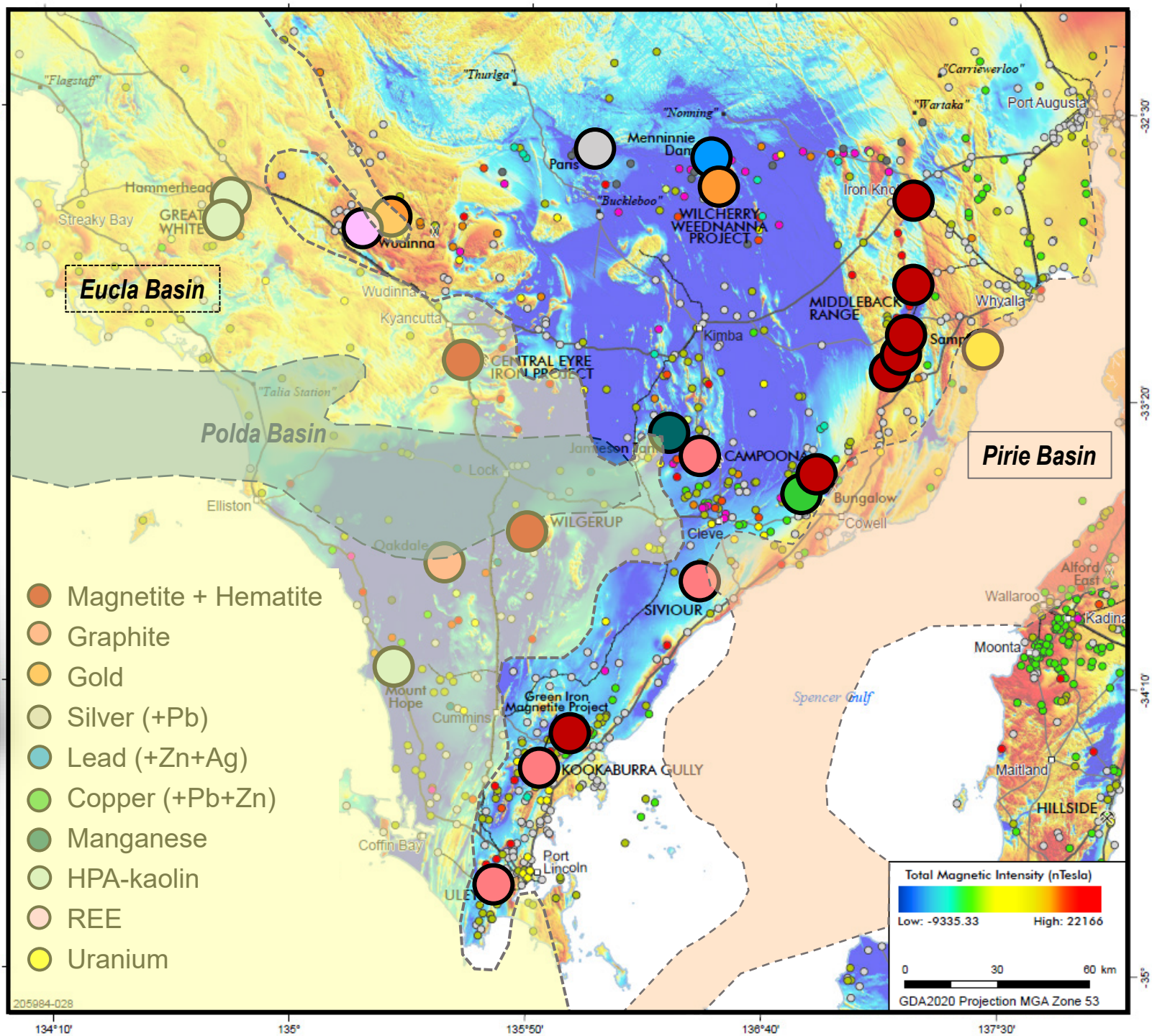
Resources include:

- Base and Precious Metals
- Critical Minerals
- Energy Resources
- Industrial & Construction Materials
- Mine Waste



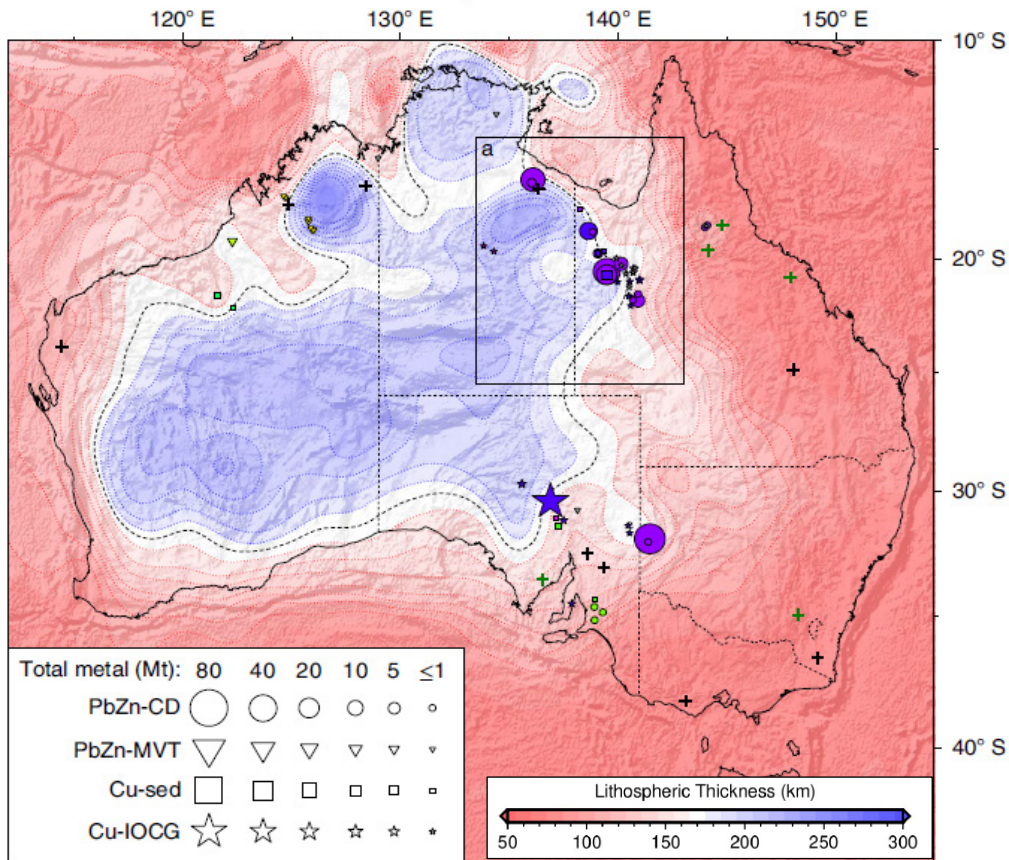
and jade!

Cowell jade

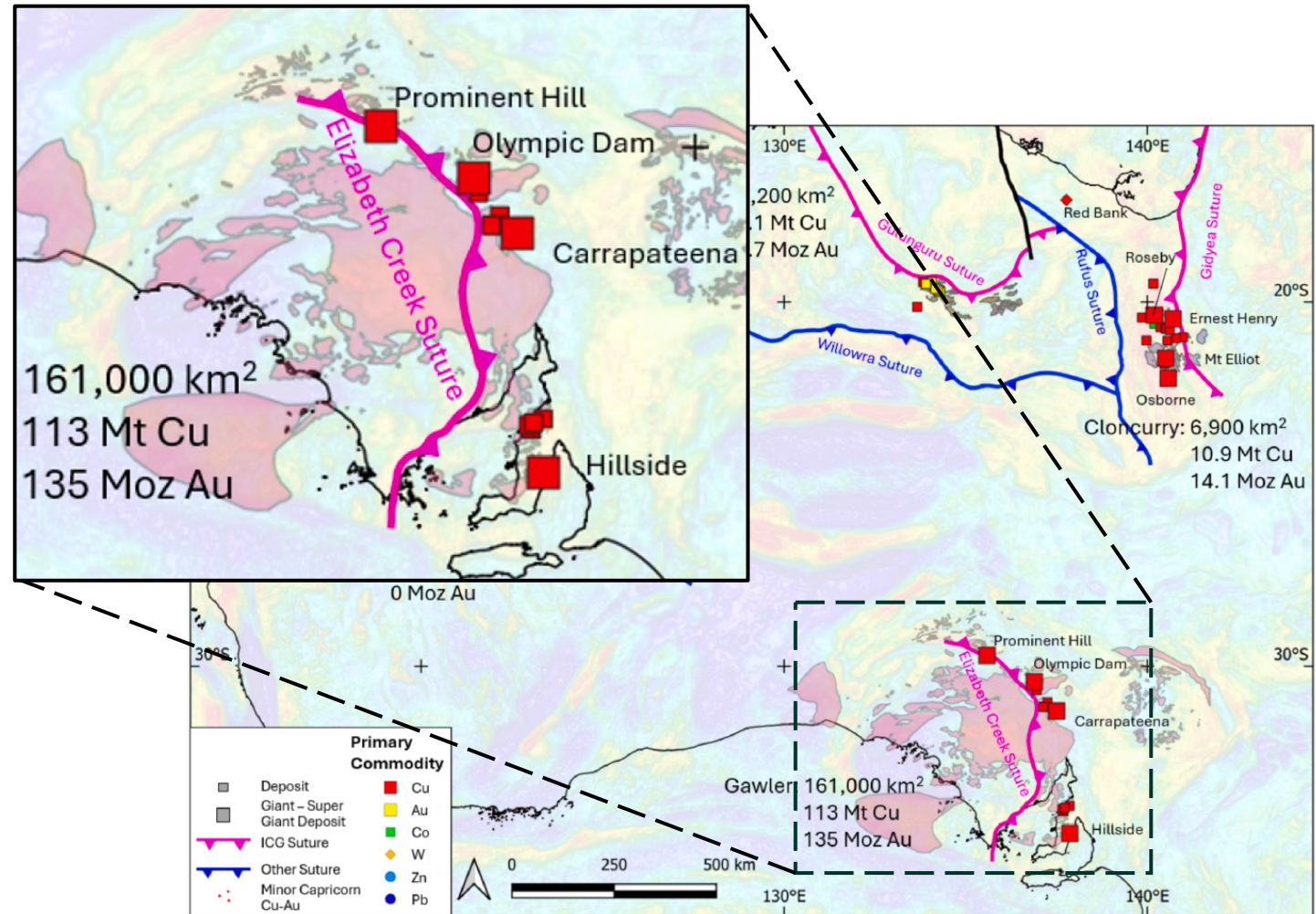


Eyre Peninsula

Major Archean craton boundary – trans-lithospheric structures



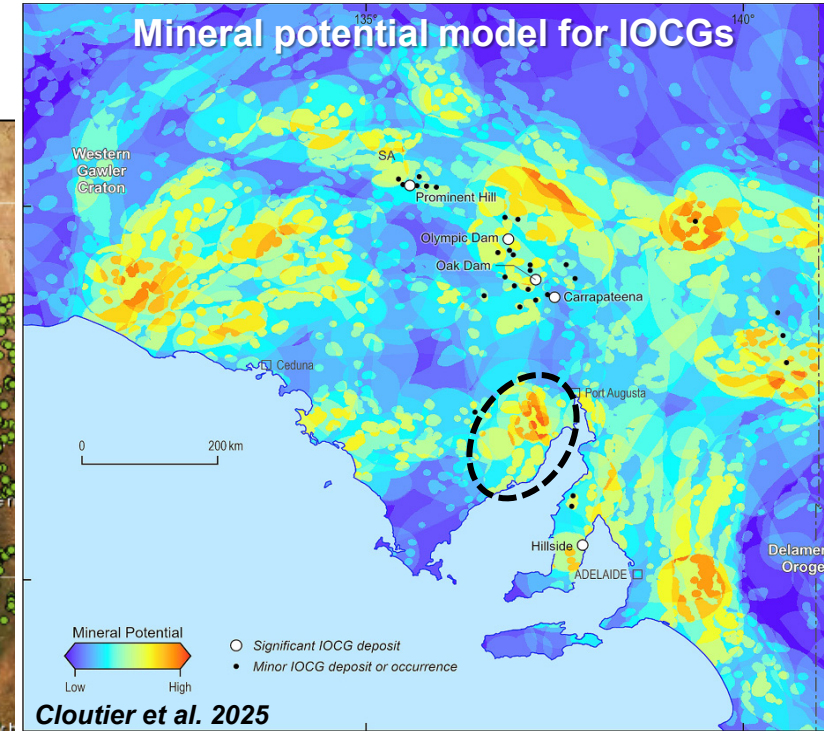
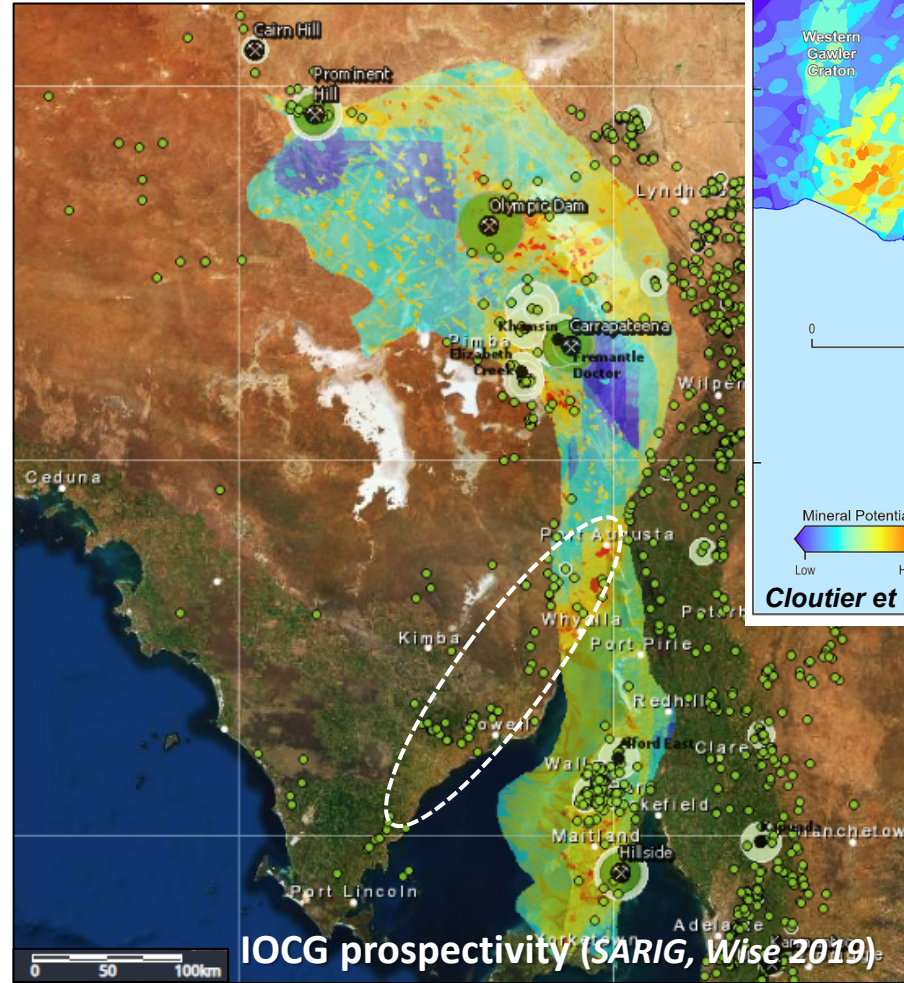
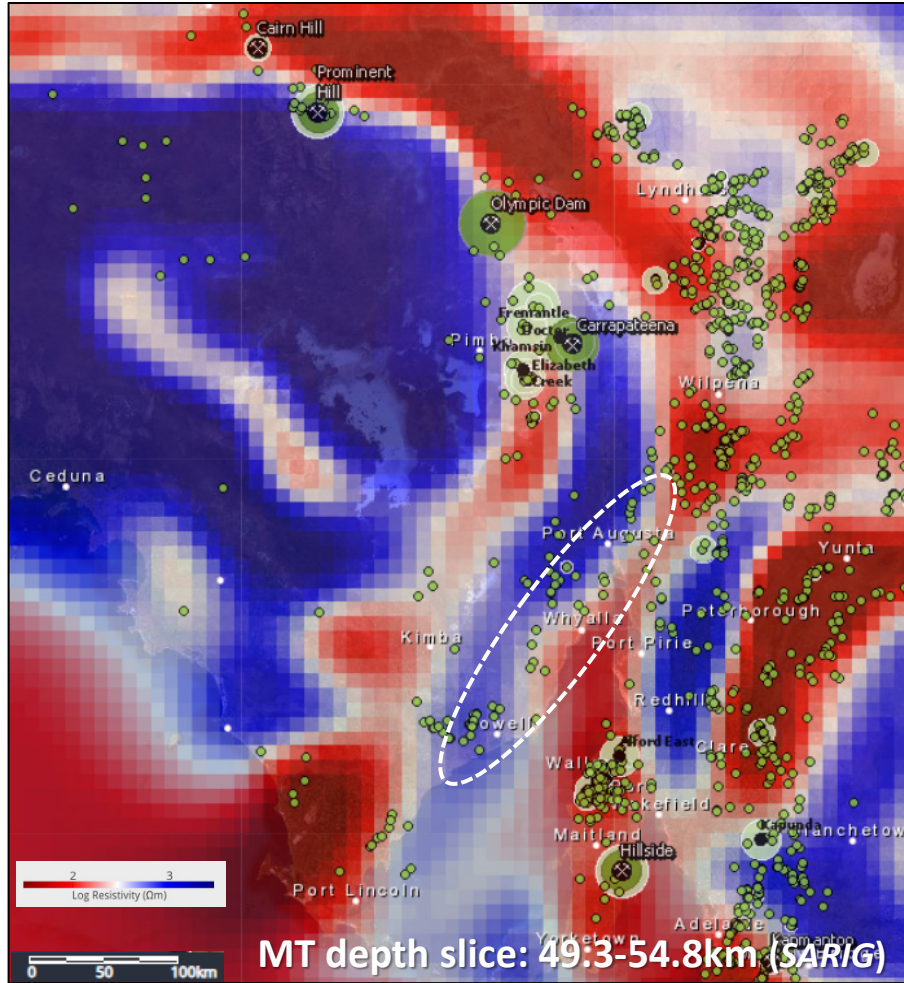
Hoggard et al. 2020



Brauhart & Groves 2025

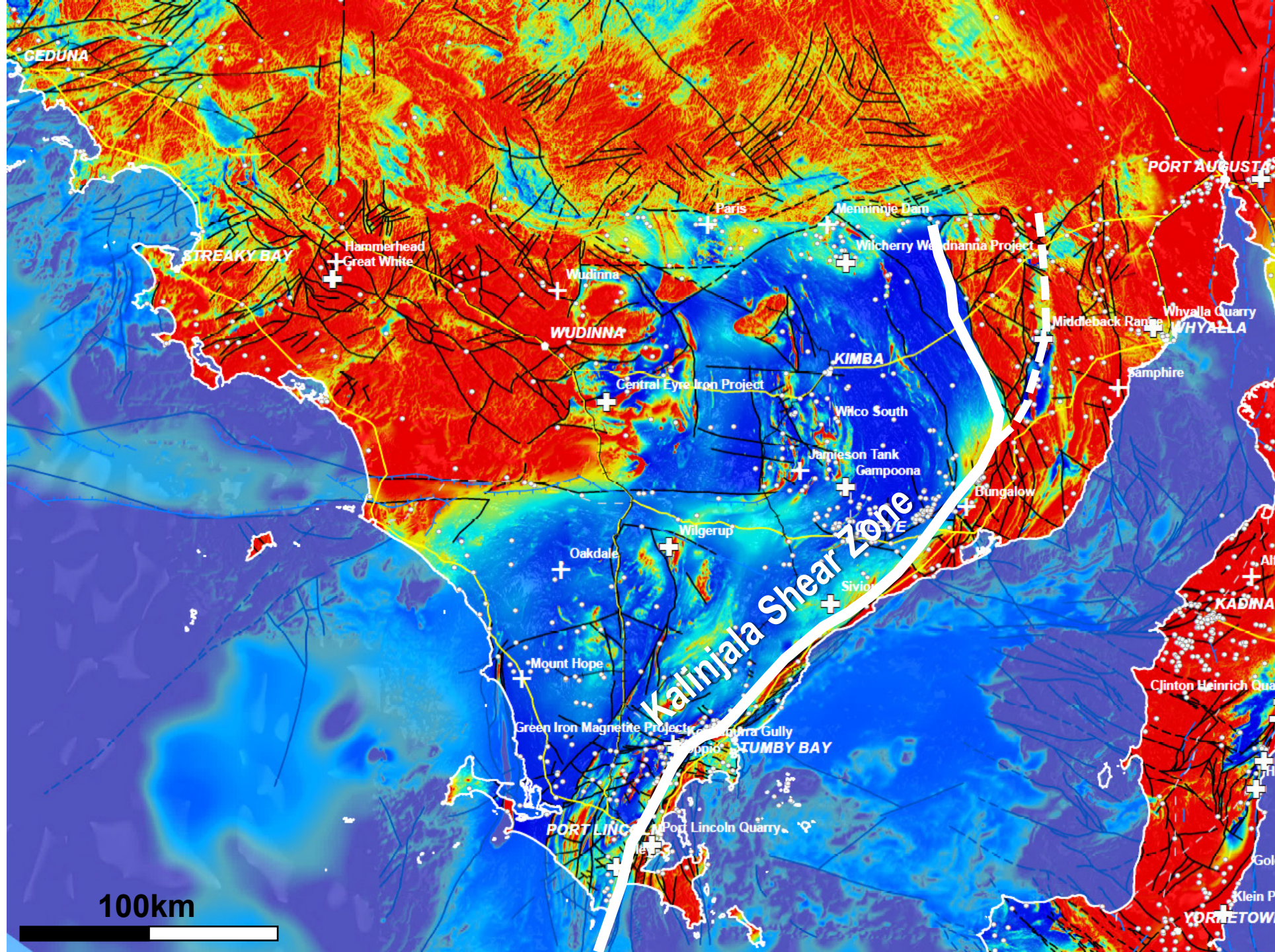
Eyre Peninsula

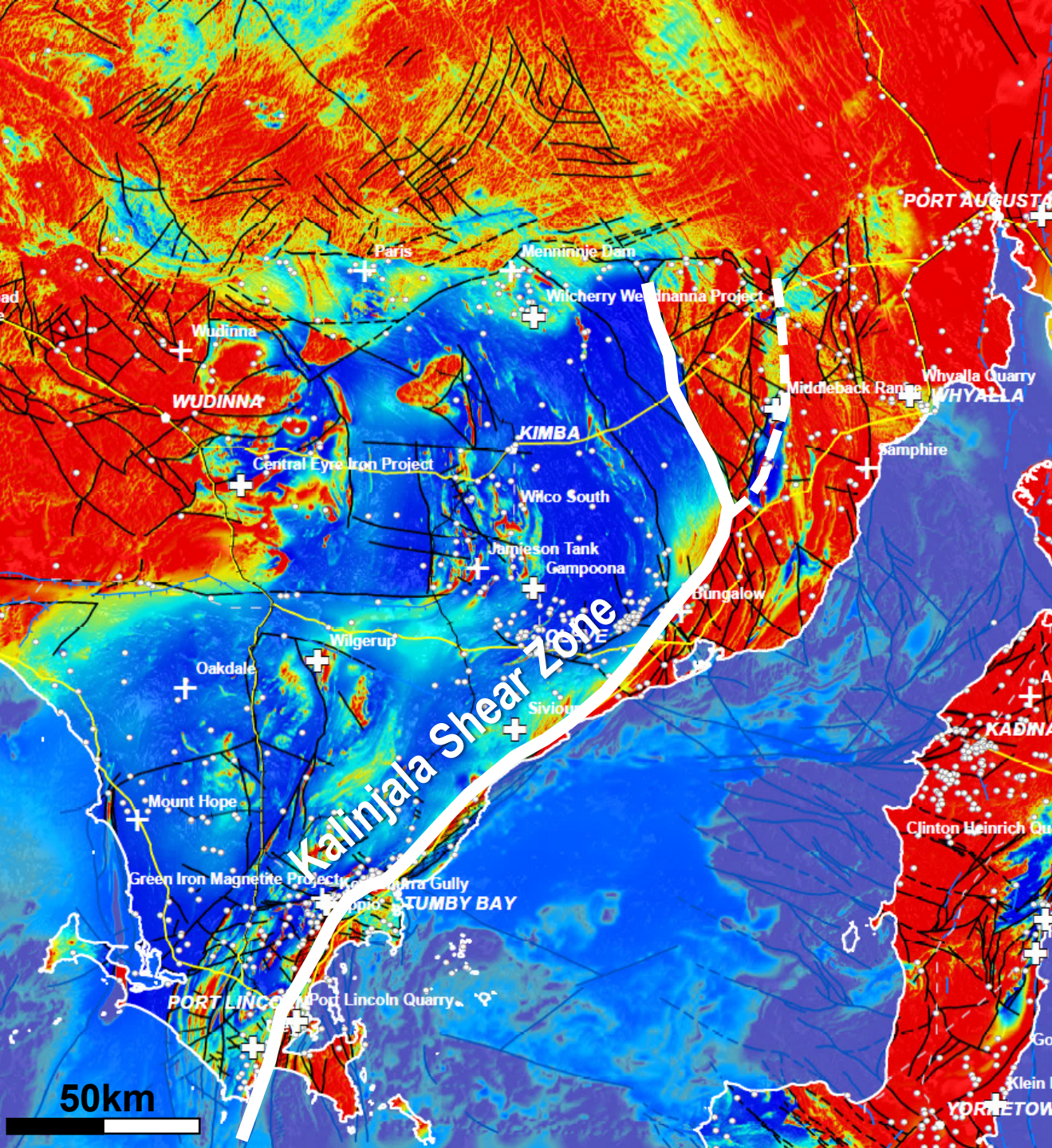
Trans-lithospheric structures – IOCG prospectivity



Eyre Peninsula Geology

- Multiple phases of faulting, folding, and metalliferous intrusions critical for sulphide mobilisation and emplacement.
- Granite intrusions that host Olympic Dam and Carrapateena (*Hiltaba and Donington suites*) are present.
- Kalinjala Shear Zone is a known crustal-scale, mantle-tapping structure.

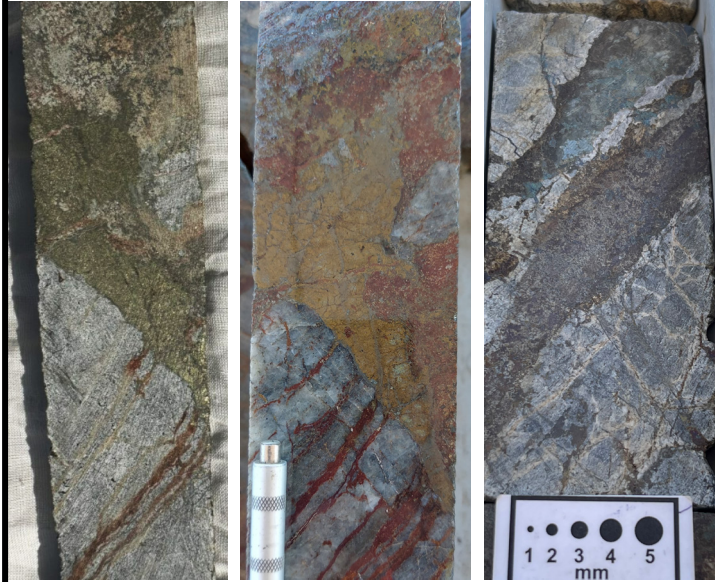




Kalinjala Shear Zone

- **Influence of fluids and metamorphism?**
 - Does Kalinjala SZ have direct input on economic potential?
- **Graphite**
 - Role of Kalinjala SZ on mineralisation?
 - What determines flake size?
 - What is origin of carbon and its control?
- **Hydrogen potential**
 - Role of serpentinization and Kalinjala SZ?
- **Base metals (Cu-Pb-Zn)**
 - Origin of massive sulphide horizon below BIF?
 - Relation to Minbrie occurrence?
 - Implications for possible mineral system and deposit models?

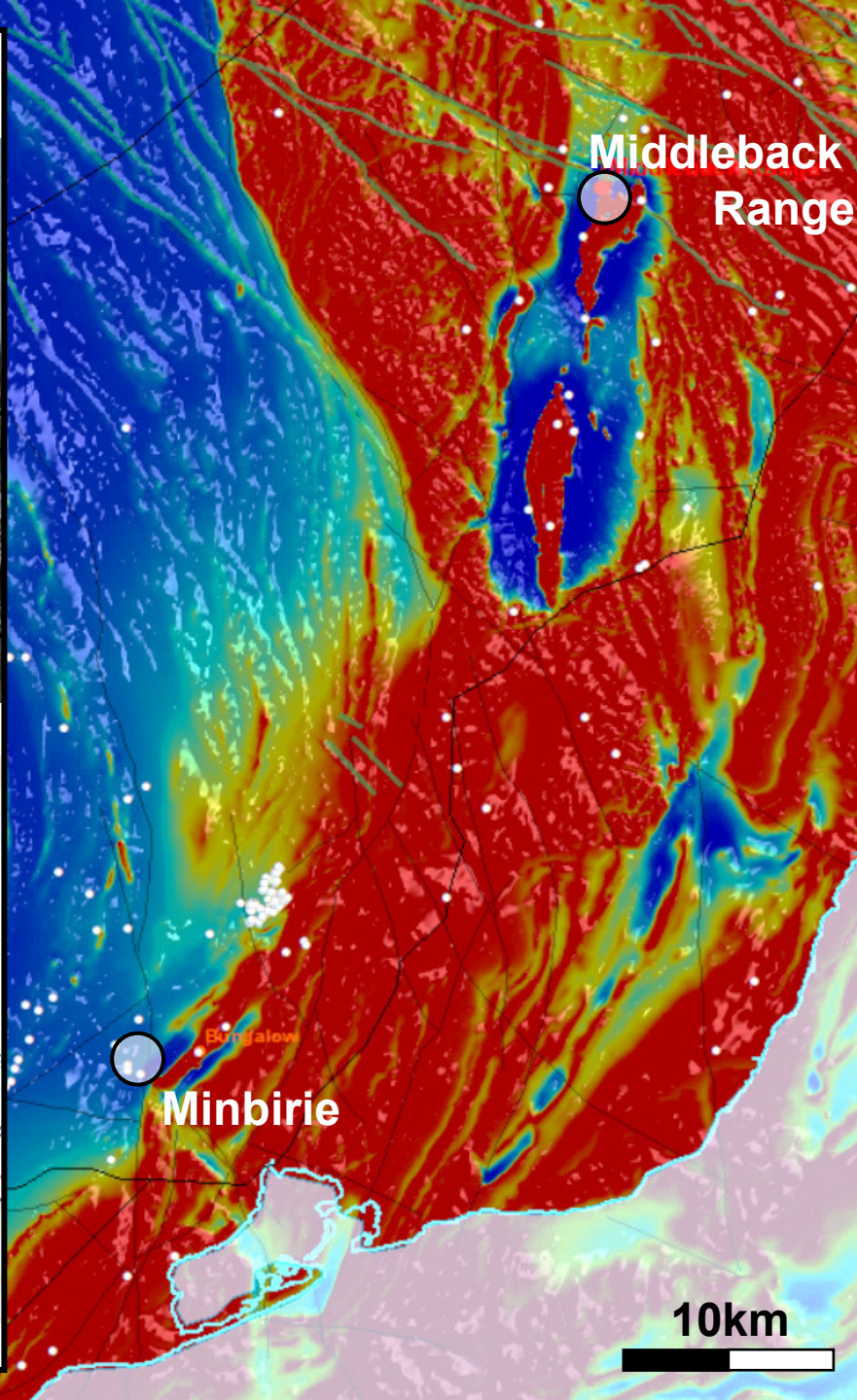
central eastern Eyre Peninsula:
Minbrie Cu-Pb-Zn mineralisation



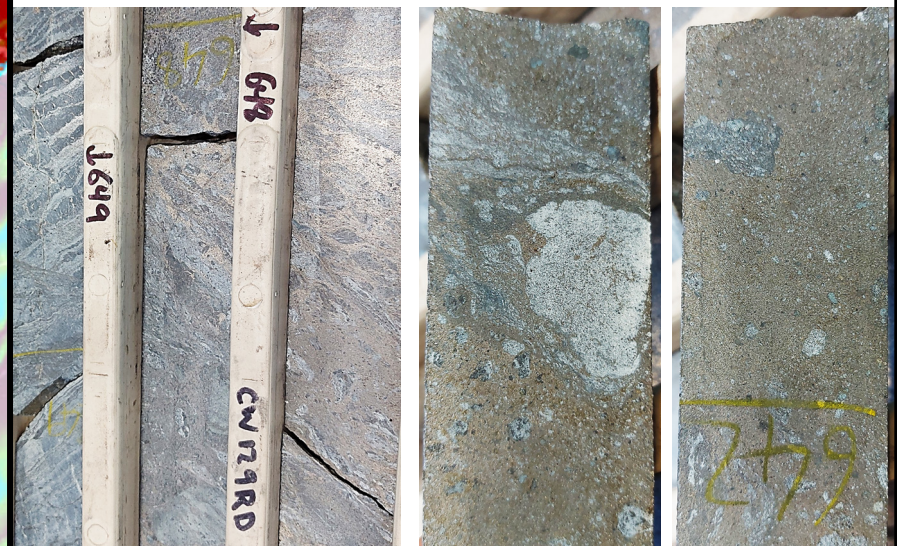
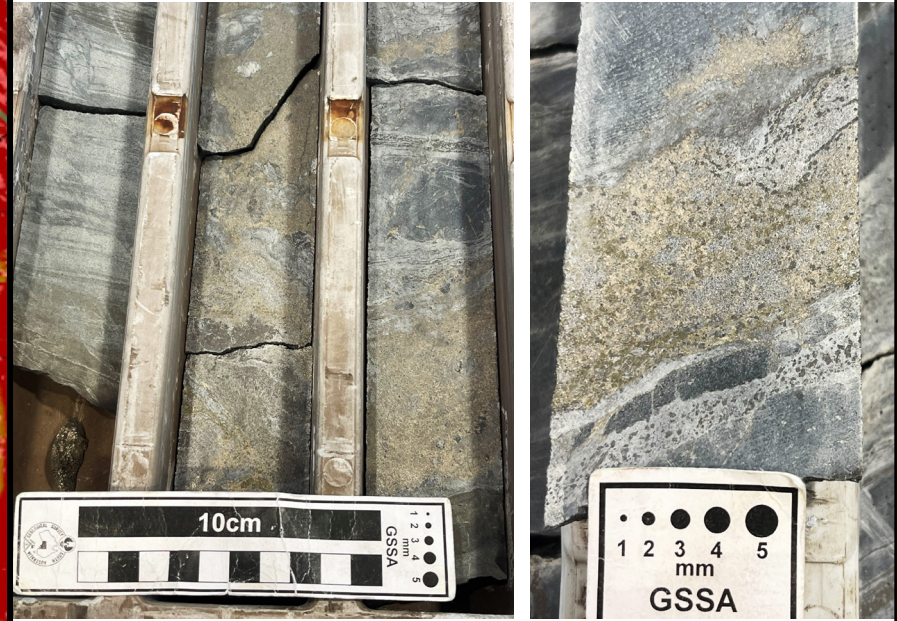
Dh BUDD192*



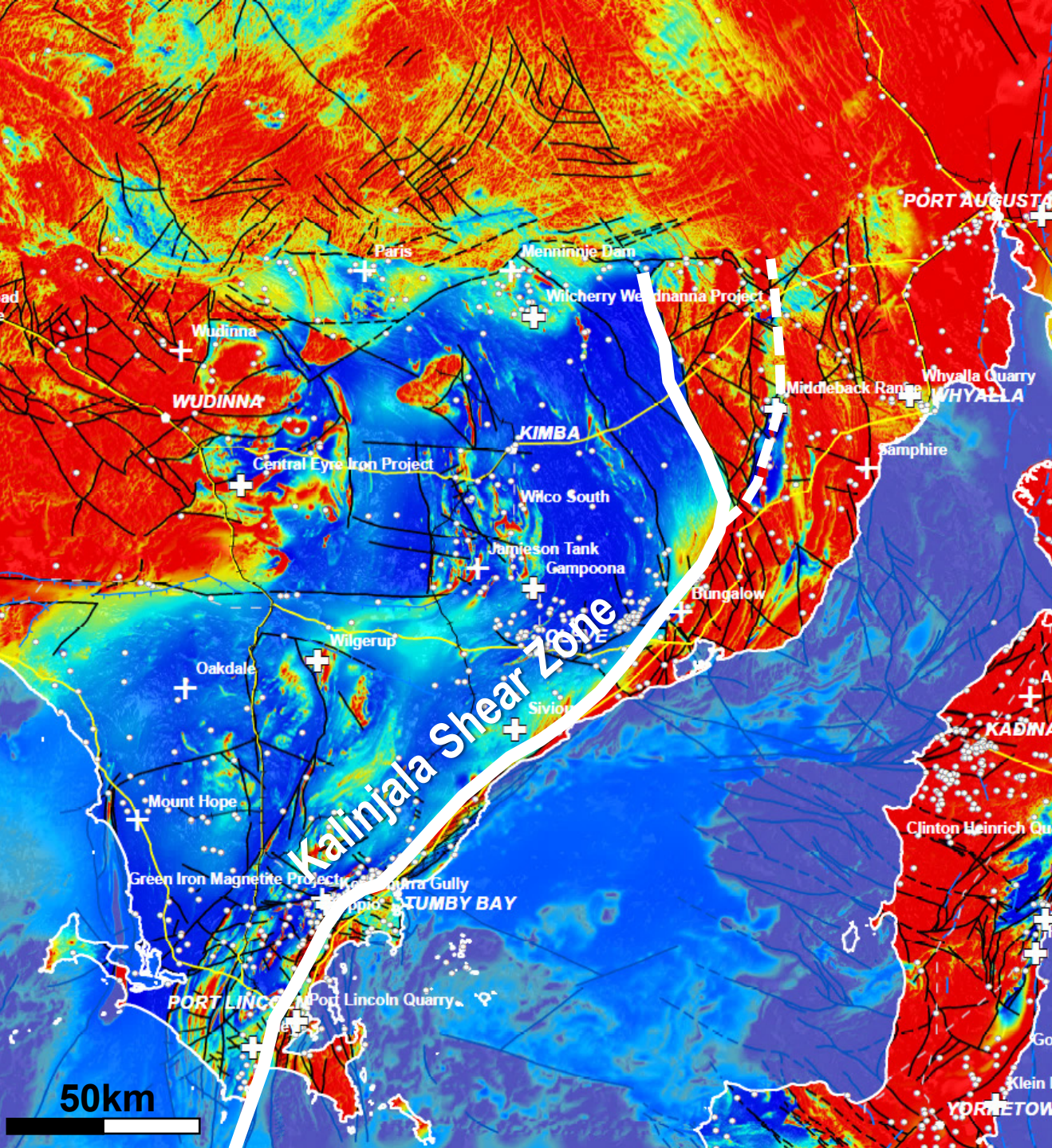
Dh BURCD 020A* **courtesy by Lincoln Minerals*



Middleback Range:
sulphide unit with pyrrhotite breccia
below Middleback Jaspilite



Dh CW129RD



Other opportunities:

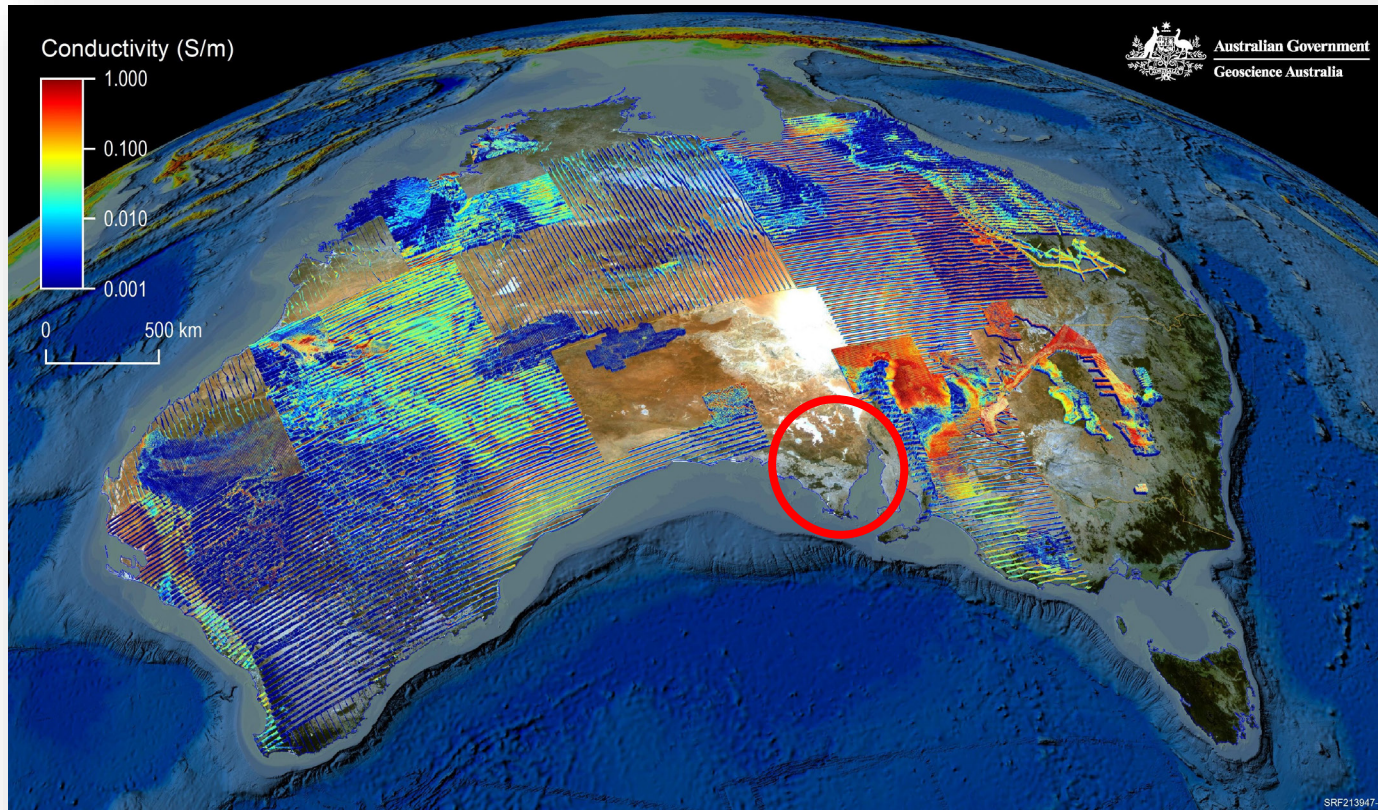
- stratigraphic re-evaluation
- paleodrainage mapping and paleovalley delineation
- Poldia Basin architecture
- evaluating nickel potential
- stratigraphic linkages for gold systems
- depth to basement – weathering thickness
- hydrogeological studies to identify groundwater resources

This requires:

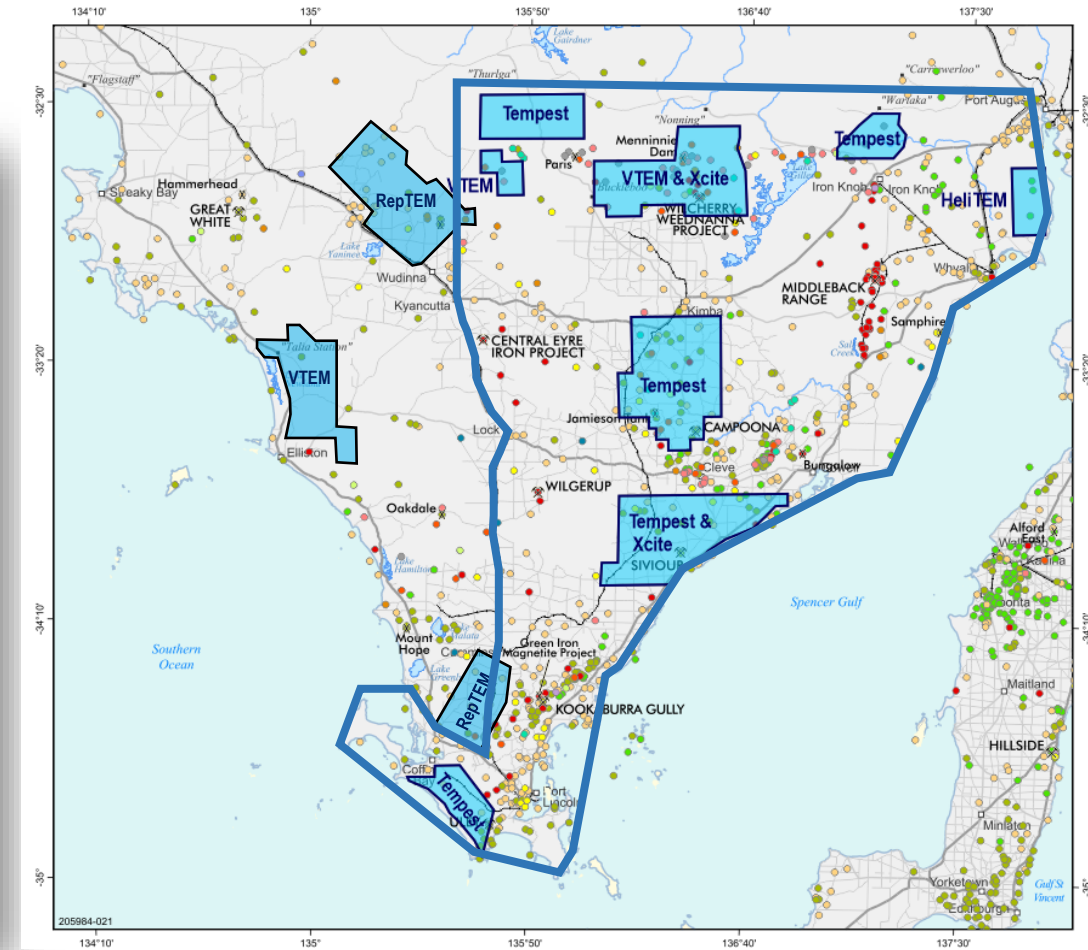
- improved geophysical coverage
- legacy data audit & review
- historic drill core scanning
- new geophysical interpretation
- geological and structural mapping
- geochronology and isotope studies
- selected detailed deposits studies
- and stratigraphic drilling

New geophysics

Airborne Electromagnetics AEM



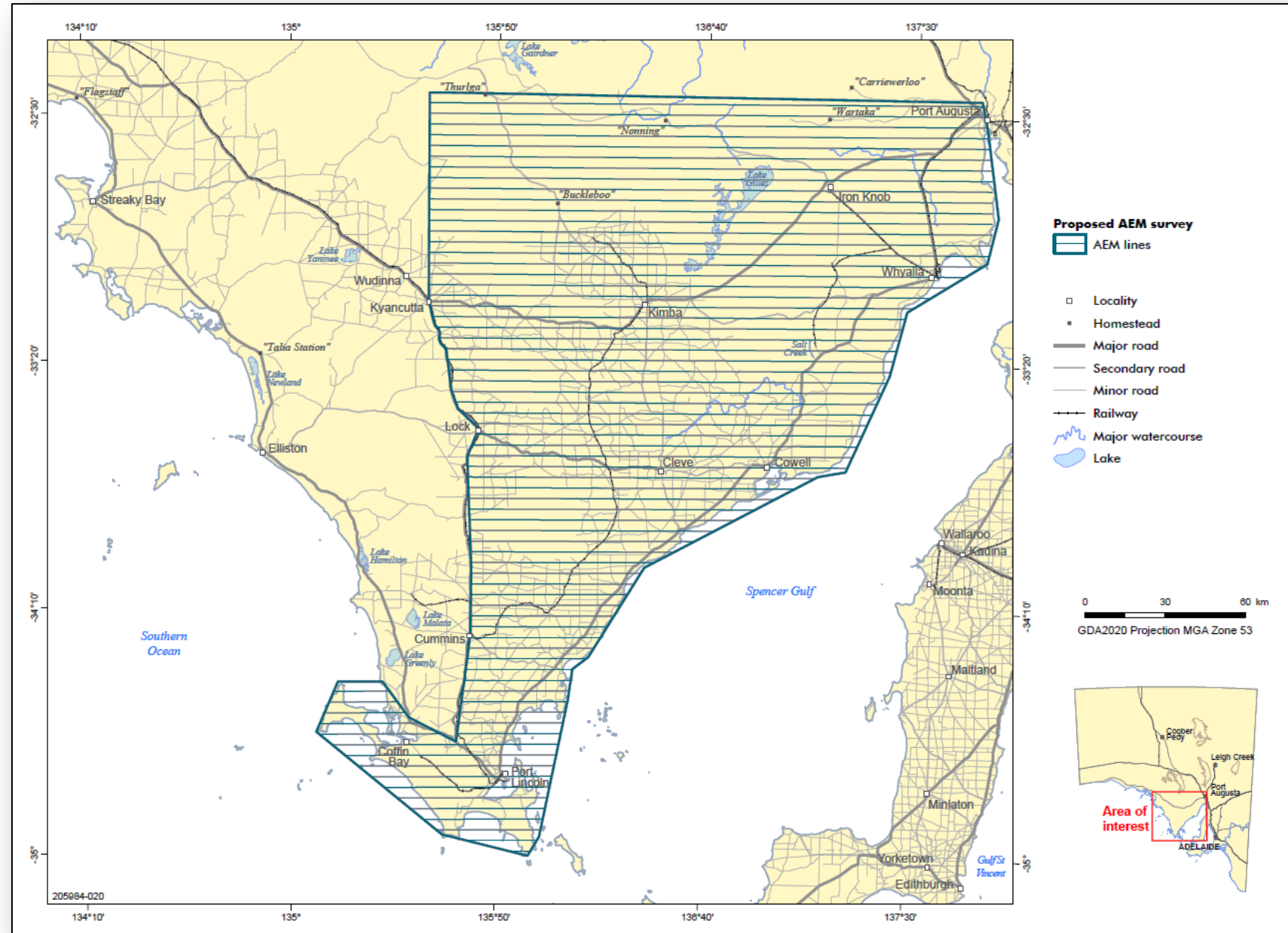
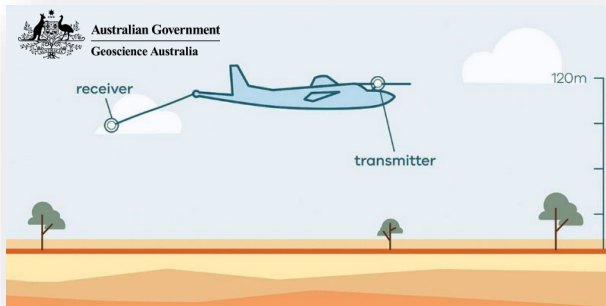
AusAEM coverage as of November 2025



current AEM coverage eastern Eyre Peninsula

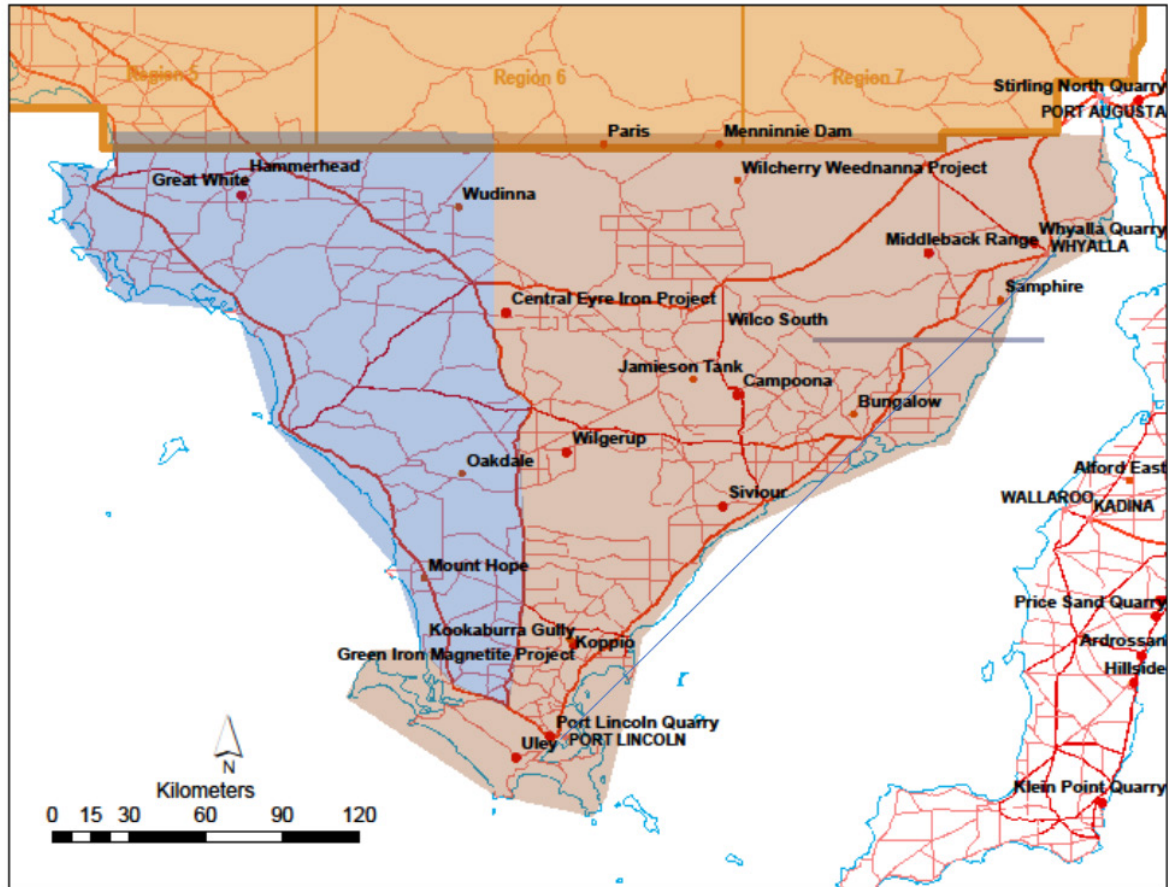
Eastern Eyre Peninsula AEM

- funded by GSSA's Critical Minerals South Australia project
- Geoscience Australia (GA) will procure and acquire the AEM survey on behalf of GSSA, with in-kind support provided by GA across the project.
- tender currently in process
- acquisition Q2/2026

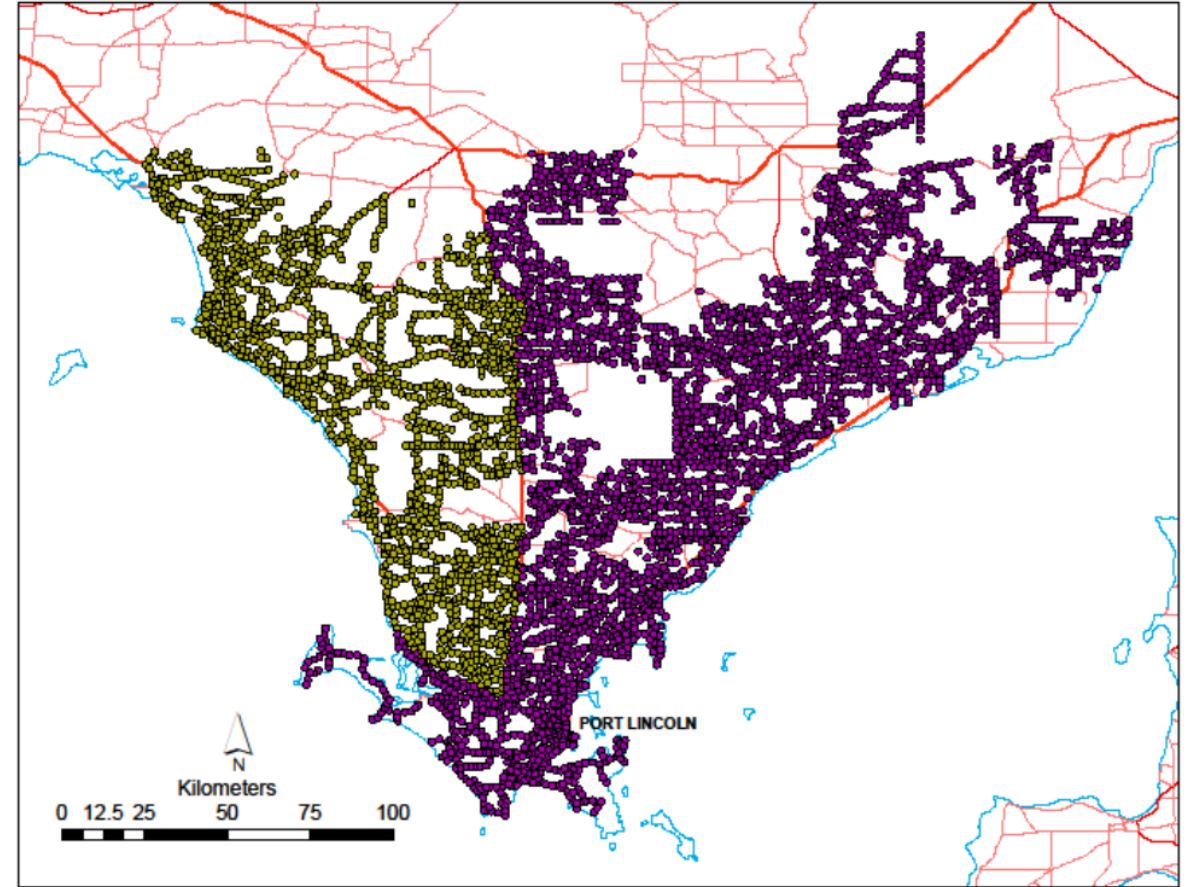


Future geophysics *(funding dependent)*

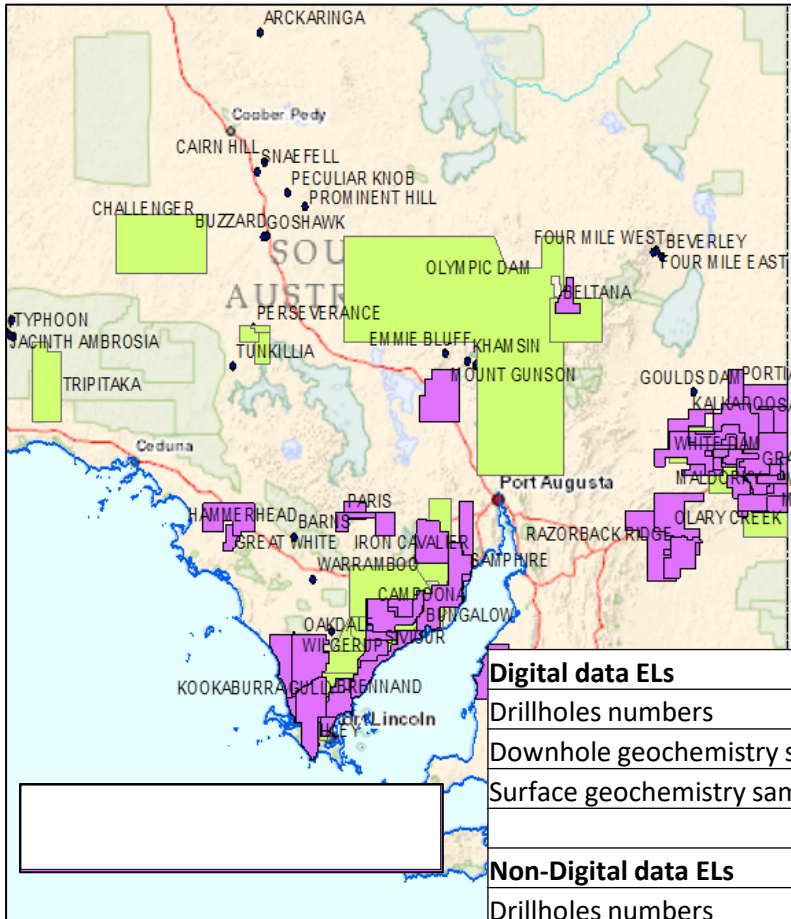
Airborne magnetics/radiometry
(with flightlines wider than 200m)



Ground gravity infill 1 km spacing

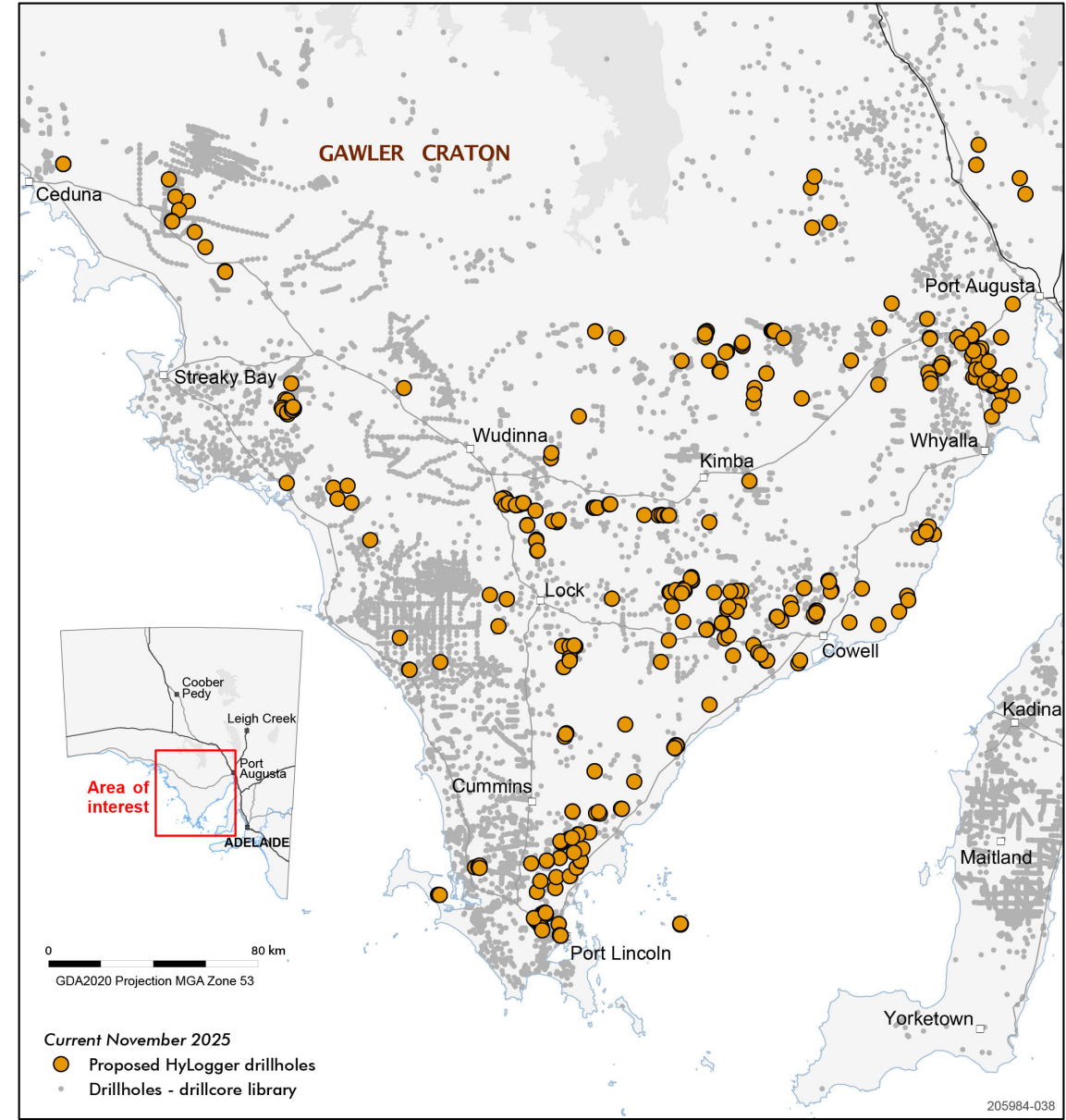


Legacy data & planned drill core scanning with HyLogger™



Stoian 2023

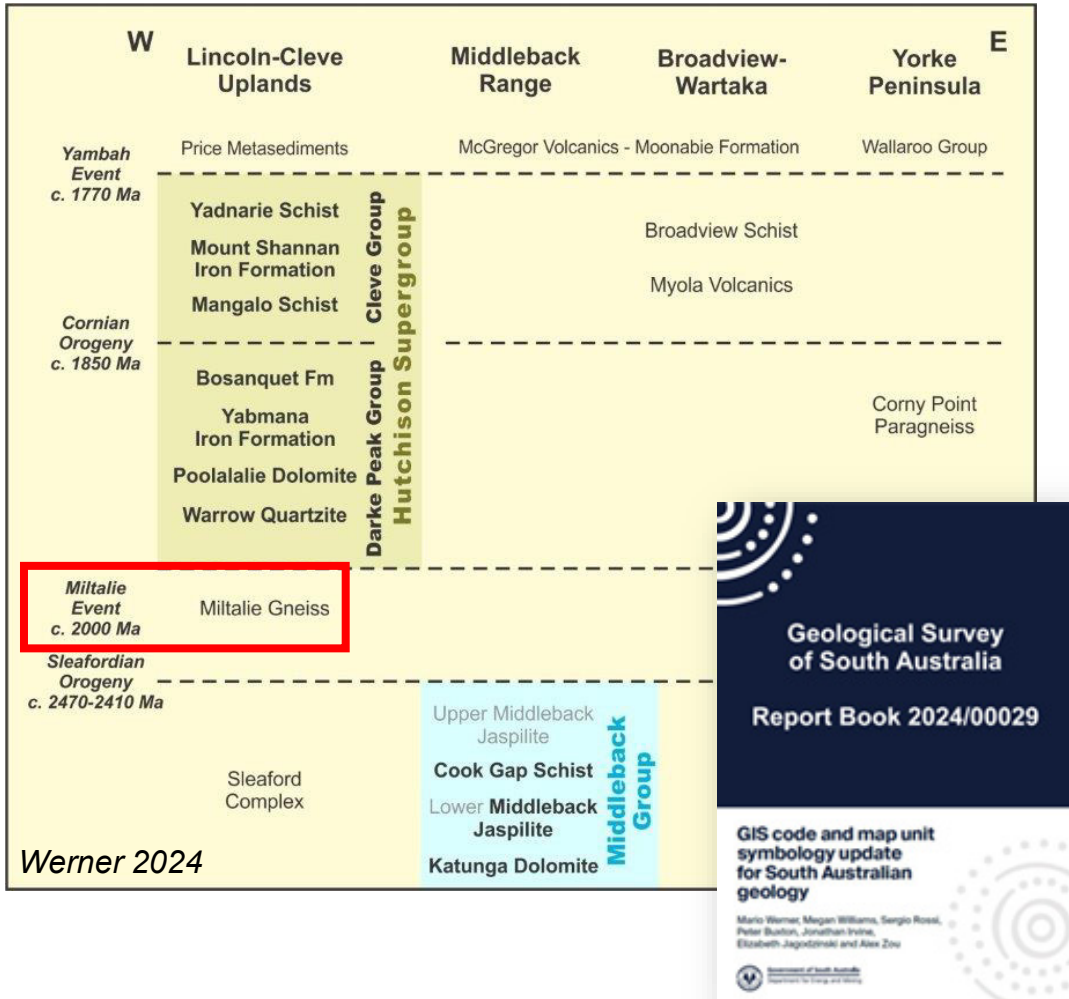
Digital data ELs	In database	To capture
Drillholes numbers	41,569	5,206
Downhole geochemistry samples	1,586,047	86,753
Surface geochemistry samples	49,395	33,636
Non-Digital data ELs		
Drillholes numbers	22,414	16,034
Downhole geochemistry samples	189,333	152,894
Surface geochemistry samples	48,947	82,531
Handwritten data SML		
Drillholes numbers	1,580	15,672
Downhole geochemistry samples	6,846	56,769
Surface geochemistry samples	3,978	29,202



Caruso 2025

New geochronology

Miltalie Gneiss and Miltalie Event: intrusive granitic magmatism

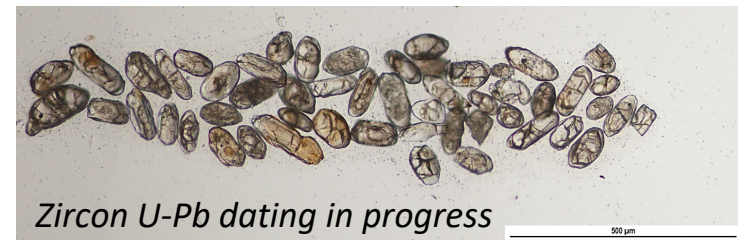


Dh MILTALIE MINE DDH 4

Are associated metasediments potentially part of Miltalie Event?



sillimanite-bearing quartzo-feldspathic gneiss



Zircon U-Pb dating in progress

Brown & Werner in prep.

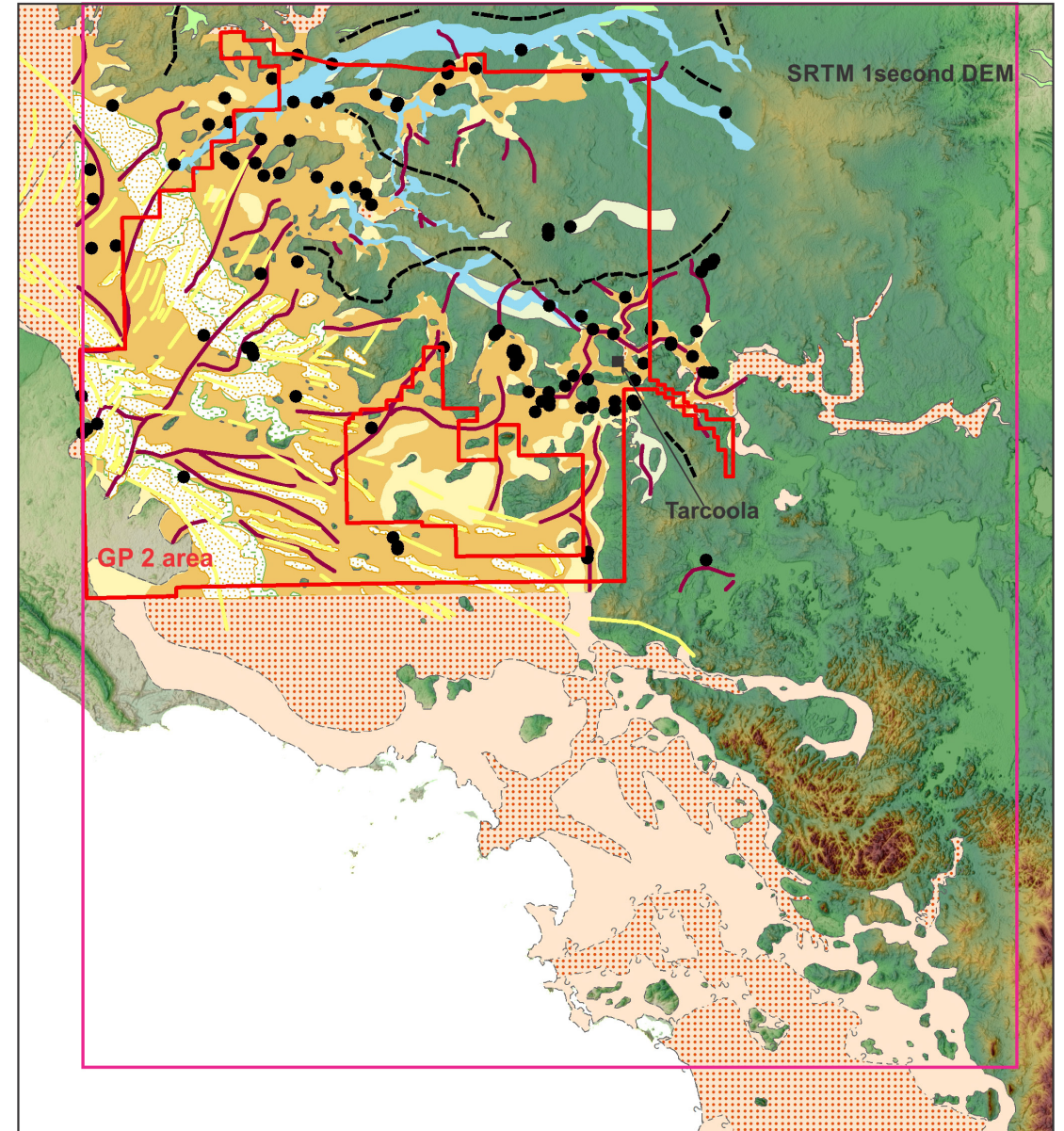
Paleodrainage mapping across Eyre Peninsula

Continue paleodrainage mapping from GSSA's GP2 and GP2 Extension projects south- and eastwards across Eyre Peninsula with focus on:

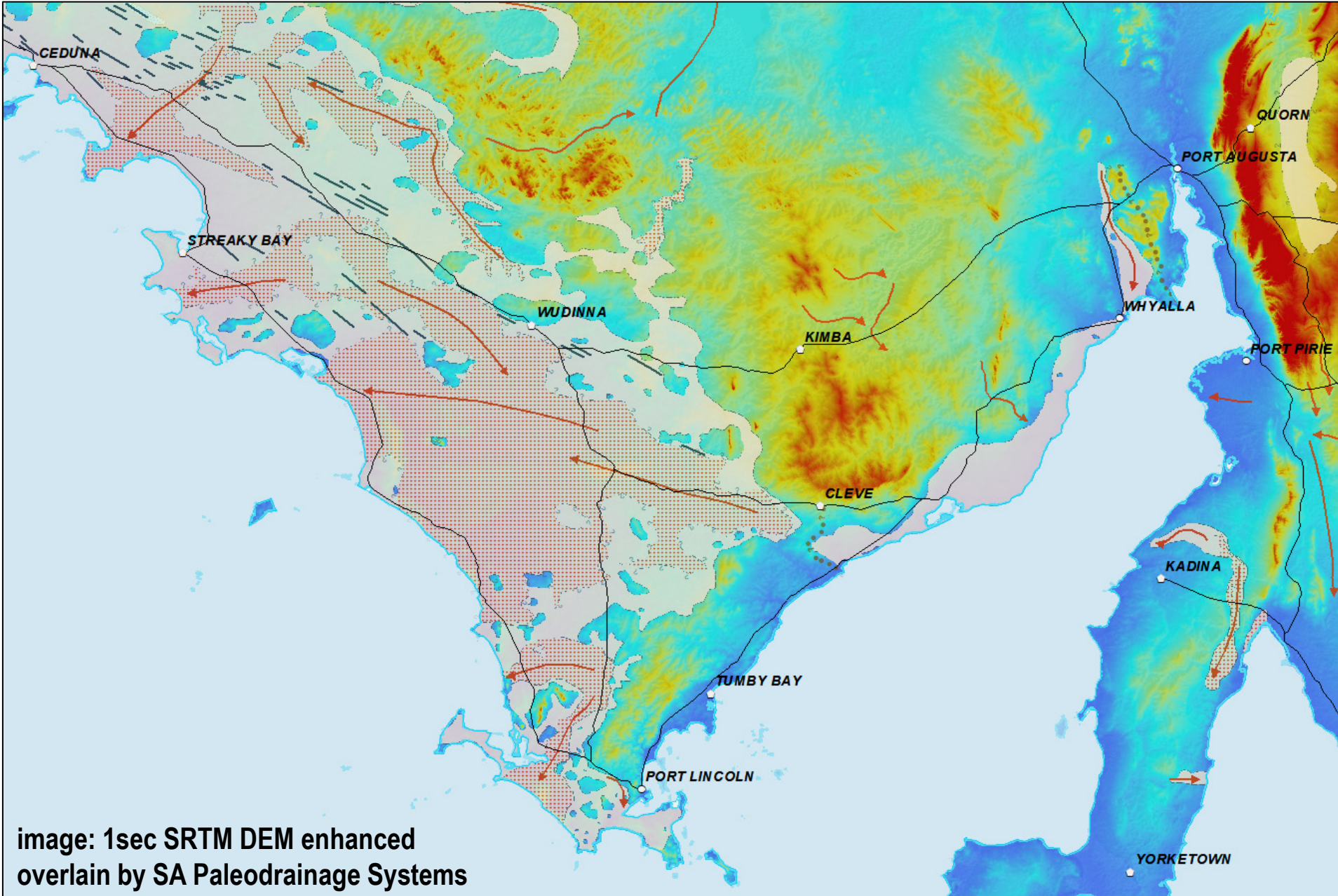
- higher resolution mapping including geometries, sedimentary characteristics, depositional environments;
- reconstruct paleo-shorelines and -valleys, paleo-topography, basin architecture, depth to basement;
- review and update basin stratigraphy.

→ new exploration opportunities for:

U, HMS, REE and groundwater



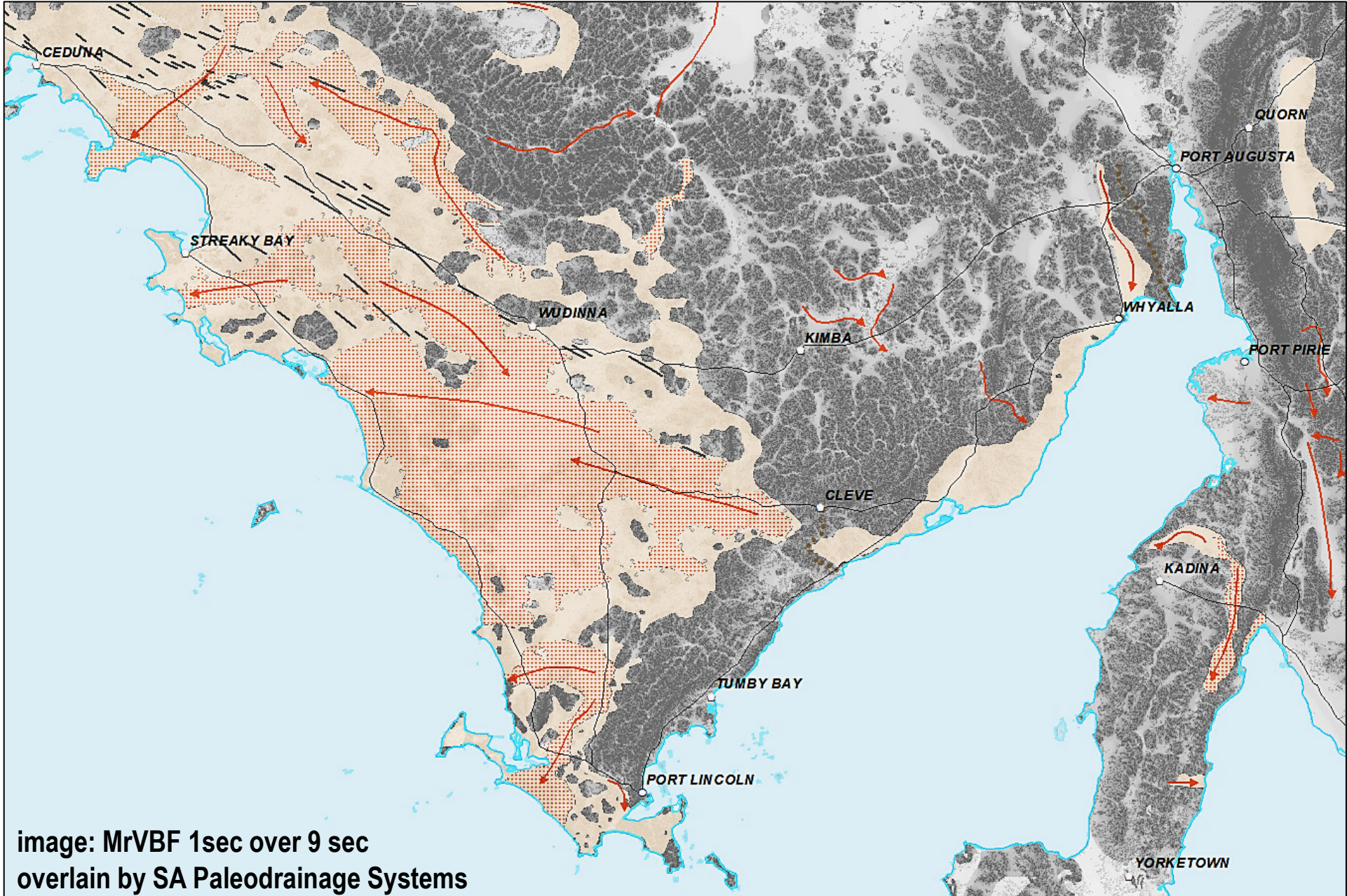
Paleodrainage mapping across Eyre Peninsula



Paleodrainage mapping across Eyre Peninsula

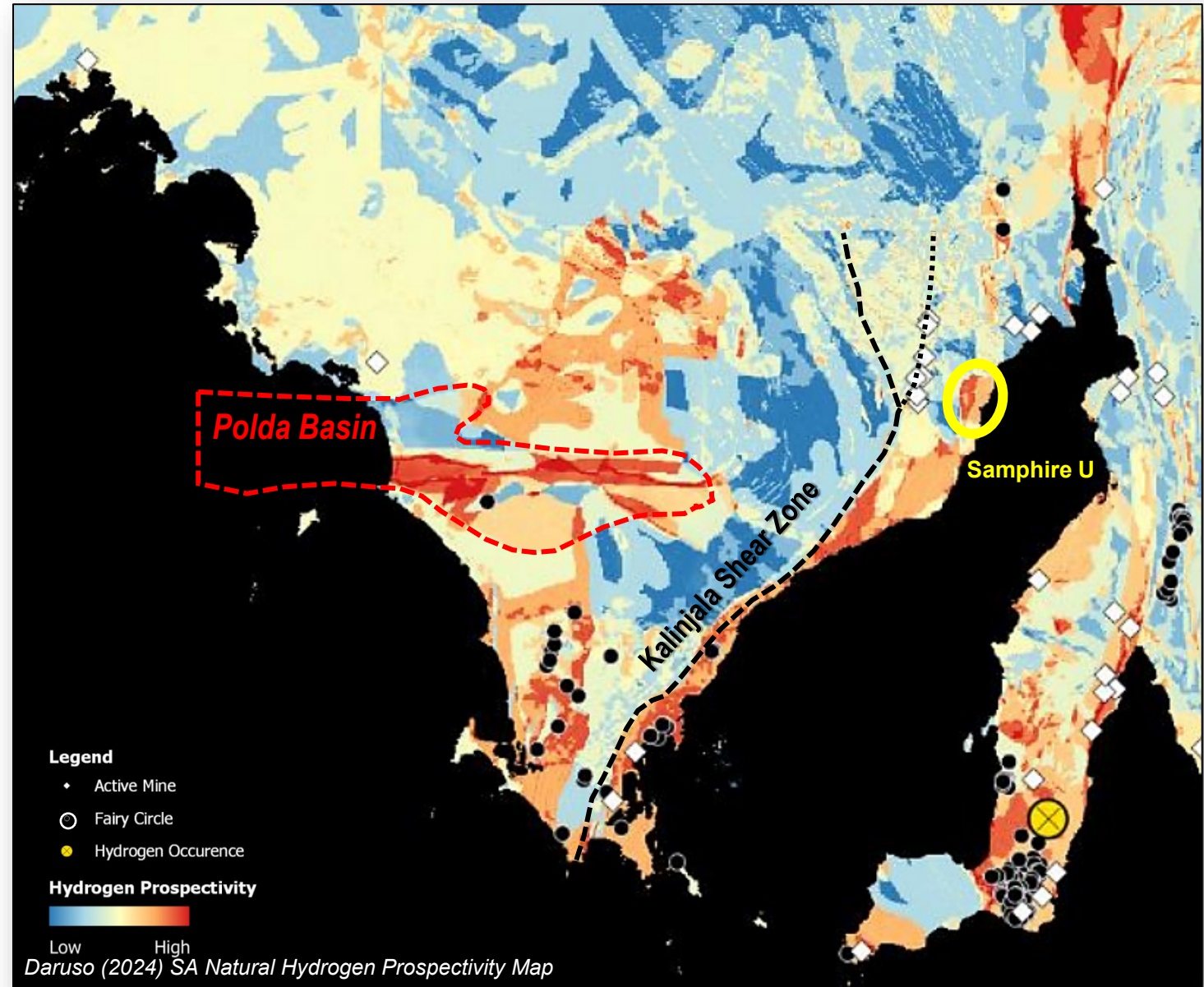


Paleodrainage mapping across Eyre Peninsula



Hydrogen Prospectivity Eyre Peninsula

- **Source:** radiogenic iron-rich basement, degassing mantle
→ e.g., *Sleaford Complex, Middleback Group, Hiltaba Suite*
- **Architecture:** mantle tapping structures with active seismicity, in an appropriate orientation for the current stress regime; above lithospheric gradient; high-heat producing crust
→ e.g., *Kalinjala SZ*
- **Trap:** sedimentary cover with groundwater
→ *Polda – Eucla – Pirie basins*





Sleaford Bay, Eyre Peninsula

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Acknowledgement of Country

As guests here on Kurna land, the Department for Energy and Mining (DEM) acknowledges everything this department does impacts on Aboriginal country, the sea, the sky, its people, and the spiritual and cultural connections which have existed since the first sunrise. Our responsibility is to share our collective knowledge, recognise a difficult history, respect the relationships made over time, and create a stronger future. We are ready to walk, learn and work together.



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