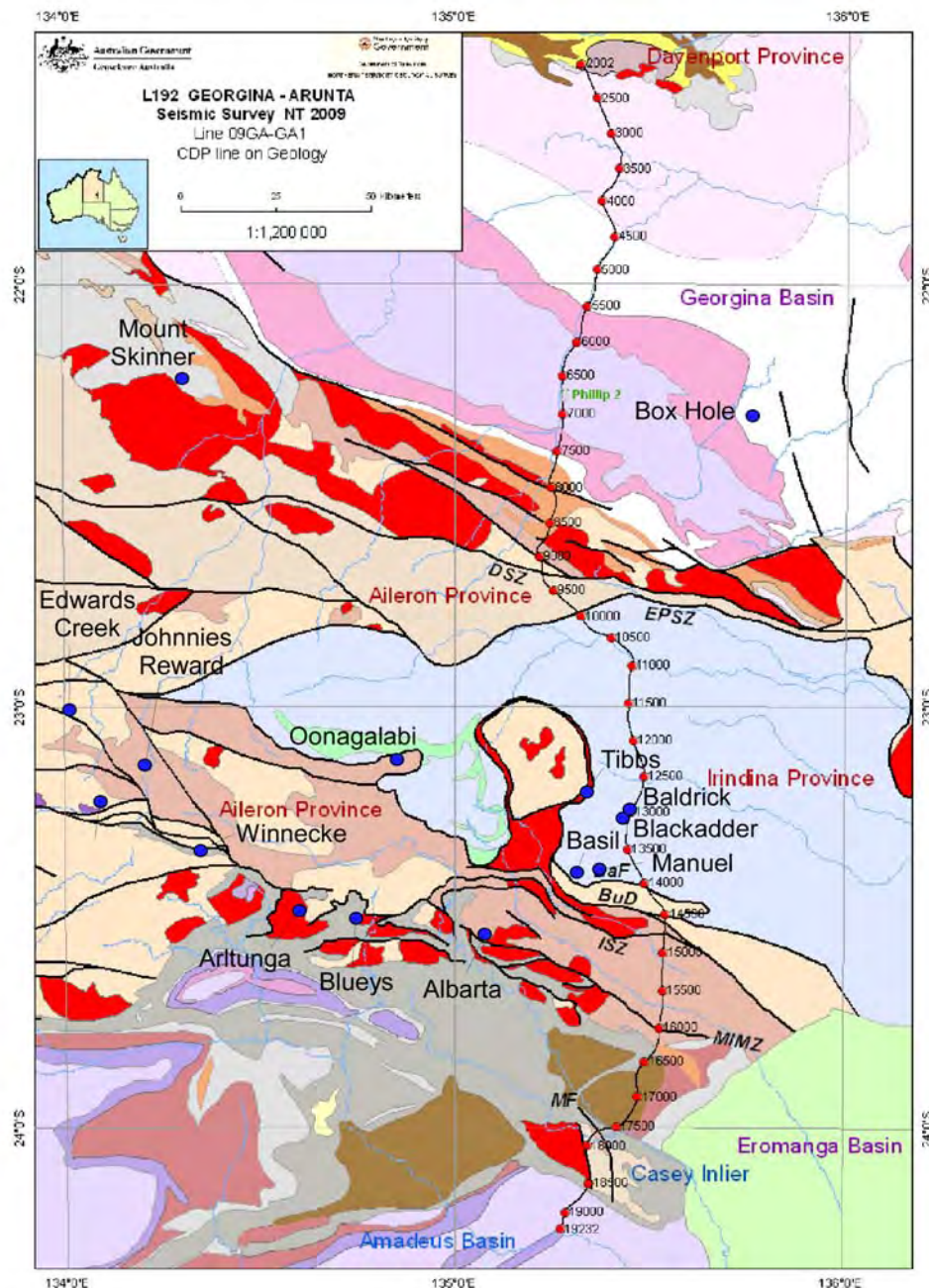




Implications of the Georgina-Arunta seismic survey to energy and mineral systems

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Alison Kirkby¹, Ed Gerner¹, Dorothy Close², Richard
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Mineral systems related to the Willowra Suture

Mineral systems related to early history of Centralian basin system

Mineral systems related to inversion of Irindina Basin

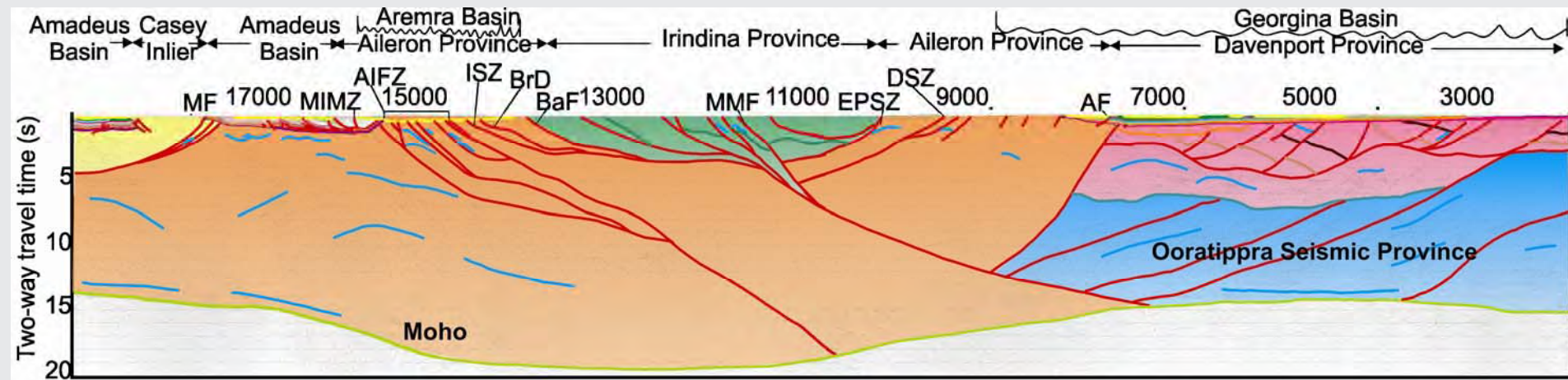
- Mississippi Valley-type Zn-Pb-Ag
- Lode gold

Basin-related uranium plays

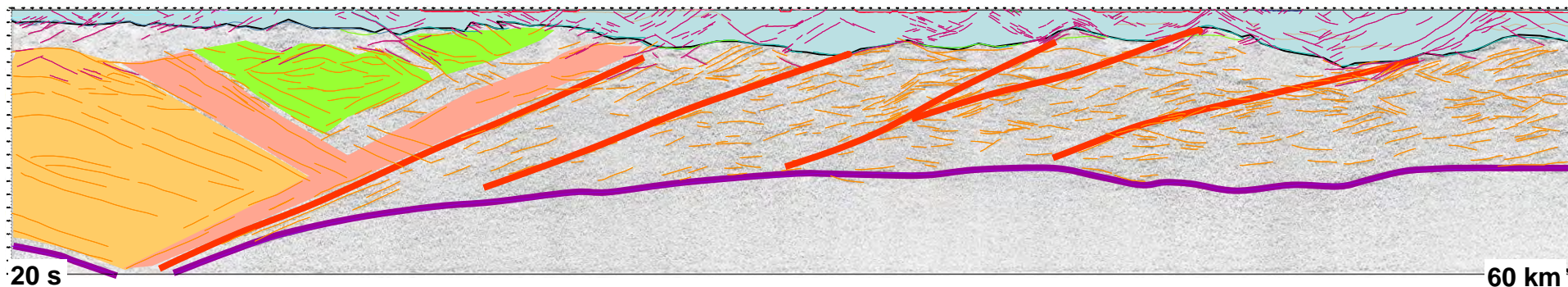
Geothermal potential, southeast Georgina Basin – subject of modeling in future

Willowra Suture – seismic evidence

09GA-GA1



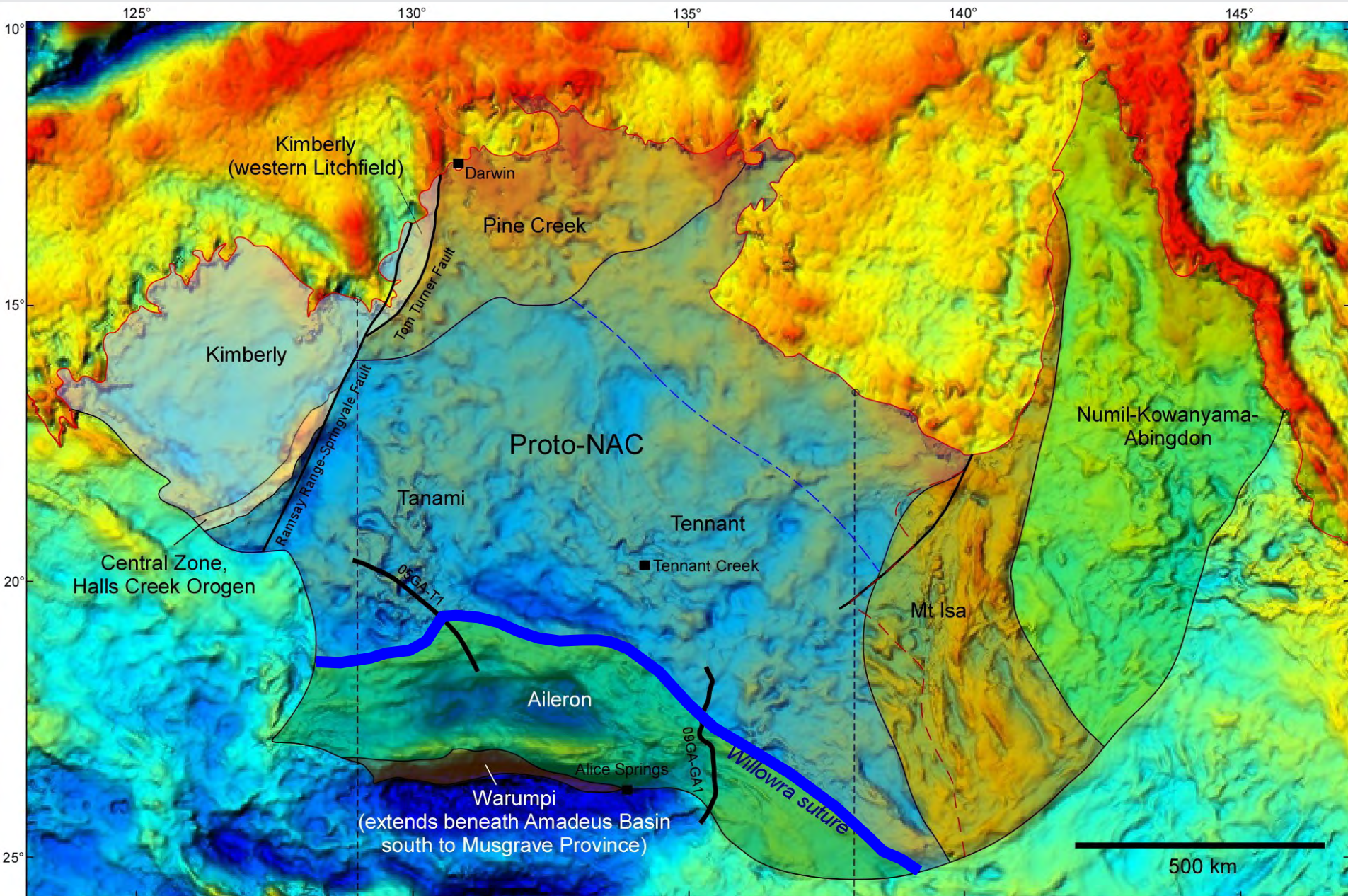
05GA-T1



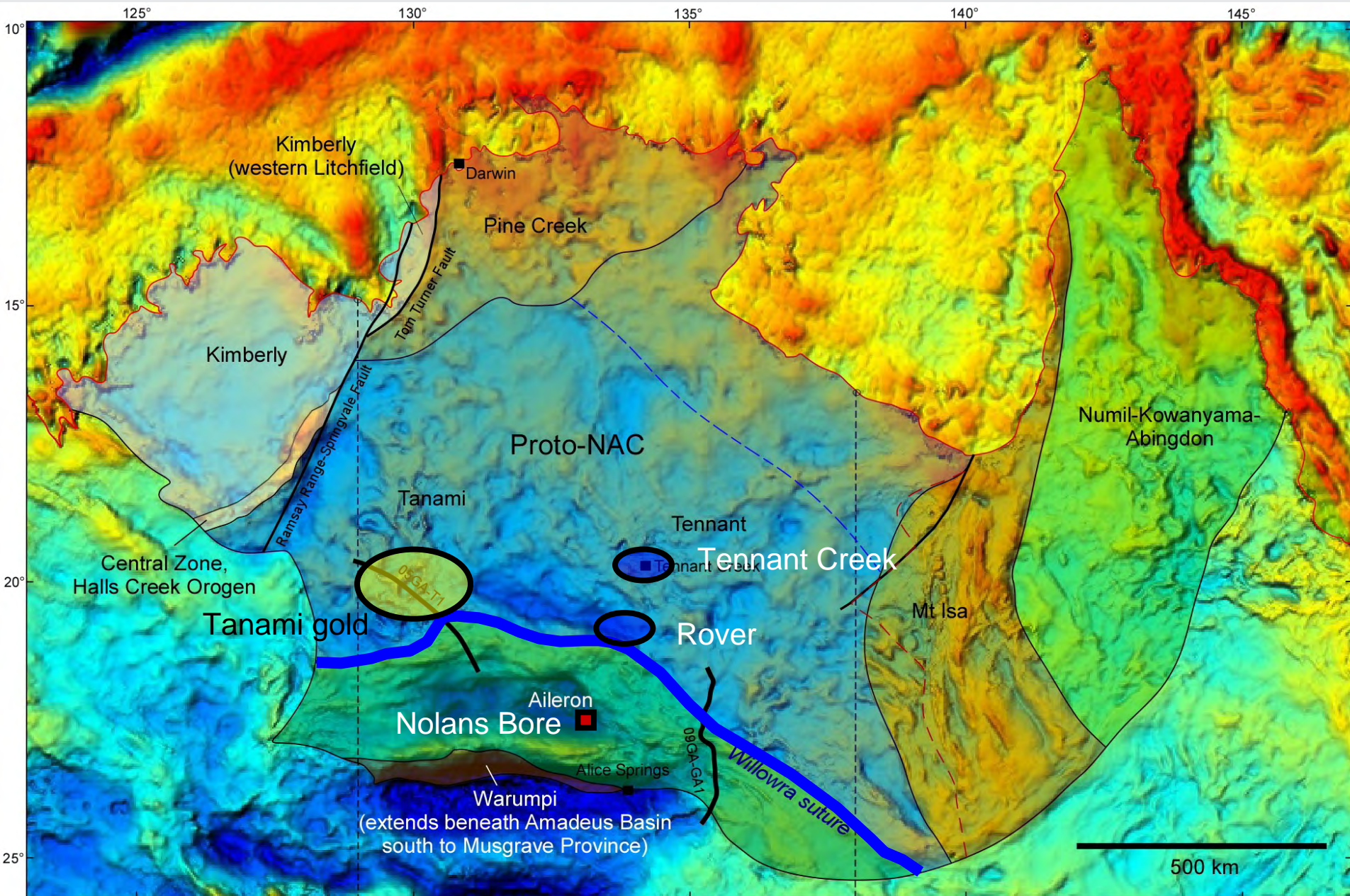
60 km

N

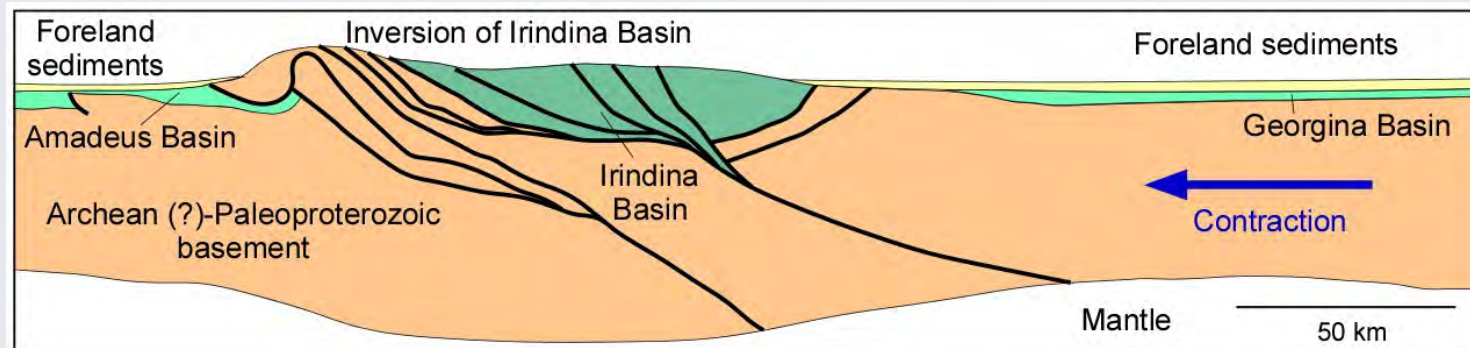
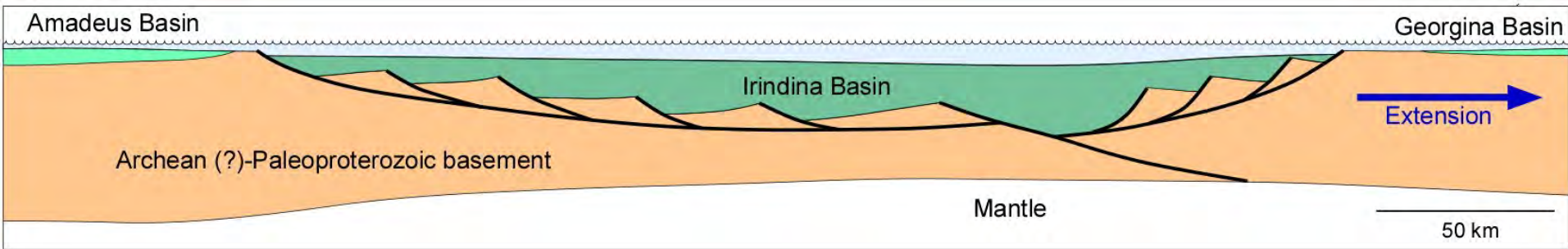
Willowra Suture – surface extent



Willowra Suture – spatially-related mineral provinces



Evolution of Centralian basins (with emphasis on the Irindina basin)



Mineral system plays related to the early history of the Centralian basin system

Unconformity-related uranium
(Kintyre analogues?)

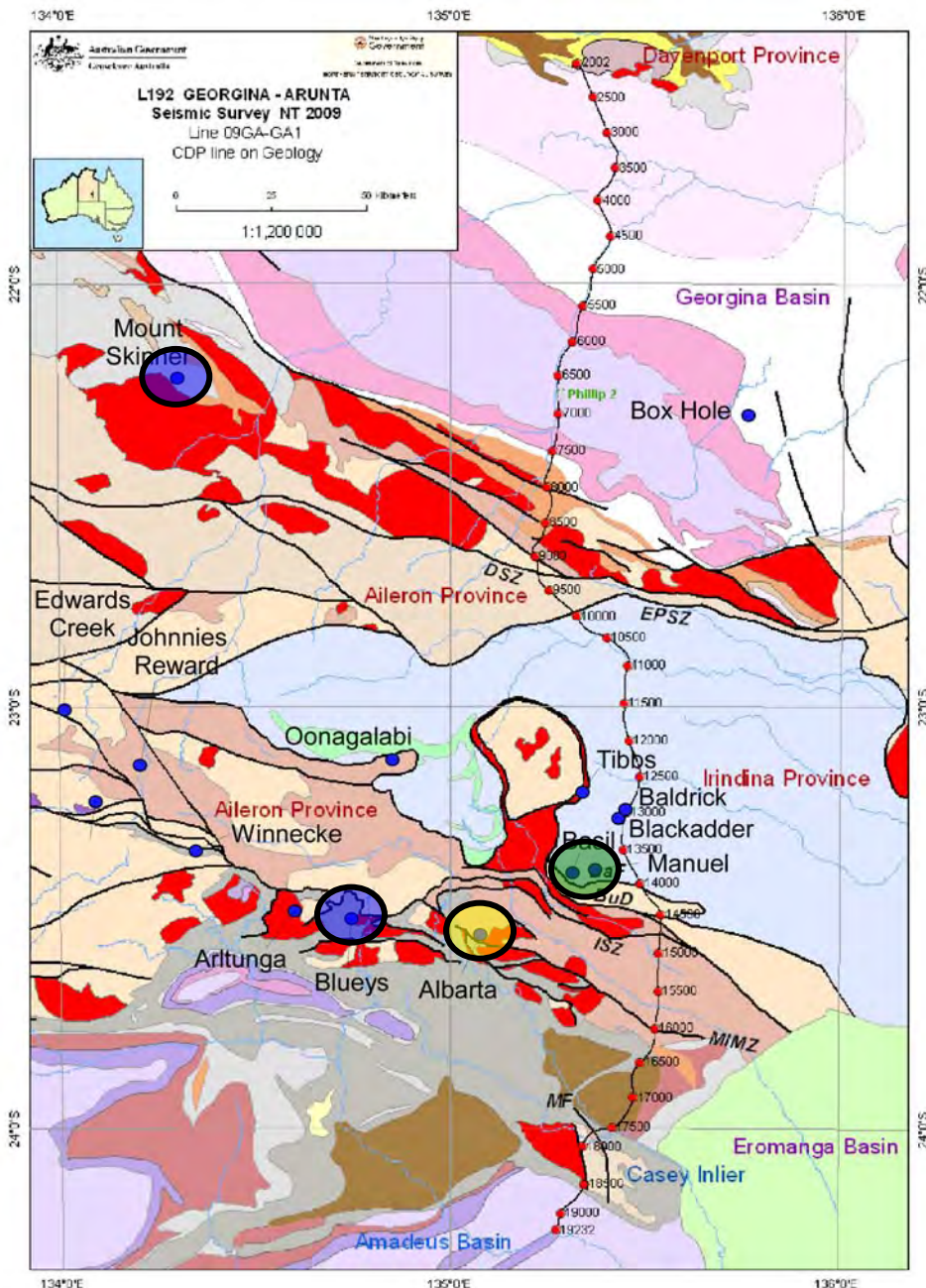
Albarta???

Sediment-hosted copper (uranium?)
(Nifty/Adelaidian analogues?)

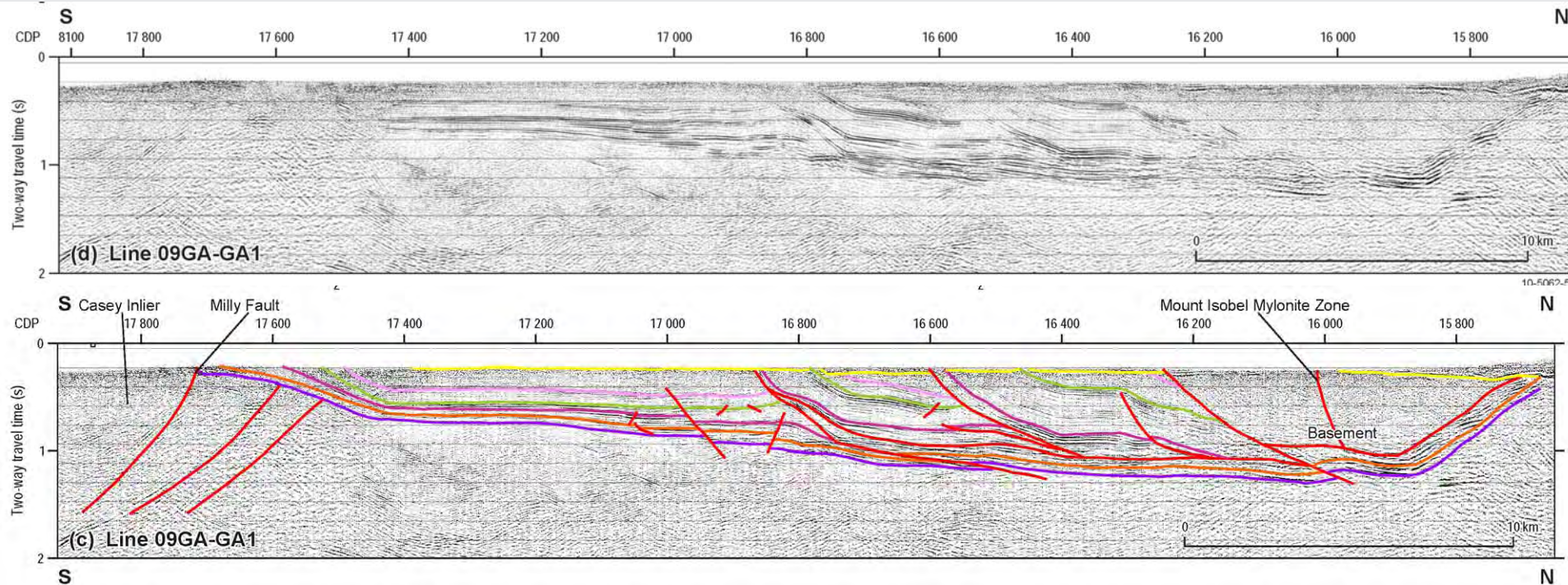
Mt Skinner, Blueys

Copper-cobalt massive sulphide

Basil, Manuel



Unconformity-related uranium potential – Amadeus Basin



~3000 m Neoproterozoic succession preserved

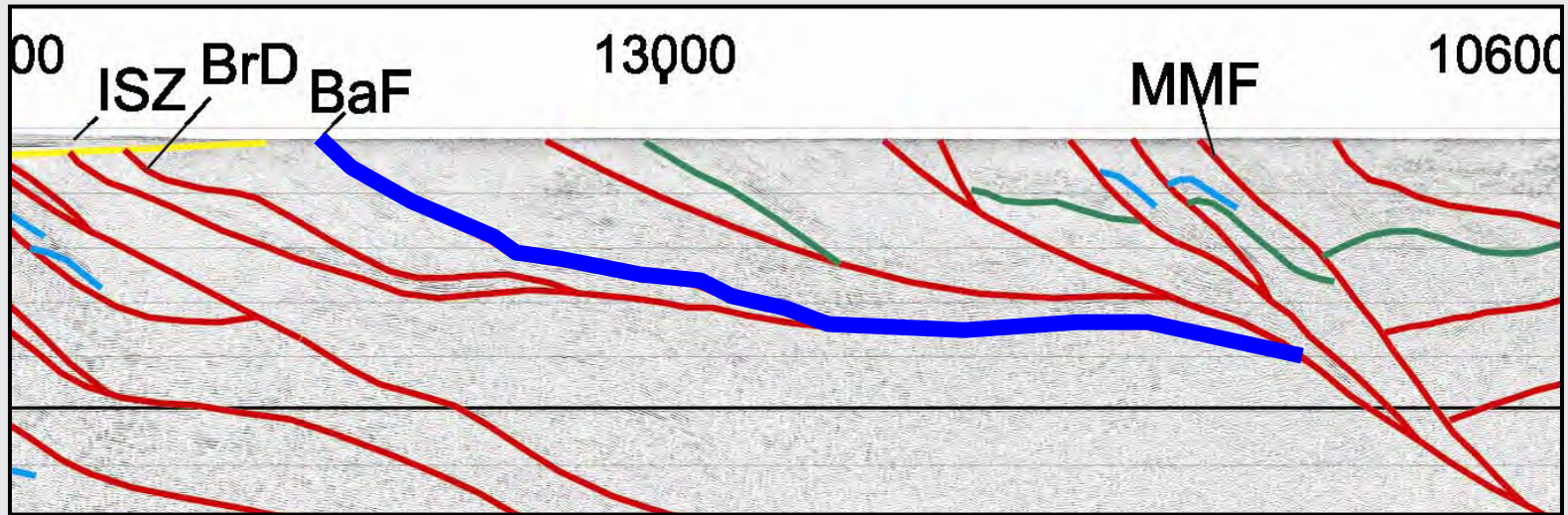
U-rich source rocks present

Structures in basement (?)

Reductants (?)

- Base Cenozoic
- Base Brewer Conglomerate
- Base Mereenie Sandstone
- Base Pertaoorta Group
- Base Pertatataka Formation
- Base Areyonga Formation
- Base Loves Creek Member
- Base Gillen Member
- Base Heavitree Formation
- Fault

Copper-cobalt potential, Irindina Basin

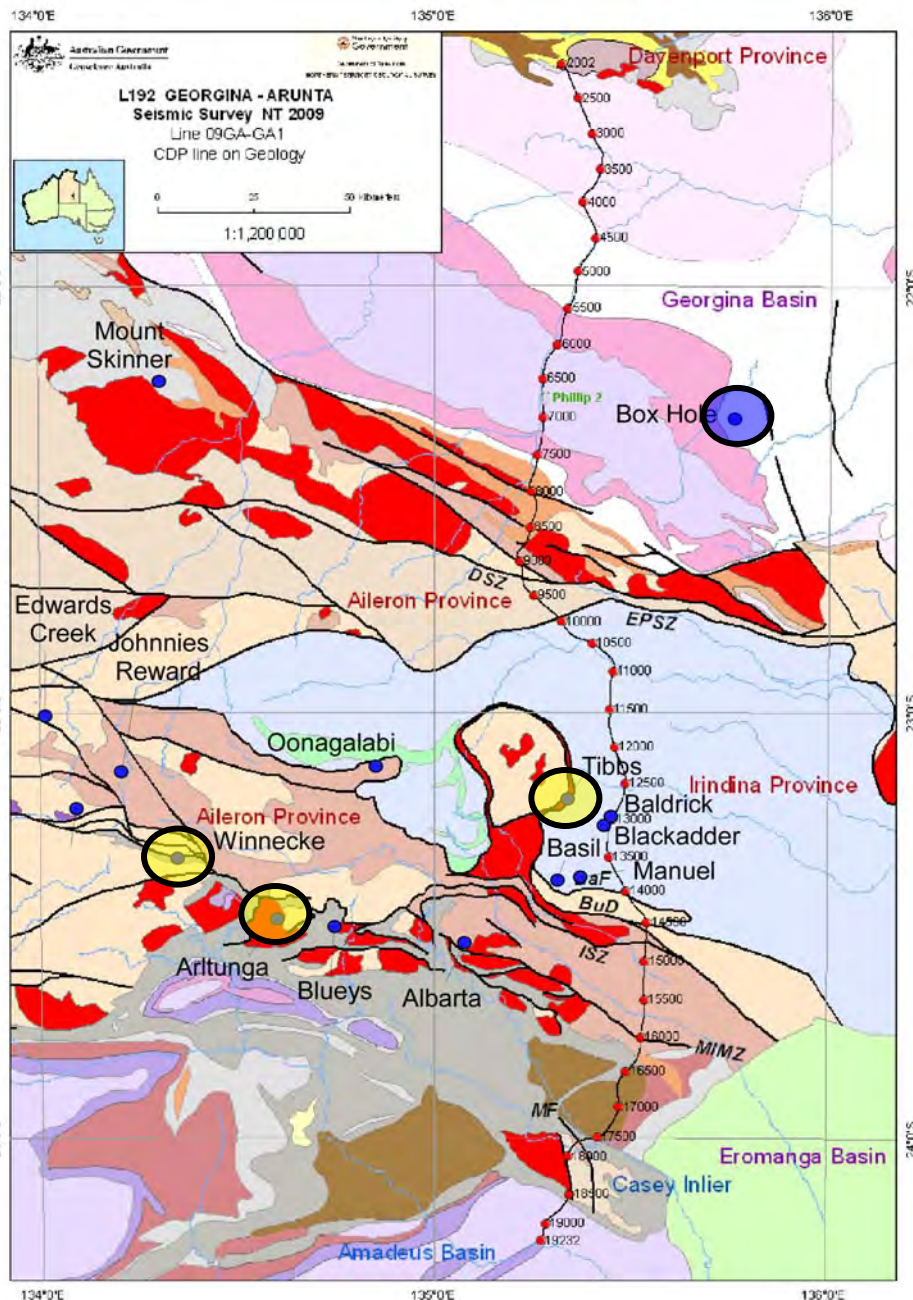


Major structures (now thrust faults) may be reactivated extensional structures (e.g. Basil Fault)

Spatial association of Cu-Co massive sulphide prospects with Basil Fault

Hangingwall to structures that define basin margins, both to north and south

Internal structures, particularly associated with juvenile Riddock Amphibolite



Mineral systems related to Alice Springs inversion of Irindina Basin

Mississippi Valley-type deposits
(~360 Ma?: Brewer Movement)

Box Hole

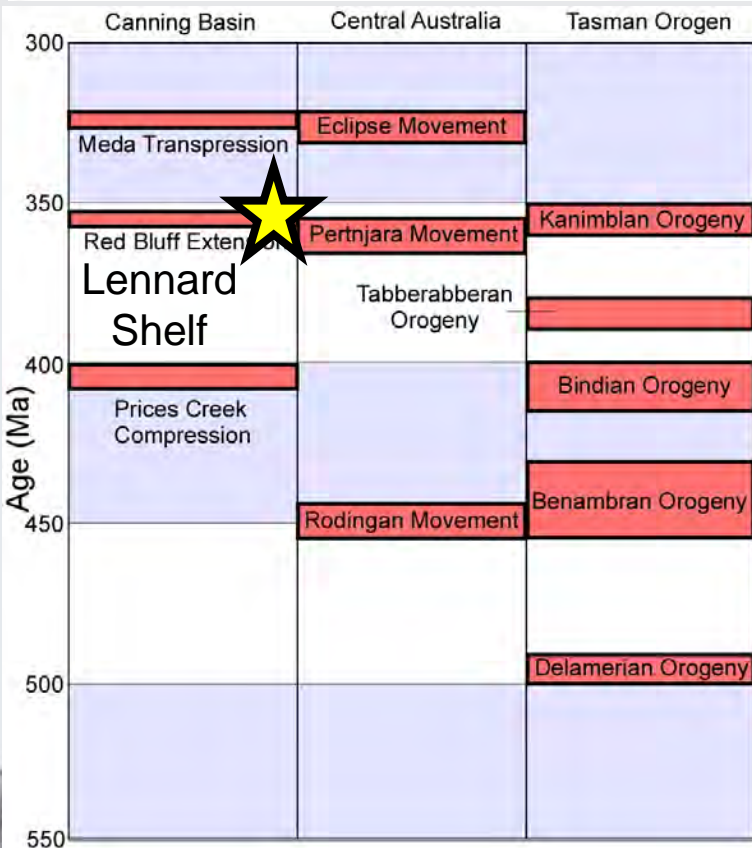
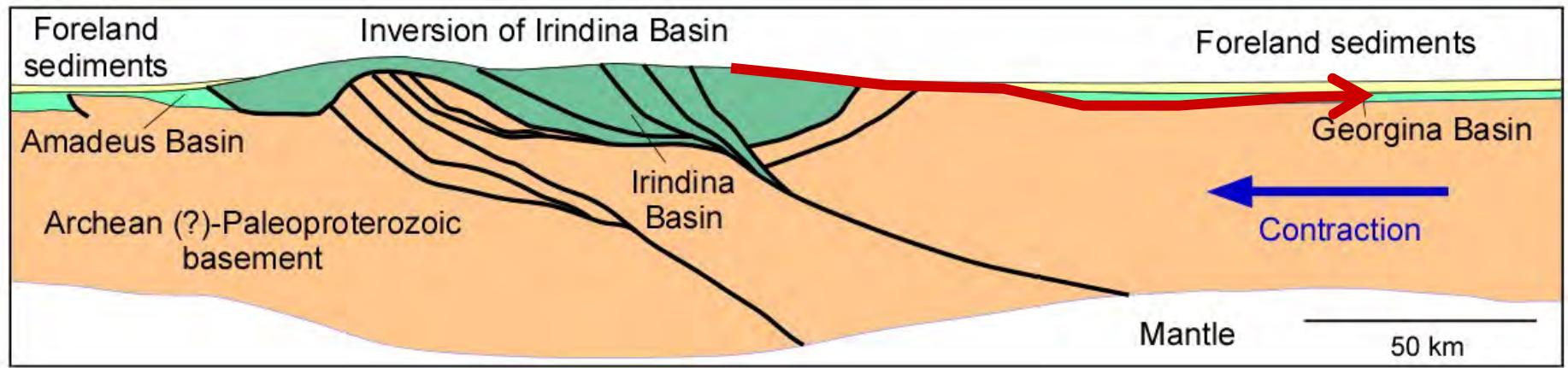
Lennard Shelf?

Lode gold deposits
(~320 Ma?: Mount Eclipse Movement)

Arlunga, Winnecke

Tibbs??

Brewer Mississippi Valley-type deposits



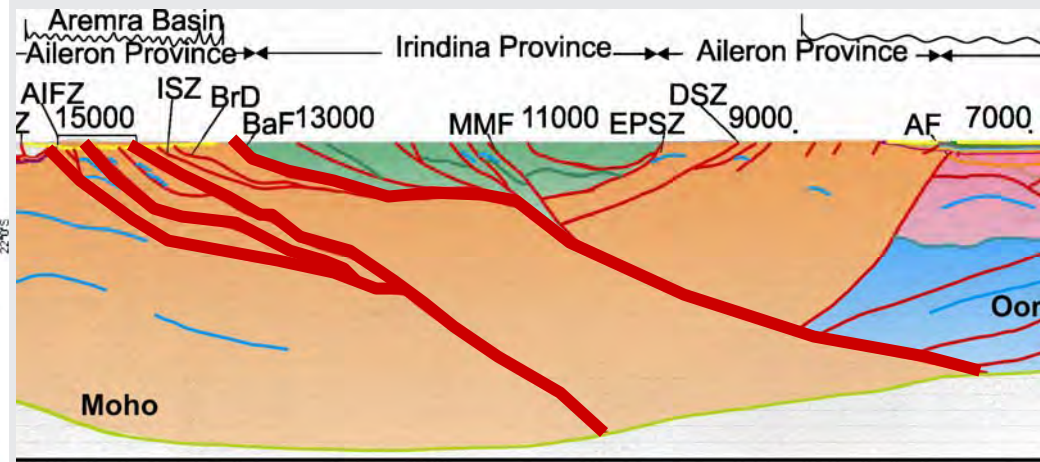
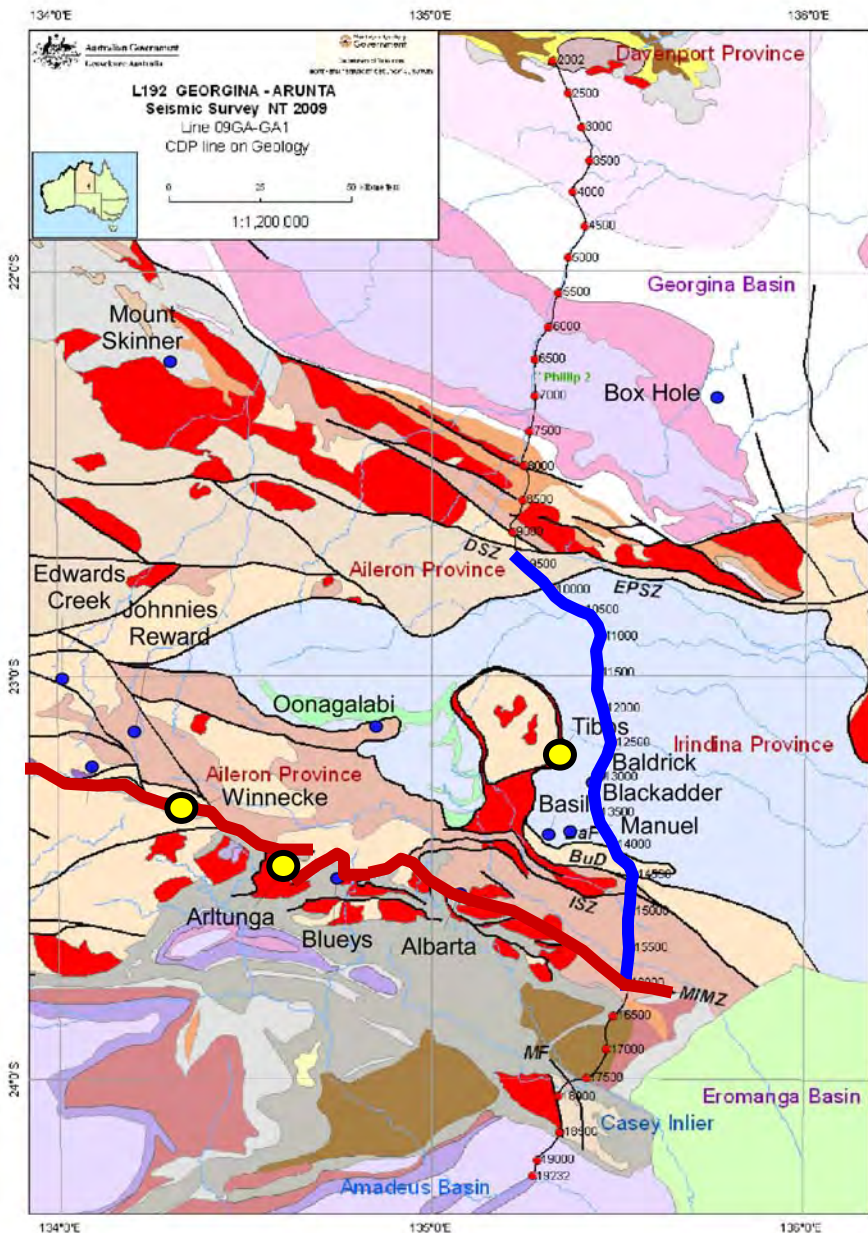
Mississippi Valley-type deposits typically distal (X00-X000 km) expressions of orogenic events – topographic-driven fluid flow (except Lennard Shelf: Leach et al., 2005)

Inversion of basin associated with deposition of foreland sedimentary rocks of the during Rodingan (~440 Ma) and Pertnjara Movement (375-355 Ma) of Alice Springs Orogeny

Orogenesis would have driven fluid flow off evolving mountain system into sedimentary basins

Lennard Shelf deposits have similar age to Pertnjara Movement; possibly similar age to Box Hole prospect.

Eclipse lode gold deposits



Two mantle-tapping structures imaged by seismic data:

Illogwa-Bruna Detachment – Mt Mary Fault

Atnarta Imbricate Fault Zone

Atnarta Imbricate Fault Zone

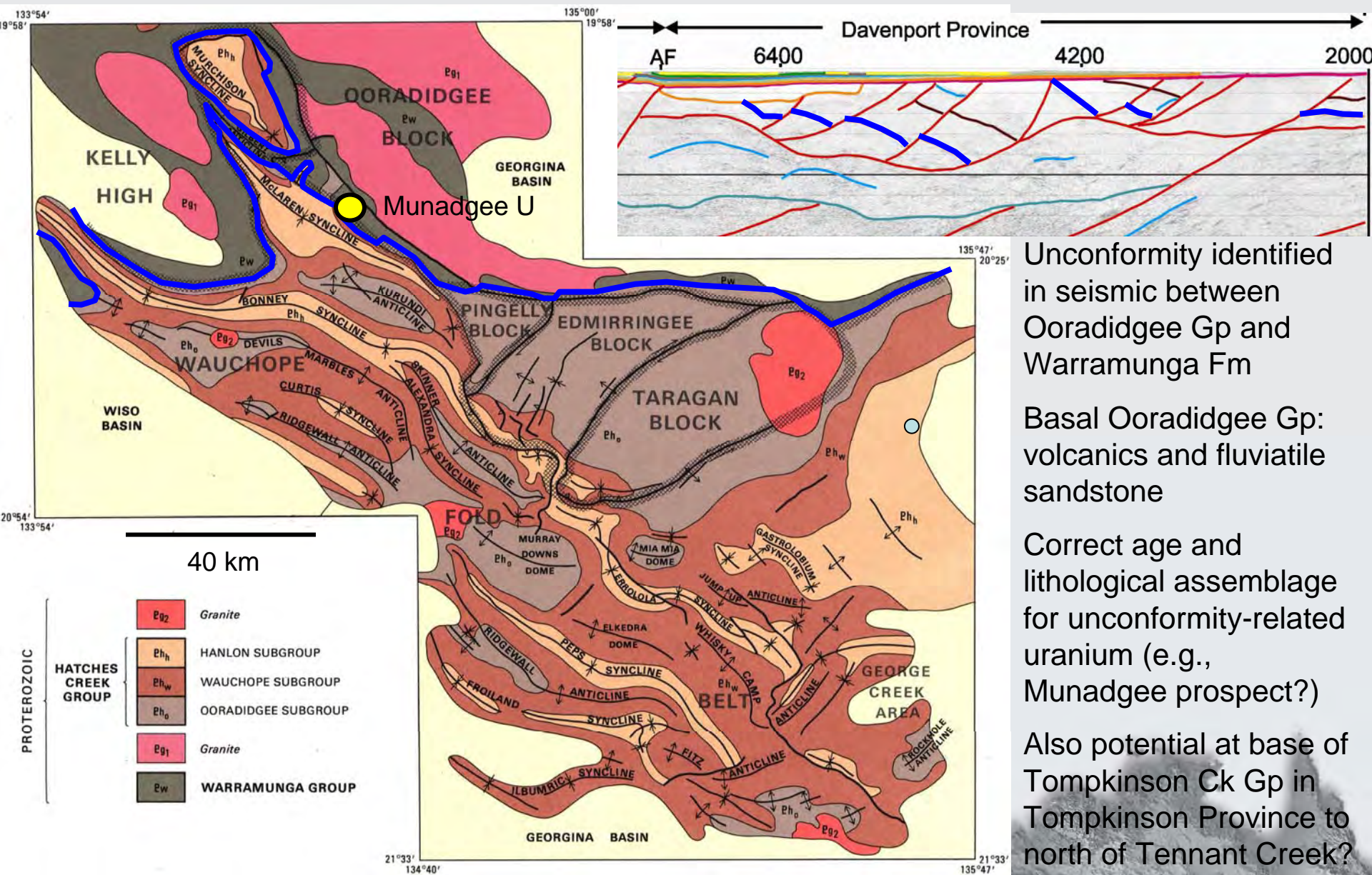
High potential – known deposits at Aritunga

Illogwa-Bruna Detachment – Mt Mary Fault

Hanging wall structures – low potential (too high metamorphic grade)

Second order footwall structures – some potential (e.g., Tibbs?)

Basin-related U plays – Paleoproterozoic unconformity-related



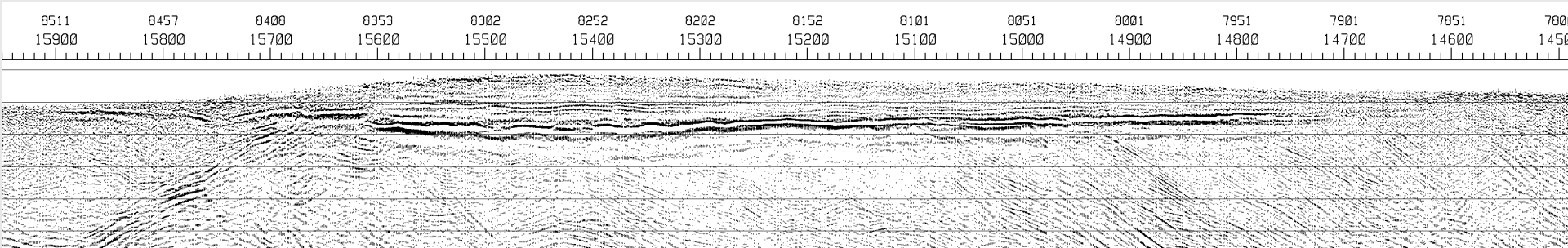
Unconformity identified in seismic between Ooradidgee Gp and Warramunga Fm

Basal Ooradidgee Gp: volcanics and fluviatile sandstone

Correct age and lithological assemblage for unconformity-related uranium (e.g., Munadgee prospect?)

Also potential at base of Tompkinson Ck Gp in Tompkinson Province to north of Tennant Creek?

Basin-related U plays – Cenozoic sandstone-hosted



Aremra Basin

Cenozoic in age

Filled by lacustrine and fluvial sedimentary rocks

Up to 0.2 ms (100-200 m ?) thick

U-rich sources – possibly Strangways (1740-1700 Ma granites)

Potential for Beverley-Four Mile-type uranium deposits?

Similar-aged basins (e.g., Ti Tree and Waite basin may have potential)

Conclusions

- Willowra Suture successfully imaged and traced across southern Northern Territory; major deposits spatially associated with it
- Uranium plays
 - Unconformity-related systems at base of Centralian Basins (Kintyre analogue)
 - Unconformity-related systems at base of Ooradidgee Group (e.g., Mundigee) and Tompkinson Ck Group
 - Sandstone-hosted systems in Aremra and other Cenozoic basins
- Mississippi Valley-type Zn-Pb plays
 - Related to Pertnjara Movement – orogenesis driving fluid flow (Box Hole and Lennard Shelf?)
- Lode gold plays
 - Two mantle-tapping fault systems identified, one possibly related to Arltunga system