



Australian Government
Geoscience Australia

Airborne Electromagnetic acquisition in uranium mineral provinces

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Airborne Electromagnetics (AEM)

Summary

Background to the project

Three project areas defined:

- Paterson (most of the talk)

- Pine Creek

- Frome Embayment – proposed for 2010

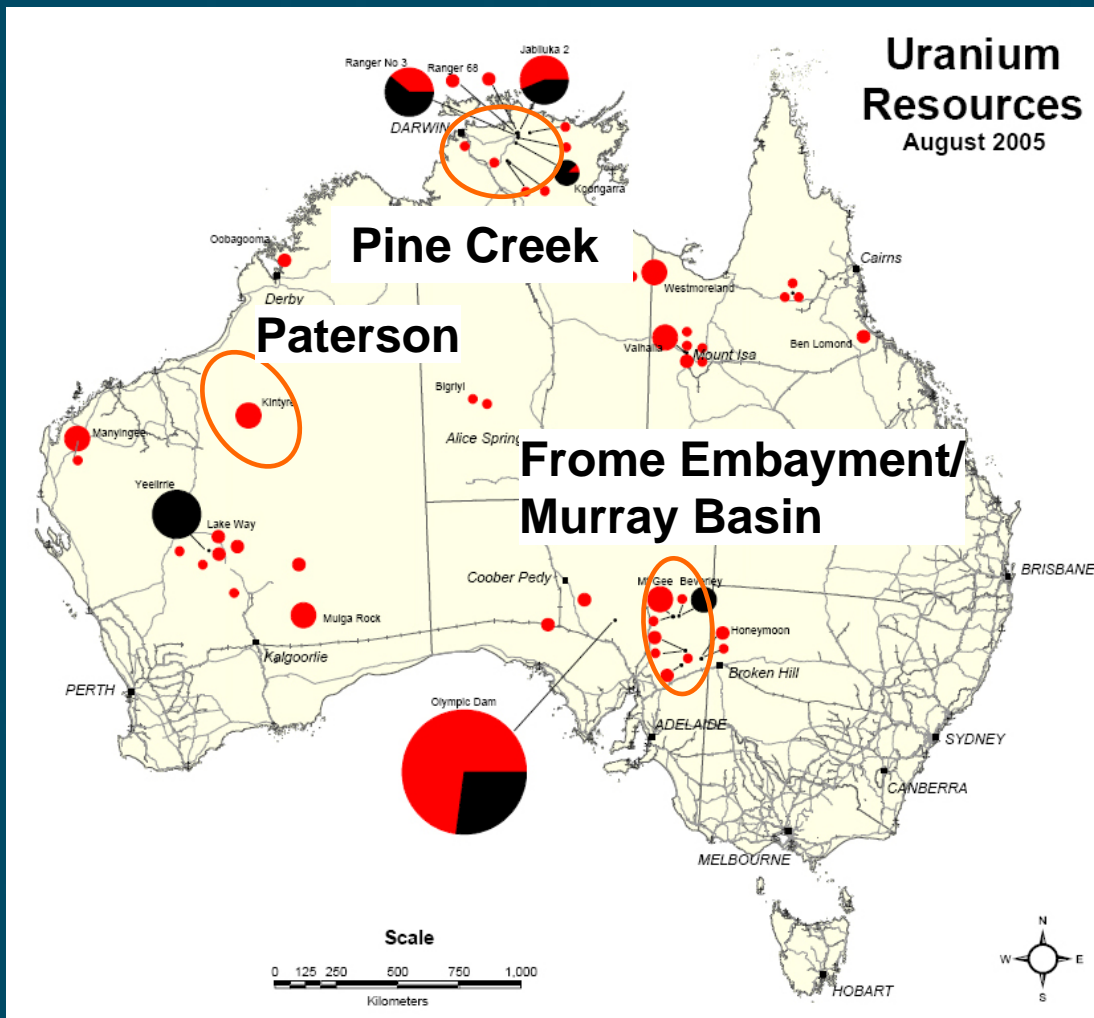
Main points

- Large areas, regional AEM line spacings (1- 6 km)

- Calibrated surveys, constrained conductivity-depth

- Provide context for existing/ new surveys

Background



Review of U deposit types
& AEM capability

Areas prospective for :

- Unconformity U deposits
- Paleovalley U deposits
(subset of sandstone type)

State/Territory Survey
consultation

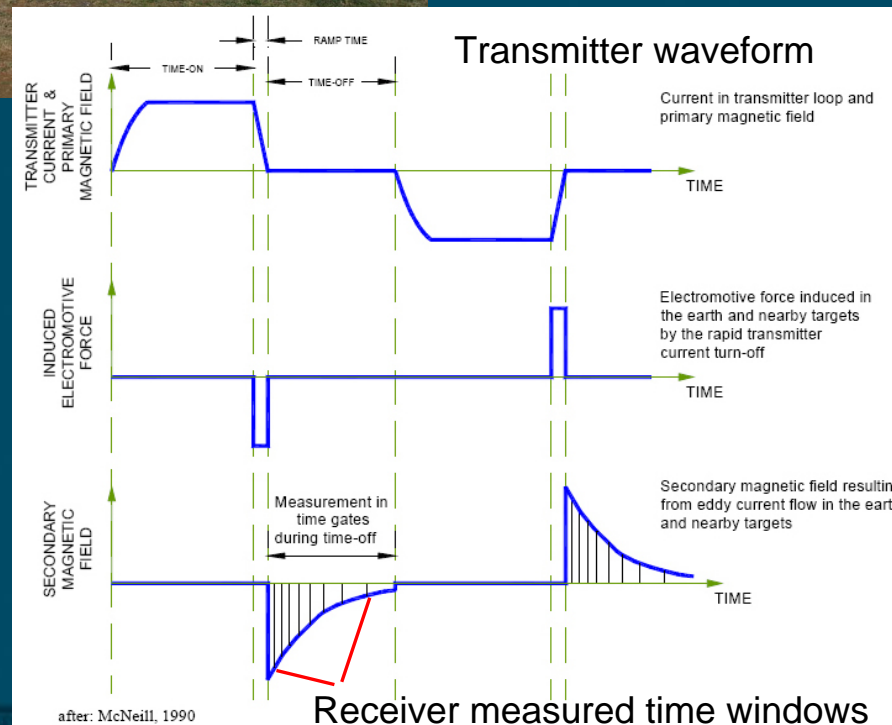
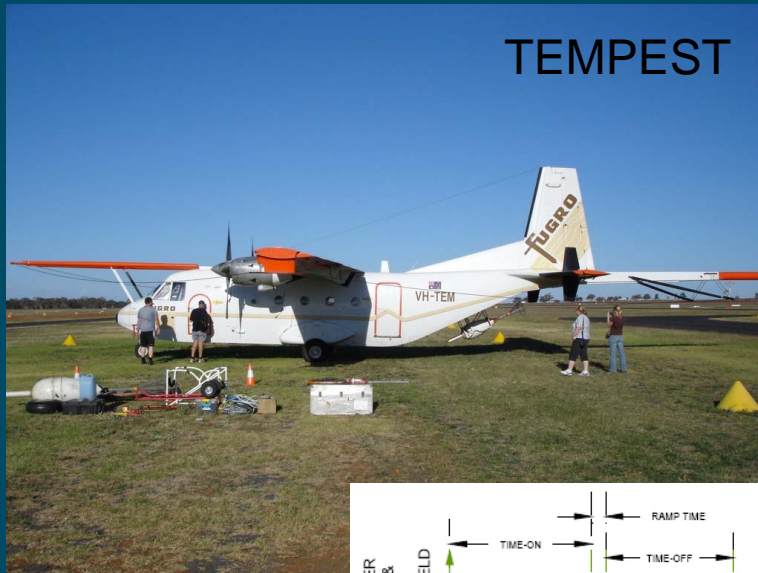
3 Project areas defined
Clustered deposits expected
Laterally extensive cover

Background

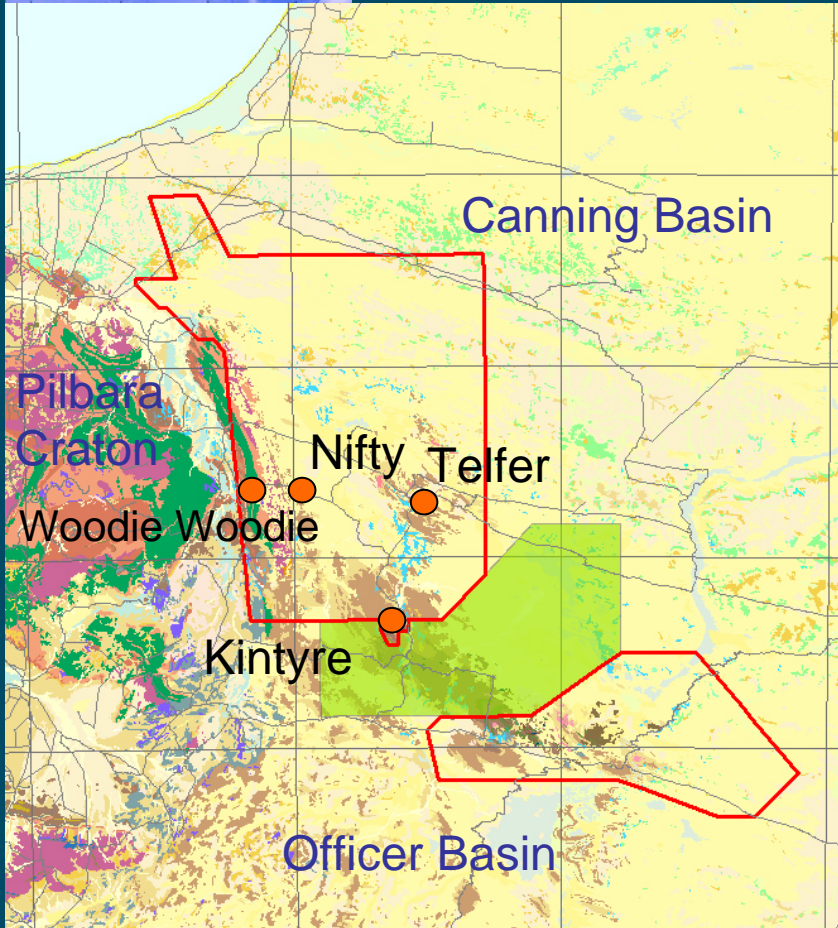
Time domain AEM

Paterson - TEMPEST

Pine Creek - TEMPEST & VTEM



Paterson Project



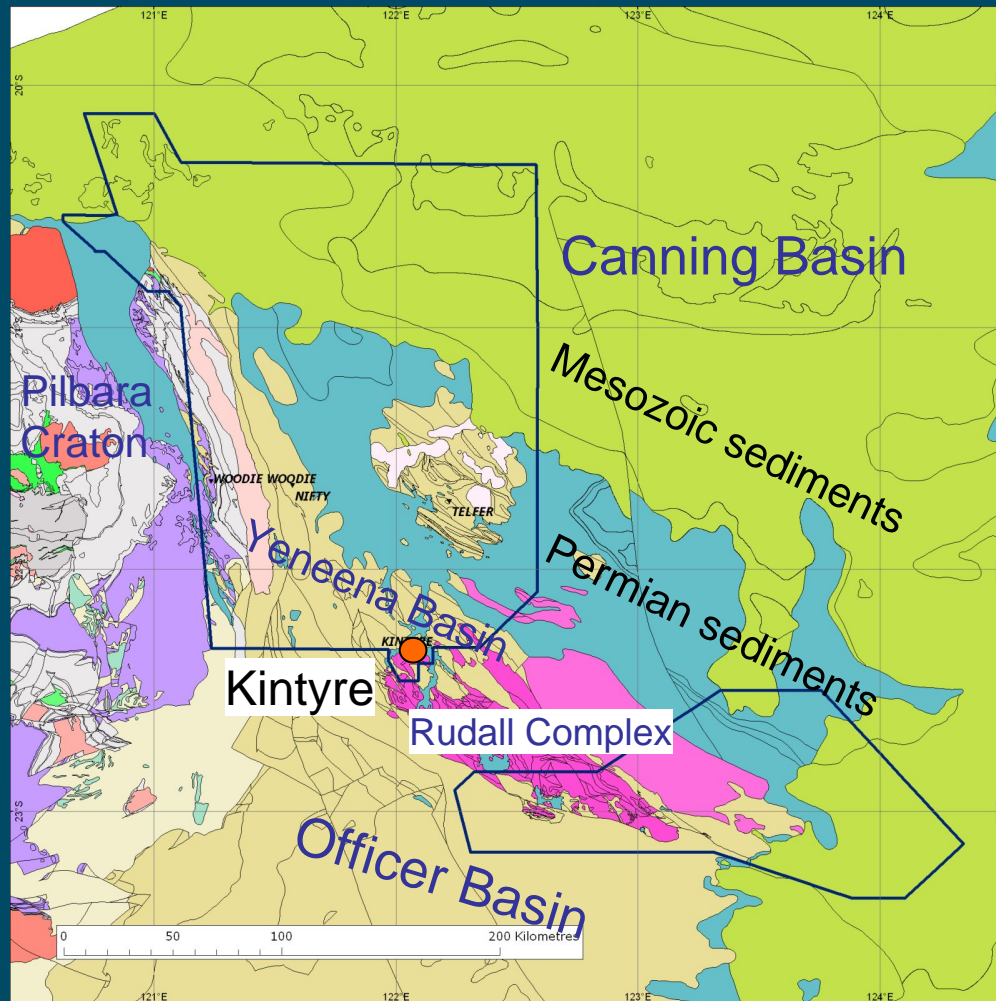
TEMPEST AEM

- ~29,000 line km acquired
(49,000 sq km ~ 2.5 x 250k sheets)
- GA Line spacings 1, 2 & 6 km
- Five infill companies
- Conductivities for 19 holes
- Compiling selected geol sections

Acknowledgments:

Woodie Woodie - Consolidated Minerals Ltd (CML).
Telfer - Newcrest Mining Ltd
Nifty - Aditya Birla (Birla Nifty Operations)
Martu Landholders & (WDLAC)

Paterson Project



Pre Cenozoic geology

100 km

Aims:

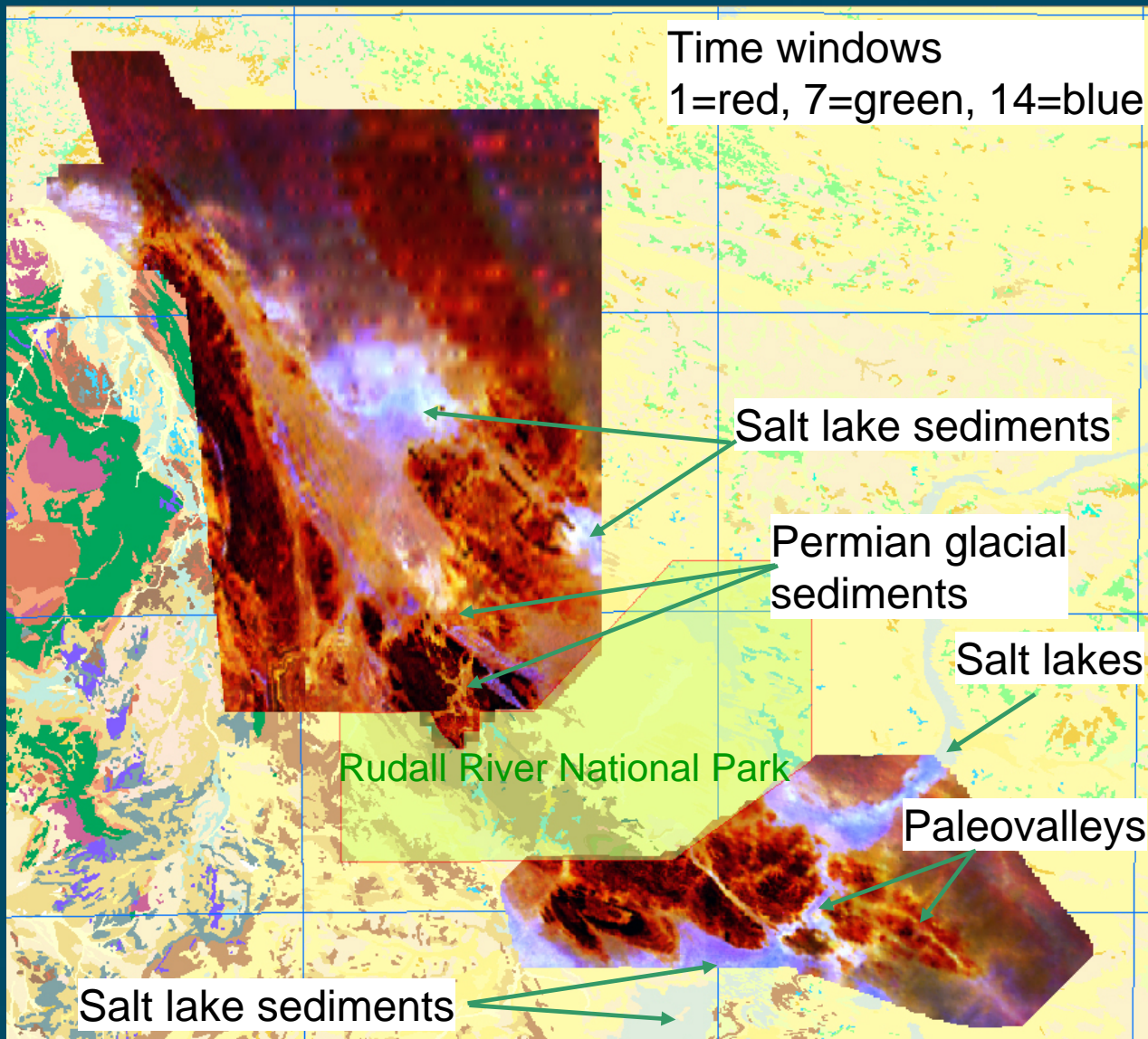
- Map sub-surface unconformities
- Map graphitic shales and schists
- Map paleovalleys
- Characterise regolith

Mineralisation styles

- Unconformity U - Kintyre
- Calcrete & Sandstone U ?
- Au, Cu, Mn, Pb-Zn & alteration
- Groundwater programme

— AEM survey outline

Paterson Project

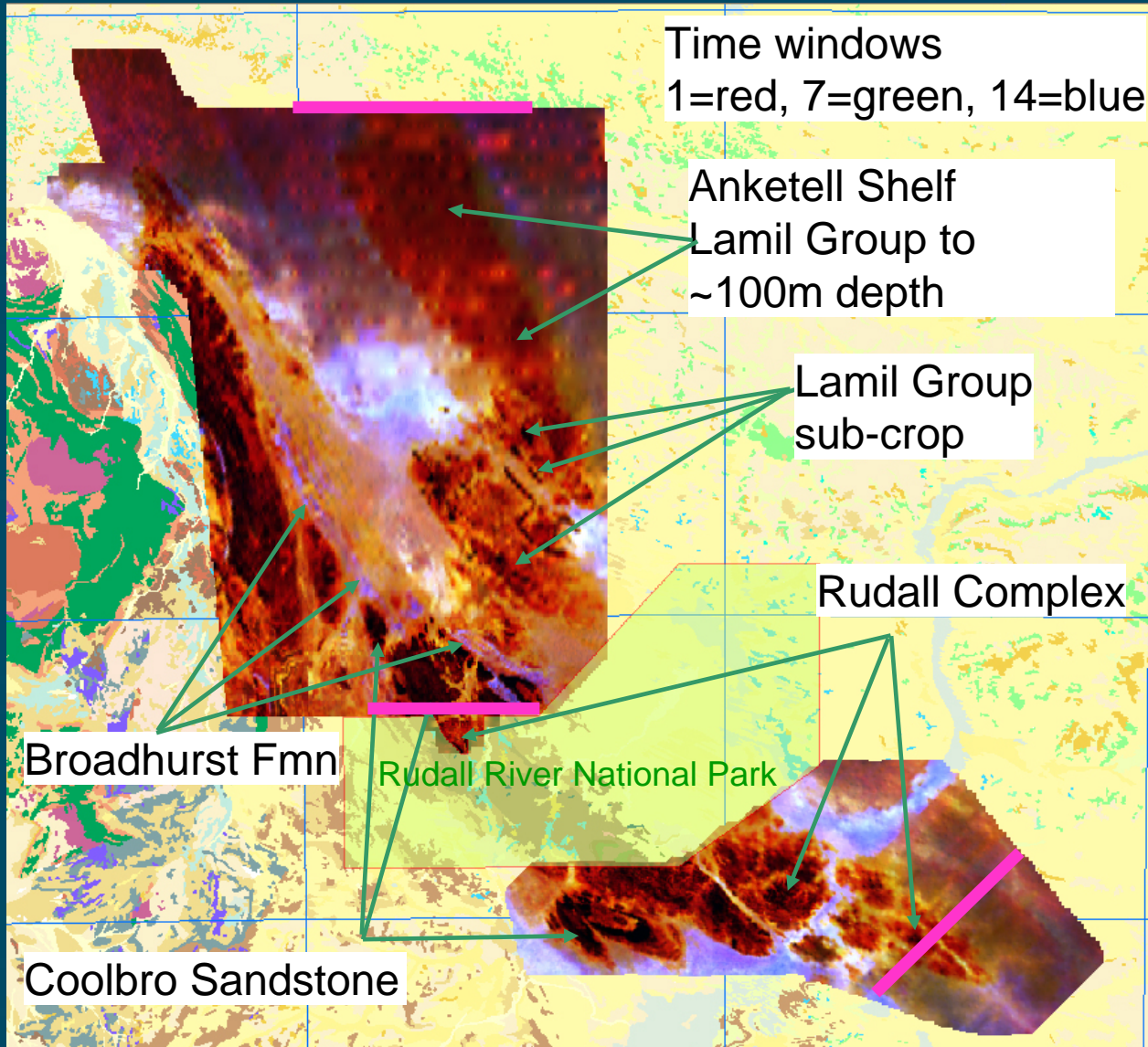


Windowed AEM & Geology

White – response in all
three time windows

Yellow – relatively lower
late time response

Paterson Project



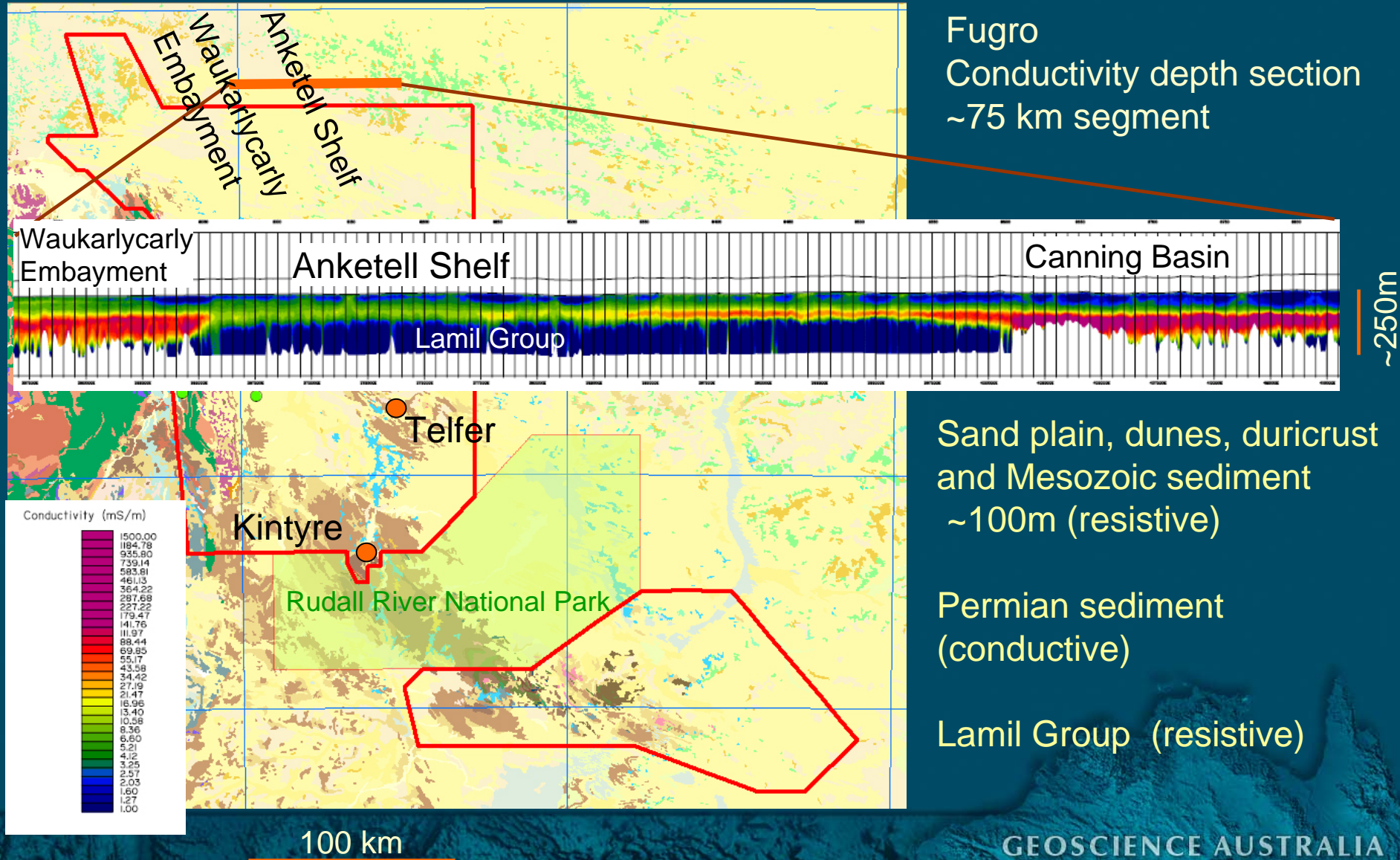
Windowed AEM & Geology

Black – low response in
all time windows
- resistive bedrock outcrop

Red - Early time response
- weathered bedrock
- colluvium
- bedrock cover to +100m

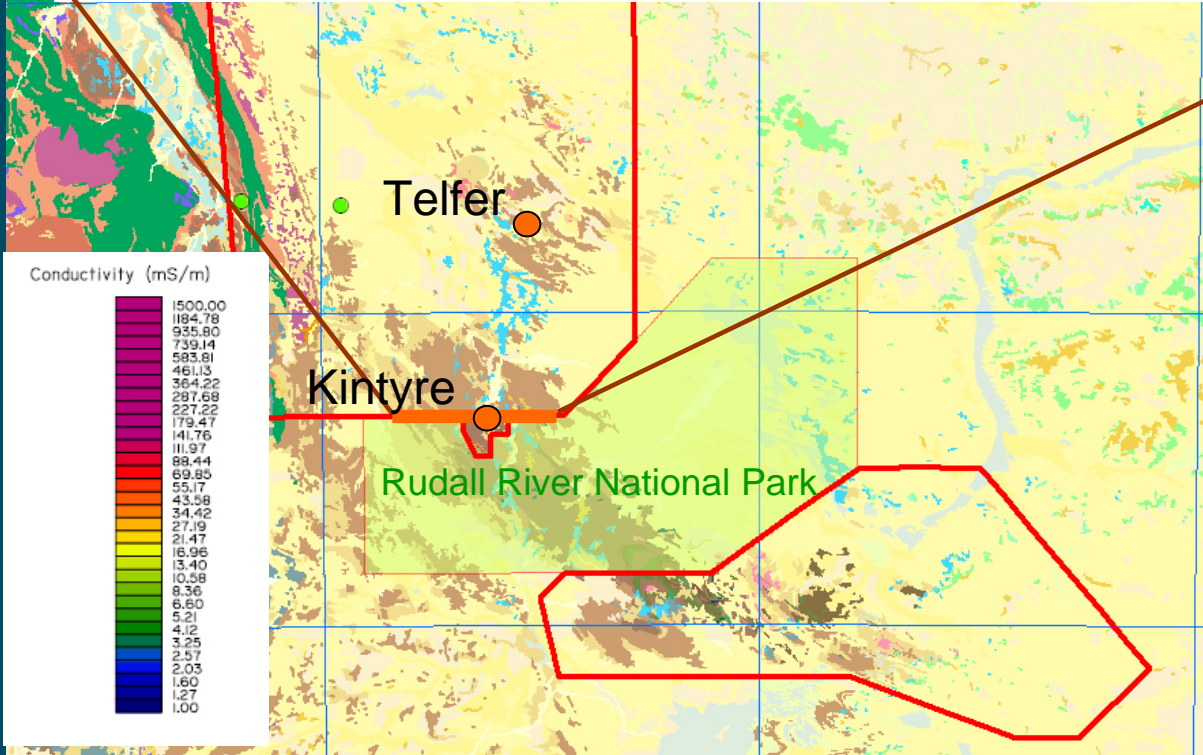
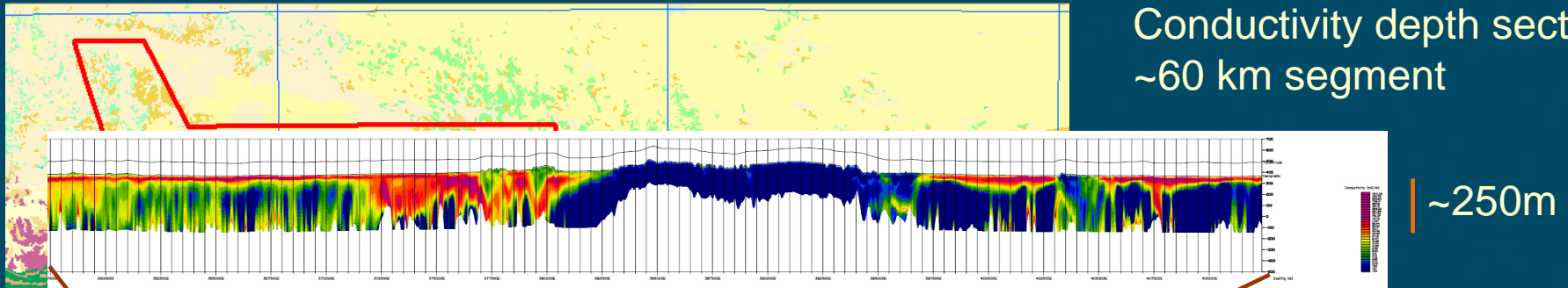
Purple – Early & late
response
- Broadhurst black shales

Paterson Project



Paterson Project

Fugro
Conductivity depth section
~60 km segment



Permian glacial sediments
and Broadhurst Fm
(conductive)

Rudall Complex and
Coolbro Sandstone
(resistive)

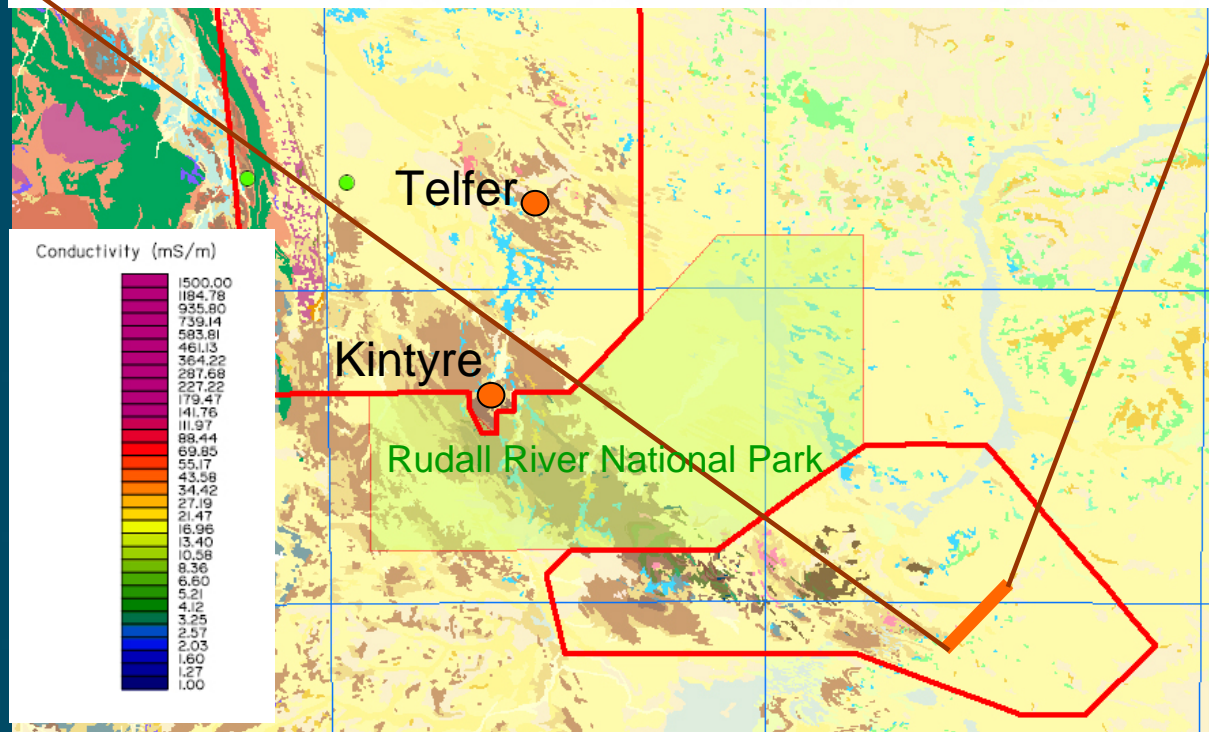
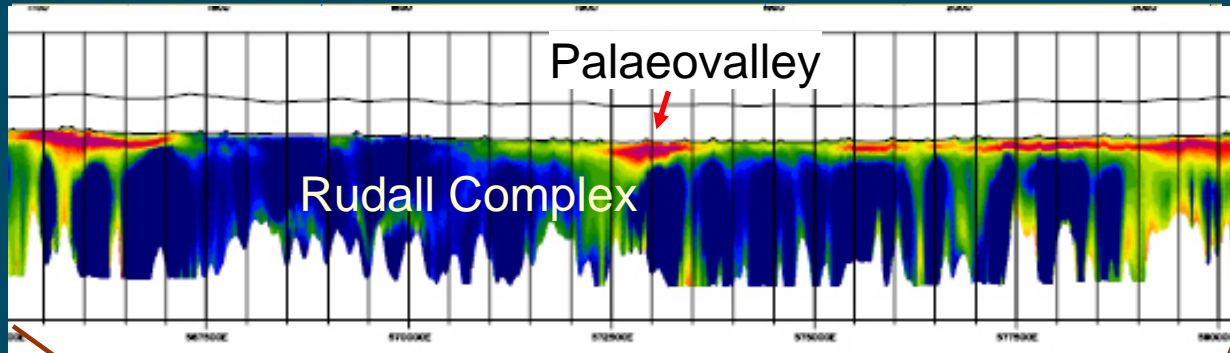
100 km

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Fugro
Conductivity depth section
~30 km segment

~250m



Palaeovalley sediments
(conductive)

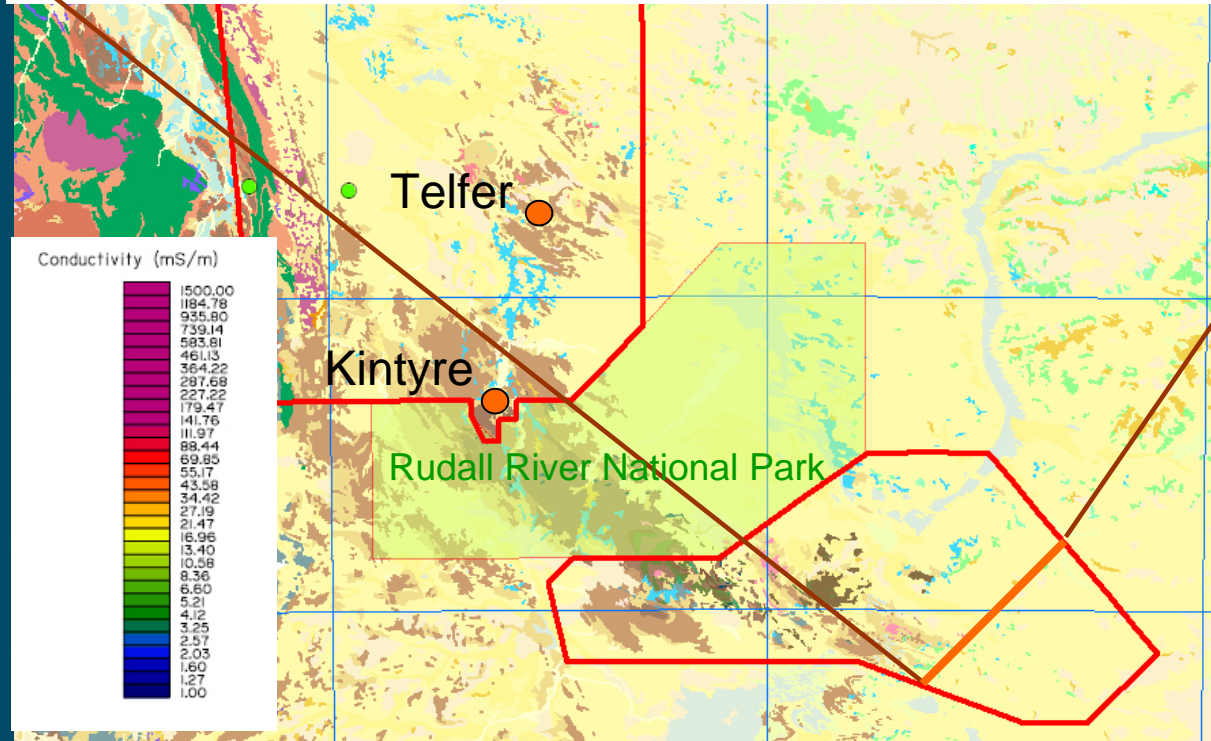
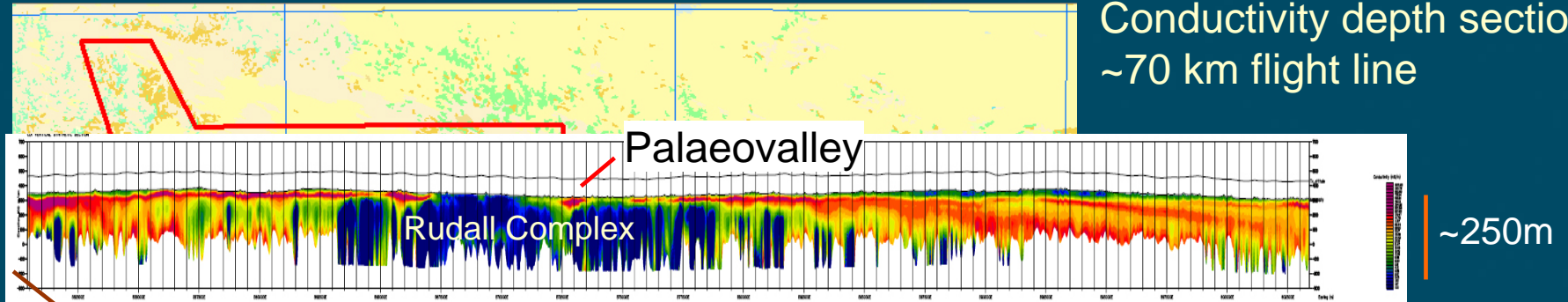
Rudall Complex (resistive)

100 km

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Paterson Project

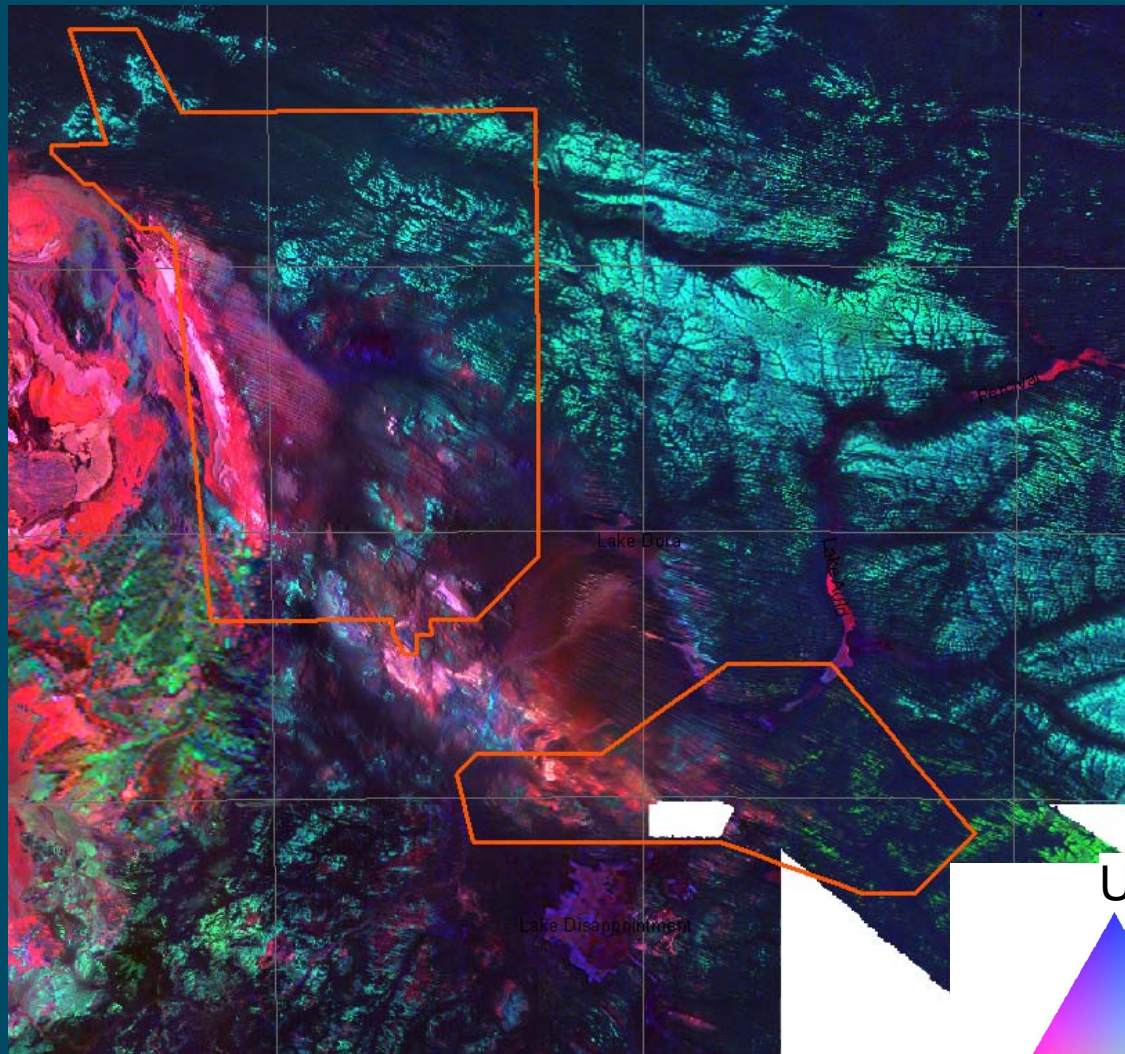
Fugro
Conductivity depth section
~70 km flight line



Flat lying (Permian?)
& dipping units (NeoProt?)
(conductive)

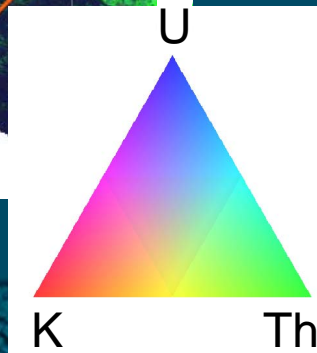
Rudall Complex (resistive)

Paterson Project



Uranium prospectivity
granite (6-12 ppm U)
duricrust (4-7 ppm U)

- Paleovalley (Cz) U
- Calcrete (Cz) U
- Permian sandstone U
- Broadhurst Fmn
graphitic shales
- Rudall/Coolbro Sandstone
unconformity



100 km

Airborne radiometric data

Paterson Project



Mount Crofton Granite – near Telfer

Progress

AEM acquisition complete

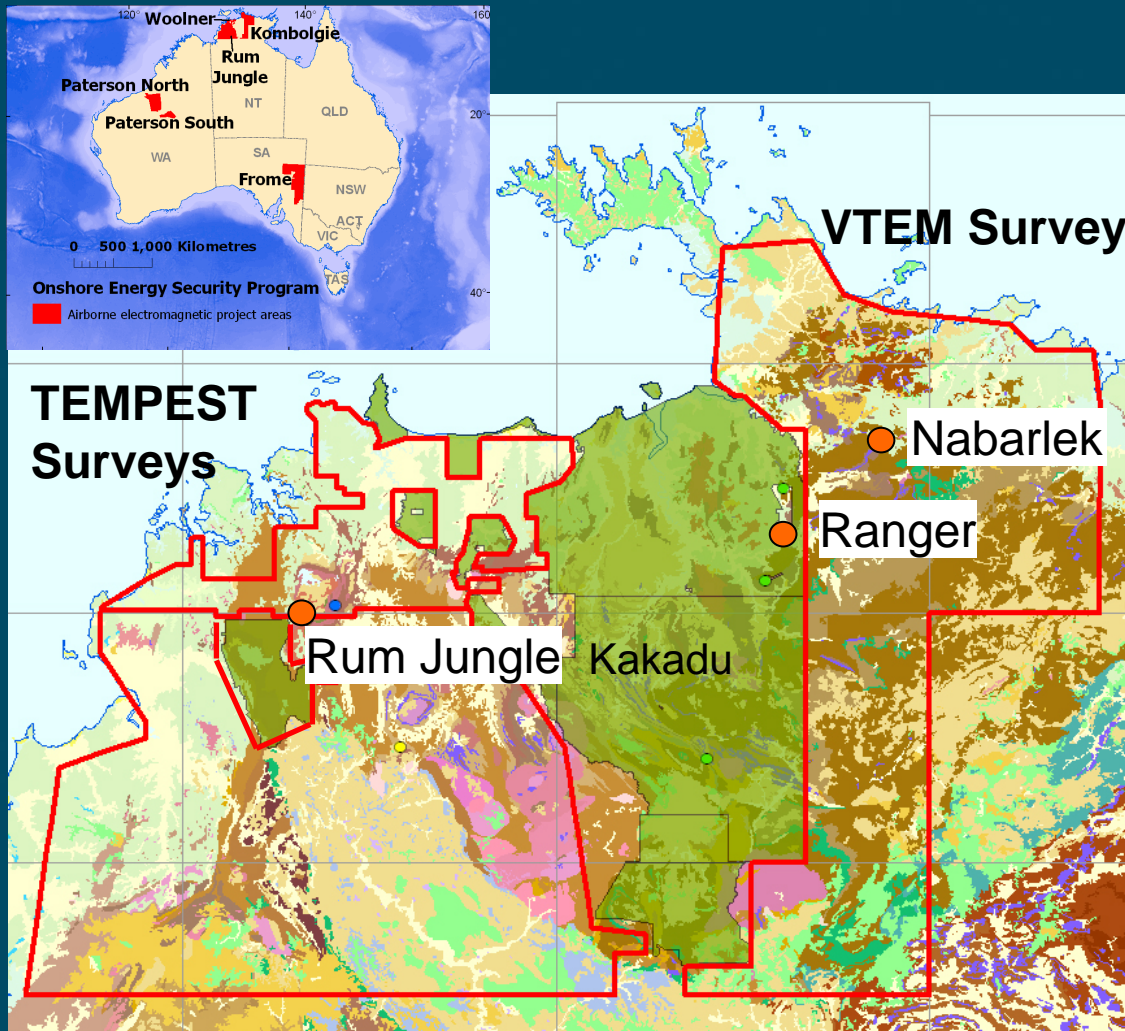
GA data released Mar & Apr 09

Compiling exploration drill holes/logs

19 drill holes - conductivity logged

GA inversion of AEM commenced

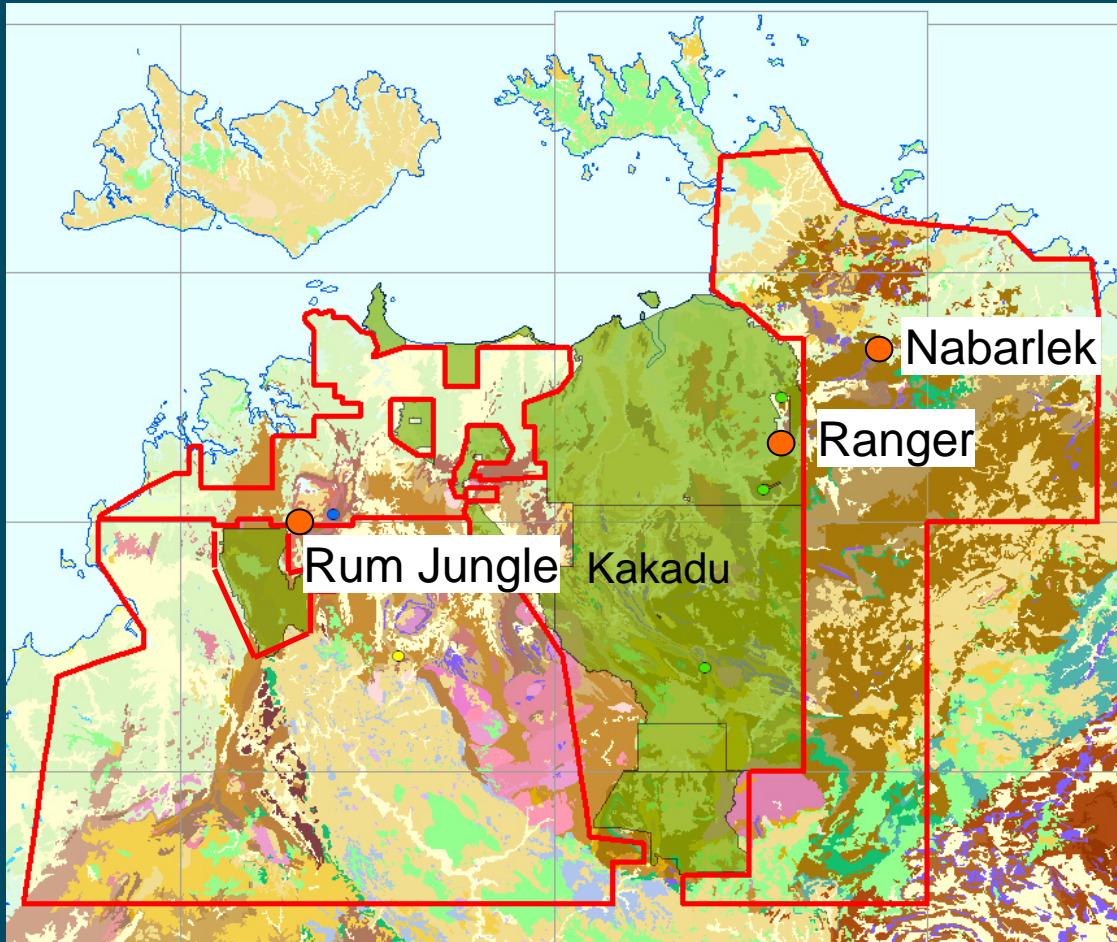
Pine Creek Project



- AEM ~ 30,000 km acquired
- GA Lines - 5 & 1.66 km (area ~2 x Paterson survey)
- 10 infill organisations ~\$1m

75,000 sq km total
~4.5 x 250k sheets

Pine Creek Project



Sub-surface unconformities

Kombolgie Subgroup/
Pine Ck Orogen &
Tolmer Group/ Finnis River Group

Graphitic conductors

Characterise regolith

Depth of cover

Paleovalleys?

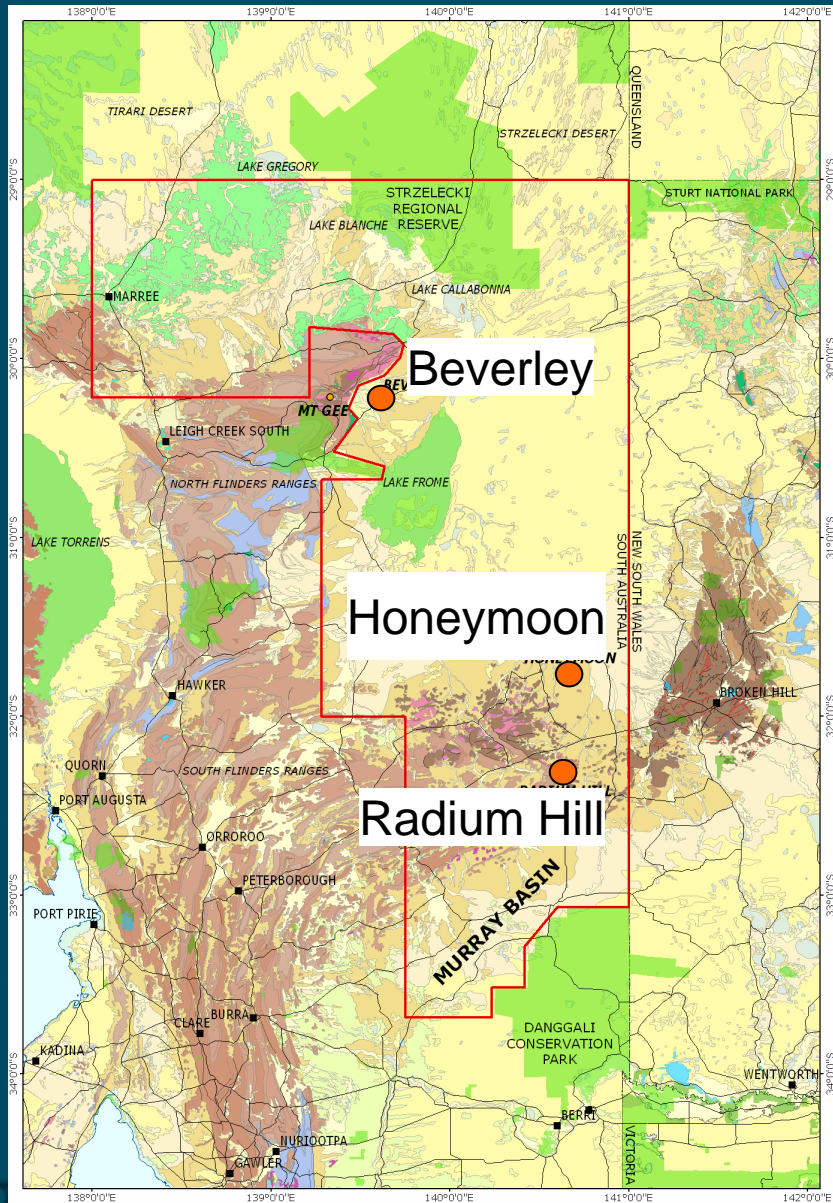
Under explored areas

Woolner Granite area

Groundwater programme
National Water Commission funds

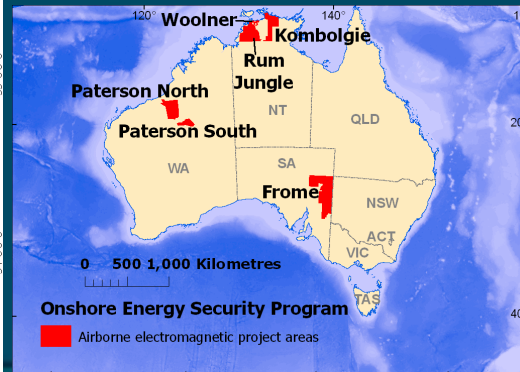
100 km

Frome Embayment/Murray Basin



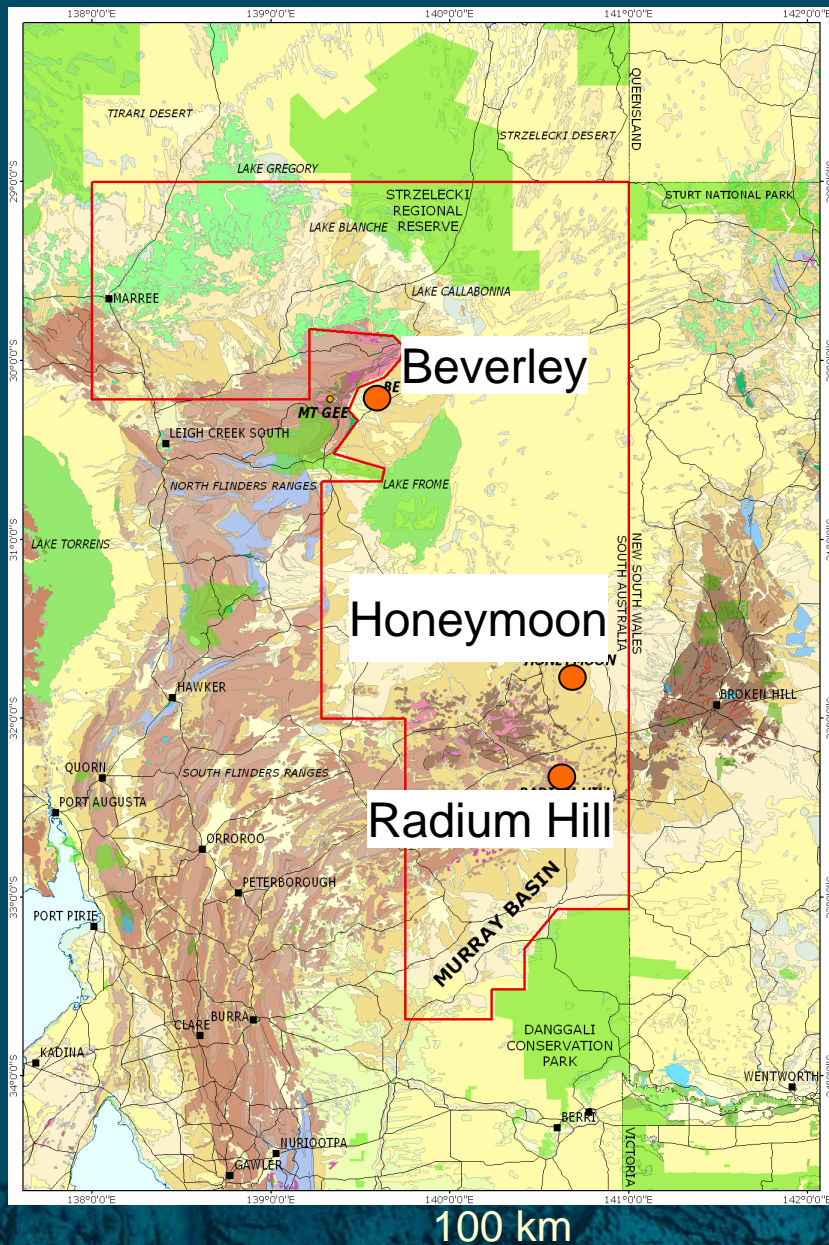
100 km

- Planned for 2010
(depends on forward funding)
 - Up to ~25,000 line km (GA)
 - Regional Lines - 5 & 1.6 km
- + 80,000 sq km ~5 x 250k sheets



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Frome Embayment/Murray Basin



- Map paleovalleys (Namba & Eyre Fmns)
- Range parallel/normal faults
- Map Cover depth
- Map strand lines – Murray Basin
- Characterise basement
Curnamona Craton
Adelaide Fold Belt
Delamerian Fold Belt
- Level existing surveys

Broad AEM coverage –
inform explorers of suitability

Summary

- Three AEM acquisition projects
- Directed at unconformity & paleovalley U
- Regional line spacings of 1 - 6 km
- To provide geophysical & geological context
- Extensive industry collaboration