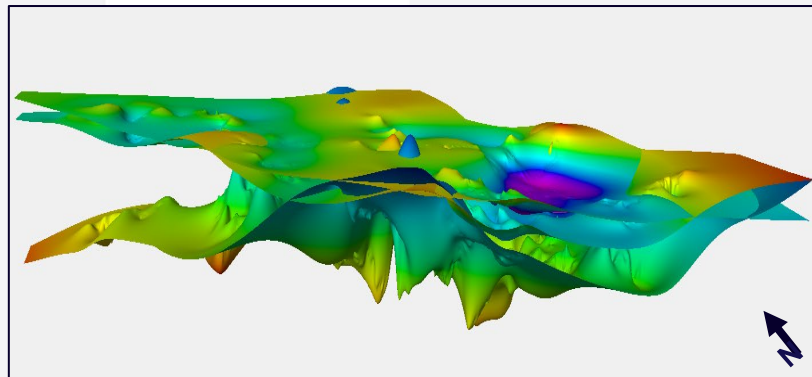


Integrating Structural Interpretation and supersequence correlation in the South Nicholson Basin

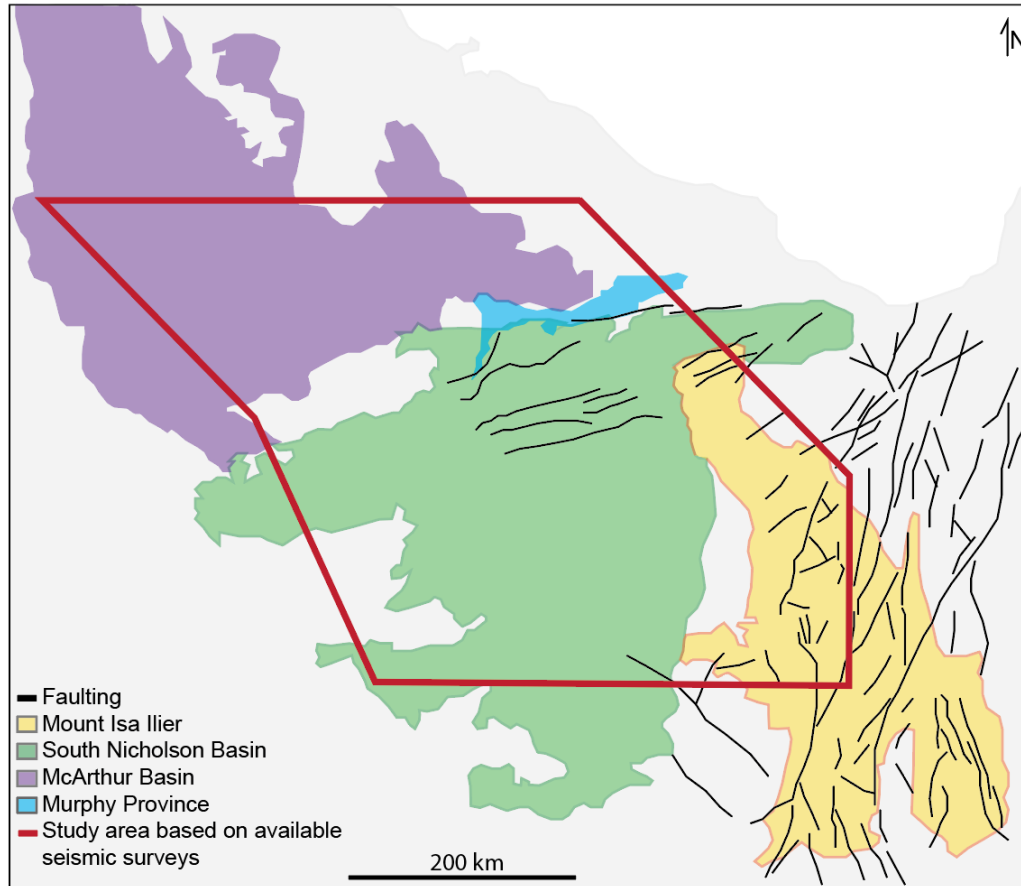
Dr Monica Jimenez, Prof Alan Collins, Prof
Simon Holford, A/Prof. Ros King
(2026)



Content

1. Introduction to the study area
2. Geological settings
3. Available data
4. Results: Seismic interpretation and mapping
5. Conclusions

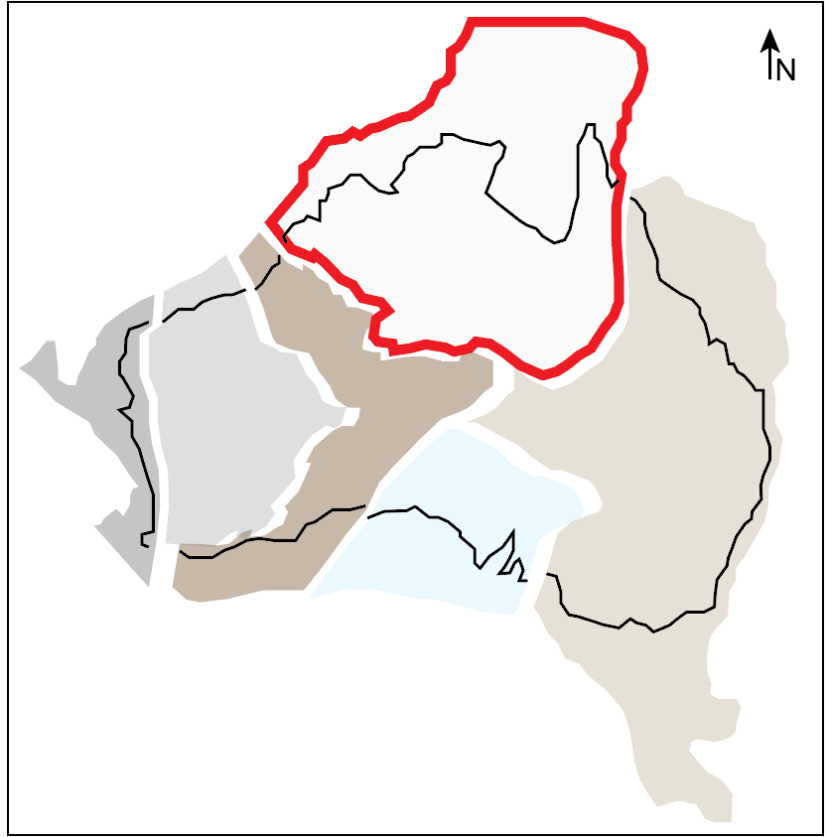
Study area



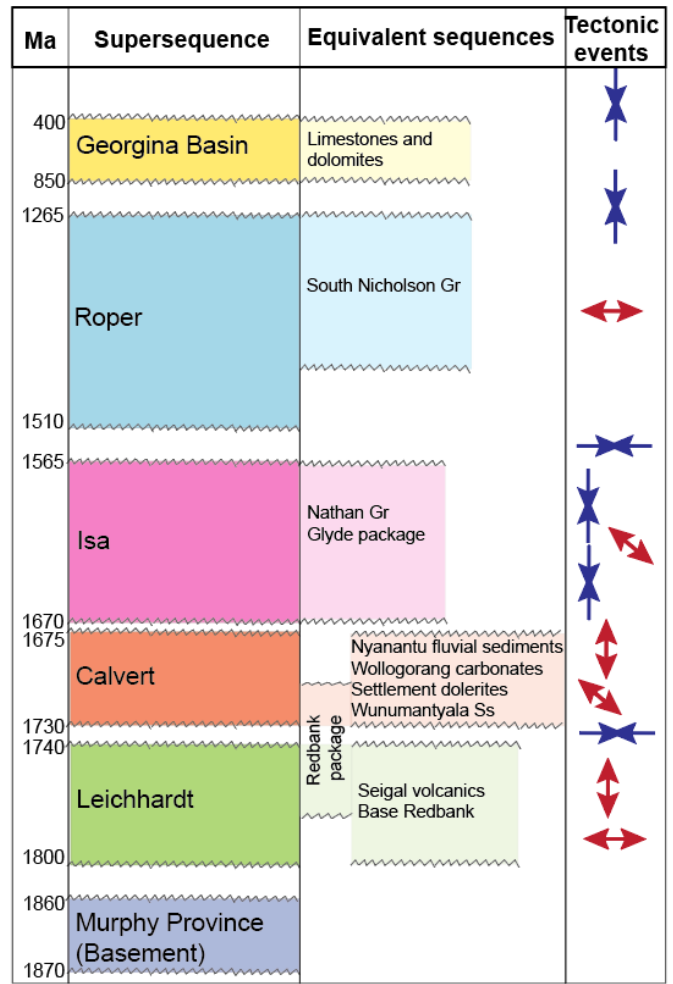
The study area refers to the extension of the available 2D seismic lines (L179, L180, L210, L212, BKR) within the South Nicholson Basin

Geological setting

Australian Cratons



Modified from Nalinakumar and Clark (2025)



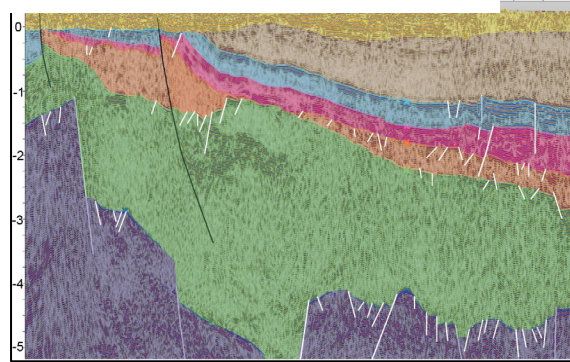
Modified from Jackson et al (1999); Kruse et al (2011); Ahmad&Scrimgeour (2013); Blaikie&Kunzmann (2020); Carr et al (2020); Gibson&Edwards (2020)

Purpose of this study

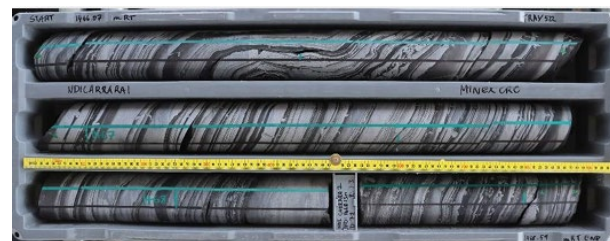
Provide a regional overview of the South Nicholson Basin:

- Structural configuration by interpreting the available 2D seismic lines
- Map changes in deposition of supersequences at a regional scale

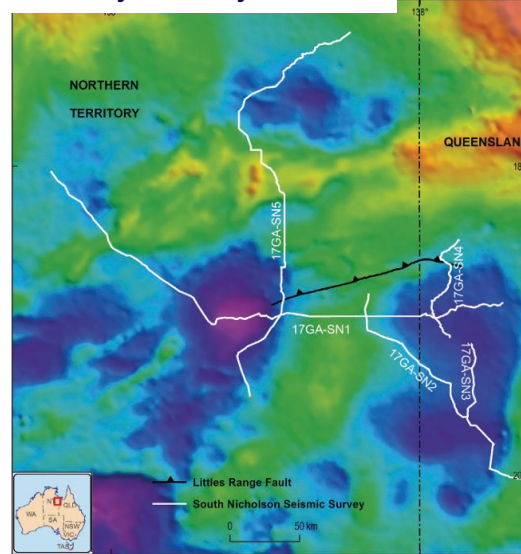
17GASN1 – 2D seismic line



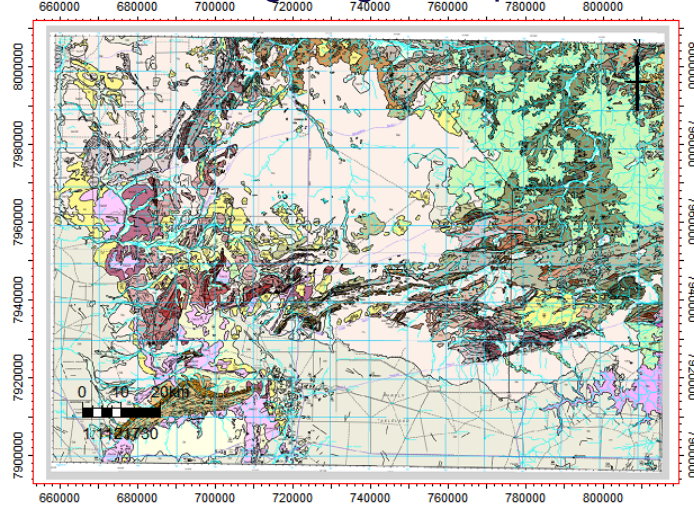
Carrara 1 core data



Gravity survey

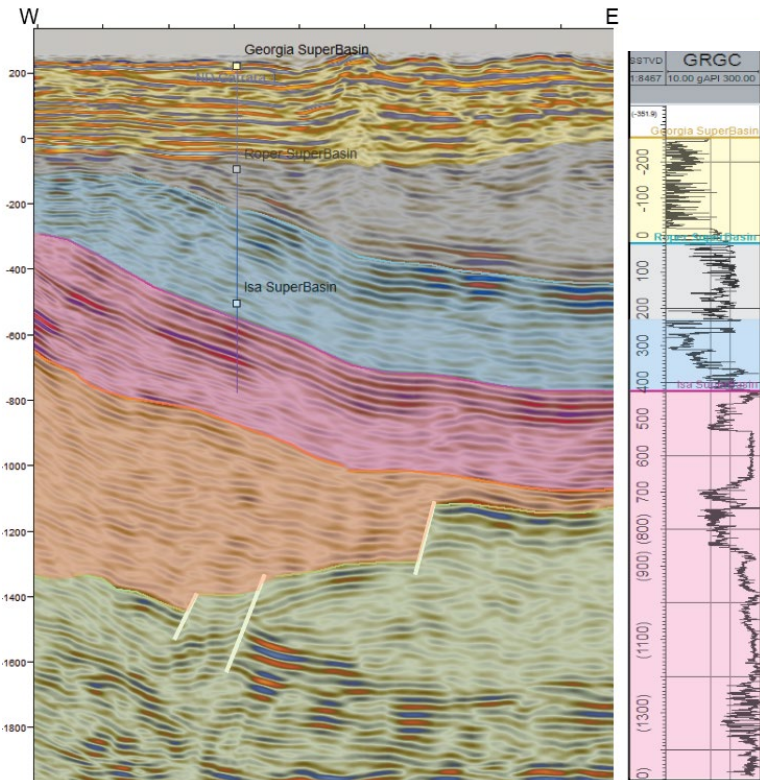


Mt Drummond geological map

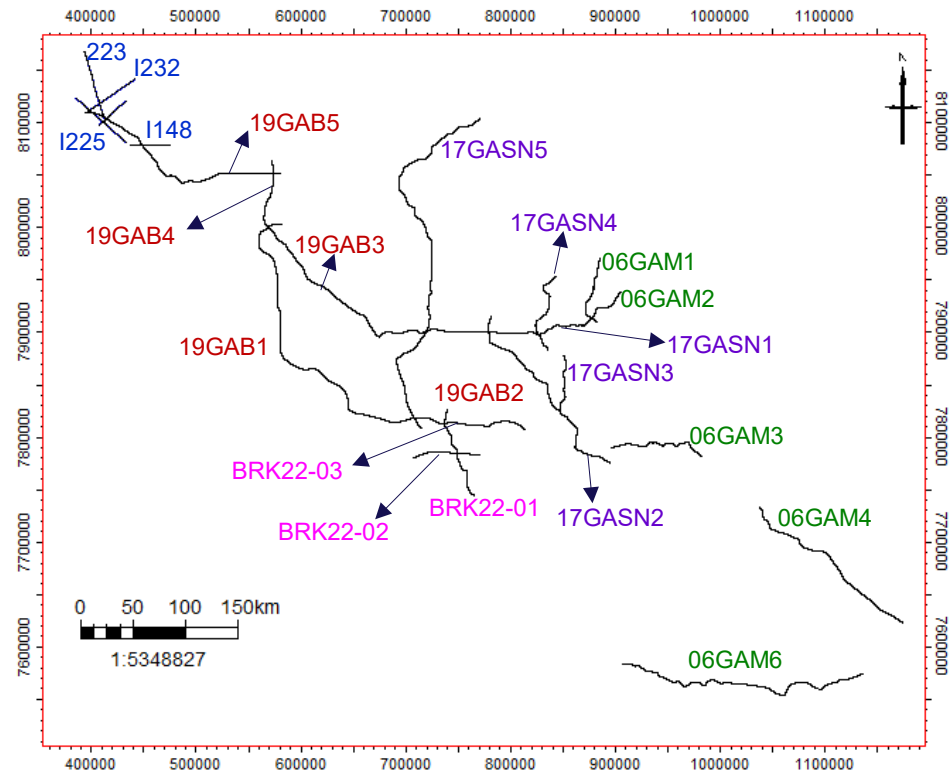


Available data: 2D seismic survey and boreholes

Seismic well-tie with NDI Carrara-1

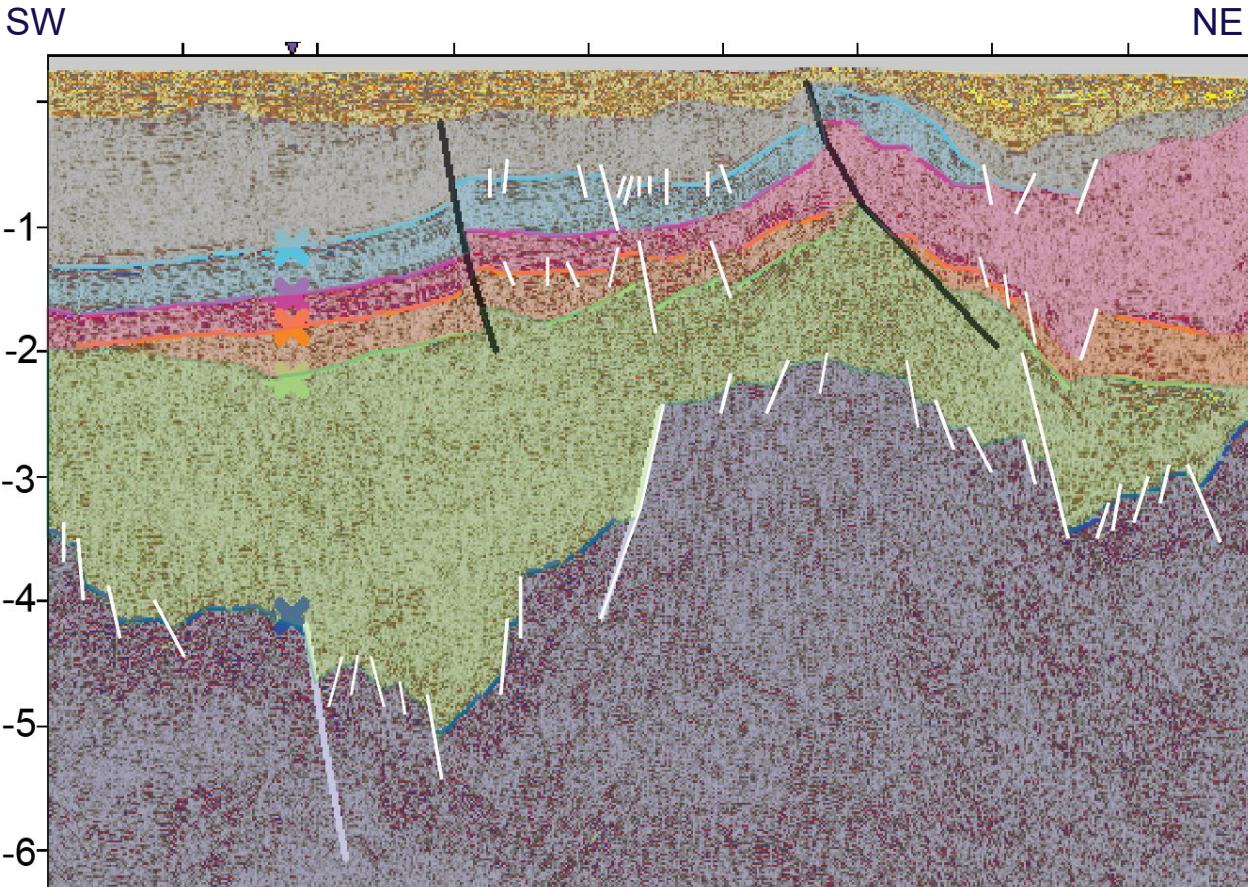


Seismic data and boreholes



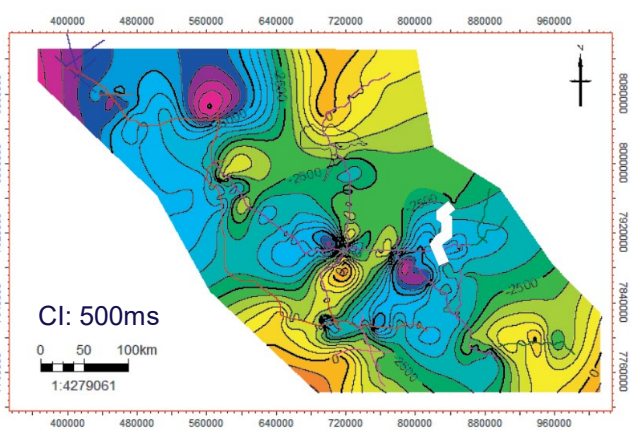
- Georgina Basin
- Upper Roper supersequence
- Lower Roper supersequence
- Isa Superbasin
- Calvert supersequence
- Leichhardt Supersequence

Seismic interpretation: Structural changes



17GASN4 (TWT)

Murphy structural map



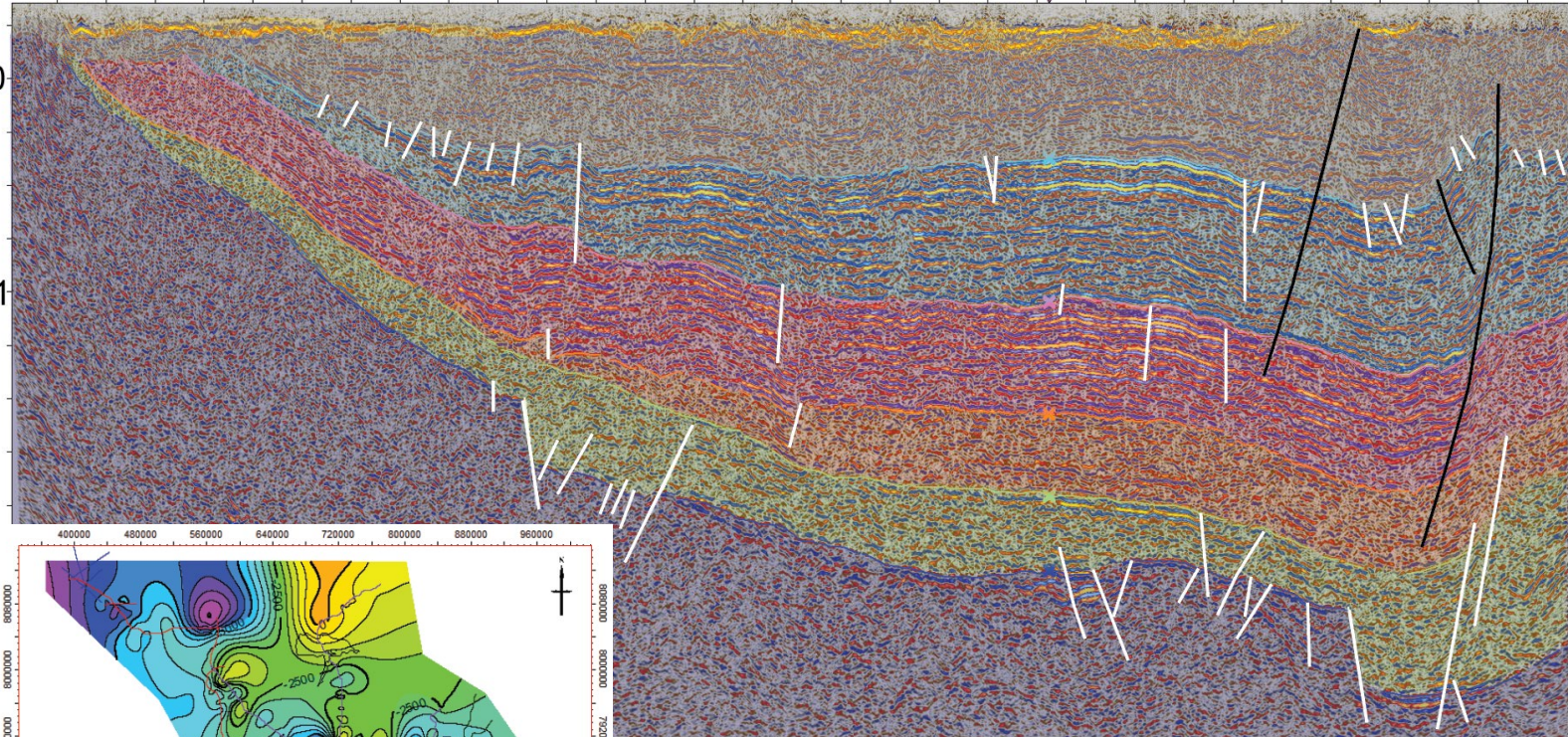
- Normal faults
- Inverted faults
- Georgina
- Upper Roper
- Lower Roper
- Isa
- Calvert
- Leichhardt
- Murphy

15 km

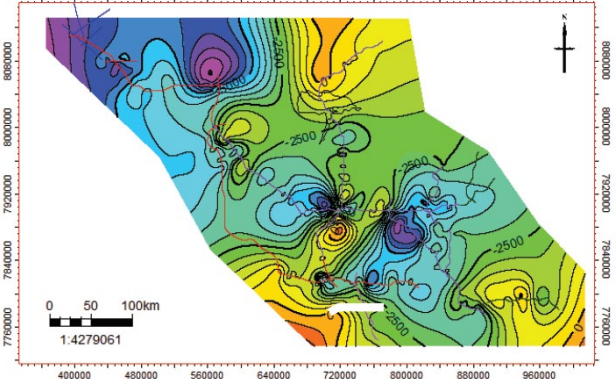
Seismic interpretation: Structural changes

W

E



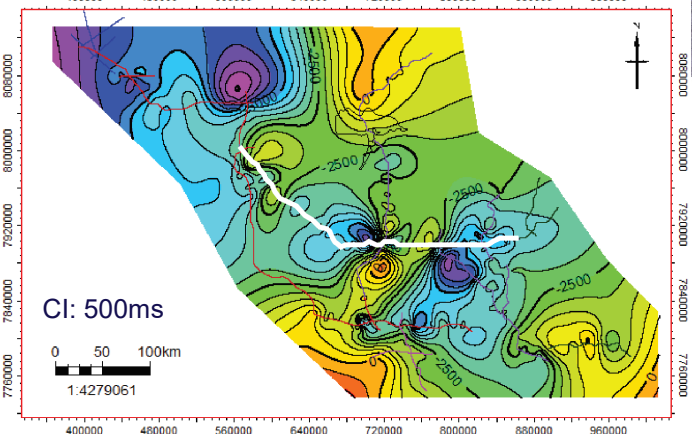
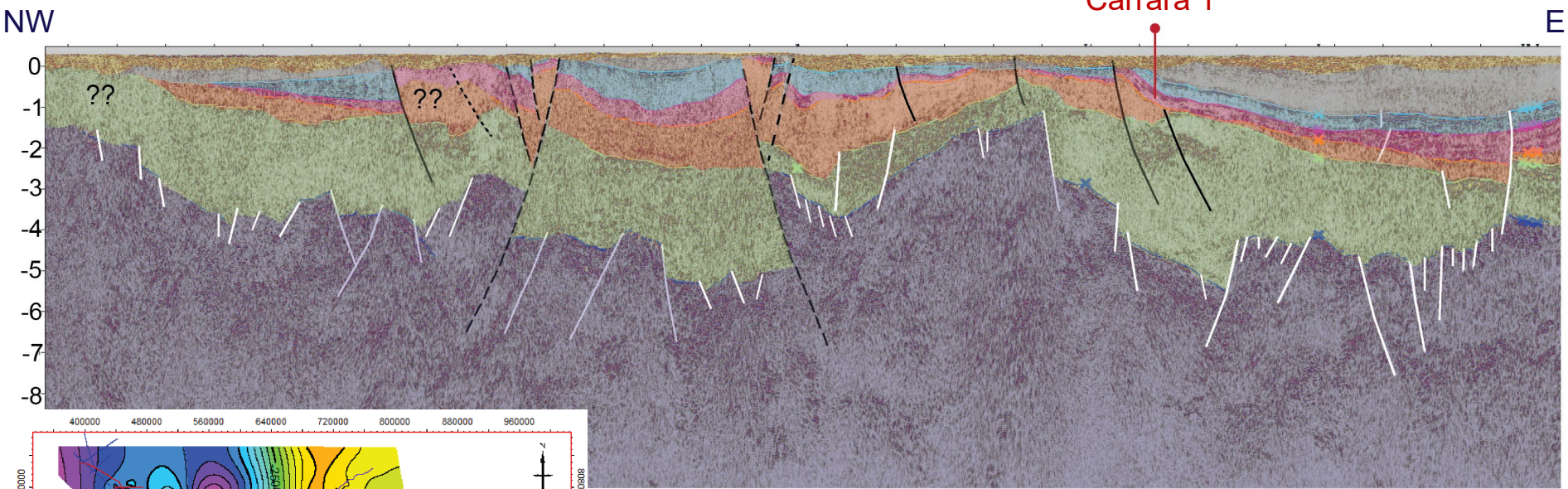
-  Normal faults
-  Inverted faults
-  Georgina
-  Upper Roper
-  Lower Roper
-  Isa
-  Calvert
-  Leichhardt
-  Murphy



3 km

BRK22-01 (TWT)

Seismic interpretation: Structural changes

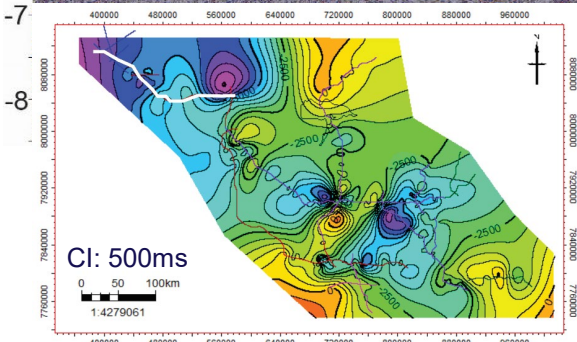
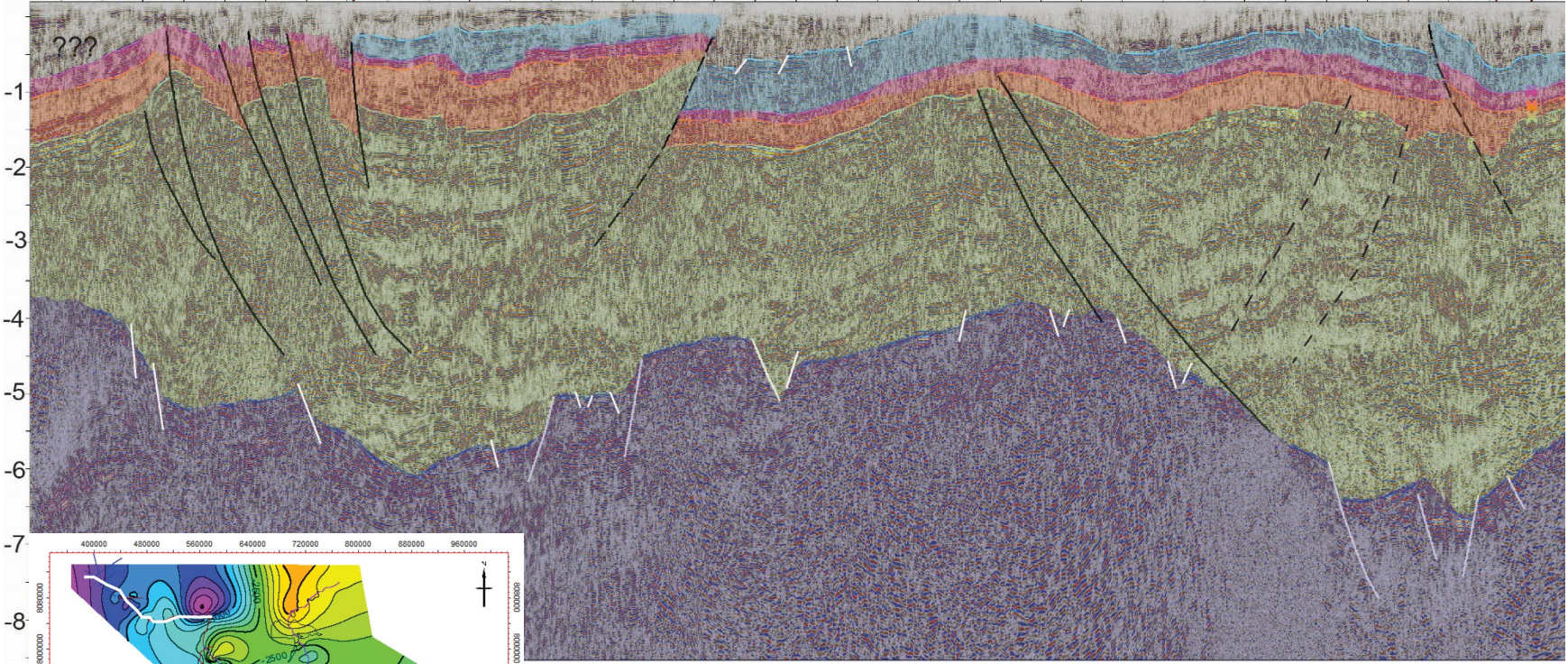


- Normal faults
- Inverted faults
- Georgina
- Upper Roper
- Lower Roper
- Isa
- Calvert
- Leichhardt
- Murphy

15 km 17GASN1 (TWT)

Seismic interpretation: Structural changes

W E

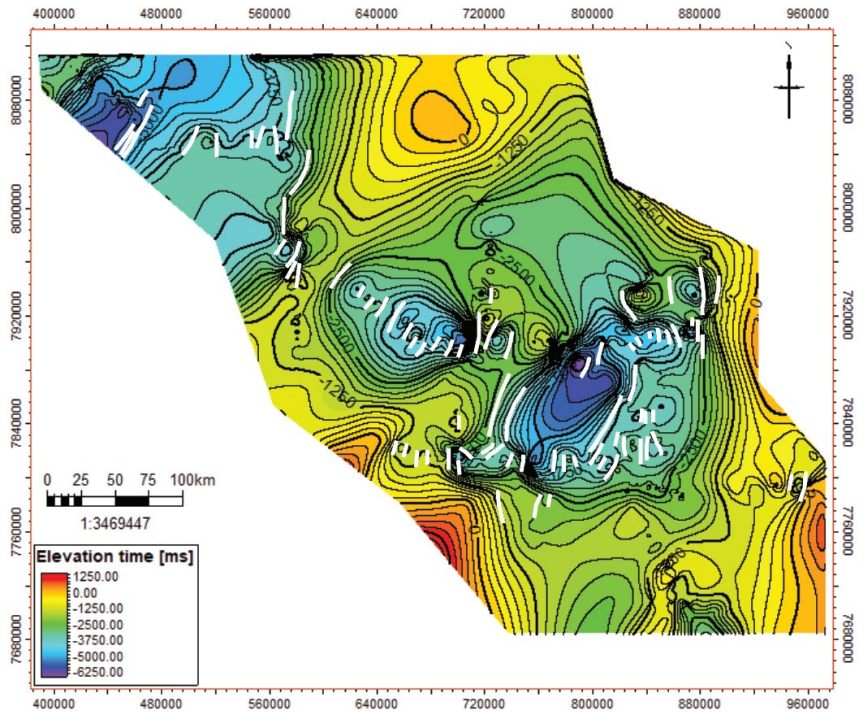


-
-

19GAB4 (TWT)
7.5 km

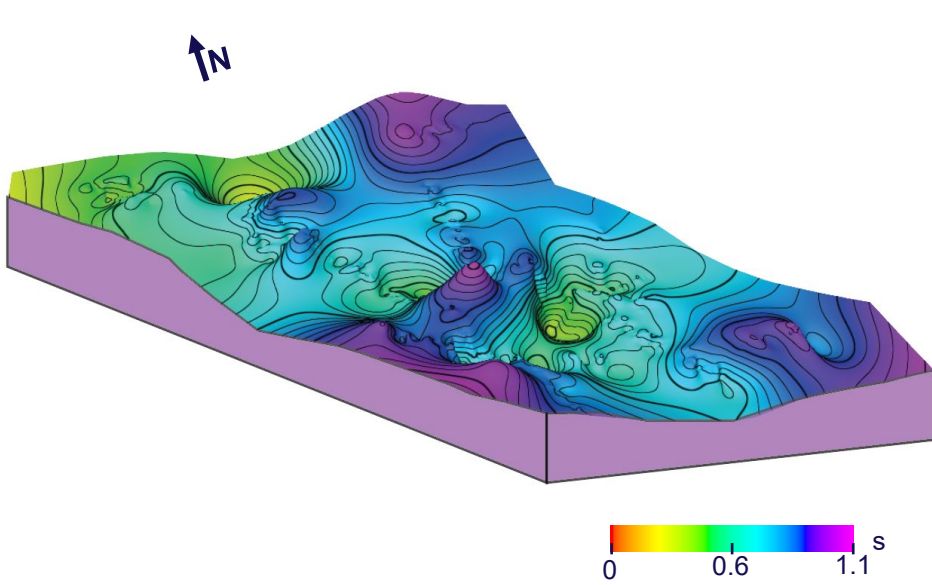
Results

Murphy Super-Basin structural map (TWT)



Murphy Super-Basin thickness (TWT)

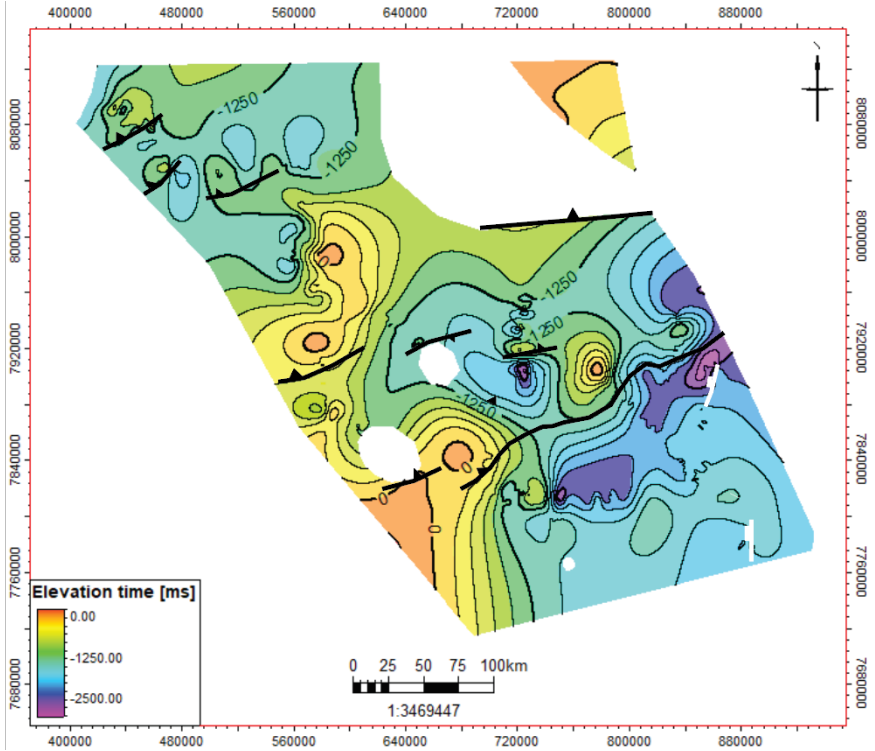
<Murphy to -10s>



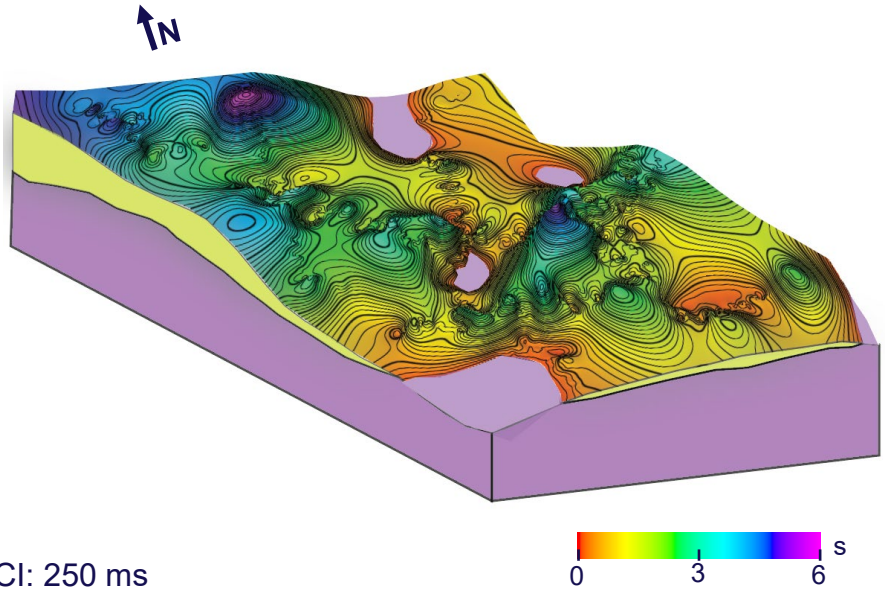
- Ages: ≥ 1850 Ma

Results

Leichhardt Super-Basin structural map (TWT)



Leichhardt Super-Basin thickness (TWT) <Leichhardt to Murphy>

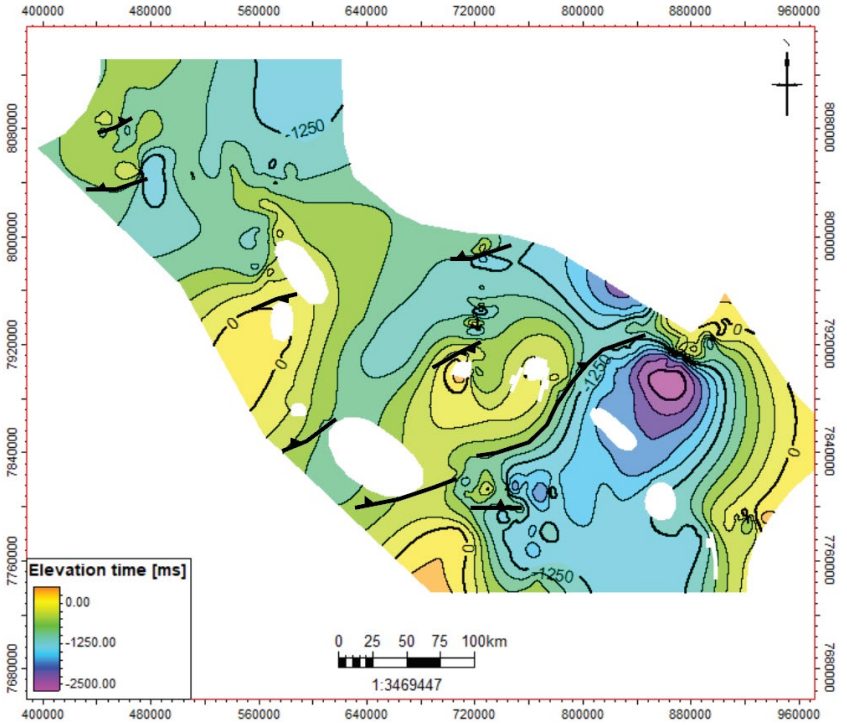


Cl: 250 ms

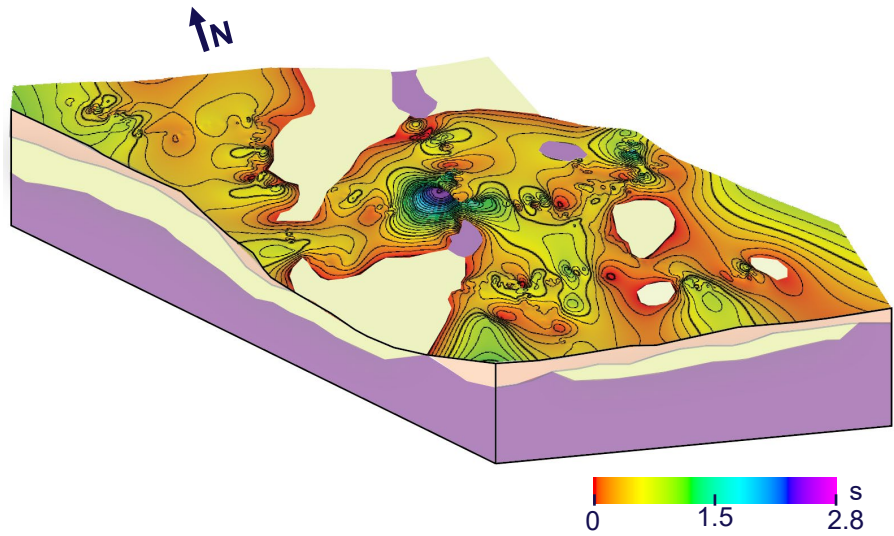
- Ages: 1800-1740 Ma
- Eq. to Seigal volcanics and base of Redbanck

Results

Calver Super-Basin structural map (TWT)



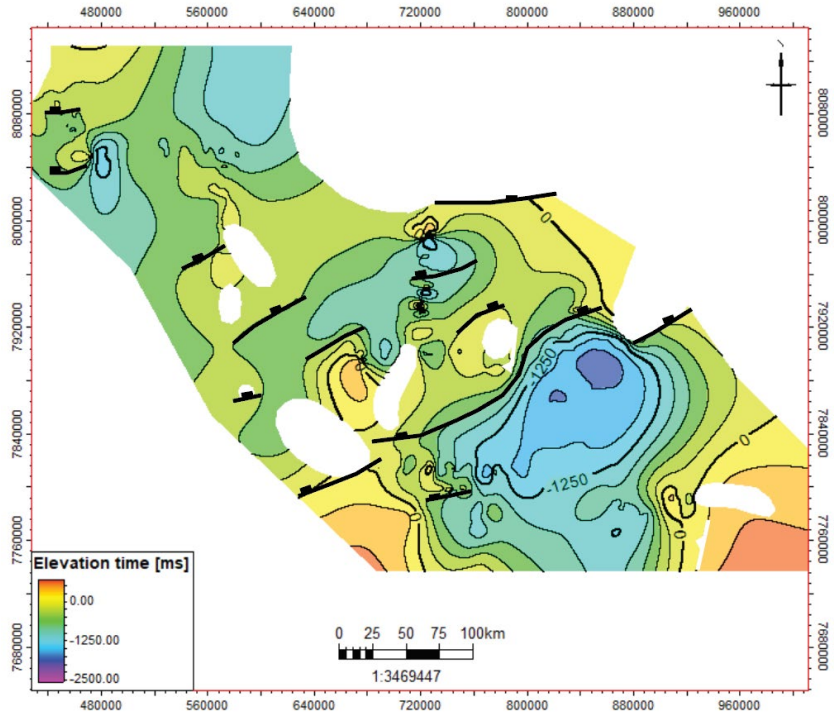
Calver Super-Basin thickness (TWT) <Calvert to Leichhardt to Murphy>



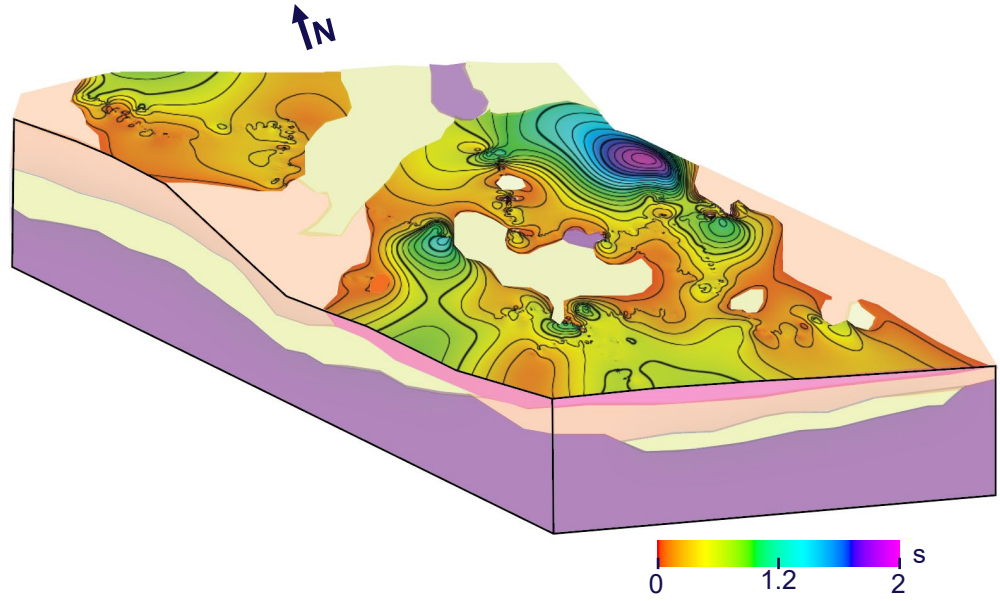
- Ages: 1730-1670 Ma
- Eq. to Nyanantu, Wollogorang, Settement and Wunumantya

Results

Isa Super-Basin structural map (TWT)



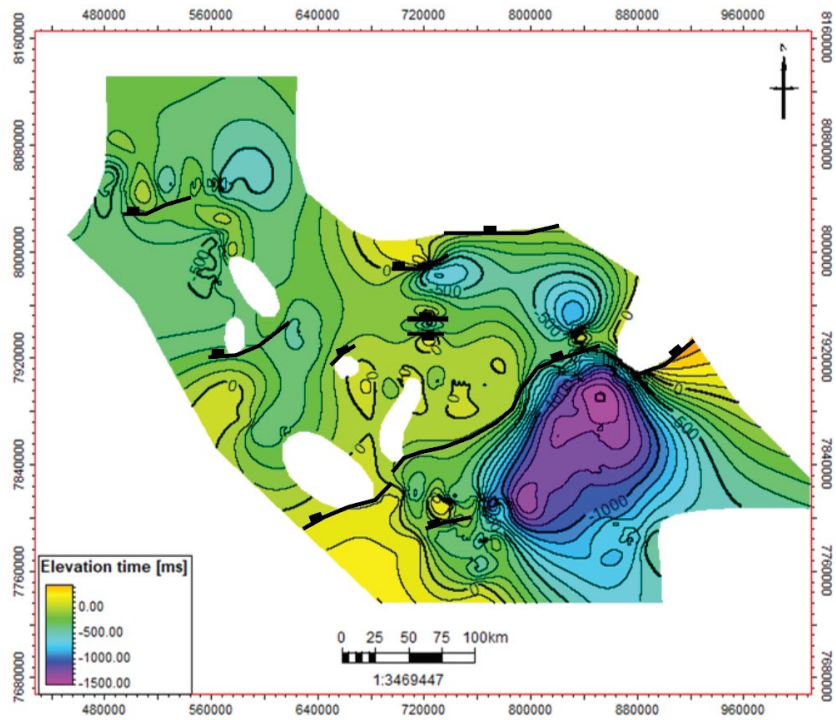
Isa Super-Basin thickness (TWT) <Isa to Calvert to Murphy>



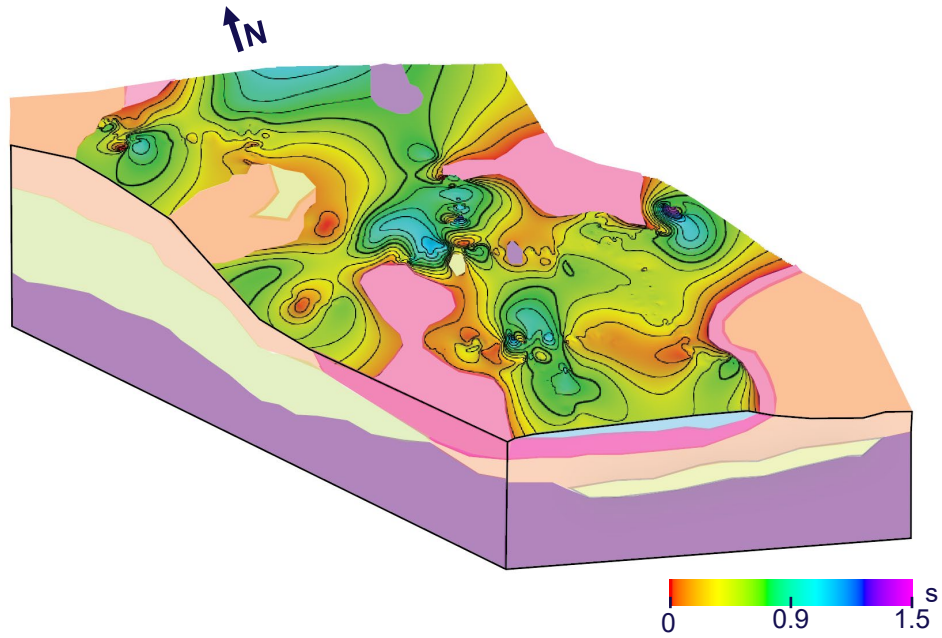
- Ages: 1660-1560 Ma
- Eq. to Nathan and Glyde Fm

Results

Roper Super-Basin structural map (TWT)



Roper Super-Basin thickness (TWT) <Isa to Calvert to Murphy>



- Ages: 1500-1270 Ma
- Eq. South Nicholson Group

Conclusions

1. Two distinctive fault systems:

- Normal: N and NNE strikes forming host-graben structures
- Inverted: E to NE strikes controlling deposition and erosion

2. Local changes in stratigraphy

- Basement: Changes in depth forming accumulation space at NW and central regions
- Leichhardt-Roper: Deposition depend on paleo-structure and controlled by inversion

Why is this important?

- Local changes in reservoirs/seal distribution (Thickness, facies distribution, etc)
- Multiple tectonic events and changes in fault displacement direction = Strong influence in fluid migration and trapping
- South Nicholson Basin likely to be a tectonic transition zone between Isa and McArthur



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