



Government of **Western Australia**
Department of **Mines and Petroleum**



The Murraba Basin: another piece of the Centralian Superbasin jigsaw puzzle falls into place

Peter Haines and Heidi Allen



Topics to cover

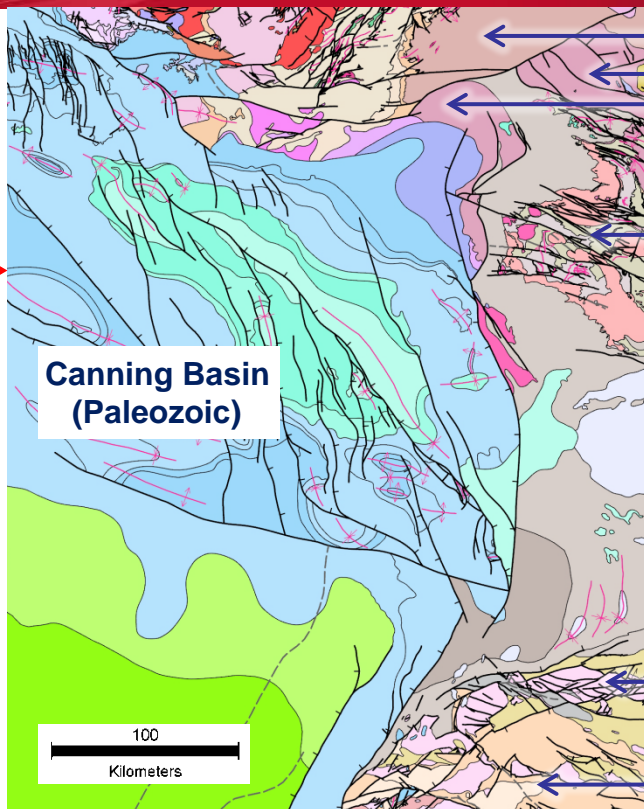


- Murraba Basin: what, where, why?
- Centralian Superbasin
- Previous stratigraphy and correlations
- Revised stratigraphy and correlations
- Implications for prospectivity (mostly hydrocarbon)
- Review previous detrital zircon data
- Tectonic implications
- Conclusions

Location



Extracted from GeoVIEW.WA



Wolfe Basin (Neoproterozoic)

Birrindudu Basin
(late Paleo – early
Mesoproterozoic)

Tanami region
(Paleoproterozoic)

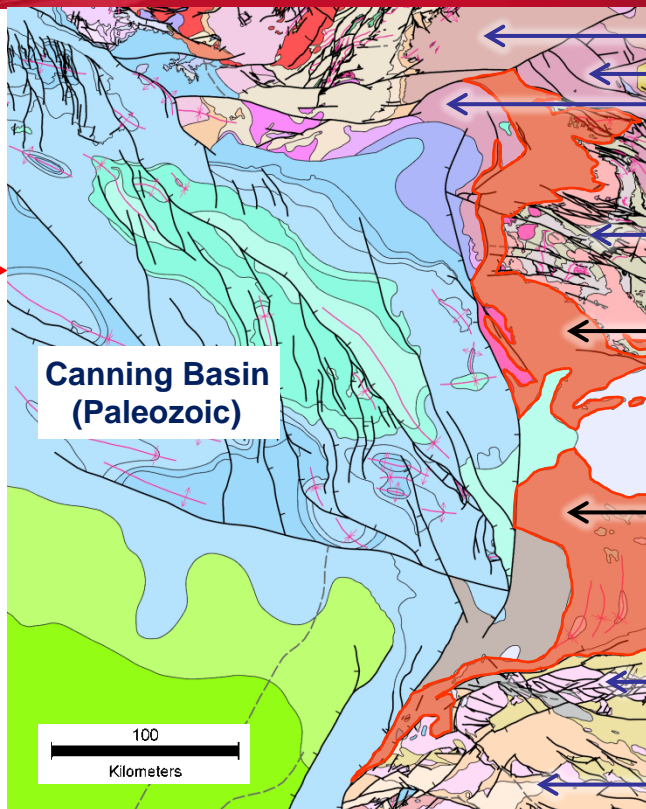
Arunta region
(mostly Paleoproterozoic)

Amadeus Basin
(mostly Neoproterozoic)

Location



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Wolfe Basin (Neoproterozoic)

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MURRABA BASIN

Redcliff Pound Group

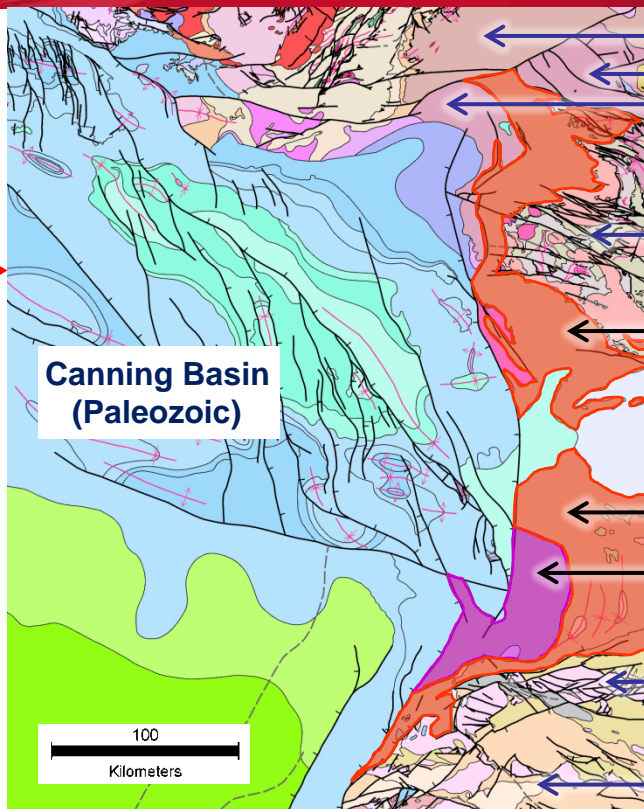
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MURRABA BASIN

Redcliff Pound Group

Hidden Basin beds

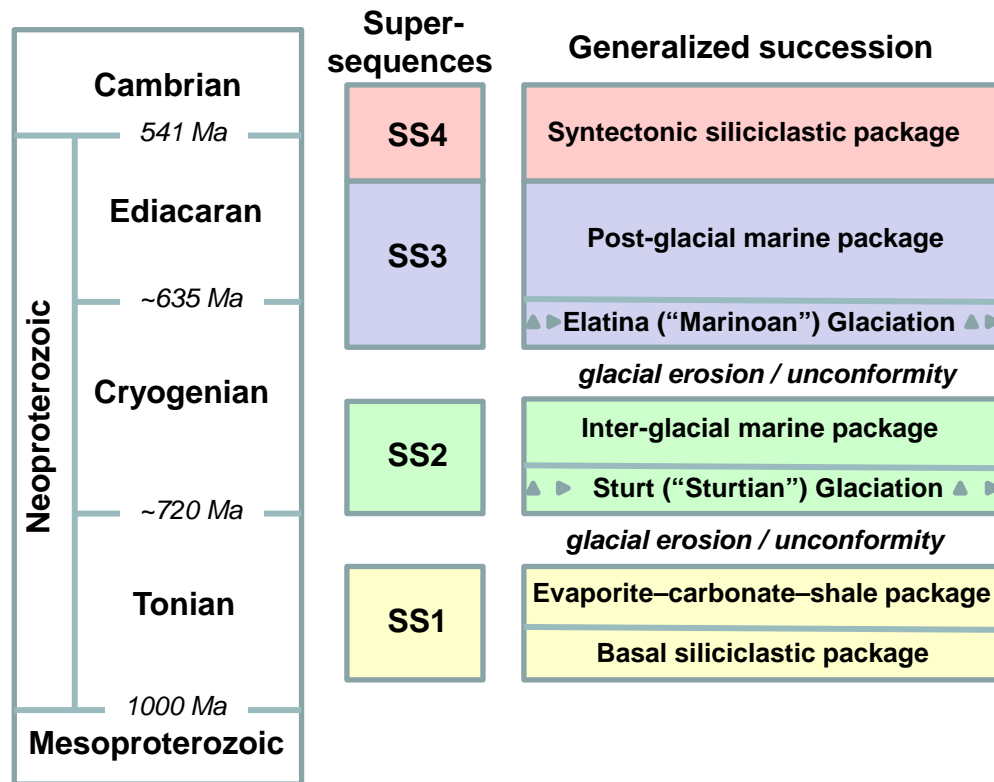
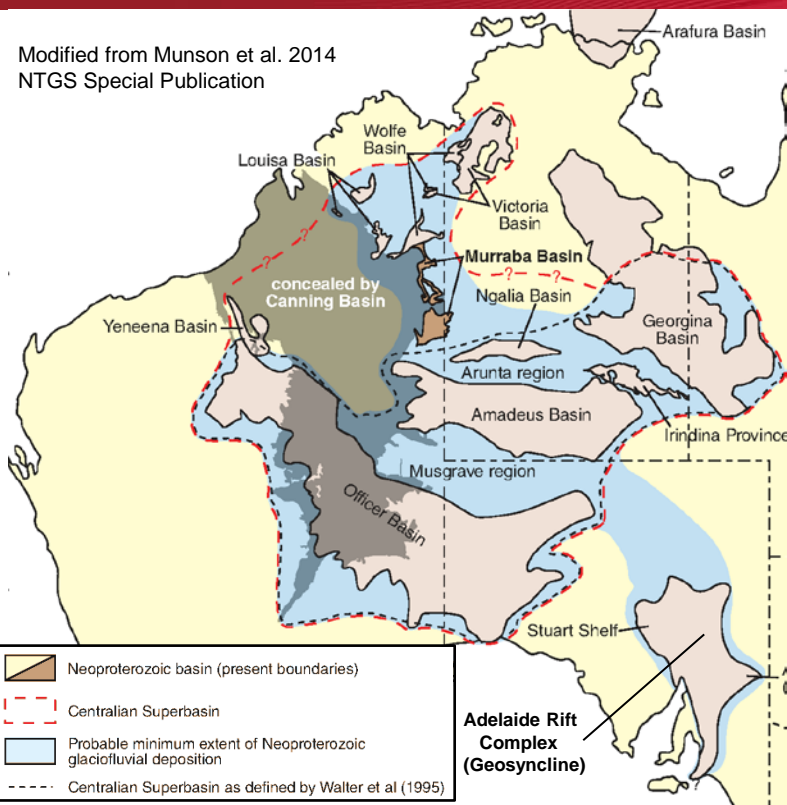
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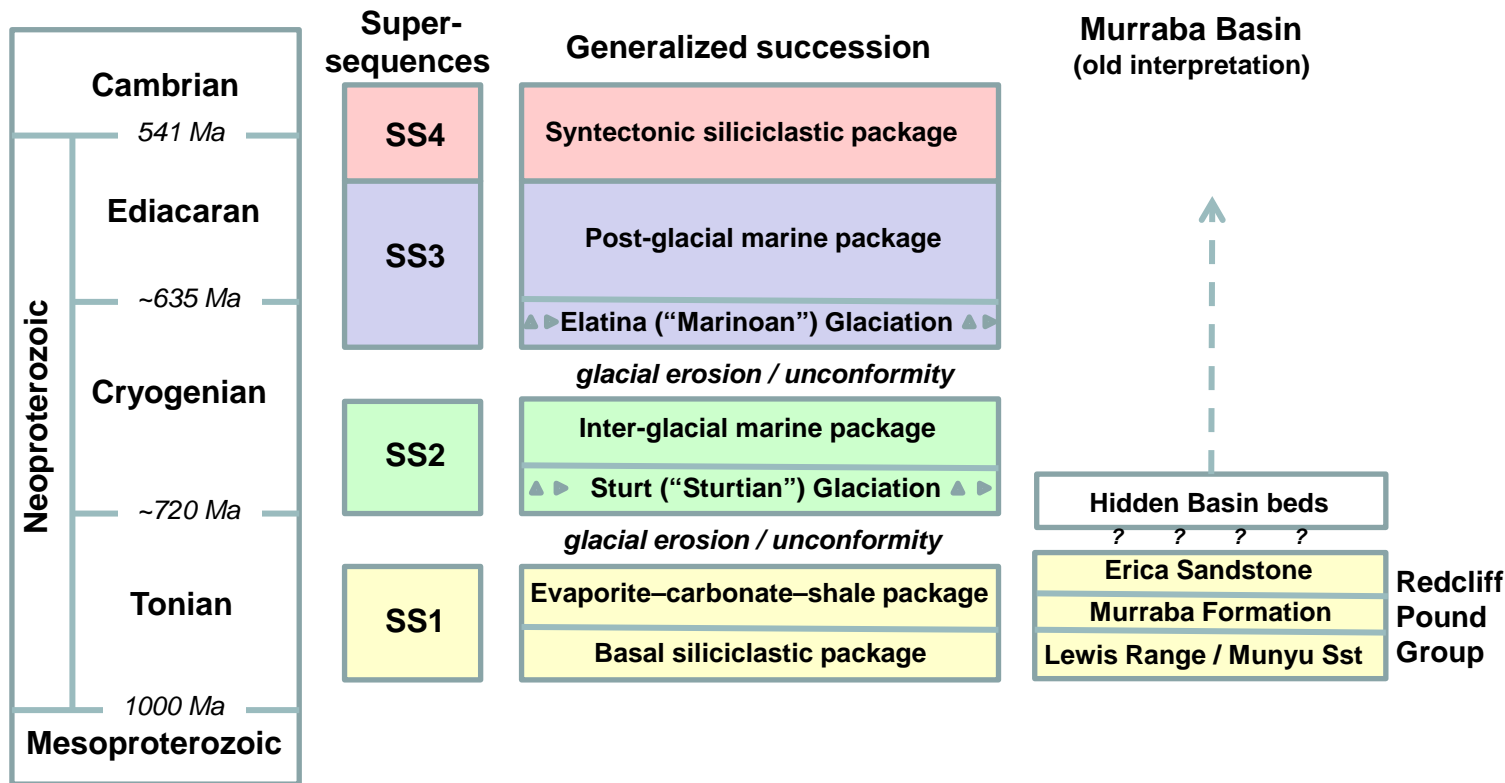
Centralian Superbasin



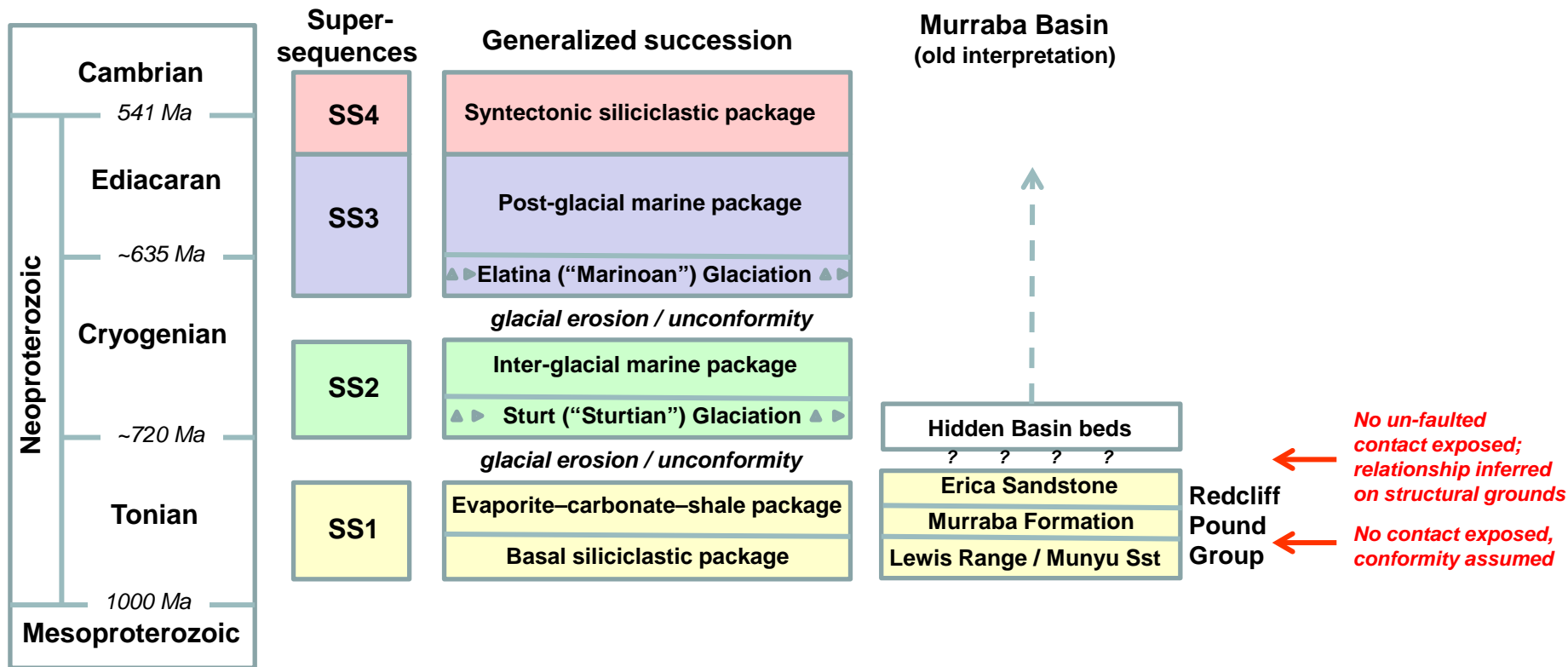
Modified from Munson et al. 2014
NTGS Special Publication



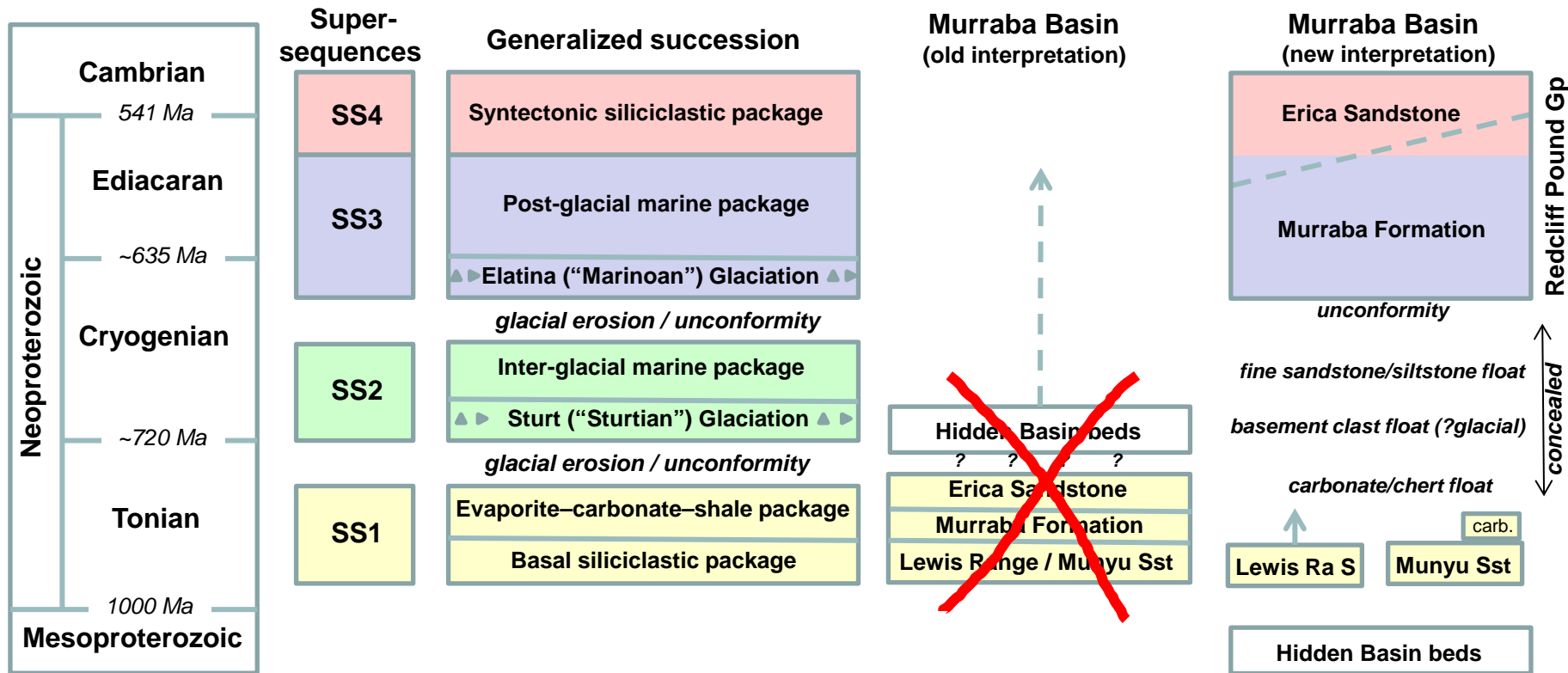
Centralian Superbasin



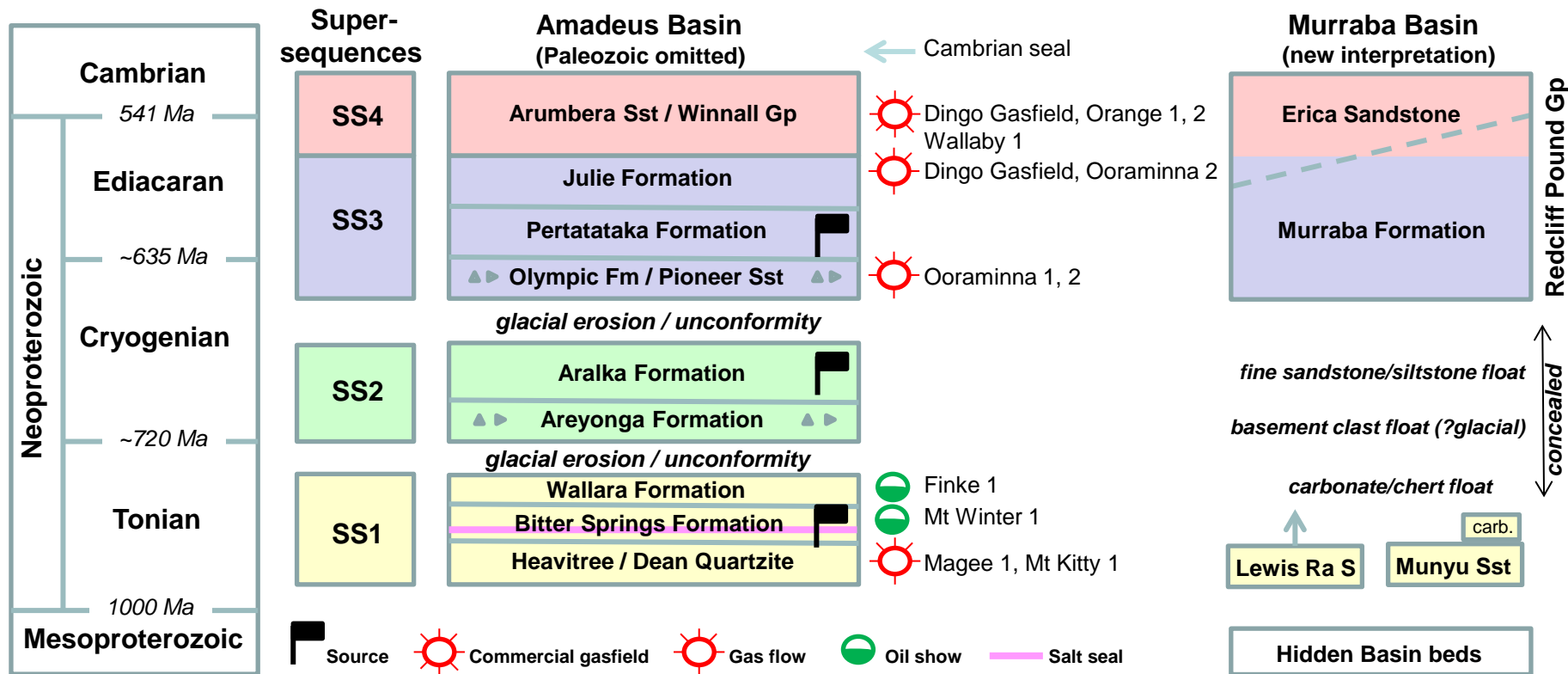
Centralian Superbasin



Centralian Superbasin



Hydrocarbon potential

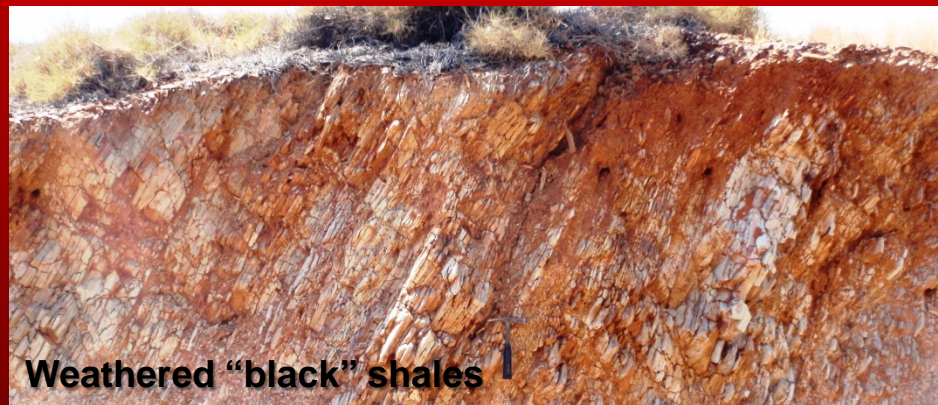


Hidden Basin beds (Birrindudu Basin?)



Quartzites dominate outcrop

>3000 m, 3700 km²



Munyu Sandstone



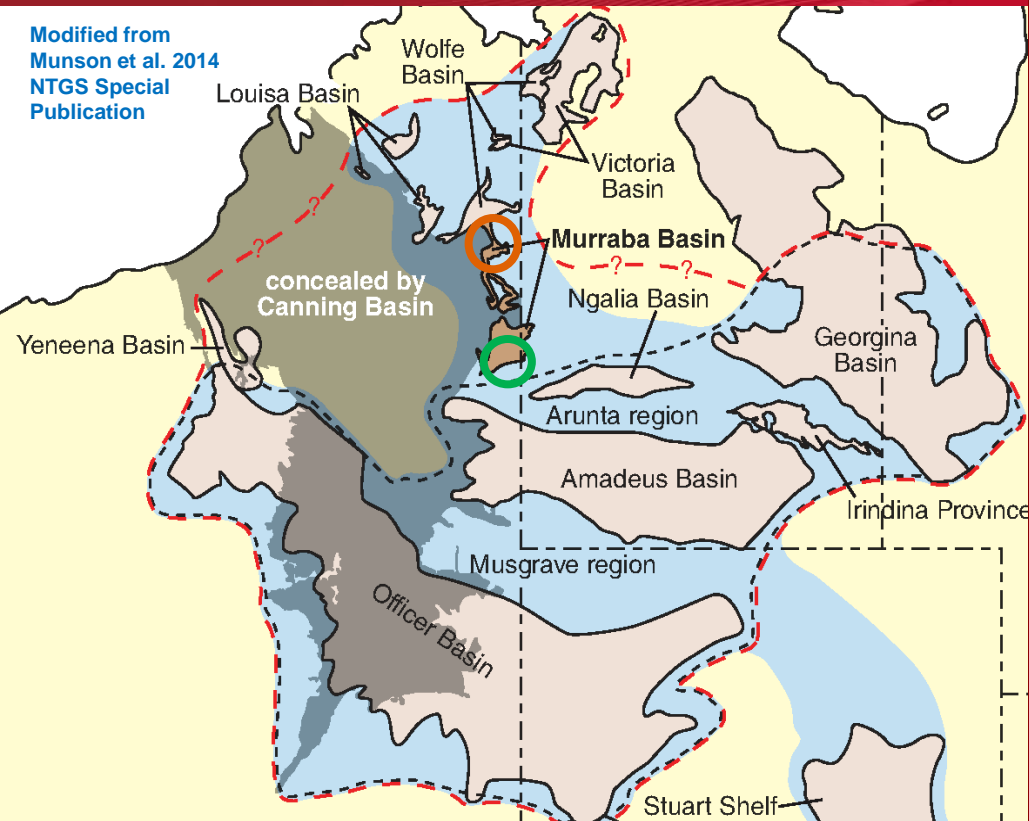
Lewis Range Sandstone



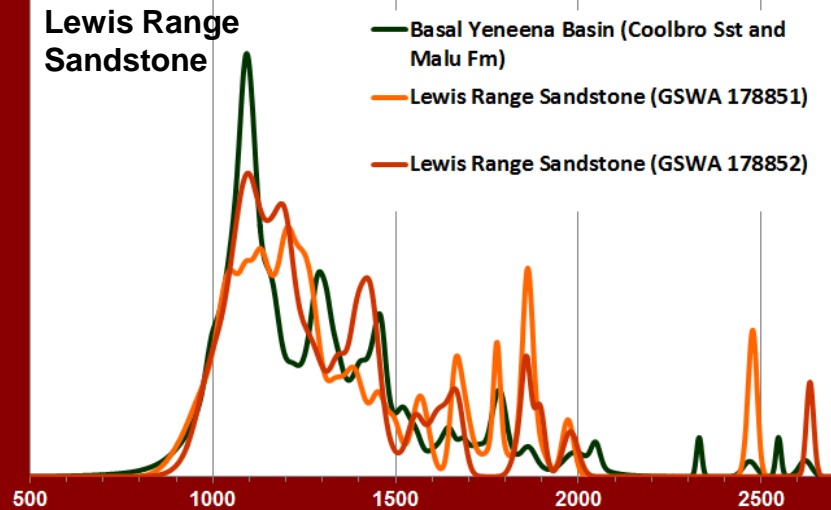
≤ 1000 m thick

Detrital zircon provenance

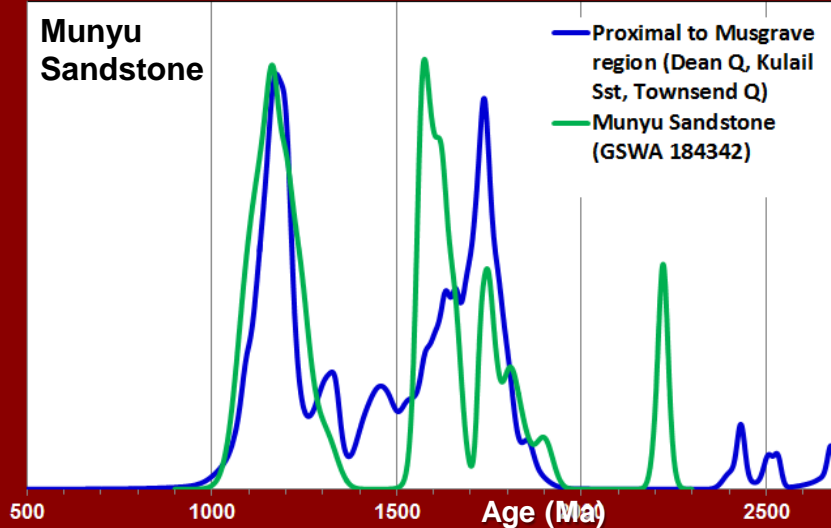
Modified from
Munson et al. 2014
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Publication



Lewis Range Sandstone

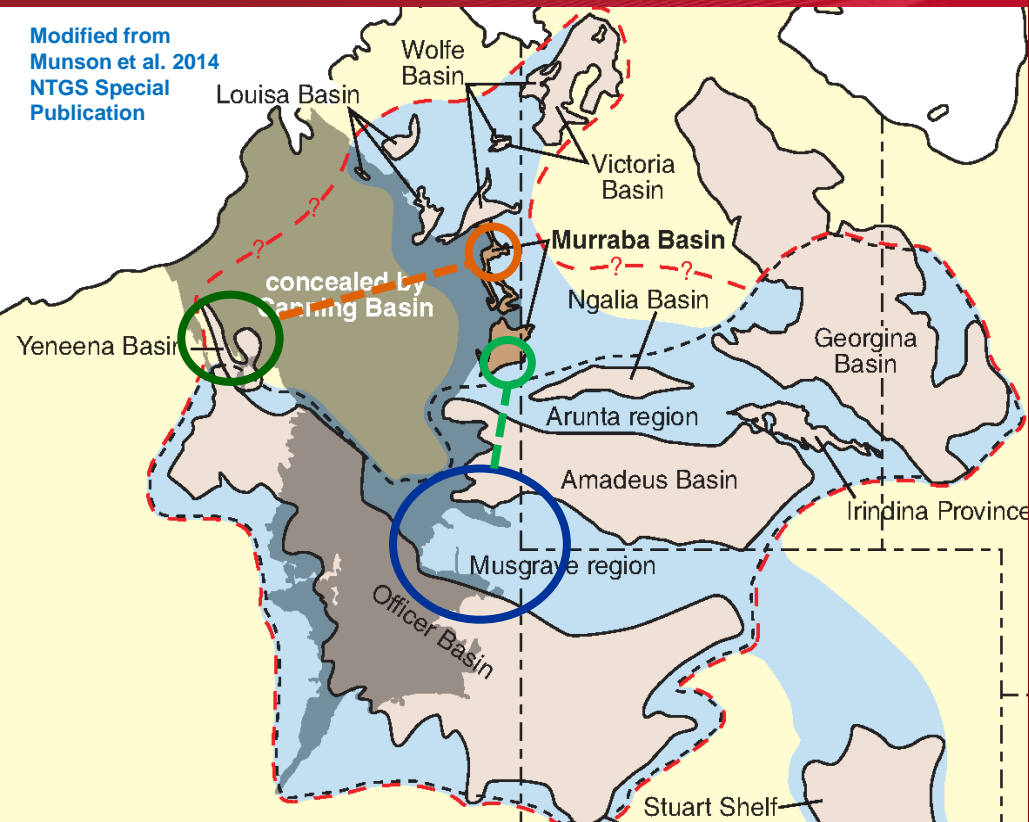


Munyu Sandstone



Detrital zircon provenance

Modified from
Munson et al. 2014
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Publication



Lewis Range Sandstone

Maximum
depositional
Age ~ 0.9 Ga

- Basal Yeneena Basin (Coolbro Sst and Malu Fm)
- Lewis Range Sandstone (GSWA 178851)
- Lewis Range Sandstone (GSWA 178852)

500

1000

1500

2000

2500

← Tanami
Basin
detritals →

Munyu Sandstone

Maximum
depositional
Age ~ 1 Ga

- Proximal to Musgrave region (Dean Q, Kulail Sst, Townsend Q)
- Munyu Sandstone (GSWA 184342)

500

1000

1500

Age (Ma)

2500

Musgrave

Arunta

Unconformity at base Murraba Formation



What's below the Murraba Formation



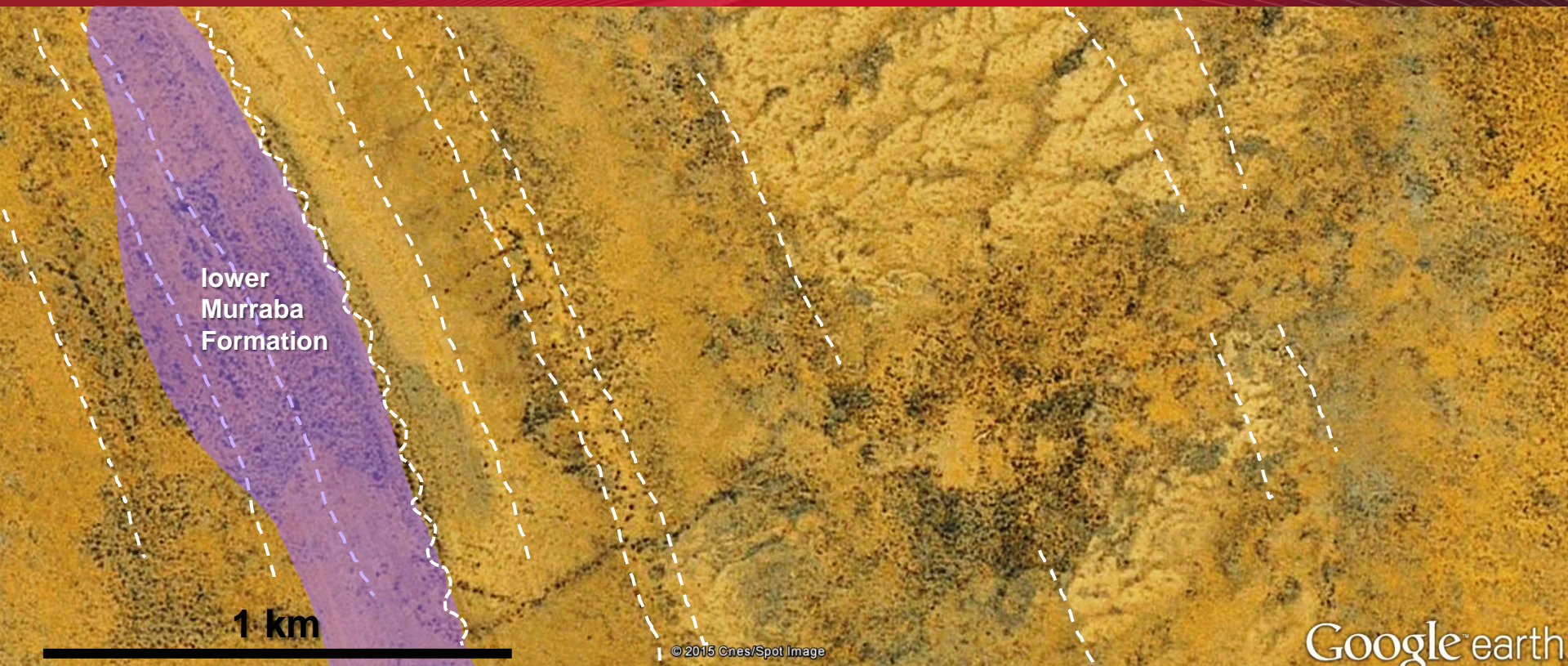
lower
Murraba
Formation

1 km

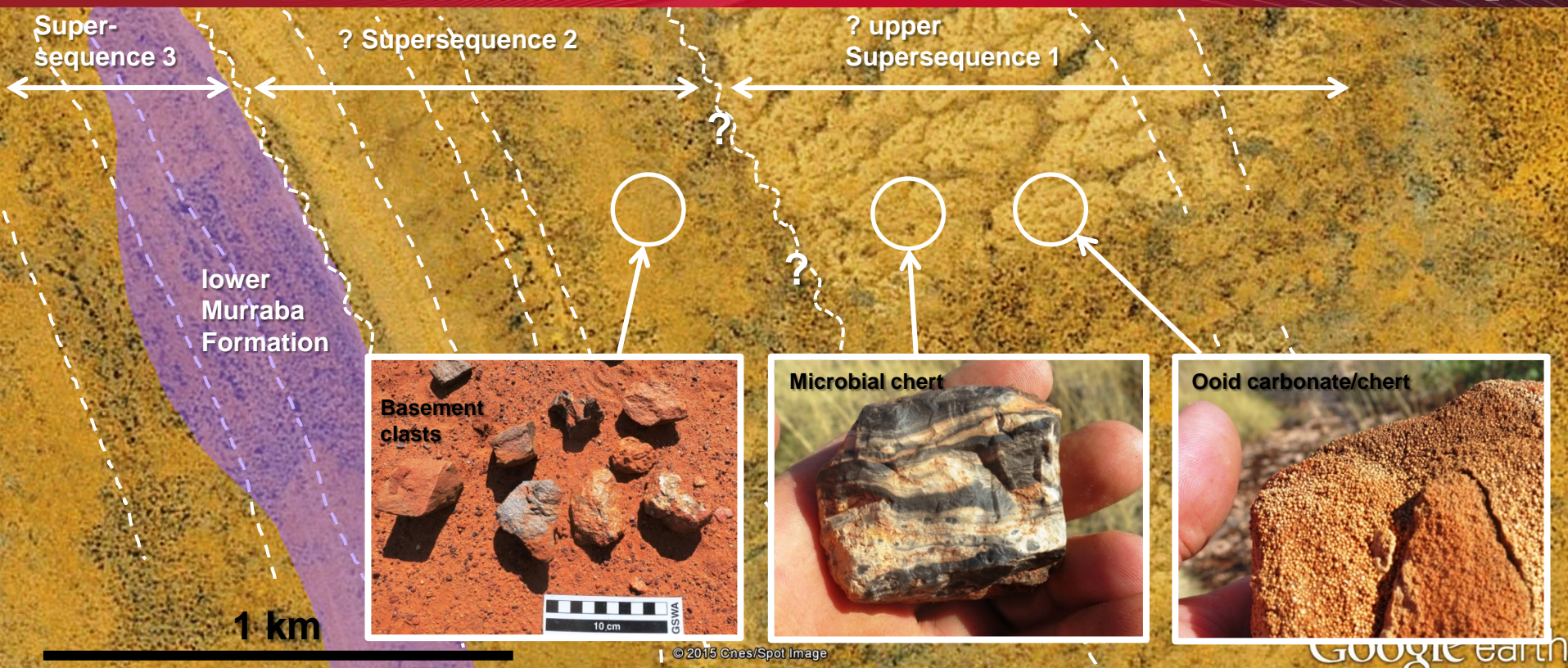
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Google earth

What's below the Murraba Formation



What's below the Murraba Formation



© 2015 Cnes/Spot Image

Murraba Fm / Erica Sst (redefined Redcliff Pound Group)



Murraba Fm: shallow marine



Murraba/Erica: red, deltaic - fluvial



Erica Sst: eolian sandstone

Murraba Fm / Erica Sst (redefined Redcliff Pound Group)



Murraba Fm: shallow marine

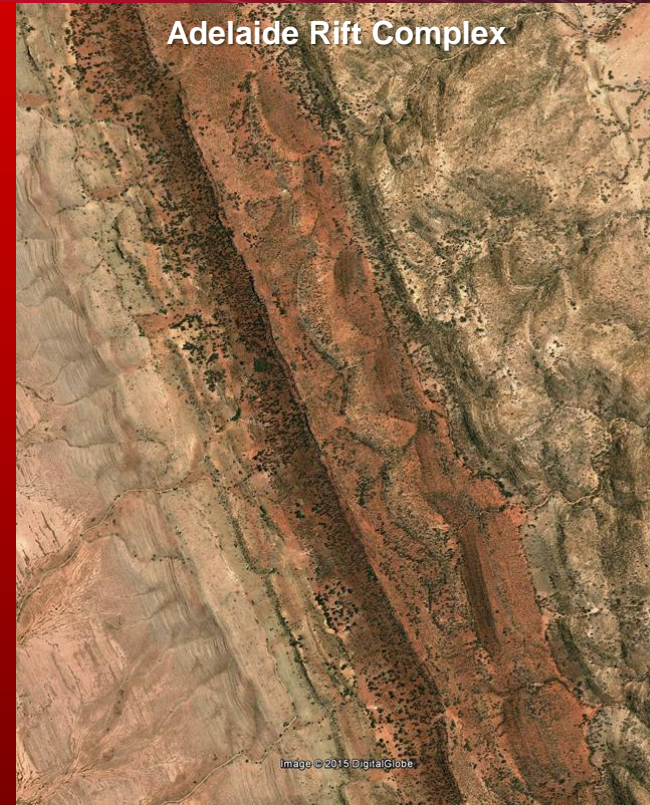
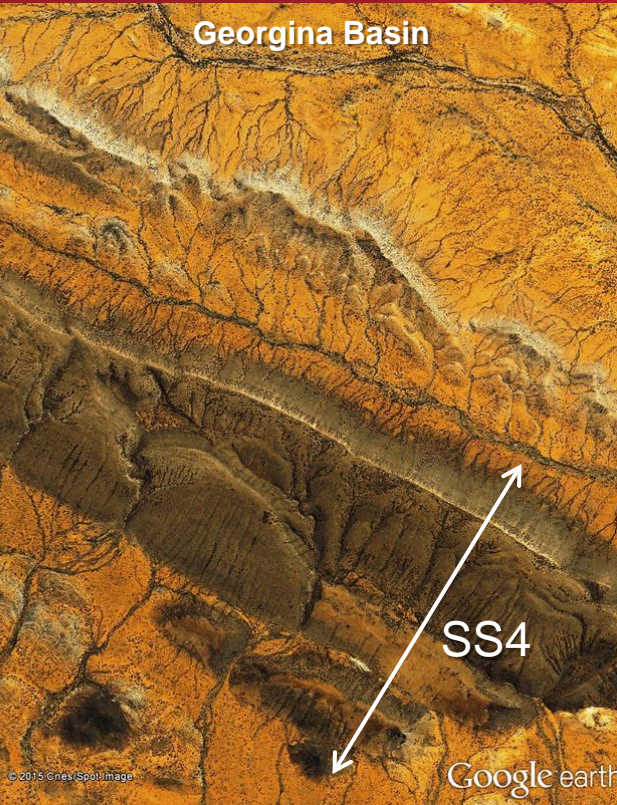


Murraba/Erica: red, deltaic - fluvial



Erica Sst: eolian sandstone

Red syntectonic sediments (Supersequence 4)



Supersequence 4 biogenic structures



Planolites, Murraba Fm



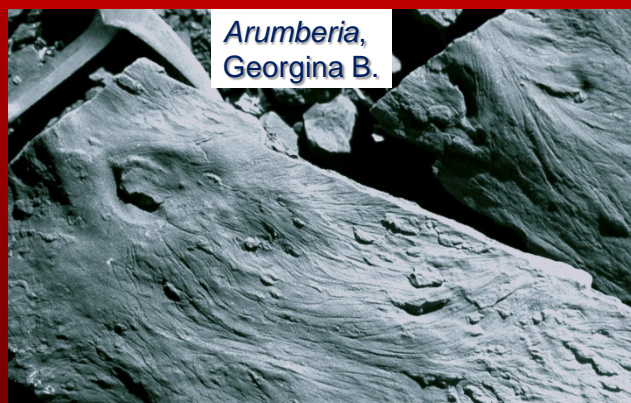
Planolites, Georgina B.



Planolites, Georgina Basin
Walter et al. (1989)



Arumberia, Murraba Fm

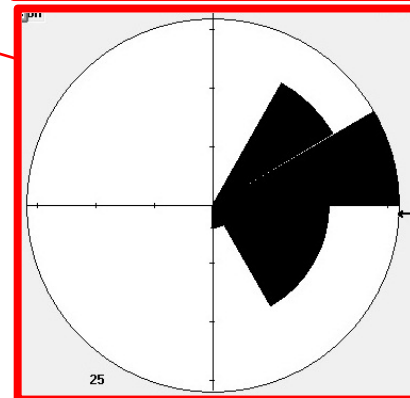
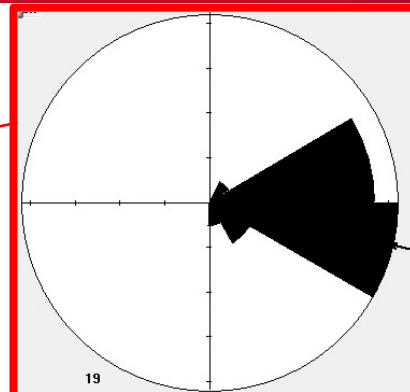
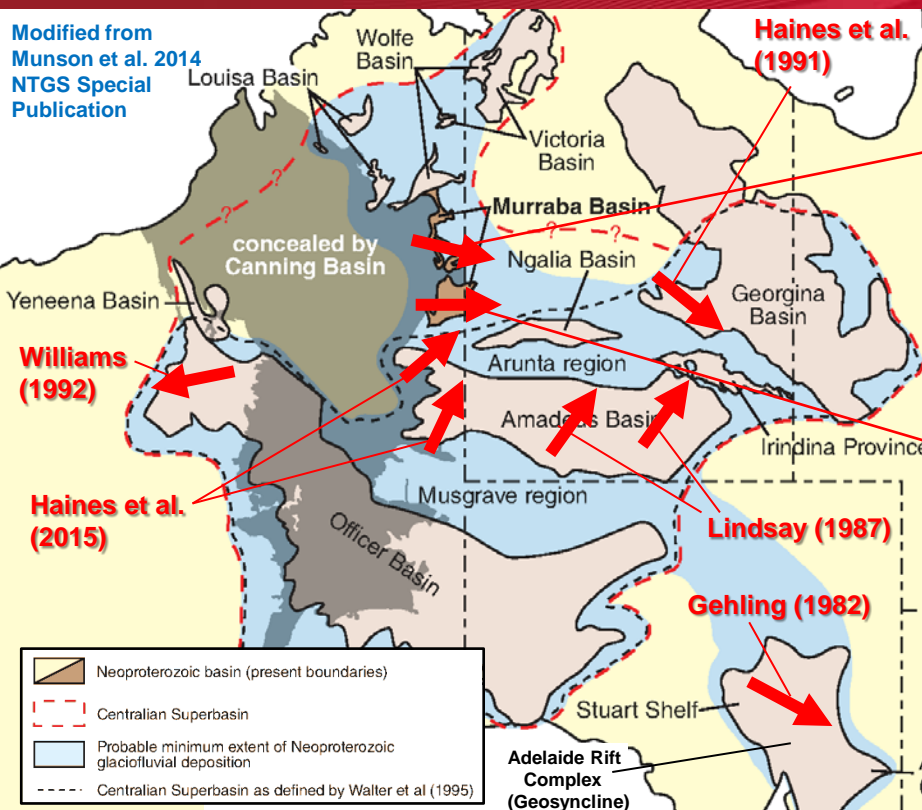


Arumberia,
Georgina B.



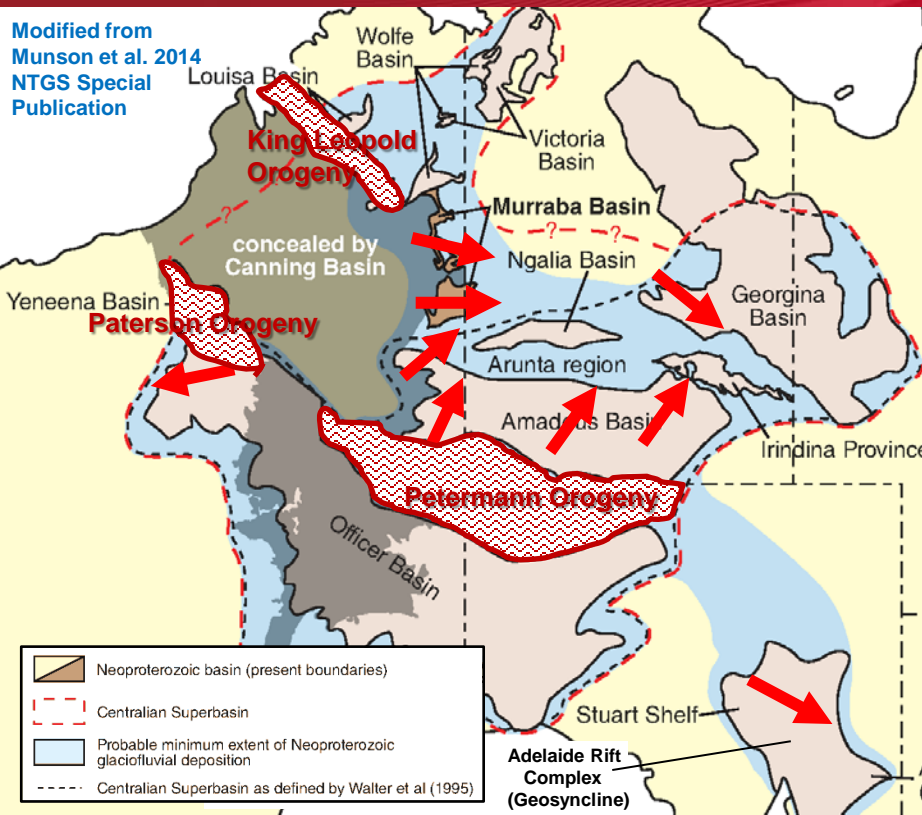
Arumberia, Amadeus B.
Glaessner & Walter (1975)

Paleocurrents

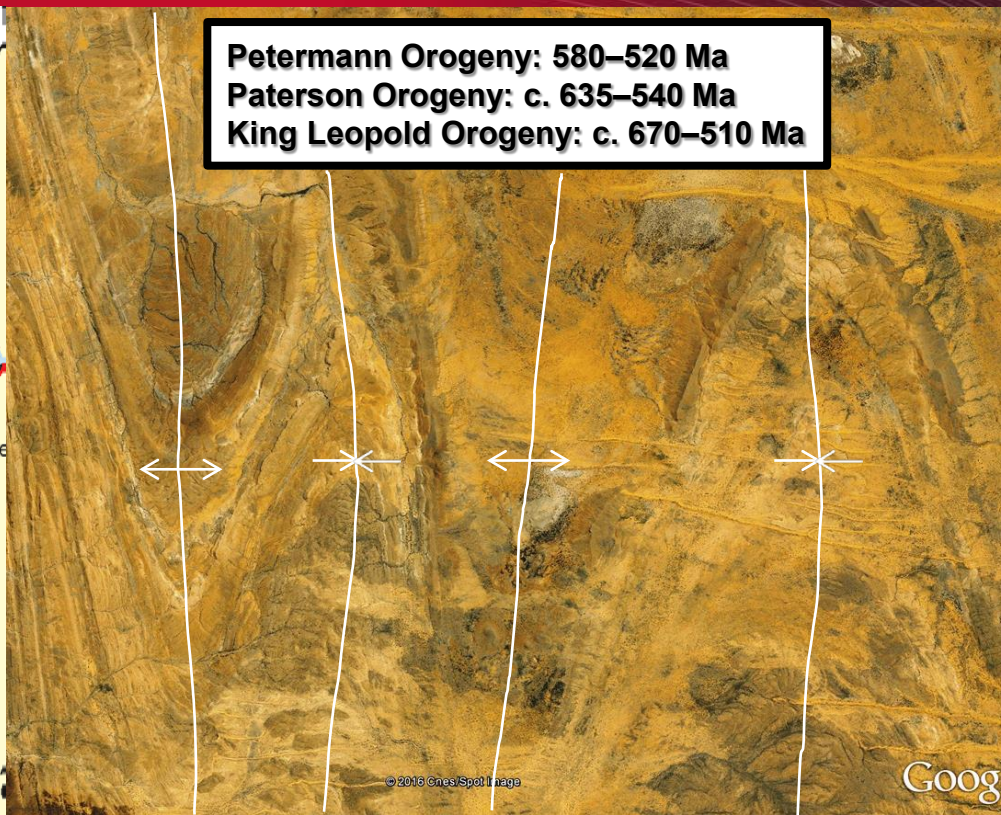


Mean paleocurrent direction for Supersequence 4 fluvio-deltaic sandstone facies

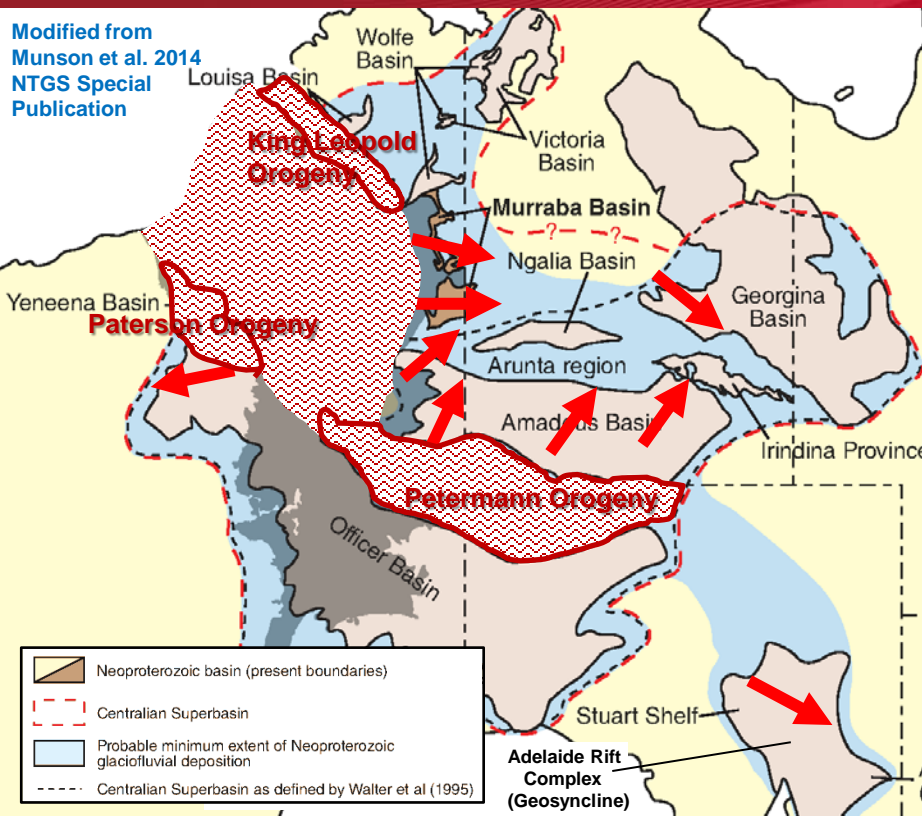
Paleocurrents and tectonism



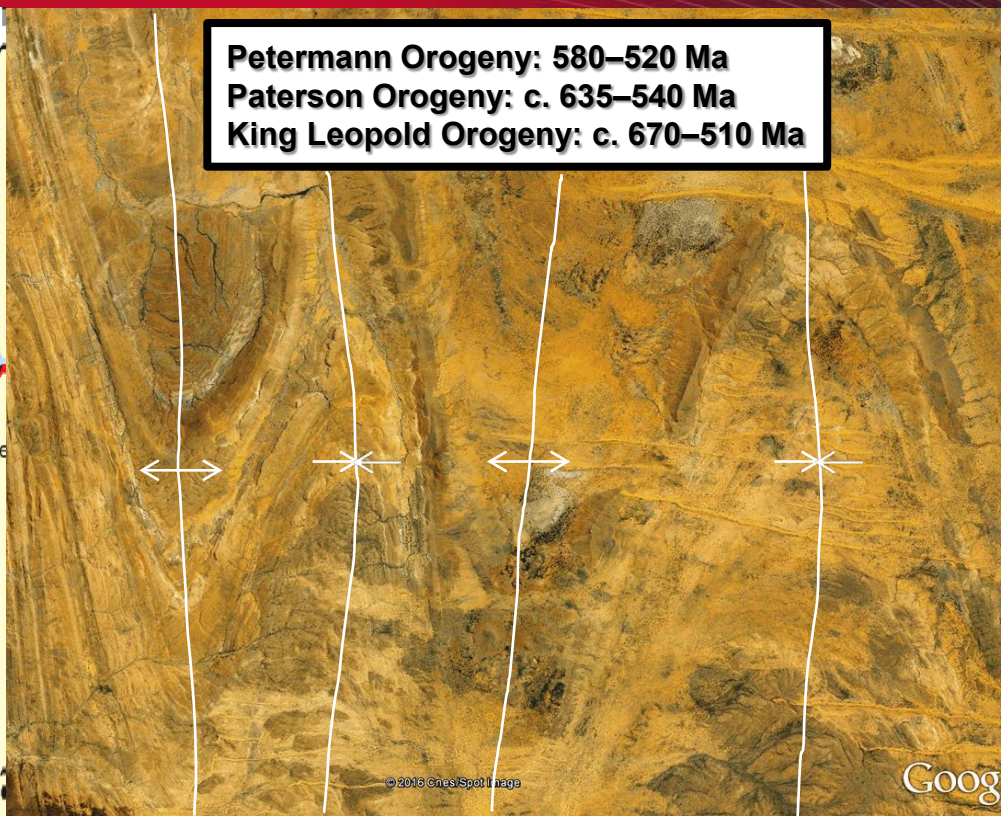
Petermann Orogeny: 580–520 Ma
Paterson Orogeny: c. 635–540 Ma
King Leopold Orogeny: c. 670–510 Ma



Paleocurrents and tectonism



Petermann Orogeny: 580–520 Ma
Paterson Orogeny: c. 635–540 Ma
King Leopold Orogeny: c. 670–510 Ma



Conclusions



- Hidden Basin beds probably pre-Murraba; perhaps Birrindudu Basin
- Murraba Basin has a much more complete Neoproterozoic Centralian Superbasin succession than previously thought
- Youngest component are syntectonic with Petermann, Paterson, King Leopold Orogenies and may extend into Cambrian
- Suggestion of a linkage of tectonic provinces beneath the Canning Basin
- Similar Neoproterozoic stratigraphy to the Amadeus Basin allows the possibility of similar hydrocarbon systems

Acknowledgments



- Ngururrpa Traditional Owners for allowing access
- Regolith Geochem Group for hospitality and logistics

