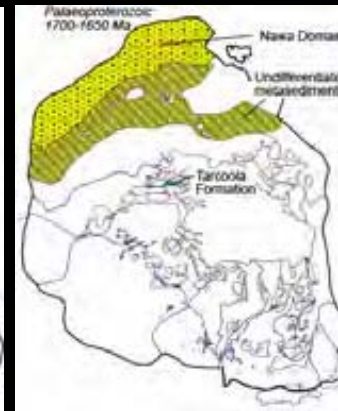


Towards a tectonic framework for the Gawler Craton



Martin Hand Justin
Payne, Greg Swain,
Karin Barovich, Rian
Dutch, Anthony Reid,
Mike Schwarz

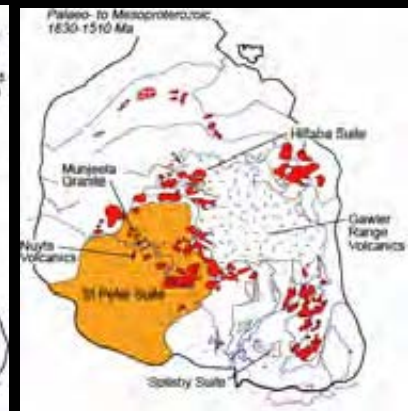
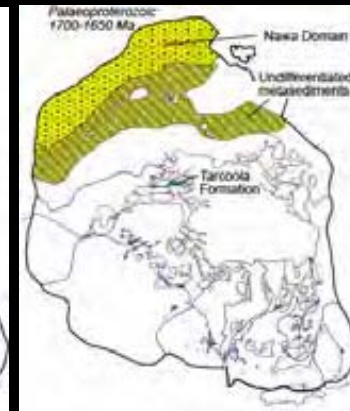


Towards a tectonic framework for the Gawler Craton

The tectonic evolution of the Gawler Craton is defined by two periods of tectonism both of which lead to apparent cratonisation.



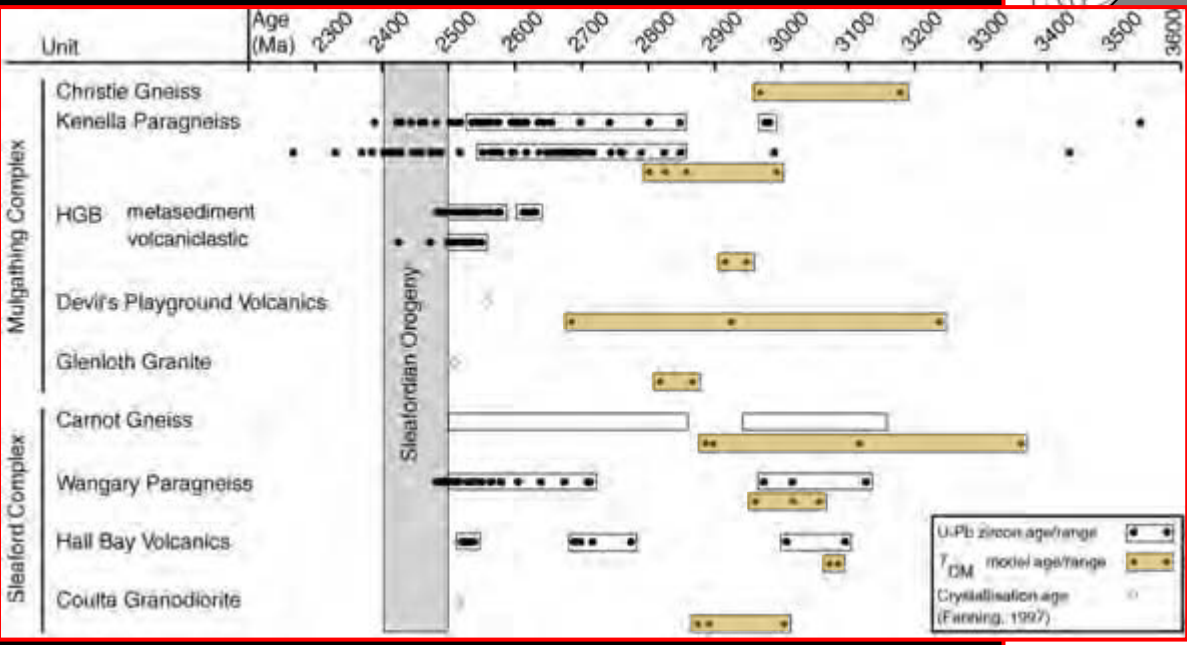
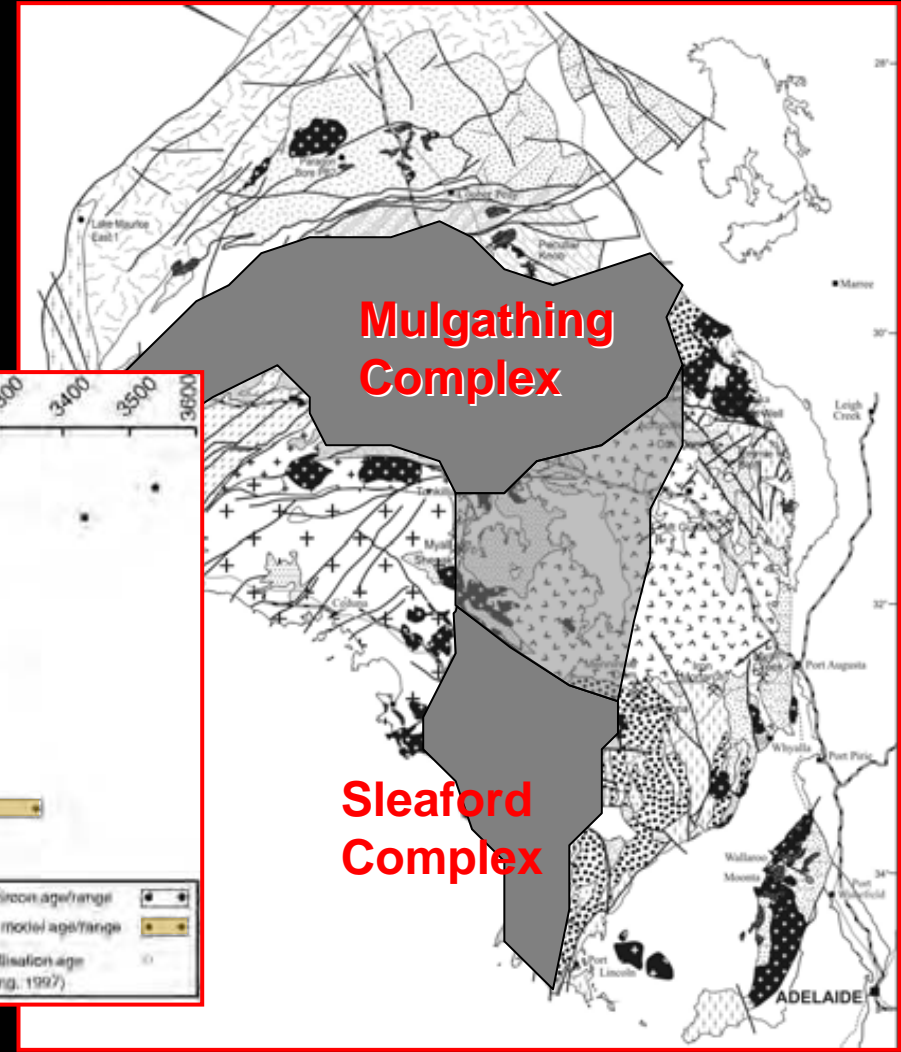
Do the lithostratigraphic components in the Gawler represent “insitu” craton building, or are there major, or even plate-scale boundaries within the craton?



Towards a tectonic framework for the Gawler Craton

Late Archaean-Early Palaeoproterozoic: 2550-2400 Ma

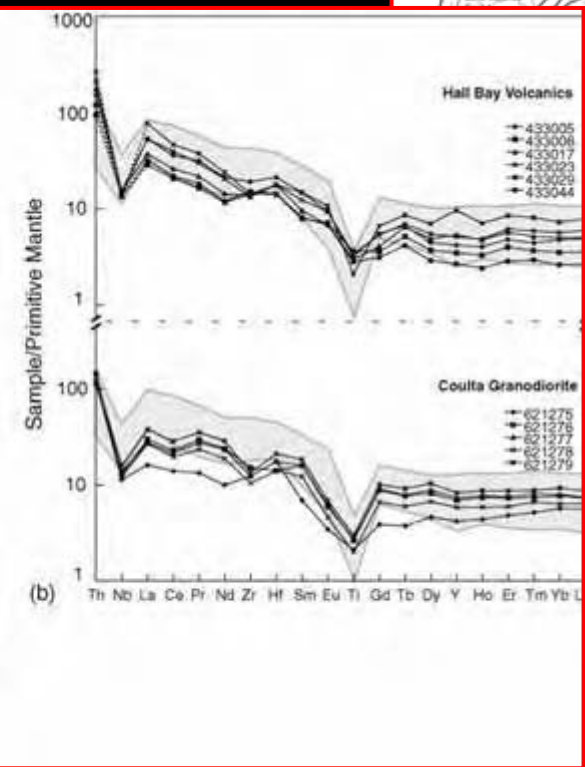
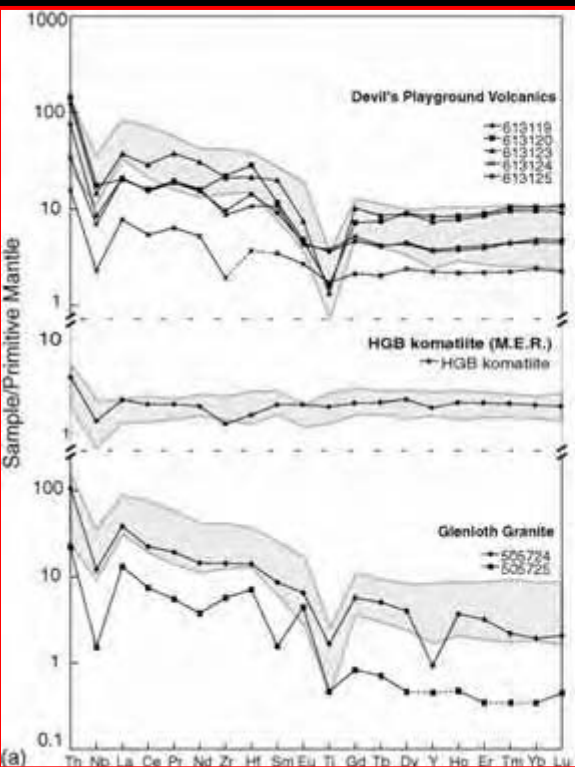
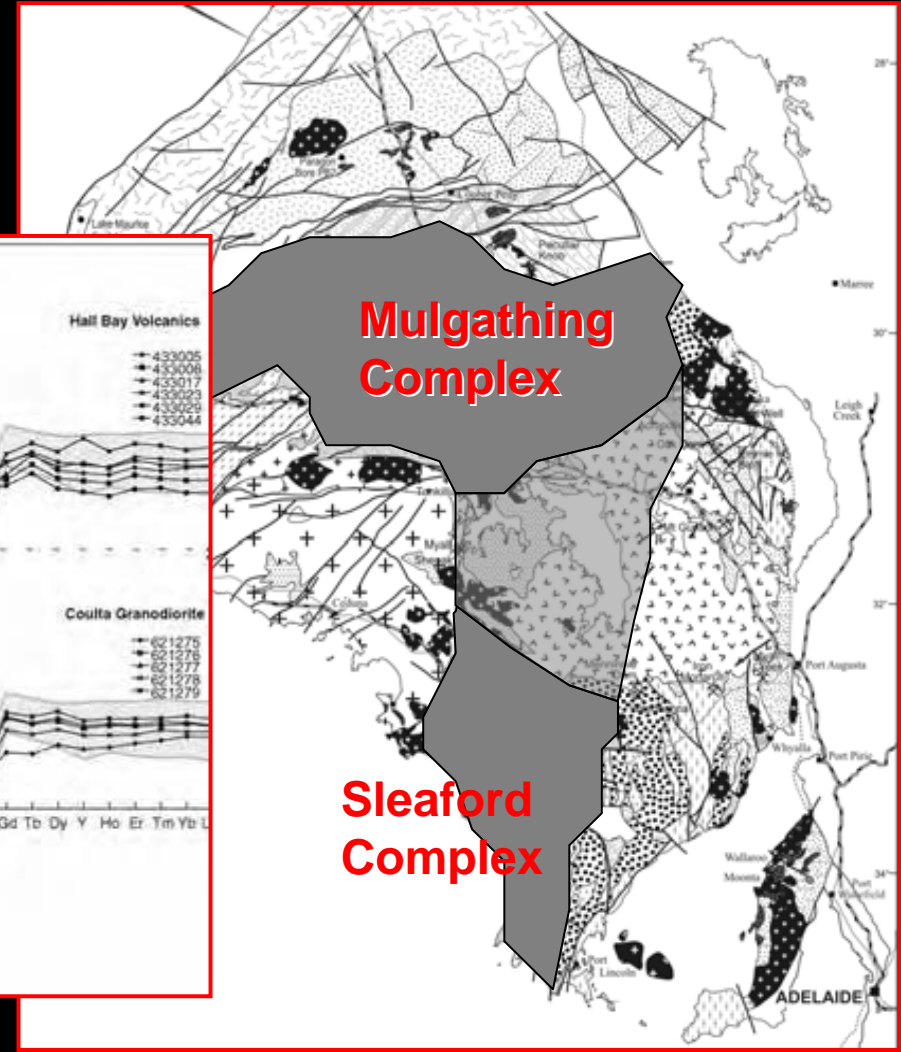
- 2.55-2.51 Ga: Rift-related sequences derived from late Archaean crust, minor BIF's.



Towards a tectonic framework for the Gawler Craton

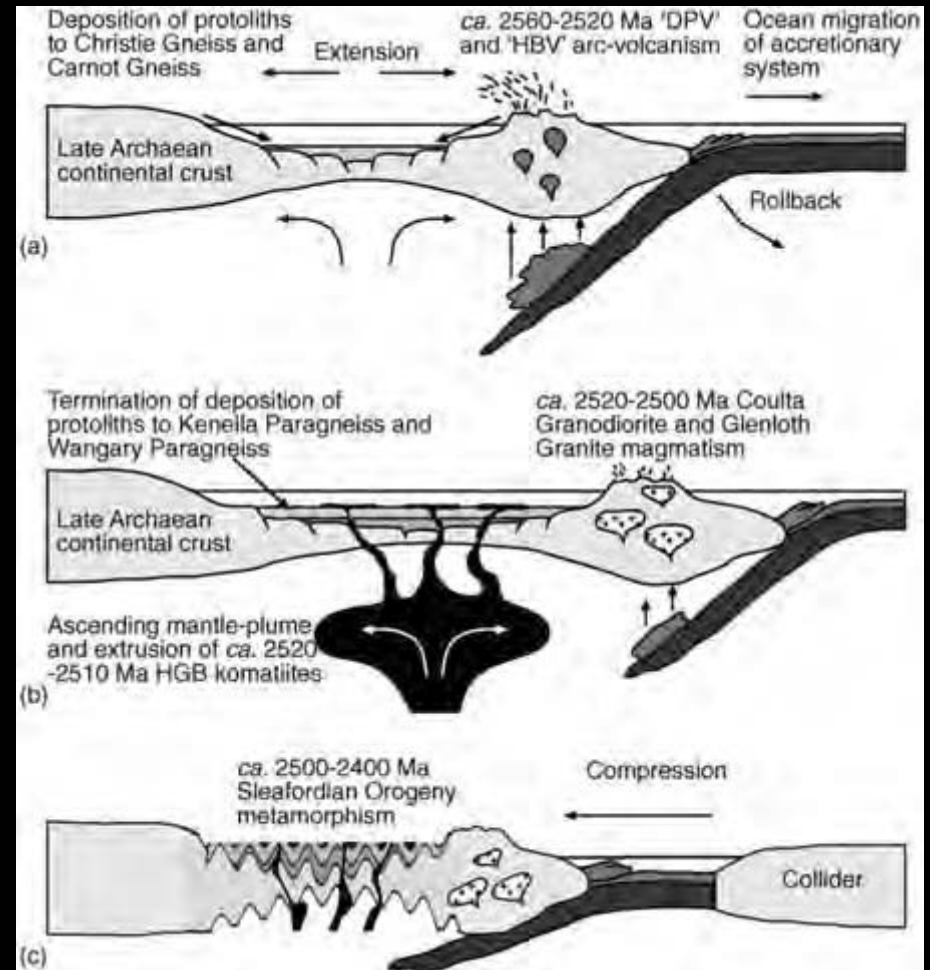
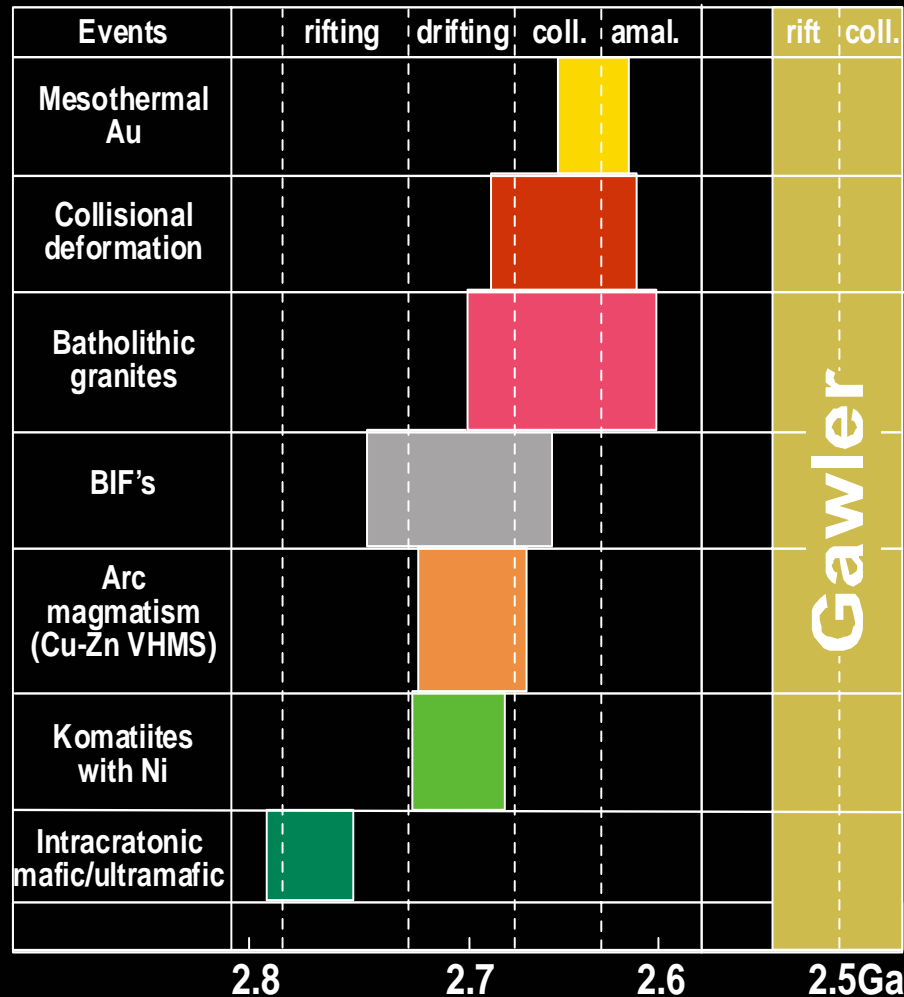
Late Archaean-Early Palaeoproterozoic: 2550-2400 Ma

2.55-2.51 Ga: Arc-related and arc-rift magmatism.



Towards a tectonic framework for the Gawler Craton

Late Archaean-Early Palaeoproterozoic (2.55-2.4 Ga)

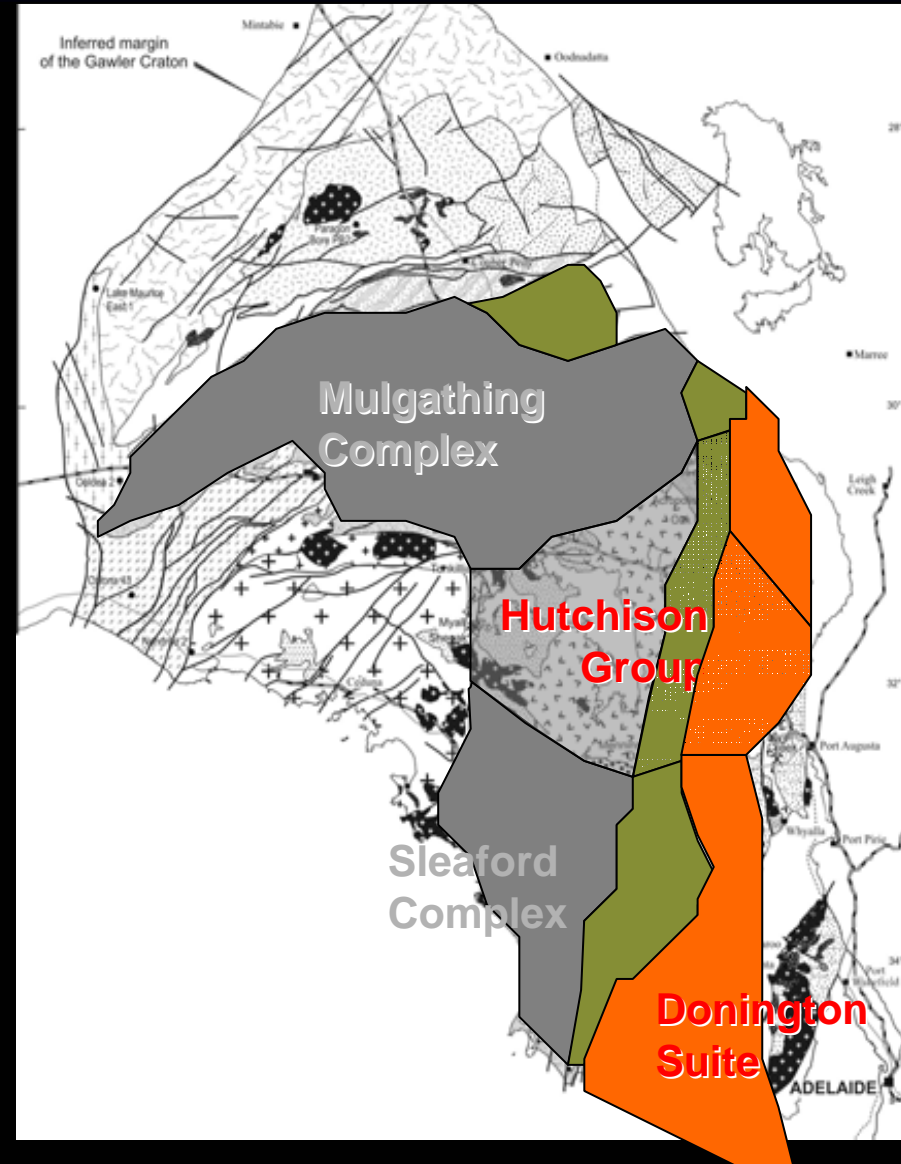


Towards a tectonic framework for the Gawler Craton

Megacycle 2

1.9-1.85 Ga

- Initiated by basin development on rifted late Archaean basement.
- Terminated by regional high-T compressional deformation magmatism and crustal extension (1.85 Ga).



Towards a tectonic framework for the Gawler Craton

Megacycle 2

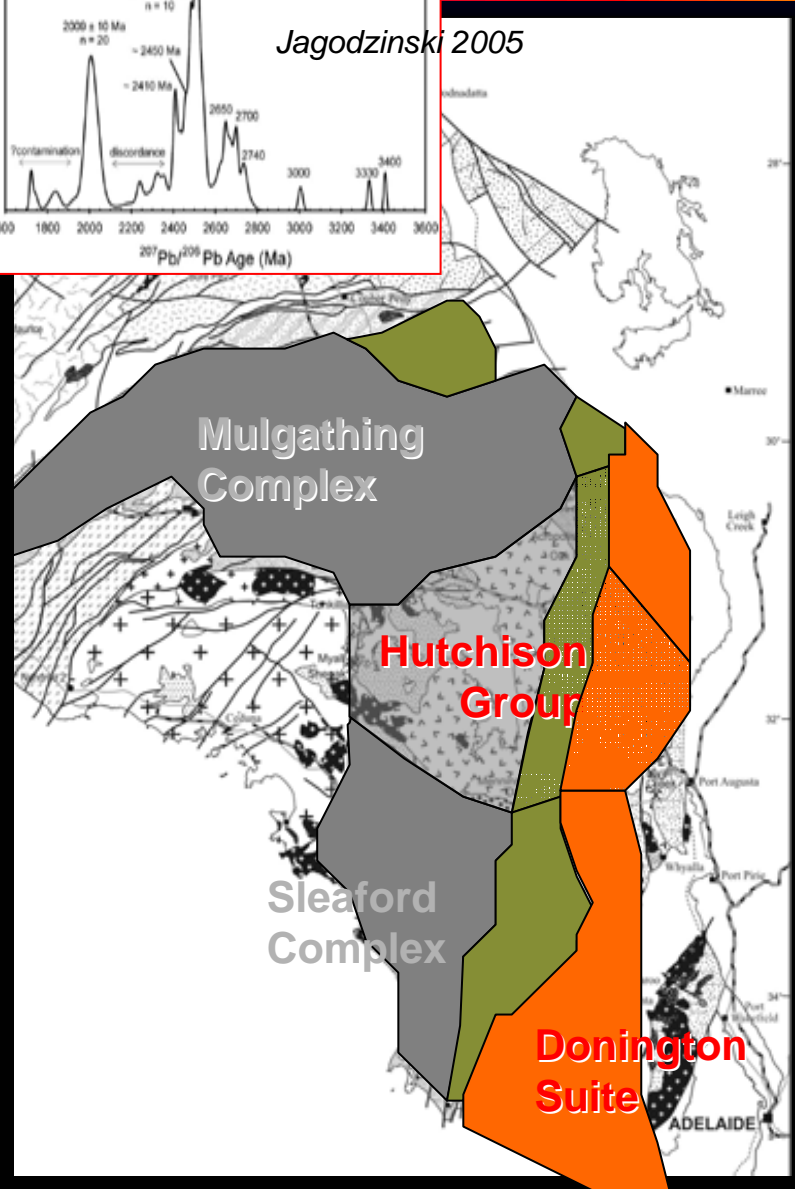
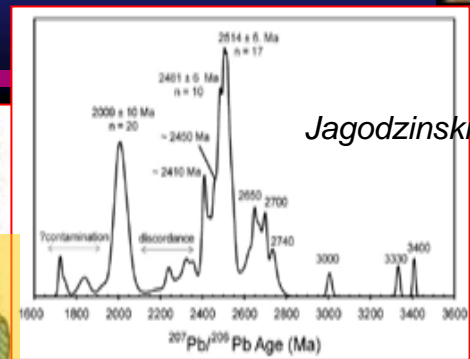
1.9-1.85 Ga:
Hutchison Group

Is there a major stratigraphic break?

Initial ϵ_{Nd} values range between -3.8 to +2.7

Initial ϵ_{Nd} values range between -9.4 to -8.4

2000, 2440, 2520 and 2720 Ma

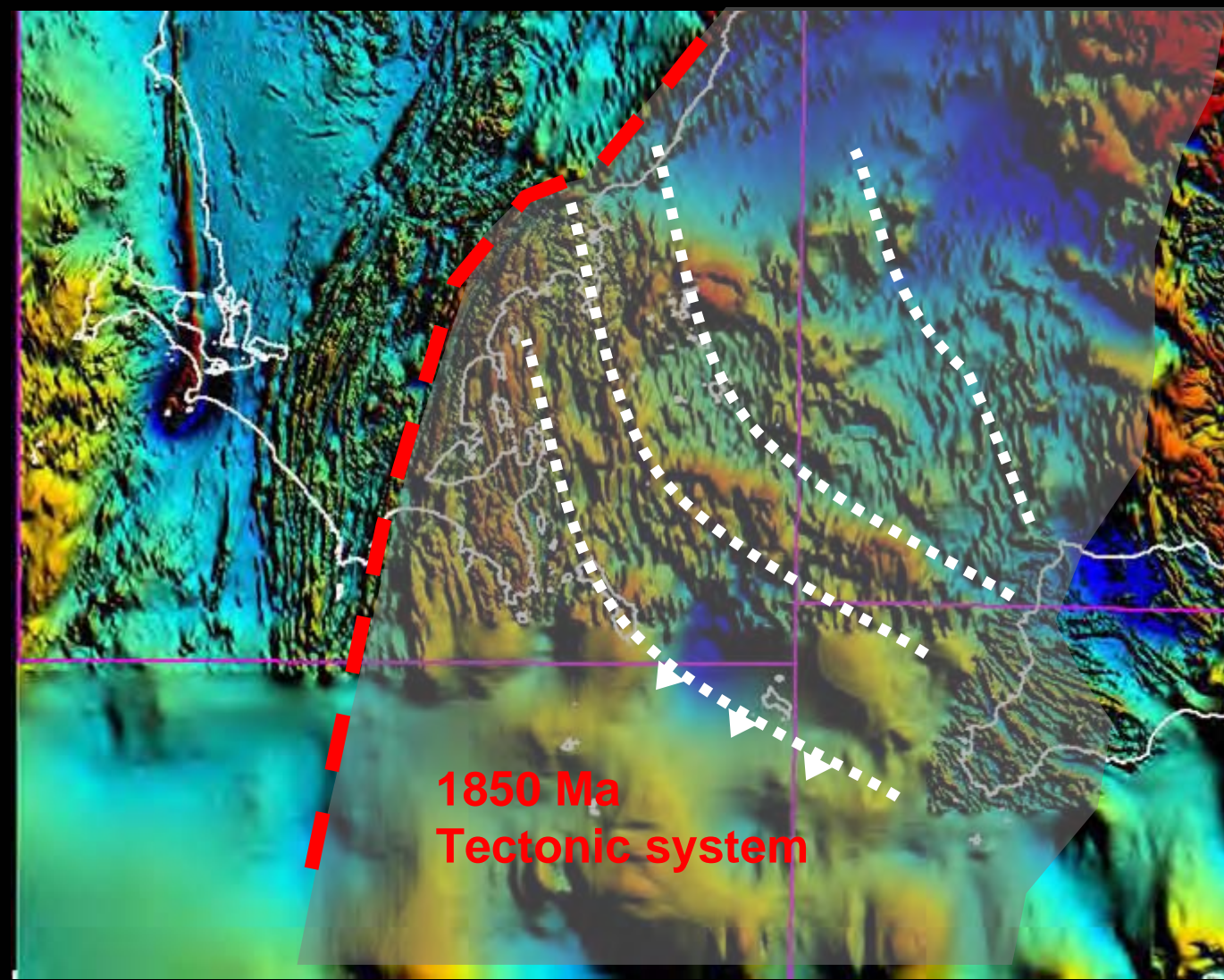


Towards a tectonic framework for the Gawler Craton

Megacycle 2

1.9-1.85 Ga

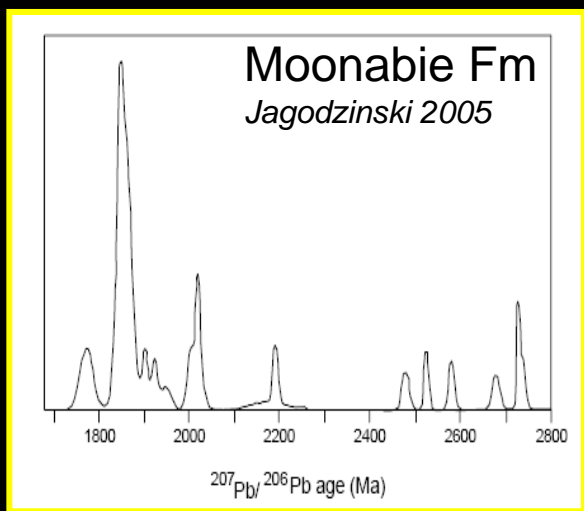
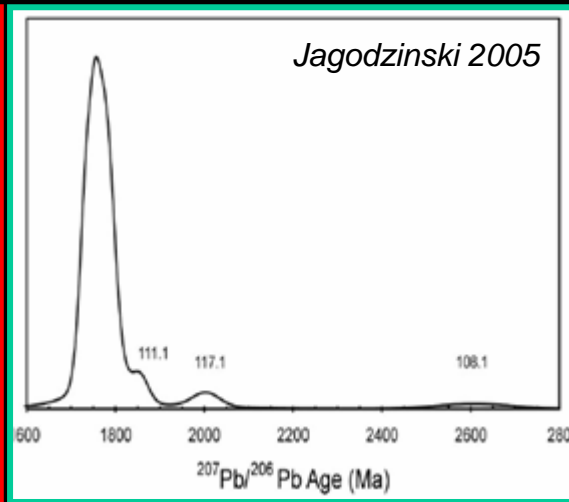
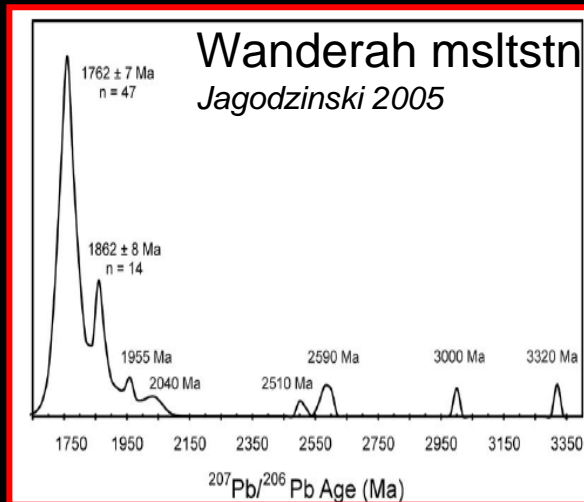
- Initiated by basin development on rifted late Archaean basement.
- Regional high-T transpressional north-directed transport and extensional crustal thinning.
- Voluminous syn-deformational magmatism.



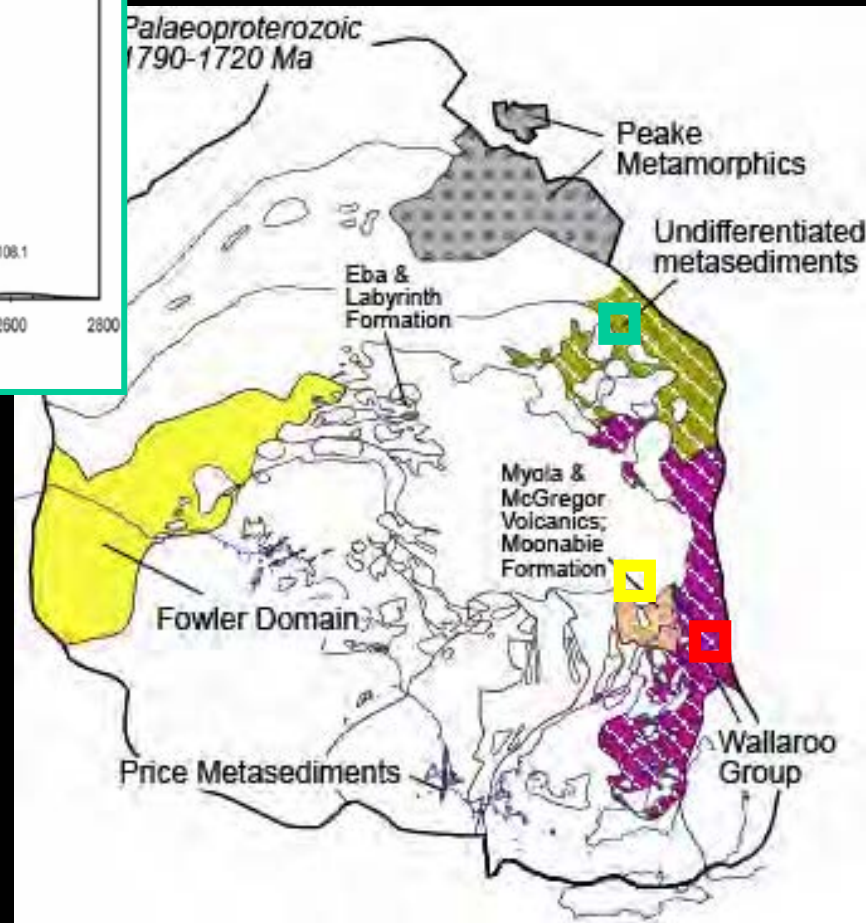
Towards a tectonic framework for the Gawler Craton

Younger rift packages (1.8-1.75)

- Basin development on rifted late Archaean and Palaeoproterozoic basement.



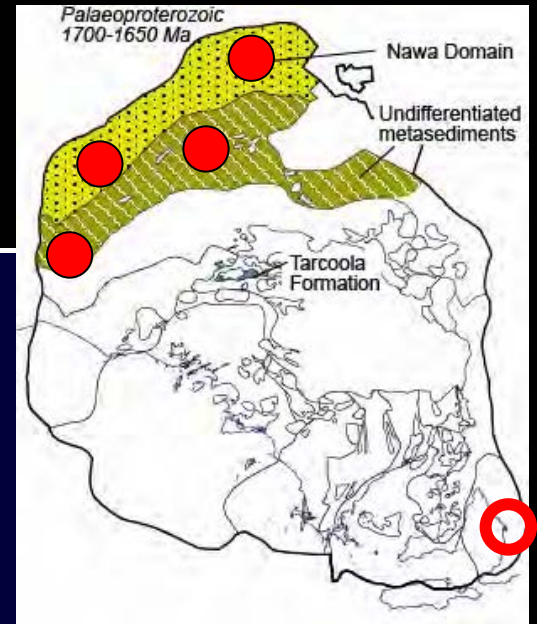
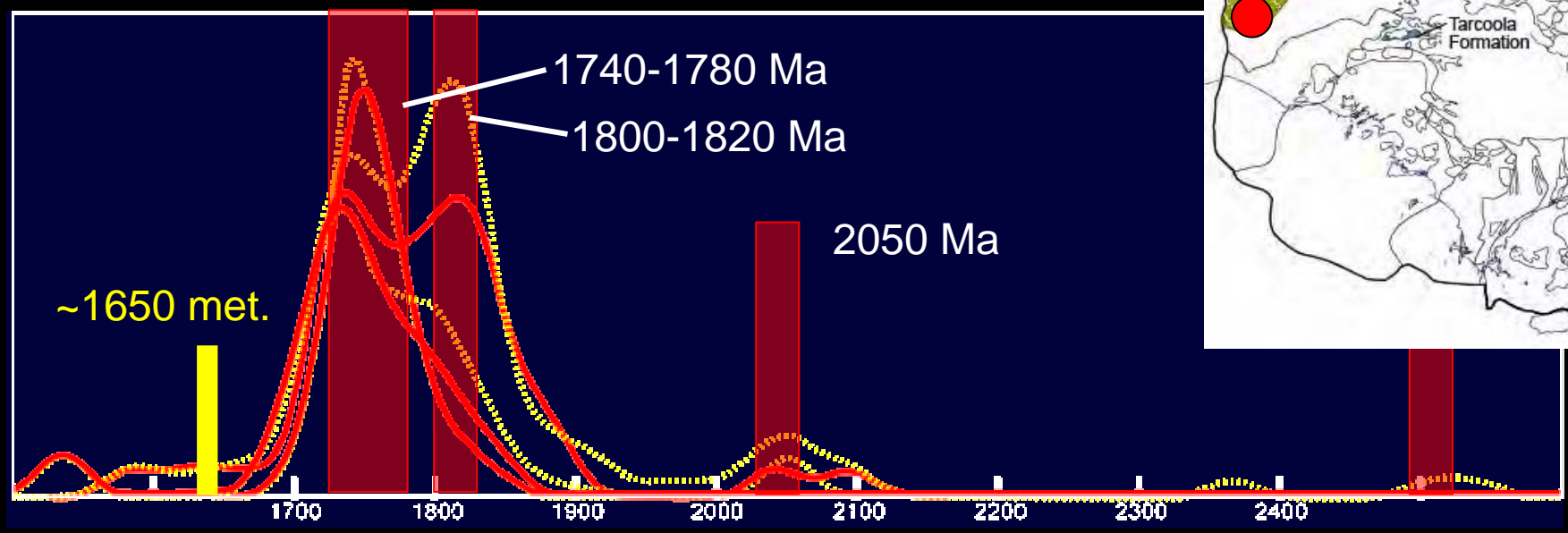
- Fowler Belt: Nd-isotopic data suggests deposition on early Palaeoproterozoic-late Archaean basement. Mx dep age ~ 1730 Ma.



Towards a tectonic framework for the Gawler Craton

Nawa packages

Combined NAWA Detrital Zircons



LA ICPMS monazite ages from the Nawa Domain

- 1715 ± 22 Ma
- 1726 ± 3 Ma
- 1717 ± 5 Ma
- 1690 ± 10 Ma

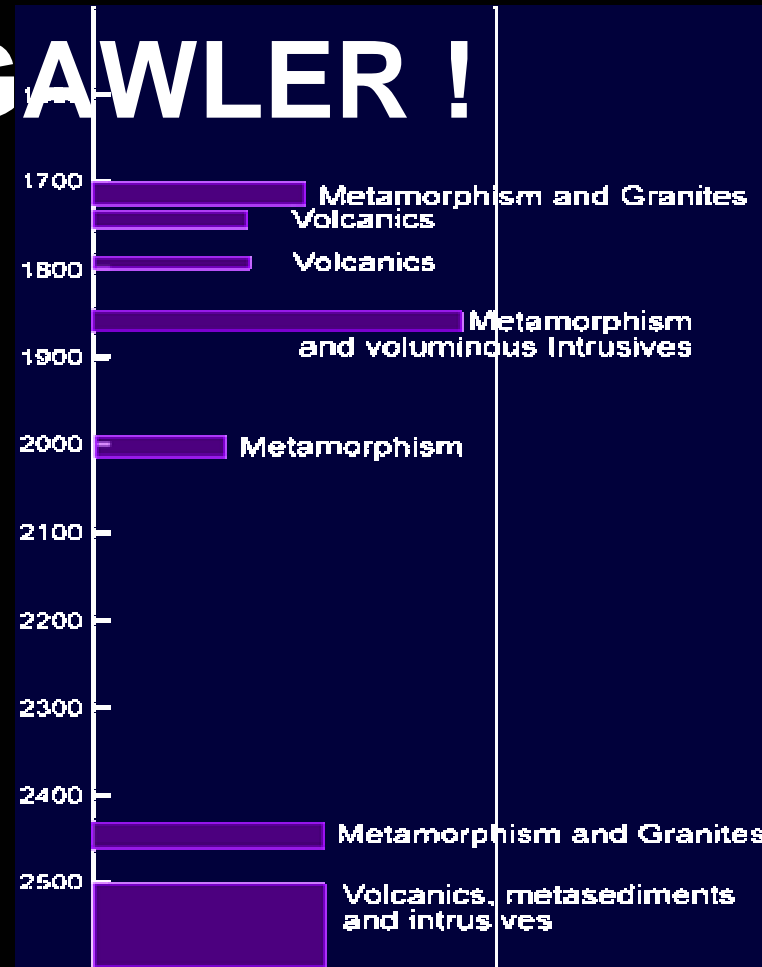
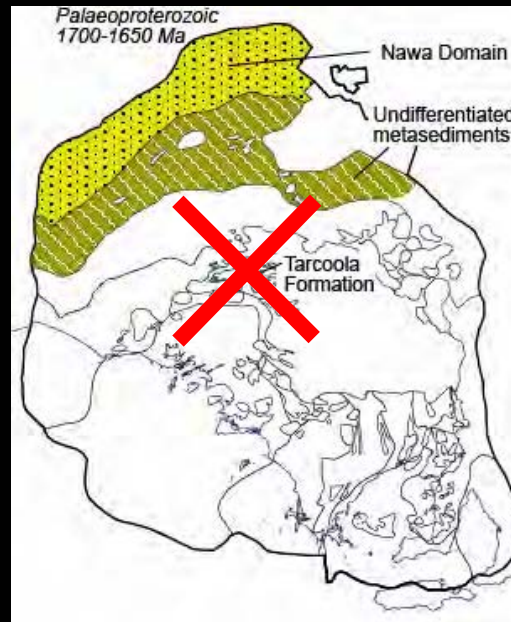
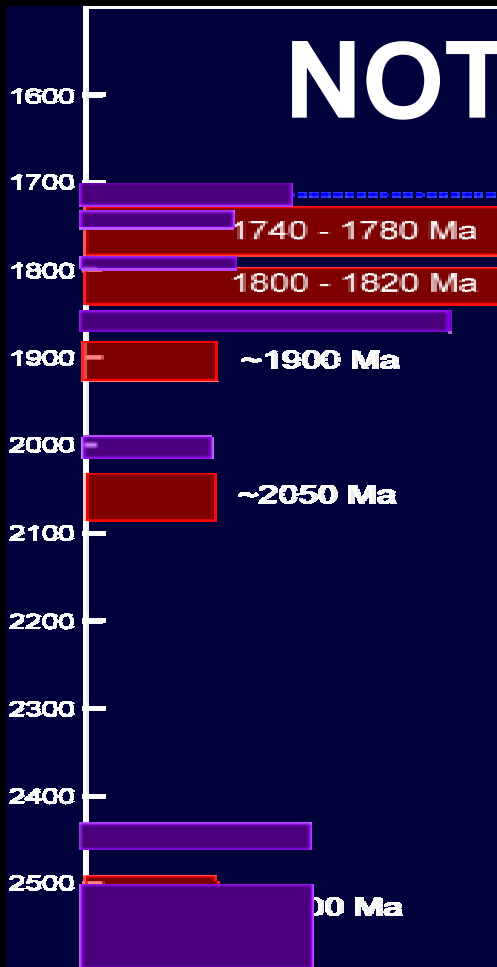
Nawa packages deposited between 1740-1720 Ma

Towards a tectonic framework for the Gawler Craton

Nawa packages (1.74-1.72)

GAWLER AT ~1740 Ma

NOT THE OLD GAWLER !



Towards a tectonic framework for the Gawler Craton

Nawa packages (1.74-1.72)

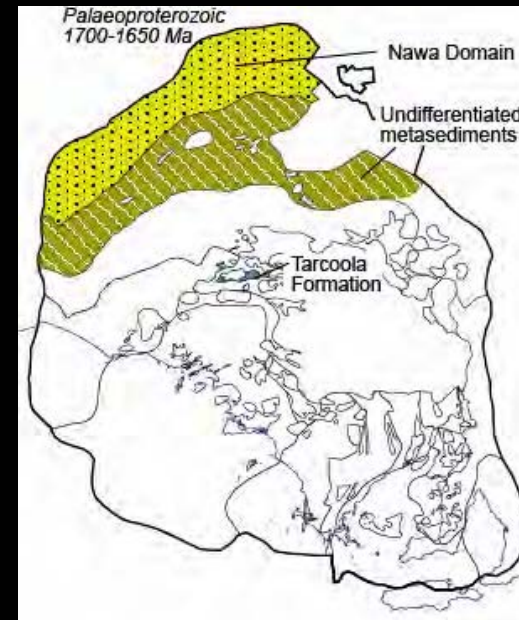
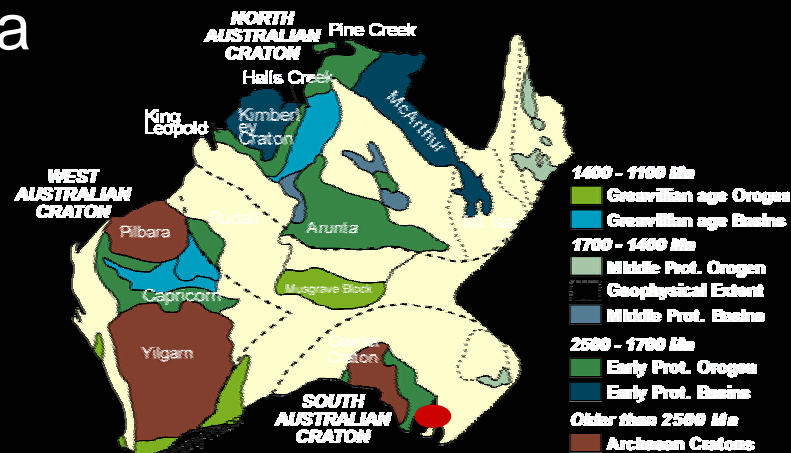
Comparative meta-sedimentary succession

Lower Willyama of the Curnamona region

Similar depositional age 1715 through to 1650 Ma

Detrital populations – 1730, 1750, 1780, 1790, 1800, 1810-1820, 1850, 1900, 1980-1990, 1980 & 2700 Ma

Not Forgetting Mt Isa

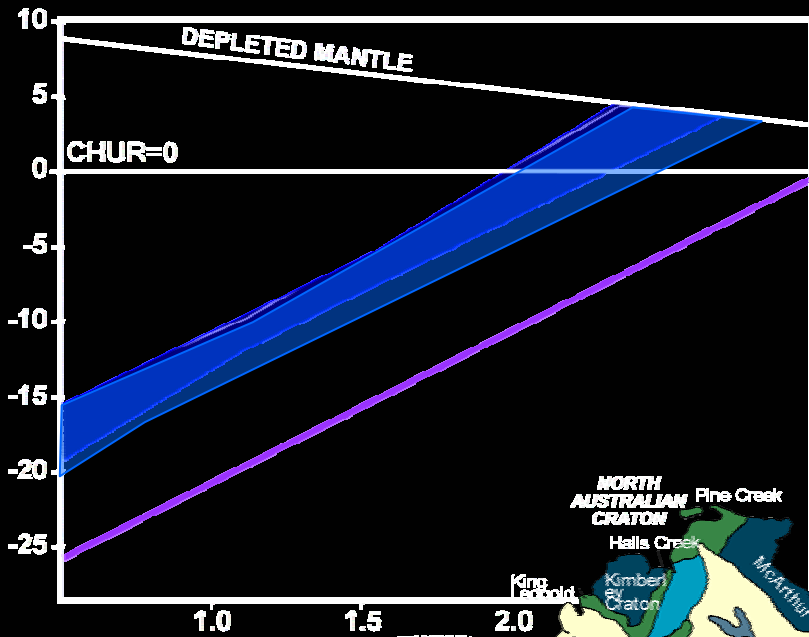


Towards a tectonic framework for the Gawler Craton

Younger rift packages (1.74-1.72)

NAWA

Similar shapes in the Lower Willyama

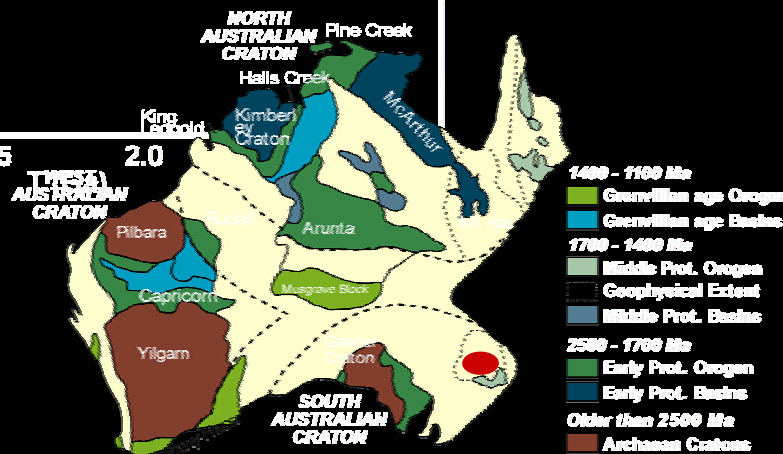


Similar - isotope values

- REE

- Detrital Zircons

Sourced from NAC

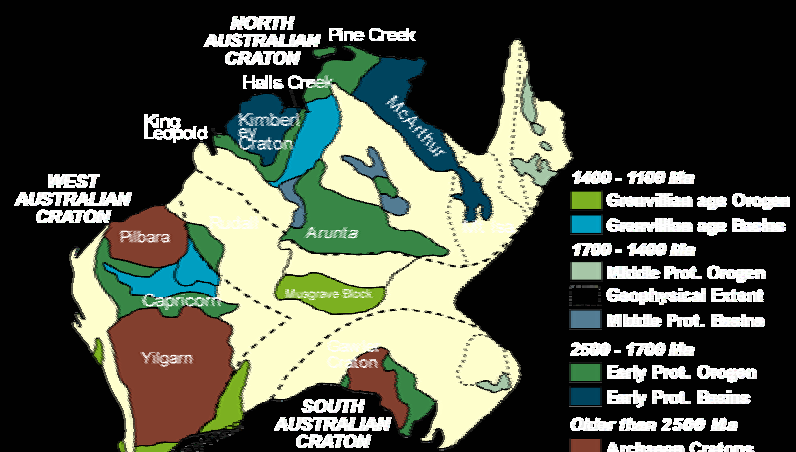
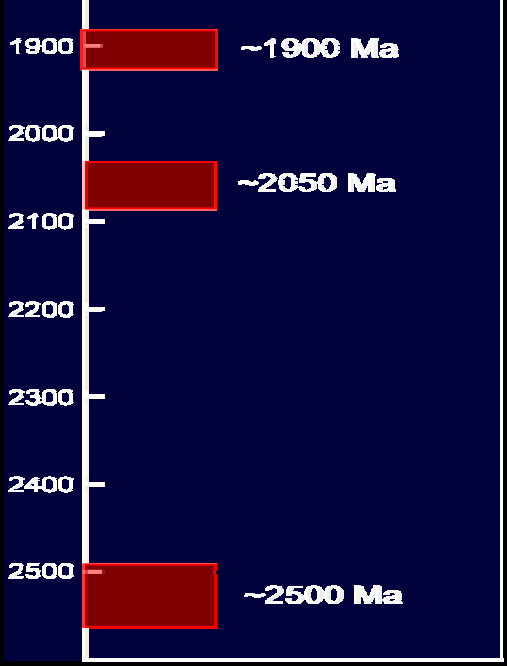
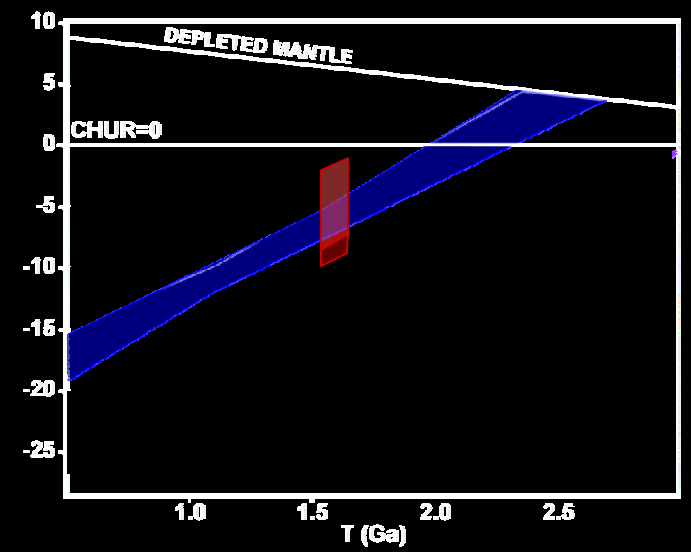
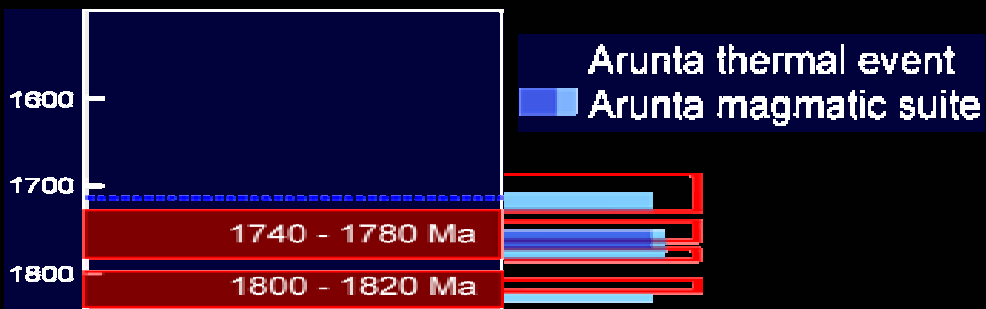


Towards a tectonic framework for the Gawler Craton

Younger rift packages (1.74-1.72)

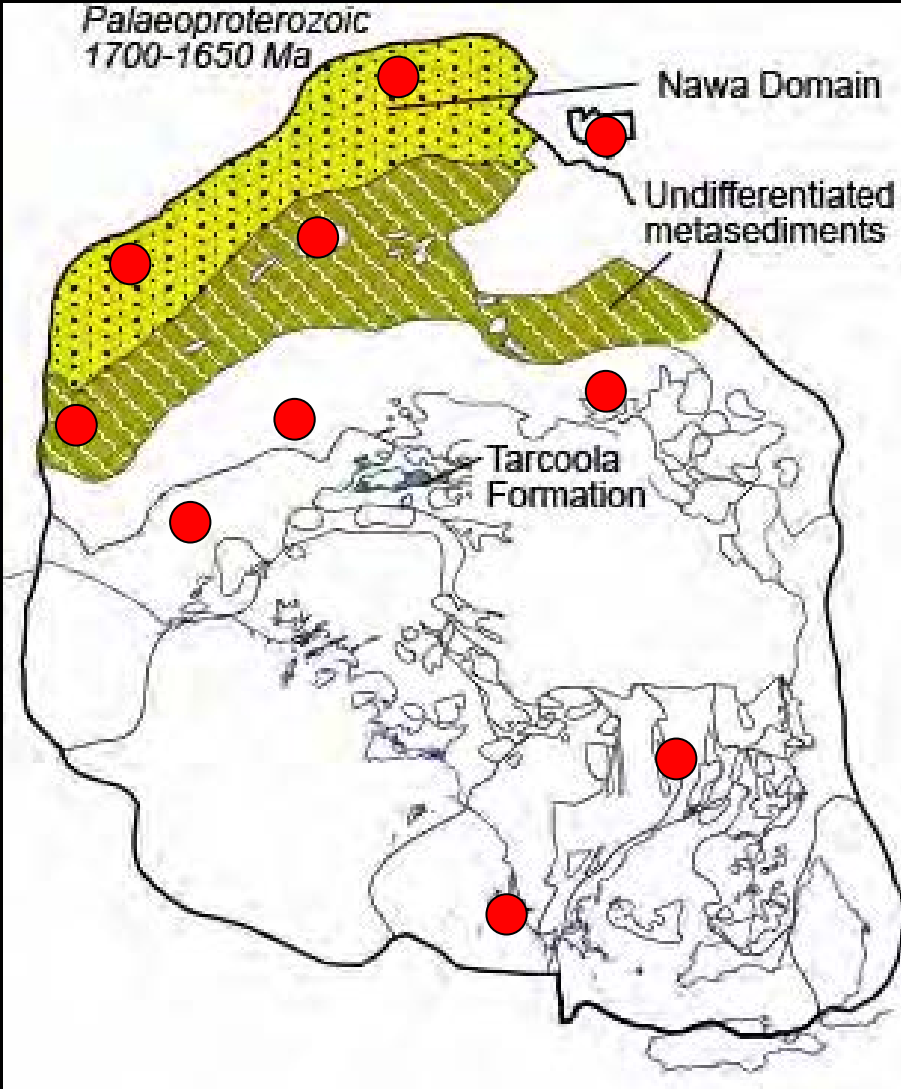
NAWA

North Australia Craton – Arunta Region



Towards a tectonic framework for the Gawler Craton

Kimban Orogeny (1.73-1.68)



- Affected the entire pre-1740 Ma Gawler system. Pre-Kimban basins -> highest grade regions.
- Tunkillia Suite - mixture of crustal and mantle sources.

