Lithospheric structure in the vicinity of the Eucla-Gawler reflection profile

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The Eucla-Gawler profile is part of an extensive network of seismic information. Prior refraction work and extensive broadband deployments (receiver functions) provide control additional to the recent reflection work, supplemented by ambient noise tomography.
Crustal Structure near EuGc

Depth slices through the crustal component of the AuSREM model with a resolution of 0.5 deg, built from all available sources.
Crustal Structure near EuGc

P wavespeed [km/s]

2.80
8.95
Crustal Structure near EuGc

25 km

35 km

P wavespeed [km/s]

2.80

8.95
Comparison of Moho Depth estimates

The map summarises all the estimates for Moho depth in the neighbourhood of the Eucla-Gawler line. Triangles denote depth estimates from reflection work and refraction. Diamonds, pentagons and squares represent results from Receiver Functions. The EuGc results provide important constraints for an undersampled area.
Moho depth superimposed on tectonic framework

The correlation of thinner crust with the ancient Archean blocks is very clear, as also is thickening at the craton margins.
SV wavespeed in mantle

Depth slices through the AuSREM mantle component
Pn tomography for mantle

New results exploiting all available earthquake and explosion records
Other lithospheric information

• The comprehensive national gravity and magnetic databases provide a useful starting point for examining other aspects of lithospheric structure, particularly relating to the crust.

• We show the horizontal half-derivative of gravity and half-integral of magnetic anomalies that have nearly the same dependence on structure.

• We also illustrate the depth to base of magnetisation based on a fractal model that also yield information about the magnetic character of different spatial domains.
These secondary potential field quantities give a very clear indication of *grain* in the fabric of the continent, and indicate that there is no simple correlation between density and susceptibility variations.
These results are derived from the magnetic anomalies across Australia at 1.2 km spacing, with an inversion for depth of base of magnetisation (Curie depth) and fractal magnetic character.
The depth of base of magnetisation (Curie depth) extends in places below the Moho, linking to other evidence for lithospheric domains extending into the mantle.
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