Capricorn Transect: Lithospheric Background

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Passive Seismic Studies – Lithospheric Background

• The regional and global distribution of earthquakes means that Australia is well suited to using techniques that depend on exploiting recordings of distant earthquakes

• Such records can be used for:
  – Surface wave tomography: mostly for mantle structure
  – Receiver function studies: crustal structure
  – Body wave tomography: 3-D images of the crust and uppermost mantle
Path coverage for surface wave tomography

Fishwick 2006
Images of seismic wavespeed for WA

Fichtner, Fishwick, Yoshizawa, 2011
Seismic coverage for Western Australia

- The Capricorn project forms part of an extensive network of reflection information.
- Prior refraction work and extensive broad-band deployments (Receiver Functions) provide additional control.
Comparison of Moho Depth estimates

The map summarises all the estimates for Moho depth in the neighbourhood of the Capricorn line. Triangles denote depth estimates from reflection work and refraction. Diamonds, pentagons and squares represent results from Receiver Functions. There is very good correspondence between the different approaches.
Moho in neighbourhood of Capricorn Line
Moho variation across Western Australia

Portion of the 2011 Moho map for Australia (Kennett et al. 2011., GJI)

The map is rendered using 0.5x0.5 deg pixels
Moho depth superimposed on tectonic framework

The correlation of thinner crust with the ancient Archean blocks is very clear.
Multiple inversions with shifted grid average to give better resolution
Layer from 0-35 km
• There is good correspondence between the region of faster crustal velocity and the mapped outline of the Pilbara craton.
• The Glenburgh terrane has distinctly lower wavespeed
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