



AuScope

AN ORGANISATION FOR A NATIONAL
EARTH SCIENCE INFRASTRUCTURE PROGRAM

Capricorn Transect: Lithospheric Background

B.L.N. Kennett

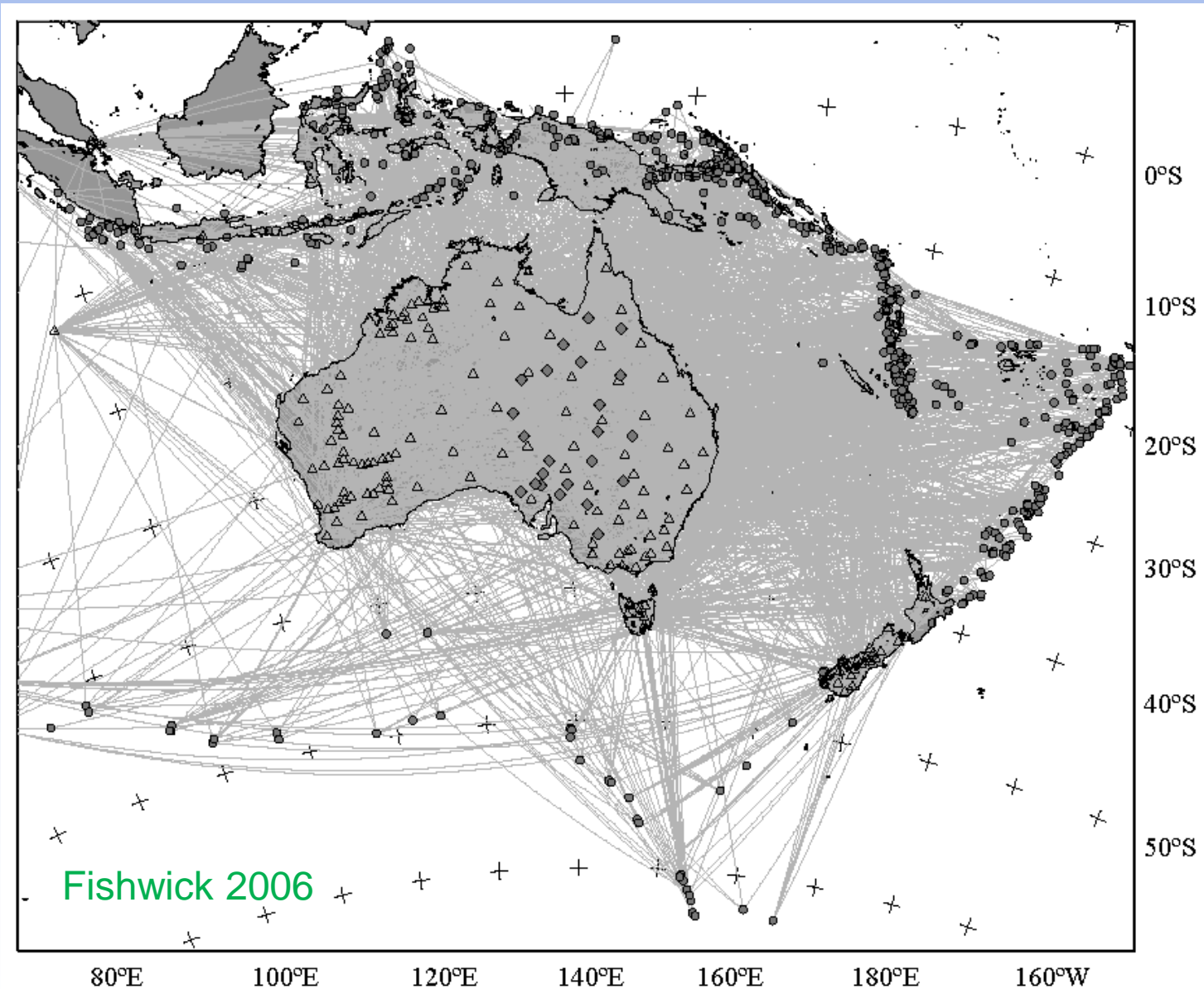
Research School of Earth Sciences

The Australian National University

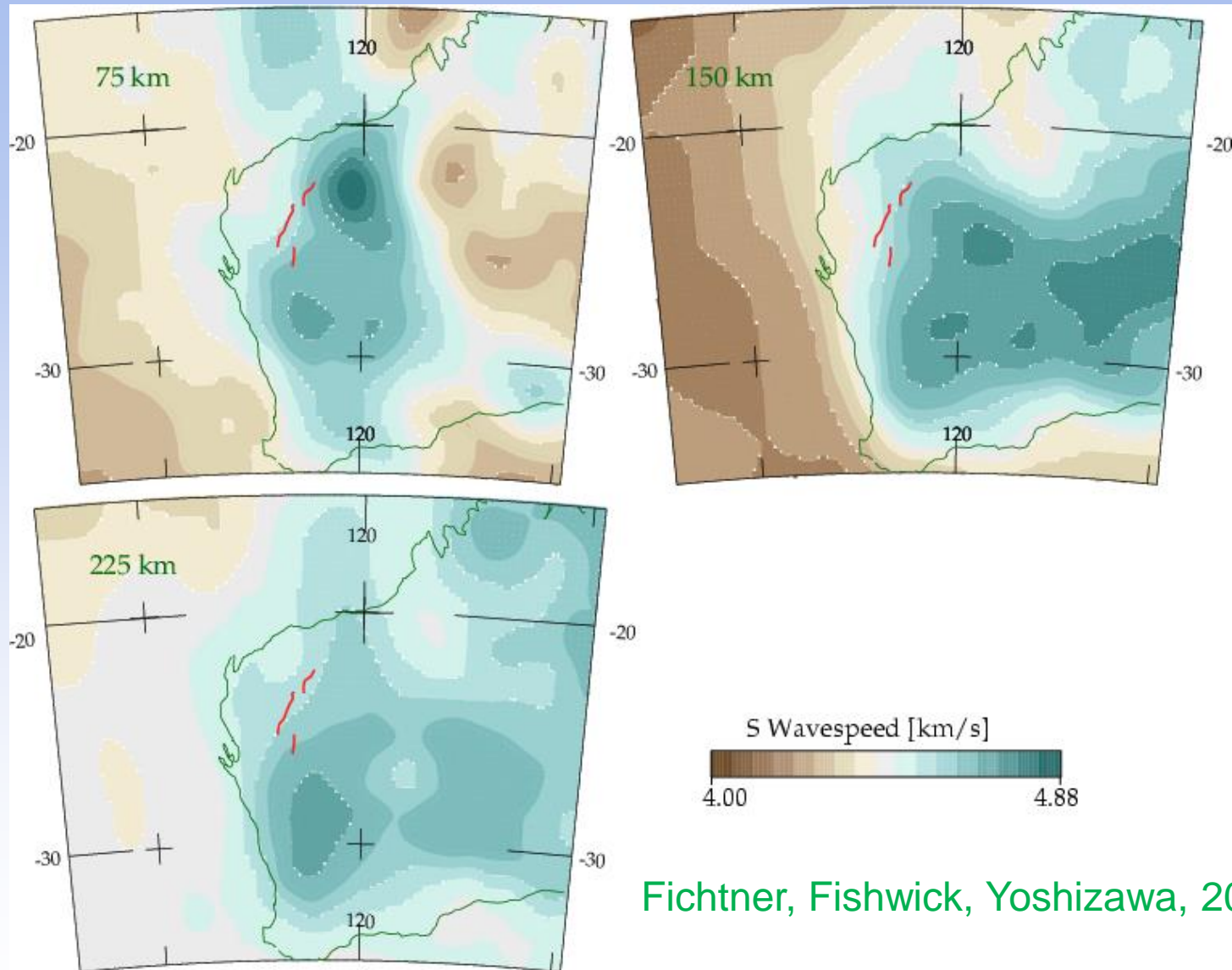
Passive Seismic Studies – Lithospheric Background

- 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



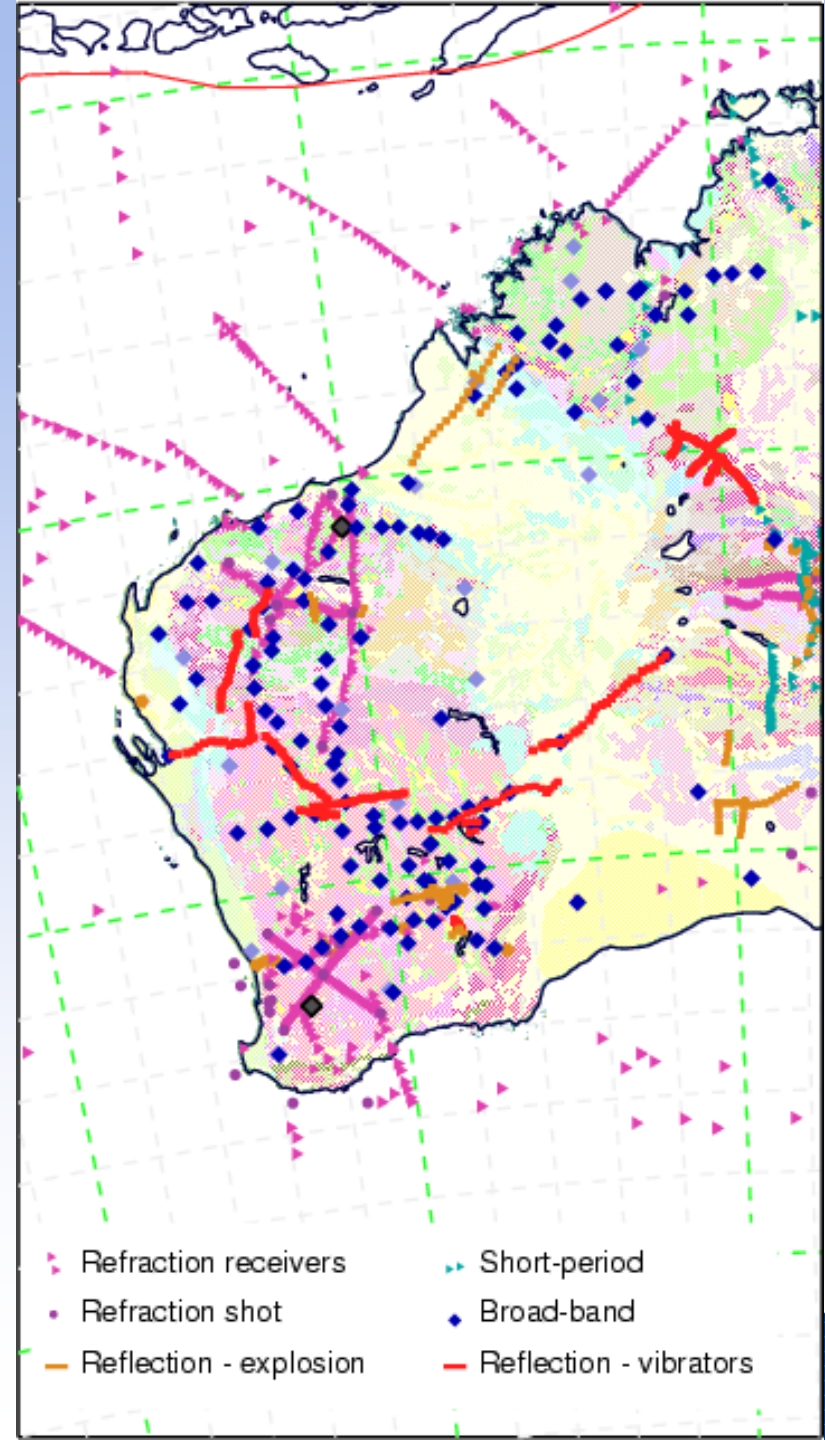
Images of seismic wavespeed for WA



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



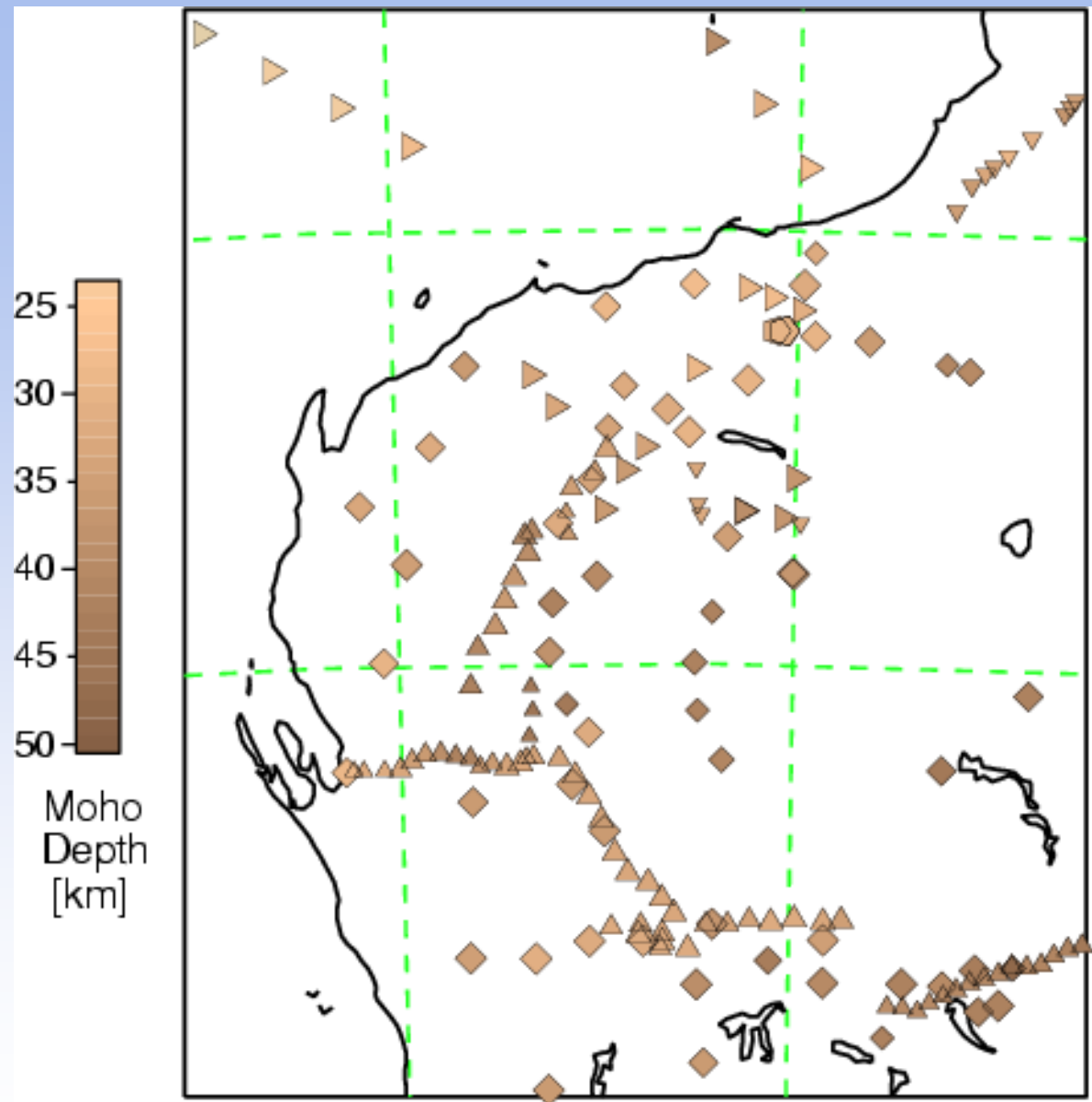
Comparison of Moho Depth estimates

The map summarises all the estimates for Moho depth in the neighbourhood of the Capricorn line.

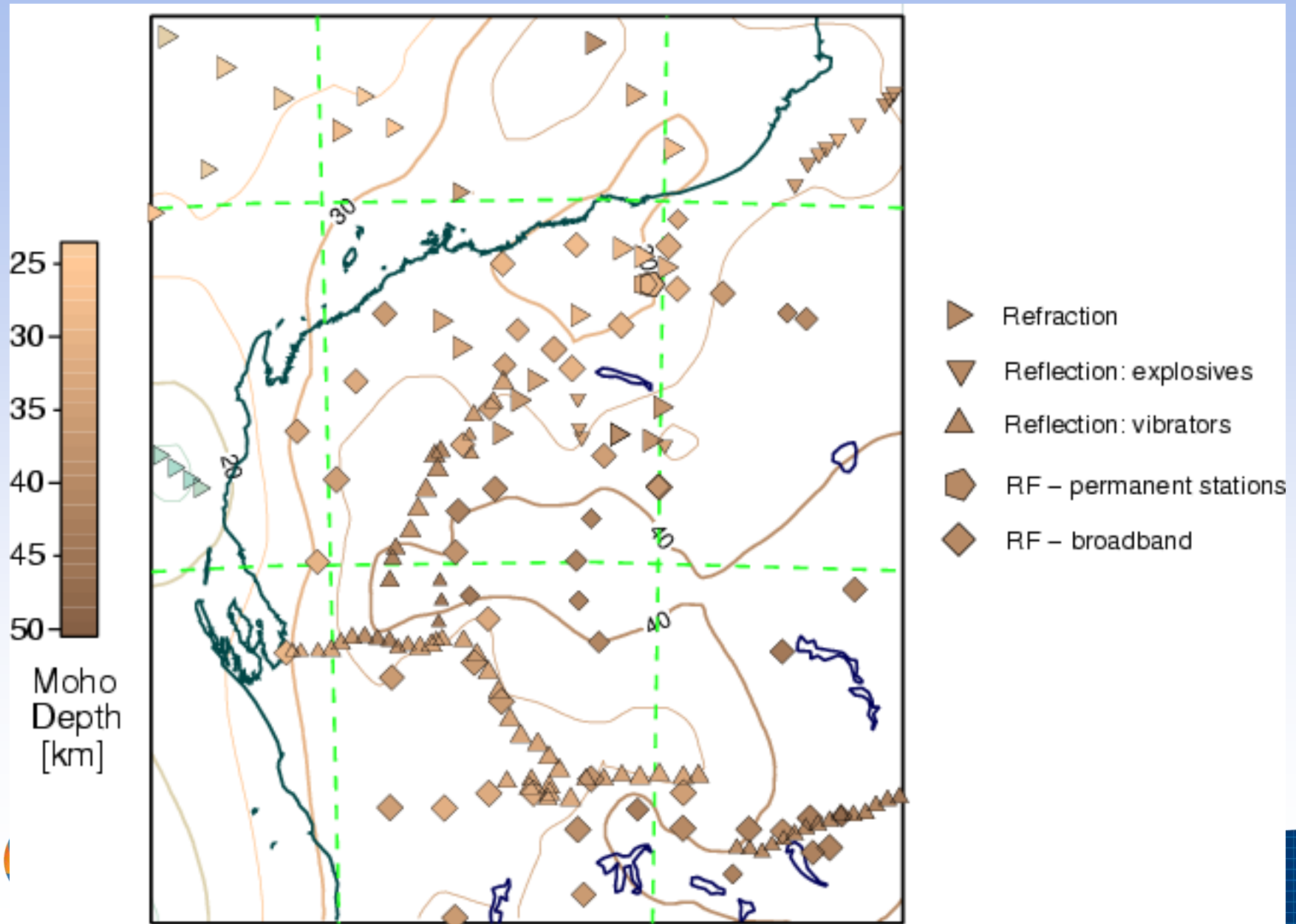
Triangles denote depth estimates from reflection work and refraction.

Diamonds, pentagons and squares represent results from Receiver Functions.

There is very good correspondence between the different approaches



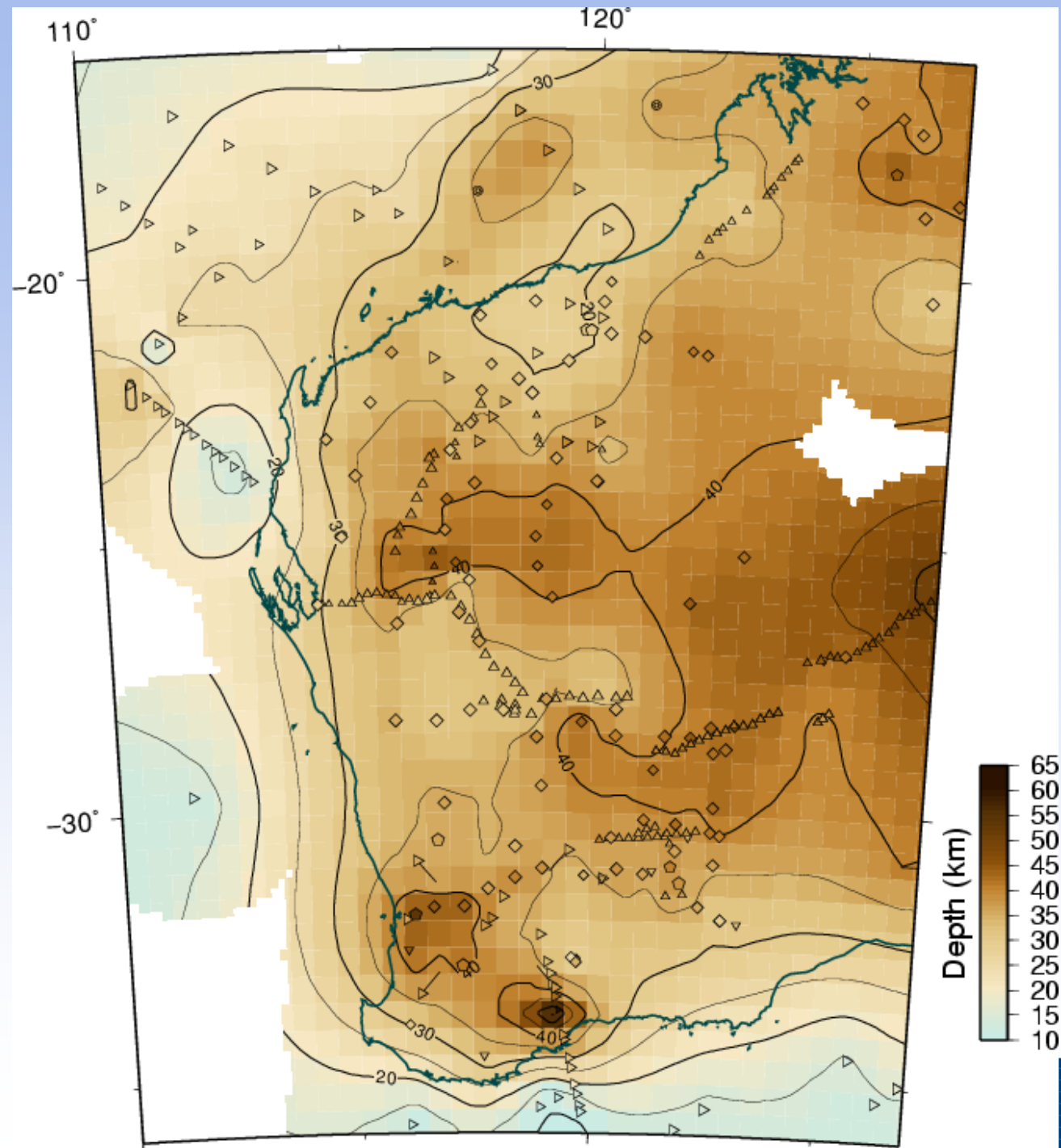
Moho in neighbourhood of Capricorn Line



Moho variation across Western Australia

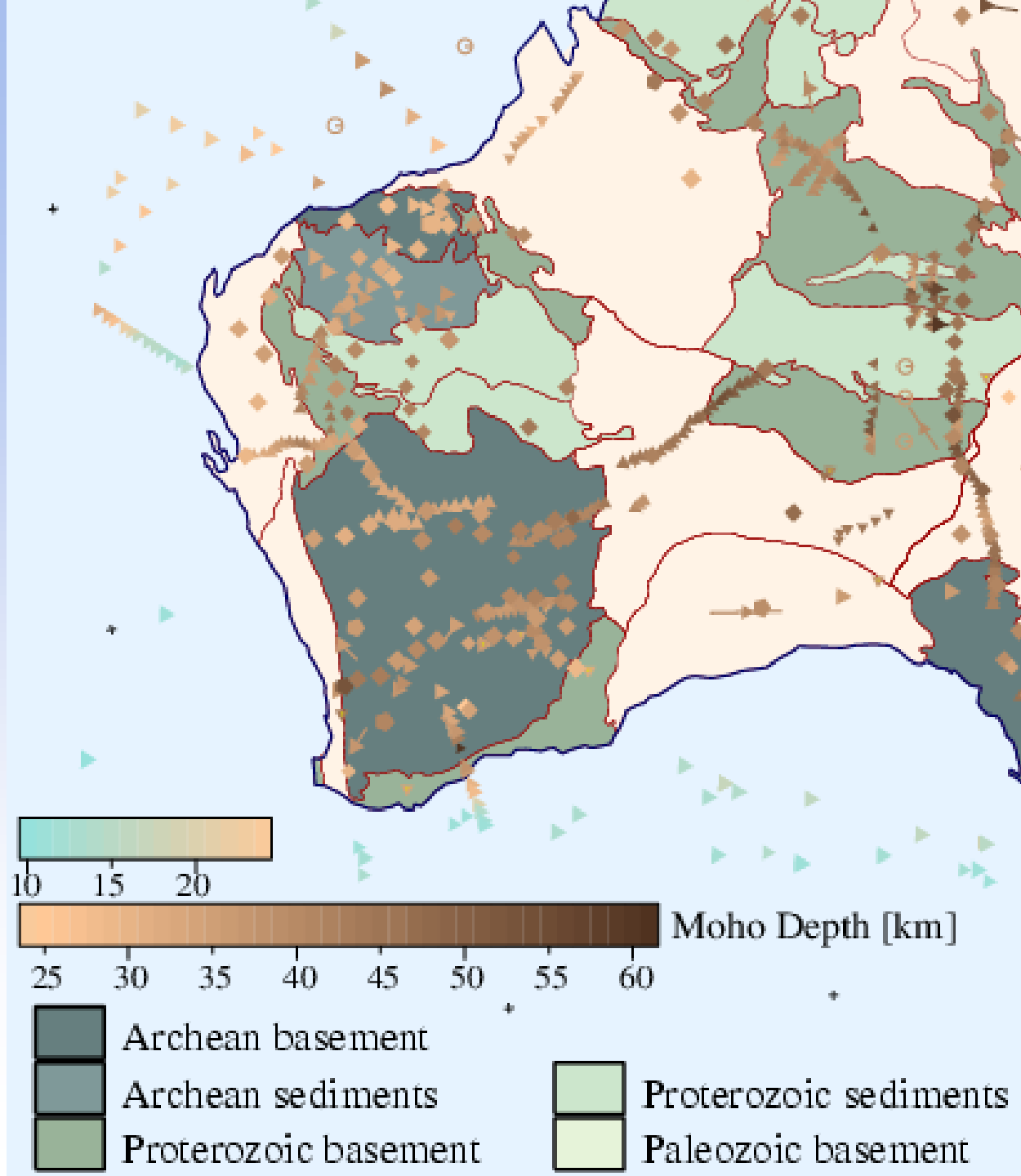
Portion of the 2011 Moho map for Australia (Kennett et al. 2011., GJI)

The map is rendered using 0.5x0.5 deg pixels



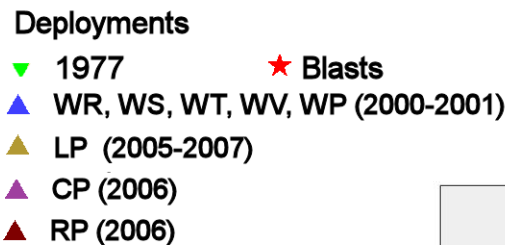
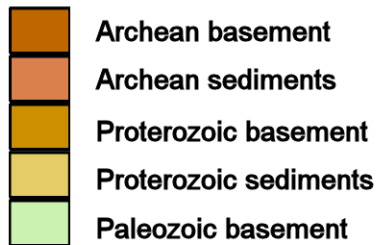
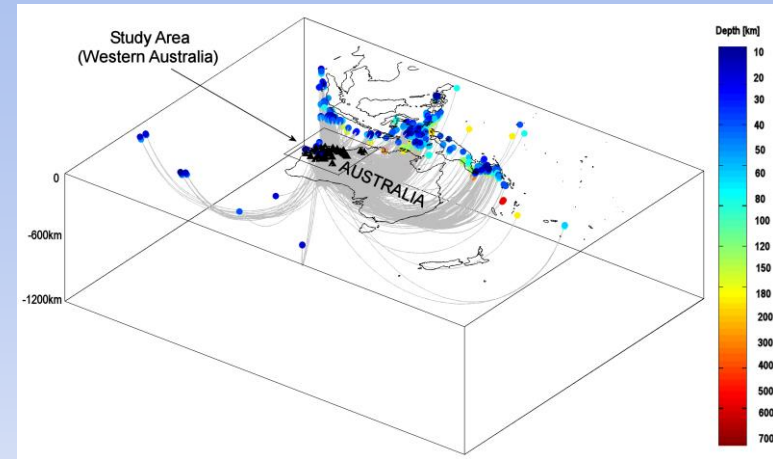
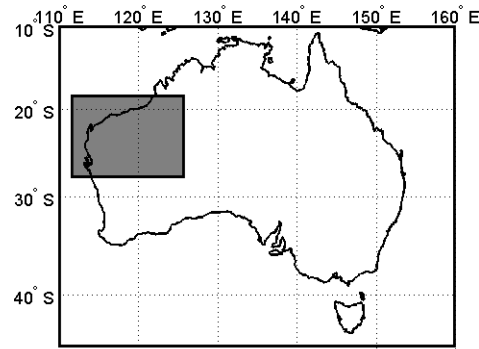
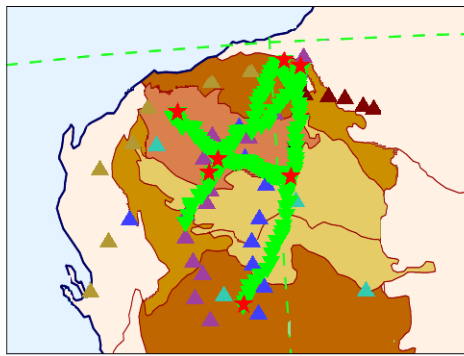
Moho depth superimposed on tectonic framework

The correlation of thinner crust with the ancient Archean blocks is very clear

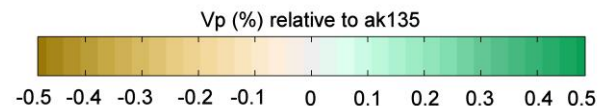
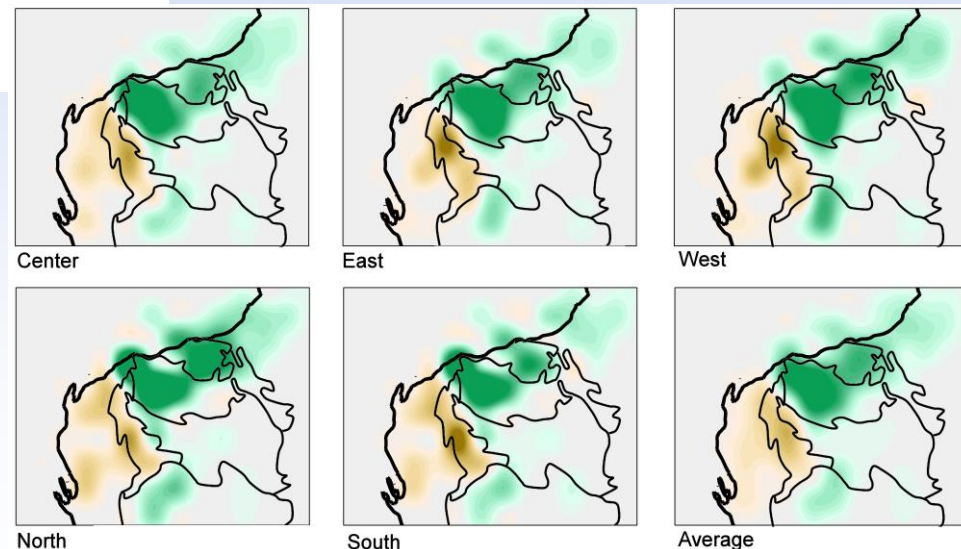


P-wave tomography

A. Abdulah PhD thesis

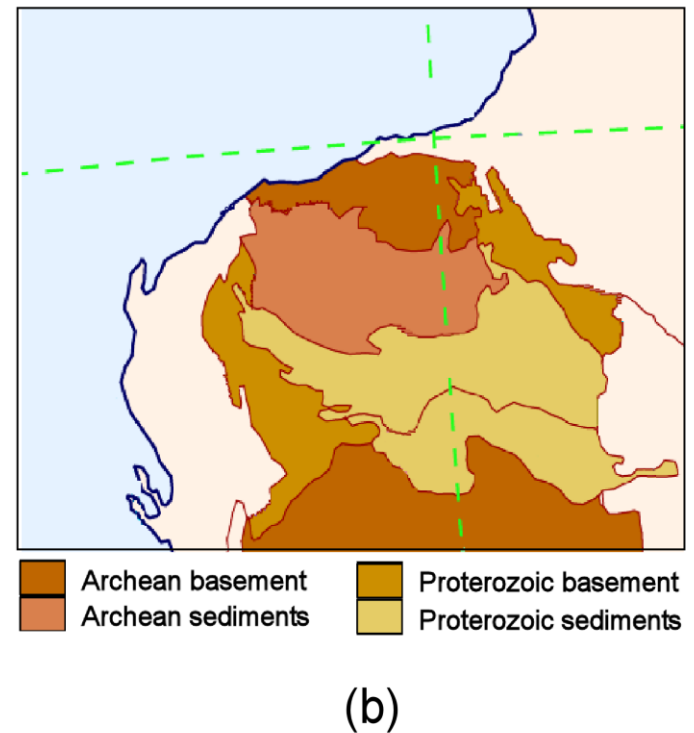
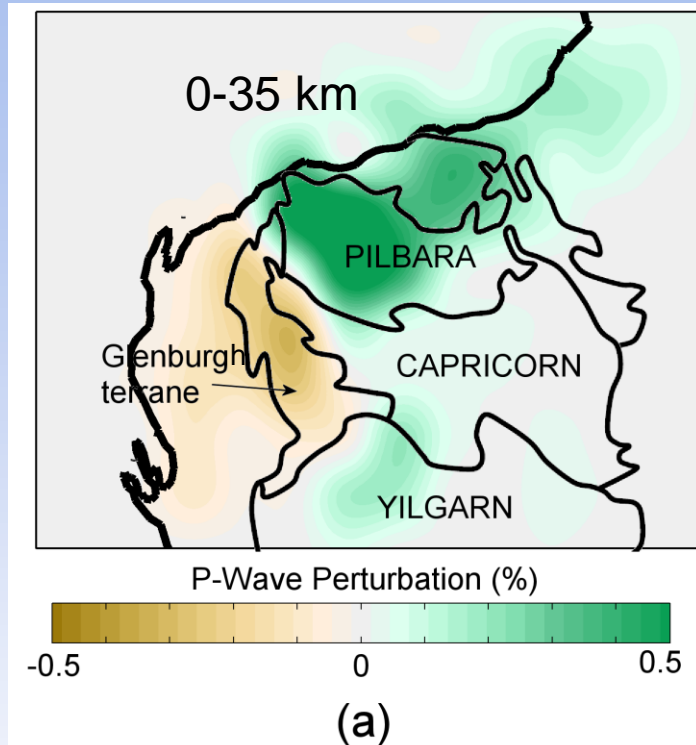


Multiple inversions with shifted grid average to give better resolution
Layer from 0-35 km



P-wave tomography

A. Abdulah PhD thesis



- 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

Acknowledgments

- Surface Wave Tomography: S. Fishwick, K.Yoshizawa, A. Fichtner
- Receiver Functions: A. Reading
- Reflection Sections: E. Saygin
- Moho map compilation: M. Salmon
- Delay Time Tomography: A. Abdulah

- All the members of RSES who have helped with the collection of portable seismic data and subsequent data handling.