



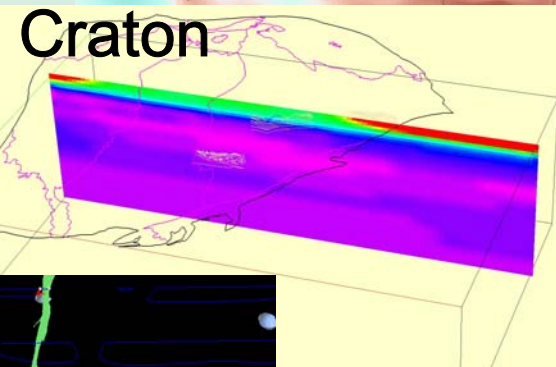
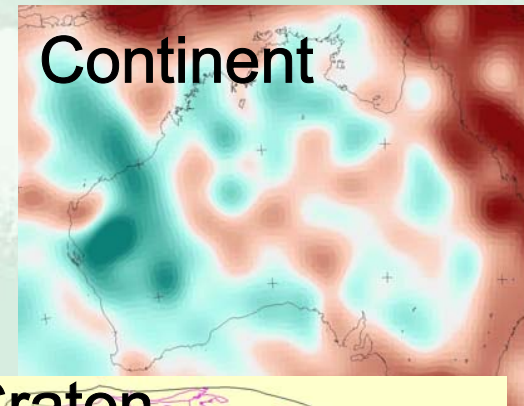
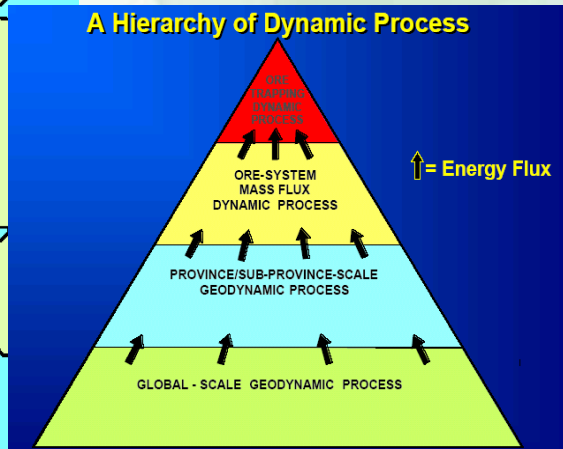
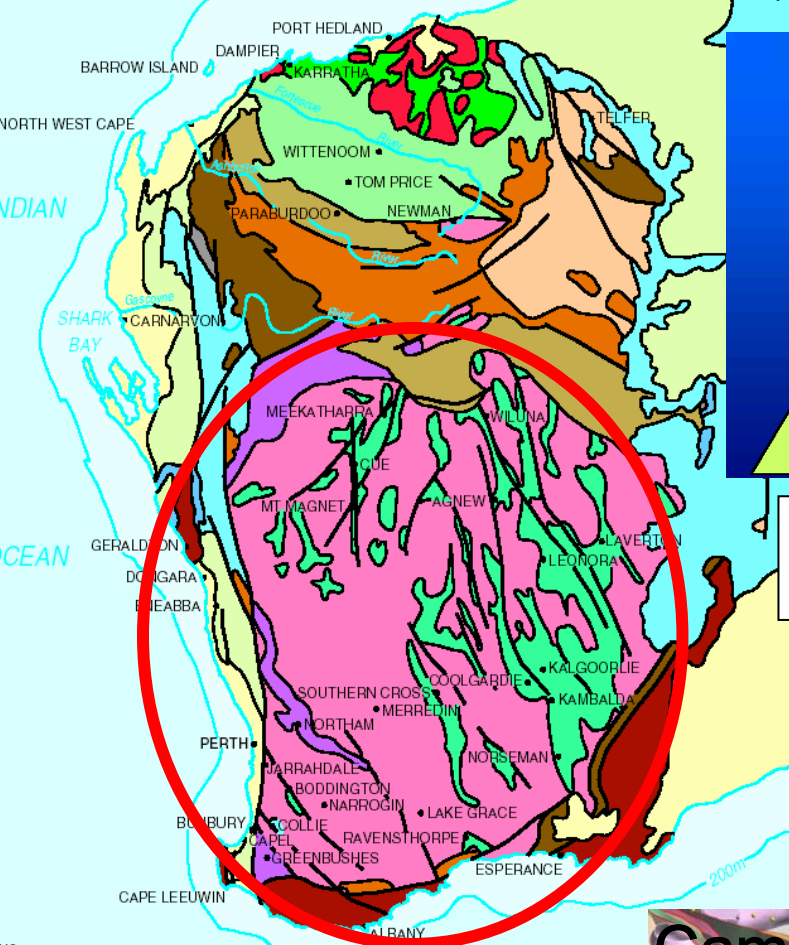
Predictive Mineral Discovery – the Yilgarn gold story.....

by

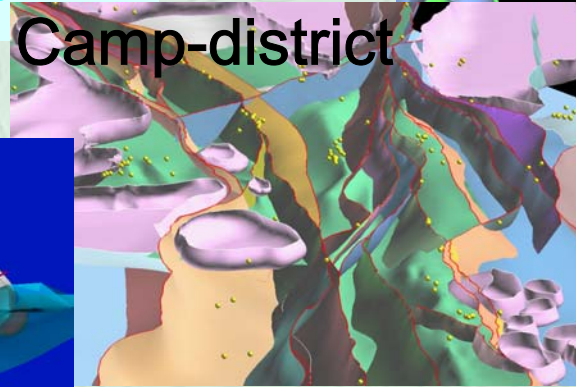
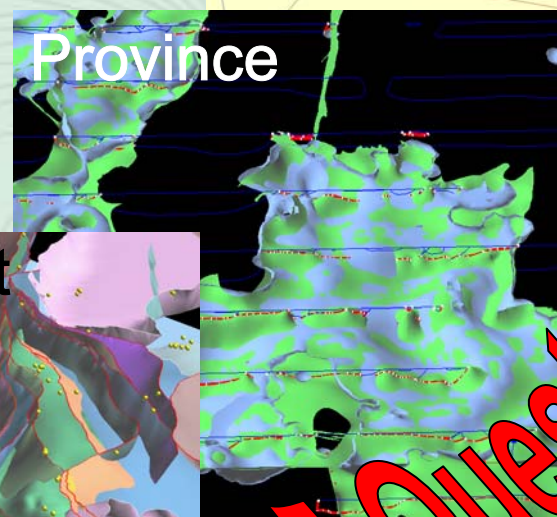
Y4-A3-M9-F6 Project Members



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Y4-A3-M9-F6

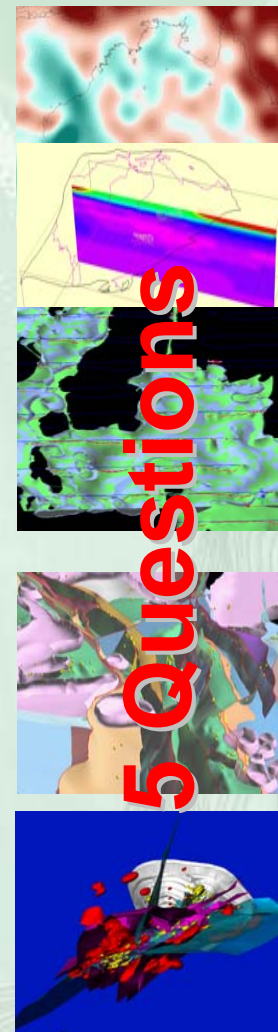


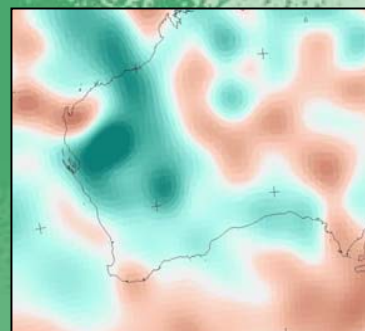
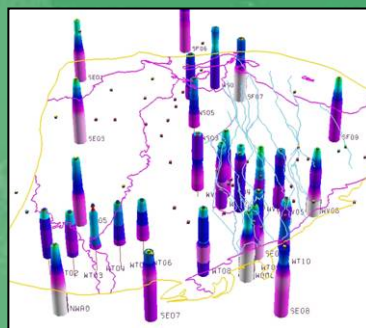
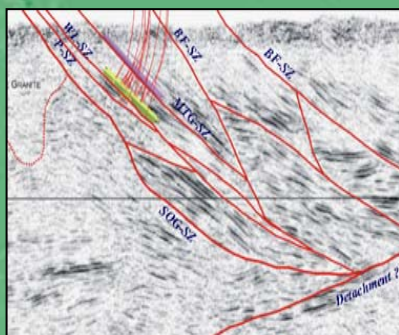
5 Questions

SESSION: YILGARN

- 11:20 **Bruce Goleby (Y4)** Big system–big picture: Integrating geology, geophysics, seismology, geochemistry and geochronology to determine why the Yilgarn is there. Setting the scene for the Laverton region
- 11:35 **Paul Henson (Y4)** Towards a unified architecture of the Laverton region, WA
- 11:50 **Heather Sheldon (M9/Y4)** Testing predictive exploration models for the Yilgarn by computer simulation
- 12:05 *Poster session 1A & B (banquet room) then Lunch (banquet room)*
- 13:30 **Richard Chopping (A3)** Seismic 'mapping' of fluid pathways for Laverton's world-class gold mineral system
- 13:45 **John Miller (Y4)** Linking structure and mineralisation in Laverton, with specific reference to Sunrise Dam and Wallaby
- 14:00 **Peter Neumayr (Y4)** Big system–big footprint: Integrating Laverton's geology, geochemistry and geophysics for predictive mineral discovery
- 14:15 **James Cleverley (F6/Y4)** Gold in Na-assemblages: Implications for deep fluid sources and pathways in the Eastern Goldfields
- 14:30 *Poster session 2A & B (banquet room) then Afternoon tea (banquet room)*
- 15:30 **Richard Blewett (Y4)** Concepts to targets: A scale integrated mineral systems study of the Laverton region, Yilgarn Craton WA
- 16:15 *Discussion then Poster Session 3A & B (banquet room)*

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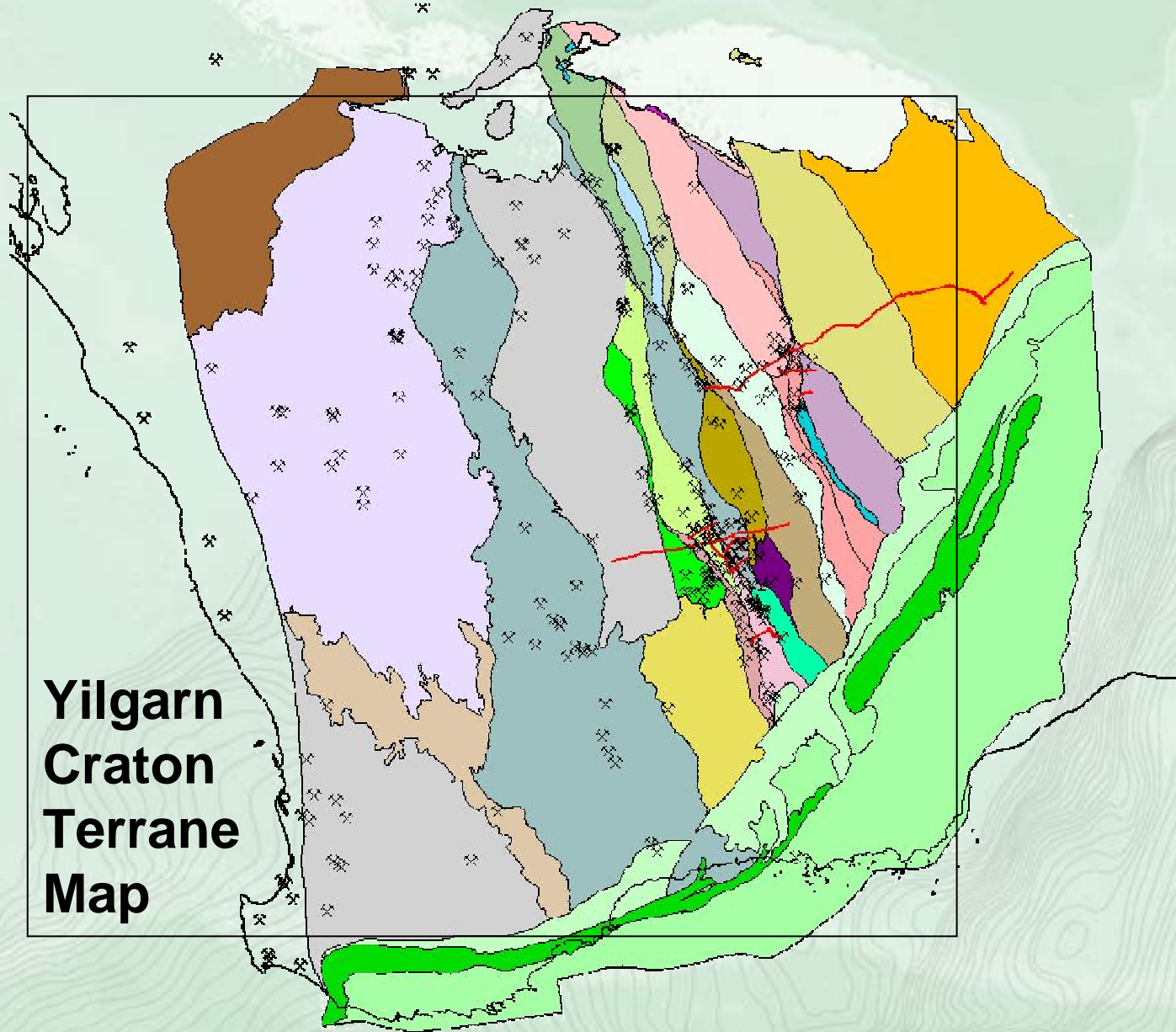
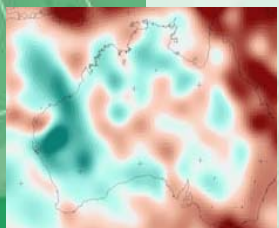
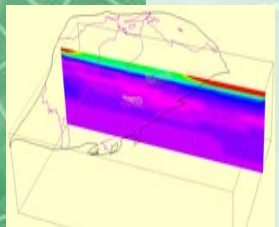
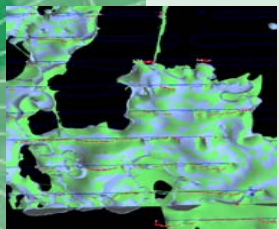
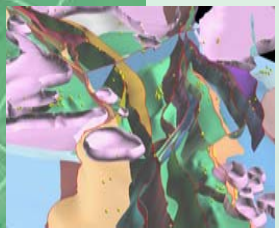
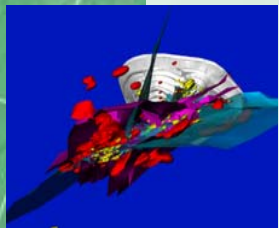


Big system-big picture: integrating geology, geophysics, seismology, geochemistry and geochronology to determine why the Yilgarn is there. Setting the scene for the Laverton region.

ANSIR NATIONAL RESEARCH FACILITY FOR EARTH SOUNDING



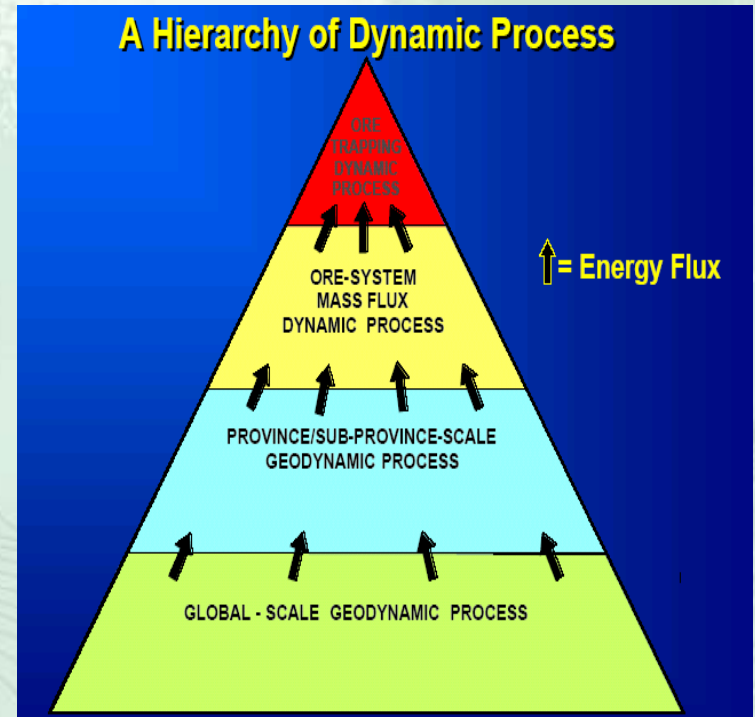
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**Yilgarn
Craton
Terrane
Map**

Data sets

- Alteration data
 - Isotopic data
 - Greenstone stratigraphy
 - Geochemical data
 - Geological data
 - Potential Field data
-
- Reflection surveys
 - Wide-angle reflection recording
 - Refraction surveys
 - Receiver function studies
 - Broadband (V_p , V_s , surface wave) studies

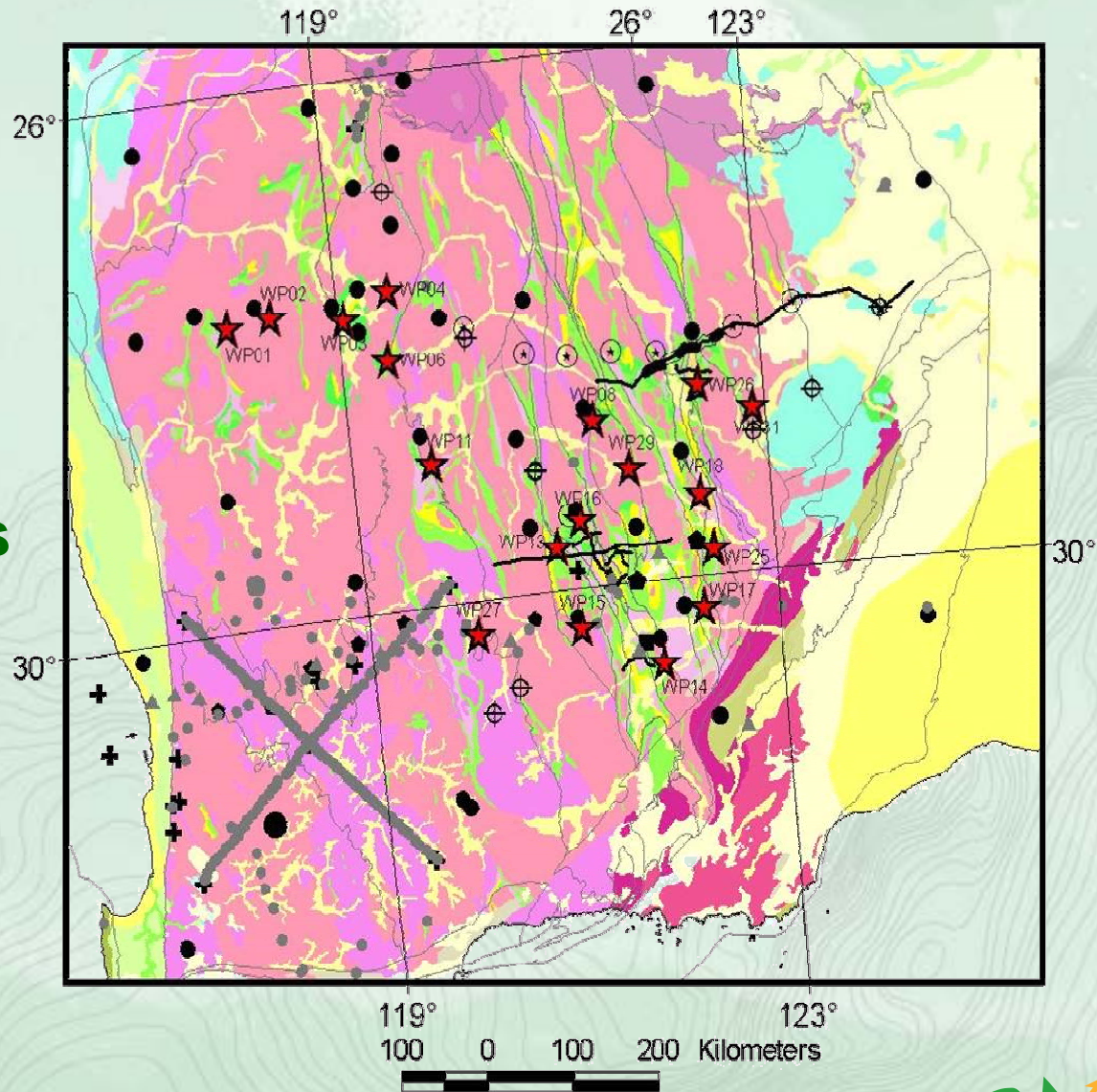


Depth Information – Seismic Data

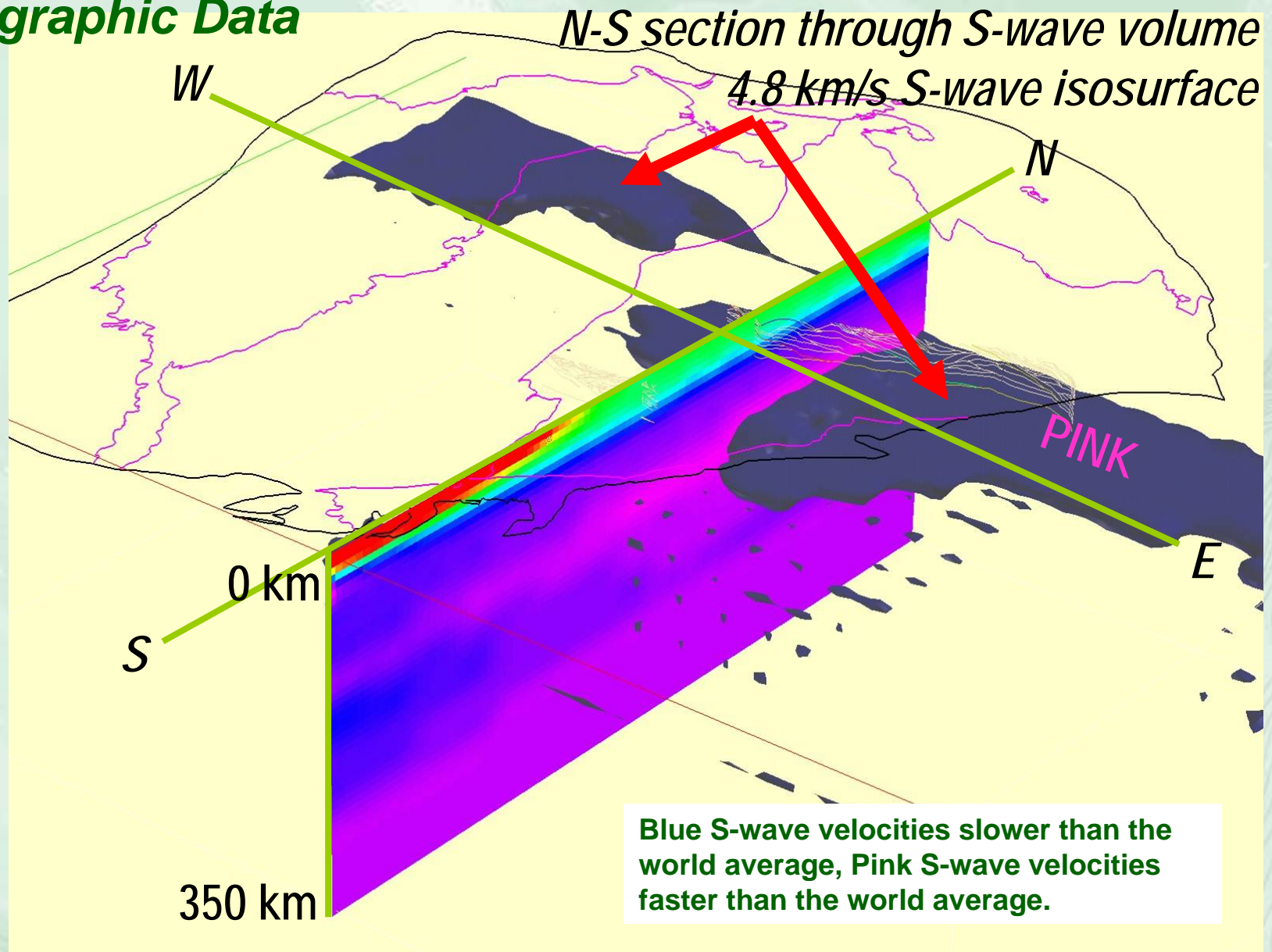
- **Tomographic (V_p , V_s , surface wave) studies – Lithospheric scale velocity variations, gives mantle structure and range of possible lithology's**
- **Receiver function studies – Broad scale crustal velocity variations – similarities and differences.**
- **Refraction surveys – Crustal velocity, gives indication of crustal lithology's.**
- **Reflection surveys – Crustal (whole of crust through to mine scale) architecture and structural relationships.**

Depth Information – Seismic Data

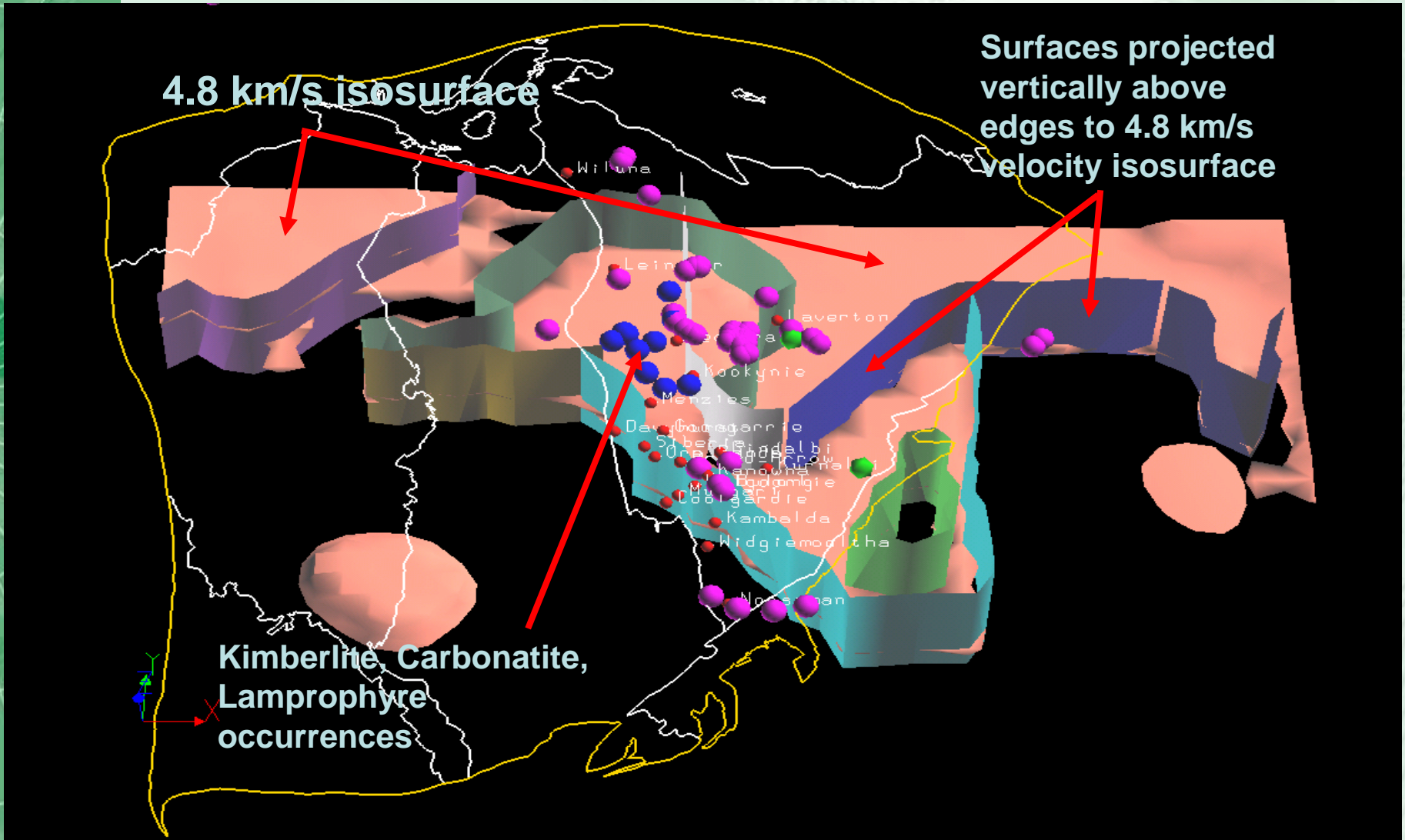
- Tomographic (Vp, Vs, surface wave) studies (★, ●, ⊙, ⊕)
- Receiver function studies (★, ●, ⊙, ⊕)
- Refraction surveys (●)
- Reflection surveys (----)



Tomographic Data

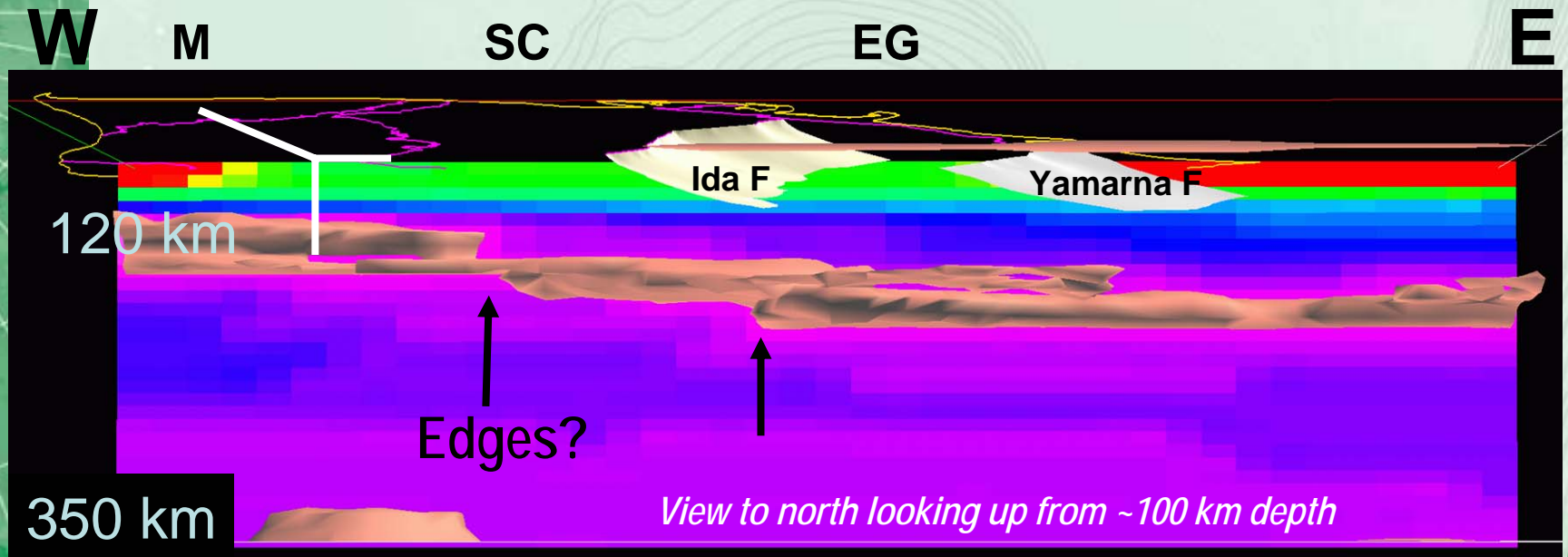


Tomographic Data



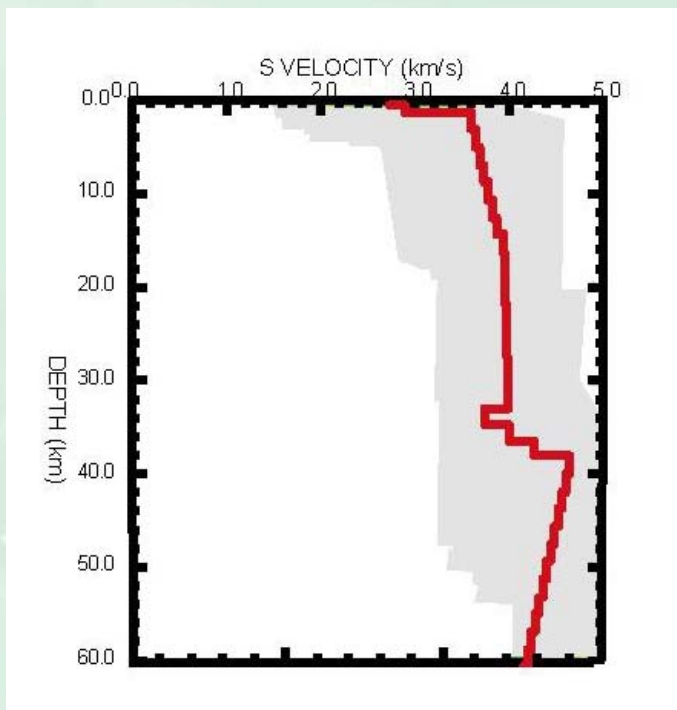
Tomographic Data

- Shows big picture velocity variations – related to composition.
- Indicated Yilgarn mantle lithosphere: **fast, depleted, refractory, cold, light, dry, strong, buoyant.**
- Steps in 4.8 km/s isosurface. Intriguing geometry of the fast velocity body.



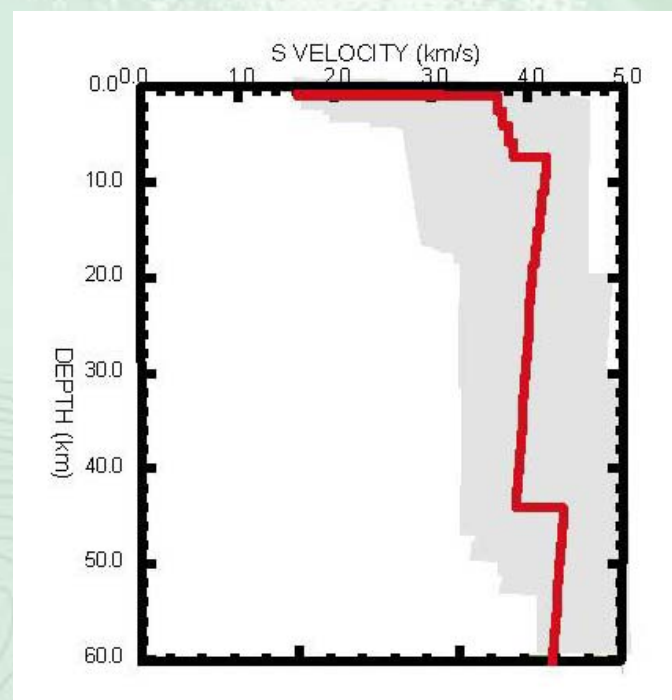
Receiver Function Data

Youanmi Province



Moho depth 38 km (e.g. WT08)
Very sharp
Simple upper crust
Constant velocity lower crust
Structure consistent across terrane

Eastern Goldfields



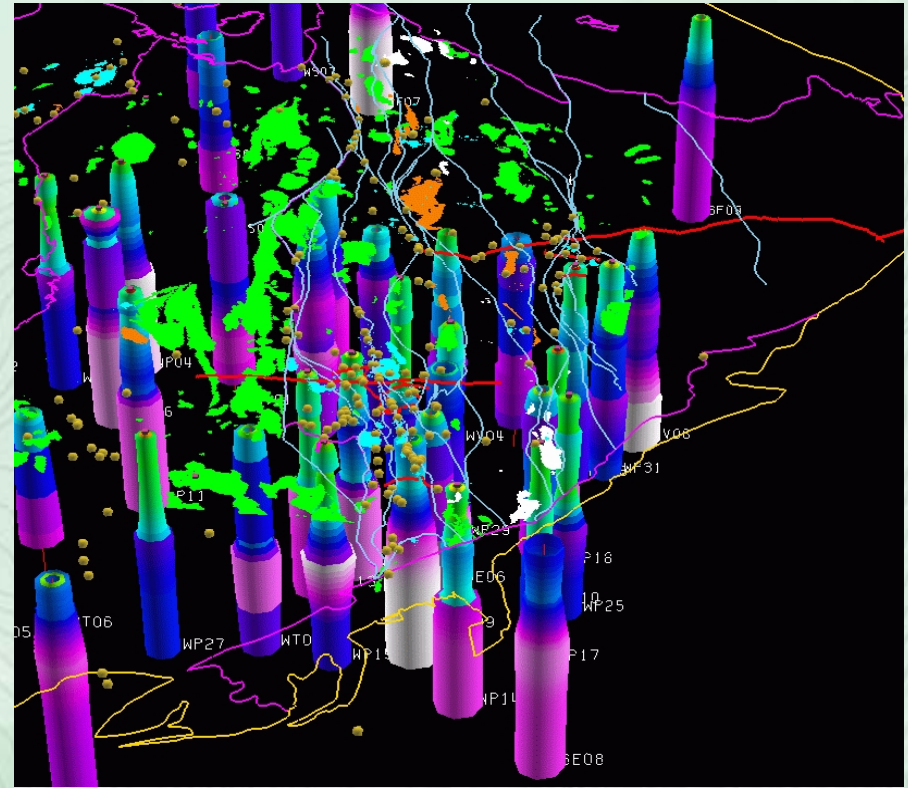
Moho depth 42 km (e.g. WV05)
Sharp
Discontinuity in upper crust
Lower crust velocity gradients variable
Structure generally very variable
Moho much shallower towards the south

From Reading et al., (in press)

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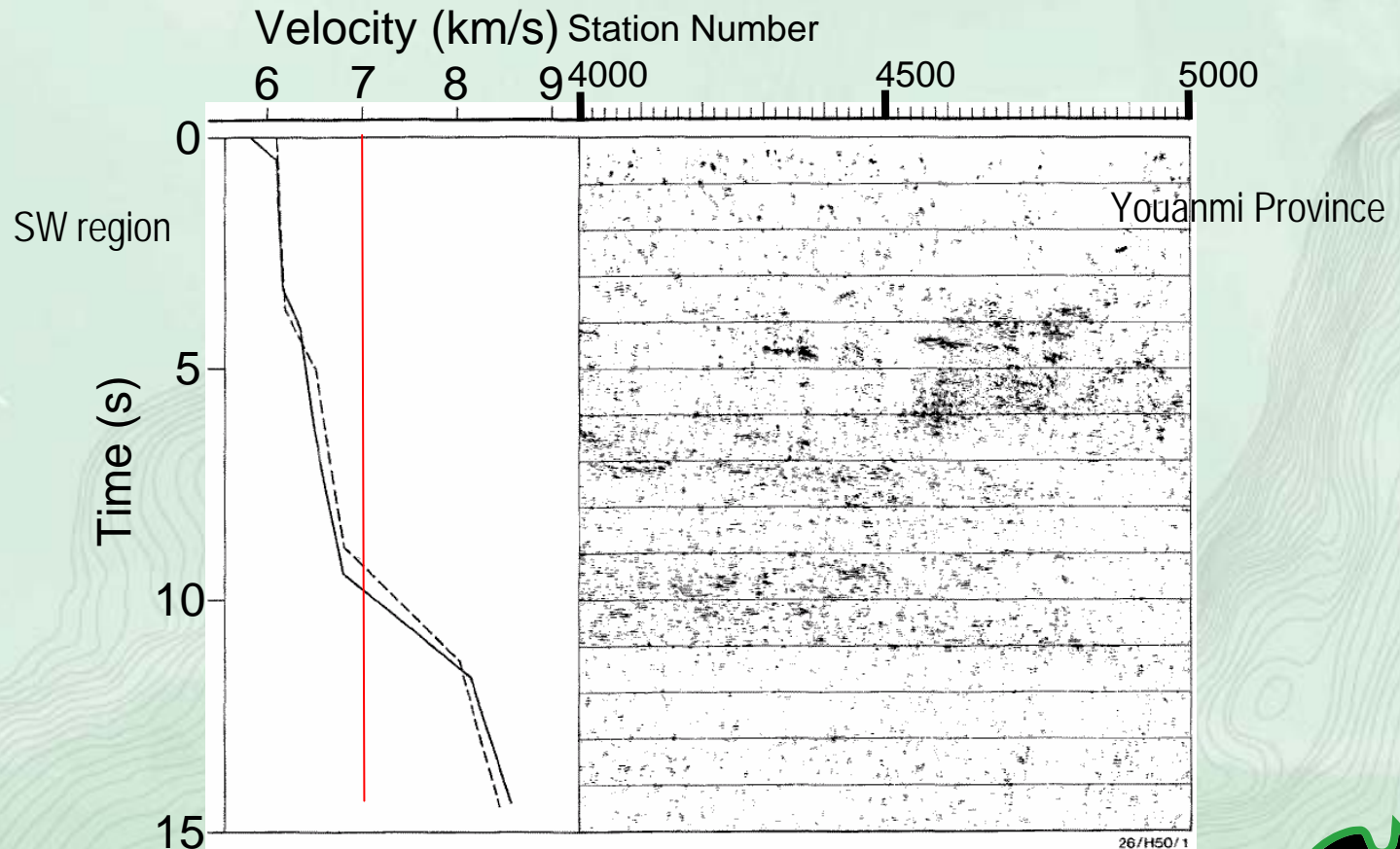
Receiver Function Data

- Shows broad scale velocity variations between terranes, consistency within terranes – related to composition-tectonic evolution.
- Kalgoorlie upper crust (10 km) low velocity anomaly.
- Low velocity indicates presence of low density material.

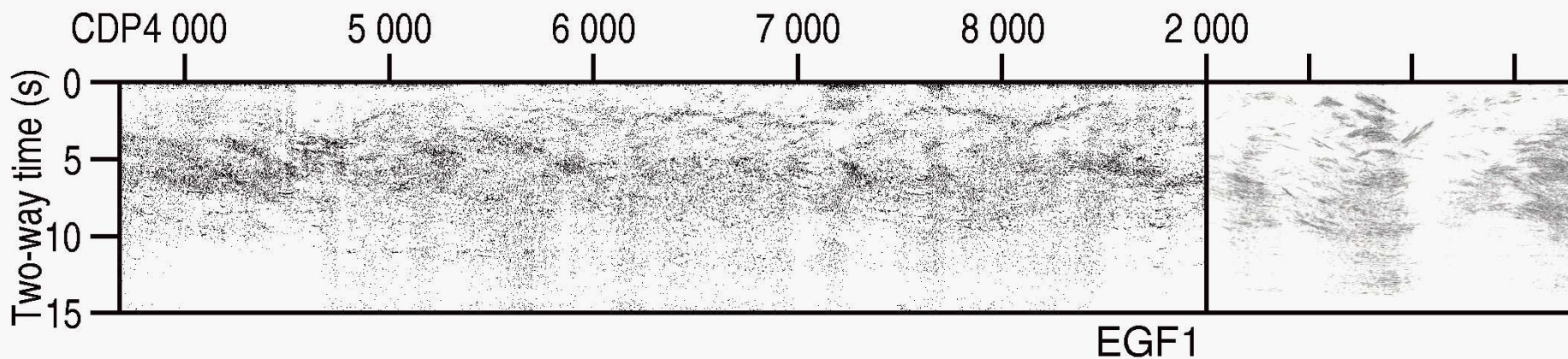
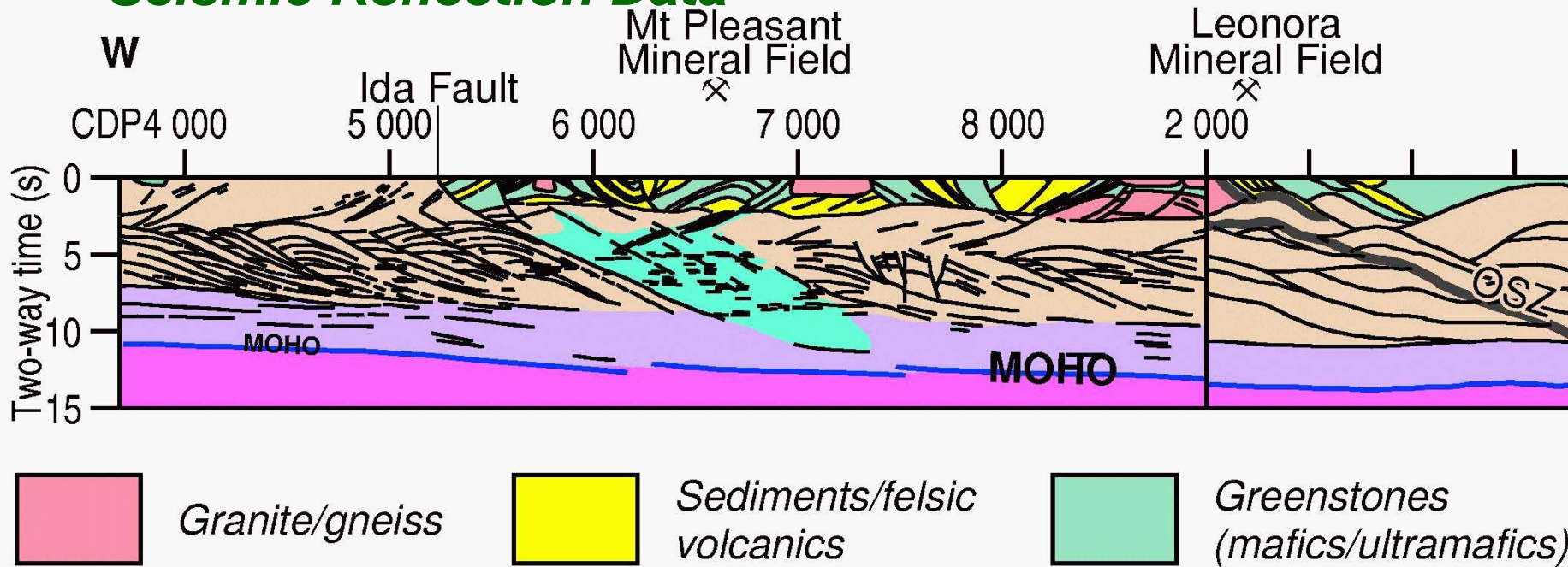


Refraction Data

- Indicates Yilgarn Craton has low velocity crust.
- Low velocity indicates presence of low density crustal material (i.e. not lot mafic material).



Seismic Reflection Data

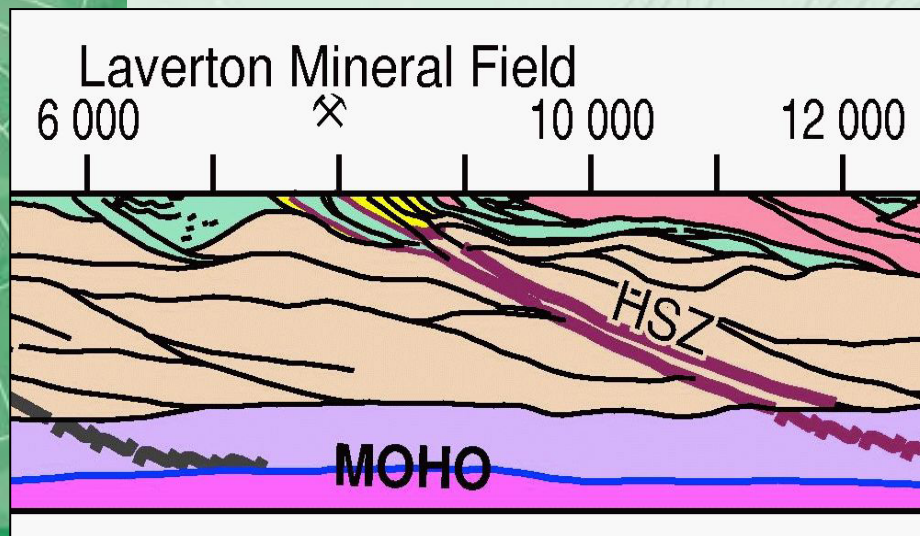


~600 km

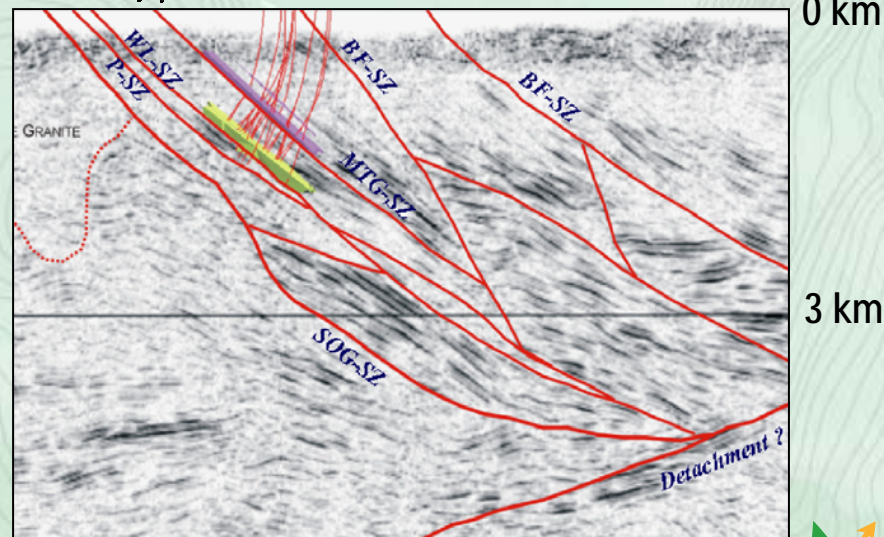
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Seismic Reflection Data

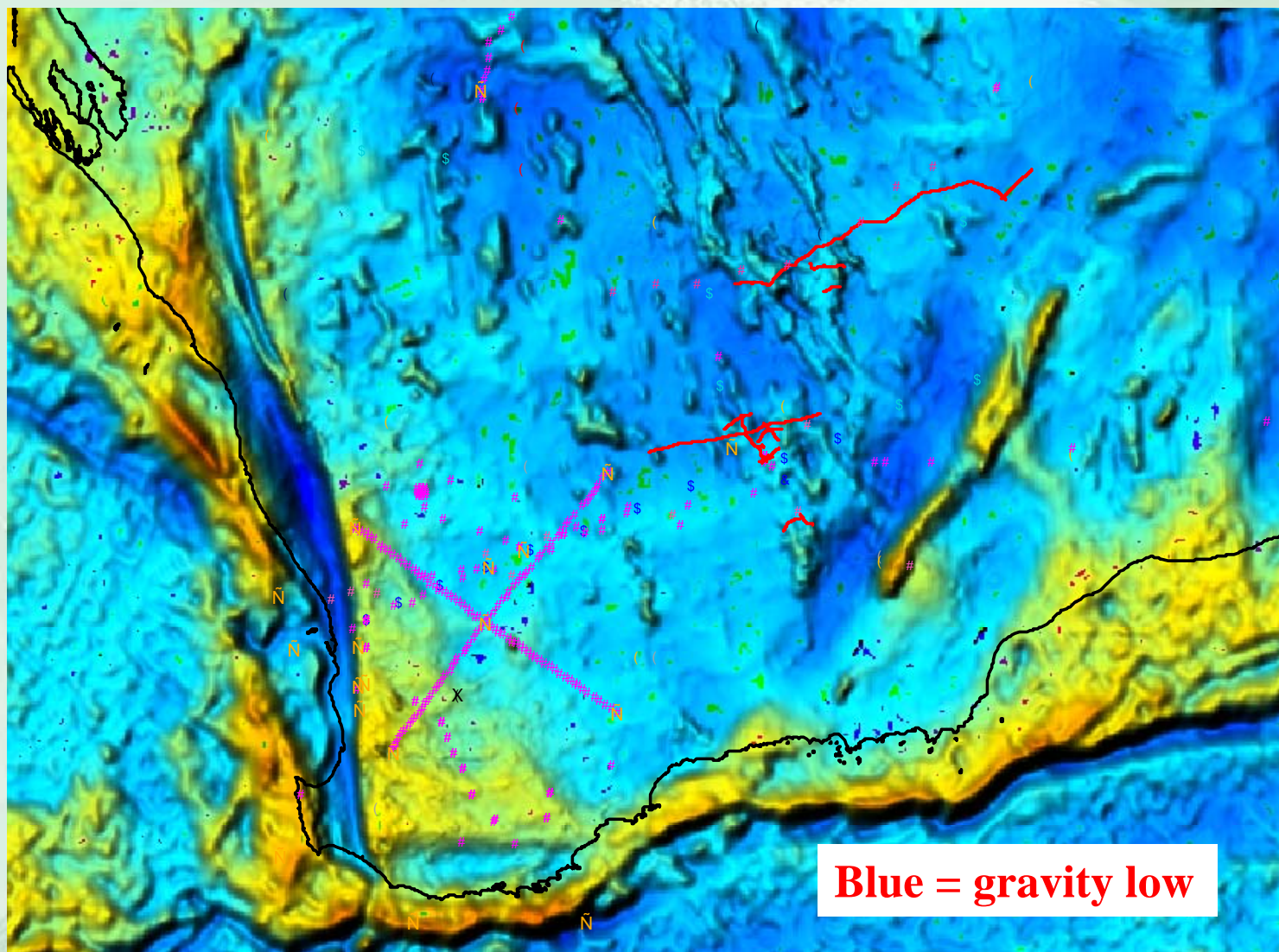
- Moho deepens to east.
- Three broad crustal layers.
- Prominent low-angle east dip.
- 4 crustal-penetrating??? shear zones.
- Essential input for well-constrained 3D geological model.
- Cracks in crust
 - fluid pathways
 - fluid conduits



Leonora
Mineral Field

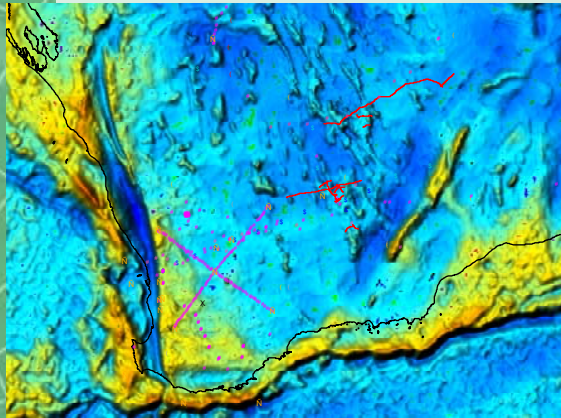


Potential Field Data

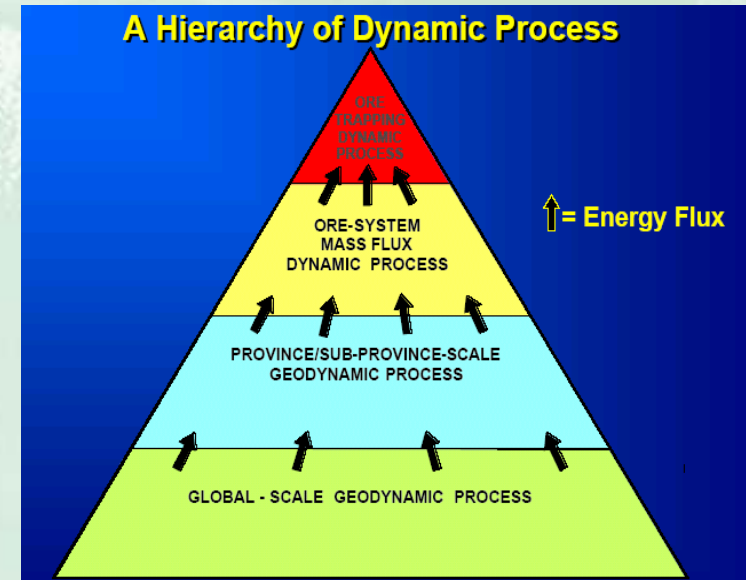


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Deep tapping faults



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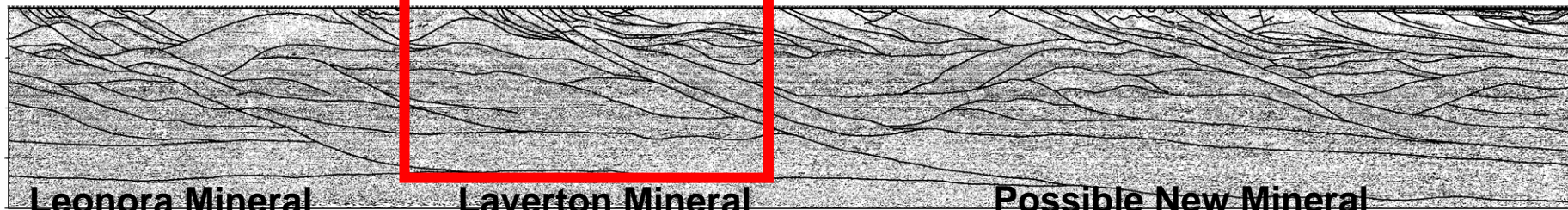


Leonora

Laverton

Yamarna

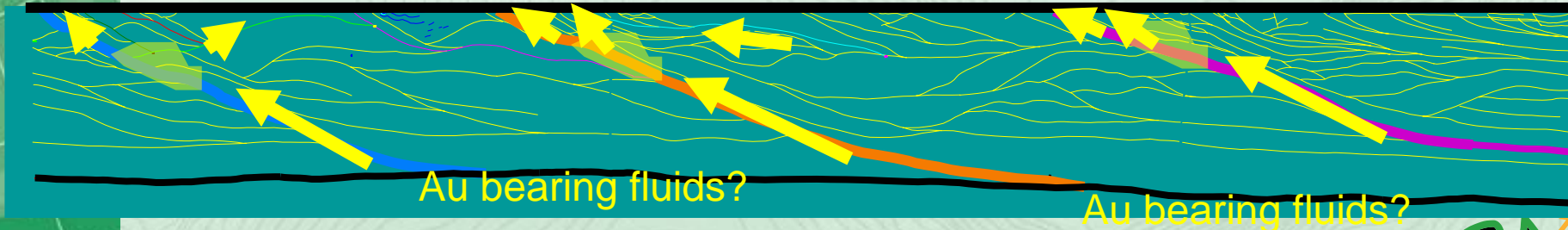
Lake-Yeo



Leonora Mineral Field

Laverton Mineral Field

Possible New Mineral Field



384 km in length , 48 km in depth

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Conclusions

- **Seismic reflection data displays deep tapping faults that could provide pathways for deep mineralised fluids**
- **Steps in the velocity of the mantle can be linked via vertical structures to mantle derived intrusives if restored to a hypothetical location prior to the Albany Frazier collision.**