Seismic 'mapping' of fluid pathways for the world-class gold mineral system at Laverton

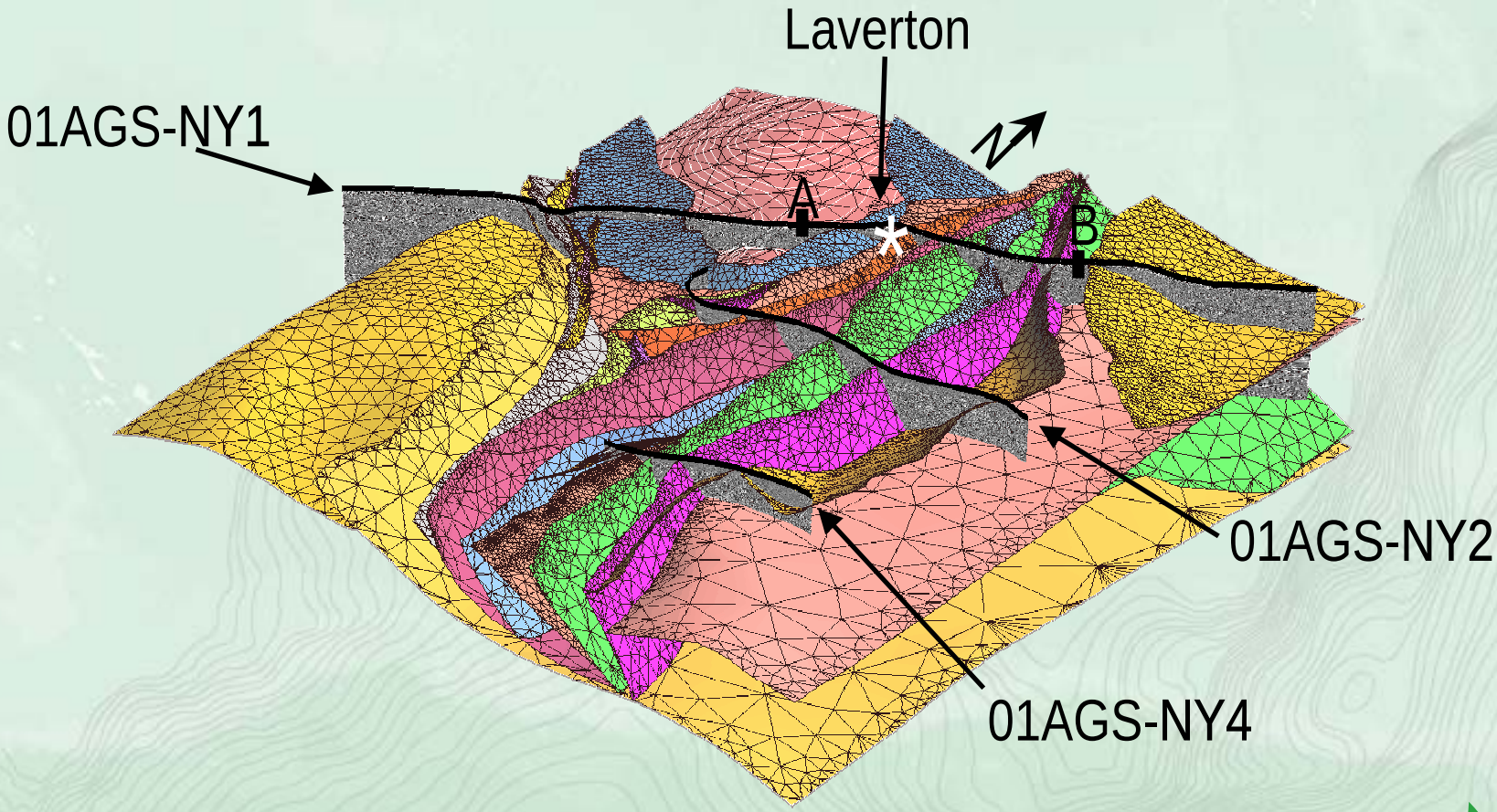
Richard Chopping, Geoscience Australia

Outline

- Seismic data in the regional context
- Previous work at the Laverton region
- Interpretation – 01AGS-NY1 seismic
- Conclusion

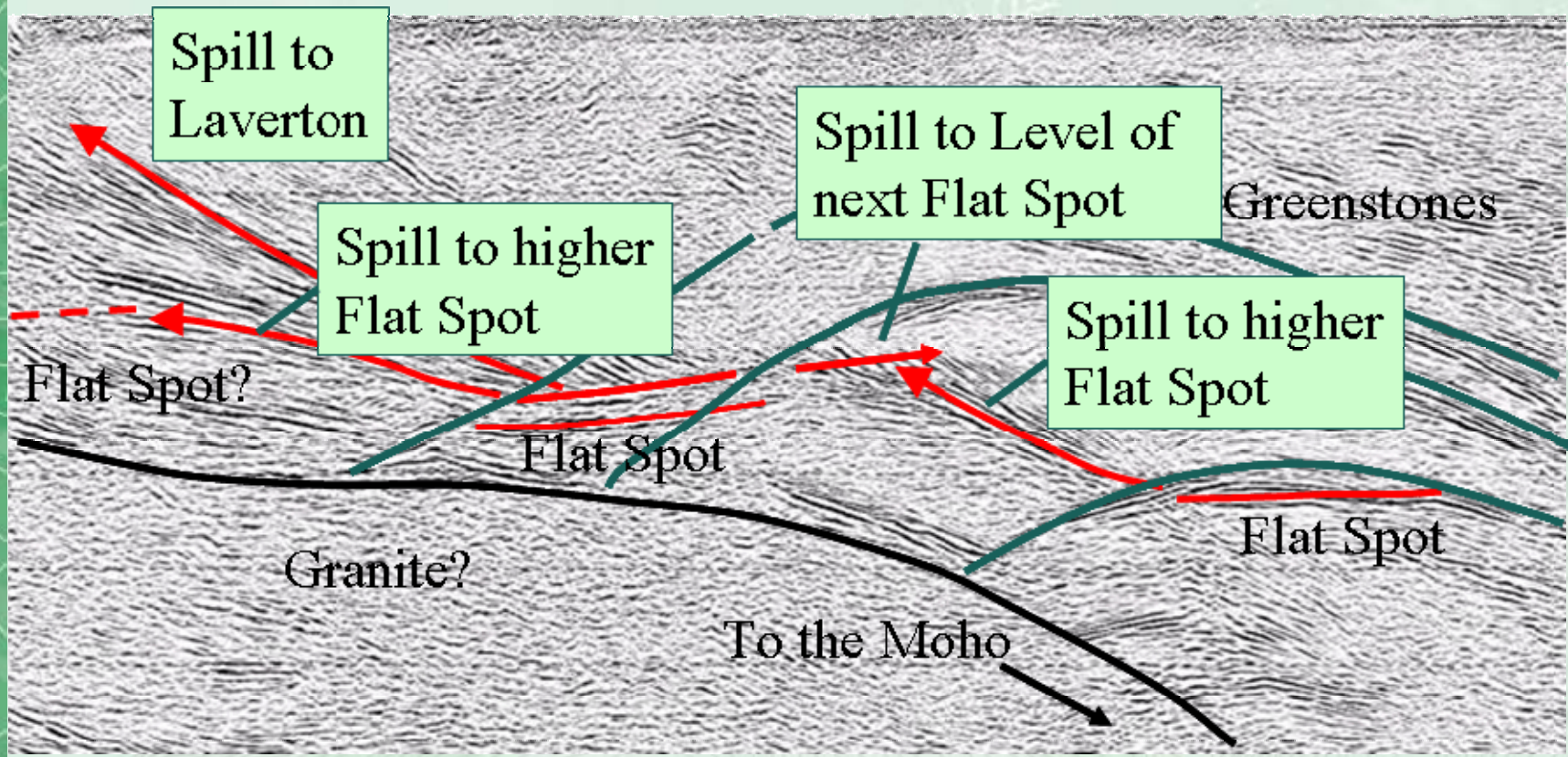
Seismic data in the Laverton region

- Location



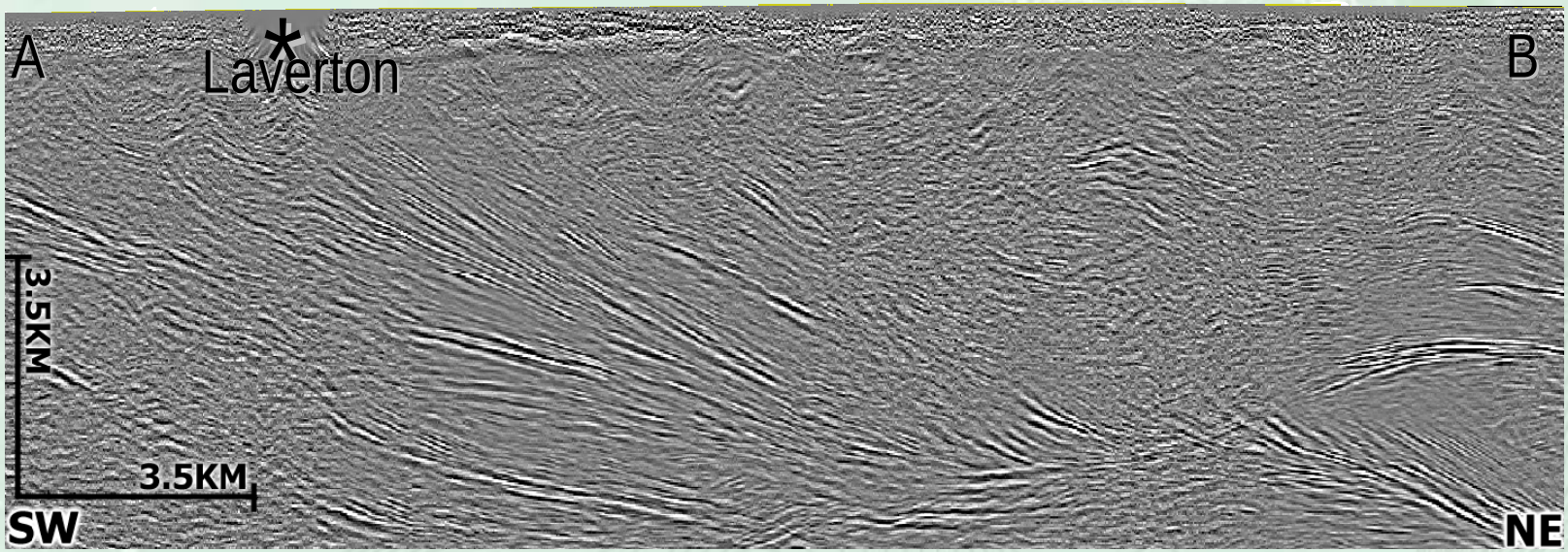
Previous work at Laverton

- Drummond et al (2004) – pmd*CRC Barossa Conference

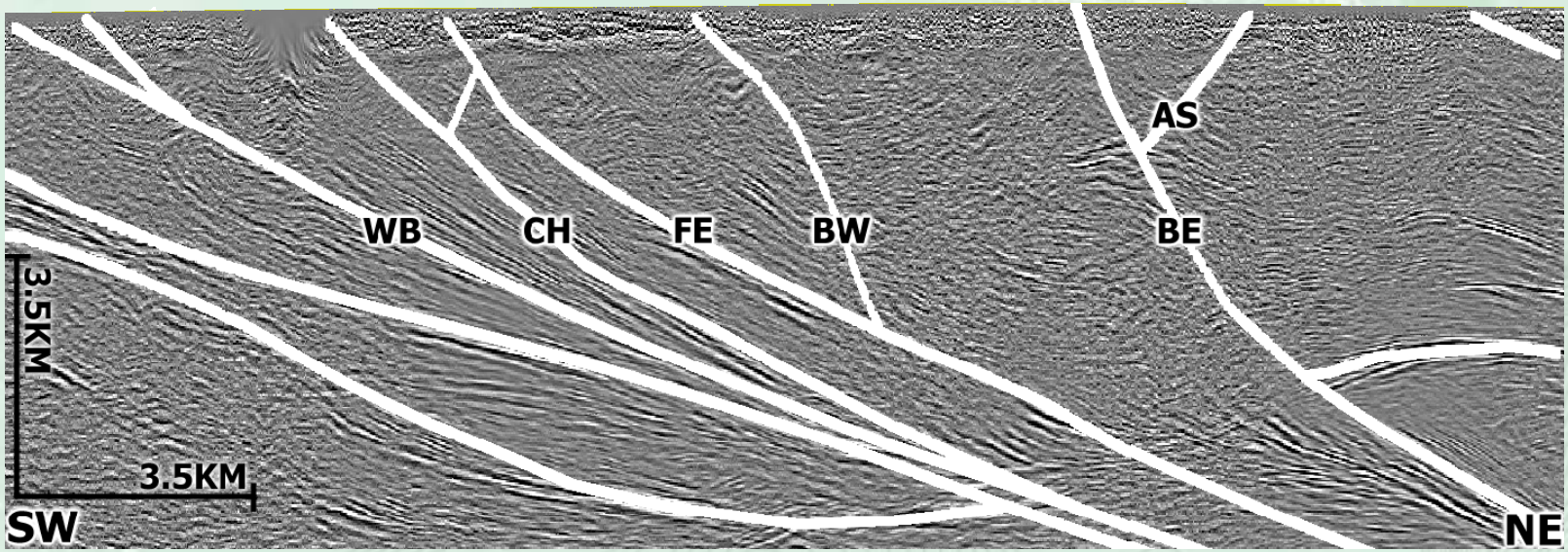


Drummond, B. J., Hobbs, B. E., Hobbs, R. W., and Goleby, B. R., (2004). Crustal fluids in tectonic evolution and mineral systems: evidence from the Yilgarn Craton. In: *Predictive Mineral Discovery Cooperative Research Centre – Extended Abstracts for the June 2004 Conference, Barossa Valley, 1-3 June 2004*. Geoscience Australia Record 2004/09, 236 pp.

NY1

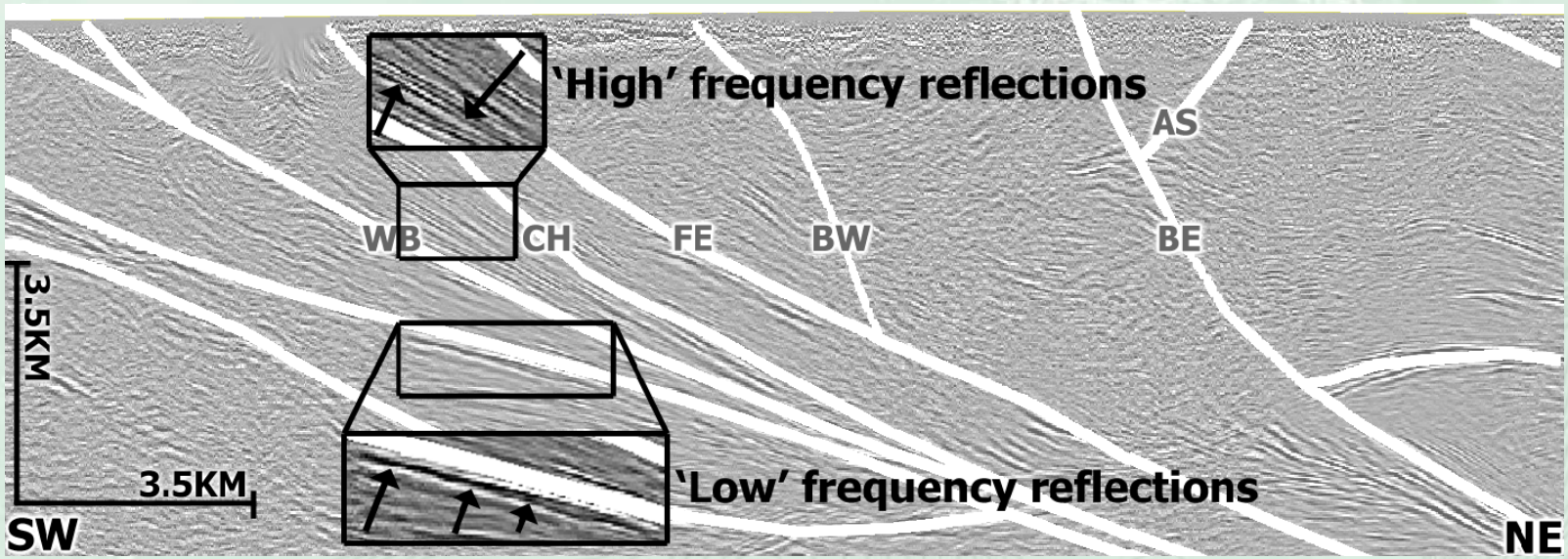


NY1 + Henson et al's 3D architecture



- Faults and surfaces:
  - WB: Wallaby Basin
  - CH: Childe Harold Fault
  - FE: Far East Fault
  - BW: Barnicoat West Fault
  - BE: Barnicoat East Fault
  - AS: Apollo Shear

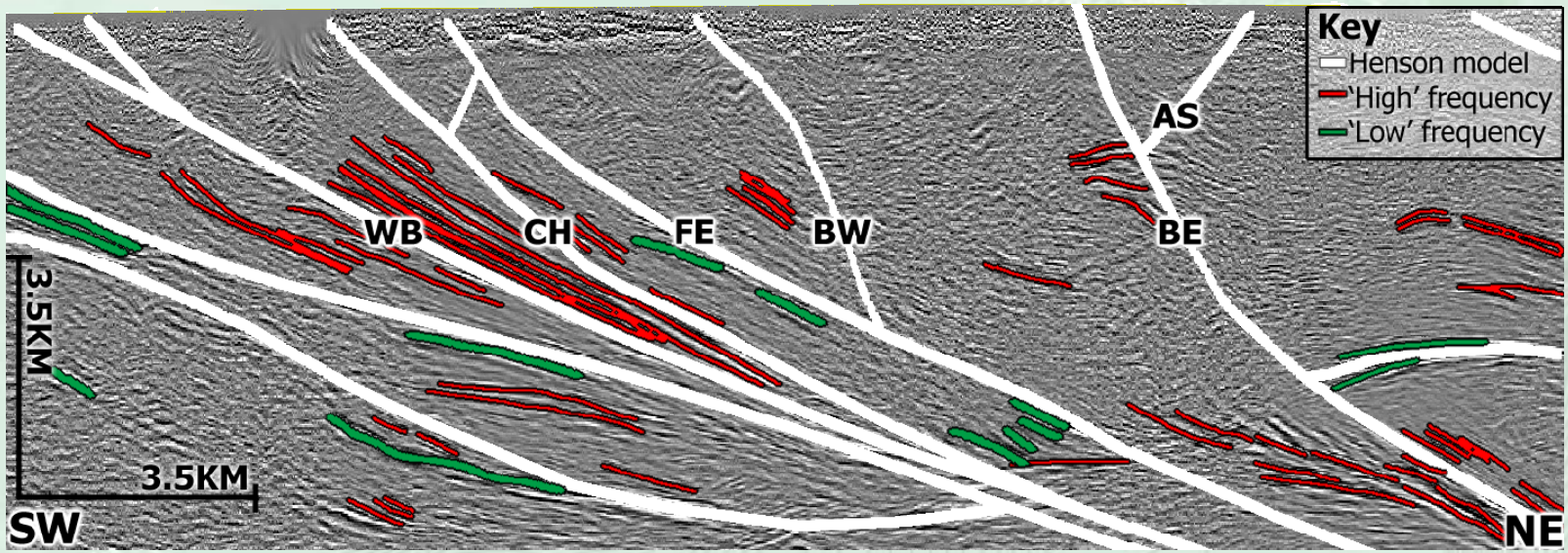
… seismic character around faults



Why reflections due to fluid flow?

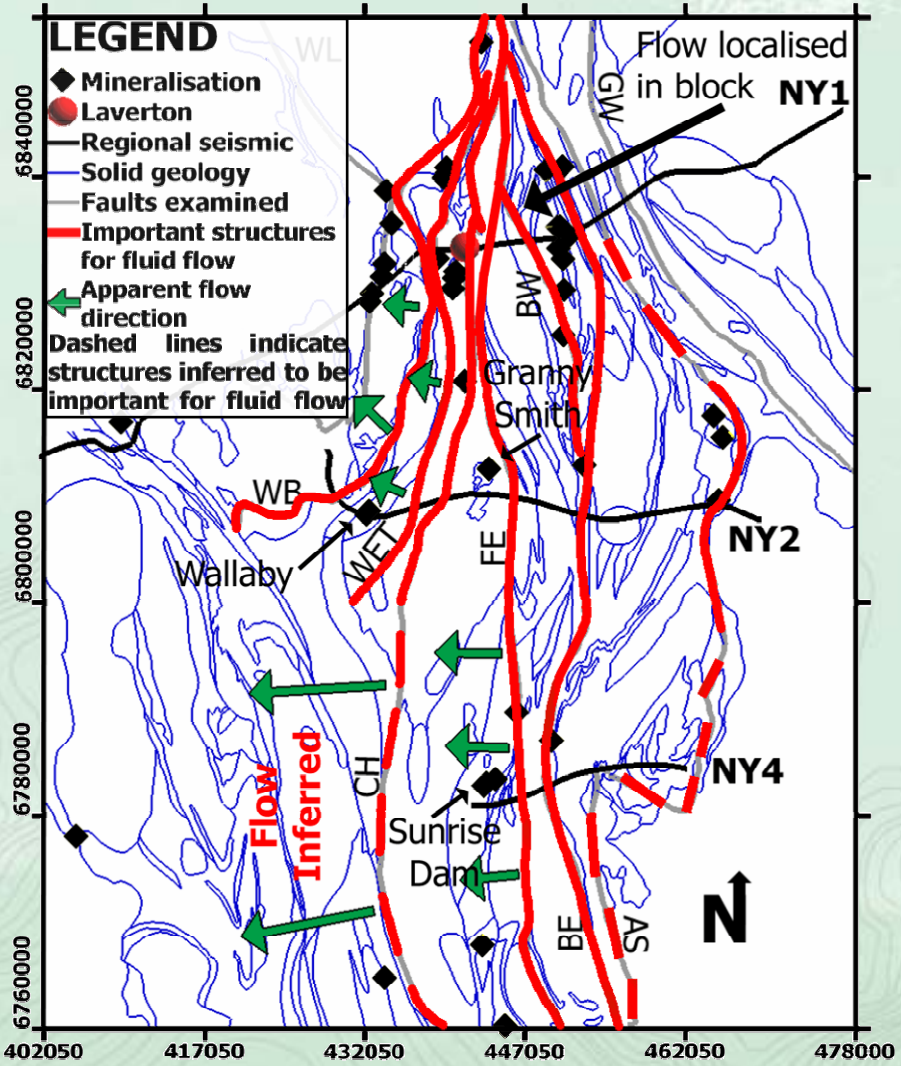
- Process of elimination
  - Processing and/or acquisition
  - Change in dip
  - Thickness of structure
  - 3D effects – 2D seismic over 3D structures (out of plane energy)
  - Change in lithology (± alteration)

Interpretation



- Lots of 'high' freq reflections streaming off Childe Harold & Far Eastern Faults
- Around NY1, nothing really seems to come towards the top of Far Eastern Fault
- Few long high-freq reflections in block between Barnicoat East and Barnicoat West near surface
- Some reflections around Wallaby Basin basal surface, so flow may have occurred around here as well
- If these reflections are demonstrating fluid flow, perhaps fluid comes from deeper tapping faults joining, and follows up Childe Harold & possibly Far Eastern Faults

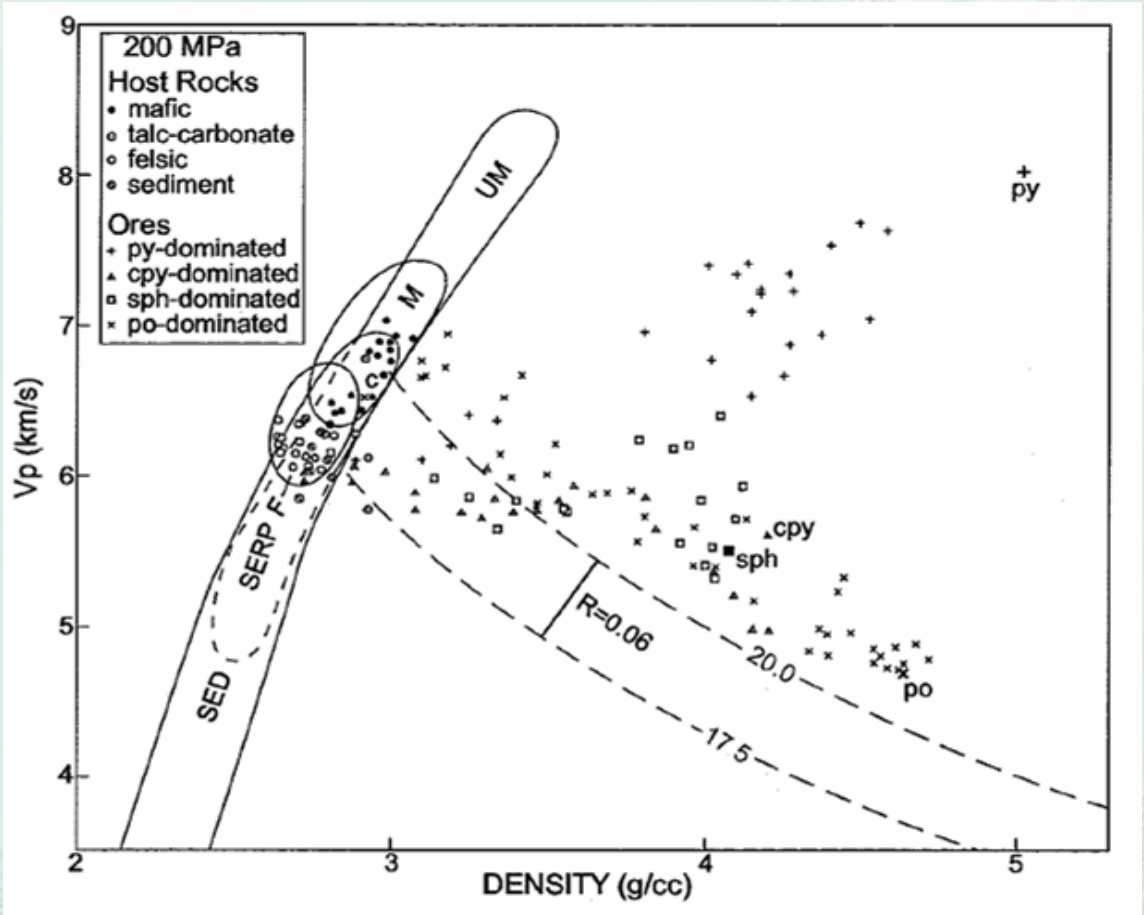
Interpretation of all seismic lines



Results from the map

- Ore bodies occur close to faults inferred to have seen fluid flow
- Highest levels of fluid flow – Childe Harold around NY1; Highest flow around NY2 around Wallaby Basin, Far Eastern, and Chile Harold; Far Eastern around NY4
- No evidence of fluid flow across the Far Eastern Fault to the East – mineralisation to the East is confined to block between Barnicoat East & West Faults
- Most prospective area is the area west of the Childe Harold in the south of the region

How much alteration?



Salisbury, M. H., Milkereit, B., Ascough, G., Adair, R., Matthews, L., Schmitt, D. R., Mwenifumbo, J., Eaton, D. W., and Wu, J., (2000). Physical properties and seismic imaging of massive sulfides, *Geophysics*, 65, 1882-1889.

Acknowledgements

- Industry supporters of the A3 project
  - AngloGold Ashanti
  - PlacerDome/Barrick Gold
  - Gold Fields
- A3 project team
  - Andy Barnicoat
  - Evgeniy Bastrakov
  - Bruce Goleby
  - Russell Korsch (project leader)