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# **STRUCTURAL AND STRATIGRAPHIC ARCHITECTURE OF WESTERN AUSTRALIA'S FRONTIER ONSHORE SEDIMENTARY BASINS: THE WESTERN OFFICER AND SOUTHERN CARNARVON BASINS**

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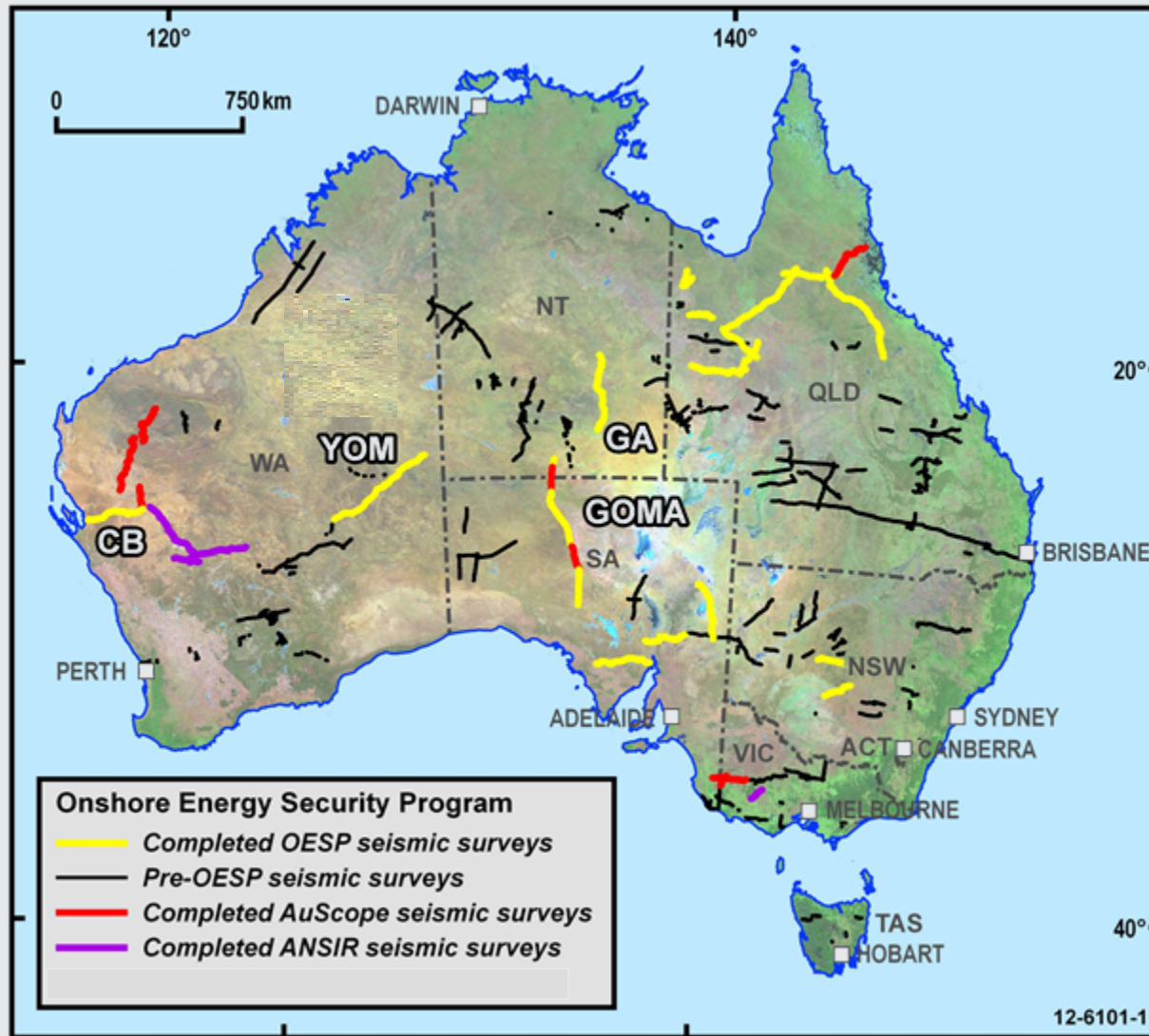
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# Outline

- Onshore Energy Security Program
- Seismic acquisition parameters
- Officer Basin seismic interpretation
- Southern Carnarvon Basin seismic interpretation
- Conclusions

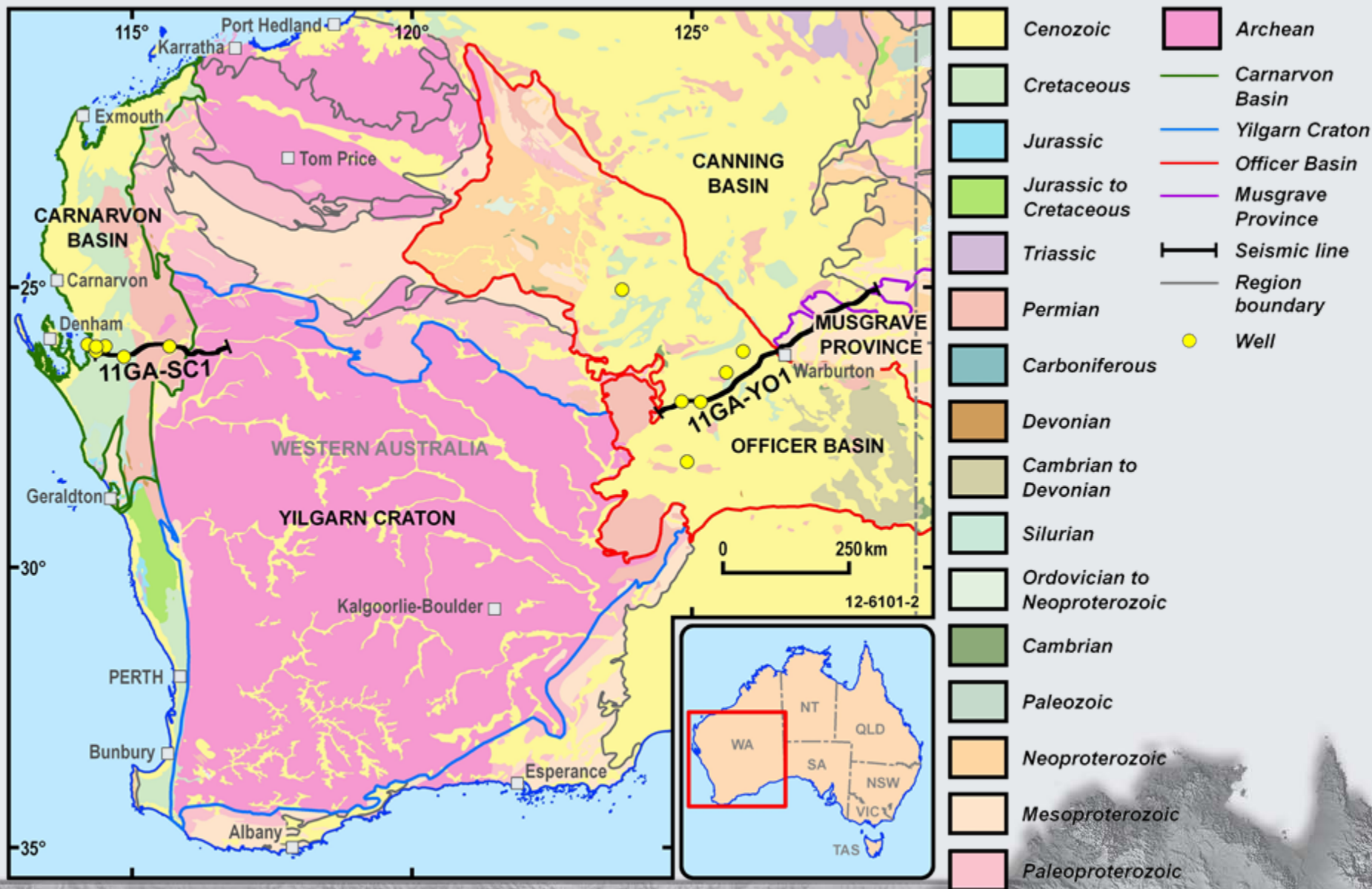
# Onshore Energy Security Program



- 5 year program 2006 -2011
- Precompetitive geoscience data and assessments on petroleum, geothermal & uranium
- New deep seismic reflection data across frontier basins to document basin architecture, internal geometries



# Seismic lines – 11GA-YO1 & 11GA-SC1

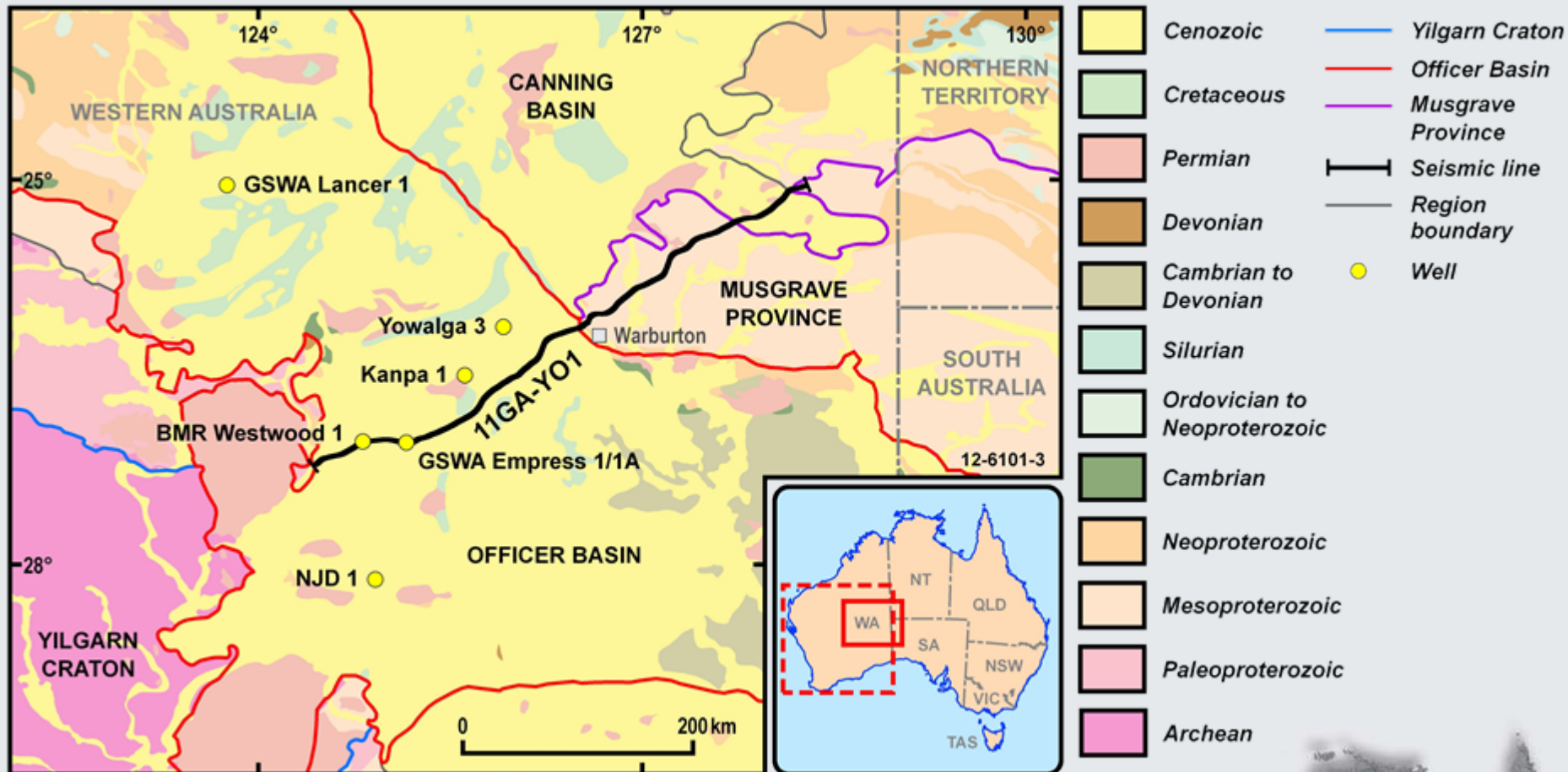




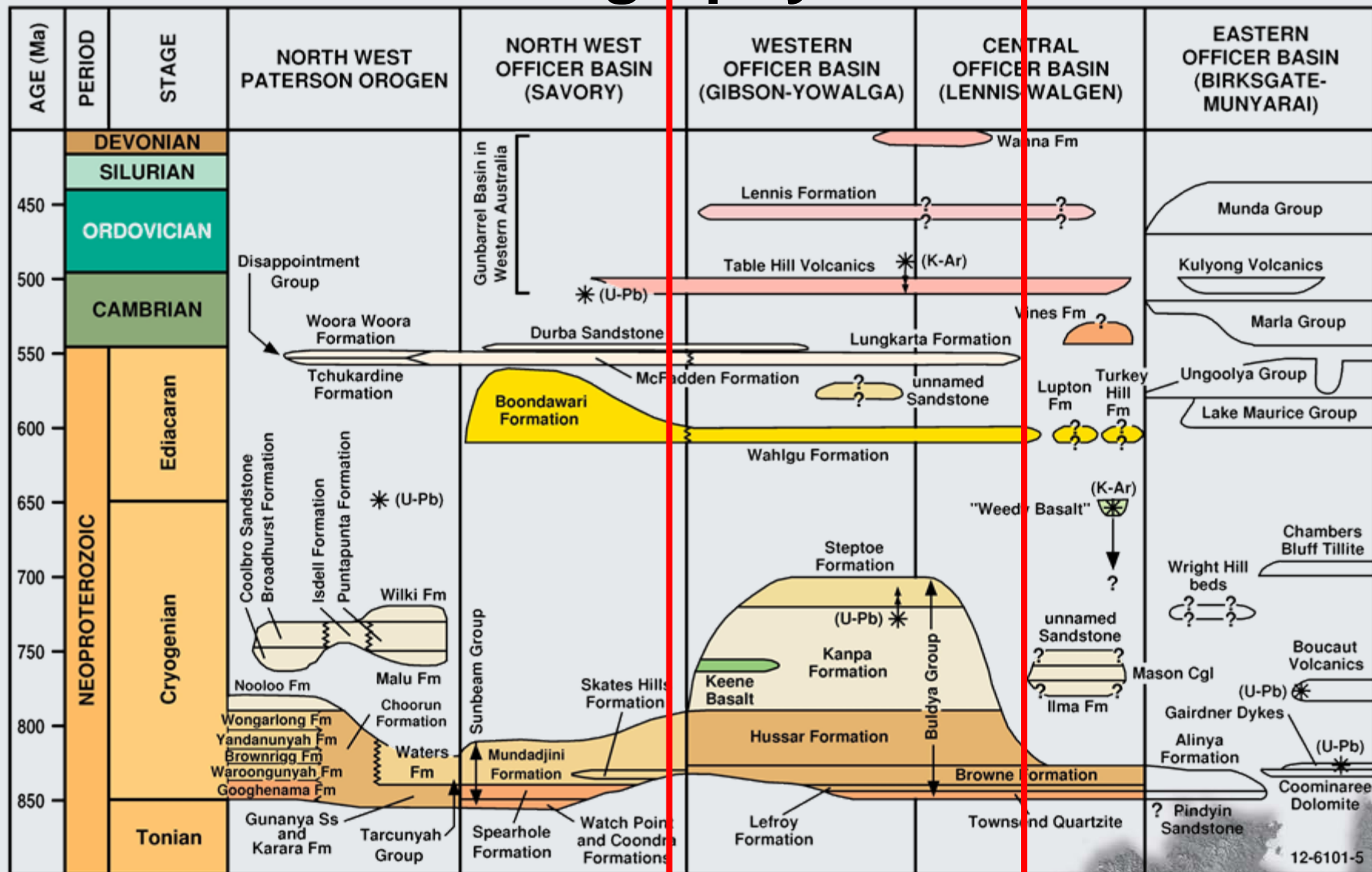
# Seismic acquisition parameters

Line and source type	11GA-SC1, 3 IVI Hemi 50 vibrators
Sweep frequency	6-64 Hz, 12-96 Hz, 8-72 Hz
Line and source type	11GA-YO1, 3 IVI Hemi 50 vibrators
Sweep frequency	6–64 HZ, 10–96 HZ, 8–80 HZ
Source array	15 m pad-to-pad, 15 m move up
Sweep length	3 x 12 s
Vibration point (VP) interval	80 m
Receiver group	12 geophones at 3.3 m spacing
Group interval	40 m
Number of recorded channels	300
Fold (nominal)	75
Record length	20 s at 2 ms

# Seismic line 11GA-YO1 across Officer Basin



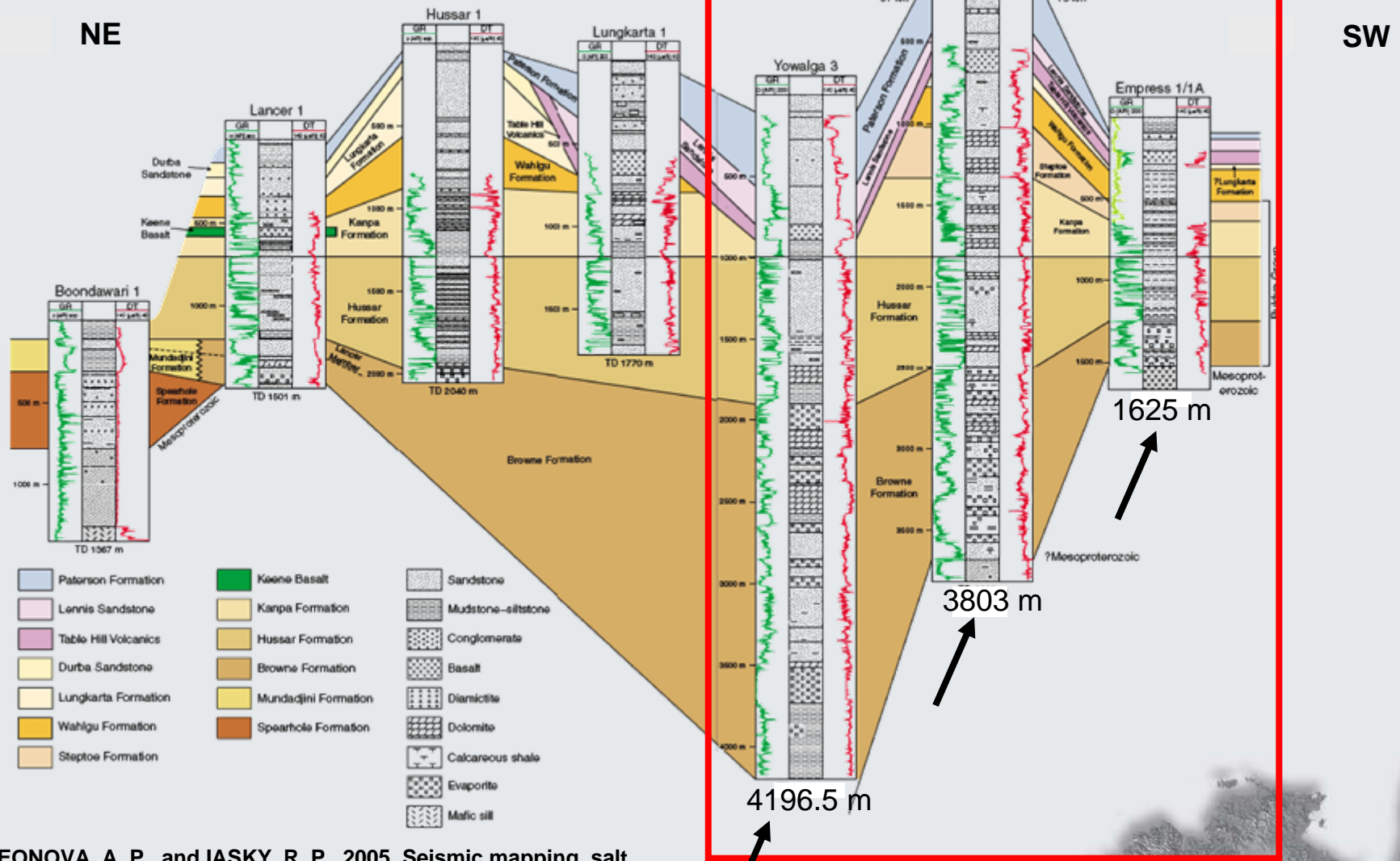
# Officer Basin stratigraphy



SIMEONOVA, A. P., and IASKY, R. P., 2005, Seismic mapping, salt deformation, and hydrocarbon potential of the central western Officer Basin, Western Australia: Western Australia Geological Survey, Report 98, 51p.



# Officer Basin well control



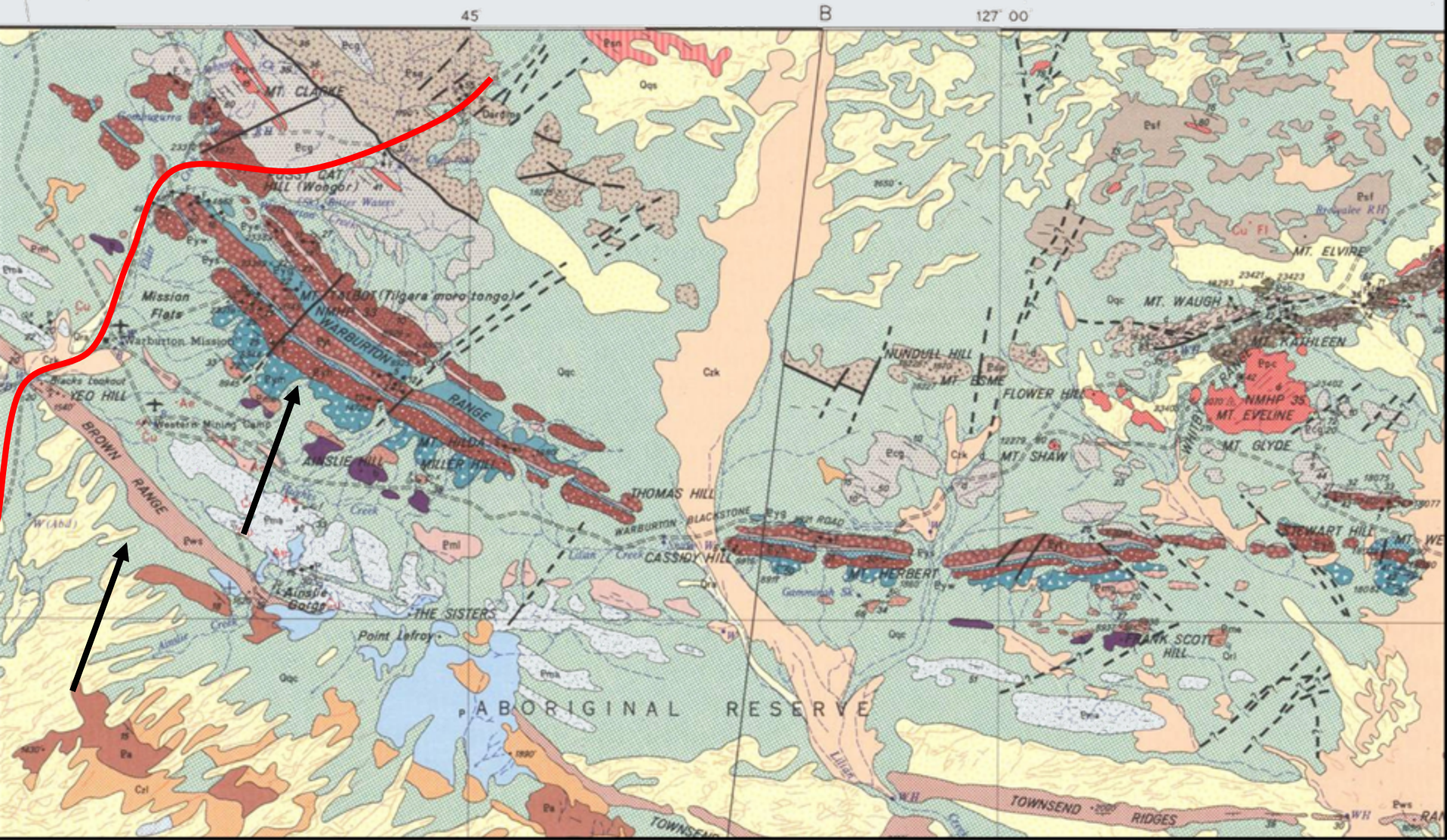
SIMEONOVA, A. P., and IASKY, R. P., 2005, Seismic mapping, salt deformation, and hydrocarbon potential of the central western Officer Basin, Western Australia: Western Australia Geological Survey, Report 98, 51p.

APPEA 15 May 2012

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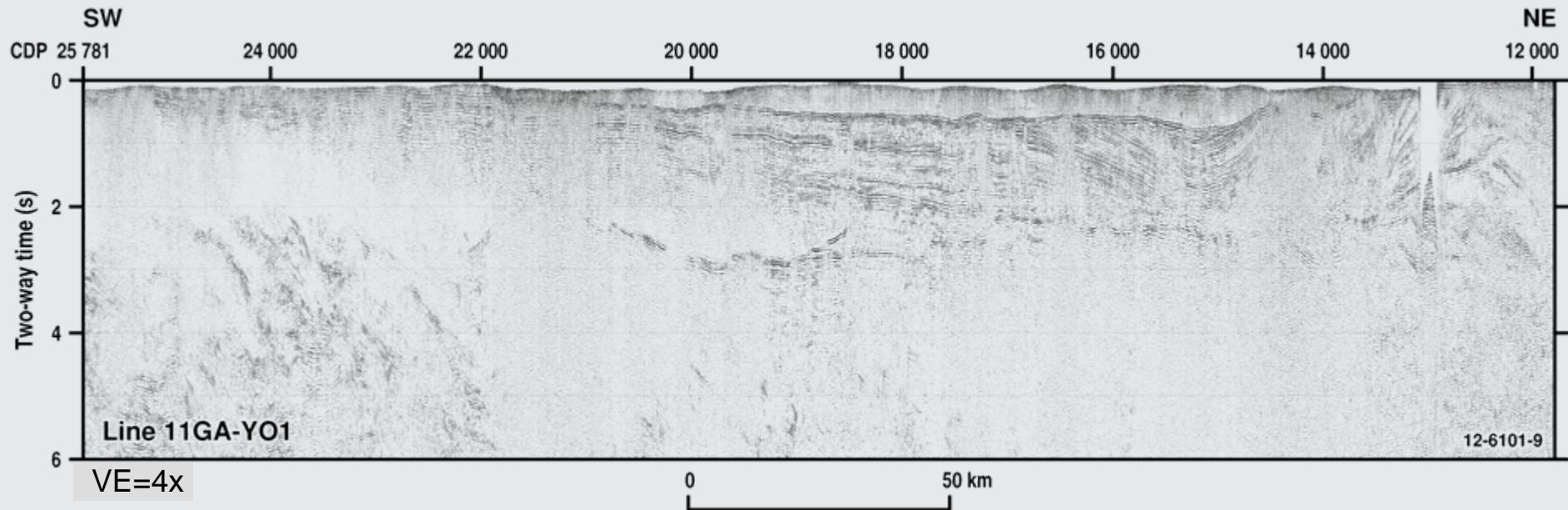


# Surface control Talbot map sheet SG 52 - 9



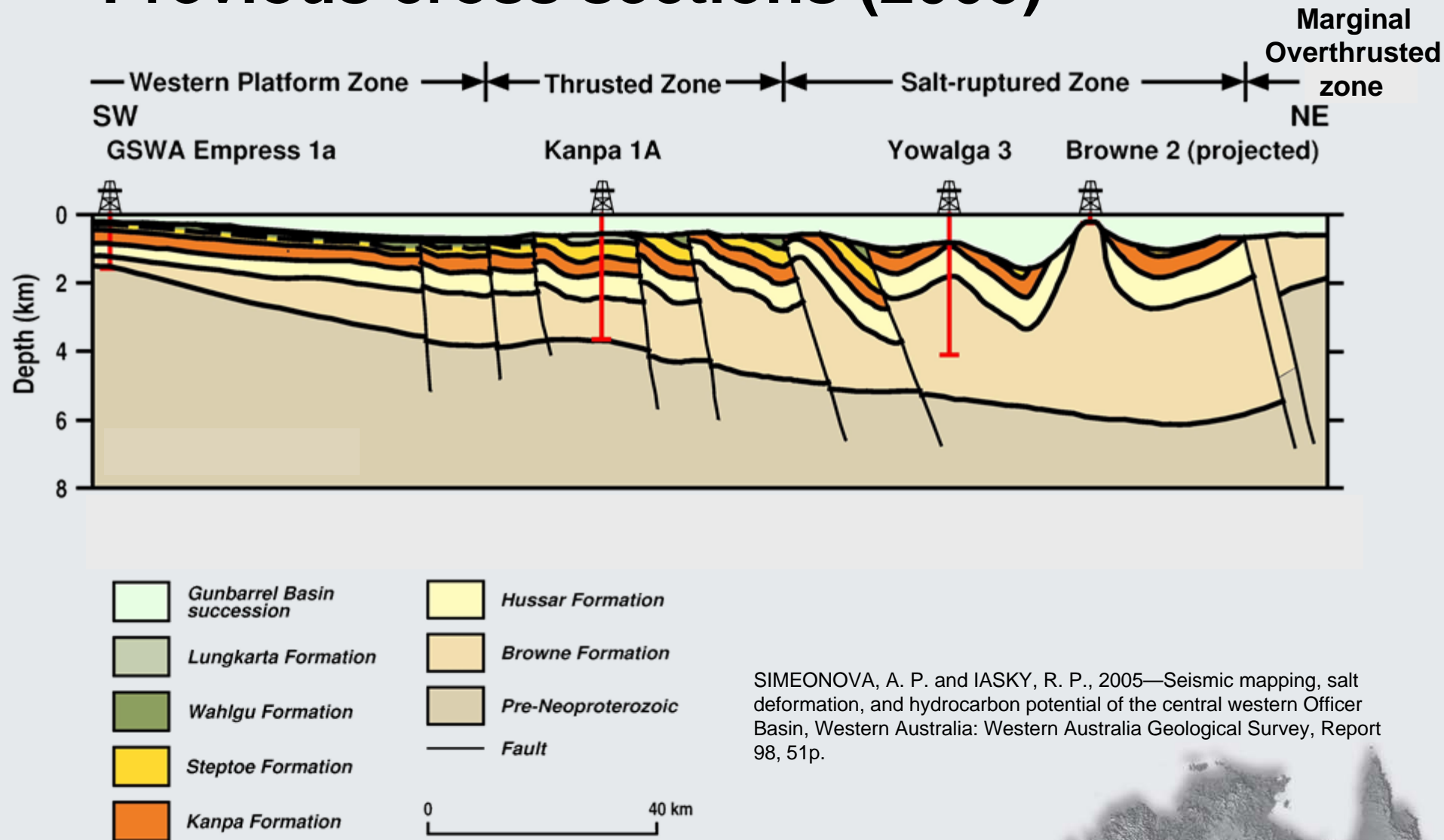


# Seismic line 11GA-YO1 uninterpreted section

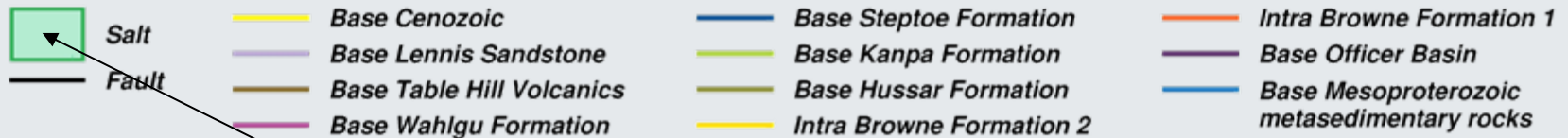
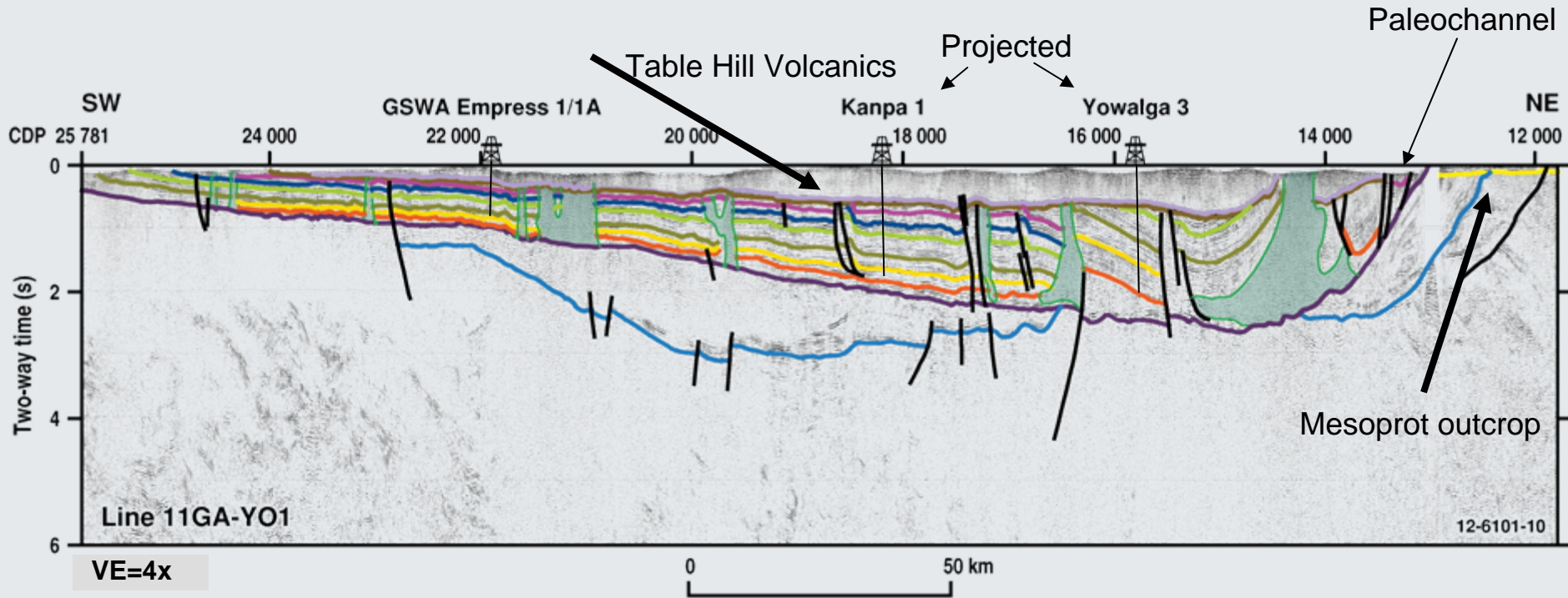




# Previous cross sections (2005)



# Seismic line 11GA-YO1 interpreted section



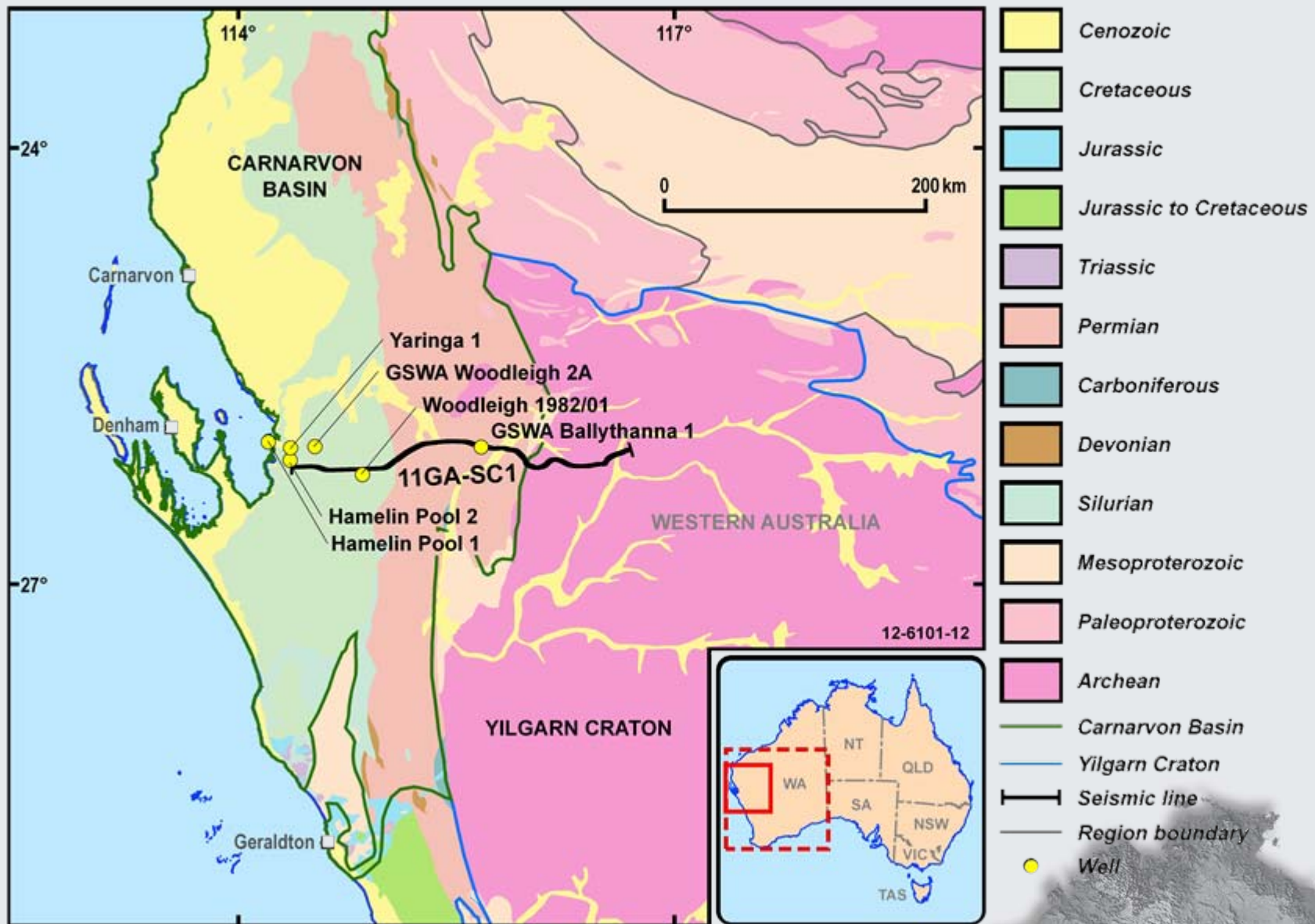
Possible salt traps

# Summary of Officer Basin

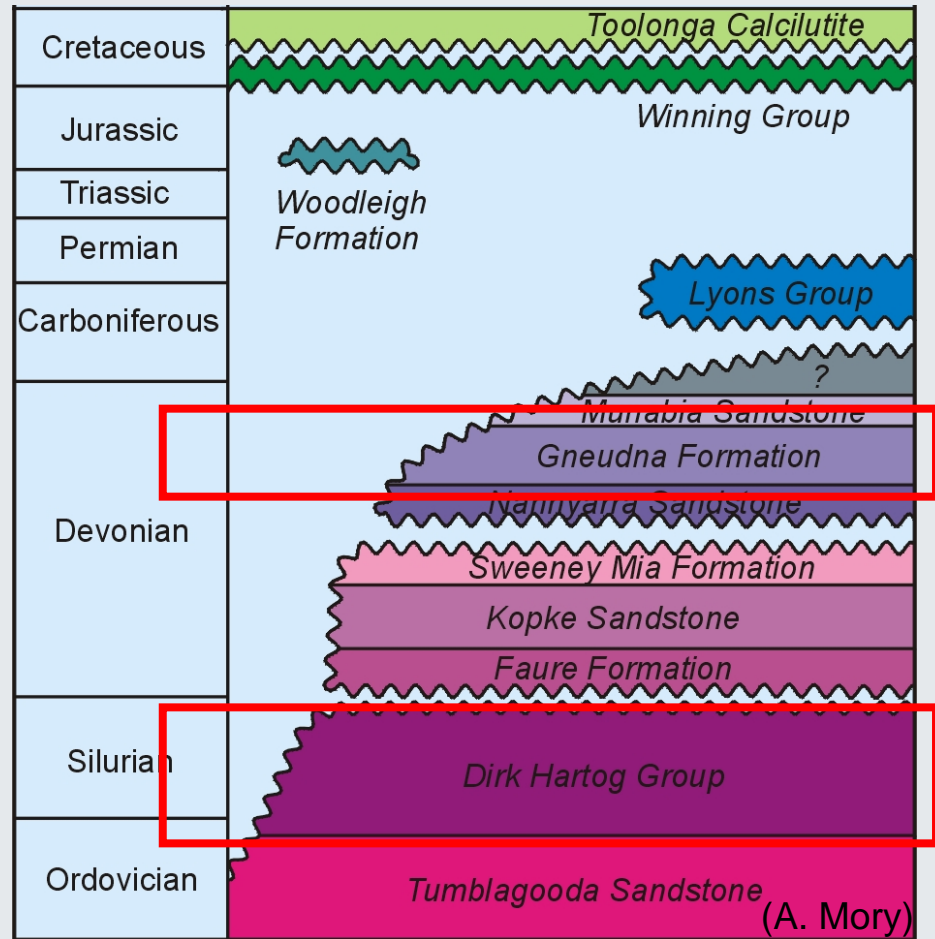
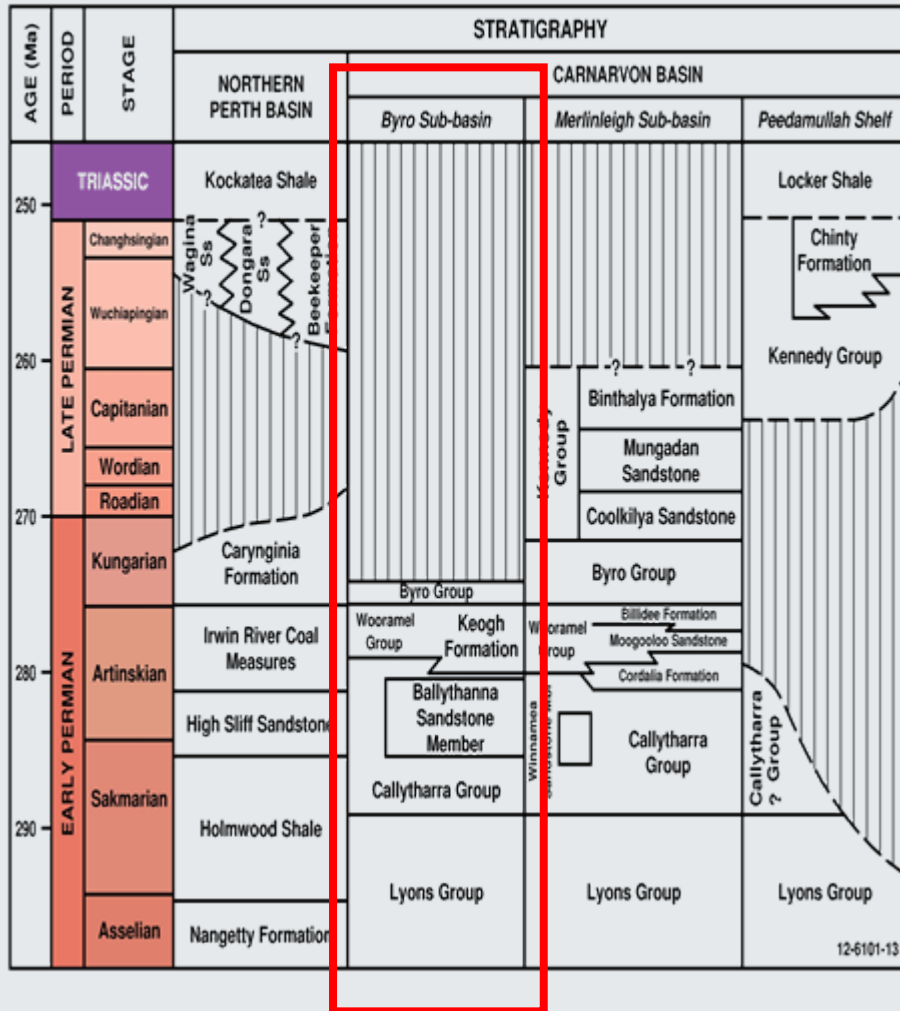
- Seismic line 11GA-YO1:
  - Provides a section across almost the entire basin
  - Asymmetrical basin
  - Thickening to the east
  - Sedimentary succession has been disrupted by salt diapirs, some of which extend to the near surface
  - Known hydrocarbon system



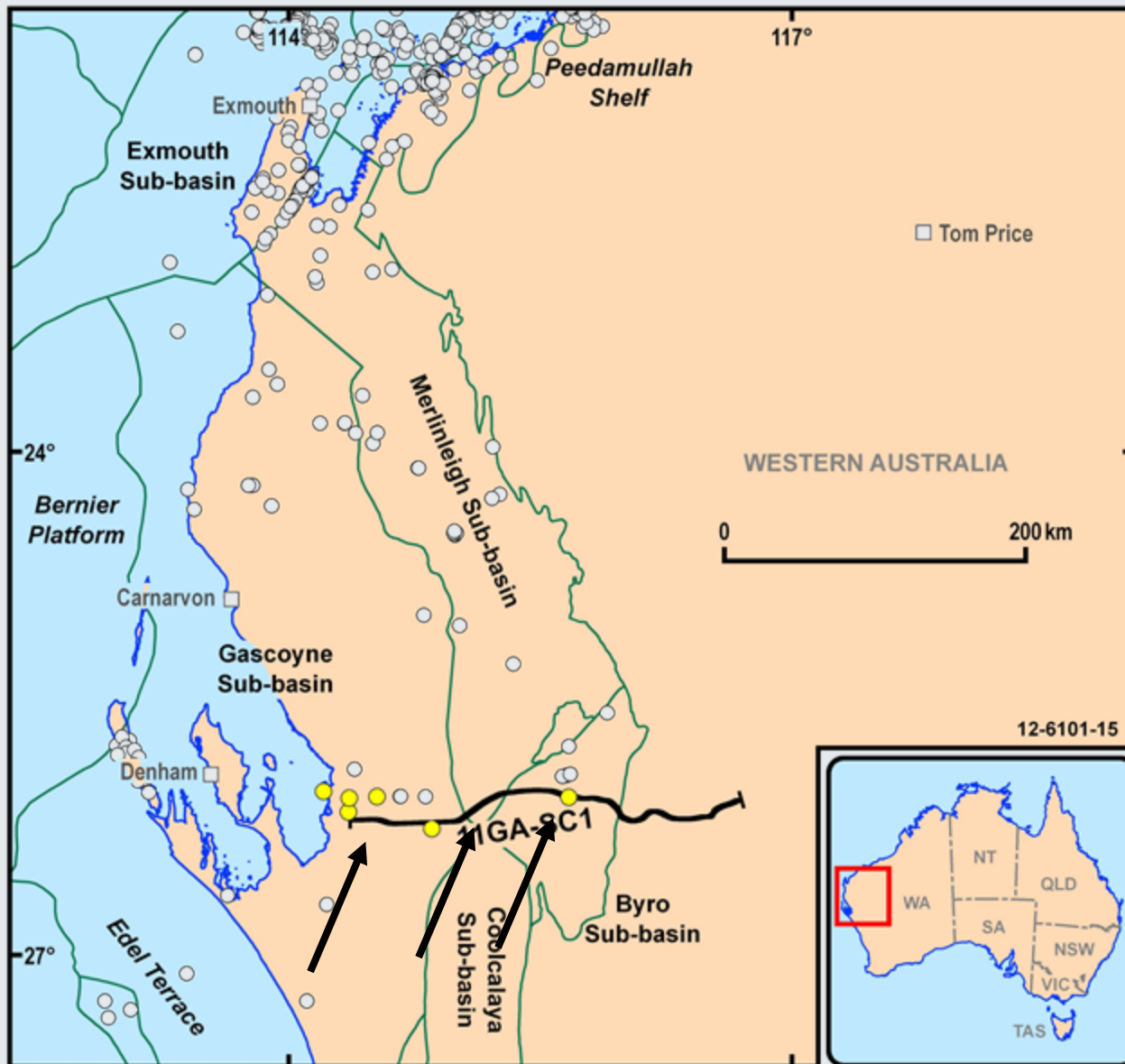
# Seismic Line 11GA-SC1 across the Southern Carnarvon



# Carnarvon Basin stratigraphy



MORY, A. J., and BACKHOUSE, J., 1997, Permian stratigraphy and palynology of the Carnarvon Basin, Western Australia: Western Australia Geological Survey, Report 51, 46p.



- Seismic line
- Sub-basin boundary
- Project wells
- Other wells

## Basin elements

- Gascoyne Platform
- Woodleigh impact structure
- Merlinleigh Sub-basin
- Byro Sub-basin
- Yilgarn Craton

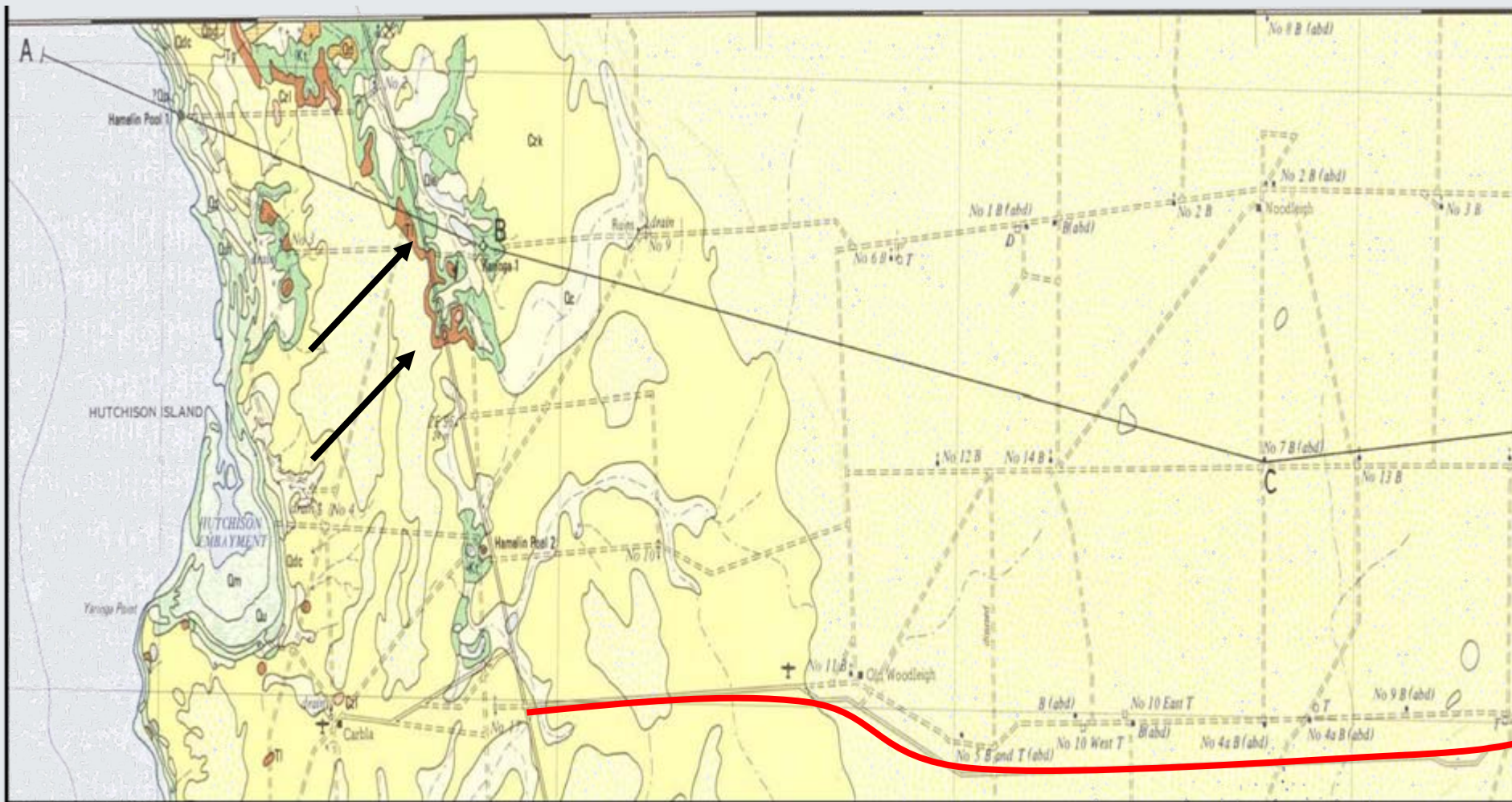
GHORI, K. A. R., 1999, Silurian–Devonian petroleum source-rock potential and thermal history, Carnarvon Basin, Western Australia: Western Australia Geological Survey, Report 72, 88p.



# Well control

Well	TD	Age
Yaringa 1 – ( <i>projected</i> ) Gascoyne platform	7508 feet (2,288 m)	Ordovician - Tumblagooda Sandstone
Woodleigh 1982/01 (Impact structure)	207 m	Silurian - Dirk Hartog Formation
GSWA Ballythanna 1 - Byro Sub-basin	465 m	Permian - Lyons Group
Hamelin Pool 1 and 2 – ( <i>projected</i> ) Gascoyne platform	1. 5113 feet (1,558 m) 2. 4000 feet (1,219 m)	Ordovician -Tumblagooda Sandstone, Silurian - Dirk Hartog Formation

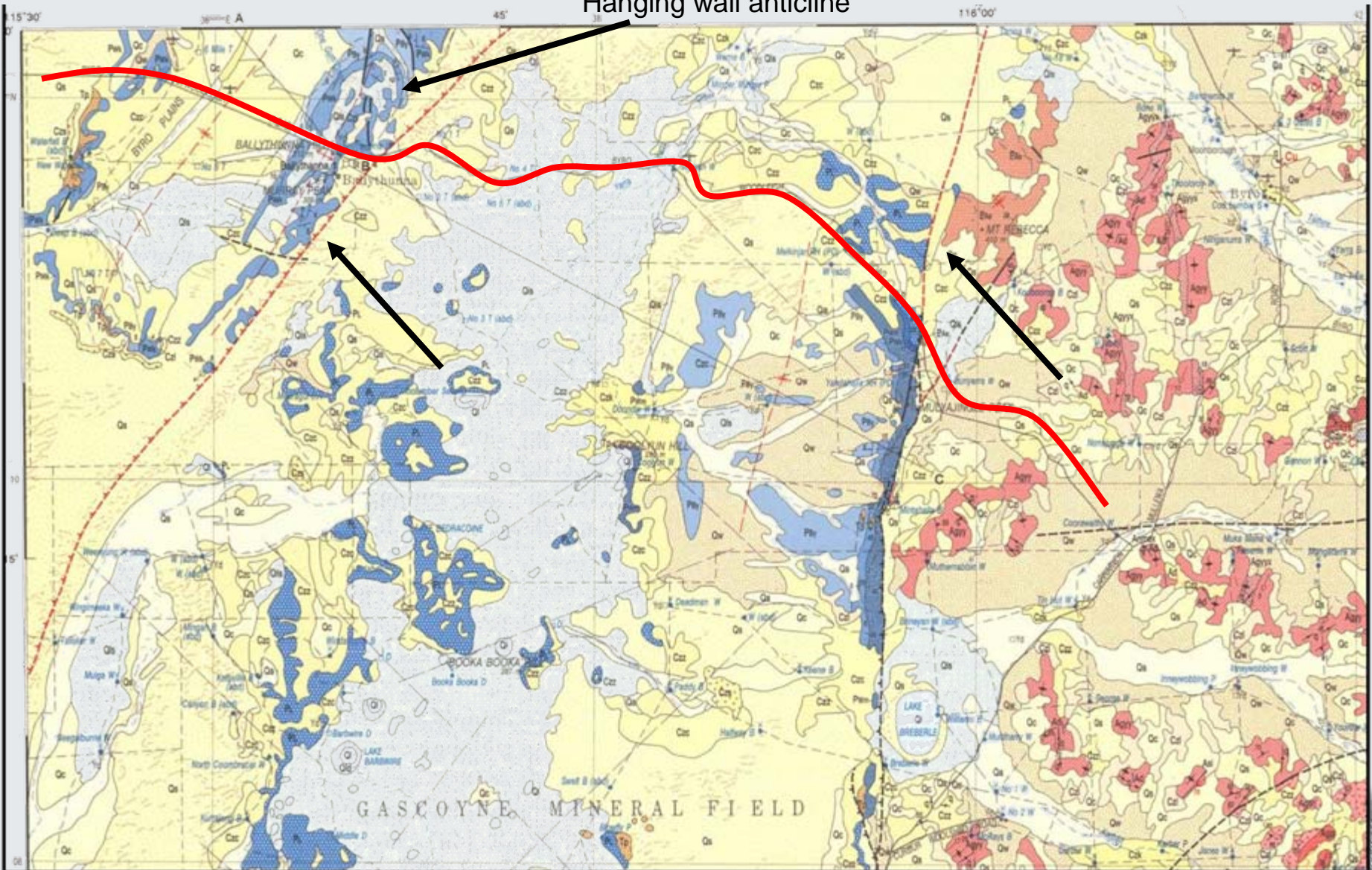
# Surface control – Yaringa map sheet SG5009





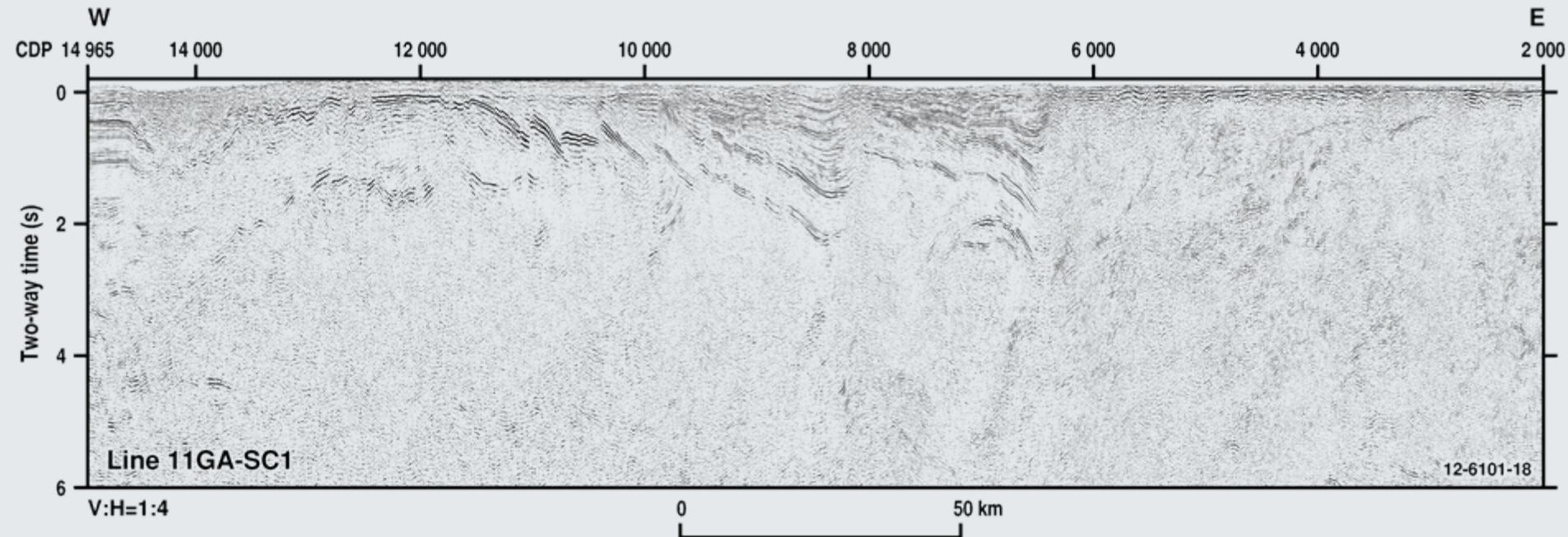
# Surface control – Byro map sheet SG5010

Hanging wall anticline

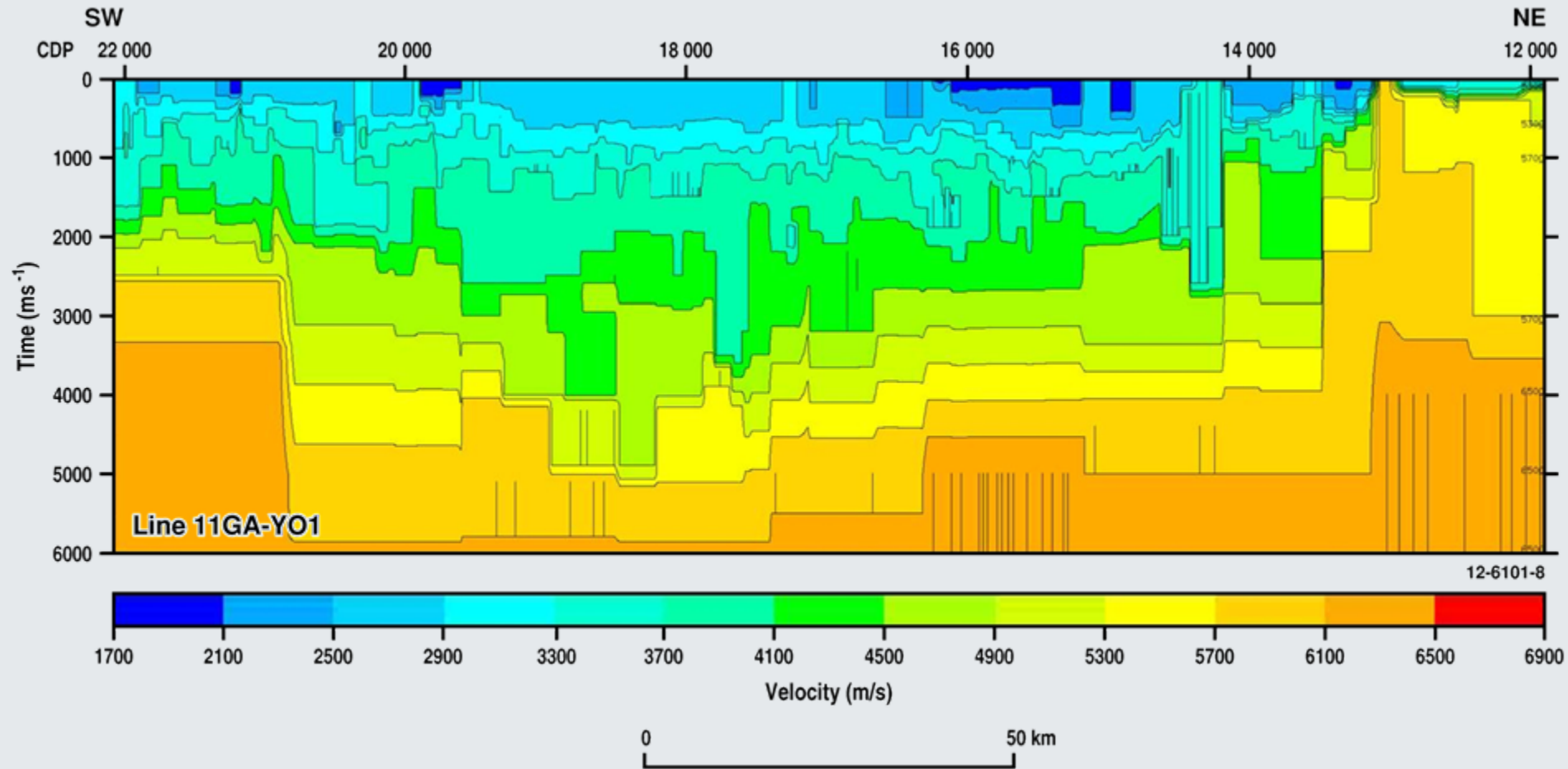




# Seismic line 11GA-SC1 uninterpreted section

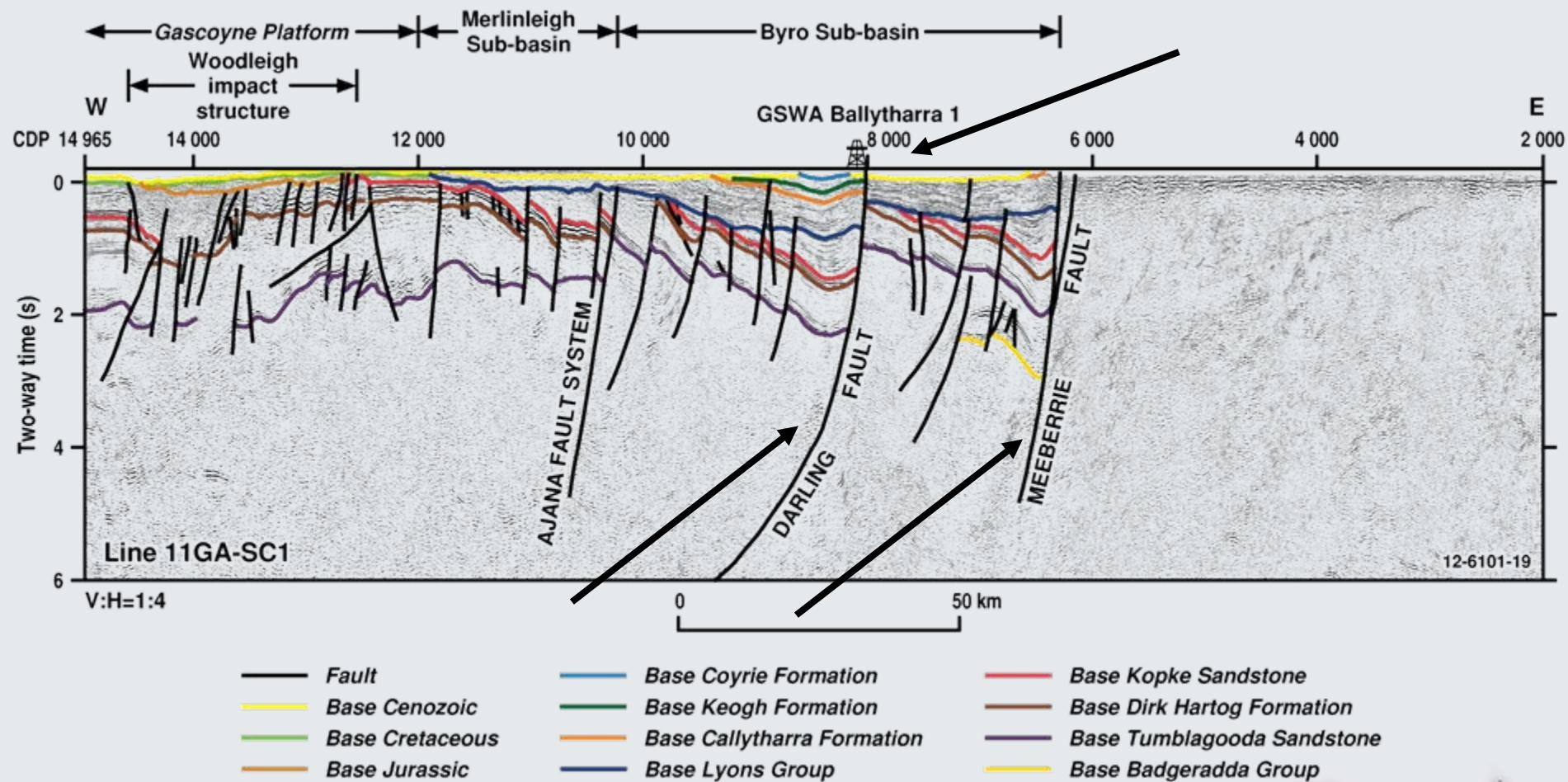


# Line 11GA-YO1 stacking velocity



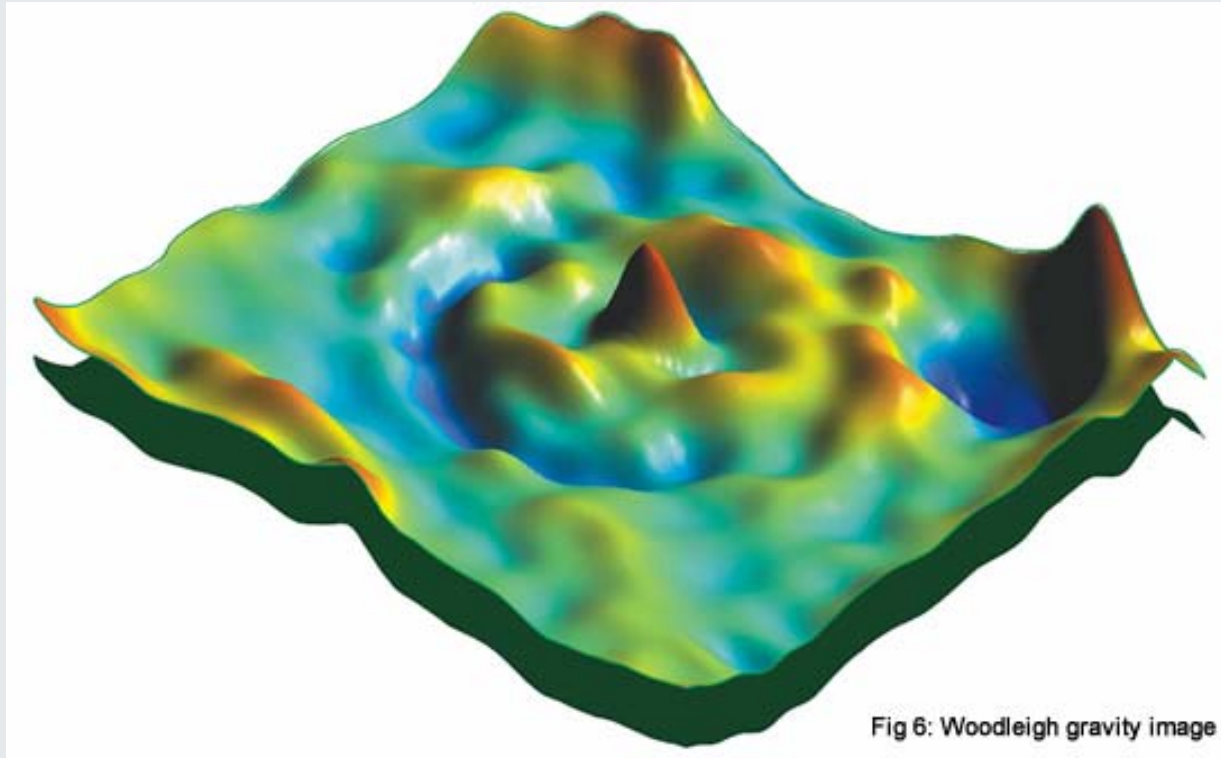


# Seismic line 11GA-SC1 interpreted section

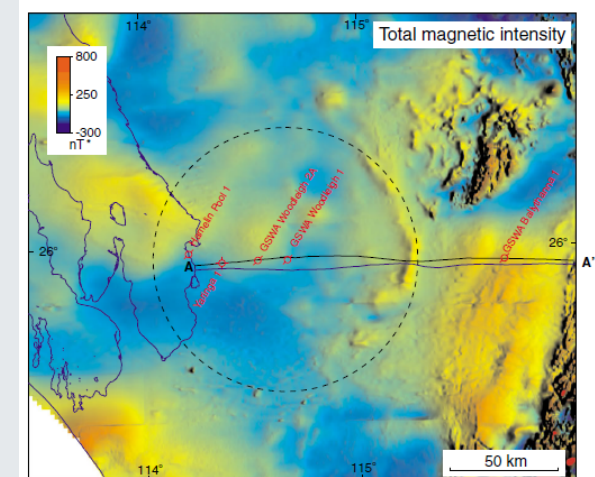
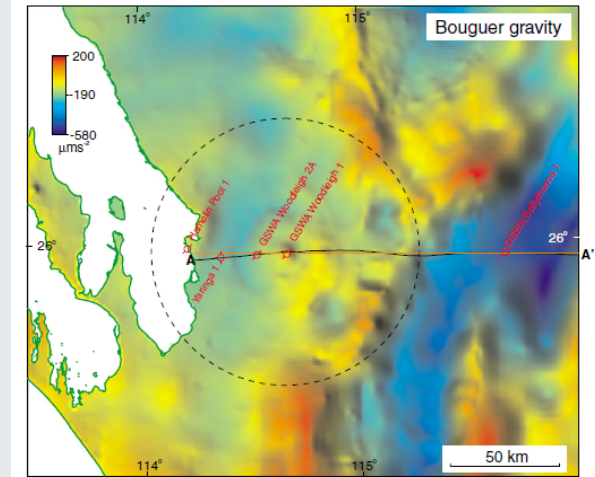




# Woodleigh impact structure

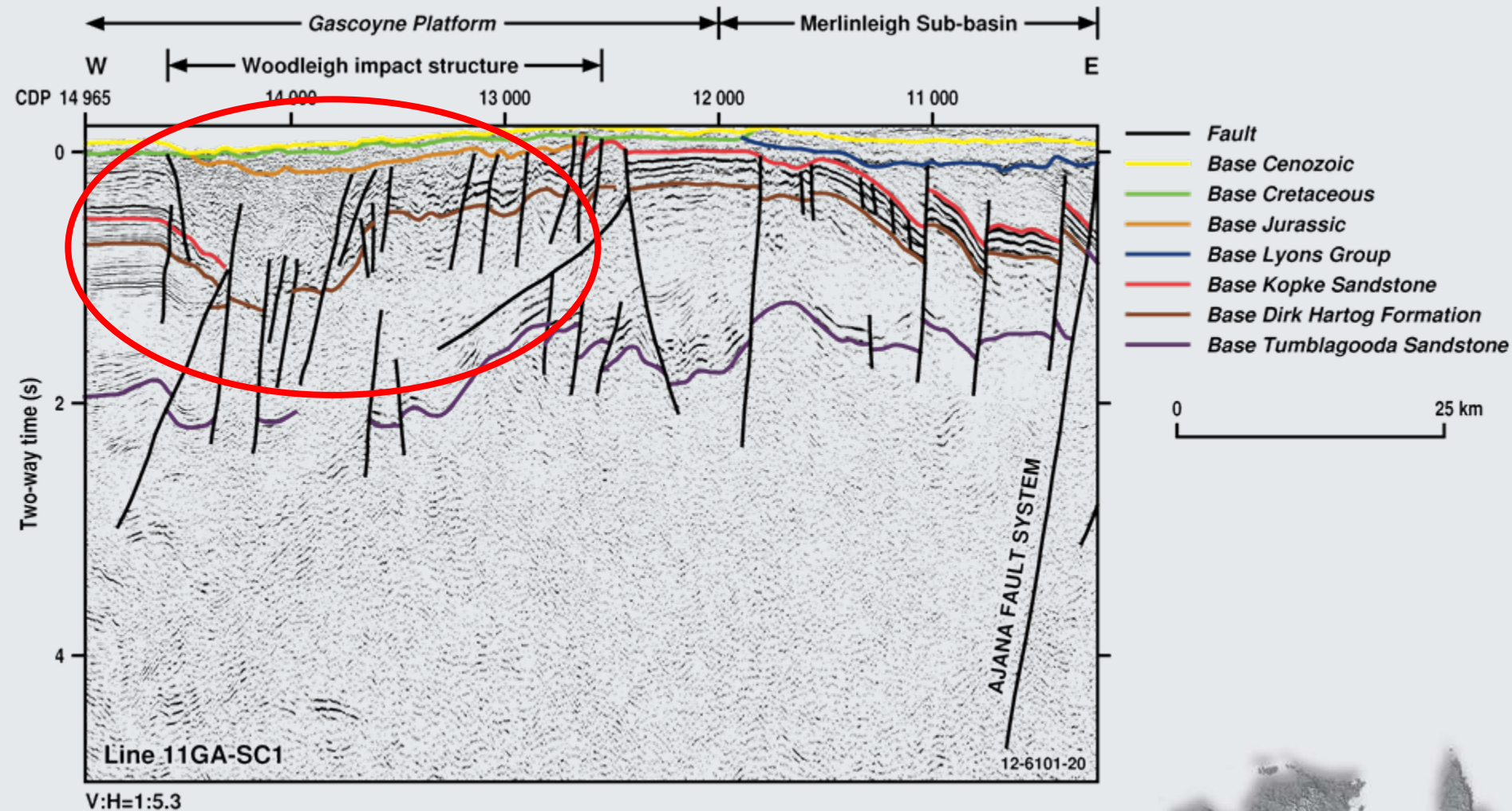


IASKY, R. P., MORY, A. J., and BLUNDELL, K. A., 2001, The geophysical interpretation of the Woodleigh impact structure, Southern Camarvon Basin, Western Australia: Western Australia Geological Survey, Report 79, 41p.



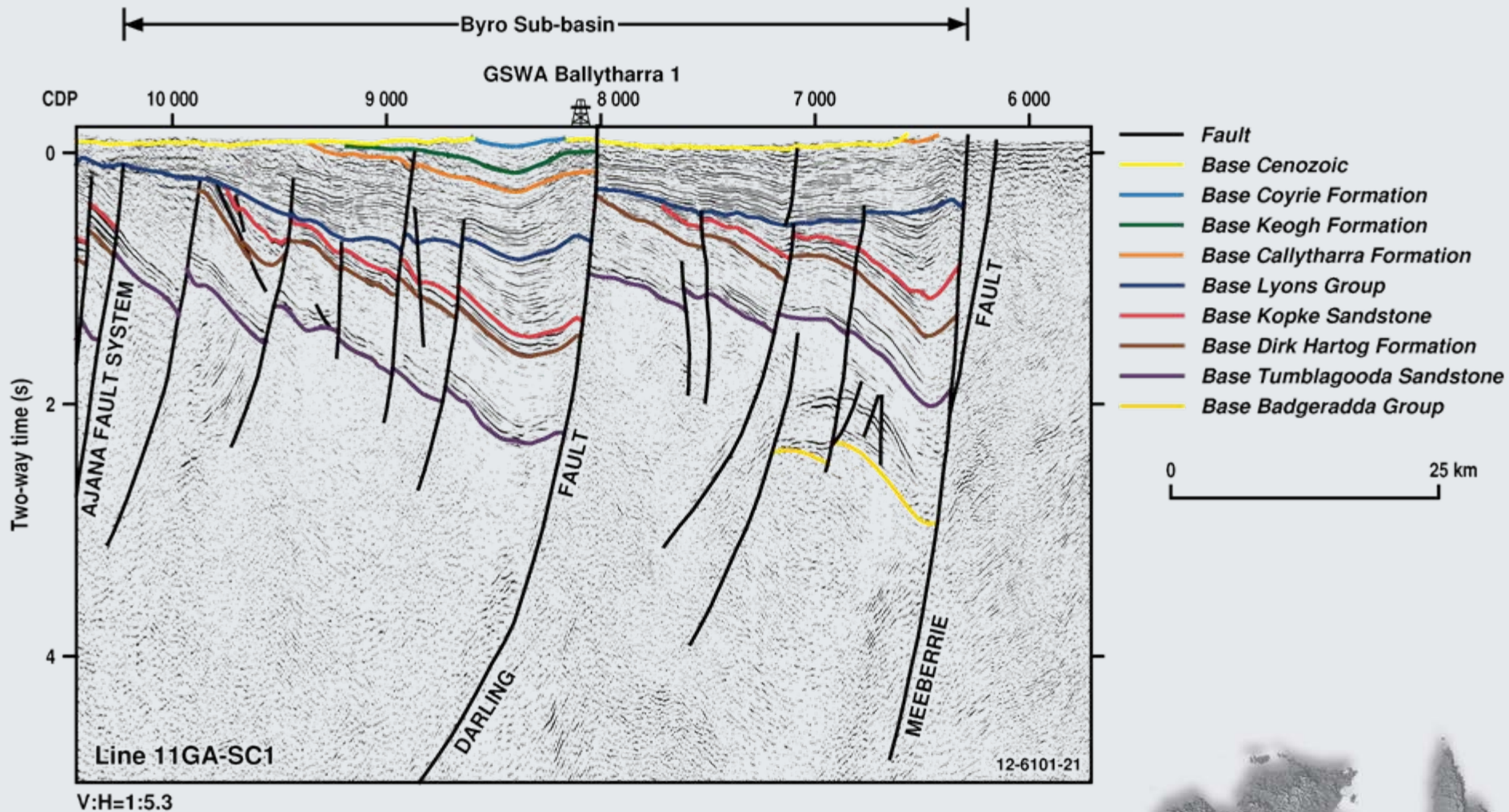
\* International Geophysical Reference Field removed

# Woodleigh impact structure



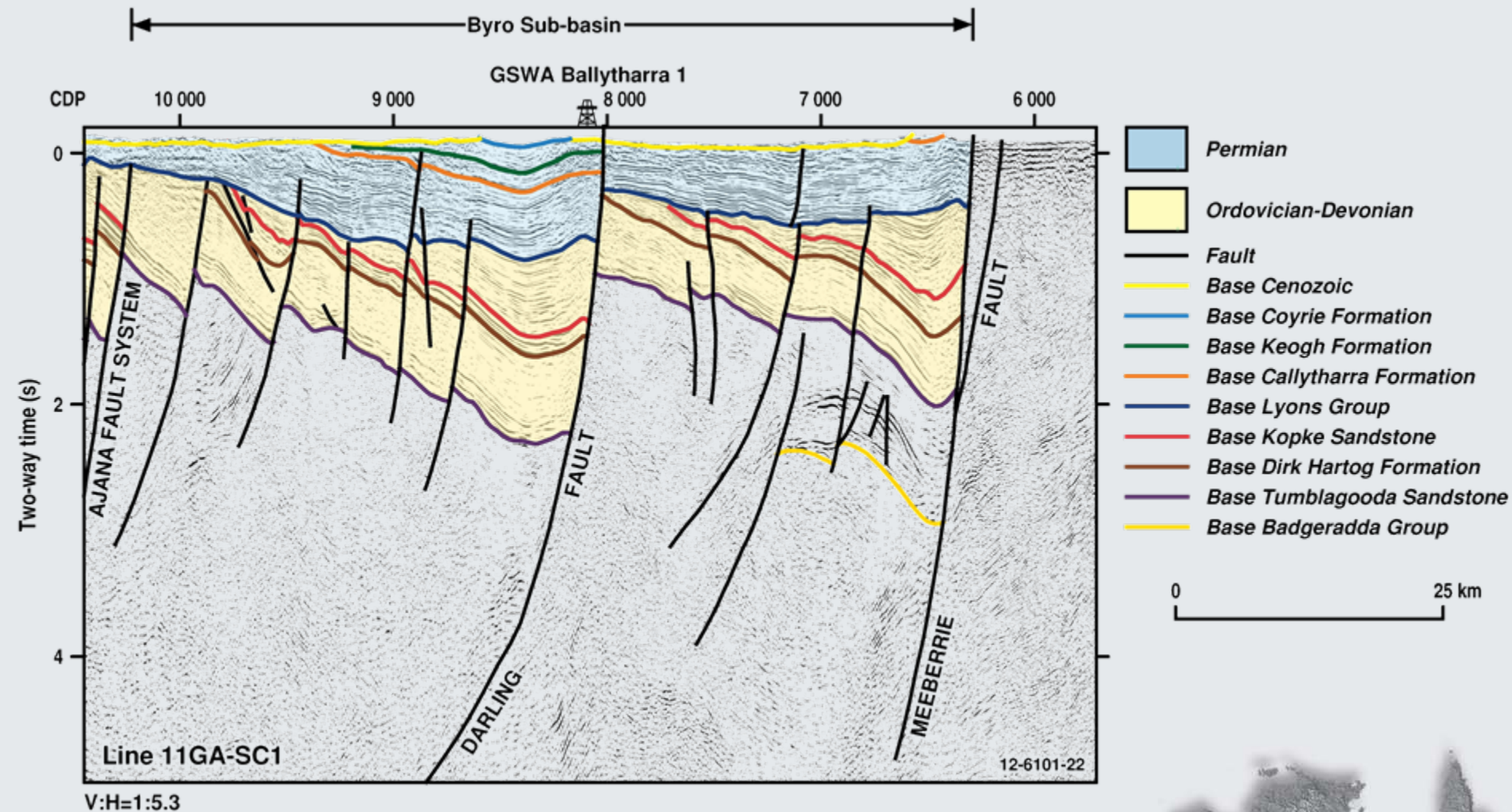


# Byro Sub-basin





# Byro Sub-basin interpretation





# Summary of the Southern Carnarvon Basin

## Seismic line 11GA-SC1:

- Crossed the Gascoyne platform, Merlinleigh and Byro Sub-basins and part of the Yilgarn
- Byro Sub-basin
  - two relatively thick half graben
  - bounded by west-dipping faults
  - two distinct sedimentary successions separated by an unconformity are present in both half graben
  - Known source rocks present
- On the Gascoyne Platform the seismic line crosses the Woodleigh Impact Structure.

# Conclusions

- Onshore Energy Security Program has collected data across several onshore frontier basins
- Western Officer Basin is a continuous, thickening to the east, asymmetrical depocentre, disrupted in places by salt diapirs.
- Southern Carnarvon Basin, showed that the Byro Sub-basin consists of two half graben, each with two distinct sedimentary rock packages
- Also images the Woodleigh Impact Structure in the west