Introduction to Geoscience Australia's regional seismic interpretation grid

Between 1990 and 1994, Geoscience Australia (GA) collected as part of the Australian Government's Continental Margin Program, approximately 35,000km of regional, mostly deep (commonly 15s record length), 2D seismic reflection data along the northern and north-western continental margin of Australia from North West Cape in the south to the eastern Arafura Sea in the north (see Fig. 1). These data were collected primarily to provide a structural and tectonic framework to assist petroleum exploration companies in their search for hydrocarbons in the region, as well as an aid to understanding the margin's geological evolution.

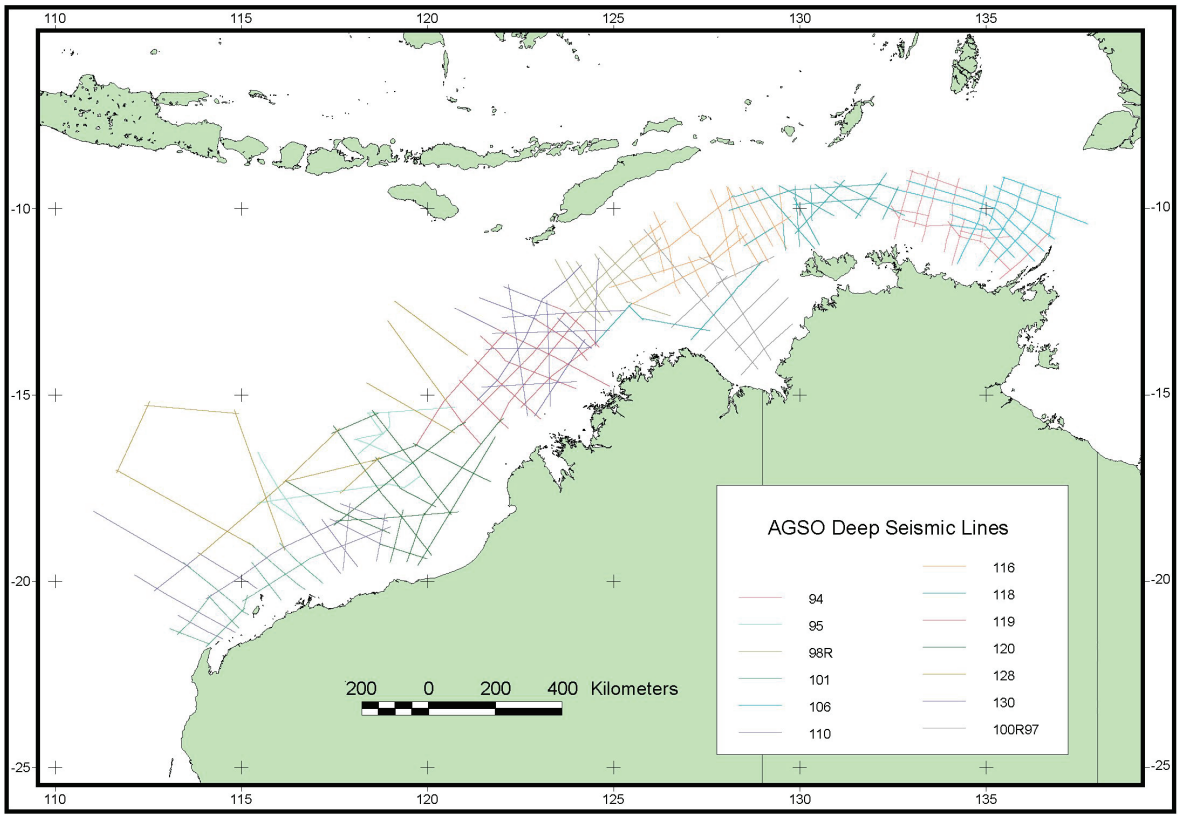

Figure 1. Geoscience Australia's (formerly AGSO) 1990-1994 regional seismic grid

As part of its 1999 petroleum promotion program, GA acquired, using an external contractor (IKODA Pty Ltd), a consistent digital interpretation of the entire GA N+NW regional seismic grid. The interpretation was made using a Landmark system, imported by GA into Geoquest and then exported as a series of ASCII files. It builds on previously published GA work of parts of the grid (e.g. papers in Purcell & Purcell, 1994) as well as tying to GA-sponsored detailed NW Shelf and Timor Sea high-resolution seismic studies such as the Carnarvon Tertiary Tie (CTT), the Yampi Shelf Tie (YST), Vulcan Sub-basin Tertiary Tie (VTT), and the Browse Basin High-Resolution (BBHR). It is being released by GA in a number of formats including: cgm+ files with purchases of the digital seismic data of individual seismic lines, profile line drawings, and digital horizon and fault data (this CD).

Horizons that are consistently interpreted through the grid include:

water bottom
late Miocene
base Miocene

mid Oligocene
base Eocene
base Tertiary
Turonian
Aptian
Valanginian
base Cretaceous
Callovian
base Jurassic/top Triassic
mid Triassic
near top Permian
late Carboniferous
“basement”

Additional horizons have also been interpreted as appropriate through parts of the grid, for example mid Carboniferous (late Visean), intra-Devonian and mid/late Cambrian in the Arafura Basin, and mid Carboniferous (late Visean) and early Carboniferous (Late Tournaisian) in the Petrel Sub-basin.

A number of important regional structural events can be seen on the interpretations. These include:

- Late Devonian northeast-southwest extension in the Petrel Sub-basin and Arafura Basin
- Late Carboniferous northwest-southeast extension in the proto-Malita Graben, Browse Basin and proto-Vulcan Sub-basin
- Late Triassic north-south compression
- Early-Mid Jurassic development of major depocentres in the Exmouth, Barrow and Dampier sub-basins, and extension in the Browse Basin
- Mid-Late Jurassic breakup in the Argo Abyssal Plain, onset of thermal sag in the Browse basin and extension in the Bonaparte Basin
- Valanginian breakup in the Gascoyne and Cuvier abyssal plains, and onset of thermal sag in the Bonaparte Basin
- Late Miocene reactivation and flexural downwarp of the Timor Trough and Cartier Sub-basin

In many places, the deep-seismic data image major basement features and structures that are deeper than, or not apparent on, conventional industry seismic.

Reference:
Purcell, P.G. & Purcell, R.R. (Eds), 1994. The Sedimentary Basins of Western Australia: Proceedings of the Petroleum Exploration Society of Australia Symposium, Perth, 1994.

Survey details

Survey	100
Contractor	GA
Vessel	Rig Seismic
Year	1991
Streamer length (m)	4800
Seismic channels	192
Sample rate / rec. length (ms)	4 / 16000
Group length/interval (m)	25 / 25
Shot interval (m)	50
Cable depth (m)	10
Source type / power or volume	20 x sleeve airguns / 49.2 litres / 2 arrays
Nominal vessel speed (kn)	5
Primary navigation	differential GPS
Secondary navigation	GPS
Tertiary navigation	Transit Satnav + Magnavox sonar doppler
Primary echo-sounder	12 kHz
Secondary echo-sounder	3.5 kHz
Magnetic data	yes
Gravity data	yes

HORIZONS & FAULTS, AGSO's REGIONAL SEISMIC GRID, OFFSHORE N+NW AUSTRALIA

Designation	**Definition**	**Comments**
wb	Water bottom (i.e. seafloor)	-
lmio	Late Miocene	Collision/reactivation
bmio	Base Miocene	-
moli	Mid Oilgocene	Major regional unconformity/hiatus
beoc	Base Eocene	Significant sequence boundary
bter	Base Tertiary	Significant flooding surface
lcre	Late Cretaceous	-
tur	Turonian	Base Turonian s.b. or mfs; or "spike"
ceno	Cenomanian - Albian	-
apt	Aptian	Major unconformity
val	Valanginian	Major unconfor.or flooding surface
bcre	Base Cretaceous	-
call	Callovian	Major unconformity
bjtt	Base Jurassic/top Triassic	Major unconformity in places
itru	Intra-Triassic unconformity	
itri	Intra-Triassic marker	
mtri	Intra-Triassic marker	
itii	Intra-Triassic inversion	
tper	Near Top Permian	Top Hyland Bay carbonates
tcar	Near top Carboniferous	-
lcar	Late Carboniferous	Major s/b. U/L Grant; base Kuriyippi
mcar	Mid Carboniferous	
ecar	Early Carboniferous	
idev	Intra-Devonian	Top Devonian siltstone
ocnt	Top of Ordovician carbonate	
lcam	Mid/Late Cambrian	Top of Wessel Group
base	Top "basement"/ acoustic basement	
basr	Intra-basement reflector	
ibs1	Intra-basement reflector	
ibs2	Intra-basement reflector	
moho	Moho	
Intrusives/ Extrusives		
tvol	Top volcanics or sill/dyke	
bvol	Bottom volcanics or sill/dyke	
vol1	Volcanics/sill or dyke	
vol2	Volcanics/sill or dyke	
vol3	Volcanics/sill or dyke	
vol4	Volcanics/sill or dyke	
Faults		
flts	Faults	

NOTE: NOT ALL HORIZONS ARE PRESENT WITHIN ALL SURVEYS OR AREAS