



Southwest–Midwest deep crustal seismic survey program 2023–24

Lines 23GSWA-MW1, MW2 final data release note

Release date: 15 August 2024

Release products

On-line download from: <https://magix.dmirs.wa.gov.au/surveys/view-survey/3806>

- Pre-stack Time Migration TWT sections to 8 s and 20 s and Depth conversions to a maximum depth of 26km and 50km respectively.
- Pre-stack Depth Migration to 50 km
- Navigation and velocity data files

Off-line: Field data gathers and full processed data products

Request form: <https://magix.dmirs.wa.gov.au/about/order-datasets-on-external-hard-drive>

See lists at end of this document.

Geological context

Lines 23GSWA-MW1 (350 km) and 23GSWA-MW2 (190 km) are part of GSWA's 2023–24 Southwest–Midwest deep crustal seismic survey program which was designed to test ongoing GSWA re-evaluation of the western margin of the Yilgarn Craton, and its juxtaposition with the Perth Basin (Figure 1). Data from line 23GSWA-SW1 were released in May 2024.

Line MW1 extends westward from the western end of the earlier Youanmi 10GA-YU3 deep-crustal seismic line, crossing the Darling Fault into the Perth Basin and the southern part of the Northampton Inlier to finish on the coast at Geraldton. Line MW2, 150 km to the south, traverses the western edge of the Yilgarn Craton, the Neo-Paleoproterozoic Moora Basin, the Darling Fault and the Perth Basin. These two lines are the first seismic reflection profiles across the Northampton Inlier and the Moora Basin, and help to elucidate the unexposed terranes of the Pinjarra Orogen underlying the Perth Basin



Figure 1. Location of seismic survey lines

Data acquisition specifications

Coordinate system: GDA2020–MGA50



Job: MW1/MW2 2D – 278 – GSWA

Acquisition: November 2023 – January 2024

Survey configuration:	Line 23GSWA-MW1	Line 23GSWA-MW2
Line length	351.98 km	189.64 km
Total number of source points	8798 — skips + 20 m shots = 8955	4654 — Skips + 20 m shots = 4705
Number of receiver stations	35191 — Skips = 34629	18614 — Skips = 18564
Sample Interval	2 ms	
Record Length	20 s	
Nominal Fold	200 — Radial offset patch of 8 km.	
Format	SEG Y (REV 0) to USB hard drive in field.	
Source	INOVA AHV-IV (60000 lb)	
Source Array	3 x AHV IV in a single fleet	
Source Number	1	
Recording filters:		
Low-cut	3 Hz	
High-cut	0.8 Nyquist set to 219 Hz	
Notch	Out	
Diversity Stack	Yes	
Source parameters:		
Source Spacing	40 m and 20 m for makeup shots.	
Sweep Frequency	3 – 96 Hz	
Sweep Number	1	
Sweep Length	24 s + 20 s listen time	
Sweep Type -	Weibull	
Source Array	3 Vibroseis	
Start Taper	500 ms	
End Taper	600 ms	
Maximum Source Gaps	As required for safety/access	
Receiver configuration:		
Geophone Type	Quantum 5 Hz (PS-5GR)	
Case	Land	
Frequency	5 Hz	
Group Spacing	10 m	
Geophones per Group	1	

POST-PLOT survey statistics:

Line #	Rec Stations	Shot Stations	BOL	EOL	Distance
23GSWA-MW1	34629	8955	10000	44628	351.98 km
23GSWA-MW2	18564	4705	10000	28614	189.64 km

Source and Receiver Numbering: 1 digit line and up to 5 digit station numbers, e.g. 1 10001

Processing workflow

1. PRE-PROCESSING

Reformat from field records to internal format
Geometry assignment
Data QC and first break picking
Refraction tomography
Low-cut debias filter
Receiver domain TFDN to suppress vehicle noise
Refraction statics (final datum: 410 m, replacement velocity 5800 m/s)
Zero-phase spike deconvolution
Air blast attenuation
Surface wave noise attenuation
Shot domain denoise (TFDN)
Initial velocity model
Residual statics
Velocity analysis 5 km intervals
2nd pass residual statics
PreSTM velocity analysis 2 km intervals
PreSTM velocity analysis 1 km intervals
Amplitude recovery
Shift to final datum

2. PRE-STACK TIME MIGRATION

Kirchhoff Pre-stack time migration (30 km aperture, 75 degree dip limit)
Linear noise attenuation
High density velocity analysis at 500 m intervals
Amplitude balancing (tailored to 8 second and 20 second sections)
Trace mute (Angle mutes for 8 second sections and hand-picked mute from 20 second sections)
Stack

3. POST-STACK PROCESSING - PRESTM

Random noise attenuation
Time-varying bandpass filter
Coherence filter (tailored for 8 second and 20second records)
Time-varying gain (8 seconds sections only)
AGC (record length)
Topographic mute
Time-depth conversion
SEG-Y output

4. PRE-STACK DEPTH MIGRATION

Model building migration (initial model)
RMO picking and reflection tomography update 1
Model building migration (tomo 1 model)
RMO picking and reflection tomography update 2
Model building migration (tomo 2 model)
RMO picking and reflection tomography update 3
Kirchhoff Pre-stack depth migration (10 km aperture, 75 degree dip limit, from topography)
Amplitude balancing
Linear noise attenuation
Stack

5. POST-STACK PROCESSING – PRES DM

Depth-varying bandpass filter
Coherence filter
Random noise attenuation
AGC (record length)
SEG Y output

Online products

23GSWA-MW1

23GSWA_MW1_Offline_Field_Data_DirList.txt :: 454.28KB
23GSWA_MW1_Offline_Proc_Data_DirList.txt :: 7.73KB
23GSWA_MW1_PreSDM-Stk_Final_20240709_Depth@460m.sgy :: 3.24GB
23GSWA_MW1_PreSTM-Stk_20sec_Full_Final_20240523_Time@460m.sgy :: 2.59GB
23GSWA_MW1_PreSTM-Stk_20sec_Full_Final_20240623_Depth@460m.sgy :: 3.24GB
23GSWA_MW1_PreSTM-Stk_8sec_Full_Final_20240523_Time@460m.sgy :: 1.05GB
23GSWA_MW1_PreSTM-Stk_8sec_Full_Final_20240623_Depth@460m.sgy :: 1.69GB
GSWA_MW1_Acquisiton_Report_Rev2.pdf :: 1.48MB
GSWA_MW1-MW2_2D_Processing_Report_Rev2.pdf :: 7.61MB
INOVA Disk Tape and Tape Image Formats 7D.pdf :: 2.11MB
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\23GSWA_MW1_SPS_files\
=====

_2023_12_18_000000000_2D_00_field_SPS_combined.R01 :: 2.8MB
_2023_12_18_000000000_2D_00_field_SPS_combined.S01 :: 1.42MB
_2023_12_18_000000000_2D_00_field_SPS_combined.X01 :: 11.49MB
GSWA_MW1_2D_Final_SPS.r :: 2.66MB
GSWA_MW1_2D_Final_SPS.s :: 709.78KB
GSWA_MW1_2D_Final_SPS.x :: 10.33MB
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\23GSWA_MW1_Velocity_files\
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23GSWA_MW1_PreSDM_Velocity_INTZ_20240709@460m.sgy :: 676.59MB
23GSWA_MW1_PreSTM_Velocity_INTZ.ascii :: 68.08MB
23GSWA_MW1_PreSTM_Velocity_INTZ_20240606@460m.sgy :: 808.68MB
23GSWA_MW1_PreSTM_Velocity_RMST.ascii :: 297.85KB
23GSWA_MW1_PreSTM_Velocity_RMST_20240606@460m.sgy :: 236.19MB
23GSWA_MW1_PreSTM_Velocity_T-D_conversion_RMST.ascii :: 84.74MB
23GSWA_MW1_PreSTM_Velocity_T-D_conversion_RMST_20240624@460m.sgy :: 236.19MB

23GSWA-MW2

23GSWA_MW2_Offline_Field_Data_DirList.txt :: 240.81KB
23GSWA_MW2_Offline_Proc_Data_DirList.txt :: 7.08KB
23GSWA_MW2_PreSDM-Stk_Final_20240719@370m.sgy :: 1.74GB
23GSWA_MW2_PreSTM-Stk_20sec_Full_Final_20240626_Depth@370m.sgy :: 1.74GB
23GSWA_MW2_PreSTM-Stk_20sec_Full_Final_20240626_Time@370m.sgy :: 1.39GB
23GSWA_MW2_PreSTM-Stk_8sec_Full_Final_20240621_Depth@370m.sgy :: 931.64MB
23GSWA_MW2_PreSTM-Stk_8sec_Full_Final_20240621_Time@370m.sgy :: 576.74MB
GSWA_MW1-MW2_2D_Processing_Report_Rev2.pdf :: 7.61MB
GSWA_MW2_Acquisiton_Report_REV2.pdf :: 1.52MB
INOVA Disk Tape and Tape Image Formats 7D.pdf :: 2.11MB
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\23GSWA_MW2_SPS_files\
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23GSWA_MW2_2D_Final_SPS.r :: 1.43MB
23GSWA_MW2_2D_Final_SPS.s :: 373.6KB
23GSWA_MW2_2D_Final_SPS.x :: 3.69MB
ALL_GSWA_MW2_fieldSPS.R01 :: 1.49MB
ALL_GSWA_MW2_fieldSPS.S01 :: 769.39KB
ALL_GSWA_MW2_fieldSPS.X01 :: 889.11KB
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\23GSWA_MW2_Velocity_files\
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23GSWA_MW2_PreSDM_Velocity_INTZ_20240719@370m.sgy :: 363.71MB
23GSWA_MW2_PreSTM_Velocity_INTZ_20240711@370m.ascii :: 32.86MB
23GSWA_MW2_PreSTM_Velocity_INTZ_20240711@370m.sgy :: 434.72MB
23GSWA_MW2_PreSTM_Velocity_RMST_20240708_Time@370.ascii :: 241.8KB
23GSWA_MW2_PreSTM_Velocity_RMST_20240708_Time@370.sgy :: 126.97MB
23GSWA_MW2_PreSTM_Velocity_T-D_conversion_RMST_20240711@370m.ascii :: 39.05MB
23GSWA_MW2_PreSTM_Velocity_T-D_conversion_RMST_20240711@370m.sgy :: 126.97MB

Offline products

Field data package

MW1 – 3 TB, MW2 – 1.7 TB

- ▼  Documents
 -  Misc
 -  Obslog
- ▼  ShotGather
 -  Correlated
 -  Uncorrelated
 -  SPS

Processed data package

MW1 – 3 TB, MW2 – 1.7 TB

-  01_Shots_geom_FBP
-  02_Refraction_tomo
-  03_Pre-migration_gathers
-  04_PreSTM
-  05_PreSDM
-  06_Statics
-  07_Documents

Directory lists provided in online products.

Continuous node recordings also available (15 TB).