Data Processing Report

for

Santos

Santos Limited

Ground Floor, 60 Flinders Street,
Adelaide, SA 5000

Area: Vic/P44 Otway Basin

Surveys: Champion/Hercules M3D 2007 Processing & Antares/Casino M3D 2007 Reprocessing

WG Contract Number: bm28
Date: June-December 2007

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1.0 Introduction

This project was conducted for Santos Limited between June and December 2007. The scope of processing was approximately 1445 sq.km marine seismic data that comprised about 660 sq.km of newly acquired Champion/Hercules surveys and two old acquired surveys of Antares (about 210 sqkm) & Casino (about 575 sq.km) from the Vic/P44, Otway Basin.

The data was processed in WesternGeco's Perth Office using proprietary OMEGA SPS™ software running on clusters of Linux Multi-node machines. The main phases of the processing sequence were i) Noise Attenuation ii) Demultiple, including Surface Multiple Prediction iii) Pre-Stack Kirchhoff Time Migration, and iv) Post-migration processing, including Residual Multiple Attenuation.

Santos representative Malcolm Horton advised on final test decisions and approval of work outside scope of contract. Velocity analysis QC was undertaken by Malcolm and his team members at WesternGeco's Adelaide office.

Project progress reporting was done on a weekly basis. A gantt chart (See figure 90) and word document were e-mailed each Thursday. The word document included the following information:

- estimated completion dates
- action for client / processing group
- data received / sent
- production status summary with completion percentages
- history of previous weeks comments

1.1 Survey Details

WesternGeco was contracted by Santos Limited to conduct a 3D seismic survey using the seismic survey vessel M/V Western Trident over the Champion/Hercules prospect in Petroleum Title VIC-P44, Offshore Australia **(See Figure 1)**. The programme consisted of acquired 660 square kilometres of conventional 3D seismic data. The configuration used was 8 x 5000m streamers with 100m separation at a depth of 8m, together with dual 3147 cu inch tuned airgun array, towed astern of the vessel with the centres 50m apart at a depth of 7m and fired every 18.75m along the pre-plotted survey line. Data was acquired North-West/South-East direction **(See Figure 2)**.

1.2 Processing Objective

Heritage data in the prospect area included the Casino & Antares surveys which were processed in 2001 and 2003 respectively. Old Casino 3D velocities and 2D stacking velocities that cover the whole project were provided by Santos from the start of the project. The main processing objective with the new data was to extend the structural imaging to 3D, subsequently improving the interpretation of the reservoir.

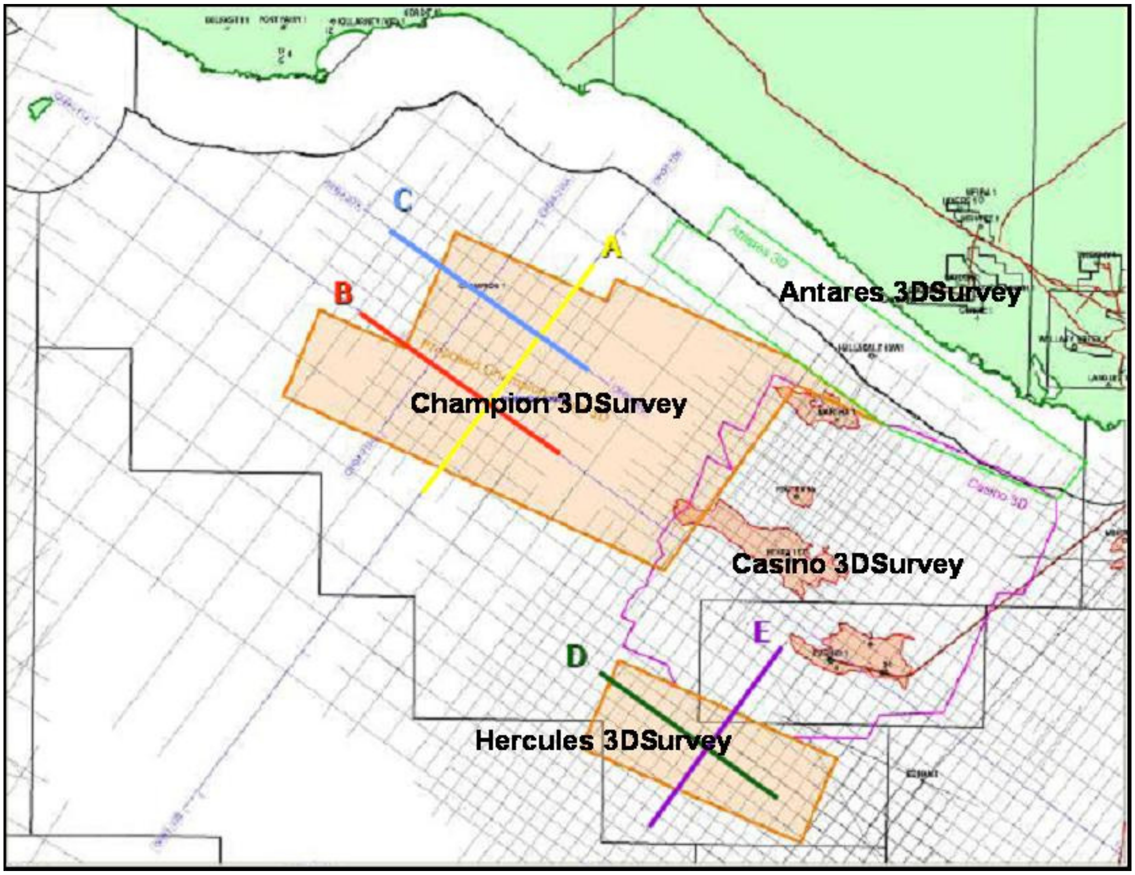


Figure 1: **Survey Location Map**

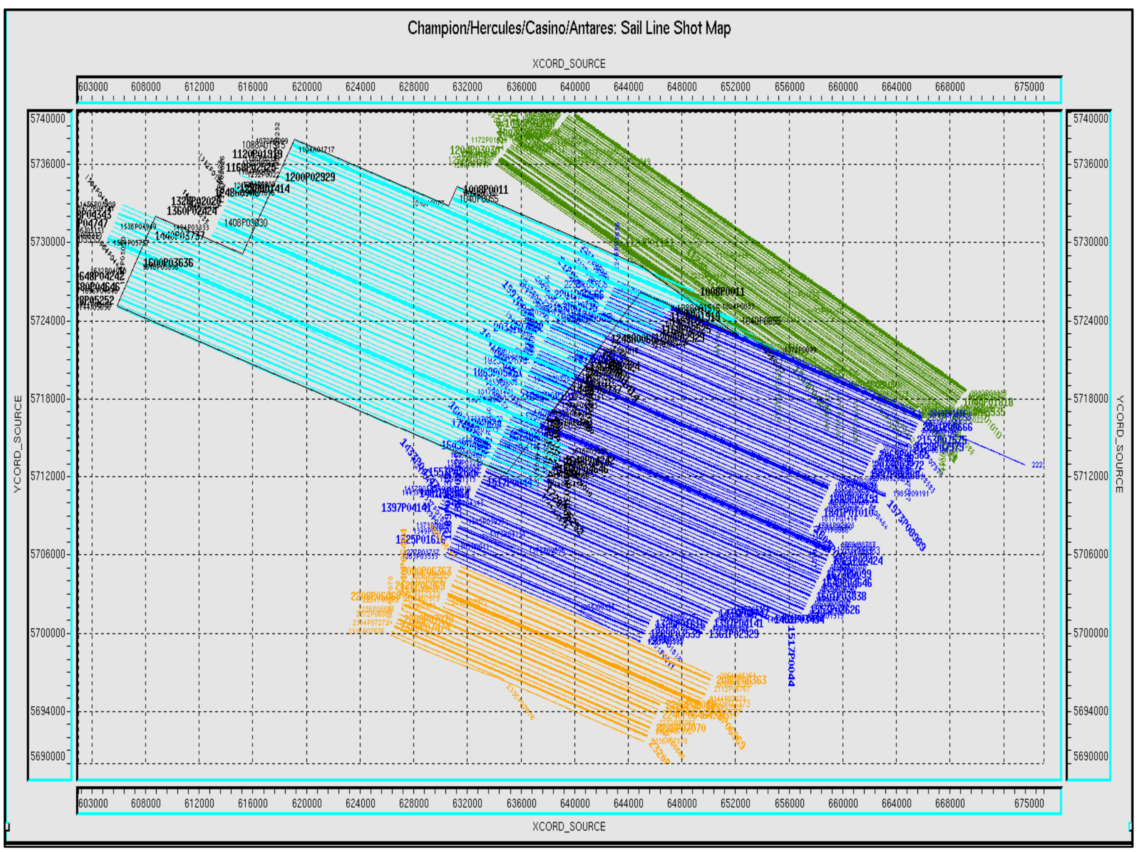


Figure 2: **Pre-plot Sail Line Map**

2.0 Acquisition Parameters

2.1 Acquisition Parameters for 2007 Champion/Hercules Surveys

General:	
Surveys	Champion South / Hercules 3D
Contractor	WesternGeco
Vessel	Western Trident
Date	3 May - 26 June 2007
Recording Configuration:	
System	MSX
Format	SEG D 8036 REV 2
Record Length	6144 ms
Sample Interval	2 ms
Filter	2 Hz 12 dB/Octave – 206 Hz 264 dB/Octave
Filter Delay	0 ms
Streamer Configuration:	
Type of Streamer	MSX solid streamer
Number of Streamers	8
Streamer Length	5000 m
Streamer Separation	100 m
Nominal Streamer Depth	8 m
Group Interval	12.5 m
Number of Channels	400 per streamer
Source Configuration:	
Type of Source	Tuned bolt gun array
Number of Sources	2
Source Separation	37.5 m
Nominal Source Depth	7 m
Shot point Interval	18.75 m
Array Volume per Source	3147 in^3
Operating Pressure	2000 psi
Binning:	
Inline Spacing	25 m
Crossline Spacing	12.5 m
Orientation	114 deg
Nominal Fold	66 or 67

2.2 Acquisition Parameters for 2001 Casino 3D Survey

General:	
Surveys	Casino 3D
Contractor	WesternGeco
Vessel	M/V Geco Resolution
Date	October-November 2001
Recording Configuration:	
Acquisition & Recording instrument	Triacq 1.6c
Format	SEG D 8015 REV 2
Record Length	5500ms
Sample Interval	2 ms
Filter	3 Hz 18 dB/Octave – 200 Hz 406 dB/Octave
Filter Delay	48.07 ms
Streamer Configuration:	
Type of Streamer	Nessie 4
Number of Streamers	6
Streamer Length	4000 m
Streamer Separation	100 m
Nominal Streamer Depth	7 m
Group Interval	12.5 m
Number of Channels	320 per streamer
Source Configuration:	
Type of Source	Bolt LL
Number of Sources	2
Source Separation	37.5 m
Nominal Source Depth	6 m
Shot point Interval	18.75 m
Array Volume per Source	2x3063 in^3
Operating Pressure	2000 psi
Binning:	
Inline Spacing	25 m
Crossline Spacing	12.5 m
Orientation	114 deg
Nominal Fold	53.33

2.3 Acquisition Parameters for 2003 Antares Survey

General:	
Surveys	Antares 3D
Contractor	PGS
Vessel	M/V Orient Explorer
Date	October-November 2003
Recording Configuration:	
Acquisition & Recording instrument	Syntrak 960-24
Format	SEG D 8058
Record Length	6144ms
Sample Interval	2 ms
Filter	3 Hz 12 dB/Octave – 206 Hz 276 dB/Octave
Filter Delay	120.0 ms
Streamer Configuration:	
Type of Streamer	Syntrak digital telemetric streamer
Number of Streamers	4
Streamer Length	4050 m
Streamer Separation	100 m
Nominal Streamer Depth	7.5 m
Group Interval	12.5 m
Number of Channels	324 per streamer
Source Configuration:	
Type of Source	Bolt Airgun
Number of Sources	2
Source Separation	50m
Nominal Source Depth	6 m
Shot point Interval	18.75 m
Array Volume per Source	2500 in^3
Operating Pressure	1800 psi
Binning:	
Inline Spacing	25 m
Crossline Spacing	12.5 m
Orientation	125.87 deg
Nominal Fold	53.33

3.0 Line Listing

Seq	Sail Line	FGSP	LGSP	Comment (nominal cable depth 8m or 9m)
001	OTSN07-1008P001	2046	3079	**8m**
002	OTSN07-1232P002	2847	1244	**8m**
003	OTSN07-1024P003	2047	3178	**8m**
004	OTSN07-1248P004	2843	1865	**NTBP**
005	OTSN07-1040P005	2047	3278	**9m**
006	OTSN07-1248A006	2843	1371	**NTBP SP1370-1244 9m**
007	OTSN07-1056P007	2047	3378	**9m**
008	OTSN07-1264P008	2838	1244	**9m**
009	OTSN07-1072P009	1376	3477	**9m**
010	OTSN07-1280P010	2834	1244	**NTBP**
011	OTSN07-1088P011	1376	3020	**NTBP**
012	OTSN07-1296P012	2830	1244	**NTBP**
013	OTSN07-1104P013	1376	2989	**NTBP**
014	OTSN07-1280A014	2834	1244	**9m**
015	OTSN07-1088A015	1376	3020	**9m**
016	OTSN07-1296A016	2830	1244	**9m**
017	OTSN07-1104A017	1376	3015	**9m**
018	OTSN07-1312P018	2825	1245	**9m**
019	OTSN07-1120P019	1376	3011	**9m**
020	OTSN07-1328P020	2821	1245	**9m**
021	OTSN07-1136P021	1377	3007	**9m**
022	OTSN07-1344P022	2816	1245	**9m**
023	OTSN07-1152P023	1377	3002	**9m**
024	OTSN07-1360P024	2812	1245	**9m**
025	OTSN07-1168P025	1377	2998	**9m**
026	OTSN07-1376P026	2808	1245	**9m**
027	OTSN07-1184P027	1377	2993	**9m**
028	OTSN07-1392P028	2803	1245	**9m**
029	OTSN07-1200P029	1377	2989	**9m**
030	OTSN07-1408P030	2799	1245	**9m**
031	OTSN07-1216P031	1377	1441	**NTBP**
032	OTSN07-1216A032	1377	2985	**9m**
033	OTSN07-1424P033	2794	1245	**9m**
034	OTSN07-1216J034	1377	2985	**9m**
035	OTSN07-1424J035	2794	1245	**9m**
036	OTSN07-1600P036	1005	2879	**8m**
037	OTSN07-1440P037	2790	1248	**8.5m**
038	OTSN07-1616P038	1005	2875	**8.5m**
039	OTSN07-1456P039	2786	868	**8m**
040	OTSN07-1632P040	1006	2870	**8m**
041	OTSN07-1472P041	2781	869	**8m**
042	OTSN07-1648P042	1006	2866	**8m**
043	OTSN07-1488P043	2777	869	**8m**
044	OTSN07-1664P044	1006	2862	**8m**
045	OTSN07-1504P045	2773	869	**8m**
046	OTSN07-1680P046	1007	2857	**8m**
047	OTSN07-1520P047	2768	870	**8m**
048	OTSN07-1696P048	1007	2853	**8m**
049	OTSN07-1536P049	2764	870	**8m**
050	OTSN07-1712P050	1008	2848	**8m**
051	OTSN07-1536J051	2764	870	**8m**
052	OTSN07-1728P052	1008	2844	**8m**
053	OTSN07-1552P053	2759	871	**8m**
054	OTSN07-1744P054	1009	2840	**8m**
055	OTSN07-1568P055	2755	871	**8m**
056	OTSN07-1744J056	1009	2840	**9m**
057	OTSN07-1584P057	2751	871	**9m**

Figure 3: Table 1 Champion 3D Survey Lines list

Seq	Sail Line	FGSP	LGSP	Comment (nominal cable depth 8m)
058	OTSN07-20648P058	2656	3113	**NTBP**
059	OTSN07-20648P059			**NTBP**
060	OTSN07-2208P060	3656	2555	
061	OTSN07-2064A061	2686	3785	
062	OTSN07-2224P062	3657	2555	
063	OTSN07-2080P063	2686	3785	
064	OTSN07-2240P064	3657	2556	
065	OTSN07-2096P065	2686	3786	
066	OTSN07-2256P066	3657	2556	
067	OTSN07-2112P067	2686	3786	
068	OTSN07-2272P068	3658	2556	
069	OTSN07-2128P069	2687	3787	
070	OTSN07-2288P070	3658	2557	
071	OTSN07-2144P071	2687	3787	
072	OTSN07-2304P072	3659	2557	
073	OTSN07-2160P073	2687	3788	
074	OTSN07-2320P074	3659	2557	
075	OTSN07-2176P075	2688	3788	
076	OTSN07-2336P076	3045	2557	
077	OTSN07-2192P077	2688	3789	
078	OTSN07-2336A078	3660	2557	
079	OTSN07-2192J079	2688	3789	

Figure 4: Table 2 Hercules 3D Survey Lines list

Seq	Sail Line	FGSP	LGSP	Comment (nominal cable depth 7m or 9.5m)
001	S01CAS1301P001	1816	2670	
002	S01CAS1505P002	2670	1341	
003	S01CAS1313P003	1816	2670	
004	S01CAS1517P004	2670	1313	Cable2 depth occasionally 8.1 to 8.5m
005	S01CAS1529P005	2670	1285	**NTBP dt swell noise**
006	S01CAS1781P006	1390	2707	**Cable depth 7.5m**
007	S01CAS1661P007	2670	1284	**Cable depth 9.5m**
008	S01CAS1853P008	1390	2670	**Cable depth 9.5m**
009	S01CAS1673P009	2670	1284	**Cable depth 9.5m**
010	S01CAS1841P010	1390	2670	**Cable depth 9.5m**
011	S01CAS1685P011	2670	1284	**Cable depth 9.5m**
012	S01CAS1829P012	1390	2670	**Cable depth 9.5m**
013	S01CAS1697P013	2670	1284	**Cable depth 9.5m**
014	S01CAS1817P014	1390	2670	
015	S01CAS1529R015	2670	1285	
016	S01CAS1325P016	1816	2670	
017	S01CAS1541P017	2670	1284	
018	S01CAS1337P018	1816	2670	
019	S01CAS1493P019	2670	1369	
021	S01CAS1805P021	1390	2670	**Cable depth 9.5m**
022	S01CAS1709P022	2670	1284	**Cable depth 9.5m**
023	S01CAS1793P023	1390	2685	**Cable depth 9.5m**
024	S01CAS1721P024	2670	1284	**Cable depth 9.5m**
025	S01CAS1865P025	1390	2670	**Cable depth 9.5m**
026	S01CAS1553P026	2670	1284	
027	S01CAS1349P027	1816	2670	
028	S01CAS1565P028	2670	1284	
029	S01CAS1361P029	1603	2670	
030	S01CAS1577P030	2670	1284	
031	S01CAS1373P031	1603	2572	
032	S01CAS1589P032	2670	1284	
033	S01CAS1265P033	1816	2671	
034	S01CAS1481P034	2670	1397	
035	S01CAS1289P035	1816	2670	
036	S01CAS1469P036	2670	1425	
037	S01CAS1277P037	1816	2671	

038	S01CAS1601P038	2670	1284	
039	S01CAS1385P039	1603	2670	
040	S01CAS1613P040	2670	1284	
041	S01CAS1397P041	1603	2776	
042	S01CAS1625P042	2670	1284	
043	S01CAS1409P043	1603	2776	
044	S01CAS1637P044	2670	1284	
045	S01CAS1421P045	1603	2776	
046	S01CAS1649P046	2670	1284	
047	S01CAS1433P047	1603	2776	
048	S01CAS1649J048	2670	2656	**NTBP dt cable depth out of control**
049	S01CAS1877P049	1390	2670	**Cable depth 9.5m**
050	S01CAS1733P050	2670	1284	**Cable depth 9.5m**
051	S01CAS1889P051	1390	2670	**Cable depth 9.5m**
052	S01CAS1745P052	2664	1284	**Cable depth 9.5m**
053	S01CAS1445P053	1576	2776	
054	S01CAS1649J054	2670	1284	
055	S01CAS1457P055	1559	2776	
056	S01CAS2249P056	2511	1177	
057	S01CAS2105P057	1283	2619	
058	S01CAS2237P058	2511	1177	
059	S01CAS2093P059	1283	2619	
060	S01CAS2225P060	2512	1177	Line extended to 2D portion (SP1176-721)
061	S01CAS2081P061	1283	2619	
062	S01CAS2213P062	2512	1177	
063	S01CAS1757P063	2643	1284	**Cable depth 9.5m**
065	S01CAS2069P065	1283	2670	
066	S01CAS2201P066	2512	1177	
067	S01CAS2057P067	1283	2670	
068	S01CAS2189P068	2512	1177	
069	S01CAS2045P069	1283	2670	
070	S01CAS1901P070	1390	2670	**Cable depth 9.5m**
071	S01CAS2177P071	2512	1177	
072	S01CAS2033P072	1283	2670	
073	S01CAS2165P073	2512	1177	
074	S01CAS2021P074	1283	2670	
075	S01CAS2153P075	2512	1177	
076	S01CAS1913P076	1390	2670	**Cable depth 9.5m**
077	S01CAS2141P077	2513	1177	
078	S01CAS1925P078	1390	2670	**Cable depth 9.5m**
079	S01CAS2129P079	2513	1177	
080	S01CAS1937P080	1390	2670	**Cable depth 9.5m**
081	S01CAS2117P081	2513	1177	
082	S01CAS1949P082	1390	2670	**Cable depth 9.5m**
083	S01CAS2117J083	2513	1177	
084	S01CAS1961P084	1283	2670	**Cable depth 9.5m**
085	S01CAS1769P085	2622	1284	**NTBP dt bad port guns**
086	S01CAS2009P086	1283	2670	
087	S01CAS1769J087	2622	1284	**Cable depth 9.5m**
088	S01CAS1997P088	1283	2670	
089	S01CAS1973P089	2564	1177	
090	S01CAS1793J090	1390	2685	**Cable depth 9.5m**
091	S01CAS1985P091	2564	1177	
092	S01CAS1997J092	1283	2670	
093	S01CAS1769R093	2622	1284	**Cable depth 9.5m**
095	S01CAS1265J095	1816	2120	**Cable depth 9.5m**
096	S01CAS1373R096	2400	2670	**Cable depth 9.5m**

Figure 5: Table 3 Casino 3D Lines list

Seq	Sail Line	FGSP	LGSP	Comment (nominal cable depth 7.5m)
001	W03ANT1116P1	1080	1258	**NTBP dt guns autofire**
002	W03ANT1116P2	1782	2944	
003	W03ANT1156P1	2836	893	
004	W03ANT1108P1	1001	2944	
005	W03ANT1148P1	2836	893	
006	W03ANT1036P1	1001	2944	
007	W03ANT1140P1	2836	893	
008	W03ANT1100P1	1001	2944	
009	W03ANT1132P1	2836	893	
010	W03ANT1004P1	1022	2944	
011	W03ANT1124P1	2836	1678	
012	W03ANT1124P2	1687	893	
013	W03ANT1012P1	1001	2944	**C35653(NTBP),**
014	W03ANT1092P1	1100	2944	**C35659-35660(NTBP)**
015	W03ANT1164P1	2813	893	
016	W03ANT1012P2	2092	2163	
017	W03ANT1260P1	2168	893	
018	W03ANT1044P1	1001	2944	
019	W03ANT1172P1	2759	893	
020	W03ANT1020P1	1001	2944	
021	W03ANT1180P1	2730	893	
022	W03ANT1052P1	1001	2944	
023	W03ANT1188P1	2658	893	**C35692(NTBP)**
024	W03ANT1028P1	1001	2944	**C35700-35701(NTBP)**
025	W03ANT1196P1	2634	893	NTBP SP2096-1959
026	W03ANT1020I1	1001	2944	
027	W03ANT1196I1	2648	2565	**NTBP dt extraction counts error streamer 3**
028	W03ANT1196I2	2598	893	
029	W03ANT1060P1	1231	2944	
030	W03ANT1204P1	2544	893	
031	W03ANT1068P1	1001	2944	
032	W03ANT1212P1	2525	893	
033	W03ANT1076P1	1003	2944	
034	W03ANT1220P1	2478	893	
035	W03ANT1084P1	1001	2944	
036	W03ANT1228P1	2425	893	
037	W03ANT1084I1	1001	2944	
038	W03ANT1236P1	2372	893	
039	W03ANT1116I1	1001	2944	
040	W03ANT1180P2	2588	2415	
041	W03ANT1196P2	2106	1949	
042	W03ANT1244P1	2319	893	
043	W03ANT1116P3	1001	1791	
044	W03ANT1212P2	1938	1763	
045	W03ANT1252P1	2265	893	
046	W03ANT1092P2	1001	1109	
047	W03ANT1092P3	2102	2220	
048	W03ANT1252I1	2222	893	
049	W03ANT1060P2	1001	1240	

Figure 6: Table 4 Antares 3D Survey Lines list

4.0 Seismic Data Processing

4.1 Processing Flow Chart.

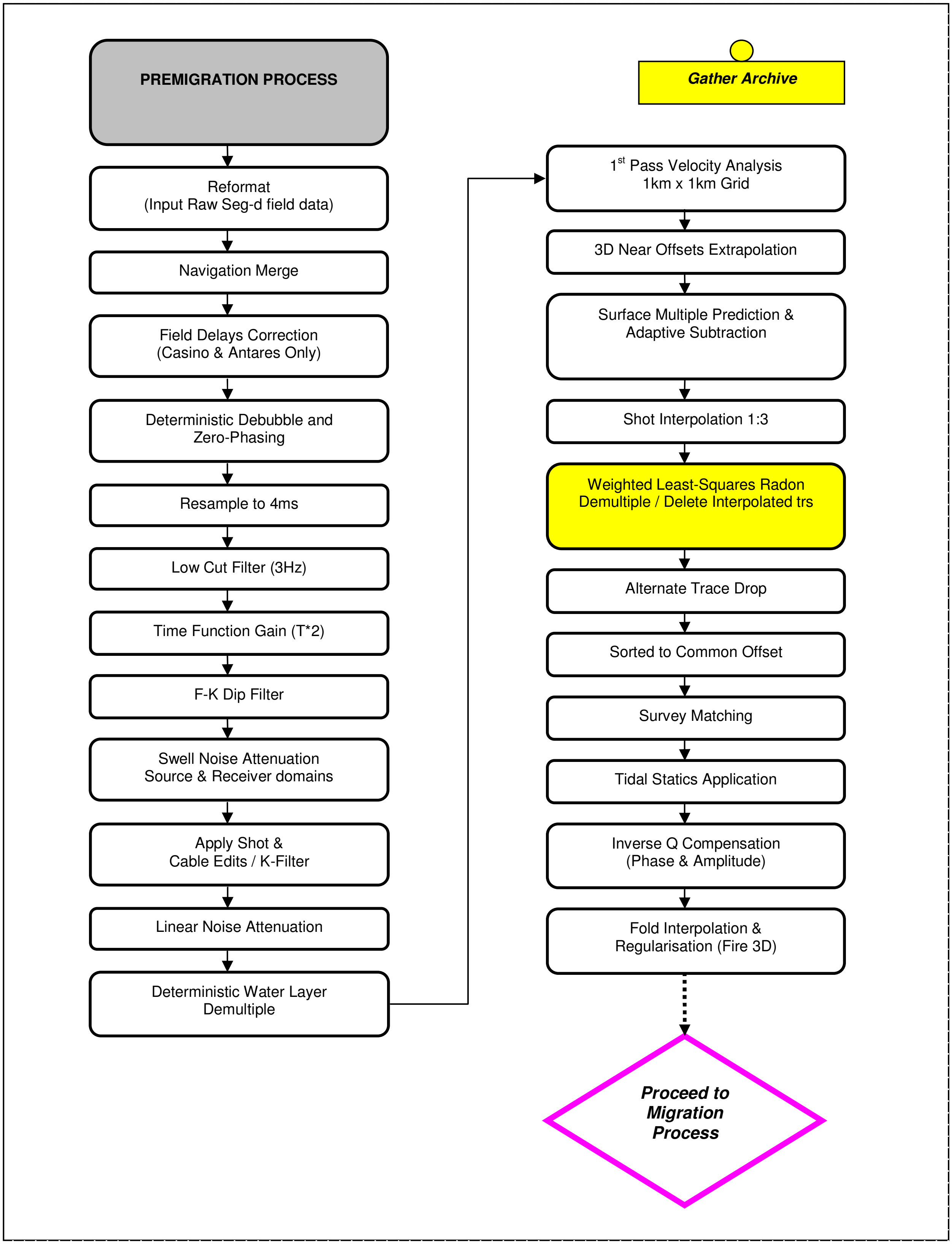


Figure 7: **Pre-Migration Processing Flow Chart**

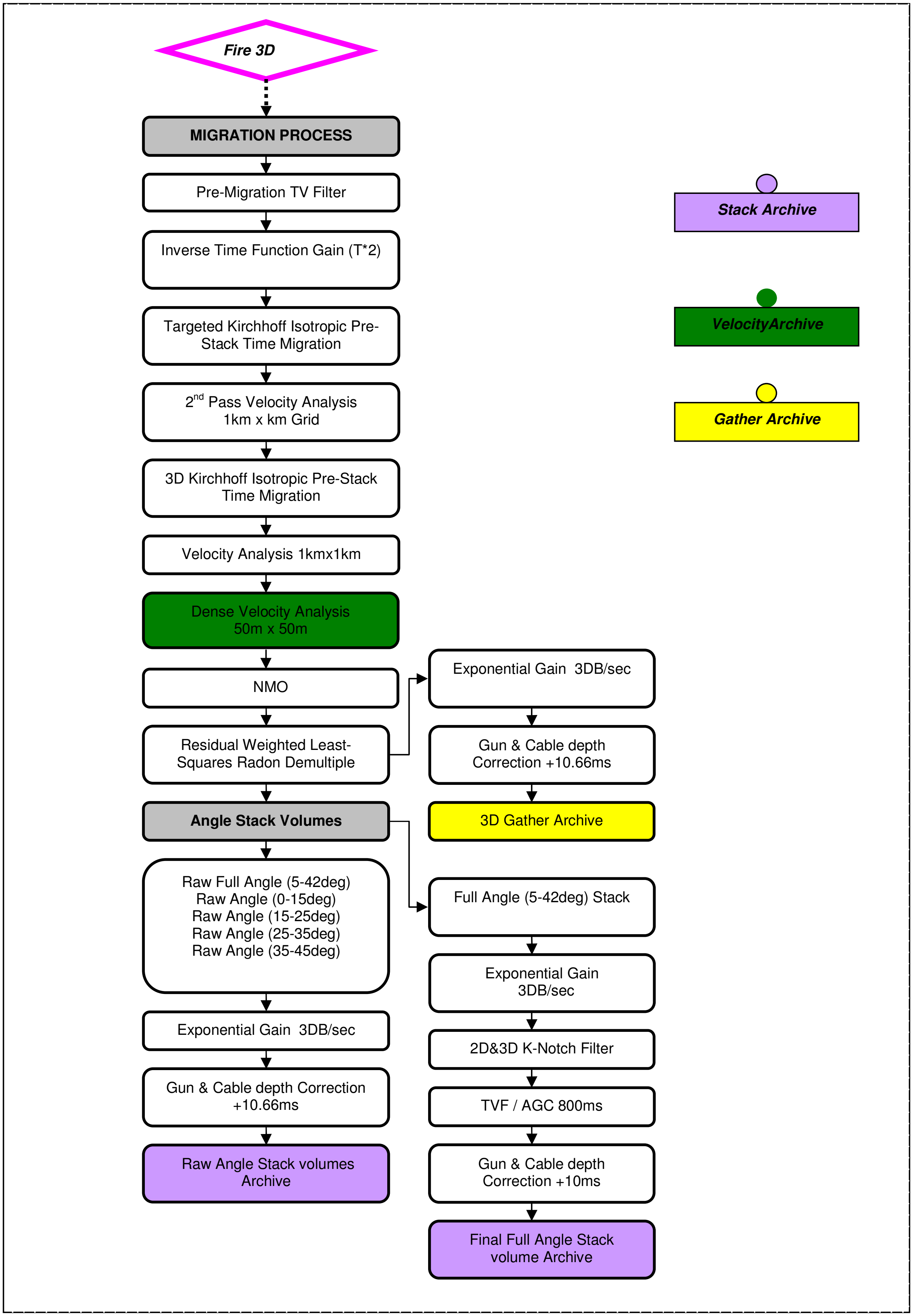


Figure 8: **Migration Processing Flow Chart**

4.2 Pre-Migration Processing

4.2.1 Reformat

The de-multiplexed field data were reformatted from SEG-D to an in-house source-gathered seismic file format.

- Champion 3D SEG D 8036(8x400 traces), 2ms sample rate & 6000ms record length.
- Casino 3D SEG D 8015 (6x310 traces), 2ms sample rate & 5632ms record length.
- Anteras 3D SEG D8058 (4x324 traces), 2ms sample rate & 6000ms record length.
- Hercules 3D SEG D 8036 (8x400 traces), 2ms sample rate & 6000ms record length.

4.2.2 Navigation/Seismic Data Merge

The navigation geometry information was used to update the seismic trace header literals with that information. The two sets of data were matched using unique shot point numbers.
See in section 8.2 for Projection & Datum information.

4.2.3 Assign Nominal Geometry

In addition to assigning the genuine 3D navigation geometry, a simple regular 2D geometry was also assigned. The geometry used the nominal acquisition values as defined by the acquisition parameters.

4.2.4 Reformat & Navigation Merge QC Products

Initial data analysis at the reformat and navigation merge stage includes:

- Trace summary printout reports of exceptions, for example, gun code patterns and checks for missing shot points.
- Shot point position map
- Sparse display of shot records for each sail line.
- LMO displays for each cable.
- Fold of coverage after navigation/seismic merge

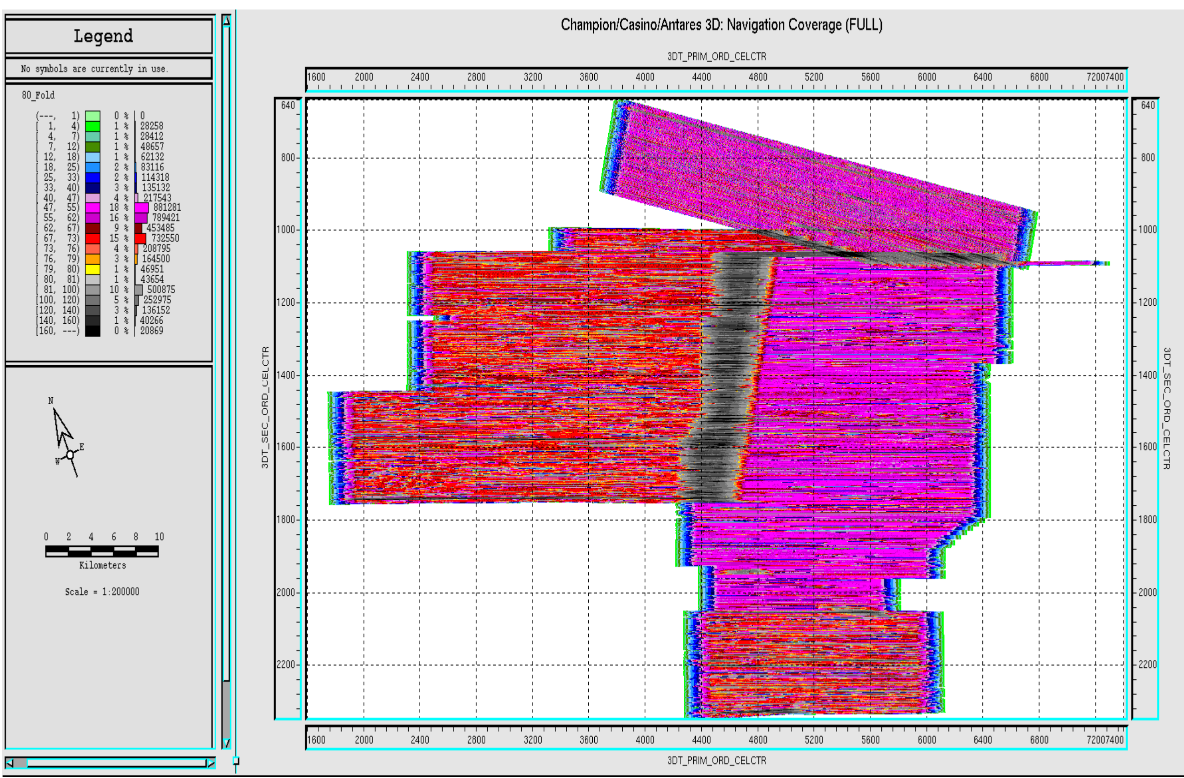


Figure 9: Fold Coverage, All Offsets group

4.2.5 *Regional Velocity model*

Regional 3D velocity field was created from vintage 2D lines velocity and used for initial QC products and input to 1st-pass velocity analysis.

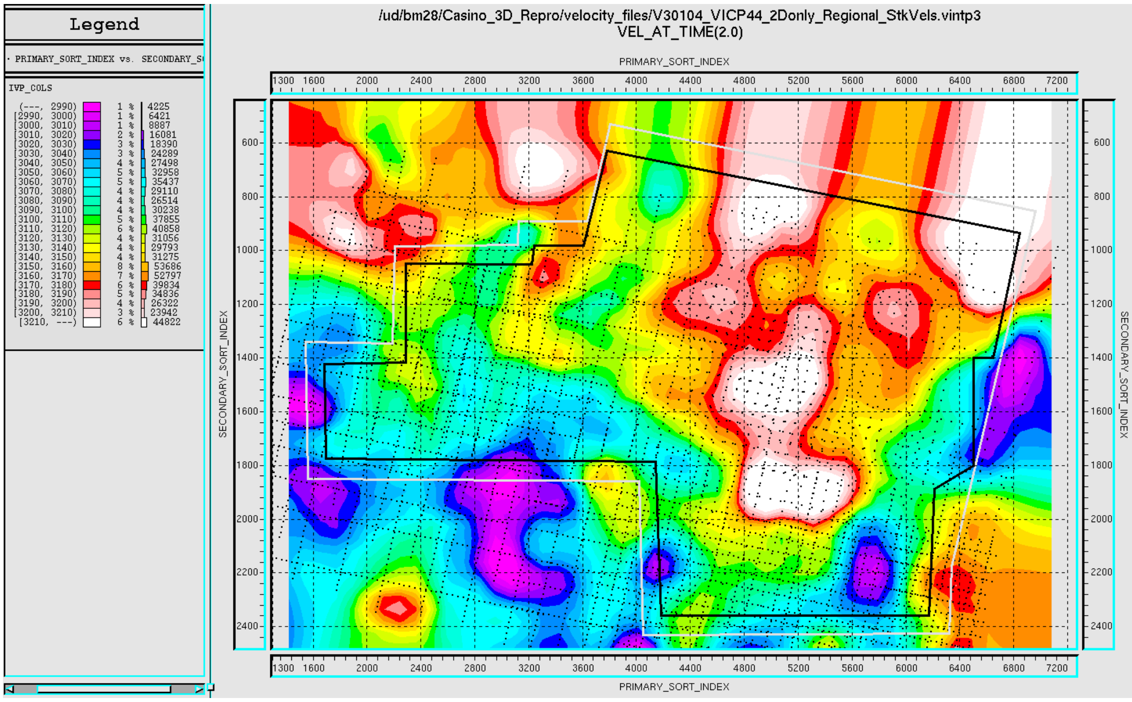


Figure 10: Regional velocity field at 2000msec

4.2.6 *Field Delays correction (Casino & Antares)*

A single static correction was applied to the data to correct for the field recording delay. A negative static value indicates that the samples are moved towards time zero.

Parameter values:
Static Correction: -48.07 ms (Casino survey)
Static Correction -120.00 ms (Antares survey)

4.2.7 *Deterministic Zero Phasing & Debubble*

A modelled far-field source signature was used for each acquisition type to deterministically derive a combined filter that removed the source bubble from the wavelet and shaped the effective source wavelet to its' zero-phase equivalent. Whilst adverse weather conditions during acquisition had resulted in the data being acquired with nominal streamer depths of 7-9.5m in Casino survey, 7.5m in Antares survey, 8-9m in Champion and Hercules survey. It was agreed to use a constant 8m streamer ghost in the modelling processes for all of the surveys.

Parameter values:

Far-field Signature (Champion/Hercules) : Modelled signature supplied by WesternGeco Marine Geosupport group
(Other signature (Antares/Casino) from Processing Report.)
Desired Output Wavelet : Zero-Phase Equivalent
Debubble Applied : Yes
Output Polarity : SEG negative – an increase in acoustic impedance gives a negative

See Section 5 for wavelet and operator coefficients

4.2.8 Time Resample

Data were re-sampled after applying an Anti-Alias Filter.

Parameter values:	
Input Trace Length	: 6000 ms (Champion, Hercules & Antares)
	: 5600 ms (Casino)
Output Trace Length	: 6000 ms (Champion, Hercules & Antares)
	: 5600 ms (Casino)
Input Sampling Interval	: 2 ms
Output Sampling Interval	: 4 ms
Anti-Alias filter	: Zero phase

4.2.9 Low Cut Filter

A low-cut filter was applied to the data.

Parameter values:	
Phase	: Zero
Low-cut Frequency	: 3 Hz
Slope	: 18 dB/octave

4.2.10 Time Function Gain

A Time Function Gain was applied to each survey. Trace samples were scaled by the time of the sample raised to a user specified exponential value.

$$A_o(t) = A_i(t) * t^n$$

where:

$A_o(t)$	=	Amplitude of output sample at time t
$A_i(t)$	=	Amplitude of input sample at time t
t	=	Time in seconds
n	=	User supplied exponential value

Parameter values:	
Exponential value	: 2

4.2.11 FK Dip Filter

Frequency-Wavenumber (FK) domain filtering was used to attenuate high energy, low velocity mud roll.
A two dimensional filter designed to reject a dip range was applied to the FK-transformed record. The FK record was then transformed back to the time domain.

Parameter values:	
Taper	4ms per trace
Dip range	+14ms per trace to +22ms per trace (Champion, Hercules & Casino)
	-22ms per trace to -14ms per trace (Antares)

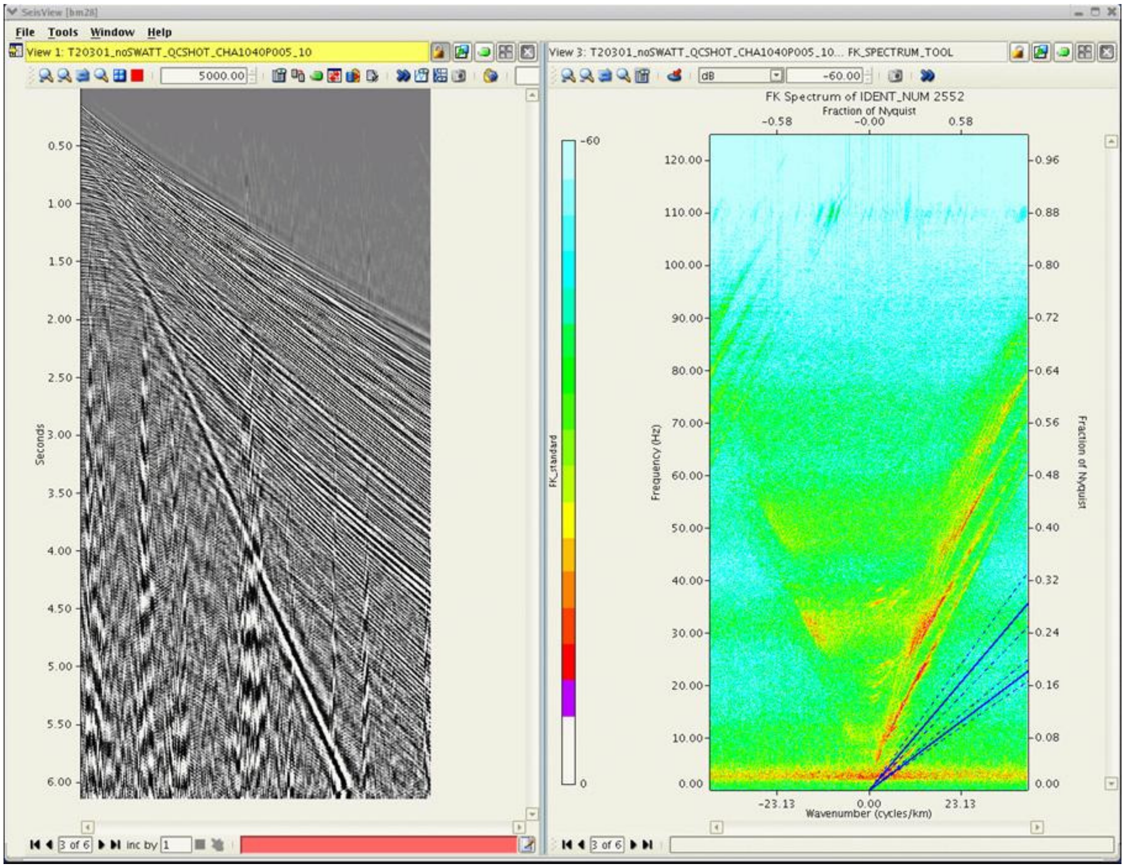


Figure 11: Shot record & F-K plot

4.2.12 Swell Noise Attenuation (SWATT)

Swell noise is caused by data acquisition in rough sea conditions, particularly when the cables are being towed at a relatively shallow depth. SWATT aims to attenuate this noise by transforming the processing gather into the frequency domain and applying a spatial median filter. Frequency bands that deviate from the median amplitude by a specified threshold are either zeroed, or replaced by good frequency bands interpolated from neighbouring traces.

An initial pass of SWATT was performed in shot domain to remove the bulk of random swell noise up to 20Hz. Where the noise spanned large sections of the cable, it proved difficult to entirely remove the swell noise; therefore a second pass of SWATT was performed in the Receiver domain.

Parameter values: First Pass

Processing Domain	: Shot
Width of Spatial Median Filter	: 41-Traces
Frequency Range Processed	: 0 to 20Hz
Width of Frequency Bands to Process	: 5 Hz

Threshold Values

Time wrt WB (ms)	Threshold ratio
0	15
2000	15
3000	6
5000	4
6000	3

Parameter values: Second Pass

Processing Domain : Receiver

Width of Spatial Median Filter : 21-Traces
Frequency Range Processed : 0 to 10Hz
Width of Frequency Bands to Process : 5 Hz

Threshold Values

Time wrt WB (ms)	Threshold ratio
0	6
2000	5
3000	5
5000	4
6000	3

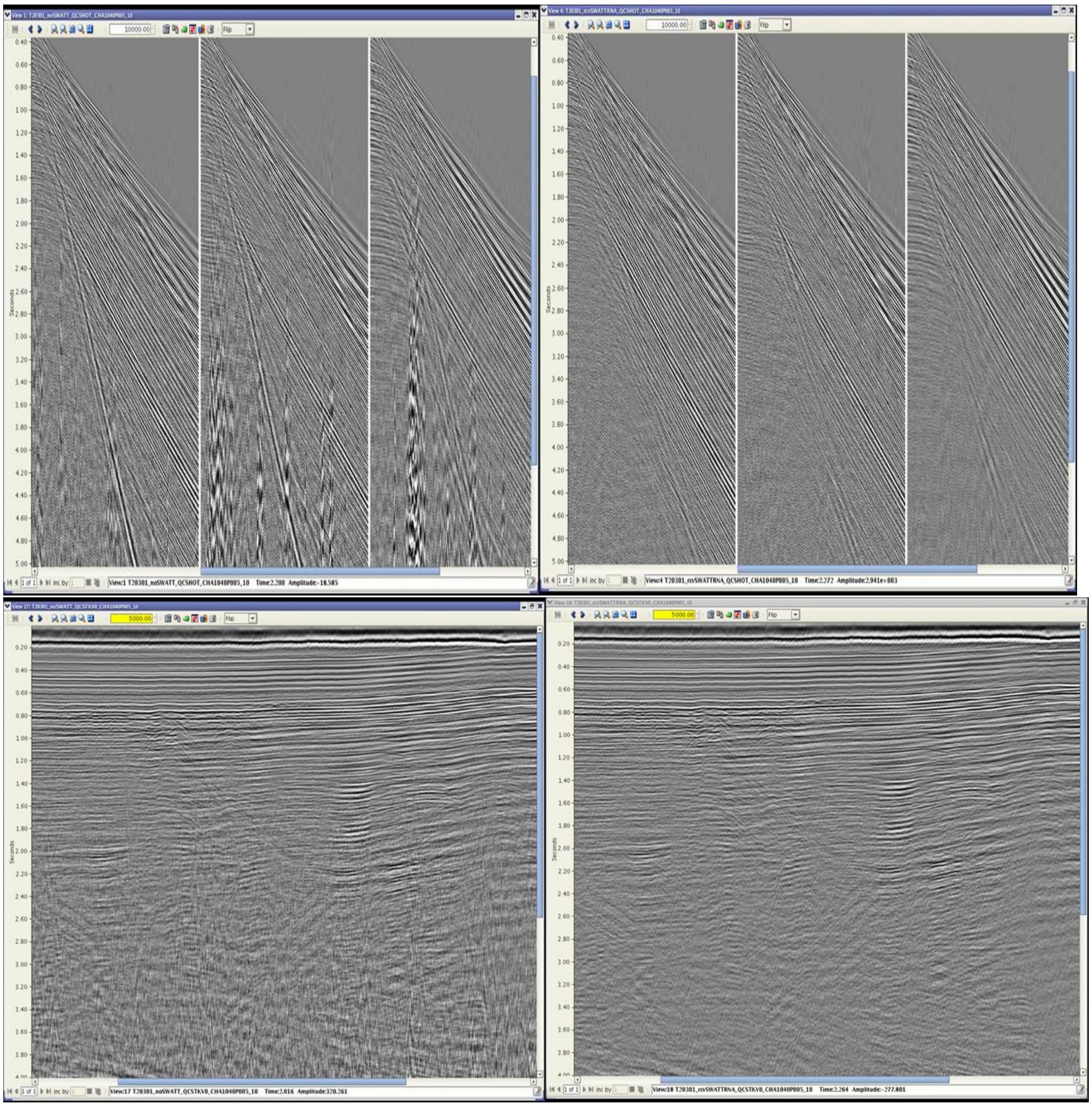


Figure 12: Shot records & stack before and after Swell Noise Attenuation.

4.2.13 Shot and Trace Edits

Records flagged as bad in the Observer's logs or as displayed in the near trace gather and QC plots were edited from the processing sequence.

4.2.14 K-Filter (Spatial Anti-Alias Filtering)

A seismic section such as a shot gather, CMP gather or stack section is a two-dimensional array of samples representing the amplitude of the seismic signal as a function of reflection time (t) and trace position (x). A Fourier transform can be used to convert trace position to the spatial frequency or wave number (k) domain. A range of wave numbers was specified to be passed by the filter and a taper was also applied to the filter boundaries to smooth the transition between the pass and the reject regions.
The k-filter was implemented in the f-k domain. A 2-D Fourier transform was used to convert trace position to the wave number domain and reflection time to the frequency (f) domain. After implementation of the k-filter the data were inverse Fourier transformed back to the t-x domain.
This filtering was applied in preparation for the subsequent of alternate traces within a shot gather as detailed in section 4.2.26

Parameter values:	
High Wave number Cut off	: 0.5 of k-Nyquist (relative to input trace separation)

4.2.15 Tau-p Linear Noise Attenuation (shot domain)

The data were forward transformed into the tau-p (or slant-stack) domain. In this domain certain types of coherent noise can be isolated and subtracted. Geometry compensation is needed to reduce artefacts due to gather geometry and so improve separation of transformed events whilst maintaining acceptable invertability for the events being modelled. Preconditioning steps may be required to reduce other artefacts that may hinder separation of noise from signal; such artefacts can be caused by such as data aliasing, event truncation at gather boundaries, high amplitude incoherent noise like swell noise.
High-energy linear and near-linear noise, which contaminated primary in the zone of interest, was suppressed by muting in the tau-p domain. Either the noise zone is inverse-transformed and subtracted from the data in the t-x domain (DIFFERENCE method) or the signal zone is inverse-transformed to replace the data in the t-x domain (REPLACEMENT method).

Parameter values:	
Method:	: 200ms tapered replacement from water-bottom
Preconditioning:	: none
Geometry compensation	: Least Squares
Reference offset(m)	: 5362.5
Max frequency (Hz)	: 125
Number p traces	: 872
Minimum p value(msec @ Ref)	: -3673
Maximum p value	: +3673
Mute definition	: Symmetrical mute derived from regional velocities; projection of 60° incidence, max linear vel. 3500m/s
Taper definition	: p-direction 400ms
Noise removal method	: DIFFERENCE

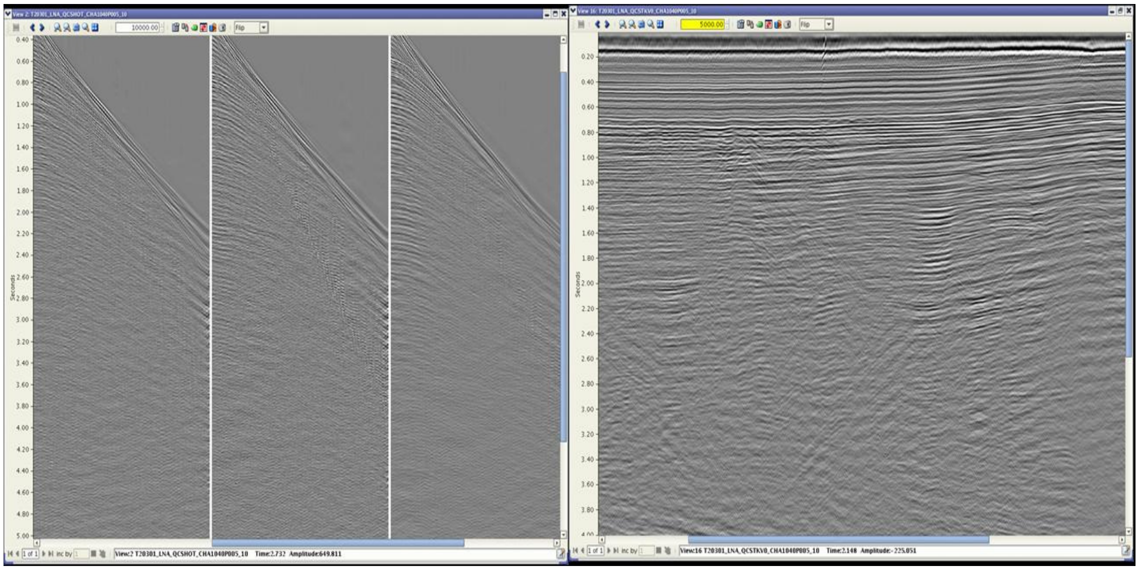


Figure 13: **Shot records & Stack with LNA**

4.2.16 Deterministic Water Layer Demultiple (DWD)

Deterministic Water-layer Demultiple is a WesternGeco proprietary method for removing water-layer reverberations from seismic data.

DWD models water-layer reverberations using a wave field extrapolation method which incorporates non-linear prediction operators, in order to obtain correct amplitudes for both the simple and peg-leg multiples. The model is adaptively subtracted from the data. DWD is well suited to shallow water environments, where the water bottom is flat and has high reflectivity.

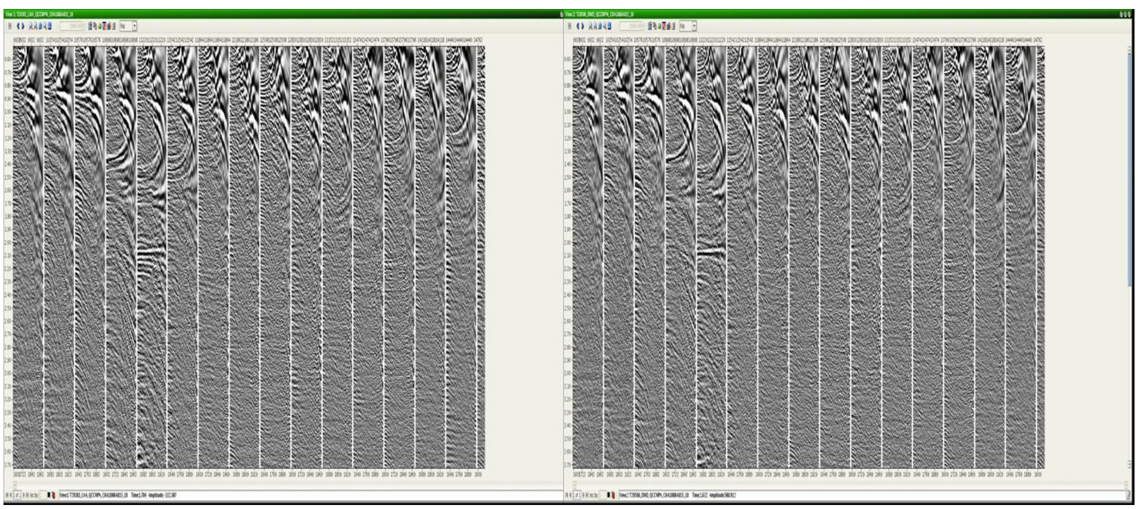


Figure 14: **CMP gathers before and after DWD**

4.2.17 Preliminary Velocity Analysis

Velocity analysis was performed using WesternGeco's Interactive Velocity Analysis (INVA) package. At regular intervals across the survey CMP gather data were selected. From this data Multi-Velocity Function (MVF) stacks and velocity semblance values were computed. For each velocity location, MVF data, semblances and gathers are displayed interactively allowing stacking velocities to be interpreted.

Parameter Values:

Analysis Spacing	:	1km x 1km Grid
Number of CMPs per Analysis (MVF Stack)	:	19
Number of CMPs per Analysis (Semblance Display)	:	3

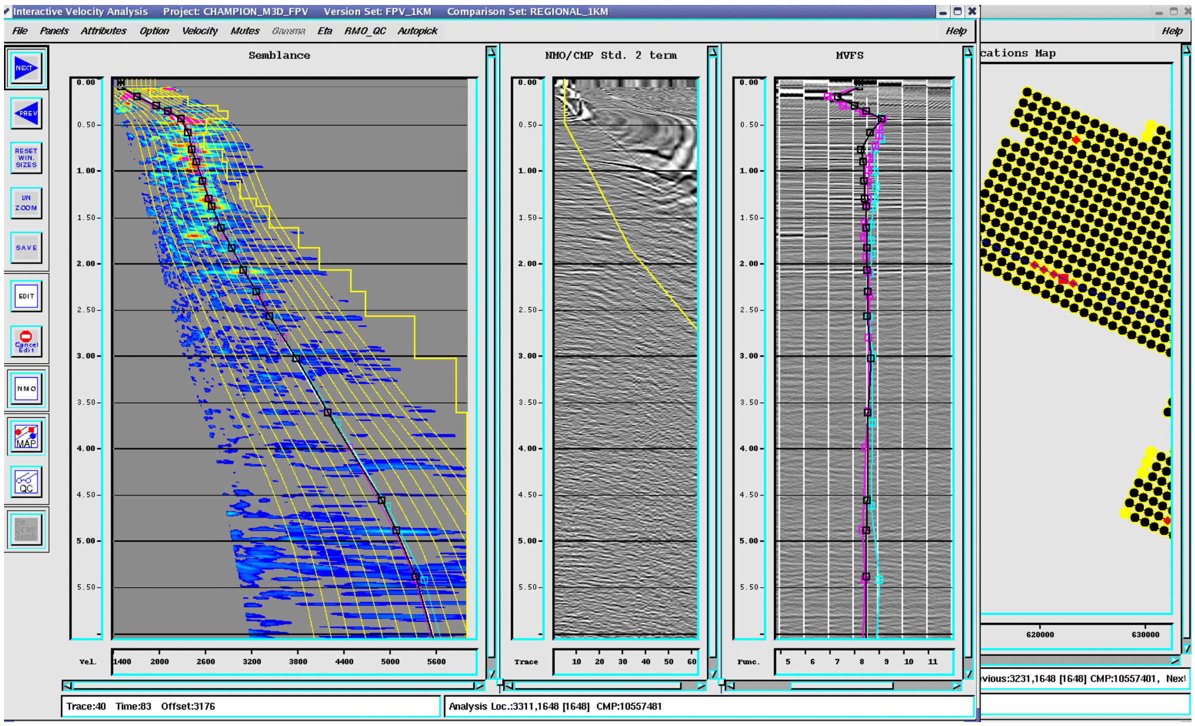
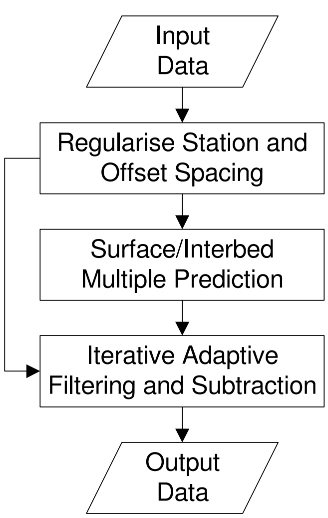


Figure 15: **Preliminary velocity analysis on 1km grid**

4.2.18 Surface/Inter-bed Multiple Prediction

By definition, the ray path for every surface multiple includes a downward reflection at the surface, and can therefore be decomposed into an event which is not a surface multiple, and a lower order surface multiple by breaking the ray path at the downward reflection point nearest to the source. Combination of these two events using a Kirchhoff integral operator provides an accurate prediction of the surface multiple without requiring a velocity or structural model. This approach can be extended to allow prediction of inter-bed multiples by supplying pick times for the primary event that generates the multiples to be predicted.
The prediction can be done entirely from the multiple contaminated data themselves, though it is necessary to iterate the process as a consequence of not having an initial multiple-free dataset. It is also necessary to deconvolve the source wavelet from the predicted multiples after each iteration and hence an estimate of the source wavelet is required.



The algorithm requires that the input data have uniform station spacing and uniform offset distribution down to zero offset. Therefore it is often necessary to pre-condition the data to achieve this prior to running SMP (surface multiple prediction). The prediction can be done in 2-D or 1-D, with the 2-D results being theoretically more accurate in the presence of inline dip. However the 1-D results suffer less from end-of-line effects, and pose less stringent geometrical constraints, requiring only that the offset distribution within each gather be regular.

Once the multiple model has been generated, an adaptive matching filter is applied to the model to improve the match with multiples corresponding to those predicted by the SMP process (see SMP process flow diagram).

Parameter values:

Modelling mode	:	3-D
Predict surface multiples	:	Yes
Predict inter-bed multiples	:	No
Minimum frequency	:	0 Hz
Maximum frequency	:	Nyquist
Station interval	:	12.5 m
Source signature	:	Estimated deterministically
Number of iterations	:	2

Notes:

- Data were 3D extrapolated to zero offset prior to modelling.
- Data were regularized to 2D geometry prior to modelling.
- Water bottom was removed with mute prior to modelling.
- Time function gain removed prior to modelling and reapplied afterwards.
- Final model was de-regularized to original geometry.

4.2.19 Adaptive Filter and Subtract

In many situations we have noise contaminated data and attempt to make an estimate of the noise those data contain. However, the noise estimate contains small amplitude, timing or phase errors, which may be slowly time and/or space variant. Filtering the noise to improve the match with the input data before subtracting it can greatly improve the noise attenuation.

Given two time series, it is possible to construct a filter that makes the best possible match, in a least-squares sense, between the two series. The adaptive filtering process generates a series of time- and spatially-varying matching filters that adapt as the characteristics of the time series change. It is sometimes necessary to iterate through the matching process using progressively smaller windows to arrive at the optimum match.

Parameter Values:

Number of iterations : 1

	Design Window Length (ms)	Design Window Width (traces)	Match Filter Length (no. of samples)
Iteration 1	1000	80	21

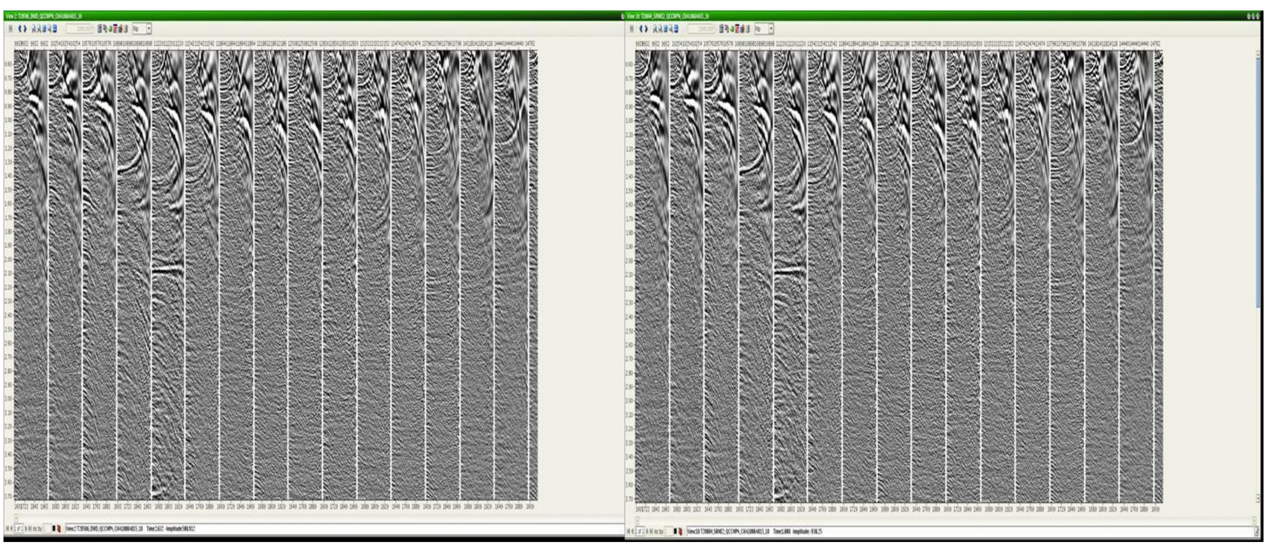


Figure 16: CMP gather record before and after DWD

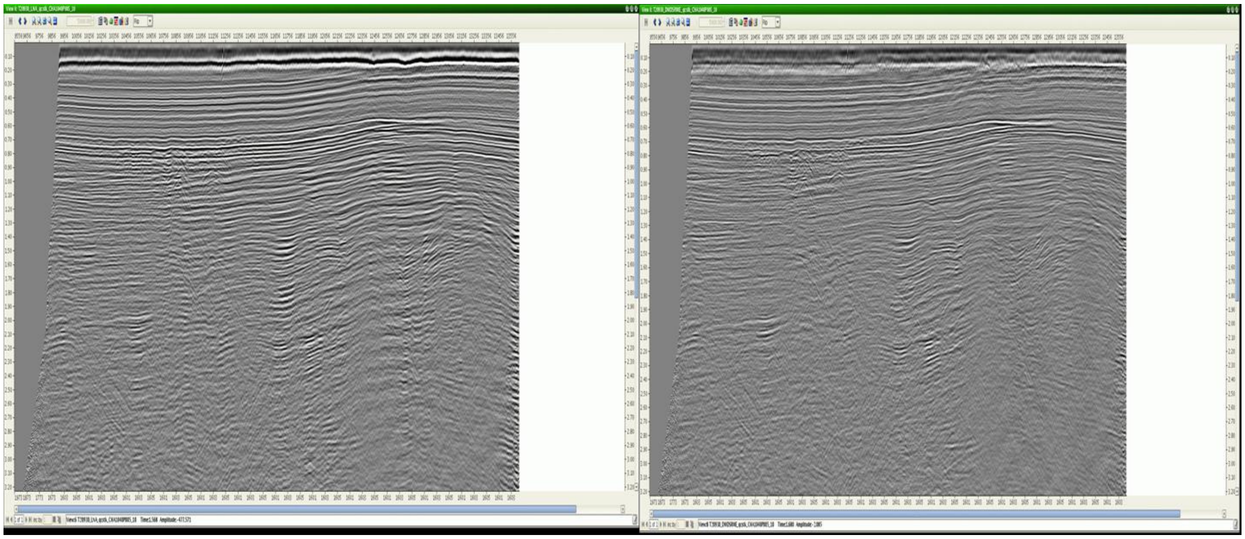


Figure 17: LNA stacks & DWD/SRME stack

4.2.20 Prestack Shot Interpolation (2.5D)

Input shot gathers are read and stored in the form of a cube where the x direction is receiver station number, the y direction is shot station number and the third direction is time. Interpolated shot gathers are then created by a '2.5 D' interpolation.

The cube of data is windowed in all 3 directions to create sub-volumes within which the interpolation takes place. These sub-volumes are overlapped to allow for blending of the interpolation results. This is done in order to conform to the premise of the algorithm that seismic events are linear or planar within each sub-volume. NMO is also applied prior to interpolation to further conform to this assumption

In the '2.5 D' method, interpolation is then only carried out in the shot (or common detector) direction, after Fourier transform to the f-x-Ky domain. The operator used is then an average for all the receivers in the time-space window, which should produce more reliable operators than a simple 2D receiver domain interpolator.

Parameter values:

Input source spacing	:	37.5m
Output source spacing	:	12.5m
Time window length	:	512ms
Time overlap	:	256ms
Maximum dip	:	40 ms/trace
Window width in the detector direction	:	20 traces
Window width in the source direction	:	20 traces
Window overlap in the detector direction	:	6 traces
Window overlap in the source direction	:	6 traces

4.2.21 2D CMP Sort

The data volume was sorted from 2D source gathers to 2D common midpoint super gathers.

Parameter values:

Input Domain	:	Interpolated source
Input Fold	:	200
Output Domain	:	CMP
Output Fold	:	200

4.2.22 Weighted Least-Squares Radon Multiple Attenuation

Radon Multiple Attenuation is principally a modelling and subtraction process. CMP gathers are transformed to the Radon (tau-p) domain, unwanted coherent noise is isolated in this domain, transformed back to the time-offset (t-x) domain, and then subtracted from the original data. The transform separates events according to move out (or velocity), and hence multiple energy can be isolated in the tau-p domain (by means of a mute) provided it has a different velocity to that of the primaries.

Effective separation of coherent signal (primaries) and noise (multiples) requires that both are adequately focused in the Radon domain. Conventionally, this is achieved in two steps. For a parabolic Radon transform, the first step is to condition coherent signal and noise events such that their moveout is approximately parabolic, and their amplitude and phase are approximately constant across all offsets. The second step is to apply a geometry compensation filter during the transform, which attempts to reduce artefacts caused by the input gather geometry. A least-squares geometry compensation filter requires the moveout range for the transform to be adequate to model all coherent events. The transform minimises the difference between the input and the forward and reverse transformed data (the residual), and if a significant amount of coherent energy lies outside the modelled moveout range, artefacts will result.

Weighted Least-Squares Radon transforms seek to improve the focusing of events in the Radon domain over that provided by the conventional transform. Prior information (derived from the data themselves) is used to create weights that improve the sparseness of the transform domain whilst still modelling all of the data. Improved focusing in the Radon domain improves identification and separation of signal and noise trends, with reduced artefact levels. For multiple attenuation, improved focusing allows the Radon domain mute to be moved closer to the primary events than with the conventional transform, and primary and multiple events with very little moveout discrimination can be separated.

Weighted Least-Squares Radon transforms can also reduce artefacts caused by data aliasing. Aliased input data lead to dispersed energy in the transform domain when a conventional transform is used. The weights for the weighted transform are derived in such a way that they are only significant in the correct (un-aliased) parts of the transform domain. Consequently, high frequencies that would be free to alias in the conventional transform tend to model in the correct part of the weighted transform domain. This improved handling of aliased data may be sufficient to remove or reduce the level of interpolation that would be required by a conventional transform.

In Radon Multiple Attenuation, two velocity fields are required:

- An estimate of the stacking velocity field, V_s.
- A maximum velocity for multiple attenuation, V_m. This is usually a percentage of V_s.

CMP gather data are conditioned prior to the transform. Typically the gathers are moveout corrected with velocity $V_{s,}$ which ideally results in flattened primary reflections and under-corrected multiples. For convenience, we refer to over-corrected data as having negative dip (decreasing time with increasing offset), under-corrected data as having positive dip (increasing time with increasing offset) and flat data as having no discernible change in time with offset. The amplitudes may also be preconditioned, for example by using a reversible AGC.

The data are then transformed into the tau-p (Radon) domain using a parabolic Radon transform. After hyperbolic normal-moveout (or higher-order moveout correction), residual moveout has an approximately parabolic shape and hence a parabolic Radon transform is appropriate.

The range of moveouts to transform, measured in ms at a reference offset (X_{ref}), is chosen to cover the range of both primary and multiple energy. Following this, parts of tau-p domain representing primary energy are zeroed by application of a mute. For this purpose ‘primary energy’ is usually assumed to be any data with a velocity faster than V_m. This allows for time-variance in the separation of primary and multiple events. V_m does not need to be the actual velocity of the multiples but rather a velocity that is as fast or faster than multiples of interest while being slower than the primary velocity. Primary energy is protected at late times by imposing a minimum moveout (p) value on the mute. Note that for some deep water datasets, the mute may be safely defined by use of the minimum p value alone, without reference to V_m. The boundary between the zeroed and preserved regions is tapered in the p direction.

Inverse tau-p transform and removal of the pre-transform conditioning produces a model of the multiple energy. This is subtracted from the original data to produce the multiple-attenuated output.

Parameter values:

Pre-transform conditioning	: NMO stretch mute
Reference offset (X_{ref})	: 5300 m
Moveouts (Δt) at the reference offset (X_{ref}):	
Minimum moveout (i.e. for the first p-trace)	: -1000 ms
Maximum moveout (i.e. for the last p-trace)	: 3100 ms
Maximum signal moveout	: 250 ms
Frequency range of multiple model	: 0 Hz - NYQUIST
Multiple Mute Velocity (V_m)	: 90% Velocity mute

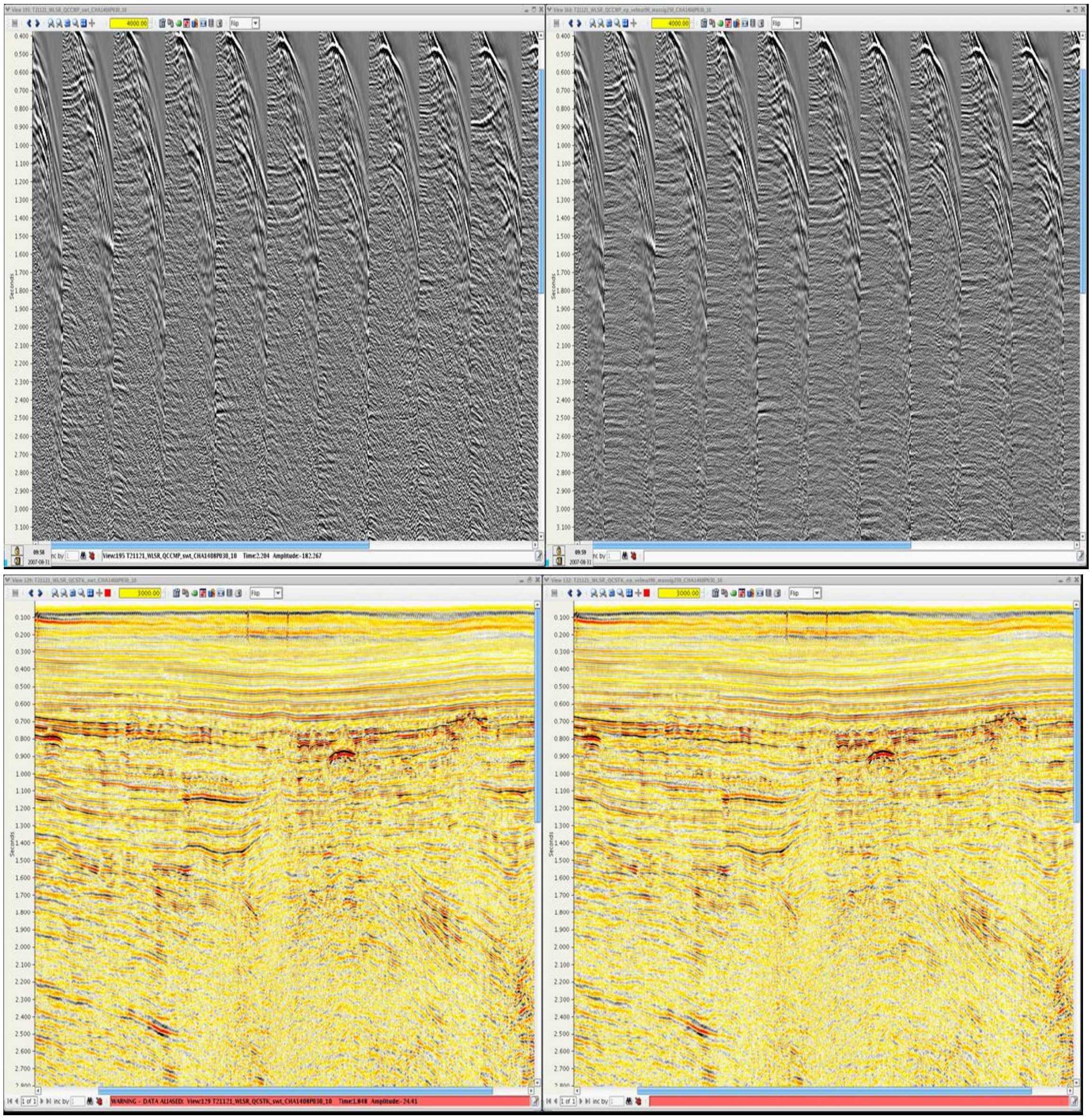


Figure 18: CMP gather records and Stack, before & after Weighted Least Squares Radon

4.2.23 Removal of Interpolated Shot Records

The additional interpolated shot gathers created in step 4.3.3 were removed from the data volume. The maximum number of traces within the 2D CMP gathers was reduced from 200 to 66/67.

4.2.24 SEG-Y Gathers Archives

Weighted Least-Squares Radon Demultiples CMP gathers with NMO corrected (1st Pass velocity field) were archived to USB disk for delivery to Santos.

4.2.25 Trace Reduction

The data volume was reduced in size by decimating the gathers. The near offset was retained and every second trace (even number) was removed. This was possible due to the application of a K-Filter in step 4.2.15 to prevent spatial aliasing.

Parameter values:		
Input Shot Records	:	400 traces
Output Shot Records	:	200 traces

4.2.26 3D Grid define

The 4 corner points of Processing Master Grid are defined as follows:
Output grid : 12.5m x 25.0m
Crosslines : 901-8510, incr 1
Inlines : 261-3400, incr 1

	X-Coordinates	Y-Coordinates	Crossline	Inlines
P1	608862.86506	5764504.460945	901	261
P2	695752.457387	5725818.721952	8510	261
P3	576944.206971	5692813.981167	901	3400
P4	663833.799299	5654128.242174	8510	3400

Crossline cell size 12.5m
Inline cell size 25.0m

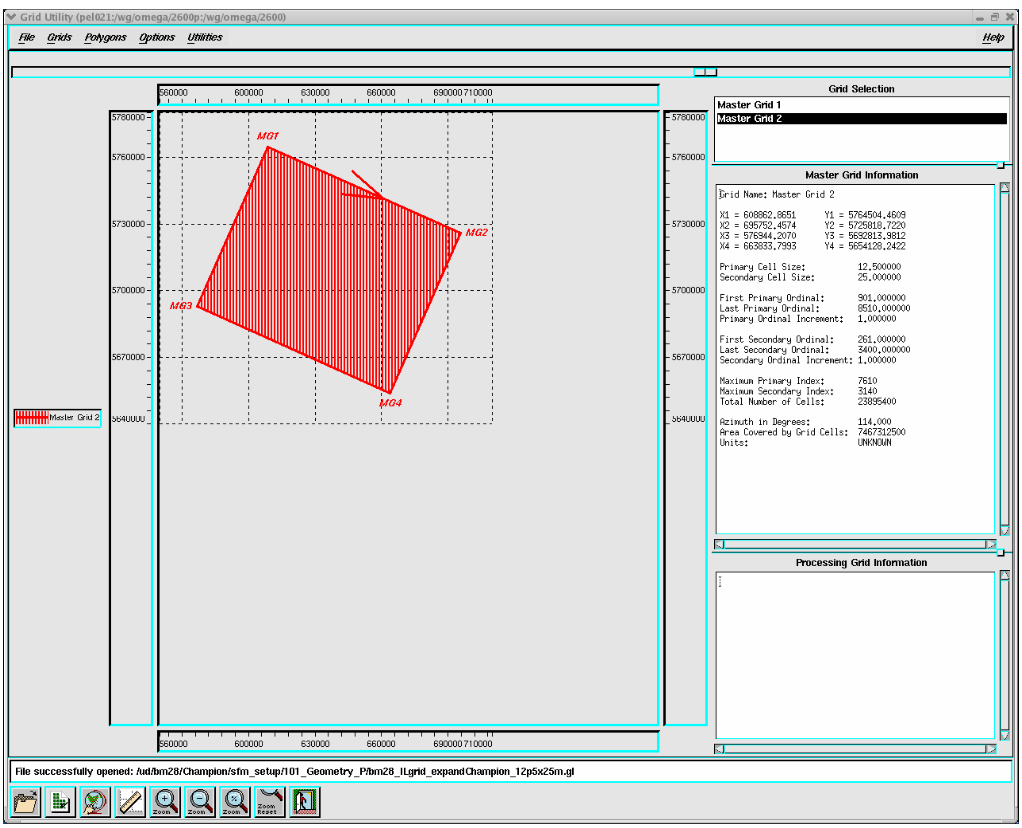


Figure 19: **12.5m x 25.0m Grid**

4.2.27 Common Offset Sort

The data volume was sorted to 3D binned common offset gathers. A nominal offset was assigned to each group, where the nominal offset increment between groups was fixed at 75m. Resulting offset groups are numbered 1 to 68 and represent 197.5m to 5222.5m inc. 75m.

Offset Bin	Min Offset	Max Offset	Group Offset
1	0	197.5	160
2	197.5	272.5	235
3	272.5	347.5	310
4	347.5	422.5	385
5	422.5	497.5	460
6	497.5	572.5	535
7	572.5	647.5	610
8	647.5	722.5	685
9	722.5	797.5	760
10	797.5	872.5	835
11	872.5	947.5	910
12	947.5	1022.5	985
13	1022.5	1097.5	1060
14	1097.5	1172.5	1135
15	1172.5	1247.5	1210
16	1247.5	1322.5	1285
17	1322.5	1397.5	1360
18	1397.5	1472.5	1435
19	1472.5	1547.5	1510
20	1547.5	1622.5	1585
21	1622.5	1697.5	1660
22	1697.5	1772.5	1735
23	1772.5	1847.5	1810
24	1847.5	1922.5	1885
25	1922.5	1997.5	1960
26	1997.5	2072.5	2035
27	2072.5	2147.5	2110
28	2147.5	2222.5	2185
29	2222.5	2297.5	2260
30	2297.5	2372.5	2335
31	2372.5	2447.5	2410
32	2447.5	2522.5	2485
33	2522.5	2597.5	2560
34	2597.5	2672.5	2635
35	2672.5	2747.5	2710
36	2747.5	2822.5	2785
37	2822.5	2897.5	2860
38	2897.5	2972.5	2935
39	2972.5	3047.5	3010
40	3047.5	3122.5	3085
41	3122.5	3197.5	3160
42	3197.5	3272.5	3235
43	3272.5	3347.5	3310
44	3347.5	3422.5	3385
45	3422.5	3497.5	3460
46	3497.5	3572.5	3535
47	3572.5	3647.5	3610
48	3647.5	3722.5	3685
49	3722.5	3797.5	3760
50	3797.5	3872.5	3835
51	3872.5	3947.5	3910
52	3947.5	4022.5	3985
53	4022.5	4097.5	4060

54	4097.5	4172.5	4135
55	4172.5	4247.5	4210
56	4247.5	4322.5	4285
57	4322.5	4397.5	4360
58	4397.5	4472.5	4435
59	4472.5	4547.5	4510
60	4547.5	4622.5	4585
61	4622.5	4697.5	4660
62	4697.5	4772.5	4735
63	4772.5	4847.5	4810
64	4847.5	4922.5	4885
65	4922.5	4997.5	4960
66	4997.5	5072.5	5035
67	5072.5	5147.5	5110
68	5147.5	5300	5185

Parameter values:

Input Domain	:	2D common midpoint gathers	
Input Fold	:	68	
Output Domain	:	Offset	
Output Fold	:	68 single offset volumes	
		Offset 01-54	Antares & Casino
		Offset 02-68	Champion & Hercules

4.2.28 Tidal Statics

Tidal statics were supplied by Santos. Statics values to correct the data to a datum of Mean Sea Level (MSL) were less than 1ms. A water velocity of 1500m/s was used to calculate the statics, which were applied to the data based on acquisition time.

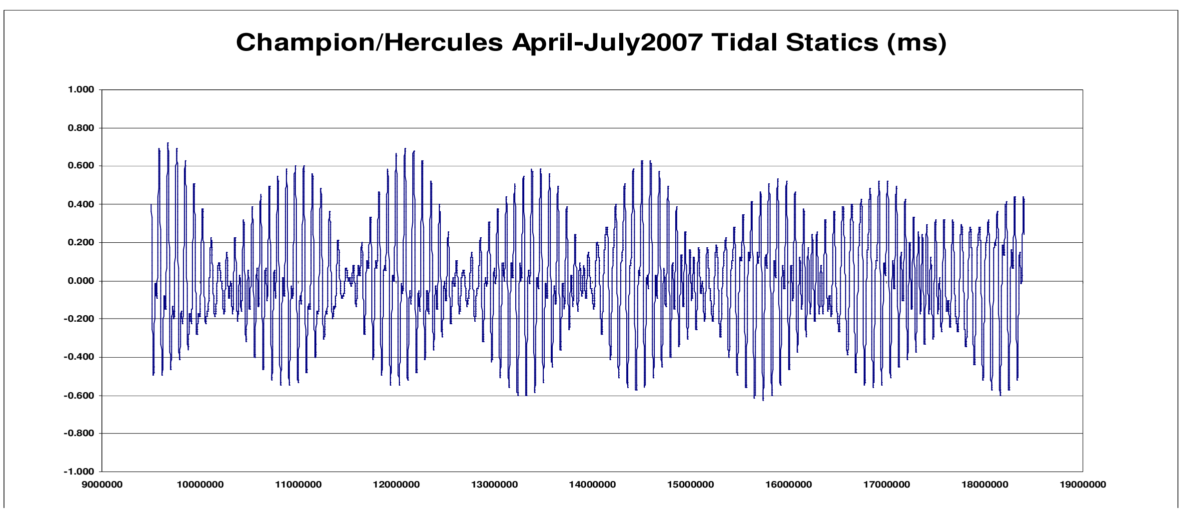


Figure 20: Tidal Statics Chart for Champion & Hercules surveys

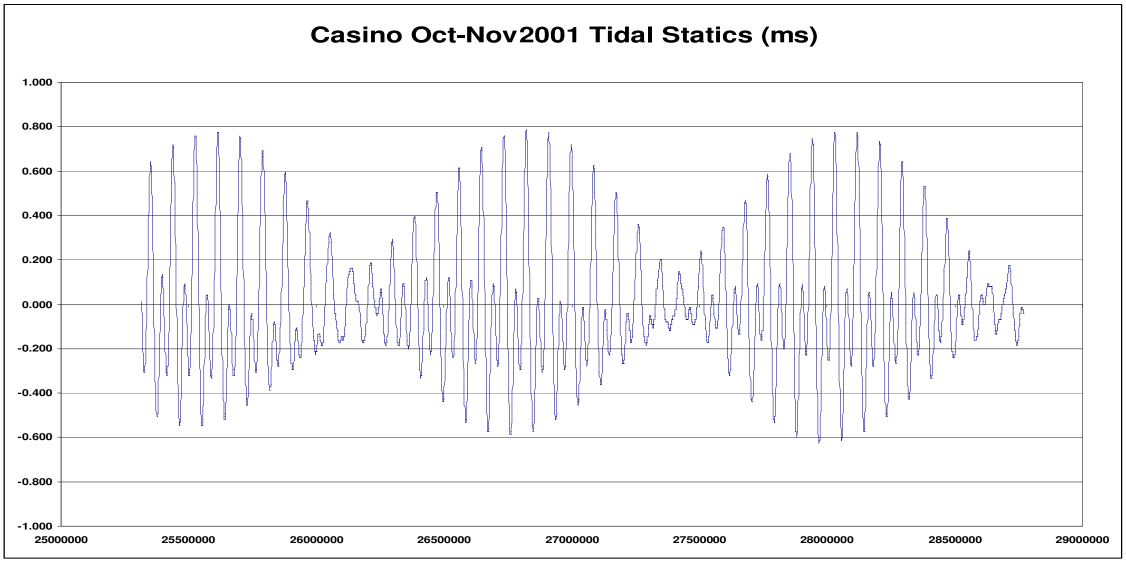


Figure 21: **Tidal Statics chart for Casino**

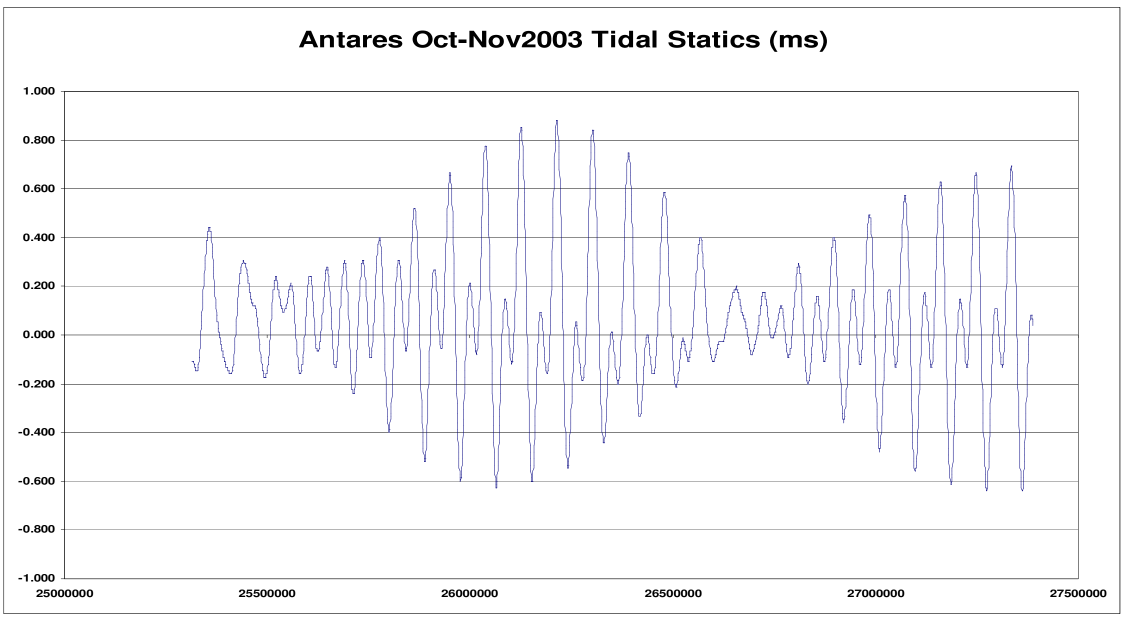


Figure 22: **Tidal Statics chart for Antares**

4.2.29 Survey Matching

Prior to migration the 3D offset planes for all 4 surveys were merged together to form continuous input data. Analysis was performed to match the Casino & Antares data to the Champion/Hercules. After the appropriate phase and amplitude matching was applied the data areas were selected using the polygon as detailed in Figure.23

Parameter values:	
Casino Survey	0deg Phase rotation, -4ms time shift & *0.65 Bulk Amplitude scalar
Antares Survey	0deg Phase rotation, -2ms time shift & *0.85 Bulk Amplitude scalar.

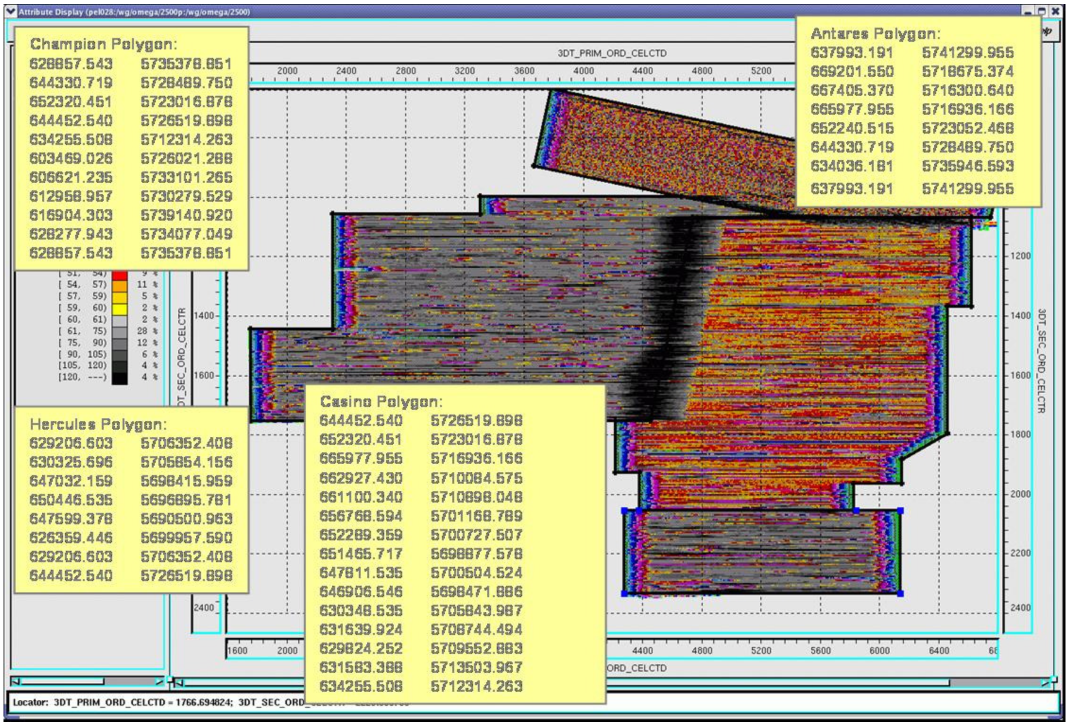


Figure 23: Survey Polygons for Hard Boundary Merge

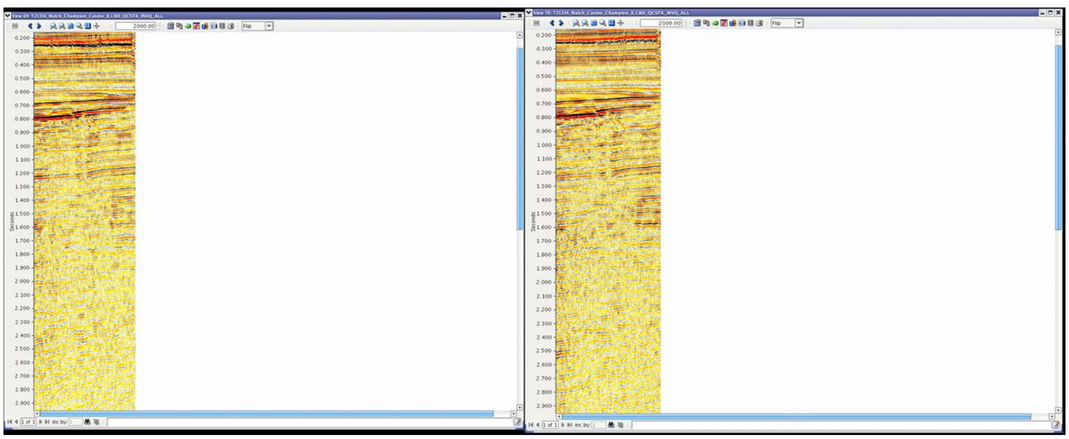


Figure 24: IL1360 Champion Stack & Matched Casino Stack

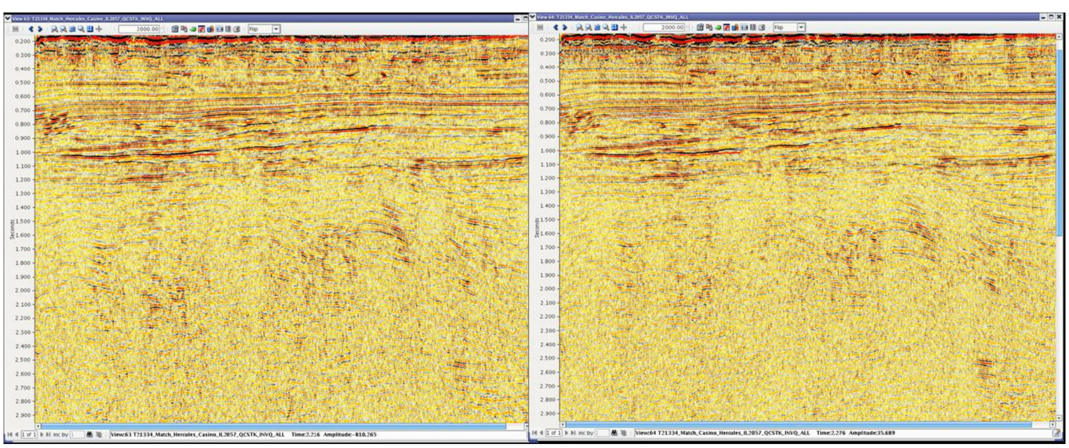


Figure 25: IL2057 Hercules Stack & Matched Casino Stack

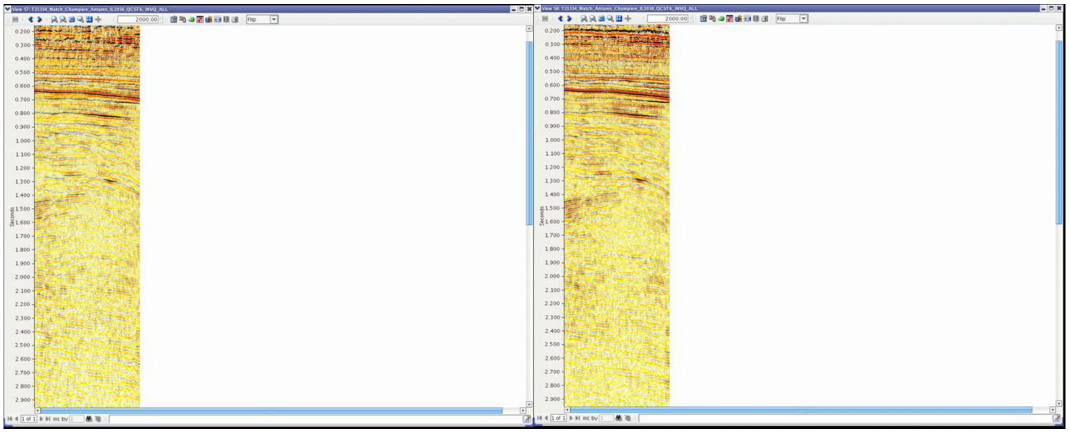


Figure 26: IL1038 Champion Stack & Matched Antares Stack

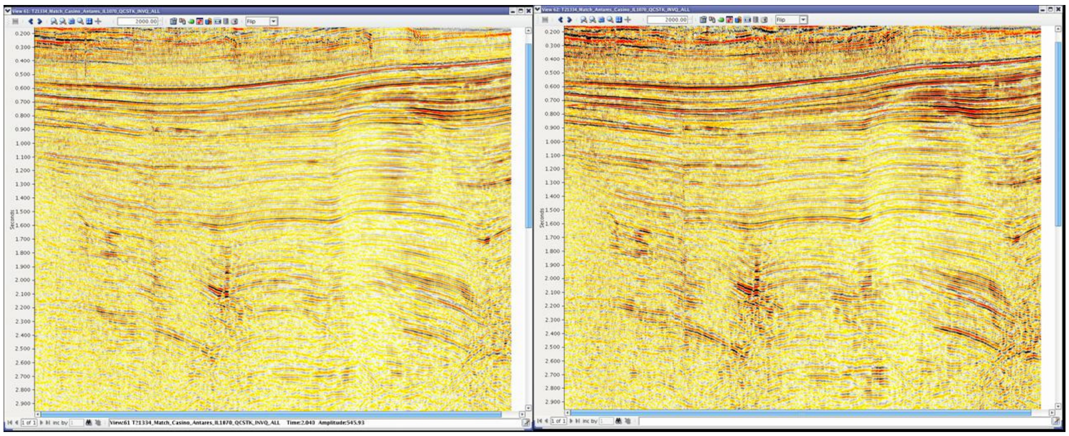


Figure 27: IL1070 Matched Casino Stack & Matched Antares Stack

4.2.30 Inverse Q-Compensation

To compensate for the earth Q-filter, that is, attenuation of higher frequencies and the frequency dependent variation of propagation velocity, a time-variant compensation was applied using an algorithm based on the Futterman frequency-constant Q model of earth attenuation.

Parameter values:

Compensation Type	:	Phase & Amplitude
Q Value	:	136
Maximum Gain Level	:	12dB
Start times	:	Water Bottom

4.2.31 3D Pre-stack Fold Interpolation and Regularization (FIRE 3D)

This process is a seismic interpolation and regularization tool for pre-stack 3D data that are irregularly sampled in space. It provides an improved method of regularizing 3D fold of coverage relative to the conventional flex binning approach of copy and move employed to fill gaps in coverage. The process also allows for the pre-stack regularization of traces to move them (via interpolation) to their respective cell-centre positions.

In partial regularization, the original data remain unaltered and traces are only interpolated to fill empty cells. Such partial regularisation can be useful prior to Pre-stack Time or Depth Migration where irregular subsurface fold can result in undesired amplitude variations.

Each interpolated output trace was calculated from a cluster of nearby input traces using adaptive interpolation. An optional dip map was computed to guide the interpolation and thus enable it to handle steeply dipping events. At each sample, the data were scanned over a range of dips to determine the local dominant dip. The dip-search was accomplished by computing the un-normalised semblance (correlation) between nearby traces for the range of dips of interest; peaks in the semblance indicate local dominant dips. The interpolated trace was then constructed by a weighted sum of input traces along the local dominant dip for each output sample.

The interpolation process was performed on common offset planes using a time-space (t-x) sinc interpolation that adapted to the local input cluster density and dominant dip.

Parameter Values:

Operation Mode	: Infill holes / Partial Regularization
Maximum number of traces in output cell*	: 1
Sinc Interpolation length (inline x crossline)	: 34x34
Number of Dip Scans	: 11
Correlation Width	: 31 bins
Correlation Length	: 52 ms

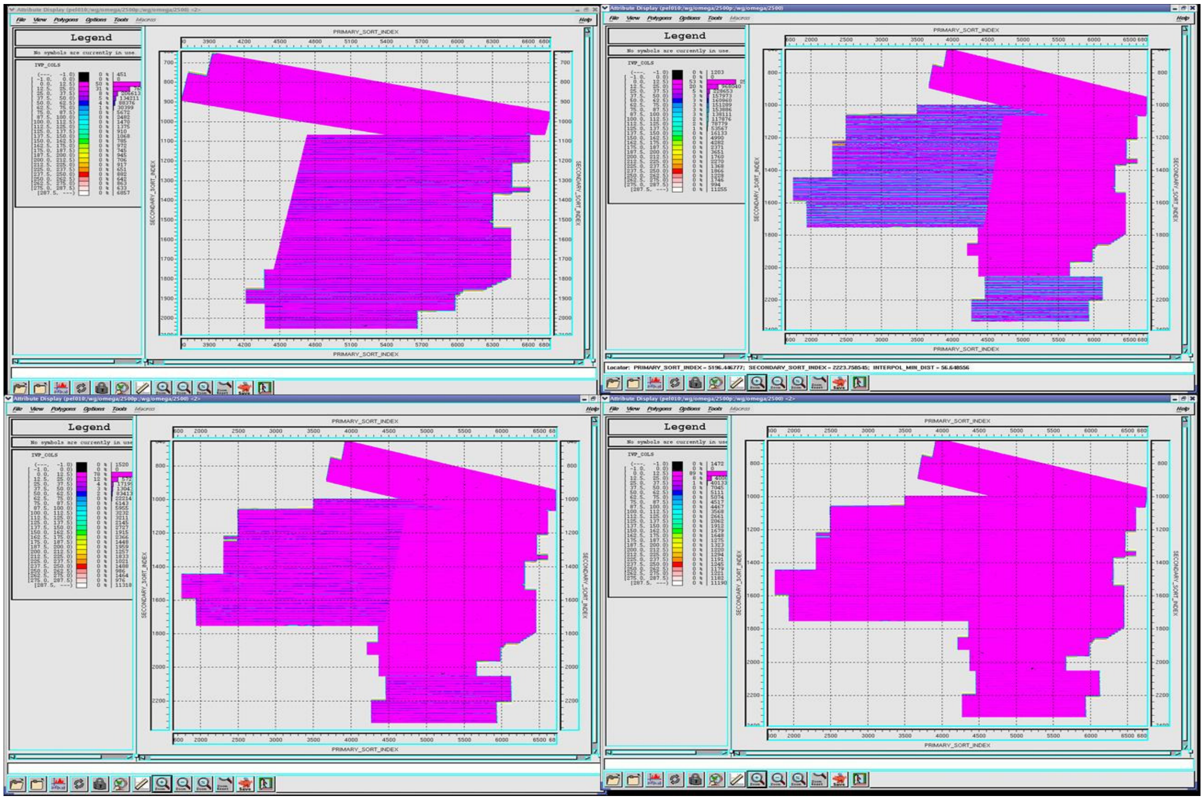


Figure 28: FIRE Interpolation distance Offset 01, 02, 03 & 04

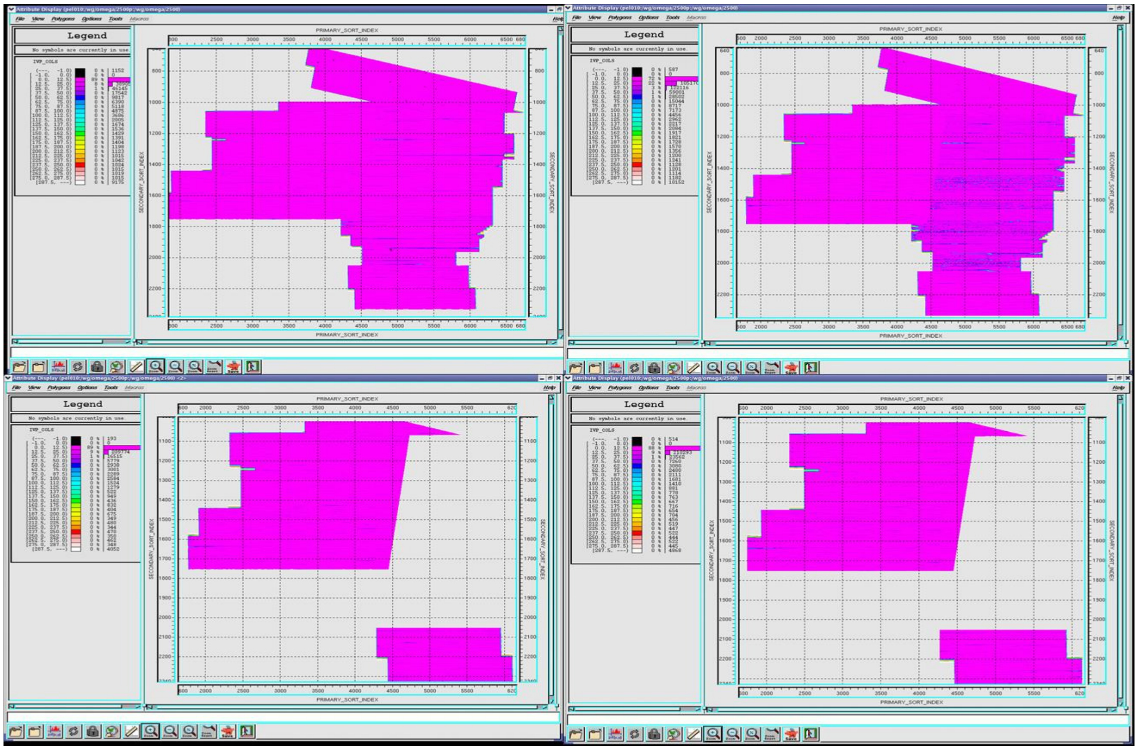


Figure 29: FIRE 3D Interpolation distance Offset 50, 54, 60 & 68

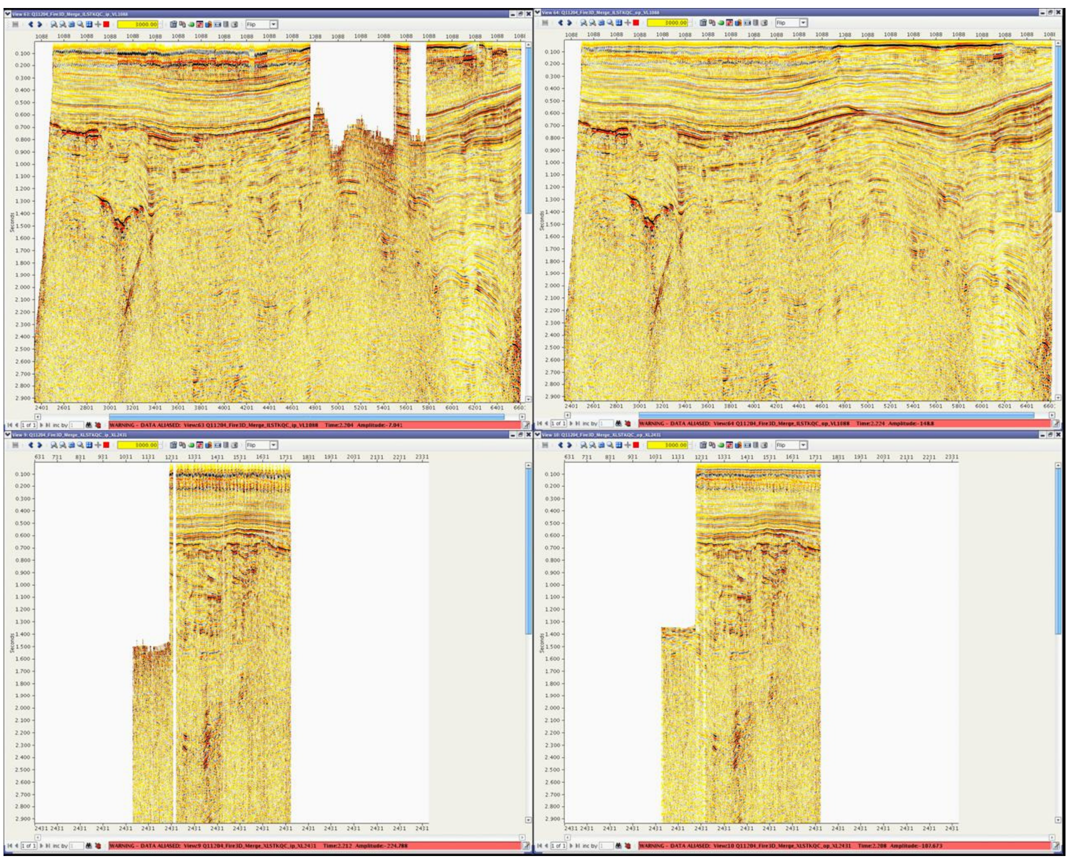


Figure 30: FIRE 3D Inline and Xline Stack Qc

4.2.32 Pre-Migration Time Variant Filter

A zero-phase TVF (Time Variant Filter) was applied to the data. The filter pass bands were described by low- and high-cut frequencies and associated dB/octave cut off slopes. The specified cut off frequencies are located at the half-power (-3 dB in amplitude) response points and the slopes at these frequencies are equal to the respective dB/octave values. The slope is an approximate cosine squared function in the amplitude domain. The filters were normalized so that the output amplitudes were the same as the input amplitudes for frequency components within the pass band.

Parameter values:

Filter Centre Time (ms)	Low-cut Frequency (Hz)	Low-cut Slope (dB/octave)	High-cut Frequency (Hz)	High-cut Slope (dB/octave)
0	-	-	110	63
1250	-	-	100	60
2500	-	-	90	57
4000	-	-	80	54
6000	-	-	70	50

Note:
The times are those at the centre of the filter where the full effect of the filter is attained
The first filter was applied from the beginning of the trace to the first filter centre time
Intermediate filters were linearly tapered and blended with the preceding and succeeding filter between the filter centre times
The last filter was applied from the last filter centre time to the end of the data

4.2.33 Removal of Time Function Gain

The gain previously applied (section 4.2.11) was removed.

4.2.34 Migration Velocity Analysis

Targeted Kirchhoff PreSTM and velocity analysis was performed on a 1000m x 1000m grid. This field was then interpolated to a 500x500m field and spatially smoothed for use in migration.

Parameter Values:

Analysis Spacing	:	1000m
Number of CMPs per Analysis (MVF Stack)	:	19 (post decimation)
Number of CMPs per Analysis (Semblance Display)	:	3

The velocities were interpolated to a 500x500m field and spatially smoothed for use in migration.

Smoothing Parameters	*Time (ms)*	*Radius (m)*
	0	1000
	1000	1250
	2000	2500
	3000	4000
	6200	4000

Linear interpolation between above control points was used.
A Cosine Bell function was used in the above spatial filter.

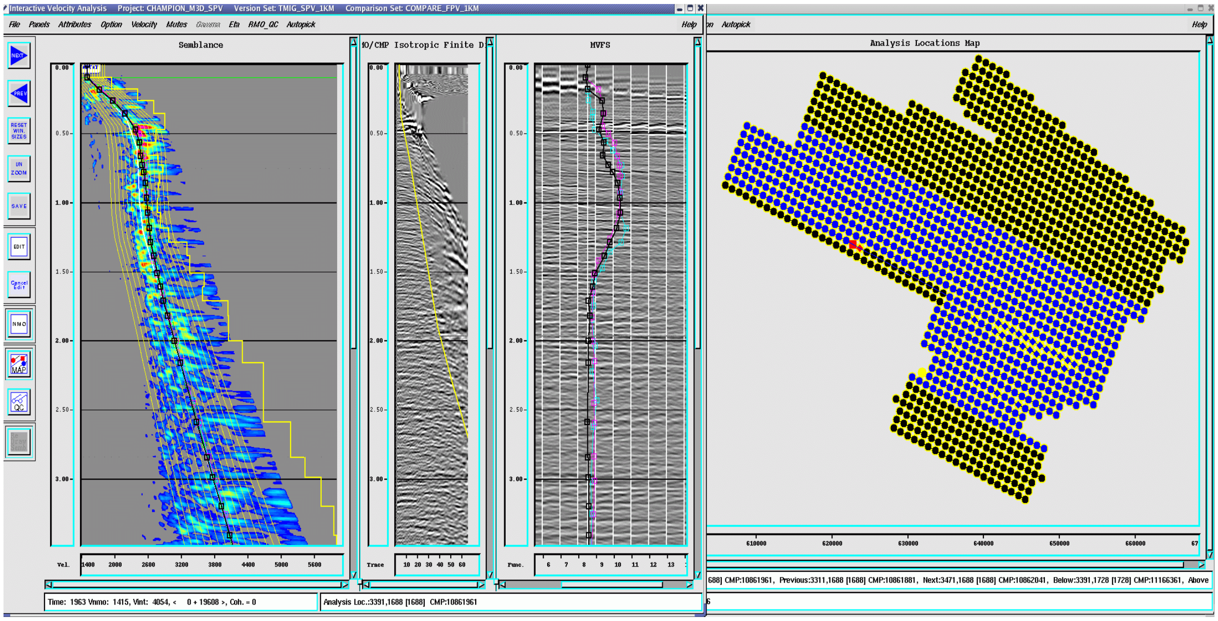


Figure 31: **Migration velocity analysis on 1km grid**

4.2.35 Velocity Processing QC

- NMO corrected gathers at the inline velocity spacing interval
- Iso-velocity displays for every picked inline
- Velocity time slice at least every 1000ms

4.2.36 Kirchhoff Pre-Stack Time Migration

The Kirchhoff Time Migration Seismic Function Module performs seismic time migration using the Kirchhoff summation method. The migrated image is constructed by summing weighted amplitudes along diffraction curves or curved surfaces for the 3D case. These diffraction curves are determined by two-way travel times from the surface to subsurface scatterers that are computed from the user-supplied velocity field. In pre-stack mode, migration is performed on common offset volumes for 3D data.

Theoretical Basis Kirchhoff migration is based on Green's theorem, a mathematical equation that states a relationship between the observations of a wave field on a closed surface and the wave field at any point inside that surface (see Schneider, W.A., 1978). The name of Gustav Kirchhoff is associated with the method because of his work in 1882 on optical diffraction. The formula for migration that is derived from Green's theorem has the form of an integral (or a summation in the case of discretely sampled data) over observations made on the surface of the earth. The migrated image calculated by that summation represents the acoustic reflectance throughout a section of the earth beneath the surface observations.

Key parameters to the migration process are the Maximum Dip Filter Angle and Spatial Anti-aliasing factors. Kirchhoff Migration typically provides a better migration solution, compared with other time migration algorithms, when the velocities vary both laterally and temporally. One feature of the WesternGeco's Kirchhoff Migration is the ability to define an output location, line or volume independently of the input data. This allows the user to target the output of selected lines or locations that are fully 3D migrated without the associated time/cost of migrating the whole volume. This target output option is particularly useful when processing 3D pre-stack as it allows the generation of targeted velocity analyses prior to running the full migration. Under such circumstances, the process does not waste time migrating those input traces that do not contribute to the output profile.

The travel times calculation used by WesternGeco's Kirchhoff Pre-stack Time Migration can be derived by a variety of methods. However, the most common approach now is ray traced using a gridded interval velocity model. This method uses the WesternGeco proprietary "RTFM" method (Recursive Travel times by Fermat Minimisation) . This can be implemented in an Isotropic mode - comprehending ray bending (curved ray) due to Snells law at the interval velocity boundaries, or VTI Anisotropic mode. In the Anisotropic mode, the travel time calculation requires both vertical and horizontal Interval velocity models (Vz and Vx) to be provided. These two velocity fields are normally computed from the Vrms velocity and effective eta fields determined in a pass of interactive velocity analysis using a similar gridded moveout method in the velocity analysis tool (InVA). RTFM does not use high order formula algorithmic calculations to derive travel times. RTFM uses ray tracing "on the fly" during the execution of the migration. Pre-computed travel time tables are not used.

Pre-stack migration is achieved by migrating the sorted common-offset panels into individual zero-offset panels. During migration the traces are effectively NMO-corrected; however, inverse NMO using the migration velocity is typically applied prior to output of the data. This allows a final velocity analyses and moveout to be performed on the data prior to stacking it.

Data migrated onto different grid

Parameter values:

Trace length		5500ms (All surveys)	
Traveltime computation	:	Isotropic RTFM	
Aperture computation type	:	Ray Bending	
Aperture	:	4000m	
Dip limit	:	60^{o}	
Time variant frequency limits	:	Time (ms)	Frequency (Hz)
		0	125
		1250	125
		2500	125
		4000	112
		6000	98

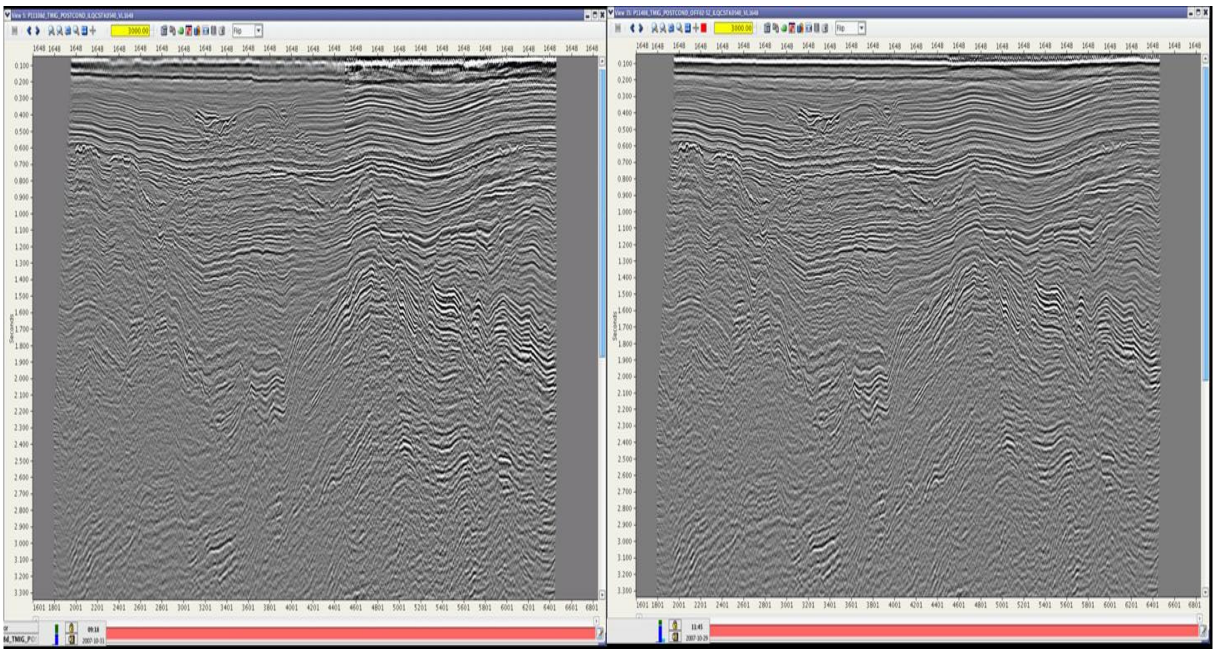


Figure 32: Comparison of Targeted Kmig & Production Kmig Inline stack

4.3 Post-Migration Processing

4.3.1 3D CMP sort

The data was sorted from common offset planes to 3D common midpoint gathers.

Parameter values:

Input Domain	:	Offset
Input Fold	:	68single offset volumes
Output Domain	:	CMP
Output Fold	:	68

4.3.2 Inverse NMO Correction

Inverse hyperbolic moveout was applied.

Parameter values:		
Velocity source	:	1km Migration velocity field
NMO muting applied	:	n/a

4.3.3 3D High Density Velocity Analysis (HDVA)

3D velocity analysis is typically performed on a sparse grid of data with 500x500m spacing. Whilst this analysis density is generally adequate to determine the general velocity trends in quite high detail, the High Density Velocity Analysis process (HDVA) is a semi-automated approach to generate a velocity field with a higher spatial resolution. This velocity field can then be used to perform final NMO correction.

High density velocity analyses generation

Velocity Analysis control points for Semblances and Gathers were generated at a dense spatial sampling interval in preparation for running the Automatic Velocity Picker. Adjacent CMP Summing was performed in the generation of cross-correlation matrices that were sampled in time and velocity.

Parameter values:		
Velocity Analysis Density	:	50x50m
Velocity Trace Sampling	:	10m/s
Time Sampling	:	8ms
Output Trace Length	:	6000ms

Automatic Velocity Picking

The Automatic Velocity Picker generated time-velocity picks from input coherence tables plus additional velocity information that was used to determine the starting velocity functions for the iterative velocity picking algorithm. It was also used for constraining the final interval velocity models and for deleting unacceptable RMS velocities from the computations.

The algorithm is based upon the work of J.L Toldi (1985). A significant feature of Toldi's technique is that velocities are picked under the constraint of a realistic interval velocity model, ensuring that picked RMS velocities do not imply absurd interval velocity functions. The algorithm works best for horizontally stratified geology, with mild lateral velocity variations. Toldi's method also performs automatic stacking velocity analysis by finding the observed stacking velocity that maximises the data semblance. The resultant algorithm simultaneously maximises the semblance and minimises the stacking velocity differences.

In order to prevent unrealistic picking of VRMS values, the following constraints, or penalty functions, may be included to guide the auto picking algorithm:

Temporal smoothness weighting to reduce the effect of rapid fluctuations in interval velocity.
Deviation tolerance from the initial model.
Weight accorded to surrounding velocity functions.
Maximum and minimum allowable interval velocity.

Parameter values:		
Steering Velocity Field Density	:	500x500m
Interval Velocity Range Limits	:	1500-6000m/s
Output Velocity Field Density	:	50x50m

Velocity Interpolation

The raw auto-picked velocities were gridded to a regular spatial and temporal grid prior to smoothing

Parameter values:		
Output Velocity Field Grid Size	:	50m x 50m
Output temporal sample interval	:	32ms

Velocity Field Smoothing

The final stage of the HDVA process involved the spatial and temporal smoothing of the raw time-velocity picks generated by the automatic velocity picking. Temporal smoothing was performed using either a flat or triangular running average filter on the raw RMS velocity values.
Spatial smoothing was performed using a 3D Cosine Bell smoothing operator and can be applied to either the RMS or interval velocities, or both.
See figure 24, 25, 26, 27, 28 and 29 for HDVA Time slice, inlines xlines Qc

Parameter values:

Velocity type smoothed	:	RMS
Spatial Filter Radius	:	175m
Spatial Filter Decay Rate	:	1

(where 0 represents a running average and 1 represents a linear weighting function from 0 to 1)

4.3.4 HDVA Velocity Processing QC

- NMO corrected gathers at the inline velocity spacing interval
- Velocity time slice at least every 500ms

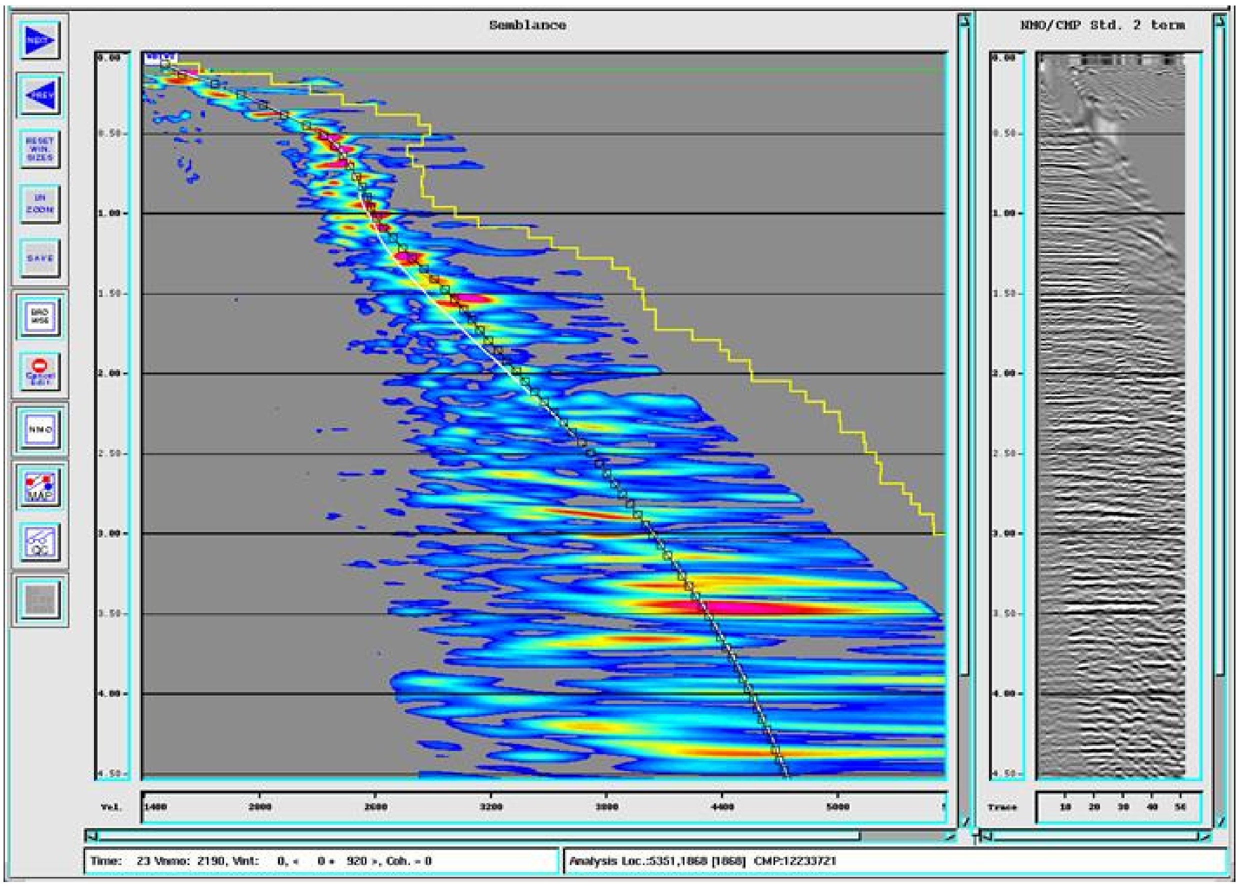


Figure 33: HDVA velocity analysis QC

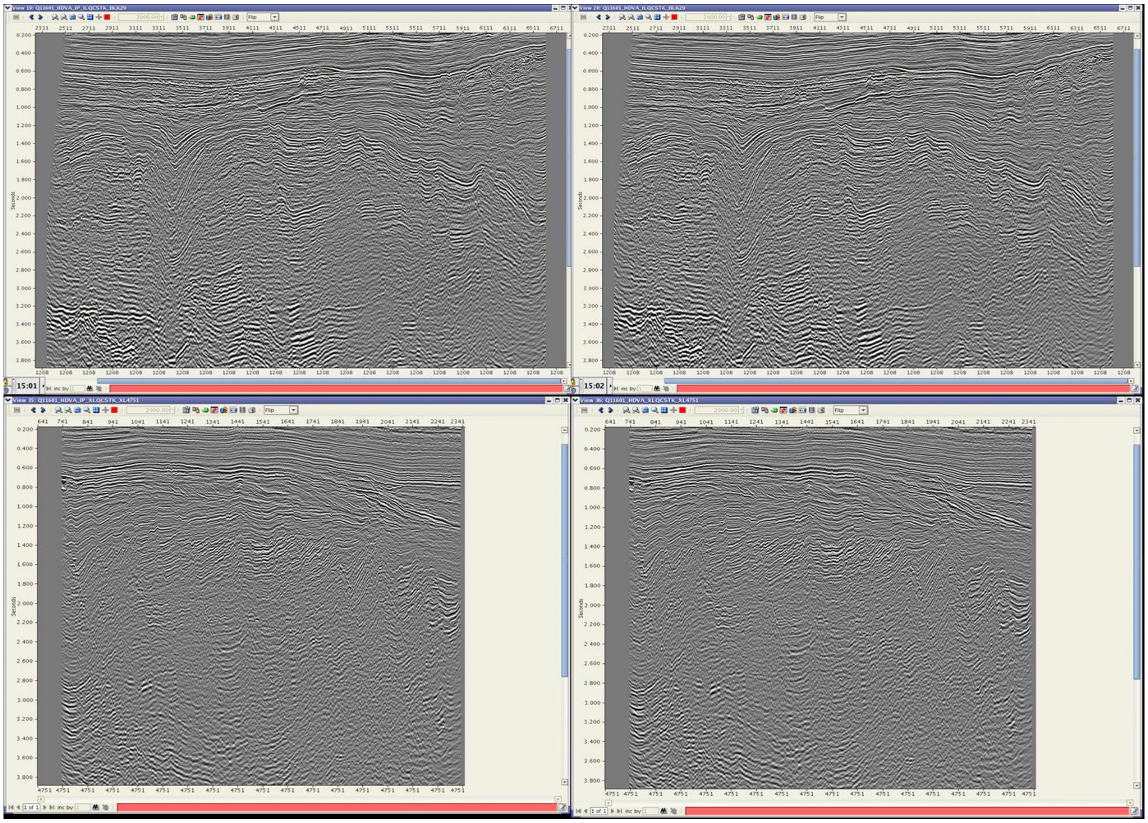


Figure 34: **Inline and Xline stack, before and after HDVA velocity**

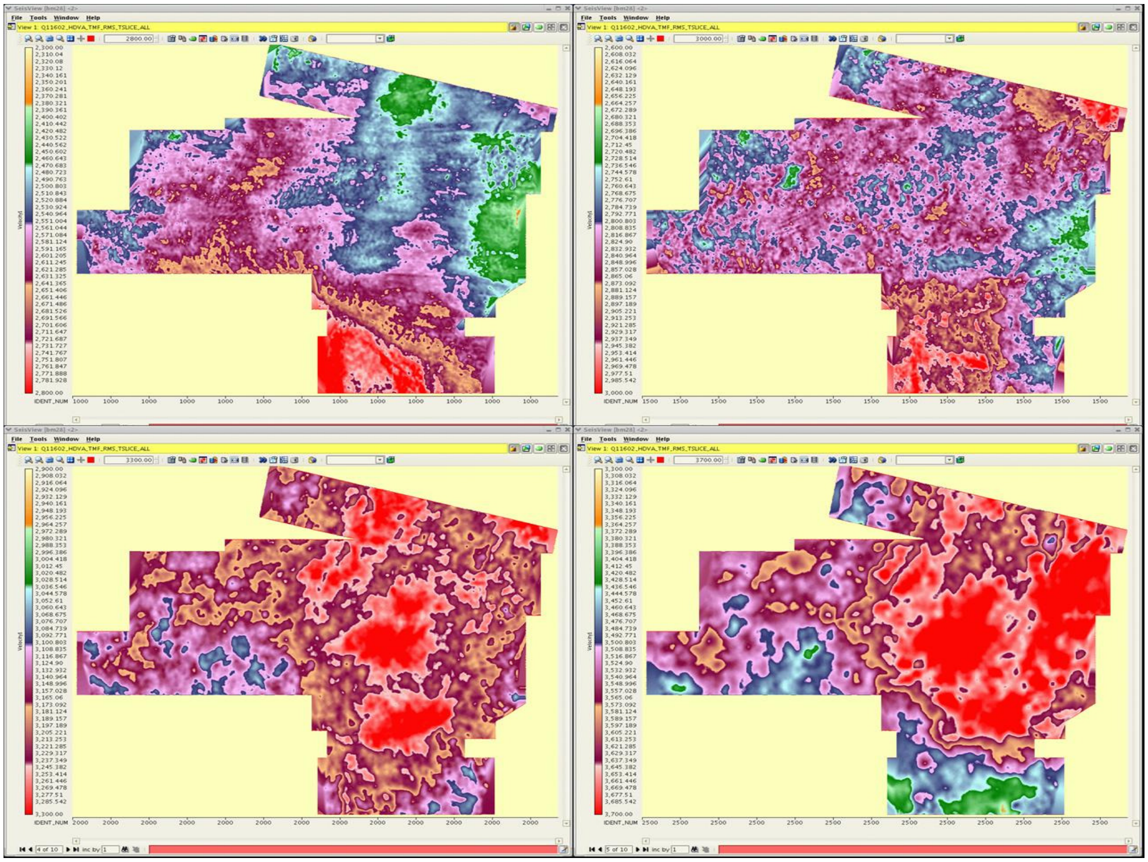


Figure 35: **HDVA RMS velocity Time slice QC**

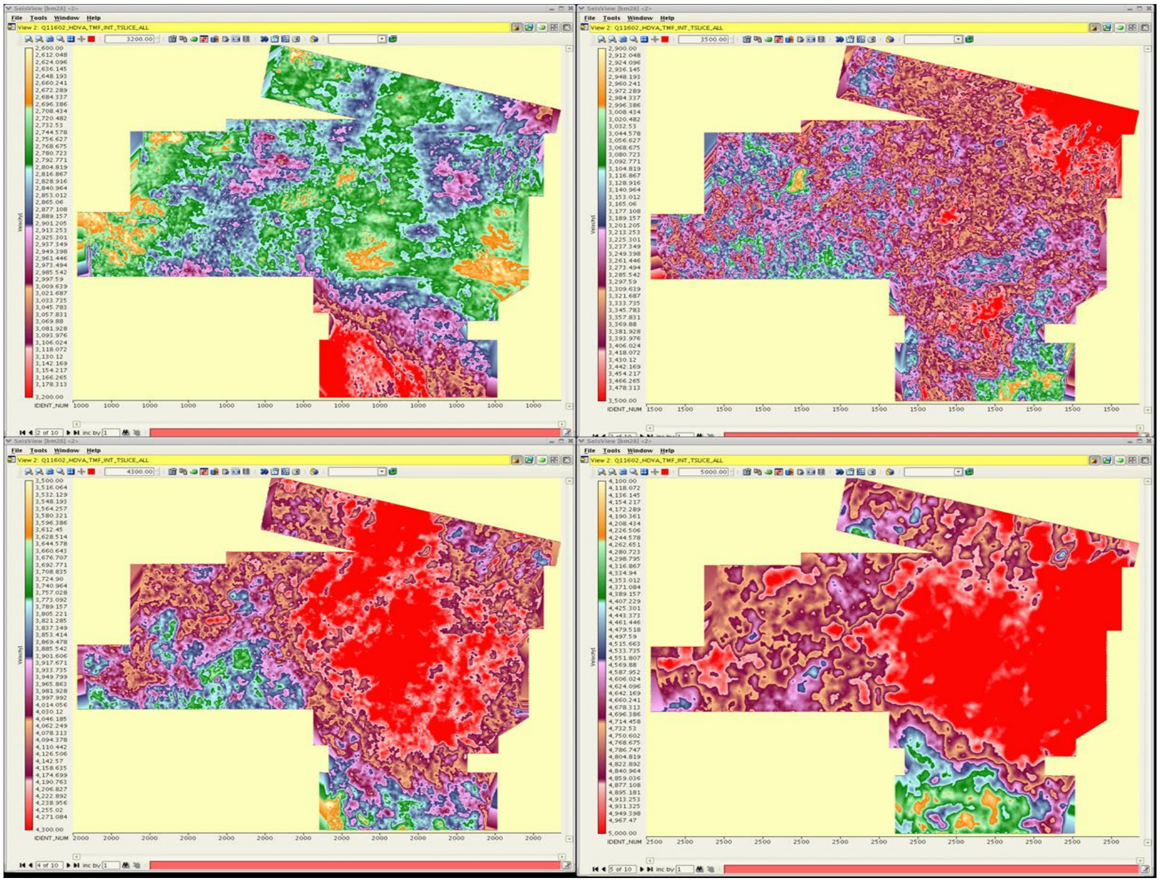


Figure 36: HDVA Interval velocity Time slice QC

4.3.5 NMO Compensation

Hyperbolic moveout was applied to the data. This corrected the reflection events to their zero offset position by:

$$t_o = \sqrt{t^2 - \frac{X^2}{V^2}}$$

where:

t is the travel time at offset *X*
t_o is the zero offset traveltime
X is the absolute value of the source-to-detector offset distance
V is the moveout velocity

Parameter values:		
Velocity source	:	HDVA Velocity field
NMO muting applied	:	n/a

4.3.6 Residual Weighted Least-Squares Radon Demultiple

This pass of Weighted Least Squares Radon Multiple Attenuation was used to attenuate residual multiple energy. The improved velocity control available from performing the velocity analysis after migration, allowed a more severe mute to be applied than that used in the first pass of Radon Multiple Attenuation.

Parameter values:	
Pre-transform conditioning	: 240ms AGC, NMO stretch mute
Reference offset (X_{ref})	: 6000m
Moveouts (Δt) at the reference offset (X_{ref}):	
Minimum moveout (i.e. for the first p-trace)	: -900 ms
Maximum moveout (i.e. for the last p-trace)	: 1800 ms
Number of p-traces generated	: 451
Frequency range of multiple model	: 0 Hz - NYQUIST
Multiple Mute Velocity (V_m)	: 96% Velocity mute
Mute minimum moveout limit	: 120 ms

Notes:
Multiple attenuation was full-off to WB+100ms, then tapered to full-on at WB+124ms.

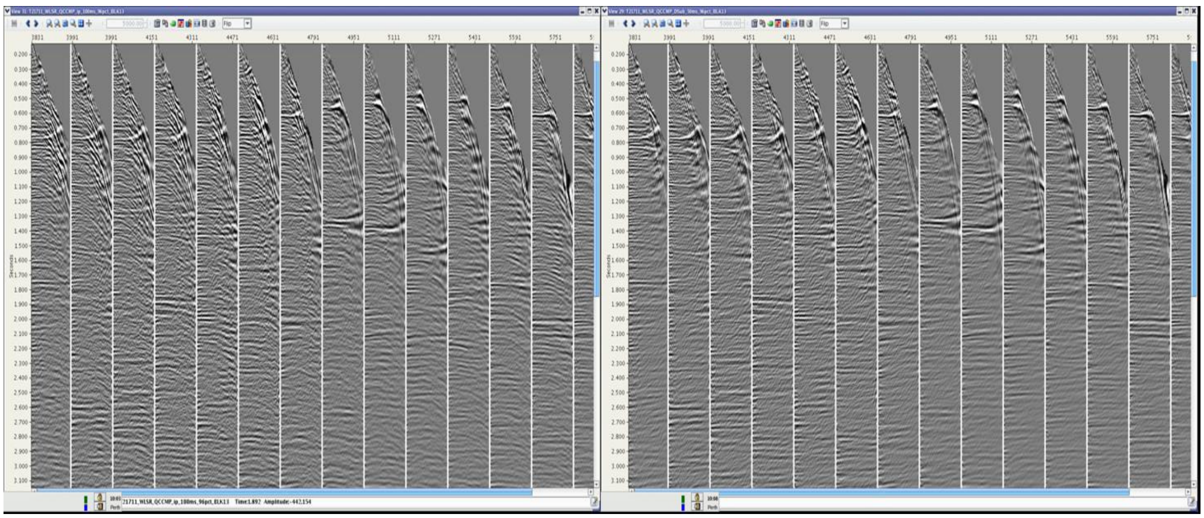


Figure 37: Inline CMP gathers, before and after Residual Radon Demultiple

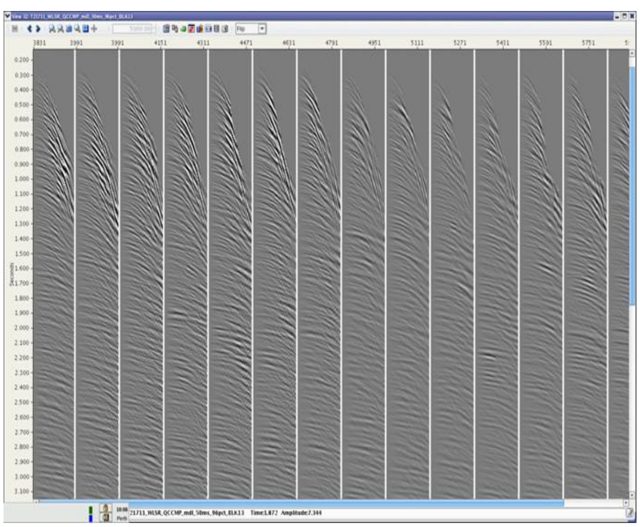


Figure 38: Inline CMP gathers (Residual Radon Demultiple model)

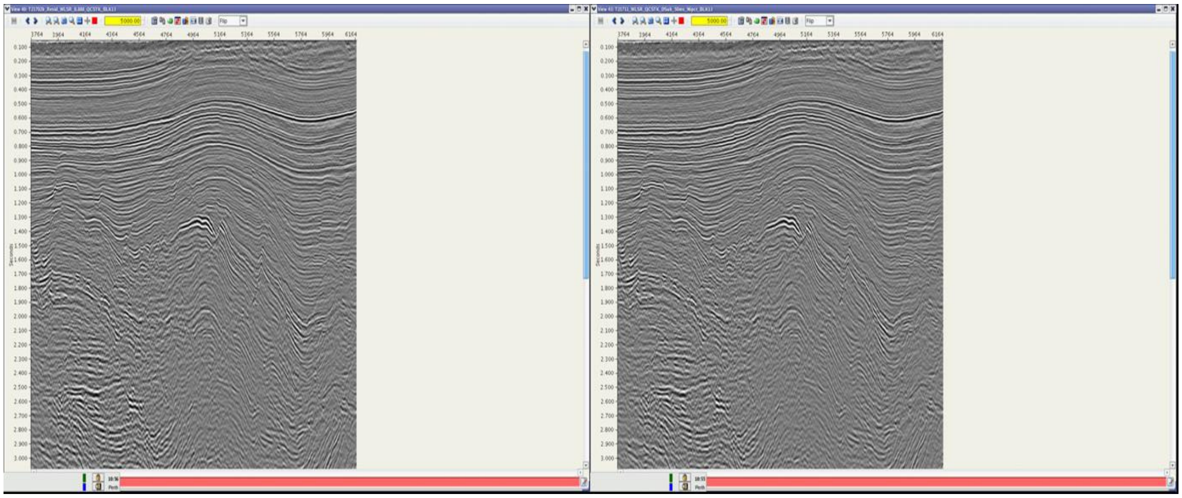


Figure 39: **Inline Stack, before and after Residual Radon Demultiple**

4.3.7 *Exponential Gain*

The data were scaled with a time variant exponential gain function (that is, the trace sample at 2 seconds is multiplied by a value a specified amount higher in dB than the trace sample at 1 second). This scaling was applied from the trace's start time down to a time of t_{stop} after which the gain was held constant, according to the formulae:

$A_o(t) = A_i(t)$ $\quad t \le 0$

$A_o(t) = A_i(t)\, e^{((t - Ts) * PWR)}$ $\quad t > Ts,\ t \le t_{stop}$

$A_o(t) = A_i(t)\, e^{((t_{stop} - Ts) * PWR)}$ $\quad t > t_{stop}$

where:

$A_o(t)$ is the output trace sample at time t

$A_i(t)$ is the input trace sample at time t

t is the time in seconds

Ts is the start time associated with the trace

PWR is the exponential gain function

Parameter values:

Exponential Gain Function	: 3 dB/s
Ts	: WB

4.3.8 *SEG-Y 3D CMP Gather Archive*

The 3D CMP ordered data with Gun and Cable statics correction (+10) was archived to USB disks for delivery to Santos.

4.4 Angle Stacks

4.4.1 Raw Angle Stack

In certain depositional settings, the amplitude variation dependent on offset between source and receiver can provide an important clue to the presence of hydrocarbons. The reflection coefficient for an incident plane P-wave can increase or decrease (and even change polarity) with reflection angle, depending on changes in elastic parameters across a reflecting boundary. Conventional CMP stacking suppresses this information because the amplitude of each event in the stack represents an average over all offsets. Consequently, reflection character, event amplitude and continuity on conventional CMP stacks can differ from a zero-offset recorded section.

Several methods exist which allow seismic traces to be generated that, unlike conventionally stacked traces, exploit information about the dependence of amplitude on reflection angle.

With AVO Angle Decomposition traces recorded at fixed offsets are transformed into traces characterized by their angles of incidence. Traces with reflection angles within a desired range are then stacked to produce an angle trace. Repeating this process for different reflection angles produces an angle-trace gather. This partial stacking improves the signal-to-noise ratio and is consistent with the Fresnel-zone concept. The Reflection Angles are computed from offset-time by either a straight-ray or a bending-ray approximation, with velocities derived from the rms velocities.

For each of the selected angle mute ranges the mute patterns were further modified to constrain the offset contribution within given ranges. See below for details and Figure 29 shows examples of muted CMP gathers.

Parameter values:

Angle Computation Option	: Higher Order – 4th order Taner-Koehler expansion
Velocity Field	: Smoothed migration velocities
Angle ranges applied	: Angle 05-42 deg
	Angle 00-15 deg
	Angle 15-25 deg
	Angle 25-35 deg
	Angle 35-45 deg

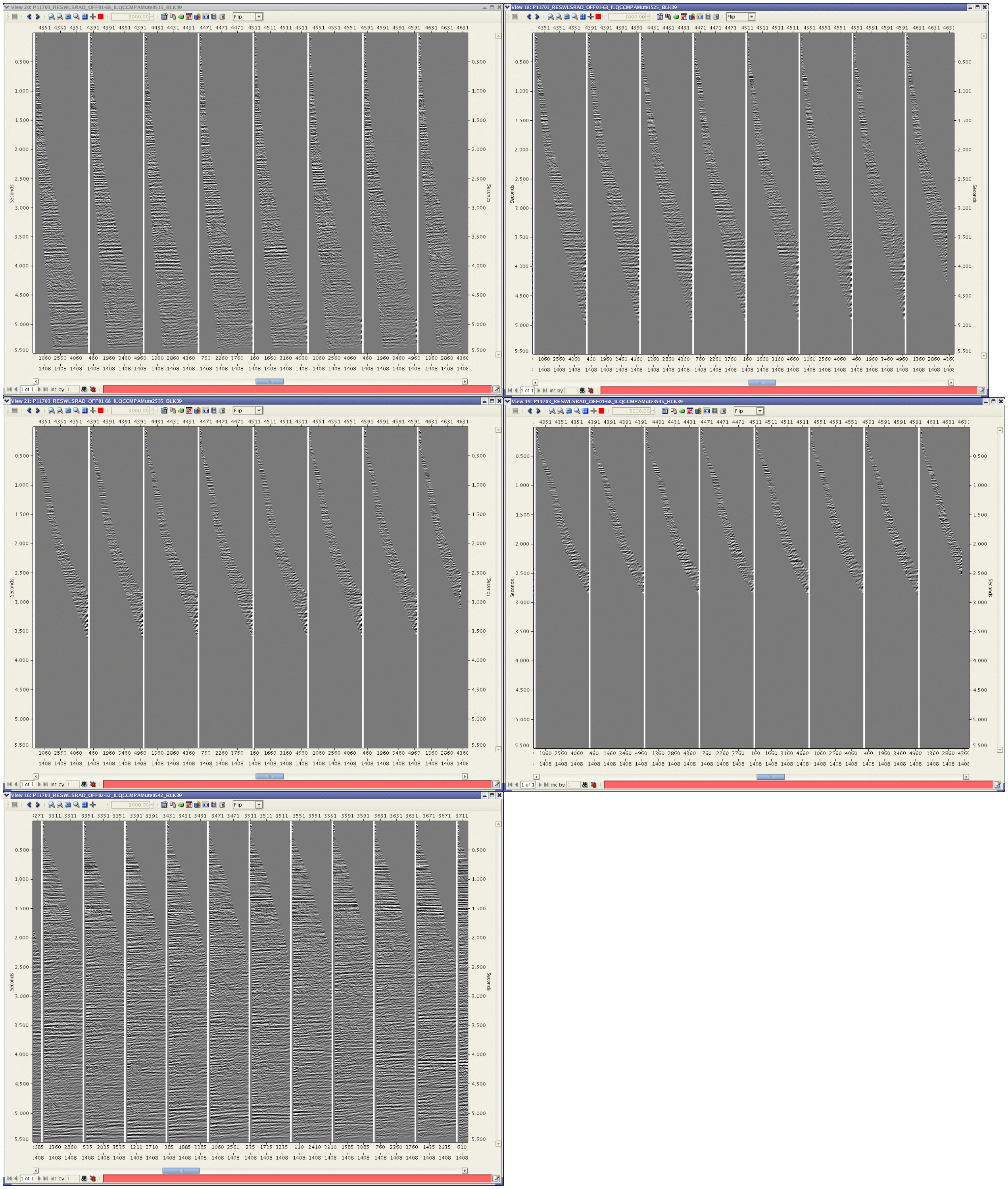


Figure 40: Angle mute CMP gathers (0-15deg, 15-25deg, 25-35deg, 35-45 deg, 05,42deg)

4.4.2 Gun and Cable Correction

A gun and cable static correction was calculated using the following equation and then applied to the data:

Correction = (Gun depth + Cable depth)/Water velocity

Parameter values:		
Gun Depth	: 8m	(Reference to Champion & Hercules survey)
Cable Depth	: 7m	(Reference to Champion & Hercules survey)
Water Velocity	: 1500m/s	
Static Correction	: +10ms	

4.4.3 Exponential Gain

The data were scaled with a time variant exponential gain function (that is, the trace sample at 2 seconds is multiplied by a value a specified amount higher in dB than the trace sample at 1 second). This scaling was applied from the trace's start time down to a time of t_{stop} after which the gain was held constant, according to the formulae:

$A_o(t) = A_i(t)$ $\quad t \leq 0$

$A_o(t) = A_i(t)\, e^{((t - Ts) * PWR)}$ $\quad t > Ts,\ t \leq t_{stop}$

$A_o(t) = A_i(t)\, e^{((t_{stop} - Ts) * PWR)}$ $\quad t > t_{stop}$

where:

$A_o(t)$ is the output trace sample at time t

$A_i(t)$ is the input trace sample at time t

t is the time in seconds

Ts is the start time associated with the trace

PWR is the exponential gain function

Parameter values:	
Exponential Gain Function	: 3 dB/s
Ts	: WB

4.4.4 2D K-Notch Filter (applied to Final Full Angle Stack only)

A seismic section such as a shot gather, CMP gather or stack section is a two-dimensional array of samples representing the amplitude of the seismic signal as a function of reflection time (t) and trace position (x). Dipping events (including linear noise) which overlap in this time-offset (t?x) domain cannot often be easily separated. However, a Fourier transform can be used to convert the seismic signal to the f-k domain, that is, to a function of temporal frequency (f) and spatial frequency or wave number (k). In this domain, dipping events plot along straight lines radiating outwards from the point of zero frequency and zero wave number. Gently dipping events plot closer to the frequency (vertical) axis (horizontal events actually plot along this axis), while steeply dipping events plot closer to the wave number (horizontal) axis. Events with a positive dip (that is, where the reflection time increases as the trace position increases) have positive wave numbers and events with negative dips have negative wave numbers. The events are therefore more easily separated in the f-k domain and unwanted events such as linear noise rejected by applying a user-specified filter. The data are then inverse Fourier transformed to the t-x domain. (Note: The term dip refers only to the apparent dip of an event measured in time (ms/trace) or velocity ((ft or m)/s) and not to the actual spatial dip of the geologic structure.)

Parameter values:	
Taper	600-1000ms
Reject Noise Attenuation level	-36 dB
Low/High Wave number cut off	-0.725 to -0.62 0.62 to 0.72

4.4.5 FK Filt 3D (applied to Final Full Angle Stack only)

Coherency Enhancement Incoherent events in the input volume(t-x-y) are transformed into a plateau in the transform domain (F-Kx-Ky). The level of the plateau is proportional to the amount of noise the data contains. Zeroing samples which are lower in amplitude than the plateau produces coherency enhancement in the input volume. Thresholding is performed frequency by frequency, so that all temporal frequencies are preserved while zeroing weak wave numbers at each frequency slice. An addback feature is provided to bring back a certain percentage of the input data.

Parameter values:

Start Time Filter	4ms
End Time Filter	650
Window length	800ms
Filter type	K-Notch Filter

4.4.6 Time Variant Filter (applied to Final Full Angle Stack only)

A zero-phase TVF (Time Variant Filter) was applied to the data. The filter pass bands were described by low- and high-cut frequencies and associated dB/octave cut off slopes. The specified cut off frequencies are located at the half-power (-3 dB in amplitude) response points and the slopes at these frequencies are equal to the respective dB/octave values. The slope is an approximate cosine squared function in the amplitude domain. The filters were normalized so that the output amplitudes were the same as the input amplitudes for frequency components within the pass band.

Parameter values:

Filter Centre Time (ms)	Low-cut Frequency (Hz)	Low-cut Slope (dB/octave)	High-cut Frequency (Hz)	High-cut Slope (dB/octave)
0	10	12	80	54
1250	8	12	80	54
2500	6	12	60	46
4000	4	12	50	42
5000	4	12	40	42

4.4.7 Post stack Scaling (Only on Full Angle stack 05-42deg)

User-specified time windows were used to derive and apply scale factors to each data sample. These multipliers were calculated by centreing the window over a sample, taking the average absolute amplitude of the window, defining a multiplier to make this average 0.9 times the desired output rms amplitude and applying it to the sample. The window centre was then moved down one sample and a new multiplier calculated and applied. In this way, multipliers were computed and applied to each sample from the first window application point to the last window application point.

Parameter values:

AGC Window Length	800ms

4.4.8 SEG-Y 3D Stack Archives

Five angle stacks volume were archived to 3590E media.

- Raw Full Angle stack (05-42deg)
- Final Full Angle stack (05-42deg), with 2D K-Notch filter, FK 3D Filt, TVF & Scaling
- Raw Angle stack (00-15deg)
- Raw Angle stack (15-25deg)
- Raw Angle stack (25-35deg)
- Raw Angle stack (35-45deg)

5.0 Parameter Testing

Extensive parameter testing was performed on the Champion, Hercules, Casino and Antares data prior to the production processing

Test lines from all surveys were covering various water depths, weather condition and opposite shooting directions.

Test Lines were:

- Champion survey 1040P, 1408P & 1088A
- Casino survey 1925P, 2237P
- Antares survey 1252P

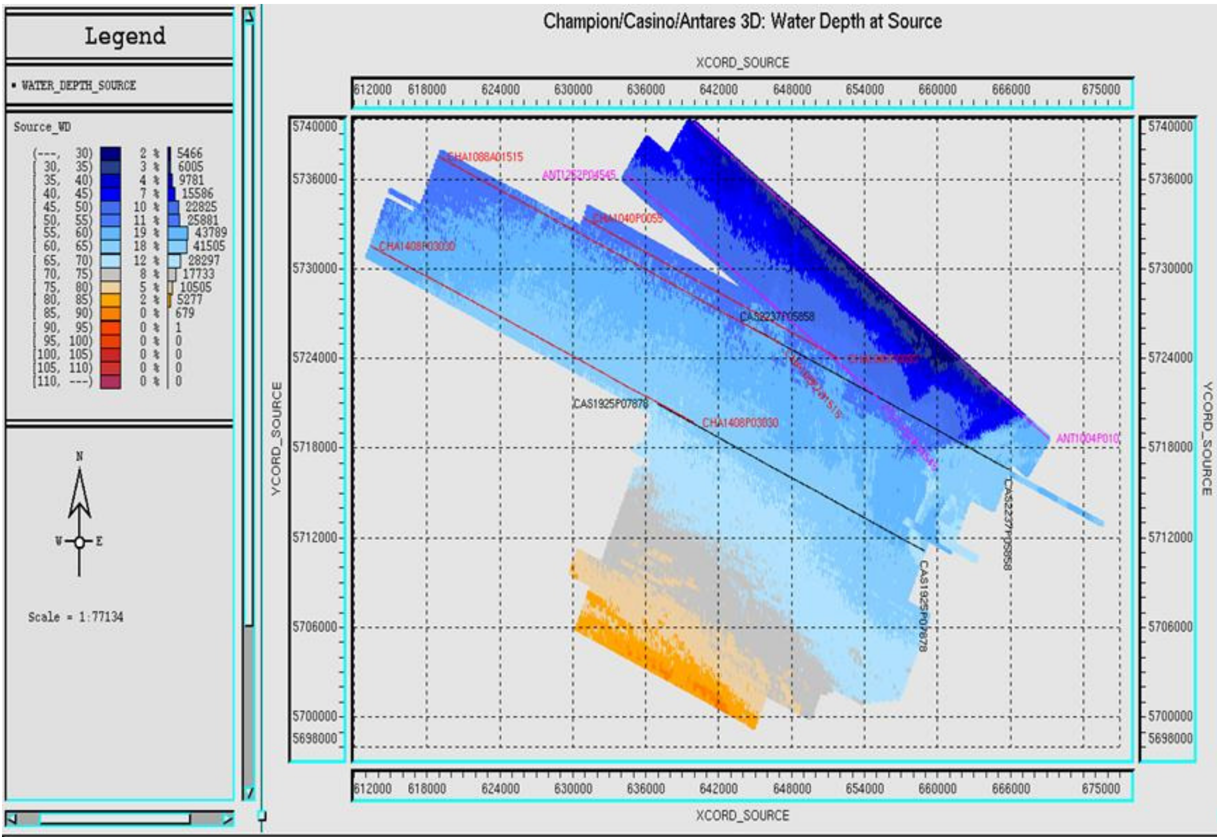


Figure 41: Surveys Test lines location

5.1 Deterministic Debubble and Zero Phasing

The conversion to minimum phase of the source signature embedded within the seismic dataset is often a prerequisite to the application of spiking or predictive deconvolution. Alternatively, converting the source signature to zero phase can be performed as the first stage in the process of converting the recorded seismic data to zero phase, particularly when long-gapped or no predictive deconvolution is being applied. The objective of this process is to obtain an operator that will convert the recorded or modelled far field source signature to its' minimum- or zero-phase equivalent, or to another target wavelet.

In the conventional marine acquisition case, the far field source signature is assumed to be an accurate measure of the down-going source wavelet produced by the airgun array. The source signature can be determined either by measuring the far-field airgun response, or by generating a synthetic signature using known source and array parameters; however, by the time the seismic signal is recorded, the source wavelet has undergone phase and amplitude distortions. Some contributing factors to the distortion of the source wavelet are:

- Source and receiver ghosting
- Earth attenuation, Q
- Hydrophone impulse response
- Recording instrument impulse response

Often, supplied far field source signatures have a number of the above components 'built-in'. If, however, these components have not been applied but are known or can be determined, then it is possible to apply them to the signature during the signature deconvolution procedure. Commonly, the earth attenuation, Q, is not compensated for during deterministic signature deconvolution as it is time variant in nature. Processes applied later in the processing sequence, such as predictive deconvolution and inverse Q compensation, may be designed to accommodate for this.

An additional process that may be included in the deterministic signature deconvolution procedure is the removal of the airgun bubble pulse. Dependent on the airgun array parameters, the bubble pulse may be observed at some lag-time away from the main energy of the source signature (usually of the order of 100 ms). The bubble pulse has the effect of introducing a 'ripple' in the low frequencies of the source signature's amplitude spectrum. The application of a 'gapped' deconvolution (using predictive distances of the order of 30 ms to 60 ms) to the conditioned signature has the effect of removing the bubble pulse energy without altering the main energy of the signature, and in turn a smoother amplitude spectrum is achieved.

Where the seismic data has had its sampling interval changed from its recorded interval, the conditioned signature is also re-sampled to the same interval using the same re-sampling parameters. Likewise, any other wavelet shaping processes that have been applied to the seismic data are also applied to the conditioned signature.

Having conditioned the recorded or modelled far field source, the resultant wavelet is assumed to be a reasonable measure of the wavelet contained within the near offset, shallow seismic data. Knowing the desired output target wavelet (minimum or zero phase equivalent or some other target wavelet), an operator is derived that will convert the conditioned signature to the appropriate target wavelet. This operator is then applied to the recorded seismic data.

For this project there were 3 different acquisition configurations used with the main differences given in the following table.

	Antares	Casino	Champion and Hercules
Source array	3147cu.in. Bolt airgun array operating at 2000psi	3063cu.in. Bolt airgun array operating at 2000psi	2500cu.in. Bolt airgun array operating at 1800psi
Source depth	6m	6m	7m
Nominal cable depth	7.5m	7m & 9.5m	8m & 9m
Recording system	Syntrak	Triacq	MSX
Recording filters	2/12-206/264	3/18-200/406	3/12-206/276

For the deterministic modelling work far field signatures were supplied for each of the surveys (see Figure 41). These raw signatures are included in Section 8 – Appendices.

Despite the range of nominal and actual streamer depths observed it was agreed that for each of the three surveys the modelling work would assume an 8m streamer ghost. Each of the three signatures were passed through the modelling process to derive both debubble and de-phasing operators. The three pairs of operators were combined and resulted in the three operators applied to the production data. These operators are listed in Section 8.

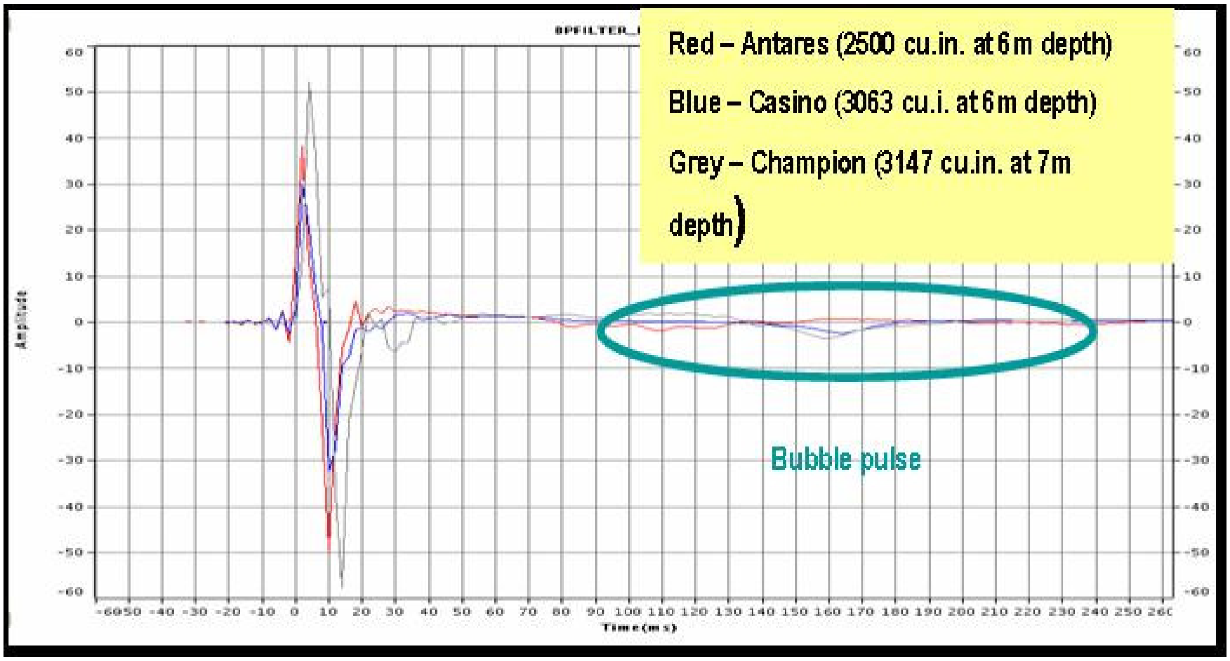


Figure 42: **Modelled source signatures for the Antares, Casino and Champion surveys**

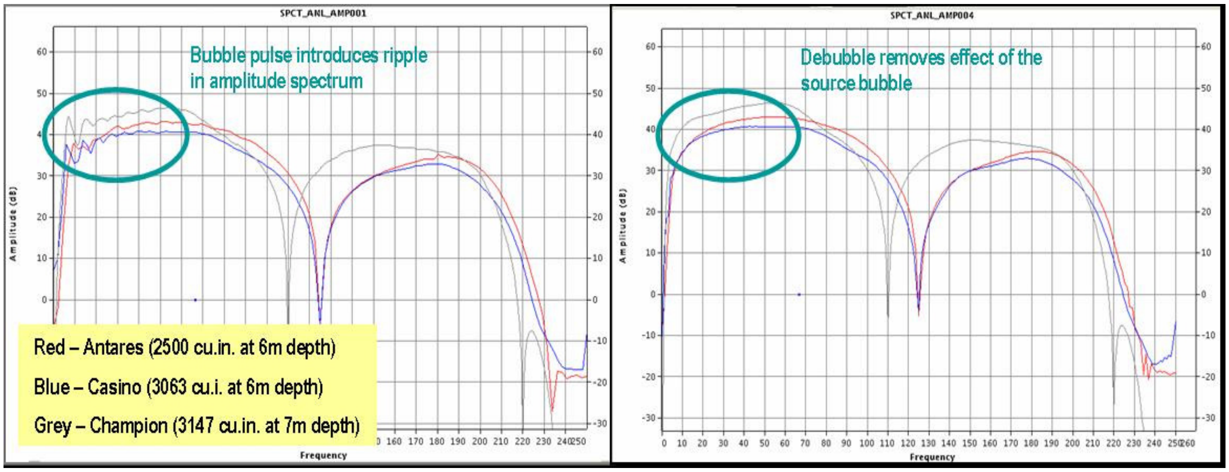


Figure 43: **The Debubble operator and its effect on the amplitude spectra of the signatures**

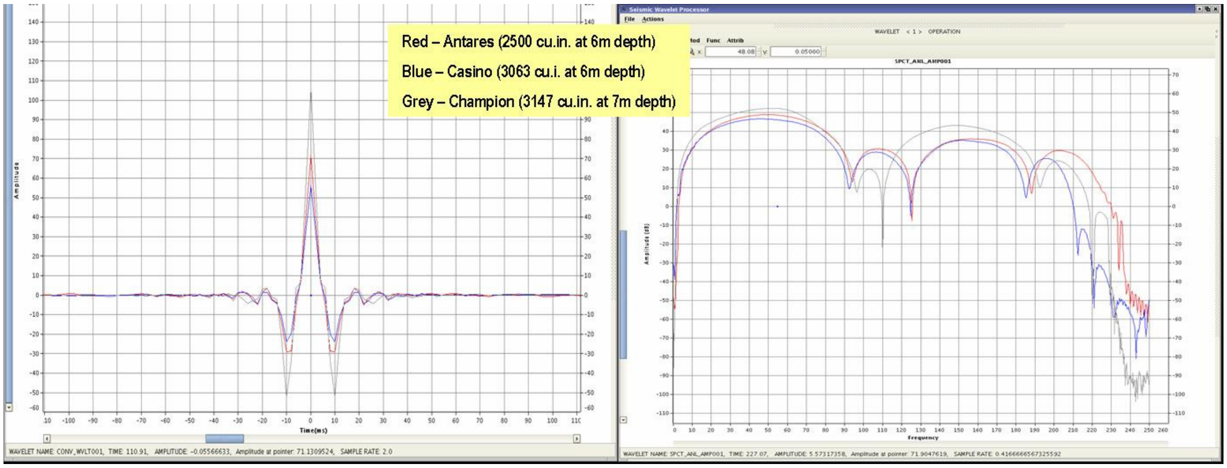


Figure 44: **Signature Deconvolution, Wavelet shape & Amplitude Spectra**

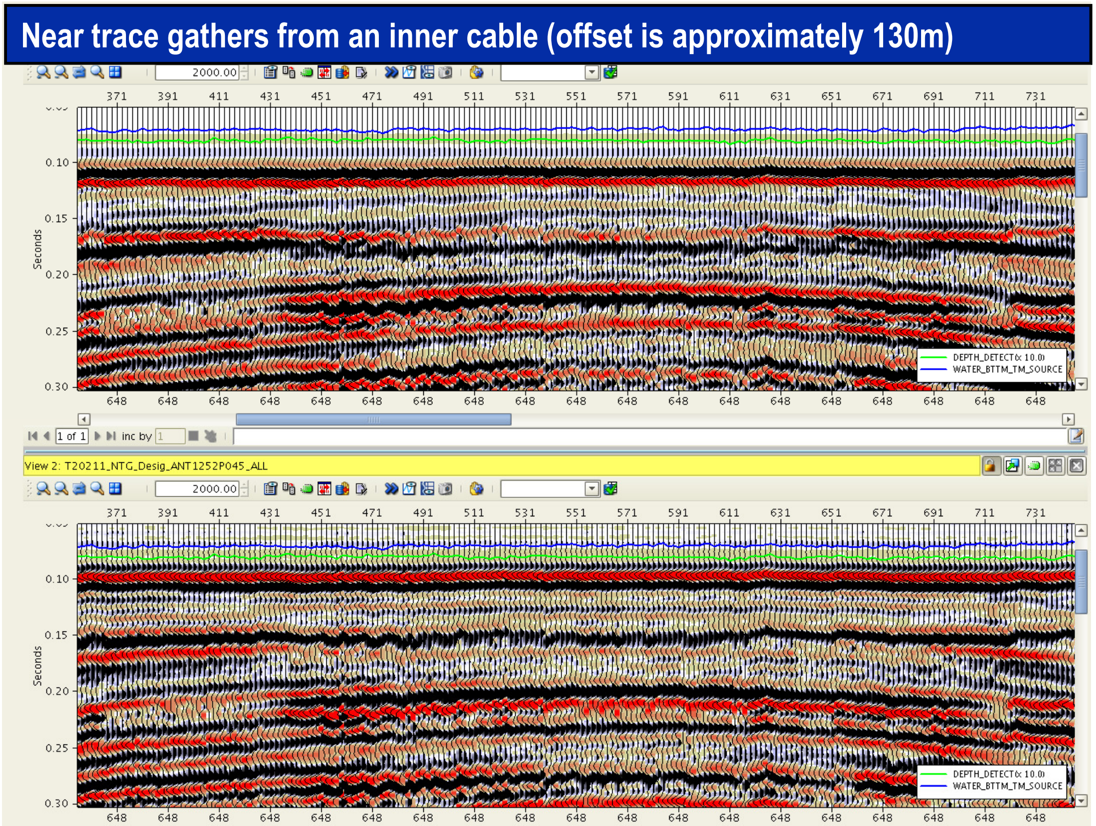


Figure 45: **Near traces from Antares before and after combined Debubble and De-phasing. Polarity of input data is unchanged**

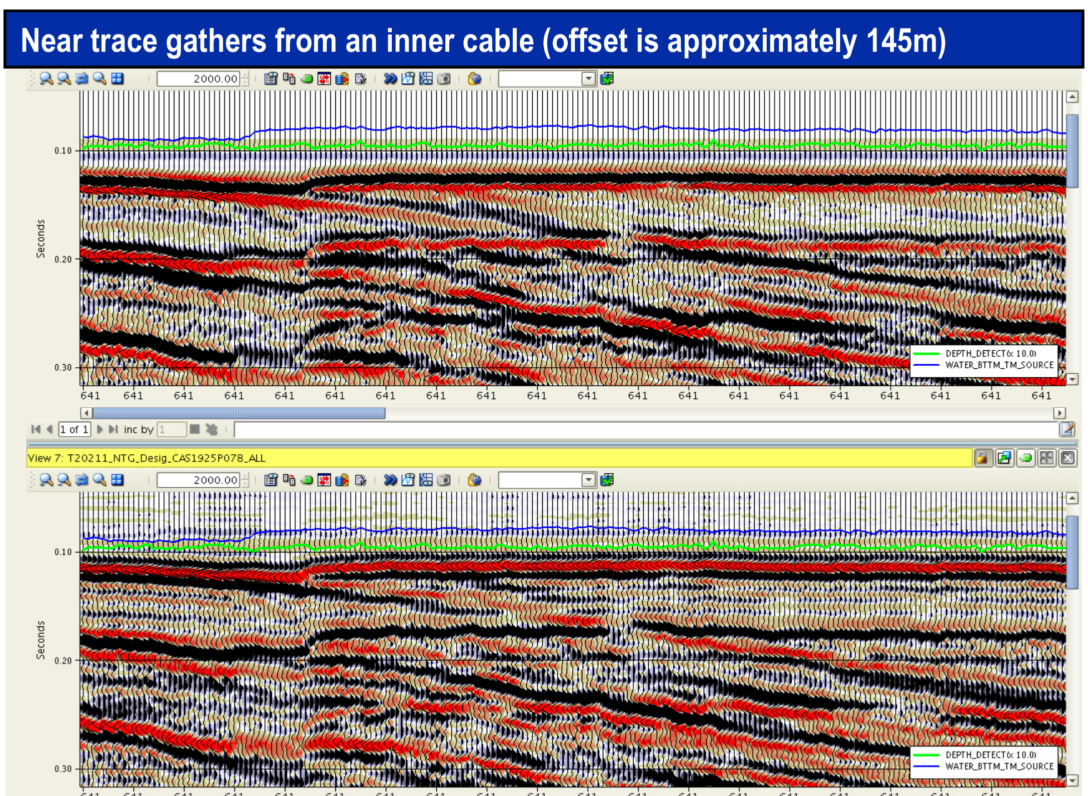


Figure 46: **Near traces from Casino before and after combined Debubble and De-phasing. Polarity of input data is unchanged**

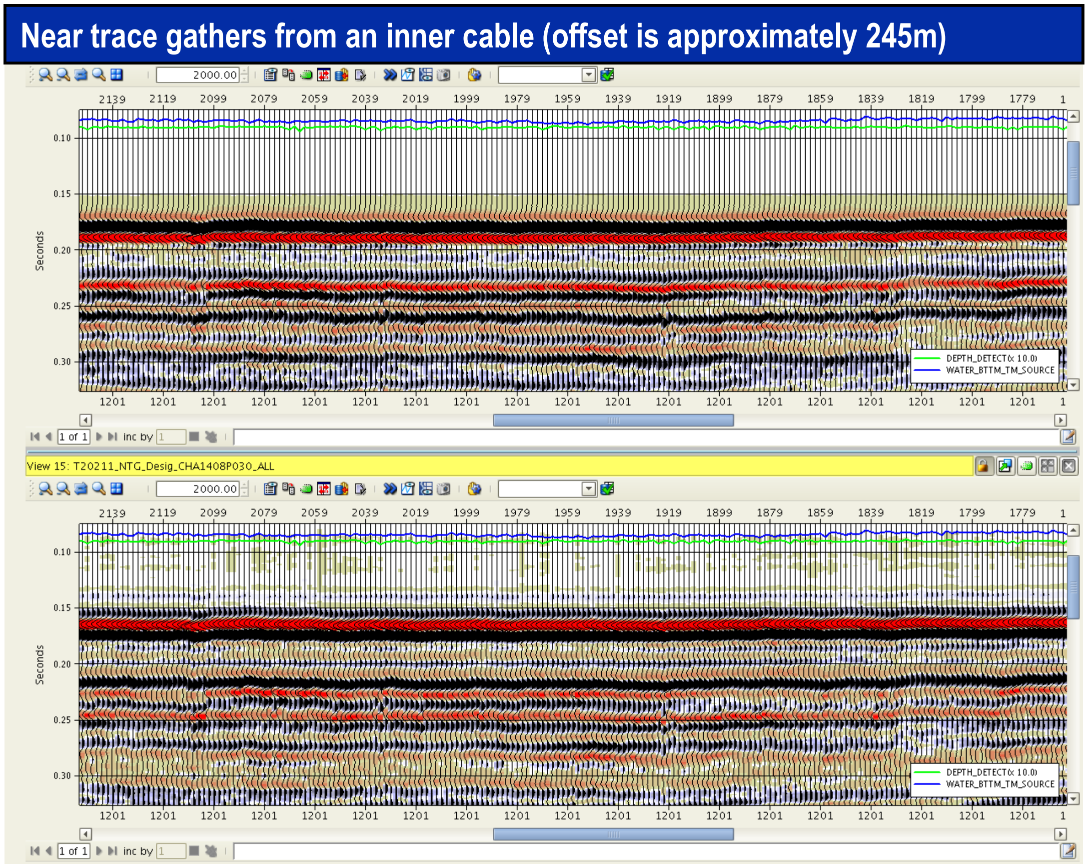


Figure 47: **Near traces from Champion before and after combined Debubble and De-phasing. Polarity of input data is unchanged**

Decision:	
11/07/07	Application of a combined debubble and Zero-Phase designature for each survey

5.2 Low Cut Filter

A series of zero-phase low-cut filters and slopes were tested for subsequent application after Designature. The following filters were tested:

- 2Hz 12dB/Oct
- 2Hz 18dB/Oct
- 2Hz 24dB/Oct
- 3Hz 12dB/Oct
- 3Hz 18dB/Oct

Decision:	
11/07/07	Apply 3hz 18dB/Oct Low-cut filter (zero phase)

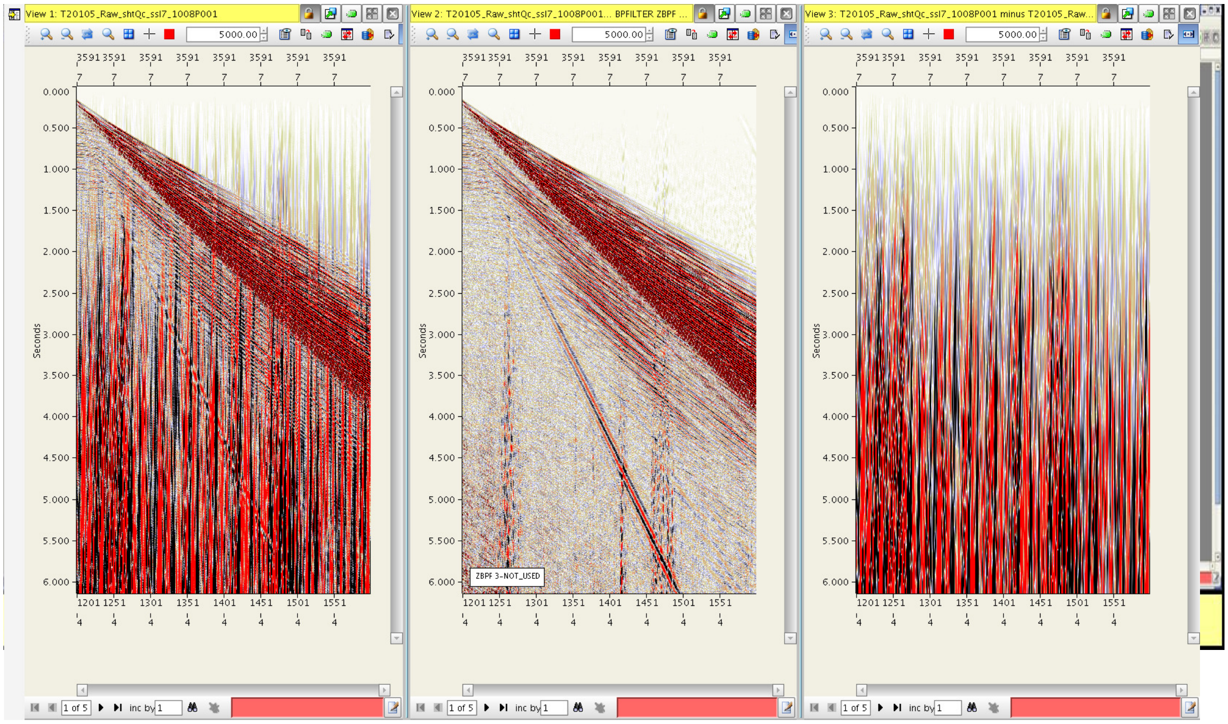


Figure 48: Shot gather, before and after 3Hz 18dB/Oct Low cut filter and noise removed

5.3 FK Dip Filter & Swell Noise Attenuation (SWATT)

Variable strengths of swell noise were present on data and mud roll (low energy velocity) were observed on some lines.

Decision:

11/07/07 A mild FK +14ms/tr to +22ms/tr (4ms/tr taper)
1st pass : Shot domain
Max. freq. to attenuate : 20Hz
Time windows (0ms to max data length) : 800ms (160ms overlap)
Spatial windows : 41 traces
2nd pass : Receiver domain
Wrap-around NMO using single velocity function derived from regional field
Max. freq. to attenuate : 10Hz
Time windows (0ms to max data length) : 800ms (160ms overlap)
Spatial windows : 21 traces

5.4 Linear Noise Attenuation

Parameters outlined below:

- LNA to be applied in shot domain following SWATT process and k-filtering
- The noise is modelled using a hi-res Tau-p linear transform, and symmetrical taup mutes have been derived from the primary velocity field.
- Mute is a Tau-p projection of primary hyperbola at approximate 65 degree incidence angle, limited to maximum linear velocity of 3500m/s.
- The mute is tapered and applied symmetrically about p=0 .
- Inverse transformed noise model is subtracted from data. Application is tapered on over 200ms from water bottom time at 350m to protect shallow events.

Decision:

11/07/07 Application of Linear Noise Attenuation as recommended above.

Figure 49: Tau-P LNA velocity mute, 3500m/sec, 4500m/sec

5.5 Deterministic Water Layer Demultiple(DWD) & Surface Multiple Prediction and Adaptive Substraction(SRME)

Demultiple testing focused initially on test line CHA1088A Seq 015 and testing was run on both an inner and outer cable to assess the performance of the demultiple with the extremes of near group offset:

- Minimum crossline offset subsurface line (10), ~230m near offset.
- Maximum crossline offset subsurface line (02), ~440m near offset.

The conclusions made were:

- DWD is effective for both inner and outer subsurface lines, removing most multiple energy
- SRME is fairly effective at attenuating remaining surface multiples, though these are weak compared to the water layer multiples
- SRME iteration gives minor uplift
- SRME performs similarly on inner and outer subsurface lines

Further confirmation was given by repeating the final tests on other lines from the Casino and Antares surveys

Decision:	
30/07/07	Application of DWD and double iteration of 2D SRME.

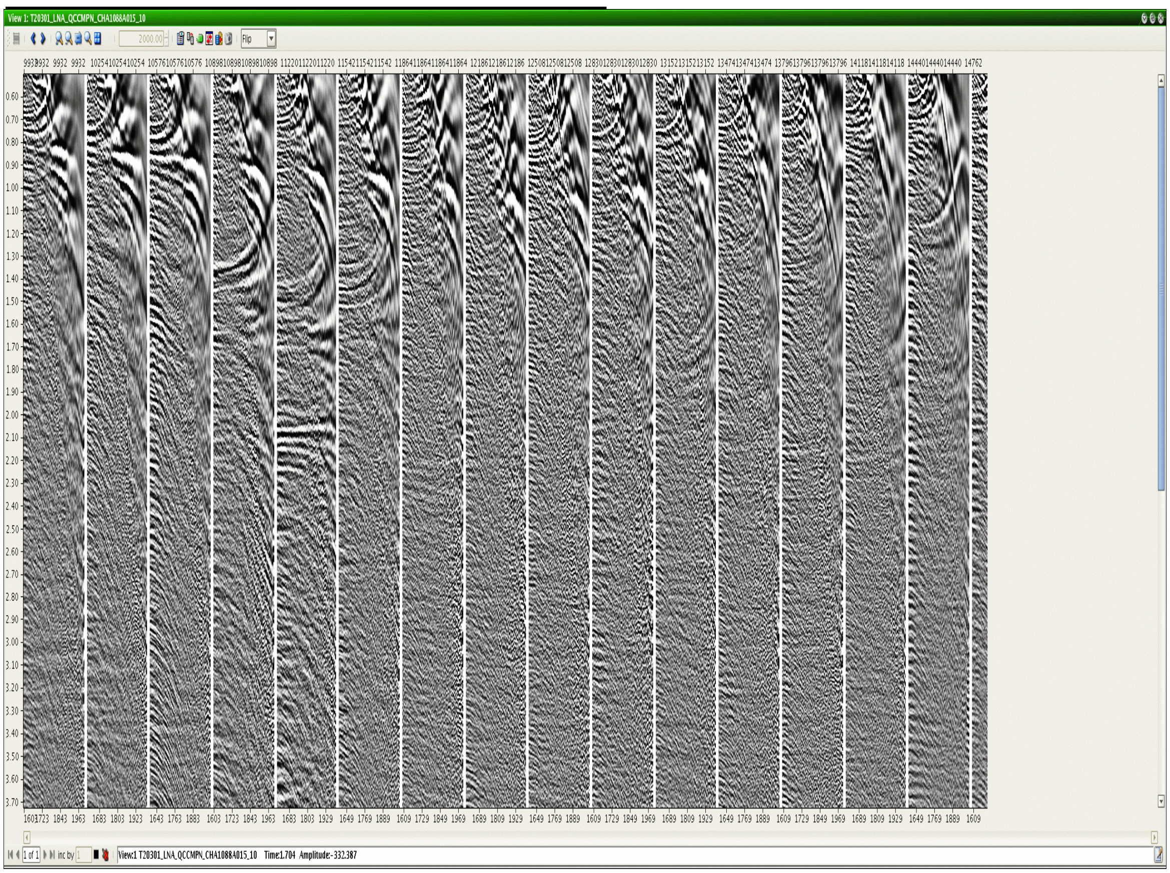


Figure 50: Line CHA1088A015_10, CMP gathers after LNA

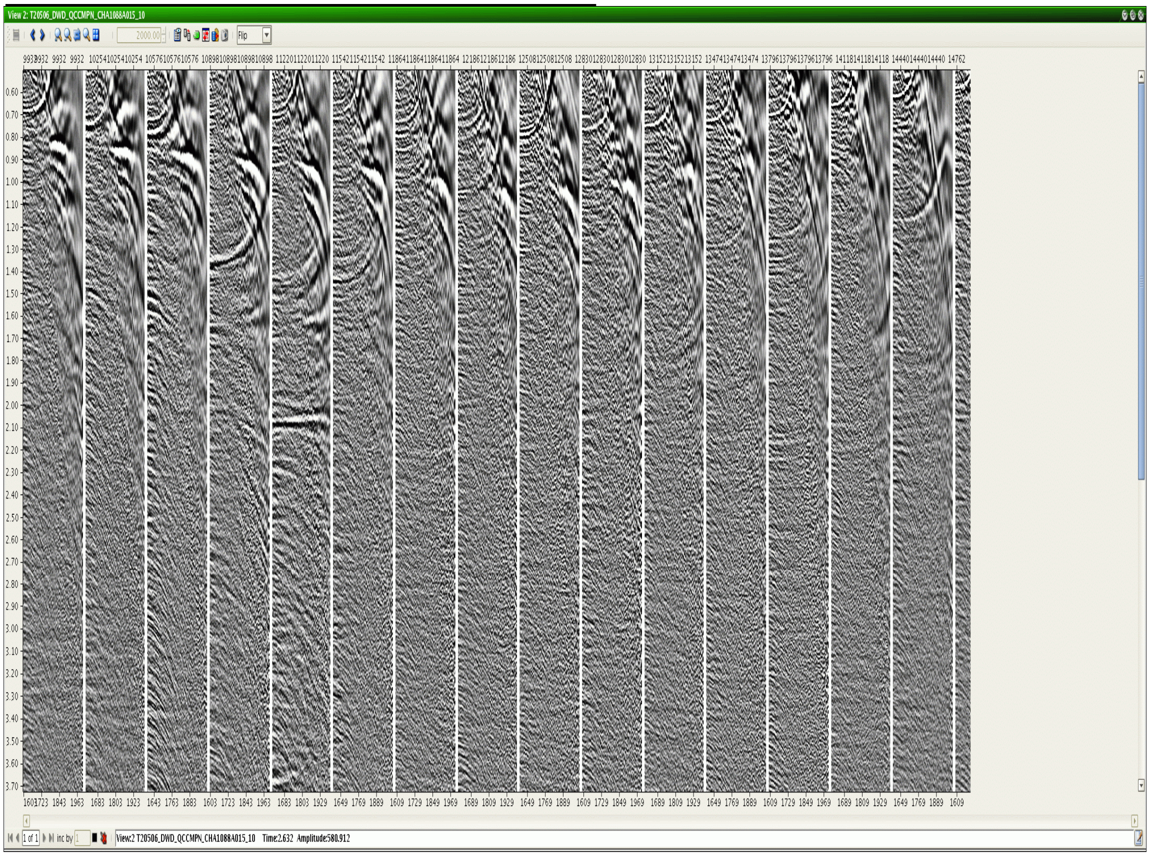


Figure 51: **Line CHA1088A015_10, after LNA and DWD**

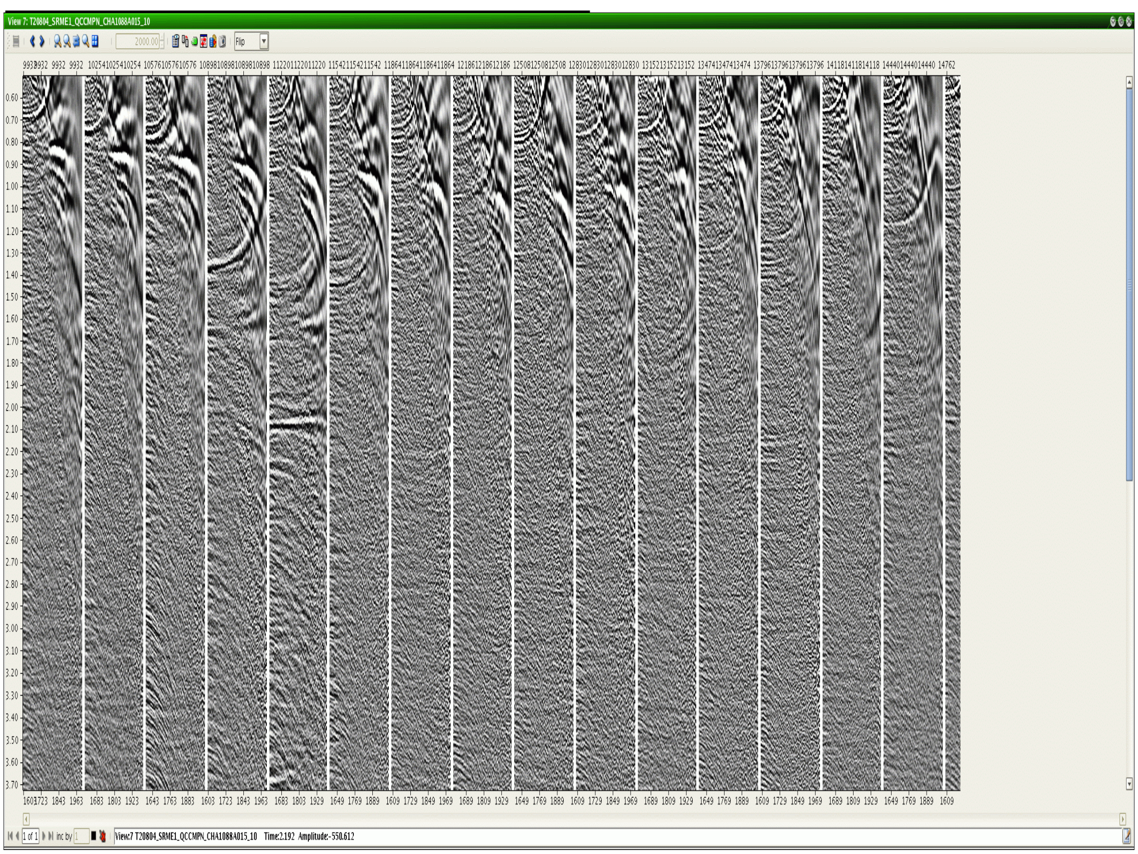


Figure 52: **Line CHA1088A015_10, after LNA, DWD and 1 iteration of 2D SRME**

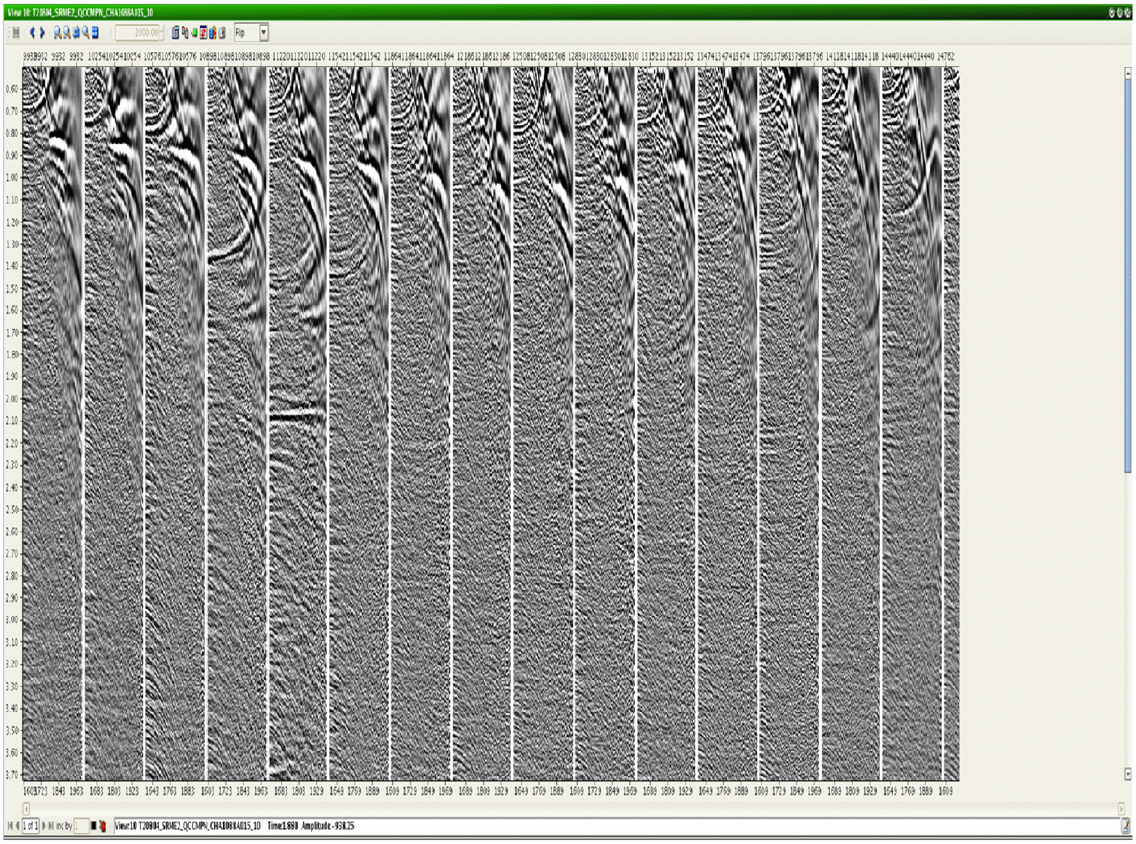


Figure 53: Line CHA1088A015_10, after LNA, DWD and 2 iterations of 2D SRME

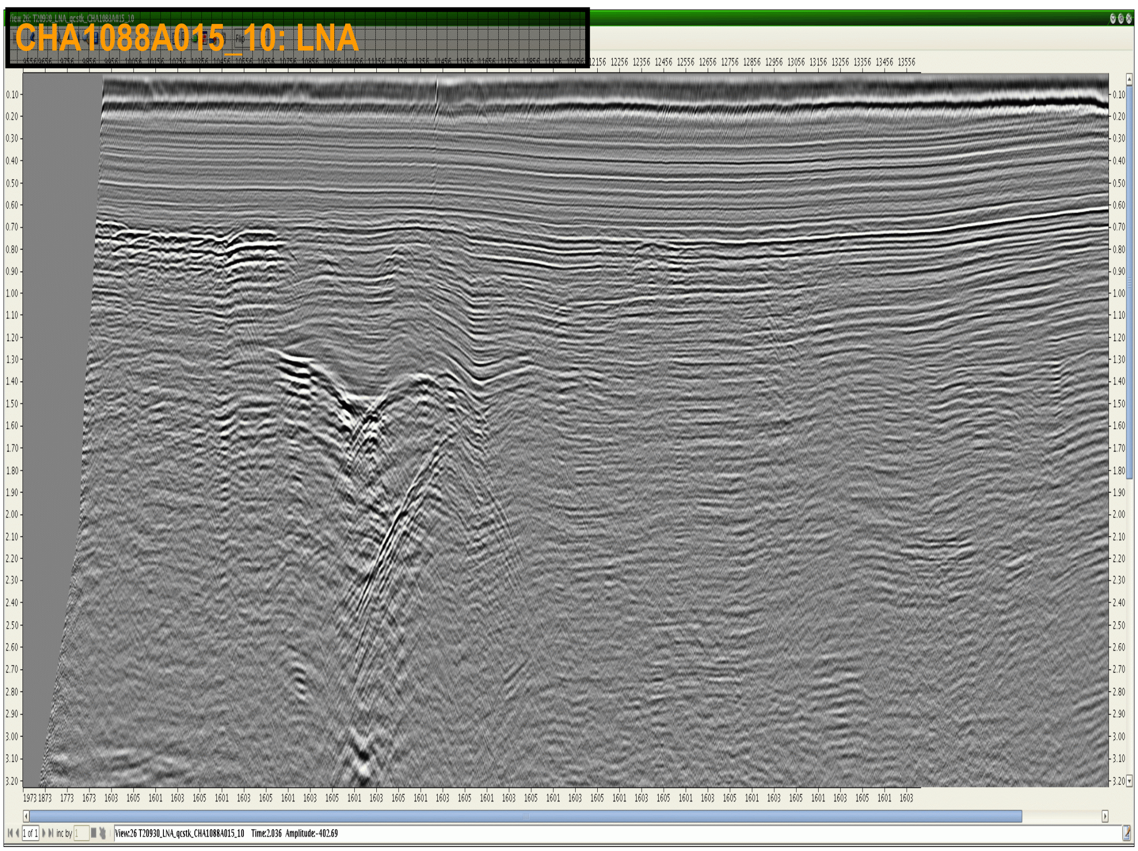


Figure 54: Line CHA1088A015_10, CMP stack after LNA

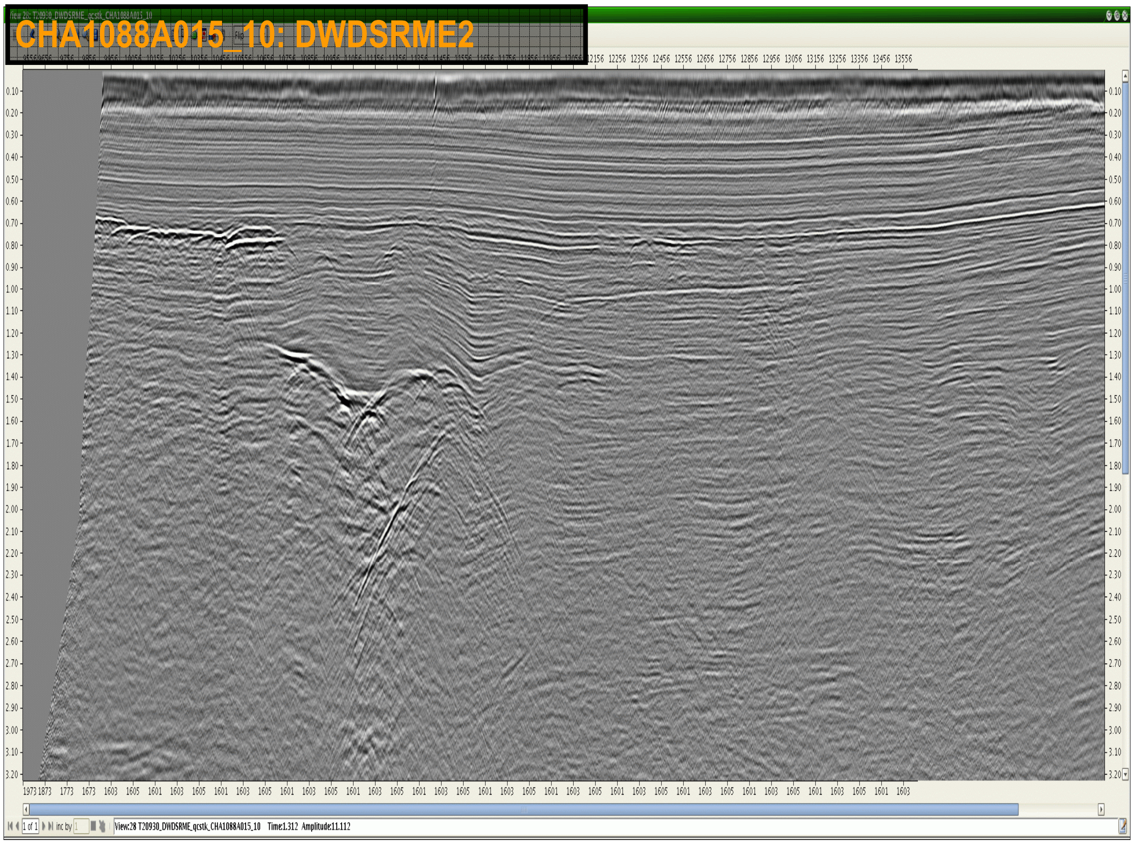


Figure 55: **Line CHA1088A015_10, after LNA, DWD and 2 iterations of 2D SRME**

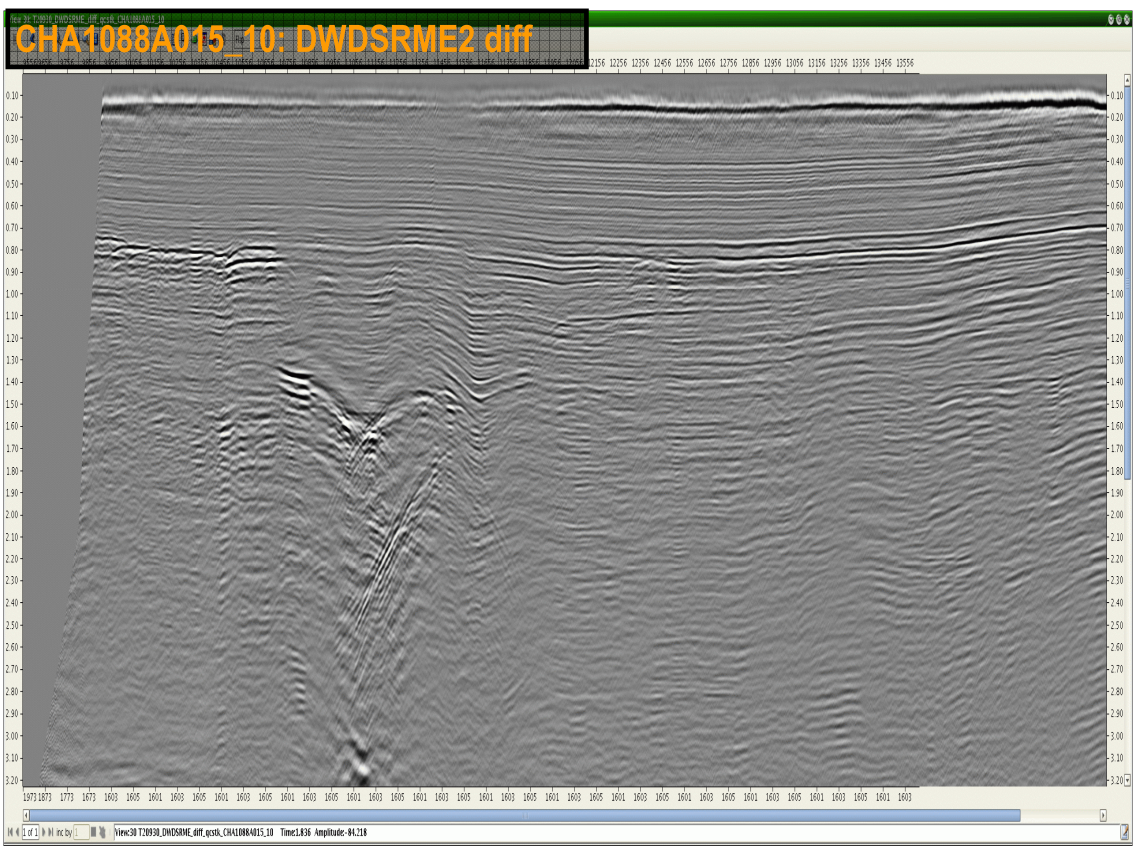


Figure 56: **Line CHA1088A015_10, difference section showing multiple attenuated**

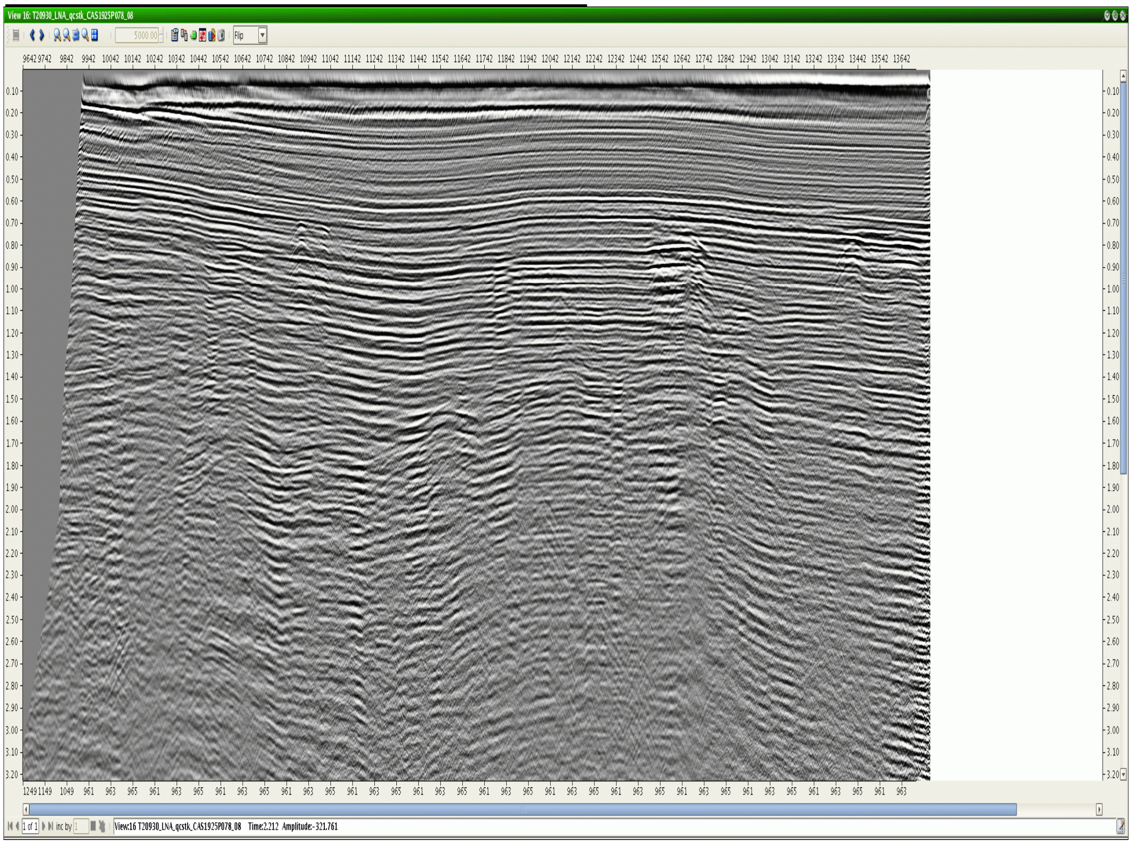


Figure 57: **Line CAS1925P078_08, CMP stack after LNA**

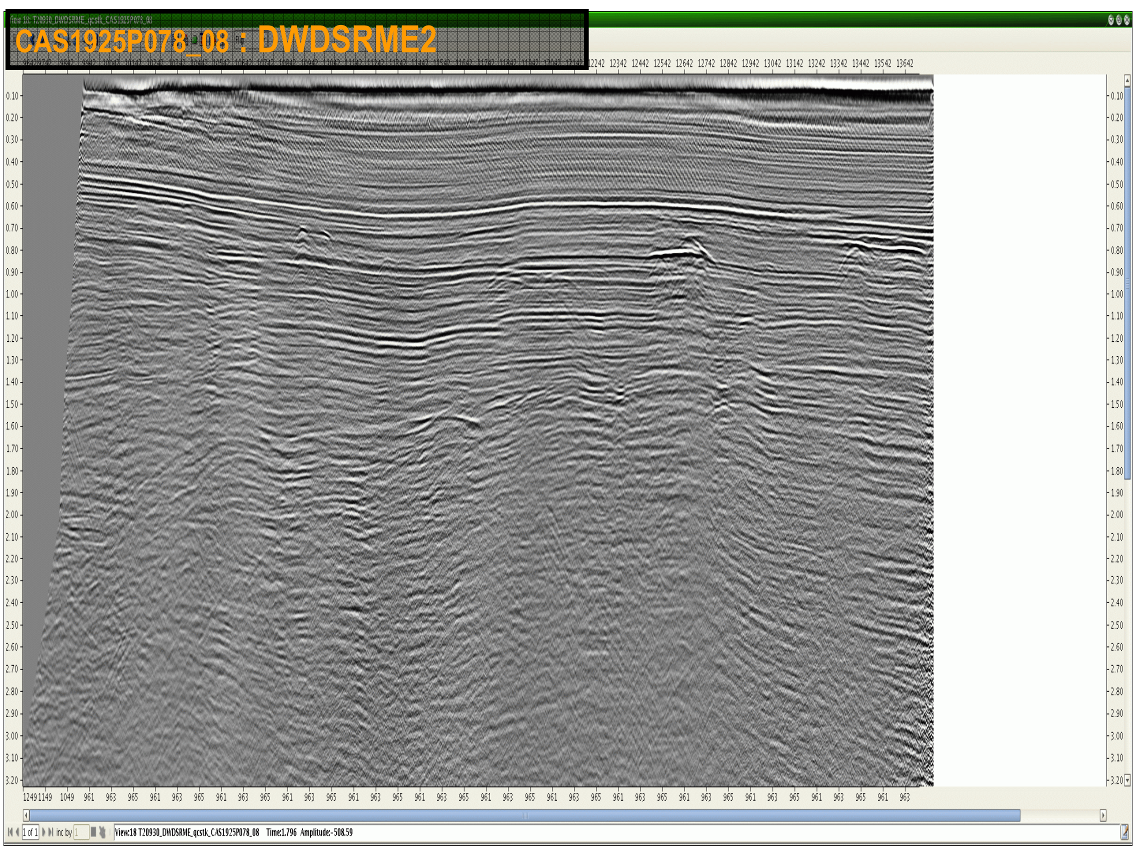


Figure 58: **Line CAS1925P078_08, after LNA, DWD and 2 iterations of 2D SRME**

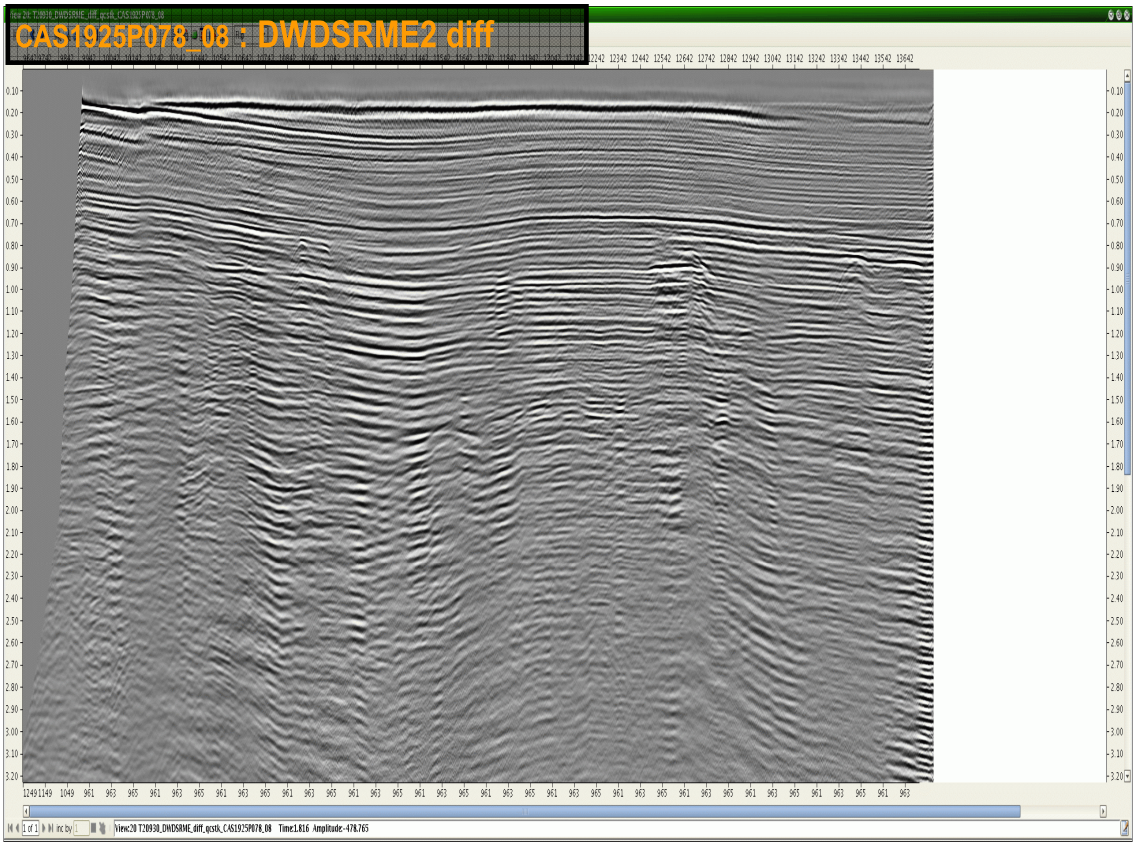


Figure 59: **Line CAS1925P078_08, difference section showing multiple attenuated**

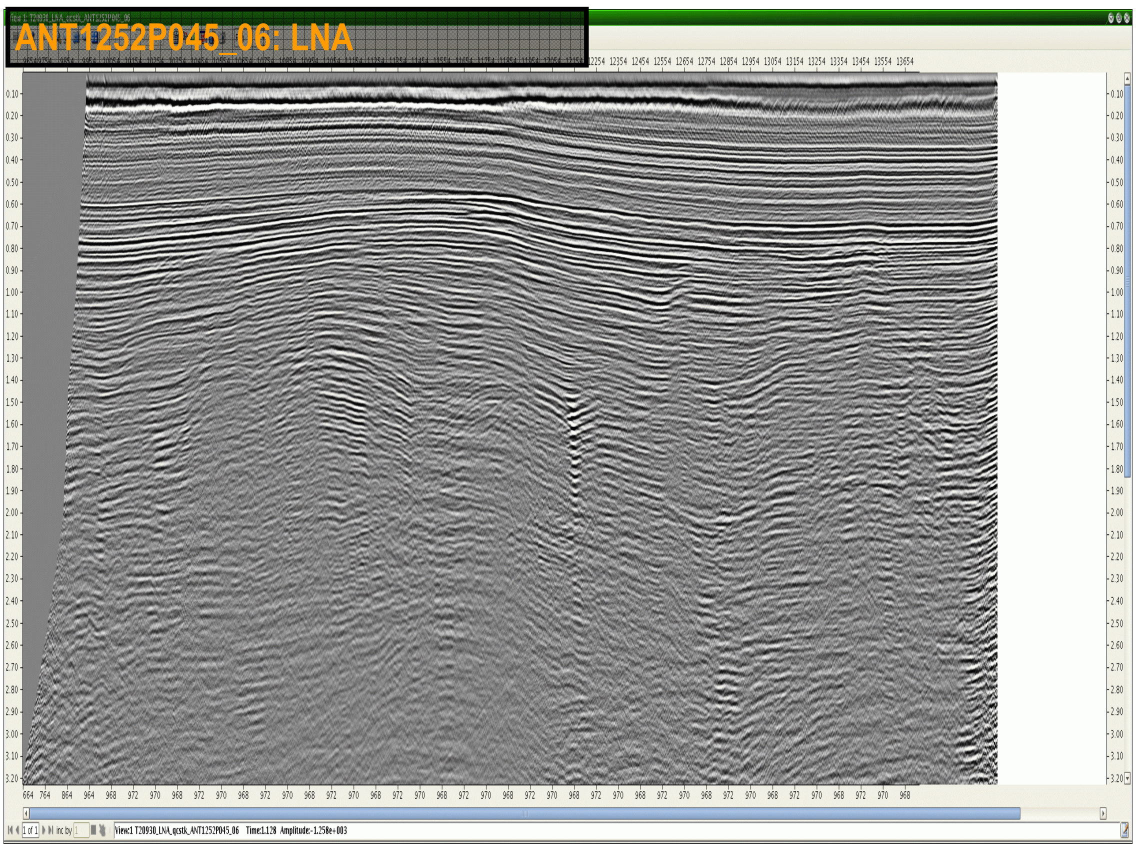


Figure 60: **Line ANT1252P045_06, CMP stack after LNA**

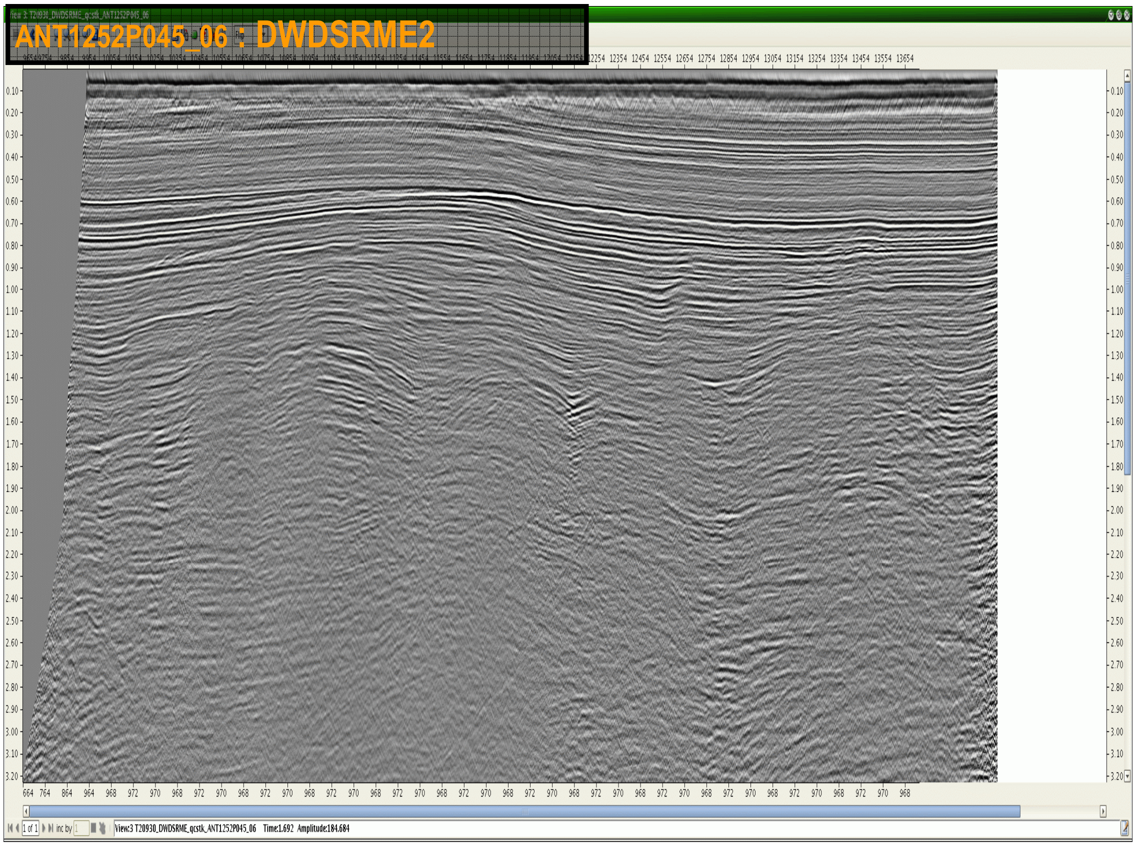


Figure 61: Line ANT1252P045_06, CMP stack after LNA, DWD and 2 iter. of 2D SRME

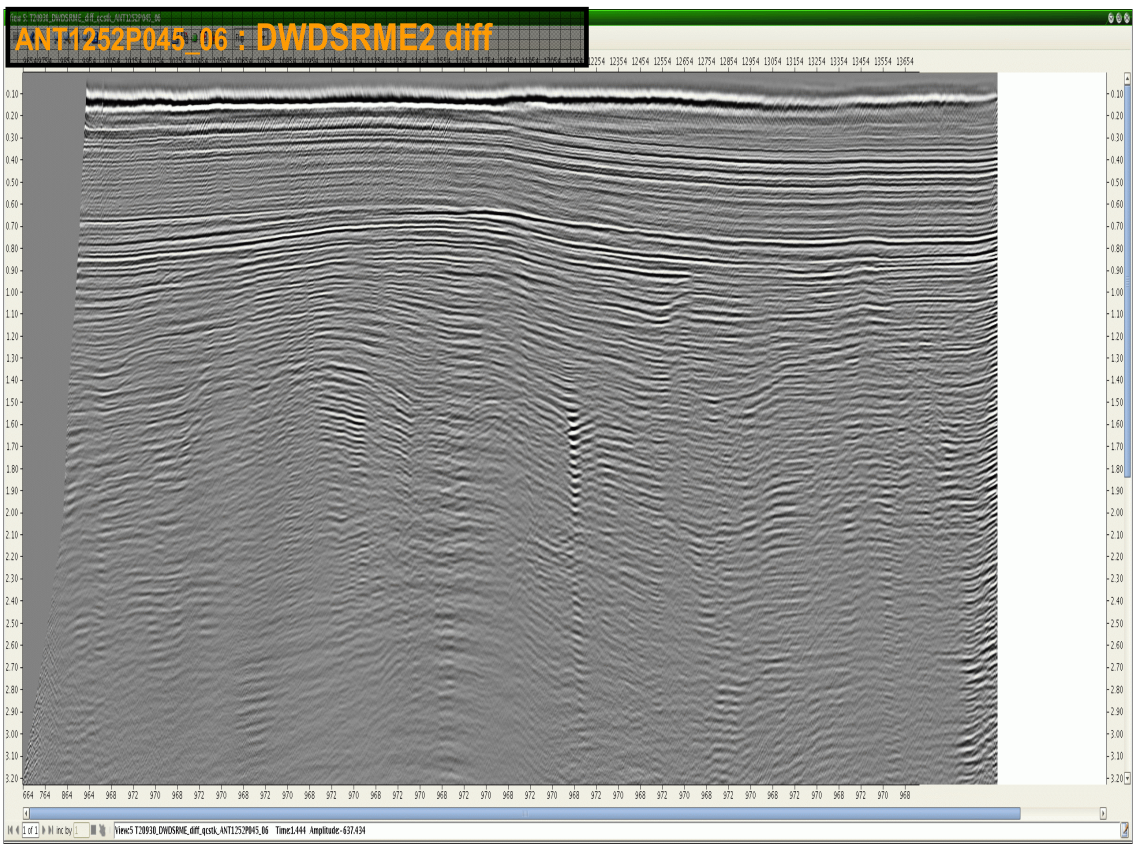


Figure 62: Line ANT1252P045_06, difference section showing multiple attenuated

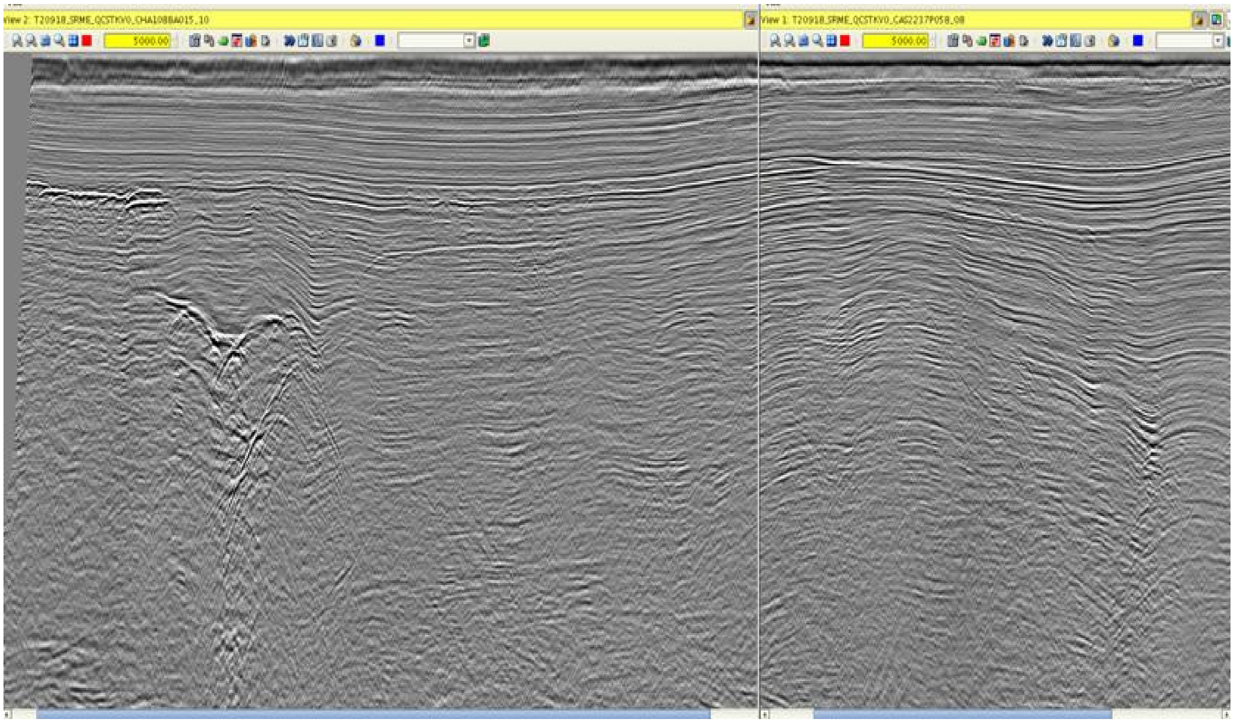


Figure 63: CHA1088A015 & CAS2237P058, DWD/SRME approximate merge

5.6 Tau-p Deconvolution

Tau-P Deconvolution was tested after DWD+SRME and was applied to target Residual Surface and/or Inter-bed Multiples. The approach tested looked at multiples generated from horizons for Casino supplied by Santos (Mepunga, Dwilyn and Base Dwilyn). Testing was restricted to Casino Test Line 2237P only.
A summary of the testing conducted is:

- 60ms gap & 240ms operator; Design window WB to WB+3000ms
- 60ms gap & 240ms operator; Design window Mepunga to Mepunga +2000ms
- 60ms gap & 240ms operator; Design window Dilwyn to Dilwyn +2000ms
- 60ms gap & 240ms operator; Design window Base Dilywn to Base Dilwyn +2000ms

The Tau-p deconvolution showed some improvement in multiple attenuation when compared to the DWD+SRME data, but primary signal was also attenuated to some extent. Recommendation was not to apply Tau-P Deconvolution.

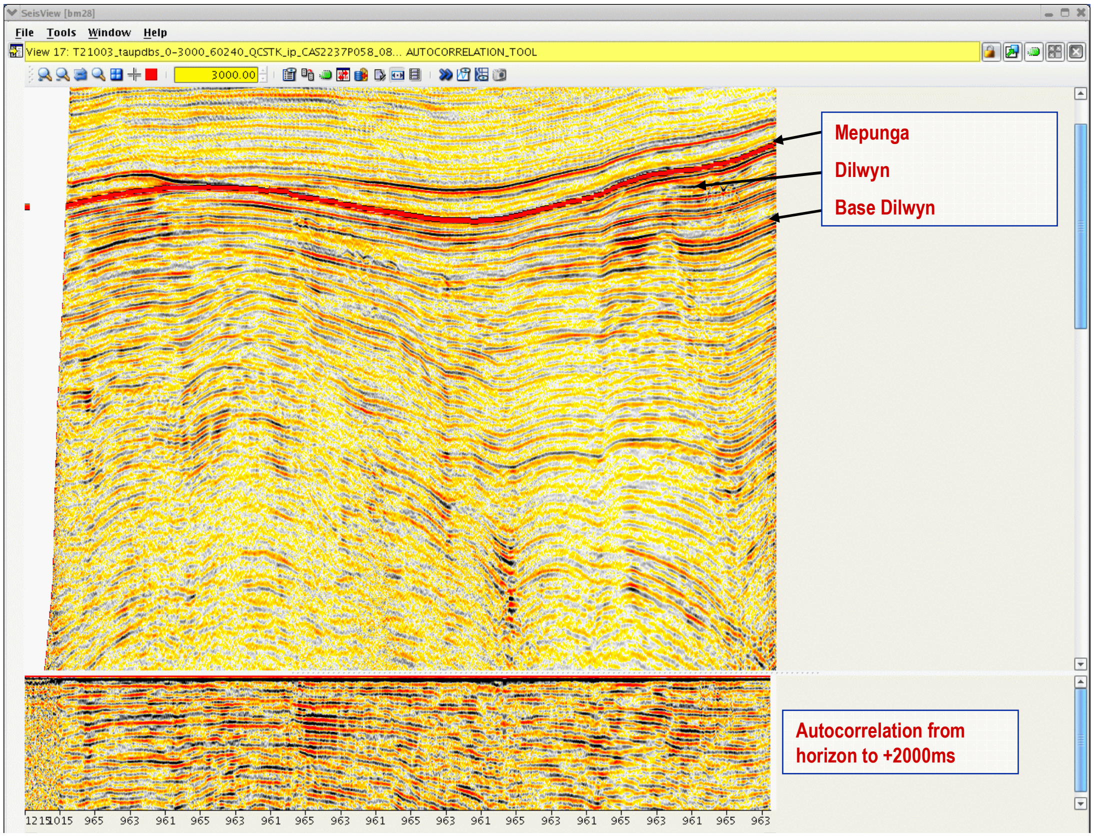


Figure 64: CAS2237P058, Stack after DWD/SRME

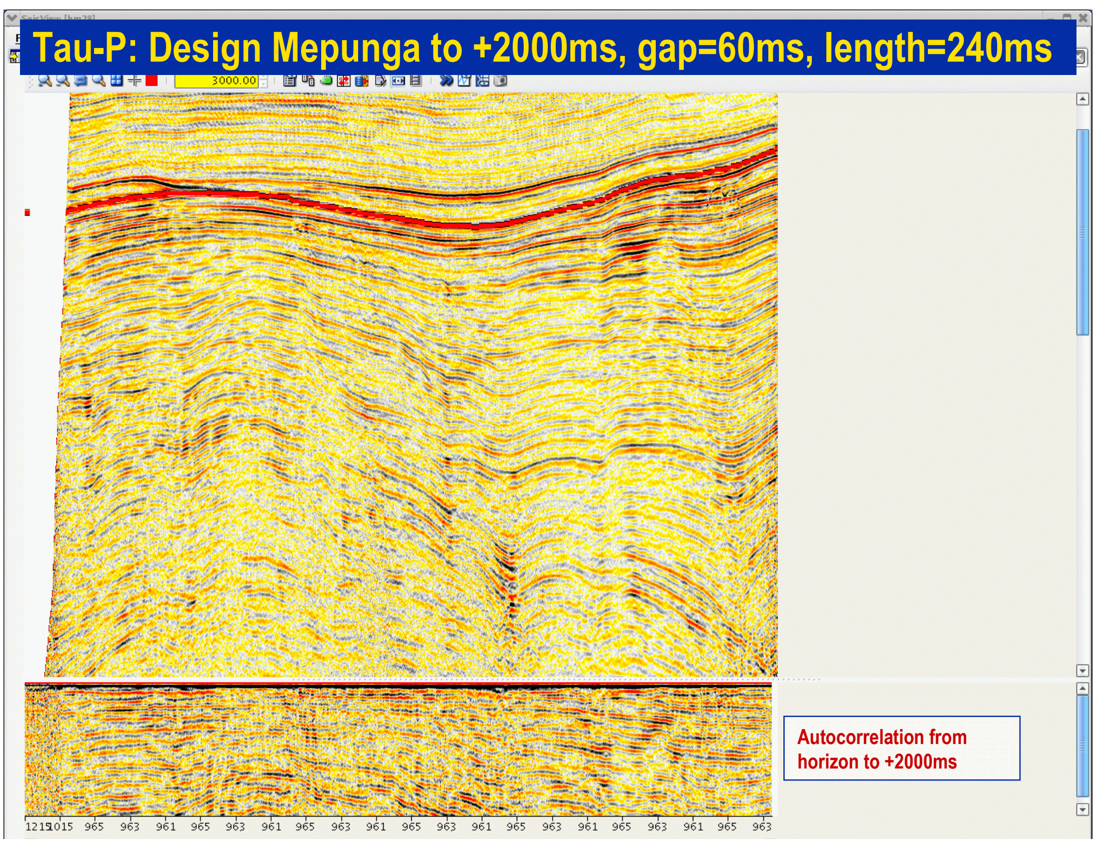


Figure 65: CAS2237P058, with Tau-p DBS from Mepunga horizon

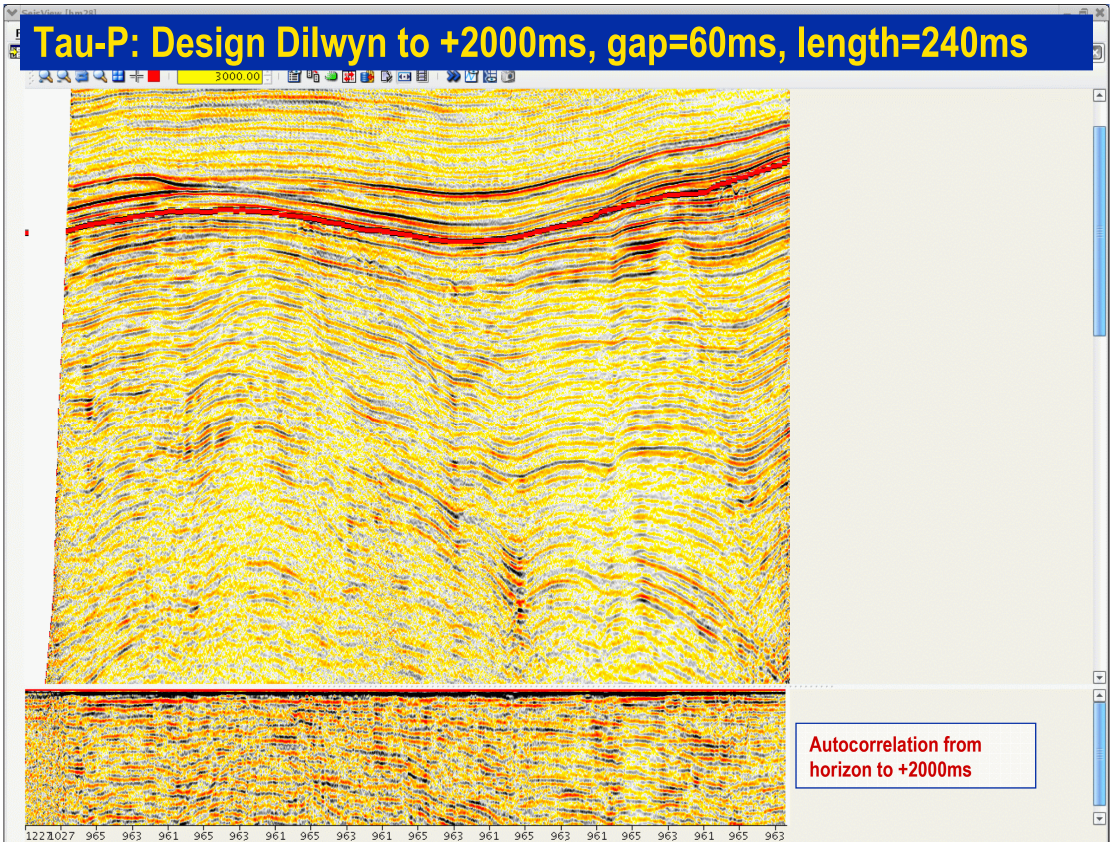


Figure 66: **CAS2237P058, with Tau-p DBS from Dilwyn horizon**

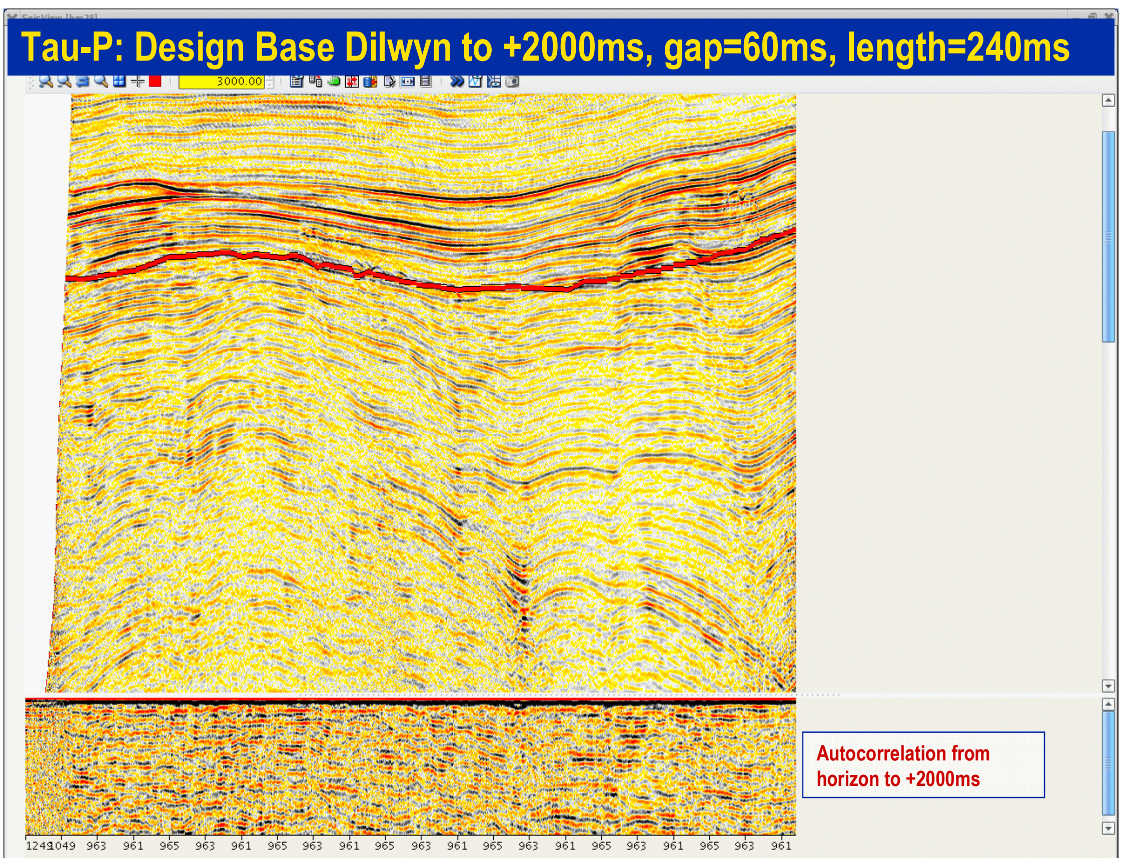


Figure 67: **CAS2237P058, with Tau-p DBS from Base Dilwyn horizon**

5.7 Weighted Least Squares Radon Demultiple

Testing of Radon Demultiple was combined with SRME testing to provide an overall multiple attenuation work flow. Due to aliasing of residual multiple tails post-LNA, it was recommended to perform a 3:1 shot interpolation prior to Radon Demultiple, effectively reducing trace spacing. All radon testing was performed using picked 1st-pass velocities.

Testing was performed on six test lines covering the four survey areas. Tests looked at varying the percentage velocity mute along with the maximum moveout.

Conclusions from the testing were:

- Weighted Least Squares Radon Demultiple is powerful in attenuating the faster multiples with little evidence that primary energy is being harmed
- A combination of a reasonably safe max signal moveout and a slow velocity mute provide good primary protection which is essential at this stage due to the use of the first-pass velocity field to apply NMO prior to the demultiple
- An additional pass of Radon demultiple is planned for later in the processing sequence following the Pre-Stack Time Migration

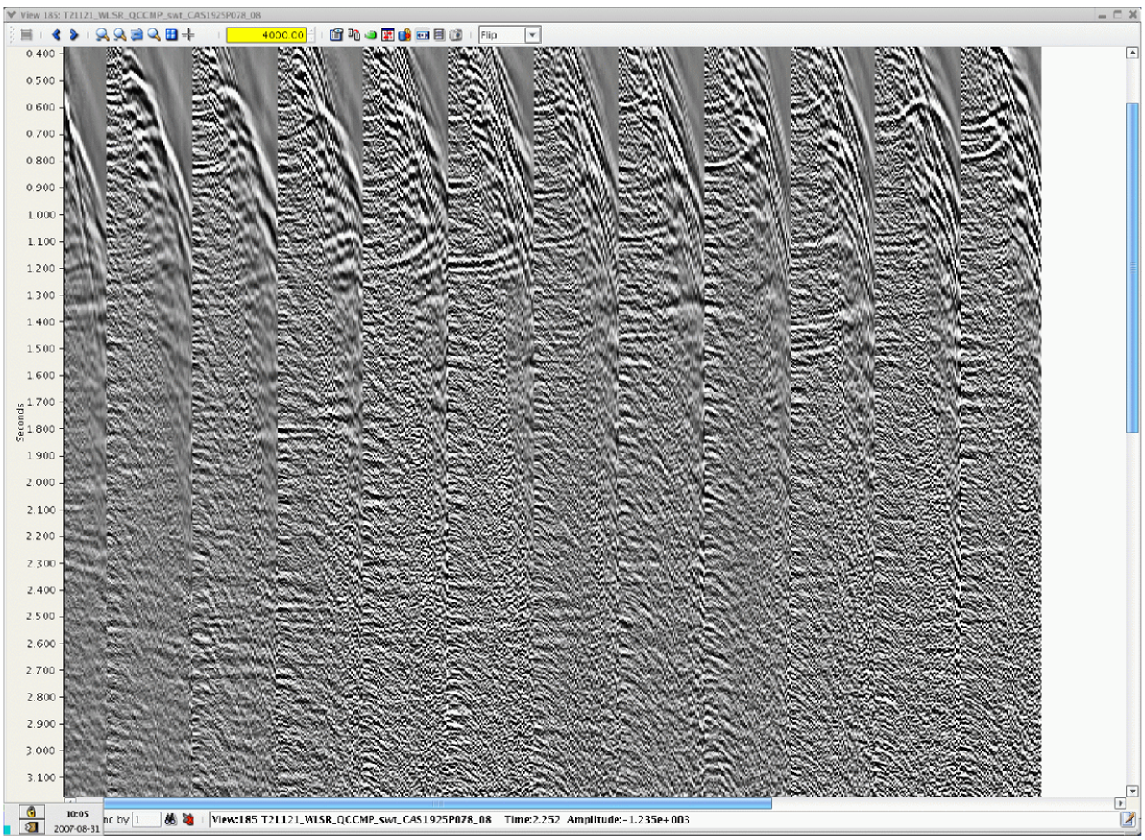


Figure 68: **CAS1925P078, CMP gathers with DWD and SRME**

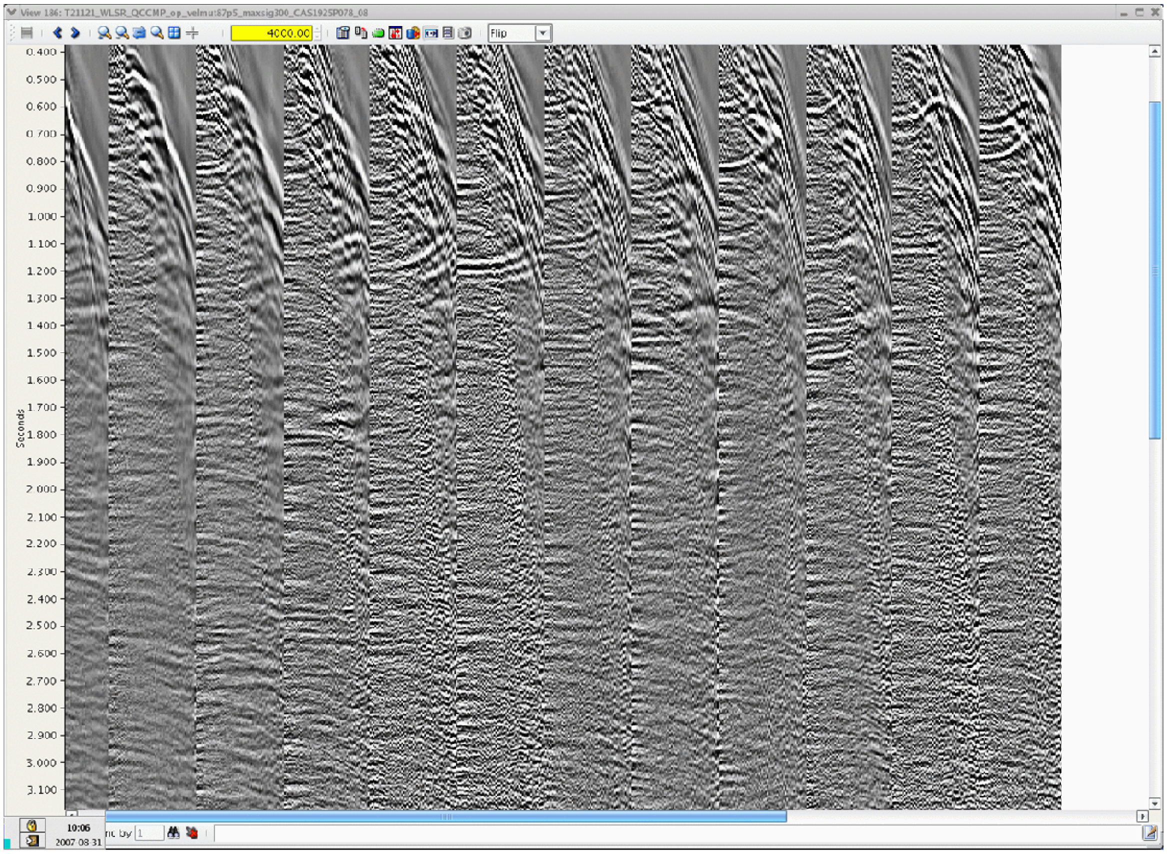


Figure 69: **CAS1925P078, after Radon Demultiple using 87.5% vels, 300ms moveout**

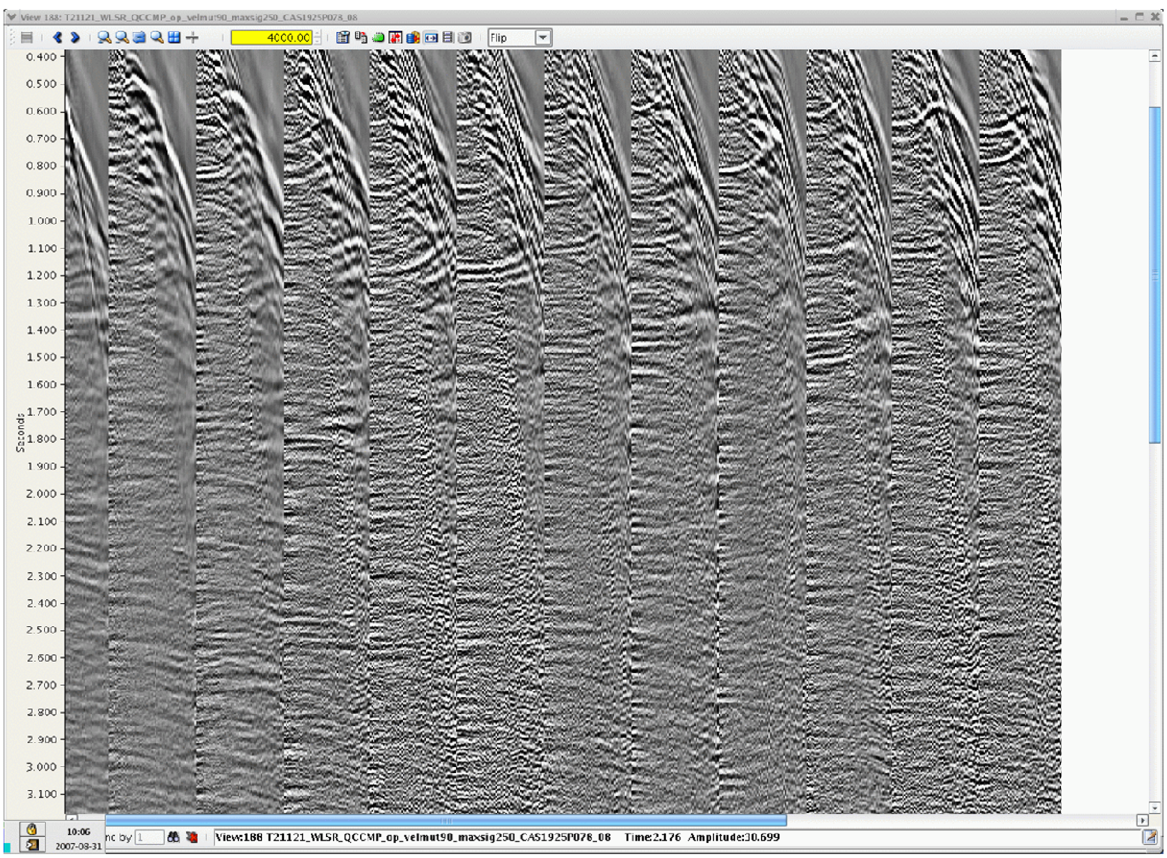


Figure 70: **CAS1925P078, after Radon Demultiple using 90% vels, 250ms moveout**

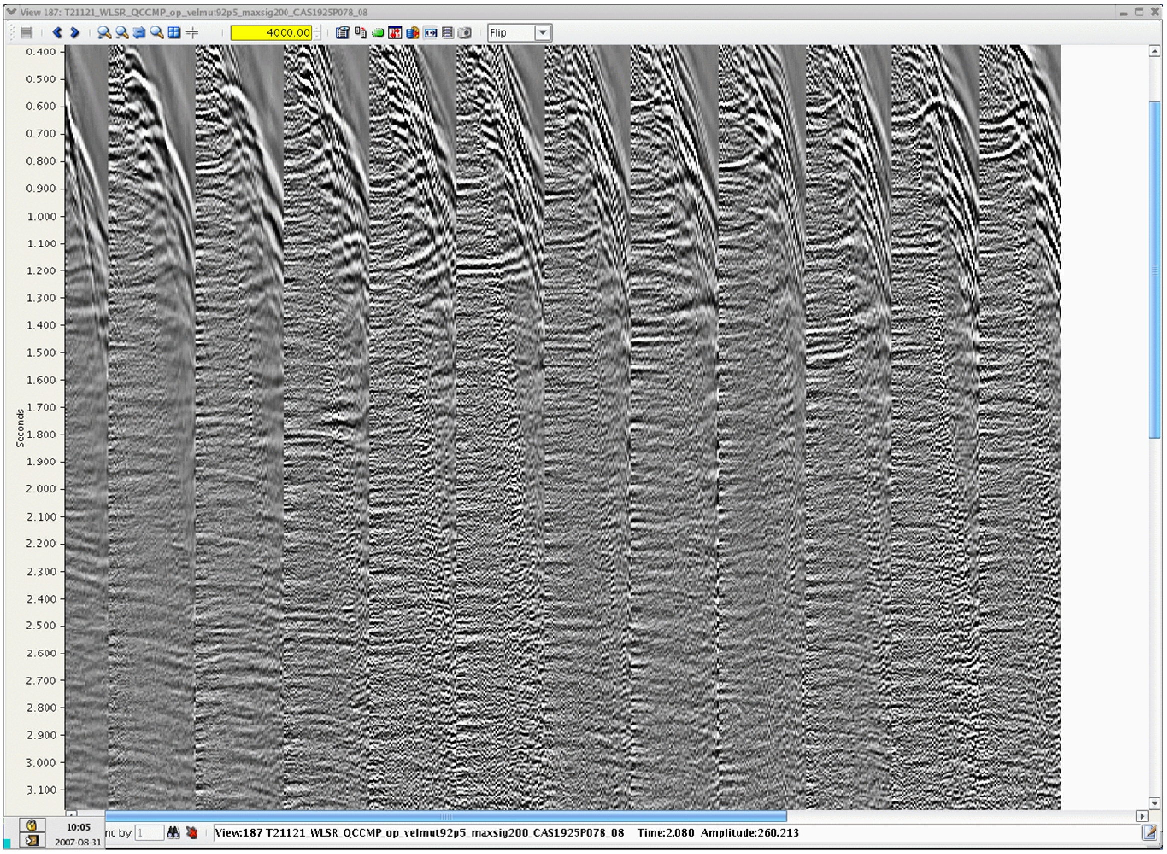


Figure 71: CAS1925P078, after Radon Demultiple using 92.5% vels, 200ms moveout

Decision:

06/09/07 Approval of Residual Radon Demultiple:

3:1 Shot interpolation prior to transform, reducing CMP trace spacing from 75m to 25m.

- Moveout Range: -1000 to 3100ms ref. offset 5300m
- Moveout/velocity protection = 250ms min. moveout
- Apply 90% velocity mute with a max signal moveout of 250ms at offset of 5300m.
- Subtraction of Multiple model tapered from off @400ms to on @700ms.

5.8 Survey Matching

Eight overlap test areas were defined for survey matching analysis: 3 test areas for Casino–Champion, 1 test area for Casino–Hercules, 3 test areas for Antares-Champion and 1 test area for Antares–Casino.
All velocity analysis interpretation was performed consistently as one survey, so there was no additional requirement for matching of the velocity fields.
For the seismic data the analysis looked at the phase and timing of the datasets and was performed by cross-correlating traces from the various surveys that occupied common cells.
Matching work focused on matching surveys to the new Champion and Hercules datasets.

Decision:

27/09/07	Casino Survey	0deg Phase rotation, -4ms time shift & *0.65 Bulk Amplitude scalar
	Antares Survey	0deg Phase rotation, -2ms time shift & *0.85 Bulk Amplitude scalar

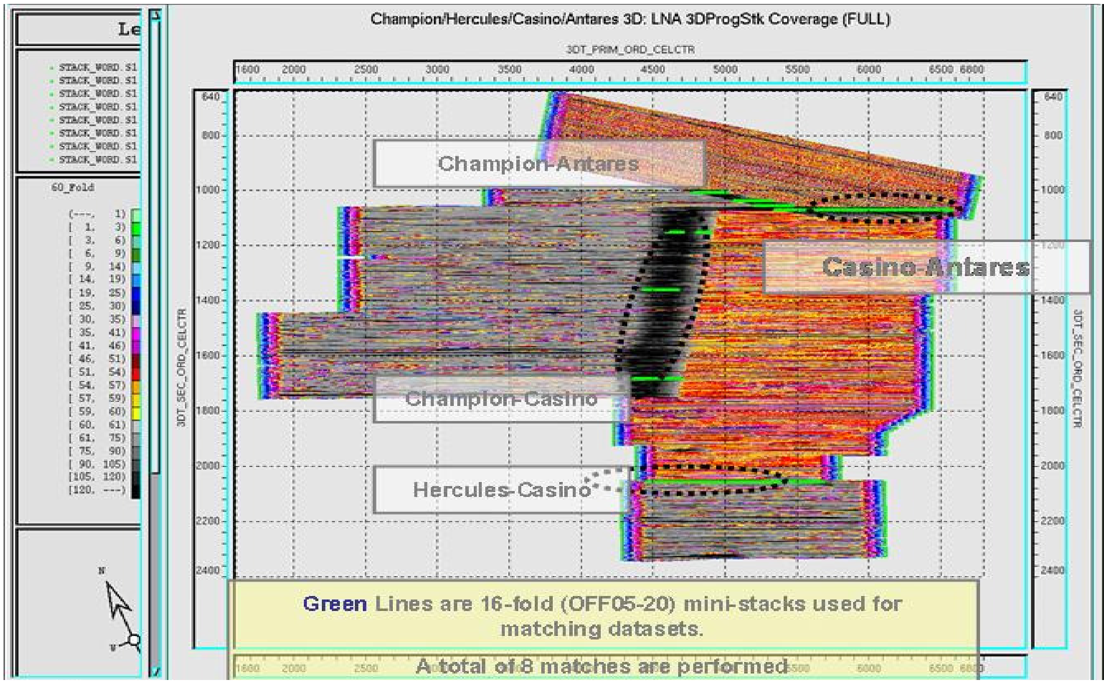


Figure 72: **Survey Test areas for Survey matching**

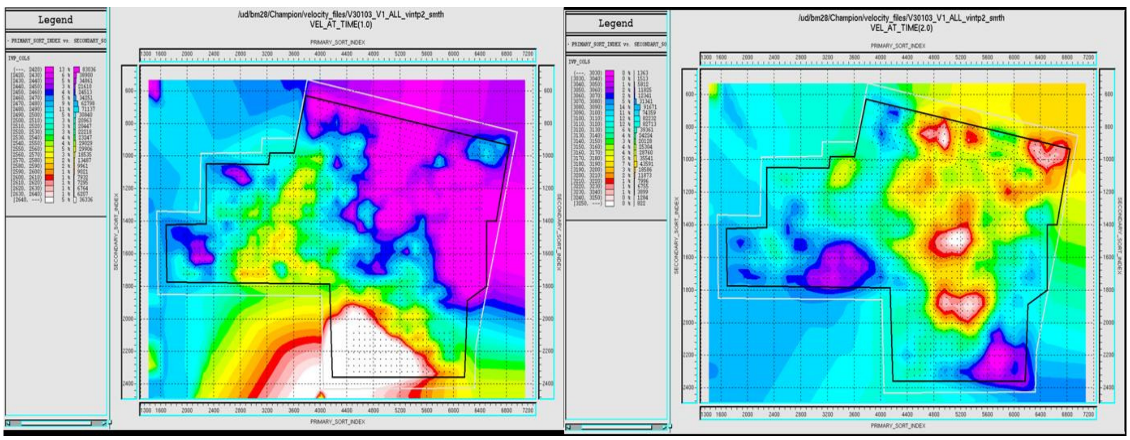


Figure 73: **Velocity Timeslice 1000ms & 3000ms Qc for survey matching**

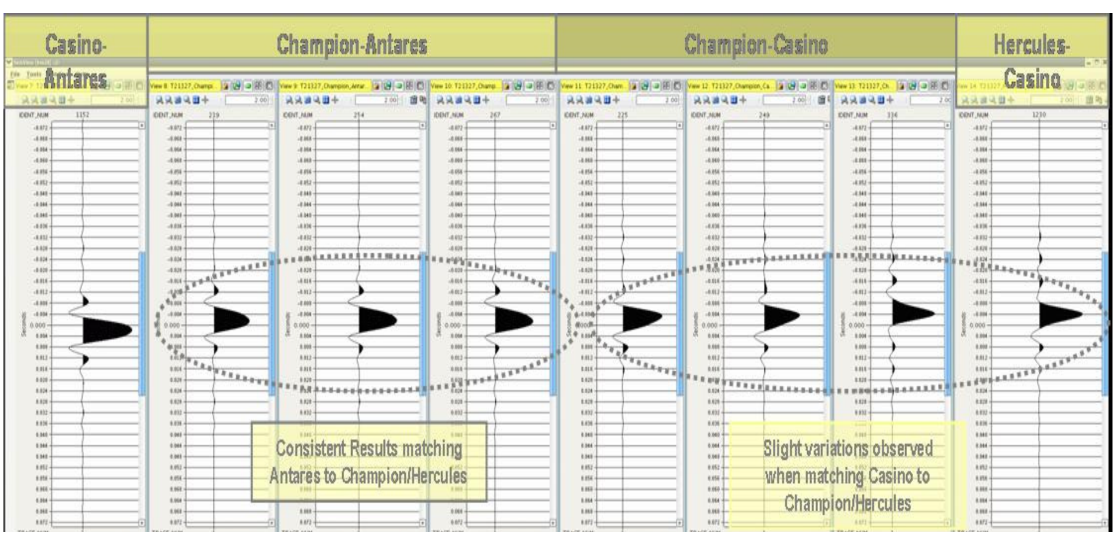


Figure 74: **Results of cross-correlations between surveys**

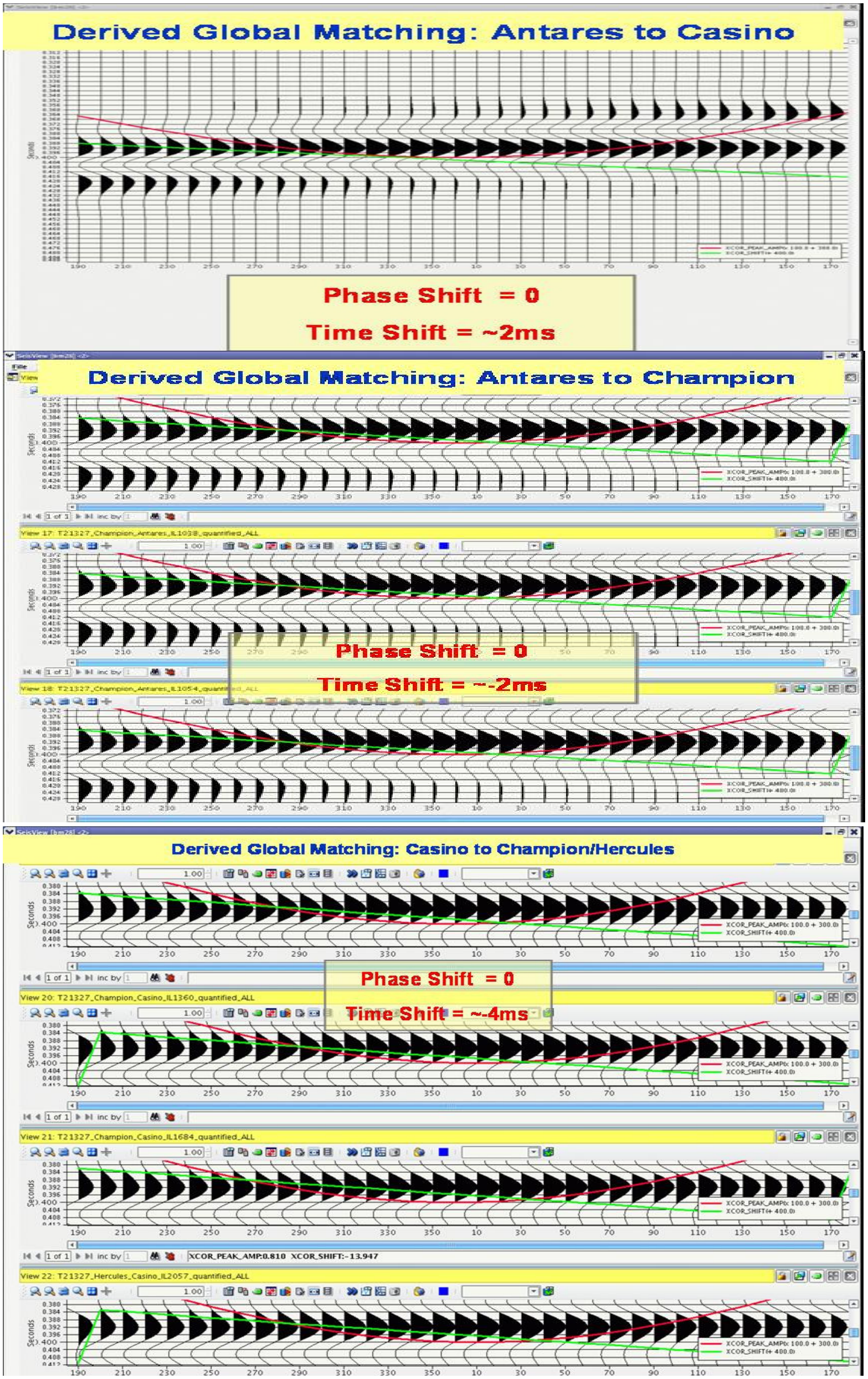


Figure 75: **Global Surveys Phase & Time matching**

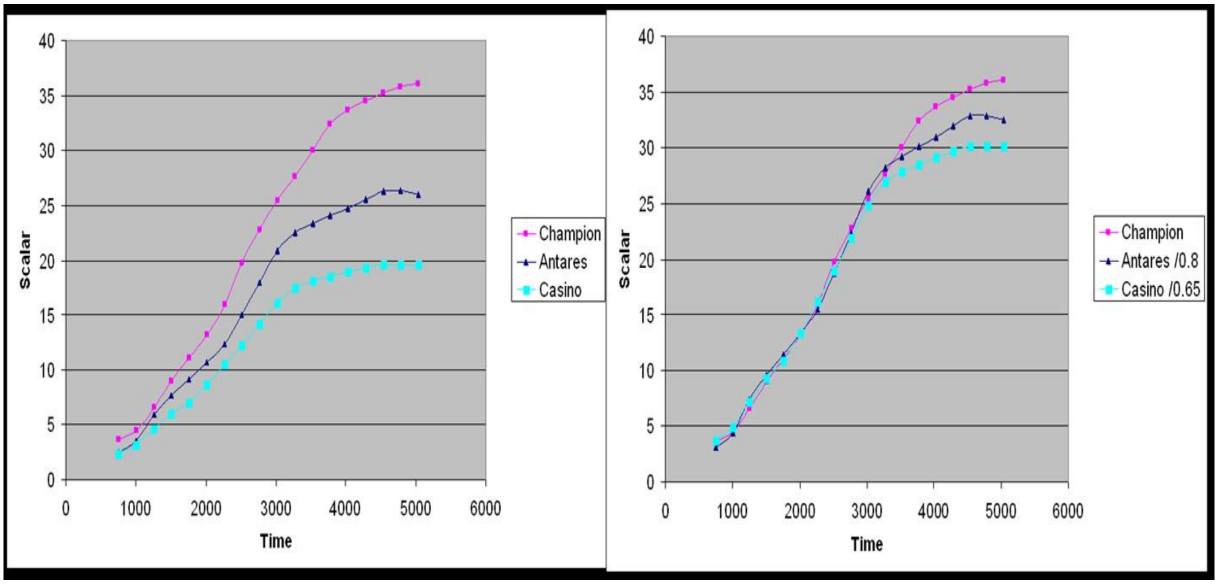


Figure 76: **Amplitude scalar charts for all Surveys**

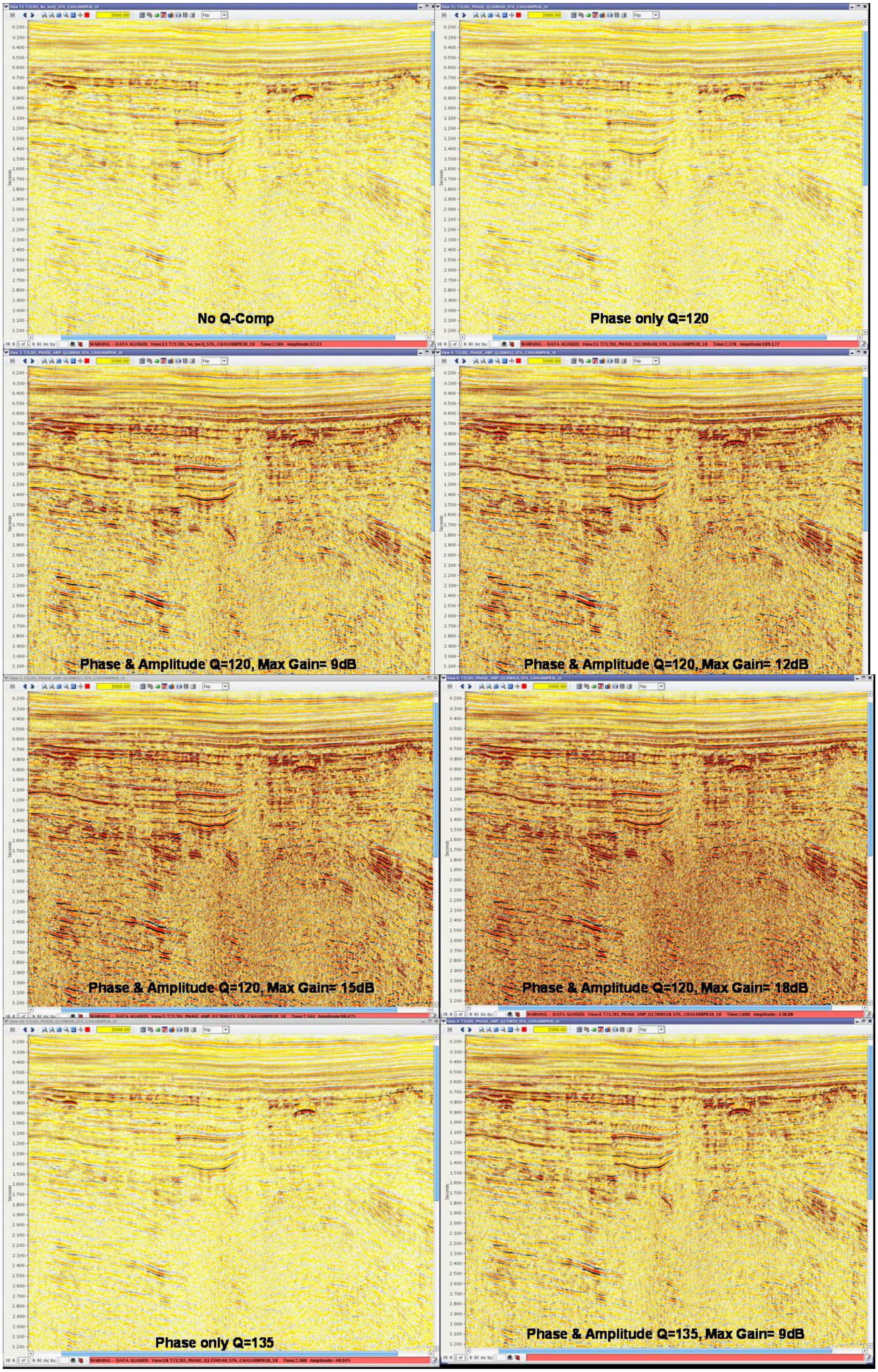
5.9 Inverse Q-Compensation

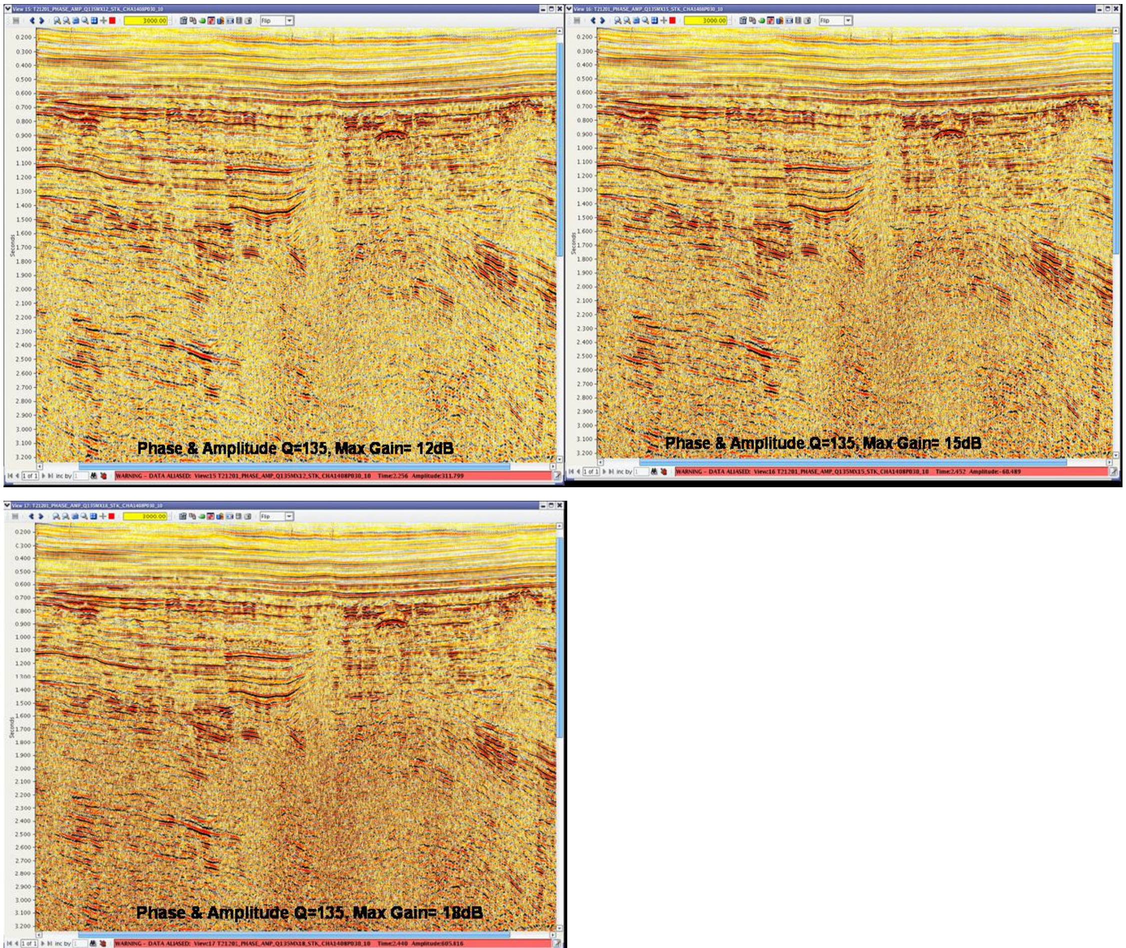
An estimate of the Earth's Q was determined from analysis of spectral decay over time on limited offset stack data. Based on vintage processing of Casino/Antares (Q=136, max gain of 18 dB, Phase & Amplitude) a series of Q value and max gain value were tested.

- Q=120, 135 and 160
- Max gain= 9dB, 12dB, 15dB & 18dB.

Decision:

27/09/07 Application of phase & amplitude inverse-Q; Q=136 & gain limit of 12dB


No Q-Comp
Phase only Q=120
Phase & Amplitude Q=120, Max Gain= 9dB
Phase & Amplitude Q=120, Max Gain= 12dB
Phase & Amplitude Q=120, Max Gain= 15dB
Phase & Amplitude Q=120, Max Gain= 18dB
Phase only Q=135
Phase & Amplitude Q=135, Max Gain= 9dB



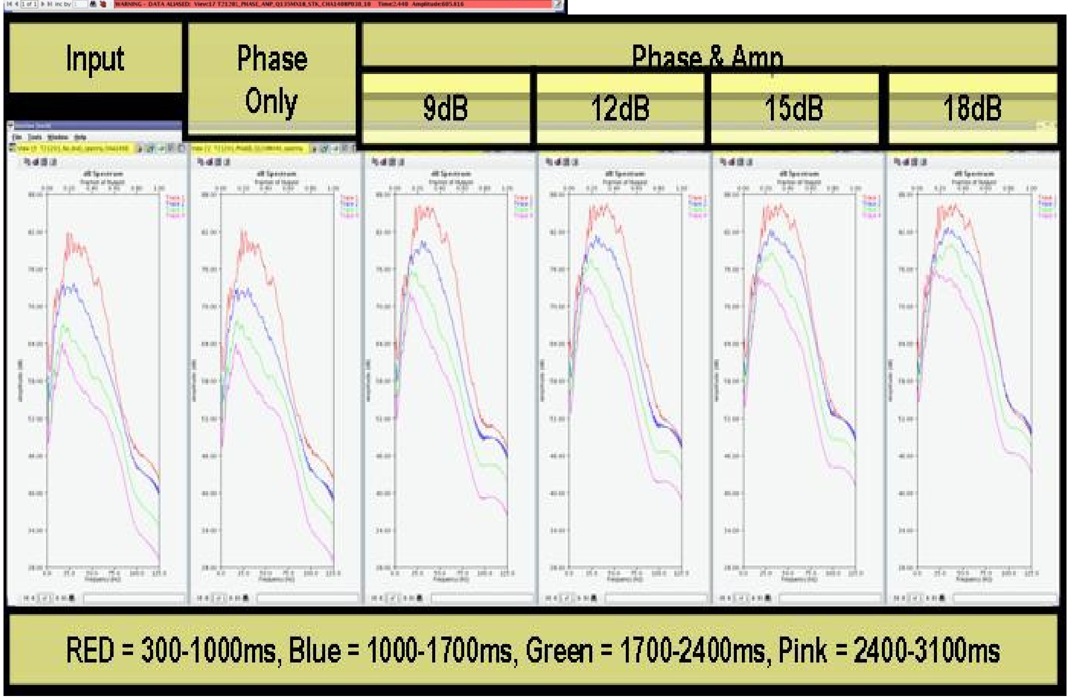


Figure 77: Spectra for four windows Q=120

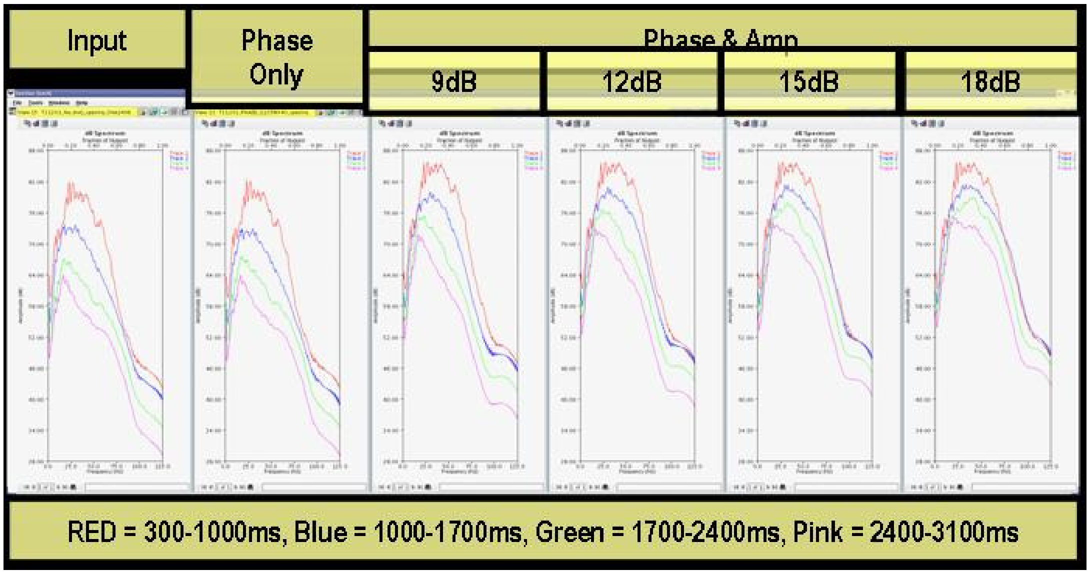


Figure 78: Spectra for four windows Q=135

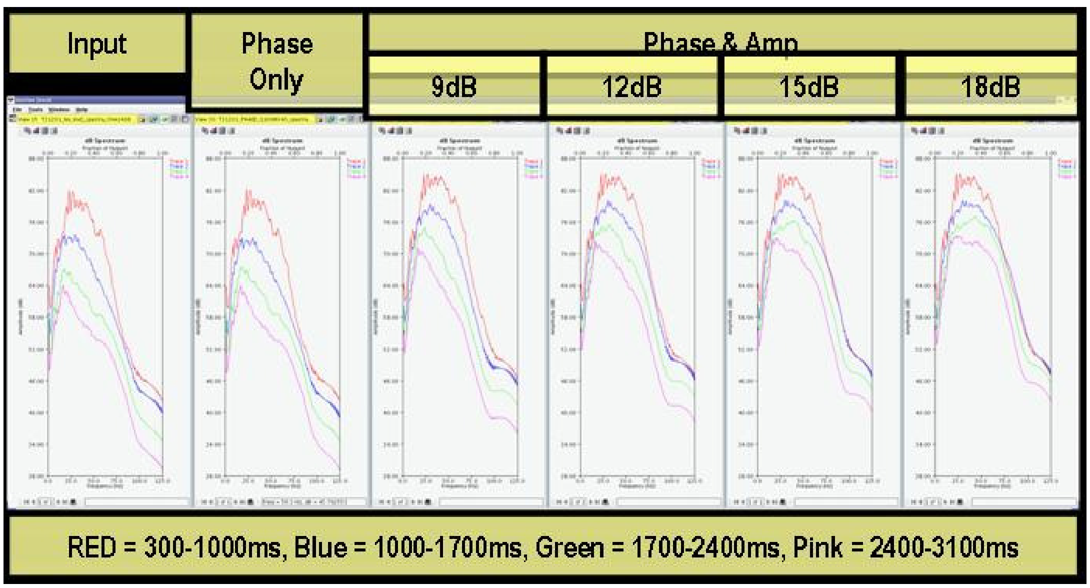


Figure 79: Spectra for four windows Q=160

5.10 Migration Bin Size Test

Testing was performed to decide on the input and output bin dimensions to migration.
Testing was performed on a limited 3D cube and looked at the following combinations:

- Migration Input Bin size 12.5mx25m, Output 12.5mx25m.
- Migration Input Bin size 12.5mx12.5m, Output 12.5mx25m.
- Migration Input Bin size 12.5mx12.5m, Output 12.5mx25m, Post-Stack Interpolation on offset planes to 12.5mx12.5m.
- Migration Input Bin size 12.5mx12.5m, output 12.5mx12.5m

A 4km half-aperture and a 60 deg. dip limit were used throughout the migration.

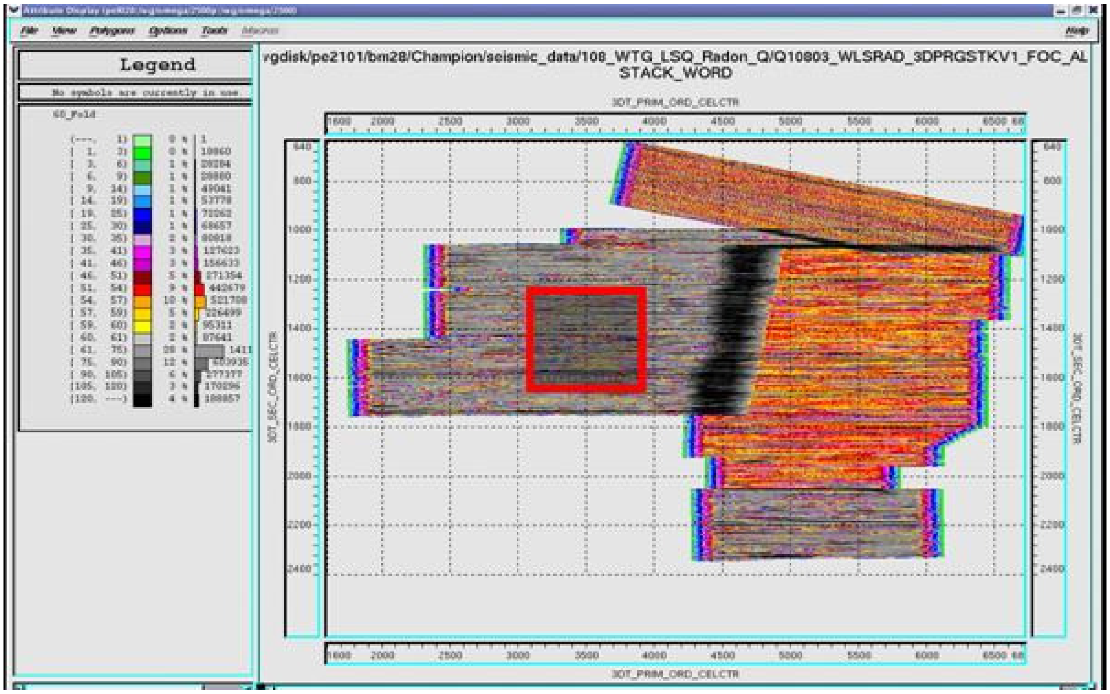


Figure 80: **Migration Test cube location**

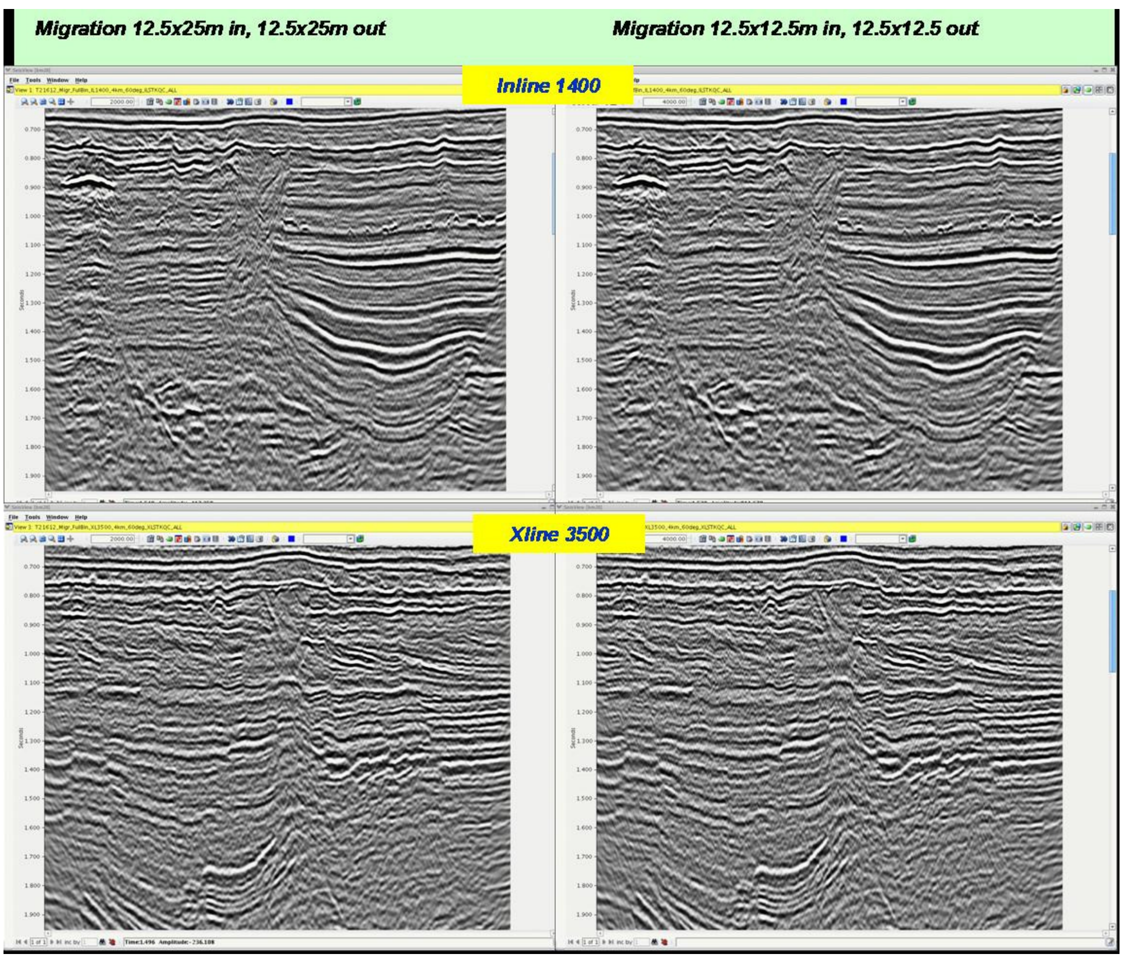


Figure 81: **Example inline and crossline output from migration test cubes comparing 12.5x12.5m and 12.5x25m output bins**

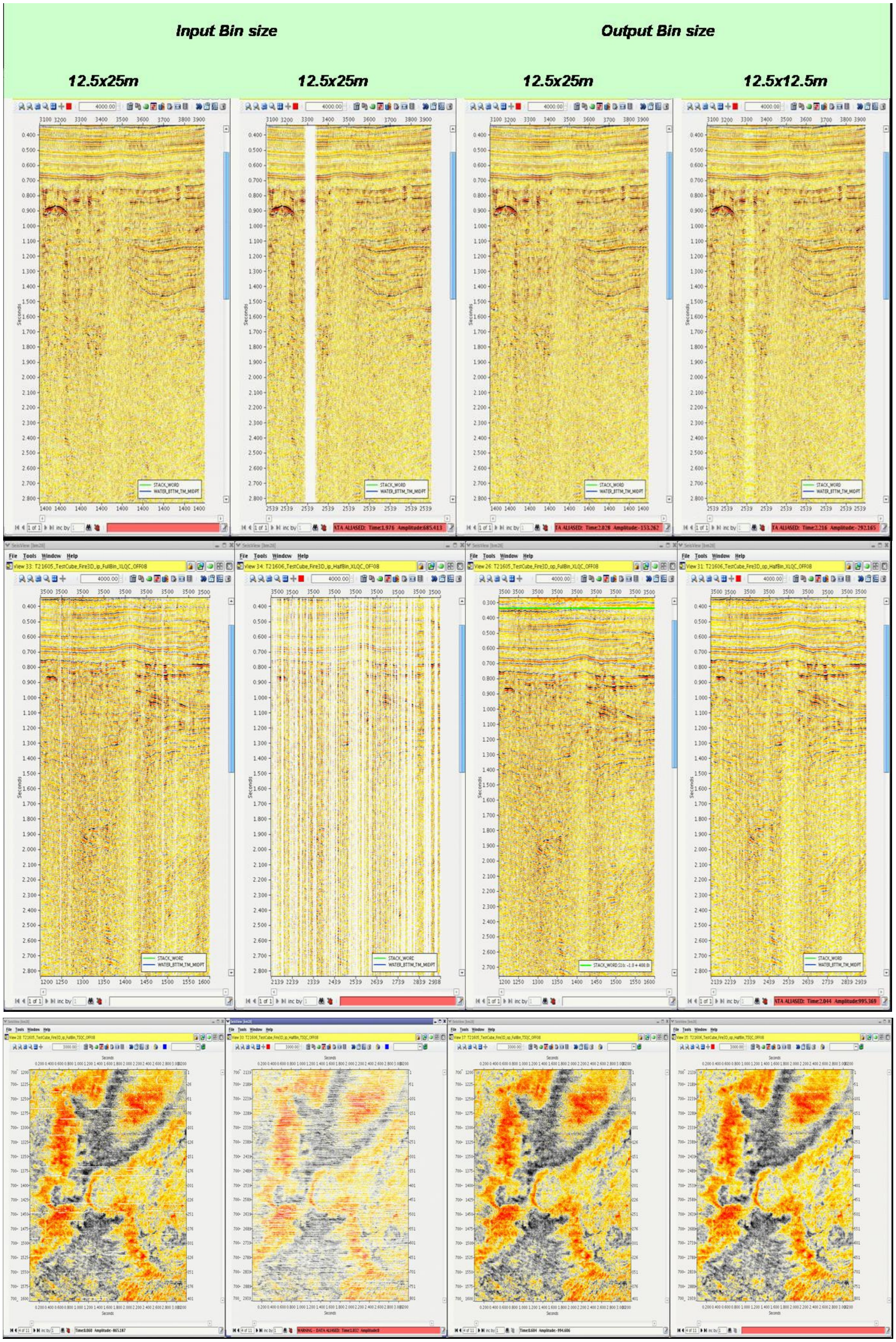


Figure 82: Offset-08, IL1400, XL3500 & Time slice (700ms), Bin size 12.5x25 vs 12.5x25, before and after Fire 3D (Regularisation)

Decision:

10/10/07 Decision to migrate with input and output bin size of 12.5x25m, max dip of 60deg and 4km half-aperture. Pre-Migration filter and velocity smoothing function approved.

Pre-Migration Time Variant Filter (section 4.3.14)

Time(ms)	High-cut Freq(Hz)	High-cut Slop(dB/octave)
0	110	63
1250	100	60
2500	90	57
4000	80	54
6000	70	50

Smooth Migration velocity 500x500m field (section 4.4.9)

Smoothing Parameters	Time(ms)	Radius(m)
	0	1000
	1000	1250
	2000	2500
	3000	4000

5.11 Fold Interpolation & Regularisation (Fire 3D)

Selected offsets from a small test cube were selected to test and Qc Fire 3D. Confirmation testing was performed on the following offset groups:

- Offset01, 02, 03, 04, 05, 10, 20, 30, 40, 50, 54, 60 and 68.

Use interpolation distance to prevent breaks in data continuity.
Fold of coverage maps for these offsets can be found in section 4.3.13 figure 24 and. QC of seismic data was performed on selected crosslines and inlines.

Decision:

07/09/07 Approval of FIRE3D confirmation tests.

5.12 HDVA (High Dense Velocity Analysis)

To improve gather flattening to 40-deg and subsequent structural imaging in the stack, it was decided to test HDVA on a 50m x 50m grid. Input to HDVA was 1km velocity field.

Initial testing of the HDVA was to prepare semblances for picking, with the main test being the angle range used. Ranges of 5-30, 5-35 and 5-40 were tested, with optimum picking achieved with semblance generated from 0-40 deg seismic gathers. Subsequent testing focussed on stabilising the auto-picking and then relaxing the pick constraints to allow more freedom in flattening.

HDVA has clearly provided flatter events on the CMP gathers and has resulted in an improved stack response.
3D trim mean filter used following radius:

0ms	150m
1500ms.	150m
2000ms	300m
3000ms	450m
6000ms	600m

Decision:

20/11/07 HDVA on 50m x 50m grid, picked on 5-40deg semblances.

5.13 Residual Radon Demultiple

A second post-migration pass of Weighted Least Squares Radon Demultiple was tested to attenuate residual multiple energy.

A series of test sequences were;.
Model Pre-Conditioning

- Start Time & Mute to reduce artefacts in Tau-P domain
- CMP Interpolation to reduce aliasing in Tau-P domain

Model

- Moveout range
- Series of velocity mute and maximum signal moveout mute.
- Single or Double Subtraction of model.

Model Post-Conditioning

- Taper for low-fold CMP.

Residual demultiple process was successful in removing fast multiple energy remaining in the data.

Decision:

21/11/07 Approval of Residual Radon Demultiple:

- 96% velocity mute
- Maximum signal moveout of 50m at ref. offset.
- Model -900 to +1800ms moveout at reference offset of 6000m

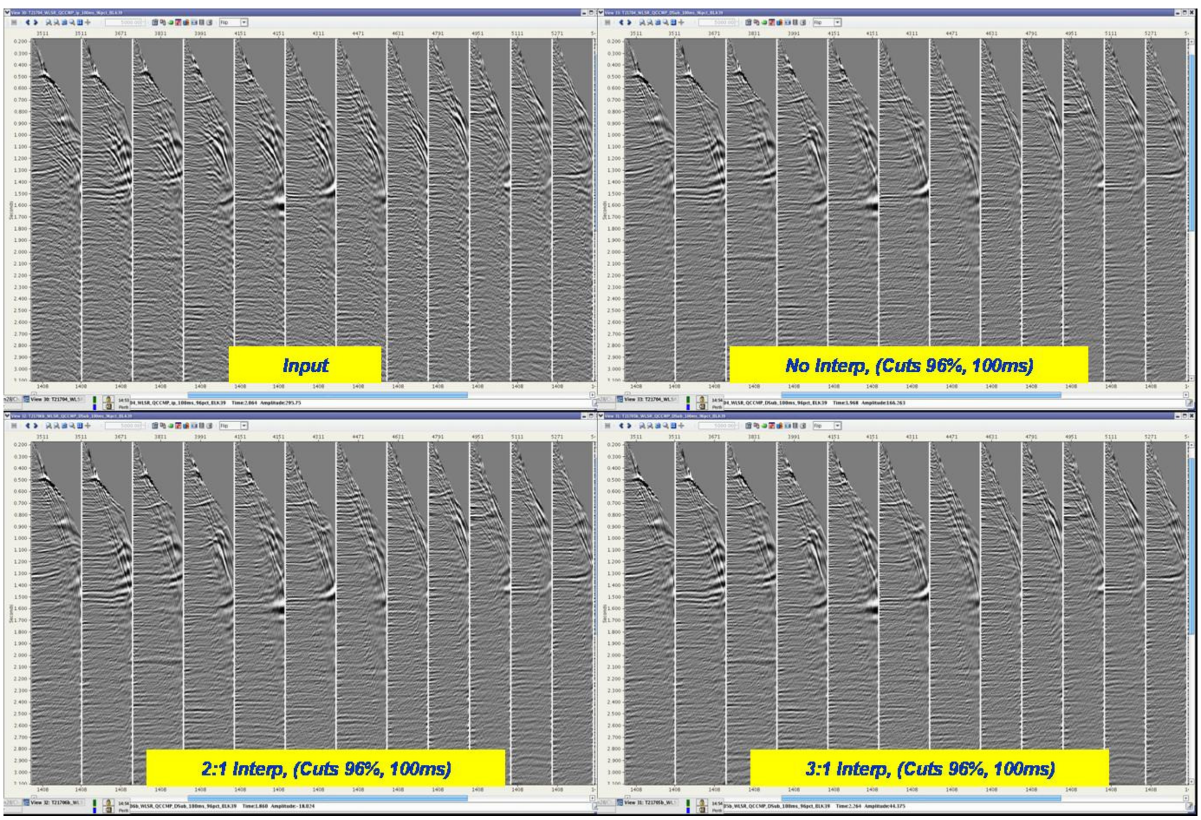


Figure 83: **CMP gathers, Residual Radon Demultiple Tests**

5.14 Angle Stacks

Final CMP gathers after PreSTM and Residual Radon demultiple showing high amplitude on far offsets. The high amplitudes are likely to be due to truncation issues in the Radon transforms used for Linear Noise Attenuation and Demultiple process. These high amplitudes would cause degradation of the stack products. The following 5 Angles were chosen for Final angle stacks volume.

- 05-42deg Angle stack
- 00-15deg Angle stack
- 15-25deg Angle stack
- 25-35deg Angle stack
- 35-45deg Angle stack

Decision:	
29/11/07	Full Stack Offsets 2-52 only (Angle 05-42deg Angle stacks ; 5-15, 15-25, 25-35, 35-45deg

5.15 Post-Stack Deconvolution

Final CMP gathers showed strong residual water bottom multiple remaining. However, only the first bounce was apparent, subsequent bounces having been successfully attenuated by previous demultiple processing. It was observed that the strength of the remaining multiple was dependent on water depth and varied in strength between the surveys.

Testing looked at using the periodicity of the multiple to perform attenuation on post-stack data using a predictive deconvolution.

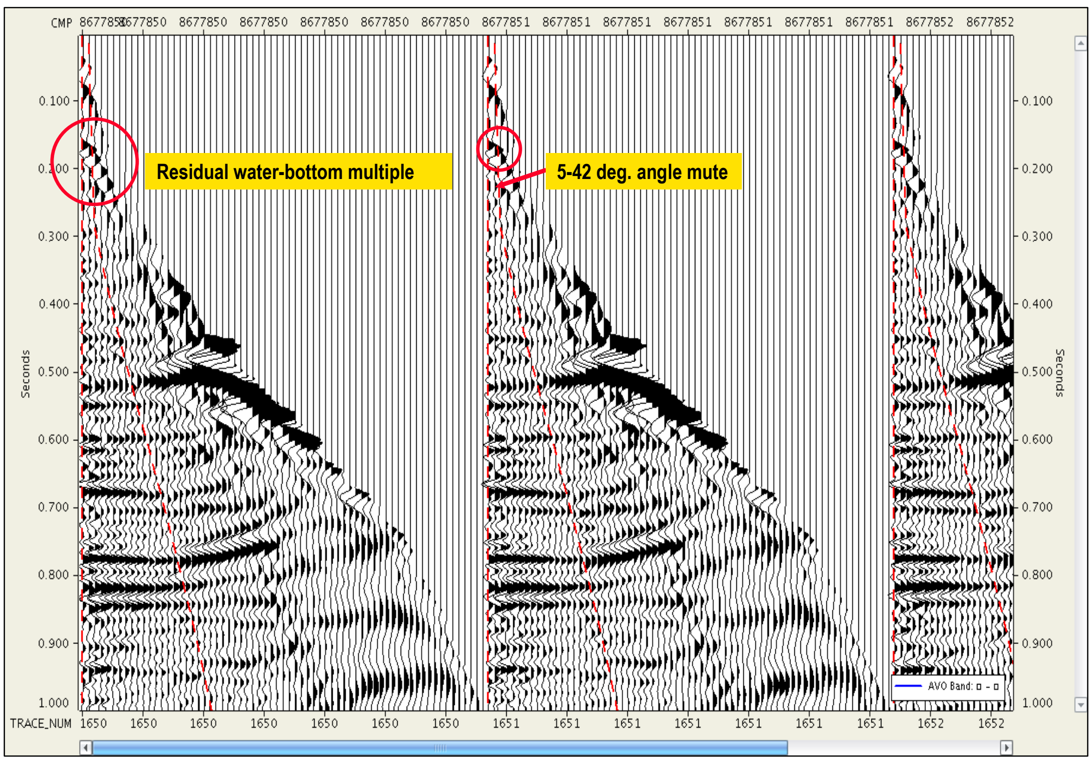


Figure 84: NMO-corrected final gathers showing residual water-bottom multiple and 5-42 deg. angle mute

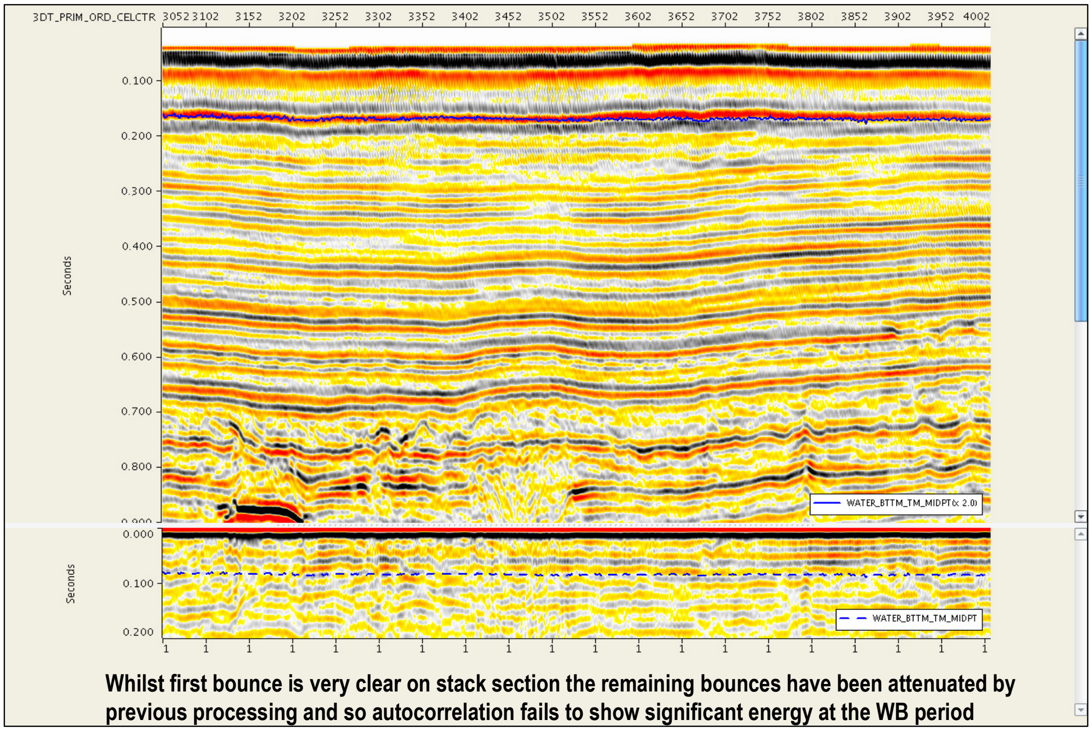


Figure 85: **5-42 deg. angle stack data with 'water bottom time x 2' over-plotted and autocorrelation**

The following observations were made from the initial analysis:

- The water bottom reflection is poorly imaged due to a combination of shallow water depth and relatively long near-offsets in the recording
- The above, combined with the fact that only the first WB bounce is apparent, has meant that the autocorrelation fails to show a strong WB period event

Given the absence of a consistent reflector on the autocorrelation it was expected that a deconvolution would not be successful at removing the multiple.

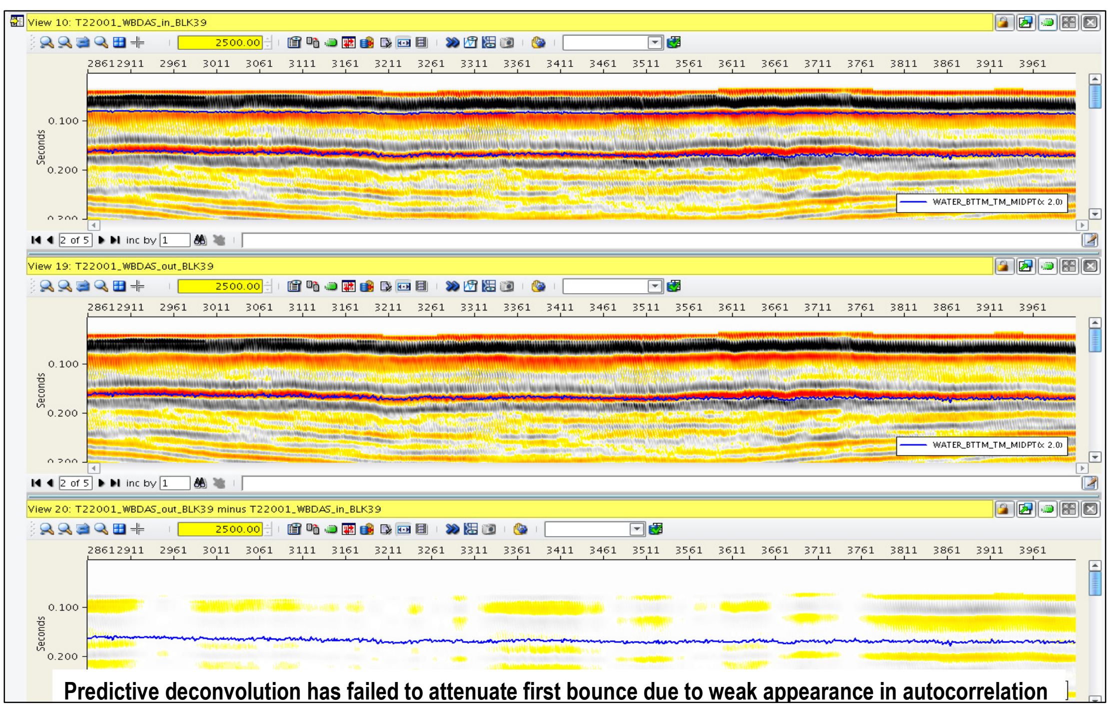


Figure 86: **IL1408 – 5-42 deg. Angle Stack before/after DAS plus difference**

Conclusions reached were that the predictive deconvolution failed to remove the multiple. It's possible that a wider mute pattern at the near surface would allow the stacking to reduce the level of multiple but would also degrade the WB reflection.

Decision:	
11/12/07	Not to apply a DAS

5.16 Post-Stack K-Notch Filter and Acquisition Footprint Removal (applied to Final Stack data only)

The incomplete removal of shallow multiple energy often results in aliased energy on the stacked data. The dip of this energy is dependent on the acquisition geometry (specifically the shot point interval and group interval) and will show clearly as focused energy on FK spectra.
For each of 3 acquisition geometries used the shot point: group interval ratios were the same so the energy would appear at the same Wave number on FK spectra. Normally these aliased energy can be attenuated using a 2D K-notch filter, however, the rotation of the Antares data from its' native acquisition azimuth meant that the aliased energy was not so clearly focused on an FK spectra display.

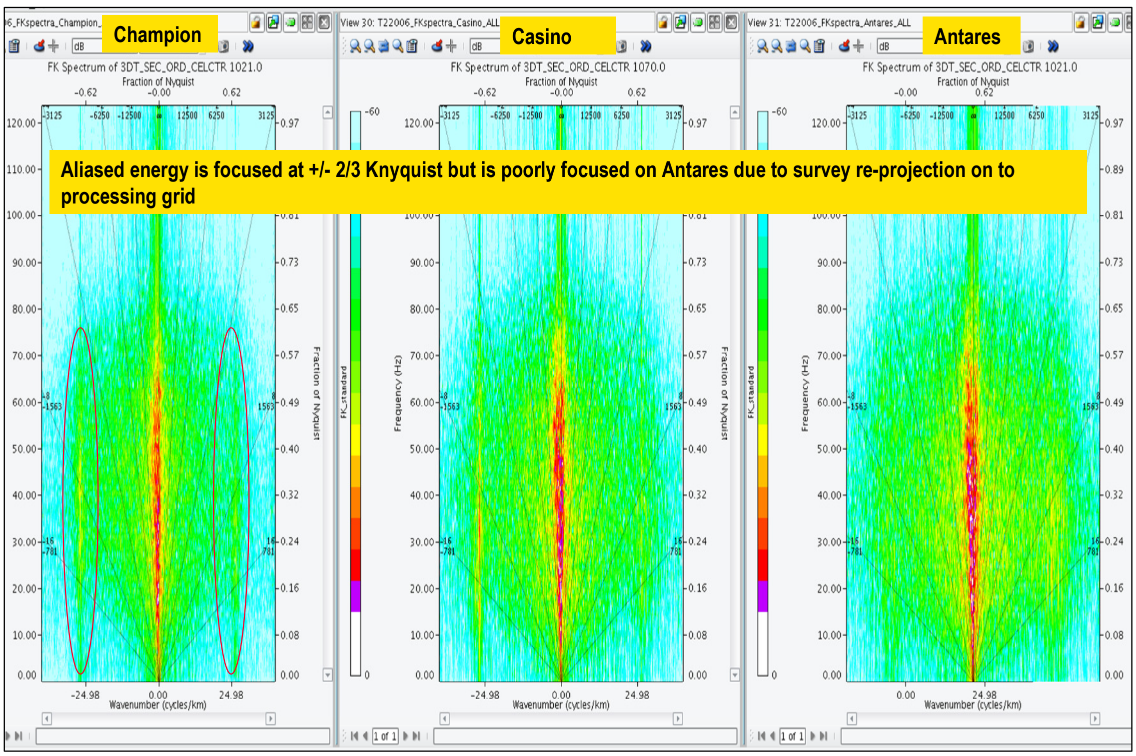


Figure 87: FK spectra from Champion, Casino and Antares showing the residual aliased multiple energy occurring at +/- 2/3 Knyquist

Time slice displays showed that acquisition footprints were visible on each of the 4 survey areas. Since these footprints are related to acquisition geometry there are 3 different footprint appearances. It was also noted that since the Antares survey was not acquired in the same direction as the processing grid then the footprint does not lie in the grid direction as it does for the other surveys. The test results showed a data adaptive 3D FKK notch filter applied in a window from 0-1000ms.

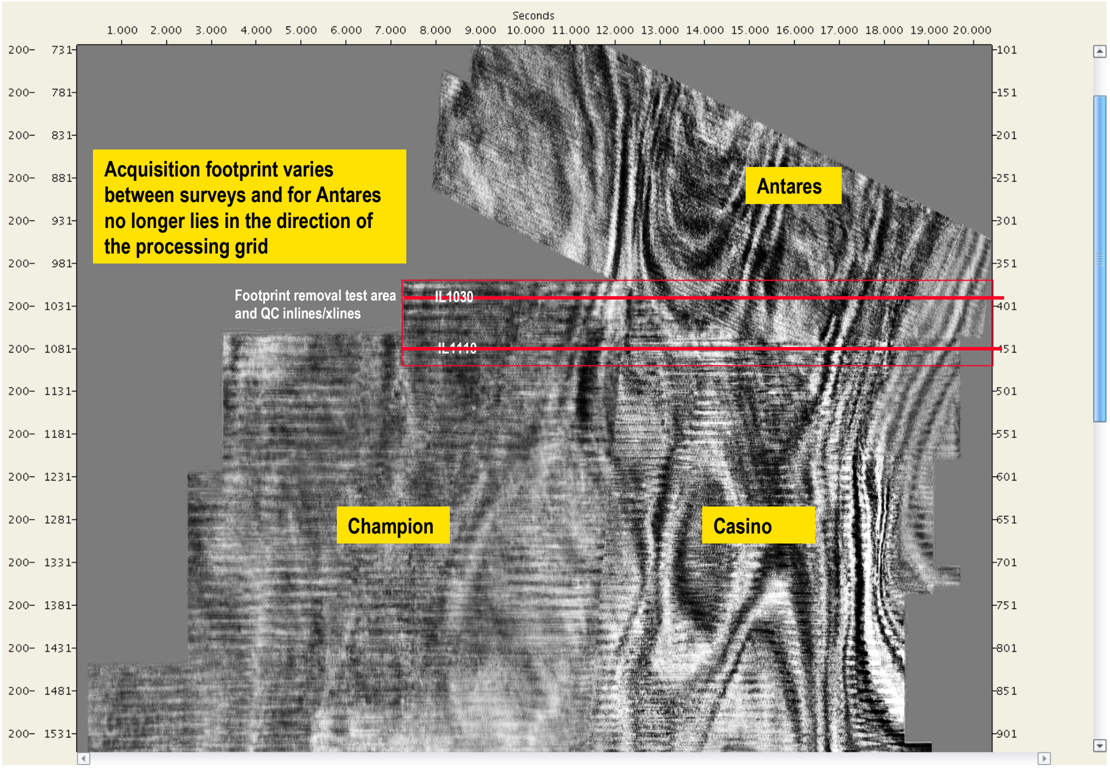


Figure 88: Full Offset Stack – Time slice at 200ms clearly showing acquisition footprints

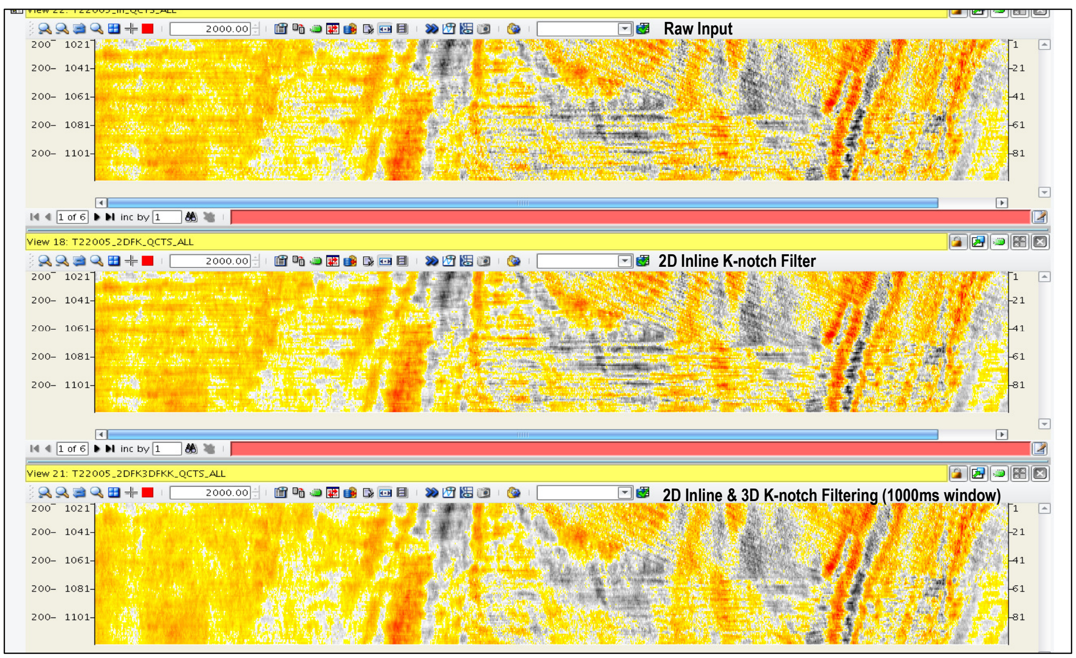


Figure 89: Full Offset Stack – Time slice at 200ms with no filtering, 2D K-notch and 2D plus 3D K-notch filtering

Decision:

18/12/07 2D K-notch filter to remove aliased residual multiple applied 0-600ms, tapering to 1000ms
Data adaptive 3D K-notch filter to remove acquisition footprint (800ms window).

5.17 Post-Stack Time Variant Filter (TVF – applied to Final Stack data only)

The 5-42 degree final angle stack (after K-notch filtering) for line 1110 was passed through a series of time invariant band pass filters to determine the final TVF to apply. Displays of the filtered stacks, along with plots of the energy removed, were sent to Santos for the filter ranges shown in the following table:

Low-Cut Filter Test Ranges (Hz)	High-Cut Filter Test Ranges (Hz)
4-70	5-40
6-70	5-45
8-70	5-50
10-70	5-55
	5-60
	5-65
	5-70
	5-75
	5-80

Decision:

18/12/07 10/12-80/54(0ms), 8/12-80/54(1250ms), 6/12-60/46(2500ms), 4/12-50/42(4000ms), 4/12-40/42(5000ms)

5.18 Post-Stack Scaling

The 5-42 degree final angle stack (after K-notch filtering and a provisional TVF) for lines 1030 and 1110 were passed through a series of display gains to determine the final gain to apply. Displays of the scaled stacks were sent to Santos for the scaling options shown in the following table:

Exponential Gain (dB/s)	Automatic Gain Control (AGC) length
2	500
3	800
4	1200
	1500
	Cascaded

Decision:

18/12/07 Apply 3dB/s gain to Raw Stack data
Apply 800ms AGC to Final Stack data

6.0 Archive Products

6.1 Deliverable Schedule

All deliverables were sent to:

Santos Limited
Ground Floor,
60 Flinders Street,
Adelaide 5000, SA
Attn: Malcolm Horton

7.0 Personnel

WesternGec0 Perth Personnel	
Paul Tredgett ptredgett@perth.westerngeco.slb.com	DP Manager
Nigel Seymour seymour0@perth.westerngeco.slb.com	Processing Supervisor
Richard Patenall rpatenall@perth.westerngeco.slb.com	Project Geophysicist
Sharon Tan stan3@perth.westerngeco.slb.com	Group Leader
Wynn Han whan@perth.westerngeco.slb.com	Project Geophysicist
Santos Representatives	
Malcolm Horton malcolm.horton@santos.com	Project Geophysicist
Jenni Scott jenni.scott@santos.com	Interpreter
Martin Novak martin.novak@santos.com	Interpreter

8.0 Appendices

8.1 Projection & Datum

Champion survey, Hercules survey & Casino survey

Spheroid name:	WGS84
Geodetic datum	WGS84
Semi major axis (m):	6378137.0
Inverse flattening (1/f) (m):	298.2572236
Projection type:	UTM
Zone:	54S
Central meridian:	141° 0' 0.0" E
Scale factor:	0.9996
False easting :	500000E
False northing :	10000000N

Antares survey

Spheroid name:	GRS-80
Geodetic datum	GDA94
Semi major axis (m):	6378137.0
Inverse flattening (1/f) (m):	298.2572221
Projection :	MGA94
Central meridian:	141° 0' 0.0" E
Scale factor:	0.9996
False easting :	500000E
False northing :	10000000N

8.2 Wavelets

8.2.1 Supplied Far-Field Source Signature - Antares

WAVELET NAME: Antares FFsig
SAMPLE_RATE: 2.000000
TIME_SHIFT_ALIGNMENT: -58.000000
CENTER OF GRAVITY SAMPLE: 33.343088
NUMBER OF SAMPLES: 201.000000
MAXIMUM AMPLITUDE: 38.307999
MAXIMUM POSITIVE: 38.307999
MAXIMUM NEGATIVE: -49.412998

SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE
1	-56.000000	0.000000e00	2	-54.000000	0.000000e00	3	-52.000000	0.000000e00
4	-50.000000	2.000000e-03	5	-48.000000	4.000000e-03	6	-46.000000	-2.600000e-02
7	-44.000000	-6.000000e-03	8	-42.000000	1.900000e-02	9	-40.000000	-2.400000e-02
10	-38.000000	5.700000e-02	11	-36.000000	-2.900000e-02	12	-34.000000	-4.100000e-02
13	-32.000000	9.400000e-02	14	-30.000000	-5.100000e-02	15	-28.000000	1.620000e-01
16	-26.000000	-2.000000e-02	17	-24.000000	3.900000e-02	18	-22.000000	1.200000e-02
19	-20.000000	-2.530000e-01	20	-18.000000	2.360000e-01	21	-16.000000	-5.680000e-01
22	-14.000000	5.530000e-01	23	-12.000000	-3.860000e-01	24	-10.000000	8.900000e-02
25	-8.000000	7.350000e-01	26	-6.000000	-1.545000e00	27	-4.000000	2.638000e00
28	-2.000000	-4.288000e00	29	0.000000	1.374100e01	30	2.000000	3.830800e01
31	4.000000	1.304900e01	32	6.000000	1.297000e00	33	8.000000	-2.207100e01
34	10.000000	-4.941300e01	35	12.000000	-2.184900e01	36	14.000000	-5.868000e00
37	16.000000	-1.374000e00	38	18.000000	4.558000e00	39	20.000000	-9.910000e-01
40	22.000000	1.972000e00	41	24.000000	2.874000e00	42	26.000000	1.984000e00
43	28.000000	3.273000e00	44	30.000000	2.275000e00	45	32.000000	2.592000e00
46	34.000000	2.582000e00	47	36.000000	2.236000e00	48	38.000000	2.360000e00
49	40.000000	2.219000e00	50	42.000000	1.960000e00	51	44.000000	1.853000e00
52	46.000000	1.752000e00	53	48.000000	1.520000e00	54	50.000000	1.484000e00
55	52.000000	1.434000e00	56	54.000000	1.352000e00	57	56.000000	1.451000e00
58	58.000000	1.384000e00	59	60.000000	1.306000e00	60	62.000000	1.381000e00
61	64.000000	1.282000e00	62	66.000000	1.278000e00	63	68.000000	1.305000e00
64	70.000000	1.086000e00	65	72.000000	9.920000e-01	66	74.000000	8.350000e-01
67	76.000000	4.600000e-01	68	78.000000	1.080000e-01	69	80.000000	-4.880000e-01
70	82.000000	-9.830000e-01	71	84.000000	-9.280000e-01	72	86.000000	-7.090000e-01
73	88.000000	-4.130000e-01	74	90.000000	-3.220000e-01	75	92.000000	-6.650000e-01
76	94.000000	-8.380000e-01	77	96.000000	-7.890000e-01	78	98.000000	-6.460000e-01
79	100.000000	-3.440000e-01	80	102.000000	-4.570000e-01	81	104.000000	-9.480000e-01
82	106.000000	-1.344000e00	83	108.000000	-1.728000e00	84	110.000000	-1.728000e00
85	112.000000	-1.317000e00	86	114.000000	-1.097000e00	87	116.000000	-9.200000e-01
88	118.000000	-8.820000e-01	89	120.000000	-1.135000e00	90	122.000000	-1.191000e00
91	124.000000	-1.203000e00	92	126.000000	-1.156000e00	93	128.000000	-7.870000e-01
94	130.000000	-5.020000e-01	95	132.000000	-1.800000e-01	96	134.000000	2.240000e-01
97	136.000000	2.870000e-01	98	138.000000	2.860000e-01	99	140.000000	1.860000e-01
100	142.000000	-1.500000e-01	101	144.000000	-2.400000e-01	102	146.000000	-2.580000e-01
103	148.000000	-2.930000e-01	104	150.000000	-3.300000e-02	105	152.000000	1.510000e-01
106	154.000000	3.290000e-01	107	156.000000	6.630000e-01	108	158.000000	7.280000e-01
109	160.000000	7.800000e-01	110	162.000000	8.570000e-01	111	164.000000	6.970000e-01
112	166.000000	7.000000e-01	113	168.000000	7.130000e-01	114	170.000000	5.960000e-01
115	172.000000	6.780000e-01	116	174.000000	6.390000e-01	117	176.000000	5.300000e-01
118	178.000000	5.920000e-01	119	180.000000	4.600000e-01	120	182.000000	4.000000e-01
121	184.000000	4.940000e-01	122	186.000000	3.930000e-01	123	188.000000	4.250000e-01
124	190.000000	4.750000e-01	125	192.000000	3.300000e-01	126	194.000000	3.380000e-01
127	196.000000	2.420000e-01	128	198.000000	1.000000e-02	129	200.000000	-1.800000e-02
130	202.000000	-1.410000e-01	131	204.000000	-2.310000e-01	132	206.000000	-1.290000e-01
133	208.000000	-1.930000e-01	134	210.000000	-1.700000e-01	135	212.000000	-8.800000e-02
136	214.000000	-1.810000e-01	137	216.000000	-8.900000e-02	138	218.000000	-5.300000e-02
139	220.000000	-1.590000e-01	140	222.000000	-9.200000e-02	141	224.000000	-1.970000e-01
142	226.000000	-3.160000e-01	143	228.000000	-2.800000e-01	144	230.000000	-4.710000e-01
145	232.000000	-5.490000e-01	146	234.000000	-4.940000e-01	147	236.000000	-5.890000e-01
148	238.000000	-4.850000e-01	149	240.000000	-3.890000e-01	150	242.000000	-4.210000e-01
151	244.000000	-2.530000e-01	152	246.000000	-1.990000e-01	153	248.000000	-1.820000e-01
154	250.000000	4.100000e-02	155	252.000000	1.020000e-01	156	254.000000	1.980000e-01
157	256.000000	3.910000e-01	158	258.000000	3.540000e-01	159	260.000000	4.180000e-01
160	262.000000	4.760000e-01	161	264.000000	3.260000e-01	162	266.000000	3.670000e-01
163	268.000000	3.350000e-01	164	270.000000	2.010000e-01	165	272.000000	2.680000e-01
166	274.000000	1.610000e-01	167	276.000000	6.300000e-02	168	278.000000	1.160000e-01
169	280.000000	-4.300000e-02	170	282.000000	-8.800000e-02	171	284.000000	-7.000000e-02
172	286.000000	-2.200000e-01	173	288.000000	-1.870000e-01	174	290.000000	-2.030000e-01
175	292.000000	-3.200000e-01	176	294.000000	-2.410000e-01	177	296.000000	-2.860000e-01
178	298.000000	-3.150000e-01	179	300.000000	-1.640000e-01	180	302.000000	-1.800000e-01
181	304.000000	-1.150000e-01	182	306.000000	6.000000e-03	183	308.000000	-6.500000e-02
184	310.000000	-1.600000e-02	185	312.000000	-6.000000e-03	186	314.000000	-1.010000e-01
187	316.000000	-1.000000e-03	188	318.000000	4.400000e-02	189	320.000000	6.100000e-02
190	322.000000	1.960000e-01	191	324.000000	1.850000e-01	192	326.000000	1.900000e-01
193	328.000000	2.470000e-01	194	330.000000	1.610000e-01	195	332.000000	1.610000e-01
196	334.000000	1.850000e-01	197	336.000000	1.240000e-01	198	338.000000	1.690000e-01
199	340.000000	1.550000e-07	200	342.000000	9.000000e-08	201	344.000000	1.090000e-07

8.2.2 Supplied Far-Field Source Signature - Casino

```
WAVELET NAME:              Casino FFsig
SAMPLE_RATE:               2.000000
TIME_SHIFT_ALIGNMENT:      -50.000000
CENTER OF GRAVITY SAMPLE:  30.552914
NUMBER OF SAMPLES:         250.000000
MAXIMUM AMPLITUDE:         29.942436
MAXIMUM POSITIVE:          29.942436
MAXIMUM NEGATIVE:          -32.326599
```

SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE
1	-48.000000	-8.906627e-05	2	-46.000000	-3.817037e-02	3	-44.000000	5.536114e-02
4	-42.000000	-4.122202e-02	5	-40.000000	4.636939e-02	6	-38.000000	-1.104187e-03
7	-36.000000	-1.760607e-02	8	-34.000000	6.466930e-03	9	-32.000000	-6.904272e-03
10	-30.000000	-1.312518e-02	11	-28.000000	3.744903e-02	12	-26.000000	-6.014621e-02
13	-24.000000	5.695148e-02	14	-22.000000	-7.208558e-03	15	-20.000000	-1.026185e-01
16	-18.000000	2.307265e-01	17	-16.000000	-3.618929e-01	18	-14.000000	3.569575e-01
19	-12.000000	-1.558530e-01	20	-10.000000	-2.727495e-01	21	-8.000000	9.278630e-01
22	-6.000000	-1.610045e00	23	-4.000000	2.150259e00	24	-2.000000	-2.369351e00
25	0.000000	2.872761e00	26	2.000000	2.994244e01	27	4.000000	2.044027e01
28	6.000000	6.969657e00	29	8.000000	-1.429202e00	30	10.000000	-3.232660e01
31	12.000000	-2.764946e01	32	14.000000	-9.310694e00	33	16.000000	-7.623116e00
34	18.000000	-1.539422e00	35	20.000000	-1.208405e00	36	22.000000	-2.029259e00
37	24.000000	-9.059961e-01	38	26.000000	-1.382886e00	39	28.000000	2.522894e-01
40	30.000000	1.549912e00	41	32.000000	1.744073e00	42	34.000000	1.921755e00
43	36.000000	1.523696e00	44	38.000000	4.784444e-01	45	40.000000	7.160287e-01
46	42.000000	1.261523e00	47	44.000000	1.362294e00	48	46.000000	1.675177e00
49	48.000000	1.441611e00	50	50.000000	1.220573e00	51	52.000000	1.229748e00
52	54.000000	1.202314e00	53	56.000000	1.338885e00	54	58.000000	1.373969e00
55	60.000000	1.331899e00	56	62.000000	1.282614e00	57	64.000000	1.221374e00
58	66.000000	1.204705e00	59	68.000000	1.210260e00	60	70.000000	1.193692e00
61	72.000000	1.151526e00	62	74.000000	1.065864e00	63	76.000000	9.493424e-01
64	78.000000	8.081817e-01	65	80.000000	6.663600e-01	66	82.000000	5.296708e-01
67	84.000000	4.352602e-01	68	86.000000	3.939256e-01	69	88.000000	4.039802e-01
70	90.000000	4.397777e-01	71	92.000000	4.771465e-01	72	94.000000	4.785912e-01
73	96.000000	4.589055e-01	74	98.000000	4.020803e-01	75	100.000000	3.320267e-01
76	102.000000	2.621759e-01	77	104.000000	1.948268e-01	78	106.000000	1.615481e-01
79	108.000000	1.681714e-01	80	110.000000	1.737741e-01	81	112.000000	2.041433e-01
82	114.000000	2.051785e-01	83	116.000000	1.732332e-01	84	118.000000	1.446540e-01
85	120.000000	1.554569e-01	86	122.000000	1.496790e-01	87	124.000000	6.704132e-02
88	126.000000	2.431230e-02	89	128.000000	-9.267759e-03	90	130.000000	-9.903854e-02
91	132.000000	-7.929075e-02	92	134.000000	-1.587805e-01	93	136.000000	-2.312447e-01
94	138.000000	-1.699016e-01	95	140.000000	-3.157658e-01	96	142.000000	-4.503247e-01
97	144.000000	-5.955641e-01	98	146.000000	-8.592114e-01	99	148.000000	-8.620823e-01
100	150.000000	-8.944747e-01	101	152.000000	-1.052817e00	102	154.000000	-1.210436e00
103	156.000000	-1.498103e00	104	158.000000	-1.823632e00	105	160.000000	-2.090705e00
106	162.000000	-2.294172e00	107	164.000000	-2.342498e00	108	166.000000	-2.186157e00
109	168.000000	-1.886690e00	110	170.000000	-1.551357e00	111	172.000000	-1.196674e00
112	174.000000	-8.969432e-01	113	176.000000	-6.431102e-01	114	178.000000	-4.001370e-01
115	180.000000	-1.954225e-01	116	182.000000	-4.588577e-02	117	184.000000	7.747085e-02
118	186.000000	1.616019e-01	119	188.000000	2.240289e-01	120	190.000000	2.791927e-01
121	192.000000	3.304650e-01	122	194.000000	3.612252e-01	123	196.000000	3.918222e-01
124	198.000000	4.173512e-01	125	200.000000	4.416015e-01	126	202.000000	4.648459e-01
127	204.000000	4.943073e-01	128	206.000000	5.107777e-01	129	208.000000	5.272181e-01
130	210.000000	5.375196e-01	131	212.000000	5.462450e-01	132	214.000000	5.484697e-01
133	216.000000	5.533454e-01	134	218.000000	5.488463e-01	135	220.000000	5.450128e-01
136	222.000000	5.357388e-01	137	224.000000	5.285487e-01	138	226.000000	5.160735e-01
139	228.000000	5.075622e-01	140	230.000000	4.937763e-01	141	232.000000	4.838830e-01
142	234.000000	4.703117e-01	143	236.000000	4.620375e-01	144	238.000000	4.520070e-01
145	240.000000	4.483758e-01	146	242.000000	4.424941e-01	147	244.000000	4.426075e-01
148	246.000000	4.381755e-01	149	248.000000	4.359258e-01	150	250.000000	4.301473e-01
151	252.000000	4.277813e-01	152	254.000000	4.183856e-01	153	256.000000	4.142785e-01
154	258.000000	4.039719e-01	155	260.000000	3.917859e-01	156	262.000000	3.749996e-01
157	264.000000	3.613746e-01	158	266.000000	3.371041e-01	159	268.000000	3.172135e-01
160	270.000000	2.932575e-01	161	272.000000	2.659838e-01	162	274.000000	2.360627e-01
163	276.000000	2.132170e-01	164	278.000000	1.791617e-01	165	280.000000	1.482054e-01
166	282.000000	1.139235e-01	167	284.000000	7.695558e-02	168	286.000000	3.632542e-02
169	288.000000	5.628796e-03	170	290.000000	-3.165884e-02	171	292.000000	-6.581881e-02
172	294.000000	-9.982114e-02	173	296.000000	-1.326847e-01	174	298.000000	-1.718446e-01
175	300.000000	-2.009916e-01	176	302.000000	-2.333960e-01	177	304.000000	-2.613694e-01
178	306.000000	-2.883601e-01	179	308.000000	-3.096435e-01	180	310.000000	-3.356676e-01
181	312.000000	-3.535502e-01	182	314.000000	-3.743859e-01	183	316.000000	-3.924305e-01
184	318.000000	-4.131476e-01	185	320.000000	-4.323802e-01	186	322.000000	-4.590355e-01
187	324.000000	-4.843157e-01	188	326.000000	-5.177805e-01	189	328.000000	-5.389999e-01
190	330.000000	-5.503455e-01	191	332.000000	-5.443009e-01	192	334.000000	-5.231423e-01
193	336.000000	-4.870013e-01	194	338.000000	-4.540428e-01	195	340.000000	-4.095794e-01
196	342.000000	-3.642930e-01	197	344.000000	-3.156603e-01	198	346.000000	-2.660842e-01
199	348.000000	-2.097865e-01	200	350.000000	-1.645706e-01	201	352.000000	-1.180612e-01
202	354.000000	-7.757990e-02	203	356.000000	-4.063917e-02	204	358.000000	-1.072826e-02
205	360.000000	2.348539e-02	206	362.000000	4.780447e-02	207	364.000000	7.236888e-02
208	366.000000	9.235763e-02	209	368.000000	1.117751e-01	210	370.000000	1.237249e-01
211	372.000000	1.403167e-01	212	374.000000	1.496157e-01	213	376.000000	1.600378e-01
214	378.000000	1.667531e-01	215	380.000000	1.754907e-01	216	382.000000	1.780782e-01
217	384.000000	1.849836e-01	218	386.000000	1.863959e-01	219	388.000000	1.902259e-01

220	390.000000	1.897729e-01	221	392.000000	1.929808e-01	222	394.000000	1.907209e-01
223	396.000000	1.923443e-01	224	398.000000	1.895701e-01	225	400.000000	1.897484e-01
226	402.000000	1.853581e-01	227	404.000000	1.857143e-01	228	406.000000	1.811475e-01
229	408.000000	1.811841e-01	230	410.000000	1.774567e-01	231	412.000000	1.773375e-01
232	414.000000	1.733622e-01	233	416.000000	1.727437e-01	234	418.000000	1.673853e-01
235	420.000000	1.664146e-01	236	422.000000	1.599702e-01	237	424.000000	1.569746e-01
238	426.000000	1.500981e-01	239	428.000000	1.449987e-01	240	430.000000	1.348131e-01
241	432.000000	1.293310e-01	242	434.000000	1.172698e-01	243	436.000000	1.083943e-01
244	438.000000	9.641501e-02	245	440.000000	8.705086e-02	246	442.000000	7.247644e-02
247	444.000000	6.343161e-02	248	446.000000	4.909366e-02	249	448.000000	3.730944e-02
250	450.000000	2.351239e-02						

8.2.3 Supplied Far-Field Source Signature – Champion and Hercules

```
WAVELET NAME:                Champion FFsig
SAMPLE_RATE:                 2.000000
TIME_SHIFT_ALIGNMENT:        -62.000000
CENTER OF GRAVITY SAMPLE:    37.316647
NUMBER OF SAMPLES:           1000.000000
MAXIMUM AMPLITUDE:           52.086102
MAXIMUM POSITIVE:            52.086102
MAXIMUM NEGATIVE:            -57.503399
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SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE
1	-60.000000	-3.461410e-07	2	-58.000000	5.069060e-05	3	-56.000000	2.026500e-04
4	-54.000000	2.063460e-04	5	-52.000000	1.721680e-04	6	-50.000000	4.032320e-04
7	-48.000000	1.817300e-04	8	-46.000000	-3.715150e-03	9	-44.000000	-1.189800e-02
10	-42.000000	-8.510840e-03	11	-40.000000	7.450370e-04	12	-38.000000	-8.446640e-03
13	-36.000000	1.492600e-02	14	-34.000000	1.196110e-02	15	-32.000000	-1.033970e-02
16	-30.000000	3.551940e-02	17	-28.000000	-4.012380e-02	18	-26.000000	3.122410e-02
19	-24.000000	1.242530e-03	20	-22.000000	-5.635130e-02	21	-20.000000	1.183410e-01
22	-18.000000	-1.582670e-01	23	-16.000000	1.602020e-01	24	-14.000000	-8.936490e-02
25	-12.000000	-4.568140e-02	26	-10.000000	2.300910e-01	27	-8.000000	-4.249700e-01
28	-6.000000	5.751070e-01	29	-4.000000	-6.345460e-01	30	-2.000000	5.781280e-01
31	0.000000	-3.590680e-01	32	2.000000	1.443960e01	33	4.000000	5.208610e01
34	6.000000	3.590740e01	35	8.000000	5.441250e00	36	10.000000	7.421040e00
37	12.000000	-3.692980e01	38	14.000000	-5.750340e01	39	16.000000	-2.159190e01
40	18.000000	-1.348540e01	41	20.000000	-6.261440e00	42	22.000000	2.030910e00
43	24.000000	-8.488830e-01	44	26.000000	7.626880e-01	45	28.000000	-5.546080e00
46	30.000000	-6.401120e00	47	32.000000	-4.455740e00	48	34.000000	-4.306290e00
49	36.000000	7.750950e-01	50	38.000000	1.410050e00	51	40.000000	1.157450e00
52	42.000000	7.825610e-01	53	44.000000	-4.362750e-01	54	46.000000	-9.384570e-02
55	48.000000	1.998570e-01	56	50.000000	1.210570e00	57	52.000000	1.577450e00
58	54.000000	1.655460e00	59	56.000000	2.031770e00	60	58.000000	1.664510e00
61	60.000000	1.515360e00	62	62.000000	1.598680e00	63	64.000000	1.359900e00
64	66.000000	1.298240e00	65	68.000000	1.272360e00	66	70.000000	1.264300e00
67	72.000000	1.167430e00	68	74.000000	1.197940e00	69	76.000000	1.503440e00
70	78.000000	1.511570e00	71	80.000000	1.675560e00	72	82.000000	1.750870e00
73	84.000000	1.535810e00	74	86.000000	1.404120e00	75	88.000000	1.209580e00
76	90.000000	1.154080e00	77	92.000000	1.255820e00	78	94.000000	1.468030e00
79	96.000000	1.703620e00	80	98.000000	1.782370e00	81	100.000000	1.830830e00
82	102.000000	1.743420e00	83	104.000000	1.709880e00	84	106.000000	1.876540e00
85	108.000000	1.753610e00	86	110.000000	1.743480e00	87	112.000000	1.967190e00
88	114.000000	1.824010e00	89	116.000000	1.800110e00	90	118.000000	1.980370e00
91	120.000000	1.840580e00	92	122.000000	1.625600e00	93	124.000000	1.494200e00
94	126.000000	1.263490e00	95	128.000000	1.291280e00	96	130.000000	1.315620e00
97	132.000000	6.883040e-01	98	134.000000	3.250690e-01	99	136.000000	2.540130e-02
100	138.000000	-7.410170e-01	101	140.000000	-7.675520e-01	102	142.000000	-6.203950e-01
103	144.000000	-8.780110e-01	104	146.000000	-1.009870e00	105	148.000000	-1.338510e00
106	150.000000	-1.704860e00	107	152.000000	-2.111350e00	108	154.000000	-2.608840e00
109	156.000000	-2.969410e00	110	158.000000	-3.320410e00	111	160.000000	-3.393570e00
112	162.000000	-3.169220e00	113	164.000000	-2.800430e00	114	166.000000	-2.308160e00
115	168.000000	-1.892990e00	116	170.000000	-1.570010e00	117	172.000000	-1.356510e00
118	174.000000	-1.218880e00	119	176.000000	-1.091630e00	120	178.000000	-9.893830e-01
121	180.000000	-8.672870e-01	122	182.000000	-7.505100e-01	123	184.000000	-6.546930e-01
124	186.000000	-5.594720e-01	125	188.000000	-4.716730e-01	126	190.000000	-3.803470e-01
127	192.000000	-2.840640e-01	128	194.000000	-1.833420e-01	129	196.000000	-8.174870e-02
130	198.000000	8.471110e-03	131	200.000000	9.527260e-02	132	202.000000	1.725890e-01
133	204.000000	2.363590e-01	134	206.000000	2.977220e-01	135	208.000000	3.501370e-01
136	210.000000	3.960680e-01	137	212.000000	4.366720e-01	138	214.000000	4.685540e-01
139	216.000000	4.946210e-01	140	218.000000	5.137130e-01	141	220.000000	5.291380e-01
142	222.000000	5.422750e-01	143	224.000000	5.553700e-01	144	226.000000	5.716470e-01
145	228.000000	5.882830e-01	146	230.000000	6.065210e-01	147	232.000000	6.252290e-01
148	234.000000	6.402170e-01	149	236.000000	6.547830e-01	150	238.000000	6.685660e-01
151	240.000000	6.789520e-01	152	242.000000	6.873380e-01	153	244.000000	6.899340e-01
154	246.000000	6.844510e-01	155	248.000000	6.731220e-01	156	250.000000	6.562240e-01
157	252.000000	6.364820e-01	158	254.000000	6.211440e-01	159	256.000000	6.098490e-01
160	258.000000	5.937460e-01	161	260.000000	5.736010e-01	162	262.000000	5.456050e-01
163	264.000000	5.016340e-01	164	266.000000	4.521920e-01	165	268.000000	4.012990e-01
166	270.000000	3.469080e-01	167	272.000000	2.952800e-01	168	274.000000	2.446280e-01
169	276.000000	1.940450e-01	170	278.000000	1.464280e-01	171	280.000000	1.016860e-01
172	282.000000	5.952550e-02	173	284.000000	2.000590e-02	174	286.000000	-1.468340e-02
175	288.000000	-4.811410e-02	176	290.000000	-8.409110e-02	177	292.000000	-1.198950e-01

178	294.000000	-1.577460e-01	179	296.000000	-2.049660e-01	180	298.000000	-2.640490e-01
181	300.000000	-3.284960e-01	182	302.000000	-3.979250e-01	183	304.000000	-4.720270e-01
184	306.000000	-5.320610e-01	185	308.000000	-5.721270e-01	186	310.000000	-5.986160e-01
187	312.000000	-6.045340e-01	188	314.000000	-5.936580e-01	189	316.000000	-5.763570e-01
190	318.000000	-5.538970e-01	191	320.000000	-5.291180e-01	192	322.000000	-5.025500e-01
193	324.000000	-4.735170e-01	194	326.000000	-4.413480e-01	195	328.000000	-4.061400e-01
196	330.000000	-3.709360e-01	197	332.000000	-3.352330e-01	198	334.000000	-3.006320e-01
199	336.000000	-2.690540e-01	200	338.000000	-2.381290e-01	201	340.000000	-2.087830e-01
202	342.000000	-1.814740e-01	203	344.000000	-1.542190e-01	204	346.000000	-1.277520e-01
205	348.000000	-1.028100e-01	206	350.000000	-7.868860e-02	207	352.000000	-5.623680e-02
208	354.000000	-3.572870e-02	209	356.000000	-1.616910e-02	210	358.000000	2.515920e-03
211	360.000000	2.071370e-02	212	362.000000	3.809430e-02	213	364.000000	5.457670e-02
214	366.000000	7.043130e-02	215	368.000000	8.460500e-02	216	370.000000	9.880630e-02
217	372.000000	1.142710e-01	218	374.000000	1.293020e-01	219	376.000000	1.443740e-01
220	378.000000	1.594260e-01	221	380.000000	1.731950e-01	222	382.000000	1.860190e-01
223	384.000000	1.986180e-01	224	386.000000	2.115140e-01	225	388.000000	2.235260e-01
226	390.000000	2.332060e-01	227	392.000000	2.413310e-01	228	394.000000	2.473610e-01
229	396.000000	2.500820e-01	230	398.000000	2.513980e-01	231	400.000000	2.514640e-01
232	402.000000	2.489780e-01	233	404.000000	2.454710e-01	234	406.000000	2.400340e-01
235	408.000000	2.322940e-01	236	410.000000	2.243770e-01	237	412.000000	2.145910e-01
238	414.000000	2.031030e-01	239	416.000000	1.919520e-01	240	418.000000	1.794530e-01
241	420.000000	1.650750e-01	242	422.000000	1.503320e-01	243	424.000000	1.348230e-01
244	426.000000	1.176520e-01	245	428.000000	1.002170e-01	246	430.000000	8.283220e-02
247	432.000000	6.433460e-02	248	434.000000	4.590970e-02	249	436.000000	2.772580e-02
250	438.000000	9.006800e-03	251	440.000000	-9.283360e-03	252	442.000000	-2.702990e-02
253	444.000000	-4.457540e-02	254	446.000000	-6.167190e-02	255	448.000000	-7.785030e-02
256	450.000000	-9.346230e-02	257	452.000000	-1.093160e-01	258	454.000000	-1.242530e-01
259	456.000000	-1.380390e-01	260	458.000000	-1.517050e-01	261	460.000000	-1.634760e-01
262	462.000000	-1.725150e-01	263	464.000000	-1.801350e-01	264	466.000000	-1.851950e-01
265	468.000000	-1.864750e-01	266	470.000000	-1.849150e-01	267	472.000000	-1.816710e-01
268	474.000000	-1.767280e-01	269	476.000000	-1.698500e-01	270	478.000000	-1.627980e-01
271	480.000000	-1.553830e-01	272	482.000000	-1.455290e-01	273	484.000000	-1.349690e-01
274	486.000000	-1.243240e-01	275	488.000000	-1.123110e-01	276	490.000000	-1.006080e-01
277	492.000000	-8.920100e-02	278	494.000000	-7.730420e-02	279	496.000000	-6.601140e-02
280	498.000000	-5.473180e-02	281	500.000000	-4.327140e-02	282	502.000000	-3.244540e-02
283	504.000000	-2.204690e-02	284	506.000000	-1.185820e-02	285	508.000000	-2.115150e-03
286	510.000000	7.002670e-03	287	512.000000	1.617740e-02	288	514.000000	2.500160e-02
289	516.000000	3.283960e-02	290	518.000000	4.036220e-02	291	520.000000	4.708170e-02
292	522.000000	5.314910e-02	293	524.000000	5.893590e-02	294	526.000000	6.442590e-02
295	528.000000	6.994150e-02	296	530.000000	7.475610e-02	297	532.000000	7.980830e-02
298	534.000000	8.457660e-02	299	536.000000	8.767260e-02	300	538.000000	9.026230e-02
301	540.000000	9.142020e-02	302	542.000000	9.169560e-02	303	544.000000	9.150170e-02
304	546.000000	8.977600e-02	305	548.000000	8.860940e-02	306	550.000000	8.633430e-02
307	552.000000	8.234740e-02	308	554.000000	7.943880e-02	309	556.000000	7.501750e-02
310	558.000000	6.943630e-02	311	560.000000	6.528050e-02	312	562.000000	6.036730e-02
313	564.000000	5.472990e-02	314	566.000000	4.982090e-02	315	568.000000	4.443280e-02
316	570.000000	3.789530e-02	317	572.000000	3.174000e-02	318	574.000000	2.567870e-02
319	576.000000	1.861020e-02	320	578.000000	1.262830e-02	321	580.000000	7.199430e-03
322	582.000000	1.309630e-03	323	584.000000	-3.348750e-03	324	586.000000	-8.124260e-03
325	588.000000	-1.313840e-02	326	590.000000	-1.749120e-02	327	592.000000	-2.209310e-02
328	594.000000	-2.670160e-02	329	596.000000	-3.150230e-02	330	598.000000	-3.540630e-02
331	600.000000	-3.821840e-02	332	602.000000	-4.140770e-02	333	604.000000	-4.337740e-02
334	606.000000	-4.469270e-02	335	608.000000	-4.744940e-02	336	610.000000	-4.951410e-02
337	612.000000	-5.017420e-02	338	614.000000	-5.103940e-02	339	616.000000	-5.138100e-02
340	618.000000	-5.061070e-02	341	620.000000	-4.917070e-02	342	622.000000	-4.798150e-02
343	624.000000	-4.706800e-02	344	626.000000	-4.472970e-02	345	628.000000	-4.245620e-02
346	630.000000	-4.103400e-02	347	632.000000	-3.798510e-02	348	634.000000	-3.452540e-02
349	636.000000	-3.173640e-02	350	638.000000	-2.835770e-02	351	640.000000	-2.540550e-02
352	642.000000	-2.271970e-02	353	644.000000	-1.957060e-02	354	646.000000	-1.686610e-02
355	648.000000	-1.335260e-02	356	650.000000	-9.147850e-03	357	652.000000	-5.986980e-03
358	654.000000	-2.983460e-03	359	656.000000	-9.673180e-05	360	658.000000	2.634840e-03
361	660.000000	5.441650e-03	362	662.000000	8.001890e-03	363	664.000000	1.127420e-02
364	666.000000	1.421840e-02	365	668.000000	1.603480e-02	366	670.000000	1.826330e-02
367	672.000000	2.061010e-02	368	674.000000	2.198780e-02	369	676.000000	2.377260e-02
370	678.000000	2.642940e-02	371	680.000000	2.757100e-02	372	682.000000	2.853540e-02
373	684.000000	3.015410e-02	374	686.000000	3.020740e-02	375	688.000000	3.046370e-02
376	690.000000	3.050050e-02	377	692.000000	2.937410e-02	378	694.000000	2.894040e-02
379	696.000000	2.779130e-02	380	698.000000	2.686840e-02	381	700.000000	2.681310e-02
382	702.000000	2.557270e-02	383	704.000000	2.448340e-02	384	706.000000	2.298420e-02
385	708.000000	2.070520e-02	386	710.000000	1.900960e-02	387	712.000000	1.682400e-02
388	714.000000	1.467000e-02	389	716.000000	1.248210e-02	390	718.000000	1.004080e-02
391	720.000000	8.145510e-03	392	722.000000	5.506570e-03	393	724.000000	3.645760e-03
394	726.000000	2.673580e-03	395	728.000000	2.466600e-04	396	730.000000	-1.519680e-03
397	732.000000	-3.055120e-03	398	734.000000	-5.846040e-03	399	736.000000	-7.678450e-03
400	738.000000	-8.937420e-03	401	740.000000	-1.057990e-02	402	742.000000	-1.189200e-02
403	744.000000	-1.285980e-02	404	746.000000	-1.400080e-02	405	748.000000	-1.558140e-02
406	750.000000	-1.640790e-02	407	752.000000	-1.677770e-02	408	754.000000	-1.752330e-02
409	756.000000	-1.755190e-02	410	758.000000	-1.766330e-02	411	760.000000	-1.804330e-02
412	762.000000	-1.790640e-02	413	764.000000	-1.790190e-02	414	766.000000	-1.731550e-02
415	768.000000	-1.666750e-02	416	770.000000	-1.649680e-02	417	772.000000	-1.566080e-02
418	774.000000	-1.494900e-02	419	776.000000	-1.407960e-02	420	778.000000	-1.263240e-02
421	780.000000	-1.169100e-02	422	782.000000	-1.081070e-02	423	784.000000	-9.682840e-03
424	786.000000	-8.312910e-03	425	788.000000	-7.129760e-03	426	790.000000	-6.146370e-03
427	792.000000	-4.416950e-03	428	794.000000	-2.983340e-03	429	796.000000	-1.996330e-03
430	798.000000	-8.042050e-04	431	800.000000	-3.712540e-05	432	802.000000	6.164050e-04
433	804.000000	1.295610e-03	434	806.000000	2.576550e-03	435	808.000000	4.289430e-03

436	810.000000	5.194330e-03	437	812.000000	6.307440e-03	438	814.000000	7.364340e-03
439	816.000000	7.843440e-03	440	818.000000	8.851130e-03	441	820.000000	9.339950e-03
442	822.000000	9.537810e-03	443	824.000000	1.051330e-02	444	826.000000	1.078930e-02
445	828.000000	1.071420e-02	446	830.000000	1.141370e-02	447	832.000000	1.154600e-02
448	834.000000	1.076690e-02	449	836.000000	1.040940e-02	450	838.000000	1.026470e-02
451	840.000000	9.769480e-03	452	842.000000	1.004580e-02	453	844.000000	1.027640e-02
454	846.000000	9.511100e-03	455	848.000000	9.259790e-03	456	850.000000	8.331060e-03
457	852.000000	6.666860e-03	458	854.000000	6.402280e-03	459	856.000000	6.059340e-03
460	858.000000	5.317920e-03	461	860.000000	5.074950e-03	462	862.000000	4.571790e-03
463	864.000000	3.705170e-03	464	866.000000	2.140560e-03	465	868.000000	7.180400e-04
466	870.000000	2.204370e-04	467	872.000000	-6.575310e-04	468	874.000000	-1.311440e-03
469	876.000000	-1.083950e-03	470	878.000000	-1.672630e-03	471	880.000000	-3.077930e-03
472	882.000000	-3.689720e-03	473	884.000000	-4.113730e-03	474	886.000000	-5.343290e-03
475	888.000000	-6.096930e-03	476	890.000000	-6.124930e-03	477	892.000000	-6.426820e-03
478	894.000000	-6.747990e-03	479	896.000000	-6.654270e-03	480	898.000000	-6.351450e-03
481	900.000000	-6.636480e-03	482	902.000000	-6.982550e-03	483	904.000000	-6.565310e-03
484	906.000000	-6.560480e-03	485	908.000000	-6.624470e-03	486	910.000000	-6.051260e-03
487	912.000000	-5.900730e-03	488	914.000000	-5.820840e-03	489	916.000000	-5.388770e-03
490	918.000000	-5.359290e-03	491	920.000000	-5.310060e-03	492	922.000000	-4.899770e-03
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502	942.000000	-3.705830e-04	503	944.000000	7.009100e-04	504	946.000000	1.198790e-03
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508	954.000000	1.618940e-03	509	956.000000	2.209570e-03	510	958.000000	3.036840e-03
511	960.000000	4.100510e-03	512	962.000000	4.898810e-03	513	964.000000	5.161000e-03
514	966.000000	4.780400e-03	515	968.000000	4.078360e-03	516	970.000000	3.980360e-03
517	972.000000	3.880630e-03	518	974.000000	3.840110e-03	519	976.000000	4.257820e-03
520	978.000000	4.426330e-03	521	980.000000	4.454070e-03	522	982.000000	4.370940e-03
523	984.000000	4.118470e-03	524	986.000000	3.910410e-03	525	988.000000	3.647170e-03
526	990.000000	3.447770e-03	527	992.000000	3.257500e-03	528	994.000000	3.013920e-03
529	996.000000	2.753870e-03	530	998.000000	2.428660e-03	531	1000.000000	2.094190e-03
532	1002.000000	1.751790e-03	533	1004.000000	1.414830e-03	534	1006.000000	1.081300e-03
535	1008.000000	7.583340e-04	536	1010.000000	4.292270e-04	537	1012.000000	9.536370e-05
538	1014.000000	-2.317480e-04	539	1016.000000	-5.387650e-04	540	1018.000000	-8.318620e-04
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553	1044.000000	-2.760120e-03	554	1046.000000	-2.751610e-03	555	1048.000000	-2.726230e-03
556	1050.000000	-2.678990e-03	557	1052.000000	-2.604170e-03	558	1054.000000	-2.516450e-03
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574	1086.000000	3.200330e-04	575	1088.000000	5.029010e-04	576	1090.000000	6.708810e-04
577	1092.000000	8.214620e-04	578	1094.000000	9.629020e-04	579	1096.000000	1.099270e-03
580	1098.000000	1.221490e-03	581	1100.000000	1.336900e-03	582	1102.000000	1.443240e-03
583	1104.000000	1.536210e-03	584	1106.000000	1.615980e-03	585	1108.000000	1.674020e-03
586	1110.000000	1.713560e-03	587	1112.000000	1.731750e-03	588	1114.000000	1.730270e-03
589	1116.000000	1.720870e-03	590	1118.000000	1.700710e-03	591	1120.000000	1.669270e-03
592	1122.000000	1.630030e-03	593	1124.000000	1.578780e-03	594	1126.000000	1.513070e-03
595	1128.000000	1.437560e-03	596	1130.000000	1.352630e-03	597	1132.000000	1.254760e-03
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637	1212.000000	-4.194760e-04	638	1214.000000	-3.450790e-04	639	1216.000000	-2.719960e-04
640	1218.000000	-1.986560e-04	641	1220.000000	-1.243720e-04	642	1222.000000	-5.159280e-05
643	1224.000000	1.988530e-05	644	1226.000000	9.030270e-05	645	1228.000000	1.575800e-04
646	1230.000000	2.216650e-04	647	1232.000000	2.828940e-04	648	1234.000000	3.403950e-04
649	1236.000000	3.938130e-04	650	1238.000000	4.431960e-04	651	1240.000000	4.882230e-04
652	1242.000000	5.289640e-04	653	1244.000000	5.644210e-04	654	1246.000000	5.941370e-04
655	1248.000000	6.185240e-04	656	1250.000000	6.365630e-04	657	1252.000000	6.484110e-04
658	1254.000000	6.558600e-04	659	1256.000000	6.570910e-04	660	1258.000000	6.515670e-04
661	1260.000000	6.414130e-04	662	1262.000000	6.255190e-04	663	1264.000000	6.039400e-04
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676	1290.000000	7.926270e-05	677	1292.000000	3.314060e-05	678	1294.000000	-1.242190e-05
679	1296.000000	-5.680640e-05	680	1298.000000	-9.920830e-05	681	1300.000000	-1.400140e-04
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709	1356.000000	-1.186760e-04	710	1358.000000	-9.015960e-05	711	1360.000000	-6.211910e-05
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715	1368.000000	4.609420e-05	716	1370.000000	7.109550e-05	717	1372.000000	9.475490e-05
718	1374.000000	1.171720e-04	719	1376.000000	1.382700e-04	720	1378.000000	1.579510e-04
721	1380.000000	1.760690e-04	722	1382.000000	1.925400e-04	723	1384.000000	2.072000e-04
724	1386.000000	2.199640e-04	725	1388.000000	2.304310e-04	726	1390.000000	2.388570e-04
727	1392.000000	2.453450e-04	728	1394.000000	2.494010e-04	729	1396.000000	2.510310e-04
730	1398.000000	2.508830e-04	731	1400.000000	2.483530e-04	732	1402.000000	2.437630e-04
733	1404.000000	2.379220e-04	734	1406.000000	2.301030e-04	735	1408.000000	2.200840e-04
736	1410.000000	2.089130e-04	737	1412.000000	1.960180e-04	738	1414.000000	1.815570e-04
739	1416.000000	1.665500e-04	740	1418.000000	1.506140e-04	741	1420.000000	1.333640e-04
742	1422.000000	1.157330e-04	743	1424.000000	9.755490e-05	744	1426.000000	7.883290e-05
745	1428.000000	6.028450e-05	746	1430.000000	4.197650e-05	747	1432.000000	2.351850e-05
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751	1440.000000	-4.569940e-05	752	1442.000000	-6.112090e-05	753	1444.000000	-7.574100e-05
754	1446.000000	-8.923990e-05	755	1448.000000	-1.016050e-04	756	1450.000000	-1.126940e-04
757	1452.000000	-1.224890e-04	758	1454.000000	-1.310190e-04	759	1456.000000	-1.382420e-04
760	1458.000000	-1.439950e-04	761	1460.000000	-1.486220e-04	762	1462.000000	-1.518750e-04
763	1464.000000	-1.538180e-04	764	1466.000000	-1.547920e-04	765	1468.000000	-1.546090e-04
766	1470.000000	-1.529130e-04	767	1472.000000	-1.502110e-04	768	1474.000000	-1.463380e-04
769	1476.000000	-1.412670e-04	770	1478.000000	-1.354530e-04	771	1480.000000	-1.289620e-04
772	1482.000000	-1.213440e-04	773	1484.000000	-1.130150e-04	774	1486.000000	-1.040400e-04
775	1488.000000	-9.429610e-05	776	1490.000000	-8.411760e-05	777	1492.000000	-7.386460e-05
778	1494.000000	-6.306410e-05	779	1496.000000	-5.199840e-05	780	1498.000000	-4.091030e-05
781	1500.000000	-2.966480e-05	782	1502.000000	-1.841240e-05	783	1504.000000	-7.578460e-06
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787	1512.000000	3.331510e-05	788	1514.000000	4.251040e-05	789	1516.000000	5.107780e-05
790	1518.000000	5.913170e-05	791	1520.000000	6.650630e-05	792	1522.000000	7.326480e-05
793	1524.000000	7.927400e-05	794	1526.000000	8.453350e-05	795	1528.000000	8.901000e-05
796	1530.000000	9.276750e-05	797	1532.000000	9.551970e-05	798	1534.000000	9.741130e-05
799	1536.000000	9.842170e-05	800	1538.000000	9.852400e-05	801	1540.000000	9.780450e-05
802	1542.000000	9.654550e-05	803	1544.000000	9.435580e-05	804	1546.000000	9.138710e-05
805	1548.000000	8.781410e-05	806	1550.000000	8.351100e-05	807	1552.000000	7.853250e-05
808	1554.000000	7.335030e-05	809	1556.000000	6.757060e-05	810	1558.000000	6.127490e-05
811	1560.000000	5.471640e-05	812	1562.000000	4.784190e-05	813	1564.000000	4.060770e-05
814	1566.000000	3.348490e-05	815	1568.000000	2.623950e-05	816	1570.000000	1.890070e-05
817	1572.000000	1.162050e-05	818	1574.000000	4.480460e-06	819	1576.000000	-2.624680e-06
820	1578.000000	-9.383300e-06	821	1580.000000	-1.589670e-05	822	1582.000000	-2.209620e-05
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829	1596.000000	-5.333870e-05	830	1598.000000	-5.574330e-05	831	1600.000000	-5.763650e-05
832	1602.000000	-5.896050e-05	833	1604.000000	-5.997810e-05	834	1606.000000	-6.042490e-05
835	1608.000000	-6.035850e-05	836	1610.000000	-5.983970e-05	837	1612.000000	-5.886630e-05
838	1614.000000	-5.732560e-05	839	1616.000000	-5.558330e-05	840	1618.000000	-5.341440e-05
841	1620.000000	-5.082940e-05	842	1622.000000	-4.791630e-05	843	1624.000000	-4.475480e-05
844	1626.000000	-4.118450e-05	845	1628.000000	-3.753970e-05	846	1630.000000	-3.370170e-05
847	1632.000000	-2.966870e-05	848	1634.000000	-2.545390e-05	849	1636.000000	-2.123400e-05
850	1638.000000	-1.683060e-05	851	1640.000000	-1.250290e-05	852	1642.000000	-8.207670e-06
853	1644.000000	-3.970100e-06	854	1646.000000	2.657990e-07	855	1648.000000	4.296250e-06
856	1650.000000	8.283420e-06	857	1652.000000	1.203800e-05	858	1654.000000	1.563100e-05
859	1656.000000	1.897270e-05	860	1658.000000	2.215320e-05	861	1660.000000	2.502170e-05
862	1662.000000	2.770310e-05	863	1664.000000	3.003980e-05	864	1666.000000	3.217650e-05
865	1668.000000	3.395760e-05	866	1670.000000	3.545400e-05	867	1672.000000	3.655840e-05
868	1674.000000	3.738310e-05	869	1676.000000	3.776610e-05	870	1678.000000	3.793170e-05
871	1680.000000	3.775240e-05	872	1682.000000	3.728410e-05	873	1684.000000	3.645100e-05
874	1686.000000	3.542610e-05	875	1688.000000	3.401230e-05	876	1690.000000	3.244340e-05
877	1692.000000	3.065750e-05	878	1694.000000	2.868470e-05	879	1696.000000	2.642430e-05
880	1698.000000	2.412490e-05	881	1700.000000	2.156570e-05	882	1702.000000	1.895720e-05
883	1704.000000	1.627910e-05	884	1706.000000	1.358450e-05	885	1708.000000	1.073690e-05
886	1710.000000	7.991990e-06	887	1712.000000	5.158940e-06	888	1714.000000	2.416140e-06
889	1716.000000	-2.953590e-07	890	1718.000000	-2.853140e-06	891	1720.000000	-5.416180e-06
892	1722.000000	-7.772410e-06	893	1724.000000	-1.007870e-05	894	1726.000000	-1.216350e-05
895	1728.000000	-1.414890e-05	896	1730.000000	-1.587810e-05	897	1732.000000	-1.749580e-05
898	1734.000000	-1.882010e-05	899	1736.000000	-2.003210e-05	900	1738.000000	-2.094890e-05
901	1740.000000	-2.175000e-05	902	1742.000000	-2.231030e-05	903	1744.000000	-2.275460e-05
904	1746.000000	-2.290860e-05	905	1748.000000	-2.299480e-05	906	1750.000000	-2.278610e-05
907	1752.000000	-2.247890e-05	908	1754.000000	-2.197500e-05	909	1756.000000	-2.138530e-05
910	1758.000000	-2.051800e-05	911	1760.000000	-1.964020e-05	912	1762.000000	-1.852310e-05
913	1764.000000	-1.735760e-05	914	1766.000000	-1.605280e-05	915	1768.000000	-1.475580e-05
916	1770.000000	-1.324340e-05	917	1772.000000	-1.178390e-05	918	1774.000000	-1.017100e-05
919	1776.000000	-8.594040e-06	920	1778.000000	-6.924120e-06	921	1780.000000	-5.361650e-06
922	1782.000000	-3.672470e-06	923	1784.000000	-2.103950e-06	924	1786.000000	-4.621660e-07
925	1788.000000	1.051700e-06	926	1790.000000	2.613410e-06	927	1792.000000	3.992880e-06
928	1794.000000	5.422670e-06	929	1796.000000	6.664210e-06	930	1798.000000	7.936880e-06
931	1800.000000	9.009080e-06	932	1802.000000	1.009850e-05	933	1804.000000	1.098420e-05
934	1806.000000	1.188160e-05	935	1808.000000	1.253420e-05	936	1810.000000	1.320400e-05
937	1812.000000	1.361870e-05	938	1814.000000	1.401620e-05	939	1816.000000	1.418560e-05
940	1818.000000	1.436100e-05	941	1820.000000	1.426260e-05	942	1822.000000	1.419180e-05
943	1824.000000	1.387370e-05	944	1826.000000	1.356580e-05	945	1828.000000	1.304000e-05
946	1830.000000	1.257500e-05	947	1832.000000	1.185410e-05	948	1834.000000	1.119750e-05
949	1836.000000	1.032930e-05	950	1838.000000	9.528080e-06	951	1840.000000	8.529650e-06

952	1842.000000	7.668200e-06	953	1844.000000	6.594070e-06	954	1846.000000	5.643810e-06
955	1848.000000	4.525140e-06	956	1850.000000	3.549750e-06	957	1852.000000	2.402370e-06
958	1854.000000	1.462110e-06	959	1856.000000	3.541060e-07	960	1858.000000	-5.562490e-07
961	1860.000000	-1.610520e-06	962	1862.000000	-2.442060e-06	963	1864.000000	-3.423730e-06
964	1866.000000	-4.148030e-06	965	1868.000000	-5.016460e-06	966	1870.000000	-5.612000e-06
967	1872.000000	-6.349470e-06	968	1874.000000	-6.794030e-06	969	1876.000000	-7.381990e-06
970	1878.000000	-7.669150e-06	971	1880.000000	-8.122510e-06	972	1882.000000	-8.254020e-06
973	1884.000000	-8.564990e-06	974	1886.000000	-8.553600e-06	975	1888.000000	-8.730830e-06
976	1890.000000	-8.568760e-06	977	1892.000000	-8.639480e-06	978	1894.000000	-8.341710e-06
979	1896.000000	-8.277310e-06	980	1898.000000	-7.852090e-06	981	1900.000000	-7.689230e-06
982	1902.000000	-7.132240e-06	983	1904.000000	-6.909780e-06	984	1906.000000	-6.267020e-06
985	1908.000000	-5.961450e-06	986	1910.000000	-5.227930e-06	987	1912.000000	-4.888430e-06
988	1914.000000	-4.065860e-06	989	1916.000000	-3.724250e-06	990	1918.000000	-2.863820e-06
991	1920.000000	-2.525060e-06	992	1922.000000	-1.610570e-06	993	1924.000000	-1.320290e-06
994	1926.000000	-3.546490e-07	995	1928.000000	-1.444770e-07	996	1930.000000	8.544140e-07
997	1932.000000	9.416880e-07	998	1934.000000	2.012100e-06	999	1936.000000	1.902660e-06
1000	1938.000000	3.109690e-06						

8.2.4 Combined Debubble and Zero-Phasing Operator - Antares

```
WAVELET NAME:              Ant op
SAMPLE_RATE:               2.000000
TIME_SHIFT_ALIGNMENT:      -902.000000
CENTER OF GRAVITY SAMPLE:  448.538898
NUMBER OF SAMPLES:         922.000000
MAXIMUM AMPLITUDE:         0.487508
MAXIMUM POSITIVE:          0.487508
MAXIMUM NEGATIVE:          -0.306907
```

SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE
1	-900.000000	8.811473e-04	2	-898.000000	3.861468e-04	3	-896.000000	-2.871865e-03
4	-894.000000	5.152440e-04	5	-892.000000	-6.122980e-05	6	-890.000000	6.809714e-04
7	-888.000000	-3.827638e-03	8	-886.000000	6.417697e-04	9	-884.000000	-6.505018e-04
10	-882.000000	2.083748e-04	11	-880.000000	-3.709062e-03	12	-878.000000	-4.150732e-04
13	-876.000000	-1.448356e-04	14	-874.000000	-1.079563e-03	15	-872.000000	-3.124450e-03
16	-870.000000	-1.673948e-03	17	-868.000000	5.589696e-04	18	-866.000000	-2.602309e-03
19	-864.000000	-2.225350e-03	20	-862.000000	-3.221684e-03	21	-860.000000	1.324942e-03
22	-858.000000	-3.738210e-03	23	-856.000000	-2.057149e-03	24	-854.000000	-3.712680e-03
25	-852.000000	9.789341e-04	26	-850.000000	-3.848249e-03	27	-848.000000	-2.639027e-03
28	-846.000000	-3.495494e-03	29	-844.000000	-2.181623e-07	30	-842.000000	-3.148403e-03
31	-840.000000	-4.130891e-03	32	-838.000000	-2.245327e-03	33	-836.000000	-1.727648e-03
34	-834.000000	-1.949784e-03	35	-832.000000	-5.612847e-03	36	-830.000000	-1.323767e-03
37	-828.000000	-2.844913e-03	38	-826.000000	-1.264970e-03	39	-824.000000	-6.525250e-03
40	-822.000000	-8.393957e-04	41	-820.000000	-3.331966e-03	42	-818.000000	-1.367257e-03
43	-816.000000	-6.211883e-03	44	-814.000000	-1.638003e-03	45	-812.000000	-2.404128e-03
46	-810.000000	-2.577608e-03	47	-808.000000	-5.043466e-03	48	-806.000000	-2.841623e-03
49	-804.000000	-1.124412e-03	50	-802.000000	-3.968995e-03	51	-800.000000	-3.553325e-03
52	-798.000000	-4.282940e-03	53	-796.000000	3.424489e-04	54	-794.000000	-5.066345e-03
55	-792.000000	-2.630004e-03	56	-790.000000	-4.653058e-03	57	-788.000000	6.544584e-04
58	-786.000000	-4.908643e-03	59	-784.000000	-2.630675e-03	60	-782.000000	-4.105225e-03
61	-780.000000	2.777299e-04	62	-778.000000	-3.875974e-03	63	-776.000000	-3.539182e-03
64	-774.000000	-2.410259e-03	65	-772.000000	-9.995692e-04	66	-770.000000	-2.071122e-03
67	-768.000000	-4.693864e-03	68	-766.000000	-7.996134e-04	69	-764.000000	-1.807986e-03
70	-762.000000	-7.042701e-04	71	-760.000000	-5.320078e-03	72	-758.000000	4.242963e-04
73	-756.000000	-2.122589e-03	74	-754.000000	3.791647e-05	75	-752.000000	-4.934315e-03
76	-750.000000	4.890126e-04	77	-748.000000	-1.087355e-03	78	-746.000000	-4.227833e-04
79	-744.000000	-3.578530e-03	80	-742.000000	-3.050559e-05	81	-740.000000	3.920961e-04
82	-738.000000	-1.154377e-03	83	-736.000000	-1.876897e-03	84	-734.000000	-9.241696e-04
85	-732.000000	2.243411e-03	86	-730.000000	-1.958548e-03	87	-728.000000	-3.652630e-04
88	-726.000000	-1.203417e-03	89	-724.000000	3.229288e-03	90	-722.000000	-1.798333e-03
91	-720.000000	3.414529e-04	92	-718.000000	-7.898044e-04	93	-716.000000	3.693739e-03
94	-714.000000	-1.125760e-03	95	-712.000000	3.796485e-04	96	-710.000000	4.828246e-04
97	-708.000000	3.260790e-03	98	-706.000000	3.789610e-04	99	-704.000000	-1.613032e-04
100	-702.000000	1.926202e-03	101	-700.000000	2.926772e-03	102	-698.000000	1.661094e-03
103	-696.000000	-5.261197e-04	104	-694.000000	3.298750e-03	105	-692.000000	2.476102e-03
106	-690.000000	2.939314e-03	107	-688.000000	-7.003738e-04	108	-686.000000	4.168386e-03
109	-684.000000	2.717502e-03	110	-682.000000	3.358789e-03	111	-680.000000	-2.489961e-04
112	-678.000000	4.594066e-03	113	-676.000000	3.162107e-03	114	-674.000000	3.586973e-03
115	-672.000000	4.194116e-04	116	-670.000000	4.432446e-03	117	-668.000000	4.301972e-03
118	-666.000000	3.029649e-03	119	-664.000000	1.662289e-03	120	-662.000000	3.893566e-03
121	-660.000000	5.387804e-03	122	-658.000000	2.537244e-03	123	-656.000000	2.815624e-03
124	-654.000000	3.212265e-03	125	-652.000000	6.682539e-03	126	-650.000000	1.680618e-03
127	-648.000000	3.953325e-03	128	-646.000000	2.803998e-03	129	-644.000000	7.263955e-03
130	-642.000000	1.661243e-03	131	-640.000000	4.094176e-03	132	-638.000000	3.017557e-03
133	-636.000000	7.274288e-03	134	-634.000000	2.032997e-03	135	-632.000000	3.628704e-03
136	-630.000000	3.934669e-03	137	-628.000000	6.103106e-03	138	-626.000000	3.473566e-03
139	-624.000000	2.130941e-03	140	-622.000000	5.399645e-03	141	-620.000000	4.668254e-03
142	-618.000000	4.624967e-03	143	-616.000000	7.983373e-04	144	-614.000000	6.614689e-03
145	-612.000000	3.261637e-03	146	-610.000000	5.608638e-03	147	-608.000000	-3.324458e-04
148	-606.000000	6.967738e-03	149	-604.000000	3.018359e-03	150	-602.000000	5.034426e-03
151	-600.000000	5.753431e-05	152	-598.000000	5.871485e-03	153	-596.000000	3.686544e-03
154	-594.000000	3.640441e-03	155	-592.000000	1.139716e-03	156	-590.000000	3.915153e-03
157	-588.000000	5.308957e-03	158	-586.000000	1.070460e-03	159	-584.000000	2.993047e-03

160	-582.000000	1.600399e-03	161	-580.000000	6.656460e-03	162	-578.000000	-7.684473e-04
163	-576.000000	3.679006e-03	164	-574.000000	2.283426e-04	165	-572.000000	7.070425e-03
166	-570.000000	-1.829827e-03	167	-568.000000	3.393936e-03	168	-566.000000	4.880130e-07
169	-564.000000	5.625980e-03	170	-562.000000	-9.328942e-04	171	-560.000000	1.032552e-03
172	-558.000000	1.441286e-03	173	-556.000000	2.916534e-03	174	-554.000000	4.413311e-04
175	-552.000000	-1.731951e-03	176	-550.000000	3.147550e-03	177	-548.000000	-1.978092e-04
178	-546.000000	2.221386e-03	179	-544.000000	-4.844899e-03	180	-542.000000	4.462408e-03
181	-540.000000	-2.238218e-03	182	-538.000000	2.326361e-03	183	-536.000000	-5.844236e-03
184	-534.000000	3.661735e-03	185	-532.000000	-2.598769e-03	186	-530.000000	1.052499e-03
187	-528.000000	-5.462864e-03	188	-526.000000	1.456967e-03	189	-524.000000	-1.111922e-03
190	-522.000000	-2.424191e-03	191	-520.000000	-2.979886e-03	192	-518.000000	-2.225673e-03
193	-516.000000	1.246761e-03	194	-514.000000	-5.806567e-03	195	-512.000000	-1.200327e-03
196	-510.000000	-5.135431e-03	197	-508.000000	3.000304e-03	198	-506.000000	-8.545429e-03
199	-504.000000	-5.498901e-05	200	-502.000000	-6.924925e-03	201	-500.000000	2.699619e-03
202	-498.000000	-8.549191e-03	203	-496.000000	-1.866728e-03	204	-494.000000	-5.720703e-03
205	-492.000000	1.725566e-05	206	-490.000000	-6.953322e-03	207	-488.000000	-4.894028e-03
208	-486.000000	-3.198675e-03	209	-484.000000	-3.923743e-03	210	-482.000000	-3.691344e-03
211	-480.000000	-9.481184e-03	212	-478.000000	2.127164e-04	213	-476.000000	-7.567965e-03
214	-474.000000	-1.471209e-03	215	-472.000000	-1.191653e-02	216	-470.000000	1.278100e-03
217	-468.000000	-9.076631e-03	218	-466.000000	-9.516124e-04	219	-464.000000	-1.240838e-02
220	-462.000000	5.032157e-04	221	-460.000000	-7.884819e-03	222	-458.000000	-3.840925e-03
223	-456.000000	-9.103452e-03	224	-454.000000	-3.454164e-03	225	-452.000000	-3.903684e-03
226	-450.000000	-8.120669e-03	227	-448.000000	-5.329591e-03	228	-446.000000	-7.451626e-03
229	-444.000000	3.811161e-04	230	-442.000000	-1.241288e-02	231	-440.000000	-1.180696e-03
232	-438.000000	-1.108929e-02	233	-436.000000	3.138211e-03	234	-434.000000	-1.362135e-02
235	-432.000000	-6.474697e-04	236	-430.000000	-1.015107e-02	237	-428.000000	1.915148e-03
238	-426.000000	-1.161035e-02	239	-424.000000	-2.607964e-03	240	-422.000000	-6.462988e-03
241	-420.000000	-1.849949e-03	242	-418.000000	-6.117947e-03	243	-416.000000	-8.328502e-03
244	-414.000000	4.990208e-04	245	-412.000000	-7.274785e-03	246	-410.000000	-1.213719e-04
247	-408.000000	-1.250591e-02	248	-406.000000	4.970991e-03	249	-404.000000	-1.020701e-02
250	-402.000000	3.820484e-03	251	-400.000000	-1.429308e-02	252	-398.000000	7.166833e-03
253	-396.000000	-9.615609e-03	254	-394.000000	2.503895e-03	255	-392.000000	-9.682078e-03
256	-390.000000	3.113247e-03	257	-388.000000	-2.990551e-03	258	-386.000000	-3.095557e-03
259	-384.000000	-2.632985e-03	260	-382.000000	-2.620439e-03	261	-380.000000	5.291289e-03
262	-378.000000	-1.007967e-02	263	-376.000000	6.102935e-03	264	-374.000000	-9.507895e-03
265	-372.000000	1.241602e-02	266	-370.000000	-1.344272e-02	267	-368.000000	9.330021e-03
268	-366.000000	-9.017440e-03	269	-364.000000	1.165948e-02	270	-362.000000	-1.022101e-02
271	-360.000000	6.673723e-03	272	-358.000000	-2.748287e-03	273	-356.000000	5.279074e-03
274	-354.000000	-6.988696e-04	275	-352.000000	-3.242273e-03	276	-350.000000	1.003612e-02
277	-348.000000	-5.470133e-03	278	-346.000000	1.056166e-02	279	-344.000000	-1.109872e-02
280	-342.000000	1.696472e-02	281	-340.000000	-8.357683e-03	282	-338.000000	1.481141e-02
283	-336.000000	-9.988956e-03	284	-334.000000	1.745995e-02	285	-332.000000	-3.020549e-03
286	-330.000000	9.668608e-03	287	-328.000000	1.010120e-03	288	-326.000000	9.122316e-03
289	-324.000000	9.948412e-03	290	-322.000000	6.192271e-04	291	-320.000000	9.622209e-03
292	-318.000000	2.960648e-03	293	-316.000000	1.726626e-02	294	-314.000000	-5.717482e-03
295	-312.000000	1.630908e-02	296	-310.000000	-2.481452e-03	297	-308.000000	2.085491e-02
298	-306.000000	-4.808236e-03	299	-304.000000	1.271449e-02	300	-302.000000	2.028754e-03
301	-300.000000	1.369866e-02	302	-298.000000	-1.373470e-03	303	-296.000000	7.031436e-03
304	-294.000000	6.432763e-03	305	-292.000000	5.980998e-03	306	-290.000000	5.297593e-03
307	-288.000000	-3.339001e-03	308	-286.000000	1.464881e-02	309	-284.000000	-2.005433e-04
310	-282.000000	9.153400e-03	311	-280.000000	-5.469659e-03	312	-278.000000	1.541760e-02
313	-276.000000	2.678862e-04	314	-274.000000	1.117812e-02	315	-272.000000	-4.141104e-03
316	-270.000000	1.535225e-02	317	-268.000000	4.227486e-03	318	-266.000000	7.894688e-03
319	-264.000000	4.183279e-03	320	-262.000000	1.172202e-02	321	-260.000000	1.212484e-02
322	-258.000000	3.458265e-03	323	-256.000000	9.210858e-03	324	-254.000000	8.883827e-03
325	-252.000000	1.618888e-02	326	-250.000000	-6.477237e-04	327	-248.000000	1.030065e-02
328	-246.000000	3.602756e-03	329	-244.000000	1.684719e-02	330	-242.000000	-3.162361e-03
331	-240.000000	7.194464e-03	332	-238.000000	2.935766e-03	333	-236.000000	8.971518e-03
334	-234.000000	-2.170968e-03	335	-232.000000	2.334573e-03	336	-230.000000	4.153113e-03
337	-228.000000	6.328538e-03	338	-226.000000	-1.940609e-03	339	-224.000000	-2.179837e-03
340	-222.000000	1.086332e-02	341	-220.000000	1.269029e-03	342	-218.000000	3.187140e-03
343	-216.000000	-5.272031e-03	344	-214.000000	8.875897e-03	345	-212.000000	3.986399e-03
346	-210.000000	1.595111e-03	347	-208.000000	-5.552859e-03	348	-206.000000	9.686612e-03
349	-204.000000	-1.237749e-03	350	-202.000000	1.520524e-03	351	-200.000000	-2.118981e-03
352	-198.000000	5.444860e-03	353	-196.000000	6.819719e-03	354	-194.000000	-4.640759e-03
355	-192.000000	1.546735e-04	356	-190.000000	9.848601e-03	357	-188.000000	6.016091e-03
358	-186.000000	-2.715135e-03	359	-184.000000	1.538650e-03	360	-182.000000	3.576771e-03
361	-180.000000	1.362102e-02	362	-178.000000	-3.641635e-03	363	-176.000000	1.635203e-03
364	-174.000000	9.228436e-03	365	-172.000000	6.074662e-03	366	-170.000000	7.574306e-04
367	-168.000000	4.664425e-03	368	-166.000000	8.032323e-03	369	-164.000000	1.181438e-02
370	-162.000000	-2.550387e-03	371	-160.000000	2.388137e-03	372	-158.000000	1.751719e-02
373	-156.000000	6.892955e-03	374	-154.000000	-6.714056e-04	375	-152.000000	-2.255120e-03
376	-150.000000	6.083533e-03	377	-148.000000	1.020426e-02	378	-146.000000	-6.978804e-03
379	-144.000000	-5.753552e-03	380	-142.000000	7.363478e-03	381	-140.000000	1.598976e-05
382	-138.000000	-3.313684e-03	383	-136.000000	-1.677600e-03	384	-134.000000	2.411705e-03
385	-132.000000	2.671808e-03	386	-130.000000	-1.972252e-02	387	-128.000000	-1.139187e-02
388	-126.000000	4.174195e-03	389	-124.000000	-1.206792e-02	390	-122.000000	-2.075645e-02
391	-120.000000	-2.460884e-02	392	-118.000000	-8.884616e-03	393	-116.000000	-6.973416e-03
394	-114.000000	-3.166103e-02	395	-112.000000	-3.421220e-02	396	-110.000000	-1.540671e-02
397	-108.000000	-3.579047e-02	398	-106.000000	-2.772384e-02	399	-104.000000	-3.631889e-02
400	-102.000000	-2.192864e-02	401	-100.000000	-2.709710e-02	402	-98.000000	-5.677832e-02
403	-96.000000	-3.896697e-02	404	-94.000000	-1.518893e-02	405	-92.000000	-3.632985e-02
406	-90.000000	-5.192906e-02	407	-88.000000	-5.347972e-02	408	-86.000000	-3.769754e-02
409	-84.000000	-1.703512e-02	410	-82.000000	-7.048546e-02	411	-80.000000	-4.516826e-02
412	-78.000000	-3.704911e-02	413	-76.000000	-3.969949e-02	414	-74.000000	-4.652711e-02
415	-72.000000	-3.522710e-02	416	-70.000000	-3.163813e-02	417	-68.000000	-1.727093e-02

418	-66.000000	-7.674888e-02	419	-64.000000	-2.469944e-02	420	-62.000000	1.199764e-02
421	-60.000000	-2.918049e-02	422	-58.000000	-3.582702e-02	423	-56.000000	-5.573833e-02
424	-54.000000	1.492443e-02	425	-52.000000	2.704644e-02	426	-50.000000	-3.100892e-02
427	-48.000000	-3.030967e-02	428	-46.000000	4.028657e-02	429	-44.000000	-2.625271e-02
430	-42.000000	4.818117e-02	431	-40.000000	5.786490e-03	432	-38.000000	7.140180e-02
433	-36.000000	3.863607e-02	434	-34.000000	-5.410042e-02	435	-32.000000	7.194291e-02
436	-30.000000	2.003691e-01	437	-28.000000	5.240973e-02	438	-26.000000	6.450587e-03
439	-24.000000	-2.364372e-02	440	-22.000000	1.578751e-01	441	-20.000000	4.151665e-01
442	-18.000000	-1.447691e-01	443	-16.000000	7.151492e-02	444	-14.000000	-7.625127e-02
445	-12.000000	-2.557095e-01	446	-10.000000	-3.069070e-01	447	-8.000000	-6.595011e-02
448	-6.000000	4.767115e-02	449	-4.000000	-1.089202e-01	450	-2.000000	4.875076e-01
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454	6.000000	1.094768e-01	455	8.000000	1.806111e-01	456	10.000000	-3.754158e-02
457	12.000000	-5.641736e-02	458	14.000000	1.170491e-01	459	16.000000	7.805648e-02
460	18.000000	4.025293e-02	461	20.000000	1.083538e-01	462	22.000000	-9.707553e-03
463	24.000000	5.425262e-02	464	26.000000	2.431932e-02	465	28.000000	6.700101e-02
466	30.000000	1.179259e-01	467	32.000000	9.404900e-03	468	34.000000	-4.089680e-02
469	36.000000	5.695726e-02	470	38.000000	4.841212e-02	471	40.000000	8.273094e-02
472	42.000000	-1.566208e-02	473	44.000000	-4.233567e-02	474	46.000000	6.003069e-02
475	48.000000	9.726331e-03	476	50.000000	2.992818e-02	477	52.000000	1.158738e-02
478	54.000000	-4.756457e-03	479	56.000000	5.982507e-03	480	58.000000	9.924157e-03
481	60.000000	1.258301e-02	482	62.000000	6.936896e-02	483	64.000000	-2.488164e-02
484	66.000000	-3.304423e-02	485	68.000000	4.794824e-03	486	70.000000	9.316409e-03
487	72.000000	3.301785e-02	488	74.000000	-3.451775e-02	489	76.000000	-3.550778e-02
490	78.000000	1.575010e-02	491	80.000000	-6.876690e-03	492	82.000000	-8.512942e-03
493	84.000000	3.498224e-03	494	86.000000	-1.903580e-02	495	88.000000	7.771930e-03
496	90.000000	-1.824916e-02	497	92.000000	-6.108832e-03	498	94.000000	2.239328e-02
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502	102.000000	5.970837e-04	503	104.000000	1.180558e-02	504	106.000000	-3.856029e-02
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517	132.000000	-2.157004e-02	518	134.000000	-1.613909e-02	519	136.000000	-1.332773e-02
520	138.000000	-4.629694e-02	521	140.000000	-4.617855e-02	522	142.000000	-8.409544e-03
523	144.000000	-2.676491e-02	524	146.000000	-2.488636e-02	525	148.000000	-2.704811e-02
526	150.000000	-2.900236e-02	527	152.000000	-2.341207e-02	528	154.000000	-3.281298e-02
529	156.000000	-2.255398e-02	530	158.000000	-4.359147e-03	531	160.000000	-3.625380e-02
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535	168.000000	-8.040778e-03	536	170.000000	-4.039820e-02	537	172.000000	-2.618152e-02
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553	204.000000	-7.216926e-03	554	206.000000	1.924478e-02	555	208.000000	6.106534e-04
556	210.000000	1.279523e-02	557	212.000000	3.118021e-03	558	214.000000	1.038215e-02
559	216.000000	1.329878e-02	560	218.000000	1.851348e-03	561	220.000000	9.337613e-03
562	222.000000	2.318985e-02	563	224.000000	-4.430740e-03	564	226.000000	1.532822e-03
565	228.000000	7.218722e-03	566	230.000000	9.065536e-03	567	232.000000	1.492844e-02
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574	246.000000	4.564173e-04	575	248.000000	1.472307e-02	576	250.000000	-1.207965e-03
577	252.000000	1.356817e-02	578	254.000000	2.087764e-02	579	256.000000	4.483301e-03
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589	276.000000	1.592984e-02	590	278.000000	2.038582e-02	591	280.000000	1.623084e-02
592	282.000000	1.049350e-02	593	284.000000	1.671917e-02	594	286.000000	2.083128e-02
595	288.000000	7.319616e-03	596	290.000000	5.600998e-03	597	292.000000	1.461600e-02
598	294.000000	1.552649e-02	599	296.000000	1.440546e-02	600	298.000000	-4.408439e-03
601	300.000000	9.874310e-03	602	302.000000	1.044747e-02	603	304.000000	5.772356e-03
604	306.000000	2.690158e-03	605	308.000000	5.405724e-03	606	310.000000	8.112002e-03
607	312.000000	4.948959e-03	608	314.000000	-1.017255e-03	609	316.000000	8.261058e-03
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613	324.000000	5.084444e-03	614	326.000000	1.530546e-02	615	328.000000	6.776853e-03
616	330.000000	-6.209488e-03	617	332.000000	9.812163e-03	618	334.000000	9.584131e-03
619	336.000000	5.984882e-03	620	338.000000	-6.236405e-05	621	340.000000	6.798214e-03
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625	348.000000	8.302306e-03	626	350.000000	7.369716e-03	627	352.000000	-3.960842e-03
628	354.000000	-6.336054e-04	629	356.000000	3.716279e-04	630	358.000000	9.423378e-03
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646	390.000000	-9.706041e-04	647	392.000000	6.500704e-05	648	394.000000	-1.467165e-02
649	396.000000	1.557448e-03	650	398.000000	-1.806444e-03	651	400.000000	-3.672579e-03
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655	408.000000	-4.866050e-03	656	410.000000	-8.607261e-03	657	412.000000	-1.823487e-03
658	414.000000	1.533099e-03	659	416.000000	-1.093852e-02	660	418.000000	-4.155691e-03
661	420.000000	-6.359927e-03	662	422.000000	3.624308e-03	663	424.000000	-7.505133e-03
664	426.000000	-8.774042e-03	665	428.000000	-4.254973e-03	666	430.000000	1.403609e-03
667	432.000000	-7.808988e-03	668	434.000000	-5.359191e-03	669	436.000000	-5.084187e-03
670	438.000000	-1.660857e-03	671	440.000000	-4.266584e-03	672	442.000000	-1.050431e-02
673	444.000000	9.897167e-04	674	446.000000	-3.077290e-03	675	448.000000	-5.930907e-03

676	450.000000	-8.877850e-03	677	452.000000	-1.118207e-03	678	454.000000	-1.693164e-03
679	456.000000	-3.040642e-03	680	458.000000	-1.182801e-02	681	460.000000	-3.015747e-04
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685	468.000000	-4.362940e-03	686	470.000000	-3.224667e-04	687	472.000000	-5.905534e-03
688	474.000000	-7.073619e-03	689	476.000000	-1.870821e-03	690	478.000000	2.668711e-04
691	480.000000	-8.773522e-03	692	482.000000	-4.658896e-03	693	484.000000	-4.297407e-03
694	486.000000	1.696264e-03	695	488.000000	-6.020873e-03	696	490.000000	-8.128040e-03
697	492.000000	-1.544821e-03	698	494.000000	-1.733166e-04	699	496.000000	-5.080600e-03
700	498.000000	-5.287892e-03	701	500.000000	-2.342390e-03	702	502.000000	-5.664512e-04
703	504.000000	-3.099942e-03	704	506.000000	-7.323522e-03	705	508.000000	1.971399e-03
706	510.000000	-9.453576e-04	707	512.000000	-4.028820e-03	708	514.000000	-4.877318e-03
709	516.000000	-1.059196e-04	710	518.000000	1.803376e-03	711	520.000000	-2.867775e-03
712	522.000000	-6.136179e-03	713	524.000000	1.016089e-03	714	526.000000	1.601618e-03
715	528.000000	-3.585255e-03	716	530.000000	-2.380932e-03	717	532.000000	-1.714938e-03
718	534.000000	2.554139e-03	719	536.000000	-3.548023e-03	720	538.000000	-3.821554e-03
721	540.000000	1.334528e-03	722	542.000000	1.341282e-03	723	544.000000	-4.117795e-03
724	546.000000	-2.850708e-03	725	548.000000	7.857796e-05	726	550.000000	2.459364e-03
727	552.000000	-2.246469e-03	728	554.000000	-5.418040e-03	729	556.000000	2.643883e-03
730	558.000000	8.238201e-04	731	560.000000	-1.269666e-03	732	562.000000	-3.007130e-03
733	564.000000	1.219874e-03	734	566.000000	1.900795e-03	735	568.000000	-8.734417e-04
736	570.000000	-3.387921e-03	737	572.000000	3.783858e-03	738	574.000000	1.994001e-03
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742	582.000000	4.933378e-03	743	584.000000	-1.680601e-03	744	586.000000	-1.377173e-03
745	588.000000	2.760937e-03	746	590.000000	4.426997e-03	747	592.000000	-1.415111e-03
748	594.000000	8.246172e-04	749	596.000000	1.243812e-03	750	598.000000	5.053307e-03
751	600.000000	-9.053936e-04	752	602.000000	-5.149187e-04	753	604.000000	4.308230e-03
754	606.000000	3.287841e-03	755	608.000000	-2.279809e-04	756	610.000000	-3.180805e-04
757	612.000000	3.860581e-03	758	614.000000	4.164346e-03	759	616.000000	9.202508e-04
760	618.000000	-2.039182e-03	761	620.000000	5.807192e-03	762	622.000000	2.759213e-03
763	624.000000	1.772380e-03	764	626.000000	-4.727130e-04	765	628.000000	4.308200e-03
766	630.000000	3.992206e-03	767	632.000000	1.303334e-03	768	634.000000	-3.907805e-04
769	636.000000	5.740657e-03	770	638.000000	3.746311e-03	771	640.000000	6.448091e-04
772	642.000000	1.247750e-03	773	644.000000	3.854776e-03	774	646.000000	6.098176e-03
775	648.000000	3.779165e-05	776	650.000000	1.100851e-03	777	652.000000	4.442304e-03
778	654.000000	5.575059e-03	779	656.000000	2.195573e-04	780	658.000000	2.608302e-03
781	660.000000	2.845021e-03	782	662.000000	6.577279e-03	783	664.000000	-1.925997e-04
784	666.000000	2.148701e-03	785	668.000000	4.584746e-03	786	670.000000	5.137004e-03
787	672.000000	3.428049e-04	788	674.000000	1.976911e-03	789	676.000000	4.242952e-03
790	678.000000	5.469935e-03	791	680.000000	1.100671e-03	792	682.000000	6.928205e-05
793	684.000000	6.251147e-03	794	686.000000	3.073616e-03	795	688.000000	2.773736e-03
796	690.000000	-4.059011e-04	797	692.000000	5.916785e-03	798	694.000000	2.873229e-03
799	696.000000	2.726997e-03	800	698.000000	-1.134828e-03	801	700.000000	7.023911e-03
802	702.000000	1.916414e-03	803	704.000000	2.123463e-03	804	706.000000	-1.233355e-04
805	708.000000	4.707269e-03	806	710.000000	4.311383e-03	807	712.000000	-1.289340e-04
808	714.000000	9.543134e-04	809	716.000000	3.302622e-03	810	718.000000	4.932825e-03
811	720.000000	-1.588776e-03	812	722.000000	2.831160e-03	813	724.000000	5.800261e-04
814	726.000000	6.471254e-03	815	728.000000	-3.216668e-03	816	730.000000	2.810300e-03
817	732.000000	1.298650e-03	818	734.000000	4.689659e-03	819	736.000000	-2.369035e-03
820	738.000000	1.333203e-03	821	740.000000	1.881492e-03	822	742.000000	3.422273e-03
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826	750.000000	-1.755673e-04	827	752.000000	1.508521e-03	828	754.000000	-3.672272e-03
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832	762.000000	-4.376113e-03	833	764.000000	5.249894e-03	834	766.000000	-1.804171e-03
835	768.000000	2.519593e-04	836	770.000000	-3.166291e-03	837	772.000000	2.337086e-03
838	774.000000	9.407195e-04	839	776.000000	-3.091229e-03	840	778.000000	-1.155342e-03
841	780.000000	-1.981975e-04	842	782.000000	2.247164e-03	843	784.000000	-5.197796e-03
844	786.000000	6.593254e-04	845	788.000000	-2.963940e-03	846	790.000000	3.719616e-03
847	792.000000	-6.946454e-03	848	794.000000	7.002677e-04	849	796.000000	-2.501687e-03
850	798.000000	1.834545e-03	851	800.000000	-5.715840e-03	852	802.000000	-1.320042e-03
853	804.000000	-1.265345e-03	854	806.000000	-1.152599e-06	855	808.000000	-4.012123e-03
856	810.000000	-4.265635e-03	857	812.000000	1.429113e-03	858	814.000000	-3.487171e-03
859	816.000000	-1.320186e-03	860	818.000000	-6.522216e-03	861	820.000000	2.385502e-03
862	822.000000	-4.475540e-03	863	824.000000	-1.242217e-03	864	826.000000	-6.857845e-03
865	828.000000	2.487707e-03	866	830.000000	-4.691984e-03	867	832.000000	-2.146949e-03
868	834.000000	-5.592266e-03	869	836.000000	1.174310e-04	870	838.000000	-2.005460e-03
871	840.000000	-5.139139e-03	872	842.000000	-3.209054e-03	873	844.000000	-2.217695e-03
874	846.000000	-3.258065e-04	875	848.000000	-6.866935e-03	876	850.000000	-1.387310e-03
877	852.000000	-4.306981e-03	878	854.000000	1.307516e-03	879	856.000000	-8.240147e-03
880	858.000000	-7.959416e-04	881	860.000000	-3.906908e-03	882	862.000000	1.806353e-04
883	864.000000	-6.885185e-03	884	866.000000	-2.248642e-03	885	868.000000	-2.428633e-03
886	870.000000	-1.107696e-03	887	872.000000	-5.184792e-03	888	874.000000	-4.233824e-03
889	876.000000	7.108098e-05	890	878.000000	-3.647594e-03	891	880.000000	-2.480547e-03
892	882.000000	-6.008334e-03	893	884.000000	1.504288e-03	894	886.000000	-4.312434e-03
895	888.000000	-1.894826e-03	896	890.000000	-5.994461e-03	897	892.000000	2.025685e-03
898	894.000000	-4.276728e-03	899	896.000000	-1.963717e-03	900	898.000000	-4.909104e-03
901	900.000000	8.290350e-04	902	902.000000	-1.984528e-03	903	904.000000	-3.870751e-03
904	906.000000	-2.598301e-03	905	908.000000	-6.770854e-04	906	910.000000	-2.261694e-04
907	912.000000	-4.840332e-03	908	914.000000	-8.152041e-04	909	916.000000	-1.945319e-03
910	918.000000	1.570909e-03	911	920.000000	-5.784170e-03	912	922.000000	3.822740e-04
913	924.000000	-1.669400e-03	914	926.000000	1.403378e-03	915	928.000000	-4.633793e-03
916	930.000000	-1.732379e-04	917	932.000000	-3.724659e-04	918	934.000000	9.596213e-04
919	936.000000	-3.277970e-03	920	938.000000	-1.068379e-03	921	940.000000	1.615468e-03
922	942.000000	-5.406735e-04						

8.2.5 Combined Debubble and Zero-Phasing Operator - Casino

WAVELET NAME: Cas op
SAMPLE_RATE: 2.000000
TIME_SHIFT_ALIGNMENT: -812.000000
CENTER OF GRAVITY SAMPLE: 402.303199
NUMBER OF SAMPLES: 830.000000
MAXIMUM AMPLITUDE: 0.325213
MAXIMUM POSITIVE: 0.325213
MAXIMUM NEGATIVE: -0.373697

SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE
1	-810.000000	-3.274088e-04	2	-808.000000	1.250746e-03	3	-806.000000	3.341942e-04
4	-804.000000	-1.287660e-03	5	-802.000000	-6.286963e-04	6	-800.000000	9.855952e-04
7	-798.000000	2.348694e-04	8	-796.000000	-1.589814e-03	9	-794.000000	-8.443429e-04
10	-792.000000	7.700228e-04	11	-790.000000	-9.246205e-05	12	-788.000000	-1.707227e-03
13	-786.000000	-1.088258e-03	14	-784.000000	4.832351e-04	15	-782.000000	-2.262290e-04
16	-780.000000	-2.024666e-03	17	-778.000000	-1.296595e-03	18	-776.000000	3.490242e-04
19	-774.000000	-5.191342e-04	20	-772.000000	-2.166169e-03	21	-770.000000	-1.541497e-03
22	-768.000000	6.364170e-05	23	-766.000000	-5.862933e-04	24	-764.000000	-2.409917e-03
25	-762.000000	-1.762892e-03	26	-760.000000	-8.126709e-05	27	-758.000000	-8.855259e-04
28	-756.000000	-2.523986e-03	29	-754.000000	-1.924673e-03	30	-752.000000	-3.599480e-04
31	-750.000000	-9.865211e-04	32	-748.000000	-2.787357e-03	33	-746.000000	-2.158687e-03
34	-744.000000	-4.462067e-04	35	-742.000000	-1.258644e-03	36	-740.000000	-2.955497e-03
37	-738.000000	-2.362911e-03	38	-736.000000	-7.701537e-04	39	-734.000000	-1.351104e-03
40	-732.000000	-3.183820e-03	41	-730.000000	-2.655475e-03	42	-728.000000	-9.318779e-04
43	-726.000000	-1.693023e-03	44	-724.000000	-3.401245e-03	45	-722.000000	-2.838996e-03
46	-720.000000	-1.298671e-03	47	-718.000000	-1.890339e-03	48	-716.000000	-3.718817e-03
49	-714.000000	-3.217213e-03	50	-712.000000	-1.469167e-03	51	-710.000000	-2.242430e-03
52	-708.000000	-4.037033e-03	53	-706.000000	-3.492444e-03	54	-704.000000	-1.917840e-03
55	-702.000000	-2.465121e-03	56	-700.000000	-4.315813e-03	57	-698.000000	-3.909958e-03
58	-696.000000	-2.152658e-03	59	-694.000000	-2.857554e-03	60	-692.000000	-4.649612e-03
61	-690.000000	-4.104926e-03	62	-688.000000	-2.553553e-03	63	-686.000000	-3.108474e-03
64	-684.000000	-4.938362e-03	65	-682.000000	-4.525617e-03	66	-680.000000	-2.710162e-03
67	-678.000000	-3.392905e-03	68	-676.000000	-5.267475e-03	69	-674.000000	-4.725801e-03
70	-672.000000	-3.106155e-03	71	-670.000000	-3.597718e-03	72	-668.000000	-5.427405e-03
73	-666.000000	-5.096822e-03	74	-664.000000	-3.275628e-03	75	-662.000000	-3.879232e-03
76	-660.000000	-5.748454e-03	77	-658.000000	-5.191722e-03	78	-656.000000	-3.581633e-03
79	-654.000000	-4.105459e-03	80	-652.000000	-5.932797e-03	81	-650.000000	-5.589471e-03
82	-648.000000	-3.708706e-03	83	-646.000000	-4.288169e-03	84	-644.000000	-6.272899e-03
85	-642.000000	-5.749021e-03	86	-640.000000	-4.068109e-03	87	-638.000000	-4.543663e-03
88	-636.000000	-6.377894e-03	89	-634.000000	-6.130984e-03	90	-632.000000	-4.272392e-03
91	-630.000000	-4.788496e-03	92	-628.000000	-6.775793e-03	93	-626.000000	-6.232918e-03
94	-624.000000	-4.542072e-03	95	-622.000000	-5.073783e-03	96	-620.000000	-6.923803e-03
97	-618.000000	-6.638077e-03	98	-616.000000	-4.696601e-03	99	-614.000000	-5.148427e-03
100	-612.000000	-7.244819e-03	101	-610.000000	-6.730540e-03	102	-608.000000	-4.929460e-03
103	-606.000000	-5.366022e-03	104	-604.000000	-7.175868e-03	105	-602.000000	-6.940633e-03
106	-600.000000	-5.017023e-03	107	-598.000000	-5.365778e-03	108	-596.000000	-7.422178e-03
109	-594.000000	-6.845607e-03	110	-592.000000	-4.980754e-03	111	-590.000000	-5.463033e-03
112	-588.000000	-7.283930e-03	113	-586.000000	-6.978735e-03	114	-584.000000	-4.934317e-03
115	-582.000000	-5.176498e-03	116	-580.000000	-7.333728e-03	117	-578.000000	-6.811573e-03
118	-576.000000	-4.811024e-03	119	-574.000000	-5.176908e-03	120	-572.000000	-6.941199e-03
121	-570.000000	-6.661346e-03	122	-568.000000	-4.652965e-03	123	-566.000000	-4.802015e-03
124	-564.000000	-6.905289e-03	125	-562.000000	-6.304146e-03	126	-560.000000	-4.193902e-03
127	-558.000000	-4.620137e-03	128	-556.000000	-6.438365e-03	129	-554.000000	-6.072449e-03
130	-552.000000	-3.918924e-03	131	-550.000000	-3.933410e-03	132	-548.000000	-6.141172e-03
133	-546.000000	-5.644115e-03	134	-544.000000	-3.394809e-03	135	-542.000000	-3.692533e-03
136	-540.000000	-5.452056e-03	137	-538.000000	-5.089925e-03	138	-536.000000	-3.004635e-03
139	-534.000000	-2.967257e-03	140	-532.000000	-5.120046e-03	141	-530.000000	-4.540830e-03
142	-528.000000	-2.134717e-03	143	-526.000000	-2.512497e-03	144	-524.000000	-4.392426e-03
145	-522.000000	-3.943960e-03	146	-520.000000	-1.678960e-03	147	-518.000000	-1.473941e-03
148	-516.000000	-3.714726e-03	149	-514.000000	-3.284968e-03	150	-512.000000	-7.348477e-04
151	-510.000000	-9.358446e-04	152	-508.000000	-2.736466e-03	153	-506.000000	-2.204263e-03
154	-504.000000	-8.115894e-06	155	-502.000000	2.496351e-04	156	-500.000000	-1.913535e-03
157	-498.000000	-1.315463e-03	158	-496.000000	1.482260e-03	159	-494.000000	1.273612e-03
160	-492.000000	-7.139562e-04	161	-490.000000	-4.763273e-05	162	-488.000000	2.407771e-03
163	-486.000000	2.886944e-03	164	-484.000000	6.932265e-04	165	-482.000000	1.054841e-03
166	-480.000000	3.992484e-03	167	-478.000000	3.913520e-03	168	-476.000000	1.990851e-03
169	-474.000000	2.718419e-03	170	-472.000000	5.050519e-03	171	-470.000000	5.351633e-03
172	-468.000000	3.113670e-03	173	-466.000000	3.511790e-03	174	-464.000000	6.710458e-03
175	-462.000000	6.436902e-03	176	-460.000000	4.008329e-03	177	-458.000000	4.652951e-03
178	-456.000000	7.184343e-03	179	-454.000000	7.549165e-03	180	-452.000000	5.165904e-03
181	-450.000000	5.277545e-03	182	-448.000000	8.419998e-03	183	-446.000000	8.318828e-03
184	-444.000000	6.038810e-03	185	-442.000000	6.747479e-03	186	-440.000000	9.188693e-03
187	-438.000000	9.464348e-03	188	-436.000000	7.134377e-03	189	-434.000000	7.278331e-03
190	-432.000000	1.066158e-02	191	-430.000000	1.061428e-02	192	-428.000000	7.938219e-03
193	-426.000000	8.555830e-03	194	-424.000000	1.117088e-02	195	-422.000000	1.167436e-02
196	-420.000000	9.379569e-03	197	-418.000000	9.094223e-03	198	-416.000000	1.232348e-02
199	-414.000000	1.246380e-02	200	-412.000000	9.786140e-03	201	-410.000000	1.054755e-02
202	-408.000000	1.306606e-02	203	-406.000000	1.322980e-02	204	-404.000000	1.087142e-02
205	-402.000000	1.063723e-02	206	-400.000000	1.423904e-02	207	-398.000000	1.447701e-02
208	-396.000000	1.126307e-02	209	-394.000000	1.176982e-02	210	-392.000000	1.460085e-02
211	-390.000000	1.500352e-02	212	-388.000000	1.279120e-02	213	-386.000000	1.212139e-02
214	-384.000000	1.542866e-02	215	-382.000000	1.580664e-02	216	-380.000000	1.266199e-02
217	-378.000000	1.333655e-02	218	-376.000000	1.616401e-02	219	-374.000000	1.604448e-02

220	-372.000000	1.352946e-02	221	-370.000000	1.286586e-02	222	-368.000000	1.653650e-02
223	-366.000000	1.705129e-02	224	-364.000000	1.306784e-02	225	-362.000000	1.315758e-02
226	-360.000000	1.609050e-02	227	-358.000000	1.604457e-02	228	-356.000000	1.356311e-02
229	-354.000000	1.224509e-02	230	-352.000000	1.506172e-02	231	-350.000000	1.536303e-02
232	-348.000000	1.108292e-02	233	-346.000000	1.099796e-02	234	-344.000000	1.380115e-02
235	-342.000000	1.273157e-02	236	-340.000000	9.316018e-03	237	-338.000000	7.724478e-03
238	-336.000000	1.076258e-02	239	-334.000000	1.122147e-02	240	-332.000000	6.068313e-03
241	-330.000000	5.260251e-03	242	-328.000000	8.452311e-03	243	-326.000000	8.022821e-03
244	-324.000000	5.353596e-03	245	-322.000000	3.908844e-03	246	-320.000000	6.676068e-03
247	-318.000000	7.579546e-03	248	-316.000000	2.983420e-03	249	-314.000000	2.974278e-03
250	-312.000000	7.007476e-03	251	-310.000000	6.070347e-03	252	-308.000000	2.808715e-03
253	-306.000000	1.637906e-03	254	-304.000000	5.250668e-03	255	-302.000000	7.124029e-03
256	-300.000000	1.922049e-03	257	-298.000000	8.237271e-04	258	-296.000000	5.273238e-03
259	-294.000000	4.918121e-03	260	-292.000000	2.190913e-03	261	-290.000000	1.154458e-03
262	-288.000000	3.857018e-03	263	-286.000000	5.410112e-03	264	-284.000000	4.513359e-04
265	-282.000000	-7.975532e-05	266	-280.000000	5.323540e-03	267	-278.000000	4.337488e-03
268	-276.000000	3.503422e-04	269	-274.000000	-6.871854e-04	270	-272.000000	2.957117e-03
271	-270.000000	5.768468e-03	272	-268.000000	2.681687e-04	273	-266.000000	-1.895534e-03
274	-264.000000	3.631080e-03	275	-262.000000	3.283028e-03	276	-260.000000	-4.673901e-06
277	-258.000000	-5.636858e-04	278	-256.000000	1.890901e-03	279	-254.000000	3.860281e-03
280	-252.000000	-1.585657e-03	281	-250.000000	-3.197080e-03	282	-248.000000	3.861176e-03
283	-246.000000	2.963133e-03	284	-244.000000	-2.451006e-03	285	-242.000000	-3.243417e-03
286	-240.000000	3.237422e-04	287	-238.000000	4.009867e-03	288	-236.000000	-1.419433e-03
289	-234.000000	-5.173220e-03	290	-232.000000	1.658973e-03	291	-230.000000	1.775657e-03
292	-228.000000	-2.592567e-03	293	-226.000000	-2.078150e-03	294	-224.000000	6.491275e-04
295	-222.000000	3.059363e-03	296	-220.000000	-2.273402e-03	297	-218.000000	-5.024061e-03
298	-216.000000	4.445874e-03	299	-214.000000	4.807954e-03	300	-212.000000	-2.336114e-03
301	-210.000000	-2.339025e-03	302	-208.000000	1.911244e-03	303	-206.000000	6.791784e-03
304	-204.000000	2.275606e-03	305	-202.000000	-3.269700e-03	306	-200.000000	5.246112e-03
307	-198.000000	6.749815e-03	308	-196.000000	5.371275e-04	309	-194.000000	2.610468e-03
310	-192.000000	6.138142e-03	311	-190.000000	8.216931e-03	312	-188.000000	3.037590e-03
313	-186.000000	-1.949762e-03	314	-184.000000	9.476341e-03	315	-182.000000	1.128478e-02
316	-180.000000	-1.418260e-04	317	-178.000000	-1.354150e-03	318	-176.000000	1.908337e-03
319	-174.000000	4.999167e-03	320	-172.000000	-1.593273e-03	321	-170.000000	-1.347638e-02
322	-168.000000	-7.515584e-03	323	-166.000000	-8.282206e-03	324	-164.000000	-2.108134e-02
325	-162.000000	-1.987713e-02	326	-160.000000	-1.641325e-02	327	-158.000000	-1.611902e-02
328	-156.000000	-2.264437e-02	329	-154.000000	-3.219555e-02	330	-152.000000	-1.889452e-02
331	-150.000000	-1.290082e-02	332	-148.000000	-2.987709e-02	333	-146.000000	-3.179779e-02
334	-144.000000	-2.444564e-02	335	-142.000000	-2.020636e-02	336	-140.000000	-2.139602e-02
337	-138.000000	-3.245538e-02	338	-136.000000	-2.537427e-02	339	-134.000000	-1.843413e-02
340	-132.000000	-3.283134e-02	341	-130.000000	-2.923560e-02	342	-128.000000	-1.836659e-02
343	-126.000000	-2.243761e-02	344	-124.000000	-2.914401e-02	345	-122.000000	-3.797664e-02
346	-120.000000	-2.348148e-02	347	-118.000000	-9.465024e-03	348	-116.000000	-3.307047e-02
349	-114.000000	-3.804204e-02	350	-112.000000	-2.446510e-02	351	-110.000000	-2.350664e-02
352	-108.000000	-2.297318e-02	353	-106.000000	-3.591125e-02	354	-104.000000	-3.092776e-02
355	-102.000000	-1.683895e-02	356	-100.000000	-3.892590e-02	357	-98.000000	-3.538073e-02
358	-96.000000	-1.391865e-02	359	-94.000000	-2.243285e-02	360	-92.000000	-3.098768e-02
361	-90.000000	-4.654864e-02	362	-88.000000	-2.934751e-02	363	-86.000000	1.267672e-03
364	-84.000000	-3.364573e-02	365	-82.000000	-4.529685e-02	366	-80.000000	-2.270393e-02
367	-78.000000	-2.343266e-02	368	-76.000000	-1.371472e-02	369	-74.000000	-2.866216e-02
370	-72.000000	-2.617434e-02	371	-70.000000	1.391194e-03	372	-68.000000	-3.919813e-02
373	-66.000000	-3.320958e-02	374	-64.000000	1.436451e-02	375	-62.000000	1.301368e-04
376	-60.000000	-1.633516e-02	377	-58.000000	-3.885546e-02	378	-56.000000	-1.809849e-02
379	-54.000000	5.349715e-02	380	-52.000000	4.410867e-03	381	-50.000000	-4.163761e-02
382	-48.000000	2.266922e-02	383	-46.000000	2.320808e-03	384	-44.000000	2.553743e-02
385	-42.000000	3.033232e-02	386	-40.000000	-1.112543e-02	387	-38.000000	8.392490e-02
388	-36.000000	-2.155559e-02	389	-34.000000	-3.157958e-02	390	-32.000000	1.547778e-01
391	-30.000000	7.883815e-02	392	-28.000000	3.536114e-02	393	-26.000000	-8.461611e-02
394	-24.000000	-3.814578e-02	395	-22.000000	3.192164e-01	396	-20.000000	1.013762e-01
397	-18.000000	-1.782359e-01	398	-16.000000	-6.156809e-02	399	-14.000000	-1.726886e-01
400	-12.000000	-3.736966e-01	401	-10.000000	-2.117643e-01	402	-8.000000	3.417496e-02
403	-6.000000	-7.943088e-02	404	-4.000000	1.261536e-01	405	-2.000000	3.252130e-01
406	0.000000	-1.825372e-01	407	2.000000	-1.675115e-01	408	4.000000	1.327085e-01
409	6.000000	7.657056e-02	410	8.000000	1.319389e-01	411	10.000000	-8.243375e-02
412	12.000000	-9.563620e-02	413	14.000000	1.455220e-01	414	16.000000	1.890501e-02
415	18.000000	5.355088e-02	416	20.000000	6.654476e-02	417	22.000000	-3.887240e-02
418	24.000000	4.420187e-02	419	26.000000	9.376741e-03	420	28.000000	4.818849e-02
421	30.000000	1.138033e-01	422	32.000000	-2.347403e-02	423	34.000000	-2.929940e-02
424	36.000000	4.873193e-02	425	38.000000	5.899338e-02	426	40.000000	7.326350e-02
427	42.000000	-3.450512e-03	428	44.000000	-1.893850e-02	429	46.000000	7.164737e-02
430	48.000000	3.212928e-02	431	50.000000	2.444005e-02	432	52.000000	6.032711e-02
433	54.000000	1.514519e-02	434	56.000000	2.197793e-02	435	58.000000	2.136585e-02
436	60.000000	3.439309e-02	437	62.000000	8.799399e-02	438	64.000000	9.644897e-03
439	66.000000	-3.110375e-02	440	68.000000	3.894976e-02	441	70.000000	4.270385e-02
442	72.000000	3.772165e-02	443	74.000000	4.943986e-03	444	76.000000	-1.984242e-02
445	78.000000	3.840552e-02	446	80.000000	1.982031e-02	447	82.000000	-8.030765e-03
448	84.000000	3.236602e-02	449	86.000000	2.580751e-03	450	88.000000	-1.657441e-02
451	90.000000	-8.151244e-03	452	92.000000	-3.114852e-03	453	94.000000	3.707135e-02
454	96.000000	-6.046385e-03	455	98.000000	-5.311976e-02	456	100.000000	3.925535e-03
457	102.000000	1.518874e-02	458	104.000000	1.020600e-03	459	106.000000	-8.364735e-03
460	108.000000	-2.765388e-02	461	110.000000	9.947795e-03	462	112.000000	6.208667e-03
463	114.000000	-2.006357e-02	464	116.000000	1.970532e-02	465	118.000000	1.375737e-02
466	120.000000	-7.531711e-03	467	122.000000	3.967128e-03	468	124.000000	1.261702e-02
469	126.000000	4.597606e-02	470	128.000000	2.733357e-02	471	130.000000	-1.244825e-02
472	132.000000	2.480881e-02	473	134.000000	4.418626e-02	474	136.000000	3.550220e-02
475	138.000000	2.915637e-02	476	140.000000	1.085046e-02	477	142.000000	2.631316e-02

478	144.000000	1.950122e-02	479	146.000000	-8.821988e-03	480	148.000000	1.336016e-02
481	150.000000	7.689118e-03	482	152.000000	-2.189947e-02	483	154.000000	-1.864062e-02
484	156.000000	-1.251390e-02	485	158.000000	7.781498e-03	486	160.000000	-2.377705e-03
487	162.000000	-4.123490e-02	488	164.000000	-1.838505e-02	489	166.000000	2.306856e-03
490	168.000000	-1.334511e-02	491	170.000000	-1.538661e-02	492	172.000000	-2.278010e-02
493	174.000000	-1.395029e-02	494	176.000000	-8.940216e-03	495	178.000000	-2.859333e-02
496	180.000000	-9.032437e-03	497	182.000000	-1.756925e-04	498	184.000000	-2.710678e-02
499	186.000000	-2.576166e-02	500	188.000000	-1.588584e-02	501	190.000000	-1.980129e-03
502	192.000000	-3.528454e-03	503	194.000000	-3.454299e-02	504	196.000000	-2.173591e-02
505	198.000000	6.359671e-04	506	200.000000	-1.302436e-02	507	202.000000	-1.426750e-02
508	204.000000	-1.485346e-02	509	206.000000	-1.167812e-02	510	208.000000	-5.829856e-03
511	210.000000	-2.054417e-02	512	212.000000	-6.916260e-03	513	214.000000	7.931136e-03
514	216.000000	-1.495169e-02	515	218.000000	-1.753822e-02	516	220.000000	-5.433509e-03
517	222.000000	4.238842e-03	518	224.000000	6.364684e-03	519	226.000000	-1.679343e-02
520	228.000000	-1.189537e-02	521	230.000000	9.842029e-03	522	232.000000	-1.425991e-03
523	234.000000	-4.999110e-03	524	236.000000	-1.009883e-03	525	238.000000	-1.536006e-03
526	240.000000	1.768084e-03	527	242.000000	-9.480132e-03	528	244.000000	-2.578420e-03
529	246.000000	1.299579e-02	530	248.000000	-6.318895e-03	531	250.000000	-1.454497e-02
532	252.000000	-3.311042e-03	533	254.000000	2.367131e-03	534	256.000000	3.629196e-03
535	258.000000	-1.393767e-02	536	260.000000	-1.551001e-02	537	262.000000	3.060861e-03
538	264.000000	-5.898567e-03	539	266.000000	-1.272650e-02	540	268.000000	-6.160827e-03
541	270.000000	-7.831774e-03	542	272.000000	-7.318271e-03	543	274.000000	-1.443593e-02
544	276.000000	-1.088997e-02	545	278.000000	5.410830e-03	546	280.000000	-7.210550e-03
547	282.000000	-1.720549e-02	548	284.000000	-4.602715e-03	549	286.000000	2.543253e-03
550	288.000000	5.091375e-03	551	290.000000	-4.328182e-03	552	292.000000	-5.998463e-03
553	294.000000	1.195804e-02	554	296.000000	8.995124e-03	555	298.000000	2.722080e-03
556	300.000000	1.256446e-02	557	302.000000	1.375629e-02	558	304.000000	1.300730e-02
559	306.000000	8.969828e-03	560	308.000000	1.027306e-02	561	310.000000	2.440355e-02
562	312.000000	1.550606e-02	563	314.000000	2.112880e-03	564	316.000000	1.151824e-02
565	318.000000	1.681884e-02	566	320.000000	1.561201e-02	567	322.000000	7.957128e-03
568	324.000000	2.643421e-03	569	326.000000	1.438024e-02	570	328.000000	1.195972e-02
571	330.000000	2.073309e-03	572	332.000000	9.440359e-03	573	334.000000	1.073718e-02
574	336.000000	6.245330e-03	575	338.000000	2.523906e-03	576	340.000000	2.457769e-03
577	342.000000	1.390854e-02	578	344.000000	9.190124e-03	579	346.000000	-4.488938e-03
580	348.000000	2.939613e-03	581	350.000000	9.423040e-03	582	352.000000	7.160636e-03
583	354.000000	2.234992e-03	584	356.000000	-1.987936e-03	585	358.000000	7.001025e-03
586	360.000000	6.852068e-03	587	362.000000	-3.017664e-03	588	364.000000	3.643956e-03
589	366.000000	7.403986e-03	590	368.000000	1.899739e-03	591	370.000000	-1.073925e-03
592	372.000000	-5.746701e-04	593	374.000000	9.117443e-03	594	376.000000	7.445204e-03
595	378.000000	-5.328544e-03	596	380.000000	5.550944e-04	597	382.000000	8.696065e-03
598	384.000000	5.737322e-03	599	386.000000	1.616242e-03	600	388.000000	1.142774e-05
601	390.000000	7.793788e-03	602	392.000000	8.443354e-03	603	394.000000	-1.337890e-03
604	396.000000	4.914250e-03	605	398.000000	1.152634e-02	606	400.000000	4.107351e-03
607	402.000000	3.619993e-05	608	404.000000	2.269386e-03	609	406.000000	9.922327e-03
610	408.000000	9.684340e-03	611	410.000000	-2.534774e-03	612	412.000000	4.151485e-04
613	414.000000	9.278933e-03	614	416.000000	5.242756e-03	615	418.000000	1.136139e-03
616	420.000000	2.524315e-04	617	422.000000	4.133317e-03	618	424.000000	5.078383e-03
619	426.000000	-3.730065e-03	620	428.000000	-7.129817e-04	621	430.000000	6.040786e-03
622	432.000000	-7.148221e-04	623	434.000000	-5.628070e-03	624	436.000000	-4.153460e-03
625	438.000000	1.067611e-03	626	440.000000	1.582616e-03	627	442.000000	-8.798771e-03
628	444.000000	-8.284487e-03	629	446.000000	4.710332e-06	630	448.000000	-3.452391e-03
631	450.000000	-7.717371e-03	632	452.000000	-7.377033e-03	633	454.000000	-4.327512e-03
634	456.000000	-3.114354e-03	635	458.000000	-1.002198e-02	636	460.000000	-8.328630e-03
637	462.000000	-3.939926e-04	638	464.000000	-5.051347e-03	639	466.000000	-1.010130e-02
640	468.000000	-7.623214e-03	641	470.000000	-2.621738e-03	642	472.000000	-1.041057e-03
643	474.000000	-8.802656e-03	644	476.000000	-9.293178e-03	645	478.000000	-8.537400e-04
646	480.000000	-2.910839e-03	647	482.000000	-7.316120e-03	648	484.000000	-5.860247e-03
649	486.000000	-3.048140e-03	650	488.000000	-2.072883e-03	651	490.000000	-7.609327e-03
652	492.000000	-7.239851e-03	653	494.000000	5.544217e-04	654	496.000000	-2.718551e-03
655	498.000000	-8.625718e-03	656	500.000000	-6.304573e-03	657	502.000000	-1.978638e-03
658	504.000000	-7.612050e-04	659	506.000000	-6.962538e-03	660	508.000000	-8.623965e-03
661	510.000000	-1.181463e-03	662	512.000000	-2.355141e-03	663	514.000000	-7.449580e-03
664	516.000000	-5.765116e-03	665	518.000000	-3.068653e-03	666	520.000000	-2.786650e-03
667	522.000000	-7.379049e-03	668	524.000000	-7.968767e-03	669	526.000000	-7.983118e-04
670	528.000000	-2.658050e-03	671	530.000000	-9.050775e-03	672	532.000000	-7.082087e-03
673	534.000000	-2.868505e-03	674	536.000000	-2.057251e-03	675	538.000000	-6.817165e-03
676	540.000000	-8.892670e-03	677	542.000000	-2.356285e-03	678	544.000000	-2.465693e-03
679	546.000000	-7.707088e-03	680	548.000000	-5.951855e-03	681	550.000000	-2.709393e-03
682	552.000000	-2.799624e-03	683	554.000000	-6.403917e-03	684	556.000000	-7.208193e-03
685	558.000000	-6.052965e-04	686	560.000000	-9.173908e-04	687	562.000000	-7.147558e-03
688	564.000000	-5.484413e-03	689	566.000000	-9.180234e-04	690	568.000000	-2.597325e-04
691	570.000000	-3.823590e-03	692	572.000000	-5.671170e-03	693	574.000000	-4.760113e-06
694	576.000000	9.152655e-04	695	578.000000	-4.211189e-03	696	580.000000	-2.684852e-03
697	582.000000	1.112092e-03	698	584.000000	7.529618e-04	699	586.000000	-2.387440e-03
700	588.000000	-3.269699e-03	701	590.000000	2.361672e-03	702	592.000000	3.029766e-03
703	594.000000	-3.074392e-03	704	596.000000	-2.260297e-03	705	598.000000	2.279111e-03
706	600.000000	2.462801e-03	707	602.000000	-7.608795e-04	708	604.000000	-2.594933e-03
709	606.000000	1.822007e-03	710	608.000000	3.044416e-03	711	610.000000	-2.117523e-03
712	612.000000	-1.453101e-03	713	614.000000	2.514067e-03	714	616.000000	1.776823e-03
715	618.000000	-1.408360e-03	716	620.000000	-2.400789e-03	717	622.000000	2.197319e-03
718	624.000000	3.420284e-03	719	626.000000	-2.270290e-03	720	628.000000	-2.298662e-03
721	630.000000	2.304154e-03	722	632.000000	2.375014e-03	723	634.000000	-5.757133e-04
724	636.000000	-2.002798e-03	725	638.000000	1.664556e-03	726	640.000000	3.266436e-03
727	642.000000	-1.380677e-03	728	644.000000	-1.287300e-03	729	646.000000	3.048524e-03
730	648.000000	2.509541e-03	731	650.000000	-6.036477e-04	732	652.000000	-1.348553e-03
733	654.000000	2.588662e-03	734	656.000000	4.255069e-03	735	658.000000	-7.232544e-04

736	660.000000	-1.417669e-03	737	662.000000	3.162514e-03	738	664.000000	3.328646e-03
739	666.000000	3.994259e-04	740	668.000000	-6.832497e-04	741	670.000000	2.347530e-03
742	672.000000	3.984706e-03	743	674.000000	-1.970096e-04	744	676.000000	-7.910659e-04
745	678.000000	3.528610e-03	746	680.000000	3.196048e-03	747	682.000000	-1.318118e-04
748	684.000000	-8.365152e-04	749	686.000000	2.437879e-03	750	688.000000	4.116664e-03
751	690.000000	-2.656438e-04	752	692.000000	-1.640417e-03	753	694.000000	2.620838e-03
754	696.000000	2.900377e-03	755	698.000000	-2.237979e-04	756	700.000000	-1.147974e-03
757	702.000000	1.387464e-03	758	704.000000	2.837904e-03	759	706.000000	-9.023588e-04
760	708.000000	-2.091419e-03	761	710.000000	2.005907e-03	762	712.000000	2.007624e-03
763	714.000000	-1.511218e-03	764	716.000000	-2.210493e-03	765	718.000000	6.490116e-04
766	720.000000	2.247381e-03	767	722.000000	-1.477984e-03	768	724.000000	-3.239859e-03
769	726.000000	6.970029e-04	770	728.000000	1.318509e-03	771	730.000000	-1.856210e-03
772	732.000000	-2.583375e-03	773	734.000000	-1.811374e-04	774	736.000000	1.185994e-03
775	738.000000	-1.973188e-03	776	740.000000	-3.407550e-03	777	742.000000	4.978272e-04
778	744.000000	1.066382e-03	779	746.000000	-2.402166e-03	780	748.000000	-3.022984e-03
781	750.000000	-2.675354e-04	782	752.000000	1.308851e-03	783	754.000000	-1.731393e-03
784	756.000000	-3.589408e-03	785	758.000000	1.921615e-05	786	760.000000	1.067277e-03
787	762.000000	-2.064790e-03	788	764.000000	-2.713541e-03	789	766.000000	-3.217363e-04
790	768.000000	9.173657e-04	791	770.000000	-1.806553e-03	792	772.000000	-3.405876e-03
793	774.000000	1.119092e-04	794	776.000000	1.112120e-03	795	778.000000	-2.331042e-03
796	780.000000	-3.099359e-03	797	782.000000	-4.840149e-04	798	784.000000	9.123945e-04
799	786.000000	-1.712129e-03	800	788.000000	-3.647002e-03	801	790.000000	-5.288969e-04
802	792.000000	7.961988e-04	803	794.000000	-2.306241e-03	804	796.000000	-3.072646e-03
805	798.000000	-6.848217e-04	806	800.000000	4.191438e-04	807	802.000000	-2.000662e-03
808	804.000000	-3.641048e-03	809	806.000000	-5.343313e-04	810	808.000000	8.568646e-04
811	810.000000	-2.402288e-03	812	812.000000	-3.317122e-03	813	814.000000	-7.103586e-04
814	816.000000	6.299776e-04	815	818.000000	-1.612134e-03	816	820.000000	-3.410281e-03
817	822.000000	-6.611018e-04	818	824.000000	9.769144e-04	819	826.000000	-1.899797e-03
820	828.000000	-2.757943e-03	821	830.000000	-2.633106e-04	822	832.000000	8.601709e-04
823	834.000000	-1.278022e-03	824	836.000000	-2.804404e-03	825	838.000000	-3.754994e-05
826	840.000000	1.688974e-03	827	842.000000	-1.260637e-03	828	844.000000	-2.330235e-03
829	846.000000	2.854649e-04	830	848.000000	1.627623e-03			

8.2.6 Combined Debubble and Zero-Phasing Operator – Champion and Hercules

WAVELET NAME: Cha op
SAMPLE_RATE: 2.000000
TIME_SHIFT_ALIGNMENT: -796.000000
CENTER OF GRAVITY SAMPLE: 395.070911
NUMBER OF SAMPLES: 844.000000
MAXIMUM AMPLITUDE: 0.252491
MAXIMUM POSITIVE: 0.252491
MAXIMUM NEGATIVE: -0.519635

SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE	SAMPLE#	TIME	VALUE
1	-794.000000	-1.383512e-03	2	-792.000000	-2.323045e-03	3	-790.000000	-6.644074e-04
4	-788.000000	8.130661e-04	5	-786.000000	-1.944178e-03	6	-784.000000	-1.896854e-03
7	-782.000000	-2.561187e-03	8	-780.000000	6.398621e-04	9	-778.000000	-1.041025e-03
10	-776.000000	-1.985592e-03	11	-774.000000	-3.152223e-03	12	-772.000000	-9.768120e-04
13	-770.000000	-2.626597e-04	14	-768.000000	-1.547223e-03	15	-766.000000	-3.291902e-03
16	-764.000000	-2.426967e-03	17	-762.000000	-7.346434e-04	18	-760.000000	-7.667124e-04
19	-758.000000	-2.811825e-03	20	-756.000000	-3.562022e-03	21	-754.000000	-1.598585e-03
22	-752.000000	-9.839998e-04	23	-750.000000	-1.382294e-03	24	-748.000000	-4.351823e-03
25	-746.000000	-2.365718e-03	26	-744.000000	-1.953377e-03	27	-742.000000	-4.365898e-04
28	-740.000000	-3.653315e-03	29	-738.000000	-3.647770e-03	30	-736.000000	-2.428027e-03
31	-734.000000	-1.198910e-03	32	-732.000000	-1.582482e-03	33	-730.000000	-4.797804e-03
34	-728.000000	-2.651012e-03	35	-726.000000	-2.650449e-03	36	-724.000000	-2.426670e-04
37	-722.000000	-4.209857e-03	38	-720.000000	-3.593580e-03	39	-718.000000	-3.271780e-03
40	-716.000000	-9.755595e-04	41	-714.000000	-2.005347e-03	42	-712.000000	-4.588293e-03
43	-710.000000	-3.332339e-03	44	-708.000000	-2.660828e-03	45	-706.000000	-3.746540e-04
46	-704.000000	-4.121514e-03	47	-702.000000	-3.642936e-03	48	-700.000000	-3.855779e-03
49	-698.000000	-5.662334e-04	50	-696.000000	-2.440182e-03	51	-694.000000	-3.807661e-03
52	-692.000000	-4.271246e-03	53	-690.000000	-2.068253e-03	54	-688.000000	-8.711053e-04
55	-686.000000	-3.383489e-03	56	-684.000000	-3.888537e-03	57	-682.000000	-3.949838e-03
58	-680.000000	-2.874593e-04	59	-678.000000	-2.618085e-03	60	-676.000000	-2.865697e-03
61	-674.000000	-5.150414e-03	62	-672.000000	-1.107023e-03	63	-670.000000	-1.596436e-03
64	-668.000000	-2.159383e-03	65	-666.000000	-4.390225e-03	66	-664.000000	-3.517486e-03
67	-662.000000	-2.349490e-04	68	-660.000000	-2.414478e-03	69	-658.000000	-2.062626e-03
70	-656.000000	-5.703834e-03	71	-654.000000	-1.727706e-04	72	-652.000000	-2.098746e-03
73	-650.000000	-8.099554e-04	74	-648.000000	-4.903752e-03	75	-646.000000	-2.771580e-03
76	-644.000000	-3.734317e-04	77	-642.000000	-1.647271e-03	78	-640.000000	-1.555515e-03
79	-638.000000	-5.732478e-03	80	-636.000000	4.216025e-04	81	-634.000000	-2.104921e-03
82	-632.000000	4.004198e-04	83	-630.000000	-5.021955e-03	84	-628.000000	-2.073121e-03
85	-626.000000	-4.591831e-04	86	-624.000000	-6.013650e-04	87	-622.000000	-1.190384e-03
88	-620.000000	-5.112024e-03	89	-618.000000	4.819542e-04	90	-616.000000	-1.424690e-03
91	-614.000000	1.121507e-03	92	-612.000000	-4.401641e-03	93	-610.000000	-1.632522e-03
94	-608.000000	-2.365870e-04	95	-606.000000	4.366013e-04	96	-604.000000	-7.789043e-04
97	-602.000000	-4.068784e-03	98	-600.000000	3.029496e-04	99	-598.000000	-1.345248e-04
100	-596.000000	1.275904e-03	101	-594.000000	-2.995656e-03	102	-592.000000	-1.696563e-03
103	-590.000000	6.951105e-04	104	-588.000000	1.122402e-03	105	-586.000000	-1.041988e-04
106	-584.000000	-2.956670e-03	107	-582.000000	3.095419e-05	108	-580.000000	1.604041e-03
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112	-572.000000	2.188362e-03	113	-570.000000	1.457274e-03	114	-568.000000	1.149932e-03

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118	-560.000000	1.026679e-03	119	-558.000000	1.204678e-03	120	-556.000000	-3.041627e-03
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124	-548.000000	-1.554658e-03	125	-546.000000	4.294356e-04	126	-544.000000	4.609277e-03
127	-542.000000	1.408653e-03	128	-540.000000	3.336422e-03	129	-538.000000	-3.378383e-03
130	-536.000000	5.785138e-03	131	-534.000000	1.445545e-03	132	-532.000000	4.965374e-03
133	-530.000000	-1.182877e-03	134	-528.000000	1.362989e-03	135	-526.000000	5.368881e-03
136	-524.000000	2.123781e-03	137	-522.000000	4.837434e-03	138	-520.000000	-3.264028e-03
139	-518.000000	7.009475e-03	140	-516.000000	1.736811e-03	141	-514.000000	6.390248e-03
142	-512.000000	-8.247222e-04	143	-510.000000	2.191448e-03	144	-508.000000	5.731661e-03
145	-506.000000	3.309447e-03	146	-504.000000	5.323575e-03	147	-502.000000	-2.615388e-03
148	-500.000000	7.167504e-03	149	-498.000000	2.565082e-03	150	-496.000000	7.142170e-03
151	-494.000000	-4.176470e-04	152	-492.000000	2.365348e-03	153	-490.000000	5.769855e-03
154	-488.000000	4.349374e-03	155	-486.000000	5.315722e-03	156	-484.000000	-1.826555e-03
157	-482.000000	6.011679e-03	158	-480.000000	3.792303e-03	159	-478.000000	6.658766e-03
160	-476.000000	6.001325e-04	161	-474.000000	1.523716e-03	162	-472.000000	5.513568e-03
163	-470.000000	4.843101e-03	164	-468.000000	4.856662e-03	165	-466.000000	-8.812370e-04
166	-464.000000	4.226972e-03	167	-462.000000	4.985682e-03	168	-460.000000	5.391908e-03
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178	-440.000000	4.030671e-03	179	-438.000000	-1.307895e-03	180	-436.000000	7.153052e-03
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187	-422.000000	5.613368e-03	188	-420.000000	-3.117187e-03	189	-418.000000	8.262058e-03
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193	-410.000000	1.210329e-03	194	-408.000000	8.234059e-03	195	-406.000000	3.036615e-03
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208	-380.000000	2.331689e-03	209	-378.000000	7.236592e-03	210	-376.000000	-1.377874e-03
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220	-356.000000	-1.032734e-04	221	-354.000000	3.797816e-03	222	-352.000000	4.509448e-03
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241	-314.000000	-2.647049e-03	242	-312.000000	-6.305193e-03	243	-310.000000	-7.713228e-03
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247	-302.000000	-1.098451e-02	248	-300.000000	-2.078057e-03	249	-298.000000	-1.553412e-03
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253	-290.000000	9.502135e-04	254	-288.000000	-4.431774e-03	255	-286.000000	-4.150445e-03
256	-284.000000	-1.293069e-02	257	-282.000000	-1.638683e-03	258	-280.000000	-2.834948e-03
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265	-266.000000	-1.432708e-02	266	-264.000000	-3.300888e-03	267	-262.000000	-2.691087e-03
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421	46.000000	2.438636e-02	422	48.000000	-2.660951e-02	423	50.000000	-2.982039e-02
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439	82.000000	-6.005975e-02	440	84.000000	-5.165959e-02	441	86.000000	-3.803639e-02
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445	94.000000	-3.124180e-02	446	96.000000	-2.608347e-02	447	98.000000	3.259257e-03
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451	106.000000	-9.980500e-03	452	108.000000	3.561930e-03	453	110.000000	-1.282923e-03
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469	142.000000	-2.680728e-02	470	144.000000	-3.275879e-02	471	146.000000	-2.509803e-02
472	148.000000	-3.803646e-02	473	150.000000	-3.895834e-03	474	152.000000	-2.214340e-02
475	154.000000	-2.788796e-02	476	156.000000	-3.097140e-02	477	158.000000	-2.115748e-02
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487	178.000000	-5.900218e-03	488	180.000000	3.839564e-03	489	182.000000	9.857633e-05
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493	190.000000	6.432932e-03	494	192.000000	6.092889e-03	495	194.000000	-3.297013e-05
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502	208.000000	1.444193e-02	503	210.000000	6.768423e-03	504	212.000000	1.510207e-02
505	214.000000	1.645069e-02	506	216.000000	1.215425e-02	507	218.000000	8.485569e-03
508	220.000000	8.741753e-03	509	222.000000	1.160740e-02	510	224.000000	2.338576e-02
511	226.000000	3.371247e-03	512	228.000000	6.103884e-03	513	230.000000	3.760661e-03
514	232.000000	1.271578e-02	515	234.000000	1.892399e-02	516	236.000000	-1.251329e-03
517	238.000000	1.062355e-03	518	240.000000	2.549958e-03	519	242.000000	1.382210e-02
520	244.000000	1.142582e-02	521	246.000000	4.983152e-04	522	248.000000	-4.581518e-03
523	250.000000	8.632168e-03	524	252.000000	1.011923e-02	525	254.000000	1.014669e-02
526	256.000000	1.769915e-03	527	258.000000	-1.230932e-03	528	260.000000	1.420963e-02
529	262.000000	9.878686e-03	530	264.000000	1.221308e-02	531	266.000000	6.819309e-03
532	268.000000	8.402133e-03	533	270.000000	1.758850e-02	534	272.000000	1.397285e-02
535	274.000000	1.364654e-02	536	276.000000	1.659057e-02	537	278.000000	1.542439e-02
538	280.000000	2.024308e-02	539	282.000000	1.457419e-02	540	284.000000	1.584929e-02
541	286.000000	2.083697e-02	542	288.000000	1.794375e-02	543	290.000000	1.565122e-02
544	292.000000	1.197578e-02	545	294.000000	1.503923e-02	546	296.000000	2.000545e-02
547	298.000000	1.759577e-02	548	300.000000	6.845791e-03	549	302.000000	1.241177e-02
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553	310.000000	3.727586e-03	554	312.000000	9.875683e-03	555	314.000000	9.405227e-03
556	316.000000	1.893887e-02	557	318.000000	3.607139e-03	558	320.000000	4.602101e-03
559	322.000000	3.611783e-03	560	324.000000	1.306708e-02	561	326.000000	8.280162e-03
562	328.000000	4.203462e-03	563	330.000000	6.818710e-04	564	332.000000	3.787599e-03
565	334.000000	1.180189e-02	566	336.000000	2.474041e-04	567	338.000000	7.120772e-03
568	340.000000	-3.631646e-03	569	342.000000	9.355677e-03	570	344.000000	3.572504e-03
571	346.000000	2.055513e-03	572	348.000000	4.064677e-03	573	350.000000	1.072659e-03
574	352.000000	8.468551e-03	575	354.000000	-4.185899e-04	576	356.000000	4.403835e-03
577	358.000000	1.360294e-03	578	360.000000	8.987166e-03	579	362.000000	1.678947e-03
580	364.000000	2.441221e-03	581	366.000000	1.452652e-03	582	368.000000	5.400995e-03
583	370.000000	9.661937e-03	584	372.000000	-1.552428e-03	585	374.000000	3.272295e-03
586	376.000000	-3.203911e-04	587	378.000000	9.317846e-03	588	380.000000	5.128480e-03
589	382.000000	-1.548089e-03	590	384.000000	-1.377772e-04	591	386.000000	1.370029e-03
592	388.000000	7.328678e-03	593	390.000000	1.037662e-03	594	392.000000	-3.061551e-03
595	394.000000	-3.021789e-03	596	396.000000	2.239589e-03	597	398.000000	2.474142e-03
598	400.000000	-2.513158e-03	599	402.000000	-4.681316e-03	600	404.000000	-4.726917e-03
601	406.000000	1.825263e-03	602	408.000000	-3.186592e-03	603	410.000000	-4.462610e-03
604	412.000000	-5.575583e-03	605	414.000000	-4.937746e-03	606	416.000000	3.122175e-04
607	418.000000	-7.977482e-03	608	420.000000	-3.465144e-03	609	422.000000	-6.786663e-03
610	424.000000	-1.956156e-03	611	426.000000	-4.509207e-03	612	428.000000	-7.255219e-03
613	430.000000	-3.857561e-03	614	432.000000	-4.528733e-03	615	434.000000	-6.223061e-04
616	436.000000	-8.933246e-03	617	438.000000	-3.263495e-03	618	440.000000	-6.601078e-03
619	442.000000	1.387823e-03	620	444.000000	-5.578853e-03	621	446.000000	-6.859918e-03
622	448.000000	-4.625084e-03	623	450.000000	-5.383749e-03	624	452.000000	2.536799e-03
625	454.000000	-9.940894e-03	626	456.000000	-3.758507e-03	627	458.000000	-8.353215e-03
628	460.000000	3.746976e-04	629	462.000000	-3.642787e-03	630	464.000000	-7.072348e-03

631	466.000000	-6.445901e-03	632	468.000000	-5.980433e-03	633	470.000000	6.348941e-04
634	472.000000	-7.769462e-03	635	474.000000	-4.041124e-03	636	476.000000	-1.001639e-02
637	478.000000	-6.396528e-04	638	480.000000	-5.157583e-03	639	482.000000	-5.874893e-03
640	484.000000	-6.423769e-03	641	486.000000	-7.423609e-03	642	488.000000	-1.042075e-03
643	490.000000	-8.072340e-03	644	492.000000	-4.898421e-03	645	494.000000	-8.189793e-03
646	496.000000	-3.167860e-03	647	498.000000	-5.271596e-03	648	500.000000	-6.868906e-03
649	502.000000	-6.978323e-03	650	504.000000	-5.465560e-03	651	506.000000	-2.858195e-03
652	508.000000	-7.164617e-03	653	510.000000	-6.489626e-03	654	512.000000	-7.266213e-03
655	514.000000	-2.565556e-03	656	516.000000	-4.004214e-03	657	518.000000	-7.427019e-03
658	520.000000	-6.509934e-03	659	522.000000	-5.409229e-03	660	524.000000	-1.397497e-03
661	526.000000	-4.736844e-03	662	528.000000	-7.495673e-03	663	530.000000	-5.331630e-03
664	532.000000	-3.744400e-03	665	534.000000	-8.124691e-04	666	536.000000	-6.125255e-03
667	538.000000	-5.859706e-03	668	540.000000	-4.910717e-03	669	542.000000	-1.337269e-03
670	544.000000	-2.496519e-03	671	546.000000	-5.925515e-03	672	548.000000	-4.485233e-03
673	550.000000	-4.199874e-03	674	552.000000	3.845136e-04	675	554.000000	-5.663157e-03
676	556.000000	-3.250628e-03	677	558.000000	-5.321168e-03	678	560.000000	-9.662462e-04
679	562.000000	-2.086943e-03	680	564.000000	-5.374993e-03	681	566.000000	-2.616149e-03
682	568.000000	-4.225051e-03	683	570.000000	7.334428e-04	684	572.000000	-5.335734e-03
685	574.000000	-2.645855e-03	686	576.000000	-4.198203e-03	687	578.000000	1.320865e-04
688	580.000000	-2.259780e-03	689	582.000000	-4.141942e-03	690	584.000000	-2.831962e-03
691	586.000000	-2.448080e-03	692	588.000000	1.766484e-03	693	590.000000	-4.563793e-03
694	592.000000	-1.893837e-03	695	594.000000	-3.887893e-03	696	596.000000	1.677310e-03
697	598.000000	-7.235820e-04	698	600.000000	-2.819530e-03	699	602.000000	-2.725740e-03
700	604.000000	-1.104917e-03	701	606.000000	2.180163e-03	702	608.000000	-1.564552e-03
703	610.000000	-1.642467e-03	704	612.000000	-2.805694e-03	705	614.000000	2.241238e-03
706	616.000000	3.035326e-04	707	618.000000	-1.717912e-04	708	620.000000	-2.459069e-03
709	622.000000	2.659090e-04	710	624.000000	2.084102e-03	711	626.000000	4.705764e-04
712	628.000000	-6.109854e-04	713	630.000000	-1.072558e-03	714	632.000000	2.130446e-03
715	634.000000	1.481486e-03	716	636.000000	7.576160e-04	717	638.000000	-1.309290e-03
718	640.000000	1.880127e-03	719	642.000000	1.692451e-03	720	644.000000	2.225924e-03
721	646.000000	-8.077365e-04	722	648.000000	7.460017e-04	723	650.000000	2.574716e-03
724	652.000000	2.375958e-03	725	654.000000	1.274331e-03	726	656.000000	-7.645437e-04
727	658.000000	2.661027e-03	728	660.000000	2.636918e-03	729	662.000000	3.189664e-03
730	664.000000	-6.583696e-04	731	666.000000	1.615059e-03	732	668.000000	2.551941e-03
733	670.000000	4.182068e-03	734	672.000000	1.592587e-03	735	674.000000	3.529619e-05
736	676.000000	2.697486e-03	737	678.000000	3.308398e-03	738	680.000000	4.384774e-03
739	682.000000	3.095477e-04	740	684.000000	1.863508e-03	741	686.000000	2.822487e-03
742	688.000000	4.856998e-03	743	690.000000	2.539925e-03	744	692.000000	1.359947e-03
745	694.000000	2.292838e-03	746	696.000000	4.275035e-03	747	698.000000	4.268284e-03
748	700.000000	1.892677e-03	749	702.000000	2.150531e-03	750	704.000000	3.221323e-03
751	706.000000	4.988566e-03	752	708.000000	2.984243e-03	753	710.000000	2.192078e-03
754	712.000000	2.480899e-03	755	714.000000	4.897216e-03	756	716.000000	3.750204e-03
757	718.000000	3.022771e-03	758	720.000000	1.520967e-03	759	722.000000	4.419358e-03
760	724.000000	4.445318e-03	761	726.000000	3.453377e-03	762	728.000000	2.171354e-03
763	730.000000	2.185270e-03	764	732.000000	5.616897e-03	765	734.000000	3.273807e-03
766	736.000000	3.734267e-03	767	738.000000	5.638583e-04	768	740.000000	4.908762e-03
769	742.000000	3.942232e-03	770	744.000000	4.269704e-03	771	746.000000	1.574969e-03
772	748.000000	2.047498e-03	773	750.000000	5.298560e-03	774	752.000000	3.173386e-03
775	754.000000	4.435700e-03	776	756.000000	-3.360916e-04	777	758.000000	5.074932e-03
778	760.000000	3.014870e-03	779	762.000000	4.883632e-03	780	764.000000	1.352631e-03
781	766.000000	1.898044e-03	782	768.000000	4.605612e-03	783	770.000000	2.988286e-03
784	772.000000	4.390930e-03	785	774.000000	-3.437198e-04	786	776.000000	4.690106e-03
787	778.000000	2.335746e-03	788	780.000000	4.830612e-03	789	782.000000	9.000936e-04
790	784.000000	2.010029e-03	791	786.000000	3.817761e-03	792	788.000000	2.780647e-03
793	790.000000	3.763684e-03	794	792.000000	-4.406537e-04	795	794.000000	3.984120e-03
796	796.000000	2.216563e-03	797	798.000000	4.033212e-03	798	800.000000	6.611079e-04
799	802.000000	1.306102e-03	800	804.000000	3.195289e-03	801	806.000000	2.696913e-03
802	808.000000	2.754295e-03	803	810.000000	-4.453316e-04	804	812.000000	2.484439e-03
805	814.000000	2.344346e-03	806	816.000000	3.028251e-03	807	818.000000	6.281659e-04
808	820.000000	1.134903e-04	809	822.000000	2.512757e-03	810	824.000000	2.140523e-03
811	826.000000	2.136871e-03	812	828.000000	-5.597553e-04	813	830.000000	8.302102e-04
814	832.000000	2.364161e-03	815	834.000000	1.532578e-03	816	836.000000	1.132927e-03
817	838.000000	-1.289951e-03	818	840.000000	2.039688e-03	819	842.000000	1.173481e-03
820	844.000000	1.501189e-03	821	846.000000	-6.530209e-04	822	848.000000	-4.505428e-04
823	850.000000	2.157350e-03	824	852.000000	9.709864e-05	825	854.000000	1.355108e-03
826	856.000000	-2.568549e-03	827	858.000000	1.924847e-03	828	860.000000	-4.141044e-05
829	862.000000	1.108416e-03	830	864.000000	-1.262148e-03	831	866.000000	-1.331950e-03
832	868.000000	1.885997e-03	833	870.000000	-1.063294e-03	834	872.000000	1.282069e-03
835	874.000000	-3.766323e-03	836	876.000000	1.611640e-03	837	878.000000	-9.527068e-04
838	880.000000	7.970786e-04	839	882.000000	-2.057048e-03	840	884.000000	-2.019164e-03
841	886.000000	1.104262e-03	842	888.000000	-1.531213e-03	843	890.000000	8.389670e-04
844	892.000000	-4.532397e-03						

8.3 SEG Y Format Description

8.3.1 EBCDIC Header

Final Full Angle Stack SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-2335   XLINES: 1759-6800 TAPE NUMBERS: Q54515-516
C04 DATA TYPE: FINAL FULL ANGLE STACK VOLUME (05-42DEG)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ************************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); POLYGON SELECT; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 NMO (FINAL HDVA-SMTH-VELS); ADJUSTED ANGLE MUTE 05-42DEG
C31 STACK (OFF02-52); GUN/CABLE CORRECTION +10MS; EXPGAIN 3DB/SEC
C32 2D&3D K-NOTCH FILTERS; TVF; AGC 800MS; SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS***
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 33-34(I2): STACKWORD; 65-68(R4): WATER BTTM TIME IN MS
C37 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C38 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C39 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER
C40

Raw Full Angle Stack SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-2335   XLINES: 1759-6800 TAPE NUMBERS: Q54505-506
C04 DATA TYPE: RAW FULL ANGLE STACK VOLUME (05-42DEG)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); POLYGON SELECT; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 NMO (FINAL HDVA-SMTH-VELS); ADJUSTED ANGLE MUTE 05-42DEG
C31 STACK (LIMIT TO COMMON OFF02-52); EXPGAIN 3DB/SEC
C32 GUN/CABLE CORRECTION +10MS; SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS***
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 33-34(I2): STACKWORD; 65-68(R4): WATER BTTM TIME IN MS
C37 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C38 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C39 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER
C40

Raw Angle stack (05-15Deg) SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-2335 XLINES: 1759-6800 TAPE NUMBERS: Q54507-508
C04 DATA TYPE: RAW ANGLE STACK VOLUME (05-15DEG)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); OUTPUT POLYGON; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 NMO (FINAL HDVA-SMTH-VELS); ANGLE MUTE 05-15DEG
C31 STACK (DROP 2 FAR TR); GUN/CABLE CORRECTION +10MS; EXPGAIN 3DB/SEC
C32 SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS***
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 33-34(I2): STACKWORD; 65-68(R4): WATER BTTM TIME IN MS
C37 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C38 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C39 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER
C40

Raw Angle stack (15-25Deg) SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-2335   XLINES: 1759-6800 TAPE NUMBERS: Q54509-510
C04 DATA TYPE: RAW ANGLE STACK VOLUME (15-25DEG)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); OUTPUT POLYGON; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 NMO (FINAL HDVA-SMTH-VELS); ANGLE MUTE 15-25DEG
C31 STACK (DROP 2 FAR TR); GUN/CABLE CORRECTION +10MS; EXPGAIN 3DB/SEC
C32 SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS**
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 33-34(I2): STACKWORD; 65-68(R4): WATER BTTM TIME IN MS
C37 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C38 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C39 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER
C40

Raw Angle stack (25-35Deg) SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-2335   XLINES: 1759-6800 TAPE NUMBERS: Q54511-512
C04 DATA TYPE: RAW ANGLE STACK VOLUME (25-35DEG)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); OUTPUT POLYGON; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 NMO (FINAL HDVA-SMTH-VELS); ANGLE MUTE 25-35DEG
C31 STACK (DROP 2 FAR TR); GUN/CABLE CORRECTION +10MS; EXPGAIN 3DB/SEC
C32 SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS***
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 33-34(I2): STACKWORD; 65-68(R4): WATER BTTM TIME IN MS
C37 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C38 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C39 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER
C40

Raw Angle stack (35-45Deg) SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-2335   XLINES: 1759-6800 TAPE NUMBERS: Q54513-514
C04 DATA TYPE: RAW ANGLE STACK VOLUME (35-45DEG)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); POLYGON SELECT; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 NMO (FINAL HDVA-SMTH-VELS); ANGLE MUTE 35-45DEG
C31 STACK (DROP 2 FAR TR); GUN/CABLE CORRECTION +10MS; EXPGAIN 3DB/SEC
C32 SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS***
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 33-34(I2): STACKWORD; 65-68(R4): WATER BTTM TIME IN MS
C37 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C38 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C39 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER
C40

Raw KPSTM/RADON NMO-CMP Gathers SEG Y EBCDIC Header

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 INLINES: 0641-0660 XLINES: 3774-4021
C04 DATA TYPE: RAW KPSTM/RADON NMO-CMP GATHERS
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORREC. 0MS (ANT=-120MS,CAS=-48.07MS)
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERP&ALTERNATE TRACES; 68 OFFSET SORT (INC. ANTARES/CASINO)
C25 TARGETED 3D KPSTM (4KM APERTURE, MAX 60DEG DIPS); SPV-TMIG (1x1KM GRID)
C26 APPLY TIDAL STATICS, SURVEY MATCH (MATCHED ANTARES/CASINO TO CHAMPION)
C27 INV-Q (PHASE&AMP,Q136,12DB GAIN); FOLD INTERP/REGULARISATION (FIRE3D)
C28 FULL 3D KPSTM W/SMTH TMIG-VELS (MIN-CLIP1700,PRESERVE WB TO WB+300MS)
C29 HDVA (50x50M GRID); POLYGON SELECT; RES.WLSRAD(96% FINAL HDVA-SMTH-VELS)
C30 3D GRID (12.5x25M); 3D CMP-NMO (FINAL HDVA-SMTH-VELS), NO STRETCH MUTE APPLY
C31 EXPGAIN 3DB/SEC; GUN/CABLE CORRECTION +10MS
C32 SEG Y FORMAT (MAX 5500MS TR LENGTH)
C33 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C34 *****BYTE LOCATIONS OF KEY HEADERS***
C35 17-20,189-192(I4): INLINE NUMBER; 21-24,193-196(I4): XLINE NUMBER
C36 25-28(I4): TRACE NUMBER WITHIN CMP; 33-34(I2): STACKWORD
C37 37-40(R4): SOURCE TO DETECTOR DISTANCE; 65-68(R4): WATER BTTM TIME IN MS
C38 73-76,181-184(I4): 100*CELL-CENTER-X; 77-80,185-188(I4): 100*CELL-CENTER-Y
C39 125-128(R4): CELL-CENTER-X; 129-132(R4): CELL-CENTER-Y
C40 213-216(R4): WATER DEPTH IN MS; 217-220(I4): 3D CMP NUMBER

Raw PREMIG WLS-RADON 2D-CMP Gathers SEG Y EBCDIC Header (ANTARES)

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44, ANTARES M3D, OTWAY BASIN, 2007 REPROCESSING
C03 SAIL-LINE: W03ANT1156P1   SEQ: 003   SP RANGE: 2836-893
C04 DATA TYPE: RAW PREMIG WLS-RADON 2D-CMP GATHERS (SSL/SL ORDER)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 *****   DATA ACQUISITION BY PGS (VESSEL: ORIENT EXPLORER) ****************
C08 SYNTRAK SYSTEM; FILTERS: 3/12-206/276; SEG POLARITY
C09 FORMAT SEGD 8058; 2MS SAMP INT; SYSTEM DELAY: 120MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 6M; 4 X 4050M CABLES
C11 CABLE DEPTH 7.5M; 324 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 53,54
C12 SRC SEPARATION 75M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 125M
C13 **************** NAVIGATION INFORMATION ************************************
C14 SPHEROID: GRS-80; GEODETIC DATUM: GDA-94; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORRECTION -120MS; GEOMETRY UPDATE
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERPOLATED TRACES; NO ALTERNATE TR DROP TO 12.5M CMP BIN SPACING
C25 UPDATE TIDAL STATICS & 3D GRID (6.25x25M); 2D-CMP/SSL PER SL ORDER
C26 SEG Y FORMAT (MAX 6144MS TR LENGTH)
C27 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C28 *****BYTE LOCATIONS OF KEY HEADERS*********(INTEGER UNLESS OTHERWISE STATED)
C29 9-12:FIELD FILE; 13-16:FIELD CHNL; 17-20:SP#; 21-24:2D-CMP;25-28:TR#(UNIQUE)
C30 33-34:STKW; 37-40(R4):SRC-RCV-DIST;41-44(R4):RCV DEPTH;45-48(R4):TIDAL HT(M)
C31 49-52:SRC DEPTH;53-56:FLD CBL;57-60:SRC CODE;61-64,213-216(R4):WD-SRC,MIDPT
C32 65-68(R4):WD-RCV;73-76,77-80:100*SRC-X,Y;81-84,85-88:100*RCV-X,Y;237-240:SSL
C33 107-108(R2):FLD DELAY;125-128,129-132(R4):CELL-CENTER-X,Y; 217-220:3D-CMP
C34 181-184,185-188:100*MIDPT-X,Y; 209-212:TIDAL IN US; 233-236:SAIL SUFFIX SEQ
C35 < 3D GRID INFORMATION FOR NOMINAL GEOMETRY >
C36 INLINES:261-3400,INCR:1; XLINES:901-16119,INCR:1; CELL: 6.25Mx25M; DEG:114
C37 MG1 (X) 608862.87 (Y) 5764504.46   XLINE 901   INLINE 261
C38 MG2 (X) 695752.46 (Y) 5725818.72   XLINE 16119   INLINE 261
C39 MG3 (X) 576944.21 (Y) 5692813.98   XLINE 901   INLINE 3400
C40 MG4 (X) 663833.80 (Y) 5654128.24   XLINE 16119   INLINE 3400

Raw PREMIG WLS-RADON 2D-CMP Gathers SEG Y EBCDIC Header (CASINO)

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44, CASINO M3D, OTWAY BASIN, 2007 REPROCESSING
C03 SAIL-LINE: S01CAS1661P007   SEQ: 007   SP RANGE: 2670-1284
C04 DATA TYPE: RAW PREMIG WLS-RADON 2D-CMP GATHERS (SSL/SL ORDER)
C05
C06 PROCESSING RECORD LENGTH 5632 MS; PROCESSING SAMPLE RATE 4 MS
C07 *****   DATA ACQUISITION BY WESTERNGECO (VESSEL: GECO RESOLUTION) ********
C08 TRIACQ SYSTEM; FILTERS: 3/18-200/406; SEG POLARITY
C09 FORMAT SEGD 8015 REV 2; 2MS SAMP INT; RECORDING DELAY: 48.07MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 6M; 6 X 4000M CABLES
C11 CABLE DEPTH 7,9.5M; 320 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 53,54
C12 SRC SEPARATION 75M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 140-143M
C13 **************** NAVIGATION INFORMATION ************************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORRECTION -48.07MS; GEOMETRY UPDATE
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERPOLATED TRACES; NO ALTERNATE TR DROP TO 12.5M CMP BIN SPACING
C25 UPDATE TIDAL STATICS & 3D GRID (6.25x25M); 2D-CMP/SSL PER SL ORDER
C26 SEG Y FORMAT (MAX 5632MS TR LENGTH)
C27 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C28 *****BYTE LOCATIONS OF KEY HEADERS*********(INTEGER UNLESS OTHERWISE STATED)
C29 9-12:FIELD FILE; 13-16:FIELD CHNL; 17-20:SP#; 21-24:2D-CMP;25-28:TR#(UNIQUE)
C30 33-34:STKW; 37-40(R4):SRC-RCV-DIST;41-44(R4):RCV DEPTH;45-48(R4):TIDAL HT(M)
C31 49-52:SRC DEPTH;53-56:FLD CBL;57-60:SRC CODE;61-64,213-216(R4):WD-SRC,MIDPT
C32 65-68(R4):WD-RCV;73-76,77-80:100*SRC-X,Y;81-84,85-88:100*RCV-X,Y;237-240:SSL
C33 107-108(R2):FLD DELAY;125-128,129-132(R4):CELL-CENTER-X,Y; 217-220:3D-CMP
C34 181-184,185-188:100*MIDPT-X,Y; 209-212:TIDAL IN US; 233-236:SAIL SUFFIX SEQ
C35 < 3D GRID INFORMATION FOR NOMINAL GEOMETRY >
C36 INLINES:261-3400,INCR:1; XLINES:901-16119,INCR:1; CELL: 6.25Mx25M; DEG:114
C37 MG1 (X) 608862.87 (Y) 5764504.46   XLINE 901   INLINE 261
C38 MG2 (X) 695752.46 (Y) 5725818.72   XLINE 16119   INLINE 261
C39 MG3 (X) 576944.21 (Y) 5692813.98   XLINE 901   INLINE 3400
C40 MG4 (X) 663833.80 (Y) 5654128.24   XLINE 16119   INLINE 3400

Raw PREMIG WLS-RADON 2D-CMP Gathers SEG Y EBCDIC Header (CHAMPION/HERCULES)

C01 CLIENT: SANTOS LIMITED
C02 SURVEY: VIC/P44,CHAMPION SOUTH/HERCULES M3D,OTWAY BASIN,2007 PROCESSING
C03 SAIL-LINE: OTSN07-1424P033 SEQ: 033 SP RANGE: 2794-1245
C04 DATA TYPE: RAW PREMIG WLS-RADON 2D-CMP GATHERS (SSL/SL ORDER)
C05
C06 PROCESSING RECORD LENGTH 6144 MS; PROCESSING SAMPLE RATE 4 MS
C07 ****** DATA ACQUISITION BY WESTERNGECO (VESSEL: WESTERN TRIDENT) ***********
C08 TRIACQ SYSTEM; FILTERS: 2/12-206/264; SEG POLARITY
C09 FORMAT SEGD 8036, REV 2; 2MS SAMP INT; RECORDING DELAY 0MS
C10 SHOT INT: 18.75M FLIP-FLOP; DUAL SOURCE; SOURCE DEPTH 7M; 8 X 5000M CABLES
C11 CABLE DEPTH 8,9M; 400 CHNLS PER CABLE; 12.5M GROUP INT; NOMINAL FOLD 66,67
C12 SRC SEPARATION 50M; CABLE SEPARATION 100M; NOMINAL NEAR OFFSET 230M
C13 ***************** NAVIGATION INFORMATION ***********************************
C14 SPHEROID: WGS-84; GEODETIC DATUM: WGS-84; PROJECTION TYPE: UTM,S.HEMISPHERE
C15 PROJECTION ZONE: 54 S; CENTRAL MERIDIAN: 141 DEG E; UNITS METRES
C16 ************ DATA PROCESSING BY WESTERNGECO, PERTH CENTRE ******************
C17 REFORMAT; SEIS-NAV MERGE; FIELD DELAY CORRECTION 0MS; GEOMETRY UPDATE
C18 DESIGNATURE (ZERO PHASE); LCF(3HZ,18DB/OCT); RESAMPLE TO 4MS; T SQUARED GAIN
C19 FK FILTER; SHOT-SWATT; RECEIVER-SWATTS; SORT BACK TO SHOT DOMAIN
C20 FIELD TR-EDITS; K-FILTER; TAUP LINEAR NOISE ATTENUATION (LNA)
C21 DETERMINISTIC WATER LAYER DEMULTIPLE (DWD); FPV (1x1KM GRID)
C22 2D 2-ITERATIONS SURFACE RELATED MULTIPLE ELIMINATION (SRME)
C23 3:1 SHOT-INTERP / WEIGHTED LEAST SQUARES RADON DEMULTIPLE (90% FPV)
C24 DROP INTERPOLATED TRACES; NO ALTERNATE TR DROP TO 12.5M CMP BIN SPACING
C25 UPDATE TIDAL STATICS & 3D GRID (6.25x25M); 2D-CMP/SSL PER SL ORDER
C26 SEG Y FORMAT (MAX 6144MS TR LENGTH)
C27 POLARITY:SEG NEGATIVE (INCREASE IN ACOUSTIC IMPEDANCE IS -VE NUMBER ON TAPE)
C28 *****BYTE LOCATIONS OF KEY HEADERS*********(INTEGER UNLESS OTHERWISE STATED)
C29 9-12:FIELD FILE; 13-16:FIELD CHNL; 17-20:SP#; 21-24:2D-CMP;25-28:TR#(UNIQUE)
C30 33-34:STKW; 37-40(R4):SRC-RCV-DIST;41-44(R4):RCV DEPTH;45-48(R4):TIDAL HT(M)
C31 49-52:SRC DEPTH;53-56:FLD CBL;57-60:SRC CODE;61-64,213-216(R4):WD-SRC,MIDPT
C32 65-68(R4):WD-RCV;73-76,77-80:100*SRC-X,Y;81-84,85-88:100*RCV-X,Y;237-240:SSL
C33 107-108(R2):FLD DELAY;125-128,129-132(R4):CELL-CENTER-X,Y; 217-220:3D-CMP
C34 181-184,185-188:100*MIDPT-X,Y; 209-212:TIDAL IN US; 233-236:SAIL SUFFIX SEQ
C35 < 3D GRID INFORMATION FOR NOMINAL GEOMETRY >
C36 INLINES:261-3400,INCR:1; XLINES:901-16119,INCR:1; CELL: 6.25Mx25M; DEG:114
C37 MG1 (X) 608862.87 (Y) 5764504.46 XLINE 901 INLINE 261
C38 MG2 (X) 695752.46 (Y) 5725818.72 XLINE 16119 INLINE 261
C39 MG3 (X) 576944.21 (Y) 5692813.98 XLINE 901 INLINE 3400
C40 MG4 (X) 663833.80 (Y) 5654128.24 XLINE 16119 INLINE 3400

8.3.2 SEG Y Data Loading Information

Angles Stack SEG Y Loading Information

Client : Santos Limited
Area : Vic/P44, Otway Basin
Surveys : Champion/Hercules M3D Processing & Antares/Casino M3D 2007 Reprocessing
Data type: 1) Raw Full Angle Stack Volume (05-42deg)
2) Raw Angle Stack Volume (05-15deg)
3) Raw Angle Stack Volume (15-25deg)
4) Raw Angle Stack Volume (25-35deg)
5) Raw Angle Stack Volume (35-45deg)
6) Final Full Angle Stack Volume (05-42deg)
Inline range : 0641 – 2335 (incr1)
Xline range : 1759 – 6800 (incr1)
Trace length : 5500 ms (4 ms sampling rate)
Data format : SEG-Y, 32 bit floating point
Tape media : 3590E cartridge, 20 Gb
Tape numbers **:** 1) Q54505 = IL0641-1600 & Q54506 = IL1601-2335
2) Q54507 = IL0641-1685 & Q54508 = IL1686-2335
3) Q54509 = IL0641-1685 & Q54510 = IL1686-2335
4) Q54511 = IL0641-1685 & Q54512 = IL1686-2335
5) Q54513 = IL0641-1685 & Q54514 = IL1686-2335
6) Q54515 = IL0641-1600 & Q54516 = IL1601-2335
Creation date : 21 December 2007

Navigation Information for Champion/Hercules Surveys

Spheroid : WGS-84
Geodetic datum : WGS-84
Projection type : UTM, Southern Hemisphere
Projection zone : 54 S
Central meridian : 141 deg E

4 Corner Points of Processing Grid

	X-Coordinates	Y-Coordinates	Xline	Inline
PG1	614796.64	5751463.53	1759	0641
PG2	672361.43	5725834.04	6800	0641
PG3	597571.35	5712774.88	1759	2335
PG4	655136.13	5687145.39	6800	2335

Xline cell size : 12.5 m
Inline cell size : 25.0 m
Xline increment : 1
Inline increment : 1

SEG Y Format Archive Information

Description	Byte nos.	Format
Inline number	017-020	32 bit integer
Crossline number	021-024	32 bit integer
Fold	033-034	16 bit integer
Water bottom twt at midpoint (ms)	065-068	32 bit floating point
Xcord-cell-center *100	073-076	32 bit integer
Ycord-cell-center *100	077-080	32 bit integer
Xcord-cell-center	125-128	32 bit floating point
Ycord-cell-center	129-132	32 bit floating point
Xcord-cell-center *100	181-184	32 bit integer
Ycord-cell-center *100	185-188	32 bit integer
Inline number	189-192	32 bit integer
Crossline number	193-196	32 bit integer
Water depth at midpoint (ms)	213-216	32 bit floating point
CMP (3D sequential)	217-220	32 bit integer

Raw KPSTM/Radon-NMO CMP Gathers SEG Y Loading Information

Client : Santos Limited
Area : Vic/P44, Otway Basin
Surveys : Champion/Hercules M3D Processing & Antares/Casino M3D 2007 Reprocessing
Data type: Raw KPSTM/Radon NMO-CMP Gathers

Inline range : 0641 – 2335 (incr1)
Xline range : 1759 – 6800 (incr1)
Trace length : 5500 ms (4 ms sampling rate)
Data format : SEG-Y, 32 bit floating point
Media : Linux formatted USB disk, 500 Gb
USB numbers : 1) IT4433177 (vol 1 of 4, 29 files) = IL0641-1220
2) IT4433713 (vol 2 of 4, 16 files) = IL1221-1540
3) IT4434713 (vol 3 of 4, 22 files) = IL1541-1980
4) IT4434724 (vol 4 of 4, 18 files) = IL1981-2335
Creation date : 8 January 2008

Navigation Information for Champion/Hercules Surveys

Spheroid : WGS-84
Geodetic datum : WGS-84
Projection type : UTM, Southern Hemisphere
Projection zone : 54 S
Central meridian : 141 deg E

4 Corner Points of Processing Grid

	X-Coordinates	Y-Coordinates	Xline	Inline
PG1	614796.64	5751463.53	1759	0641
PG2	672361.43	5725834.04	6800	0641
PG3	597571.35	5712774.88	1759	2335
PG4	655136.13	5687145.39	6800	2335

Xline cell size : 12.5 m
Inline cell size : 25.0 m
Xline increment : 1
Inline increment : 1

SEG Y Format Archive Information

Description	Byte nos.	Format
Inline number	017-020	32 bit integer
Crossline number	021-024	32 bit integer
Trace number (unique) within CMP	025-028	32 bit integer
Fold	033-034	16 bit integer
Source to detector distance (m)	037-040	32 bit floating point
Water bottom twt at midpoint (ms)	065-068	32 bit floating point
Xcord-cell-center *100	073-076	32 bit integer
Ycord-cell-center *100	077-080	32 bit integer
Xcord-cell-center	125-128	32 bit floating point
Ycord-cell-center	129-132	32 bit floating point
Xcord-cell-center *100	181-184	32 bit integer
Ycord-cell-center *100	185-188	32 bit integer
Inline number	189-192	32 bit integer
Crossline number	193-196	32 bit integer
Water depth at midpoint (ms)	213-216	32 bit floating point
CMP (3D sequential)	217-220	32 bit integer

Raw Pre-Mig WLS-Radon-2D CMP Gathers SEG Y Loading Information

Client : Santos Limited
Area : Vic/P44, Otway Basin
Surveys : Champion/Hercules M3D Processing & Antares/Casino M3D 2007 Reprocessing
Data type: Raw PreMig WLS-Radon 2D-CMP Gathers (SSL/SL order)

Antares sail-lines : W03ANT1004P010 - W03ANT1260P017
Champion sail-lines : OTSN07-1008P001 - OTSN07-1744P054
Casino sail-lines : S01CAS1265P033 - S01CAS2249P056
Hercules sail-lines : OTSN07-2064A061 - OTSN07-2336P076
Min-max inlines : 0641 – 2350 (incr1, 25 m cell size)
Min-max xlines : 2601 – 12698 (incr1, 6.25 m cell size)
Trace length : 6144 ms (Champion/Hercules/Antares) & 5632 ms (Casino)
Sampling rate : 4 ms sampling rate
Data format : SEG-Y, 32 bit floating point
Media : Linux formatted USB disk, 500 Gb
Creation date : 18 January 2008

USB numbers (refer to sail-line listing for more details) :
1) IT4435344 (34 files) = ANT1004P010 (SSL 1-8) to ANT1188P023 (SSL 1-8)
2) IT4435349 (22 files) = ANT1196I028 (SSL 1-8) to ANT1260P017 and
CHA1008P001 (SSL 1-16) to CHA1136P021 (SSL 1-16)
3) IT4437280 (15 files) = CHA1152P023 (SSL 1-16) to CHA1360P024 (SSL 1-16)
4) IT4437285 (13 files) = CHA1376P026 (SSL 1-16) to CHA1536P049 (SSL 1-16)
5) IT4438919 (12 files) = CHA1552P053 (SSL 1-16) to CHA1728P052 (SSL 1-16)
6) IT4438923 (34 files) = CHA1744J056 (SSL 1-16) to CHA1744P054 (SSL 1-16) and
CAS1265J095 (SSL 1-12) to CAS1613P040 (SSL 1-12)
7) IT4439563 (29 files) = CAS1625P042 (SSL 1-12) to CAS1925P078 (SSL 1-12)
8) IT4439715 (29 files) = CAS1937P080 (SSL 1-12) to CAS2249P056 (SSL 1-12)
9) IT4440251 (20 files) = HER2064A061 (SSL 1-16) to HER2336P076 (SSL 1-16)

Navigation Information for Champion/Hercules & Casino Surveys
Spheroid : WGS-84 (GRS-80 for Antares survey)
Geodetic datum : WGS-84 (GDA-94 for Antares survey)
Projection type : UTM, Southern Hemisphere
Projection zone : 54 S
Central meridian : 141 deg E

4 Corner Points of Master Grid for Nominal Geometry

	X-Coordinates	Y-Coordinates	Xline	Inline
MG1	608862.87	5764504.46	901	261
MG2	695752.46	5725818.72	16119	261
MG3	576944.21	5692813.98	901	3400
MG4	663833.80	5654128.24	16119	3400

Xline cell size : 6.25 m
Inline cell size : 25.0 m
Xline increment : 1
Inline increment : 1

SEG Y Format Archive Information

Description	Byte nos.	Format
Field file number	009-012	32 bit integer
Field channel number	013-016	32 bit integer
Shotpoint number	017-020	32 bit integer
2D-CMP(sequential within SSL)	021-024	32 bit integer
Trace number (unique)	025-028	32 bit integer
Fold	033-034	16 bit integer
Source to detector distance (m)	037-040	32 bit floating point
Detector depth (m) below MSL	041-044	32 bit floating point
Tidal height (m)	045-048	32 bit floating point
Source depth (m) below MSL	049-052	32 bit integer
Field cable number	053-056	32 bit integer
Source code	057-060	32 bit integer
Water depth at source (m)	061-064	32 bit floating point
Water depth at detector (m)	065-068	32 bit floating point
Xcord-source *100	073-076	32 bit integer
Ycord-source *100	077-080	32 bit integer
Xcord-detector *100	081-084	32 bit integer

Ycord-detector *100	085-088	32 bit integer
Gun correction (microsec) #	099-100	16 bit floating point
Cable correction (microsec) #	101-102	16 bit floating point
Total static (gun/cable+tidal) #	103-104	16 bit floating point
Total field gun/cable delay #	107-108	16 bit floating point
Xcord-cell-center	125-128	32 bit floating point
Ycord-cell-center	129-132	32 bit floating point
Year data recorded	157-158	16 bit integer
Julian day of year	159-160	16 bit integer
Hour of day	161-162	16 bit integer
Minute of hour	163-164	16 bit integer
Second of minute	165-166	16 bit integer
Xcord-midpt *100	181-184	32 bit integer
Ycord-midpt *100	185-188	32 bit integer
Inline number	189-192	32 bit integer
Crossline number	193-196	32 bit integer
Tidal static (microsec) #	209-212	32 bit integer
Water depth at midpoint (m)	213-216	32 bit floating point
CMP (3D sequential)	217-220	32 bit integer
Sail line suffix with seq. no.	233-236	32 bit integer
Subsurface line number	237-240	32 bit integer
Sail line number (numerical)	241-244	32 bit integer
Sail line sequence number	245-248	32 bit integer
Source station number	249-252	32 bit integer
Detector station number	253-256	32 bit integer

Updated information to trace headers only

8.4 Delivery Datasets

8.4.1 Delivery Datasets Summary

	Santos	**Gov**	**Peedamullag**	**Mitsui**	**Exoll**	**Media**
Archive Data Type						
Raw Full PSTM Stack	*Q54505-506*				*Q54627*	*3590E*
Final Full PSTM Stack	*Q54515-516*	*Q54628-629*	*Q54597-598*	*Q54599-600*	*Q54627*	*3590E*
Raw Angle 0-15 deg Stk	*Q54507-508*		*Q54611-612*	*Q54619-620*	*Q54627*	*3590E*
Raw Angle 15-25 deg Stk	*Q54509-510*		*Q54613-614*	*Q54621-622*	*Q54627*	*3590E*
Raw Angle 25-35 deg Stk	*Q54511-512*		*Q54631,Q54616*	*Q54623-624*	*Q54627*	*3590E*
Raw Angle 35-45 deg Stk	*Q54513-514*		*Q54617-618*	*Q54625-626*	*Q54627*	*3590E*
Pre-Mig Radon Cmp gath	***9xUSB disc****					*Disc*
KPSTM Radon gath	***4xUSB disc*****					*Disc*
RMS velocities (text)	*DVD001*	*DVD004*	*DVD002*	*DVD003*	*DVD005*	*DVD*
HDVA velocities (Seg Y)	*Q54630*					*3590E*
CMP end co-ordinates	*DVD001*	*DVD004*	*DVD002*	*DVD003*	*DVD005*	*ftp*
CMP co-ordinates P1/90						*DVD*
Digital Shotpoint Loc Map					*DVD005*	*DVD*
FTC (Antares Only)	X30325-330					3592
Final Report (pdf file)	*DVD006*	*DVD007*	*DVD008*	*DVD009*		DVD

(9xUSB*- IT443544, 4435349, 4437280, 4437285, 4438919, 4438923, 4439563, 4439715 &4440251)
(4xUSB**- IT4433177, 4433713, 4434713 & 4434724)

8.4.2 Delivery Tape Listing

Angle Stacks & HDVA velocity Archive Listing

Archive Data Type				
	Media nos.	**Inline Range**	**Xline Range**	**For**
Raw Full PSTM Stk	*Q54505*	641-1600	1759-6800	Santos
	Q54506	1601-2335	1759-6800	Santos
	Q54627	1109-2335	1759-4622	Exoll**
Final Full PSTM Stk	Q54515	641-1600	1759-6800	Santos
	Q54516	1601-2335	1759-6800	Santos
	Q54628	641-1600	1759-6800	Government
	Q54629	1601-2335	1759-6800	Government
	Q54597	641-1600	1759-6800	Peedamullag
	Q54598	1601-2335	1759-6800	Peedamullag
	Q54599	641-1600	1759-6800	Mitsui
	Q54600	1601-2335	1759-6800	Mitsui
	Q54627	1109-2335	1759-4622	Exoll**
Raw Angle 0-15 deg Stk	Q54507	641-1600	1759-6800	Santos
	Q54508	1601-2335	1759-6800	Santos
	Q54611	641-1600	1759-6800	Peedamullag
	Q54612	1601-2335	1759-6800	Peedamullag
	Q54619	641-1600	1759-6800	Mitsui
	Q54620	1601-2335	1759-6800	Mitsui
	Q54627	1109-2335	1759-4622	Exoll**
Raw Angle 15-25 deg Stk	Q54509	641-1600	1759-6800	Santos
	Q54510	1601-2335	1759-6800	Santos
	Q54613	641-1600	1759-6800	Peedamullag
	Q54614	1601-2335	1759-6800	Peedamullag
	Q54621	641-1600	1759-6800	Mitsui
	Q54622	1601-2335	1759-6800	Mitsui
	Q54627	1109-2335	1759-4622	Exoll**
Raw Angle 25-35 deg Stk	Q54511	641-1600	1759-6800	Santos
	Q54512	1601-2335	1759-6800	Santos
	Q54631	641-1600	1759-6800	Peedamullag
	Q54616	1601-2335	1759-6800	Peedamullag
	Q54523	641-1600	1759-6800	Mitsui
	Q54624	1601-2335	1759-6800	Mitsui
	Q54627	1109-2335	1759-4622	Exoll**
Raw Angle 35-45 deg Stk	Q54513	641-1600	1759-6800	Santos
	Q54514	1601-2335	1759-6800	Santos
	Q54617	641-1600	1759-6800	Peedamullag
	Q54618	1601-2335	1759-6800	Peedamullag
	Q54625	641-1600	1759-6800	Mitsui
	Q54626	1601-2335	1759-6800	Mitsui
	Q54627	1109-2335	1759-4622	Exoll
HDVA velocities (Seg Y)	Q54630	640-2350	1687-6803	Santos
Exoll** (Restricted Polygon)				

KPSTM Radon Gather Archive Listing

Archive Data Type	*KPSTM Radon CMPgather*	
Media nos.	**Inline**	**Dataset Name**
IT4433177	0641_0660	RAW_KPSTMRAD_NMOCMP_IL0641_0660.sgy
	0661_0680	RAW_KPSTMRAD_NMOCMP_IL0661_0680.sgy
	0681_0700	RAW_KPSTMRAD_NMOCMP_IL0681_0700.sgy
	0701_0720	RAW_KPSTMRAD_NMOCMP_IL0701_0720.sgy
	0721_0740	RAW_KPSTMRAD_NMOCMP_IL0721_0740.sgy
	0741_0760	RAW_KPSTMRAD_NMOCMP_IL0741_0760.sgy
	0761_0780	RAW_KPSTMRAD_NMOCMP_IL0761_0780.sgy
	0781_0800	RAW_KPSTMRAD_NMOCMP_IL0781_0800.sgy
	0801_0820	RAW_KPSTMRAD_NMOCMP_IL0801_0820.sgy
	0821_0840	RAW_KPSTMRAD_NMOCMP_IL0821_0840.sgy
	0841_0860	RAW_KPSTMRAD_NMOCMP_IL0841_0860.sgy
	0861_0880	RAW_KPSTMRAD_NMOCMP_IL0861_0880.sgy
	0881_0900	RAW_KPSTMRAD_NMOCMP_IL0881_0900.sgy
	0901_0920	RAW_KPSTMRAD_NMOCMP_IL0901_0920.sgy
	0921_0940	RAW_KPSTMRAD_NMOCMP_IL0921_0940.sgy
	0941_0960	RAW_KPSTMRAD_NMOCMP_IL0941_0960.sgy
	0961_0980	RAW_KPSTMRAD_NMOCMP_IL0961_0980.sgy
	0981_1000	RAW_KPSTMRAD_NMOCMP_IL0981_1000.sgy
	1001_1020	RAW_KPSTMRAD_NMOCMP_IL1001_1020.sgy
	1021_1040	RAW_KPSTMRAD_NMOCMP_IL1021_1040.sgy
	1041_1060	RAW_KPSTMRAD_NMOCMP_IL1041_1060.sgy
	1061_1080	RAW_KPSTMRAD_NMOCMP_IL1061_1080.sgy
	1081_1100	RAW_KPSTMRAD_NMOCMP_IL1081_1100.sgy
	1101_1120	RAW_KPSTMRAD_NMOCMP_IL1101_1120.sgy
	1121_1140	RAW_KPSTMRAD_NMOCMP_IL1121_1140.sgy
	1141_1160	RAW_KPSTMRAD_NMOCMP_IL1141_1160.sgy
	1161_1180	RAW_KPSTMRAD_NMOCMP_IL1161_1180.sgy
	1181_1200	RAW_KPSTMRAD_NMOCMP_IL1181_1200.sgy
	1201_1220	RAW_KPSTMRAD_NMOCMP_IL1201_1220.sgy
IT4433713	1221_1240	RAW_KPSTMRAD_NMOCMP_IL1221_1240.sgy
	1241_1260	RAW_KPSTMRAD_NMOCMP_IL1241_1260.sgy
	1261_1280	RAW_KPSTMRAD_NMOCMP_IL1261_1280.sgy
	1281_1300	RAW_KPSTMRAD_NMOCMP_IL1281_1300.sgy
	1301_1320	RAW_KPSTMRAD_NMOCMP_IL1301_1320.sgy
	1321_1340	RAW_KPSTMRAD_NMOCMP_IL1321_1340.sgy
	1341_1360	RAW_KPSTMRAD_NMOCMP_IL1341_1360.sgy
	1361_1380	RAW_KPSTMRAD_NMOCMP_IL1361_1380.sgy
	1381_1400	RAW_KPSTMRAD_NMOCMP_IL1381_1400.sgy
	1401_1420	RAW_KPSTMRAD_NMOCMP_IL1401_1420.sgy
	1421_1440	RAW_KPSTMRAD_NMOCMP_IL1421_1440.sgy
	1441_1460	RAW_KPSTMRAD_NMOCMP_IL1441_1460.sgy
	1461_1480	RAW_KPSTMRAD_NMOCMP_IL1461_1480.sgy
	1481_1500	RAW_KPSTMRAD_NMOCMP_IL1481_1500.sgy
	1501_1520	RAW_KPSTMRAD_NMOCMP_IL1501_1520.sgy
	1521_1540	RAW_KPSTMRAD_NMOCMP_IL1521_1540.sgy
IT4434713	1541_1560	RAW_KPSTMRAD_NMOCMP_IL1541_1560.sgy
	1561_1580	RAW_KPSTMRAD_NMOCMP_IL1561_1580.sgy
	1581_1600	RAW_KPSTMRAD_NMOCMP_IL1581_1600.sgy
	1601_1620	RAW_KPSTMRAD_NMOCMP_IL1601_1620.sgy
	1621_1640	RAW_KPSTMRAD_NMOCMP_IL1621_1640.sgy
	1641_1660	RAW_KPSTMRAD_NMOCMP_IL1641_1660.sgy
	1661_1680	RAW_KPSTMRAD_NMOCMP_IL1661_1680.sgy
	1681_1700	RAW_KPSTMRAD_NMOCMP_IL1681_1700.sgy
	1701_1720	RAW_KPSTMRAD_NMOCMP_IL1701_1720.sgy
	1721_1740	RAW_KPSTMRAD_NMOCMP_IL1721_1740.sgy
	1741_1760	RAW_KPSTMRAD_NMOCMP_IL1741_1760.sgy
	1761_1780	RAW_KPSTMRAD_NMOCMP_IL1761_1780.sgy
	1781_1800	RAW_KPSTMRAD_NMOCMP_IL1781_1800.sgy
	1801_1820	RAW_KPSTMRAD_NMOCMP_IL1801_1820.sgy
	1821_1840	RAW_KPSTMRAD_NMOCMP_IL1821_1840.sgy
	1841_1860	RAW_KPSTMRAD_NMOCMP_IL1841_1860.sgy
	1861_1880	RAW_KPSTMRAD_NMOCMP_IL1861_1880.sgy
	1881_1900	RAW_KPSTMRAD_NMOCMP_IL1881_1900.sgy

	1901_1920	RAW_KPSTMRAD_NMOCMP_IL1901_1920.sgy
	1921_1940	RAW_KPSTMRAD_NMOCMP_IL1921_1940.sgy
	1941_1960	RAW_KPSTMRAD_NMOCMP_IL1941_1960.sgy
	1961_1980	RAW_KPSTMRAD_NMOCMP_IL1961_1980.sgy
IT4434724	1981_2000	RAW_KPSTMRAD_NMOCMP_IL1981_2000.sgy
	2001_2020	RAW_KPSTMRAD_NMOCMP_IL2001_2020.sgy
	2021_2040	RAW_KPSTMRAD_NMOCMP_IL2021_2040.sgy
	2041_2060	RAW_KPSTMRAD_NMOCMP_IL2041_2060.sgy
	2061_2080	RAW_KPSTMRAD_NMOCMP_IL2061_2080.sgy
	2081_2100	RAW_KPSTMRAD_NMOCMP_IL2081_2100.sgy
	2101_2120	RAW_KPSTMRAD_NMOCMP_IL2101_2120.sgy
	2121_2140	RAW_KPSTMRAD_NMOCMP_IL2121_2140.sgy
	2141_2160	RAW_KPSTMRAD_NMOCMP_IL2141_2160.sgy
	2161_2180	RAW_KPSTMRAD_NMOCMP_IL2161_2180.sgy
	2181_2200	RAW_KPSTMRAD_NMOCMP_IL2181_2200.sgy
	2201_2220	RAW_KPSTMRAD_NMOCMP_IL2201_2220.sgy
	2221_2240	RAW_KPSTMRAD_NMOCMP_IL2221_2240.sgy
	2241_2260	RAW_KPSTMRAD_NMOCMP_IL2241_2260.sgy
	2261_2280	RAW_KPSTMRAD_NMOCMP_IL2261_2280.sgy
	2281_2300	RAW_KPSTMRAD_NMOCMP_IL2281_2300.sgy
	2301_2320	RAW_KPSTMRAD_NMOCMP_IL2301_2320.sgy
	2321_2335	RAW_KPSTMRAD_NMOCMP_IL2321_2335.sgy

Pre-Mig Radon 2D CMP Gather Archive Listing.

Seq	Sail Line	FGSP	LGSP	Live SSL	Dead SSL	USB Number
010	W03ANT1004P1	1022	2944	1-8		**IT4435344**
013	W03ANT1012P1	1001	2944	1-8		
016	W03ANT1012P2	2092	2163	1-8		
026	W03ANT1020I1	1001	2944	1-8		
020	W03ANT1020P1	1001	2944	1-8		
024	W03ANT1028P1	1001	2944	1-8		
006	W03ANT1036P1	1001	2944	1-8		
018	W03ANT1044P1	1001	2944	1-8		
022	W03ANT1052P1	1001	2944	1-8		
029	W03ANT1060P1	1231	2944	1-8		
049	W03ANT1060P2	1001	1240	1-8		
031	W03ANT1068P1	1001	2944	1-8		
033	W03ANT1076P1	1003	2944	1-8		
037	W03ANT1084I1	1001	2944	1-8		
035	W03ANT1084P1	1001	2944	1-8		
014	W03ANT1092P1	1100	2944	1-8		
046	W03ANT1092P2	1001	1109	1-8		
047	W03ANT1092P3	2102	2220	1-8		
008	W03ANT1100P1	1001	2944	1-8		
004	W03ANT1108P1	1001	2944	1-8		
039	W03ANT1116I1	1001	2944	1-8		
002	W03ANT1116P2	1782	2944	1-8		
043	W03ANT1116P3	1001	1791	1-8		
011	W03ANT1124P1	2836	1678	1-8		
012	W03ANT1124P2	1687	893	1-8		
009	W03ANT1132P1	2836	893	1-8		
007	W03ANT1140P1	2836	893	1-8		
005	W03ANT1148P1	2836	893	1-8		
003	W03ANT1156P1	2836	893	1-8		
015	W03ANT1164P1	2813	893	1-8		
019	W03ANT1172P1	2759	893	1-8		
021	W03ANT1180P1	2730	893	1-8		
040	W03ANT1180P2	2588	2415	1-8		
023	W03ANT1188P1	2658	893	1-8		
028	W03ANT1196I2	2598	893	1-8		**IT4435349**
025	W03ANT1196P1	2634	893	1-8		
041	W03ANT1196P2	2106	1949	1-8		
030	W03ANT1204P1	2544	893	1-8		
032	W03ANT1212P1	2525	893	1-8		
044	W03ANT1212P2	1938	1763	1-8		
034	W03ANT1220P1	2478	893	1-8		
036	W03ANT1228P1	2425	893	1-8		
038	W03ANT1236P1	2372	893	1-8		
042	W03ANT1244P1	2319	893	1-8		

048	W03ANT1252I1	2222	893	1-8		
045	W03ANT1252P1	2265	893	1-8		
017	W03ANT1260P1	2168	893	1-8		
001	OTSN07-1008P001	2046	3079	1-16		
003	OTSN07-1024P003	2047	3178	1-16		
005	OTSN07-1040P005	2047	3278	1-16		
007	OTSN07-1056P007	2047	3378	1-16		
009	OTSN07-1072P009	1376	3477	1-16		
015	OTSN07-1088A015	1376	3020	1-16		
017	OTSN07-1104A017	1376	3015	1-16		
019	OTSN07-1120P019	1376	3011	1-16		
021	OTSN07-1136P021	1377	3007	1-16		
023	OTSN07-1152P023	1377	3002	1-16		**IT4437280**
025	OTSN07-1168P025	1377	2998	1-16		
027	OTSN07-1184P027	1377	2993	1-16		
029	OTSN07-1200P029	1377	2989	1-16		
032	OTSN07-1216A032	1377	2985	1-16		
034	OTSN07-1216J034	1377	2985	1-16		
002	OTSN07-1232P002	2847	1244	1-16		
006	OTSN07-1248A006	2843	1371	1-16		
008	OTSN07-1264P008	2838	1244	1-16		
014	OTSN07-1280A014	2834	1244	1-16		
016	OTSN07-1296A016	2830	1244	1-16		
018	OTSN07-1312P018	2825	1245	1-16		
020	OTSN07-1328P020	2821	1245	1-16		
022	OTSN07-1344P022	2816	1245	1-16		
024	OTSN07-1360P024	2812	1245	1-16		
026	OTSN07-1376P026	2808	1245	1-16		**IT4437285**
028	OTSN07-1392P028	2803	1245	1-16		
030	OTSN07-1408P030	2799	1245	1-16		
035	OTSN07-1424J035	2794	1245	1-16		
033	OTSN07-1424P033	2794	1245	1-16		
037	OTSN07-1440P037	2790	1248	1-16		
039	OTSN07-1456P039	2786	868	1-16		
041	OTSN07-1472P041	2781	869	1-16		
043	OTSN07-1488P043	2777	869	1-16		
045	OTSN07-1504P045	2773	869	1-16		
047	OTSN07-1520P047	2768	870	1-16		
051	OTSN07-1536J051	2764	870	1-16		
049	OTSN07-1536P049	2764	870	1-16		
053	OTSN07-1552P053	2759	871	1-16		**IT4438919**
055	OTSN07-1568P055	2755	871	1-16		
057	OTSN07-1584P057	2751	871	1-16		
036	OTSN07-1600P036	1005	2879	1-16		
038	OTSN07-1616P038	1005	2875	1-16		
040	OTSN07-1632P040	1006	2870	1-16		
042	OTSN07-1648P042	1006	2866	1-16		
044	OTSN07-1664P044	1006	2862	1-16		
046	OTSN07-1680P046	1007	2857	1-16		
048	OTSN07-1696P048	1007	2853	1-16		
050	OTSN07-1712P050	1008	2848	1-16		
052	OTSN07-1728P052	1008	2844	1-16		
056	OTSN07-1744J056	1009	2840	1-16		**IT4438923**
054	OTSN07-1744P054	1009	2840	1-16		
033	S01CAS1265P033	1816	2671	1-12		
095	S01CAS1265J095	1816	2120	1-12		
037	S01CAS1277P037	1816	2671	1-12		
035	S01CAS1289P035	1816	2670	1-12		
001	S01CAS1301P001	1816	2670	1-12		
003	S01CAS1313P003	1816	2670	1-12		
016	S01CAS1325P016	1816	2670	1-12		
018	S01CAS1337P018	1816	2670	1-12		
027	S01CAS1349P027	1816	2670	1-12		
029	S01CAS1361P029	1603	2670	1-12		
031	S01CAS1373P031	1603	2572	1-12		
096	S01CAS1373R096	2400	2670	1-12		
039	S01CAS1385P039	1603	2670	1-12		
041	S01CAS1397P041	1603	2776	1-12		
043	S01CAS1409P043	1603	2776	1-12		
045	S01CAS1421P045	1603	2776	1-12		
047	S01CAS1433P047	1603	2776	1-12		
053	S01CAS1445P053	1576	2776	1-12		
055	S01CAS1457P055	1559	2776	1-12		
036	S01CAS1469P036	2670	1425	1-12		

034	S01CAS1481P034	2670	1397	1-12		
019	S01CAS1493P019	2670	1369	1-12		
002	S01CAS1505P002	2670	1341	1-12		
004	S01CAS1517P004	2670	1313	1-12		
015	S01CAS1529R015	2670	1285	1-12		
017	S01CAS1541P017	2670	1284	1-12		
026	S01CAS1553P026	2670	1284	1-12		
028	S01CAS1565P028	2670	1284	1-12		
030	S01CAS1577P030	2670	1284	1-12		
032	S01CAS1589P032	2670	1284	1-12		
038	S01CAS1601P038	2670	1284	1-12		
040	S01CAS1613P040	2670	1284	1-12		
042	S01CAS1625P042	2670	1284	1-12		**IT4439563**
044	S01CAS1637P044	2670	1284	1-12		
046	S01CAS1649P046	2670	1284	1-12		
054	S01CAS1649J054	2670	1284	1-12		
007	S01CAS1661P007	2670	1284	1-12		
009	S01CAS1673P009	2670	1284	1-12		
011	S01CAS1685P011	2670	1284	1-12		
013	S01CAS1697P013	2670	1284	1-12		
022	S01CAS1709P022	2670	1284	1-12		
024	S01CAS1721P024	2670	1284	1-12		
050	S01CAS1733P050	2670	1284	1-12		
052	S01CAS1745P052	2664	1284	1-12		
063	S01CAS1757P063	2643	1284	1-10	11-12	
087	S01CAS1769J087	2622	1284	1-12		
093	S01CAS1769R093	2622	1284	1-12		
006	S01CAS1781P006	1390	2707	1-12		
090	S01CAS1793J090	1390	2685	1-12		
023	S01CAS1793P023	1390	2685	1-12		
021	S01CAS1805P021	1390	2670	1-12		
014	S01CAS1817P014	1390	2670	1-12		
012	S01CAS1829P012	1390	2670	1-12		
010	S01CAS1841P010	1390	2670	1-12		
008	S01CAS1853P008	1390	2670	1-12		
025	S01CAS1865P025	1390	2670	1-12		
049	S01CAS1877P049	1390	2670	1-12		
051	S01CAS1889P051	1390	2670	1-12		
070	S01CAS1901P070	1390	2670	1-12		
076	S01CAS1913P076	1390	2670	1-12		
078	S01CAS1925P078	1390	2670	1-12		
080	S01CAS1937P080	1390	2670	1-12		**IT4439715**
082	S01CAS1949P082	1390	2670	1-12		
084	S01CAS1961P084	1283	2670	1-12		
089	S01CAS1973P089	2564	1177	1-12		
091	S01CAS1985P091	2564	1177	1-12		
088	S01CAS1997P088	1283	2670	1-12		
092	S01CAS1997J092	1283	2670	1-12		
086	S01CAS2009P086	1283	2670	1-12		
074	S01CAS2021P074	1283	2670	1-12		
072	S01CAS2033P072	1283	2670	1-12		
069	S01CAS2045P069	1283	2670	1-12		
067	S01CAS2057P067	1283	2670	1-12		
065	S01CAS2069P065	1283	2670	1-12		
061	S01CAS2081P061	1283	2619	1-12		
059	S01CAS2093P059	1283	2619	1-12		
057	S01CAS2105P057	1283	2619	1-12		
081	S01CAS2117P081	2513	1177	1-12		
083	S01CAS2117J083	2513	1177	1-12		
079	S01CAS2129P079	2513	1177	1-12		
077	S01CAS2141P077	2513	1177	1-12		
075	S01CAS2153P075	2512	1177	1-12		
073	S01CAS2165P073	2512	1177	1-12		
071	S01CAS2177P071	2512	1177	1-12		
068	S01CAS2189P068	2512	1177	1-12		
066	S01CAS2201P066	2512	1177	1-12		
062	S01CAS2213P062	2512	1177	1-12		
060	S01CAS2225P060	2512	1177	1-12		
058	S01CAS2237P058	2511	1177	1-12		
056	S01CAS2249P056	2511	1177	1-12		
061	OTSN07-2064A061	2686	3785	1-16		**IT4440251**
063	OTSN07-2080P063	2686	3785	1-16		
065	OTSN07-2096P065	2686	3786	1-16		
067	OTSN07-2112P067	2686	3786	1-16		

069	OTSN07-2128P069	2687	3787	1-16		
071	OTSN07-2144P071	2687	3787	1-16		
073	OTSN07-2160P073	2687	3788	1-16		
075	OTSN07-2176P075	2688	3788	1-16		
079	OTSN07-2192J079	2688	3789	1-16		
077	OTSN07-2192P077	2688	3789	1-16		
060	OTSN07-2208P060	3656	2555	1-16		
062	OTSN07-2224P062	3657	2555	1-16		
064	OTSN07-2240P064	3657	2556	1-16		
066	OTSN07-2256P066	3657	2556	1-16		
068	OTSN07-2272P068	3658	2556	1-16		
070	OTSN07-2288P070	3658	2557	1-16		
072	OTSN07-2304P072	3659	2557	1-16		
074	OTSN07-2320P074	3659	2557	1-16		
078	OTSN07-2336A078	3660	2557	1-16		
076	OTSN07-2336P076	3045	2557	1-16		

Field Tape Copy (Antares Survey Only) Tape Listing

		Original Tape No.	FTC Tape No.	Field File No.	
Sail Line	**Seq No.**	**(3590B, 10GB)**	**(3592, 300 GB)**	**(Min-Max)**	**DNP FT**
W03ANT1004P1	010	35642-35645	X30325	1000-2925	
W03ANT1012P1	*013*	35651-35655		100-5794	*FT35653*
W03ANT1012P2	*016*	35667		100-228	
W03ANT1020I1	*026*	35708-35712		100-2092	
W03ANT1020P1	*020*	35679-35683		100-6372	
W03ANT1028P1	*024*	35697-35703		100-5666	
W03ANT1036P1	*006*	35626-35629		100-2095	
W03ANT1044P1	018	35671-35674	X30326	100-2095	
W03ANT1052P1	022	35688-35691		100-2099	
W03ANT1060P1	029	35719-35724		100-6712	
W03ANT1060P2	049	35780		100-396	
W03ANT1068P1	031	35728-35731		100-2099	
W03ANT1076P1	033	35737-35741		100-2048	
W03ANT1084I1	037	35753-35756		100-2097	
W03ANT1084P1	*035*	35746-35749	X30327	100-2099	
W03ANT1092P1	*014*	35656-35662		100-5736	*FT35659-660*
W03ANT1092P2	*046*	35775		100-265	
W03ANT1092P3	*047*	35776		100-275	
W03ANT1100P1	*008*	35634-35637		100-2099	
W03ANT1108P1	*004*	35618-35621		100-2096	
W03ANT1116I1	*039*	35760-35763		100-2097	
W03ANT1116P2	*002*	35612-35613		101-1269	
W03ANT1116P3	*043*	35769-35770		100-948	
W03ANT1124P1	011	35646-35648	X30328	100-1350	
W03ANT1124P2	012	35649-35650		100-948	
W03ANT1132P1	009	35638-35641		100-2097	
W03ANT1140P1	007	35630-35633		100-2099	
W03ANT1148P1	005	35622-35625		100-2099	
W03ANT1156P1	003	35614-35617		100-2145	
W03ANT1164P1	015	35663-35666		100-2074	
W03ANT1172P1	019	35675-35678		101-2022	
W03ANT1180P1	*021*	35684-35687	X30329	100-6531	
W03ANT1180P2	*040*	35764		100-328	
W03ANT1188P1	*023*	35692-35696		5001-6768	*FT35692*
W03ANT1196I2	*028*	35715-35718		100-1859	
W03ANT1196P1	*025*	35704-35707		100-6070	
W03ANT1196P2	*041*	35765		100-314	
W03ANT1204P1	*030*	35725-35727		100-1805	
W03ANT1212P1	*032*	35732-35736		100-5882	
W03ANT1212P2	044	35771	X30330	100-332	
W03ANT1220P1	034	35742-35745		100-1741	
W03ANT1228P1	036	35750-35752		100-1684	
W03ANT1236P1	038	35757-35759		100-1635	
W03ANT1244P1	042	35766-35768		100-1582	
W03ANT1252I1	048	35777-35779		100-1485	
W03ANT1252P1	045	35772-35774		100-1528	
W03ANT1260P1	017	35668-35670		100-1431	
DNP Sail Lines					
W03ANT1116P1	*001*				
W03ANT1196I1	*027*				

8.5 Processing Schedule

ID	Task Name	Duration	Start	Finish
1	**Overall Project**	**234 days?**	**Wed 2/05/07**	**Fri 21/12/07**
2	**Acquisition**	**56 days**	**Wed 2/05/07**	**Tue 26/06/07**
3	Champion South & Hercules	32 days	Wed 2/05/07	Tue 26/06/07
4	**Parameter Testing**	**216 days?**	**Mon 14/05/07**	**Sat 15/12/07**
5	Swell Noise Attenuation Testing	23 days	Mon 14/05/07	Tue 26/06/07
6	Designature Testing	17 days	Mon 28/05/07	Tue 26/06/07
7	Swell Noise Attenuation Decision	1 day	Wed 11/07/07	Wed 11/07/07
8	Linear Noise Attenuation Testing	16 days	Fri 1/06/07	Wed 25/07/07
9	Linear Noise Attenuation Decision	1 day	Thu 26/07/07	Thu 26/07/07
10	DWD Testing	23 days	Thu 7/06/07	Fri 29/06/07
11	2D SRME Testing	41 days	Thu 7/06/07	Mon 30/07/07
12	Surface Multiple Decision	1 day	Fri 3/08/07	Fri 3/08/07
13	Tau-P Deconvolution Testing	19 days	Mon 13/08/07	Fri 31/08/07
14	Tau-P Deconvolution Decision	1 day	Thu 6/09/07	Thu 6/09/07
15	Radon Demultiple Testing	19 days	Mon 13/08/07	Fri 31/08/07
16	Radon Demultiple Decision	1 day	Thu 6/09/07	Thu 6/09/07
17	Inverse Q Testing	2 days	Tue 11/09/07	Wed 12/09/07
18	Inverse Q Decision	1 day	Thu 13/09/07	Thu 13/09/07
19	Survey Matching Testing	8 days	Mon 17/09/07	Mon 24/09/07
20	Survey Merge Decision	1 day	Thu 27/09/07	Thu 27/09/07
21	Data Interpolation and Regularisation tests	10 days	Mon 24/09/07	Wed 3/10/07
22	Migration Testing	7 days	Fri 28/09/07	Thu 4/10/07
23	Migration Approval	1 day?	Fri 5/10/07	Fri 5/10/07
24	Additonal Migration Testing	4 days	Mon 15/10/07	Thu 18/10/07
25	Final Migration Approval	1 day?	Fri 19/10/07	Fri 19/10/07
26	HDVA Testing	5 days	Mon 29/10/07	Fri 2/11/07
27	HDVA Decision	1 day?	Wed 7/11/07	Wed 7/11/07
28	Residual Radon Demultiple Testing	6 days	Thu 15/11/07	Tue 20/11/07
29	Resdiual Radon Demultiple Decision	1 day?	Wed 21/11/07	Wed 21/11/07
30	Post Stack Enhancement Testing	12 days	Mon 3/12/07	Fri 14/12/07
31	Post Stack Enhancement Decesion	1 day	Sat 15/12/07	Sat 15/12/07
32	**Production Processing**	**197 days?**	**Tue 8/05/07**	**Tue 20/11/07**
33	Receipt Casino M3D (seq 001-096)	1 day	Tue 8/05/07	Tue 8/05/07
34	Receipt Champion M3D (seq 001-006)	1 day	Wed 9/05/07	Wed 9/05/07
35	Receipt Antares M3D (seq ???-???)	1 day	Mon 4/06/07	Mon 4/06/07
36	Receipt Champion M3D (seq 007-036)	1 day?	Wed 13/06/07	Wed 13/06/07
37	Receipt Champion/Hercules M3D (seq 037-079)	1 day?	Mon 2/07/07	Mon 2/07/07
38	*Last Shipment +20wks*	***1 day***	***Tue 20/11/07***	***Tue 20/11/07***
39	Reformat / NavMerge	48 days	Mon 14/05/07	Tue 17/07/07
40	Desig / Swell Noise Attenuation	13 days	Thu 12/07/07	Tue 24/07/07
41	Linear Noise Attenuation	11 days	Fri 3/08/07	Mon 13/08/07
42	1st-pass Velocity Analysis	12 days	Mon 23/07/07	Fri 3/08/07
43	1st-Pass Velocity Approval	1 day	Mon 6/08/07	Mon 6/08/07
44	DWD	21 days	Fri 17/08/07	Thu 6/09/07
45	2D SRME	21 days	Fri 17/08/07	Thu 6/09/07
46	Tau-P Deconvolution	14 days	Fri 7/09/07	Thu 20/09/07
47	Shot Interpolation / Radon Demultiple	10 days	Fri 7/09/07	Sun 16/09/07
48	3D Raw Stack Volume	1 day?	Mon 17/09/07	Mon 17/09/07
49	**Imaging**	**96 days?**	**Mon 17/09/07**	**Fri 21/12/07**
50	Split and Sort to 3D Offset	2 days	Mon 17/09/07	Tue 18/09/07
51	Data Interpolation and Regularisation	6 days	Sat 6/10/07	Thu 11/10/07
52	Migrate 1km Velocity lines	5 days	Wed 19/09/07	Sun 23/09/07
53	2nd-pass Migration velocity analysis	11 days	Mon 24/09/07	Thu 4/10/07
54	2nd-pass Migration velocity approval	1 day?	Fri 12/10/07	Fri 12/10/07
55	Production Migration	10 days	Sat 20/10/07	Mon 29/10/07
56	3rd-pass Velocity Analysis	16 days	Mon 22/10/07	Mon 12/11/07
57	3rd-pass Velocity Approval	1 day	Tue 13/11/07	Tue 13/11/07
58	HDVA velocity Analysis	8 days	Thu 8/11/07	Thu 15/11/07
59	HDVA velocity Approval	1 day?	Tue 20/11/07	Tue 20/11/07
60	Residual Radon Demultiple	9 days	Thu 22/11/07	Fri 30/11/07
61	3D Migrated Raw Full Stack	2 days	Mon 3/12/07	Tue 4/12/07
62	Workstation tape delivery	1 day?	Fri 7/12/07	Fri 7/12/07
63	3D Migrated Raw Angle Stacks	2 days	Sat 8/12/07	Sun 9/12/07
64	Workstation tape delivery	1 day?	Tue 11/12/07	Tue 11/12/07
65	Post Stack Signal Enhancement	5 days	Sun 16/12/07	Thu 20/12/07
66	Workstation tape delivery	1 day?	Fri 21/12/07	Fri 21/12/07

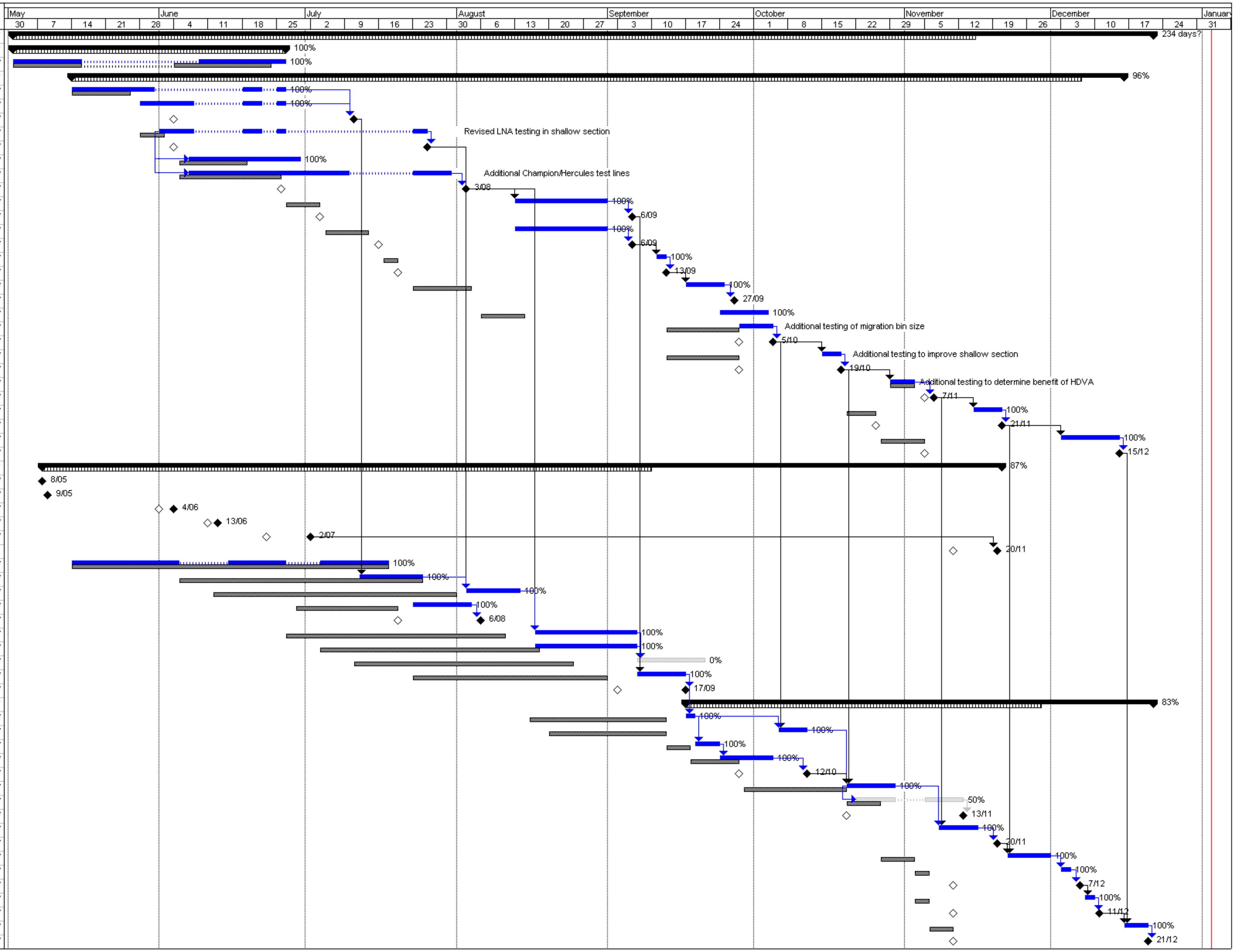

Figure 90: **Figure Project Gantt Chart**