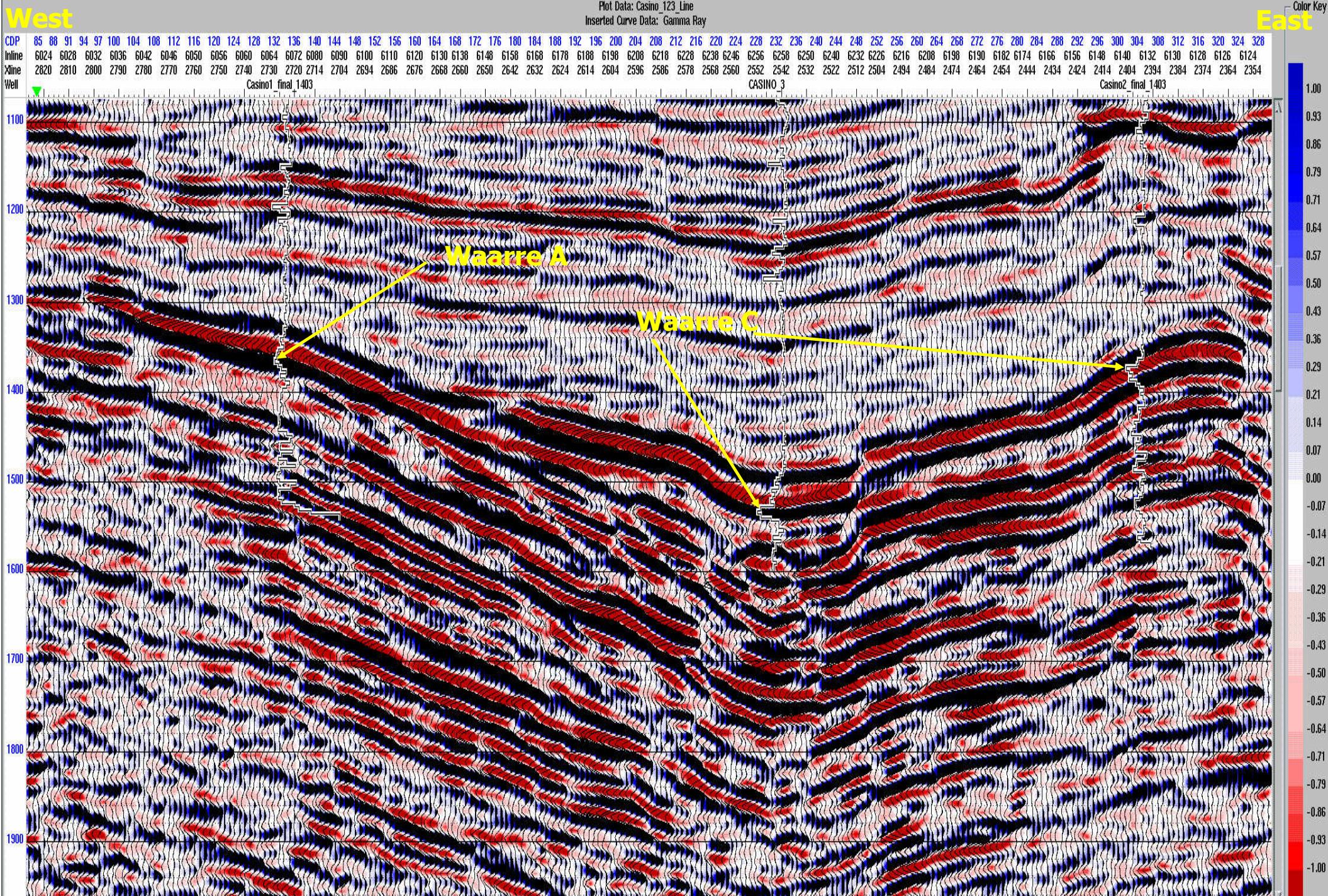


Figure 3.4.1-a Plots of the frequency spectrum of a seismic trace, the transform function and the derived band-limited coloured inversion impedance operator in frequency and time domains.

Santos



**Figure 3.4.1-b** Near stack PSTM seismic line through Casino-1, -3 and -2 wells. GR curves are inserted to show the Waarre A and Waarre C reservoir units.

Santos

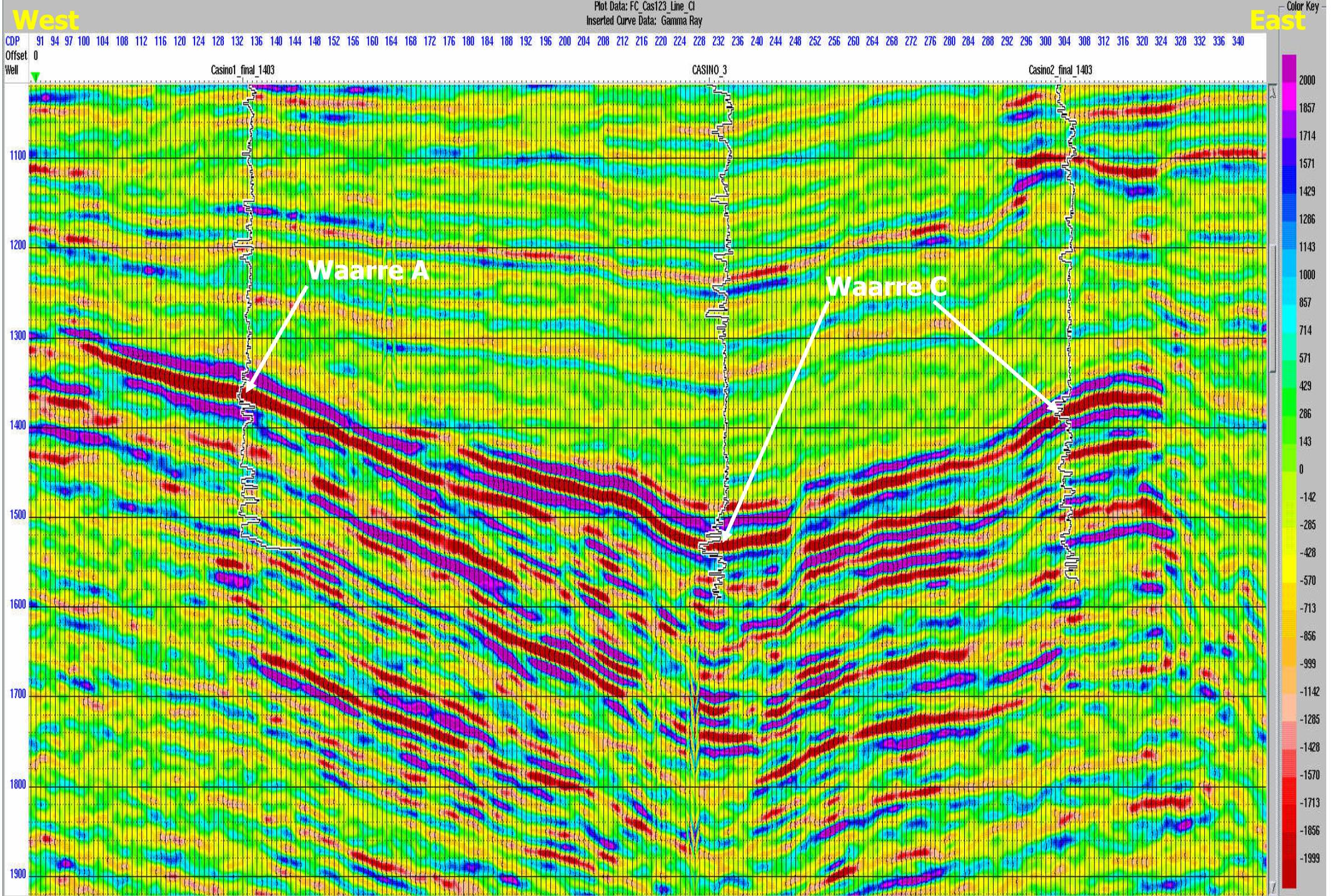


Figure 3.4.1-c: Coloured inversion impedance line through Casino-1, -3 and -2 wells. GR curves are inserted to show the Waarre A and Waarre C reservoir units. Note the good well tie of the main reservoir units.

Santos

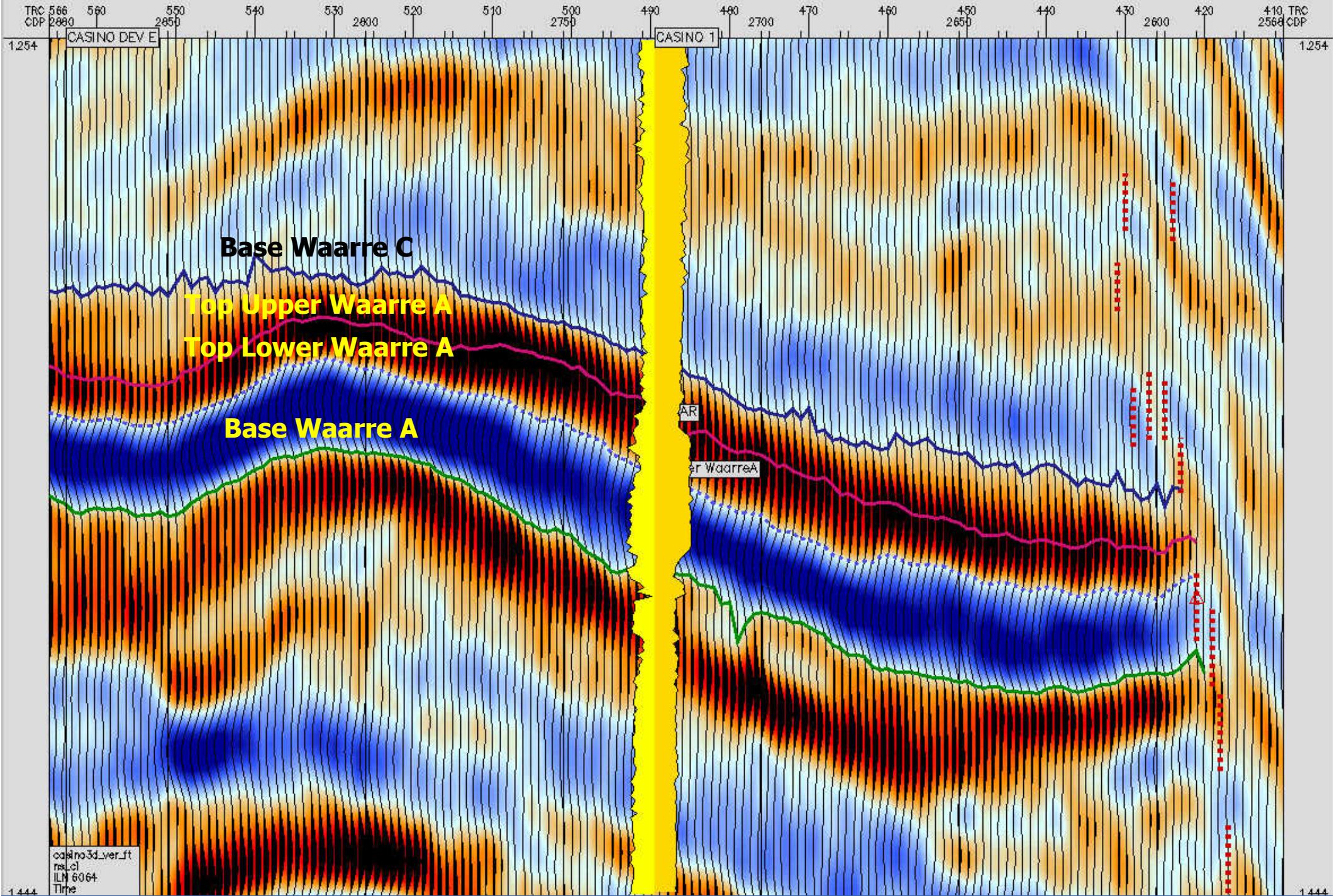


Fig. 3.4.1-d Casino-1 well to band-limited impedance tie. Negative impedance is displayed in blue and positive impedance in red.

Santos

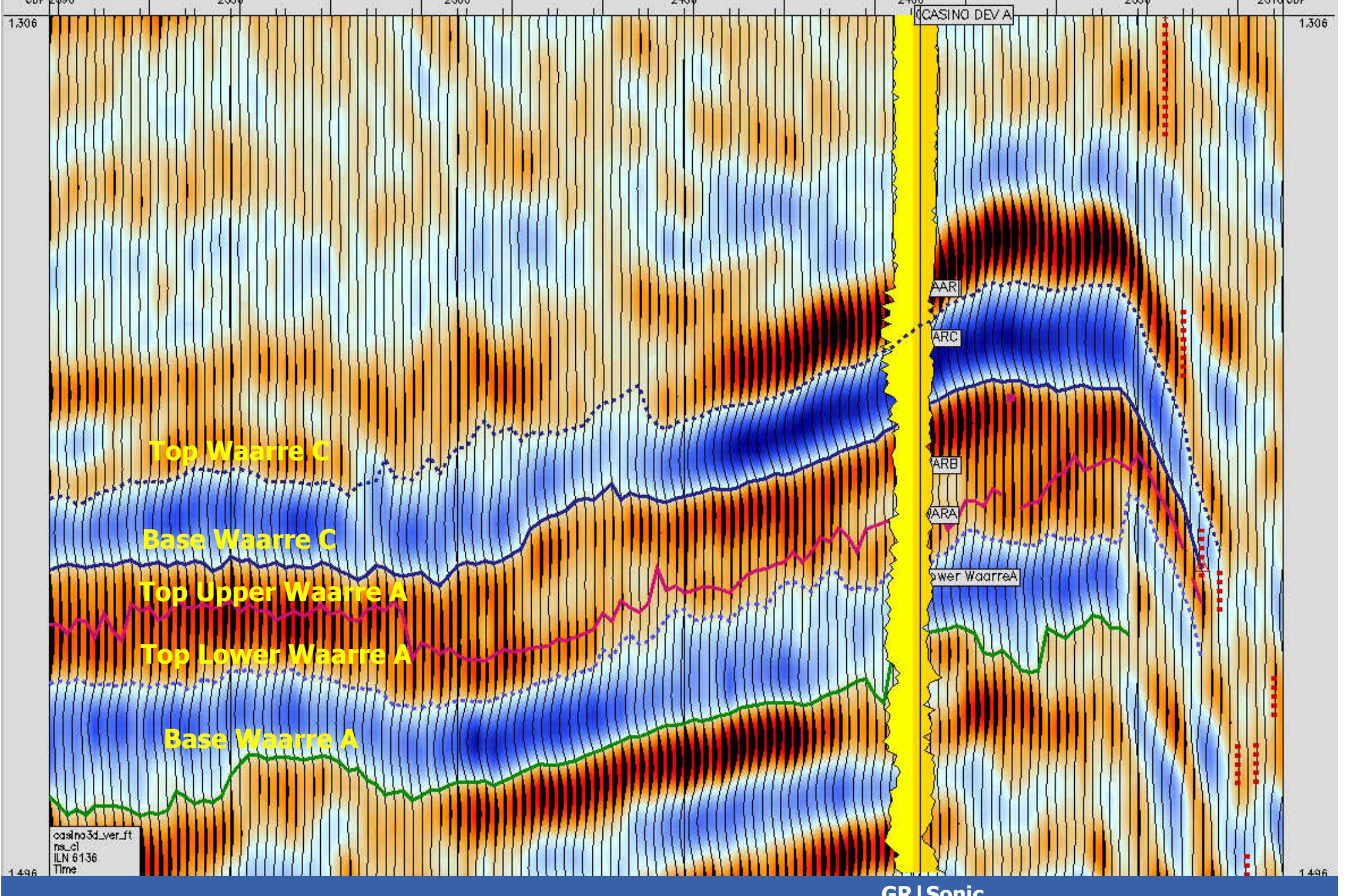
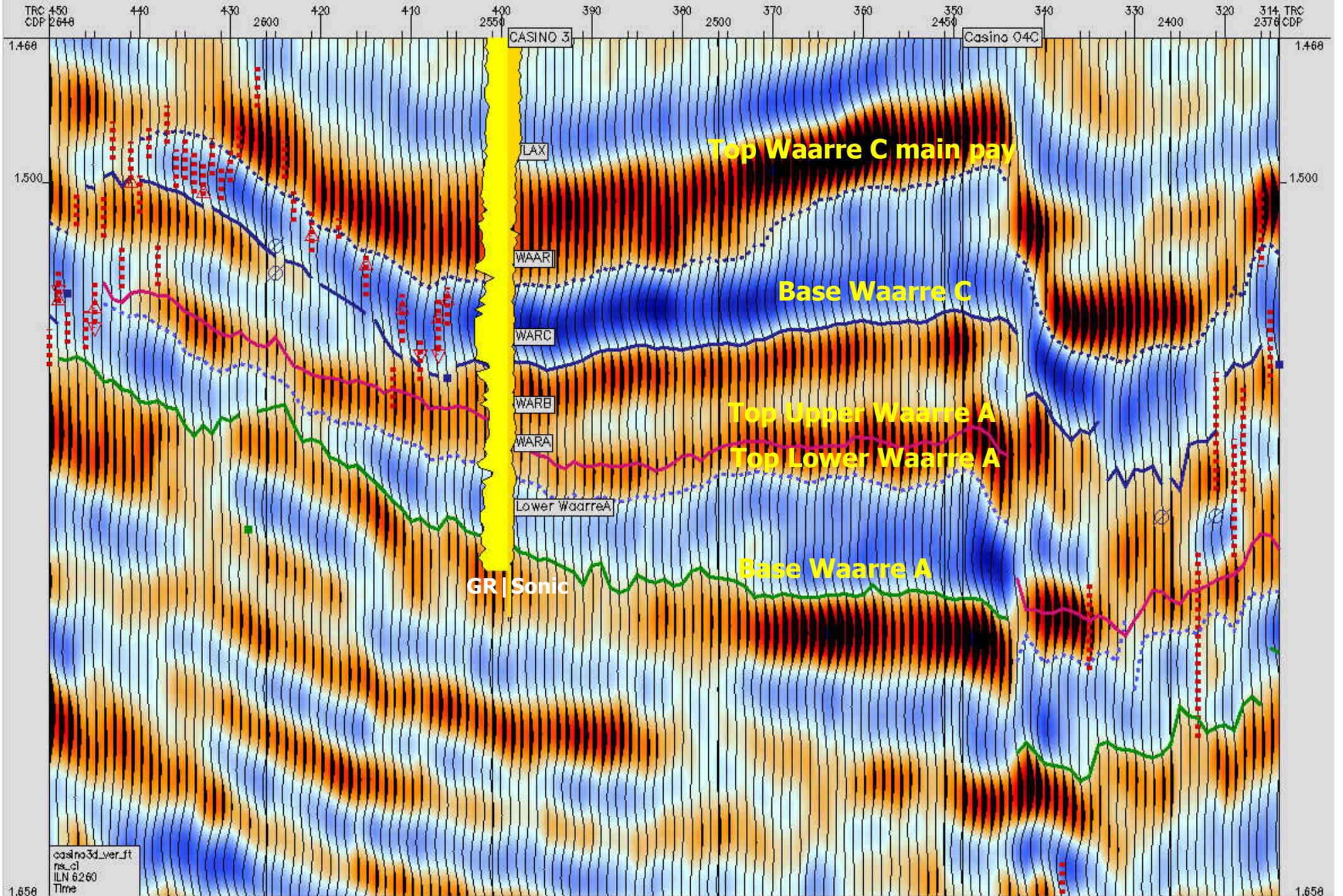


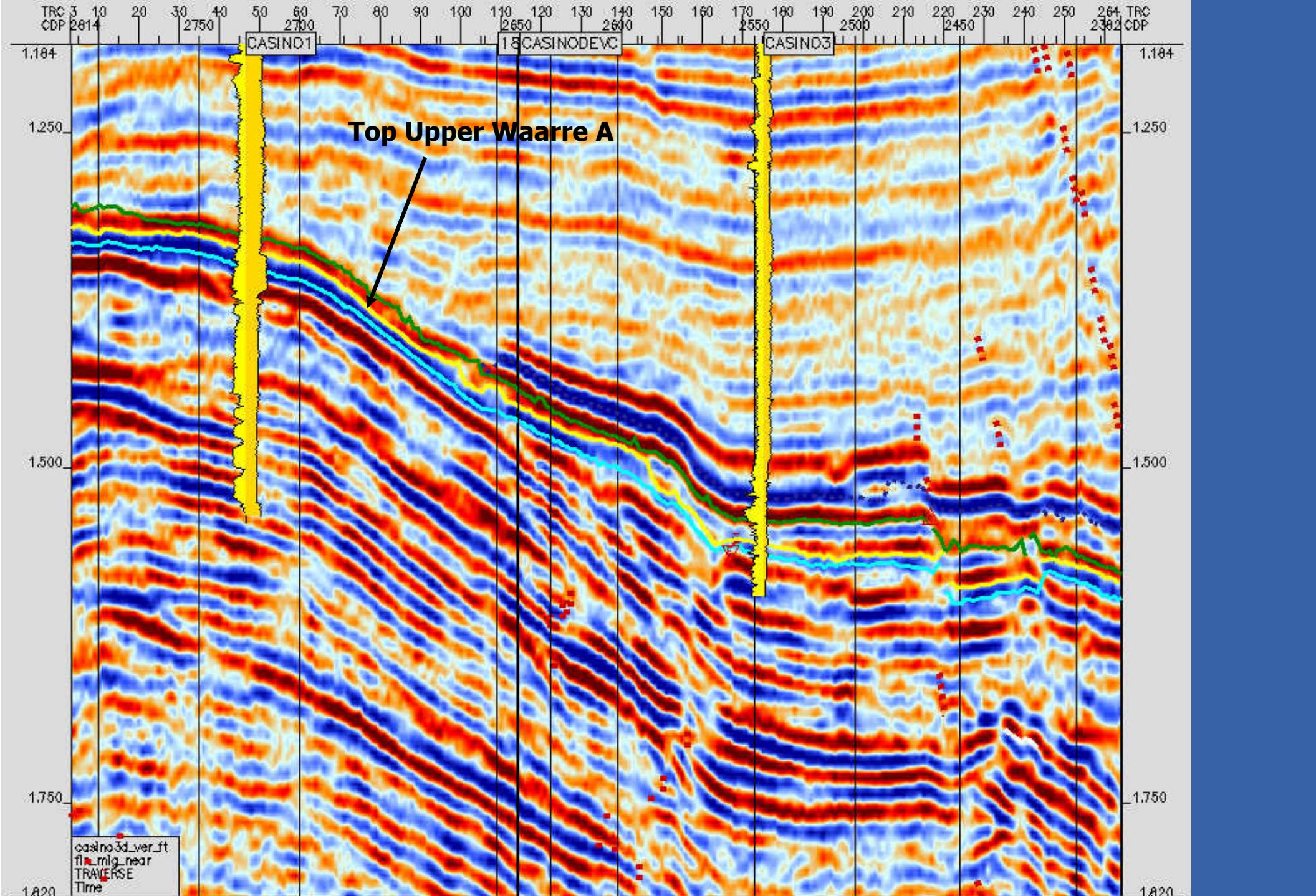
Fig. 3.4.1-e Casino-2 well to band limited impedance tie. Negative impedance is displayed in blue and positive impedance in red.

Santos



**Fig. 3.4.1-f Casino-3 well to band limited impedance tie. Negative impedance is displayed in blue and positive impedance in red.**

**Santos**



**Fig. 3.4.1-g** PSTM section through Casino-1 and -3 wells with GR and Sonic curves inserted. Top Upper Waarre A is picked at +/- crossing (Yellow horizon). Negative reflectivity is displayed in blue and positive reflectivity in red.

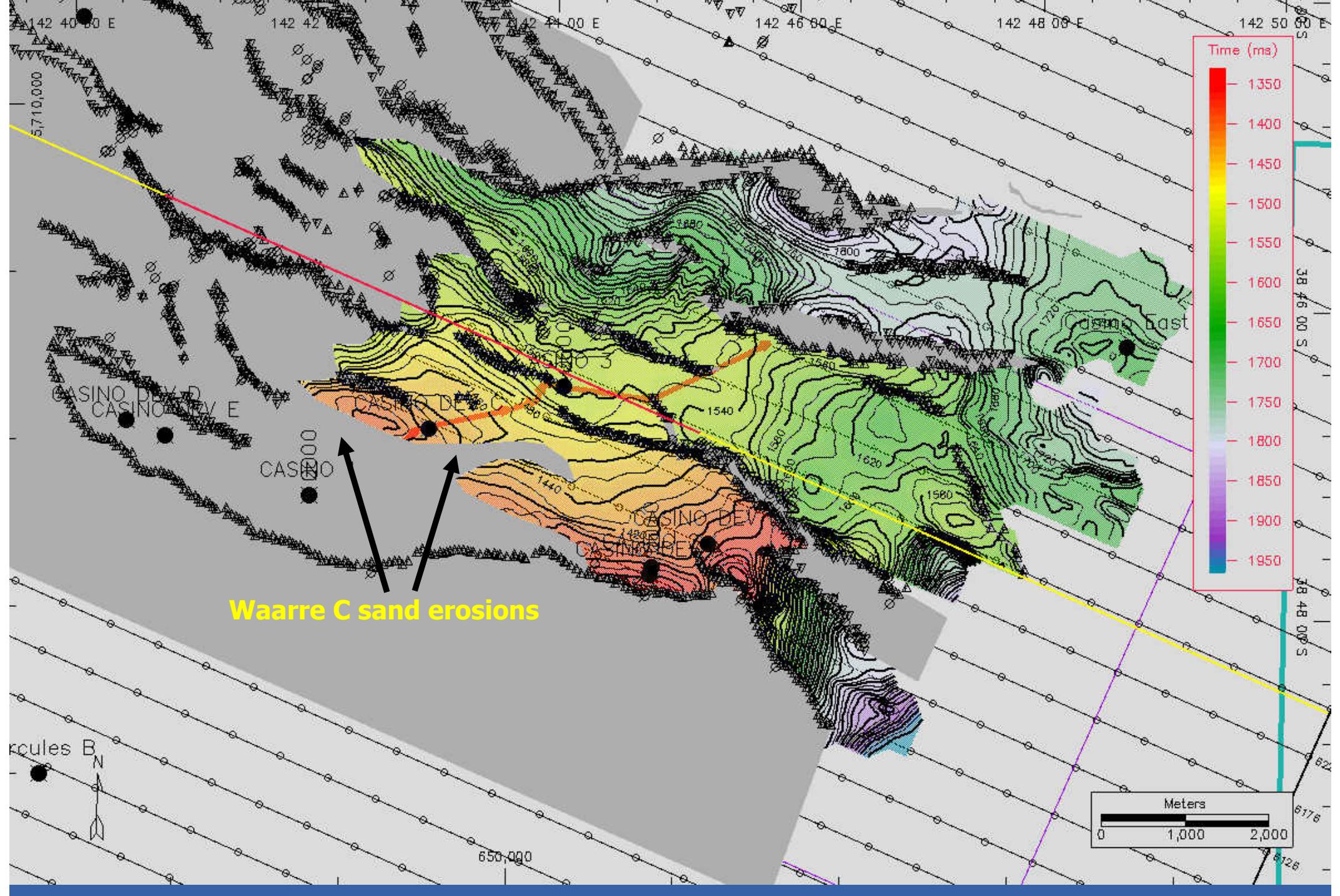


Fig. 3.4.1-h Top Waarre-C main pay TWT contour map (dotted dark blue horizon).

Santos

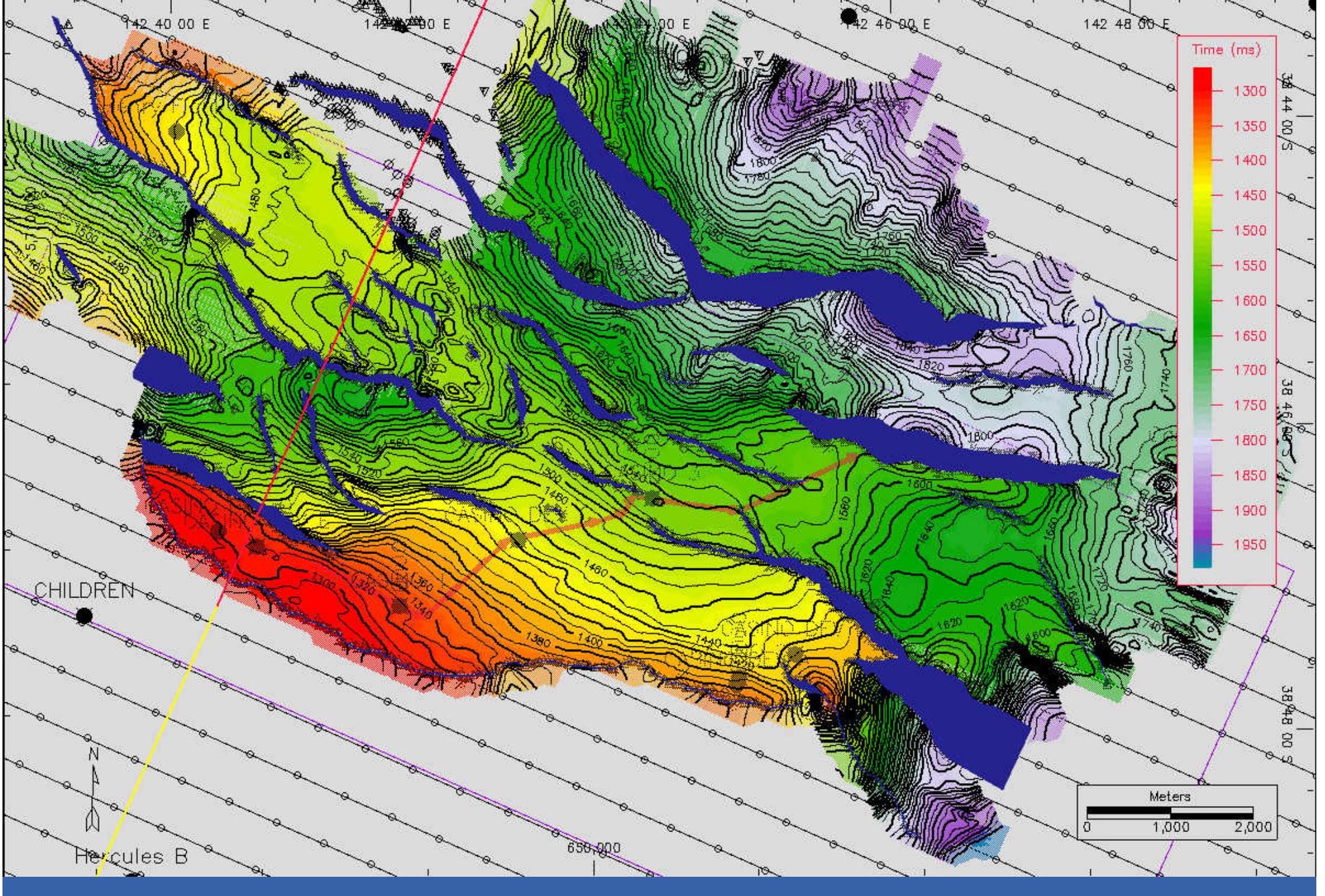


Fig. 3.4.1-i Base Waarde-C TWT contour map (black horizon).

Santos

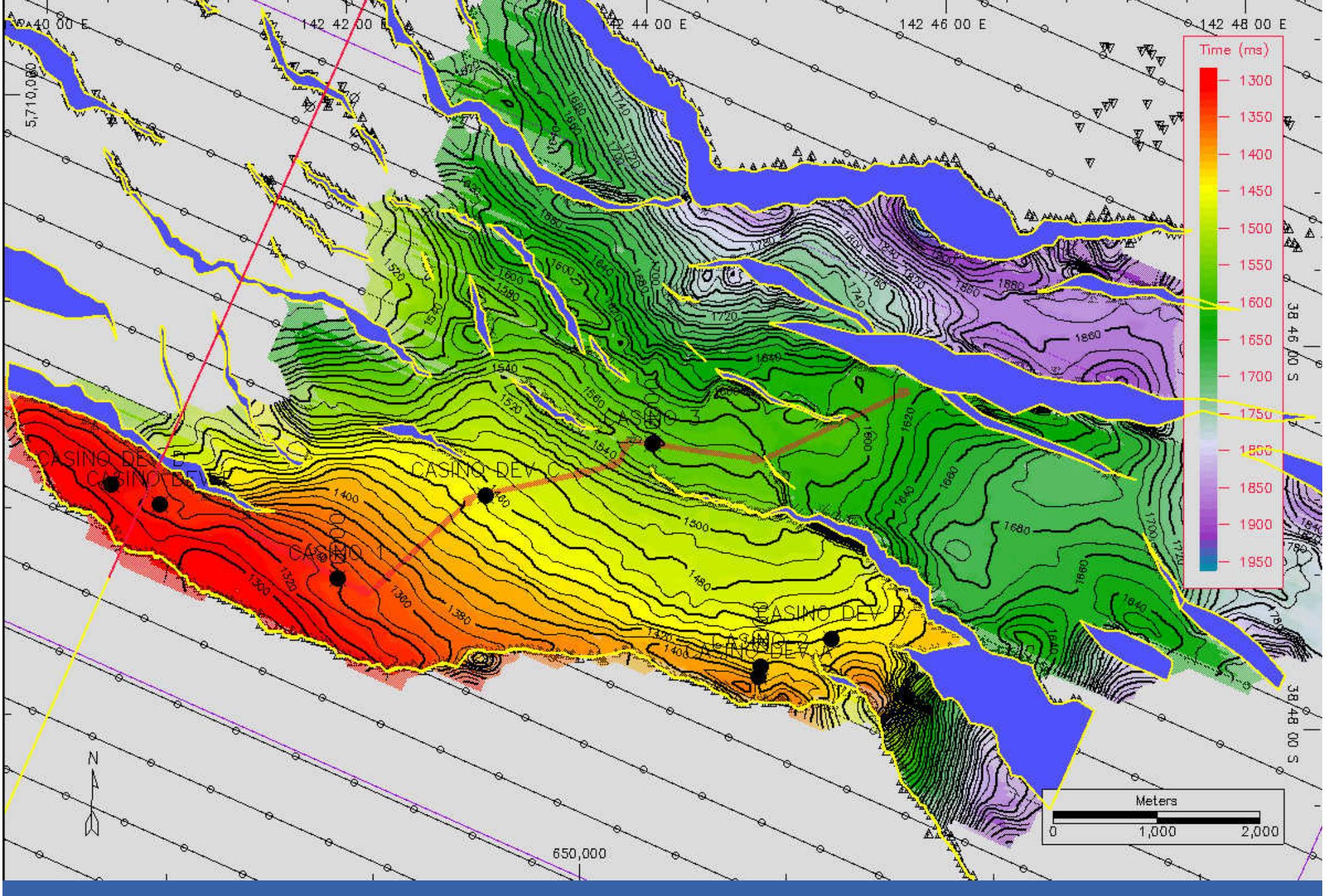


Fig. 3.4.1-j Top Upper Waarre A TWT contour map (purple horizon)

Santos

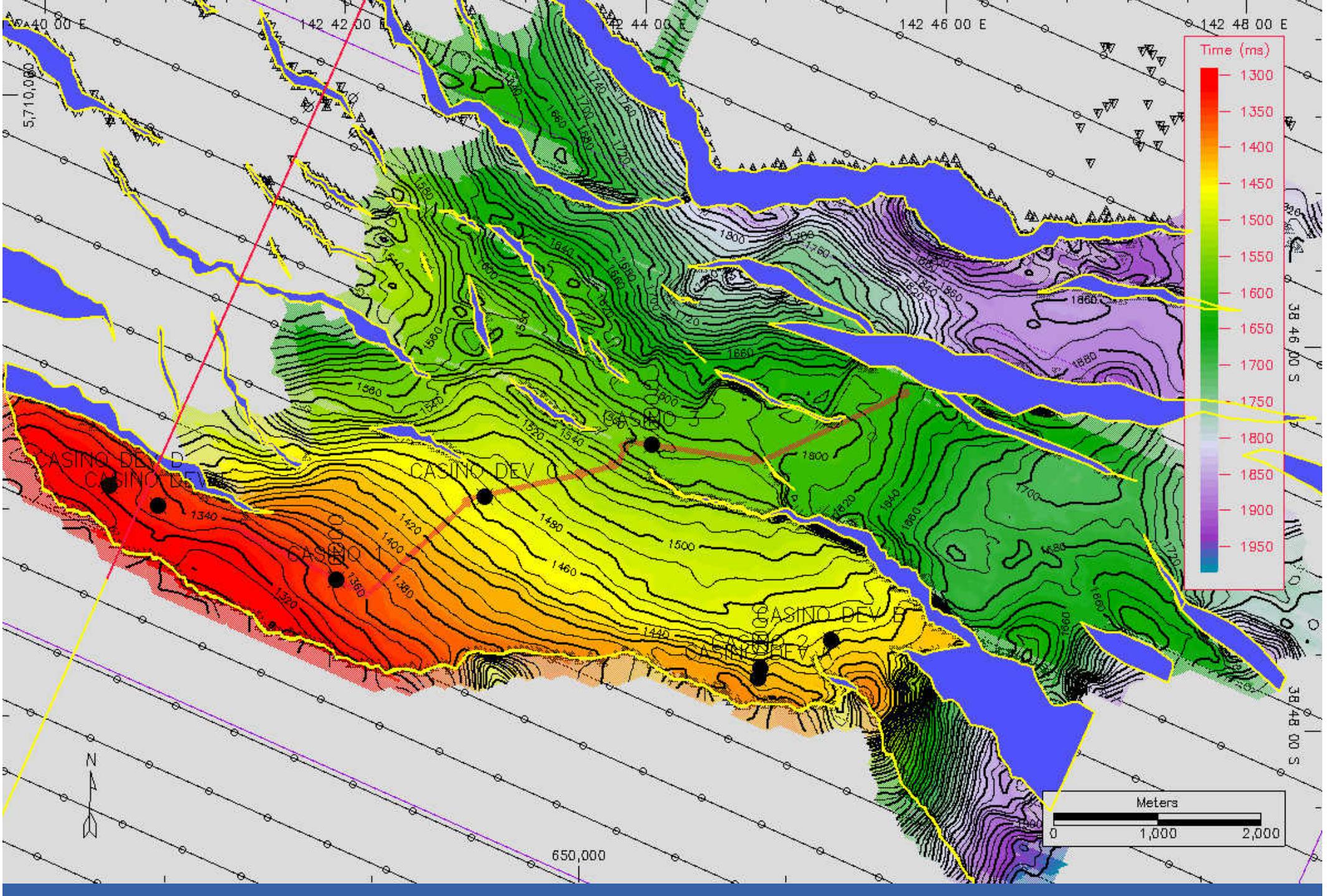


Fig. 3.4.1-k Top Lower Waarre A TWT contour map (dotted light blue horizon)

Santos

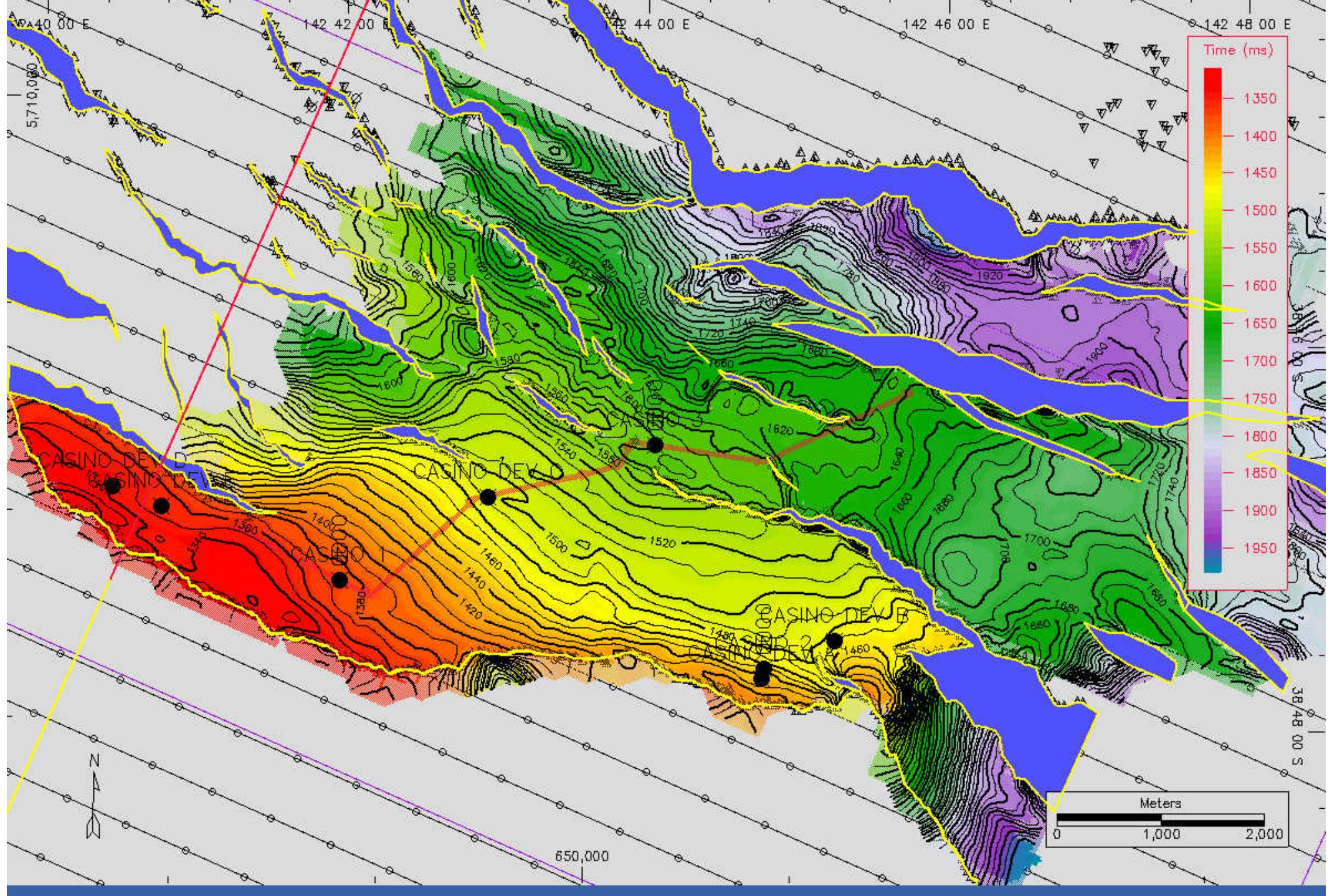


Fig. 3.4.1-I Base Waarre A TWT contour Map (dark green horizon)

Santos

TRC 582 570 560 550 540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370 360 350 340 330 320 310 300 290 280 270 260 250 240 230 220 211 TRC  
CDP 2812 2800 2790 2780 2770 2760 2750 2740 2730 2720 2710 2700 2690 2680 2670 2660 2650 2640 2630 2620 2610 2600 2590 2580 2570 2560 2550 2540 2530 2520 2510 2500 2490 2480 2470 2460 2450 2440 2430 2420 2410 2400 2390 2380 2370 2360 2350 2340 2330 2320 2310 2300 2290 2280 2270 2260 2250 2240 2230 2220 2210 CDP

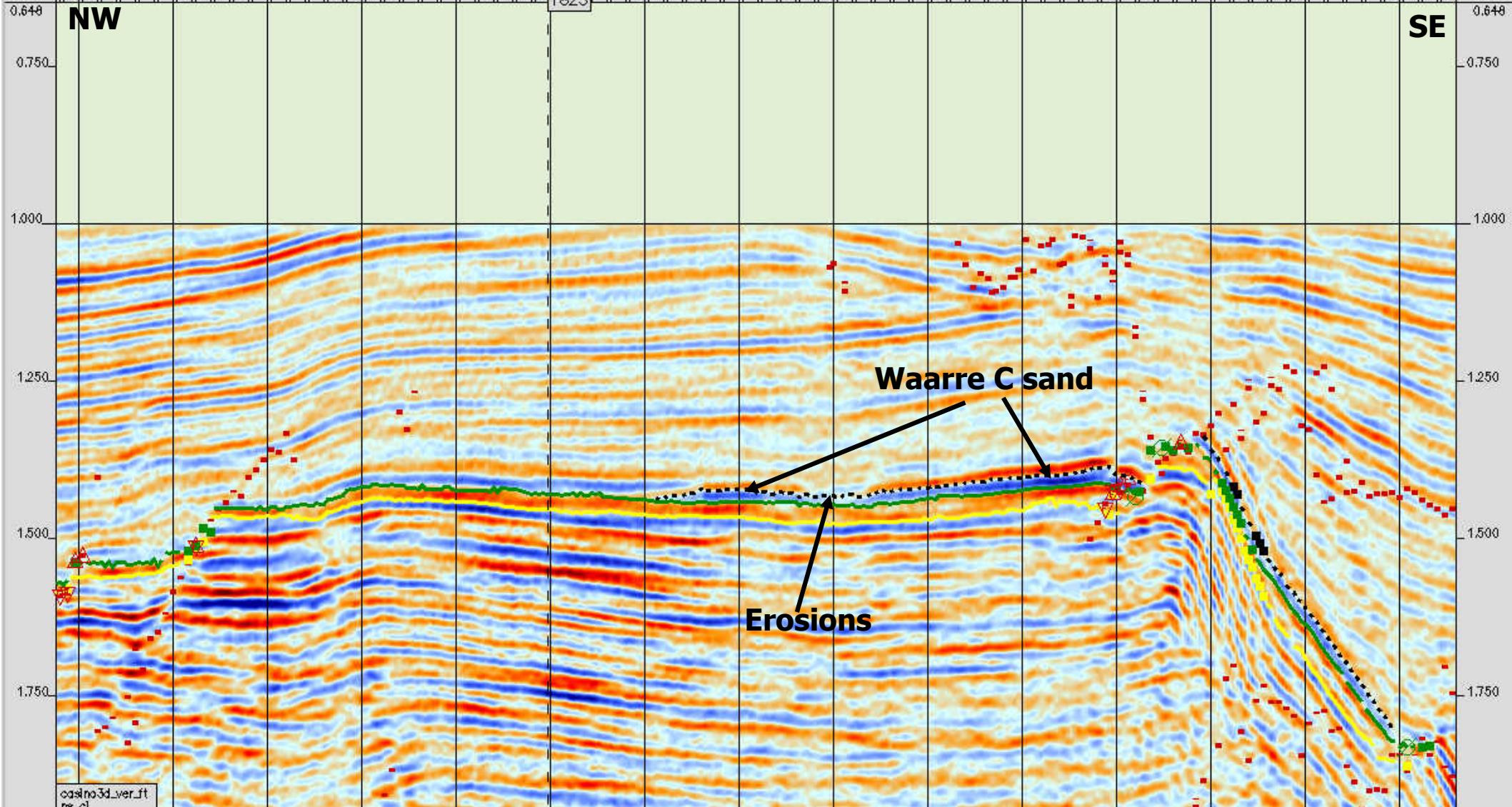


Fig. 3.4.1-m In-line 6152 showing extent of younger sand. Negative impedance is displayed in blue and positive impedance in red.

Santos

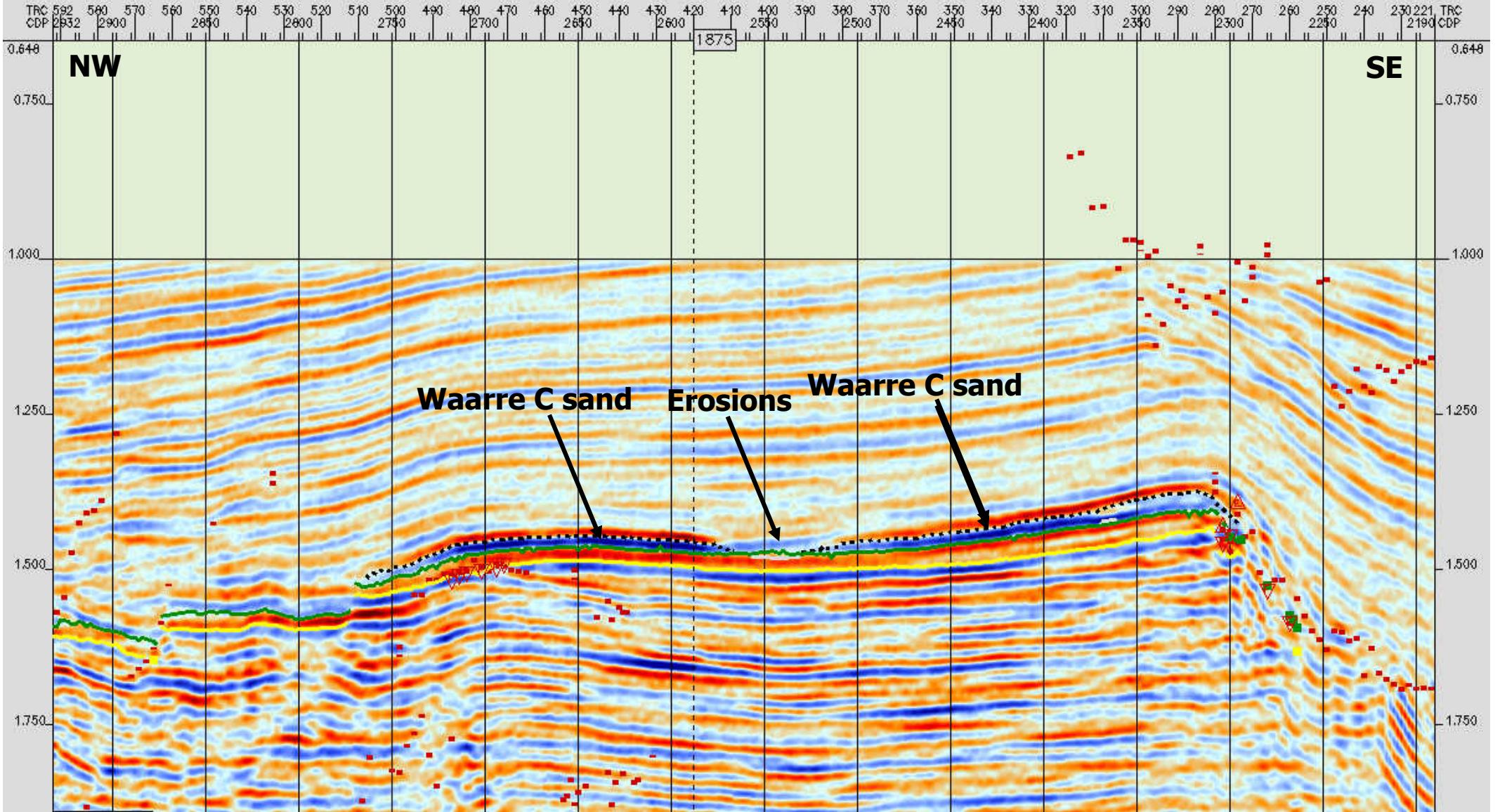


Fig. 3.4.1-n In-line 6194 showing extent of younger sand. Negative impedance is displayed in blue and positive impedance in red.

Santos

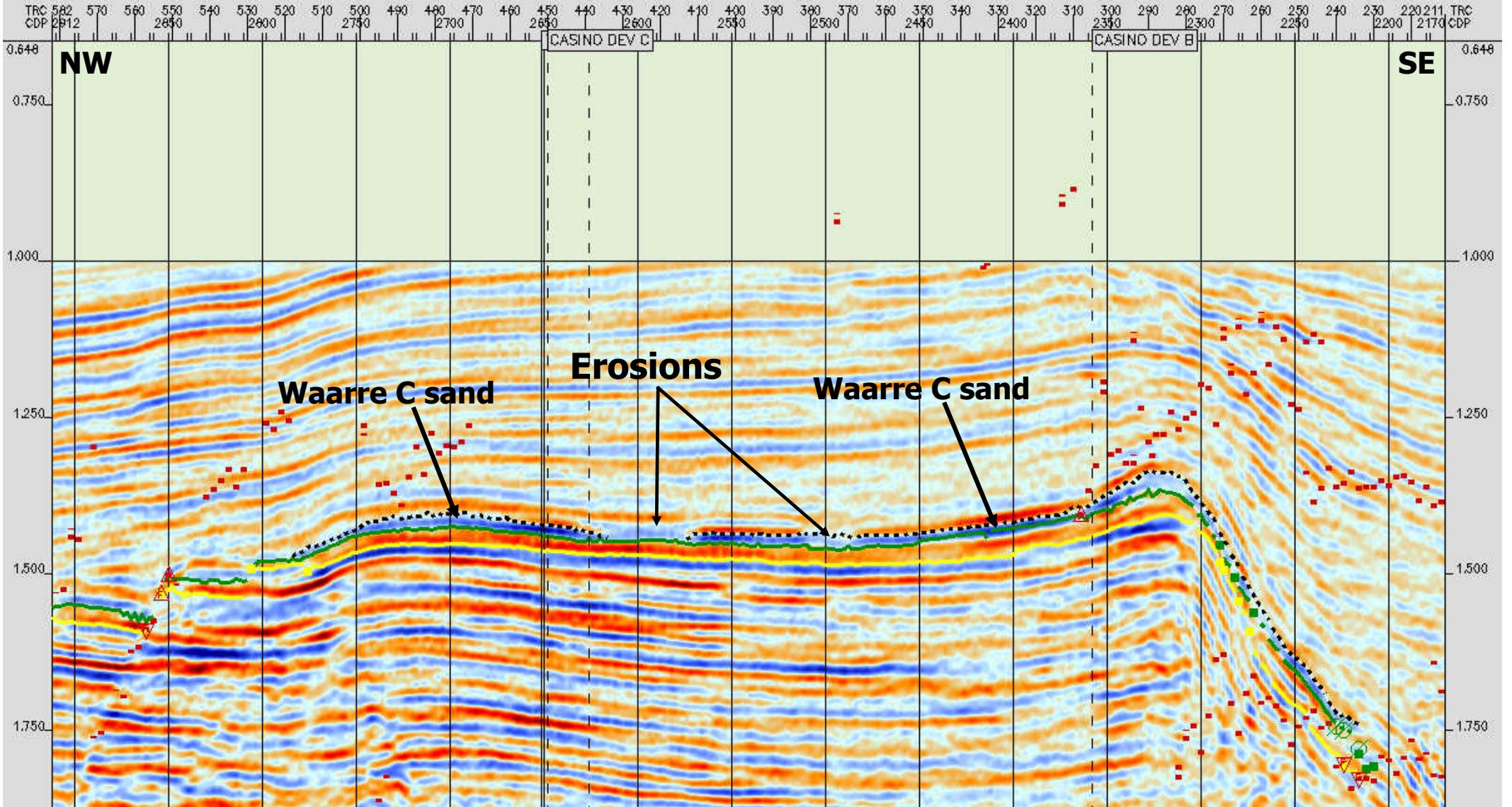


Fig 3.4.1-o In-line 6166 showing extent of younger sand. Negative impedance is displayed in blue and positive impedance in red.

Santos

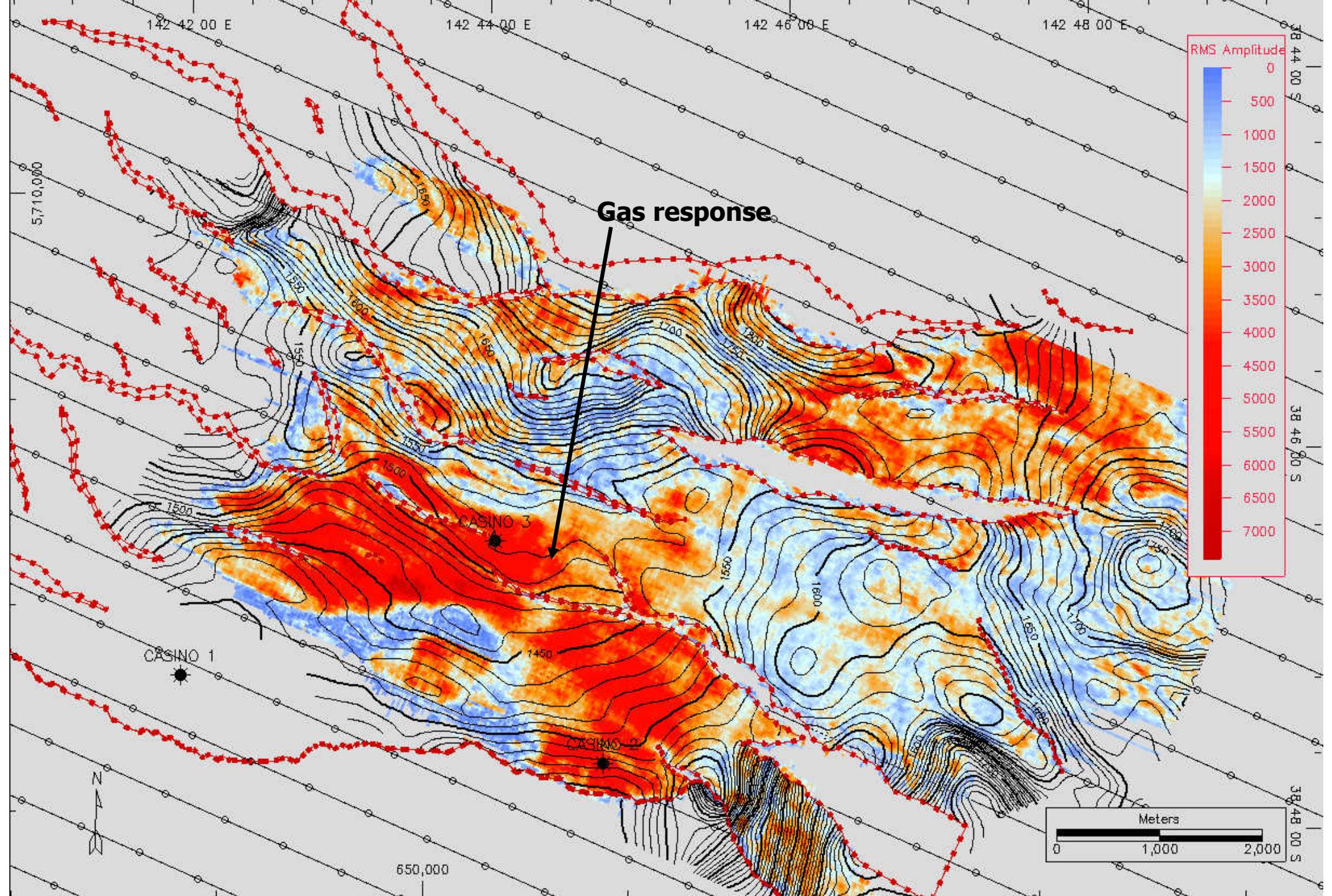


Fig. 3.4.1-p Average RMS CI impedance between Top Waarde C and Base Waarde C interval.

Santos

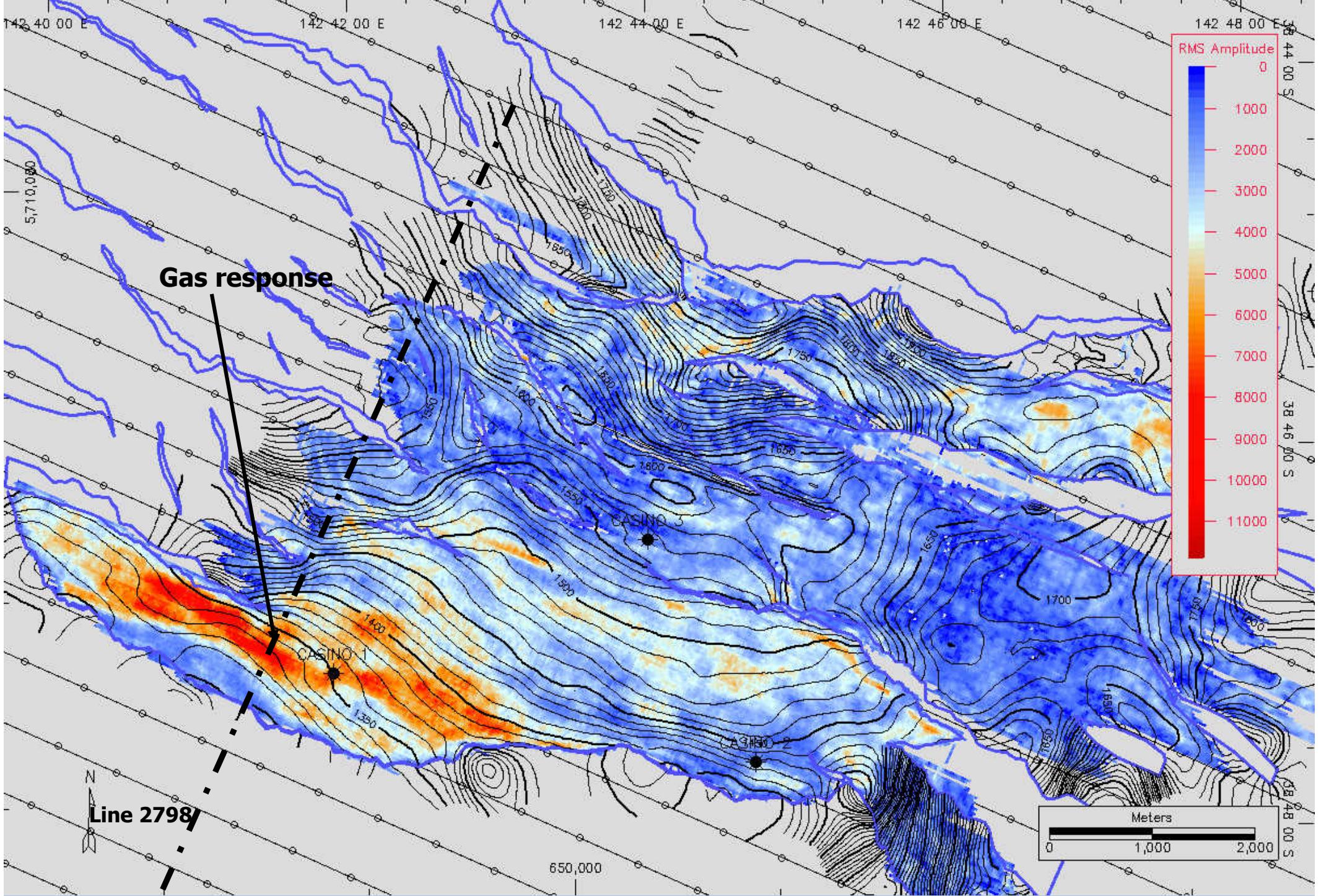


Fig. 3.4.1-q Average RMS CI impedance between Top Lower Waarde A and Base Waarde A interval.

Santos

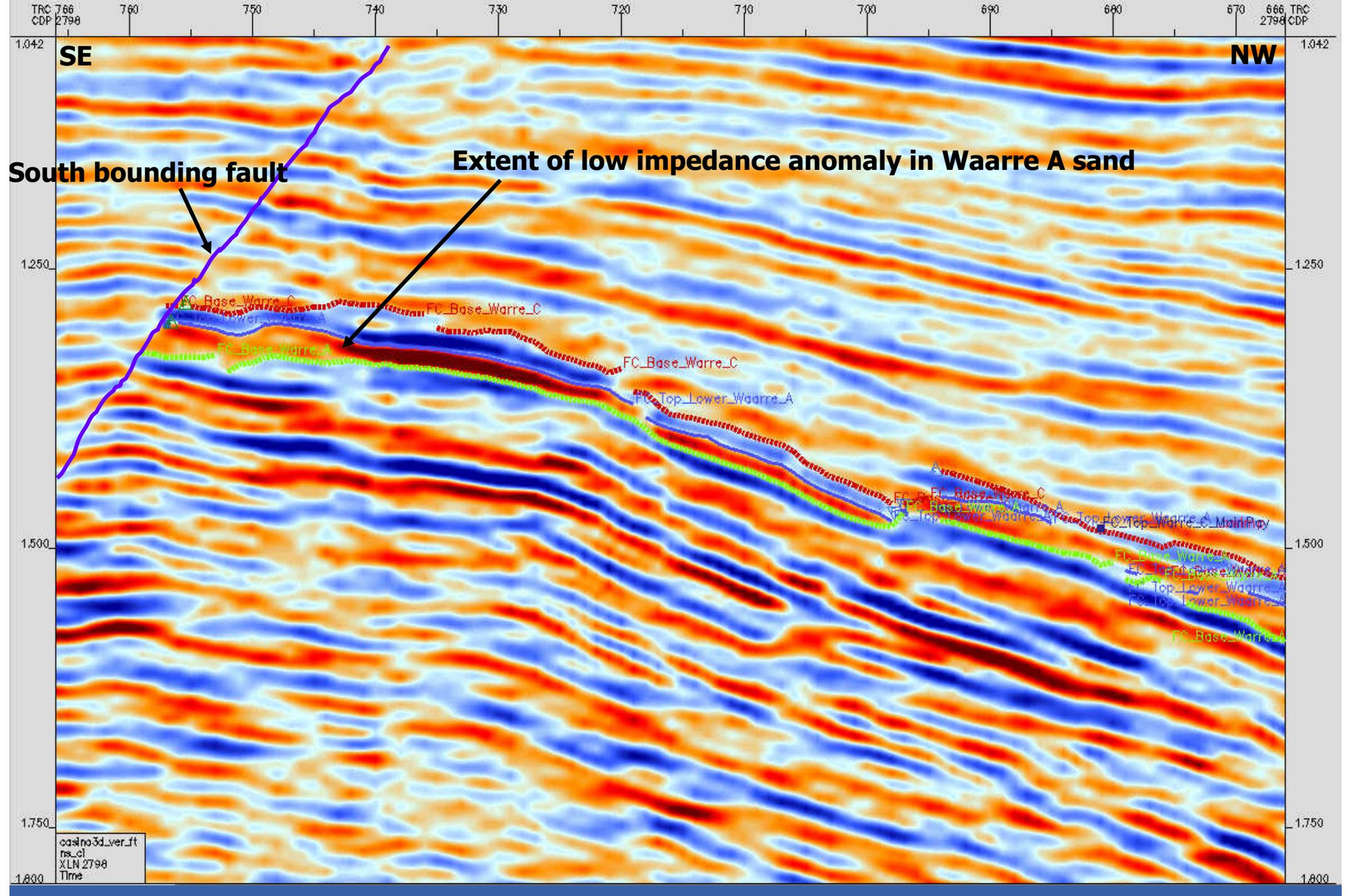


Fig. 3.4.1-r Cross-line 2798 showing extent of low impedance anomaly in Waarde A sand.

Santos

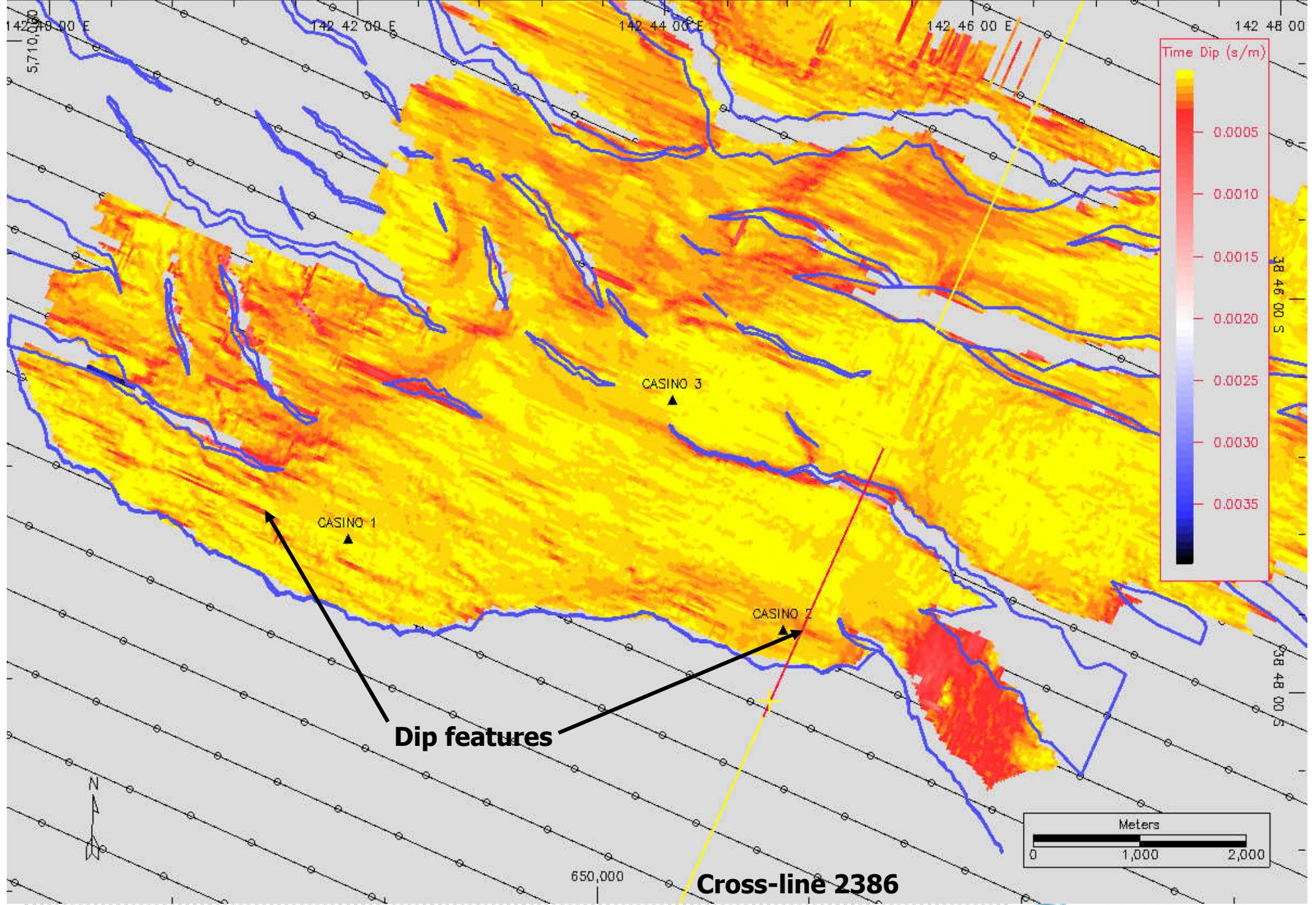


Fig. 3.4.2-a Base Waarre C Dip Map showing minor dip features.

Santos

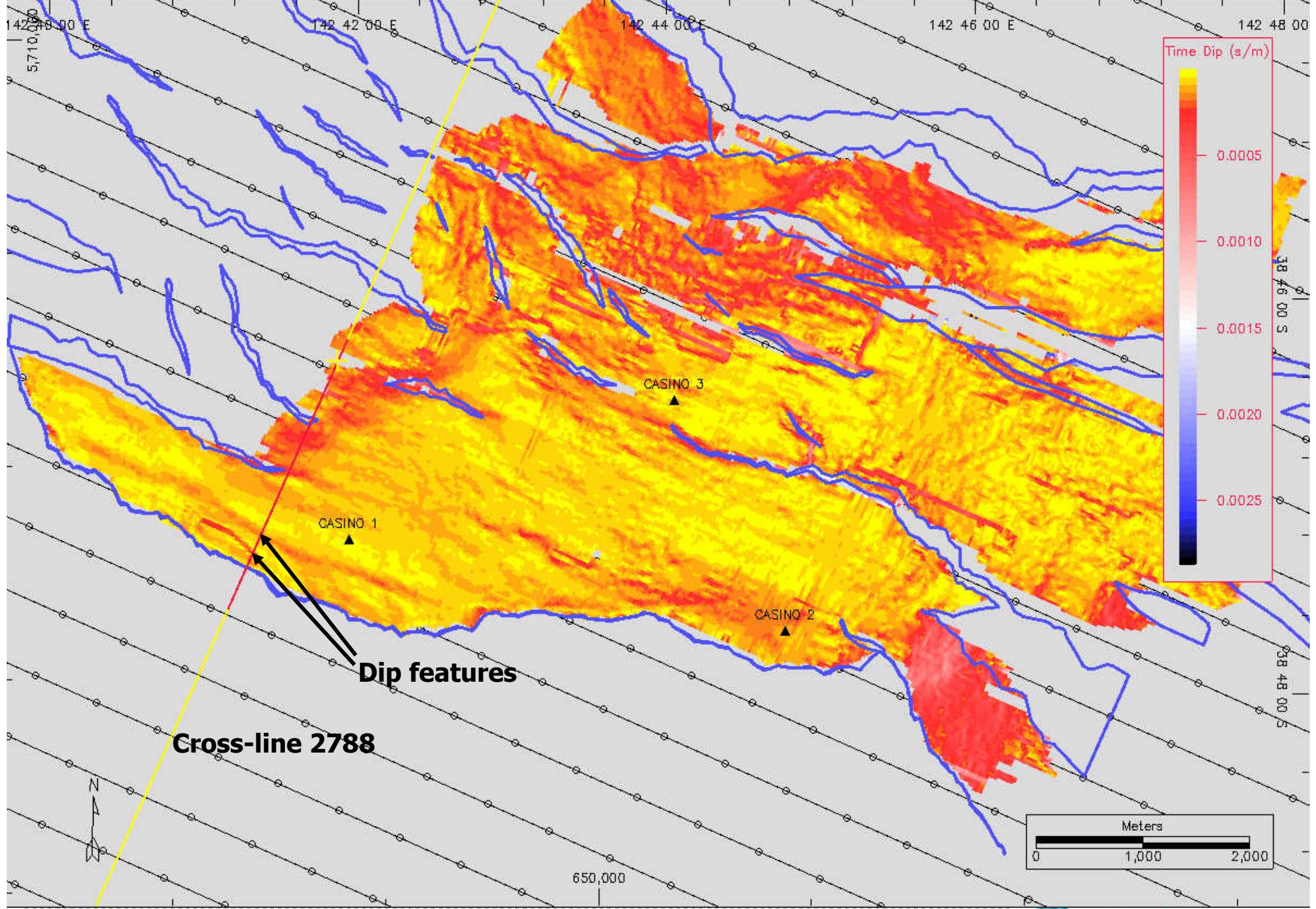


Fig. 3.4.2-b Top Lower Waarde A Dip Map showing minor dip features.

Santos

TRC 729

CDP 2386

720

710

700

690

680

670

660

650

640

630

618 TRC  
2386 CDP

1256

1256

1,500

1,500

1,752

1,752

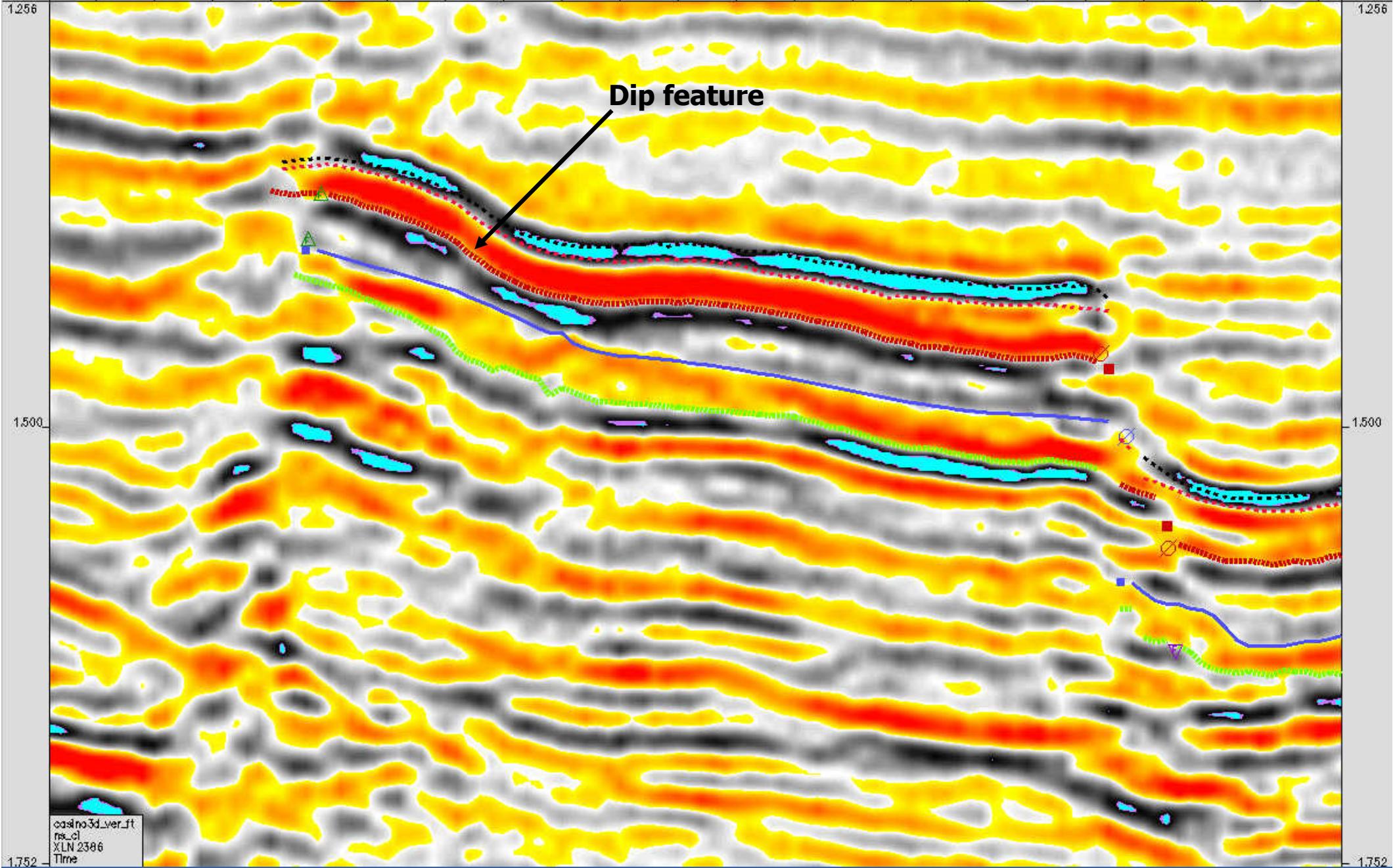
**Dip feature**

Fig. 3.4.2-c Cross line 2386 through dip feature at Base Waarre C northeast of Casino-2 well.

**Santos**

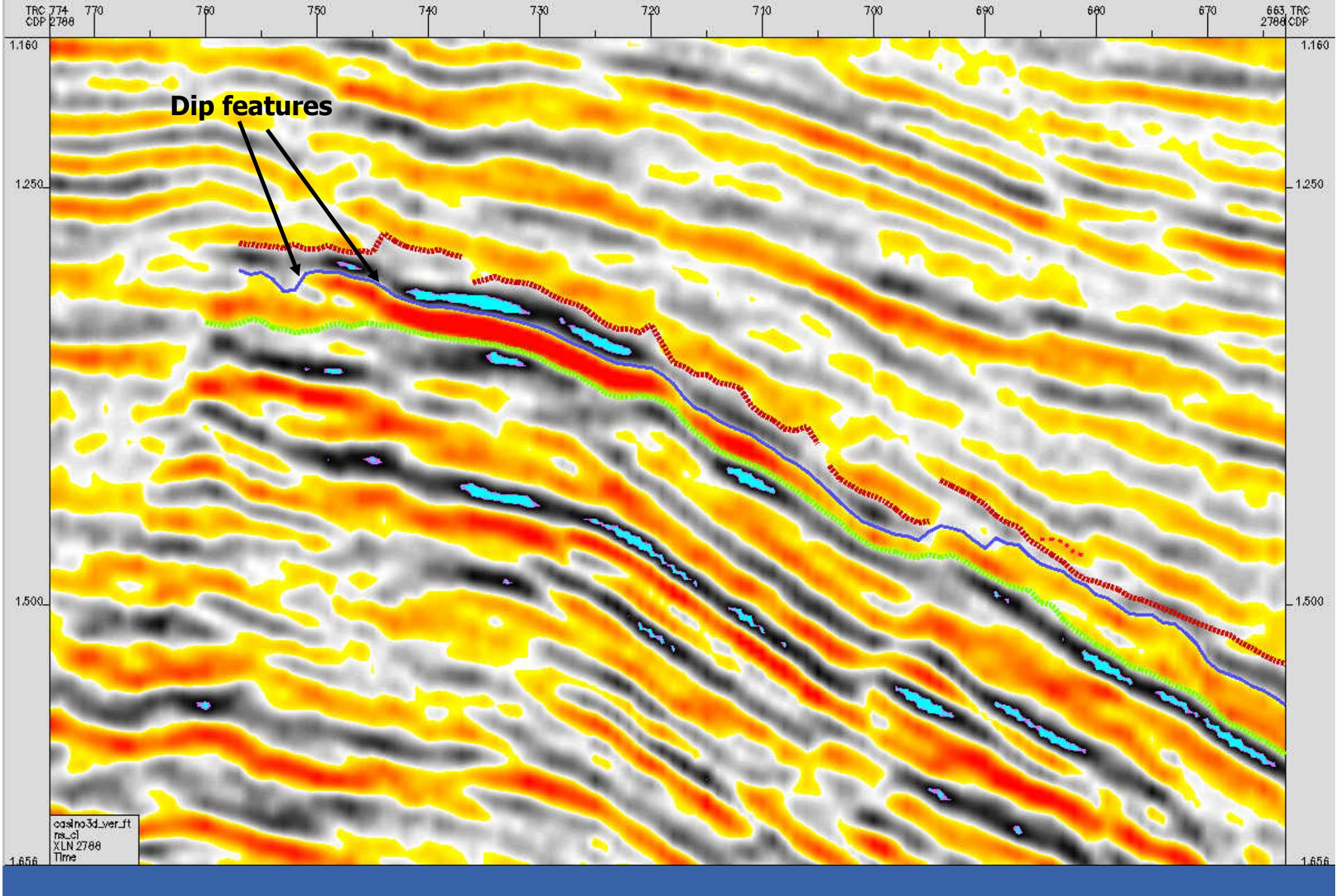


Fig. 3.4.2-d Cross line 2788 through dip features at Top Lower Waarre A west northeast of Casino-1 well.

Santos

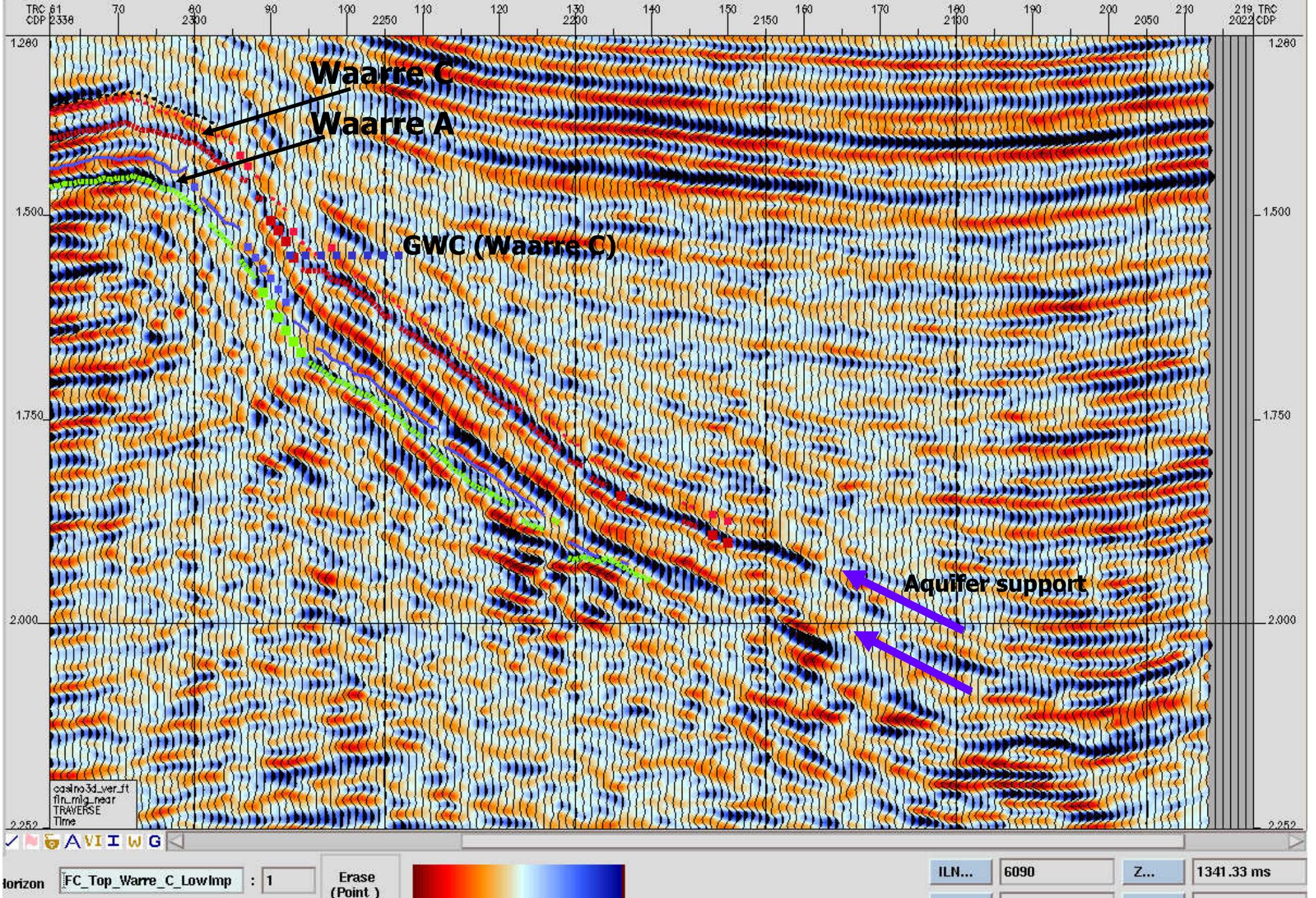
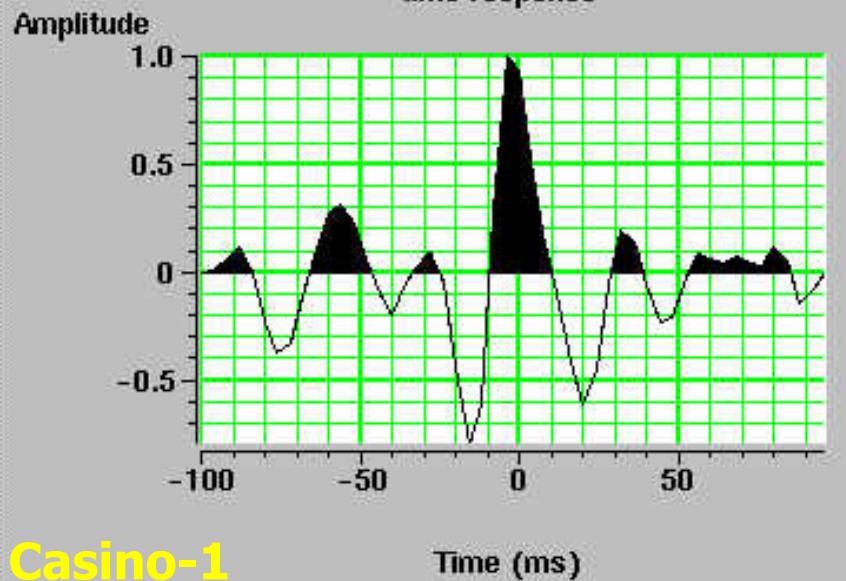


Fig. 3.4.2-e Traverse line of near stack PSTM seismic data through the SE ramp indicating possible aquifer support up the ramp for Waarde C and Waarde A Sands.

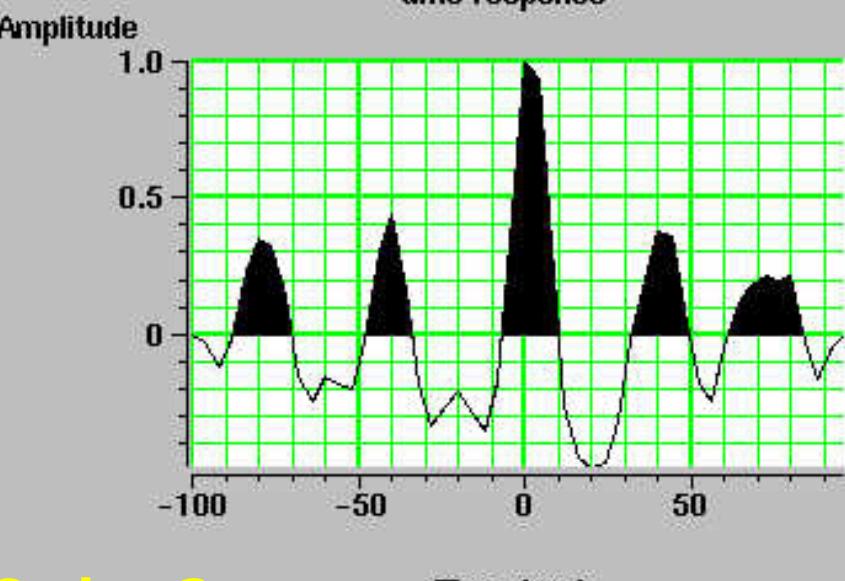
Santos

FW\_200\_Cas1\_feb2004 - wavelet time response



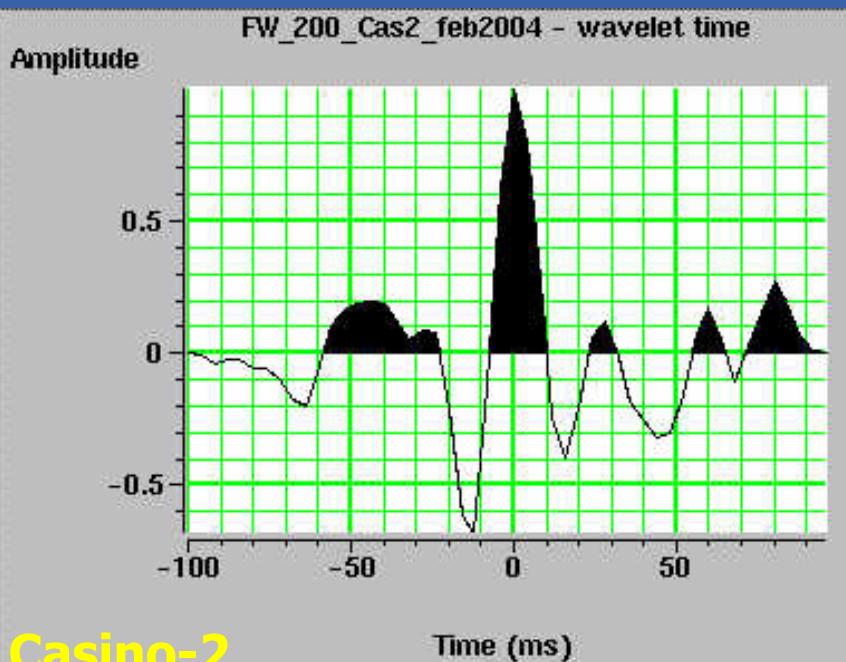
Casino-1

FW\_200\_Cas3\_feb2004 - wavelet time response



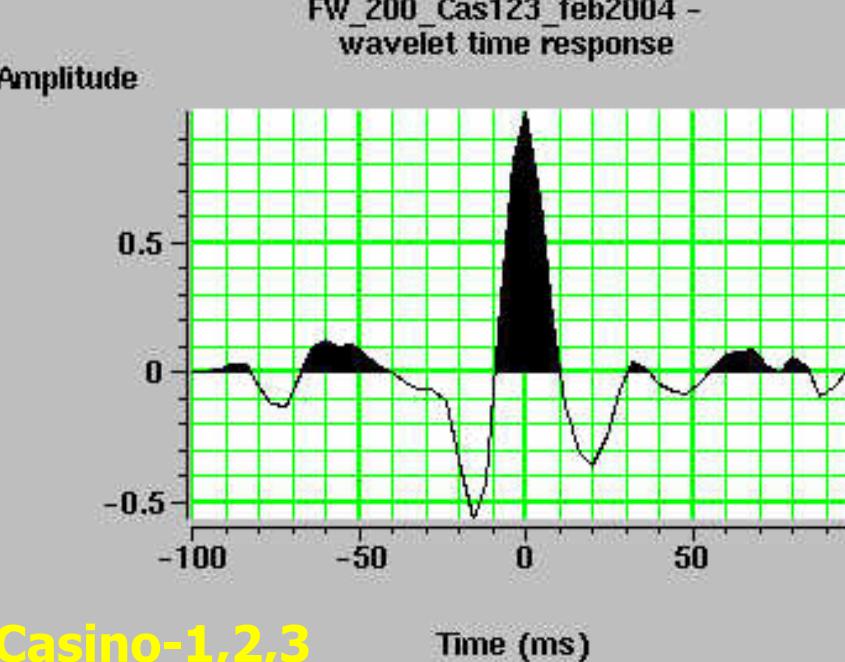
Casino-3

FW\_200\_Cas2\_feb2004 - wavelet time



Casino-2

FW\_200\_Cas123\_feb2004 - wavelet time response

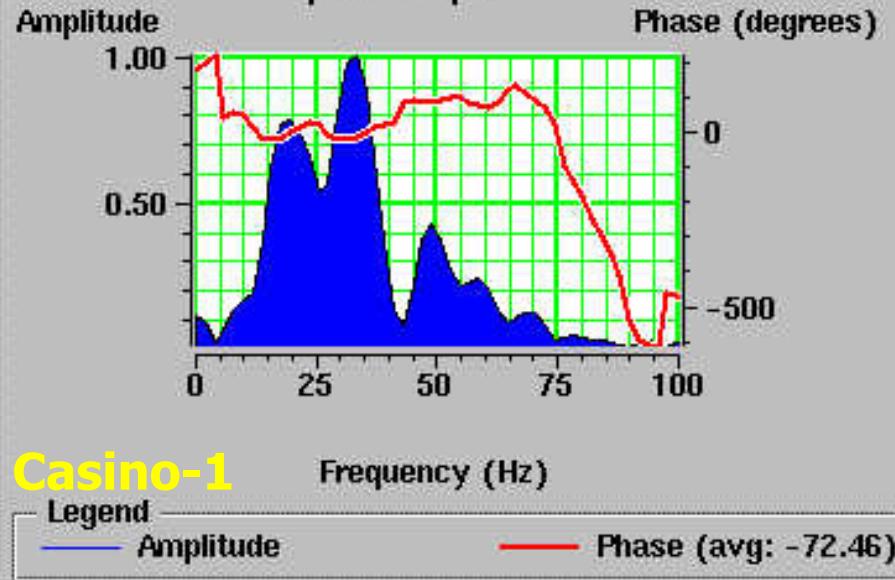


Casino-1,2,3

Fig. 3.4.3-a Extracted wavelets at Casino-1, Casino-2 and -3 wells (200 ms constant phase wavelet).

Santos

FW\_200\_Cas1\_feb2004 -  
wavelet amplitude and  
phase response

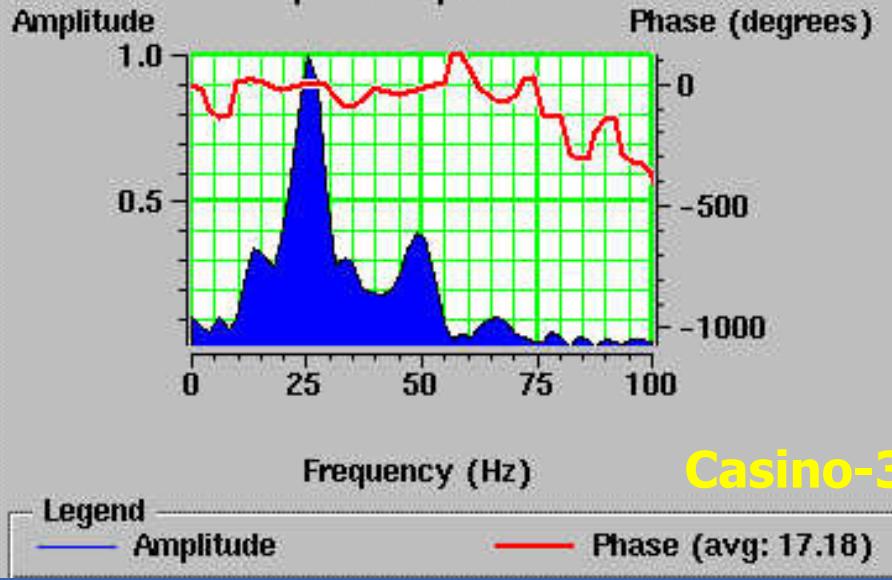


Casino-1

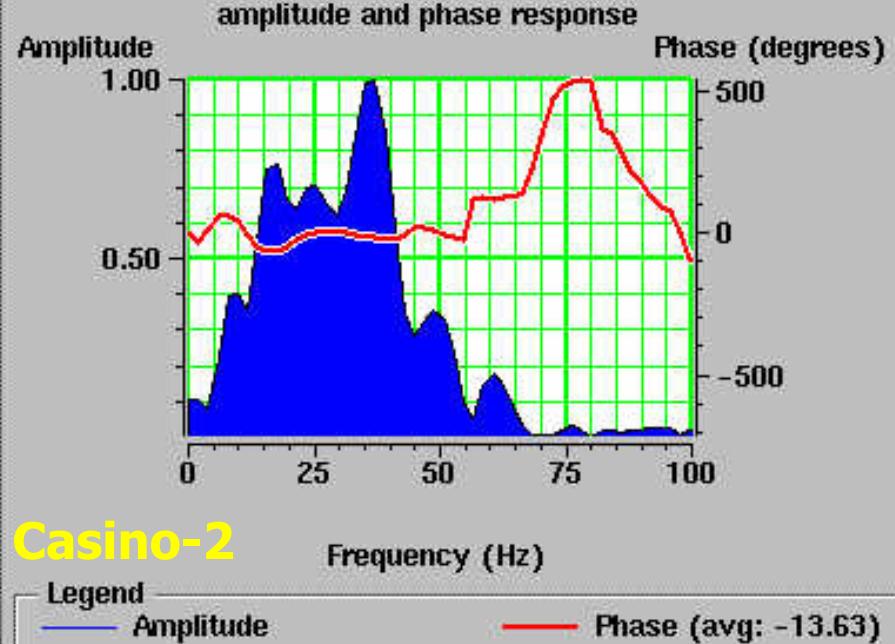
Frequency (Hz)

Casino-3

FW\_200\_Cas3\_feb2004 -  
wavelet amplitude and  
phase response



FW\_200\_Cas2\_feb2004 - wavelet  
amplitude and phase response



Casino-2

Frequency (Hz)

Casino-1,2,3

FW\_200\_Cas123\_feb2004 -  
wavelet amplitude and  
phase response

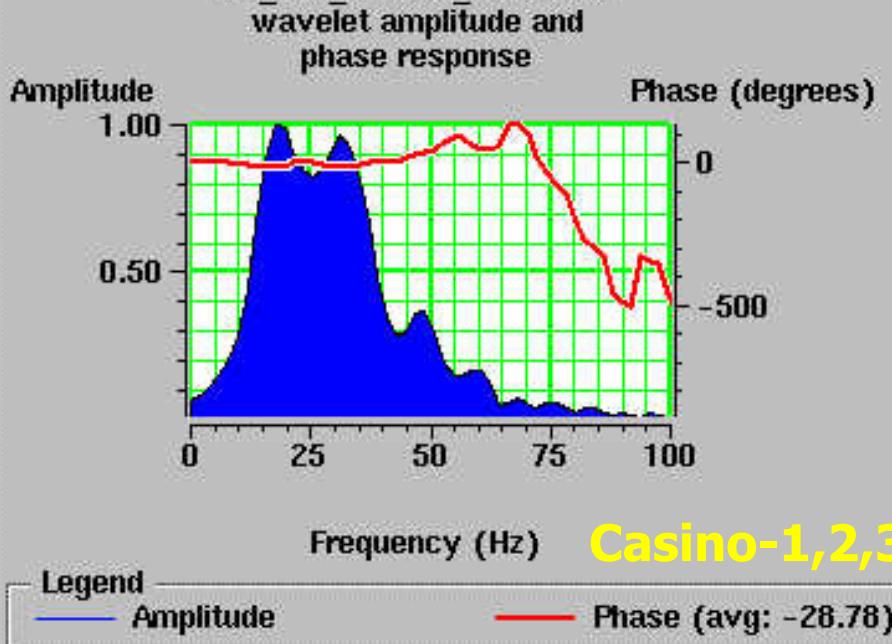
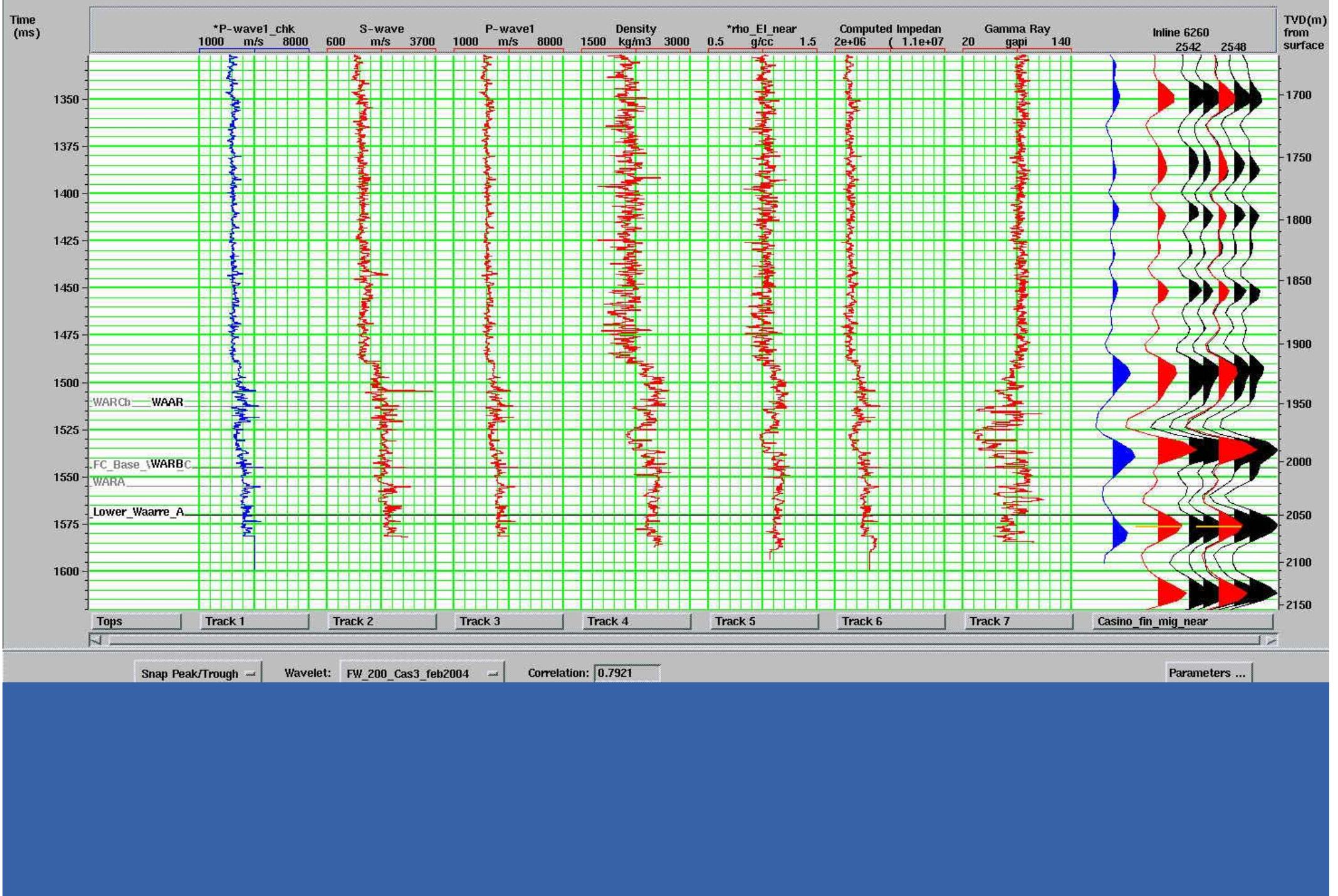


Fig. 3.4.3-b Frequency spectrum of wavelets at Casino-1, Casino-2 and -3 wells.

Santos



**Fig. 3.4.3-c Casino-3 Seismic to synthetic match.**

**Santos**

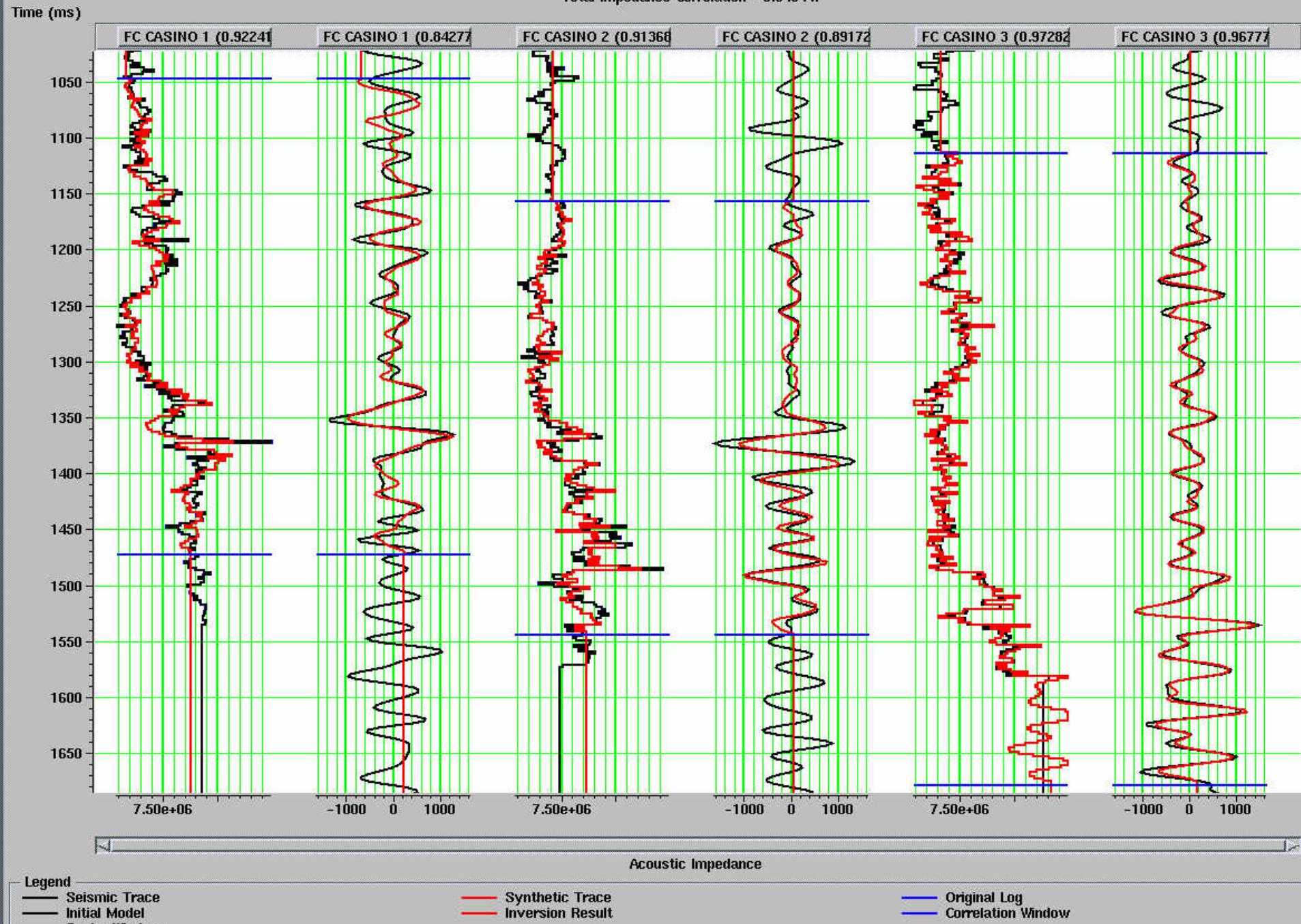


Fig. 3.4.3-d: Inversion using Casino -3 wavelet (MB Stochastic 40% model 60% seismic)

FC\_Casino\_StartImp\_Feb2004 P-Impedance  
Amplitude at FC\_Top\_Waarre\_C\_MainPay plus 0 ms  
with a window to FC\_Base\_Waarre\_C  
and showing the Arithmetic Mean.

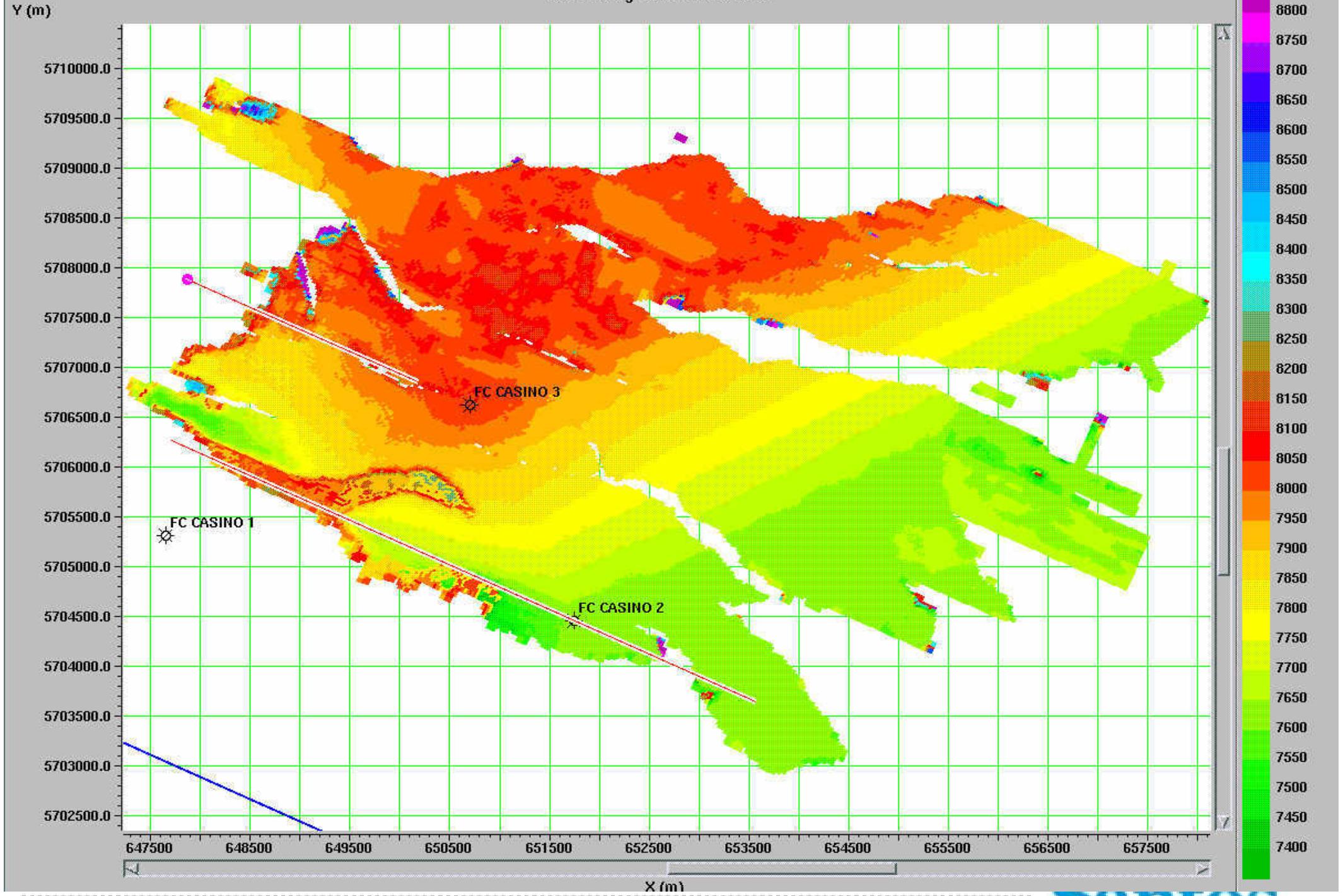


Fig. 3.4.3-e Average initial starting model impedance between Top Waarde C and Base Waarde C. Santos

FC\_Casino\_StartImp\_Feb2004 P-Impedance  
Amplitude at FC\_Top\_Lower\_Waarre\_A plus 0 ms  
with a window to FC\_Base\_Waarre\_A  
and showing the Arithmetic Mean.

Color Key

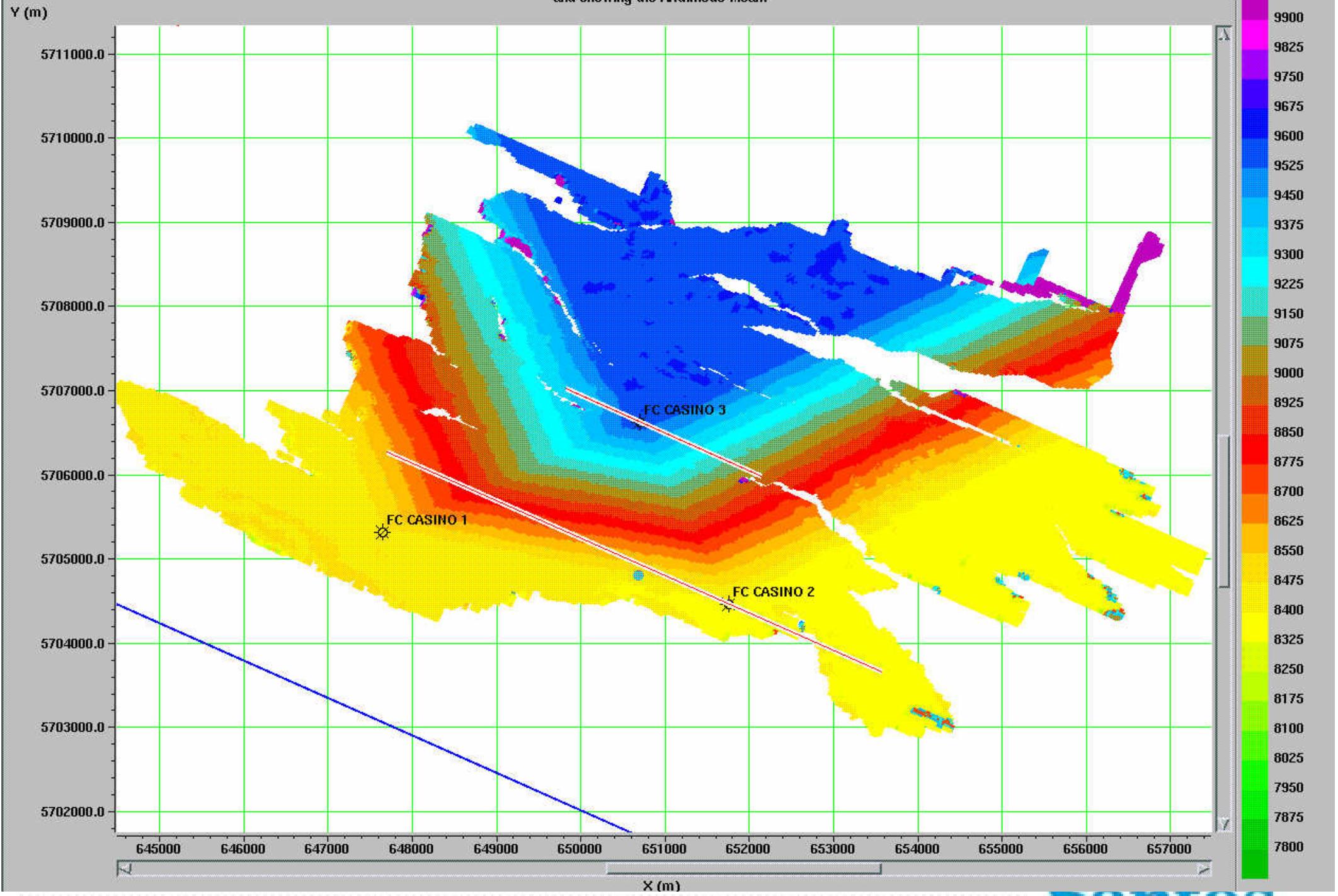


Fig. 3.4.3-f Average initial starting model impedance between Top Lower Waarde A and Base Waarde A.

FC\_Casino\_MB\_17Feb2004  
Amplitude at FC\_Top\_Waarre\_C MainPay plus 0 ms  
with a window to FC\_Base\_Waarre\_C  
and showing the Arithmetic Mean.

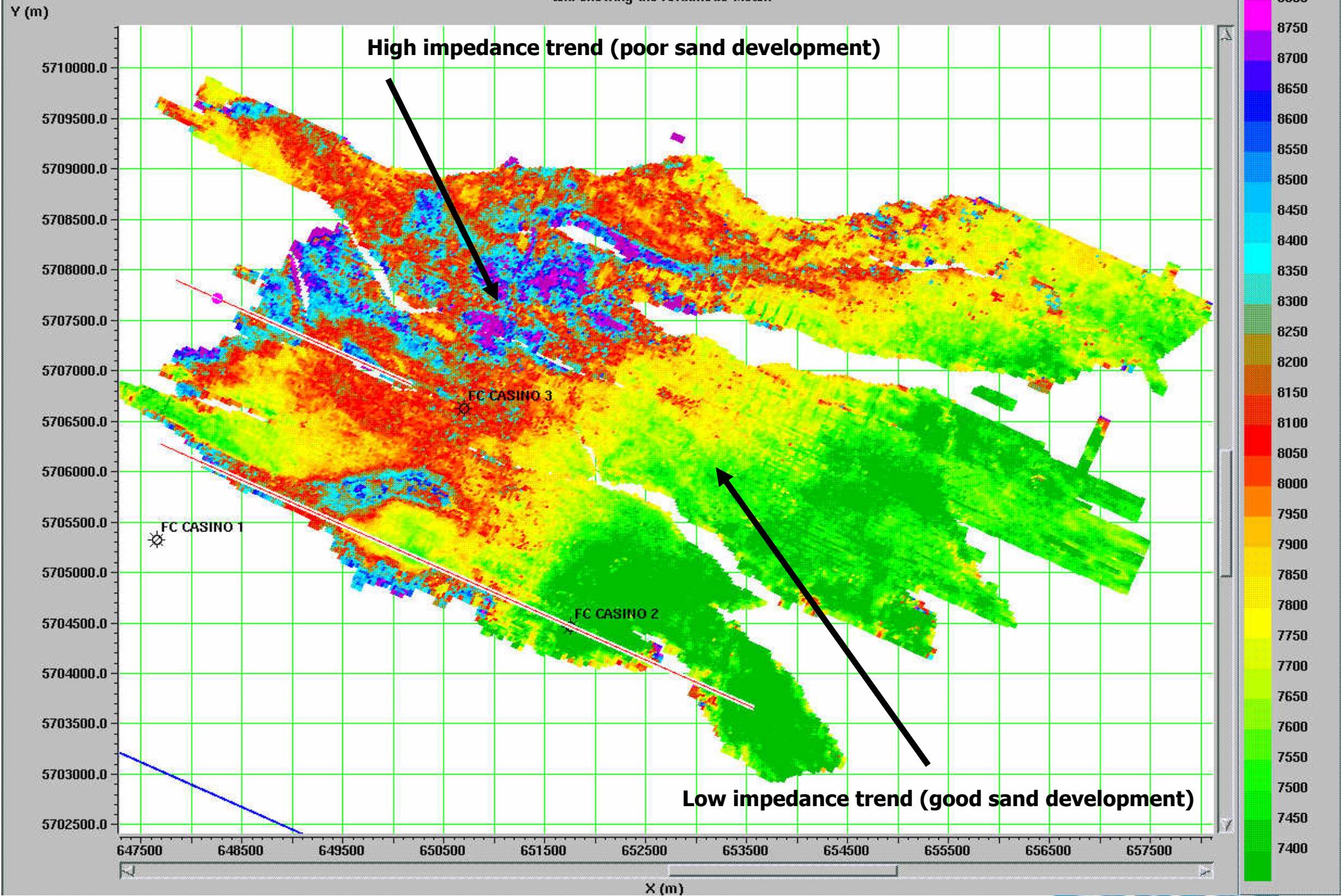


Fig. 3.4.3-g Average MB inversion derived impedance between Top Waarde C and Base Waarde C.

Santos

FC\_Casino\_MB\_17Feb2004  
Amplitude at FC\_Top\_Lower\_Waarre\_A plus 0 ms  
with a window to FC\_Base\_Waarre\_A  
and showing the Arithmetic Mean.

Color Key

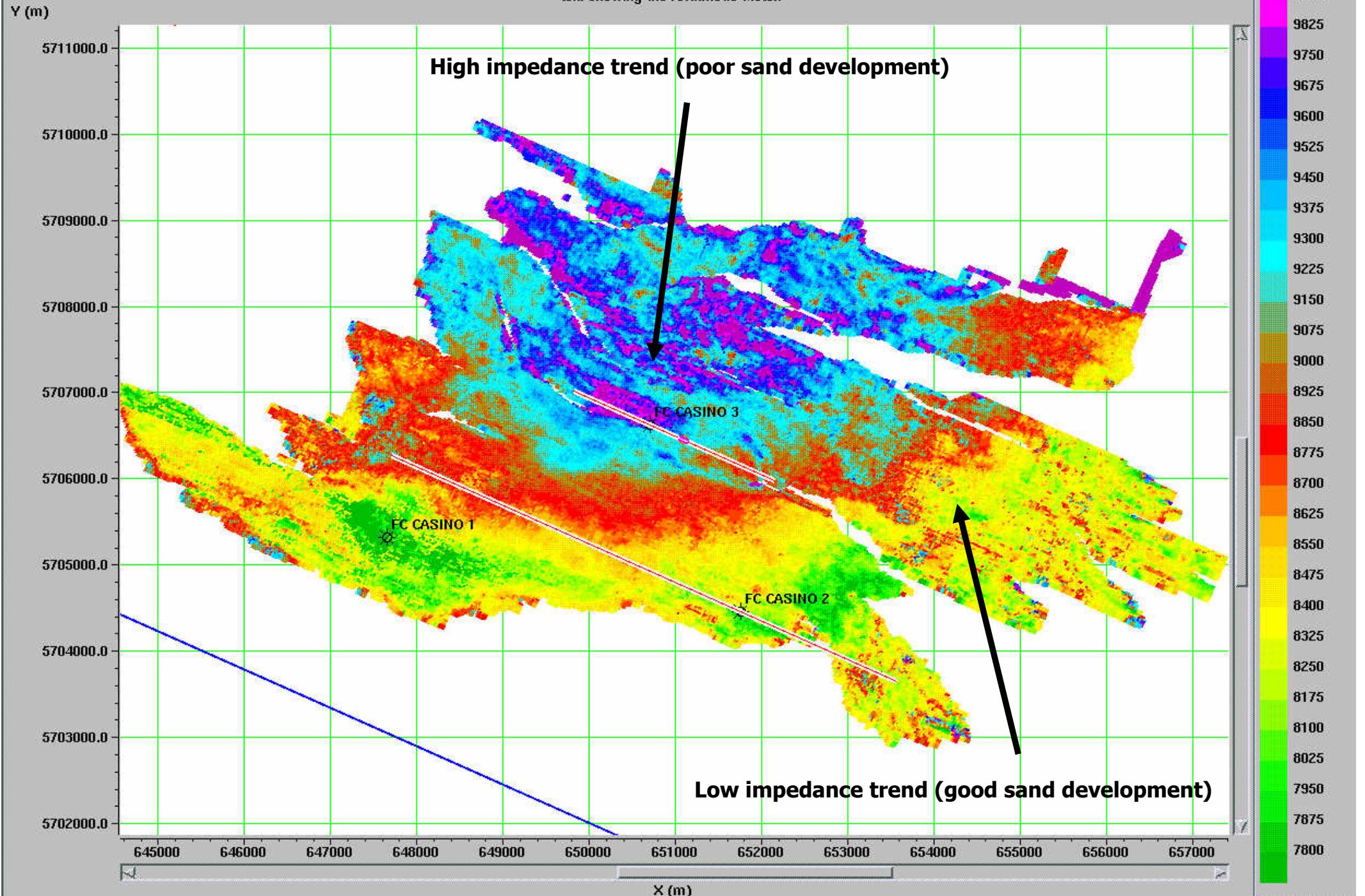


Fig. 3.4.3-h Average MB inversion derived impedance between Top Lower Waarre A and Base Waarre A.

Santos

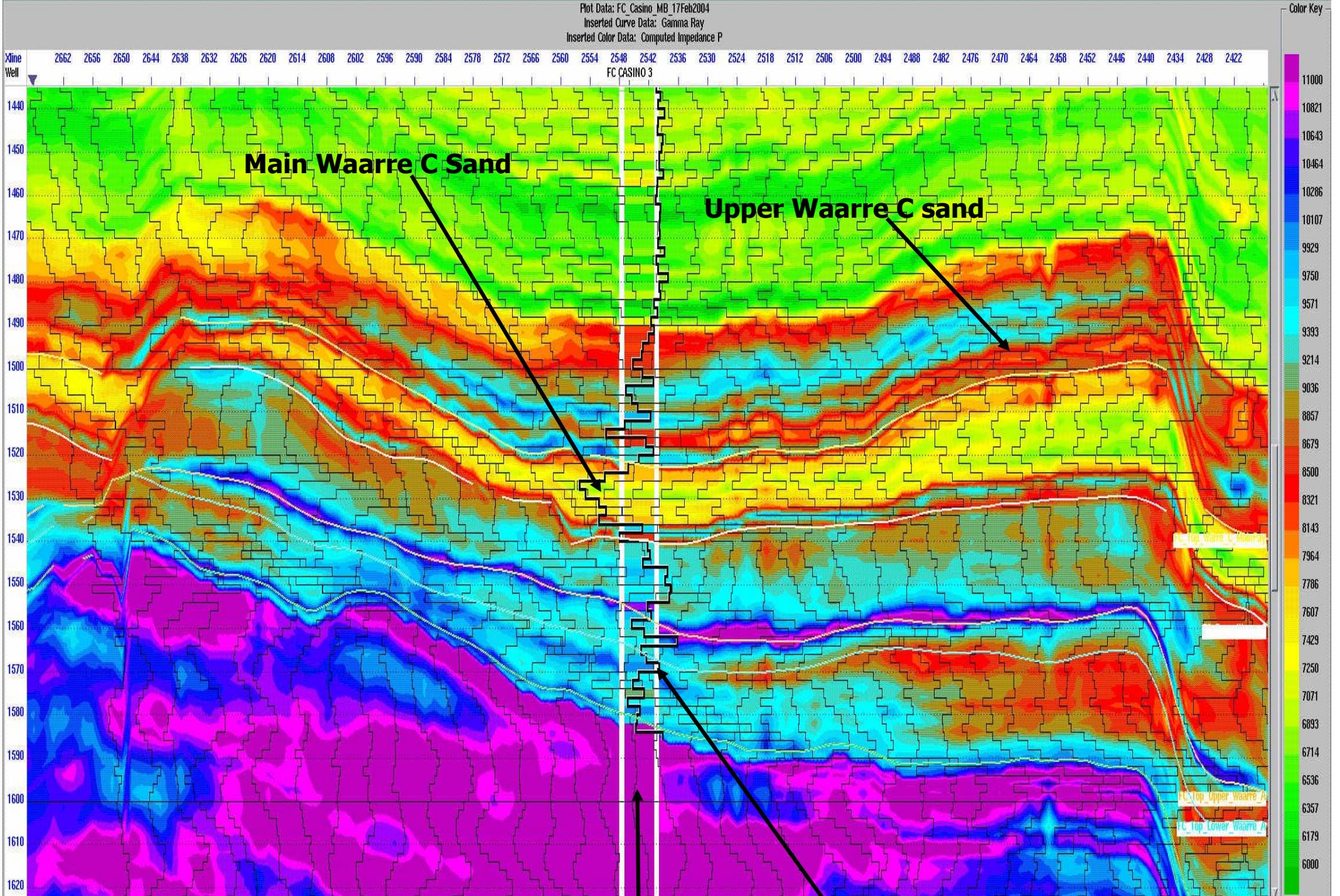
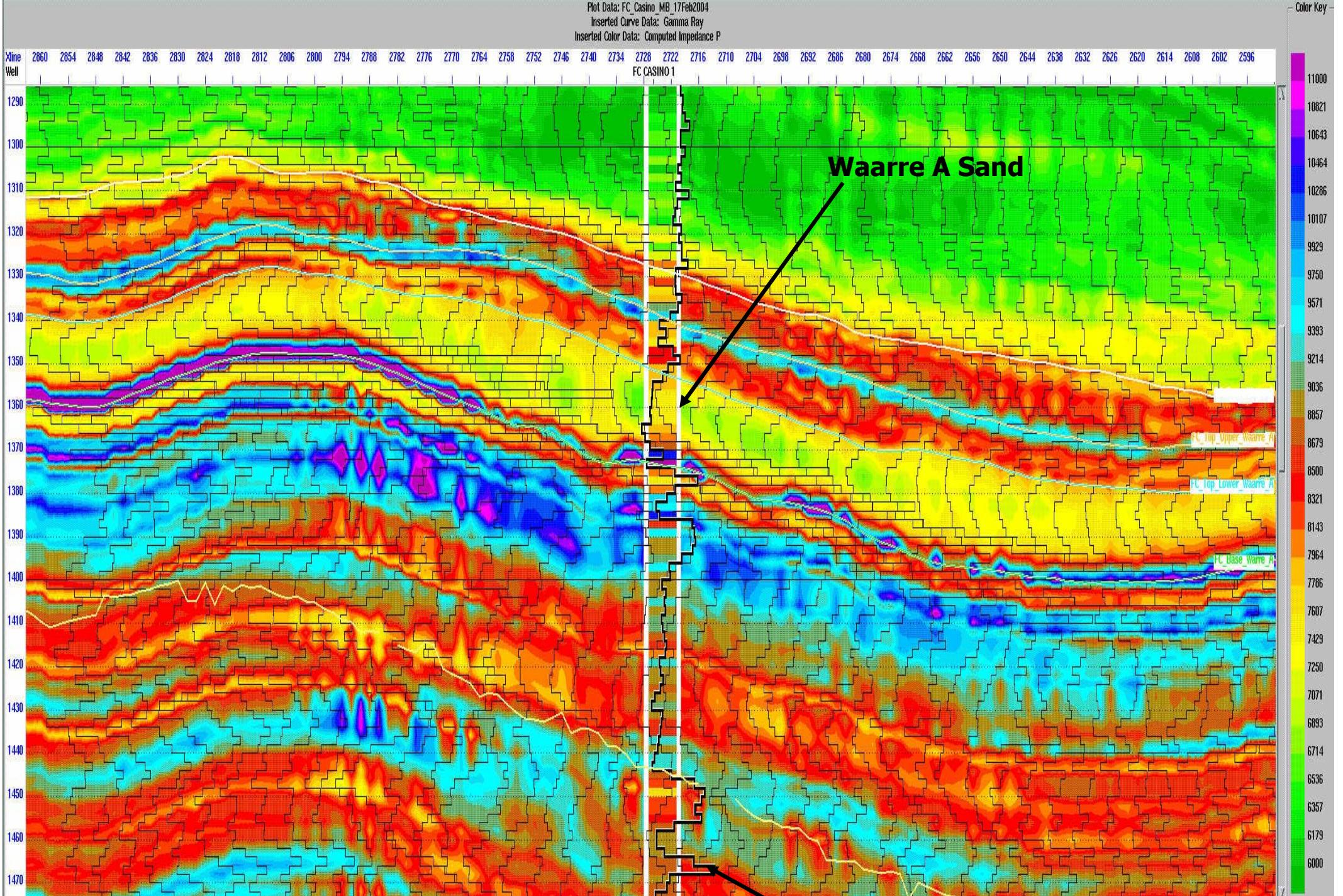


Fig. 3.4.3-i Matching MB impedance to well at Casino 3.

Impedance log

GR

Santos



**Fig. 3.4.3-j Matching MB impedance to well at Casino 1.**

**Santos**

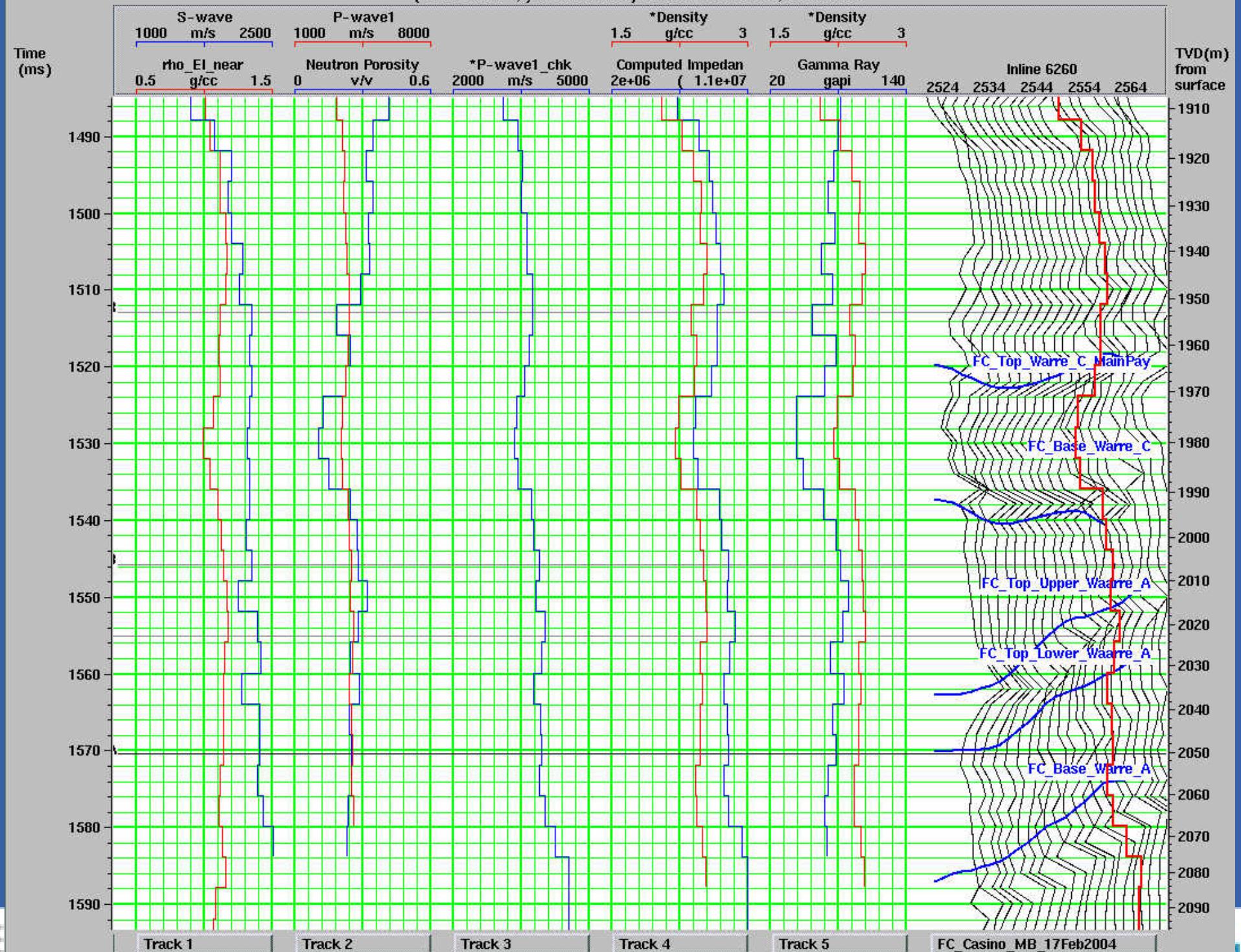


Fig. 3.4.3-k Reservoir picks on MB impedance at Casino 3 well.

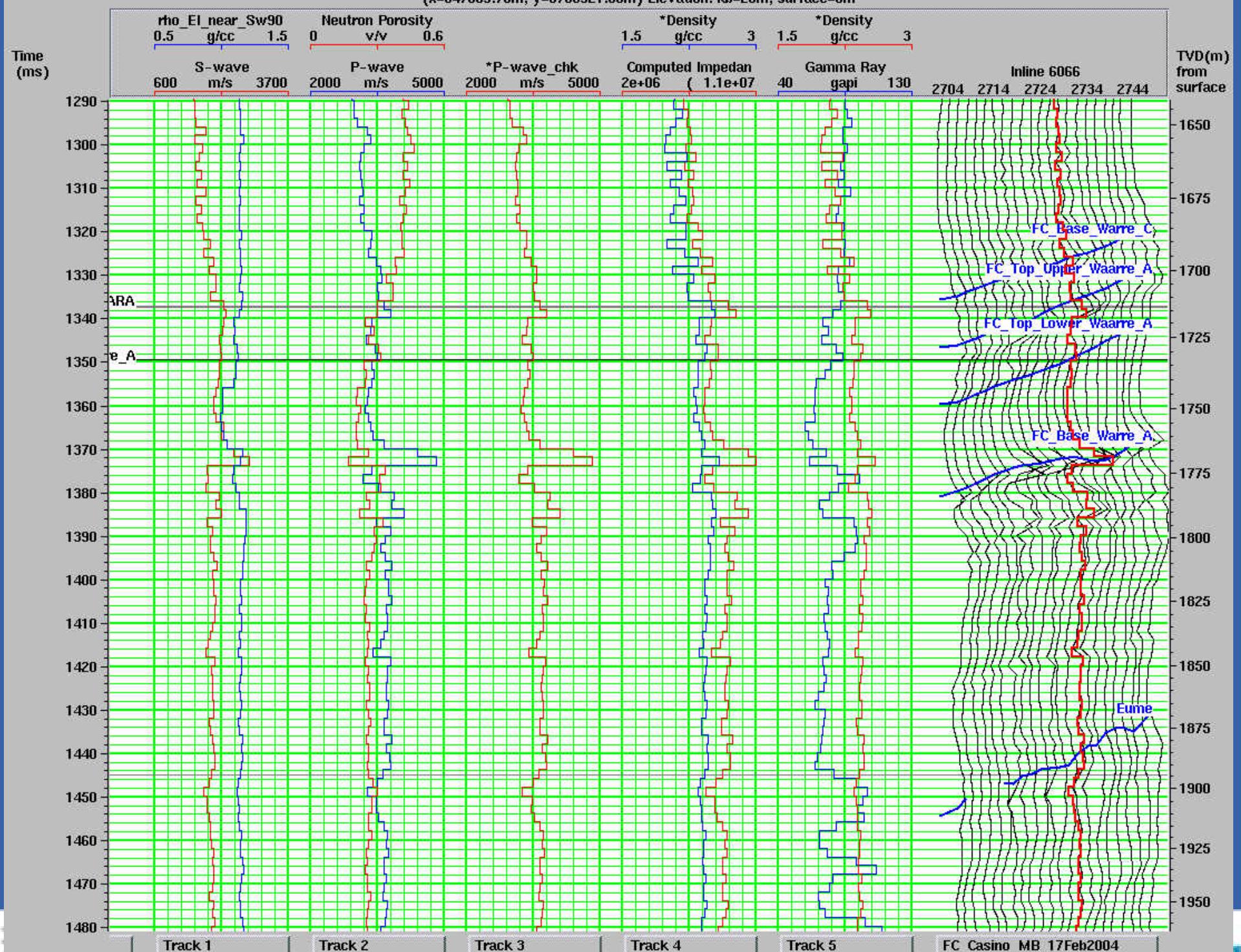
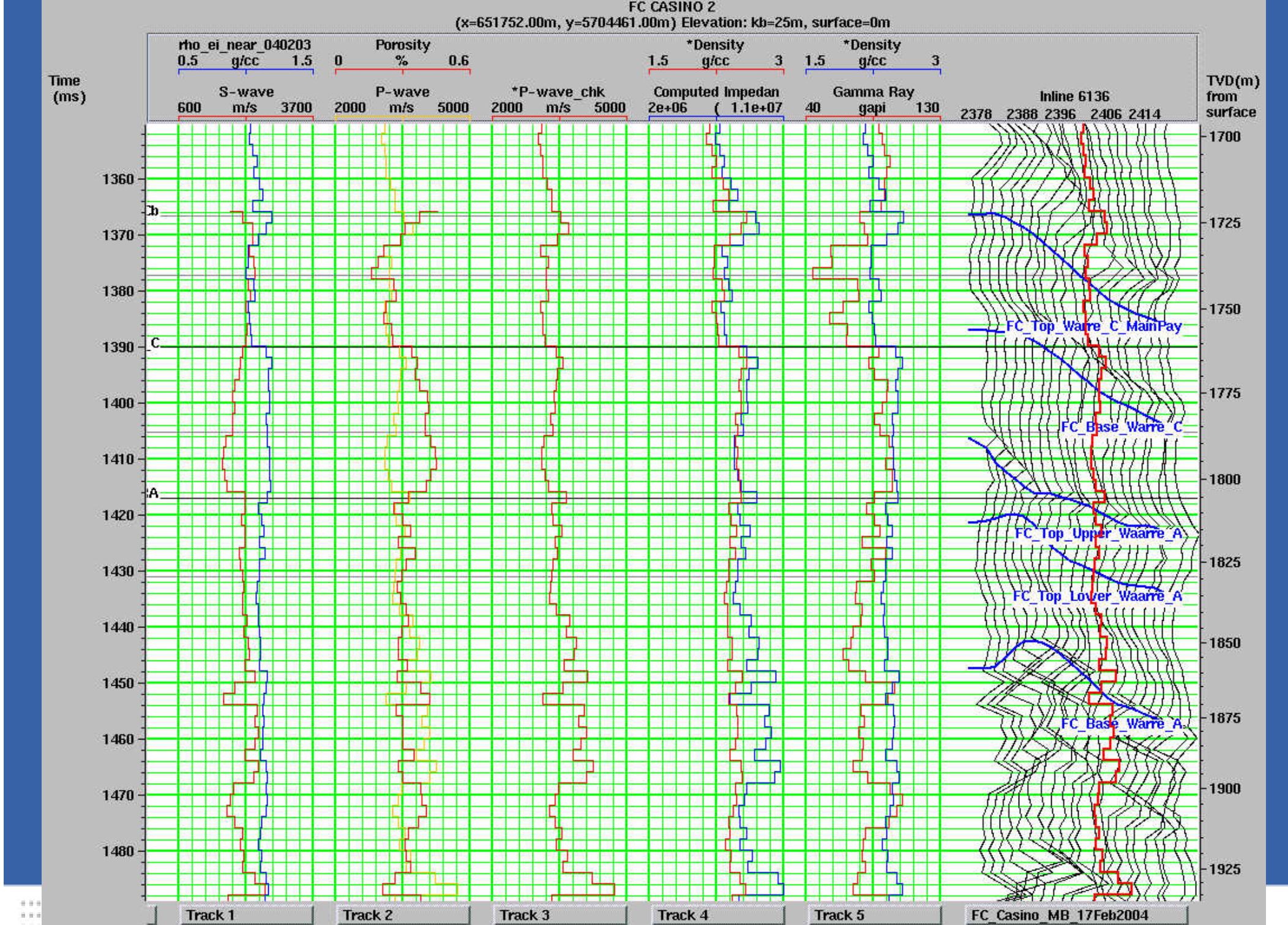


Fig. 3.4.3-I Reservoir picks on MB impedance at Casino 1 well.



### **Fig. 3.4.3-m Reservoir picks on MB inversion impedance at Casino 2 well.**

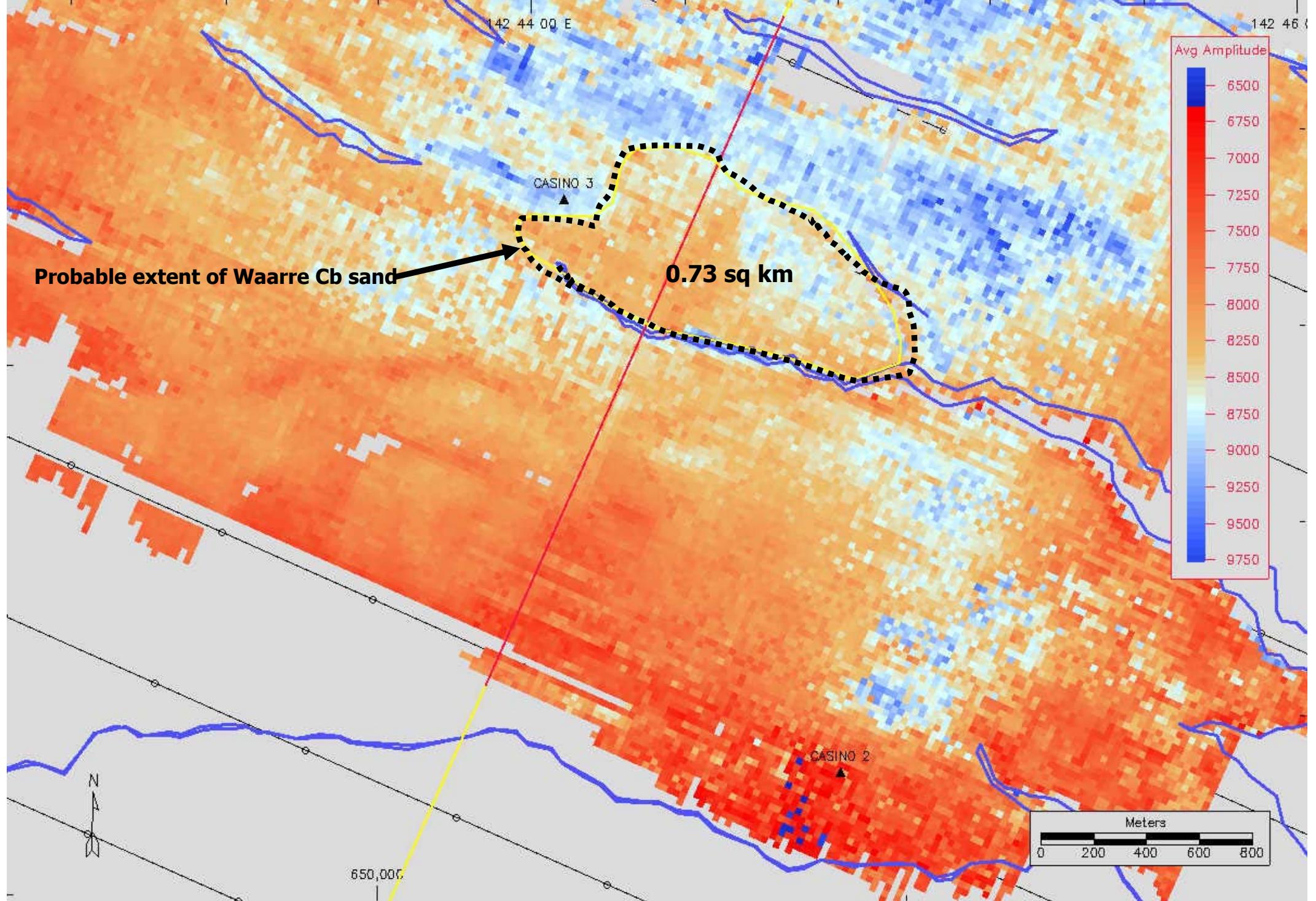


Fig. 3.4.3-n Map of average impedance extraction in Top Waarde Cb plus 4ms interval showing probable extent of Waarde Cb sand.

Santos

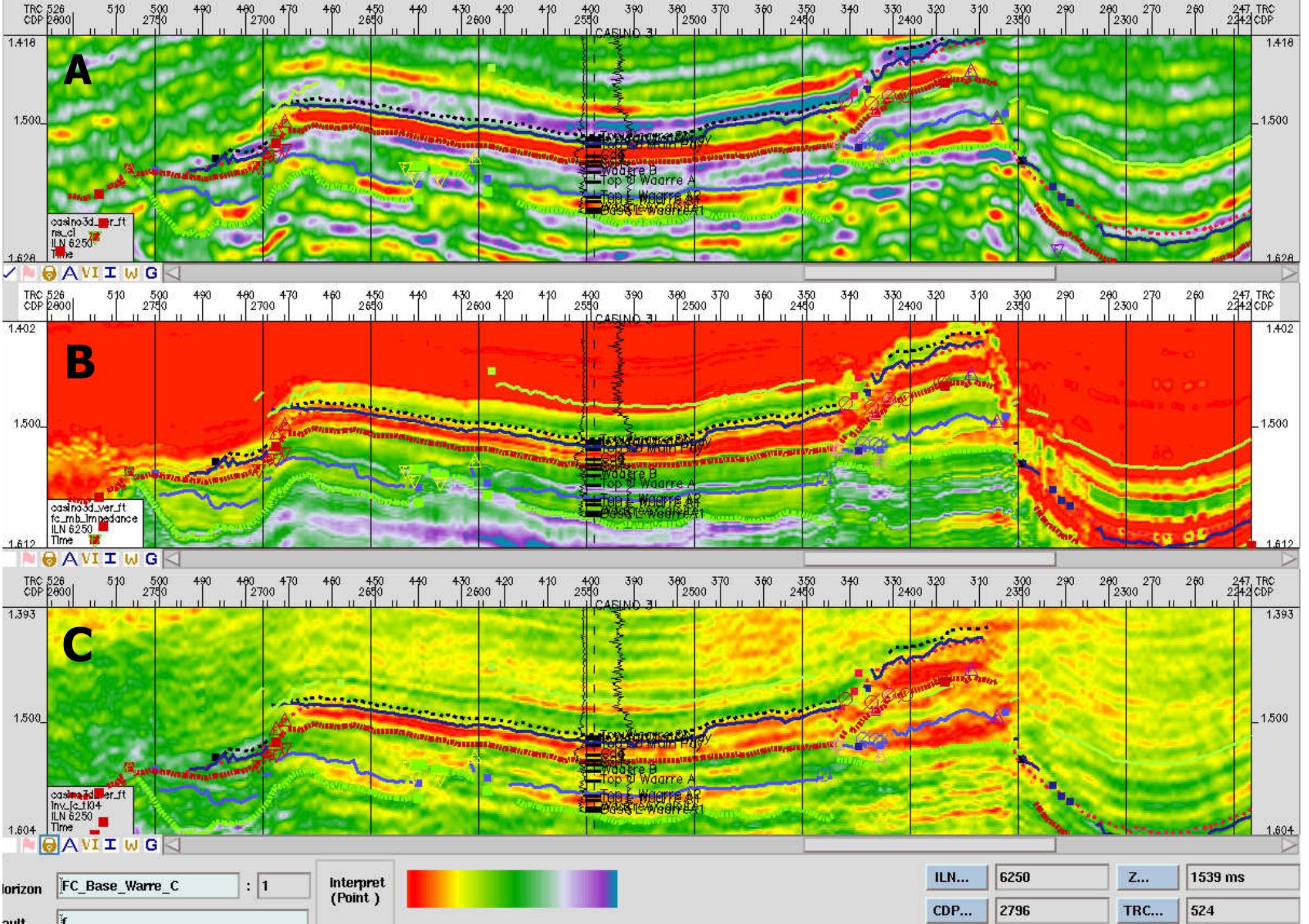


Fig. 3.4.3-o Sections through Casino-3 comparing (A) coloured impedance (B) 3-well MB impedance and (C) AOK velocity derived MB impedance.

SANTOS

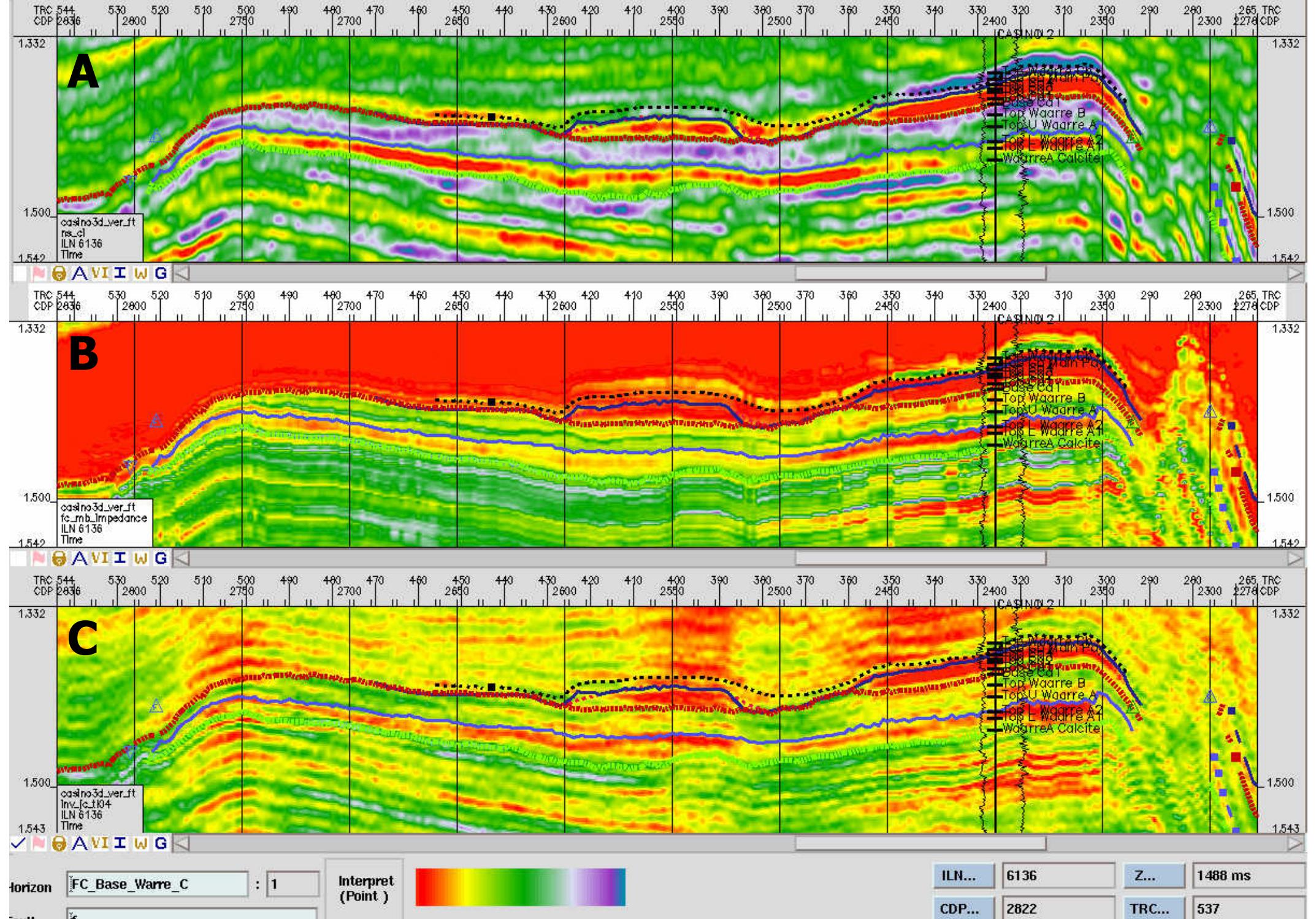


Fig. 3.4.3-p Sections through Casino-2 comparing (A) coloured impedance (B) 3-well MB impedance and (C) AOK velocity derived MB impedance.

SANTOS

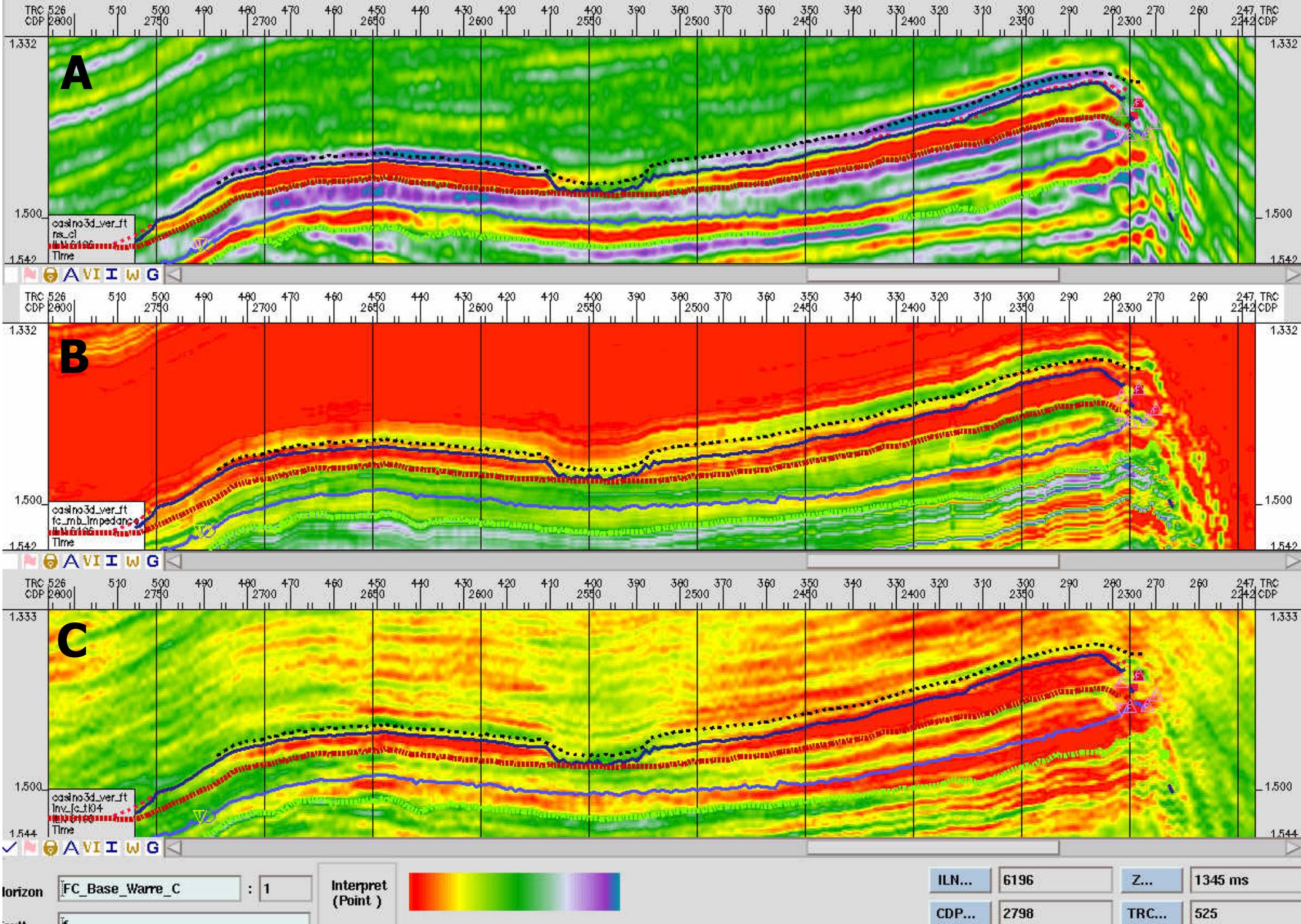
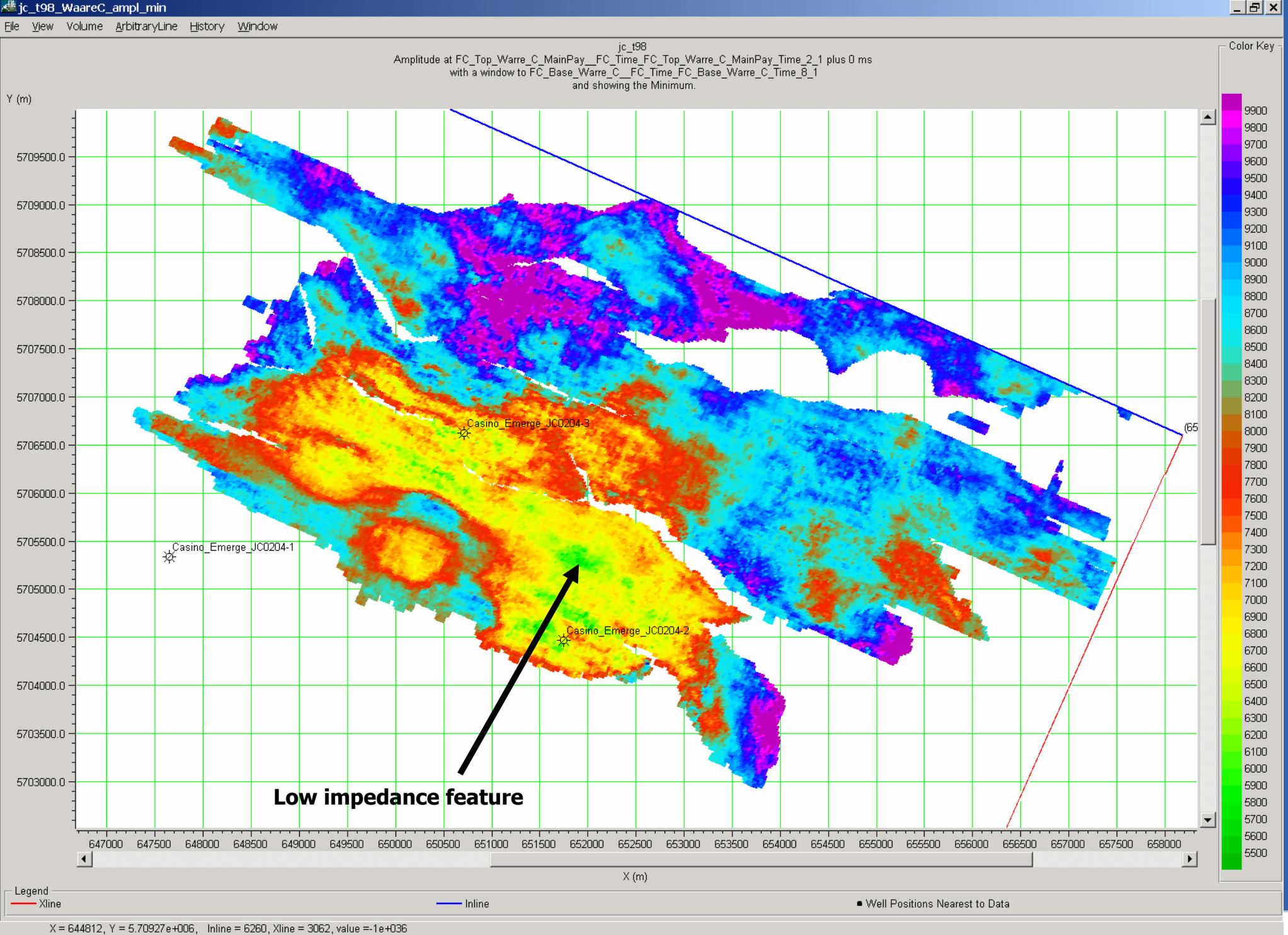


Fig. 3.4.3-q Sections along IL6196 comparing (A) coloured impedance (B) 3-well MB impedance and (C) AOK velocity derived MB impedance.

SANTOS



**Fig. 3.4.3-r Average AOK velocity derived impedance between Top Lower Waarre C and Base Waarre C showing low impedance feature similar to that seen in the coloured impedance volume.**

Santos