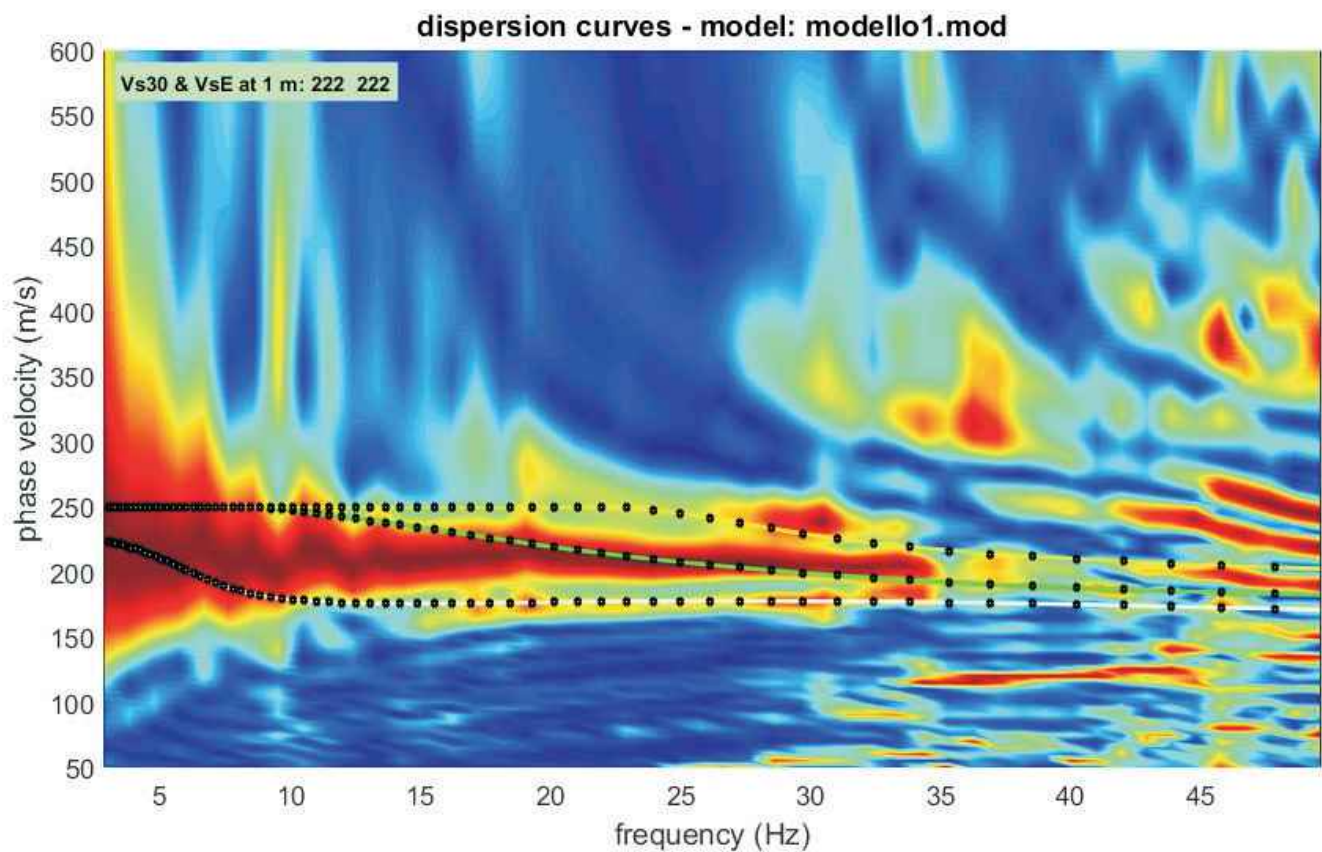
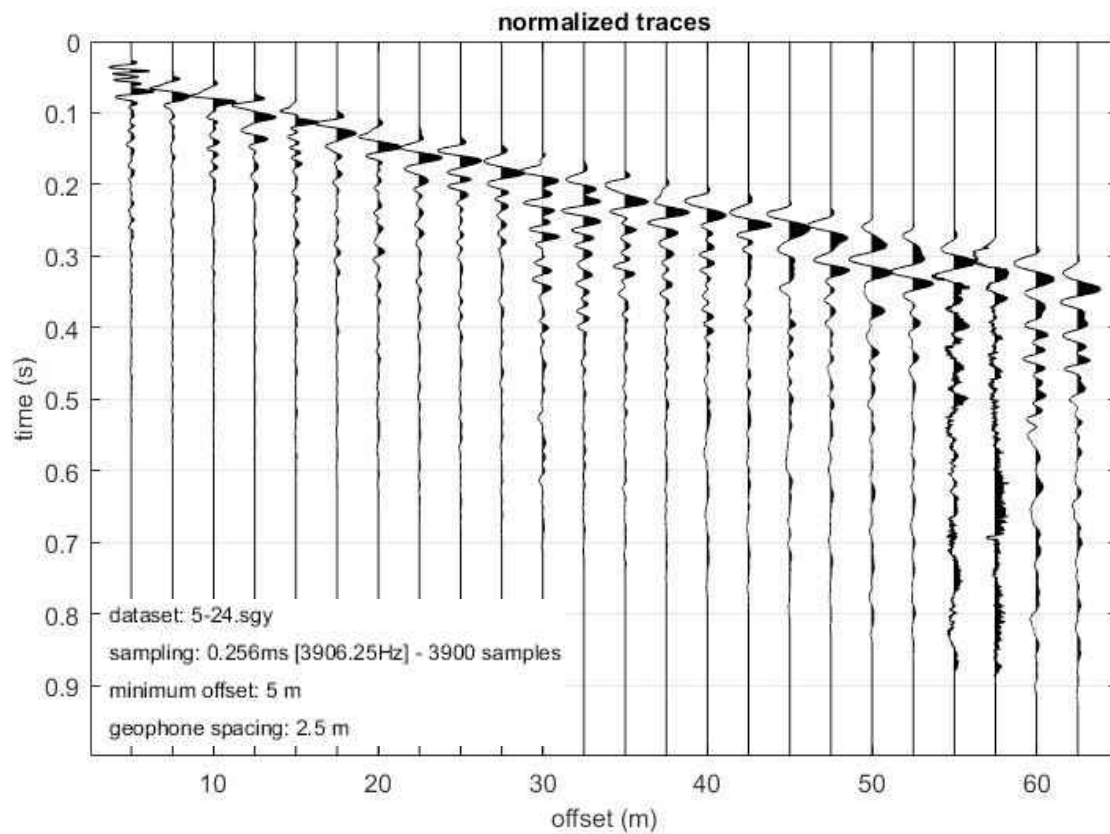




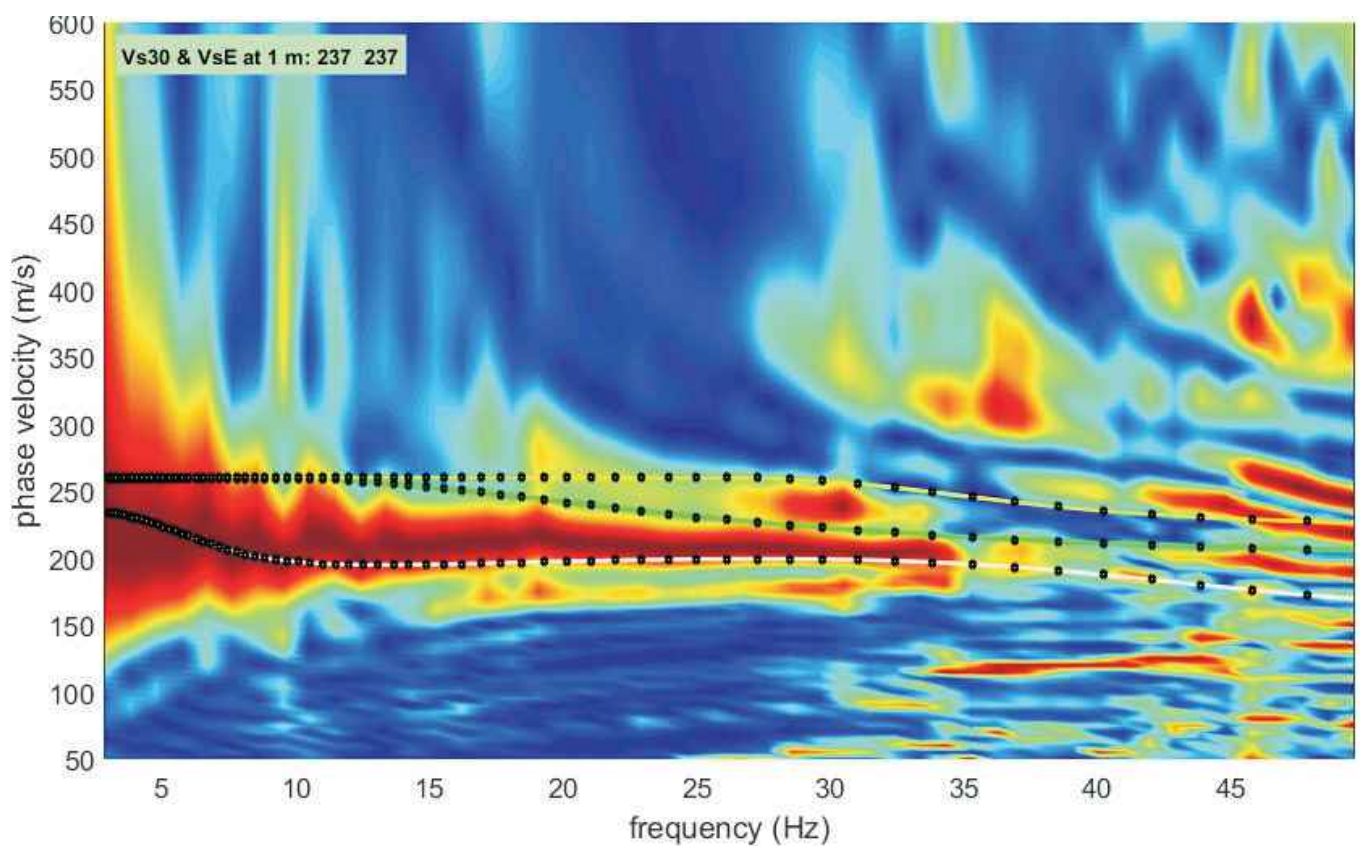
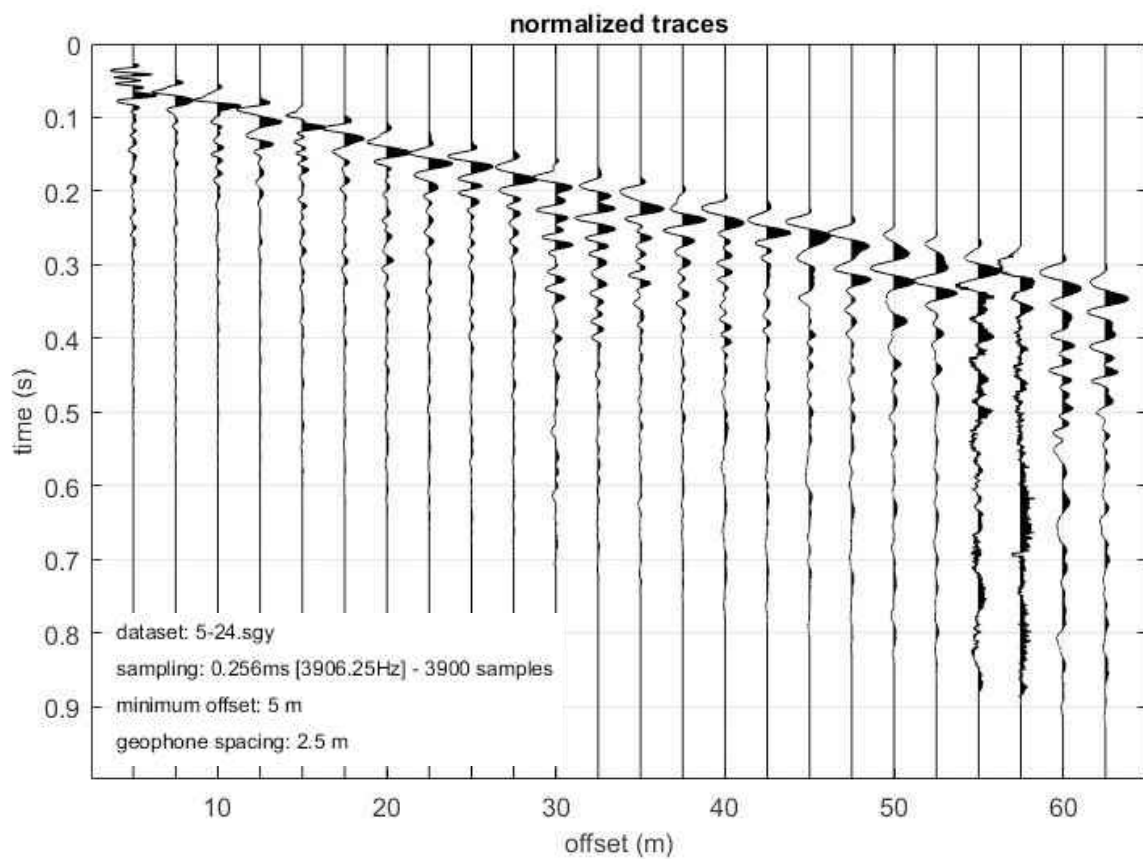
UBICAZIONE LINEA GEOSISMICA MASW SCALA 1:1000





Vs	Poisson	thickness
170	0.4	1.5
200	0.4	3.5
170	0.4	4
210	0.35	4.5
250	0.35	0

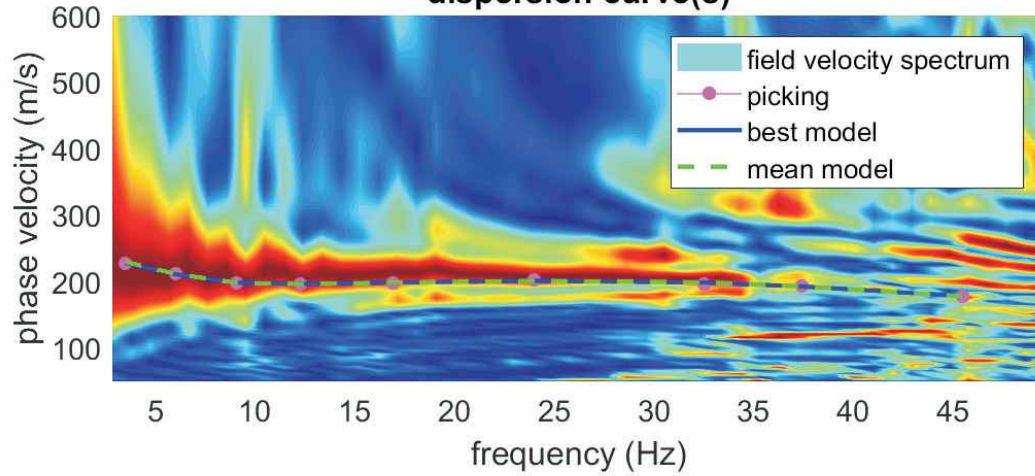
elaborazione da modello diretto
acquisizione offset minimo = 5,0 m



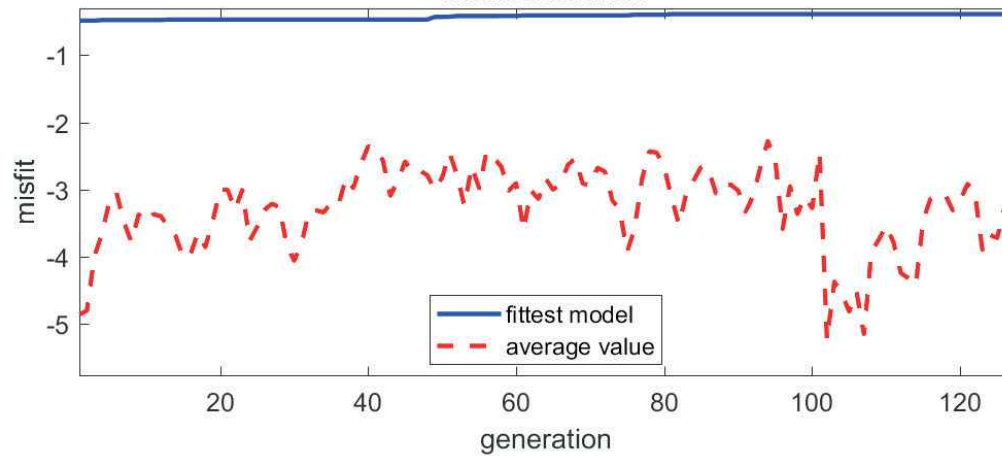
Vs	Poisson	thickness
155	0.4	1.5
240	0.4	3.5
190	0.4	4
220	0.35	4.5
260	0.35	0

elaborazione da modello diretto (2)
acquisizione offset minimo = 5,0 m

dispersion curve(s)



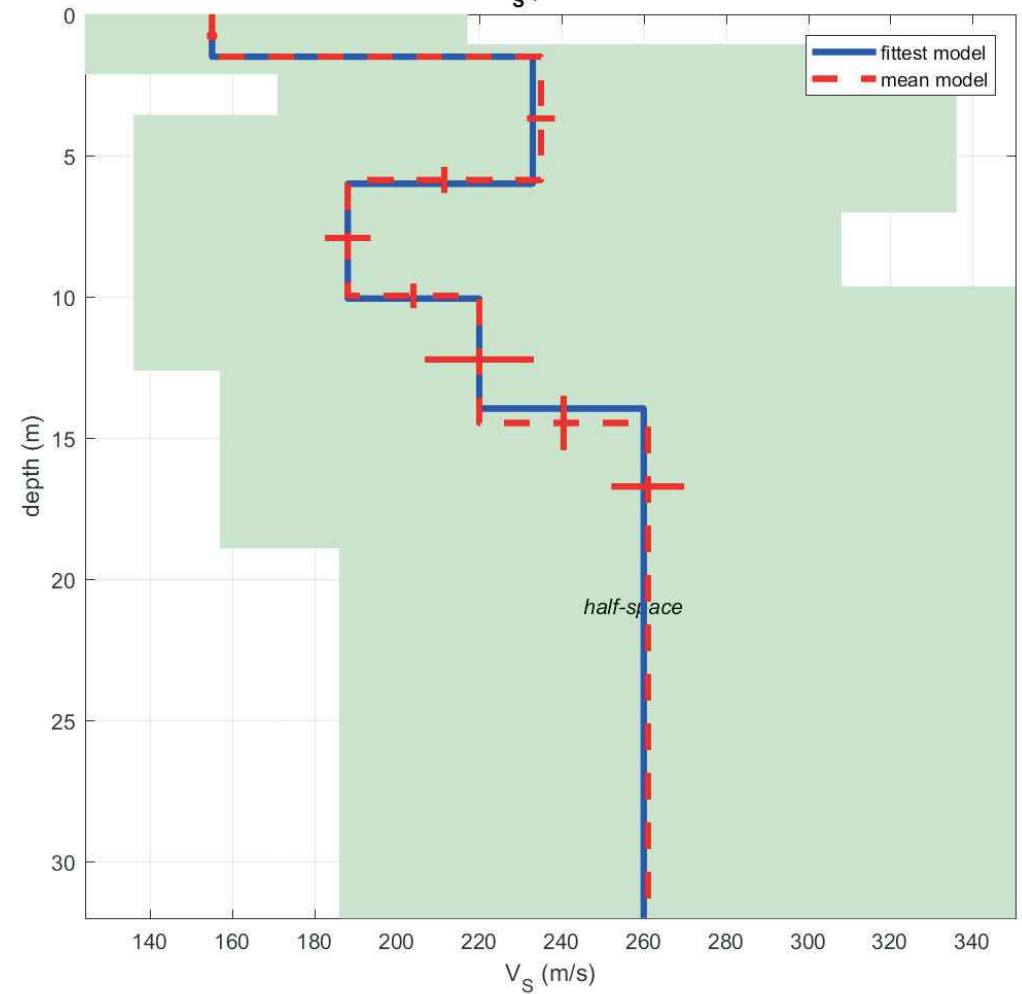
misfit evolution



best model

layer	Vs (m/s)	thickness (m)	depth (m)
1	155	1.5000	1.5000
2	233	4.4973	5.9973
3	188	4.0662	10.0634
4	220	3.8943	13.9578
5	260	0	0

V_s profile



dataset: 5-24.sgy

dispersion curve: 75-24-pick.cdp

Vs30 & VsE (best model): 231 231 m/s

Vs30 & VsE (mean model): 231 231 m/s

elaborazione per "picking" e inversione
acquisizione offset minimo = 5,0 m - modello di partenza = modello2

report elaborazione per inversione

===== SECTION#1

dataset: 5-24.sgy sampling (ms): 0.256
minimum offset (m): 5 geophone spacing (m): 2.5
offsets (m): 5 7.5 10 12.5 15 17.5 20
22.5 25 27.5 30 32.5 35 37.5 40
42.5 45 47.5 50 52.5 55 57.5 60
62.5

Dispersion curve: 75-24-pick.cdp

Number of individuals: 50

Number of generations: 101

Rayleigh-wave dispersion analysis

Analyzing phase velocities

Adopted search space (minimum Vs): 111 171 136 157 186
Adopted search space (maximum Vs): 217 336 266 308 364
Adopted search space (minimum Poisson): 0.19979 0.20002 0.1999 0.17501 0.17492
Adopted search space (maximum Poisson): 0.499 0.499 0.499 0.499 0.499
Adopted search space (minimum Qs): 7.5 12 14.25 18 21
Adopted search space (maximum Qs): 15 24 28.5 36 42
Adopted search space (minimum reference frequency): 1
Adopted search space (maximum reference frequency): 45.4722
Adopted search space (minimum thickness): 1.0714 2.5 2.8571 3.2143
Adopted search space (maximum thickness): 2.1 4.9 5.6 6.3

===== SECTION#2

Rayleigh-wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -4.856 -0.48664
Optimizing Vs & Thickness - generation: 2; average & best misfits: -4.7973 -0.48664
Optimizing Vs & Thickness - generation: 3; average & best misfits: -3.9996 -0.48664
Optimizing Vs & Thickness - generation: 4; average & best misfits: -3.6603 -0.47812
Optimizing Vs & Thickness - generation: 5; average & best misfits: -3.1961 -0.47812
Optimizing Vs & Thickness - generation: 6; average & best misfits: -3.0402 -0.47769
Optimizing Vs & Thickness - generation: 7; average & best misfits: -3.4818 -0.47769
Optimizing Vs & Thickness - generation: 8; average & best misfits: -3.775 -0.47769
Optimizing Vs & Thickness - generation: 9; average & best misfits: -3.3686 -0.47769
Optimizing Vs & Thickness - generation: 10; average & best misfits: -3.4786 -0.47769
Optimizing Vs & Thickness - generation: 11; average & best misfits: -3.3654 -0.47769
Optimizing Vs & Thickness - generation: 12; average & best misfits: -3.3947 -0.47769
Optimizing Vs & Thickness - generation: 13; average & best misfits: -3.5622 -0.47092
Optimizing Vs & Thickness - generation: 14; average & best misfits: -3.6891 -0.47092
Optimizing Vs & Thickness - generation: 15; average & best misfits: -4.0105 -0.47092
Optimizing Vs & Thickness - generation: 16; average & best misfits: -3.9558 -0.47092
Optimizing Vs & Thickness - generation: 17; average & best misfits: -3.6458 -0.47092
Optimizing Vs & Thickness - generation: 18; average & best misfits: -3.8526 -0.47092
Optimizing Vs & Thickness - generation: 19; average & best misfits: -3.465 -0.47092
Optimizing Vs & Thickness - generation: 20; average & best misfits: -3.0045 -0.47092
Optimizing Vs & Thickness - generation: 21; average & best misfits: -2.9977 -0.47092
Optimizing Vs & Thickness - generation: 22; average & best misfits: -3.2964 -0.47092
Optimizing Vs & Thickness - generation: 23; average & best misfits: -3.0061 -0.47092
Optimizing Vs & Thickness - generation: 24; average & best misfits: -3.7585 -0.47092
Optimizing Vs & Thickness - generation: 25; average & best misfits: -3.5565 -0.47092
Optimizing Vs & Thickness - generation: 26; average & best misfits: -3.3006 -0.47092
Optimizing Vs & Thickness - generation: 27; average & best misfits: -3.2085 -0.47092
Optimizing Vs & Thickness - generation: 28; average & best misfits: -3.2595 -0.47092
Optimizing Vs & Thickness - generation: 29; average & best misfits: -3.8142 -0.47092
Optimizing Vs & Thickness - generation: 30; average & best misfits: -4.0568 -0.47092
Optimizing Vs & Thickness - generation: 31; average & best misfits: -3.8029 -0.47092
Optimizing Vs & Thickness - generation: 32; average & best misfits: -3.3256 -0.47092
Optimizing Vs & Thickness - generation: 33; average & best misfits: -3.3076 -0.47076
Optimizing Vs & Thickness - generation: 34; average & best misfits: -3.3387 -0.47076
Optimizing Vs & Thickness - generation: 35; average & best misfits: -3.1865 -0.47076
Optimizing Vs & Thickness - generation: 36; average & best misfits: -3.2202 -0.47076
Optimizing Vs & Thickness - generation: 37; average & best misfits: -2.8257 -0.47076
Optimizing Vs & Thickness - generation: 38; average & best misfits: -2.976 -0.47076
Optimizing Vs & Thickness - generation: 39; average & best misfits: -2.6329 -0.47076
Optimizing Vs & Thickness - generation: 40; average & best misfits: -2.3548 -0.47076
Optimizing Vs & Thickness - generation: 41; average & best misfits: -2.3959 -0.47076
Optimizing Vs & Thickness - generation: 42; average & best misfits: -2.5639 -0.47076
Optimizing Vs & Thickness - generation: 43; average & best misfits: -3.0895 -0.47076
Optimizing Vs & Thickness - generation: 44; average & best misfits: -2.8634 -0.47076
Optimizing Vs & Thickness - generation: 45; average & best misfits: -2.5808 -0.47076
Optimizing Vs & Thickness - generation: 46; average & best misfits: -2.7393 -0.47076
Optimizing Vs & Thickness - generation: 47; average & best misfits: -2.7165 -0.47076
Optimizing Vs & Thickness - generation: 48; average & best misfits: -2.7854 -0.47076
Optimizing Vs & Thickness - generation: 49; average & best misfits: -3 -0.431
Optimizing Vs & Thickness - generation: 50; average & best misfits: -2.8199 -0.431
Optimizing Vs & Thickness - generation: 51; average & best misfits: -2.4568 -0.42846
Optimizing Vs & Thickness - generation: 52; average & best misfits: -2.7735 -0.41732
Optimizing Vs & Thickness - generation: 53; average & best misfits: -3.236 -0.41732
Optimizing Vs & Thickness - generation: 54; average & best misfits: -2.6528 -0.41732
Optimizing Vs & Thickness - generation: 55; average & best misfits: -2.9769 -0.41732
Optimizing Vs & Thickness - generation: 56; average & best misfits: -2.4338 -0.41732
Optimizing Vs & Thickness - generation: 57; average & best misfits: -2.5286 -0.41732
Optimizing Vs & Thickness - generation: 58; average & best misfits: -2.6576 -0.41662
Optimizing Vs & Thickness - generation: 59; average & best misfits: -3.0138 -0.41662
Optimizing Vs & Thickness - generation: 60; average & best misfits: -2.9039 -0.41662
Optimizing Vs & Thickness - generation: 61; average & best misfits: -3.598 -0.40912
Optimizing Vs & Thickness - generation: 62; average & best misfits: -3.0109 -0.40912
Optimizing Vs & Thickness - generation: 63; average & best misfits: -3.138 -0.40912
Optimizing Vs & Thickness - generation: 64; average & best misfits: -2.8381 -0.40912
Optimizing Vs & Thickness - generation: 65; average & best misfits: -2.9977 -0.40912
Optimizing Vs & Thickness - generation: 66; average & best misfits: -2.9171 -0.40912
Optimizing Vs & Thickness - generation: 67; average & best misfits: -2.6294 -0.40912
Optimizing Vs & Thickness - generation: 68; average & best misfits: -2.5372 -0.40912
Optimizing Vs & Thickness - generation: 69; average & best misfits: -2.9093 -0.40912
Optimizing Vs & Thickness - generation: 70; average & best misfits: -2.9329 -0.40912
Optimizing Vs & Thickness - generation: 71; average & best misfits: -2.6741 -0.40912

```

Optimizing Vs & Thickness - generation: 72; average & best misfits: -2.731 -0.40912
Optimizing Vs & Thickness - generation: 73; average & best misfits: -3.1563 -0.40912
Optimizing Vs & Thickness - generation: 74; average & best misfits: -3.3066 -0.40912
Optimizing Vs & Thickness - generation: 75; average & best misfits: -3.921 -0.40912
Optimizing Vs & Thickness - generation: 76; average & best misfits: -3.5817 -0.39846
Optimizing Vs & Thickness - generation: 77; average & best misfits: -2.8436 -0.39846
Optimizing Vs & Thickness - generation: 78; average & best misfits: -2.4284 -0.39846
Optimizing Vs & Thickness - generation: 79; average & best misfits: -2.4506 -0.39846
Optimizing Vs & Thickness - generation: 80; average & best misfits: -2.6609 -0.39846
Optimizing Vs & Thickness - generation: 81; average & best misfits: -3.117 -0.38979
Optimizing Vs & Thickness - generation: 82; average & best misfits: -3.5167 -0.38979
Optimizing Vs & Thickness - generation: 83; average & best misfits: -3.0481 -0.38979
Optimizing Vs & Thickness - generation: 84; average & best misfits: -2.8628 -0.38979
Optimizing Vs & Thickness - generation: 85; average & best misfits: -2.6567 -0.38979
Optimizing Vs & Thickness - generation: 86; average & best misfits: -2.7017 -0.38979
Optimizing Vs & Thickness - generation: 87; average & best misfits: -3.0571 -0.38979
Optimizing Vs & Thickness - generation: 88; average & best misfits: -2.9294 -0.38979
Optimizing Vs & Thickness - generation: 89; average & best misfits: -2.9254 -0.38979
Optimizing Vs & Thickness - generation: 90; average & best misfits: -3.0124 -0.38979
Optimizing Vs & Thickness - generation: 91; average & best misfits: -3.3278 -0.38979
Optimizing Vs & Thickness - generation: 92; average & best misfits: -3.0988 -0.38979
Optimizing Vs & Thickness - generation: 93; average & best misfits: -2.6661 -0.38979
Optimizing Vs & Thickness - generation: 94; average & best misfits: -2.2773 -0.38979
Optimizing Vs & Thickness - generation: 95; average & best misfits: -2.5417 -0.38979
Optimizing Vs & Thickness - generation: 96; average & best misfits: -3.586 -0.38979
Optimizing Vs & Thickness - generation: 97; average & best misfits: -2.9497 -0.38979
Optimizing Vs & Thickness - generation: 98; average & best misfits: -3.363 -0.38979
Optimizing Vs & Thickness - generation: 99; average & best misfits: -3.1042 -0.38979
Optimizing Vs & Thickness - generation: 100; average & best misfits: -3.2743 -0.38979
Optimizing Vs & Thickness - generation: 101; average & best misfits: -2.452 -0.38979

```

```

Adopted search space (minimum Vs): 111 171 136 157 186
Adopted search space (maximum Vs): 217 336 266 308 364
Adopted search space (minimum Qs): 7.5 12 14.25 18 21
Adopted search space (maximum Qs): 15 24 28.5 36 42
Adopted search space (minimum reference frequency): 1
Adopted search space (maximum reference frequency): 45.4722
Adopted search space (minimum Poisson): 0.19979 0.20002 0.1999 0.17501 0.17492
Adopted search space (maximum Poisson): 0.497 0.497 0.497 0.497 0.497
Adopted search space (minimum thickness): 1.0714 2.5 2.8571 3.2143
Adopted search space (maximum thickness): 2.1 4.9 5.6 6.3

```

Now a finer search around the most promising search space area

Rayleigh-wave analysis

```

Optimizing Vs & Thickness - generation: 1; average & best misfits: -5.2316 -0.38979
Optimizing Vs & Thickness - generation: 2; average & best misfits: -4.3673 -0.38979
Optimizing Vs & Thickness - generation: 3; average & best misfits: -4.5454 -0.38979
Optimizing Vs & Thickness - generation: 4; average & best misfits: -4.8107 -0.38979
Optimizing Vs & Thickness - generation: 5; average & best misfits: -4.5168 -0.38979
Optimizing Vs & Thickness - generation: 6; average & best misfits: -5.1477 -0.38979
Optimizing Vs & Thickness - generation: 7; average & best misfits: -3.928 -0.38979
Optimizing Vs & Thickness - generation: 8; average & best misfits: -3.7424 -0.38979
Optimizing Vs & Thickness - generation: 9; average & best misfits: -3.5347 -0.38979
Optimizing Vs & Thickness - generation: 10; average & best misfits: -3.7852 -0.38979
Optimizing Vs & Thickness - generation: 11; average & best misfits: -4.2429 -0.38979
Optimizing Vs & Thickness - generation: 12; average & best misfits: -4.3153 -0.38979
Optimizing Vs & Thickness - generation: 13; average & best misfits: -4.4192 -0.38979
Optimizing Vs & Thickness - generation: 14; average & best misfits: -3.4527 -0.38979
Optimizing Vs & Thickness - generation: 15; average & best misfits: -3.1342 -0.38979
Optimizing Vs & Thickness - generation: 16; average & best misfits: -3.1186 -0.38909
Optimizing Vs & Thickness - generation: 17; average & best misfits: -3.0774 -0.38909
Optimizing Vs & Thickness - generation: 18; average & best misfits: -3.3096 -0.38909
Optimizing Vs & Thickness - generation: 19; average & best misfits: -3.1553 -0.38909
Optimizing Vs & Thickness - generation: 20; average & best misfits: -2.9136 -0.38909
Optimizing Vs & Thickness - generation: 21; average & best misfits: -3.0632 -0.38909
Optimizing Vs & Thickness - generation: 22; average & best misfits: -3.8913 -0.38909
Optimizing Vs & Thickness - generation: 23; average & best misfits: -3.6728 -0.38909
Optimizing Vs & Thickness - generation: 24; average & best misfits: -3.7175 -0.38909
Optimizing Vs & Thickness - generation: 25; average & best misfits: -3.2603 -0.38909
Optimizing Vs & Thickness - generation: 26; average & best misfits: -3.5279 -0.38909

```

```

Model after the Vs & Thickness optimization (fixed Poisson values):
Vs (m/s):      155    233    188    220    260
Thickness (m): 1.5    4.5    4.1    3.9

```

Number of models considered to calculate the average model: 127

```

#####
RESULTS
#####

```

Dataset: 5-24.sgy Analyzed curve/spectrum: 75-24-pick.cdp

===== SECTION#3

Analyzing Phase Velocities

Analyzing Rayleigh-Wave Dispersion

```

=====
MEAN MODEL

```

```

Vs (m/s):      155    235    188    220    261
Standard deviations (m/s): 1    3    6    13    9
Thickness (m): 1.5    4.4    4.1    4.5
Standard deviations (m): 0.0    0.5    0.4    1.0

```

Approximate values for Vp, density, Poisson & Shear modulus

Vp (m/s):	477	549	390	404	467				
Density (gr/cm3):		1.87	1.91	1.83	1.83	1.87			
Vp/Vs ratio:	3.08	2.34	2.07	1.84	1.79				
Poisson:	0.44	0.39	0.35	0.29	0.27				
Shear modulus (MPa):	45		105	65	89	127			
Estimated static shear modulus (MPa):	0			0		0	0	0	0

Fundamental mode

Mean model

f (Hz)	VR(m/s)
3.49749	229.0906
6.03774	210.6849
9.06186	197.5312
12.2674	195.5982
16.9246	197.6631
24.001	200.3799
32.529	198.1204
37.4281	192.1523
45.4722	177.2226

===== SECTION#4

BEST MODEL

Vs (m/s):	155	233	188	220	260
thickness (m):	1.5	4.4973	4.0662	3.8943	

Approximate values for Vp, density, Poisson & Shear modulus

Vp (m/s):	599	571	340	399	443
Density (gr/cm3):	1.93	1.92	1.79	1.83	1.86
Vp/Vs ratio:	3.86	2.45	1.81	1.81	1.70
Poisson:	0.46	0.40	0.28	0.28	0.24
Shear modulus (MPa):	46	104	63	89	126
Estimated static shear modulus (MPa):	0	0	0	0	0

dispersion curve (frequency - velocity)

Fundamental mode)

best model

F (Hz)	VR(m/s)
3.49749	227.5557
6.03774	210.1085
9.06186	197.6786
12.2674	195.8705
16.9246	197.8558
24.001	200.3388
32.529	197.8186
37.4281	191.8925
45.4722	177.4699

===== SECTION#5

Maximum penetration depth according to the "Steady State Rayleigh Method": 32 m
Inversion quality: very good

Vs30 & VsE (mean model): 231 231 m/s
Vs30 & VsE (best model): 231 231 m/s

=====

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www.winmasw.com