



Provincia Regionale di Agrigento

Lavori per il collegamento tra la SS 189 – SS118 – SS115 a servizio dei comuni della montagna, strada Mare – Monti, tratto SS115 – SS118. Progetto definitivo

Esecuzione di Indagini geologiche e geotecniche in sito.

QUADERNO INDAGINI Allegato 2: Indagini sismiche

Rev0 del 26 agosto 2013



Autorizzazione Ministero delle Infrastrutture e dei Trasporti
n. 6527 del 11/07/2011 per l'esecuzione e certificazione di
indagini geognostiche, prelievo di campioni e prove in sito
di cui all'art. 59 del D.P.R. n. 380/2001

Il Direttore di Laboratorio
Geol. Antonello Reale


Geotec S.p.A.



GEOTEC SPA



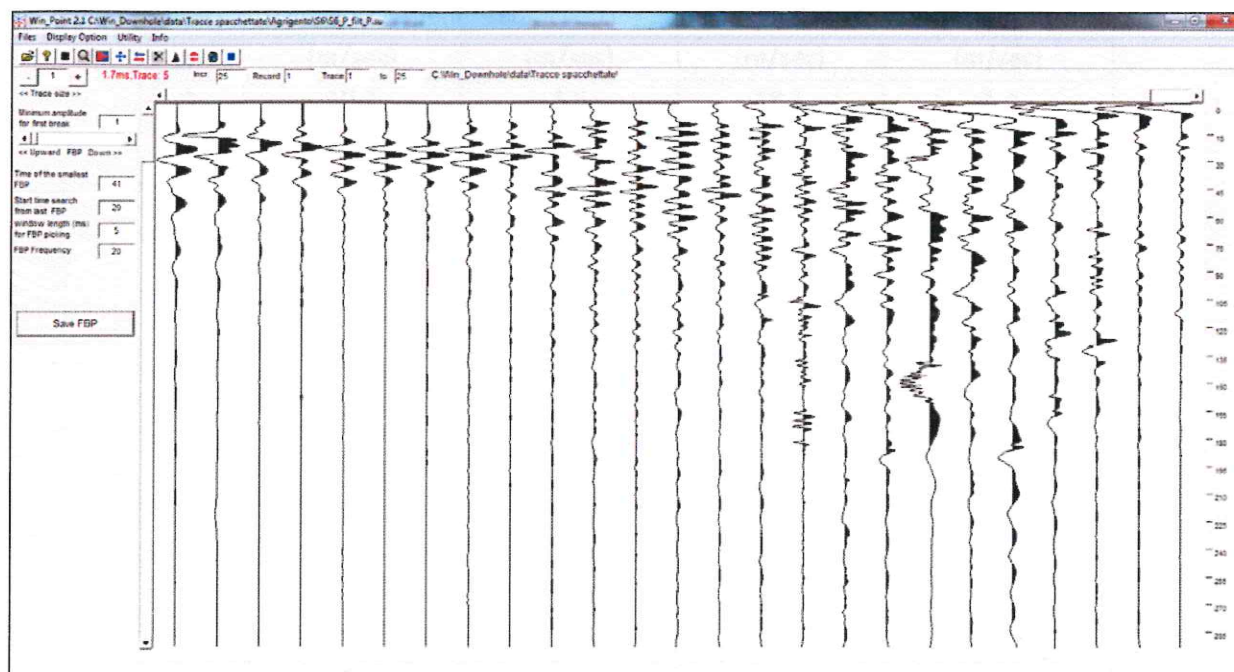
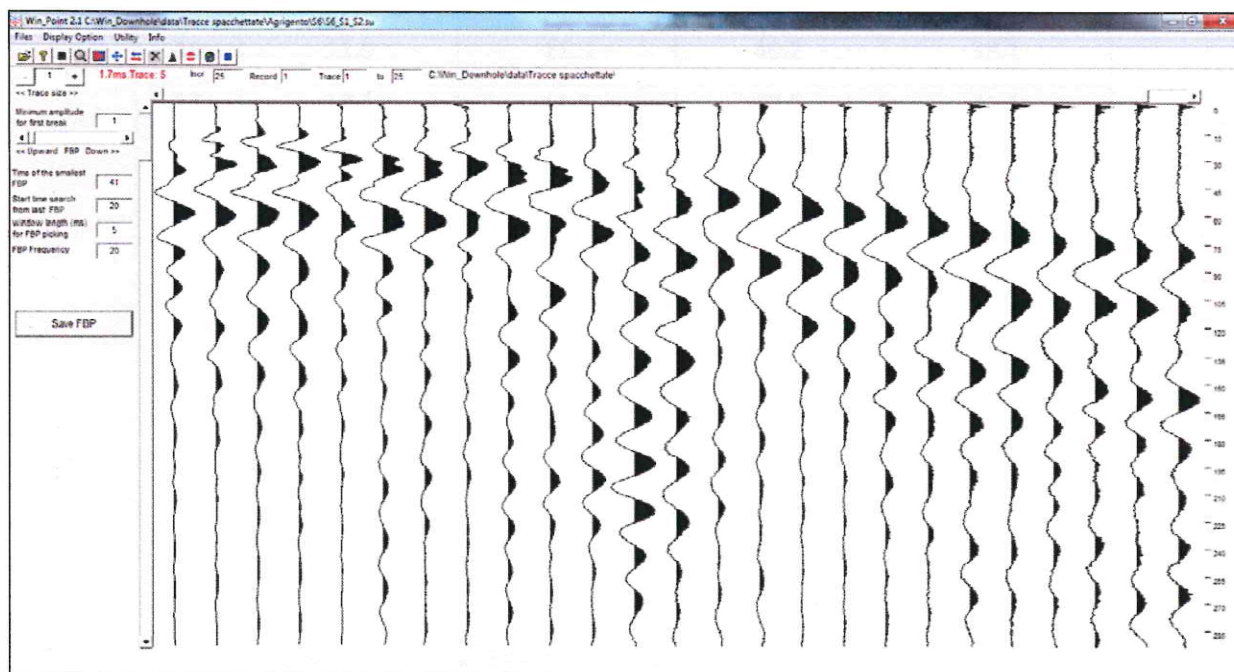
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Prova sismica in foro down hole

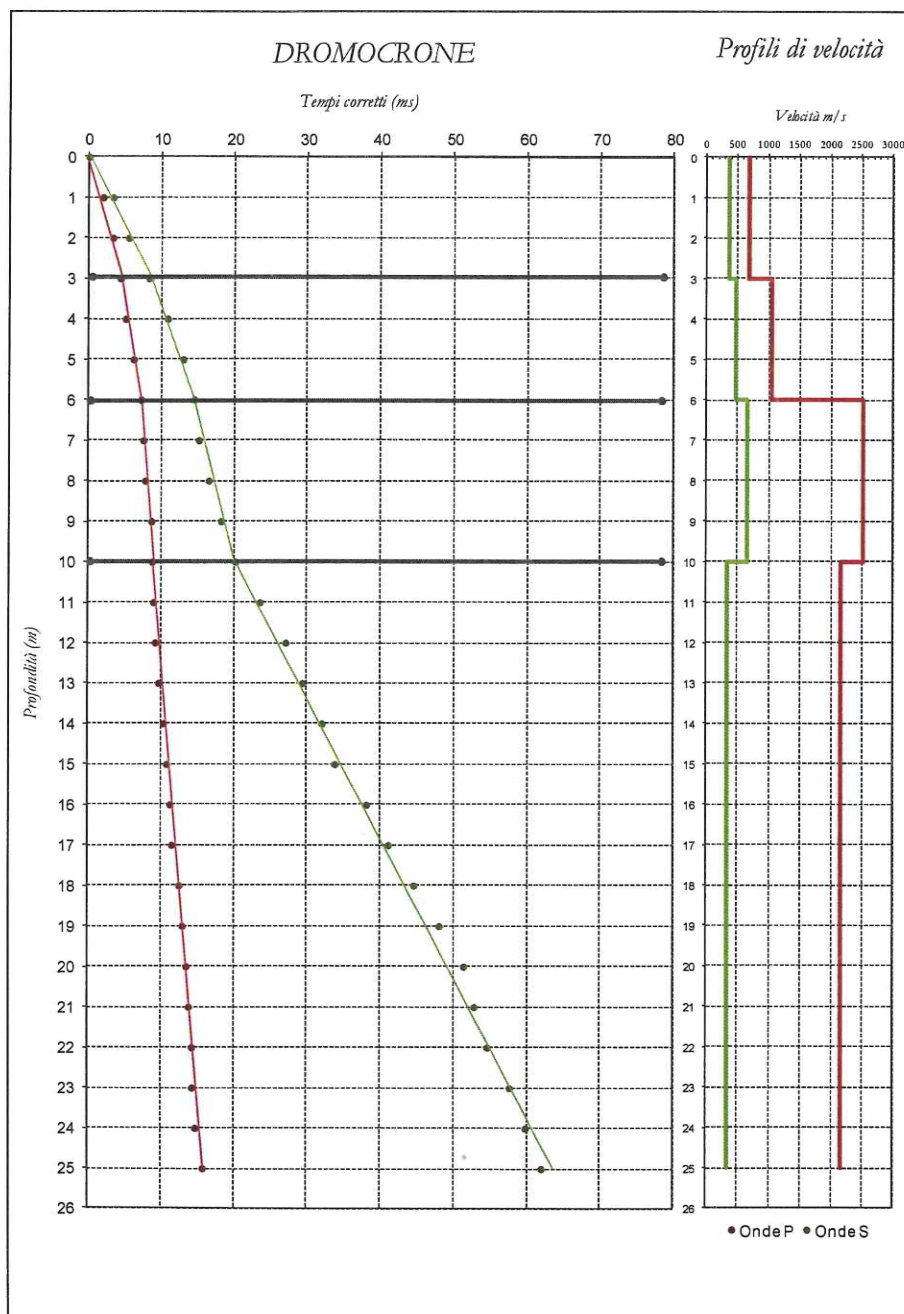
Sondaggio S6
Data esecuzione prova 2 Luglio 2013
Distanza shot – boccaforo 5.40 metri
Profondità prova 25.0 metri
Sperimentatore Geol. Francesco Palladino


Geotec s.p.a.

Traccia verticale (onde P)**Traccia orizzontale (onde S)***Tracce sismiche (Time window: 0.300 s)*

Prof.	ONDE P		ONDE SH	
	Tempi obliqui	Tempi verticali	Tempi obliqui	Tempi verticali
m	(m/sec)	(m/sec)	(m/sec)	(m/sec)
1	10.7	1.9	18.2	3.3
2	9.5	3.3	15.7	5.5
3	9.0	4.4	17.0	8.3
4	8.5	5.1	18.2	10.8
5	9.1	6.2	19.1	13.0
6	9.7	7.2	19.5	14.5
7	9.5	7.5	19.1	15.1
8	9.4	7.8	19.9	16.5
9	10.1	8.7	21.2	18.2
10	10.0	8.8	22.9	20.1
11	10.0	9.0	26.2	23.5
12	10.1	9.2	29.6	27.0
13	10.5	9.7	31.7	29.3
14	11.1	10.4	34.3	32.0
15	11.5	10.8	35.9	33.8
16	11.9	11.3	40.2	38.1
17	12.1	11.5	43.1	41.1
18	13.1	12.5	46.5	44.5
19	13.5	13.0	49.9	48.0
20	14.0	13.5	53.2	51.4
21	14.3	13.8	54.5	52.8
22	14.7	14.3	56.2	54.6
23	14.7	14.3	59.2	57.6
24	15.1	14.7	61.3	59.8
25	16.1	15.7	63.4	62.0

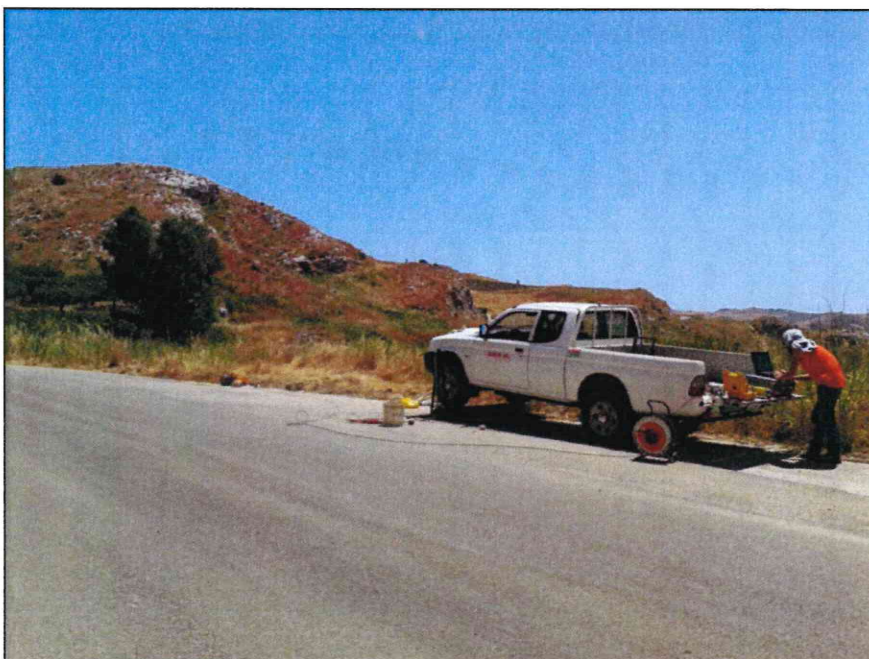
Tempi di arrivo onde P ed onde S

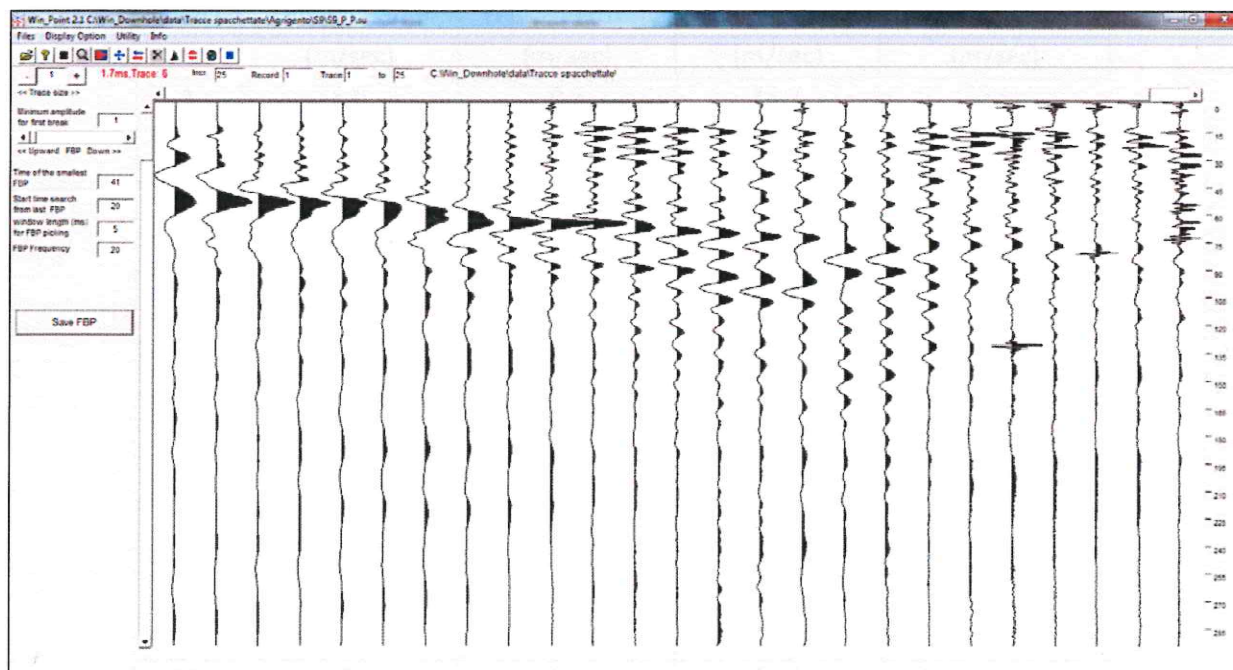
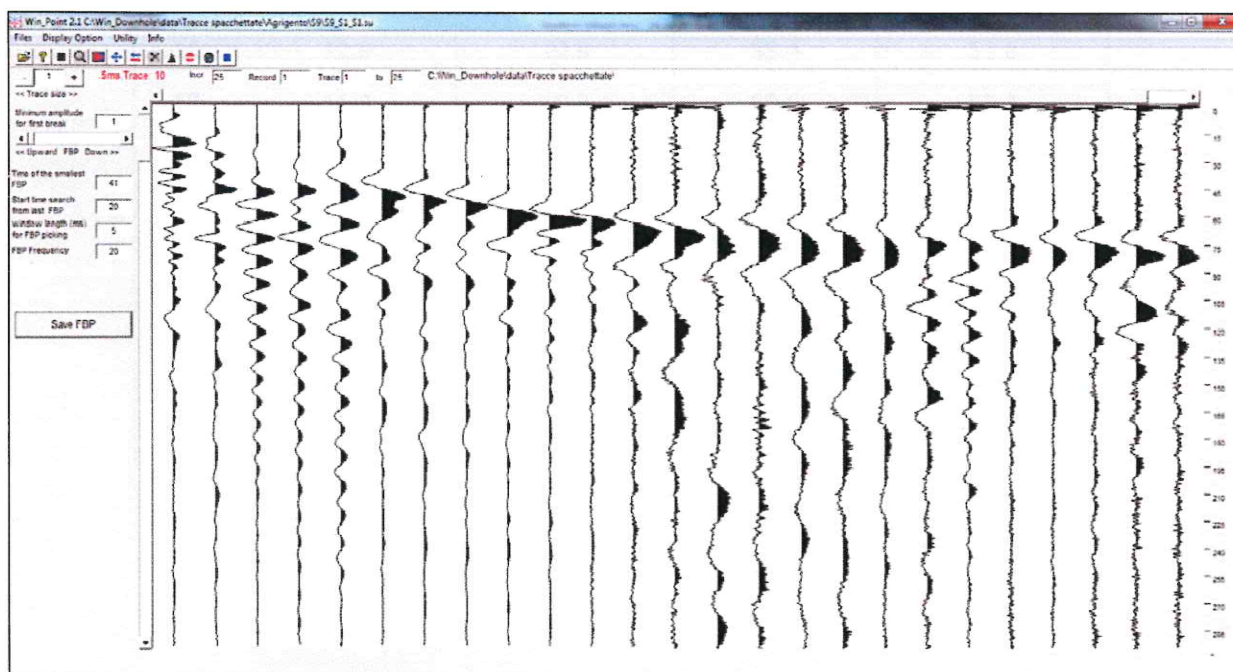


Sismostrato	Profondità (m)	Vp (m/s)	Vs (m/s)
1	0.0 – 3.0	685	360
2	3.0 – 6.0	1055	480
3	6.0 – 10.0	2515	655
4	10.0 – 25.0	2160	345

Profilo sismo stratigrafico individuato

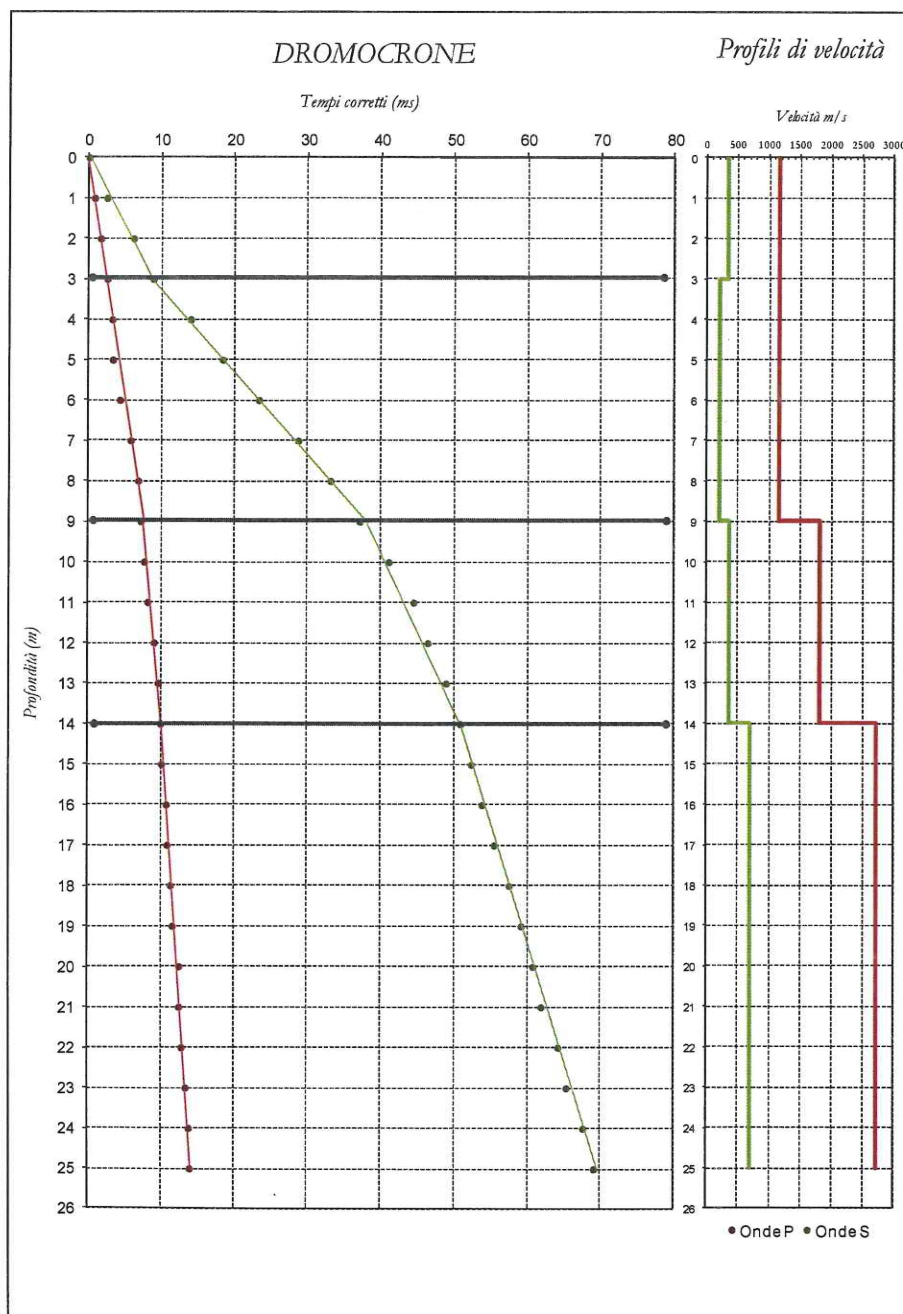
Sondaggio S9
Data esecuzione prova 2 Luglio 2013
Distanza shot – boccaforo 7.50 metri
Profondità prova 25.0 metri
Sperimentatore Geol. Francesco Palladino


Geotec s.p.a.

Traccia verticale (onde P)**Traccia orizzontale (onde S)***Tracce sismiche (Time window: 0.300 s)*

	ONDE P		ONDE SH	
Prof.	Tempi obliqui	Tempi verticali	Tempi obliqui	Tempi verticali
m	(m/sec)	(m/sec)	(m/sec)	(m/sec)
1	6.0	0.8	18.7	2.5
2	6.4	1.6	23.8	6.1
3	6.9	2.6	23.8	8.8
4	6.9	3.2	29.7	14.0
5	6.0	3.3	33.1	18.4
6	6.9	4.3	37.3	23.3
7	8.5	5.8	42.0	28.7
8	9.4	6.9	45.4	33.1
9	9.4	7.2	48.3	37.1
10	9.6	7.7	51.3	41.0
11	9.9	8.2	53.8	44.5
12	10.7	9.1	54.7	46.4
13	11.1	9.6	56.4	48.9
14	11.3	10.0	57.7	50.9
15	11.3	10.1	58.5	52.3
16	11.9	10.8	59.4	53.8
17	11.9	10.9	60.6	55.4
18	12.3	11.4	62.3	57.5
19	12.5	11.6	63.6	59.2
20	13.4	12.5	64.9	60.8
21	13.3	12.5	65.7	61.9
22	13.6	12.9	67.8	64.2
23	14.1	13.4	68.7	65.3
24	14.5	13.8	70.8	67.6
25	14.6	14.0	72.1	69.1

Tempi di arrivo onde P ed onde S

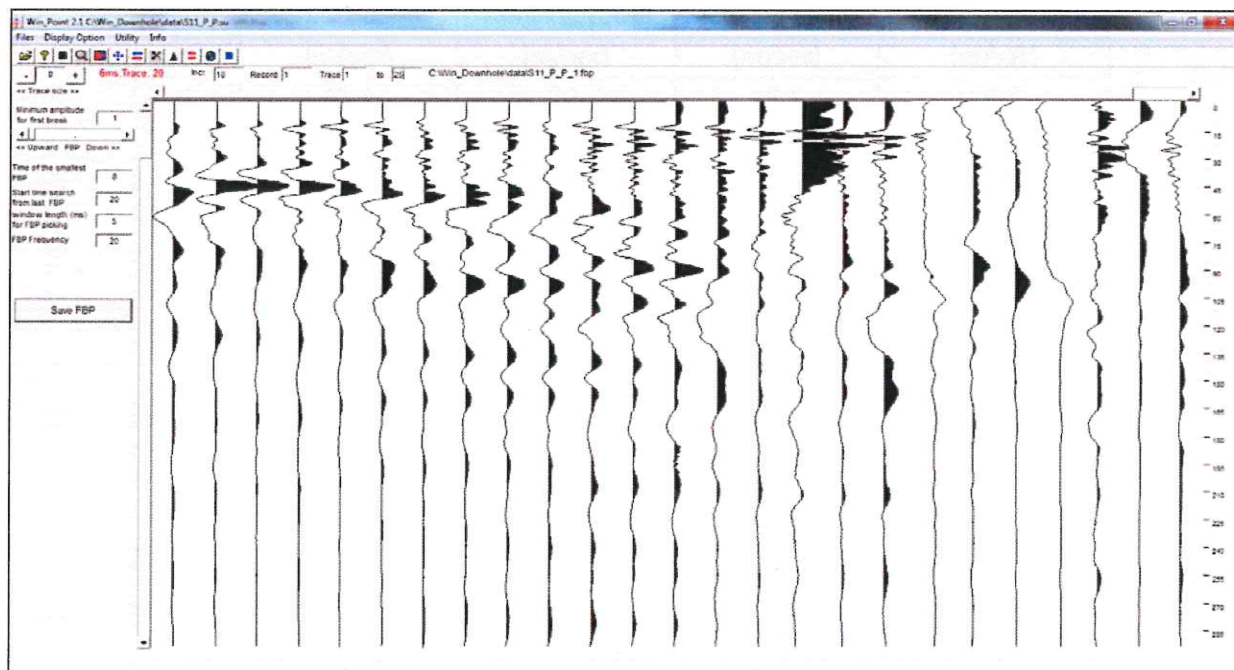
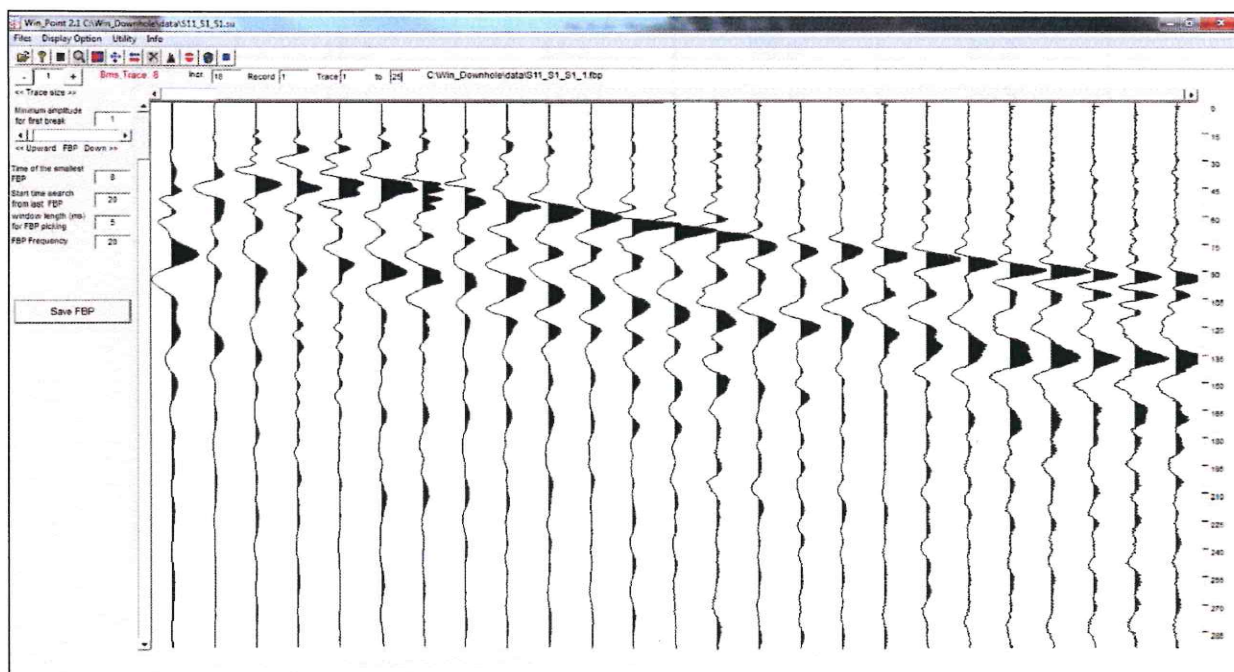


Sismostrato	Profondità (m)	Vp (m/s)	Vs (m/s)
1	0.0 – 3.0	1170	340
2	3.0 – 9.0	1170	210
3	9.0 – 14.0	1825	365
4	14.0 – 25.0	2735	700

Profilo sismo stratigrafico individuato

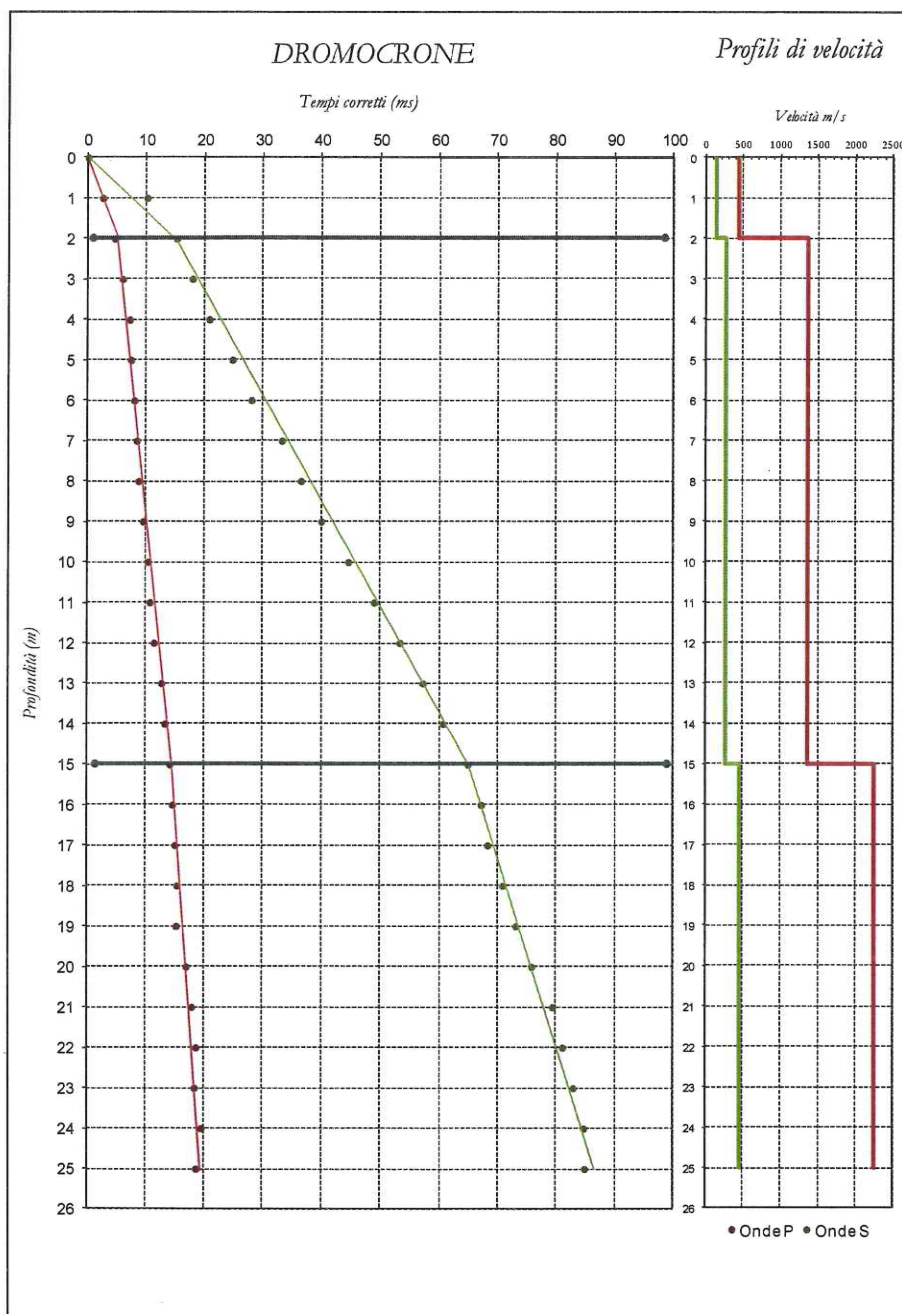
Sondaggio S11
Data esecuzione prova 2 Luglio 2013
Distanza shot – boccaforo 4.70 metri
Profondità prova 25.0 metri
Sperimentatore Geol. Francesco Palladino


Geotec s.p.a.

Traccia verticale (onde P)**Traccia orizzontale (onde S)***Tracce sismiche (Time window: 0.300 s)*

Prof. m	ONDE P		ONDE SH	
	Tempi obliqui (m/sec)	Tempi verticali (m/sec)	Tempi obliqui (m/sec)	Tempi verticali (m/sec)
1	12.3	2.6	48.4	10.1
2	11.7	4.6	38.8	15.2
3	11.0	5.9	33.2	17.9
4	11.0	7.1	32.0	20.7
5	10.1	7.4	33.9	24.7
6	10.1	8.0	35.5	27.9
7	10.1	8.4	39.9	33.1
8	10.1	8.7	42.2	36.4
9	10.7	9.5	45.0	39.9
10	11.4	10.3	49.2	44.5
11	11.6	10.7	53.2	48.9
12	12.2	11.4	57.2	53.3
13	13.5	12.7	60.8	57.2
14	14.0	13.3	64.0	60.7
15	14.8	14.1	68.0	64.9
16	15.2	14.6	70.0	67.2
17	15.6	15.0	70.8	68.2
18	15.9	15.4	73.2	70.8
19	15.7	15.2	75.3	73.1
20	17.4	16.9	77.9	75.8
21	18.3	17.9	81.3	79.3
22	19.0	18.6	82.9	81.1
23	18.7	18.3	84.6	82.9
24	19.8	19.4	86.3	84.7
25	18.9	18.6	86.3	84.8

Tempi di arrivo onde P ed onde S

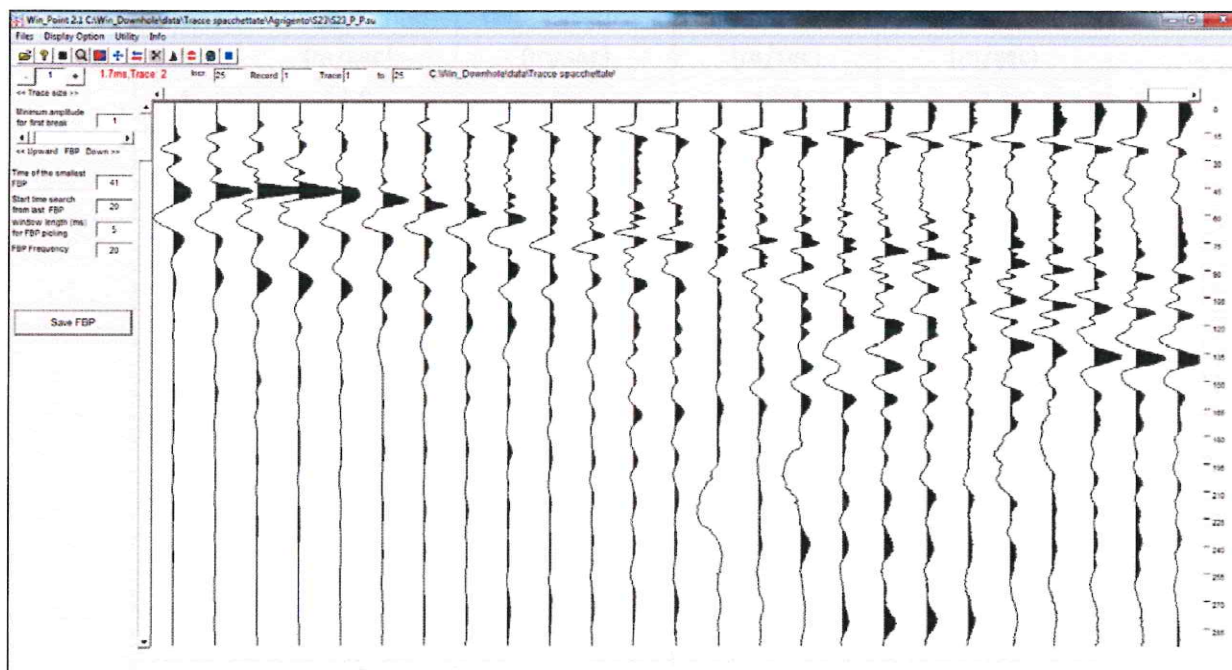
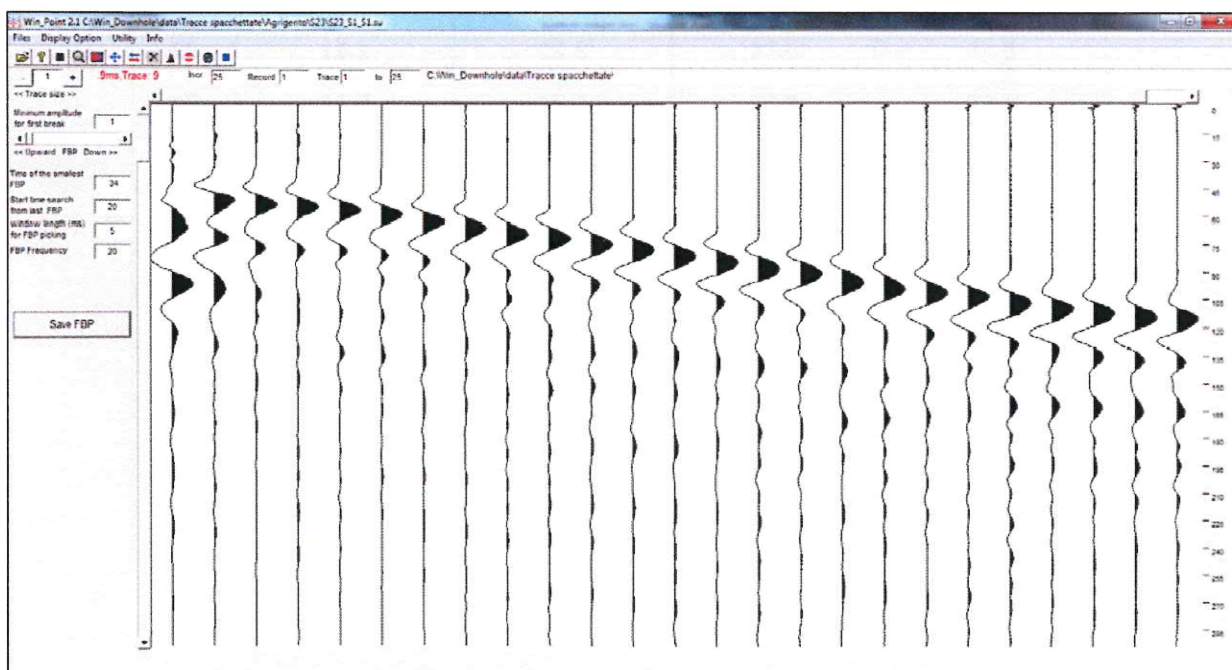


Sismostrato	Profondità (m)	Vp (m/s)	Vs (m/s)
1	0.0 – 2.0	435	130
2	2.0 – 15.0	1360	260
3	15.0 – 25.0	2245	455

Profilo sismo stratigrafico individuato

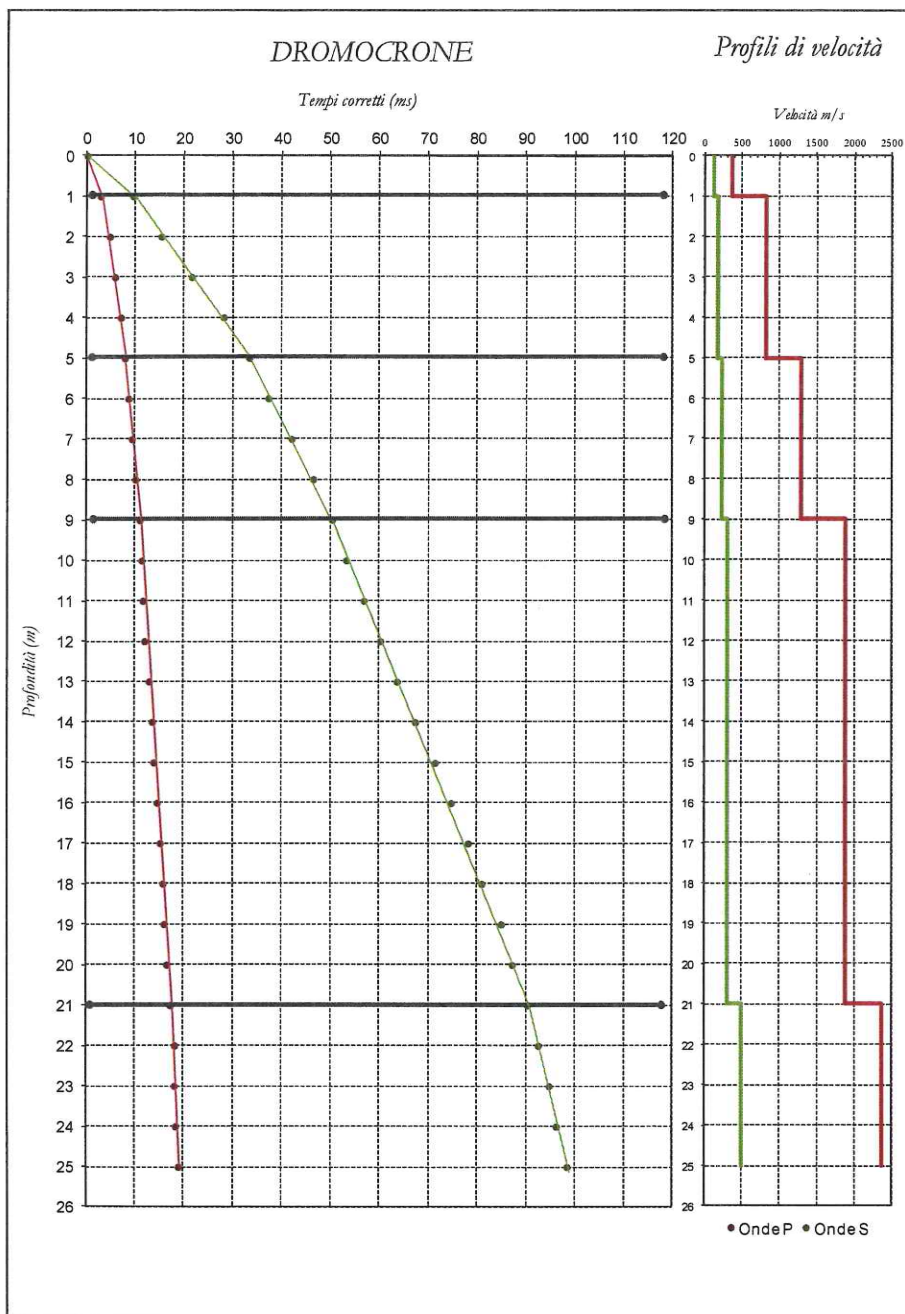
Sondaggio S23
Data esecuzione prova 2 Luglio 2013
Distanza shot – boccaforo 4.55 metri
Profondità prova 25.0 metri
Sperimentatore Geol. Francesco Palladino


Geotec s.p.a.

Traccia verticale (onde P)**Traccia orizzontale (onde S)***Tracce sismiche (Time window: 0.300 s)*

Prof. m	ONDE P		ONDE SH	
	Tempi obliqui (m/sec)	Tempi verticali (m/sec)	Tempi obliqui (m/sec)	Tempi verticali (m/sec)
1	13.0	2.8	43.7	9.4
2	11.6	4.7	37.8	15.2
3	10.4	5.7	39.0	21.5
4	10.5	6.9	42.4	28.0
5	10.5	7.8	45.0	33.3
6	10.7	8.5	46.7	37.2
7	11.0	9.2	50.0	41.9
8	11.5	10.0	53.4	46.4
9	12.2	10.9	56.4	50.3
10	12.4	11.3	58.5	53.2
11	12.5	11.6	61.5	56.8
12	12.7	11.9	64.4	60.2
13	13.6	12.8	67.4	63.6
14	14.2	13.5	70.8	67.3
15	14.4	13.8	74.6	71.4
16	15.1	14.5	77.6	74.6
17	15.7	15.2	80.9	78.1
18	16.2	15.7	83.5	81.0
19	16.4	15.9	87.3	84.9
20	16.9	16.5	89.4	87.2
21	17.6	17.2	92.4	90.3
22	18.5	18.1	94.5	92.5
23	18.4	18.1	96.6	94.8
24	18.6	18.3	97.9	96.2
25	19.2	18.9	100.0	98.4

Tempi di arrivo onde P ed onde S



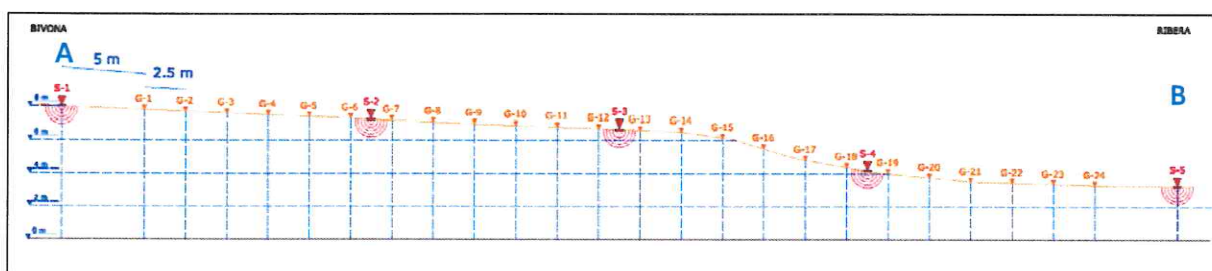
Sismostrato	Profondità (m)	Vp (m/s)	Vs (m/s)
1	0.0 – 1.0	360	105
2	1.0 – 5.0	805	165
3	5.0 – 9.0	1280	235
4	9.0 – 21.0	1870	300
5	21.0 – 25.0	2370	495

Sismica a rifrazione onde P

Profilo Ssr_1
Data esecuzione prova 3 Luglio 2013
Lunghezza stendimento 57.5 metri (+ 10 metri scoppi esterni S1 ed S5)
Distanza intergeofonica 2.5 metri
Numero energizzazioni 5
Sperimentatore Geol. Francesco Palladino

Francesco Palladino
Geotec s.p.a.



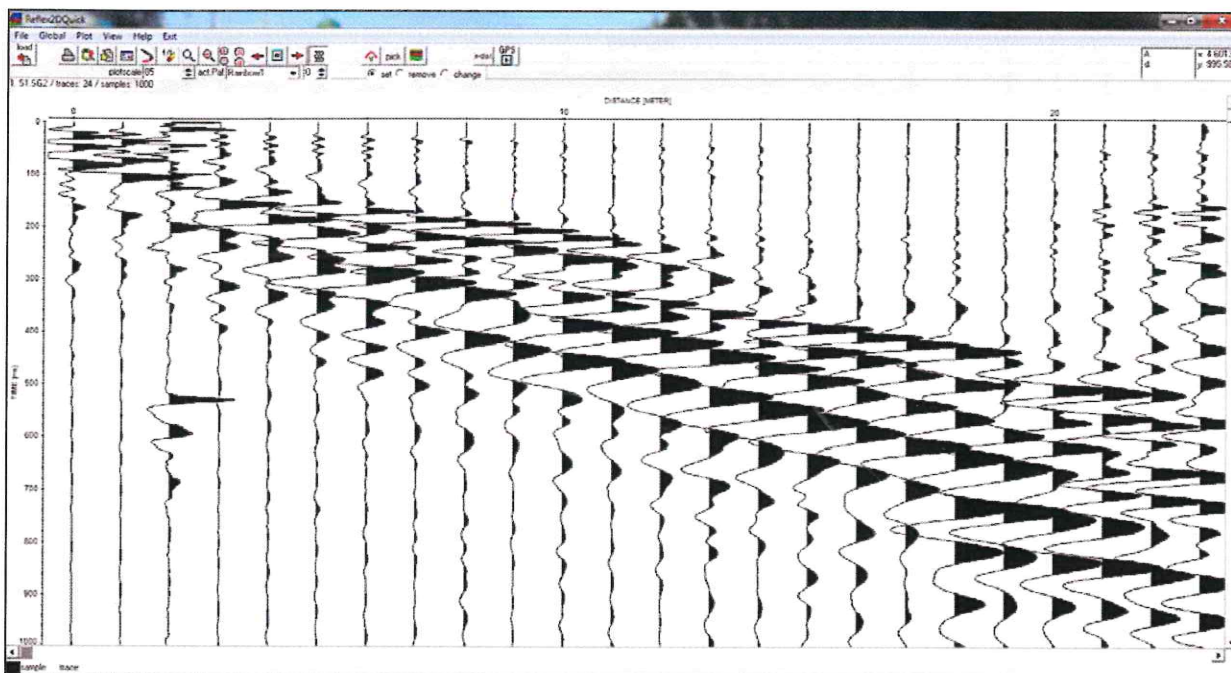


a) Ubicazione e b) Profilo altimetrico Ssr_1

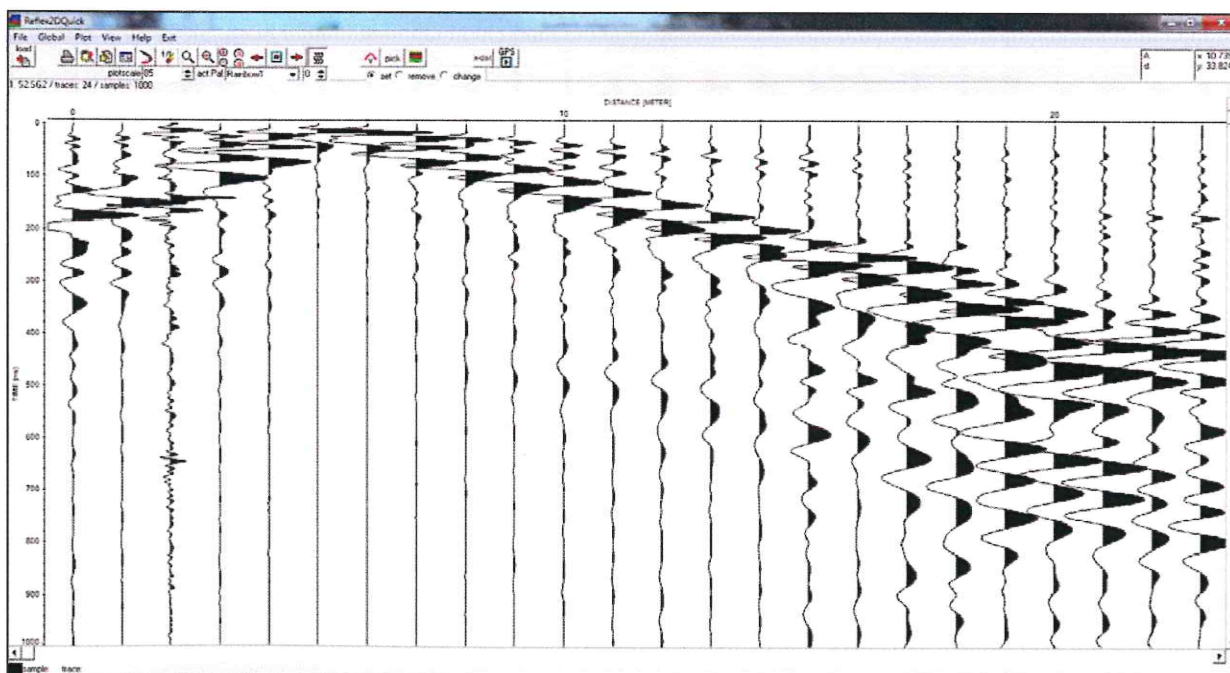
Quote relative			
Geofono	Quota relativa (m)	Geofono	Quota relativa (m)
G1	4.57	G13	3.37
G2	4.47	G14	3.28
G3	4.37	G15	2.92
G4	4.26	G16	2.28
G5	4.16	G17	1.60
G5	4.06	G18	1.17
G7	3.95	G19	0.78
G8	3.85	G20	0.54
G9	3.75	G21	0.28
G10	3.66	G22	0.20
G11	3.56	G23	0.13
G12	3.47	G24	0.06
Sorgente	Quota relativa (m)		
S1	4.78		
S2	4.06		
S3	3.42		
S4	0.95		
S5	0.00		

ELABORAZIONE – Tracce sismiche

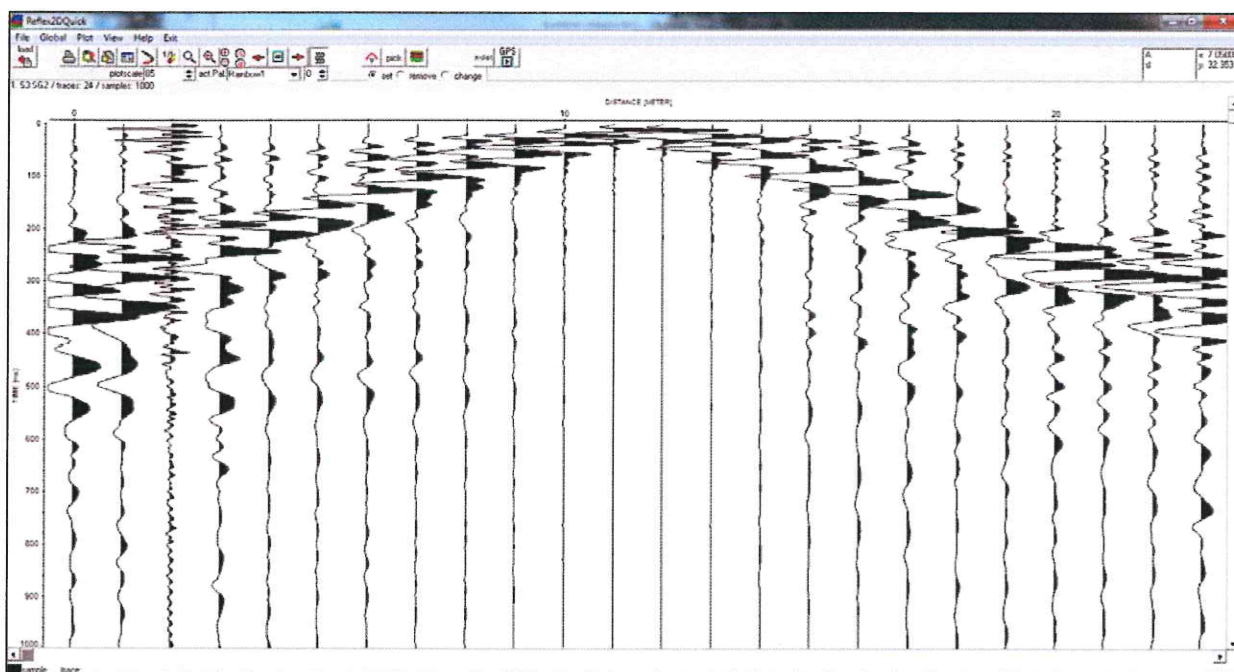
S1 (esterno a G1)



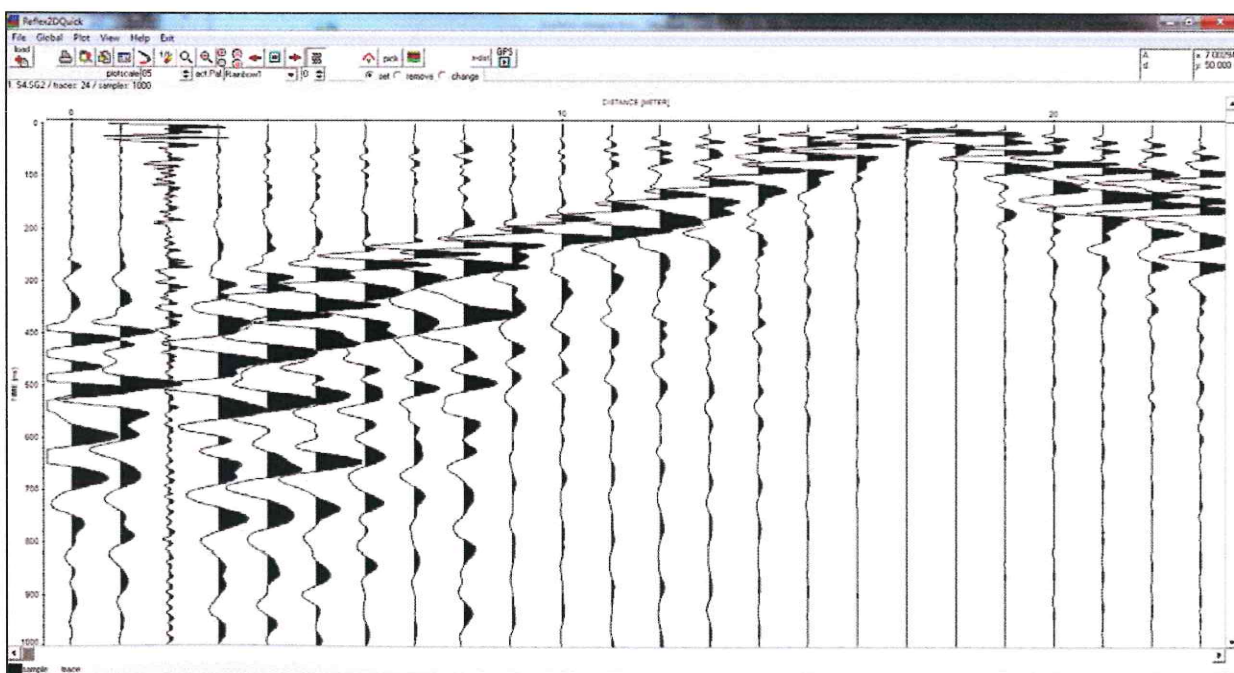
S2 (interno G6 G7)



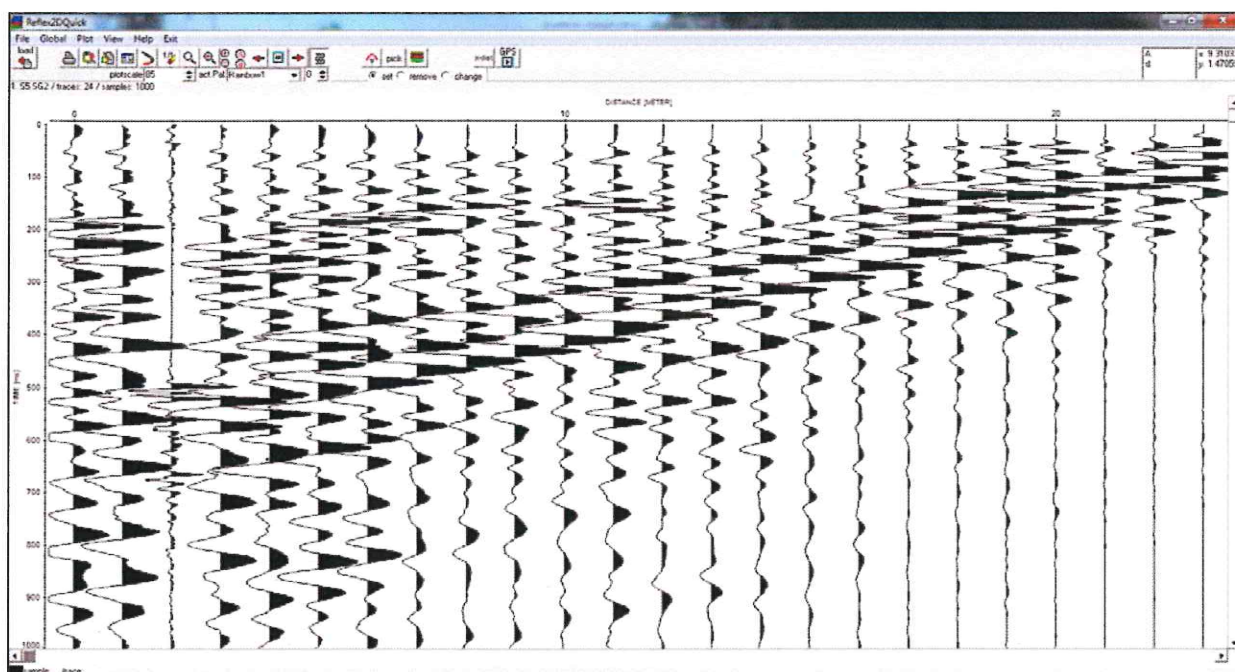
S3 (interno G12 G13)



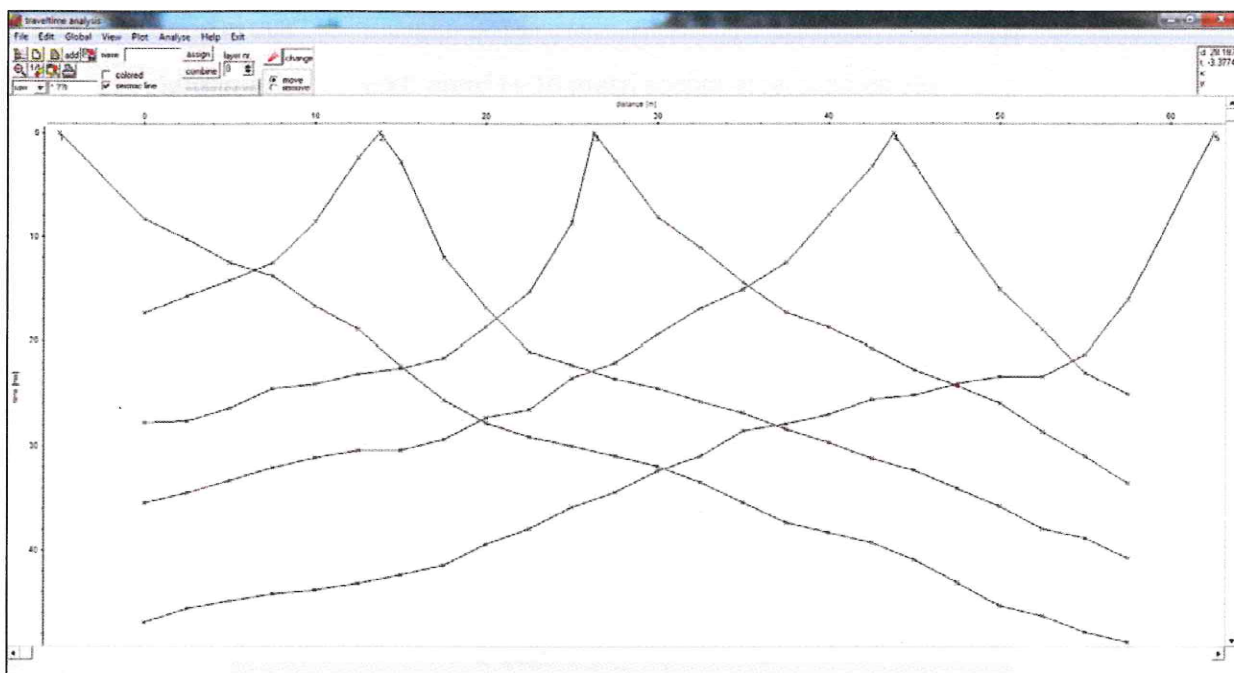
S4 (interno G18 G19)



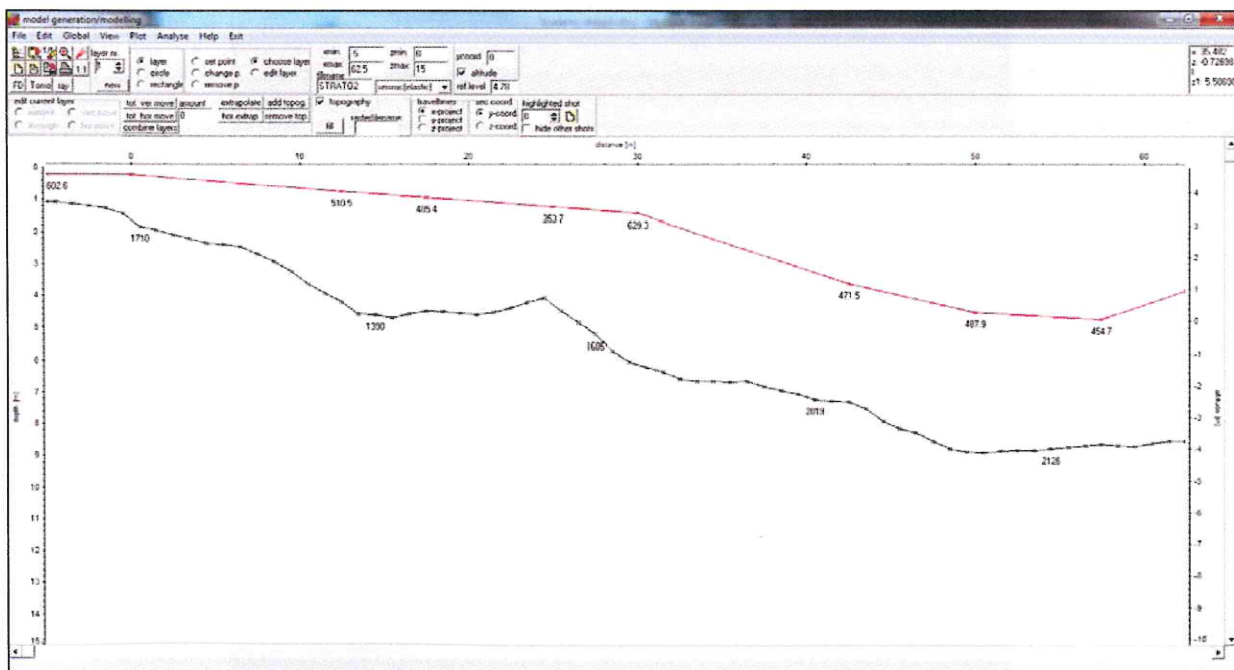
S5 (esterno G24)



Dromocrone



Profilo sismostratigrafico

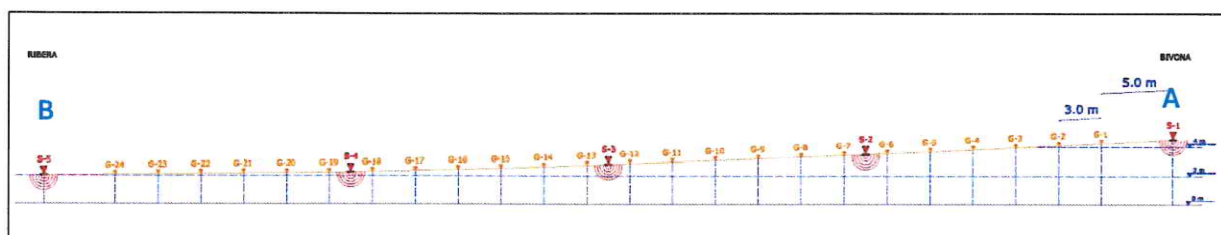


Profilo Ssr_2
Data esecuzione prova 3 Luglio 2013
Lunghezza stendimento 69.0 metri (+ 10 metri scoppi esterni S1 ed S5)
Distanza intergeofonica 3.0 metri
Numero energizzazioni 5
Sperimentatore Geol. Francesco Palladino



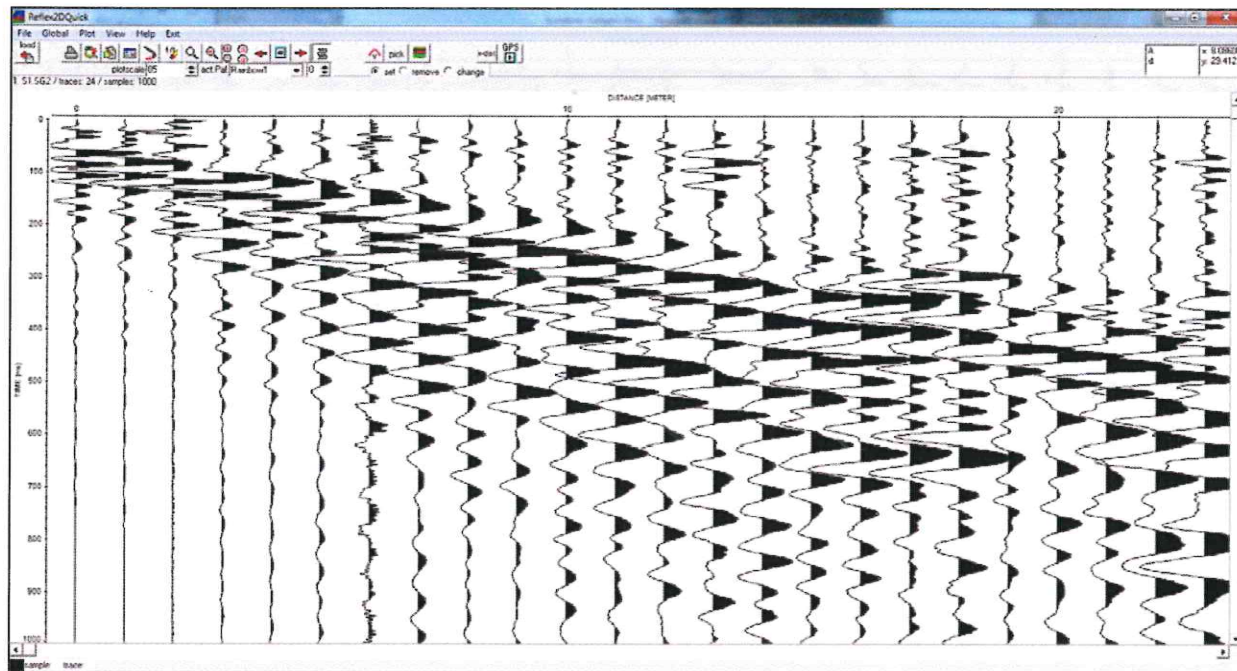
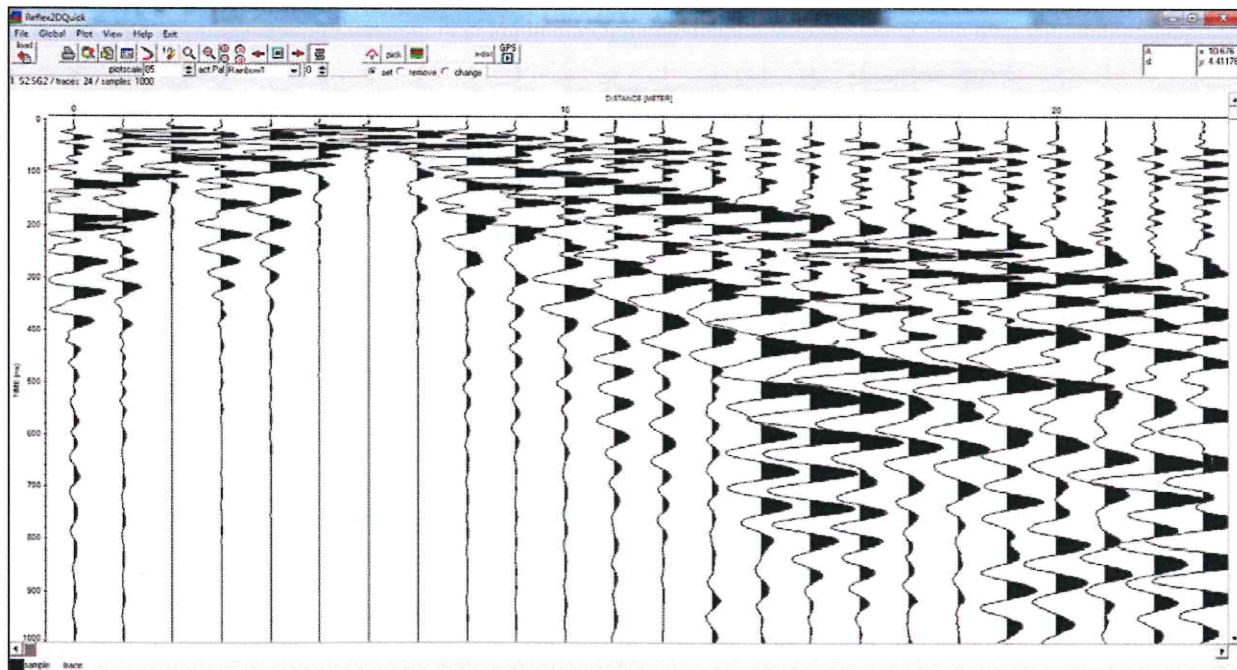
Geotec s.p.a.

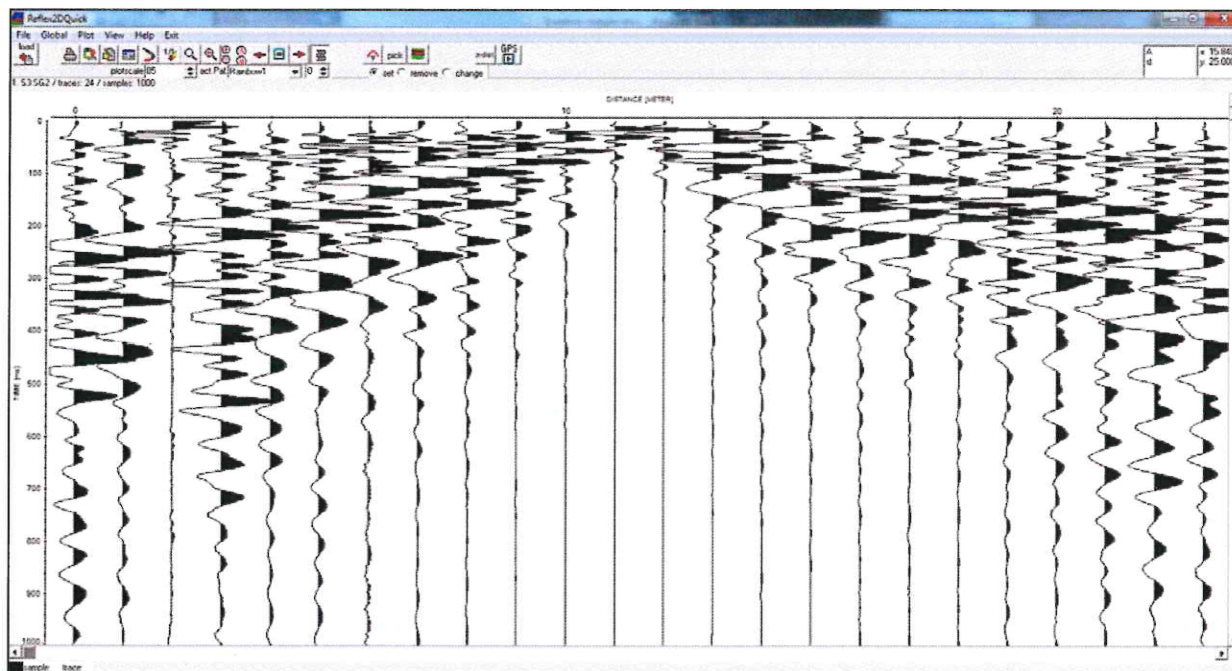
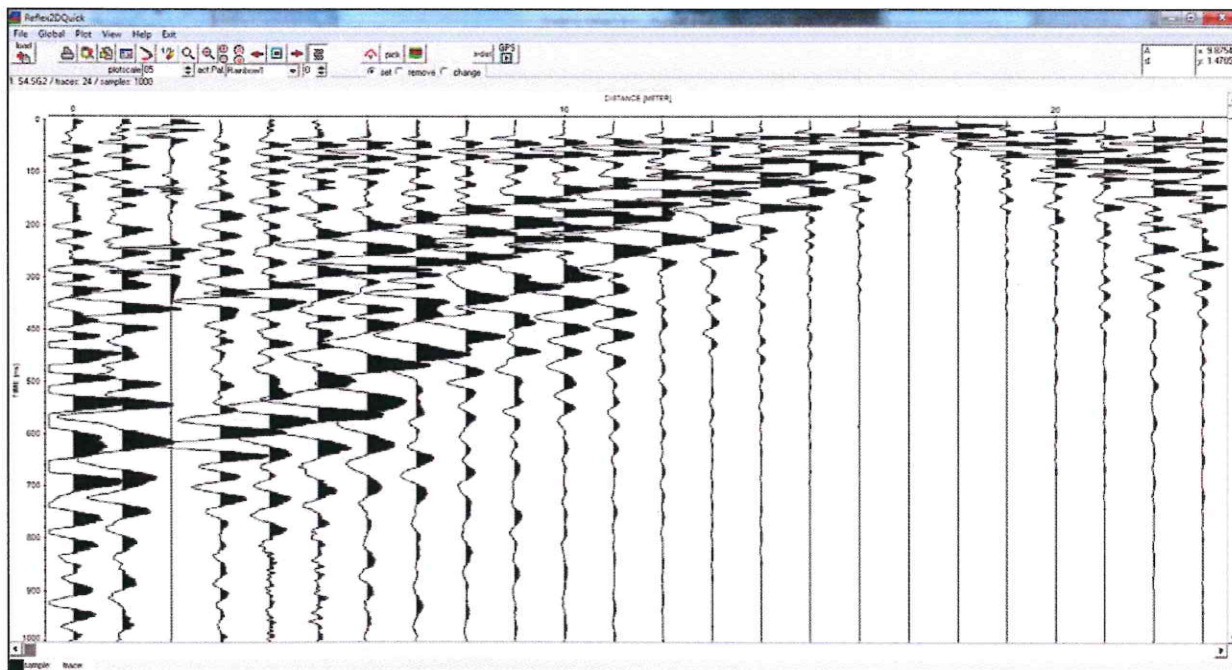




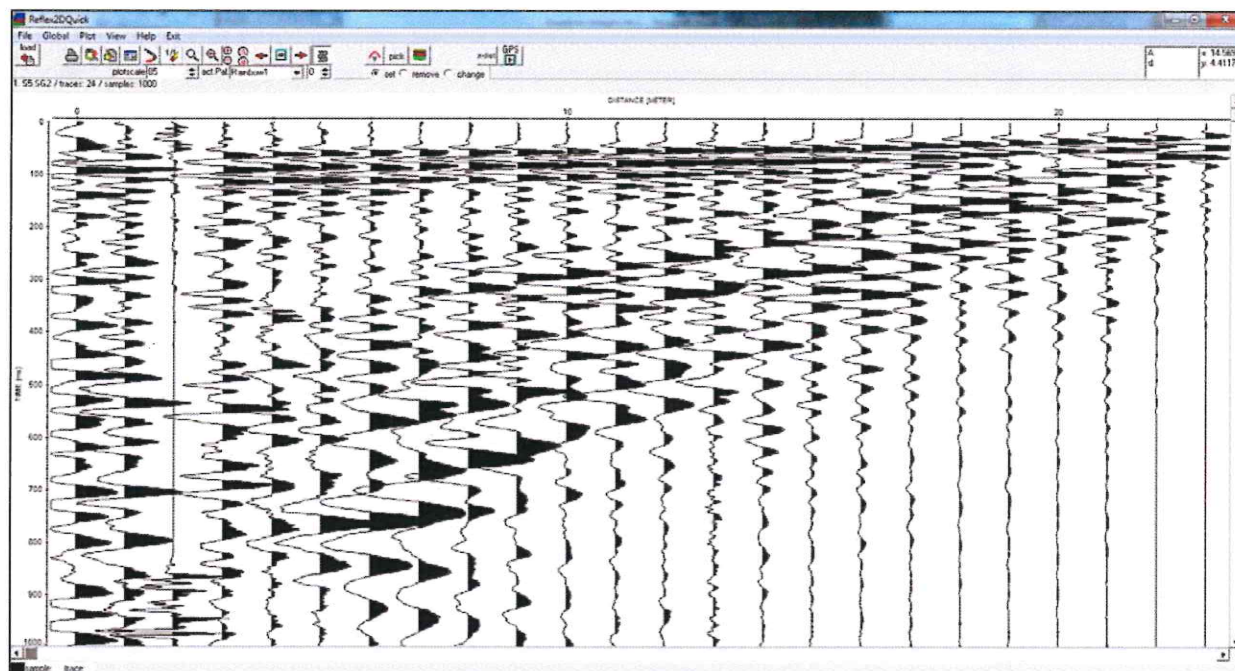
a) Ubicazione e b) Profilo altimetrico Ssr_1

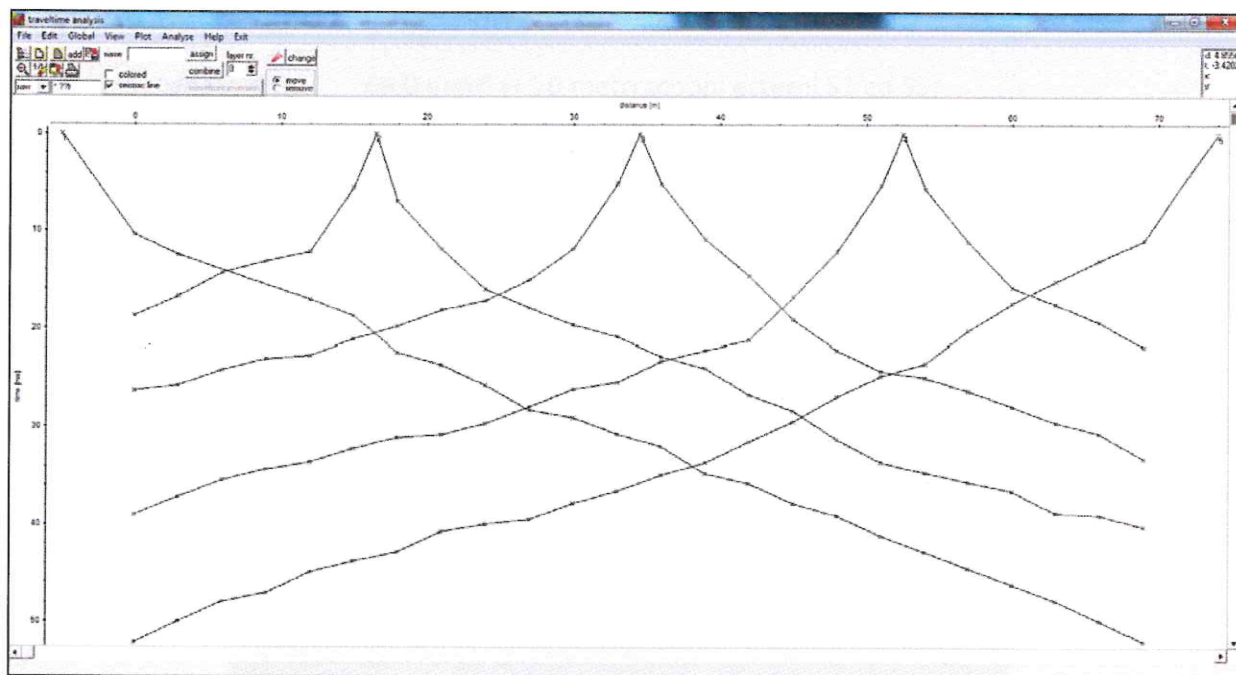
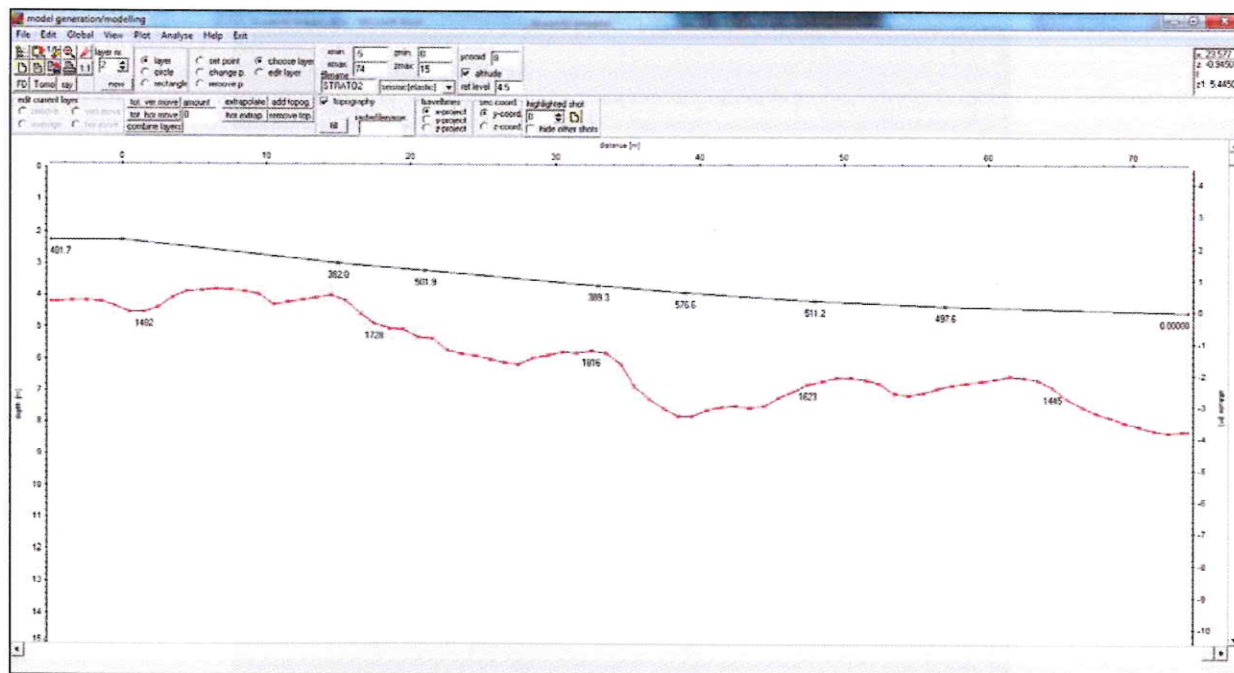
Quote relative			
Geofono	Quota relativa (m)	Geofono	Quota relativa (m)
G1	2.25	G13	0.72
G2	2.10	G14	0.62
G3	1.95	G15	0.50
G4	1.80	G16	0.43
G5	1.66	G17	0.35
G6	1.53	G18	0.28
G7	1.42	G19	0.21
G8	1.30	G20	0.18
G9	1.18	G21	0.15
G10	1.06	G22	0.12
G11	0.95	G23	0.09
G12	0.83	G24	0.06
Sorgente	Quota relativa (m)		
S1	2.50		
S2	1.47		
S3	0.78		
S4	0.24		
S5	0.00		

ELABORAZIONE – Tracce sismiche**S1 (esterno a G1)****S2 (interno G6 G7)**

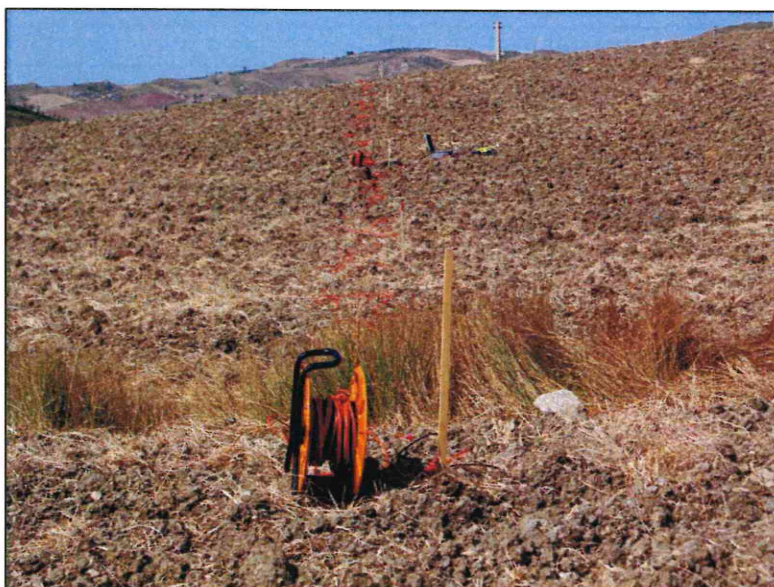
S3 (interno G12 G13)**S4 (interno G18 G19)**

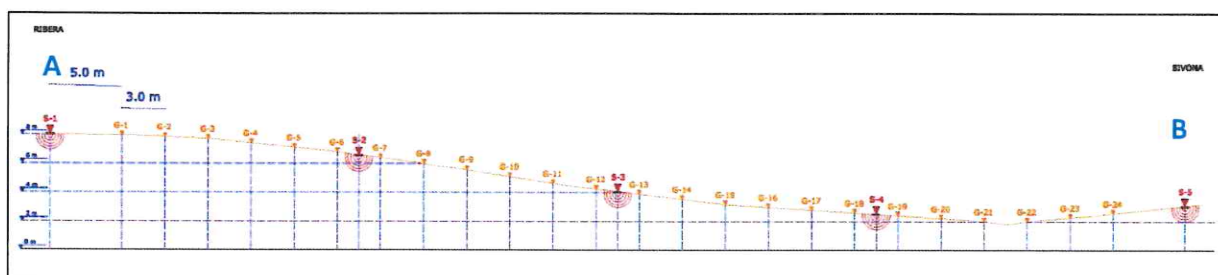
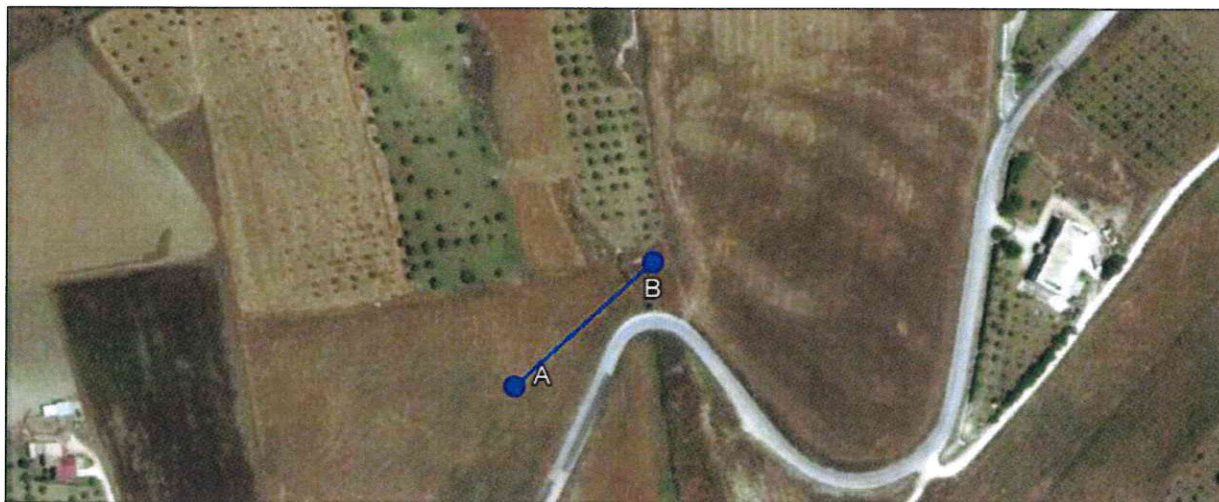
S5 (esterno G24)



Dromocrone**Profilo sismostratigrafico**

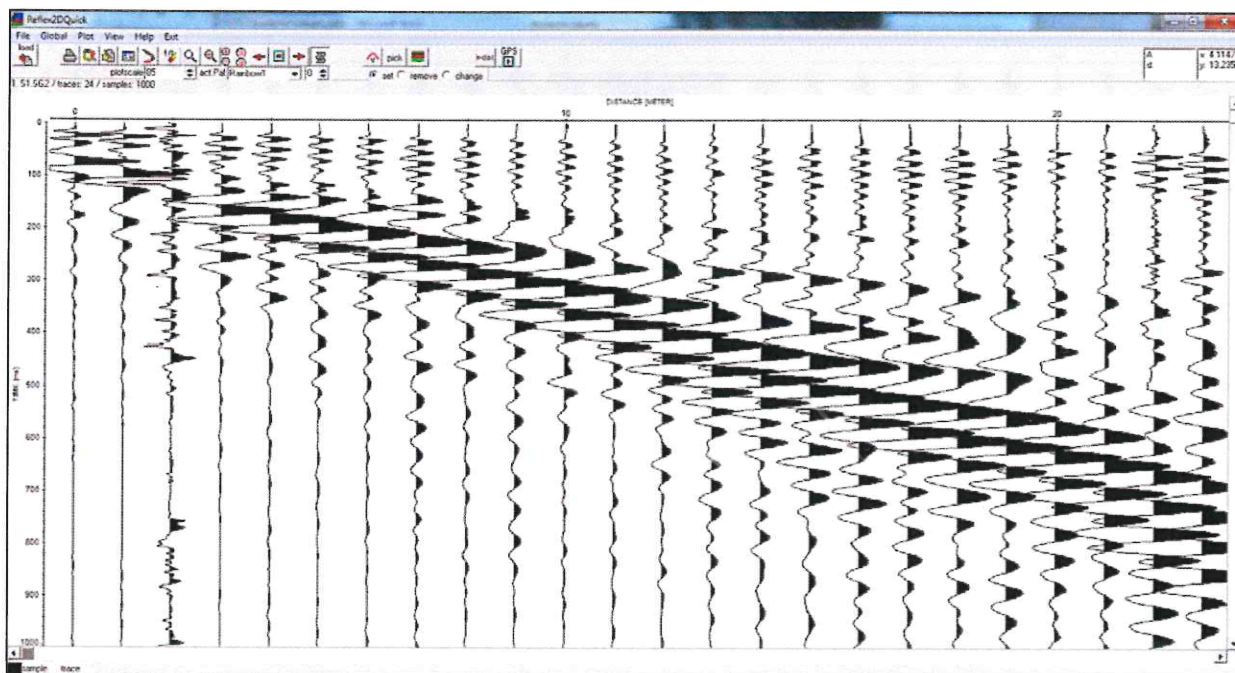
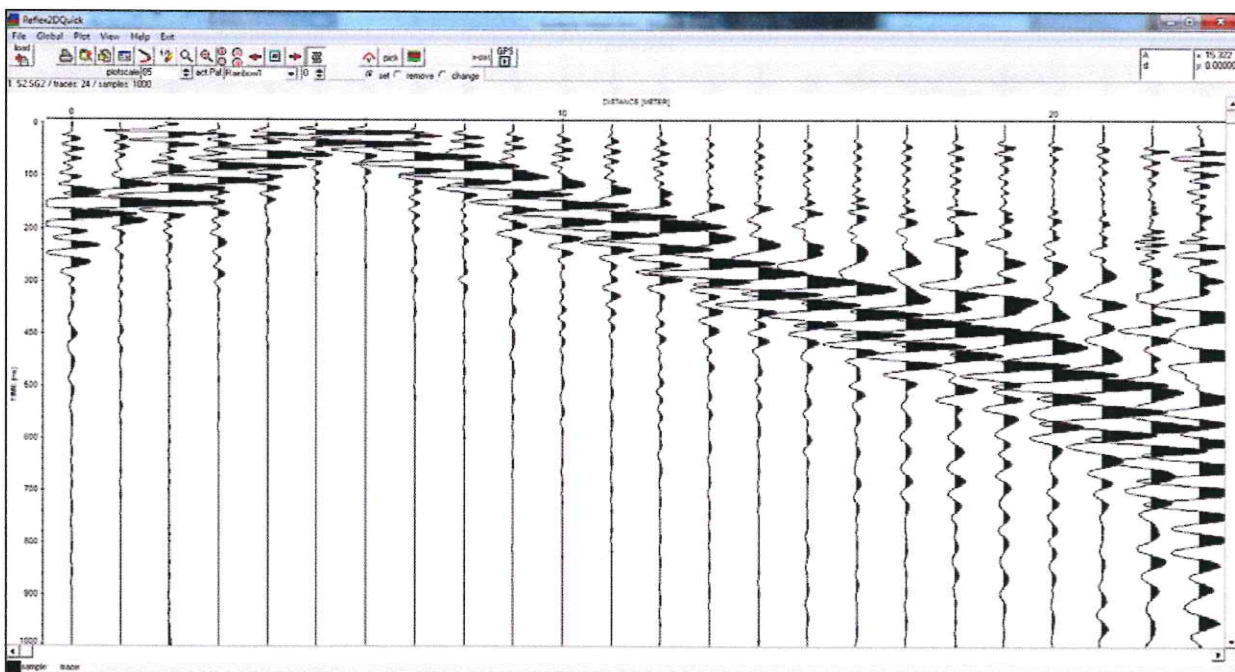
Profilo Ssr_3
Data esecuzione prova 3 Luglio 2013
Lunghezza stendimento 69.0 metri (+ 10 metri scoppi esterni S1 ed S5)
Distanza intergeofonica 3.0 metri
Numero energizzazioni 5
Sperimentatore Geol. Francesco Palladino


Geotec s.p.a.

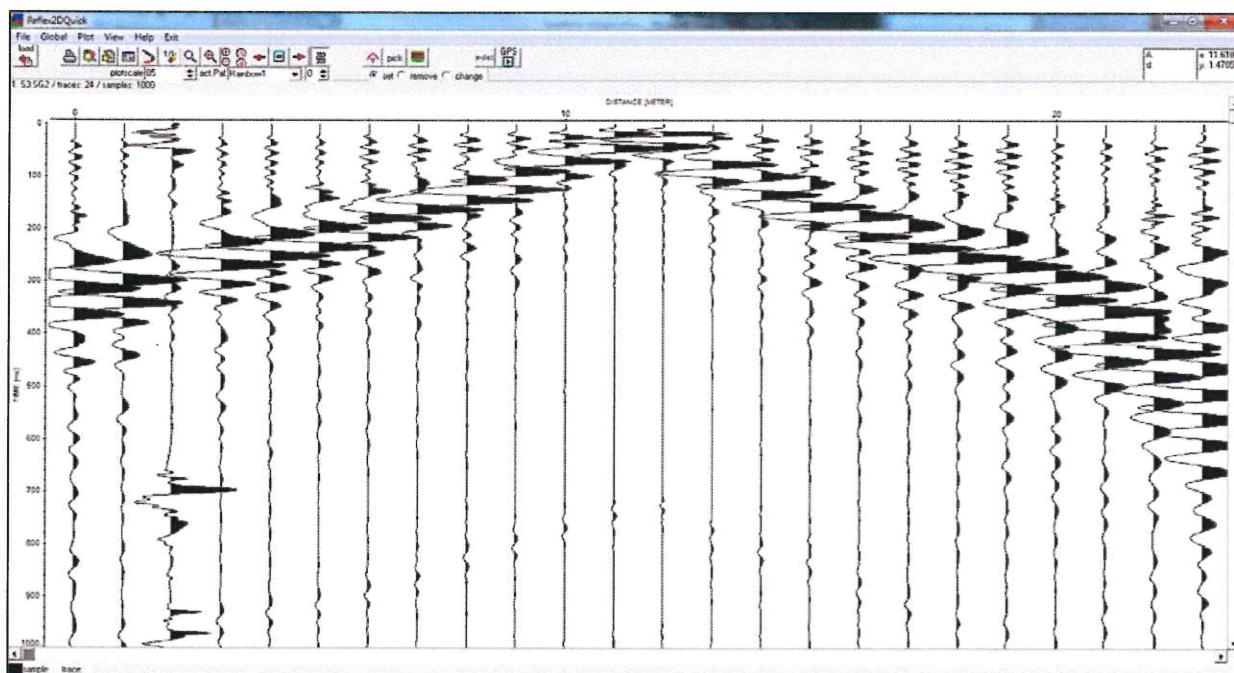


a) Ubicazione e b) Profilo altimetrico Ssr_1

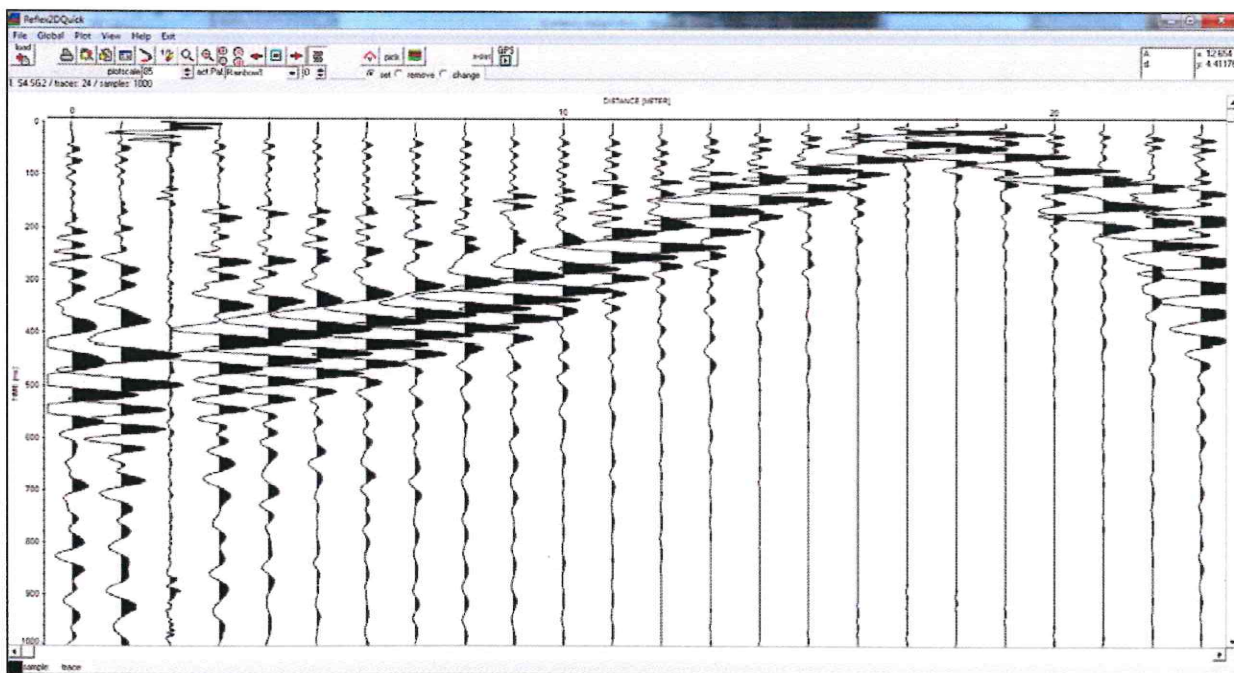
Quote relative			
Geofono	Quota relativa (m)	Geofono	Quota relativa (m)
G1	5.92	G13	1.90
G2	5.83	G14	1.54
G3	5.69	G15	1.19
G4	5.39	G16	0.98
G5	5.08	G17	0.79
G5	4.75	G18	0.59
G7	4.37	G19	0.40
G8	3.98	G20	0.20
G9	3.59	G21	0.00
G10	3.12	G22	0.00
G11	2.65	G23	0.26
G12	2.26	G24	0.56
Sorgente	Quota relativa (m)		
S1	5.98		
S2	4.56		
S3	2.07		
S4	0.50		
S5	1.08		

ELABORAZIONE – Tracce sismiche**S1 (esterno a G1)****S2 (interno G6 G7)**

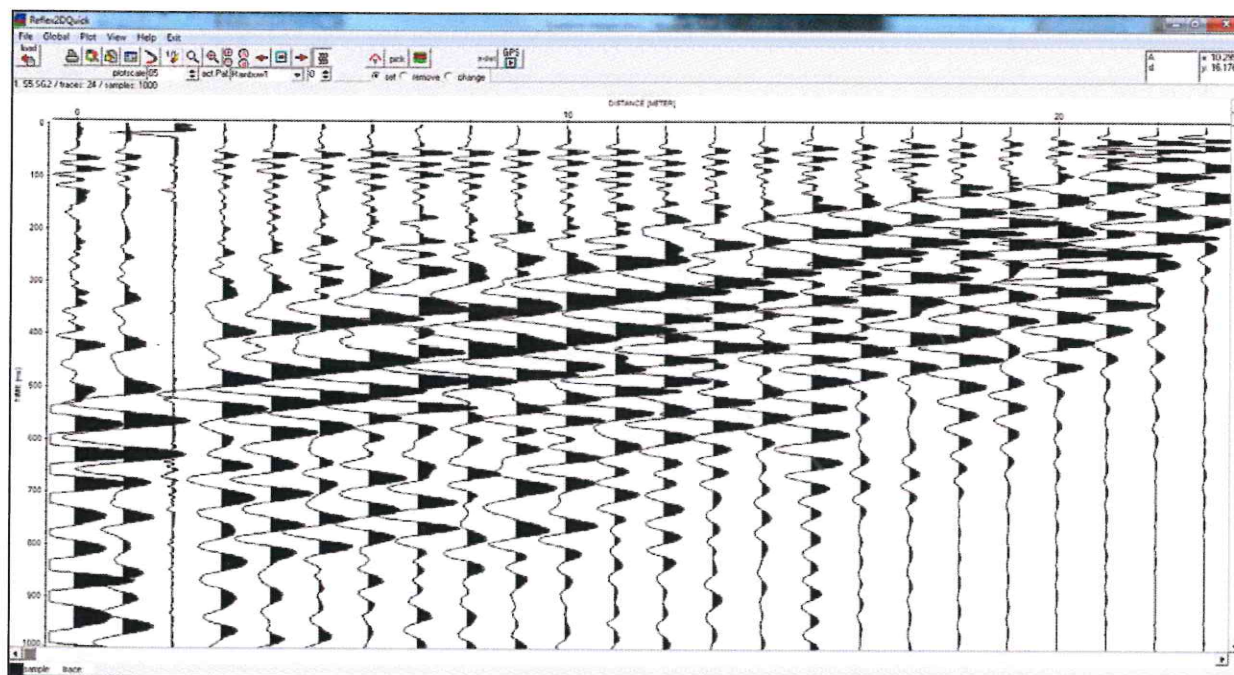
S3 (interno G12 G13)

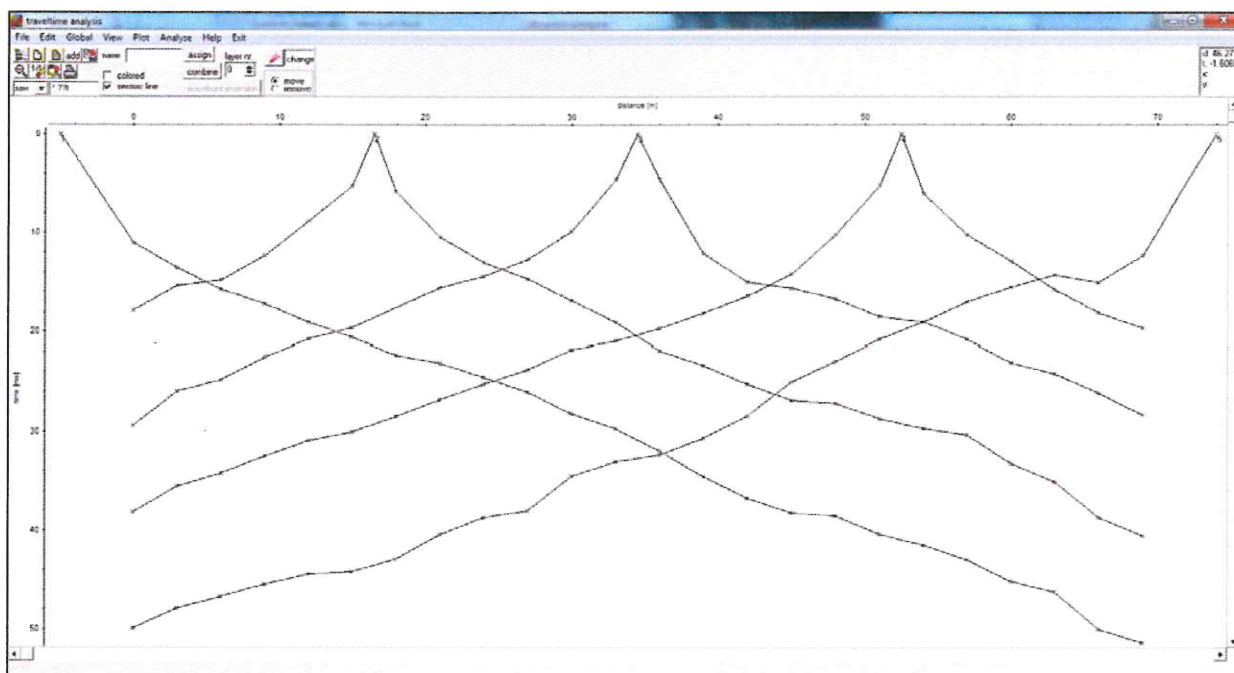


S4 (interno G18 G19)



S5 (esterno G24)



Dromocrone**Profilo sismostratigrafico**