

**Unione Europea  
REPUBBLICA ITALIANA**



***Regione Siciliana***

**Assessorato delle Infrastrutture e della Mobilità  
Dipartimento Regionale Tecnico**

*Servizio 5 - Espletamento di servizi di ingegneria di competenza  
regionale e/o per conto di enti locali  
(per le Province di Palermo, Caltanissetta, Agrigento, Trapani)*

**INTERVENTO DI SISTEMAZIONE DEL PIANO VIARIO DELLE STRADE SAN MAURO  
CASTELVERDE - GANGI SP 52 ED SP 60**

IMPORTO COMPLESSIVO LAVORI € **13.500.000,00**- CUP D97H21001660002

RIFERIMENTO ELABORATO

N. 2

DATA: 14/07/2021

SCALA:

**RELAZIONE GEOLOGICA E INDAGINI  
PARTE SETTIMA**

**I PROGETTISTI  
p.p.v.**

F.to Arch. Vincenzo Viscardi

F.to Arch. Giuseppe Pedone

F.to Geom. Paolo Franzone

F.to Geom. Francesco Carollo

**COLLABORATORI TECNICI**

Arch. Fabiola Fucile

Ing. Piero Fabio

**COORDINATORE DELLA  
SICUREZZA IN FASE DI  
PROGETTAZIONE  
(Geom. Francesco Carollo)**

Visto: Il Dirigente  
Servizio 5 -D.R.T  
Ing. Giuseppe Pirrello

**IL SUPPORTO AL R.U.P.  
F.to Fabrizio Pirrone**

**IL R.U.P.  
F.to Ing. Giuseppe Pirrello**

VELOCITÀ STRATI	
Velocità strato n.1	565.41 m/s
Velocità strato n.2	2187.03 m/s

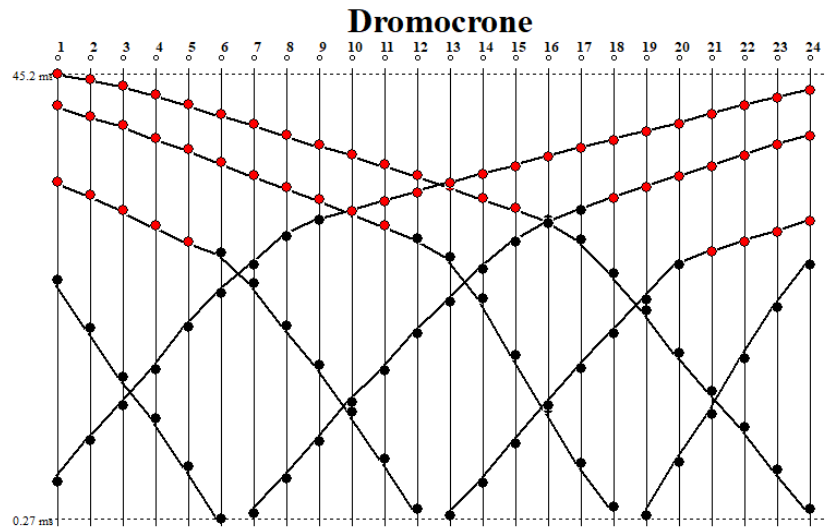


Figura 114: Dromocrone RIFRAZIONE\_8

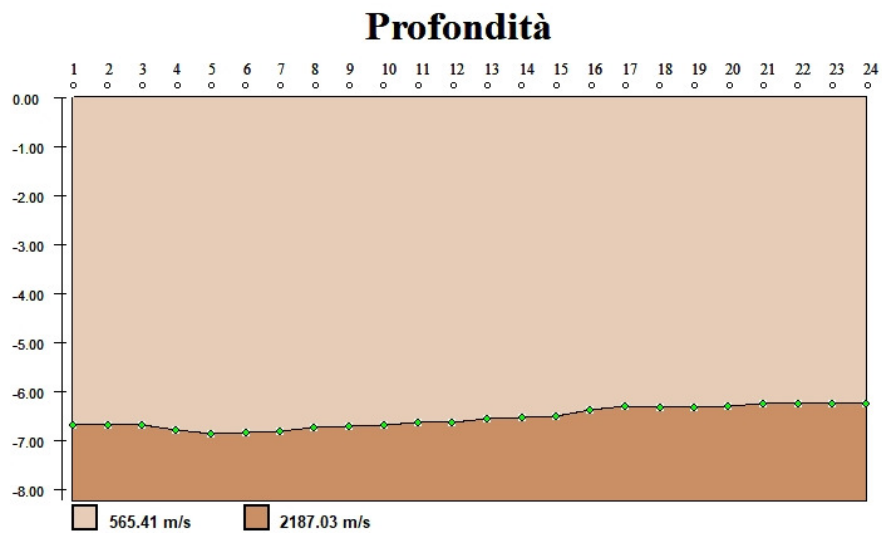


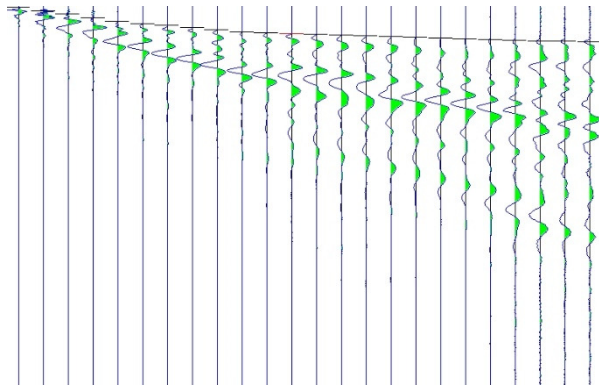
Figura 115: Sezione stratigrafica interpretata RIFRAZIONE\_8

**RIFRAZIONE\_9**

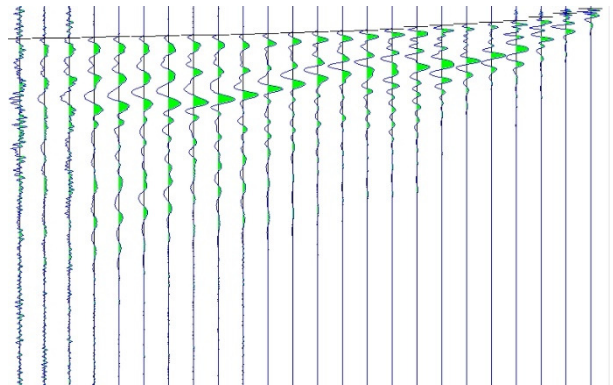
- PRIMI ARRIVI -

-2.00 mt	11.00 mt [SX]	11.00 mt [DX]	23.00 mt [SX]	23.00 mt [DX]	35.00 mt [SX]	35.00 mt [DX]	48.00 mt
0.67 ms	18.53 ms		31.47 ms		38.93 ms		40.00 ms
5.60 ms	15.47 ms		29.87 ms		38.13 ms		39.60 ms
9.73 ms	12.27 ms		27.87 ms		37.20 ms		39.20 ms
14.13 ms	8.67 ms		26.40 ms		36.40 ms		38.40 ms
18.80 ms	4.80 ms		24.53 ms		35.47 ms		37.73 ms
21.07 ms	1.07 ms		22.93 ms		34.53 ms		37.20 ms
23.60 ms		0.53 ms	21.33 ms		33.73 ms		36.53 ms
26.27 ms		4.80 ms	19.60 ms		32.67 ms		35.73 ms
28.93 ms		9.60 ms	16.53 ms		31.73 ms		35.07 ms
31.33 ms		14.27 ms	11.47 ms		29.60 ms		34.13 ms
32.40 ms		18.13 ms	6.27 ms		27.33 ms		33.33 ms
33.47 ms		19.73 ms	0.80 ms		24.80 ms		32.80 ms
34.40 ms		21.60 ms		0.40 ms	22.27 ms		31.87 ms
35.47 ms		23.47 ms		5.47 ms	19.60 ms		30.80 ms
36.67 ms		25.60 ms		10.00 ms	16.40 ms		29.47 ms
37.60 ms		27.47 ms		15.20 ms	11.73 ms		27.73 ms
38.40 ms		29.60 ms		19.60 ms	6.13 ms		25.60 ms
39.33 ms		32.00 ms		22.67 ms	1.20 ms		23.60 ms
40.27 ms		33.73 ms		25.47 ms		0.67 ms	21.87 ms
41.20 ms		34.93 ms		27.87 ms		4.93 ms	19.73 ms
42.00 ms		36.27 ms		30.13 ms		9.33 ms	17.60 ms
42.67 ms		37.60 ms		31.60 ms		14.13 ms	13.07 ms
43.20 ms		38.53 ms		32.80 ms		18.00 ms	8.53 ms
43.87 ms		39.33 ms		34.00 ms		21.47 ms	2.53 ms

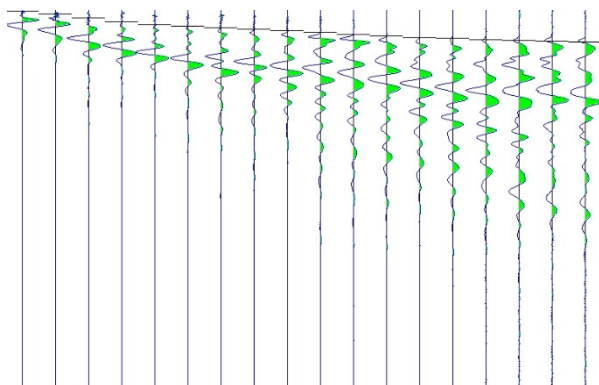
## Tracce sperimentali



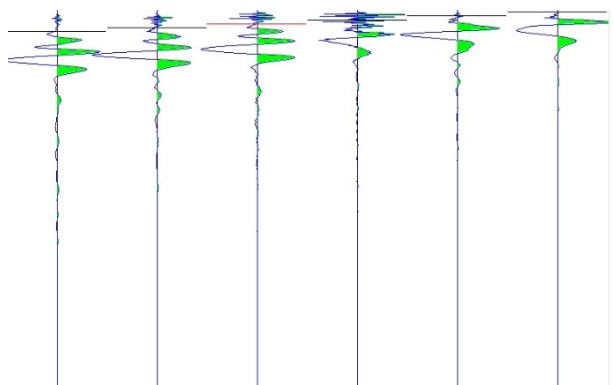
Tracce sperimentali scoppio A diretta



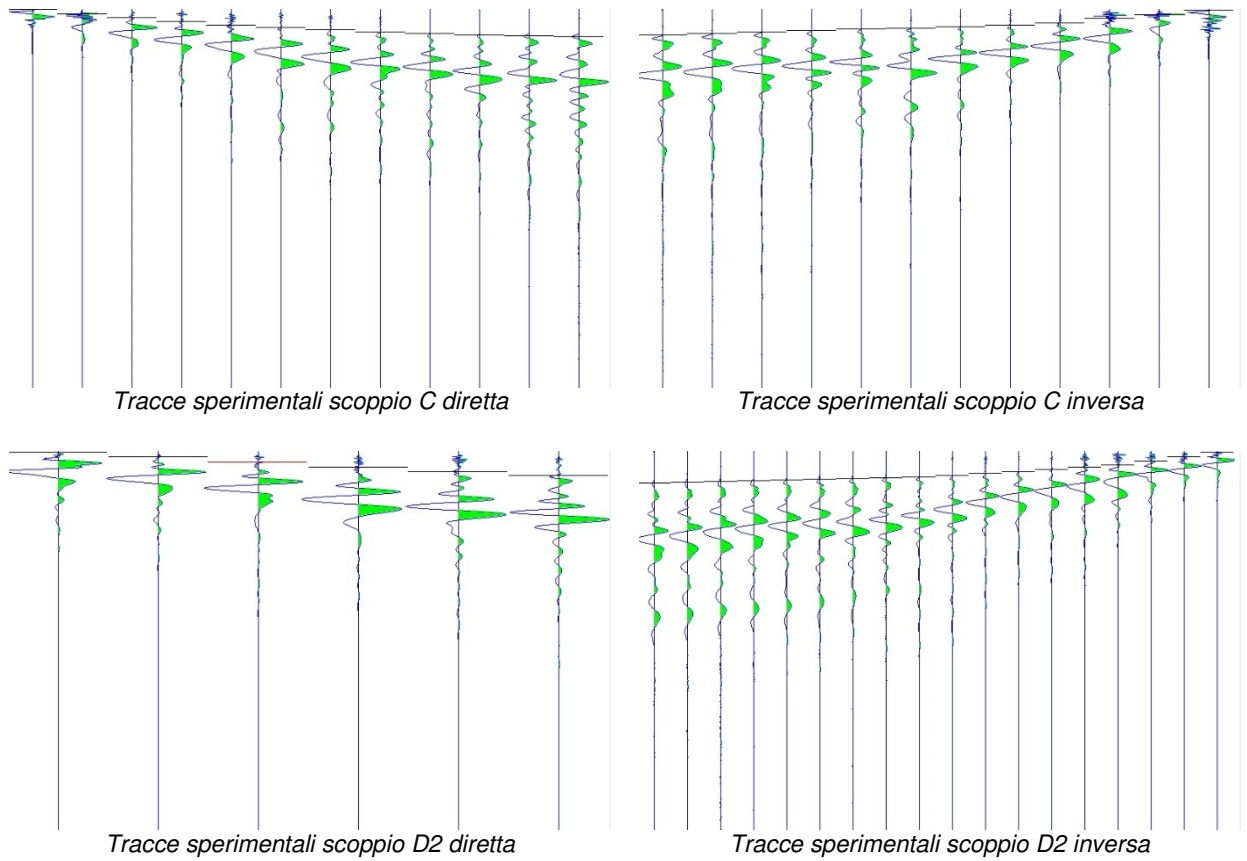
Tracce sperimentali scoppio B inversa



Tracce sperimentali scoppio D1 diretta



Tracce sperimentali scoppio D1 inversa



## VELOCITÀ STRATI

Velocità strato n.1	554.30 m/s
Velocità strato n.2	881.25 m/s
Velocità strato n.3	2583.01 m/s

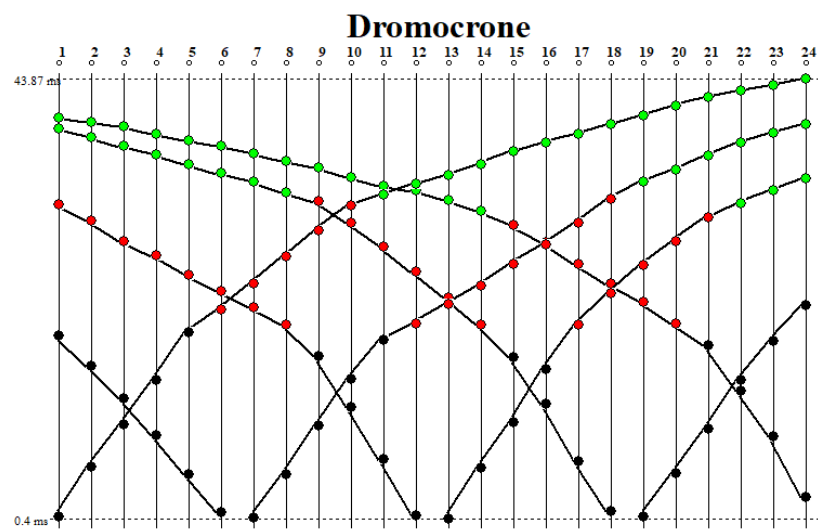


Figura 116: Dromocrone RIFRAZIONE\_9



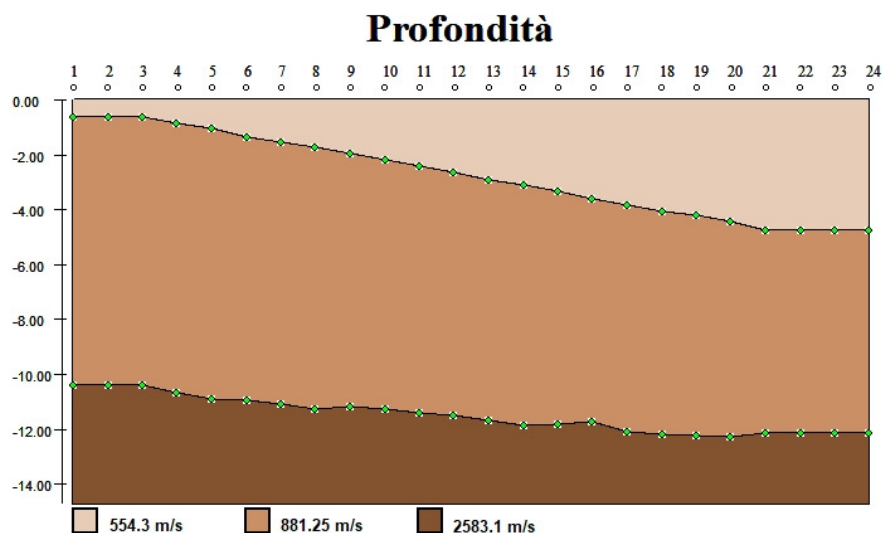
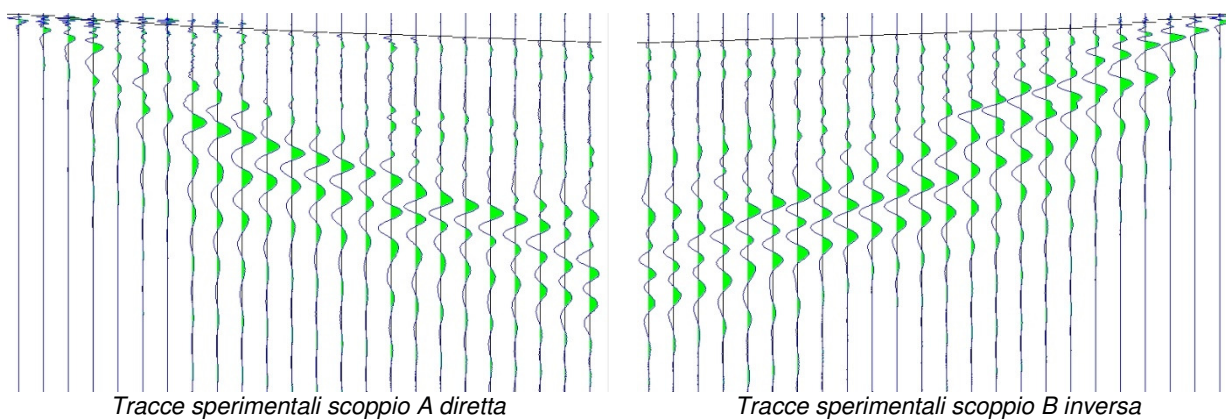


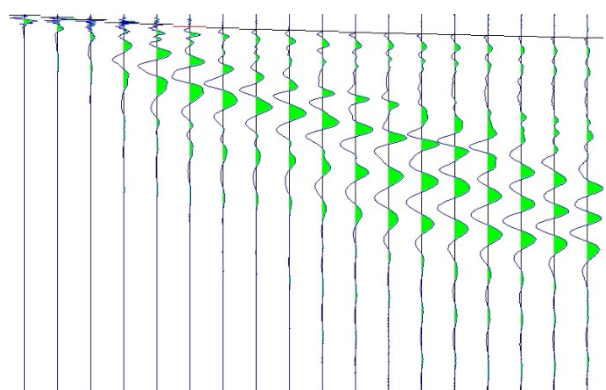
Figura 117: Sezione stratigrafica interpretata RIFRAZIONE\_9

**RIFRAZIONE\_10**

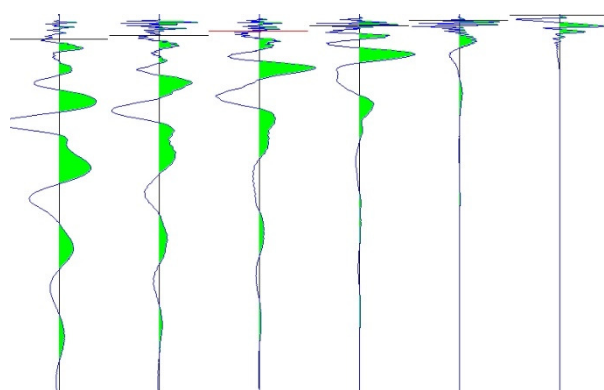
- PRIMI ARRIVI -

-2.00 mt	11.00 mt [SX]	11.00 mt [DX]	23.00 mt [SX]	23.00 mt [DX]	35.00 mt [SX]	35.00 mt [DX]	48.00 mt
1.07 ms	17.87 ms		22.53 ms		28.67 ms		36.67 ms
3.07 ms	14.80 ms		21.33 ms		27.87 ms		35.73 ms
5.20 ms	11.73 ms		20.40 ms		26.93 ms		34.80 ms
8.13 ms	8.27 ms		19.47 ms		26.00 ms		33.87 ms
10.13 ms	4.27 ms		18.27 ms		25.07 ms		32.80 ms
12.27 ms	0.67 ms		17.20 ms		24.13 ms		31.73 ms
13.87 ms		1.20 ms	16.13 ms		23.07 ms		30.67 ms
15.60 ms		4.13 ms	14.67 ms		22.00 ms		29.60 ms
17.20 ms		6.80 ms	11.73 ms		21.07 ms		28.53 ms
18.40 ms		9.87 ms	8.13 ms		20.00 ms		27.33 ms
20.13 ms		12.53 ms	4.40 ms		18.93 ms		26.00 ms
21.33 ms		14.67 ms	1.07 ms		17.60 ms		24.93 ms
23.20 ms		16.53 ms		0.53 ms	15.47 ms		23.87 ms
24.40 ms		18.40 ms		3.20 ms	13.07 ms		22.80 ms
25.60 ms		19.60 ms		6.40 ms	10.13 ms		21.73 ms
26.53 ms		20.80 ms		9.60 ms	7.33 ms		20.67 ms
27.47 ms		22.00 ms		12.67 ms	4.00 ms		19.60 ms
28.40 ms		22.93 ms		15.47 ms	0.93 ms		18.53 ms
29.47 ms		24.00 ms		17.87 ms		0.93 ms	16.40 ms
30.80 ms		25.07 ms		19.60 ms		4.80 ms	13.73 ms
31.87 ms		26.13 ms		21.20 ms		7.87 ms	10.80 ms
33.20 ms		27.33 ms		22.40 ms		11.33 ms	7.73 ms
34.40 ms		28.40 ms		23.60 ms		14.80 ms	4.40 ms
35.47 ms		29.33 ms		24.80 ms		18.53 ms	1.07 ms

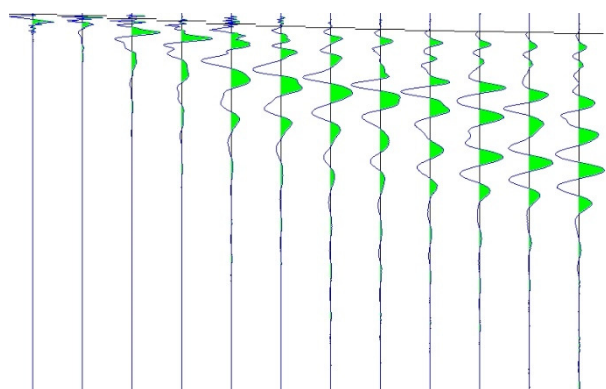
**Tracce sperimentali**



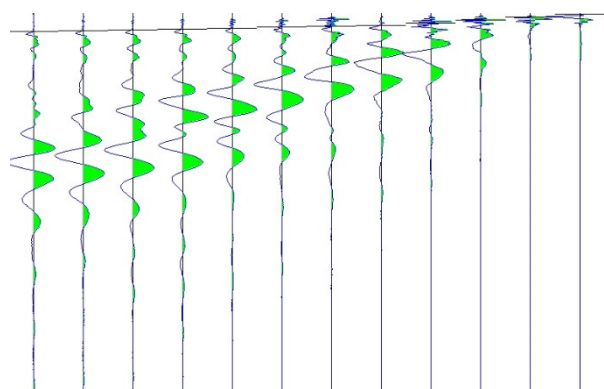
Tracce sperimentali scoppio D1 diretta



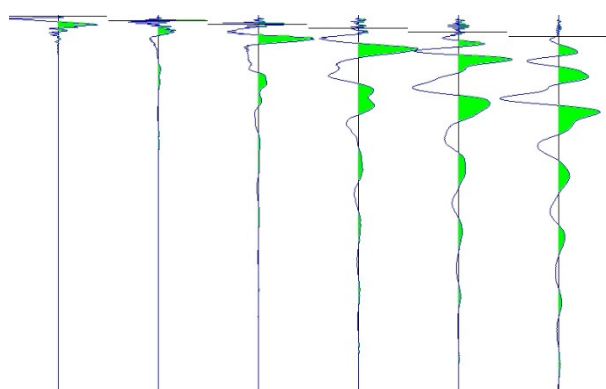
Tracce sperimentali scoppio D1 inversa



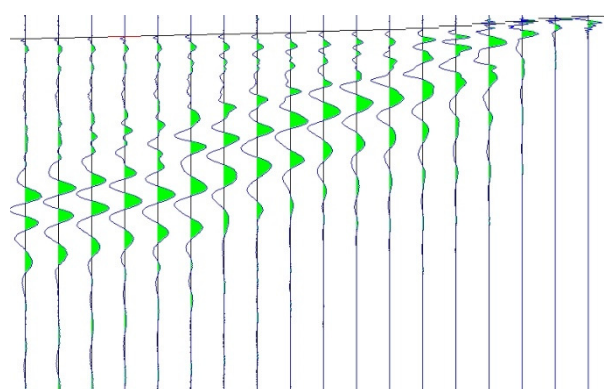
Tracce sperimentali scoppio C diretta



Tracce sperimentali scoppio C inversa



Tracce sperimentali scoppio D2 diretta



Tracce sperimentali scoppio D2 inversa

## VELOCITÀ STRATI

Velocità strato n.1	844.52 m/s
Velocità strato n.2	1806.03 m/s

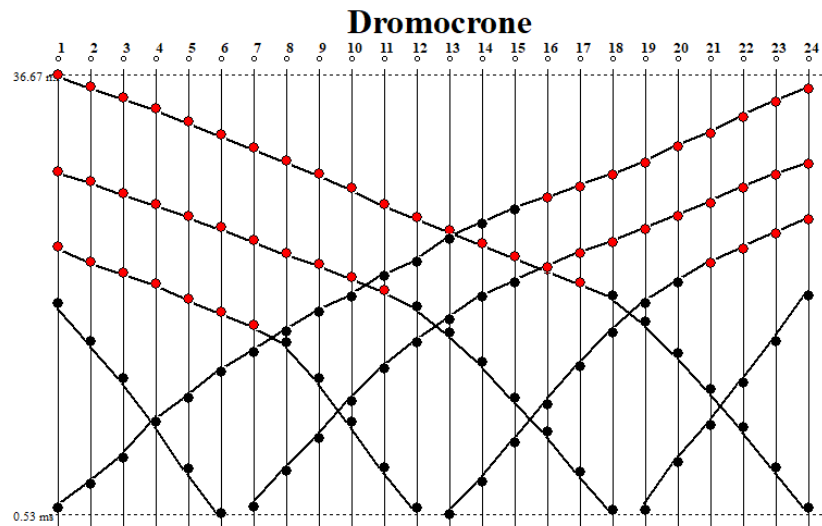


Figura 118: Dromocrone RIFRAZIONE\_10

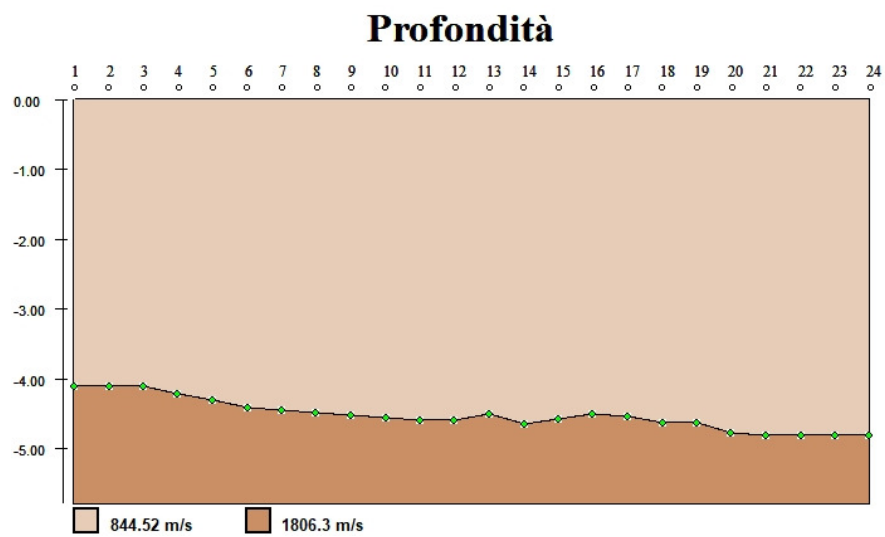


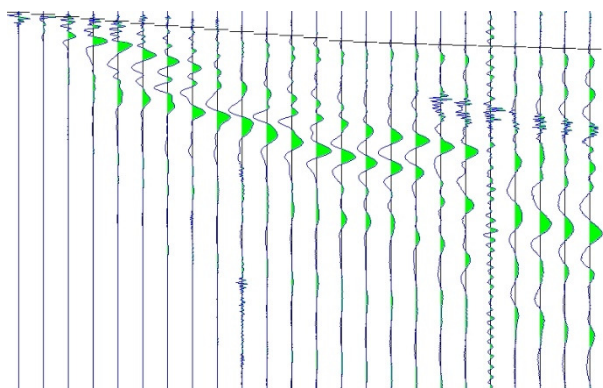
Figura 119: Sezione stratigrafica interpretata RIFRAZIONE\_10

**RIFRAZIONE\_11**

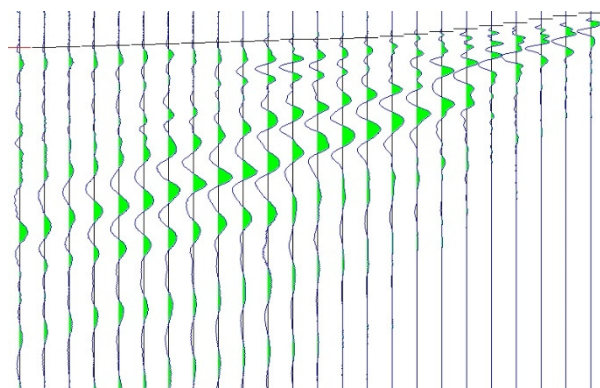
- PRIMI ARRIVI -

-2.00 mt	11.00 mt [SX]	11.00 mt [DX]	23.00 mt [SX]	23.00 mt [DX]	35.00 mt [SX]	35.00 mt [DX]	48.00 mt
0.80 ms	17.60 ms		33.73 ms		40.27 ms		45.07 ms
3.33 ms	14.93 ms		32.13 ms		39.60 ms		44.40 ms
6.40 ms	11.87 ms		30.53 ms		38.93 ms		43.60 ms
9.47 ms	8.53 ms		29.07 ms		38.13 ms		42.80 ms
11.73 ms	4.53 ms		26.27 ms		37.60 ms		41.87 ms
14.53 ms	0.80 ms		22.93 ms		37.07 ms		40.93 ms
17.33 ms		0.67 ms	18.80 ms		36.40 ms		40.00 ms
20.00 ms		3.73 ms	15.47 ms		35.07 ms		38.93 ms
22.53 ms		6.80 ms	12.27 ms		34.00 ms		37.87 ms
25.07 ms		9.87 ms	8.67 ms		31.87 ms		36.93 ms
27.60 ms		12.53 ms	4.67 ms		29.07 ms		36.00 ms
30.27 ms		15.20 ms	1.07 ms		26.13 ms		34.93 ms
33.07 ms		17.87 ms		0.40 ms	22.67 ms		34.13 ms
36.00 ms		20.27 ms		3.07 ms	18.27 ms		33.33 ms
37.87 ms		22.93 ms		6.13 ms	13.60 ms		32.27 ms
39.07 ms		25.73 ms		8.27 ms	9.20 ms		30.40 ms
40.13 ms		28.27 ms		11.33 ms	5.07 ms		27.60 ms
41.20 ms		30.80 ms		14.53 ms	1.47 ms		24.80 ms
42.27 ms		33.07 ms		17.73 ms		1.20 ms	21.73 ms
43.33 ms		35.47 ms		20.53 ms		4.93 ms	17.87 ms
44.13 ms		37.20 ms		23.47 ms		8.80 ms	13.73 ms
45.20 ms		38.27 ms		27.07 ms		12.27 ms	9.73 ms
46.13 ms		39.47 ms		30.27 ms		16.00 ms	5.47 ms
46.93 ms		40.53 ms		30.80 ms		19.60 ms	1.73 ms

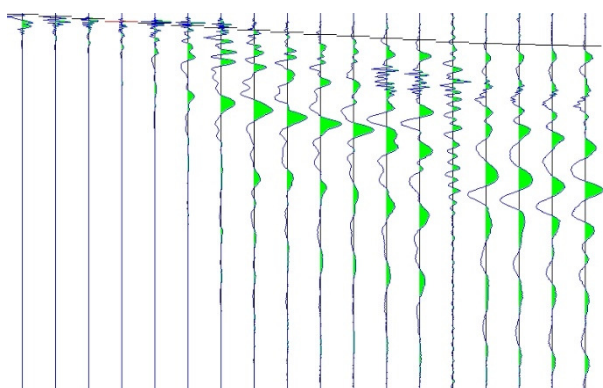
## Tracce sperimentali



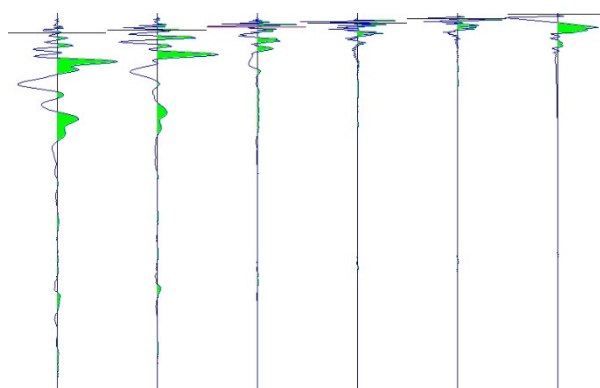
Tracce sperimentali scoppio A diretta



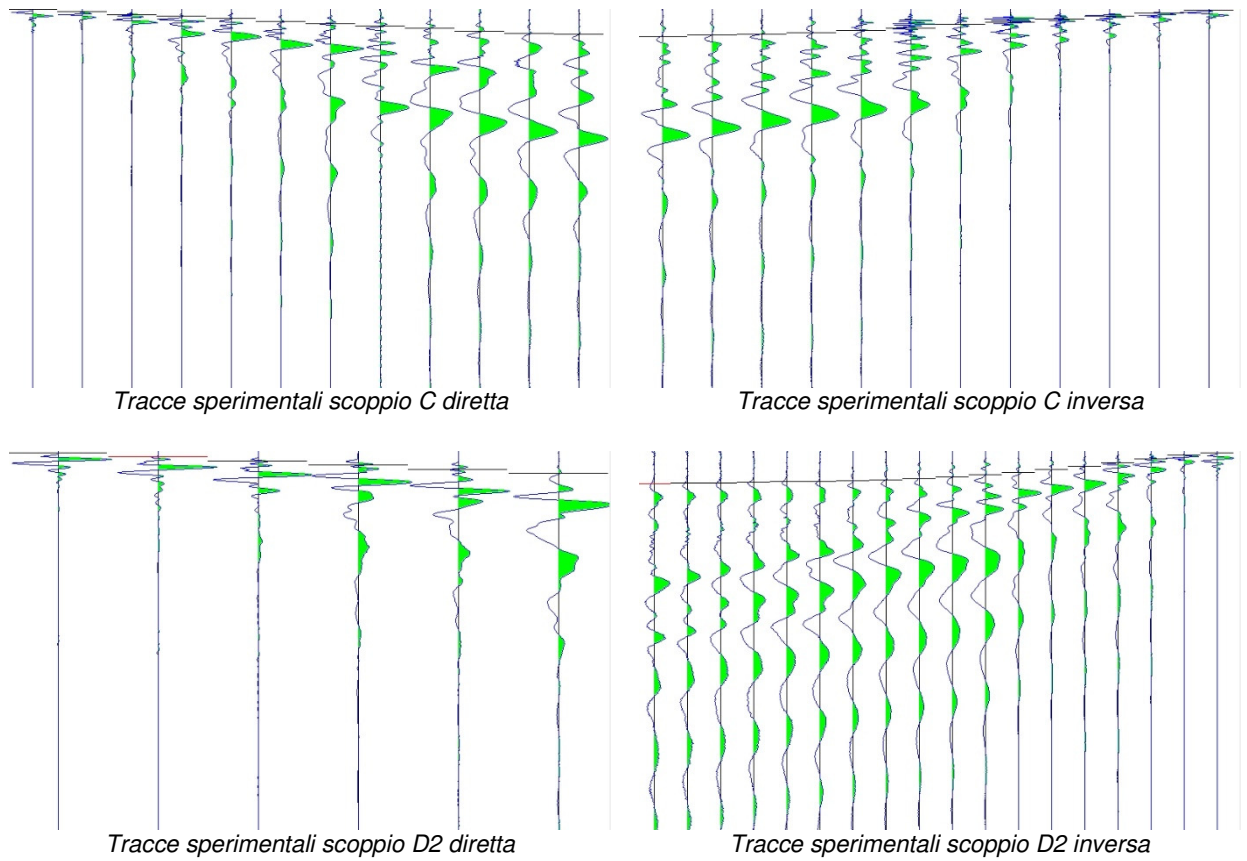
Tracce sperimentali scoppio B inversa



Tracce sperimentali scoppio D1 diretta



Tracce sperimentali scoppio D1 inversa



## VELOCITÀ STRATI

Velocità strato n.1	696.67 m/s
Velocità strato n.2	2108.98 m/s

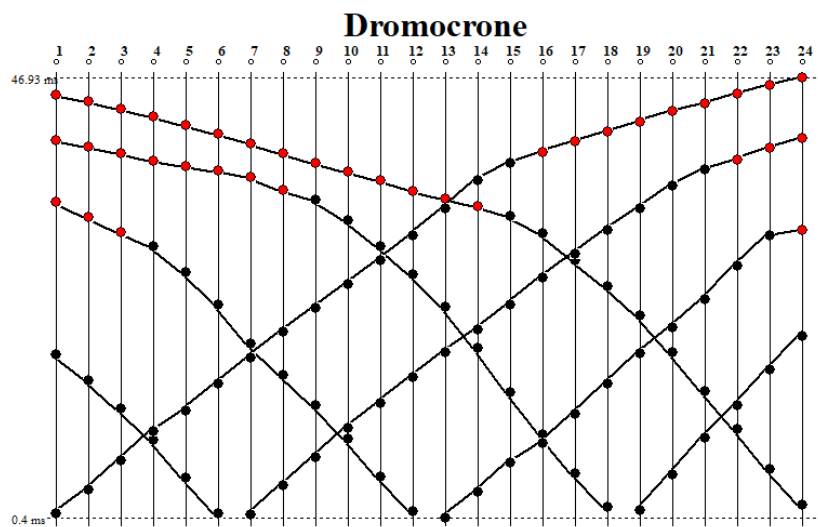


Figura 120: Dromocrone RIFRAZIONE\_11



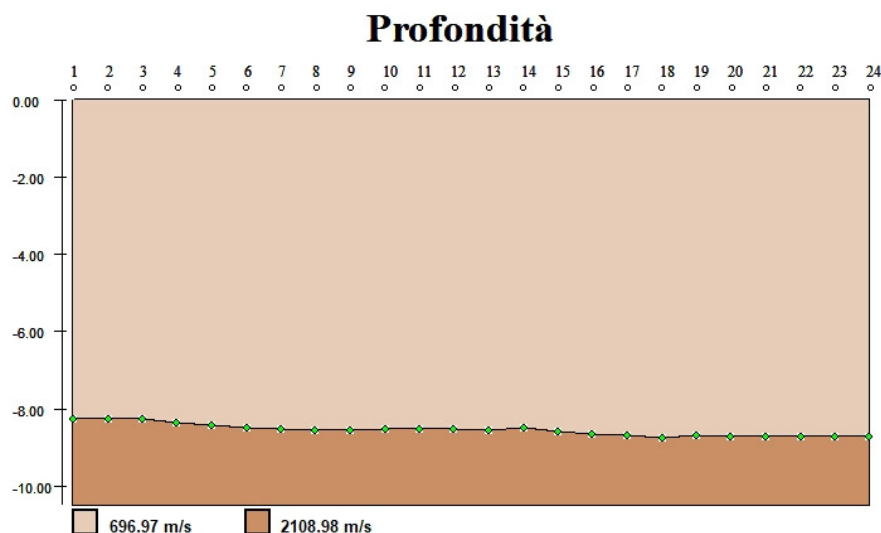
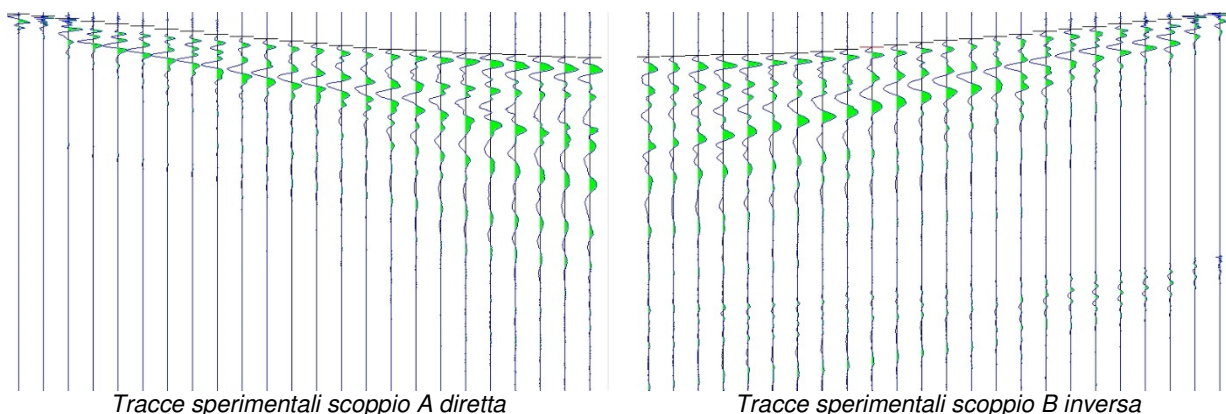


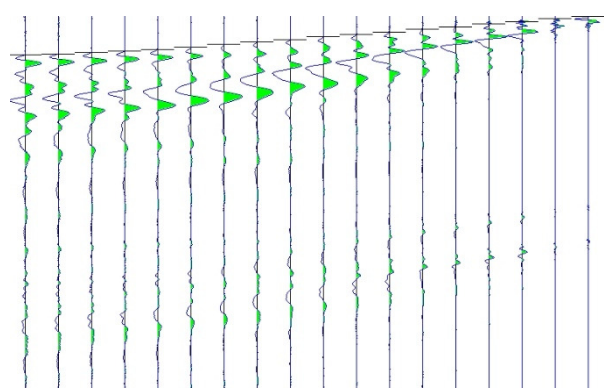
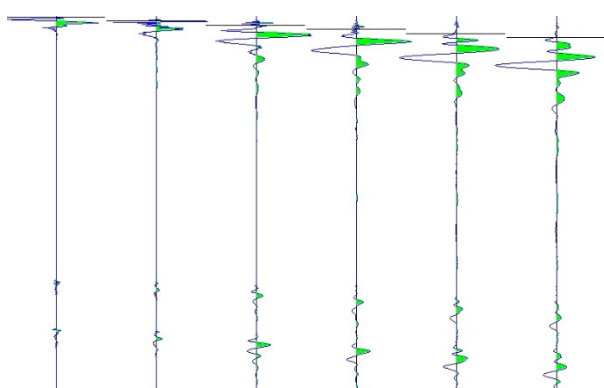
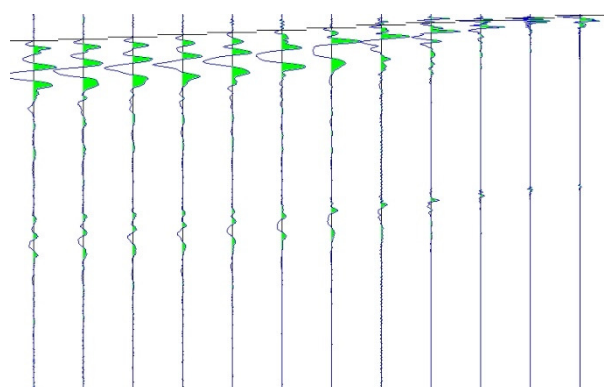
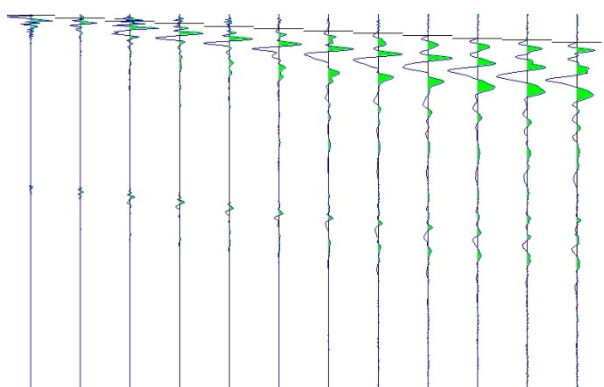
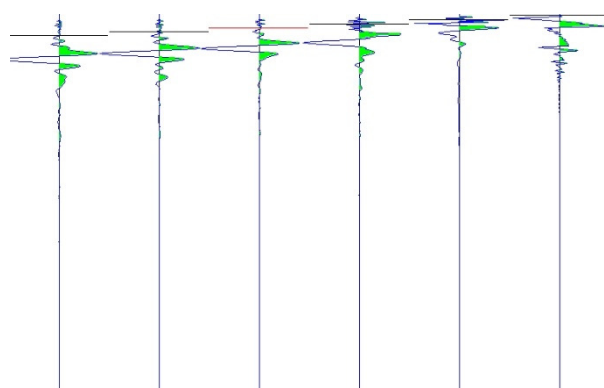
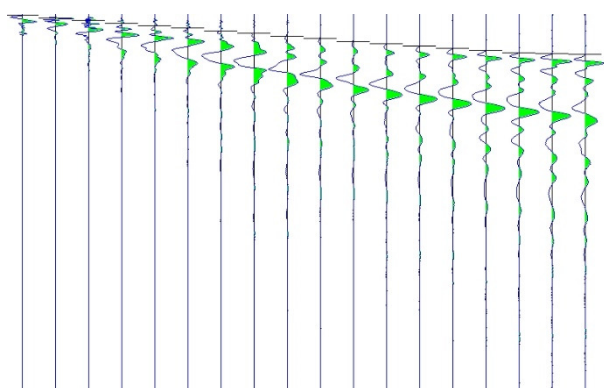
Figura 121: Sezione stratigrafica interpretata RIFRAZIONE\_11

**RIFRAZIONE\_12**

- PRIMI ARRIVI -

-2.00 mt	11.00 mt [SX]	11.00 mt [DX]	23.00 mt [SX]	23.00 mt [DX]	35.00 mt [SX]	35.00 mt [DX]	48.00 mt
1.87 ms	18.80 ms		32.80 ms		47.47 ms		54.80 ms
4.80 ms	15.33 ms		30.80 ms		46.27 ms		54.13 ms
7.87 ms	12.00 ms		28.13 ms		44.93 ms		53.33 ms
11.07 ms	8.53 ms		25.47 ms		43.33 ms		52.53 ms
14.00 ms	4.67 ms		22.80 ms		41.07 ms		51.87 ms
17.20 ms	0.93 ms		20.00 ms		38.13 ms		51.20 ms
20.53 ms		1.07 ms	16.93 ms		34.93 ms		50.40 ms
23.73 ms		4.53 ms	13.47 ms		31.73 ms		48.13 ms
26.93 ms		7.73 ms	10.53 ms		28.53 ms		45.47 ms
29.73 ms		10.93 ms	7.33 ms		25.33 ms		42.80 ms
32.80 ms		14.13 ms	4.40 ms		22.27 ms		39.87 ms
35.33 ms		16.93 ms	0.80 ms		19.20 ms		37.47 ms
38.27 ms		20.13 ms		0.93 ms	16.27 ms		34.80 ms
40.93 ms		23.60 ms		4.53 ms	12.93 ms		32.27 ms
43.73 ms		27.20 ms		8.00 ms	9.47 ms		29.73 ms
45.60 ms		30.13 ms		11.20 ms	6.13 ms		26.80 ms
47.07 ms		33.33 ms		14.53 ms	2.93 ms		23.47 ms
48.67 ms		36.53 ms		17.33 ms	0.40 ms		20.53 ms
50.00 ms		39.20 ms		20.27 ms		0.67 ms	17.73 ms
51.20 ms		42.27 ms		23.33 ms		4.27 ms	14.40 ms
52.40 ms		45.20 ms		26.53 ms		7.87 ms	11.33 ms
53.73 ms		47.20 ms		29.47 ms		11.60 ms	8.13 ms
54.93 ms		48.53 ms		32.13 ms		15.60 ms	4.40 ms
56.27 ms		49.87 ms		34.67 ms		18.67 ms	0.80 ms

**Tracce sperimentali**



## VELOCITÀ STRATI

Velocità strato n.1	680.59 m/s
Velocità strato n.2	1983.50 m/s

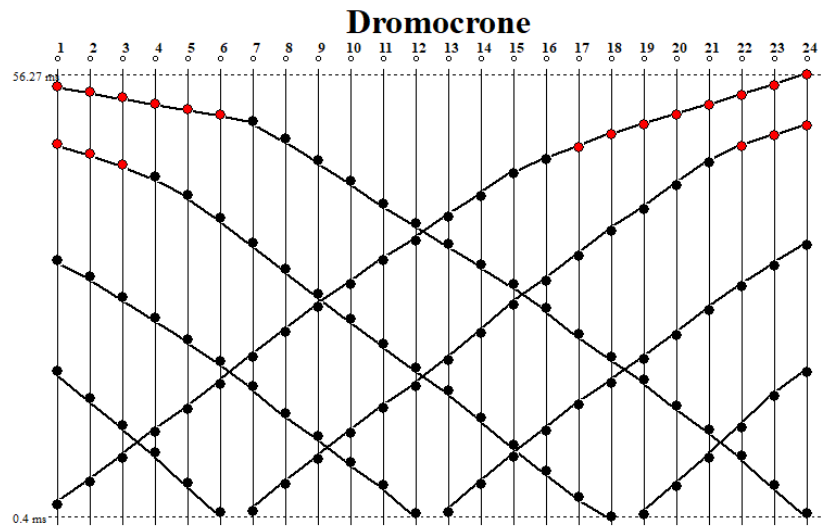


Figura 122: Dromocrone RIFRAZIONE\_12

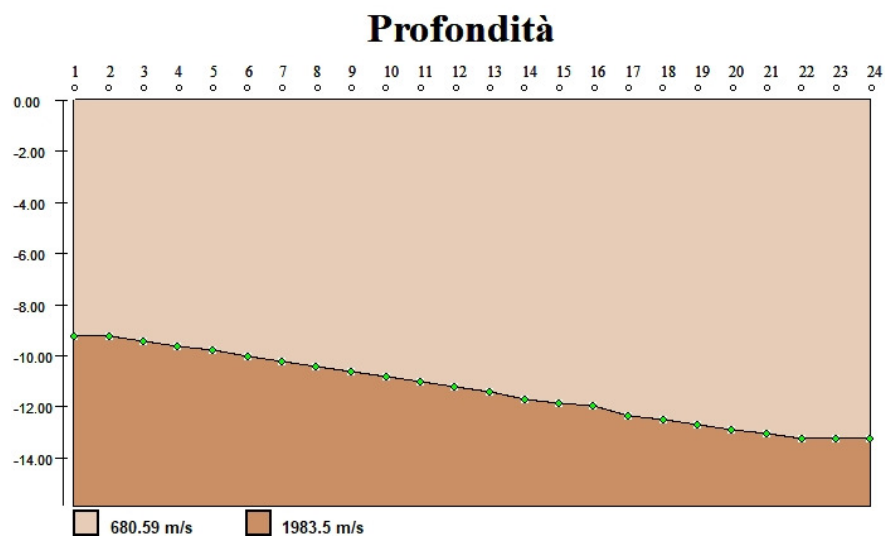


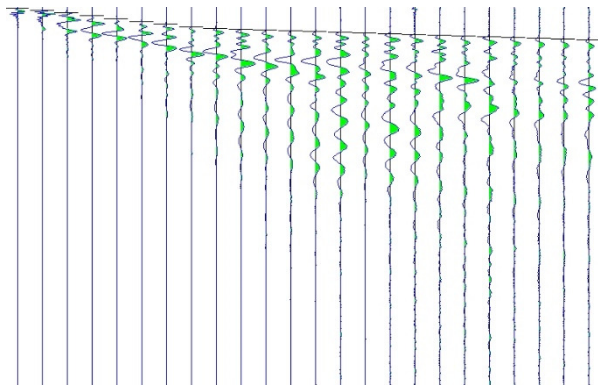
Figura 123: Sezione stratigrafica interpretata RIFRAZIONE\_12

**RIFRAZIONE\_13**

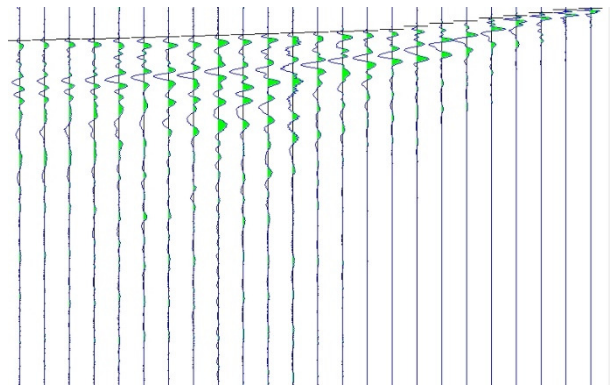


- PRIMI ARRIVI -							
2.00 mt	11.00 mt [SX]	11.00 mt [DX]	23.00 mt [SX]	23.00 mt [DX]	35.00 mt [SX]	35.00 mt [DX]	48.00 mt
0.53 ms	16.93 ms		28.00 ms		36.00 ms		41.20 ms
3.60 ms	14.13 ms		27.33 ms		35.33 ms		40.40 ms
6.93 ms	10.80 ms		26.40 ms		34.80 ms		39.60 ms
10.40 ms	7.33 ms		25.47 ms		34.13 ms		38.80 ms
14.00 ms	3.60 ms		24.67 ms		33.60 ms		38.13 ms
17.47 ms	0.27 ms		23.73 ms		32.93 ms		37.20 ms
20.93 ms		0.80 ms	20.80 ms		32.27 ms		36.53 ms
23.87 ms		4.13 ms	17.20 ms		31.60 ms		35.60 ms
25.73 ms		8.53 ms	13.33 ms		30.80 ms		34.80 ms
26.93 ms		12.67 ms	8.93 ms		28.40 ms		33.87 ms
28.00 ms		17.33 ms	4.80 ms		25.47 ms		32.80 ms
28.80 ms		21.07 ms	1.07 ms		22.40 ms		31.73 ms
29.87 ms		24.67 ms		0.80 ms	19.47 ms		30.80 ms
30.93 ms		26.53 ms		4.27 ms	16.13 ms		29.87 ms
32.00 ms		27.87 ms		8.13 ms	11.87 ms		28.80 ms
33.07 ms		29.20 ms		11.73 ms	8.13 ms		26.80 ms
33.87 ms		30.53 ms		15.73 ms	4.53 ms		23.73 ms
34.93 ms		31.87 ms		19.73 ms	1.07 ms		20.00 ms
35.73 ms		32.93 ms		22.93 ms		1.47 ms	16.93 ms
36.53 ms		34.00 ms		24.53 ms		4.53 ms	13.07 ms
37.33 ms		34.93 ms		26.13 ms		7.60 ms	9.87 ms
38.40 ms		36.00 ms		27.47 ms		10.67 ms	6.67 ms
39.33 ms		37.07 ms		28.53 ms		14.00 ms	3.20 ms
40.40 ms		37.87 ms		29.73 ms		16.80 ms	0.53 ms

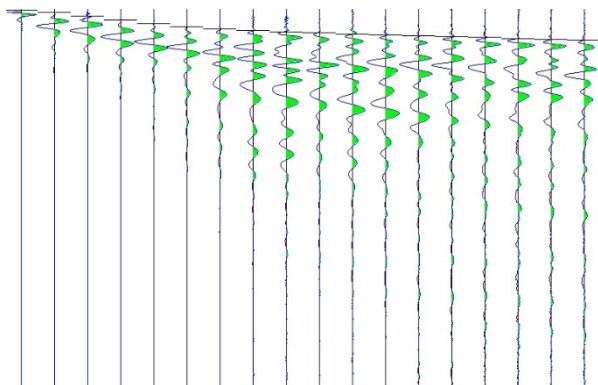
### Tracce sperimentali



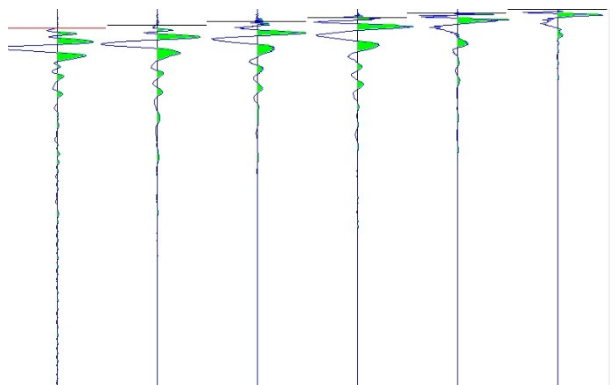
Tracce sperimentali scoppio A diretta



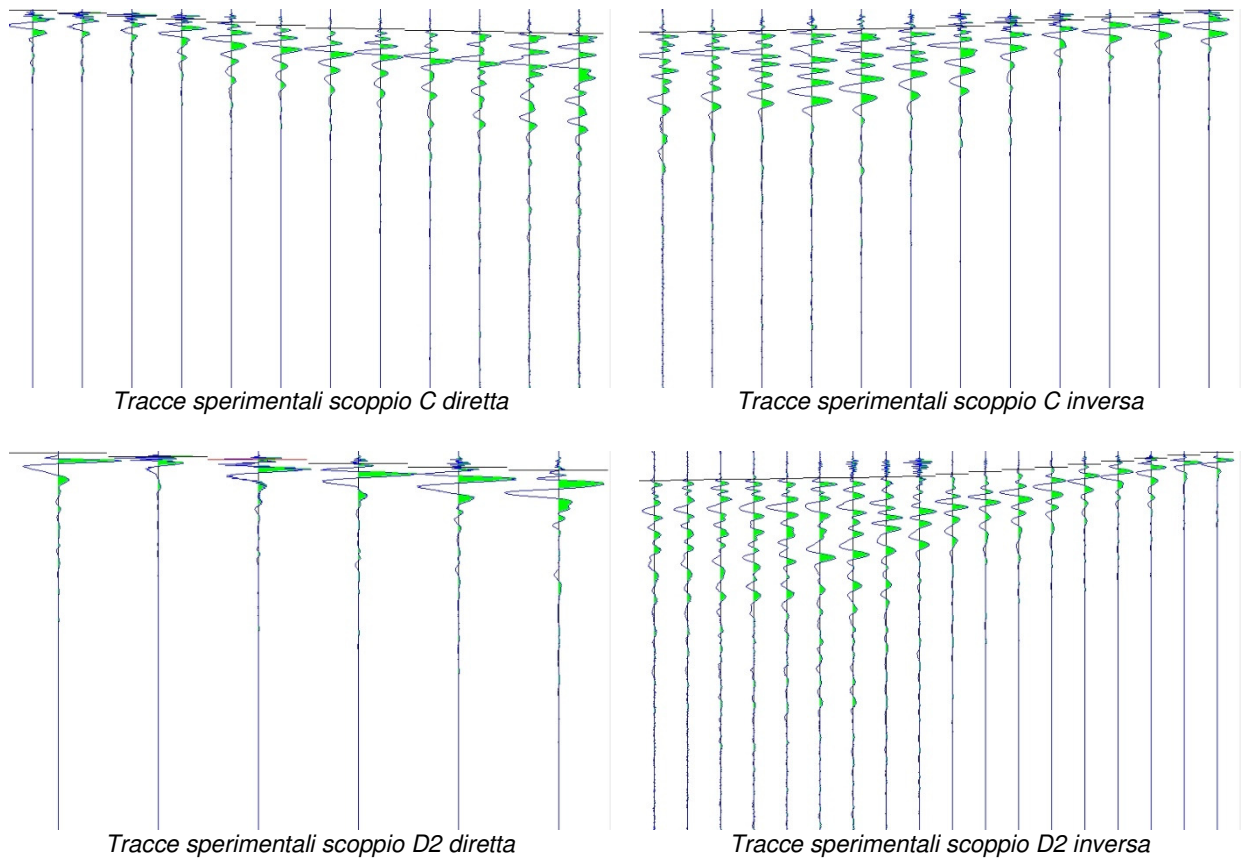
Tracce sperimentali scoppio B inversa



Tracce sperimentali scoppio D1 diretta



Tracce sperimentali scoppio D1 inversa



## VELOCITÀ STRATI

Velocità strato n.1	673.03 m/s
Velocità strato n.2	2214.77 m/s

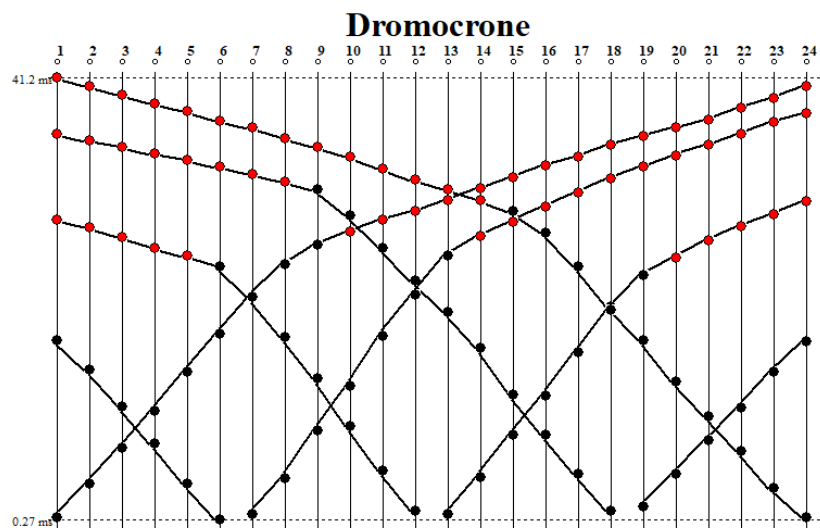


Figura 124: Dromocrone RIFRAZIONE\_13

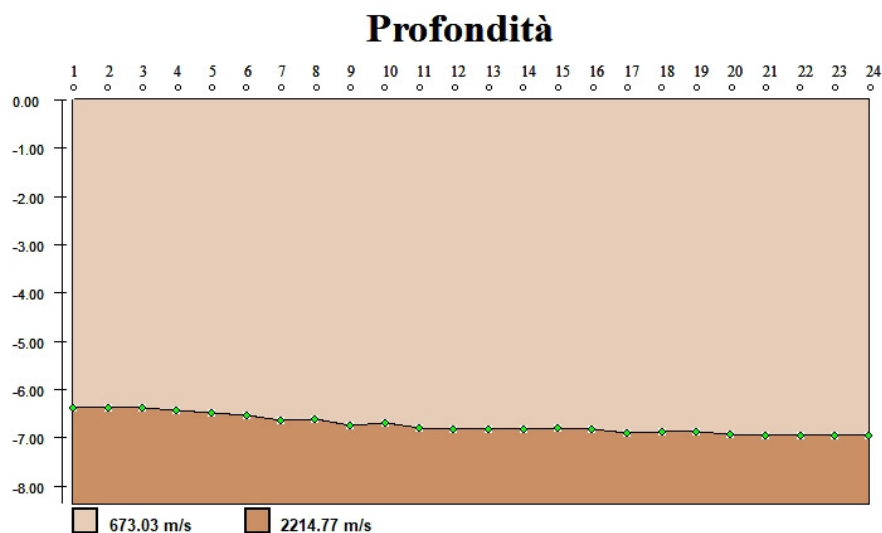
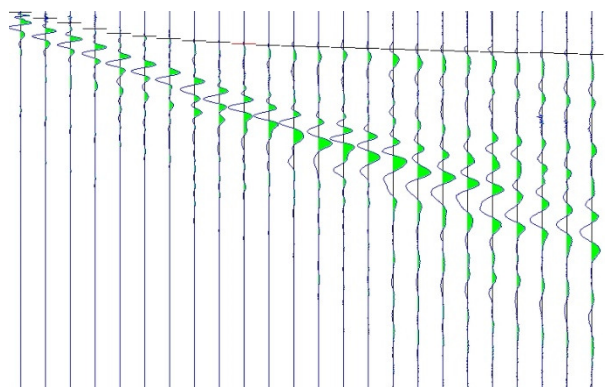
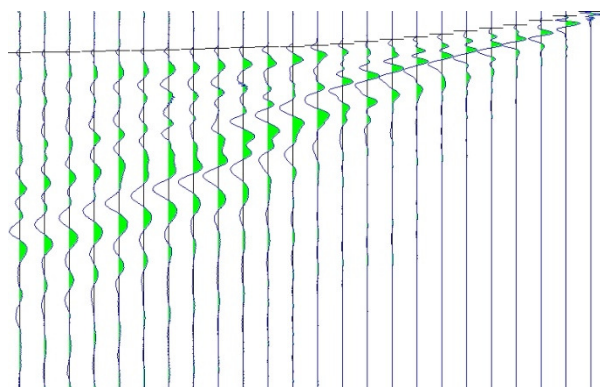
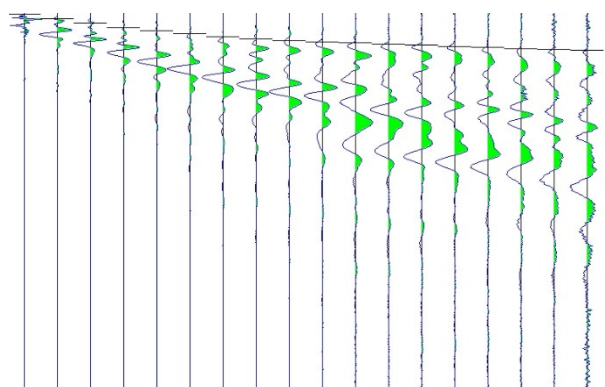
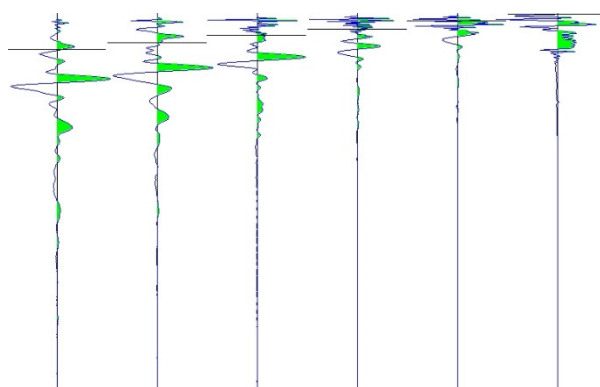
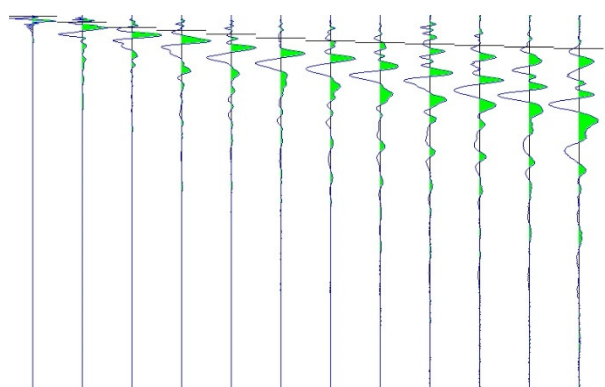
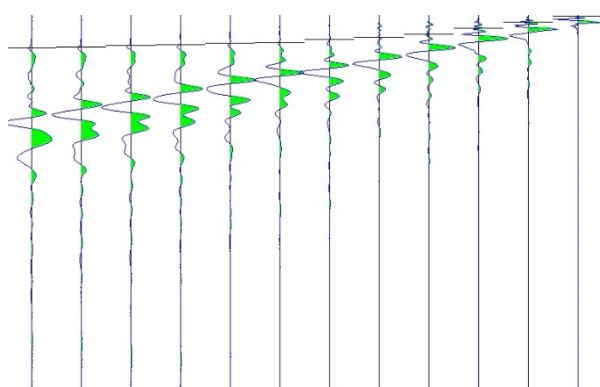
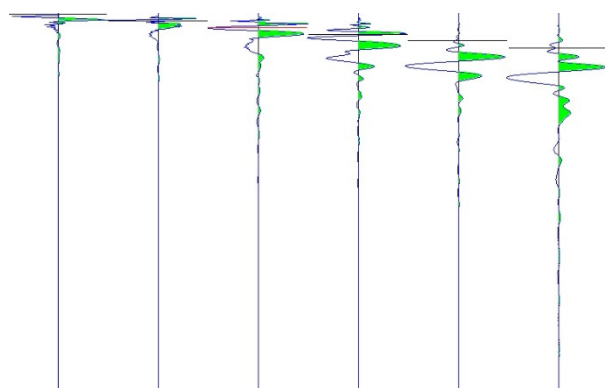
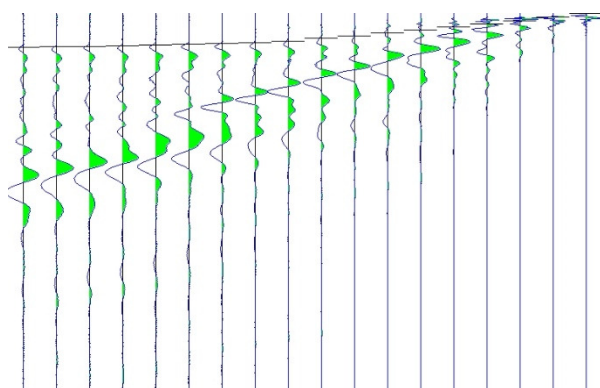


Figura 125: Sezione stratigrafica interpretata RIFRAZIONE\_13

**RIFRAZIONE\_14**

- PRIMI ARRIVI -							
-2.00 mt	11.00 mt [SX]	11.00 mt [DX]	23.00 mt [SX]	23.00 mt [DX]	35.00 mt [SX]	35.00 mt [DX]	48.00 mt
0.67 ms	31.87 ms		40.13 ms		42.27 ms		51.33 ms
8.80 ms	25.73 ms		38.93 ms		41.47 ms		50.67 ms
14.27 ms	19.47 ms		37.60 ms		40.67 ms		50.00 ms
21.33 ms	13.73 ms		36.27 ms		39.73 ms		49.33 ms
27.47 ms	6.80 ms		34.67 ms		39.07 ms		48.67 ms
30.67 ms	0.93 ms		33.20 ms		38.13 ms		48.13 ms
33.33 ms		1.07 ms	30.27 ms		37.33 ms		47.33 ms
36.00 ms		6.27 ms	26.93 ms		36.67 ms		46.53 ms
38.40 ms		12.40 ms	23.73 ms		34.40 ms		45.73 ms
40.53 ms		17.60 ms	16.27 ms		31.07 ms		45.07 ms
42.00 ms		21.33 ms	8.53 ms		28.00 ms		44.27 ms
42.93 ms		25.07 ms	0.93 ms		24.27 ms		43.47 ms
43.87 ms		28.53 ms		1.07 ms	20.40 ms		41.73 ms
44.80 ms		31.87 ms		8.00 ms	17.07 ms		40.13 ms
45.87 ms		33.87 ms		14.53 ms	13.33 ms		37.33 ms
46.67 ms		35.33 ms		18.67 ms	9.60 ms		34.40 ms
47.47 ms		36.80 ms		23.33 ms	4.27 ms		31.33 ms
48.27 ms		38.13 ms		28.40 ms	0.40 ms		28.00 ms
49.20 ms		39.60 ms		32.13 ms		0.80 ms	24.67 ms
50.27 ms		40.80 ms		34.00 ms		6.53 ms	20.80 ms
51.07 ms		42.27 ms		35.87 ms		12.40 ms	16.67 ms
51.73 ms		43.60 ms		37.73 ms		18.53 ms	11.60 ms
52.53 ms		44.93 ms		39.60 ms		24.00 ms	5.73 ms
53.47 ms		46.13 ms		41.20 ms		30.67 ms	0.40 ms

**Tracce sperimentali**

*Tracce sperimentali scoppio A diretta**Tracce sperimentali scoppio B inversa**Tracce sperimentali scoppio D1 diretta**Tracce sperimentali scoppio D1 inversa**Tracce sperimentali scoppio C diretta**Tracce sperimentali scoppio C inversa**Tracce sperimentali scoppio D2 diretta**Tracce sperimentali scoppio D2 inversa*

VELOCITÀ STRATI

Velocità strato n.1	457.11 m/s
Velocità strato n.2	743.82 m/s
Velocità strato n.3	2547.77 m/s

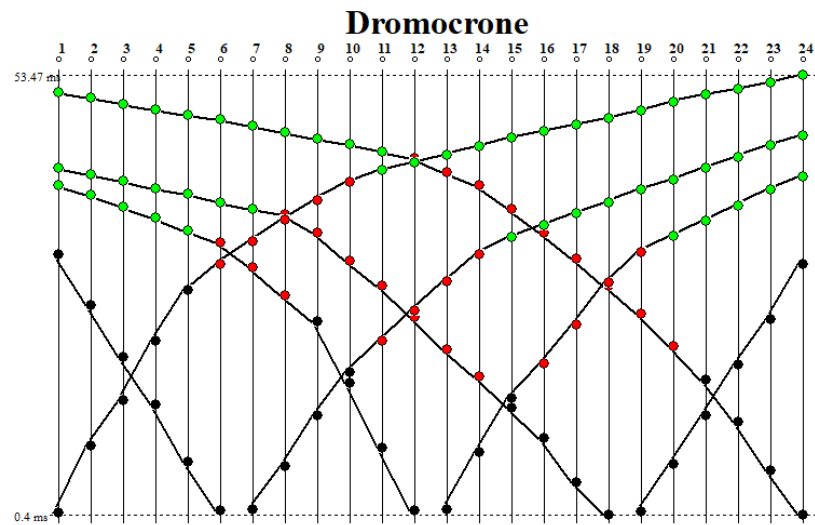


Figura 126: Dromocrone RIFRAZIONE\_14

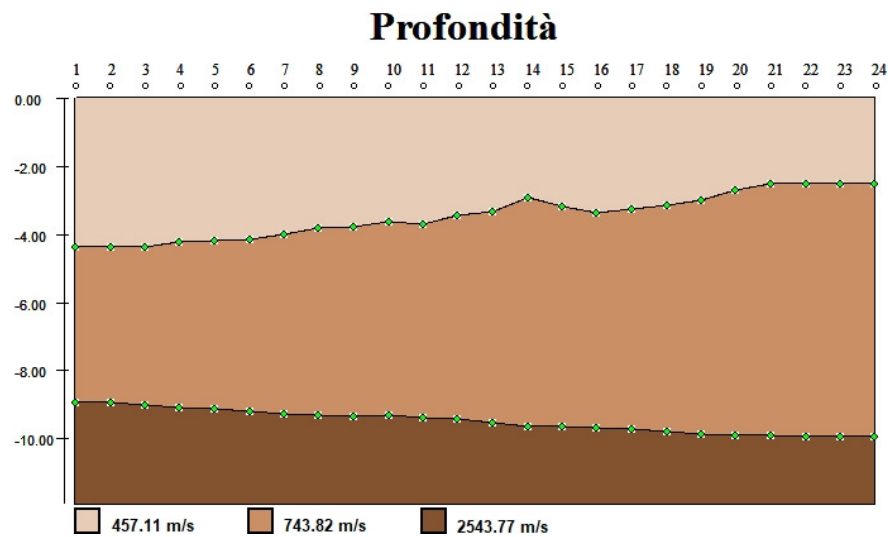


Figura 127: Sezione stratigrafica interpretata RIFRAZIONE\_14

#### 4. REPORT FOTOGRAFICO





*Figura 128: Prospezioni Sismiche MASW\_1 e RIFRAZIONE\_1*



*Figura 129: Prospezioni Sismiche MASW\_2 e RIFRAZIONE\_2*



*Figura 130: Prospezioni Sismiche MASW\_3 e RIFRAZIONE\_3*





*Figura 131: Prospezioni Sismiche MASW\_4 e RIFRAZIONE\_4*



*Figura 132: Prospezioni Sismiche MASW\_5 e RIFRAZIONE\_5*



*Figura 133: Prospezioni Sismiche MASW\_6 e RIFRAZIONE\_6*





Figura 134: Prospezioni Sismiche MASW\_7 e RIFRAZIONE\_7



Figura 135: Prospezioni Sismiche MASW\_8 e RIFRAZIONE\_8



Figura 136: Prospezioni Sismiche MASW\_9 e RIFRAZIONE\_9





*Figura 137: Prospezioni Sismiche MASW\_10 e RIFRAZIONE\_10*



*Figura 138: Prospezioni Sismiche MASW\_11 e RIFRAZIONE\_11*



*Figura 139: Prospezioni Sismiche MASW\_12 e RIFRAZIONE\_12*



*Figura 140: Prospezioni Sismiche MASW\_13 e RIFRAZIONE\_13*



*Figura 141: Prospezioni Sismiche MASW\_14 e RIFRAZIONE\_14*

*Barcellona Pozzo di Gotto, Aprile 2021*

## **I Relatori**

*Dott. Geologo Francesco Munafò*

*Dott. Geologo Alberto Fortunato De Salvatore*