

Foglio Campagna acquisizione RIFRAZIONE/MASW

Campagna	Monteleone di Fermo	Data	16-09-2017
Profilo	Masw - Via Roma	Operatore	M. La Corte
Strumento	Ambrogeo Echo24	Condizioni Meteo	Sereno
Sorgente	mazza battente	Formato Dati	Sgy-Sg2
Frequenza Geofoni	4,5 Hz	Spaziatura Geofoni	2 m
Freq. Campionamento	0.478 ms	Lungh. registrazione	1000 ms
Coordinate			
Inizio Profilo		Fine Profilo	
Latitudine	380184.46 m E	Latitudine	380189.33 m E
Longitudine	4767202.96 m N	Longitudine	4767156.76 m N
Quota	426		427

Mappa



Foto



Schema geometria

Energizzazioni: 04 Ricevitori 24

Energiz. N°	Posizione Energiz.	Nome file	Posizioni Ricevitori	Tracce inattive	Note (Rumore, Energ. singola, stack Energ.)
1	-2 m	01	0-46 m	0	6
2	-4 m	02	0-46 m	0	6
3	-10 m	03	0-46 m	0	6
4	48 m	04	0-46 m	0	6
5	52 m	05	0-46 m	0	6
6	60 m	06	0-46 m	0	6

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Interpretazione dei risultati

Frequenza finale

Frequenza iniziale

60 Hz

02 Hz

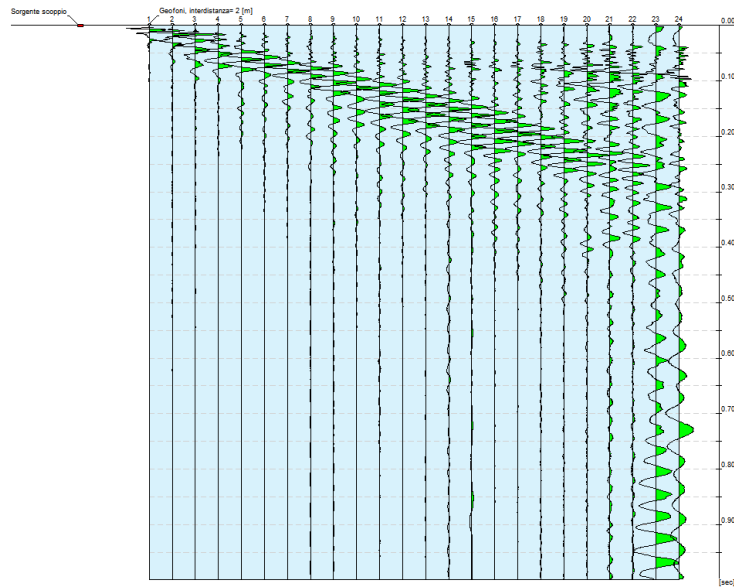


Fig. 6: Tracce sperimentali

Freq. [Hz]	V. fase [m/s]	Std. Dev % proporzional
31.61	481.58	48.16
32.20	449.15	44.91
32.94	410.82	41.08
33.67	378.39	37.84
34.26	345.96	34.60
34.85	313.52	31.35
35.88	286.99	28.70
37.05	269.30	26.93
38.38	251.61	25.16
39.70	242.76	24.28
41.46	233.92	23.39
43.23	222.13	22.21
44.84	222.13	22.21
46.76	216.23	21.62
48.08	210.33	21.03
49.40	210.33	21.03
51.31	207.38	20.74
52.49	210.33	21.03

Tab.3: Curva di dispersione ed intervallo di confidenza.

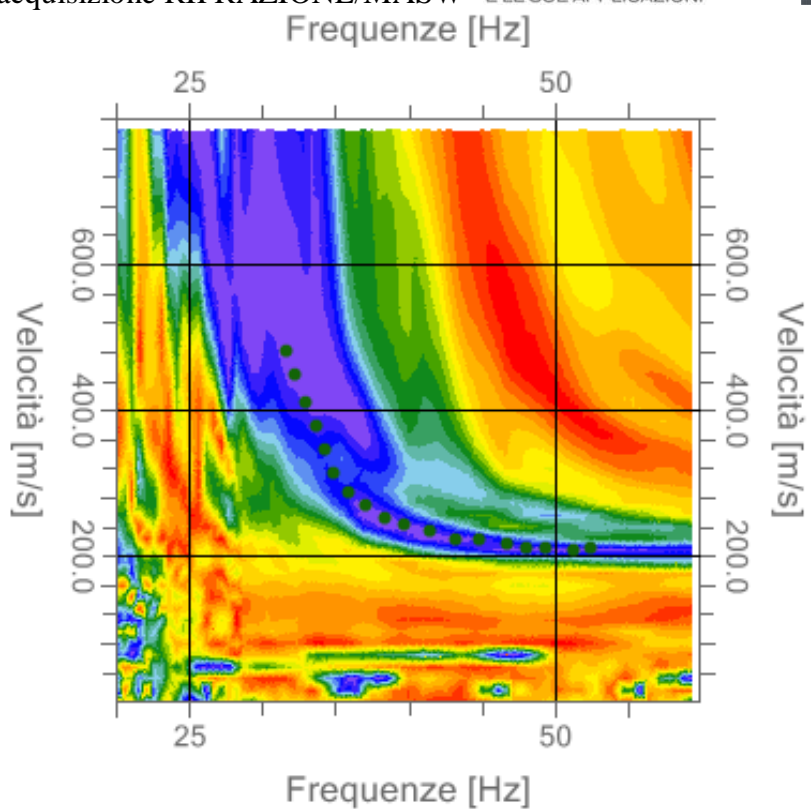


Fig. 7: Spettro velocità di fase.

ANALISI CONGIUNTA ONDE DI RAYLEIGH E ONDE DI LOVE + HVSR

INVERSION SETTINGS – First step model		
Type of inversion algorithm	Global optimization - Monte Carlo sampling	
Number of iterations	100	
Initial population	100	
Perturbation range	10% (firsts model) – 5% (second mode)	
Low parameters zone	Allows low velocity zones to exist (LVZ) for Vs	Yes
	Allows low velocity zones to exist (LVZ) for Vp	Yes
	Maximum Vs for half space	Yes
Wave parameters	Rayleigh wave modes	5
	Love wave modes	5
	Minimum number of samples	1000
	Maximum number of samples	2000
	Regularization factor	0.01

INVERSION SETTINGS – second step model		
Type of inversion algorithm	Global optimization - Modified Simulated Annealing	
Number of iterations	100	
Number of Reheatings	0	
Number of last iterations	100	
Initial population	50	
Perturbation range	5% (firsts model)	
Initial temperature	relative misfit increment	0.5
	probability of acceptance	0.5
Cooling schedule	temperature ratio	0.9
Low parameters zone	Allows low velocity zones to exist (LVZ) for Vs	Yes
	Allows low velocity zones to exist (LVZ) for Vp	Yes
	Maximum Vs for half space	Yes
Wave parameters	Rayleigh wave modes	5
	Love wave modes	5
	Minimum number of samples	1000
	Maximum number of samples	2000
	Regularization factor	0.01

Inversione congiunta HV+MASW

Spessore min (m)	Spessore max (m)	VP min (m/sec)	VP max (m/sec)	VS min (m/sec)	VS max (m/sec)	Density min (kg/m ³)	Density max (kg/m ³)	Poisson ratio min	Poisson ratio max
1	2	300	500	150	300	1850	1950	0.15	0.45
2	4	400	800	200	500	1850	2000	0.15	0.45
2	6	500	1100	200	600	1900	2050	0.15	0.45
5	10	600	1500	250	800	1900	2100	0.15	0.45
10	20	800	2000	350	900	1950	2200	0.15	0.45
20	40	800	2200	450	1200	2000	2300	0.15	0.45
semispazio	-	1000	2500	600	1400	2000	2400	0.015	0.45

Tab.4: Parametri di input per la modellazione.

PRIMA MODELLAZIONE

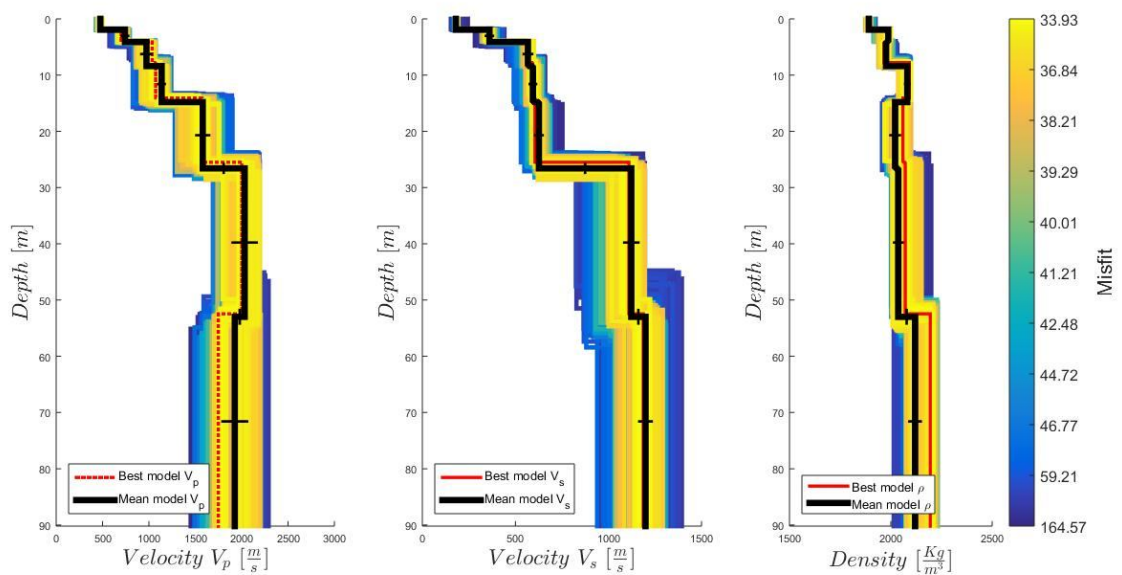
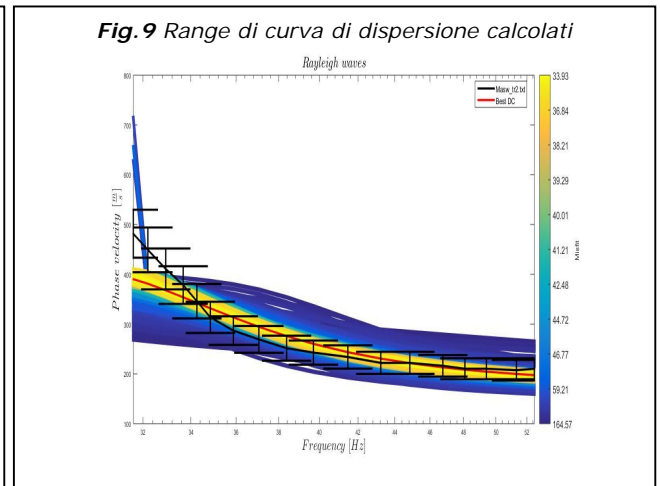
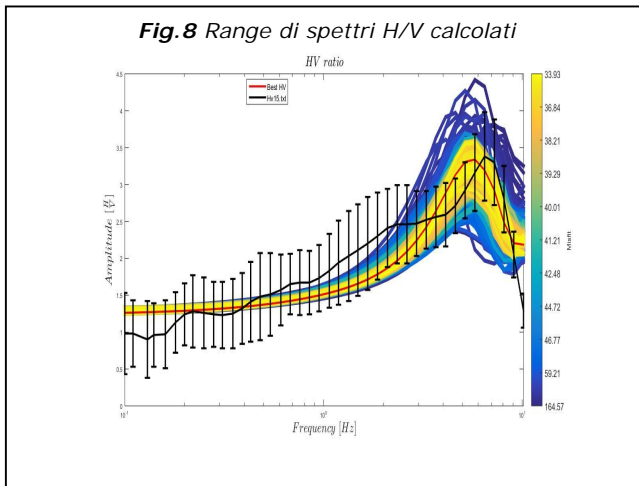


Fig. 10: range di velocità P, S e densità calcolati

Inversione congiunta HV+MASW

Fig. 11 best fitting H/V

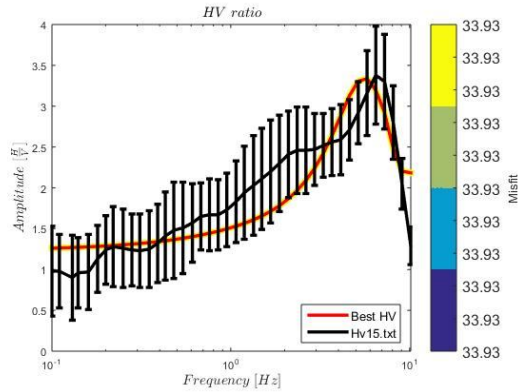


Fig. 12 best fitting curva di dispersione

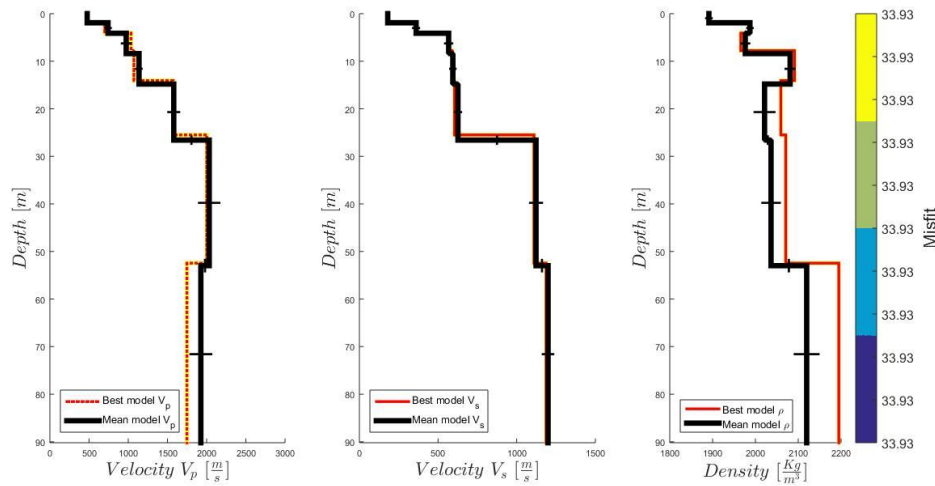
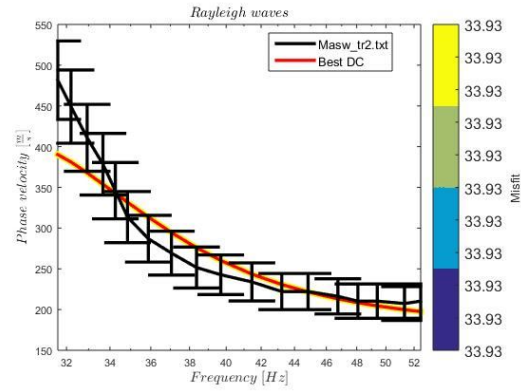


Fig. 13: best fitting velocità P, S e densità calcolati

Fig. 14 risultati modellazione

Inversion report

Method Inversion : Modified SA
Number of Iterations : 400
Number of reheatings : 0
Number of last iterations : 100

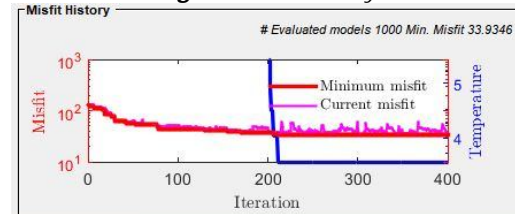
Initial Temperature : 5.5224
Final Temperature : 3.6233
Temperature ratio : 0.9
Perturbation range : 5%

Models evaluated : 1000
Valid models : 1000
Models for statistics : 100

Maximum misfit : 164.5737
Minimum misfit : 33.9346

Total time : 396.7784
Avg time per model : 0.39149

Fig. 15 Misfit History



Inversione congiunta HV+MASW

Spessore (m)	Profondità (m)	VP (m/sec)	VS (m/sec)	Density (kg/m ³)
2.0	2.0	475.6	185.8	1892.0
2.1	4.1	700.8	364.2	1985.0
3.7	7.8	1036.0	572.8	1966.0
6.3	14.1	1072.0	592.4	2091.0
11.4	25.5	1573.0	605.3	2059.0
27.0	52.5	2001.0	1110.0	2071.0
semispazio	-	1748	1187	2195

Tab.5: Parametri di output modello 1.

SECONDA MODELLAZIONE

Fig. 16 Range di spettri H/V calcolati

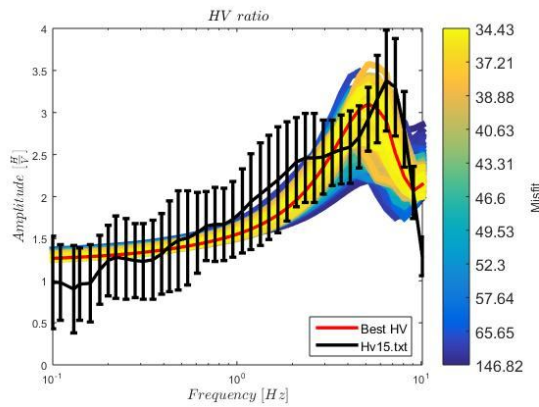


Fig. 17 Range di curva di dispersione calcolati

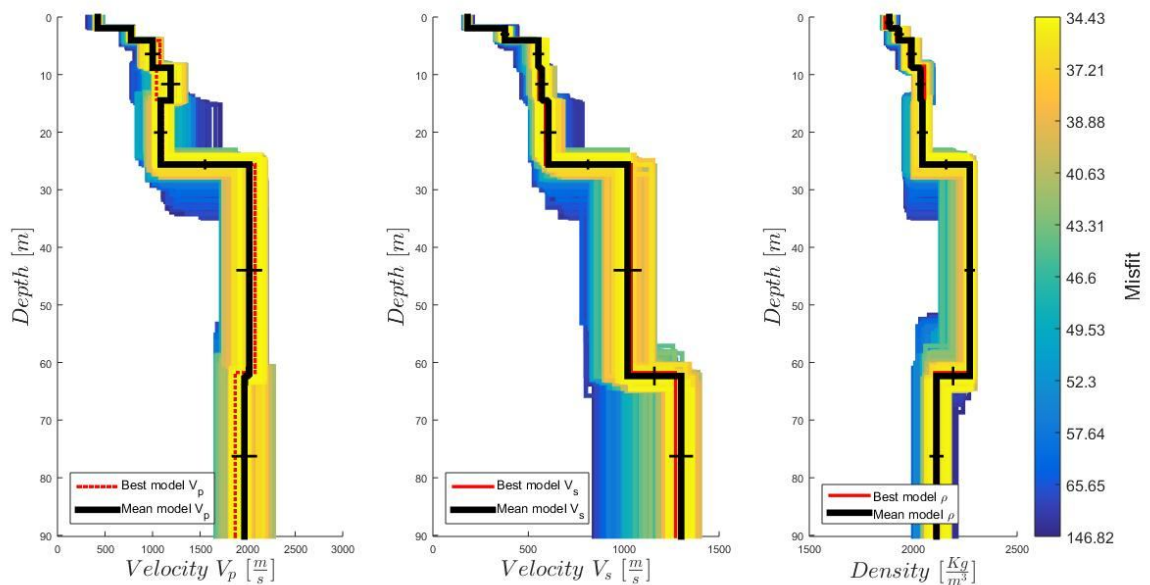
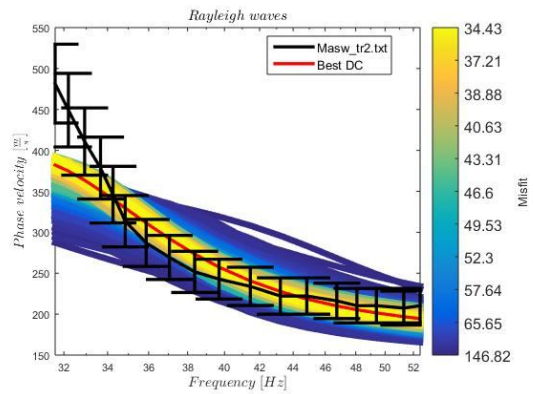


Fig. 18: range di velocità P, S e densità calcolati

Inversione congiunta HV+MASW

Fig.19 best fitting H/V

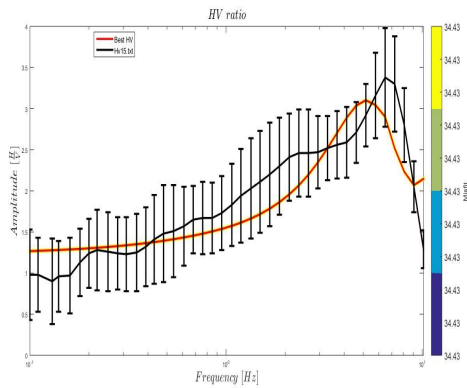


Fig.20 best fitting curva di dispersione

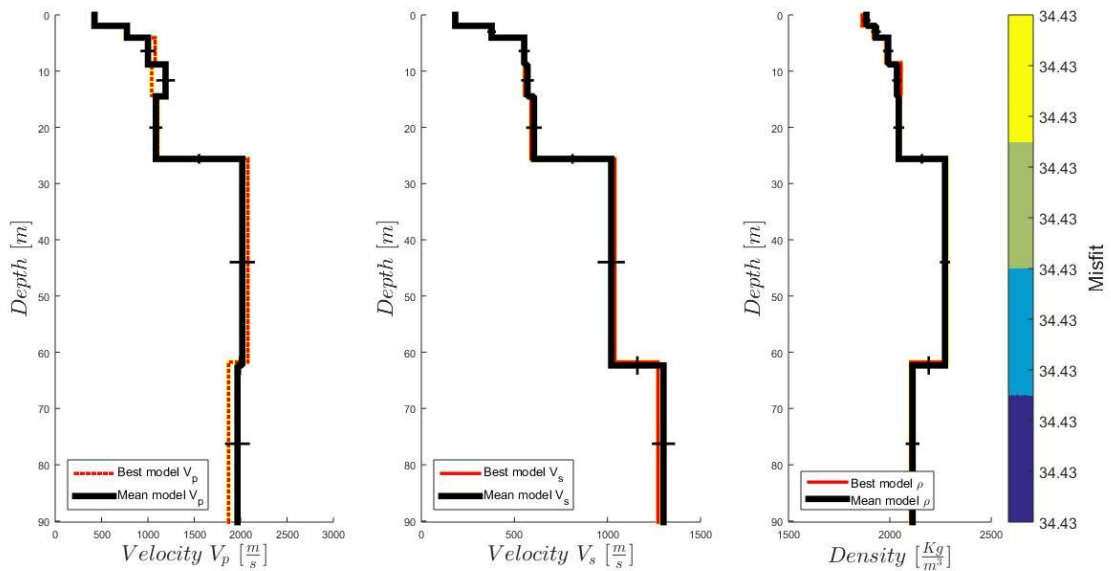
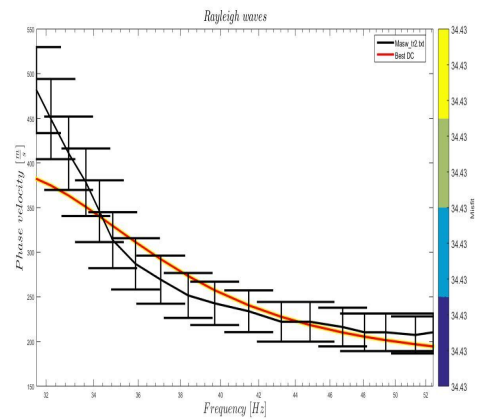


Fig. 21: best fitting velocità P, S e densità calcolati

Fig.22 risultati modellazione

Inversion report

Method Inversion : Modified SA
Number of Iterations : 400
Number of reheatings : 0
Number of last iterations : 100

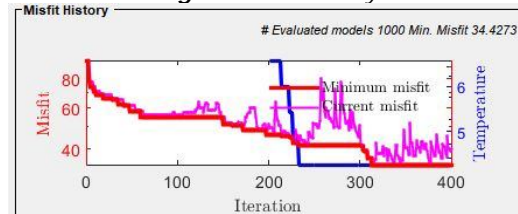
Initial Temperature : 6.6703
Final Temperature : 4.3764
Temperature ratio : 0.9
Perturbation range : 5%

Models evaluated : 1000
Valid models : 1000
Models for statistics : 100

Maximum misfit : 146.8169
Minimum misfit : 34.4273

Total time : 417.8935
Avg time per model : 0.41243

Fig.23 Misfit History



Inversione congiunta HV+MASW

Spessore (m)	Profondità (m)	VP (m/sec)	VS (m/sec)	Density (kg/m ³)
2.0	2.0	429.0	183.5	1864.0
2.1	4.1	759.9	370.9	1918.0
4.5	8.5	1078.0	554.1	1981.0
5.8	14.3	1041.0	555.3	2055.0
11.3	25.6	1107.0	589.0	2050.0
36.2	61.7	2078.0	1039.0	2280.0
semispazio	-	1870.0	1271.0	2103.0

Tab.6: Parametri di output modello 2.

TERZA MODELLAZIONE

Fig.24 Range di spettri H/V calcolati

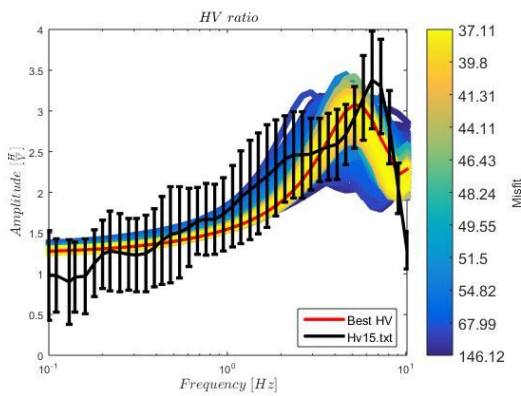


Fig.25 Range di curva di dispersione calcolati

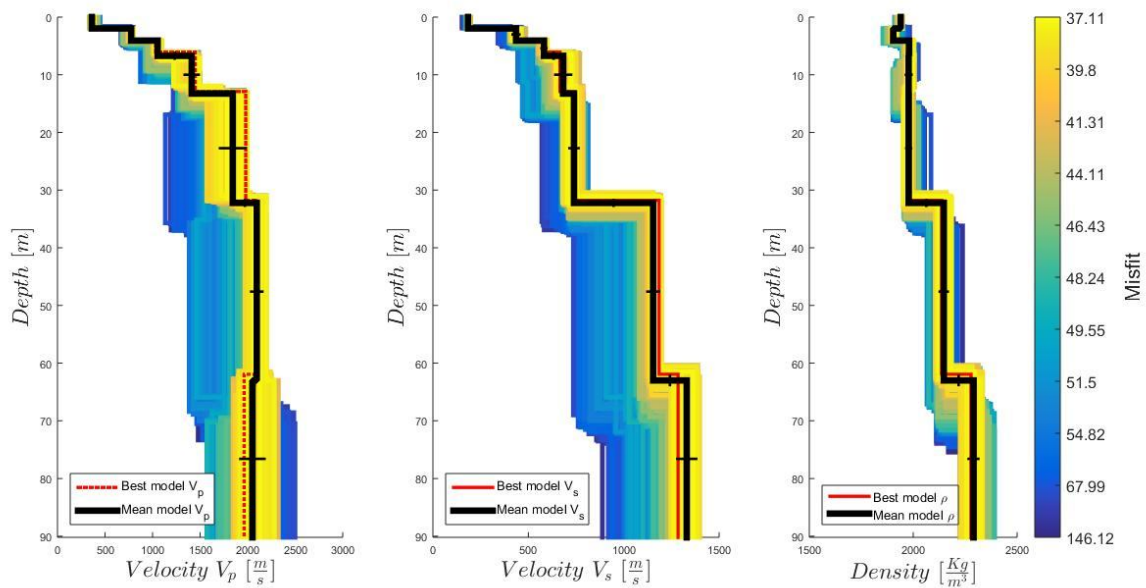
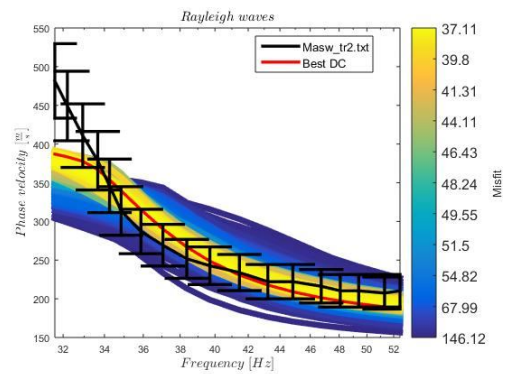


Fig. 26: range di velocità P, S e densità calcolati

Inversione congiunta HV+MASW

Fig.27 best fitting H/V

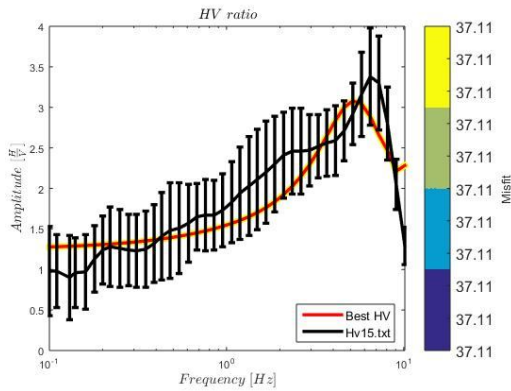


Fig.28 best fitting curva di dispersione

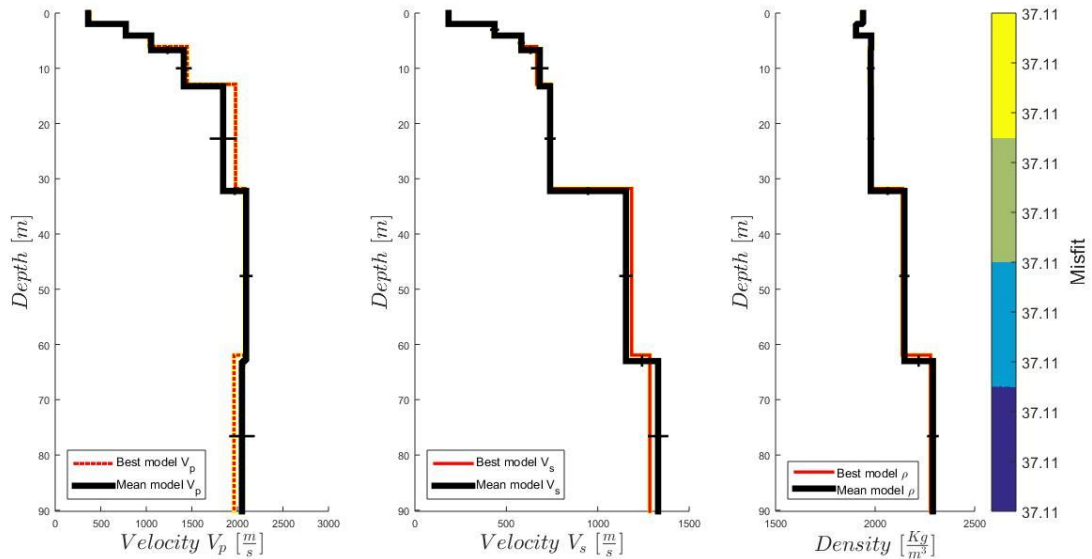
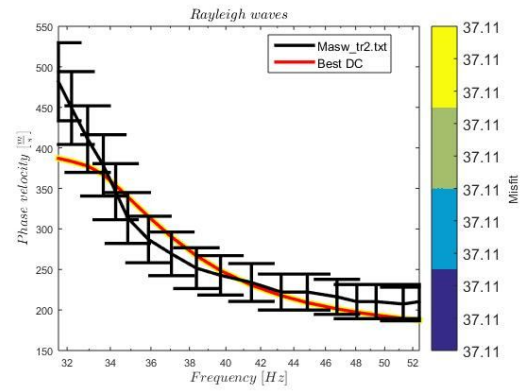


Fig. 29: best fitting velocità P, S e densità calcolati

Fig.30 risultati modellazione

Inversion report

Method Inversion : Modified SA
Number of Iterations : 400
Number of reheatings : 0
Number of last iterations : 100

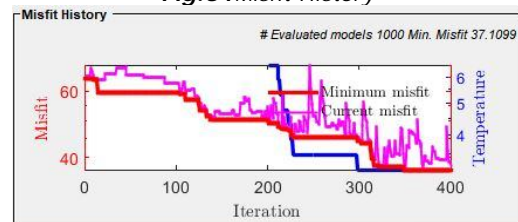
Initial Temperature : 7.2857
Final Temperature : 3.1278
Temperature ratio : 0.9
Perturbation range : 5%

Models evaluated : 1000
Valid models : 1000
Models for statistics : 100

Maximum misfit : 148.1243
Minimum misfit : 37.1099

Total time : 459.8136
Avg time per model : 0.45317

Fig.31 Misfit History



Spessore (m)	Profondità (m)	VP (m/sec)	VS (m/sec)	Density (kg/m ³)
2.0	2.0	380.5	180.4	1931.0
2.0	4.0	779.5	427.8	1905.0
2.0	6.1	1032.0	574.5	1986.0
6.8	12.9	1449.0	666.1	1971.0
18.9	31.8	1980.0	739.4	1981.0
30.2	61.9	2081.0	1185.0	2137.0
semispazio	-	1963.0	1285.0	2278.0

Tab. 7: Parametri di output modello 3.

SINTESI DEI PARAMETRI DI OUTPUT MEDI DELLA MODELLAZIONE

Spessore min (m)	Spessore max (m)	Profondità min(m)	Profondità max(m)	VP min (m/sec)	VP max (m/sec)	VS min (m/sec)	VS max (m/sec)	Density min (kg/m ³)	Density max (kg/m ³)
2.0	2.0	2.0	2.0	380.5	475.6	180.4	185.8	1864.0	1931.0
2.0	2.1	4.0	4.1	700.8	779.5	364.2	427.8	1905.0	1985.0
2.0	4.5	6.1	8.5	1032.0	1078.0	554.1	574.5	1966.0	1986.0
5.8	6.8	12.9	14.3	1041.0	1449.0	555.3	666.1	1971.0	2091.0
11.3	18.9	25.5	31.8	1107.0	1980.0	589.0	739.4	1981.0	2059.0
27.0	36.2	52.5	61.9	2001.0	2081.0	1039.0	1185.0	2071.0	2280.0
semispazio	semispazio	-	-	1748.0	1963.0	1187.0	1285.0	2103.0	2278.0

Tab. 8: Parametri di output medi sulle modellazioni effettuate.