

# **ALLEGATO N. 1**

**Prove geognostiche/geofisiche di nuova realizzazione**

Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 02/09/2021

Site: Gambettola - microzonazione - Test: CPTE 1

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 1

Location: CPTE 1

Date: 02/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 280

Ground level [cm]: 0

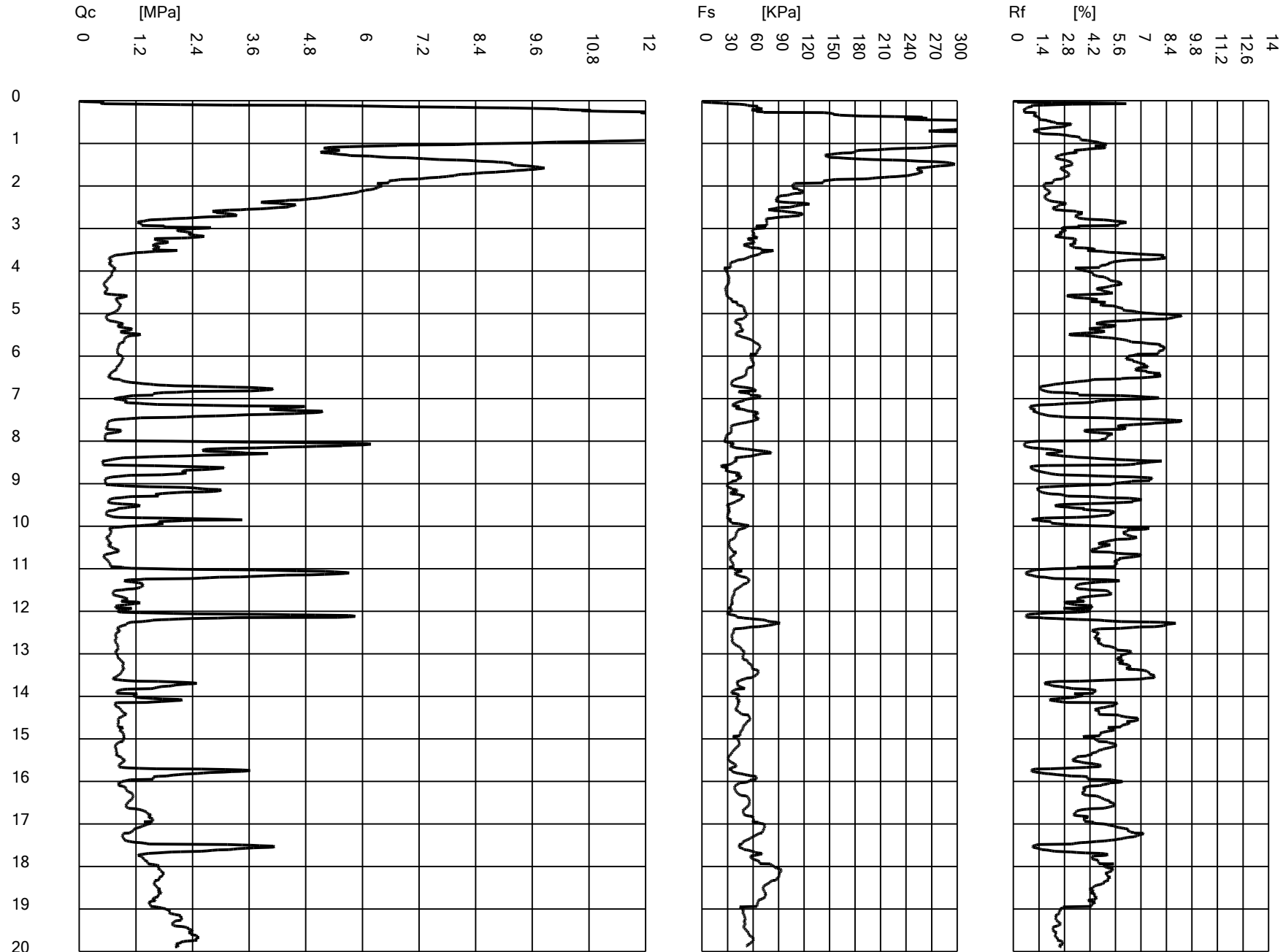
Latitude: 44.123156

Longitude: 12.338577

Operator:

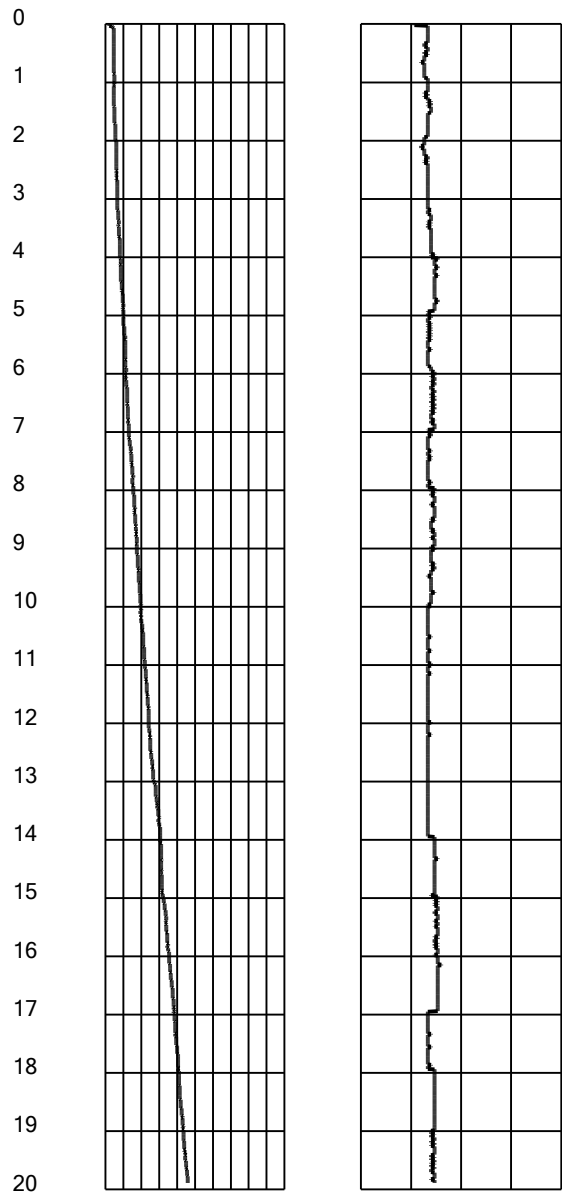
Comments:

Probe code: MKS728





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
0 0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0 4.4 4.8 5.2 5.6 6.0



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 02/09/2021

Site: Gambettola - microzonazione - Test: CPTE 2

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 2

Location: CPTE 2

Date: 02/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 290

Ground level [cm]: 0

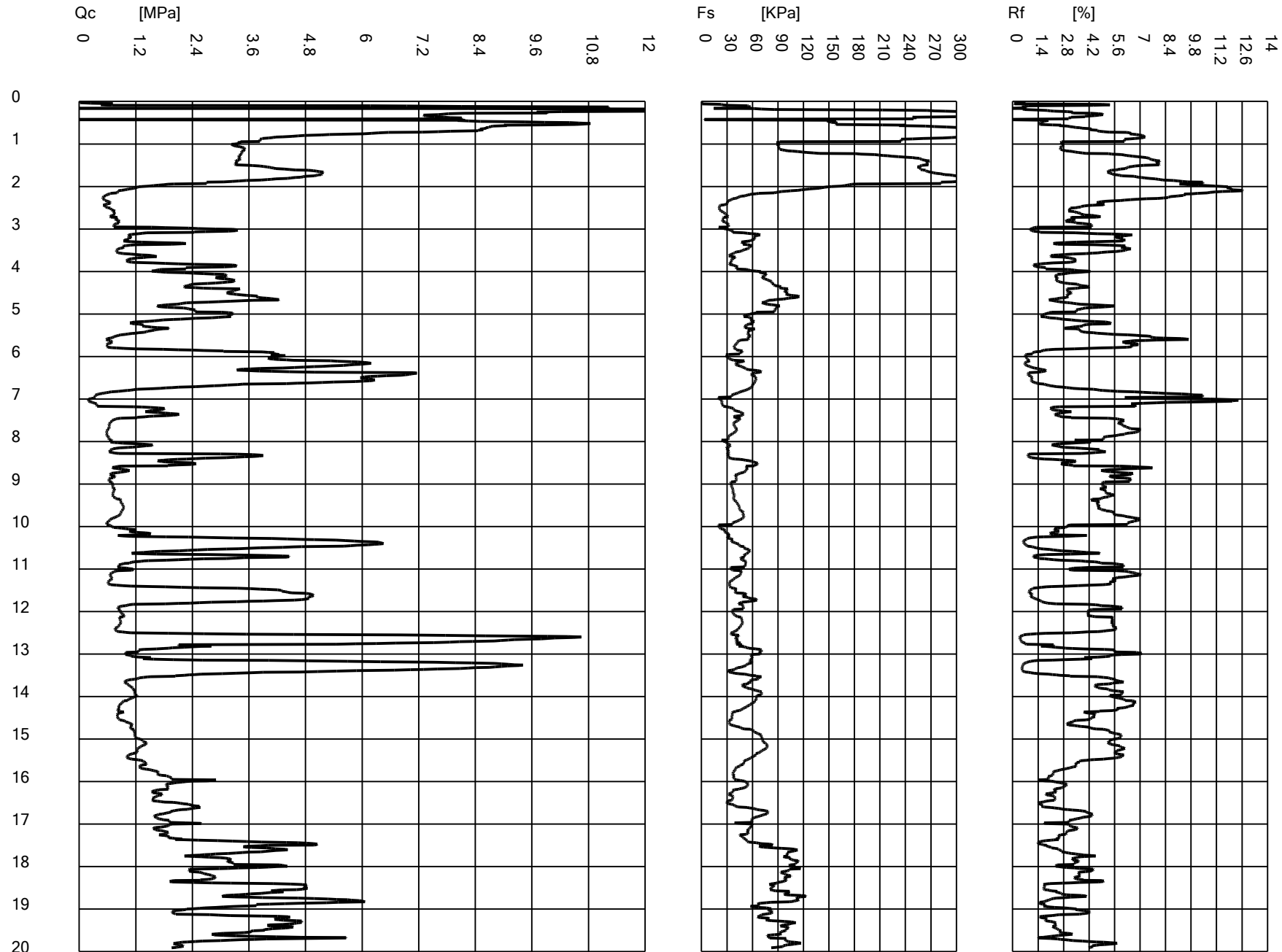
Latitude: 44.119328

Longitude: 12.341103

Operator:

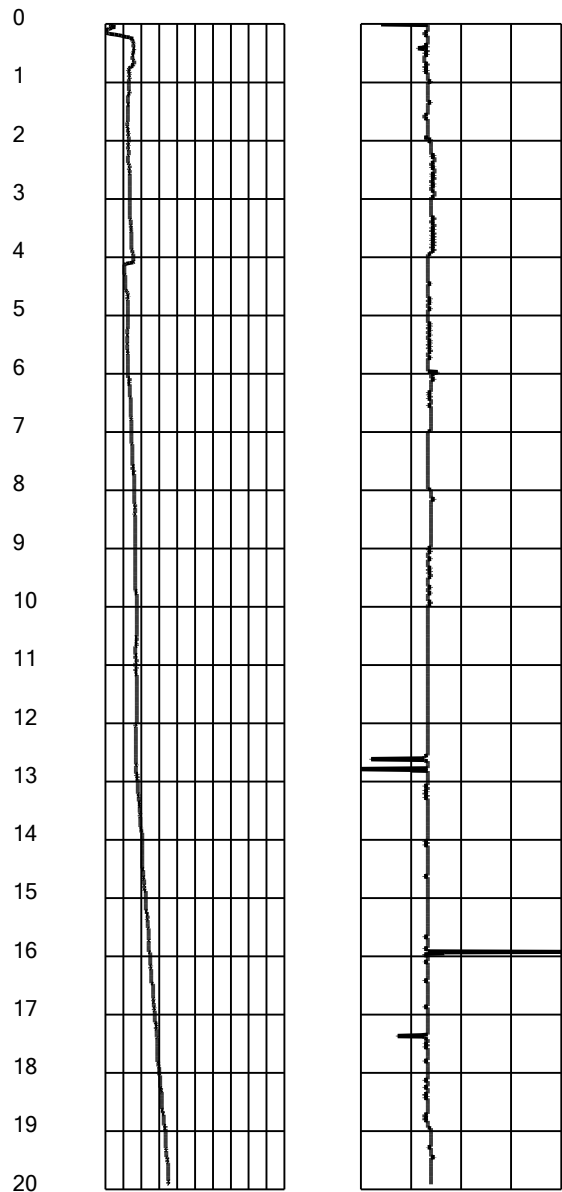
Comments:

Probe code: MKS728





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
0 0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0 4.4 4.8 5.2 5.6 6.0



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 02/09/2021

Site: Gambettola - microzonazione - Test: CPTE 3

## Company information

Name: Intergeo srl  
Address: Strada Acquasalata, 9  
Zip code:  
City: Serravalle  
P.IVA: C.O.E: SM 21197  
E-Mail: info@intergeosm.com  
Phone number:  
Fax number:

## Site information

Name: Gambettola - microzonazione  
Date: 02/09/2021  
Commissioner: Copioli Carlo  
Locality:

## Test information

Name: CPTE 3  
Location: CPTE 3  
Date: 02/09/2021  
Prehole mode:  
Prehole depth [cm]: 0  
Hydrostatic line [cm]: 260  
Ground level [cm]: 0  
Latitude: 44.117050  
Longitude: 12.336948  
Operator:  
Comments:  
Probe code: MKS728

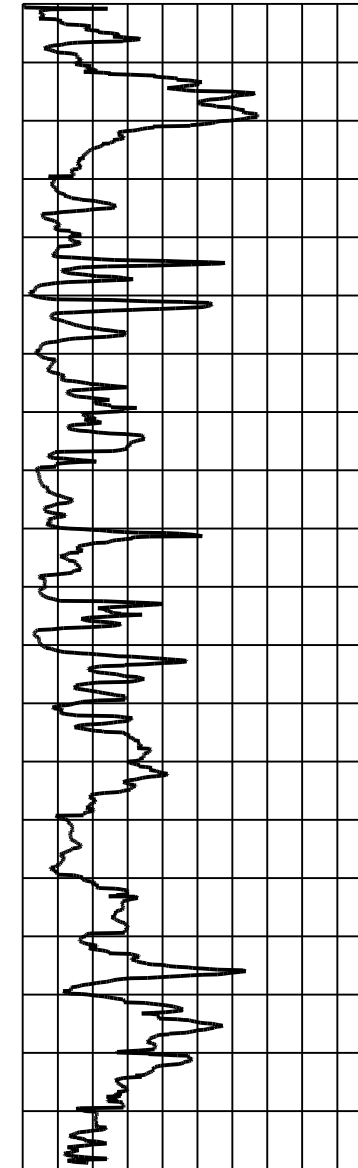
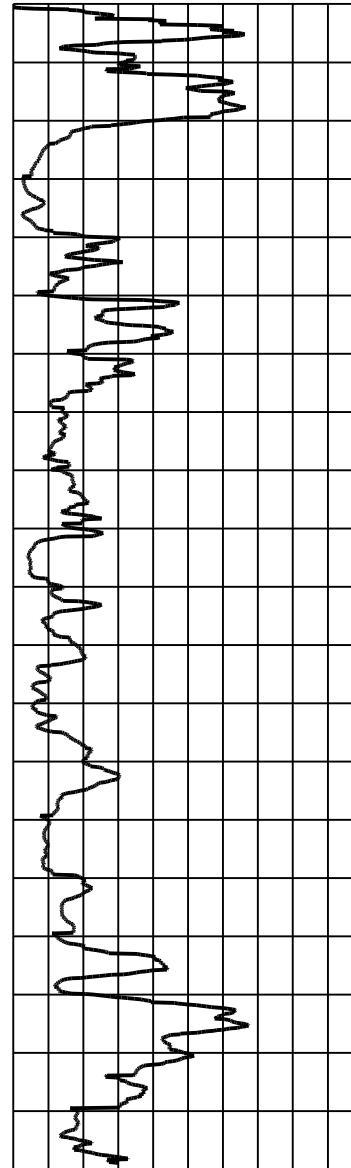
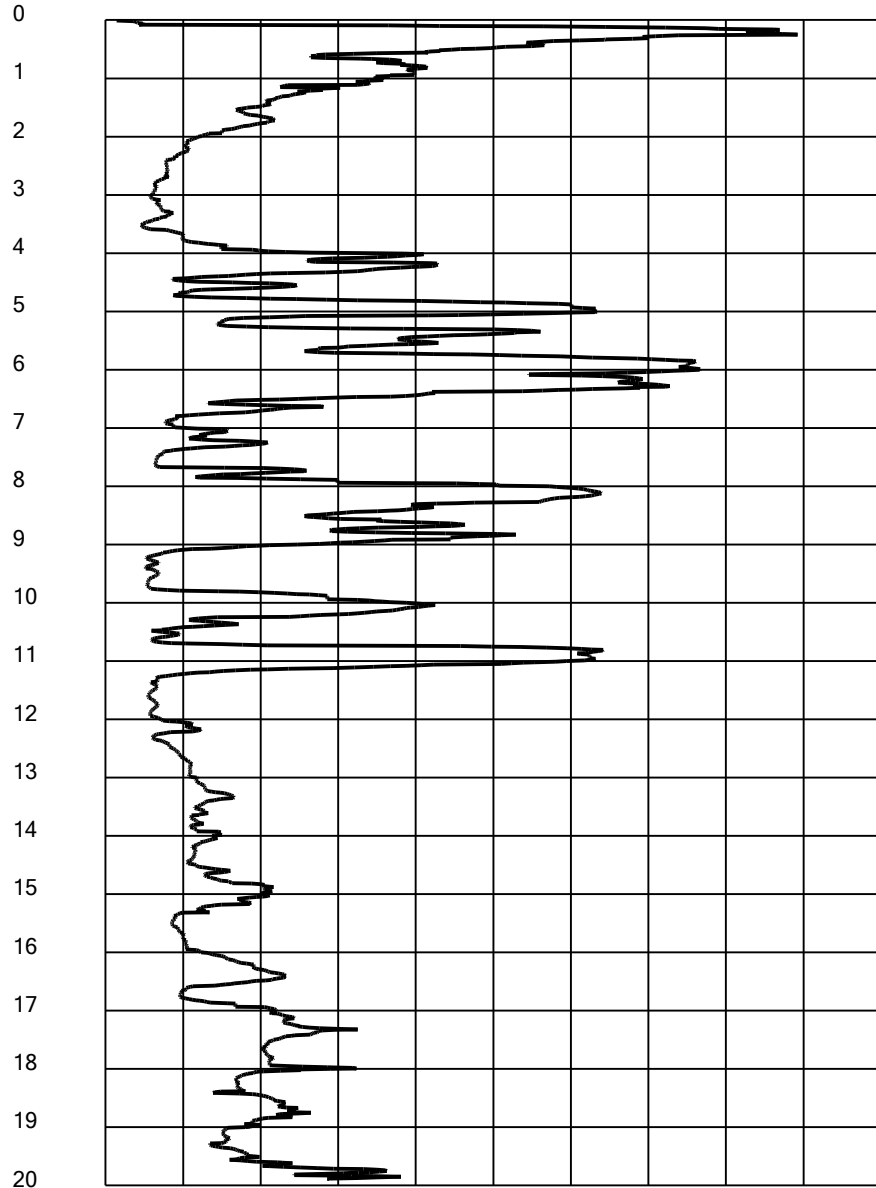




Qc [MPa]  
0 1.2 2.4 3.6 4.8 6 7.2 8.4 9.6 10.8 12

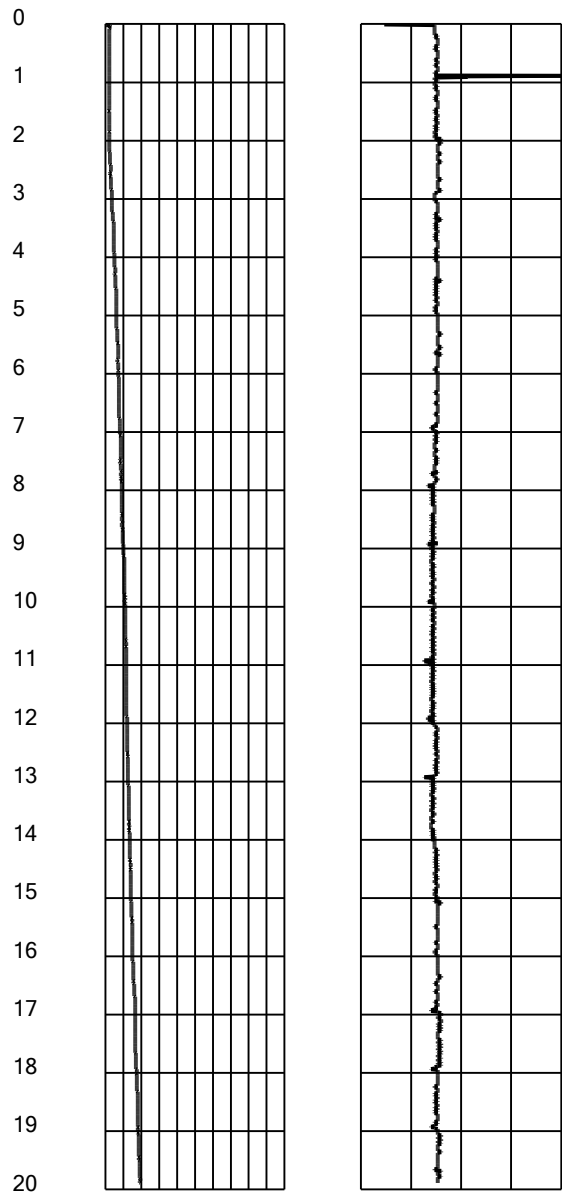
Fs [KPa]  
0 30 60 90 120 150 180 210 240 270 300

Rf [%]  
0 1.4 2.8 4.2 5.6 7 8.4 9.8 11.2 12.6 14





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 02/09/2021

Site: Gambettola - microzonazione - Test: CPTE 4

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 4

Location: CPTE 4

Date: 02/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 270

Ground level [cm]: 0

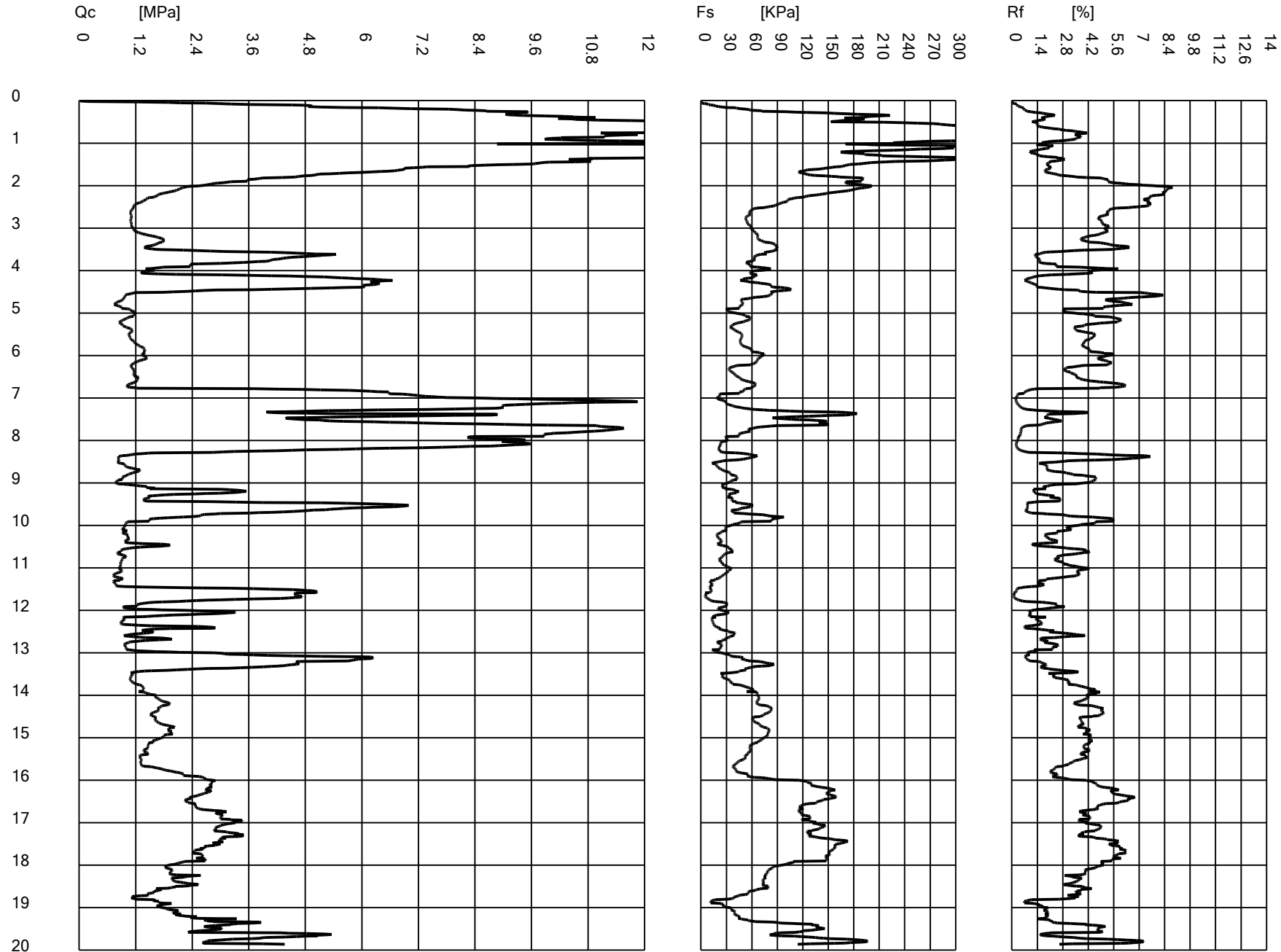
Latitude: 44.115949

Longitude: 12.345532

Operator:

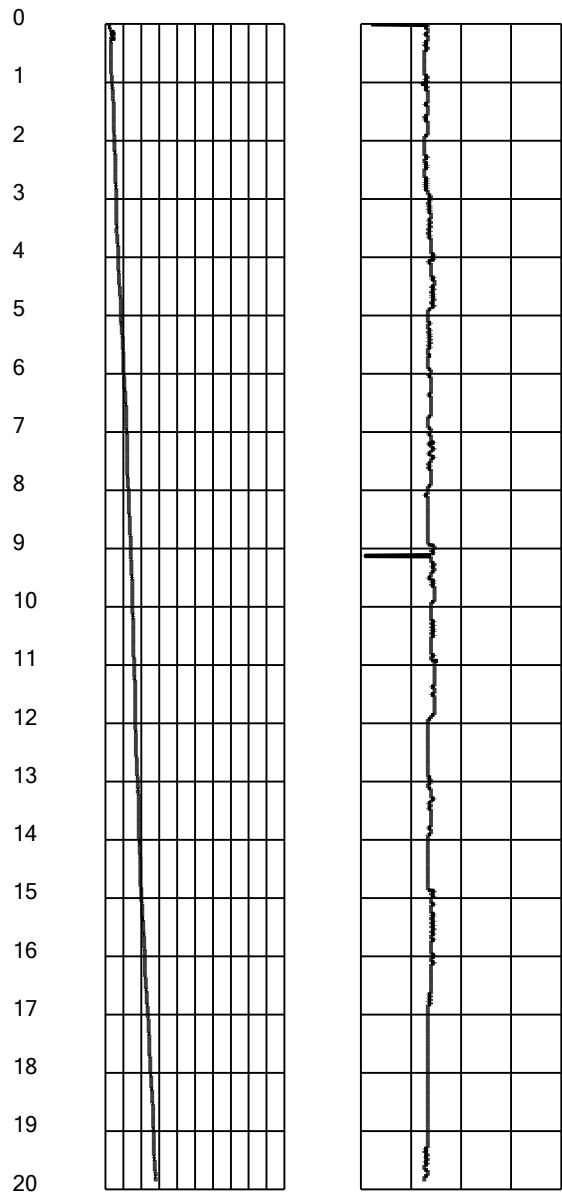
Comments:

Probe code: MKS728





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 02/09/2021

Site: Gambettola - microzonazione - Test: CPTE 5

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 5

Location: CPTE 5

Date: 02/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 230

Ground level [cm]: 0

Latitude: 44.107321

Longitude: 12.336438

Operator:

Comments:

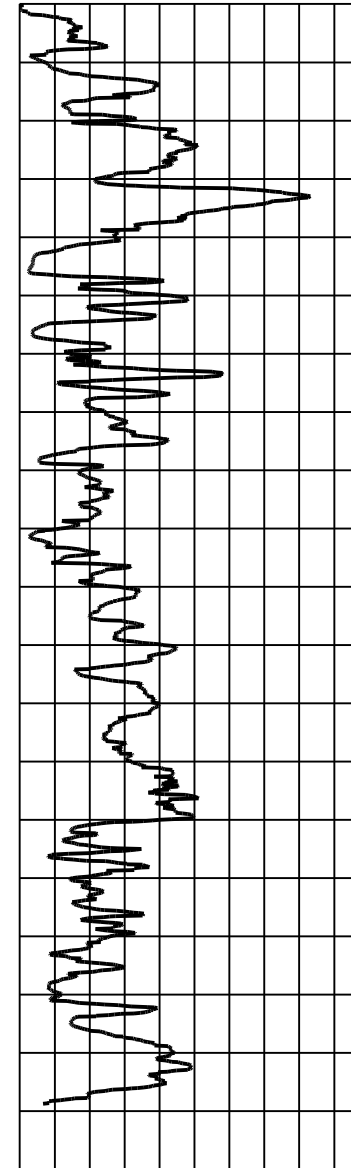
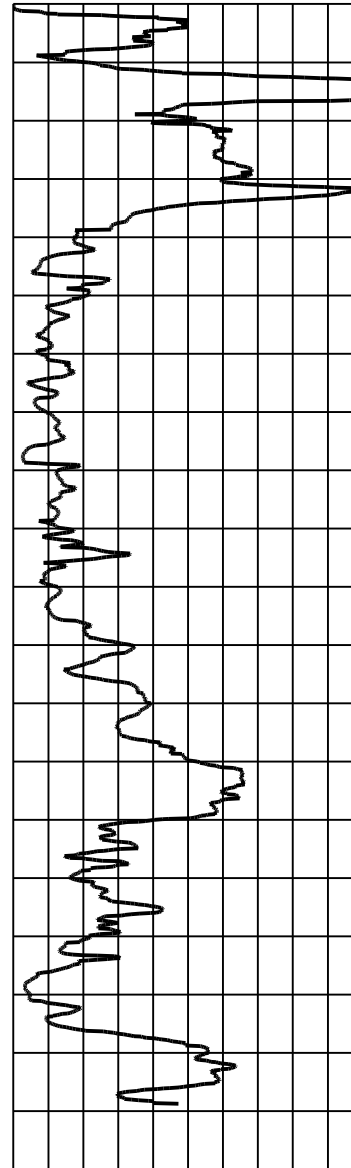
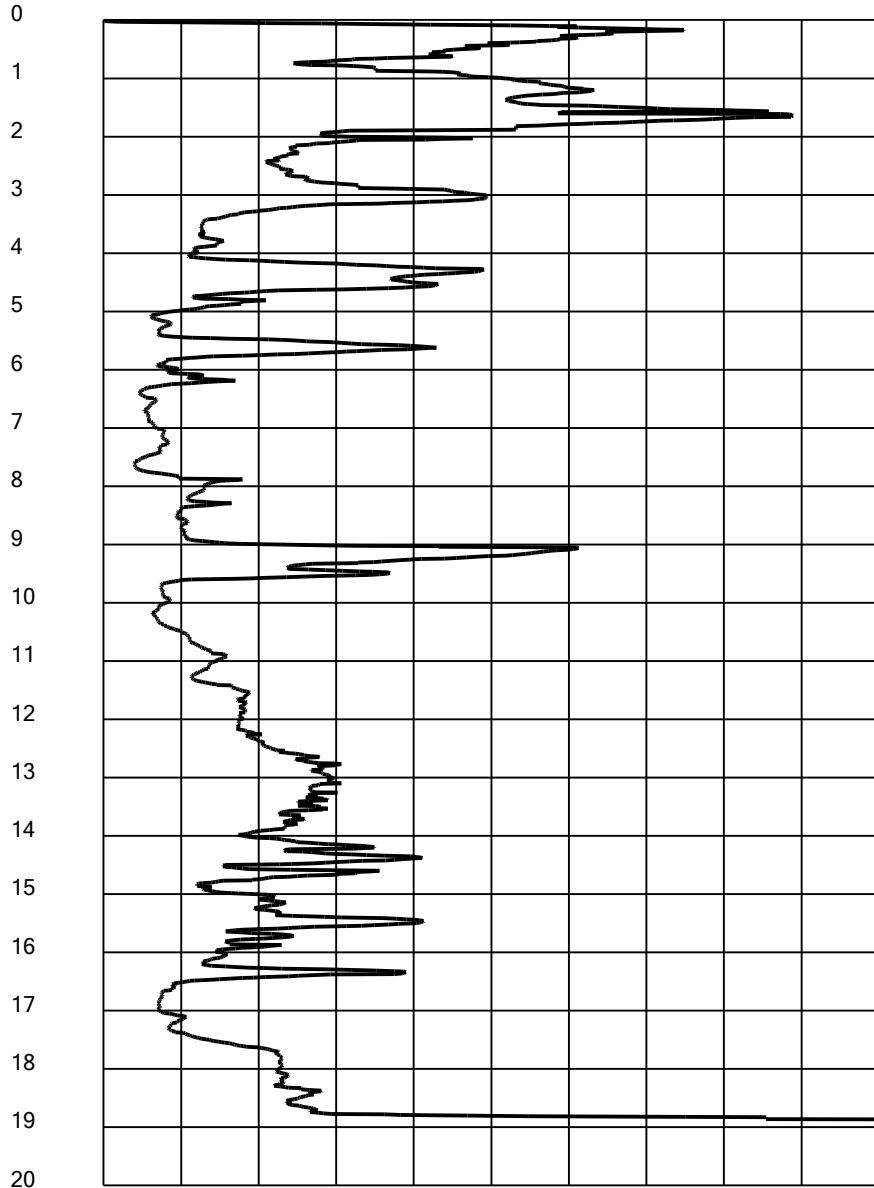
Probe code: MKS728



Qc [MPa]  
0 1.2 2.4 3.6 4.8 6 7.2 8.4 9.6 10.8 12

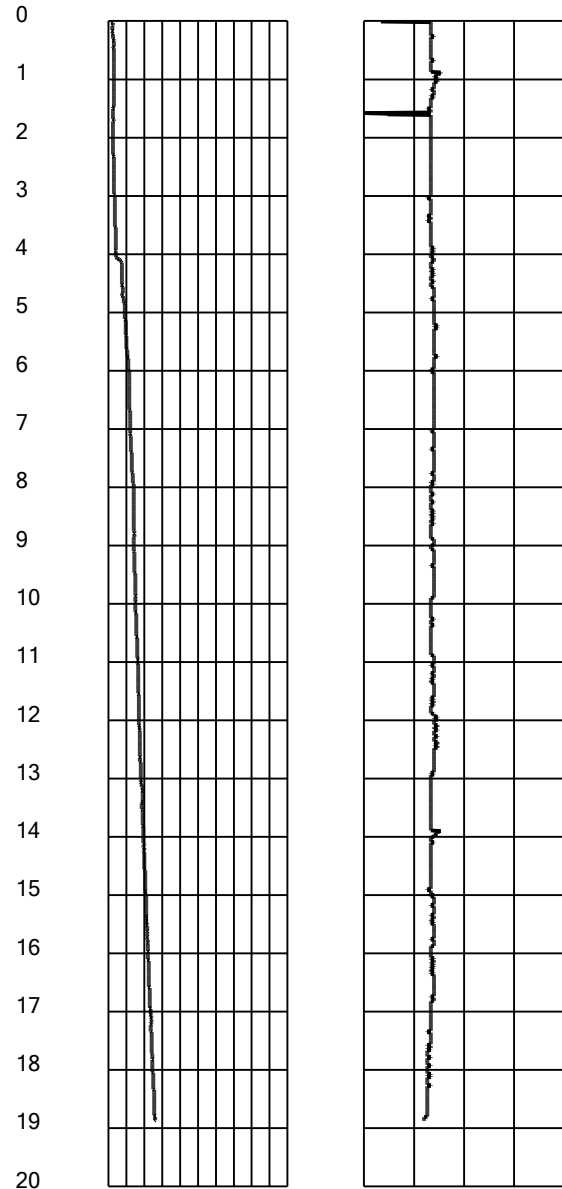
Fs [KPa]  
0 30 60 90 120 150 180 210 240 270 300

Rf [%]  
0 1.4 2.8 4.2 5.6 7 8.4 9.8 11.2 12.6 14





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20





Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 09/09/2021

Site: Gambettola - microzonazione - Test: CPTU 6

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTU 6

Location: CPTU 6

Date: 09/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 270

Ground level [cm]: 0

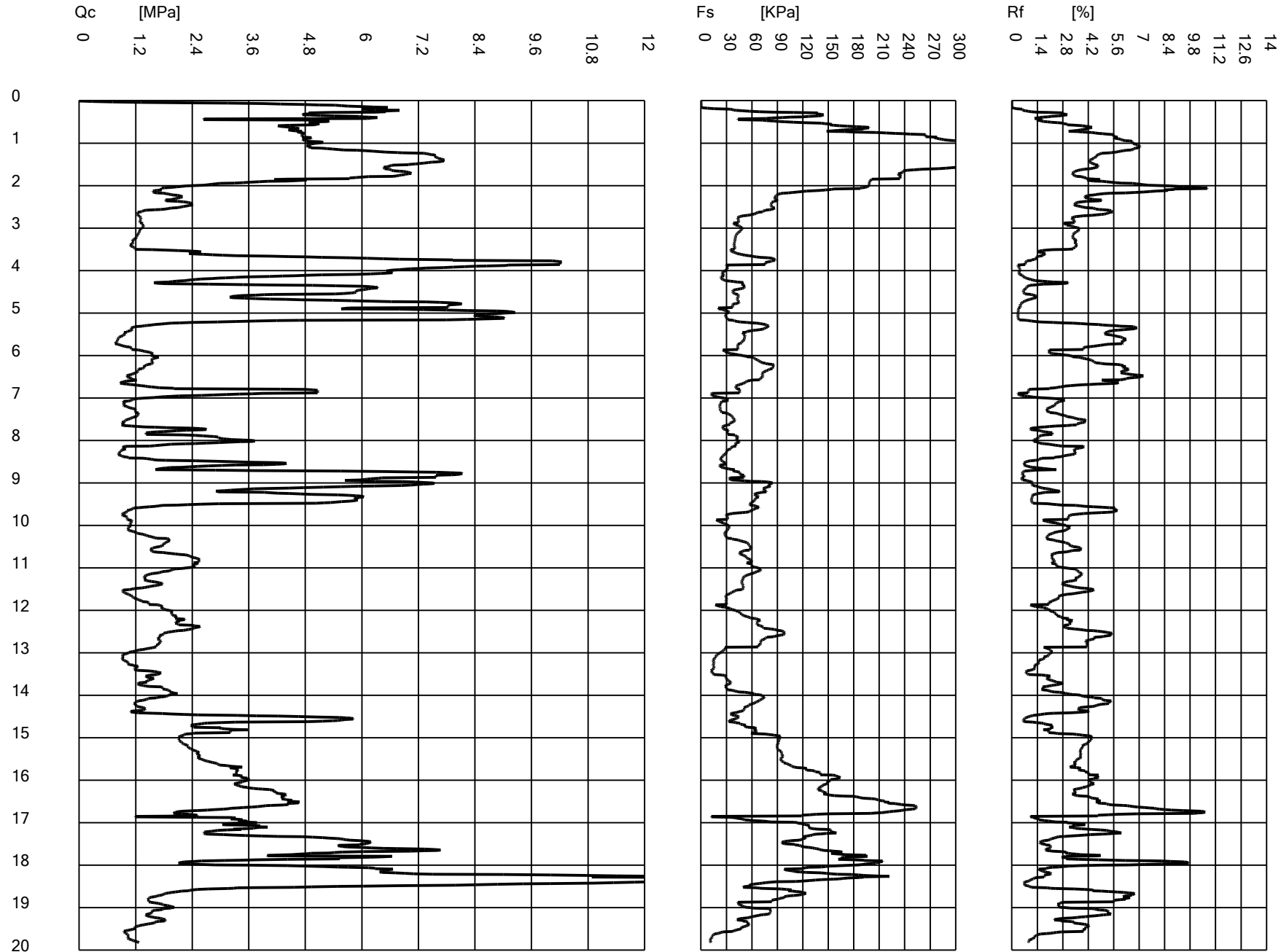
Latitude: 44.112891

Longitude: 12.327686

Operator:

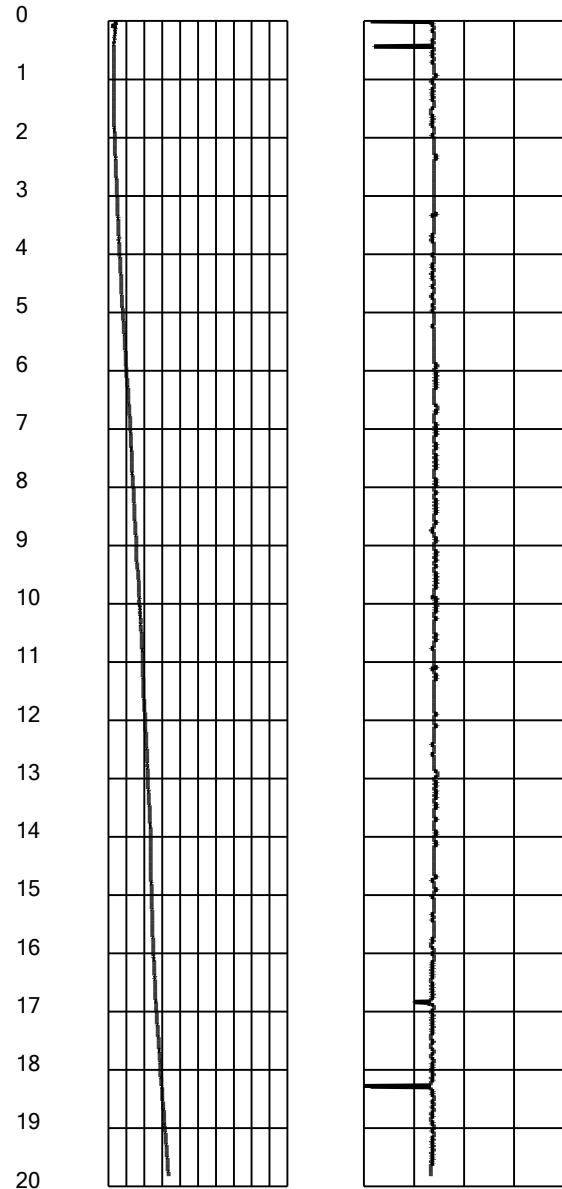
Comments:

Probe code: MKS728





Tilt [°]      Speed [cm/sec]  
20 16 14 12 10 8 6 4 2 0      0 1.5 3 4.5 6



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 09/09/2021

Site: Gambettola - microzonazione - Test: CPTE 7

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 7

Location: CPTE 7

Date: 09/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 280

Ground level [cm]: 0

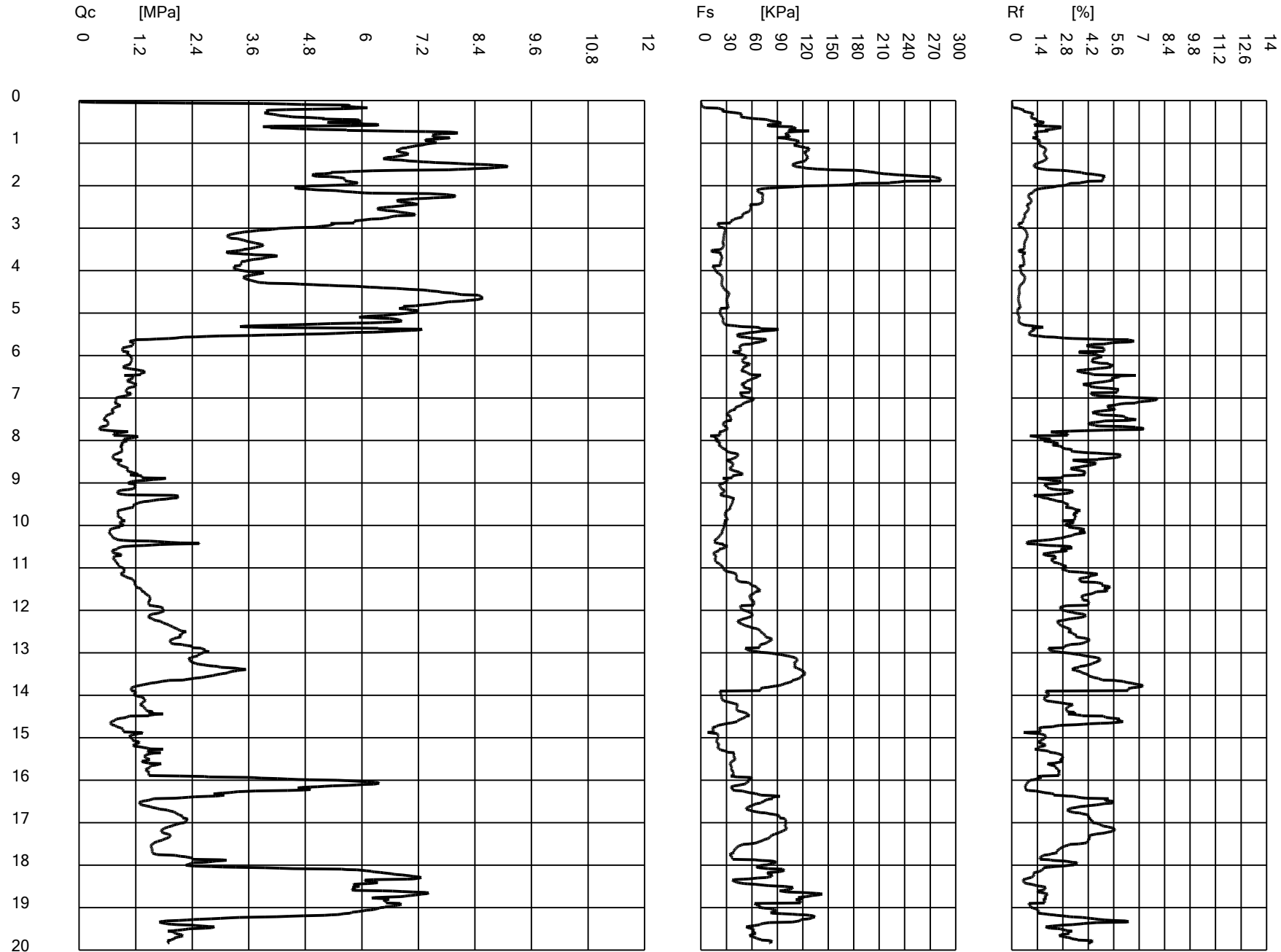
Latitude: 44.112486

Longitude: 12.334571

Operator:

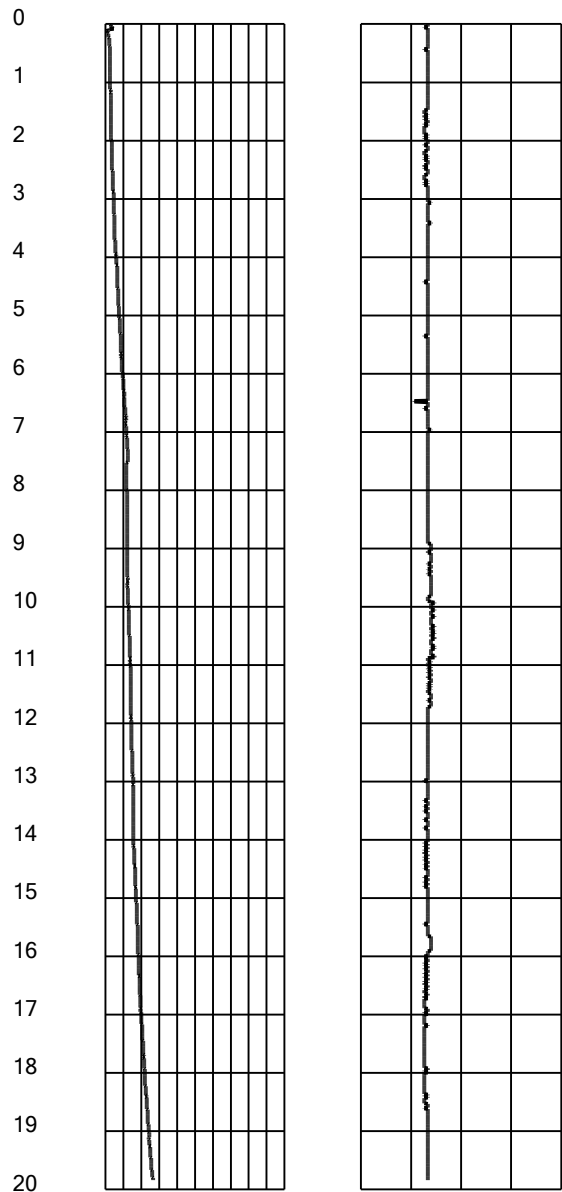
Comments:

Probe code: MKS728





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 09/09/2021

Site: Gambettola - microzonazione - Test: CPTE 8

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 8

Location: CPTE 8

Date: 09/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 350

Ground level [cm]: 0

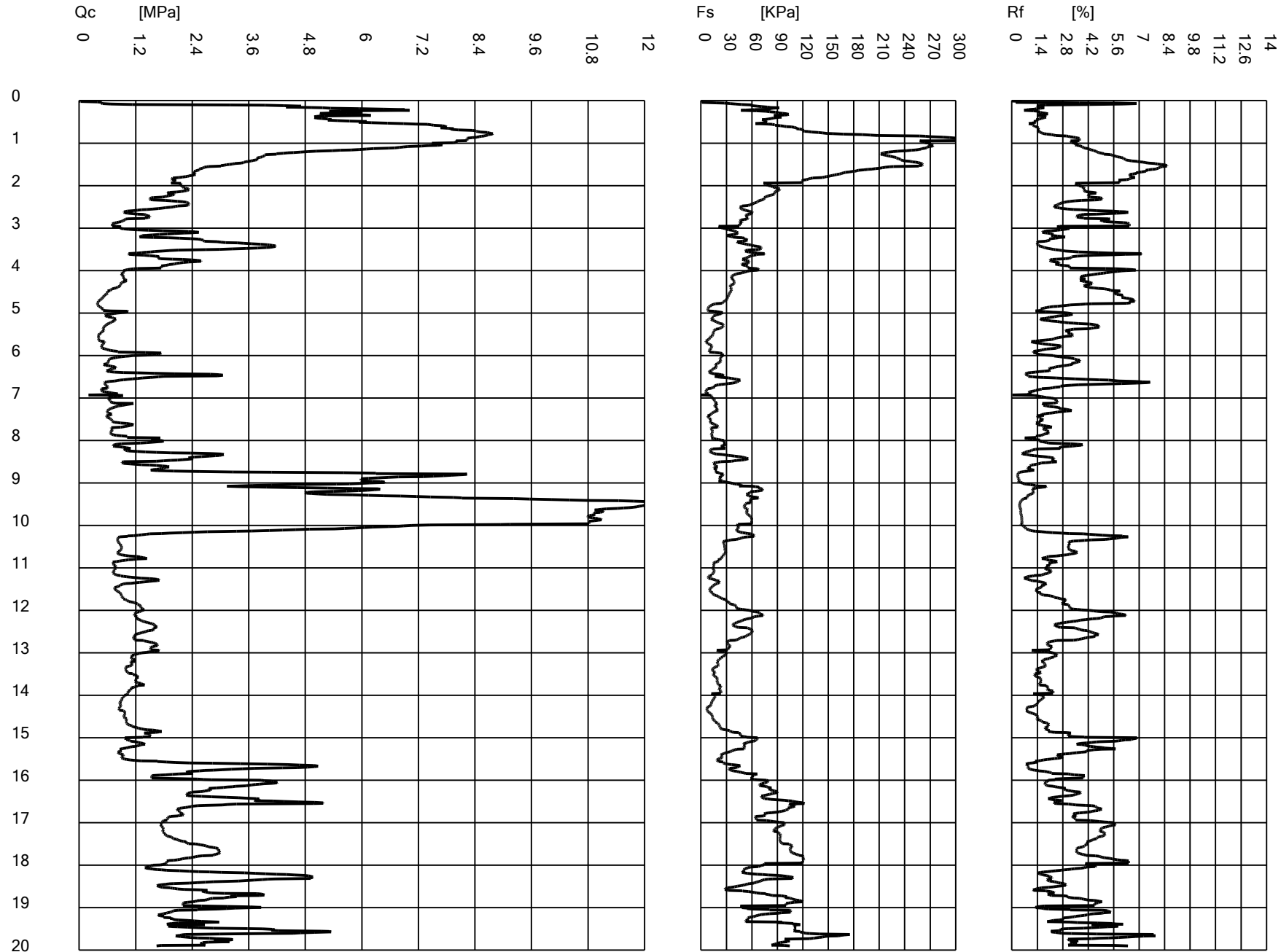
Latitude: 44.119843

Longitude: 12.325358

Operator:

Comments:

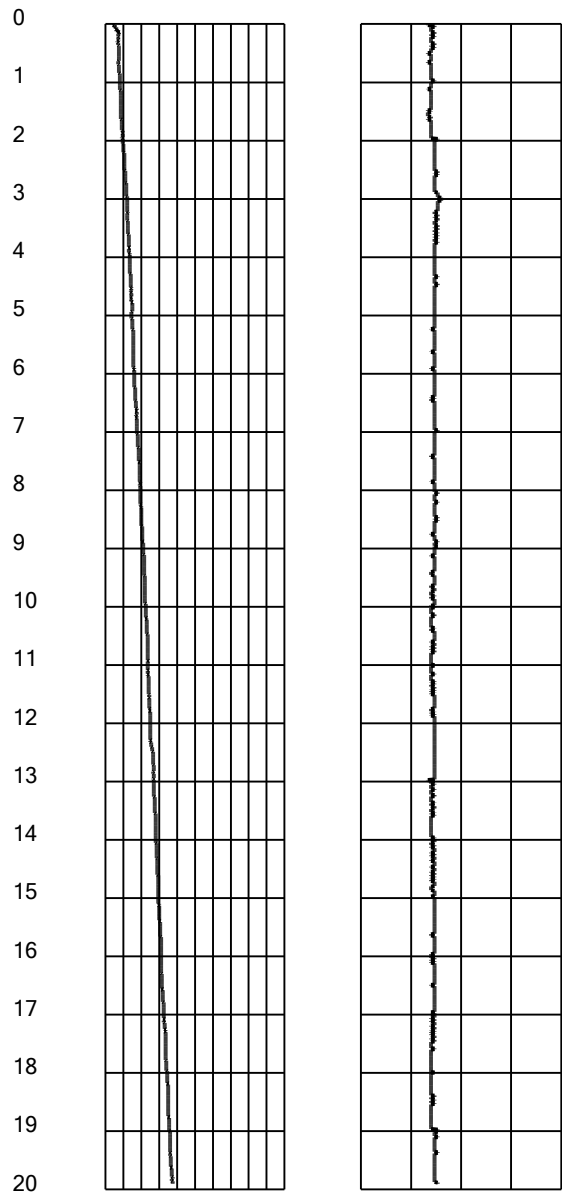
Probe code: MKS728







Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
0 0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0 4.4 4.8 5.2 5.6 6.0



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 09/09/2021

Site: Gambettola - microzonazione - Test: CPTE 9

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 9

Location: CPTE 9

Date: 09/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 390

Ground level [cm]: 0

Latitude: 44.111104

Longitude: 12.360664

Operator:

Comments:

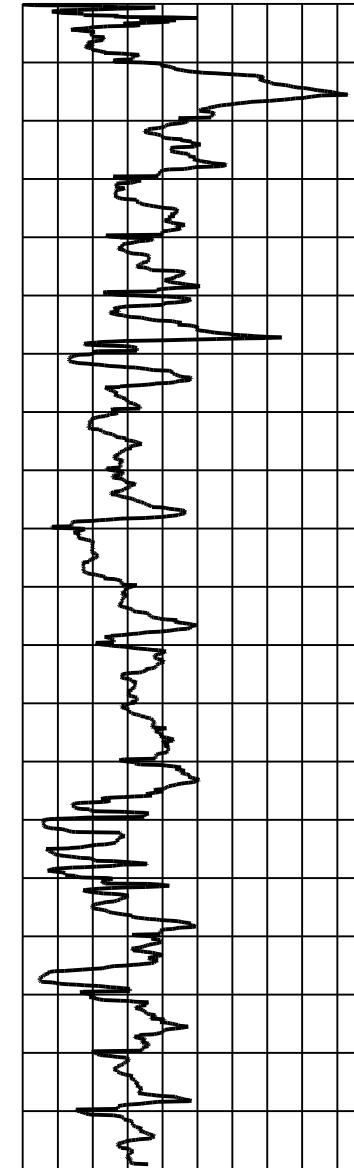
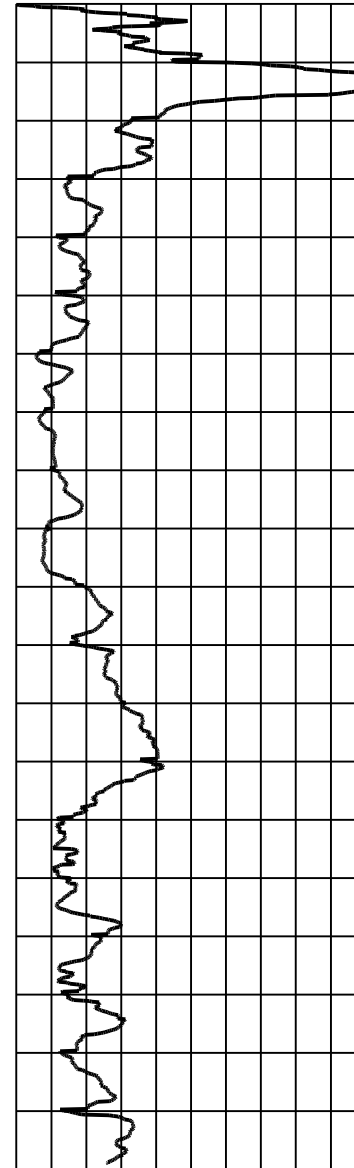
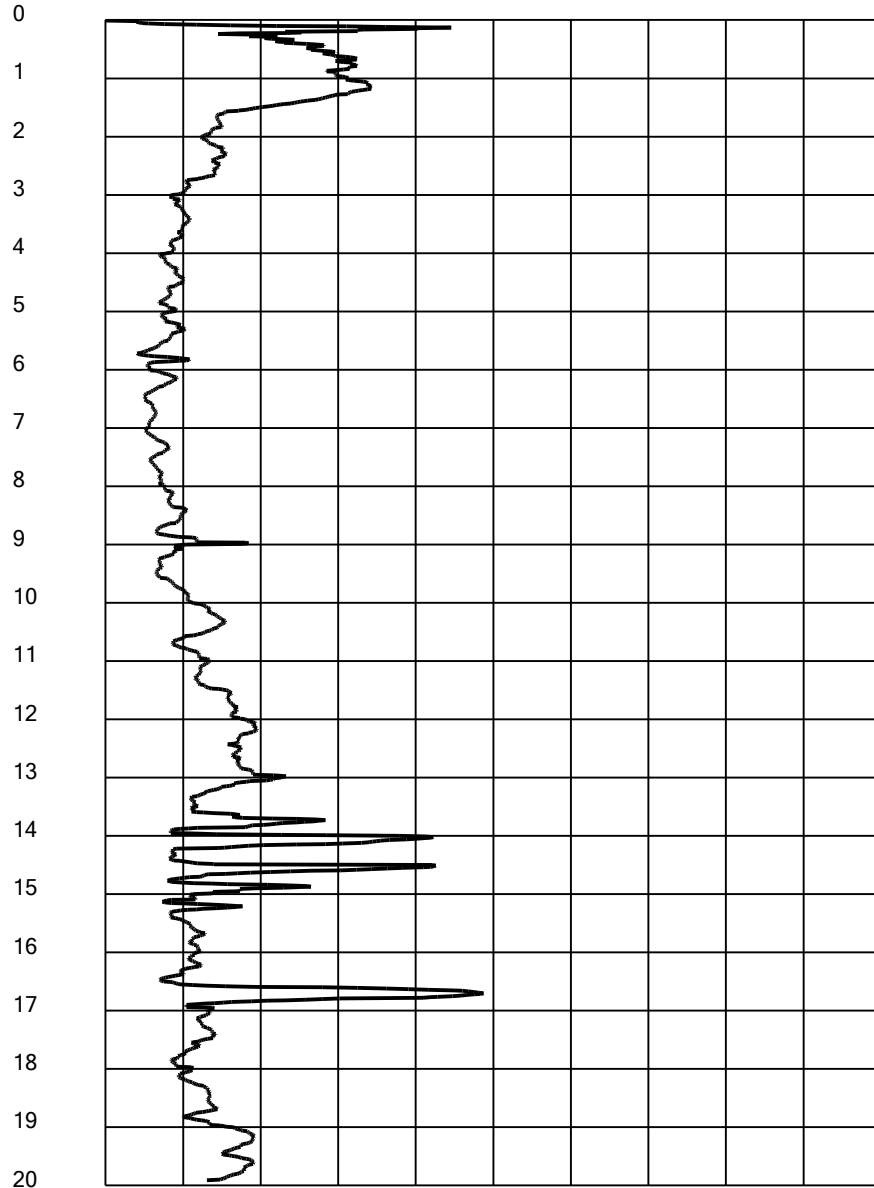
Probe code: MKS728



Qc [MPa]  
0 1.2 2.4 3.6 4.8 6 7.2 8.4 9.6 10.8 12

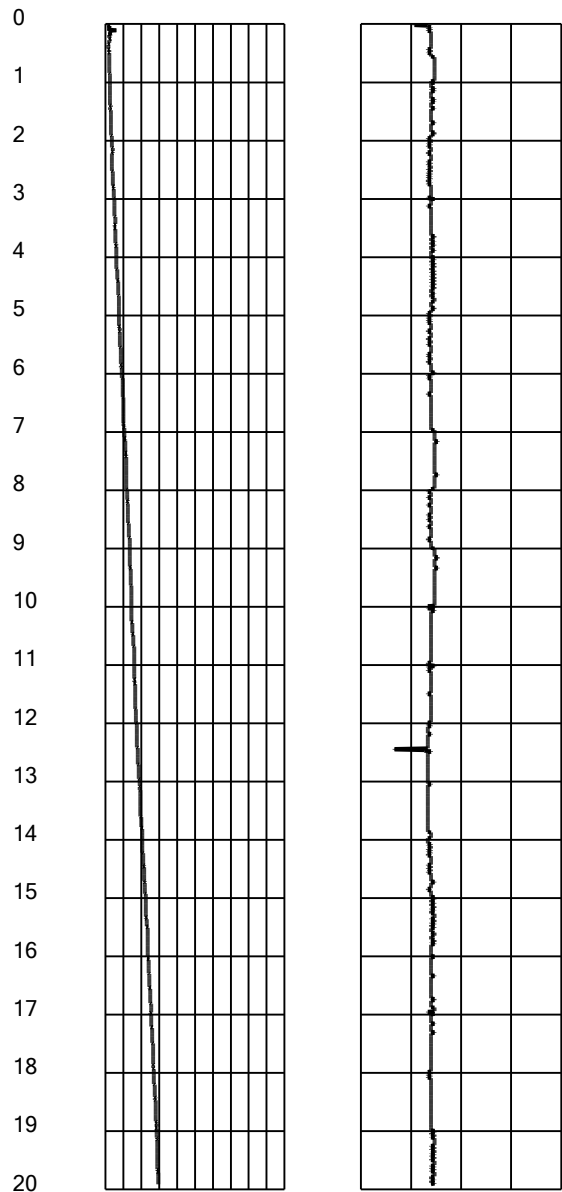
Fs [KPa]  
0 30 60 90 120 150 180 210 240 270 300

Rf [%]  
0 1.4 2.8 4.2 5.6 7 8.4 9.8 11.2 12.6 14





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0



Intergeo srl



**INTERGEO** s.r.l. - Servizi Geologici  
Strada Acquasalata, 9 47899 Serravalle - RSM  
Codice Operatore Economico - SM21197  
Tel. 333 2208376  
www.intergeosm.com - mail: info@intergeosm.com

Cone Penetration Test (CPTU) - Date: 09/09/2021

Site: Gambettola - microzonazione - Test: CPTE 10

## Company information

Name: Intergeo srl

Address: Strada Acquasalata, 9

Zip code:

City: Serravalle

P.IVA: C.O.E: SM 21197

E-Mail: info@intergeosm.com

Phone number:

Fax number:

## Site information

Name: Gambettola - microzonazione

Date: 02/09/2021

Commissioner: Copioli Carlo

Locality:

## Test information

Name: CPTE 10

Location: CPTE 10

Date: 09/09/2021

Prehole mode:

Prehole depth [cm]: 0

Hydrostatic line [cm]: 330

Ground level [cm]: 0

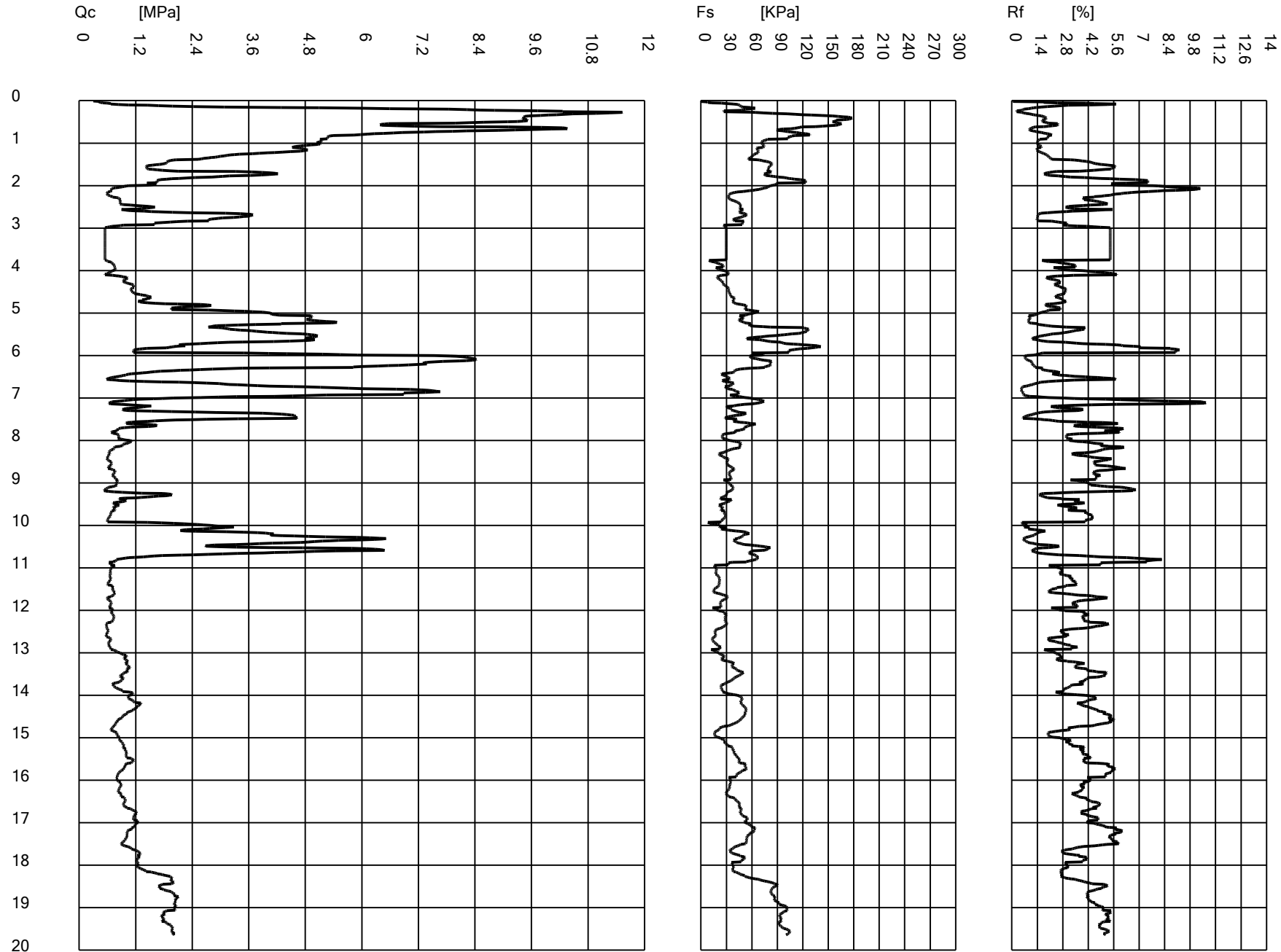
Latitude: 44.122810

Longitude: 12.349338

Operator:

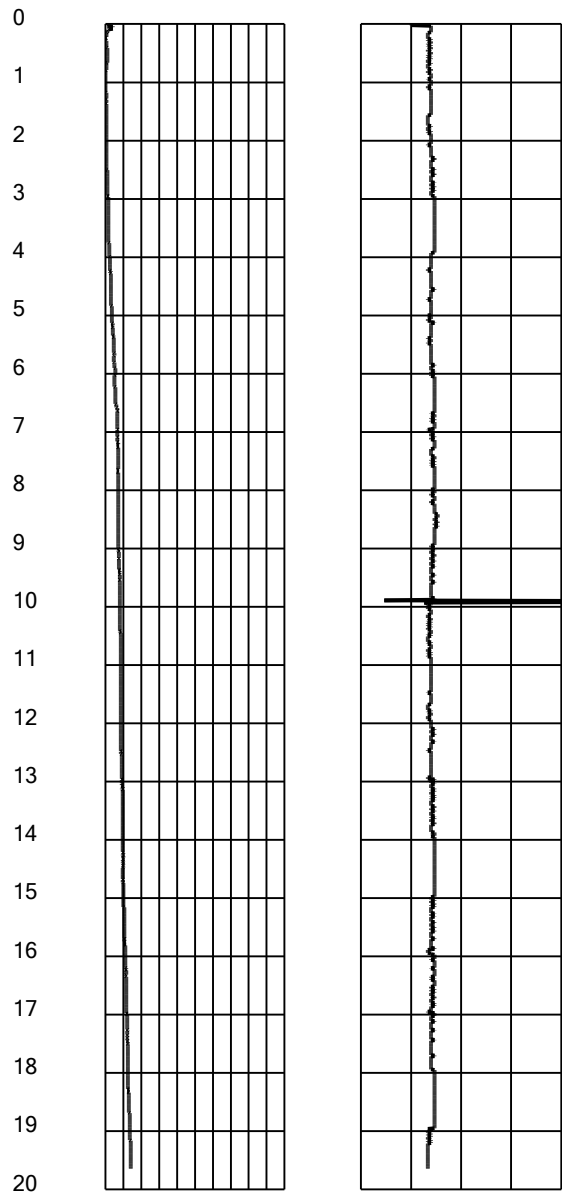
Comments:

Probe code: MKS728





Tilt [°]      Speed [cm/sec]  
0 1.5 3 4.5 6  
20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

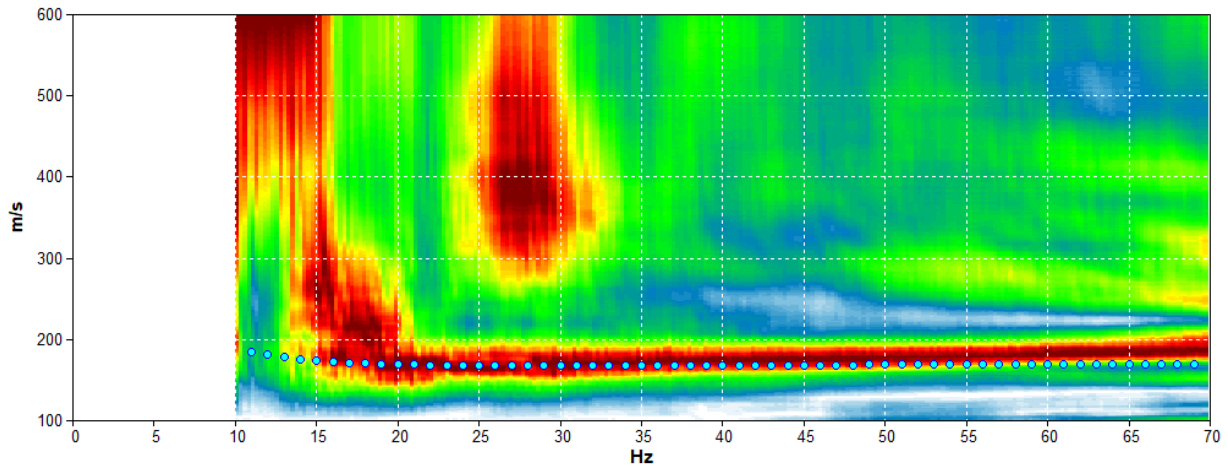


## COMGAMBETTOLA2537, MASW\_HV\_01

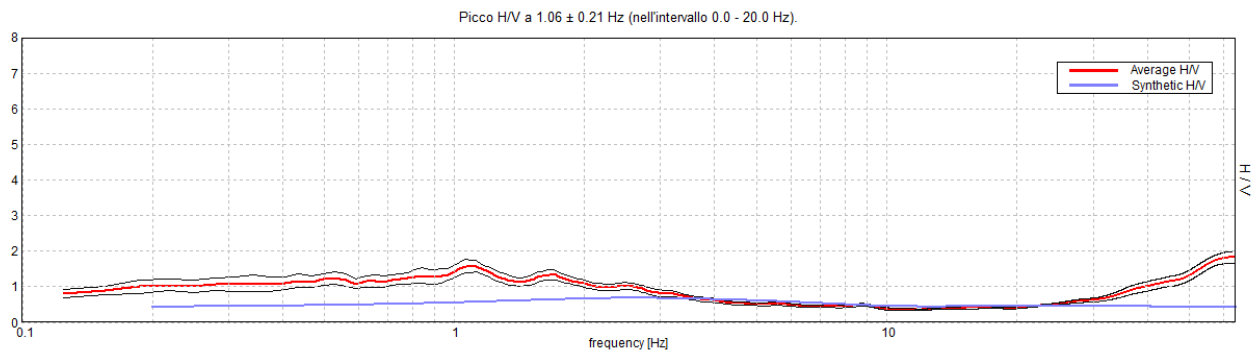
Inizio registrazione: 12/08/01 11:45:34 Fine registrazione: 12/08/01 12:05:33  
 Durata registrazione: 0h20'00". Analizzato 67% tracciato (selezione manuale)  
 Freq. campionamento: 128 Hz  
 Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0 36.0  
 38.0 40.0 42.0 44.0 46.0 m.

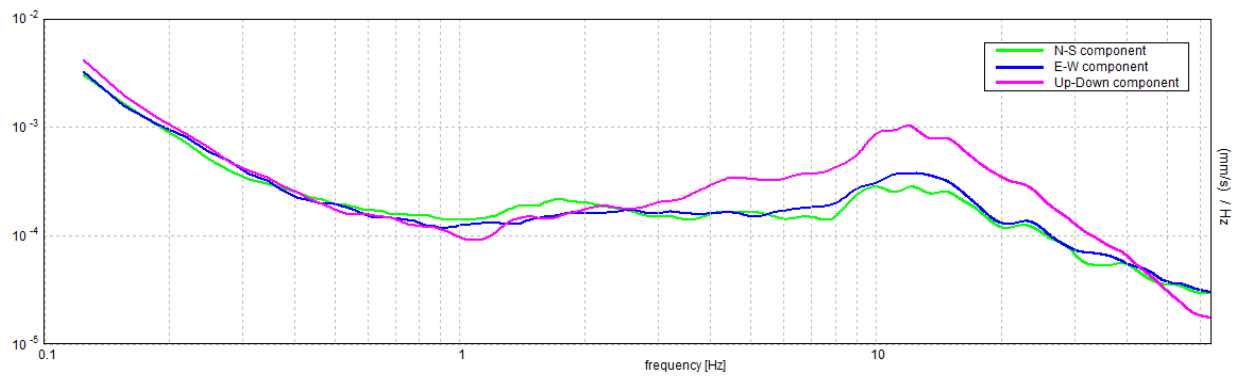
MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE



EXPERIMENTAL vs. SYNTHETIC H/V



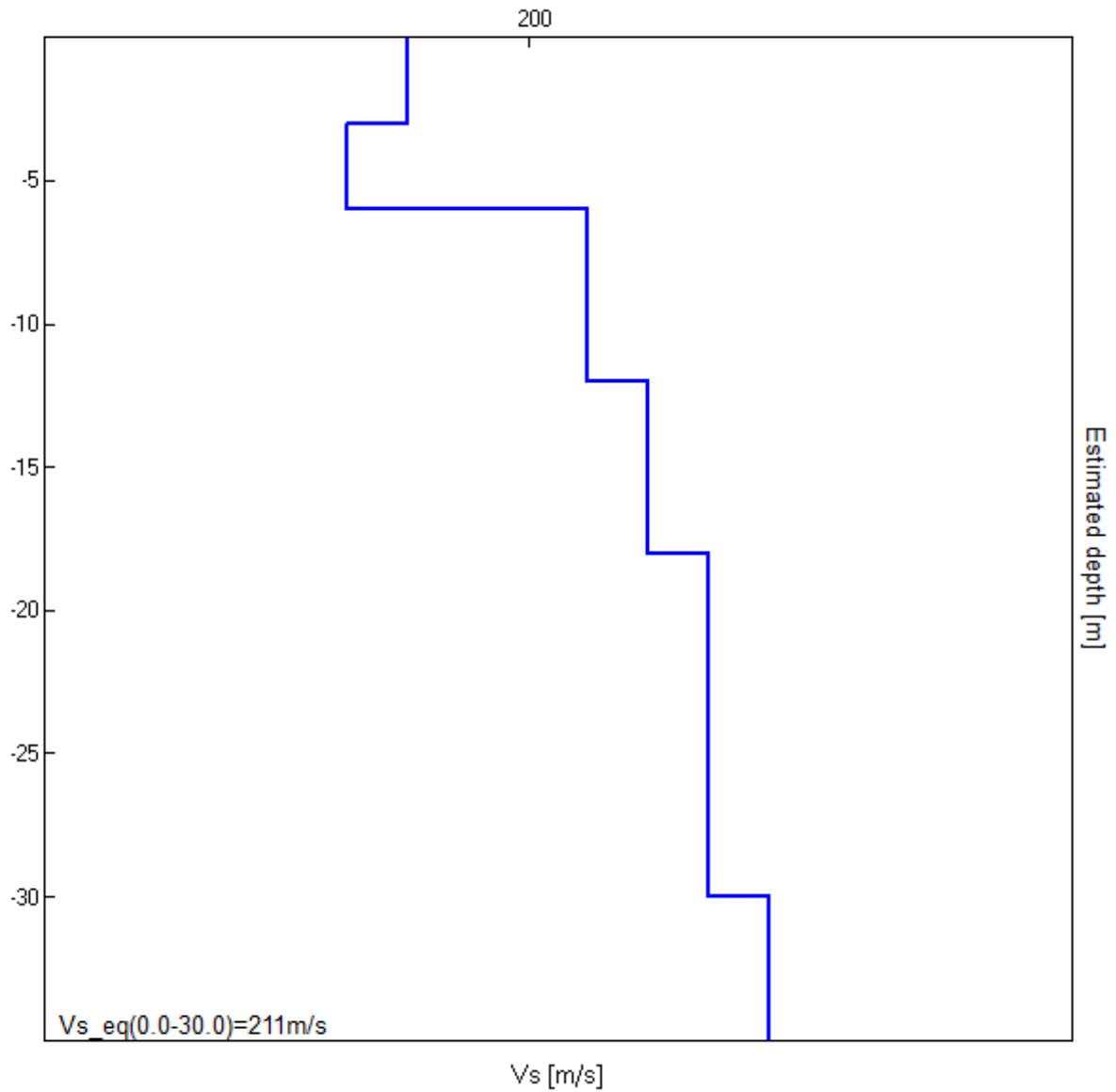
SINGLE COMPONENT SPECTRA





Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
3.00	3.00	180	0.40
6.00	3.00	170	0.49
12.00	6.00	210	0.49
18.00	6.00	220	0.49
30.00	12.00	230	0.49
inf.	inf.	240	0.45

Vs\_eq(0.0-30.0)=211m/s



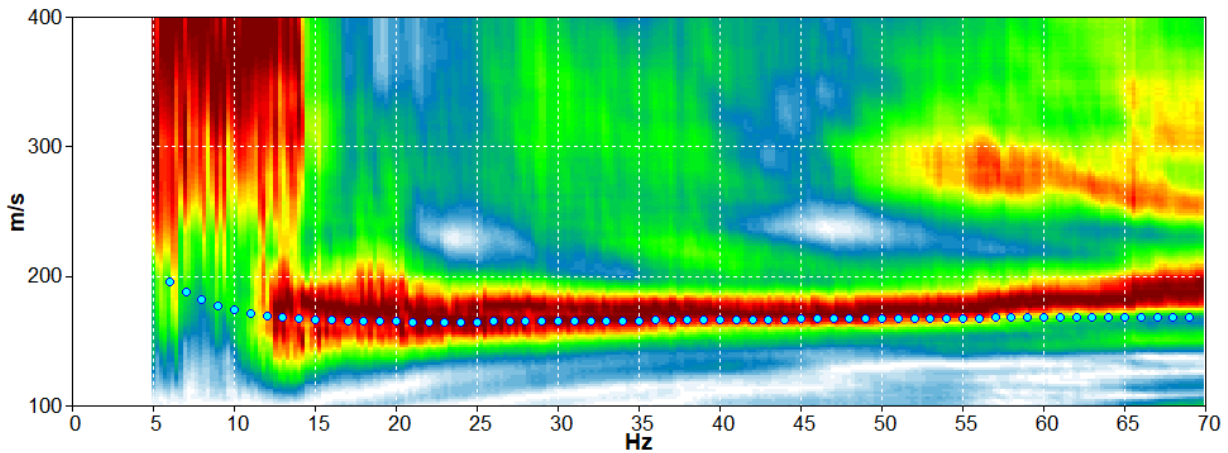
## COMGAMBETTOLA2537, MASW\_02

Inizio registrazione: 12/08/01 11:03:06 Fine registrazione: 12/08/01 11:23:05  
 Durata registrazione: 0h20'00". Analizzato 62% tracciato (selezione manuale)  
 Freq. campionamento: 128 Hz

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

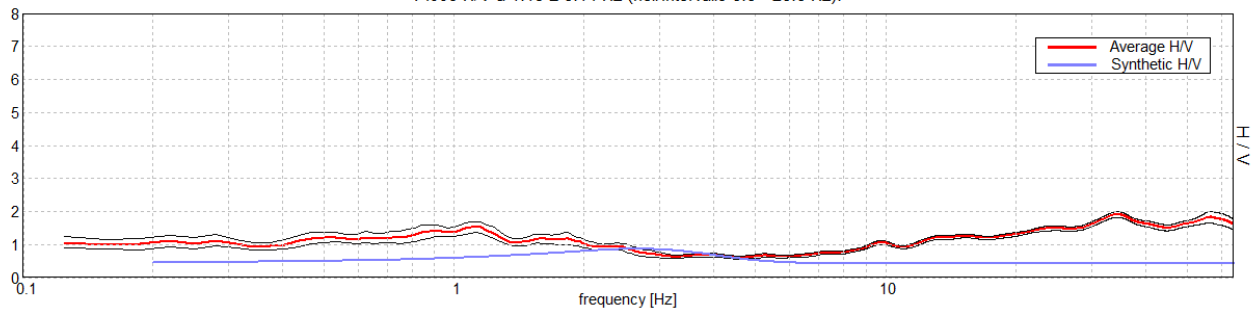
Array geometry (x): 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0 36.0  
 38.0 40.0 42.0 44.0 46.0 m.

### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE

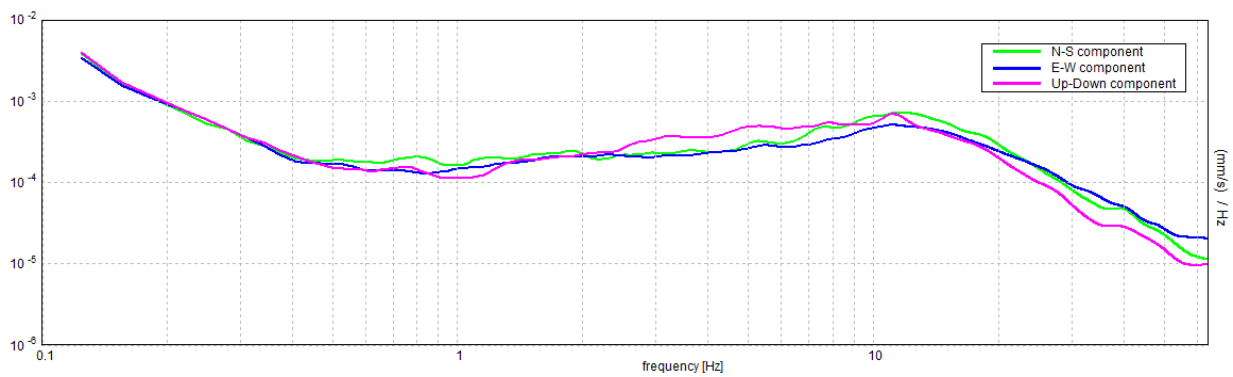


### EXPERIMENTAL vs. SYNTHETIC H/V

Picco H/V a  $1.13 \pm 0.14$  Hz (nell'intervallo 0.0 - 20.0 Hz).

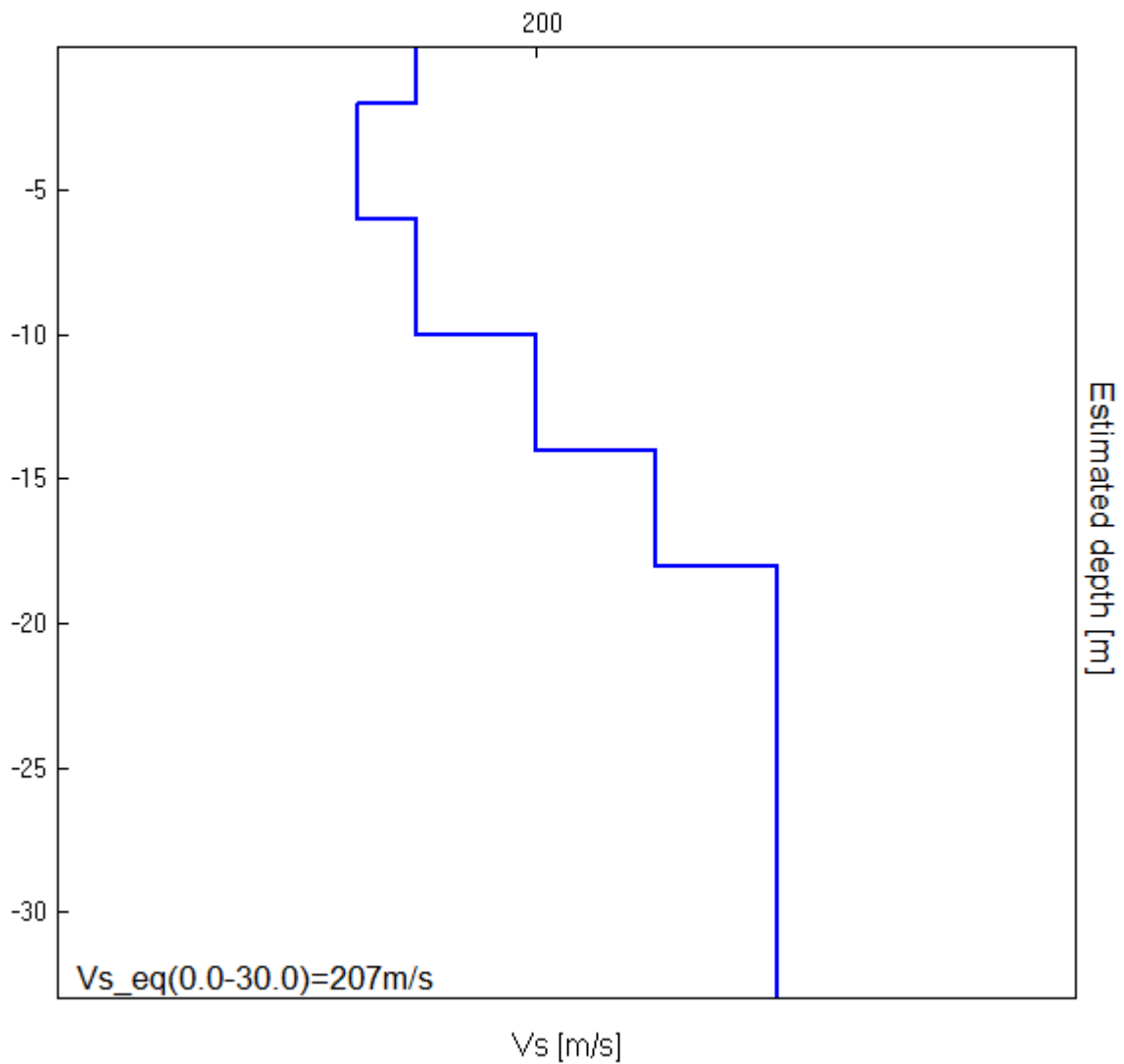


### SINGLE COMPONENT SPECTRA



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	180	0.42
6.00	4.00	170	0.49
10.00	4.00	180	0.49
14.00	4.00	200	0.49
18.00	4.00	220	0.49
28.00	10.00	240	0.49
inf.	inf.	240	0.42

$Vs_{eq}(0.0-30.0)=207m/s$



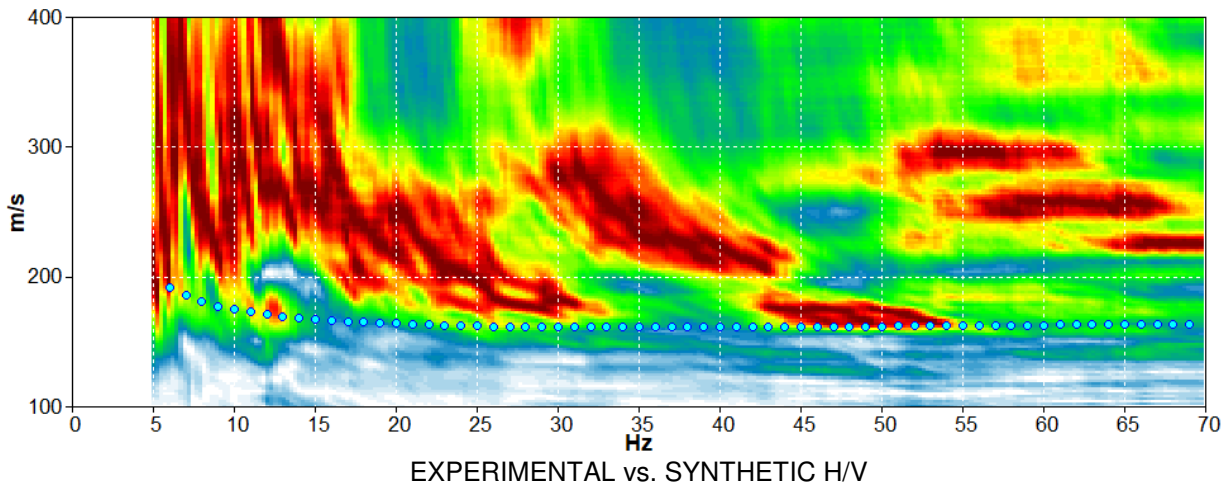
### GAMBETTOLA, MASW\_03

Start recording: 12/08/01 10:17:11      End recording: 12/08/01 10:37:10  
Trace length: 0h20'00".      Analyzed 78% trace (manual window selection)  
Sampling rate: 128 Hz

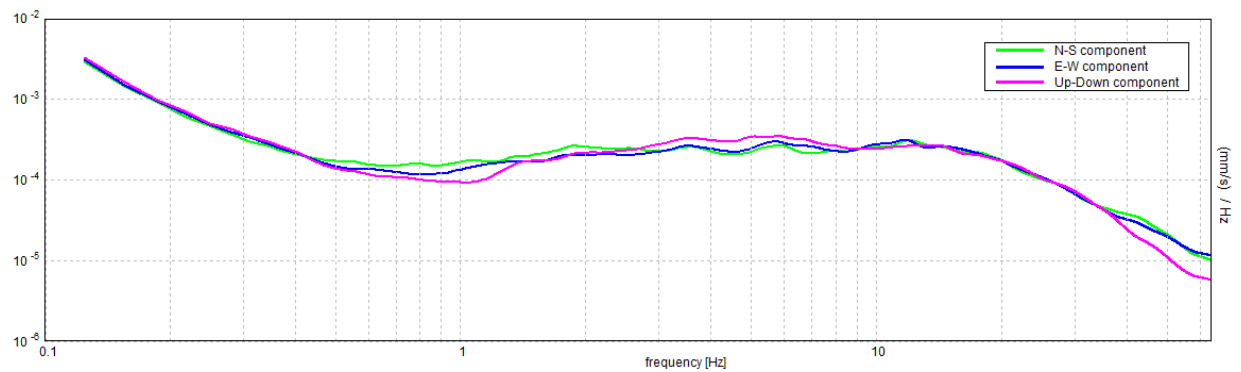
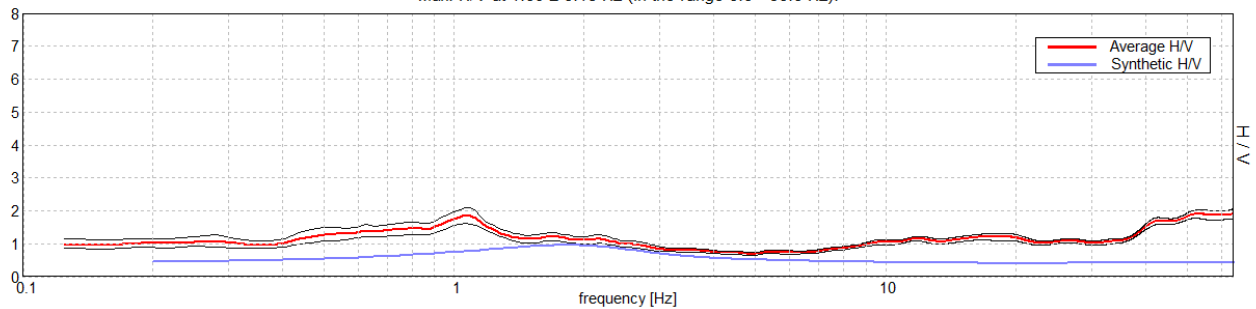
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0 36.0  
38.0 40.0 42.0 44.0 46.0 m.

#### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE

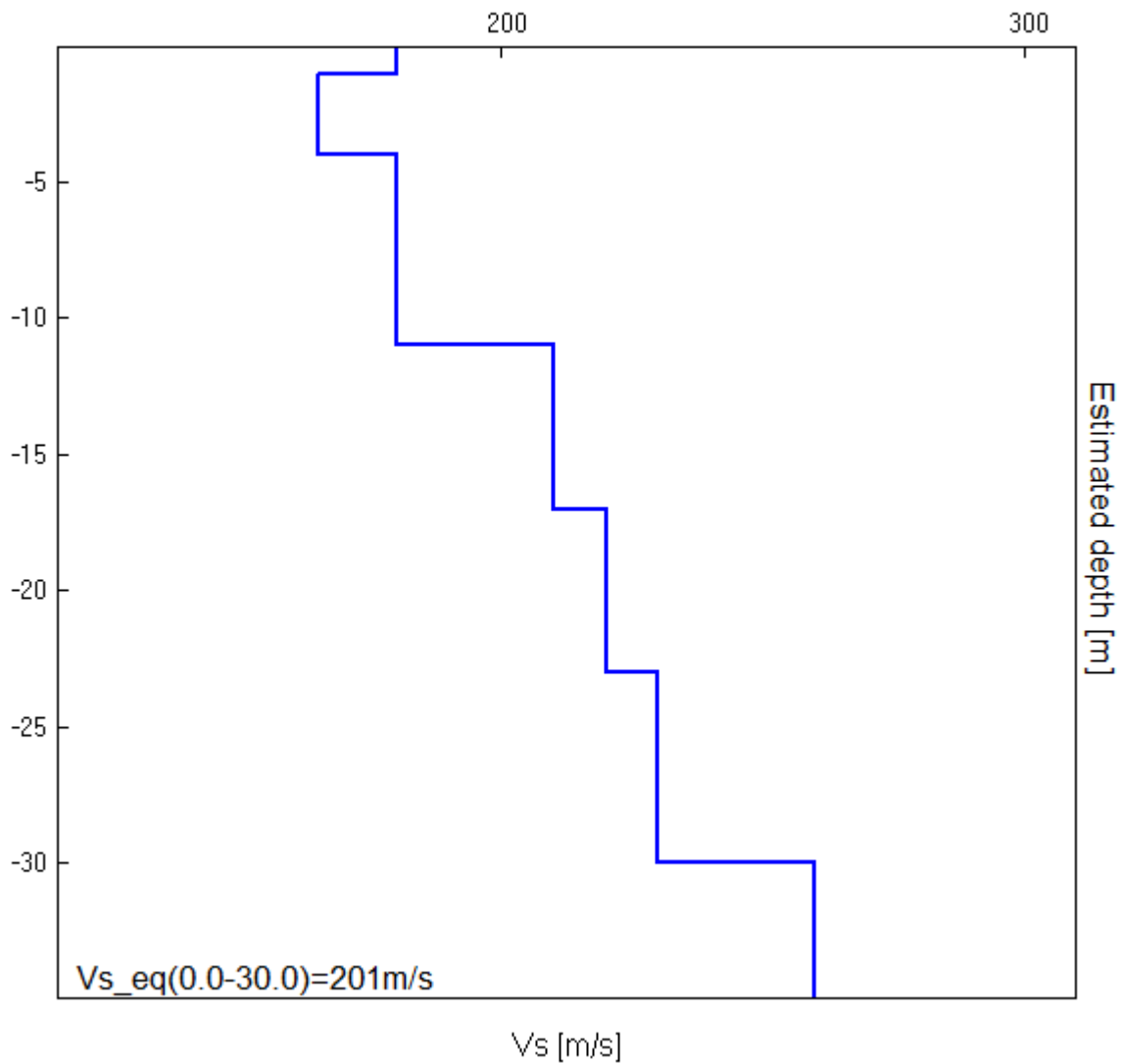


Max. H/V at  $1.06 \pm 0.18$  Hz (in the range 0.0 - 30.0 Hz).



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
1.00	1.00	180	0.45
4.00	3.00	165	0.49
11.00	7.00	180	0.49
17.00	6.00	210	0.49
23.00	6.00	220	0.49
30.00	7.00	230	0.49
inf.	inf.	260	0.49

$Vs_{eq}(0.0-30.0)=201m/s$



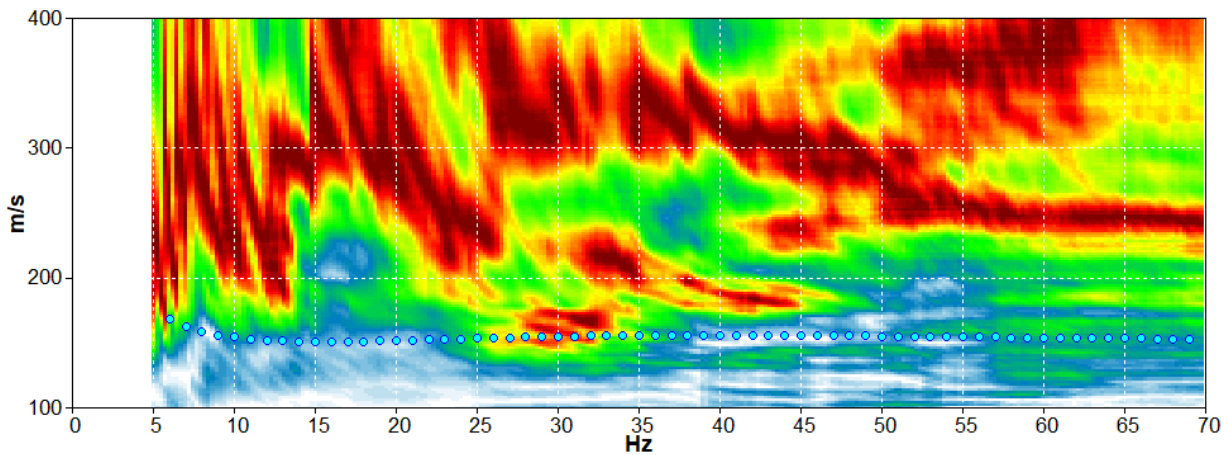
## GAMBETTOLA, MASW\_04

Inizio registrazione: 12/08/01 12:18:26 Fine registrazione: 12/08/01 12:38:26  
 Durata registrazione: 0h20'00". Analizzato 65% tracciato (selezione manuale)  
 Freq. campionamento: 128 Hz

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

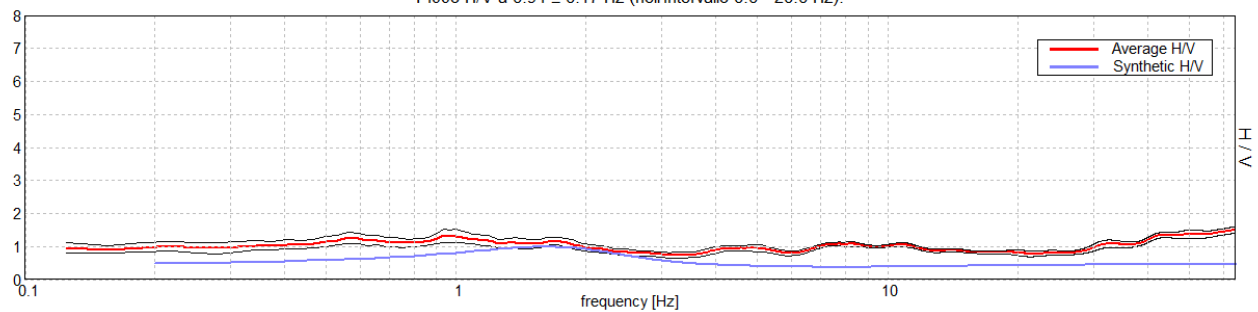
Array geometry (x): 0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0 34.0 36.0  
 38.0 40.0 42.0 44.0 46.0 m.

### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE

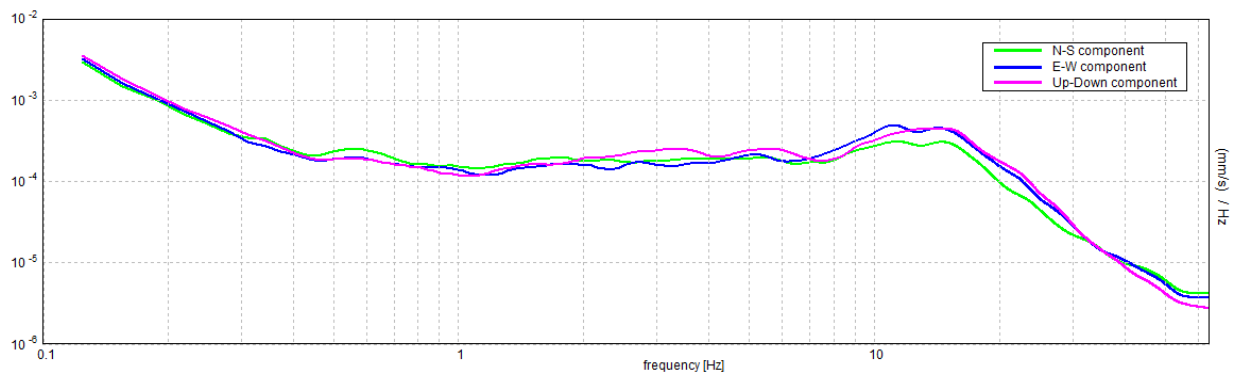


EXPERIMENTAL vs. SYNTHETIC H/V

Picco H/V a  $0.94 \pm 0.17$  Hz (nell'intervallo 0.0 - 20.0 Hz).

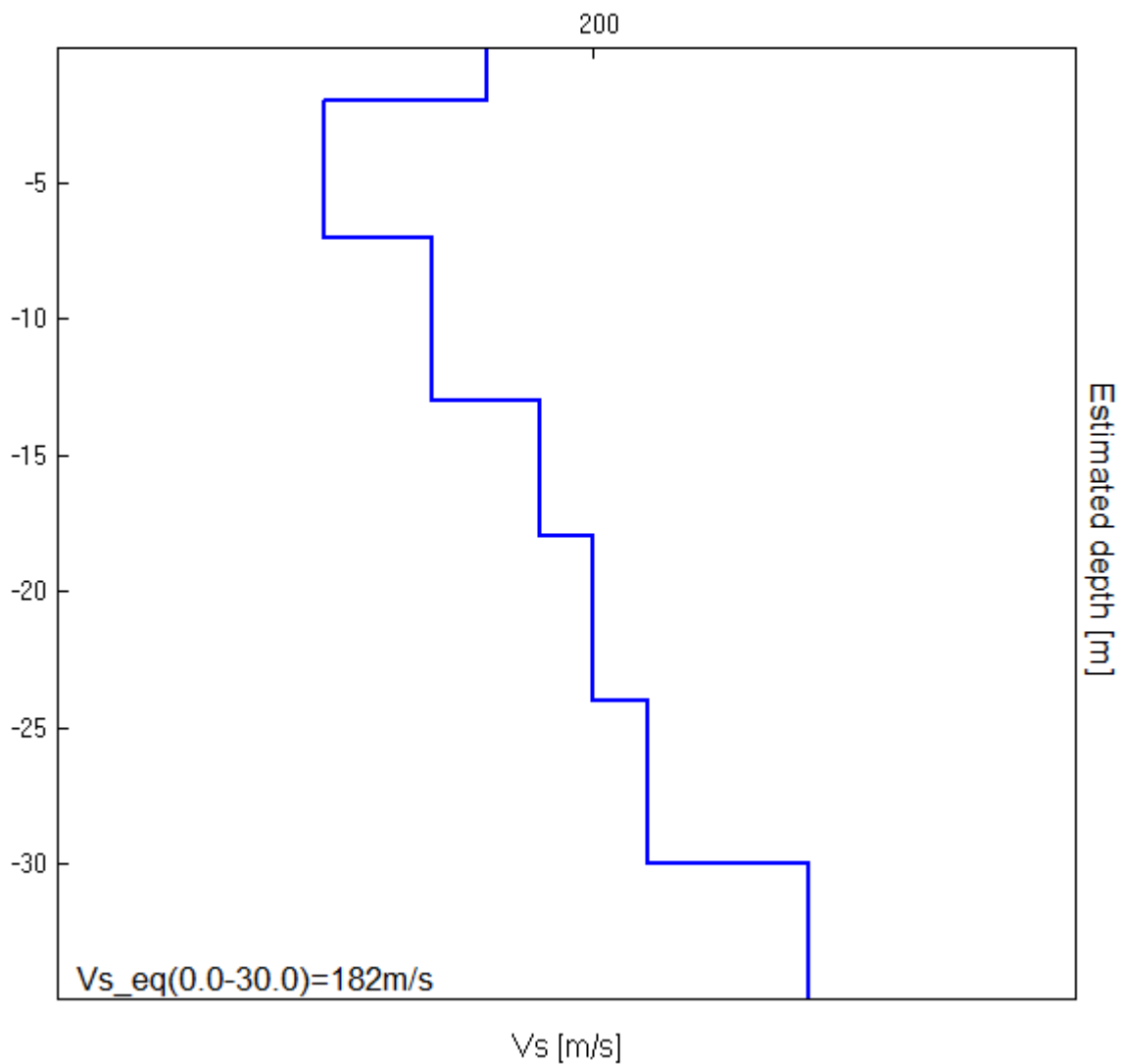


SINGLE COMPONENT SPECTRA



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	180	0.42
7.00	5.00	150	0.49
13.00	6.00	170	0.49
18.00	5.00	190	0.49
24.00	6.00	200	0.49
30.00	6.00	210	0.49
inf.	inf.	240	0.42

$Vs_{eq}(0.0-30.0)=182m/s$

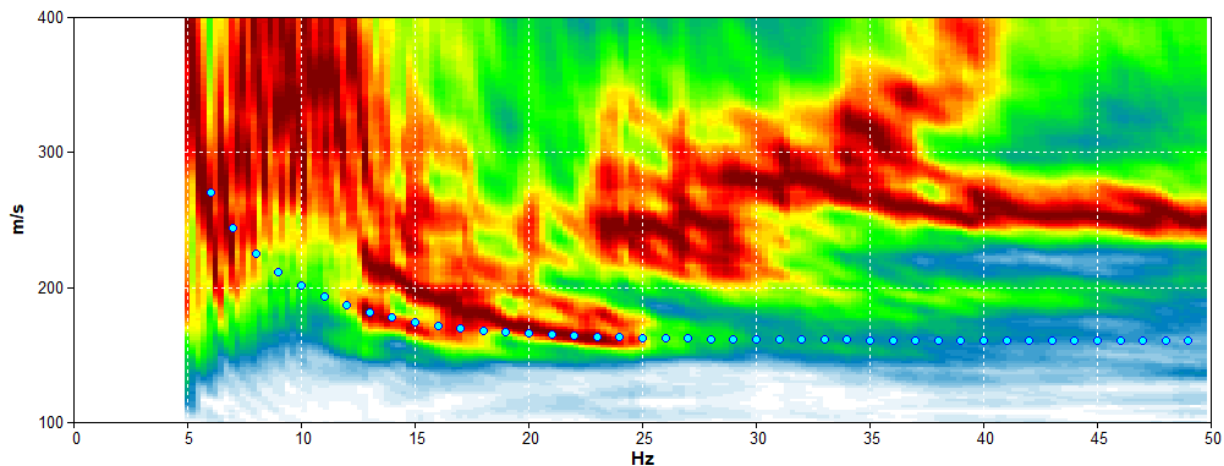


## GAMBETTOLA, MASW\_05

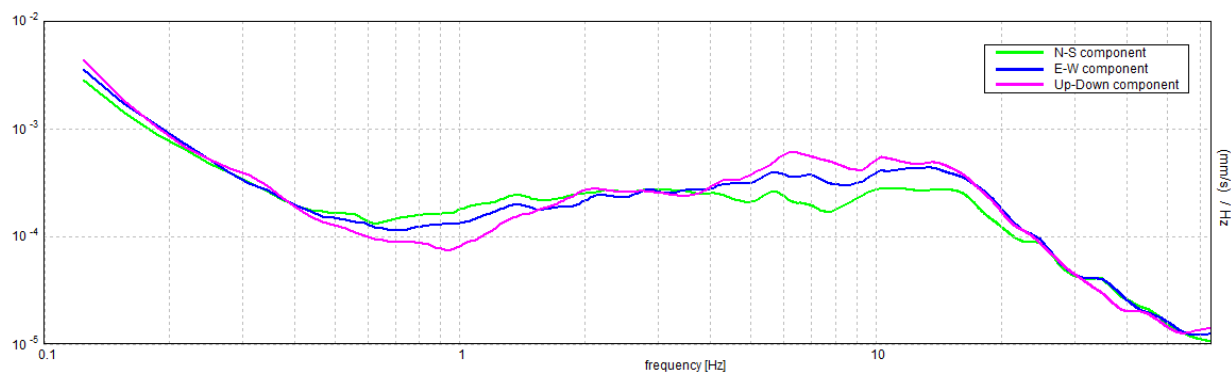
Inizio registrazione: 12/08/01 09:42:57 Fine registrazione: 12/08/01 10:02:56  
 Durata registrazione: 0h20'00". Analizzato 50% tracciato (selezione manuale)  
 Freq. campionamento: 128 Hz  
 Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

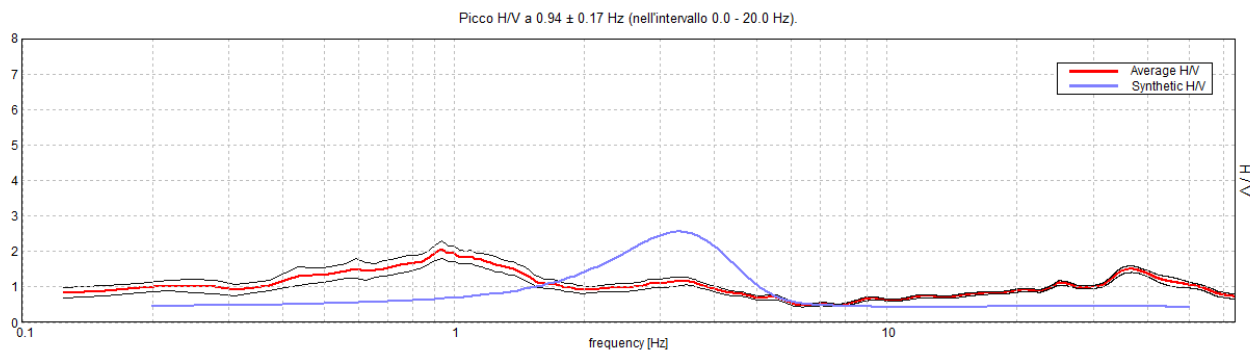
### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE



### SINGLE COMPONENT SPECTRA



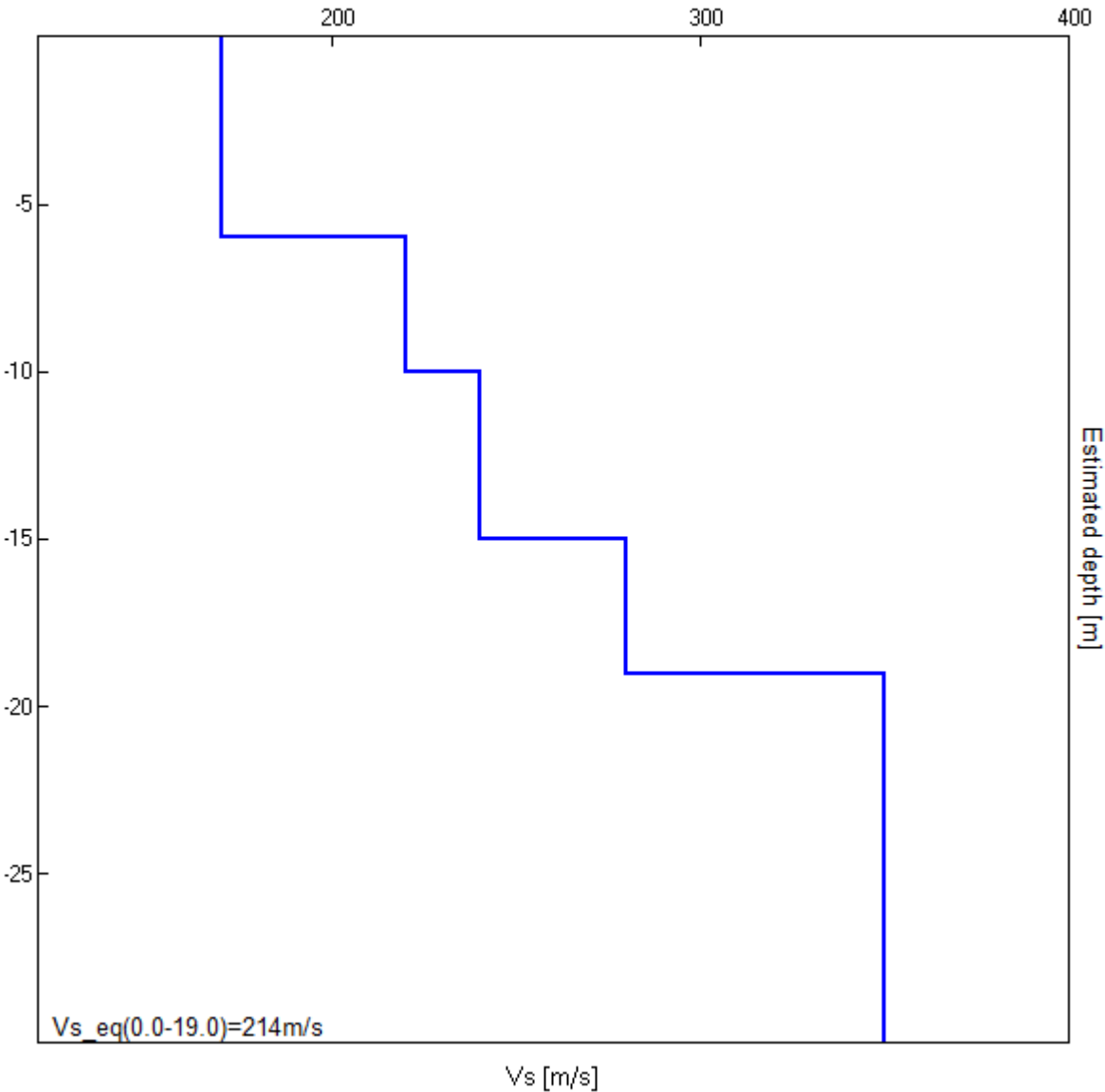
### EXPERIMENTAL vs. SYNTHETIC H/V





Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
1.00	1.00	170	0.42
2.00	1.00	170	0.49
6.00	4.00	170	0.49
10.00	4.00	220	0.49
15.00	5.00	240	0.49
19.00	4.00	280	0.49
25.00	6.00	350	0.49
inf.	inf.	350	0.42

**Vs\_eq(0.0-19.0)=214m/s**

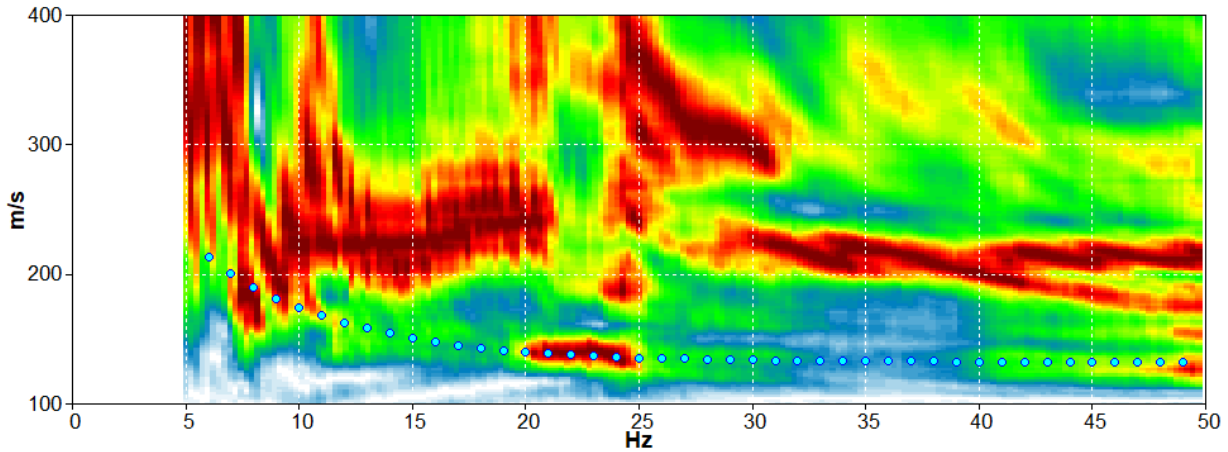


## GAMBETTOLA, MASW\_06

Start recording: 10/08/01 12:48:57      End recording: 10/08/01 13:08:56  
 Trace length: 0h20'00".      Analyzed 53% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

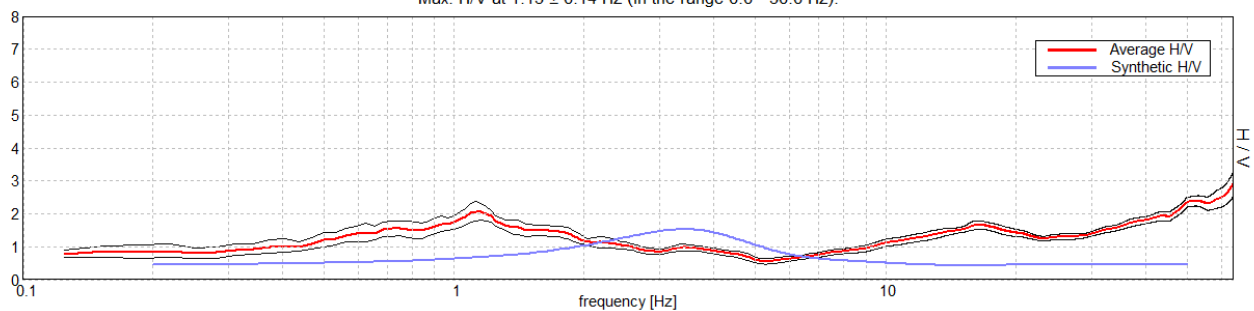
Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE

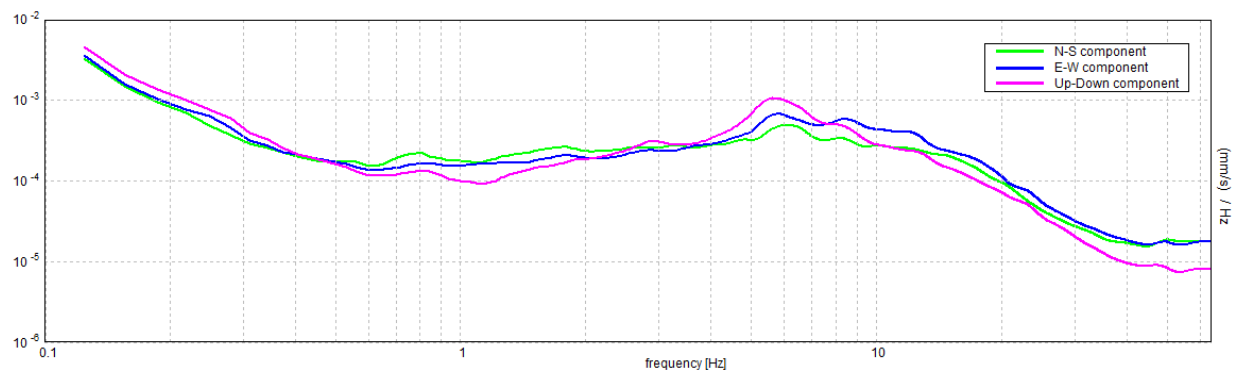


EXPERIMENTAL vs. SYNTHETIC H/V

Max. H/V at  $1.13 \pm 0.14$  Hz (in the range 0.0 - 30.0 Hz).

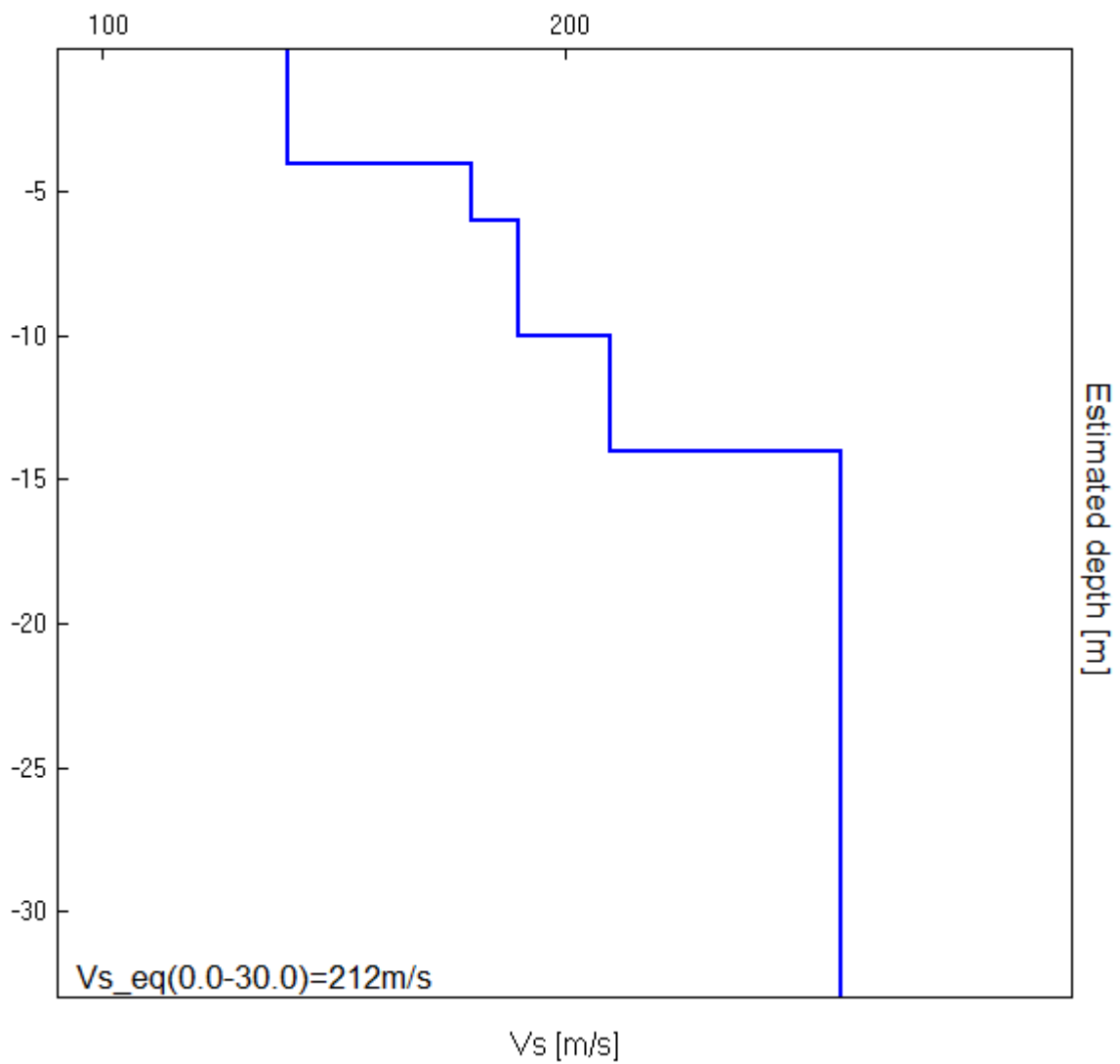


SINGLE COMPONENT SPECTRA



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	140	0.42
4.00	2.00	140	0.49
6.00	2.00	180	0.49
10.00	4.00	190	0.49
14.00	4.00	210	0.49
18.00	4.00	260	0.49
23.00	5.00	260	0.49
28.00	5.00	260	0.49
inf.	inf.	260	0.42

$Vs_{eq}(0.0-30.0)=212m/s$

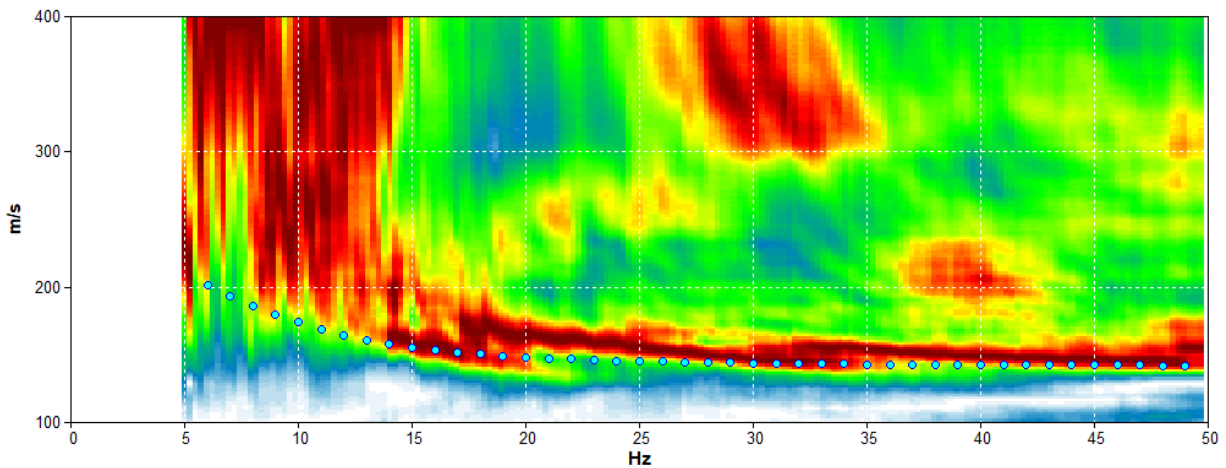


## GAMBETTOLA, MASW\_07

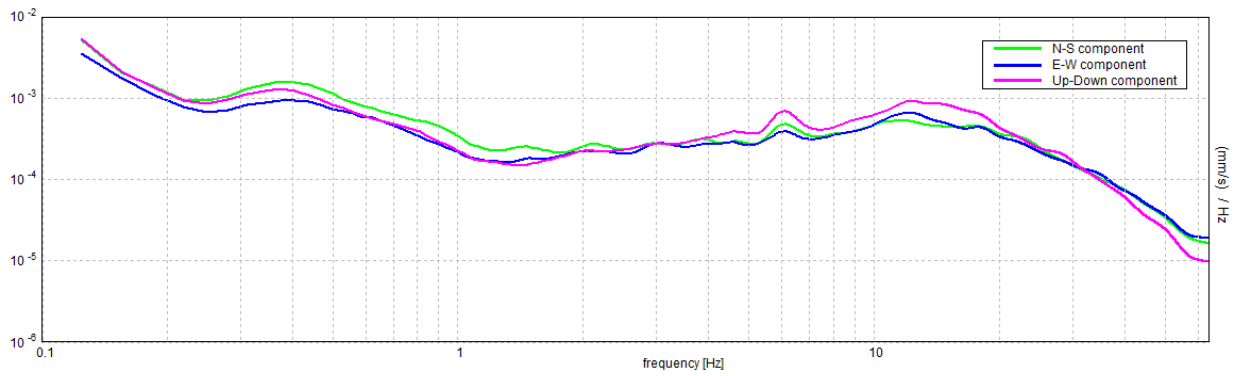
Inizio registrazione: 17/08/01 15:37:37 Fine registrazione: 17/08/01 15:57:36  
 Durata registrazione: 0h20'00". Analizzato 72% tracciato (selezione manuale)  
 Freq. campionamento: 128 Hz  
 Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

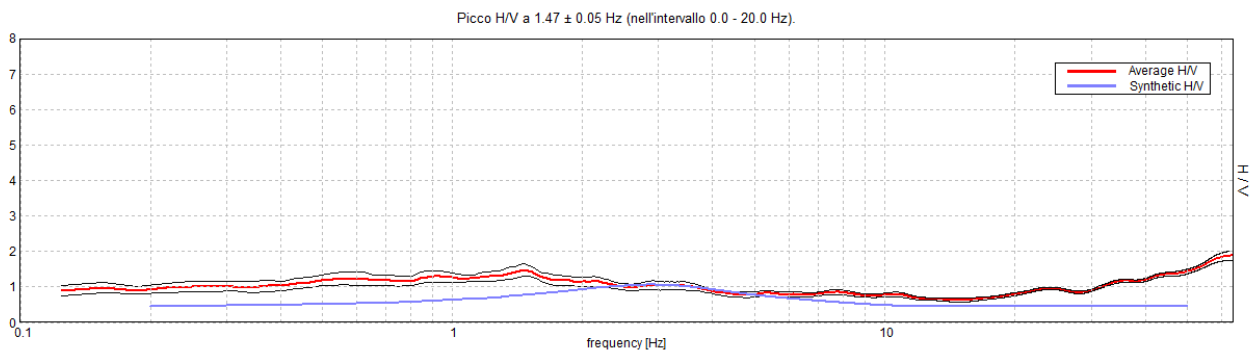
### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE



### SINGLE COMPONENT SPECTRA

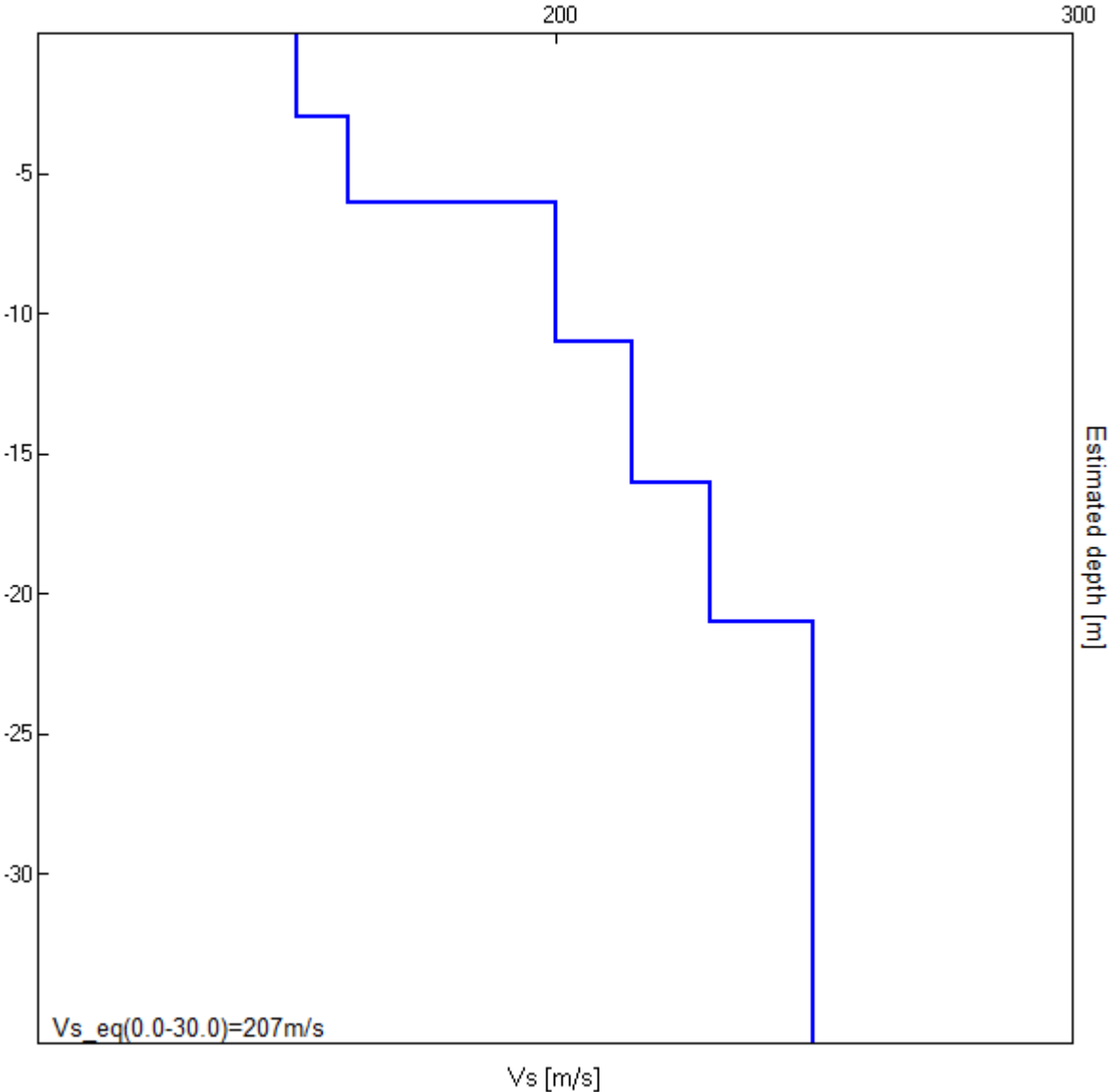


### EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
3.00	3.00	150	0.42
6.00	3.00	160	0.49
11.00	5.00	200	0.49
16.00	5.00	215	0.49
21.00	5.00	230	0.49
31.00	10.00	250	0.49
inf.	inf.	250	0.42

Vs\_eq(0.0-30.0)=207m/s

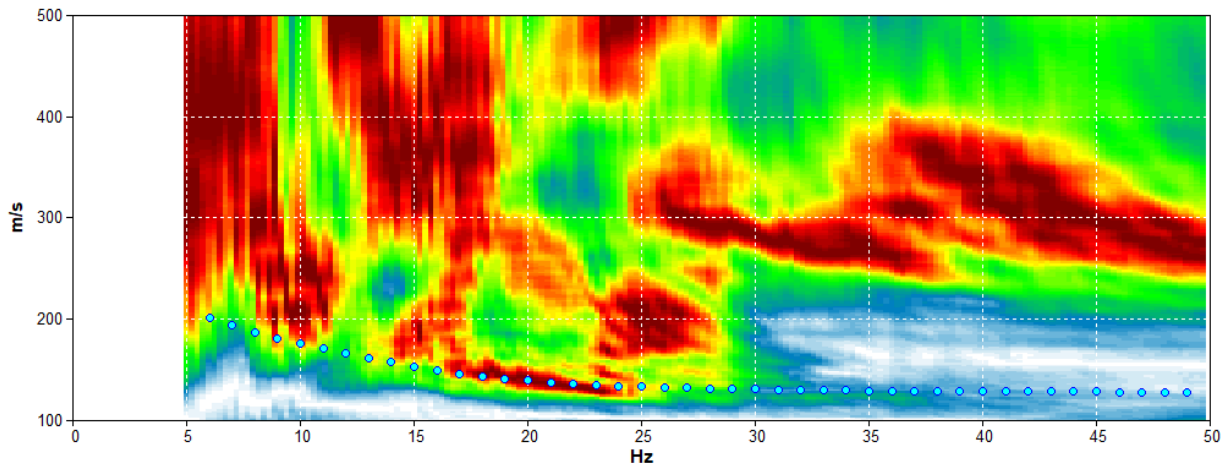


## GAMBETTOLA, MASW\_08

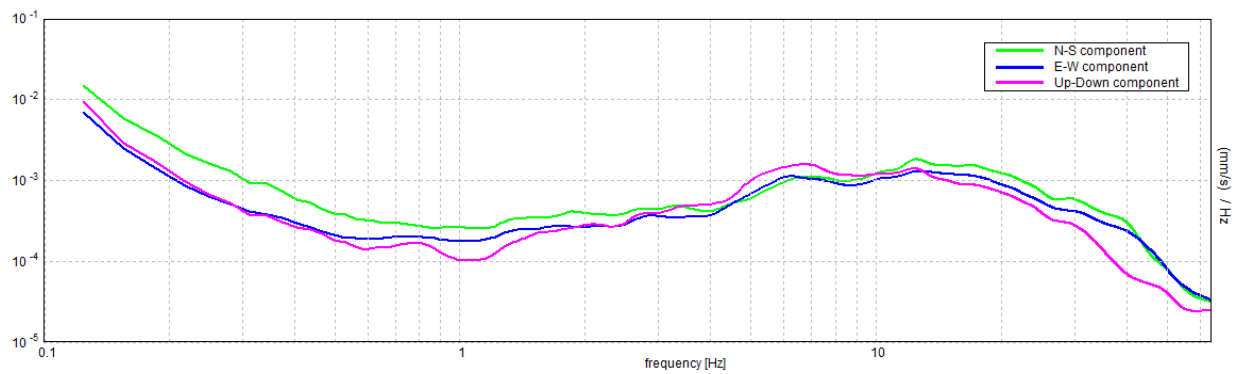
Start recording: 10/08/01 12:15:23      End recording: 10/08/01 12:35:22  
 Trace length: 0h20'00".      Analyzed 55% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

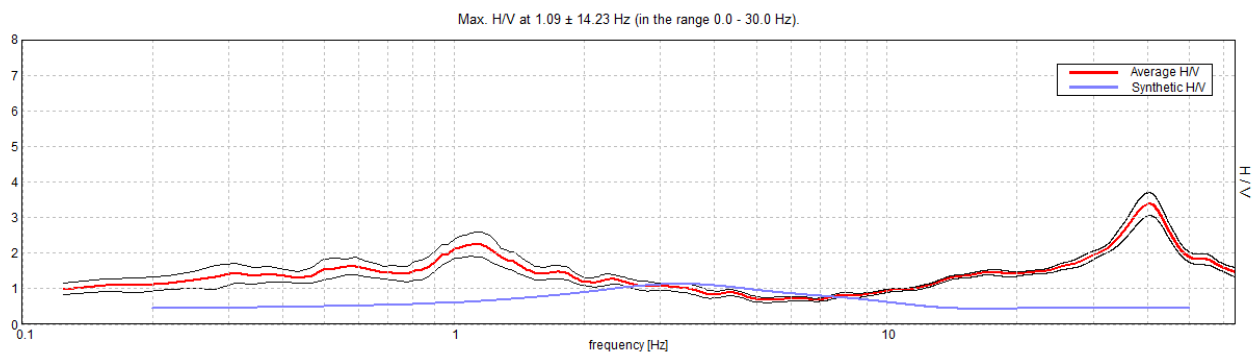
### MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE



SINGLE COMPONENT SPECTRA

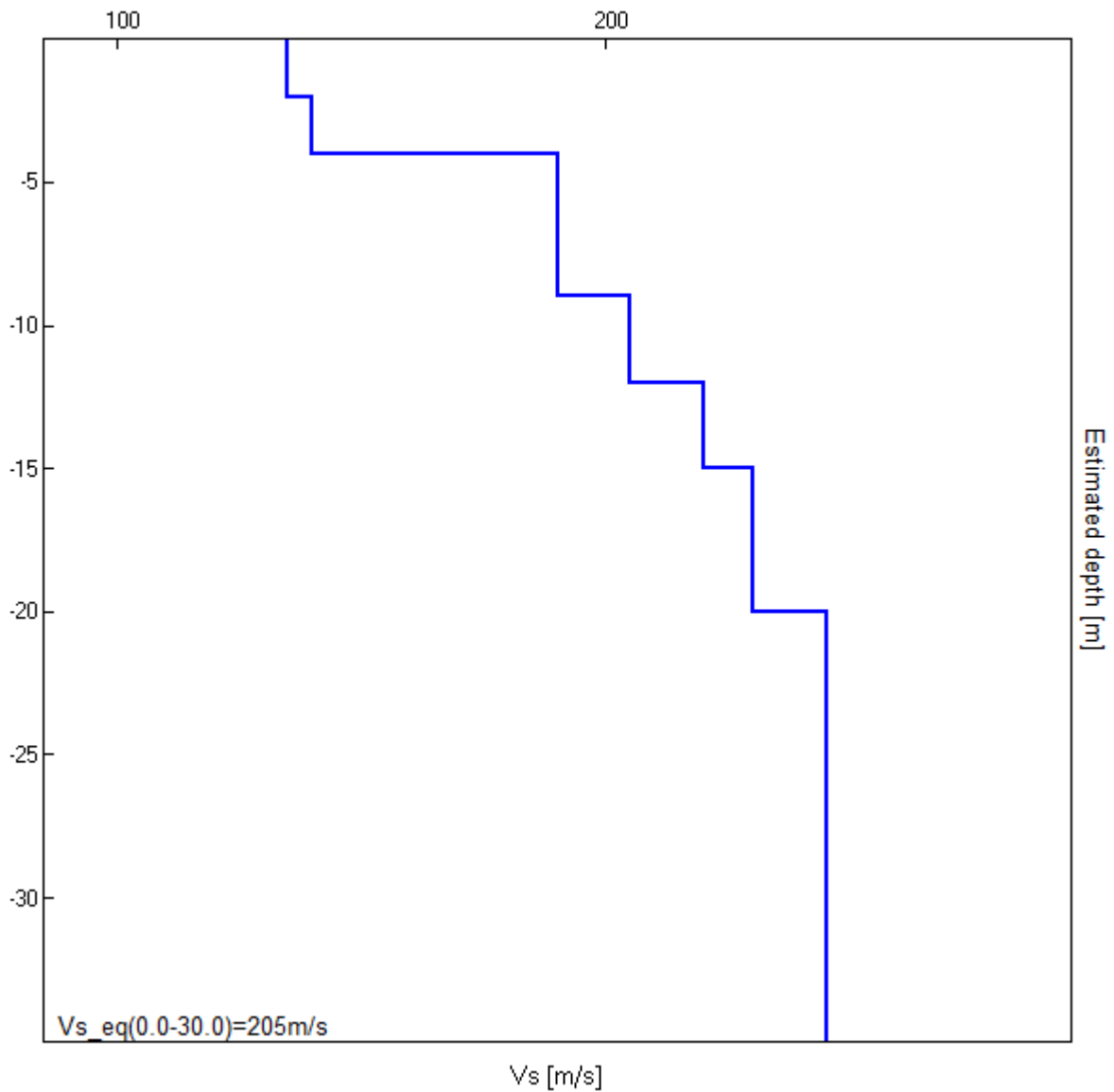


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	135	0.42
4.00	2.00	140	0.49
9.00	5.00	190	0.49
12.00	3.00	205	0.49
15.00	3.00	220	0.49
20.00	5.00	230	0.49
30.00	10.00	245	0.49
inf.	inf.	245	0.42

$Vs_{eq}(0.0-30.0)=205m/s$

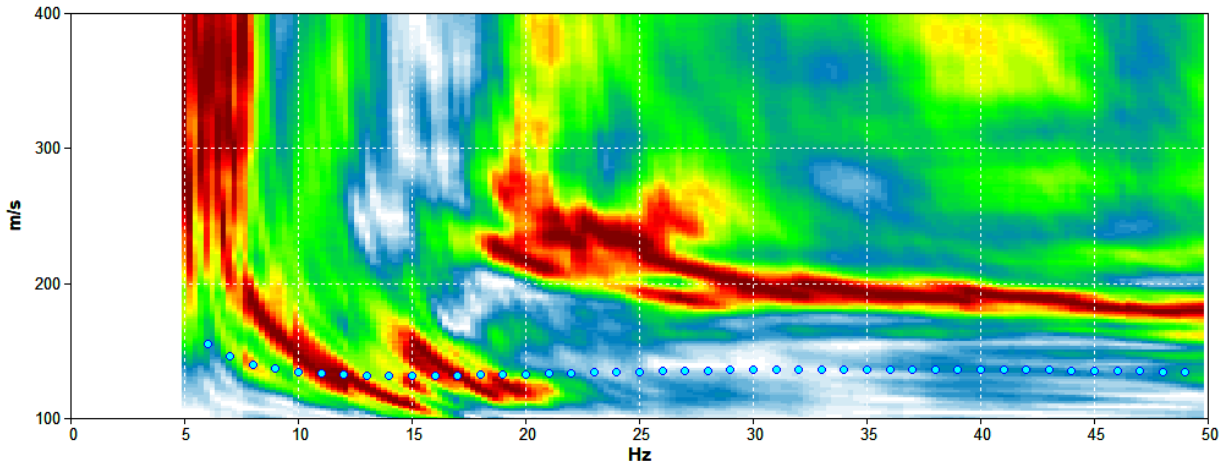


**GAMBETTOLA, MASW\_09**

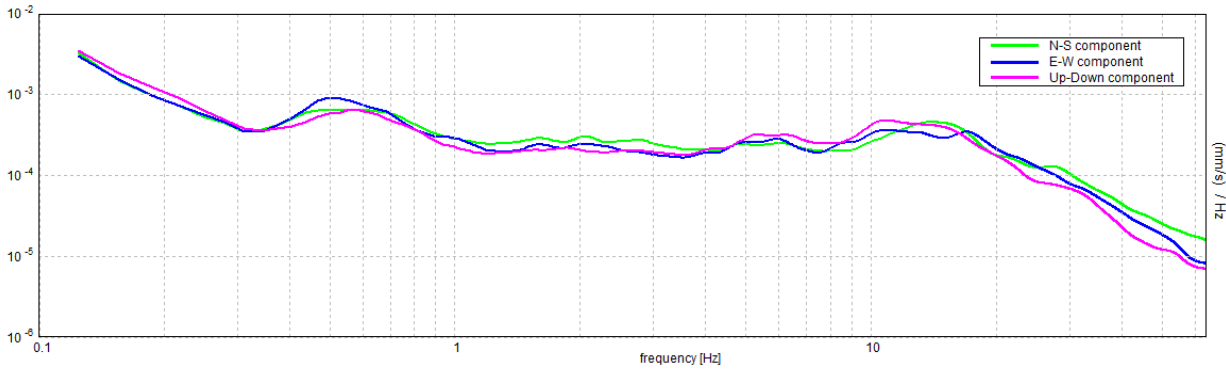
Start recording: 24/08/01 13:31:57      End recording: 24/08/01 13:51:56  
 Trace length: 0h20'00".      Analyzed 73% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

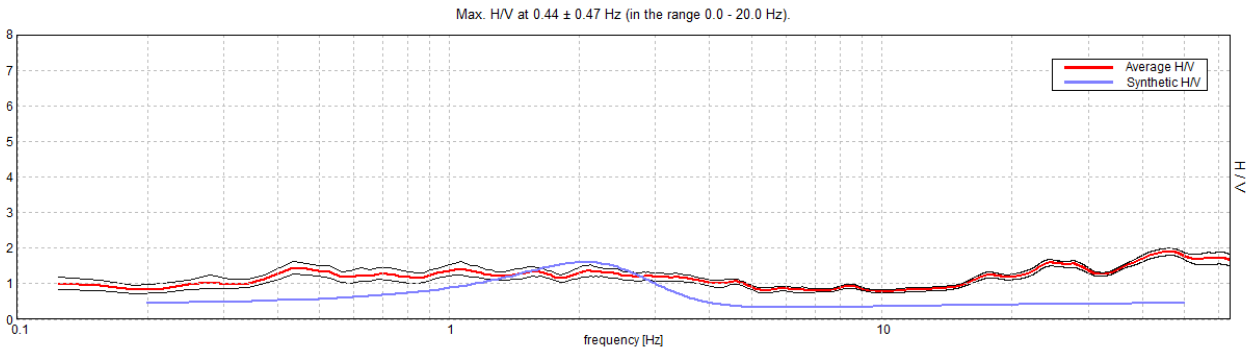
**MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE**



**SINGLE COMPONENT SPECTRA**



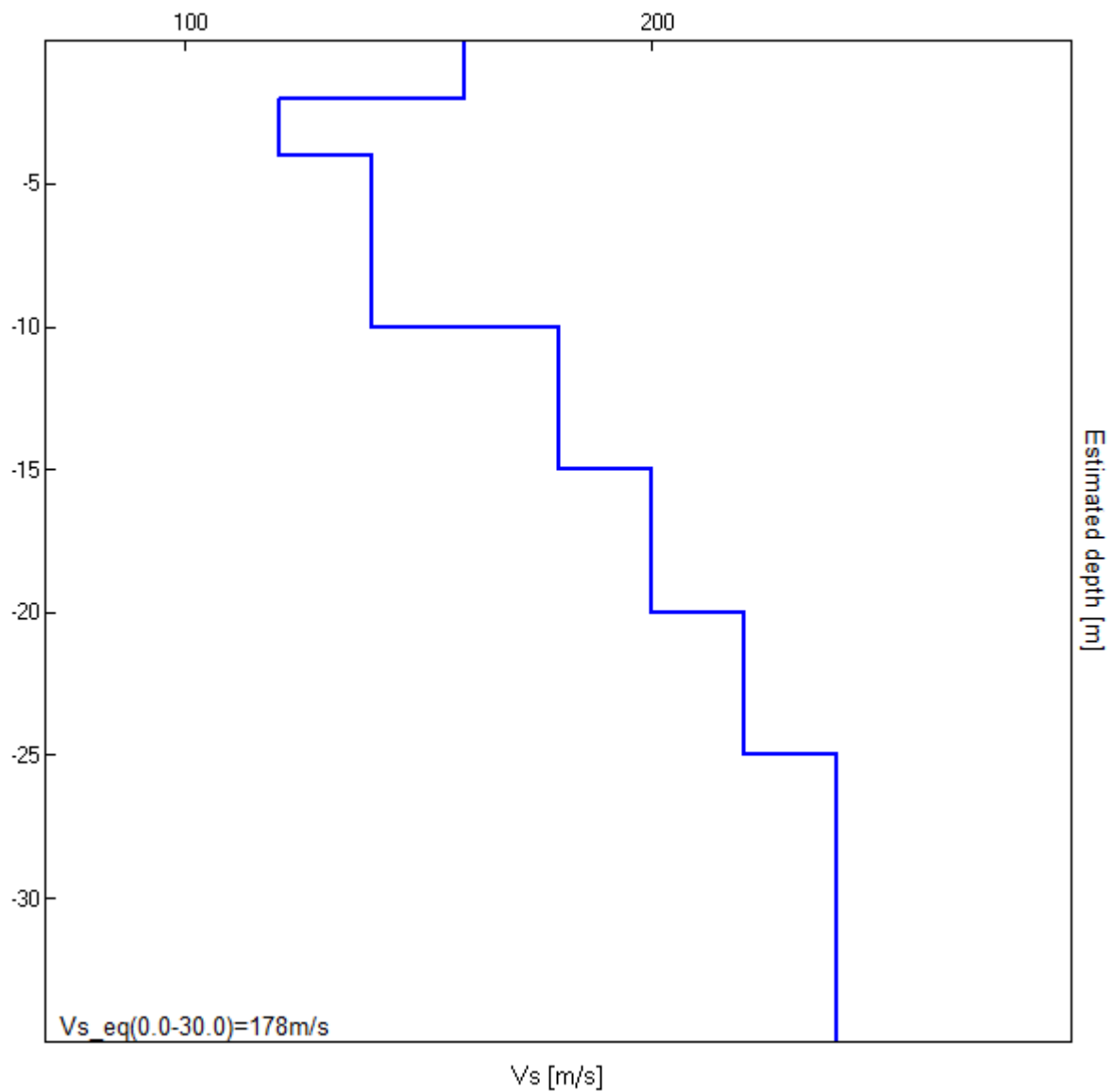
**EXPERIMENTAL vs. SYNTHETIC H/V**





Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	160	0.49
4.00	2.00	120	0.49
10.00	6.00	140	0.49
15.00	5.00	180	0.49
20.00	5.00	200	0.49
25.00	5.00	220	0.49
30.00	5.00	240	0.49
inf.	inf.	240	0.49

$Vs_{eq}(0.0-30.0)=178m/s$

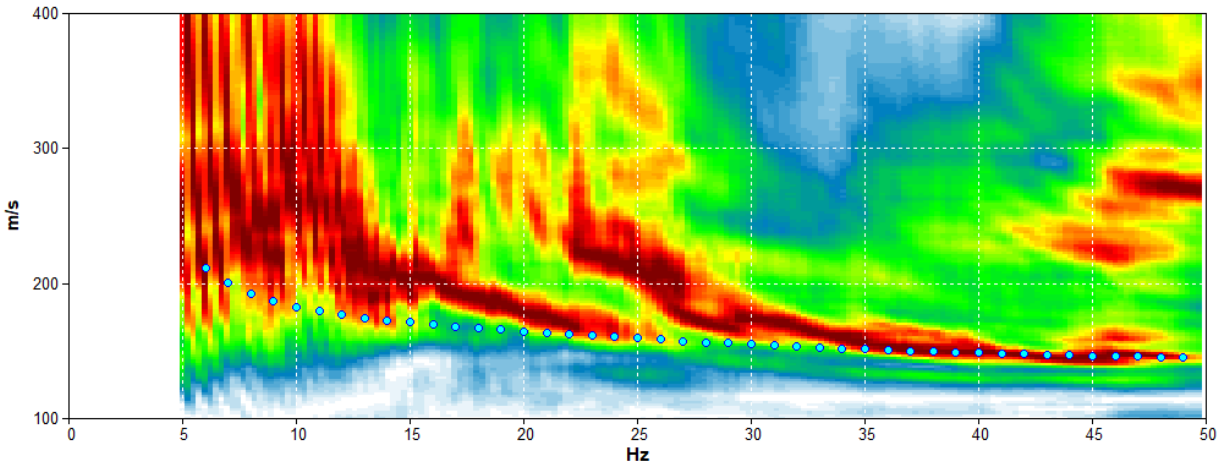


**GAMBETTOLA, MASW\_10**

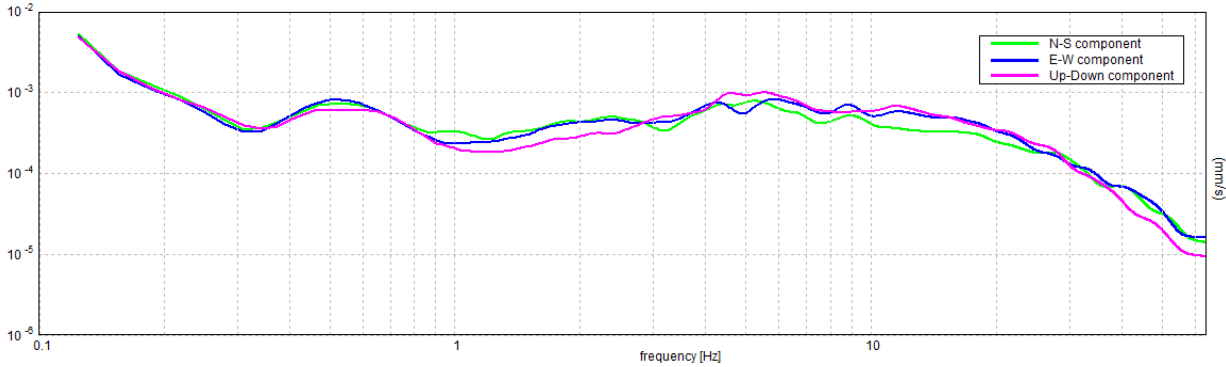
Start recording: 24/08/01 14:58:20      End recording: 24/08/01 15:18:19  
 Trace length: 0h20'00".      Analyzed 55% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

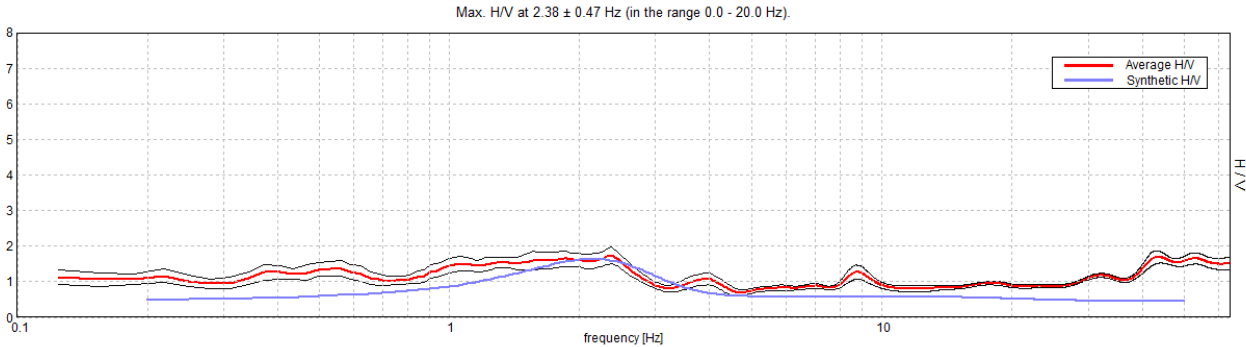
**MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE**



**SINGLE COMPONENT SPECTRA**

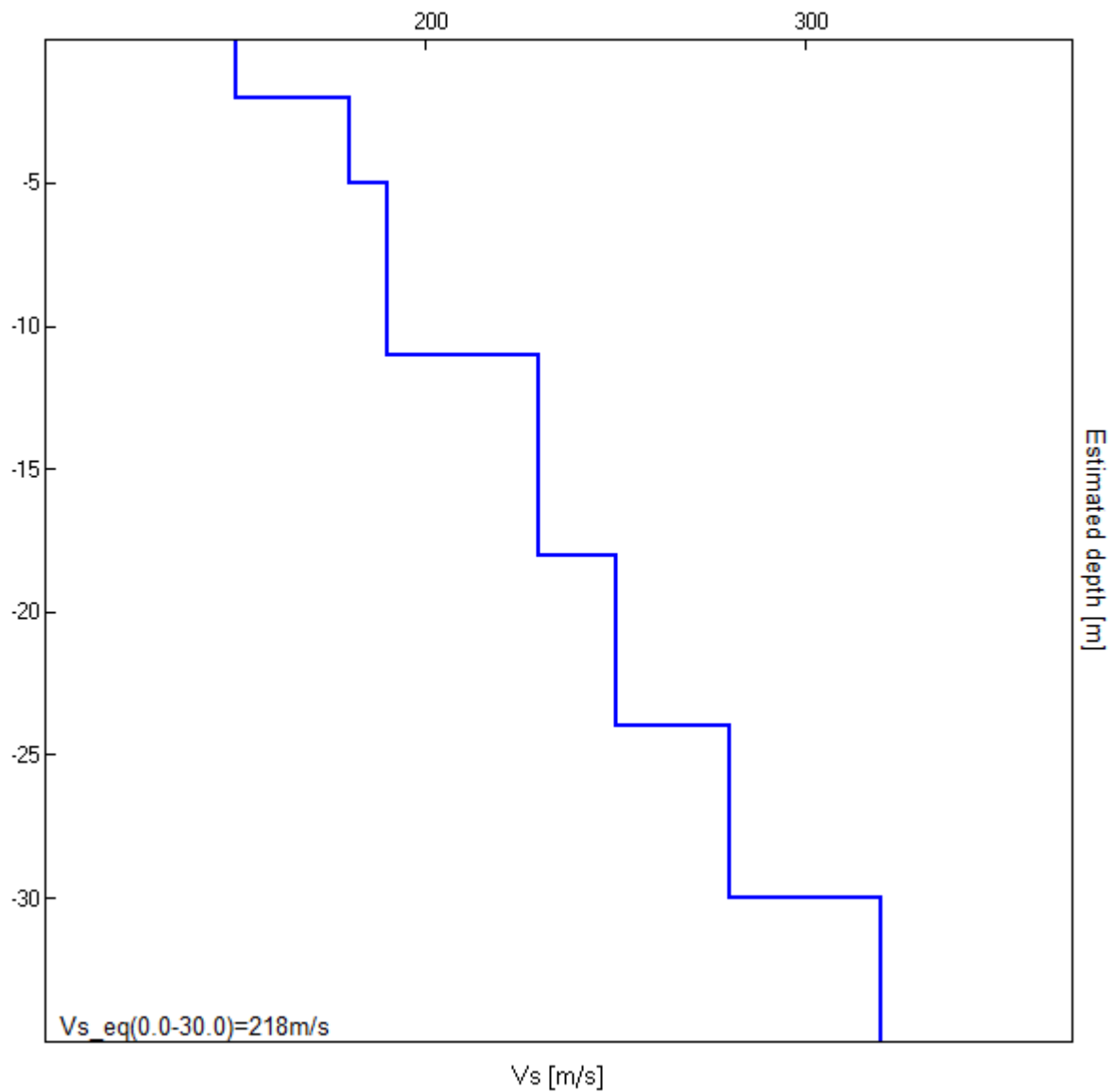


**EXPERIMENTAL vs. SYNTHETIC H/V**



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	150	0.42
5.00	3.00	180	0.49
11.00	6.00	190	0.49
18.00	7.00	230	0.49
24.00	6.00	250	0.49
30.00	6.00	280	0.49
inf.	inf.	320	0.40

$V_{s\_eq}(0.0-30.0)=218\text{m/s}$

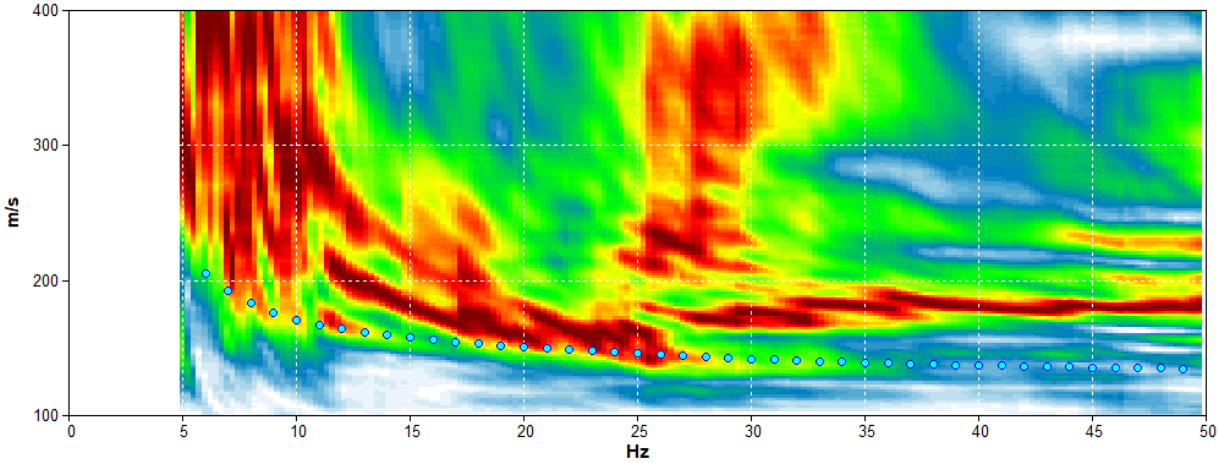


**GAMBETTOLA, MASW\_11**

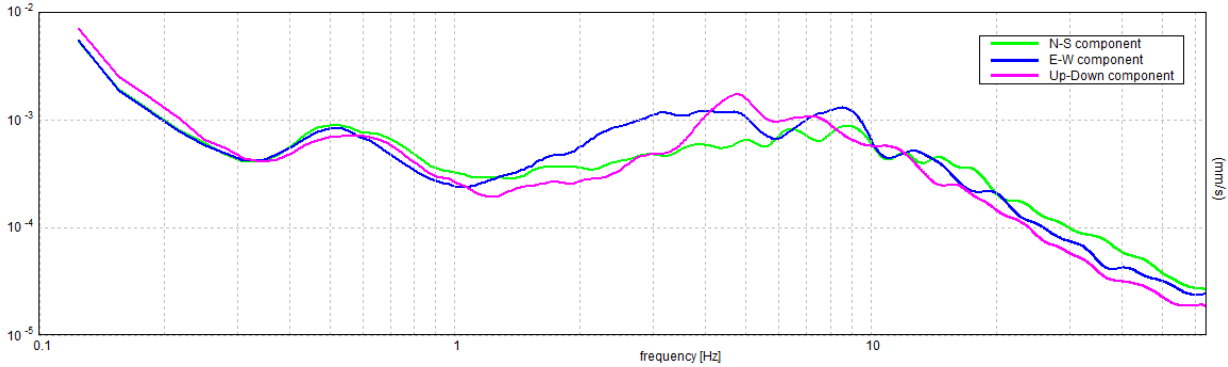
Start recording: 24/08/01 15:28:43      End recording: 24/08/01 15:48:42  
 Trace length: 0h20'00".      Analyzed 53% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

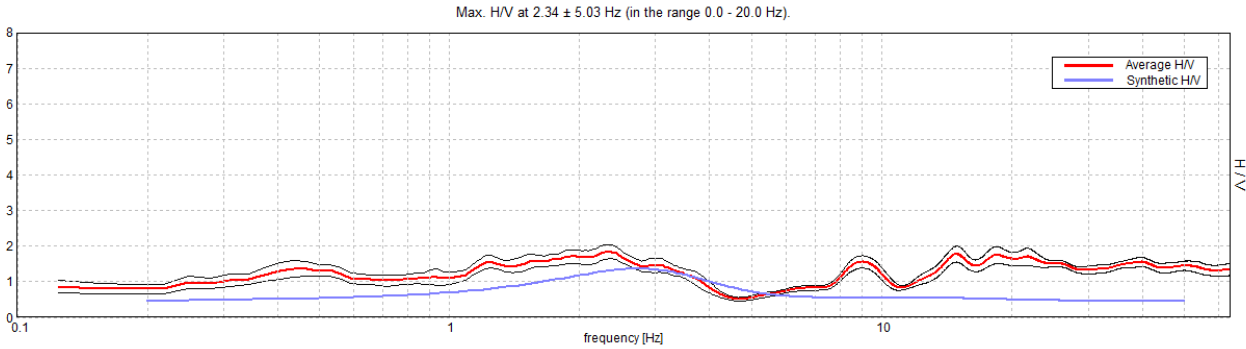
**MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE**



**SINGLE COMPONENT SPECTRA**

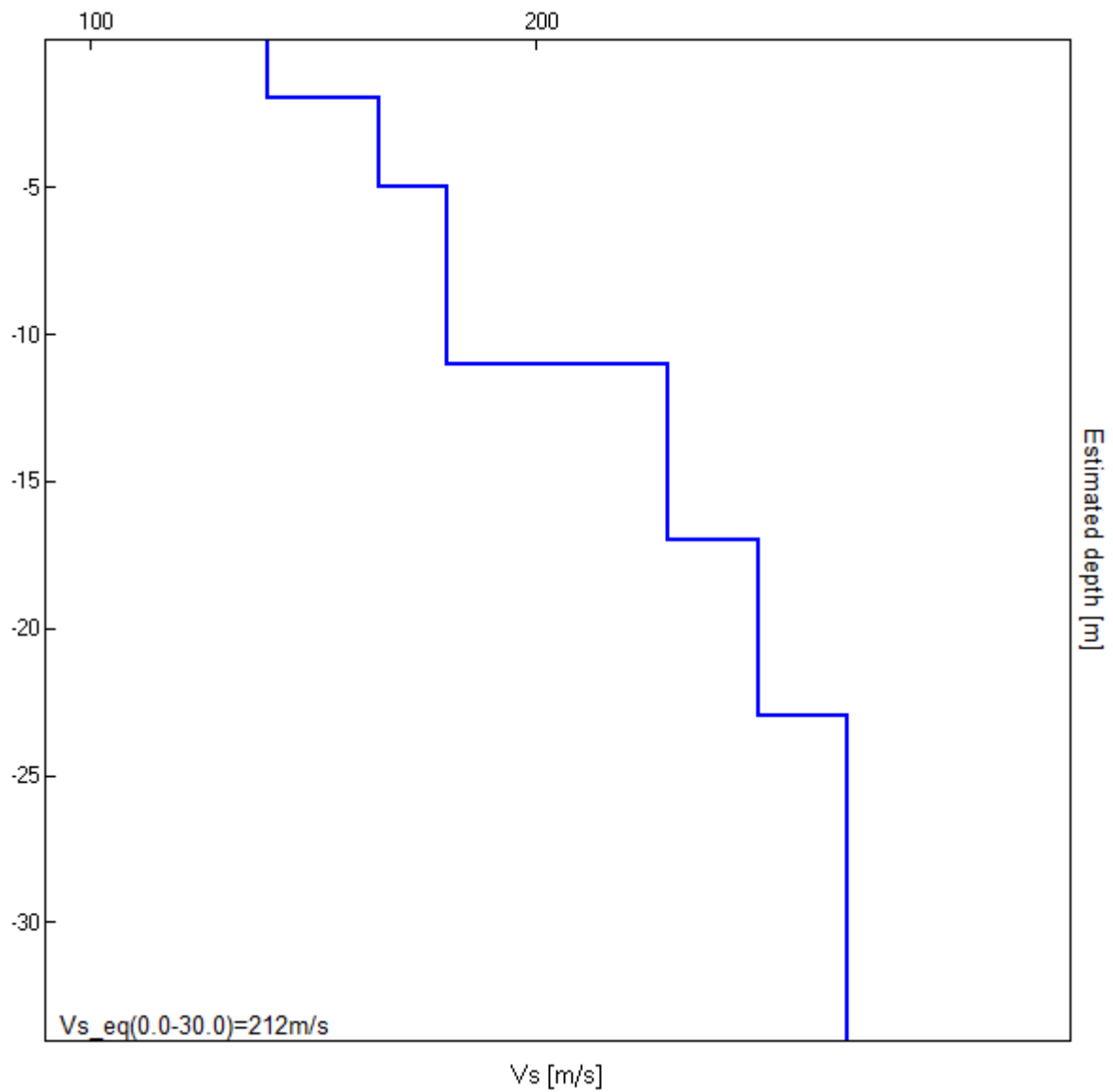


**EXPERIMENTAL vs. SYNTHETIC H/V**



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	140	0.42
5.00	3.00	165	0.49
11.00	6.00	180	0.49
17.00	6.00	230	0.49
23.00	6.00	250	0.49
29.00	6.00	270	0.49
inf.	inf.	270	0.40

$Vs_{eq}(0.0-30.0)=212m/s$

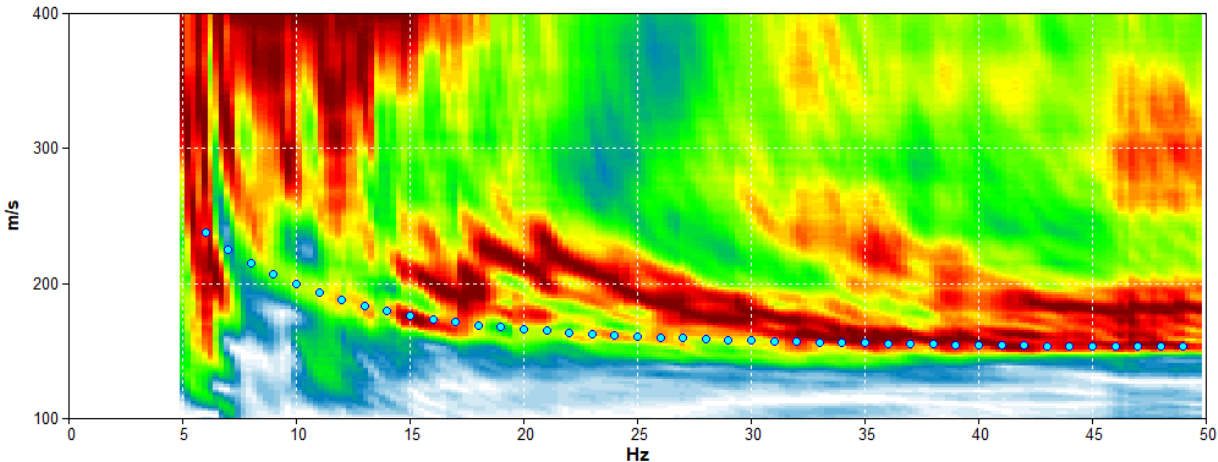


**GAMBETTOLA, MASW\_12**

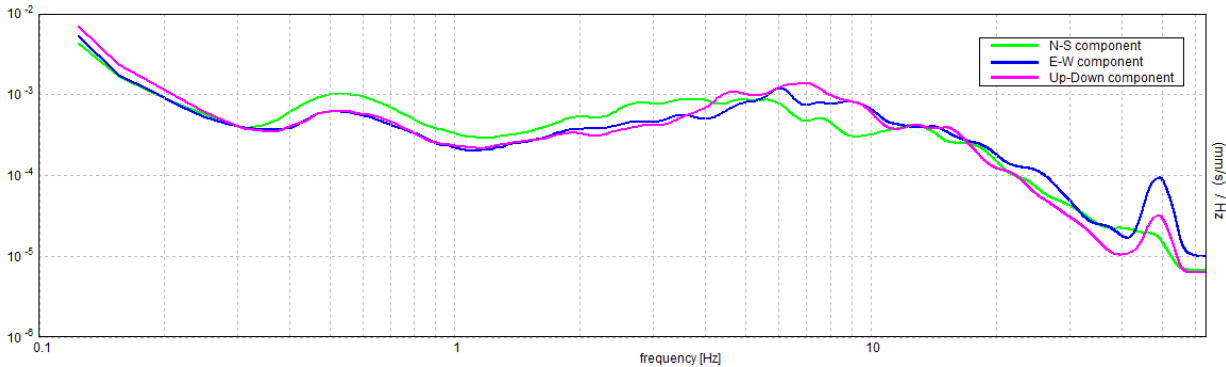
Start recording: 24/08/01 14:25:53      End recording: 24/08/01 14:45:52  
 Trace length: 0h20'00".      Analyzed 72% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN

Array geometry (x): 5.0 7.0 9.0 11.0 13.0 15.0 17.0 19.0 21.0 23.0 25.0 27.0 29.0 31.0 33.0 35.0 37.0 39.0  
 41.0 43.0 45.0 47.0 49.0 51.0 m.

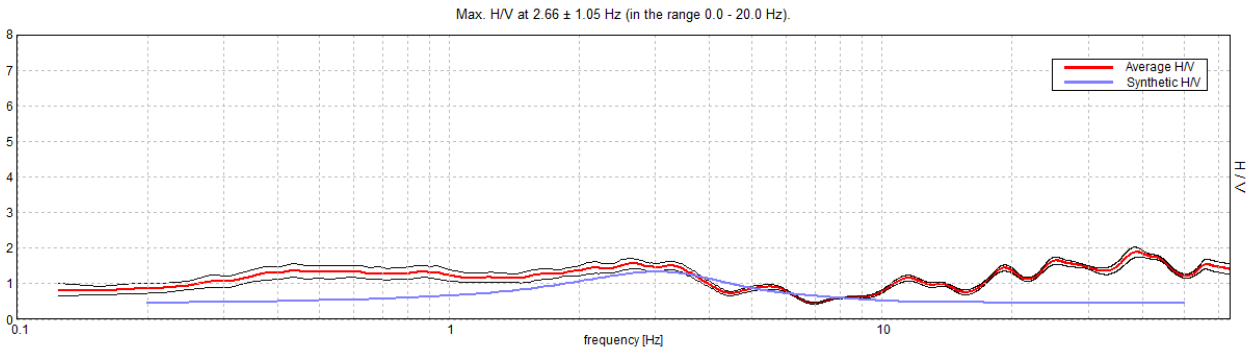
**MODELLED RAYLEIGH WAVE PHASE VELOCITY DISPERSION CURVE**



**SINGLE COMPONENT SPECTRA**

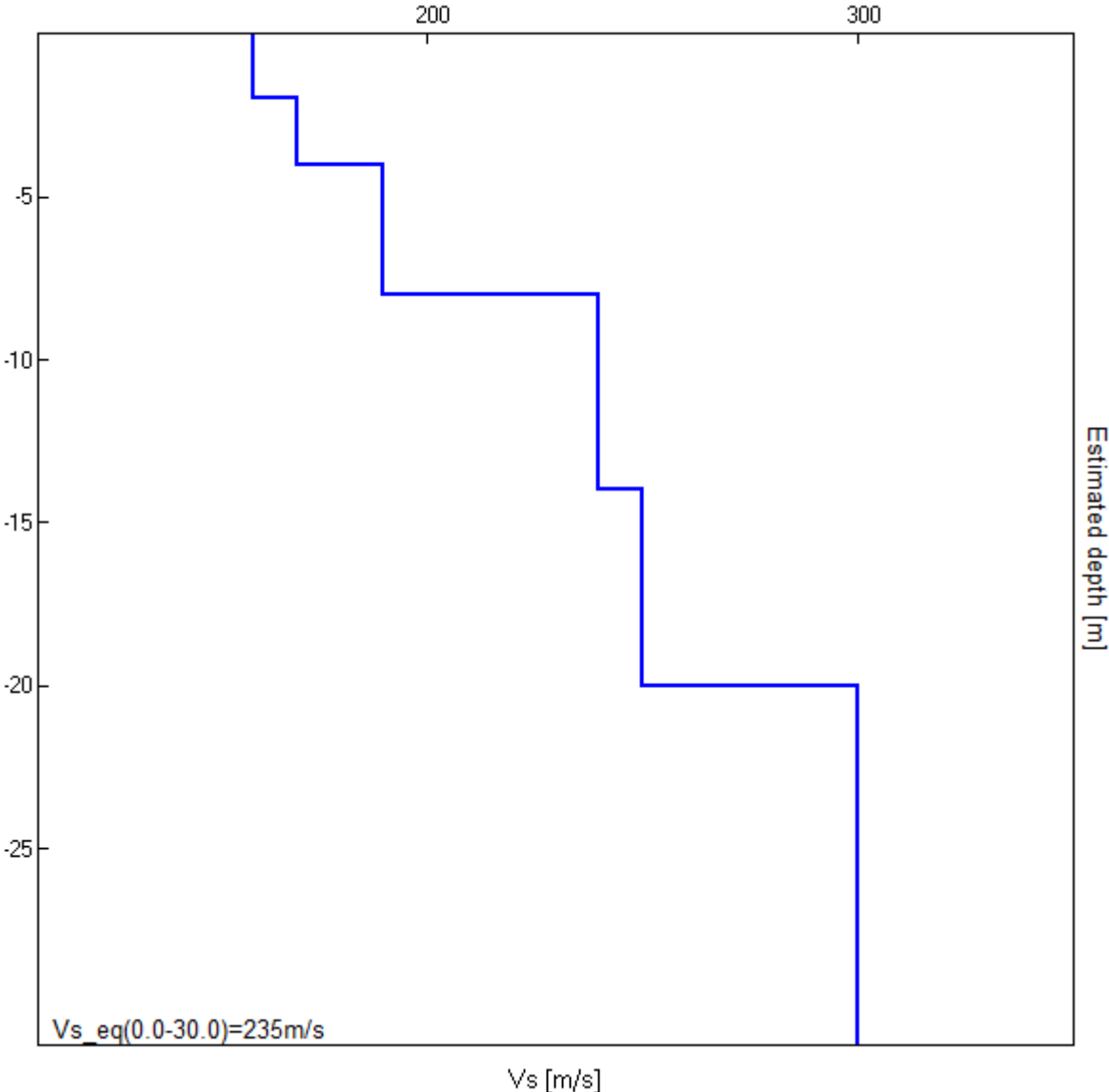


**EXPERIMENTAL vs. SYNTHETIC H/V**



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	160	0.42
4.00	2.00	170	0.49
8.00	4.00	190	0.49
14.00	6.00	240	0.49
20.00	6.00	250	0.49
26.00	6.00	300	0.49
inf.	inf.	300	0.40

Vs\_eq(0.0-30.0)=235m/s



## GAMBETTOLA, H01

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 12/08/01 11:45:34 Fine registrazione: 12/08/01 12:05:33

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00".

Analizzato 67% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

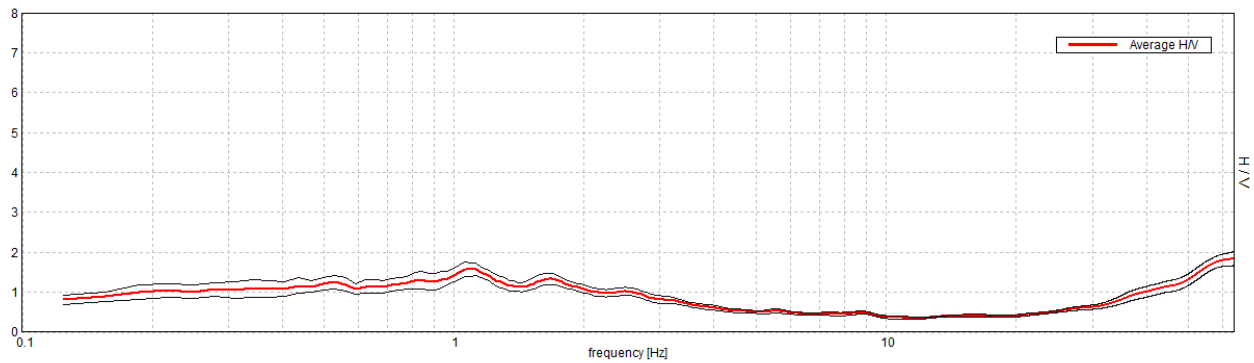
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

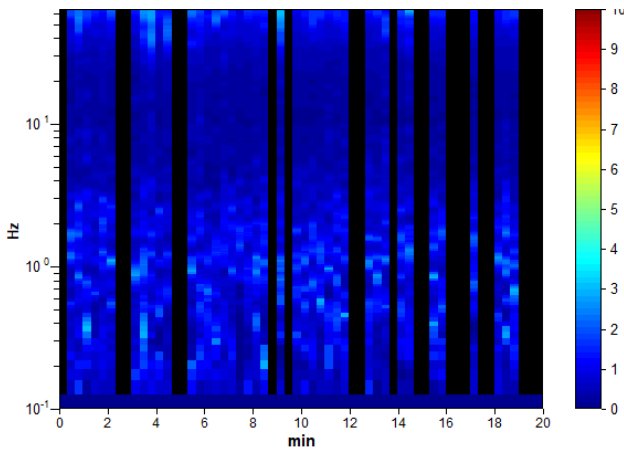
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

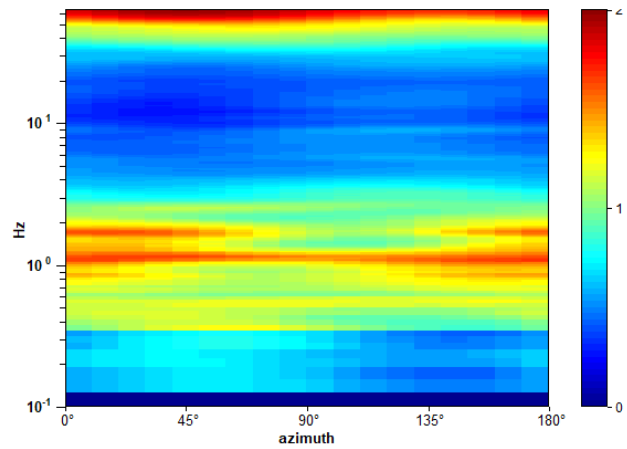
Picco H/V a  $1.06 \pm 0.21$  Hz (nell'intervallo 0.0 - 20.0 Hz).



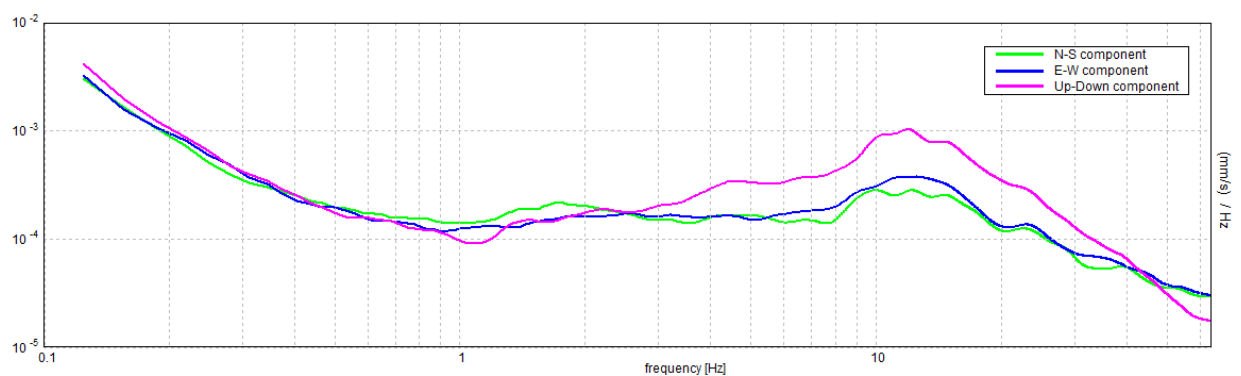
### H/V TIME HISTORY



### DIRECTIONAL H/V

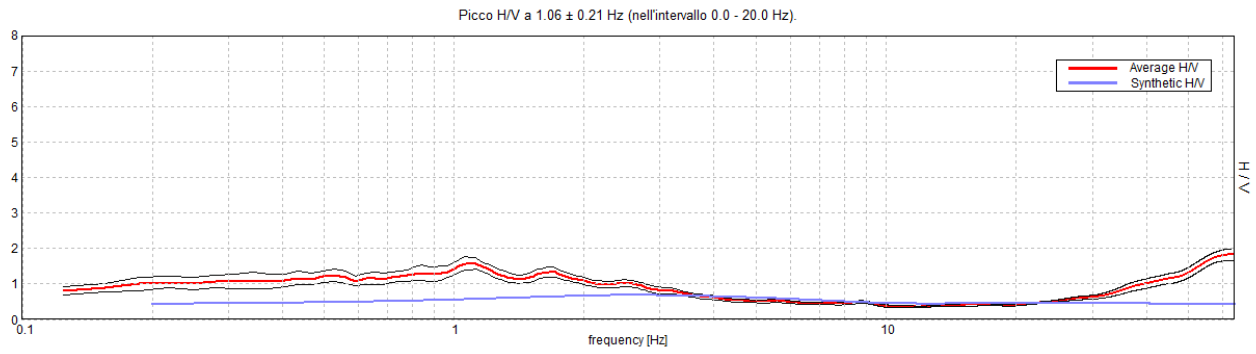


### SINGLE COMPONENT SPECTRA



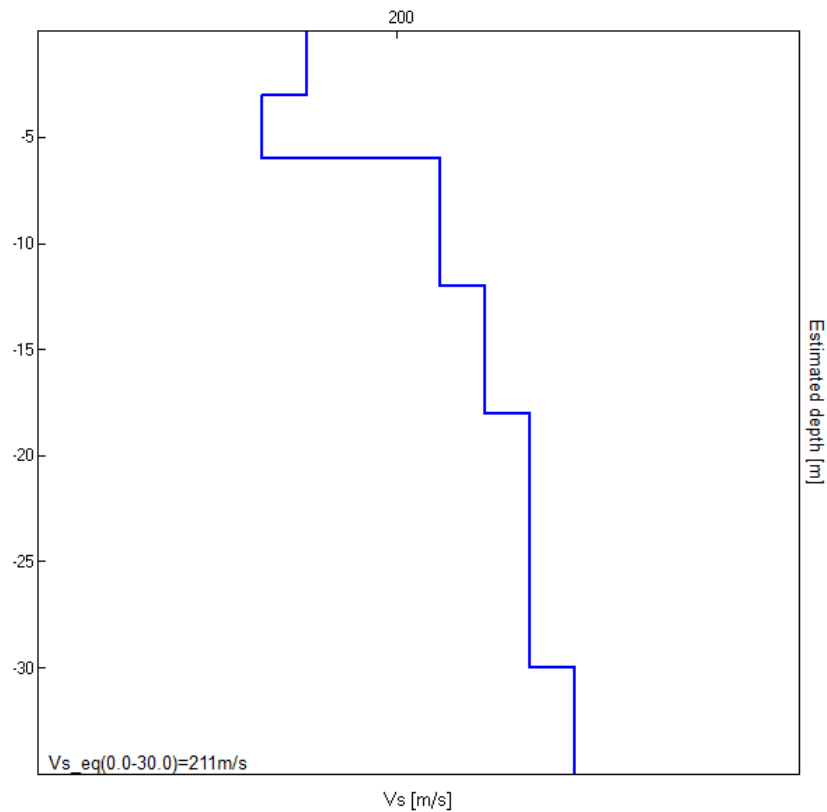


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
3.00	3.00	180	0.40
6.00	3.00	170	0.49
12.00	6.00	210	0.49
18.00	6.00	220	0.49
30.00	12.00	230	0.49
inf.	inf.	240	0.45

**Vs\_eq(0.0-30.0)=211m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $1.06 \pm 0.21$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.06 > 0.50$	OK	
$n_c(f_0) > 200$	$850.0 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 52 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.25 Hz	OK	
$A_0 > 2$	$1.57 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.20212  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.21475 < 0.10625$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.1883 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H02

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 12/08/01 11:03:06 Fine registrazione: 12/08/01 11:23:05

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 62% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

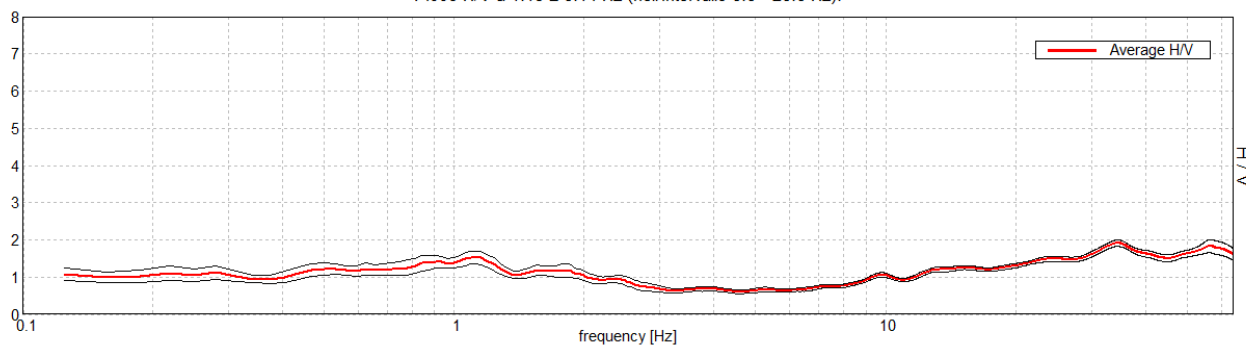
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

Lisciamento: 10%

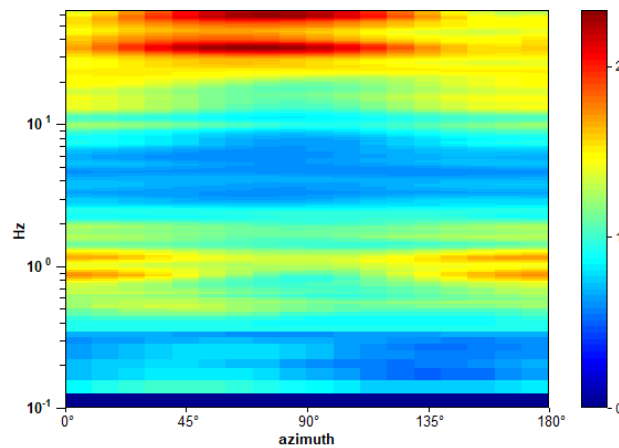
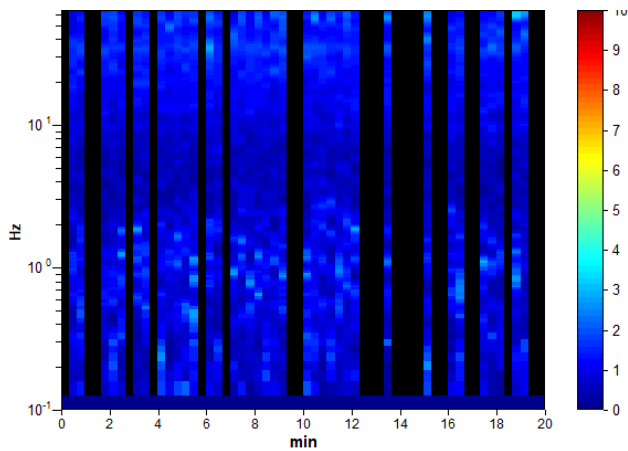
### HORIZONTAL TO VERTICAL SPECTRAL RATIO

Picco H/V a  $1.13 \pm 0.14$  Hz (nell'intervallo 0.0 - 20.0 Hz).

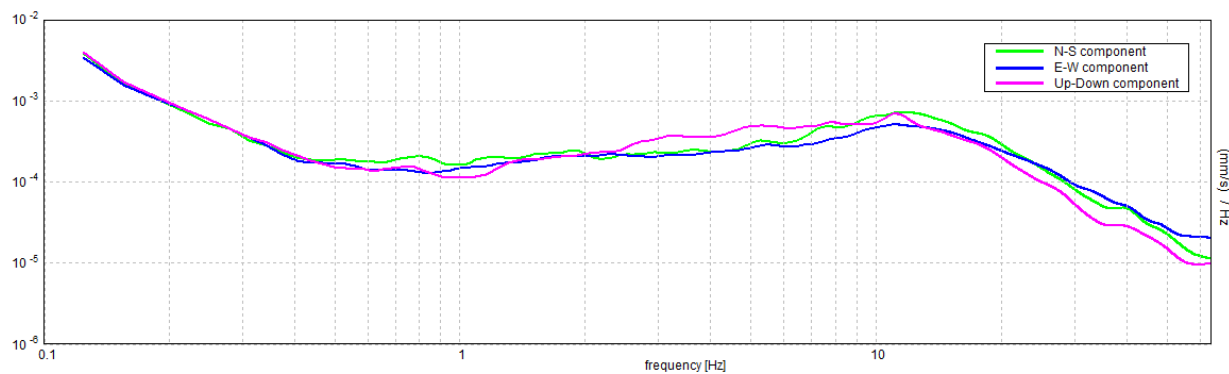


H/V TIME HISTORY

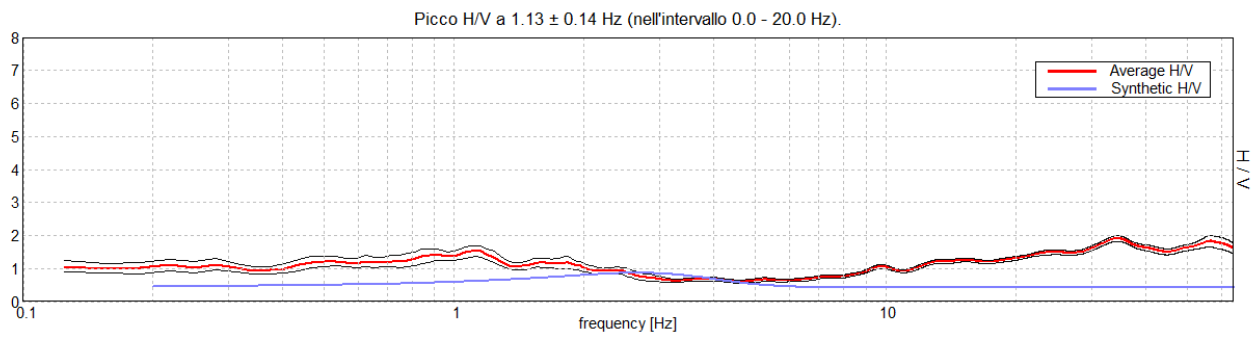
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

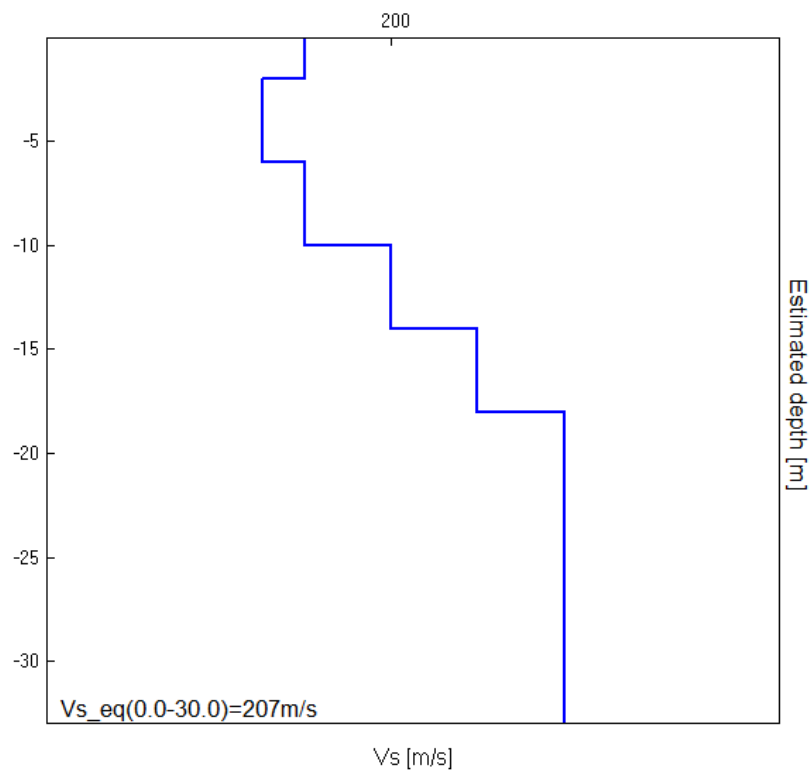


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	180	0.42
6.00	4.00	170	0.49
10.00	4.00	180	0.49
14.00	4.00	200	0.49
18.00	4.00	220	0.49
28.00	10.00	240	0.49
inf.	inf.	240	0.42

**Vs\_eq(0.0-30.0)=207m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $1.13 \pm 0.14$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.13 > 0.50$	OK	
$n_c(f_0) > 200$	$832.5 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 55 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	2.719 Hz	OK	
$A_0 > 2$	$1.53 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.12754  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.14348 < 0.1125$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.1694 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

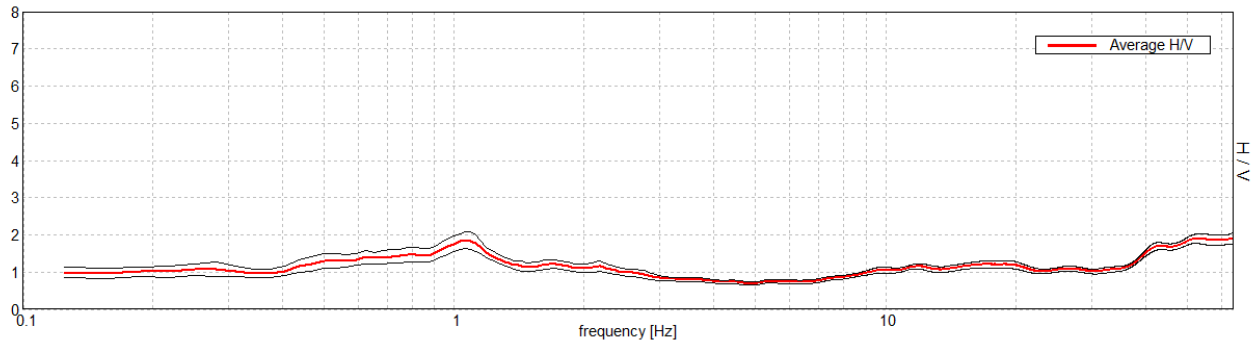
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H03

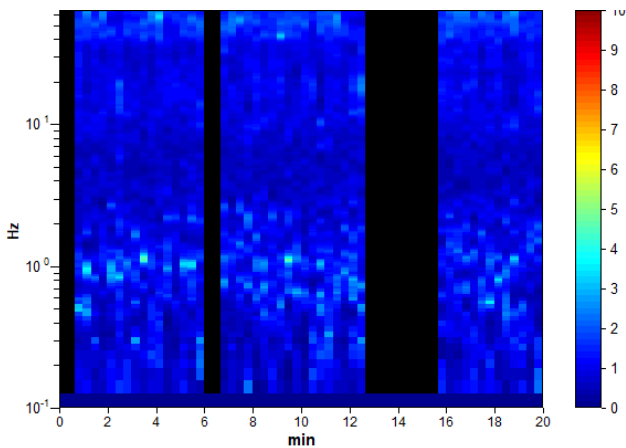
Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: n.a.  
 Start recording: 12/08/01 10:17:11 End recording: 12/08/01 10:37:10  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00". Analyzed 78% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

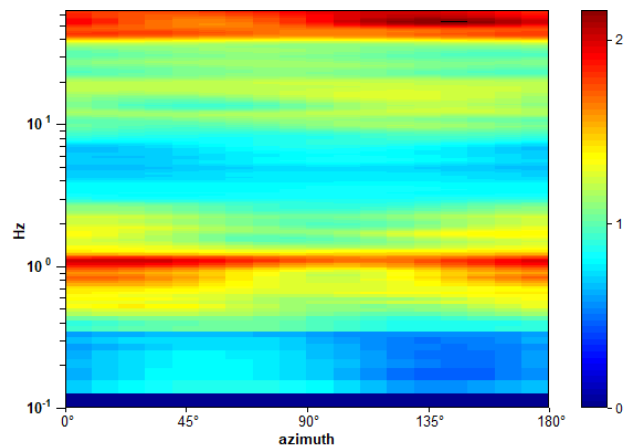
Max. H/V at  $1.06 \pm 0.18$  Hz (in the range 0.0 - 30.0 Hz).



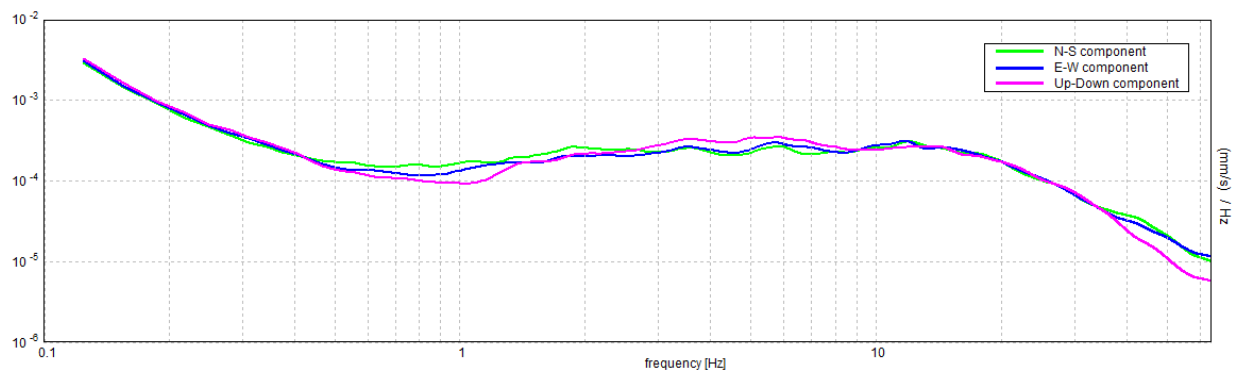
H/V TIME HISTORY



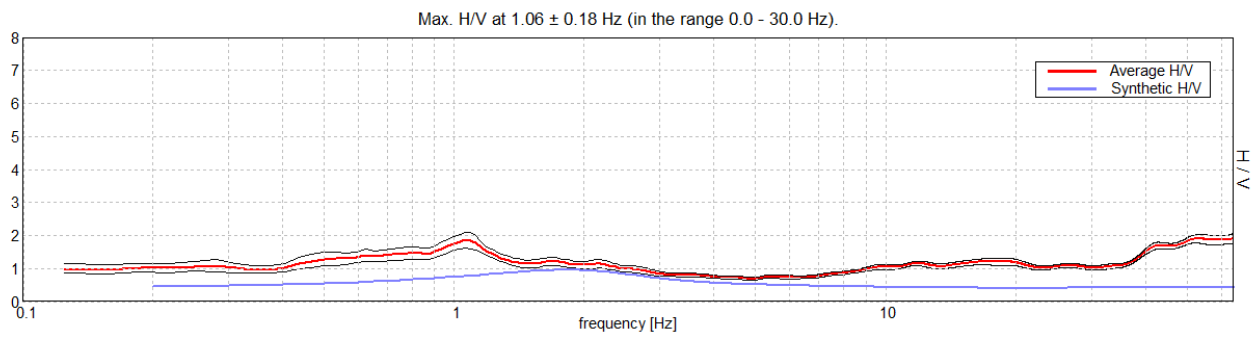
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

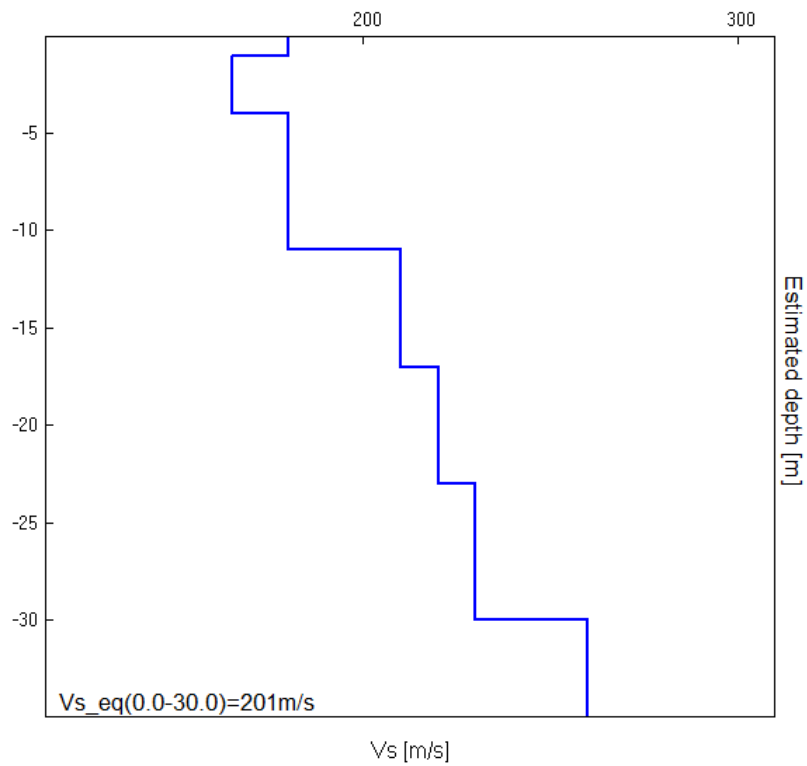


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
1.00	1.00	180	0.45
4.00	3.00	165	0.49
11.00	7.00	180	0.49
17.00	6.00	210	0.49
23.00	6.00	220	0.49
30.00	7.00	230	0.49
inf.	inf.	260	0.49

**Vs<sub>eq</sub>(0.0-30.0)=201m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $1.06 \pm 0.18$  Hz (in the range 0.0 - 30.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.06 > 0.50$	OK	
$n_c(f_0) > 200$	$998.8 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 52 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	2.781 Hz	OK	
$A_0 > 2$	$1.86 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.17299  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.18381 < 0.10625$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2337 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20



## GAMBETTOLA, H04

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 12/08/01 12:18:26 Fine registrazione: 12/08/01 12:38:26

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 65% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

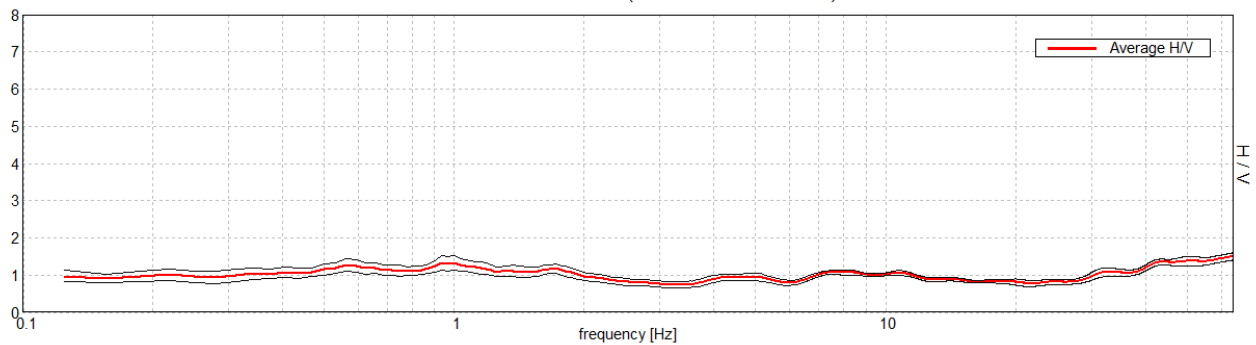
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

Lisciamento: 10%

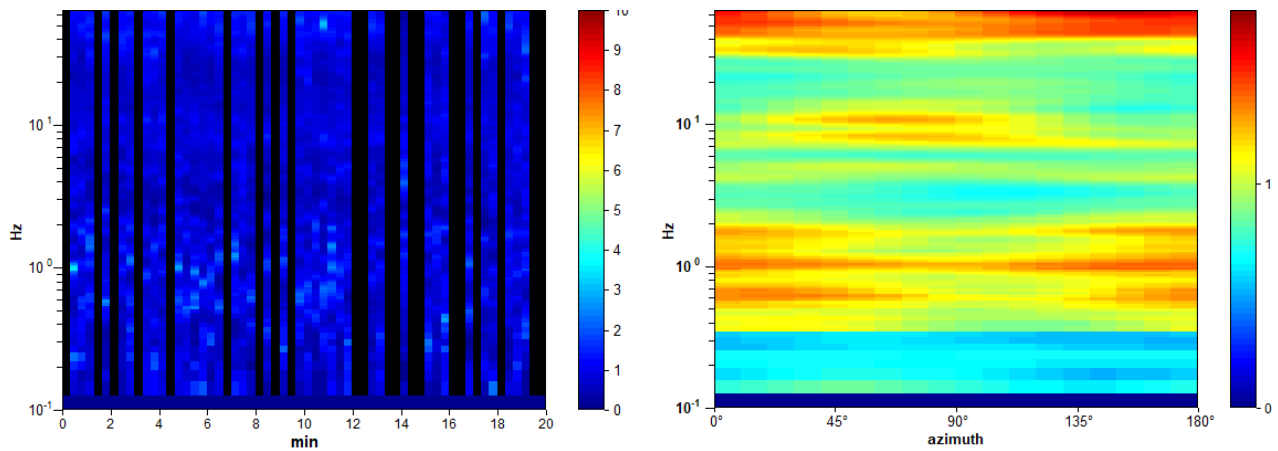
### HORIZONTAL TO VERTICAL SPECTRAL RATIO

Picco H/V a  $0.94 \pm 0.17$  Hz (nell'intervallo 0.0 - 20.0 Hz).

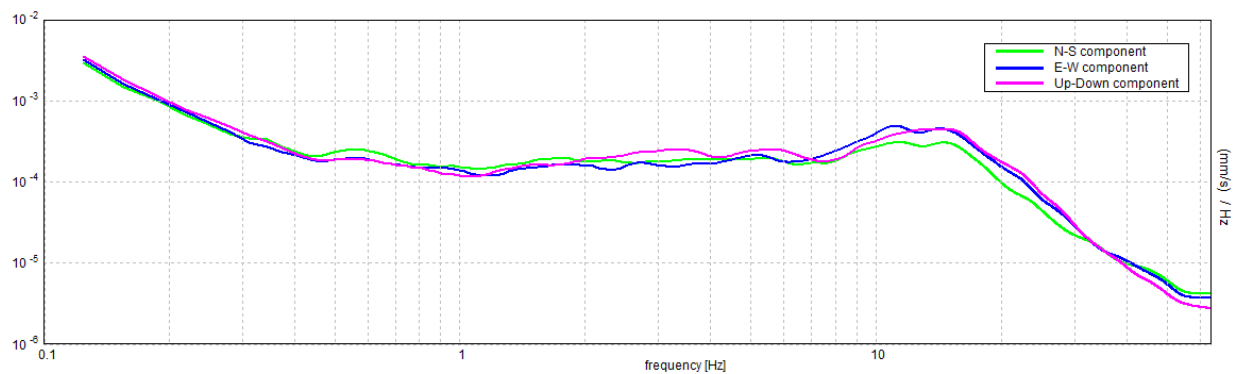


H/V TIME HISTORY

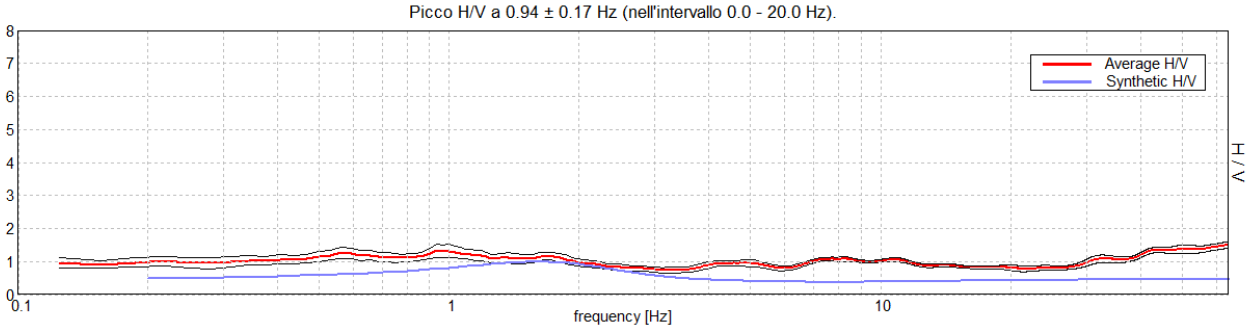
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

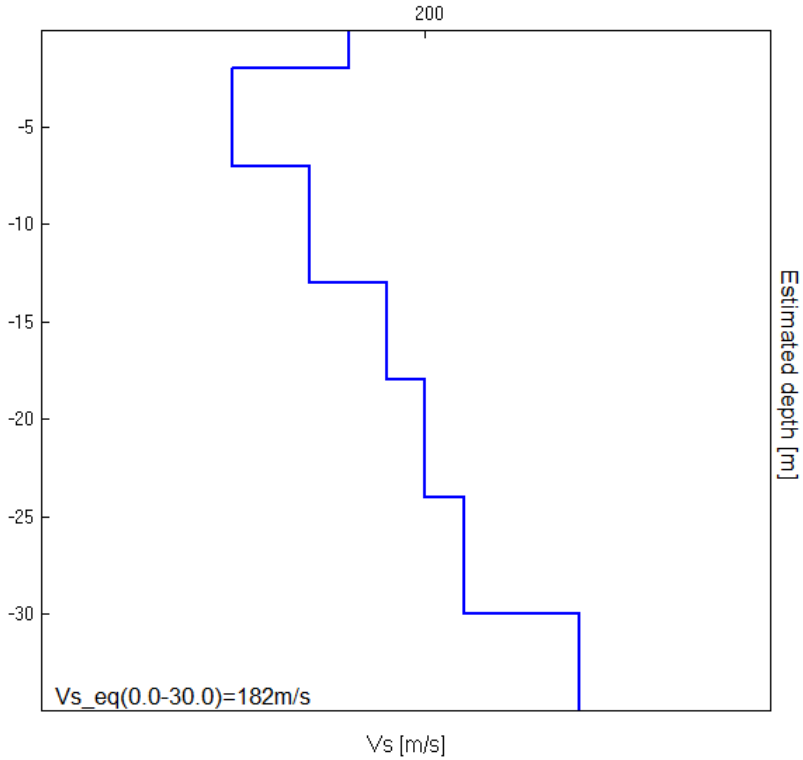


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	180	0.42
7.00	5.00	150	0.49
13.00	6.00	170	0.49
18.00	5.00	190	0.49
24.00	6.00	200	0.49
30.00	6.00	210	0.49
inf.	inf.	240	0.42

**Vs\_eq(0.0-30.0)=182m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $0.94 \pm 0.17$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$0.94 > 0.50$	OK	
$n_c(f_0) > 200$	$731.3 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 46 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	$1.33 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.17679  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.16574 < 0.14063$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2005 < 2.0$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H05

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 12/08/01 09:42:57 Fine registrazione: 12/08/01 10:02:56

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 50% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

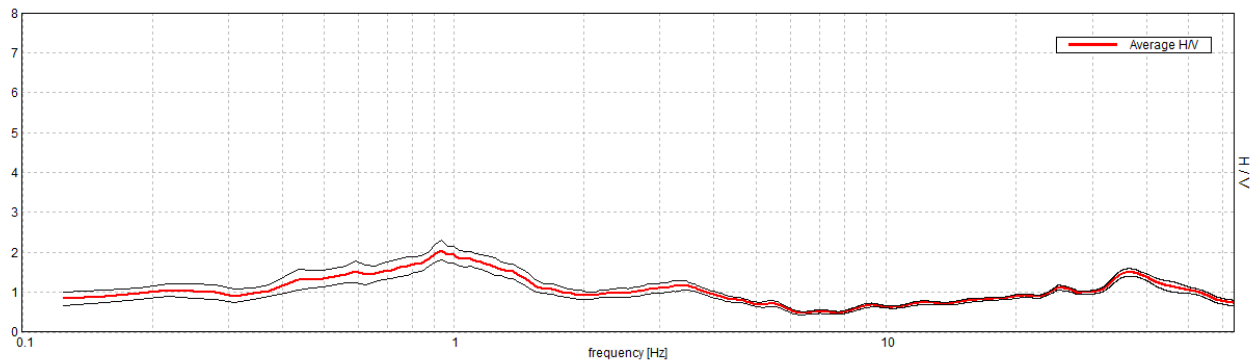
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

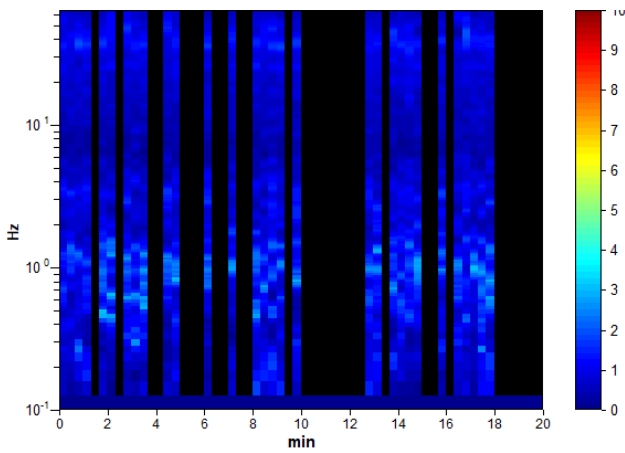
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

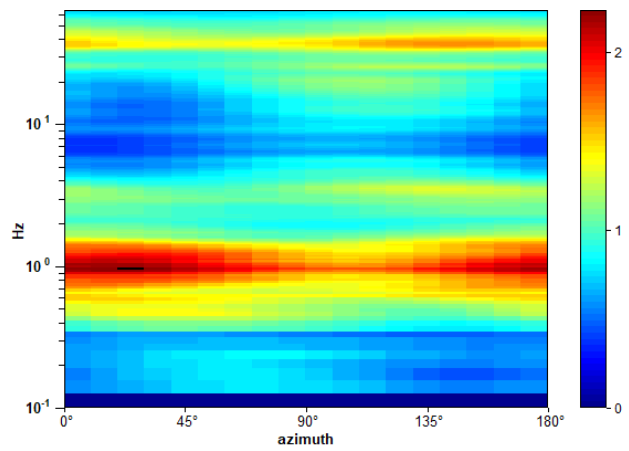
Picco H/V a  $0.94 \pm 0.17$  Hz (nell'intervallo 0.0 - 20.0 Hz).



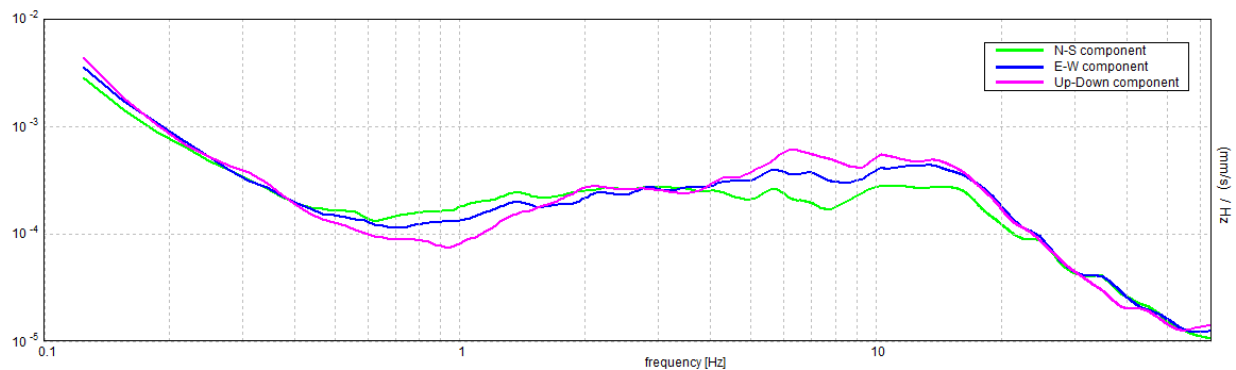
H/V TIME HISTORY



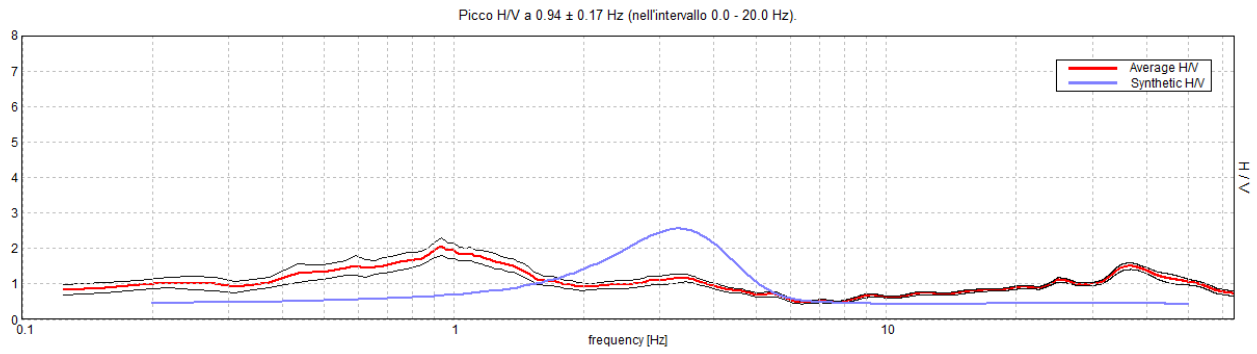
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

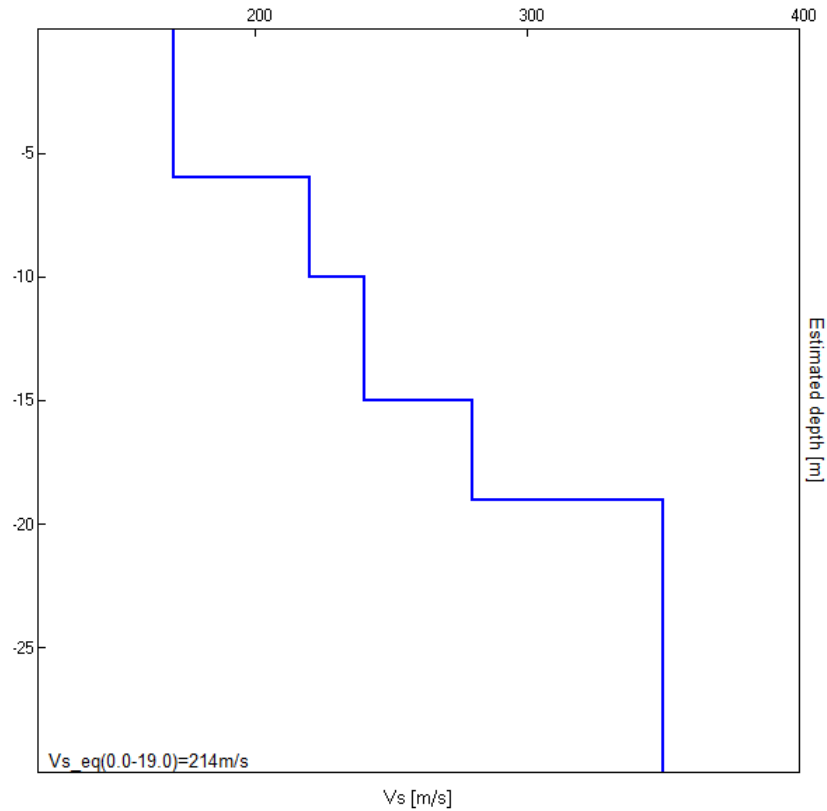


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
1.00	1.00	170	0.42
2.00	1.00	170	0.49
6.00	4.00	170	0.49
10.00	4.00	220	0.49
15.00	5.00	240	0.49
19.00	4.00	280	0.49
25.00	6.00	350	0.49
inf.	inf.	350	0.42

$V_{s\_eq}(0.0-19.0)=214\text{m/s}$



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $0.94 \pm 0.17$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$0.94 > 0.50$	OK	
$n_c(f_0) > 200$	$562.5 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 46 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0] \mid A_{H/V}(f^-) < A_0 / 2$	0.344 Hz	OK	
Exists $f^+$ in $[f_0, 4f_0] \mid A_{H/V}(f^+) < A_0 / 2$	1.781 Hz	OK	
$A_0 > 2$	$2.06 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.17774  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.16663 < 0.14063$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2515 < 2.0$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

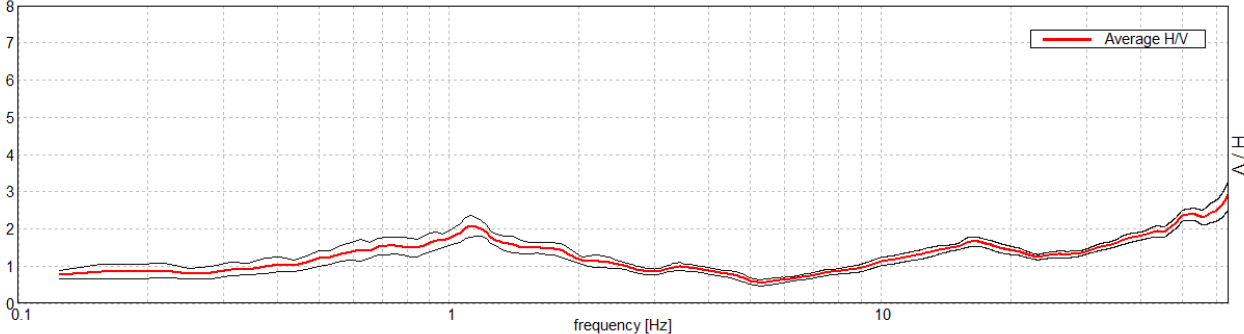
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

### GAMBETTOLA, H06

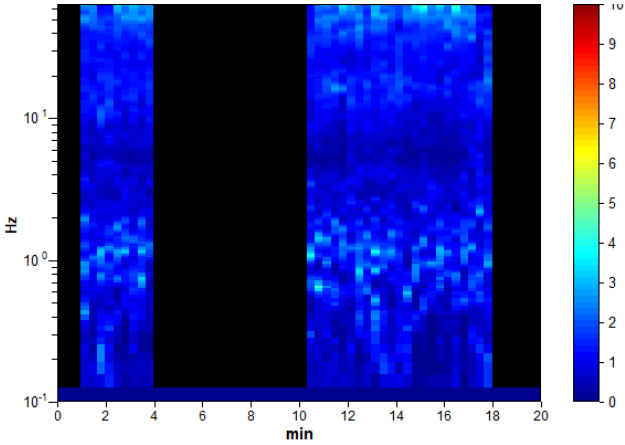
Instrument: TRZ-0144/01-11  
Data format: 16 byte  
Full scale [mV]: n.a.  
Start recording: 10/08/01 12:48:57      End recording: 10/08/01 13:08:56  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available  
Trace length: 0h20'00".      Analyzed 53% trace (manual window selection)  
Sampling rate: 128 Hz  
Window size: 20 s  
Smoothing type: Triangular window  
Smoothing: 10%

#### HORIZONTAL TO VERTICAL SPECTRAL RATIO

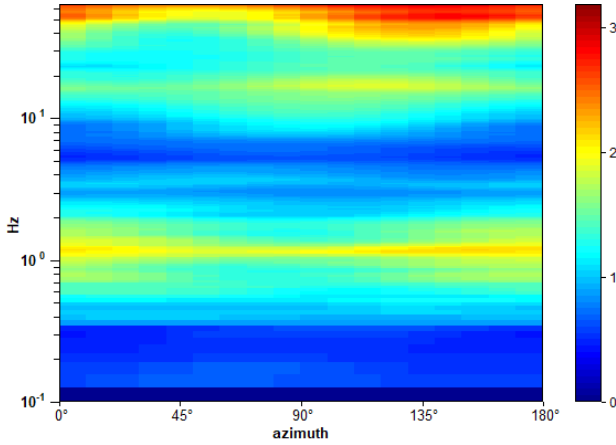
Max. H/V at  $1.13 \pm 0.14$  Hz (in the range 0.0 - 30.0 Hz).



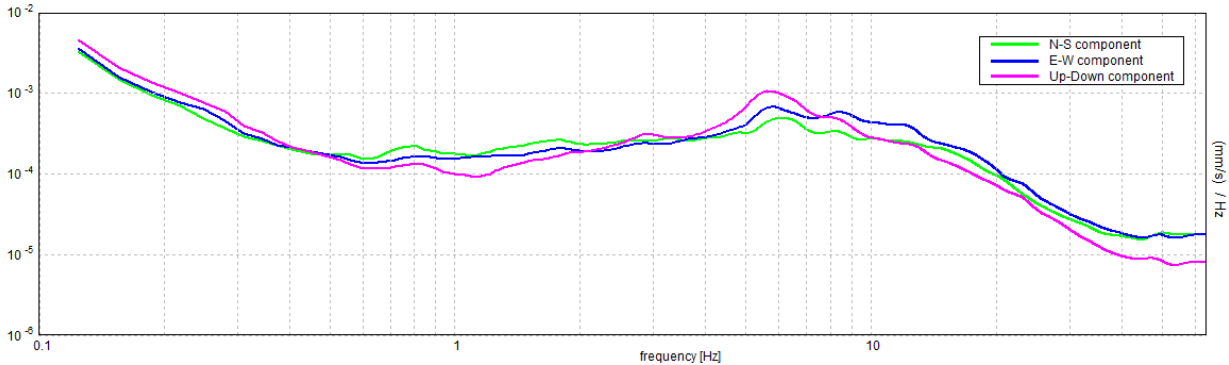
H/V TIME HISTORY



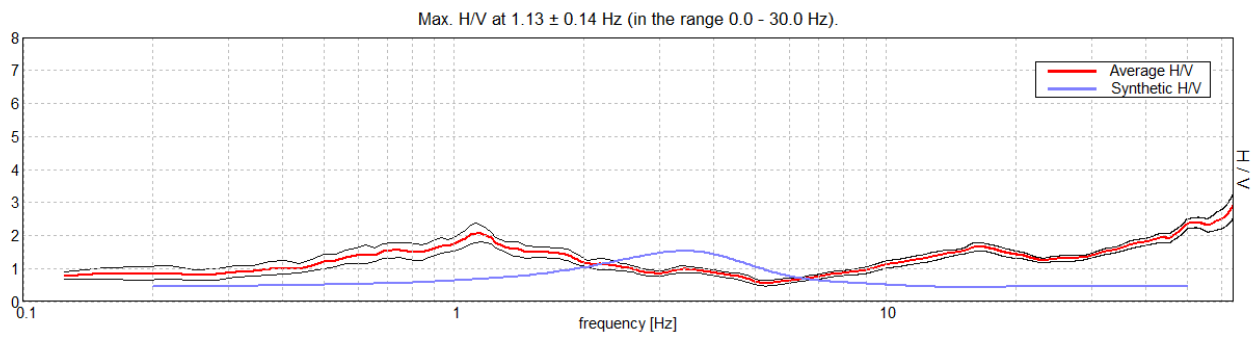
DIRECTIONAL H/V



#### SINGLE COMPONENT SPECTRA

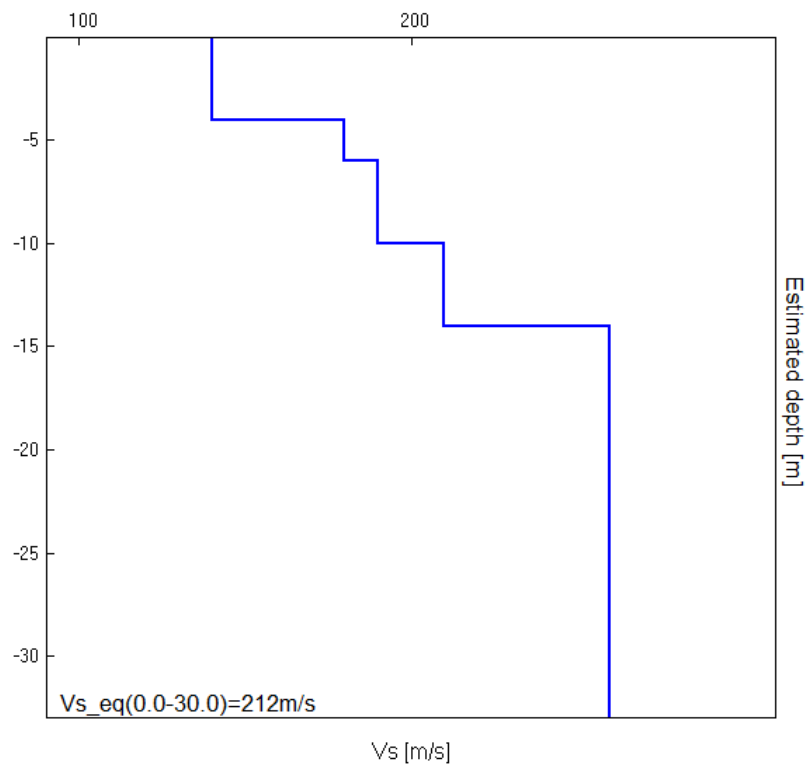


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	140	0.42
4.00	2.00	140	0.49
6.00	2.00	180	0.49
10.00	4.00	190	0.49
14.00	4.00	210	0.49
18.00	4.00	260	0.49
23.00	5.00	260	0.49
28.00	5.00	260	0.49
inf.	inf.	260	0.42

**Vs\_eq(0.0-30.0)=212m/s**





[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at 1.13 ± 0.14 Hz (in the range 0.0 - 30.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	1.13 > 0.50	OK	
$n_c(f_0) > 200$	720.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 55 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0] \mid A_{H/V}(f^-) < A_0 / 2$	0.438 Hz	OK	
Exists $f^+$ in $[f_0, 4f_0] \mid A_{H/V}(f^+) < A_0 / 2$	2.469 Hz	OK	
$A_0 > 2$	2.08 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.12413  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.13965 < 0.1125$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.294 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H07

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 17/08/01 15:37:37 Fine registrazione: 17/08/01 15:57:36

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 72% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

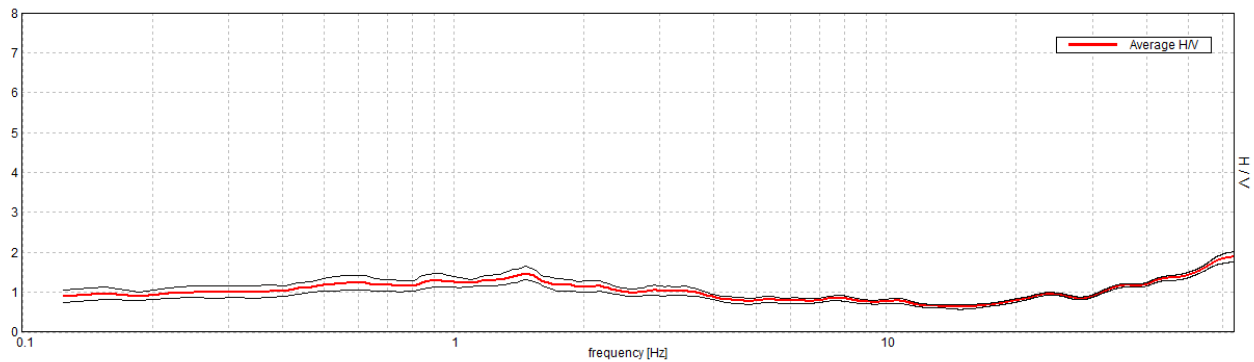
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

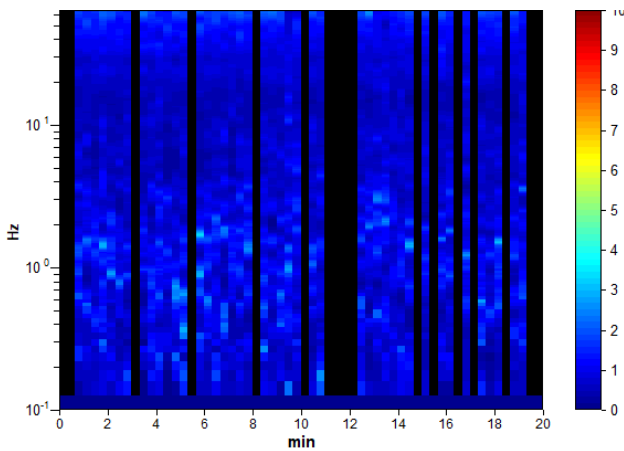
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

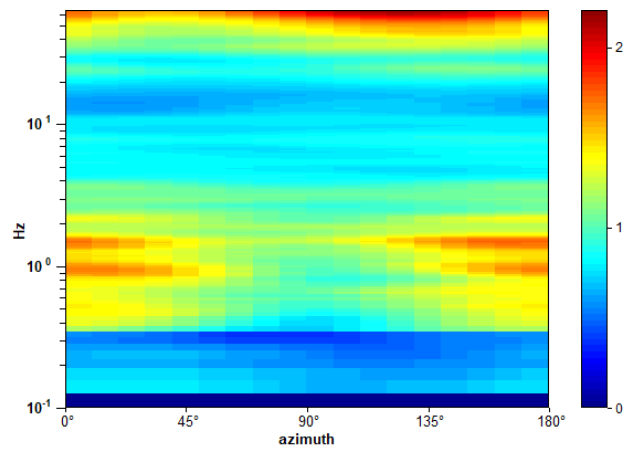
Picco H/V a  $1.47 \pm 0.05$  Hz (nell'intervallo 0.0 - 20.0 Hz).



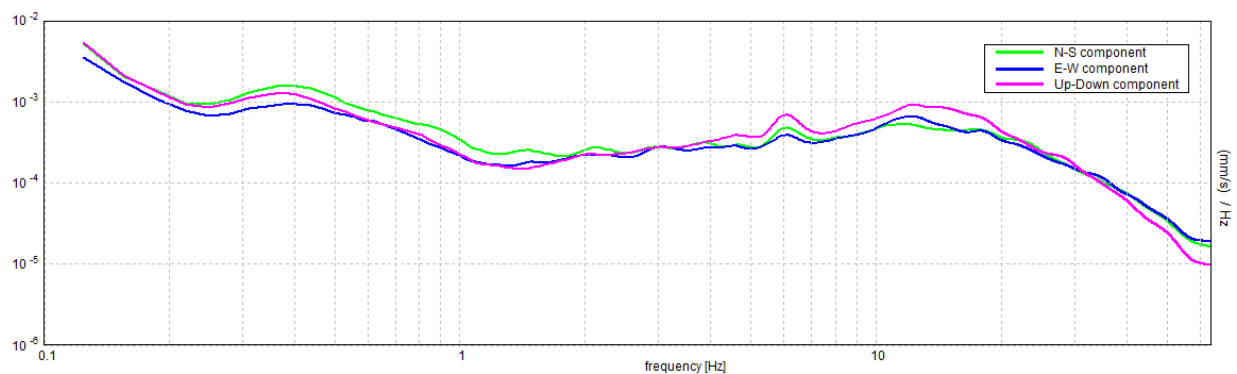
H/V TIME HISTORY



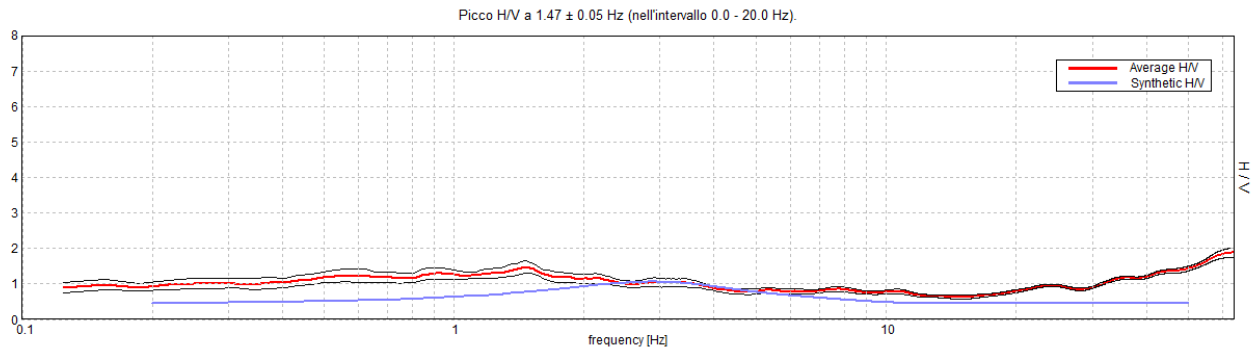
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

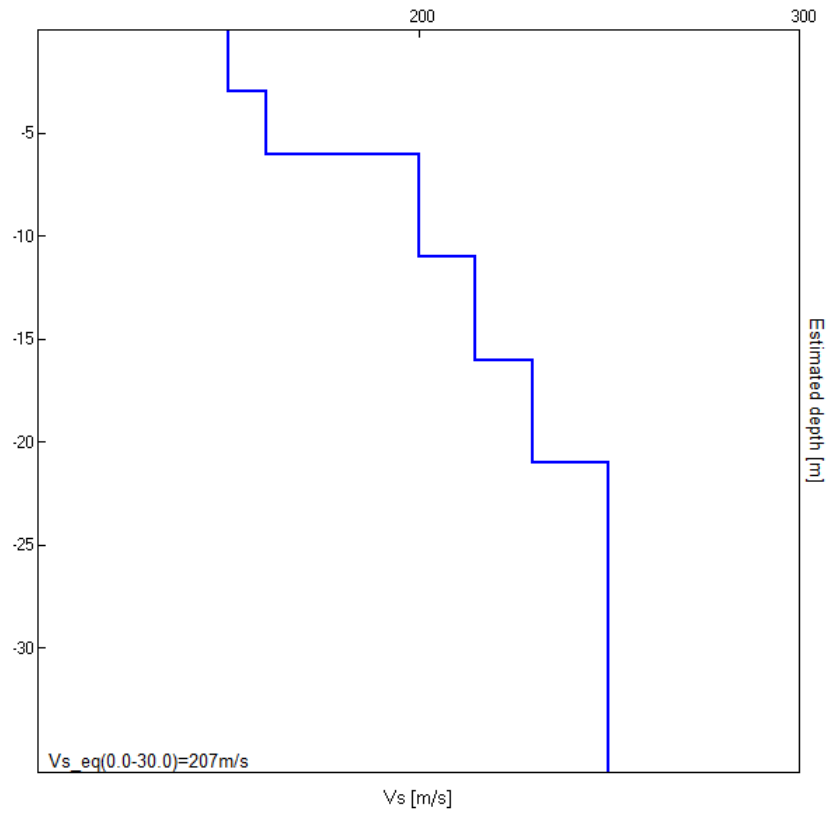


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
3.00	3.00	150	0.42
6.00	3.00	160	0.49
11.00	5.00	200	0.49
16.00	5.00	215	0.49
21.00	5.00	230	0.49
31.00	10.00	250	0.49
inf.	inf.	250	0.42

**Vs\_eq(0.0-30.0)=207m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $1.47 \pm 0.05$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.47 > 0.50$	OK	
$n_c(f_0) > 200$	$1263.1 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 72 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	$1.48 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.03228  < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	$0.04742 < 0.14688$	OK	
$\sigma_A(f_0) < \theta(f_0)$	$0.1655 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

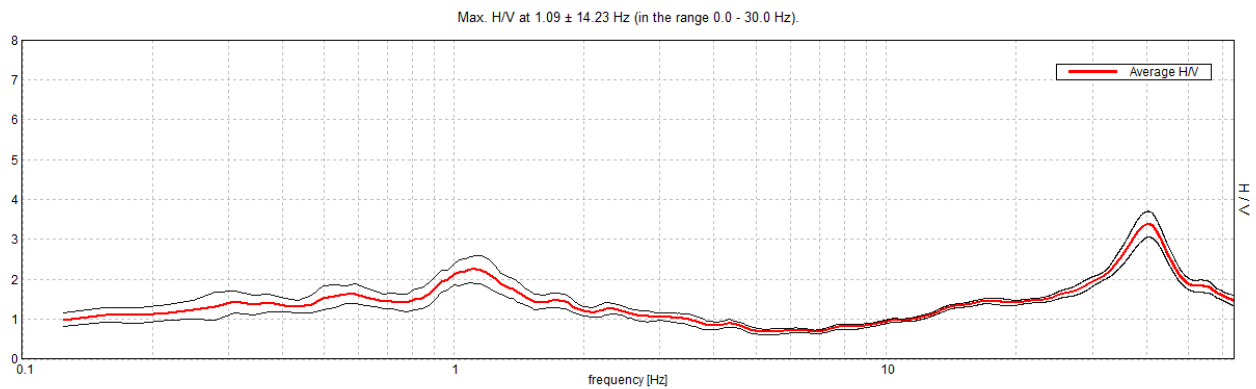
Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

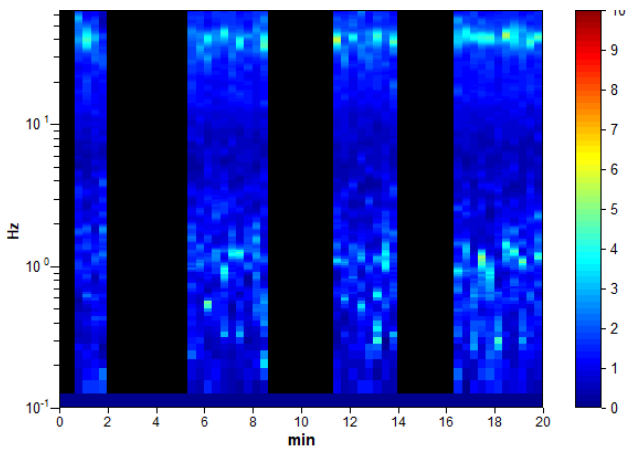
## GAMBETTOLA, H08

Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: n.a.  
 Start recording: 10/08/01 12:15:23 End recording: 10/08/01 12:35:22  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00". Analyzed 55% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

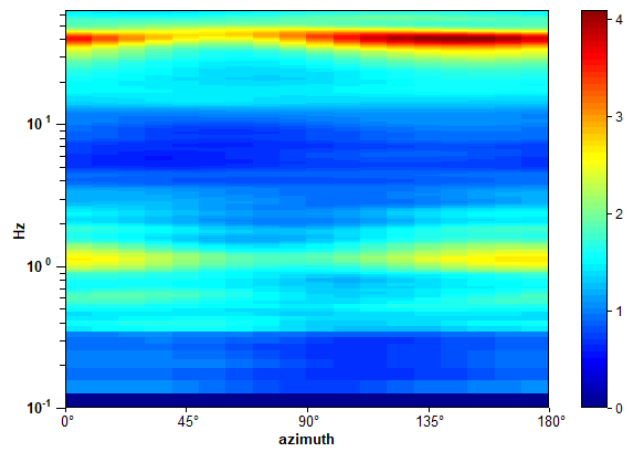
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



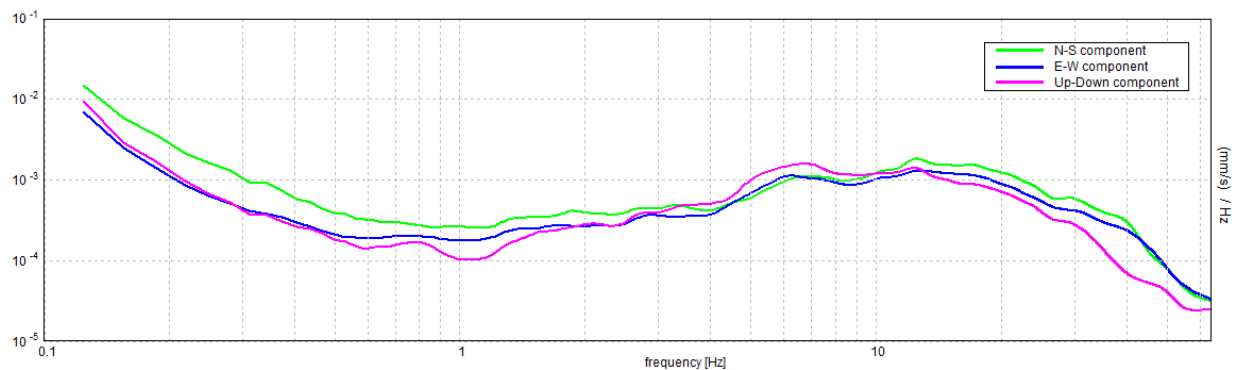
H/V TIME HISTORY



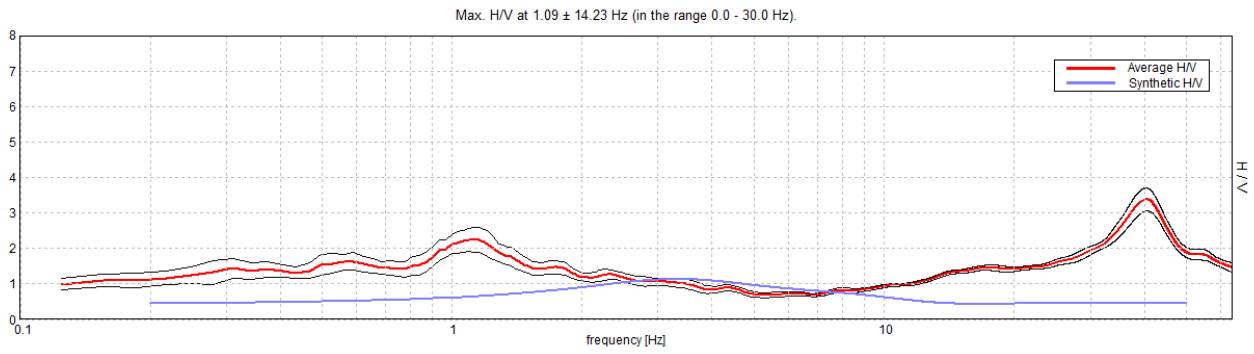
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

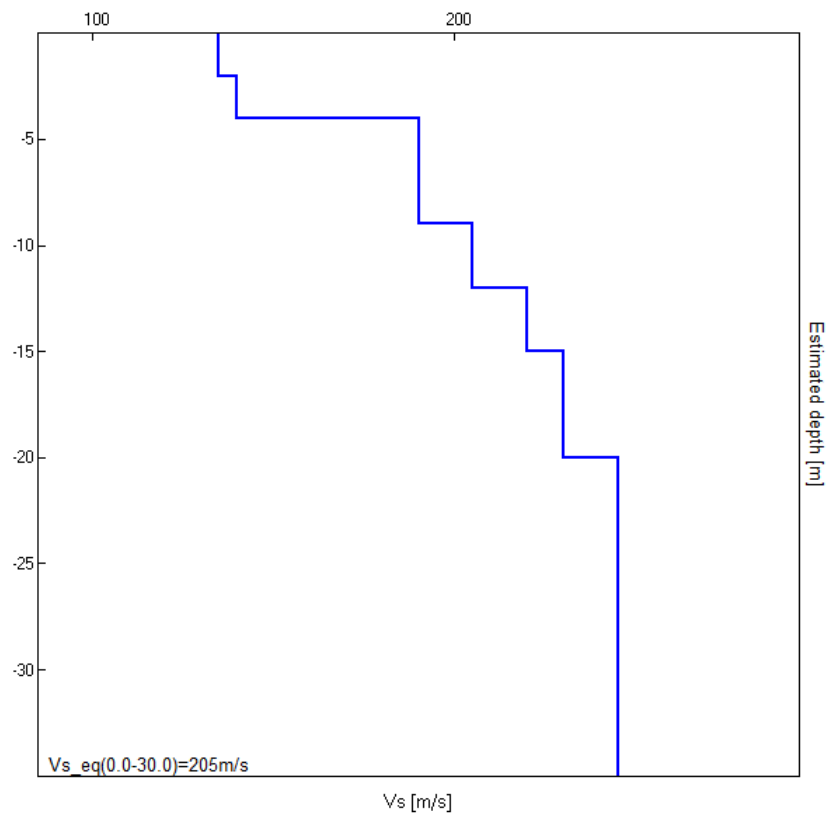


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	135	0.42
4.00	2.00	140	0.49
9.00	5.00	190	0.49
12.00	3.00	205	0.49
15.00	3.00	220	0.49
20.00	5.00	230	0.49
30.00	10.00	245	0.49
inf.	inf.	245	0.42

Vs\_eq(0.0-30.0)=205m/s



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at 1.09 ± 14.23 Hz (in the range 0.0 - 30.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	1.09 > 0.50	OK	
$n_c(f_0) > 200$	721.9 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 54 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	2.594 Hz	OK	
$A_0 > 2$	2.25 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 13.00999  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	14.22967 < 0.10938		NO
$\sigma_A(f_0) < \theta(f_0)$	0.3304 < 1.78	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

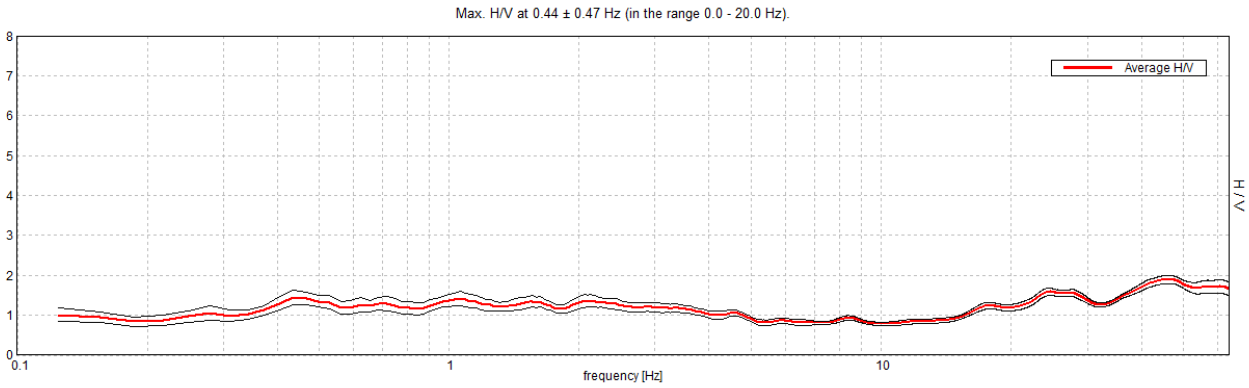
Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 $f_0$	0.2 $f_0$	0.15 $f_0$	0.10 $f_0$	0.05 $f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

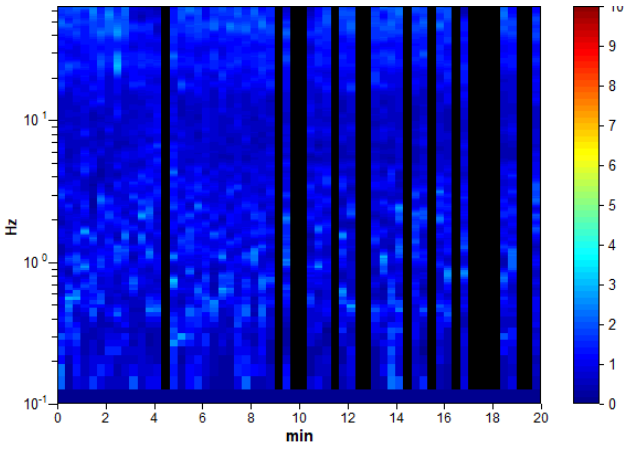
### GAMBETTOLA, H09

Instrument: TRZ-0144/01-11  
Data format: 16 byte  
Full scale [mV]: 51  
Start recording: 24/08/01 13:31:57      End recording: 24/08/01 13:51:56  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available  
Trace length: 0h20'00".      Analyzed 73% trace (manual window selection)  
Sampling rate: 128 Hz  
Window size: 20 s  
Smoothing type: Triangular window  
Smoothing: 10%

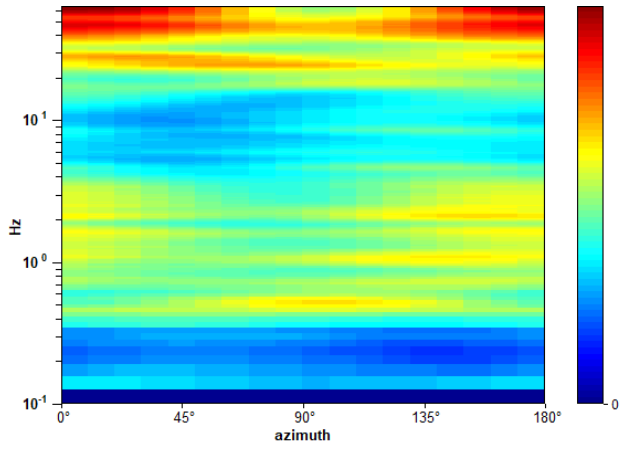
#### HORIZONTAL TO VERTICAL SPECTRAL RATIO



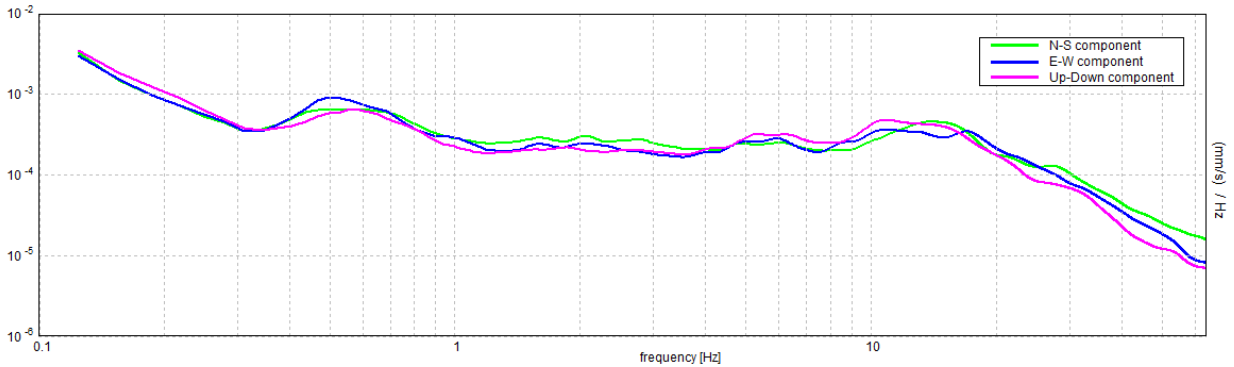
H/V TIME HISTORY



DIRECTIONAL H/V

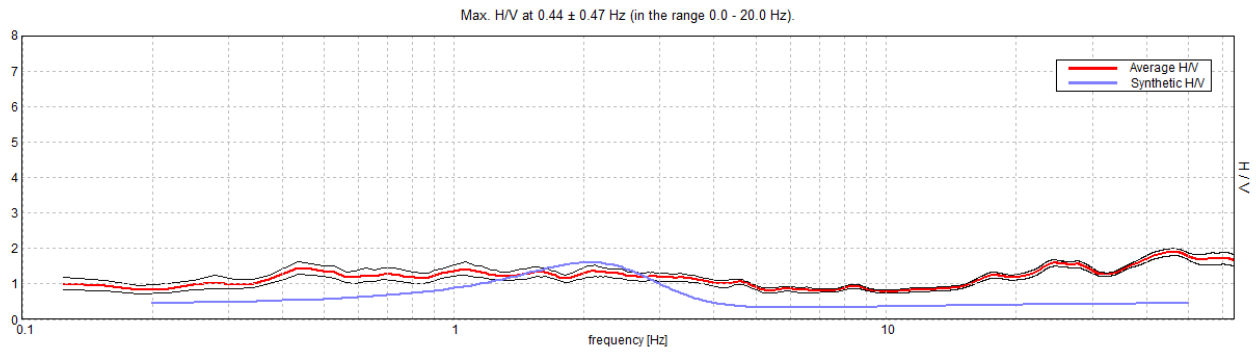


#### SINGLE COMPONENT SPECTRA



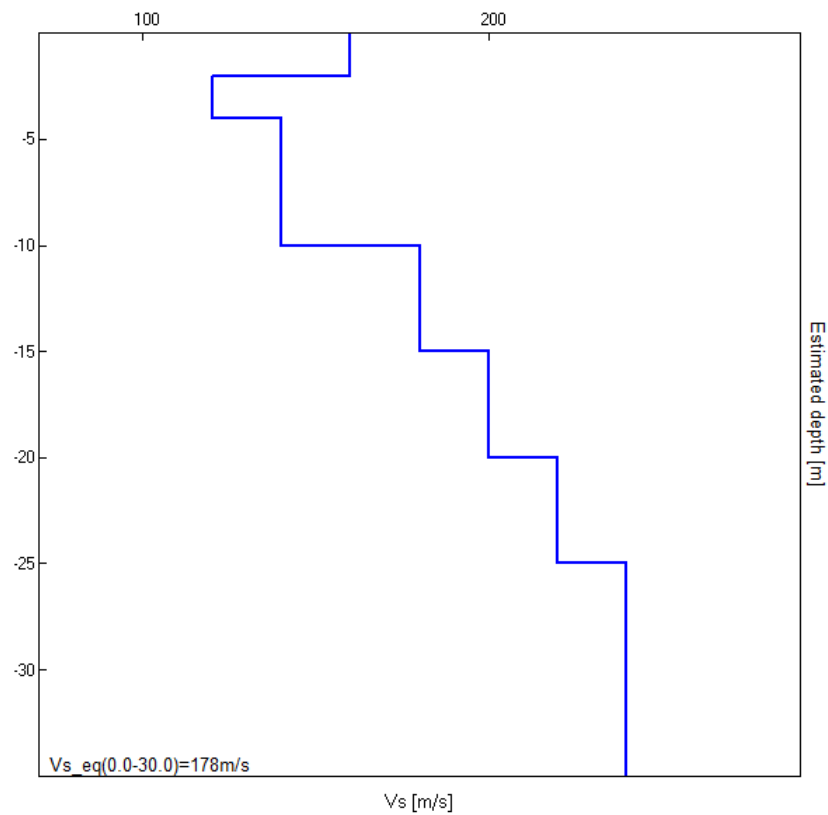


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	160	0.49
4.00	2.00	120	0.49
10.00	6.00	140	0.49
15.00	5.00	180	0.49
20.00	5.00	200	0.49
25.00	5.00	220	0.49
30.00	5.00	240	0.49
inf.	inf.	240	0.49

**Vs\_eq(0.0-30.0)=178m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $0.44 \pm 0.47$  Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$0.44 > 0.50$		<b>NO</b>
$n_c(f_0) > 200$	$385.0 > 200$	<b>OK</b>	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 22 times	<b>OK</b>	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			<b>NO</b>
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$			<b>NO</b>
$A_0 > 2$	$1.45 > 2$		<b>NO</b>
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 1.07914  < 0.05$		<b>NO</b>
$\sigma_f < \varepsilon(f_0)$	$0.47212 < 0.0875$		<b>NO</b>
$\sigma_A(f_0) < \theta(f_0)$	$0.1826 < 2.5$	<b>OK</b>	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

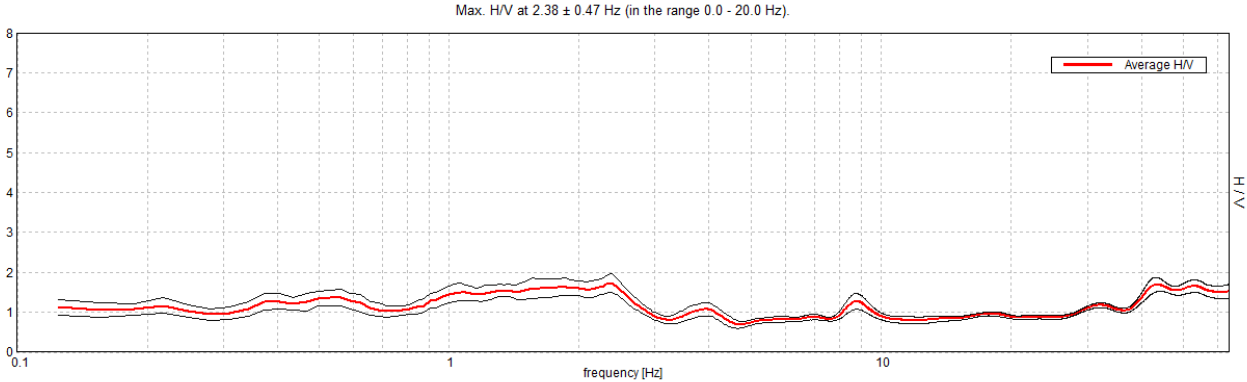
**Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$**

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

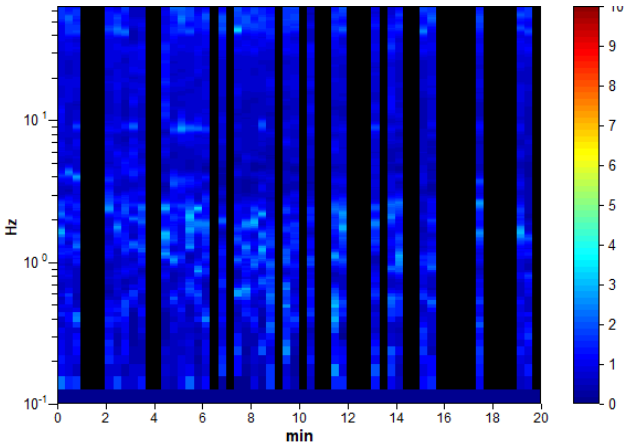
### GAMBETTOLA, H10

Instrument: TRZ-0144/01-11  
Data format: 16 byte  
Full scale [mV]: 51  
Start recording: 24/08/01 14:58:20      End recording: 24/08/01 15:18:19  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available  
Trace length: 0h20'00".      Analyzed 55% trace (manual window selection)  
Sampling rate: 128 Hz  
Window size: 20 s  
Smoothing type: Triangular window  
Smoothing: 10%

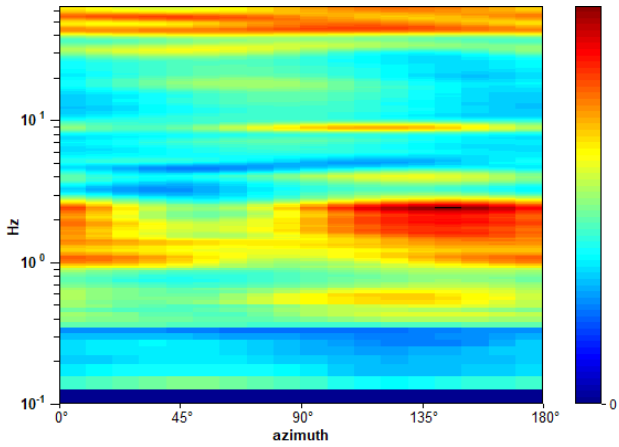
#### HORIZONTAL TO VERTICAL SPECTRAL RATIO



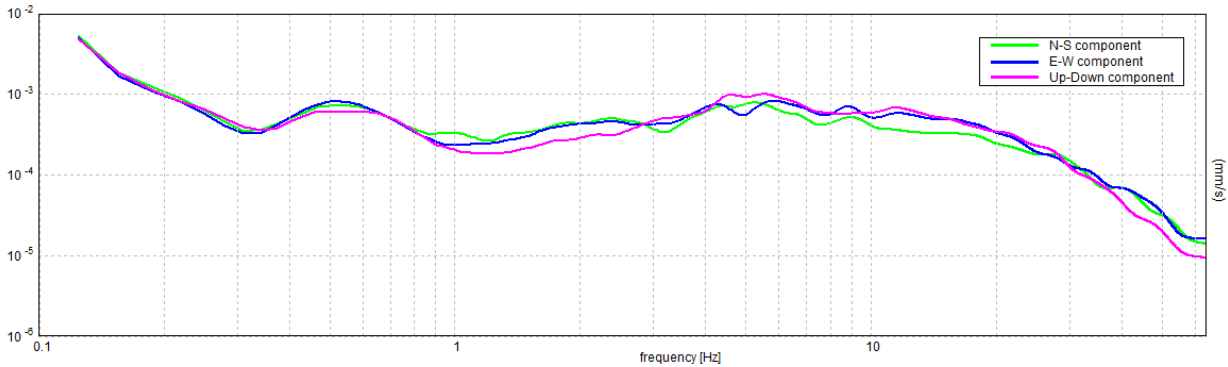
H/V TIME HISTORY



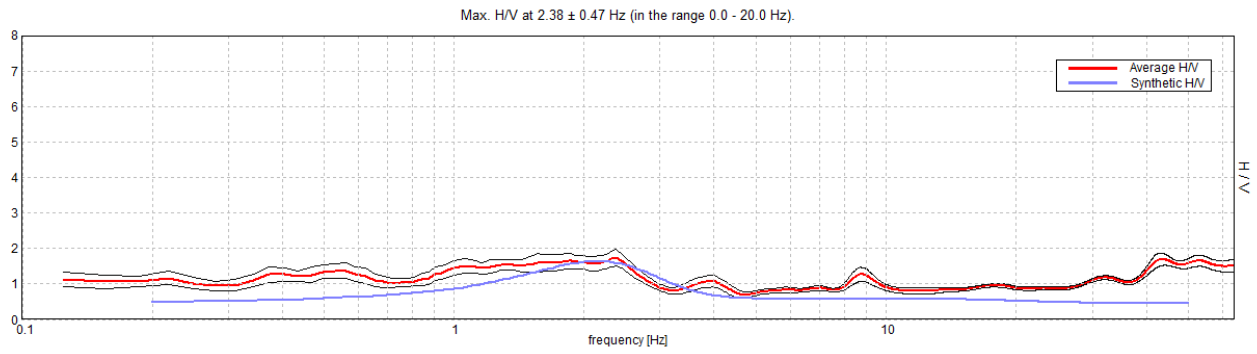
DIRECTIONAL H/V



#### SINGLE COMPONENT SPECTRA

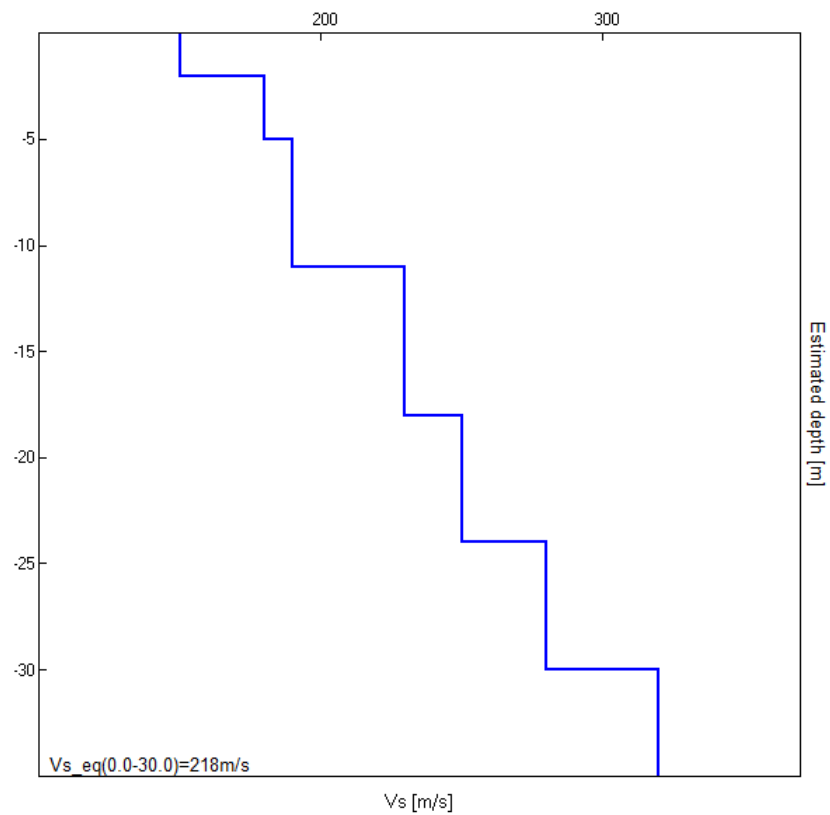


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	150	0.42
5.00	3.00	180	0.49
11.00	6.00	190	0.49
18.00	7.00	230	0.49
24.00	6.00	250	0.49
30.00	6.00	280	0.49
inf.	inf.	320	0.40

**Vs\_eq(0.0-30.0)=218m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $2.38 \pm 0.47$  Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$2.38 > 0.50$	OK	
$n_c(f_0) > 200$	$1567.5 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 115 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.063 Hz	OK	
$A_0 > 2$	$1.73 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.19754  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.46916 < 0.11875$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2362 < 1.58$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

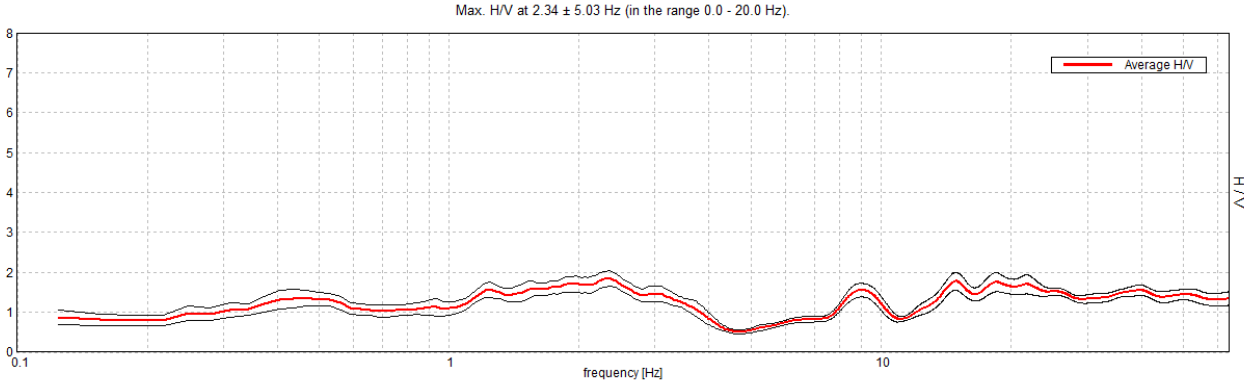
Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

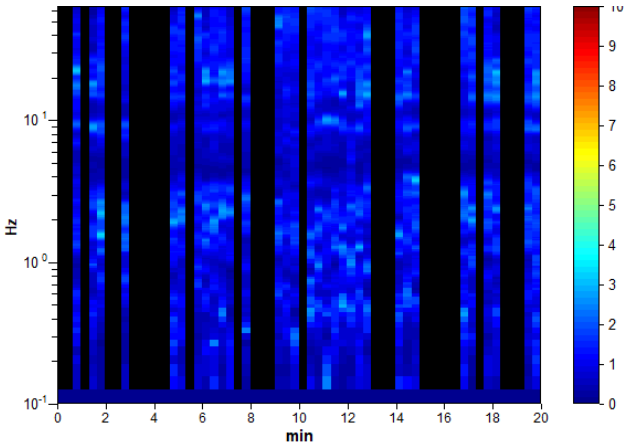
### GAMBETTOLA, H11

Instrument: TRZ-0144/01-11  
Data format: 16 byte  
Full scale [mV]: 51  
Start recording: 24/08/01 15:28:43      End recording: 24/08/01 15:48:42  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available  
Trace length: 0h20'00".      Analyzed 53% trace (manual window selection)  
Sampling rate: 128 Hz  
Window size: 20 s  
Smoothing type: Triangular window  
Smoothing: 10%

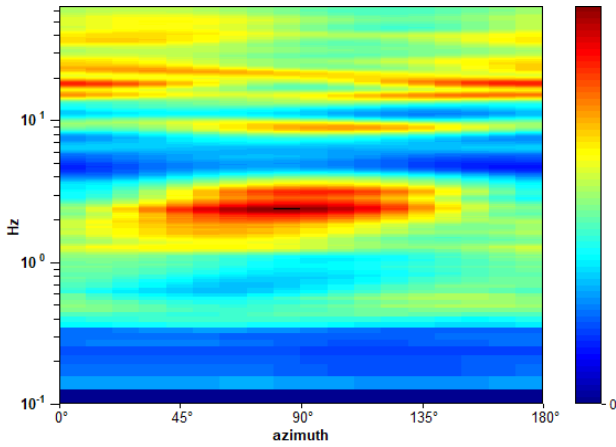
#### HORIZONTAL TO VERTICAL SPECTRAL RATIO



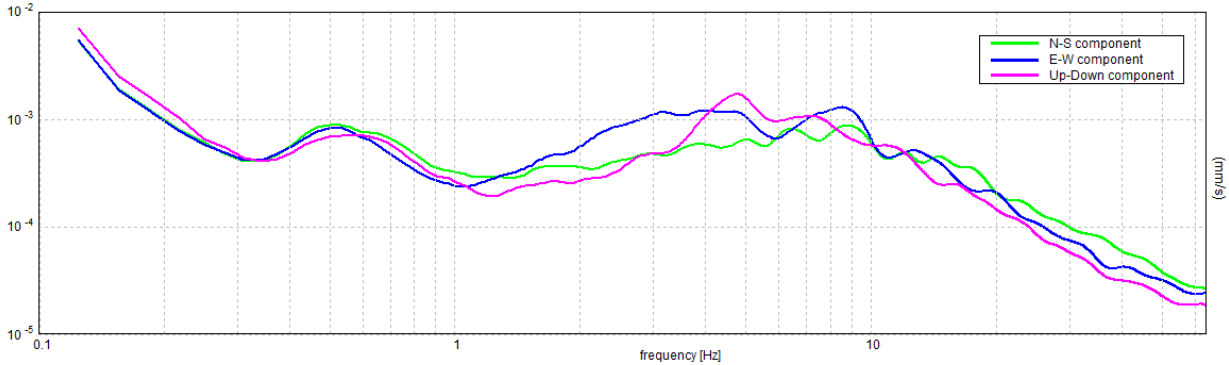
H/V TIME HISTORY



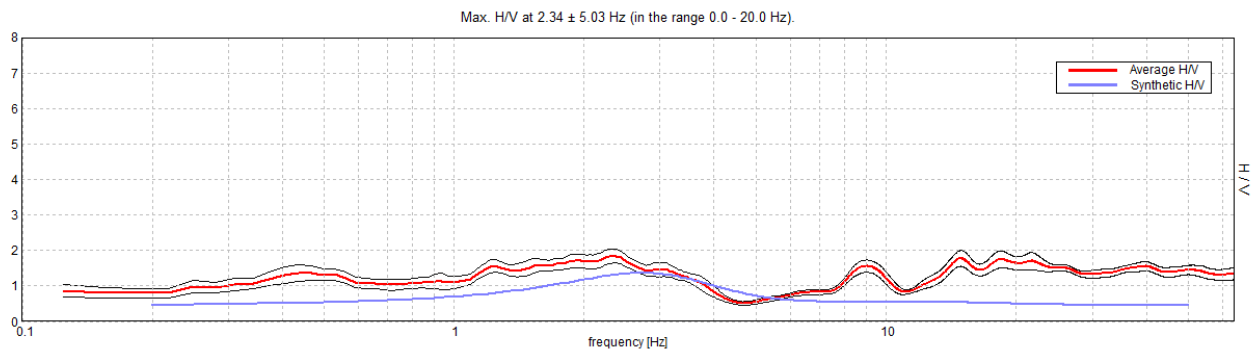
DIRECTIONAL H/V



#### SINGLE COMPONENT SPECTRA

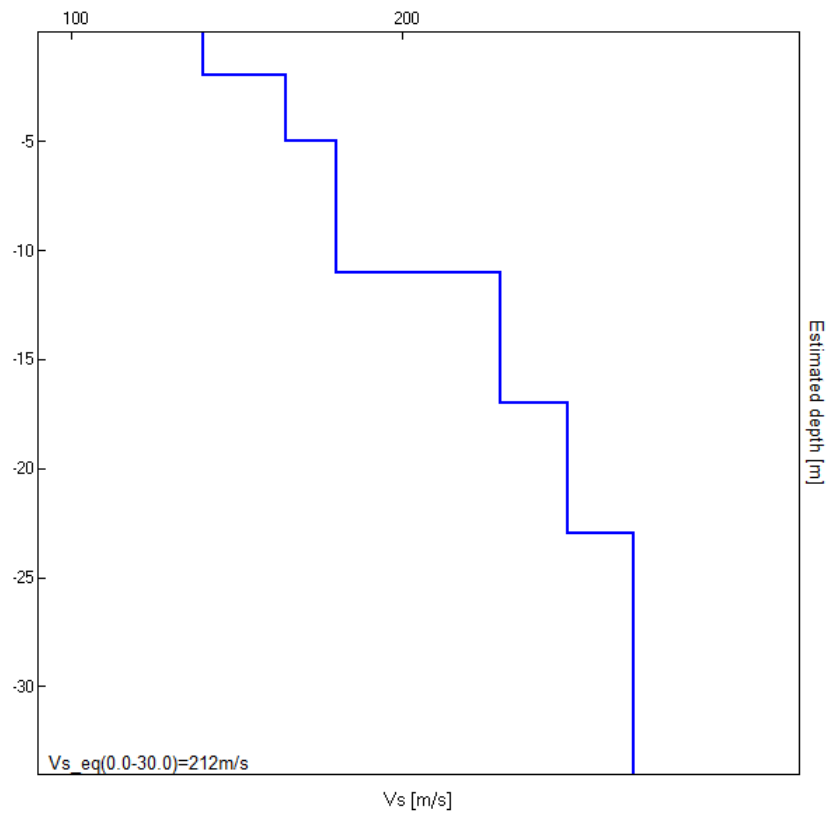


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	140	0.42
5.00	3.00	165	0.49
11.00	6.00	180	0.49
17.00	6.00	230	0.49
23.00	6.00	250	0.49
29.00	6.00	270	0.49
inf.	inf.	270	0.40

**Vs\_eq(0.0-30.0)=212m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $2.34 \pm 5.03$  Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$2.34 > 0.50$	OK	
$n_c(f_0) > 200$	$1500.0 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 114 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.906 Hz	OK	
$A_0 > 2$	$1.85 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 2.14689  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$5.03177 < 0.11719$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2002 < 1.58$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

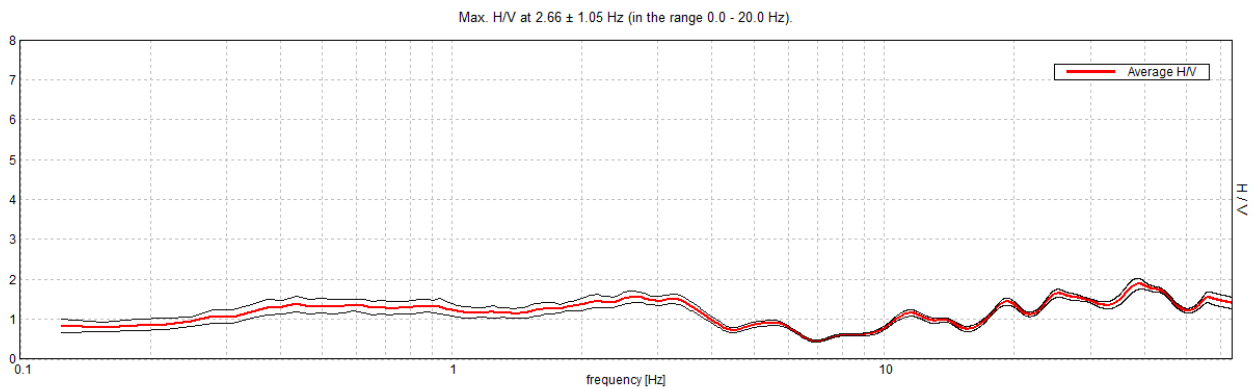
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20



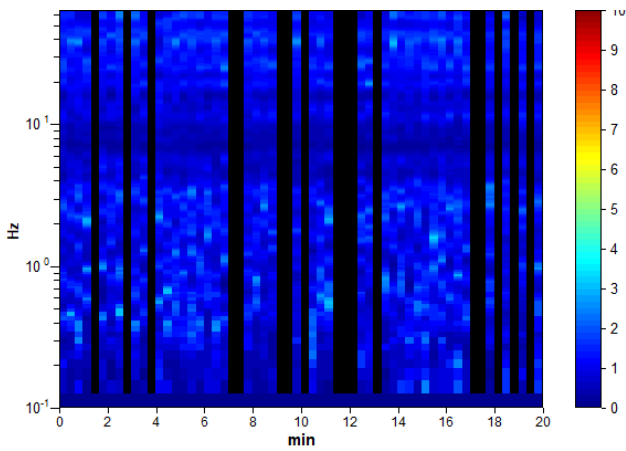
## GAMBETTOLA, H12

Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: 51  
 Start recording: 24/08/01 14:25:53 End recording: 24/08/01 14:45:52  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00". Analyzed 72% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

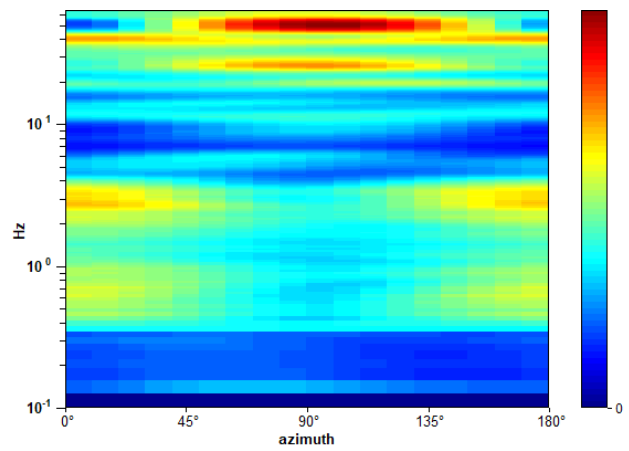
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



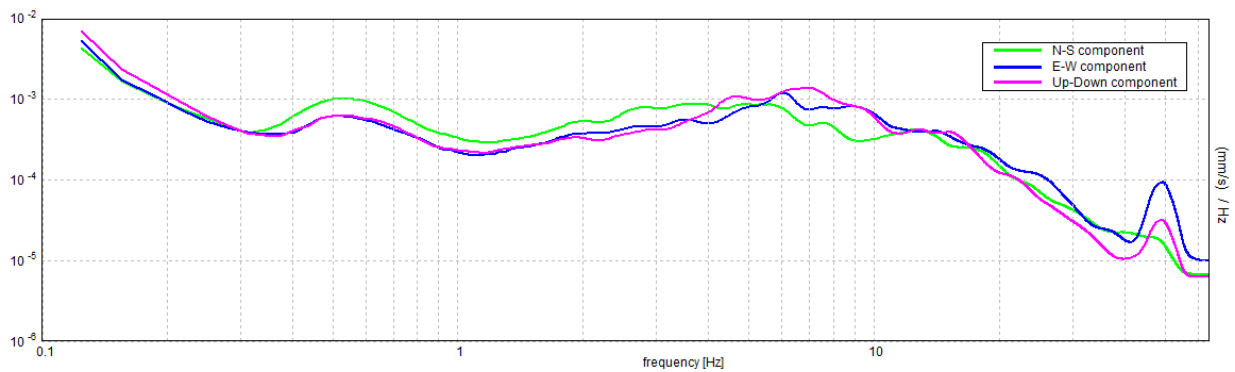
H/V TIME HISTORY



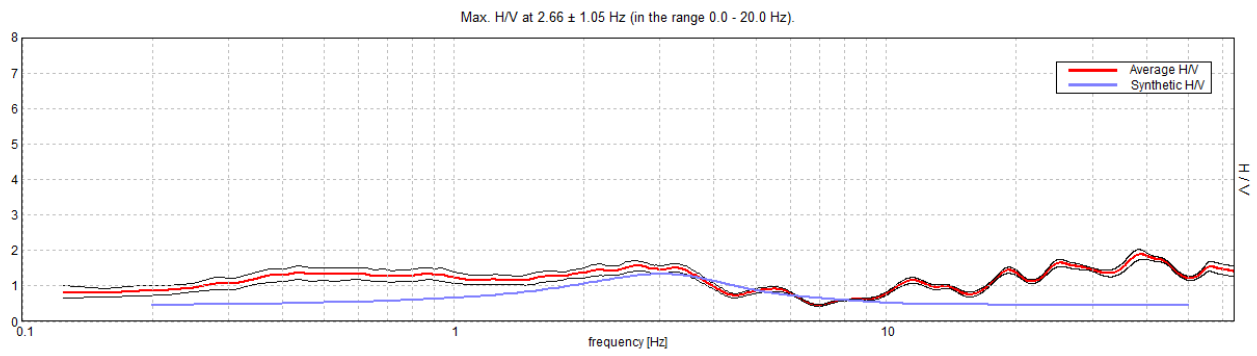
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

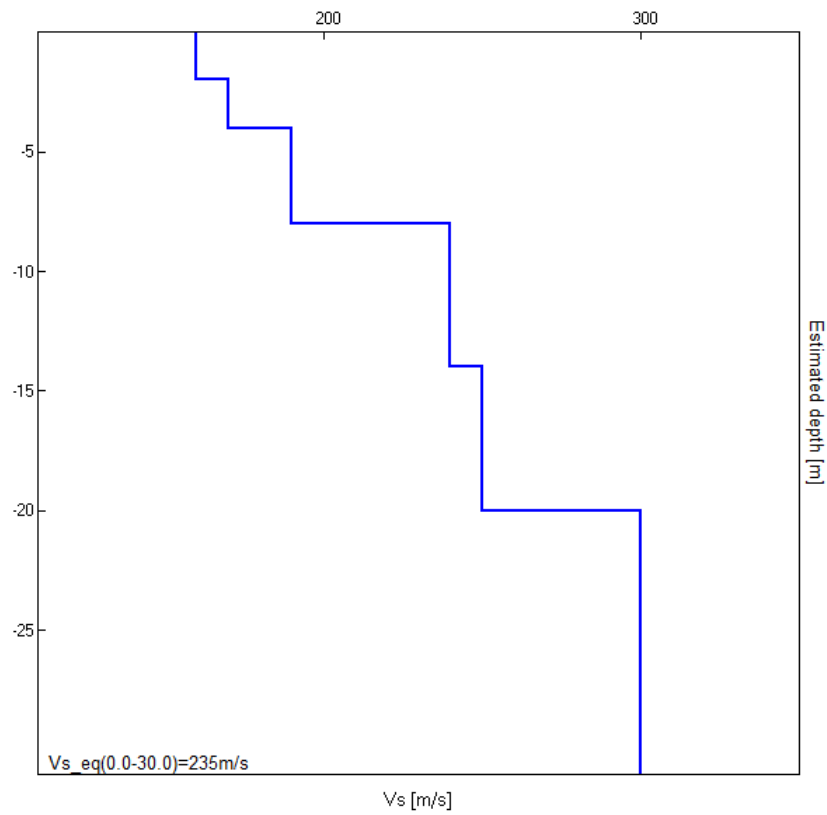


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
2.00	2.00	160	0.42
4.00	2.00	170	0.49
8.00	4.00	190	0.49
14.00	6.00	240	0.49
20.00	6.00	250	0.49
26.00	6.00	300	0.49
inf.	inf.	300	0.40

**Vs\_eq(0.0-30.0)=235m/s**



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $2.66 \pm 1.05$  Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$2.66 > 0.50$	OK	
$n_c(f_0) > 200$	$2284.4 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 128 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	4.281 Hz	OK	
$A_0 > 2$	$1.56 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.39482  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$1.04875 < 0.13281$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.1405 < 1.58$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

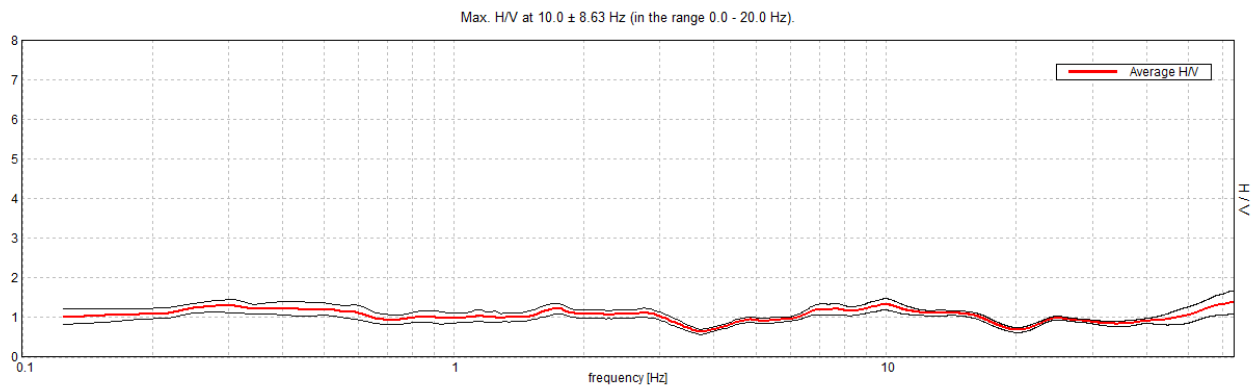
Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

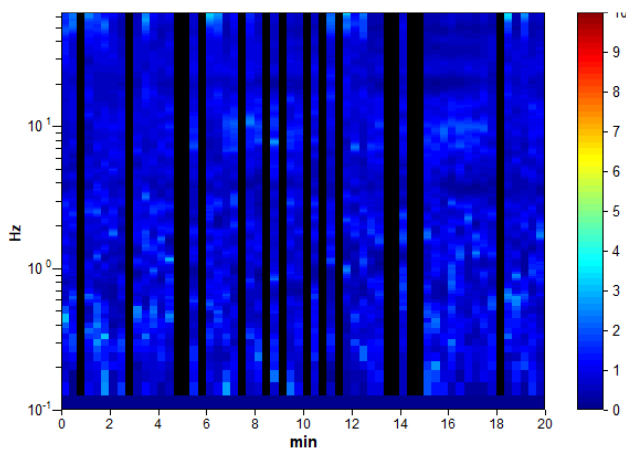
## GAMBETTOLA, H13

Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: 51  
 Start recording: 24/08/01 16:31:52      End recording: 24/08/01 16:51:51  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00".      Analyzed 73% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

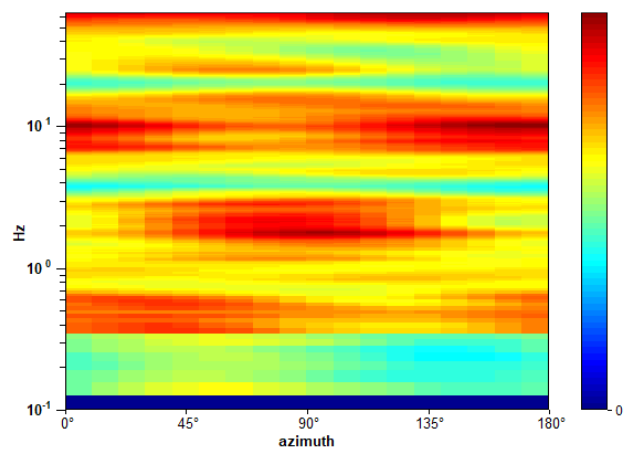
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



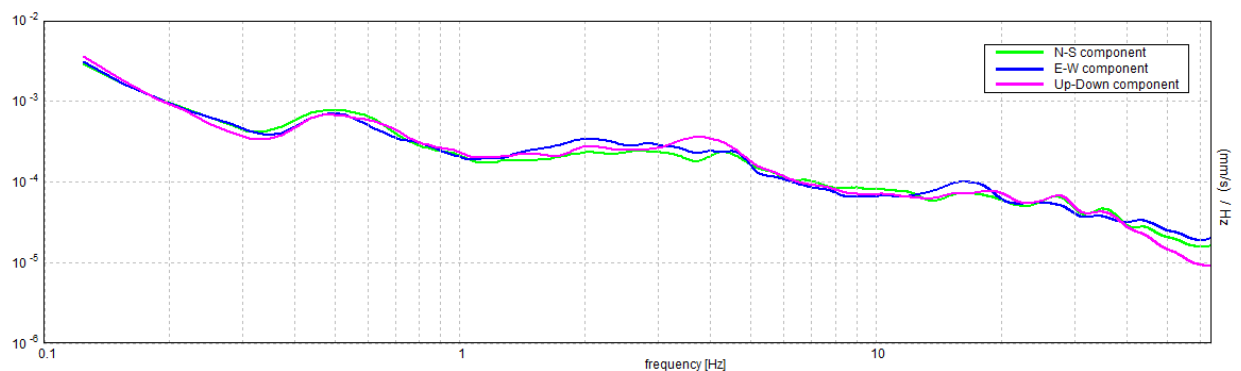
### H/V TIME HISTORY



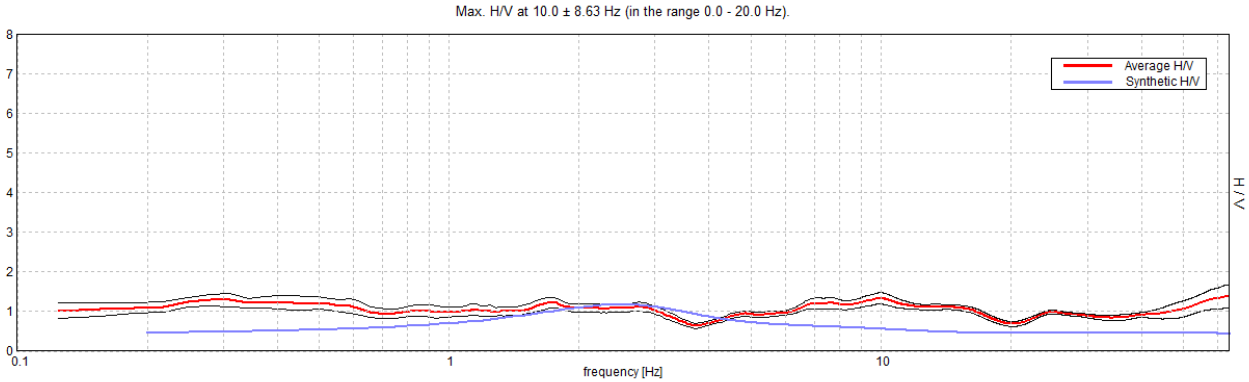
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

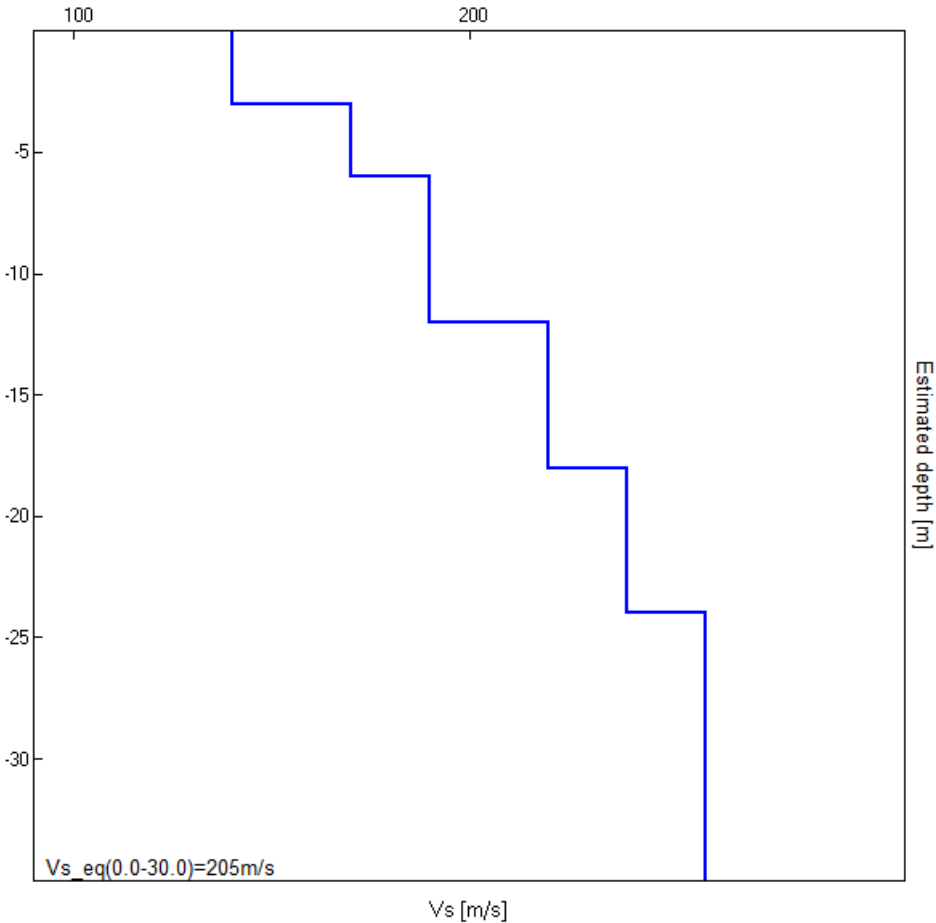


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
3.00	3.00	140	0.42
6.00	3.00	170	0.49
12.00	6.00	190	0.49
18.00	6.00	220	0.49
24.00	6.00	240	0.49
30.00	6.00	260	0.49
inf.	inf.	260	0.40

Vs\_eq(0.0-30.0)=205m/s



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at 10.0 ± 8.63 Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	10.00 > 0.50	OK	
$n_c(f_0) > 200$	8800.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 481 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$	3.844 Hz	OK	
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.34 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.86346  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	8.63463 < 0.5		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1442 < 1.58	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 $f_0$	0.2 $f_0$	0.15 $f_0$	0.10 $f_0$	0.05 $f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H14

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 01/09/01 09:44:47 Fine registrazione: 01/09/01 10:04:47

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 60% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

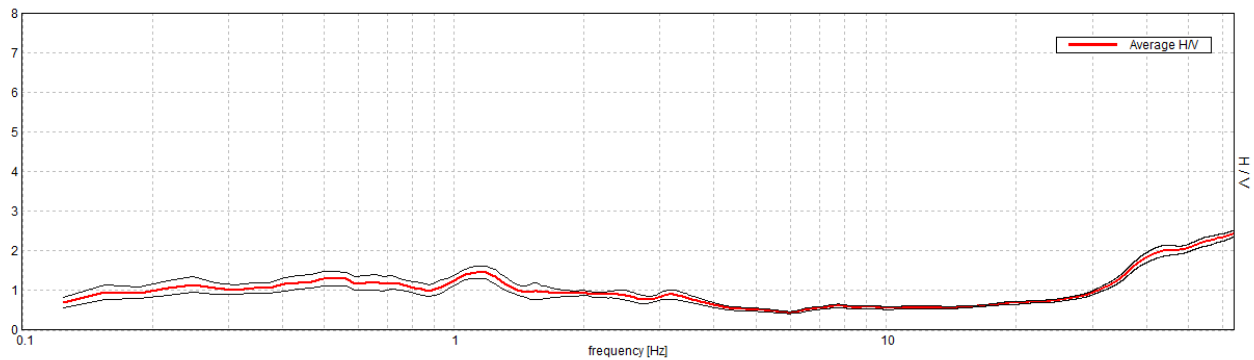
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

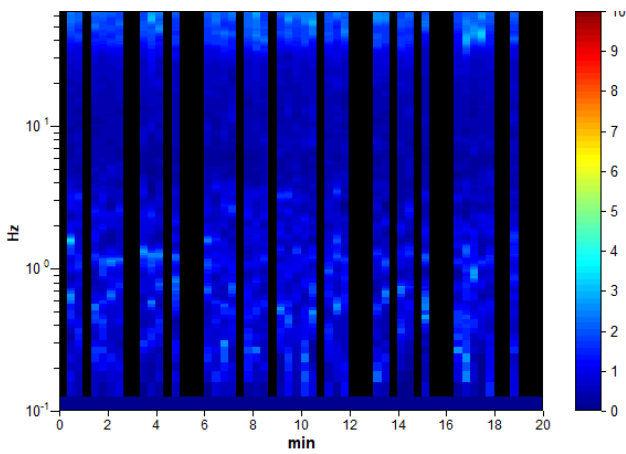
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

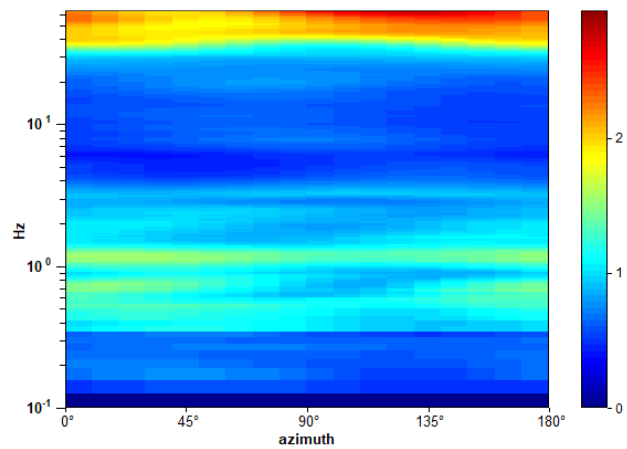
Picco H/V a 1.13 ± 0.15 Hz (nell'intervallo 0.0 - 20.0 Hz).



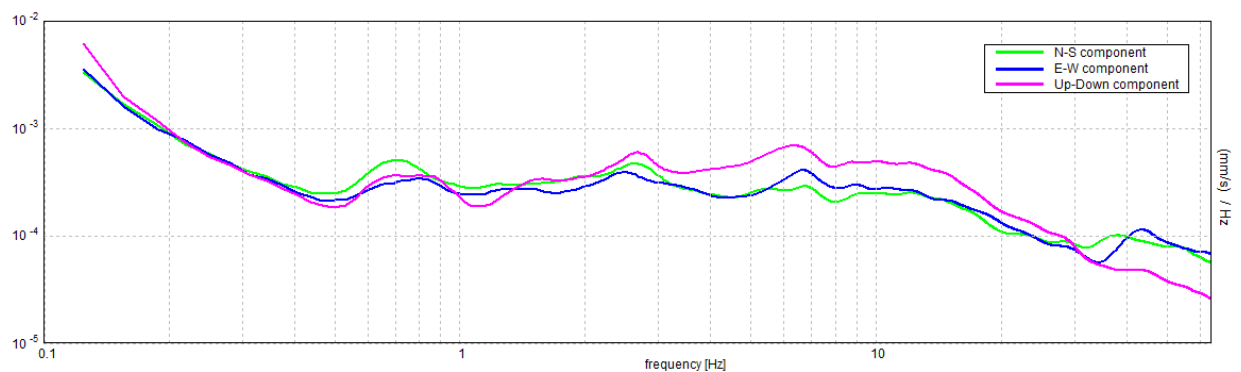
H/V TIME HISTORY



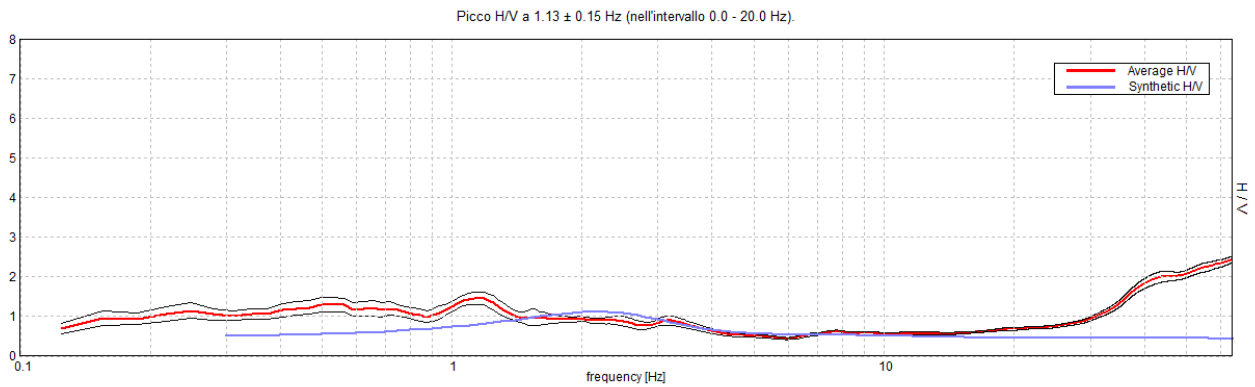
DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

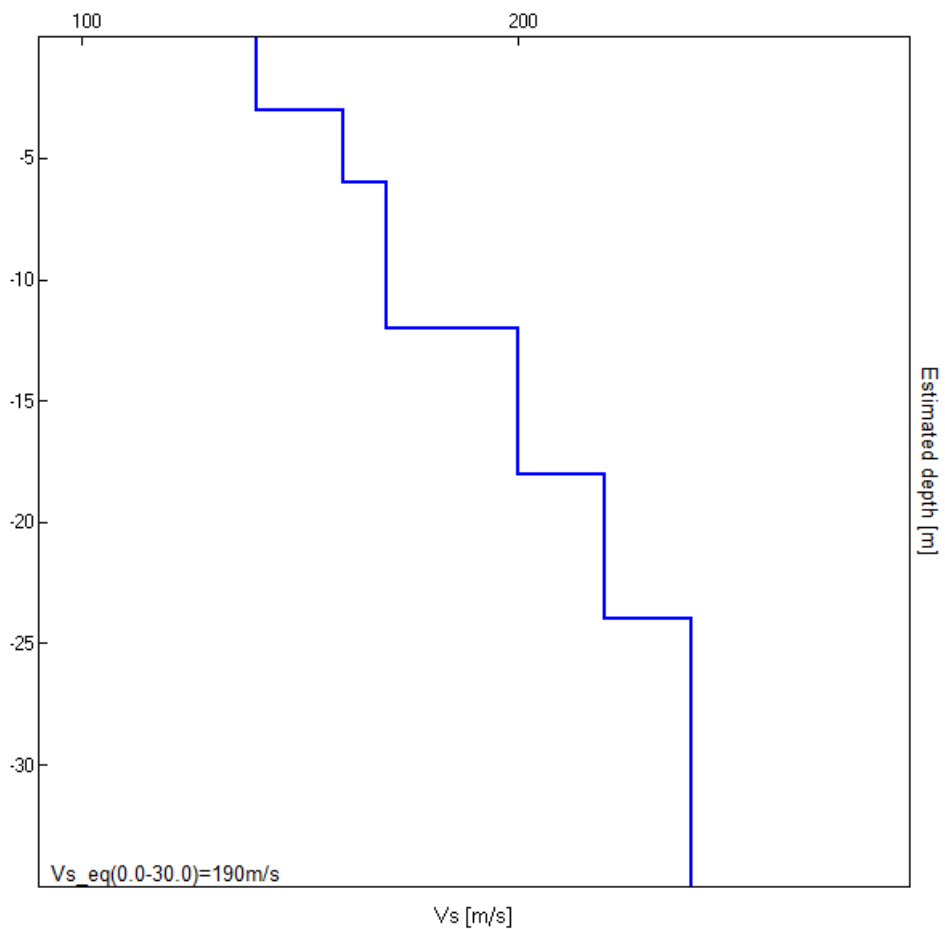


EXPERIMENTAL vs. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]	Poisson ratio
3.00	3.00	140	0.42
6.00	3.00	160	0.49
12.00	6.00	170	0.49
18.00	6.00	200	0.49
24.00	6.00	220	0.49
30.00	6.00	240	0.49
inf.	inf.	240	0.40

**Vs\_eq(0.0-30.0)=190m/s**





[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $1.13 \pm 0.15$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.13 > 0.50$	OK	
$n_c(f_0) > 200$	$810.0 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 55 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.719 Hz	OK	
$A_0 > 2$	$1.46 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.13394  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.15068 < 0.1125$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.1574 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

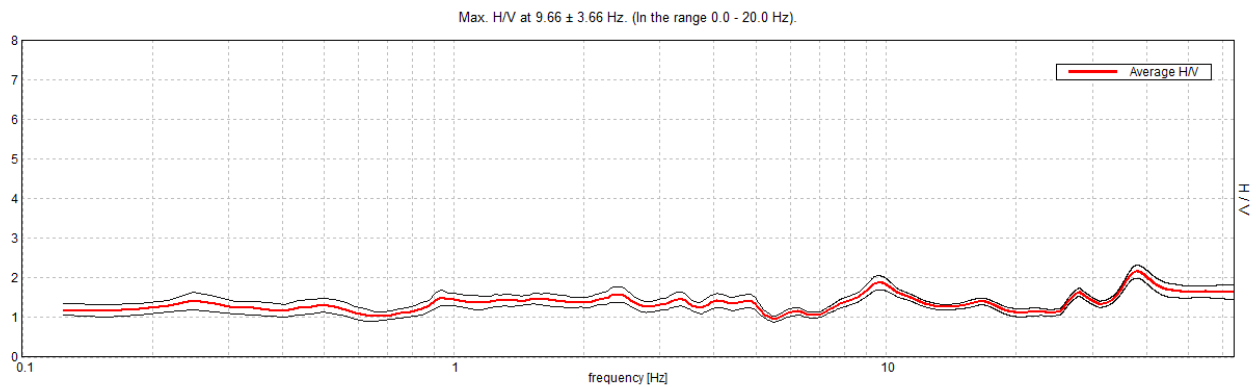
Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

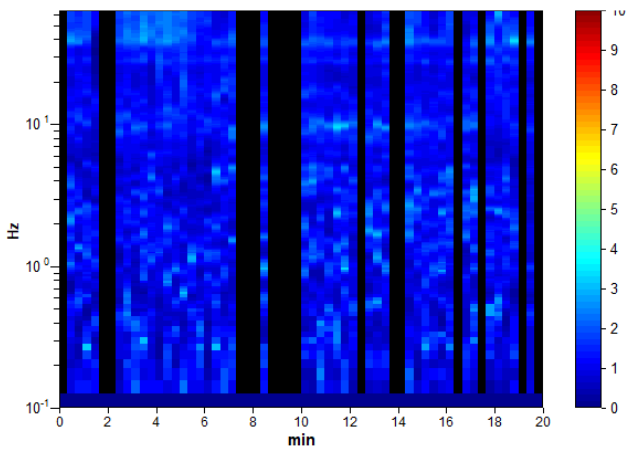
## GAMBETTOLA, H15

Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: 51  
 Start recording: 24/08/01 15:59:31 End recording: 24/08/01 16:19:30  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00". Analyzed 72% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

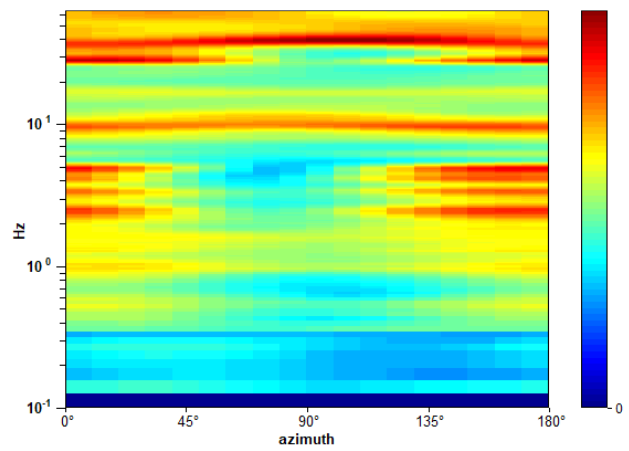
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



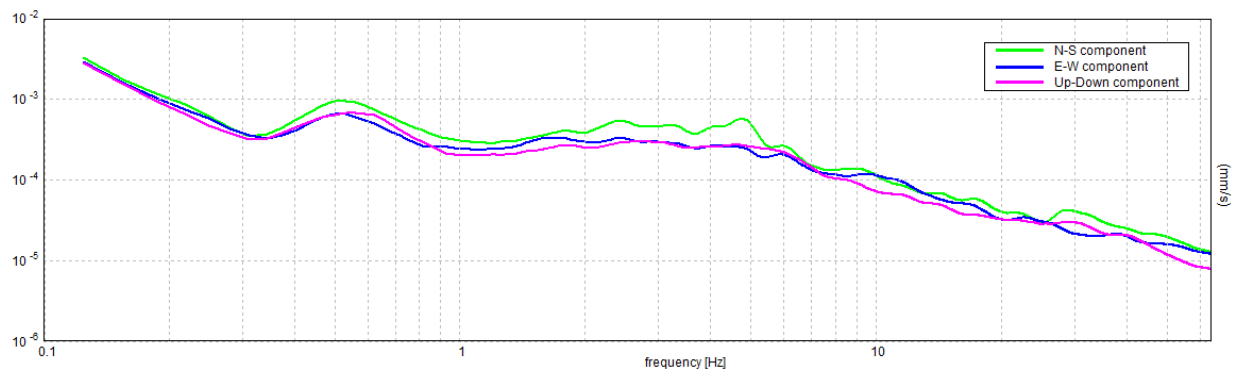
H/V TIME HISTORY



DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $9.66 \pm 3.66$  Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$9.66 > 0.50$	OK	
$n_c(f_0) > 200$	$8304.4 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 464 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	$1.88 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.37867  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$3.65649 < 0.48281$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.181 < 1.58$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H16

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 17/08/01 15:07:04 Fine registrazione: 17/08/01 15:27:03

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 45% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

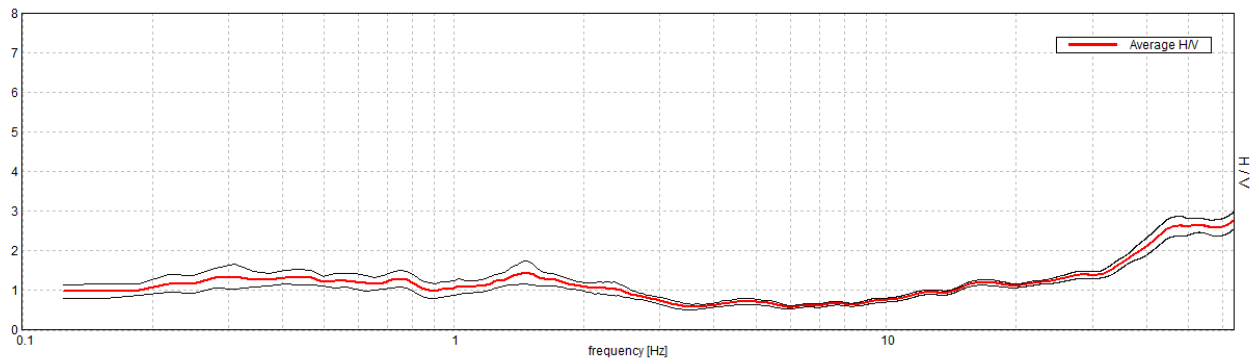
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

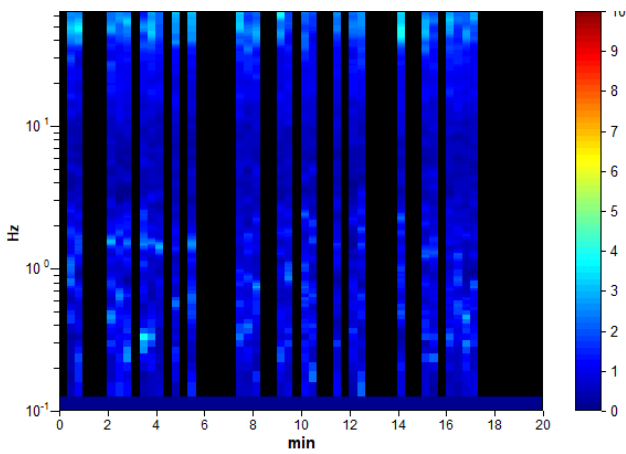
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

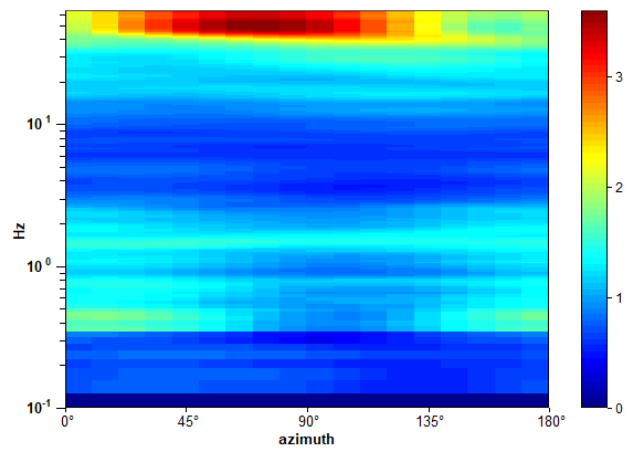
Picco H/V a 1.47 ± 0.16 Hz (nell'intervallo 0.0 - 20.0 Hz).



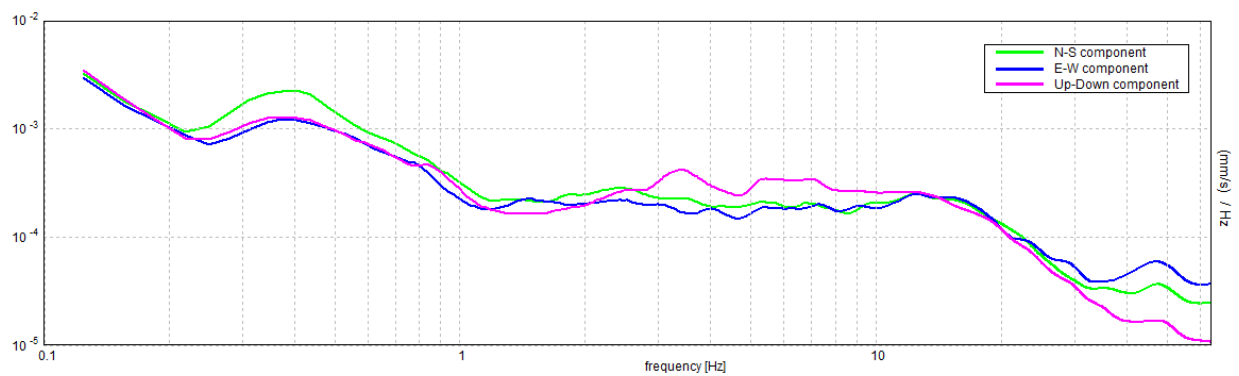
H/V TIME HISTORY



DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $1.47 \pm 0.16$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.47 > 0.50$	OK	
$n_c(f_0) > 200$	$793.1 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 72 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.063 Hz	OK	
$A_0 > 2$	$1.45 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.11093  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.16294 < 0.14688$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2876 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

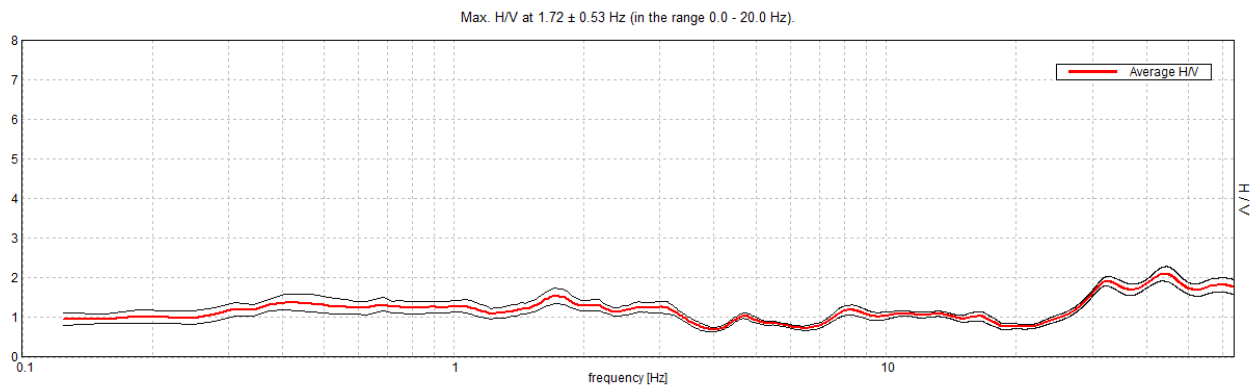
Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

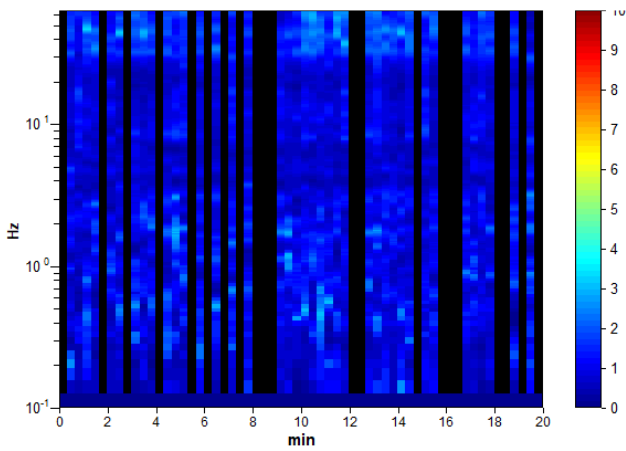
## GAMBETTOLA, H17

Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: 51  
 Start recording: 24/08/01 13:57:43 End recording: 24/08/01 14:17:42  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00". Analyzed 65% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

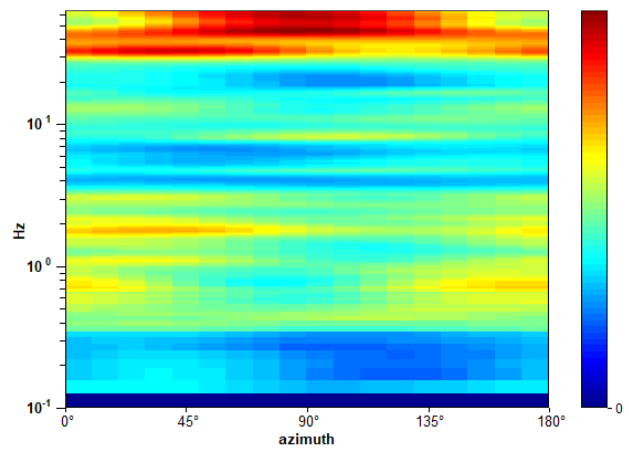
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



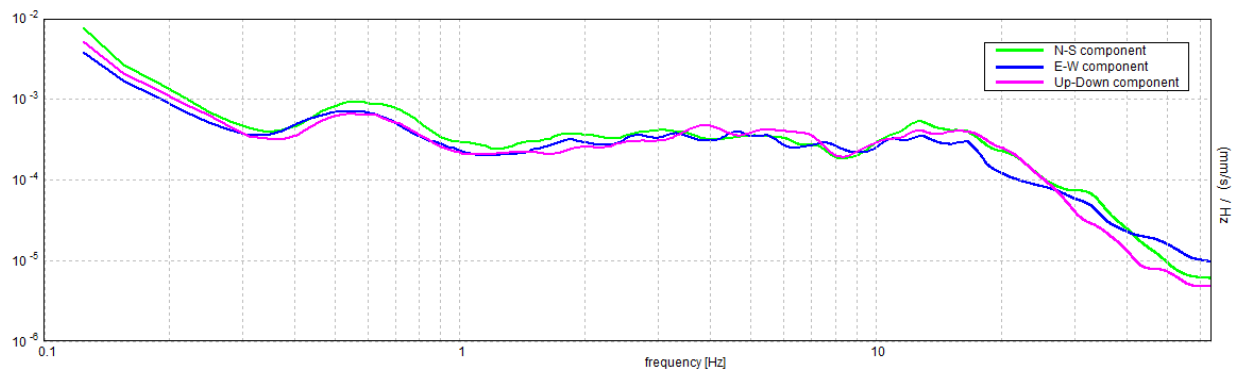
H/V TIME HISTORY



DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $1.72 \pm 0.53$  Hz (in the range 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.72 > 0.50$	OK	
$n_c(f_0) > 200$	$1340.6 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 84 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.719 Hz	OK	
$A_0 > 2$	$1.55 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.31114  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.53477 < 0.17188$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.1985 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

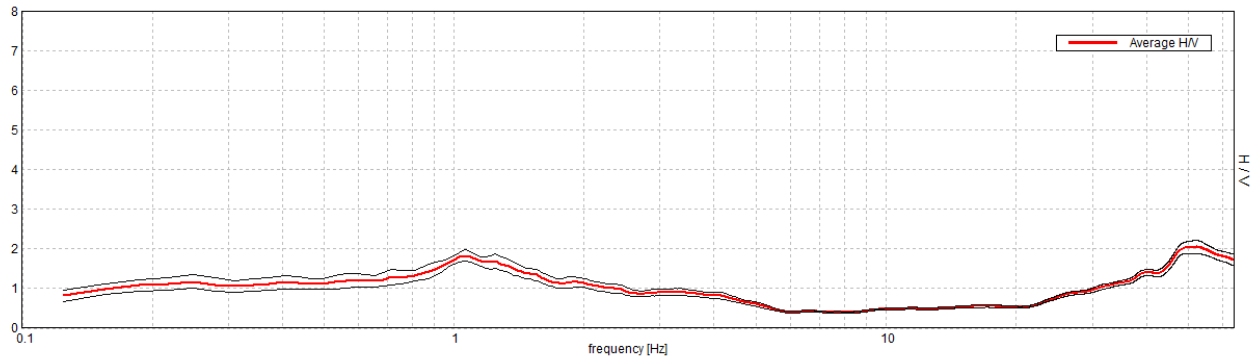
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H18

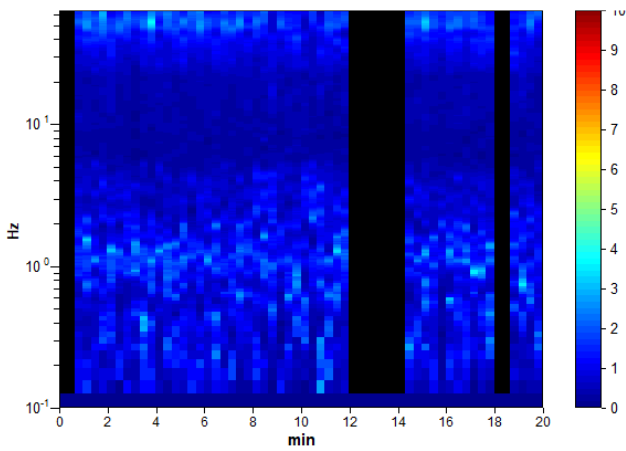
Instrument: TRZ-0144/01-11  
 Data format: 16 byte  
 Full scale [mV]: n.a.  
 Start recording: 10/08/01 11:49:01 End recording: 10/08/01 12:09:00  
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
 GPS data not available  
 Trace length: 0h20'00". Analyzed 82% trace (manual window selection)  
 Sampling rate: 128 Hz  
 Window size: 20 s  
 Smoothing type: Triangular window  
 Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

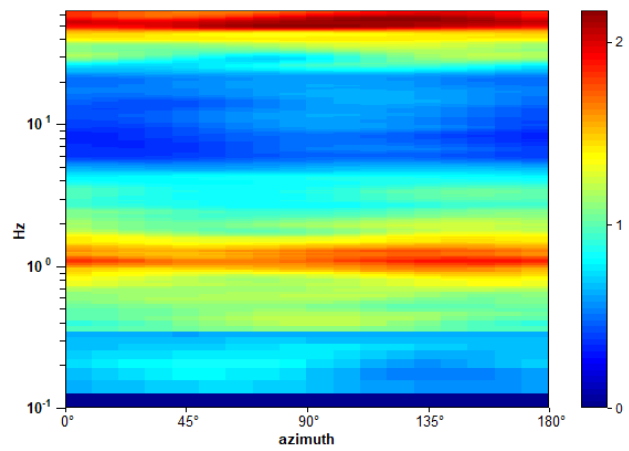
Max. H/V at 1.06 ± 0.06 Hz. (In the range 0.0 - 30.0 Hz).



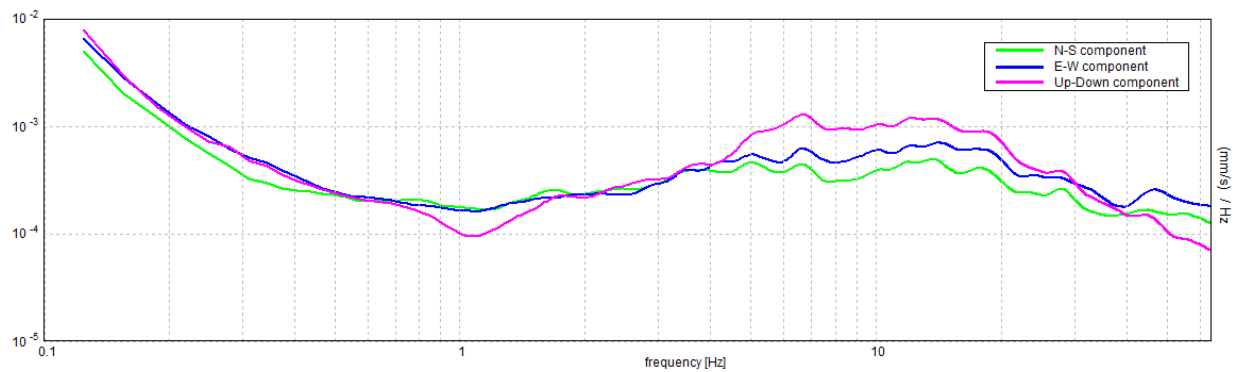
H/V TIME HISTORY



DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Max. H/V at  $1.06 \pm 0.06$  Hz (in the range 0.0 - 30.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.06 > 0.50$	OK	
$n_c(f_0) > 200$	$1041.3 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 52 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	2.531 Hz	OK	
$A_0 > 2$	$1.83 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.05882  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.0625 < 0.10625$	OK	
$\sigma_A(f_0) < \theta(f_0)$	$0.1428 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

**Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$**

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H19

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 17/08/01 16:31:15 Fine registrazione: 17/08/01 16:51:14

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00". Analizzato 63% tracciato (selezione manuale)

Freq. campionamento: 128 Hz

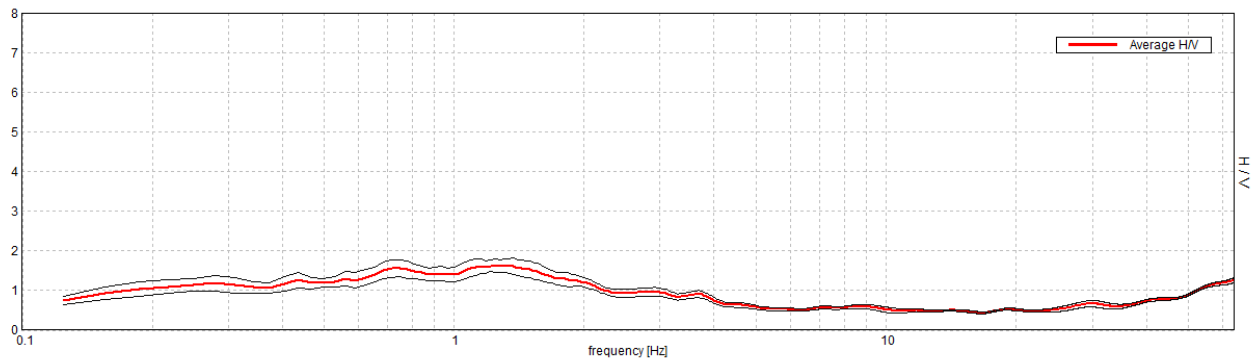
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

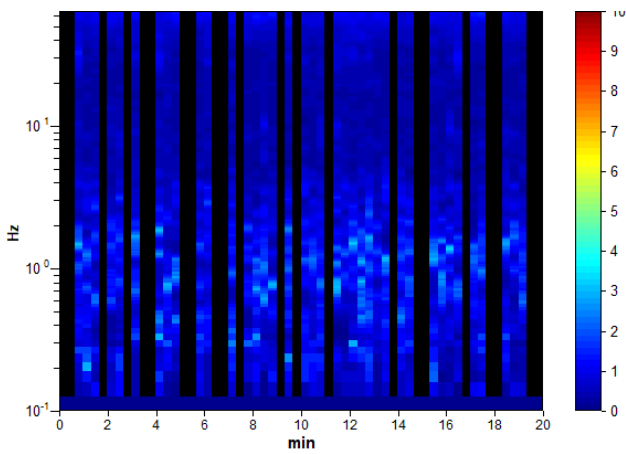
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

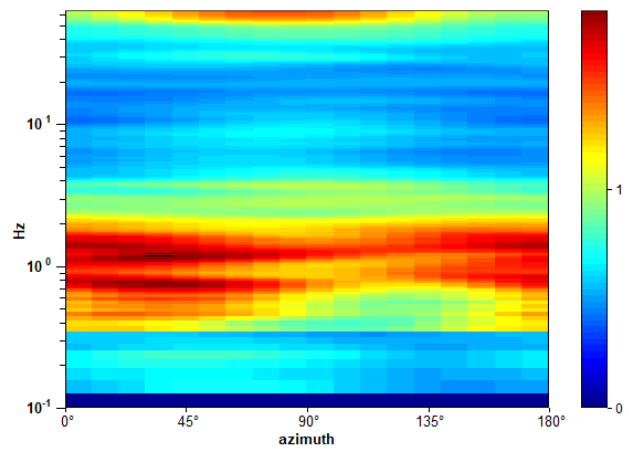
Max. H/V at 1.31 ± 0.46 Hz. (In the range 0.0 - 20.0 Hz).



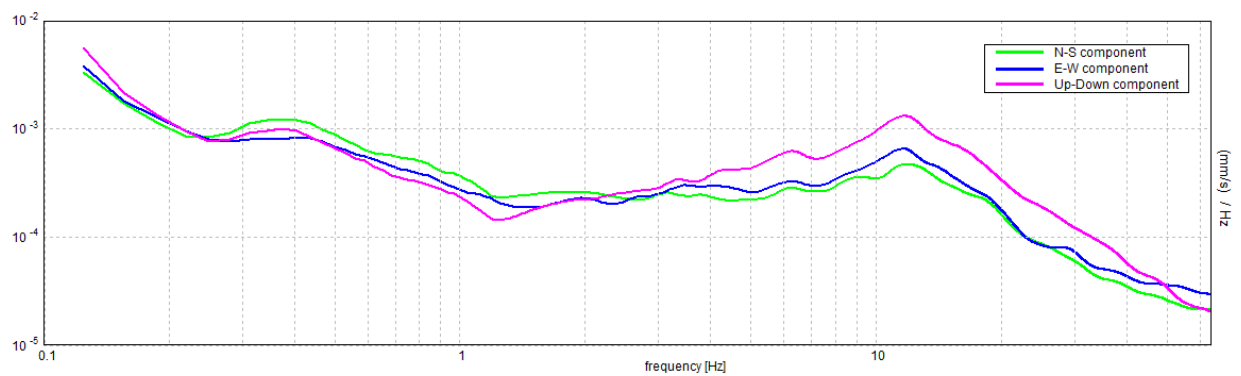
H/V TIME HISTORY



DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $1.31 \pm 0.46$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.31 > 0.50$	OK	
$n_c(f_0) > 200$	$997.5 > 200$	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 64 times	OK	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

Exists $f^-$ in $[f_0/4, f_0]$   $A_{H/V}(f^-) < A_0 / 2$			NO
Exists $f^+$ in $[f_0, 4f_0]$   $A_{H/V}(f^+) < A_0 / 2$	3.906 Hz	OK	
$A_0 > 2$	$1.63 > 2$		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.34714  < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.45563 < 0.13125$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.1789 < 1.78$	OK	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

## GAMBETTOLA, H20

Strumento: TRZ-0144/01-11

Formato dati: 16 byte

Fondo scala [mV]: n.a.

Inizio registrazione: 27/08/01 12:08:18 Fine registrazione: 27/08/01 12:28:18

Nomi canali: NORTH SOUTH; EAST WEST ; UP DOWN

Dato GPS non disponibile

Durata registrazione: 0h20'00".

Analisi effettuata sull'intera traccia.

Freq. campionamento: 128 Hz

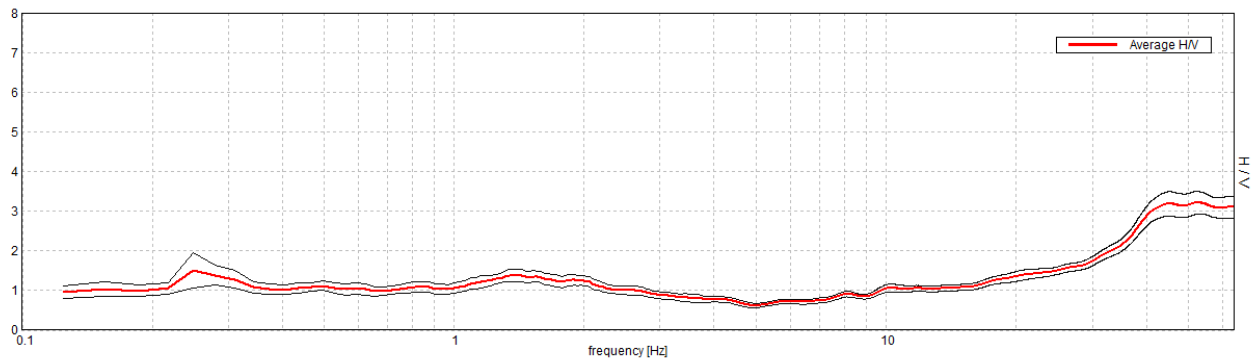
Lunghezza finestre: 20 s

Tipo di lisciamento: Triangular window

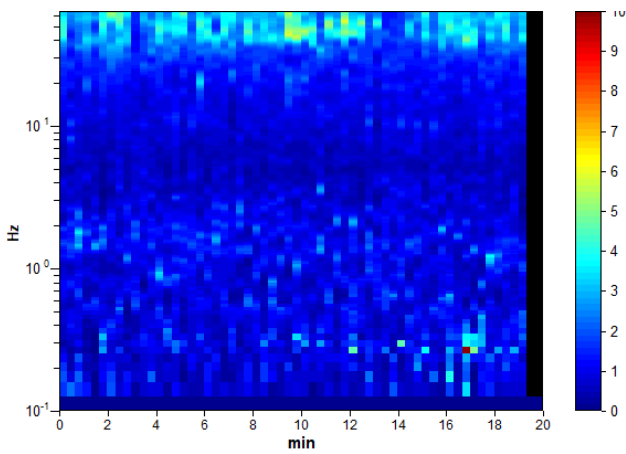
Lisciamento: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

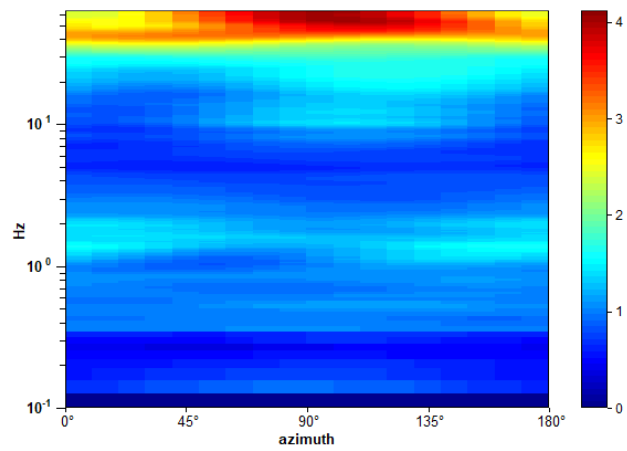
Picco H/V a  $0.25 \pm 1.1$  Hz (nell'intervallo 0.0 - 20.0 Hz).



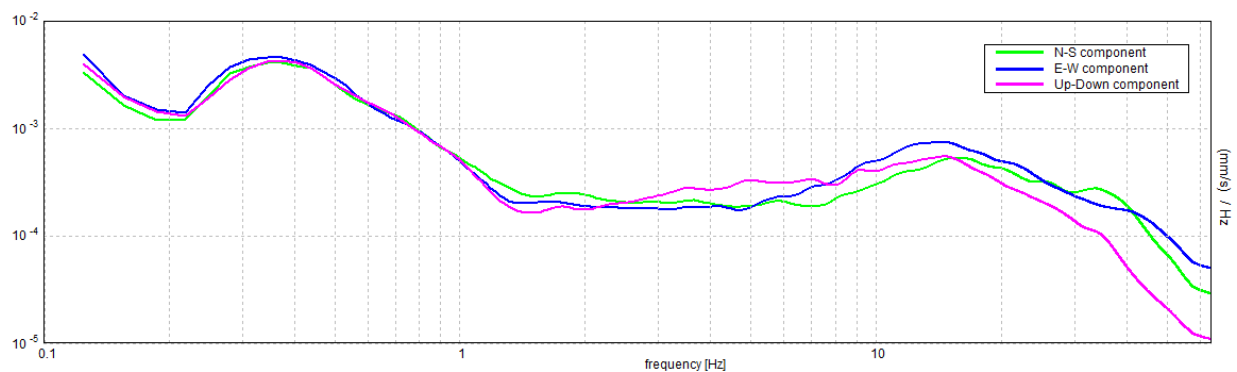
H/V TIME HISTORY



DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



[According to the SESAME, 2005 guidelines. Please read carefully the *Grilla* manual before interpreting the following tables.]

**Picco H/V a  $0.25 \pm 1.1$  Hz (nell'intervallo 0.0 - 20.0 Hz).**

**Criteria for a reliable H/V curve**

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$0.25 > 0.50$		<b>NO</b>
$n_c(f_0) > 200$	$300.0 > 200$	<b>OK</b>	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$ $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$	Exceeded 0 out of 13 times	<b>OK</b>	

**Criteria for a clear H/V peak**

[At least 5 out of 6 should be fulfilled]

<b>Exists <math>f^-</math> in <math>[f_0/4, f_0]</math>   <math>A_{H/V}(f^-) &lt; A_0 / 2</math></b>	0.094 Hz	<b>OK</b>	
<b>Exists <math>f^+</math> in <math>[f_0, 4f_0]</math>   <math>A_{H/V}(f^+) &lt; A_0 / 2</math></b>			<b>NO</b>
<b><math>A_0 &gt; 2</math></b>	$1.51 > 2$		<b>NO</b>
<b><math>f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%</math></b>	$ 4.4046  < 0.05$		<b>NO</b>
<b><math>\sigma_f &lt; \varepsilon(f_0)</math></b>	$1.10115 < 0.05$		<b>NO</b>
<b><math>\sigma_A(f_0) &lt; \theta(f_0)</math></b>	$0.4486 < 2.5$	<b>OK</b>	

$L_w$	window length
$n_w$	number of windows used in the analysis
$n_c = L_w n_w f_0$	number of significant cycles
$f$	current frequency
$f_0$	H/V peak frequency
$\sigma_f$	standard deviation of H/V peak frequency
$\varepsilon(f_0)$	threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
$A_0$	H/V peak amplitude at frequency $f_0$
$A_{H/V}(f)$	H/V curve amplitude at frequency $f$
$f^-$	frequency between $f_0/4$ and $f_0$ for which $A_{H/V}(f^-) < A_0/2$
$f^+$	frequency between $f_0$ and $4f_0$ for which $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	standard deviation of $A_{H/V}(f)$ , $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
$\sigma_{\log H/V}(f)$	standard deviation of $\log A_{H/V}(f)$ curve
$\theta(f_0)$	threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$

**Threshold values for  $\sigma_f$  and  $\sigma_A(f_0)$**

Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20