

Attuazione dell'articolo 11 della legge 24 giugno 2009, n.77

MICROZONAZIONE SISMICA

Indagini geofisiche

scala 1:10.000

Regione Emilia-Romagna

Comune di Calendasco



<p>Regione</p> <p>Emilia-Romagna</p>	<p>Soggetto realizzatore</p>  <p>Dott. Geol. Stefano Castagnetti</p> <p>Collaboratori: Dott. Geol. Marco Baldi Dott. Geol. Marco Carretta</p>	<p>Data</p> <p>Ottobre 2022</p>
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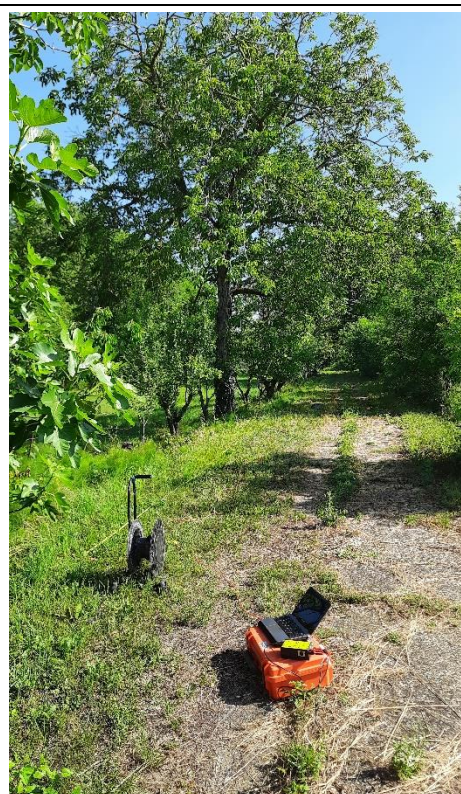
INDAGINE MASW1

Località SP13, Bonina di Rottofreno		Comune Calendasco (PC)			
Cantiere MS comune di Calendasco	Data 09/06/2022	Ora 9.15			
Codice lavoro 22_003_CSTG	Committente Dott. Geol. Stefano Castagnetti				
Codice Prova MASW1	File Calendasco 1b_STK_SEG2.dat				
Operatore: Dott. Geol. Alessandro Ferrari					

STRUMENTAZIONE

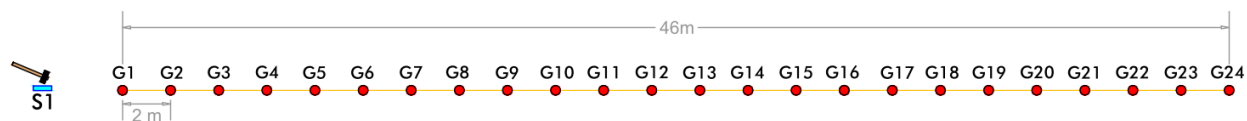
Marca: Sara Electronic Instruments	Modello: Sismografo digitale DoReMi
Marca Geofoni: Geo Space	Orientamento: <input type="checkbox"/> H <input checked="" type="checkbox"/> V Frequenza (Hz): 4.5

SPECIFICHE INDAGINE



Tipo: MASW	Onde: <input checked="" type="checkbox"/> P <input type="checkbox"/> SH
N°canali: 24	Lunghezza stendimento (m): 46+5
Offset minimo (m): 5	N° shot: 5
Durata registrazioni (sec): 1.0	
Frequenza di campionamento (Hz): 2000	
Tipologia energizzazione:	
<input type="checkbox"/> Fucile sismico	Modello:
<input checked="" type="checkbox"/> Mazza	Kg: 5
<input type="checkbox"/> Grave	Kg:
<input type="checkbox"/> Mazza su trave	Kg:
Stacking: usate 5 acquisizioni su 5:	
<input checked="" type="checkbox"/> Calendasco 1b _0105.drm	
<input checked="" type="checkbox"/> Calendasco 1b _0205.drm	
<input checked="" type="checkbox"/> Calendasco 1b _0305.drm	
<input checked="" type="checkbox"/> Calendasco 1b _0405.drm	
<input checked="" type="checkbox"/> Calendasco 1b _0505.drm	

Geometrie stendimento:



TERRENO INDAGATO

Superficie:	<input checked="" type="checkbox"/> vegetale	<input type="checkbox"/> riporto	<input type="checkbox"/> roccia	<input type="checkbox"/> pavimentazione:
Condizioni terreno:	<input checked="" type="checkbox"/> asciutto	<input type="checkbox"/> bagnato	<input type="checkbox"/> saturo	

OSSERVAZIONI: Traffico intenso su autostrada a circa 100 m

Tracce

Numero tracce: 24

Durata acquisizione: 1.0 s

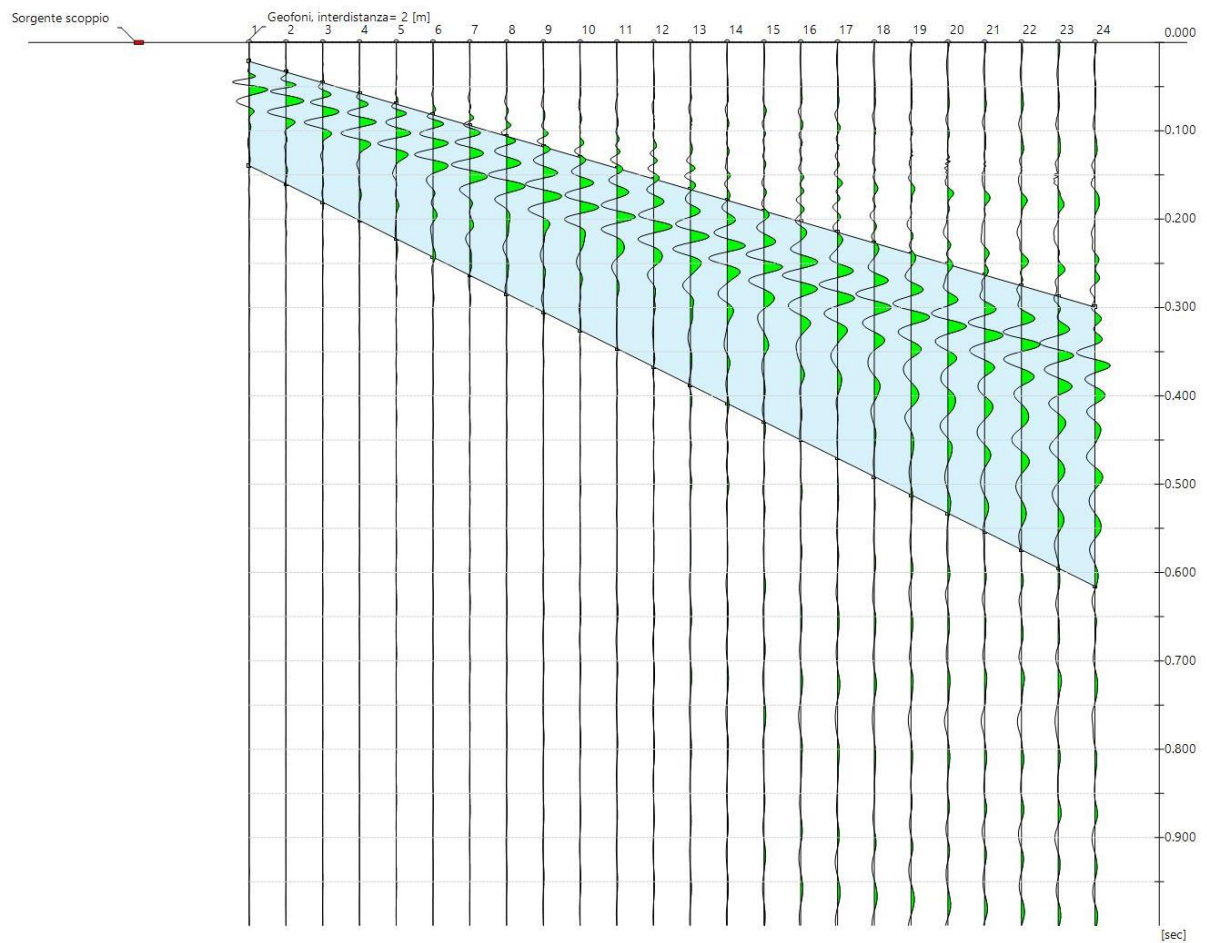
Periodo di campionamento: 0.5 ms

Interdistanza geofoni: 2 m

Distanza sorgente - primo geofono: 5 m

Selezione temporale: selezione manuale

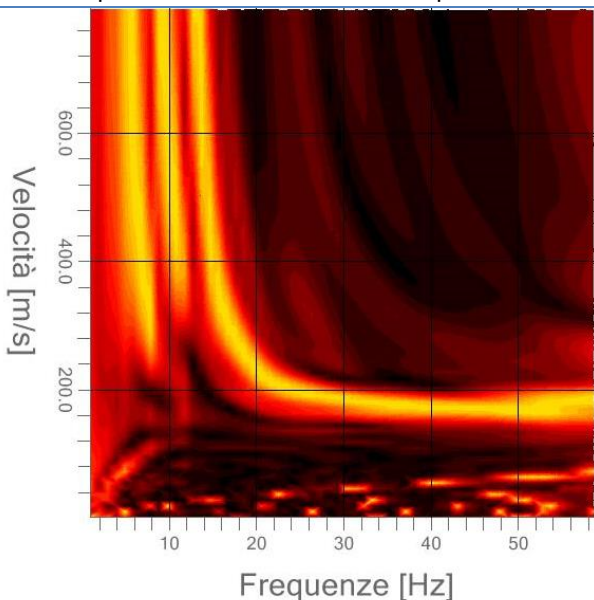
Sismogramma



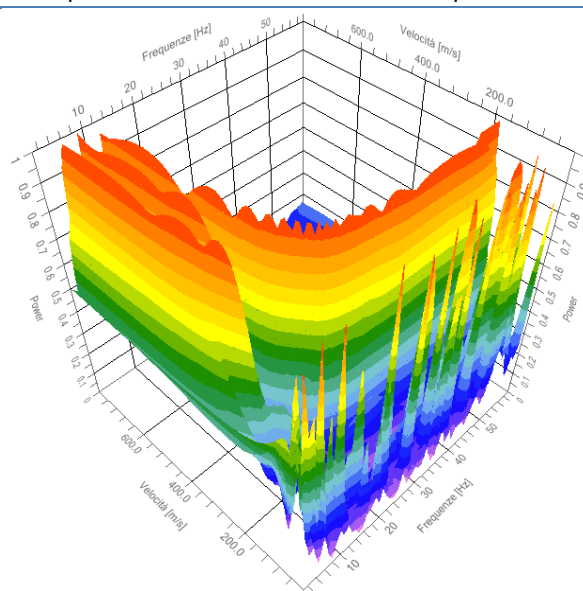
Analisi spettrale

Numero tracce utilizzate: 24
 Frequenza minima di elaborazione: 1 Hz
 Frequenza massima di elaborazione: 60 Hz
 Velocità minima di elaborazione: 1 m/s
 Velocità massima di elaborazione: 800 m/s

Spettro Velocità di fase - Frequenze



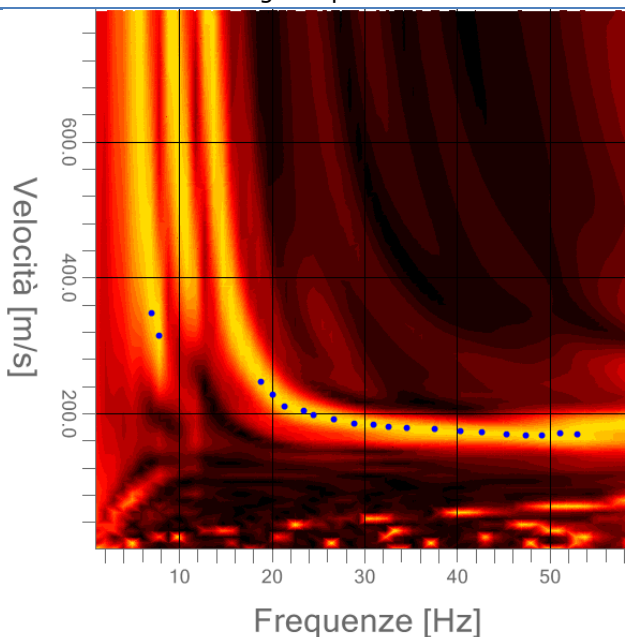
Spettro 3D Velocità di fase - Frequenze



Curva di dispersione

N° punti di picking: 20

Picking su spettro F-V



Modi vibrazionali identificati

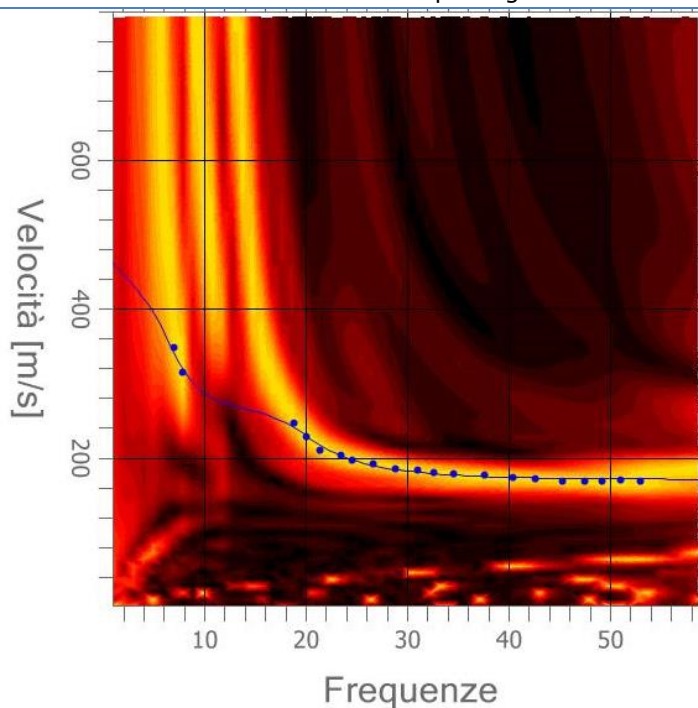
<input checked="" type="checkbox"/> Modo fondamentale	<input type="checkbox"/> 1° modo superiore	<input type="checkbox"/> 2° modo superiore	<input type="checkbox"/> 3° modo superiore	<input type="checkbox"/> 4° modo superiore
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Inversione:

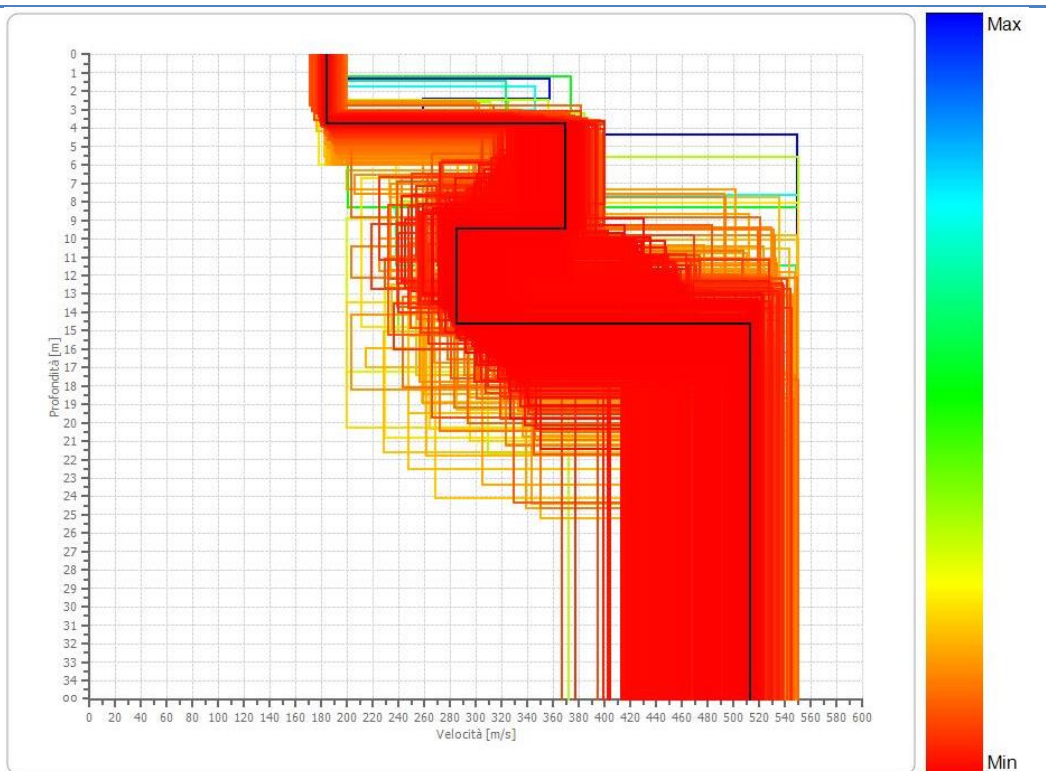
Fattore di disadattamento della soluzione (misfit): 0.016

Percentuale di errore: 0.029%

Modello sintetico su picking



Profili di Vs considerati

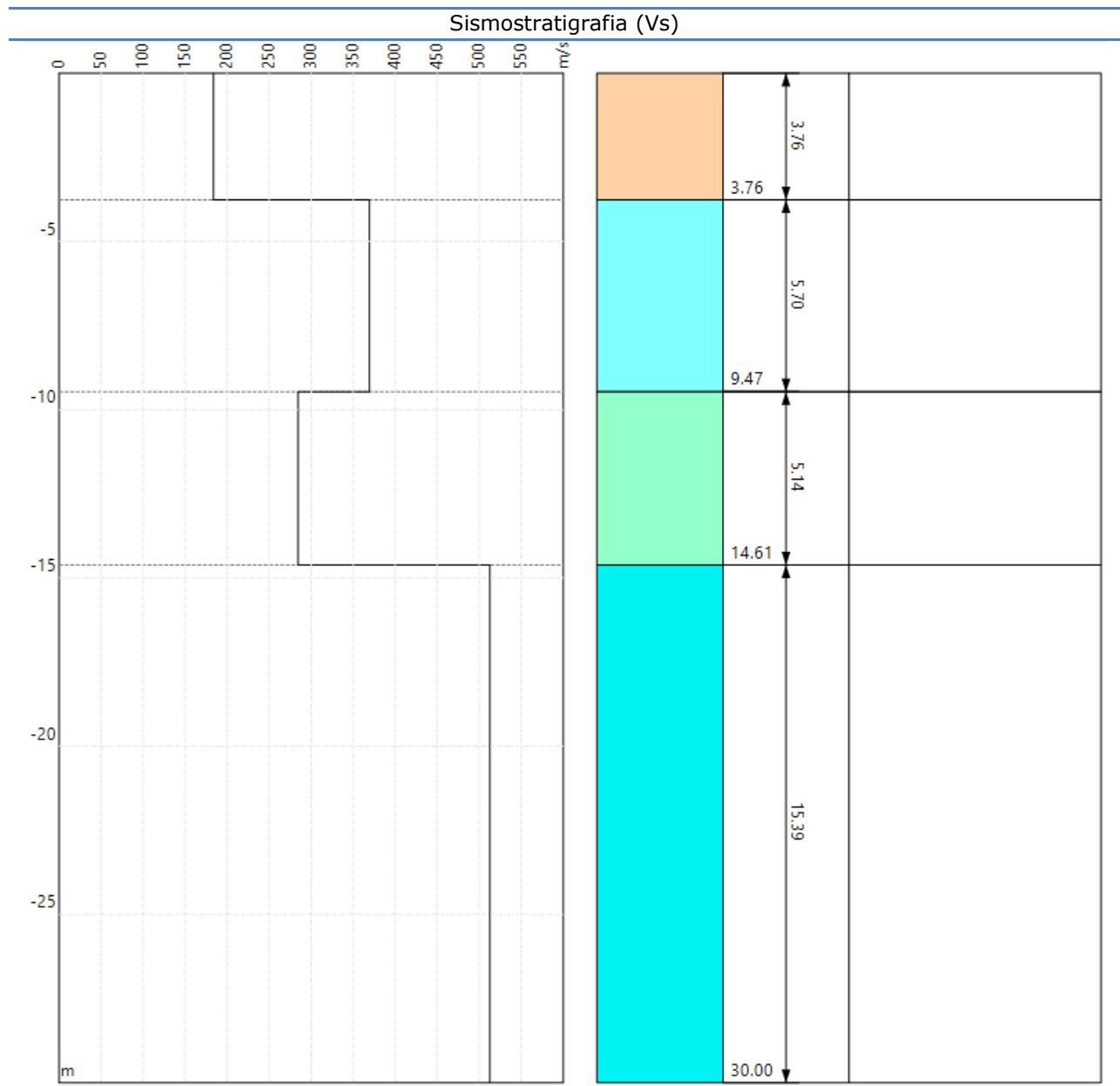


Modello sismostratigrafico:


N° di strati: 4

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio [m/s]
1	3.76	3.76	183.8
2	9.47	5.70	369.3
3	14.61	5.14	284.6
4	∞	∞	512.7

Valore V_{s30} : 357.1 m/s




INDAGINE MASW2

Località SP13, Incrociata		Comune Calendasco (PC)		
Cantiere MS comune di Calendasco	Data 09/06/2022	Ora 9.15		
Codice lavoro 22_003_CSTG	Committente Dott. Geol. Stefano Castagnetti			
Codice Prova MASW2	File Calendasco 2a_STK_SEG2.dat			
Operatore: Dott. Geol. Alessandro Ferrari				

STRUMENTAZIONE

Marca: Sara Electronic Instruments	Modello: Sismografo digitale DoReMi
Marca Geofoni: Geo Space	Orientamento: <input type="checkbox"/> H <input checked="" type="checkbox"/> V Frequenza (Hz): 4.5

SPECIFICHE INDAGINE

	Tipo: MASW	Onde: <input checked="" type="checkbox"/> P <input type="checkbox"/> SH
	N° canali: 24	Lunghezza stendimento (m): 46+5
	Offset minimo (m): 5	N° shot: 5
	Durata registrazioni (sec): 1.0	
	Frequenza di campionamento (Hz): 2000	
	Tipologia energizzazione:	
	<input type="checkbox"/> Fucile sismico	Modello:
	<input checked="" type="checkbox"/> Mazza	Kg: 5
	<input type="checkbox"/> Grave	Kg:
	<input type="checkbox"/> Mazza su trave	Kg:
Stacking: usate 5 acquisizioni su 5: <input checked="" type="checkbox"/> Calendasco 2a _0105.drm <input checked="" type="checkbox"/> Calendasco 2a _0205.drm <input checked="" type="checkbox"/> Calendasco 2a _0305.drm <input checked="" type="checkbox"/> Calendasco 2a _0405.drm <input checked="" type="checkbox"/> Calendasco 2a _0505.drm		

Geometrie stendimento:



TERRENO INDAGATO

Superficie:	<input checked="" type="checkbox"/> vegetale	<input type="checkbox"/> riporto	<input type="checkbox"/> roccia	<input type="checkbox"/> pavimentazione:
Condizioni terreno:	<input checked="" type="checkbox"/> asciutto	<input type="checkbox"/> bagnato	<input type="checkbox"/> saturo	

OSSERVAZIONI: Traffico moderato su strada a circa 5 m

Tracce

Numero tracce: 24

Durata acquisizione: 1.0 s

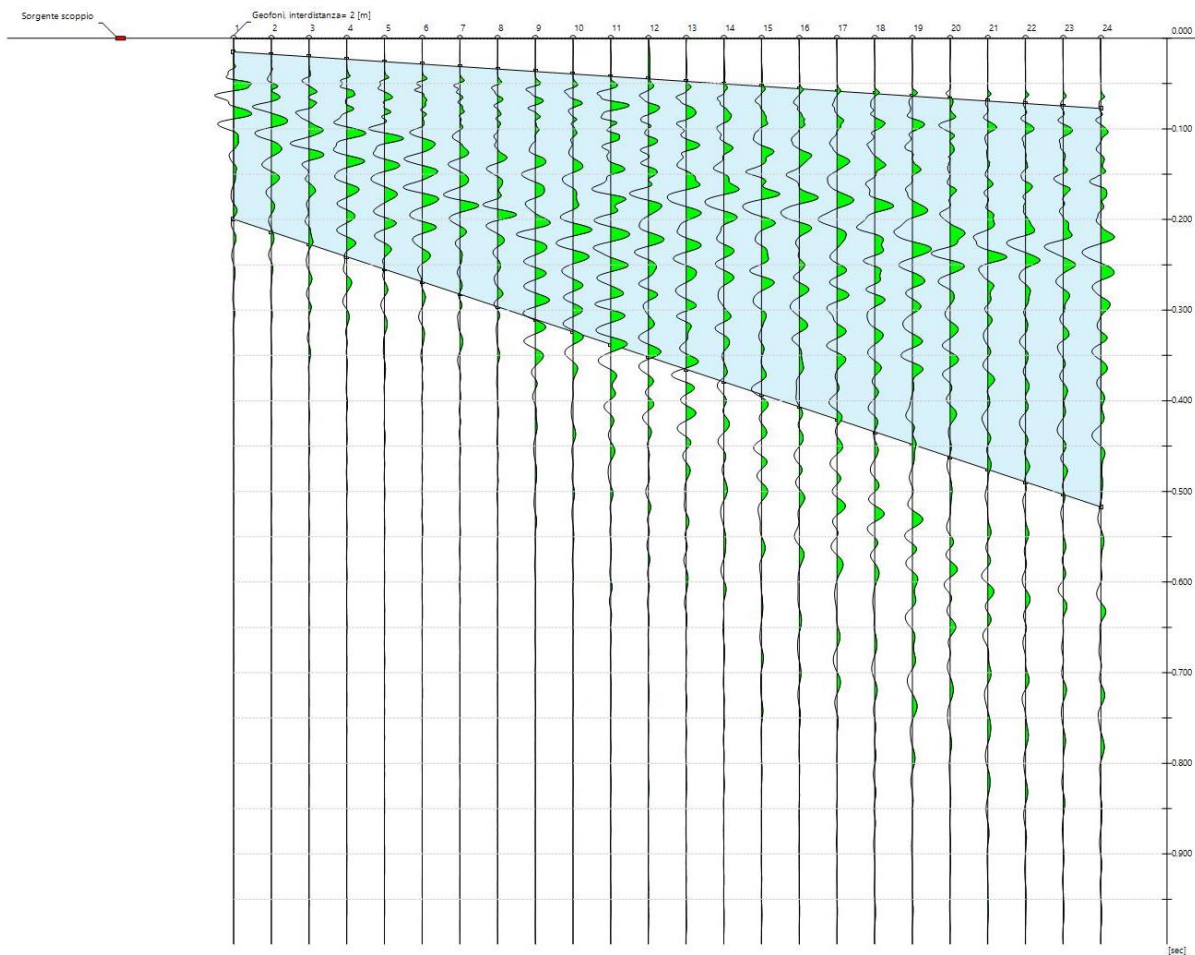
Periodo di campionamento: 0.5 ms

Interdistanza geofoni: 2 m

Distanza sorgente - primo geofono: 5 m

Selezione temporale: selezione manuale

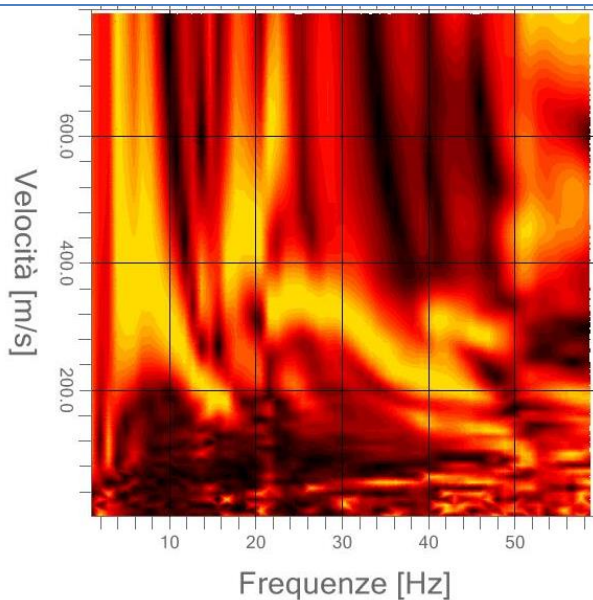
Sismogramma



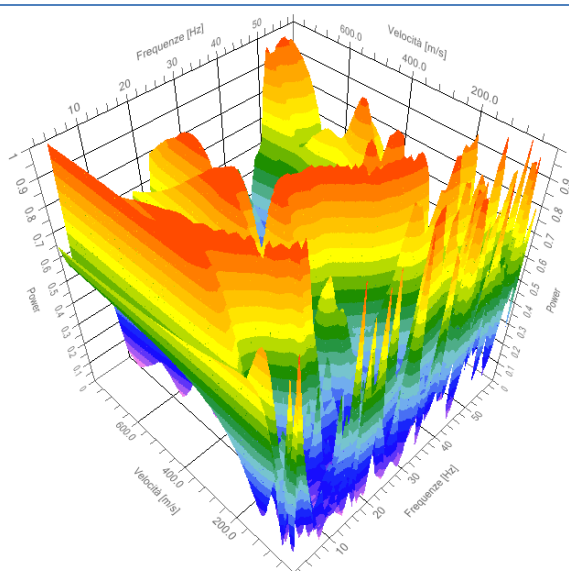
Analisi spettrale

Numero tracce utilizzate: 24
 Frequenza minima di elaborazione: 1 Hz
 Frequenza massima di elaborazione: 60 Hz
 Velocità minima di elaborazione: 1 m/s
 Velocità massima di elaborazione: 800 m/s

Spettro Velocità di fase - Frequenze



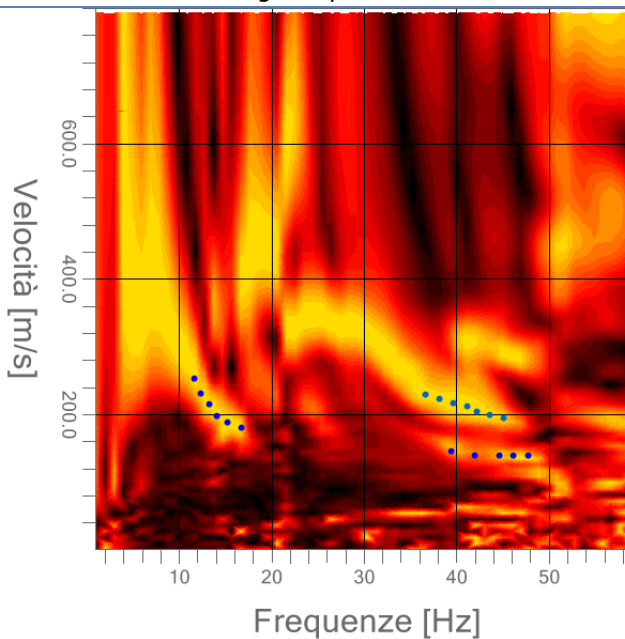
Spettro 3D Velocità di fase - Frequenze



Curva di dispersione

N° punti di picking: 18

Picking su spettro F-V



Modi vibrazionali identificati

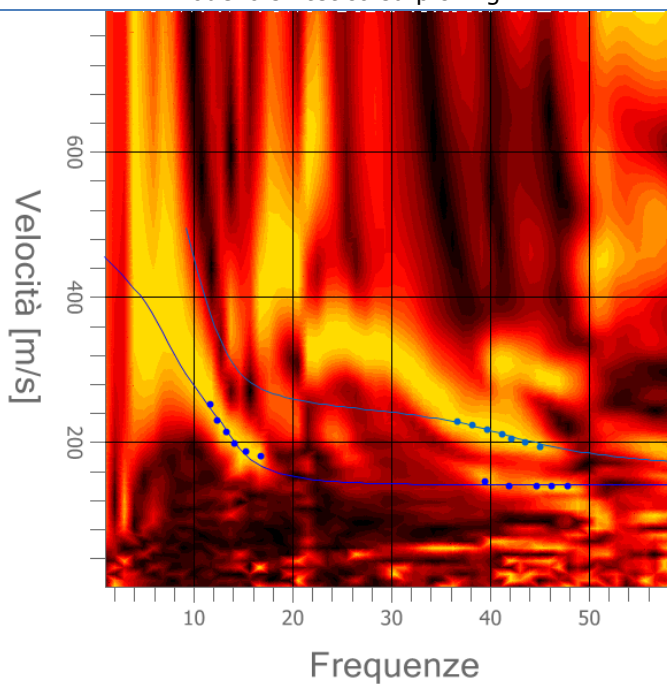
<input checked="" type="checkbox"/> Modo fondamentale	<input checked="" type="checkbox"/> 1° modo superiore	<input type="checkbox"/> 2° modo superiore	<input type="checkbox"/> 3° modo superiore	<input type="checkbox"/> 4° modo superiore
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Inversione:

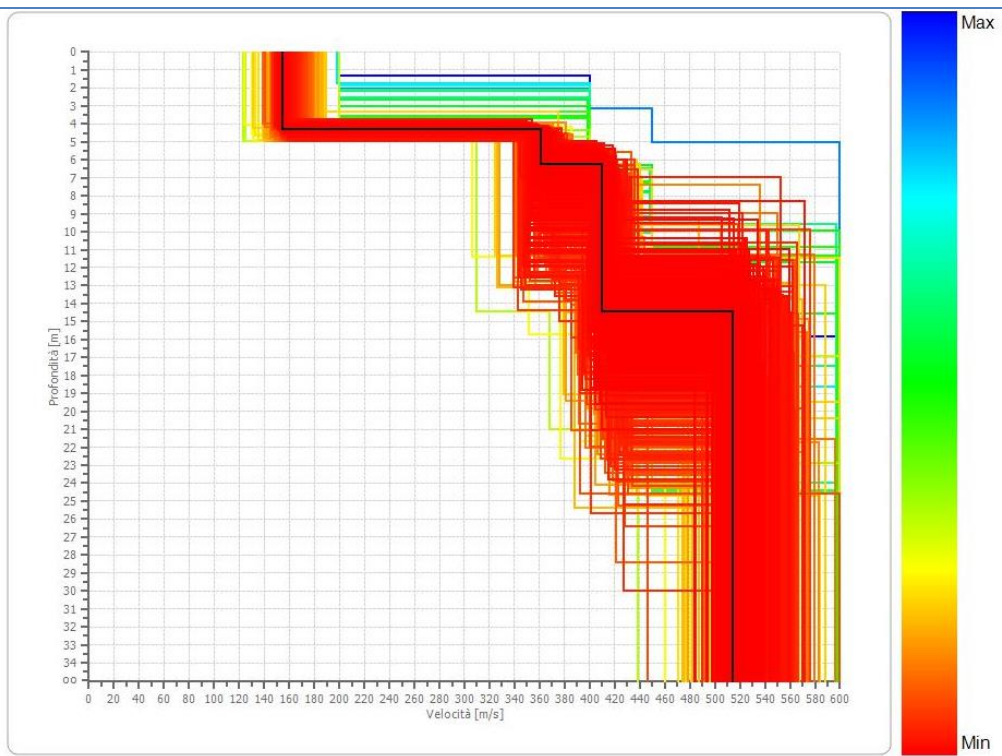
Fattore di disadattamento della soluzione (misfit): 0.023

Percentuale di errore: 0.045%

Modello sintetico su picking



Profili di Vs considerati

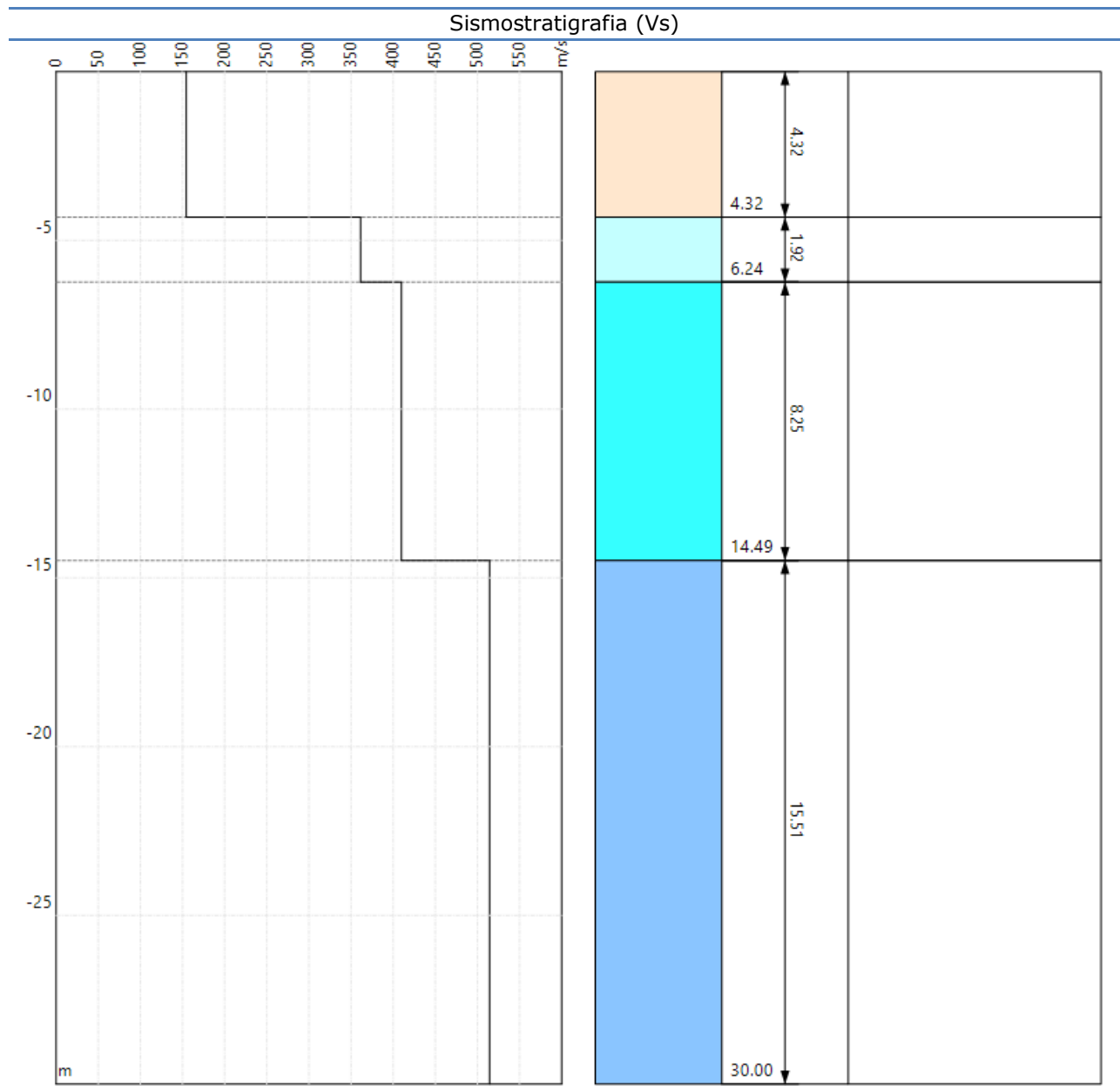


Modello sismostratigrafico:

N° di strati: 4

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio [m/s]
1	4.32	4.32	154.5
2	6.24	1.92	361.3
3	14.49	8.25	409.8
4	∞	∞	514.5

Valore V_{s30} : 359.1 m/s




INDAGINE MASW3

Località Puglia		Comune Calendasco (PC)		
Cantiere MS comune di Calendasco	Data 09/06/2022	Ora 11.10		
Codice lavoro 22_003_CSTG	Committente Dott. Geol. Stefano Castagnetti			
Codice Prova MASW3	File Calendasco 3b_STK_SEG2.dat			
Operatore: Dott. Geol. Alessandro Ferrari				

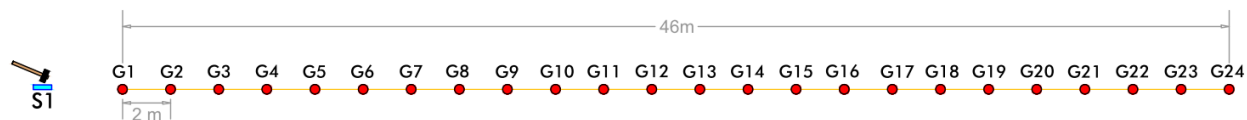
STRUMENTAZIONE

Marca: Sara Electronic Instruments	Modello: Sismografo digitale DoReMi
Marca Geofoni: Geo Space	Orientamento: <input type="checkbox"/> H <input checked="" type="checkbox"/> V Frequenza (Hz): 4.5

SPECIFICHE INDAGINE

	Tipo: MASW	Onde: <input checked="" type="checkbox"/> P <input type="checkbox"/> SH
	N°canali: 24	Lunghezza stendimento (m): 46+5
	Offset minimo (m): 5	N° shot: 5
	Durata registrazioni (sec): 1.0	
	Frequenza di campionamento (Hz): 2000	
	Tipologia energizzazione:	
	<input type="checkbox"/> Fucile sismico	Modello:
	<input checked="" type="checkbox"/> Mazza	Kg: 5
	<input type="checkbox"/> Grave	Kg:
	<input type="checkbox"/> Mazza su trave	Kg:
Stacking: usate 5 acquisizioni su 5: <input checked="" type="checkbox"/> Calendasco 3b _0105.drm <input checked="" type="checkbox"/> Calendasco 3b _0205.drm <input checked="" type="checkbox"/> Calendasco 3b _0305.drm <input checked="" type="checkbox"/> Calendasco 3b _0405.drm <input checked="" type="checkbox"/> Calendasco 3b _0505.drm		

Geometrie stendimento:



TERRENO INDAGATO

Superficie:	<input checked="" type="checkbox"/> vegetale	<input type="checkbox"/> riporto	<input type="checkbox"/> roccia	<input type="checkbox"/> pavimentazione:
Condizioni terreno:	<input checked="" type="checkbox"/> asciutto	<input type="checkbox"/> bagnato	<input type="checkbox"/> saturo	

OSSERVAZIONI:

Tracce

Numero tracce: 24

Durata acquisizione: 1.0 s

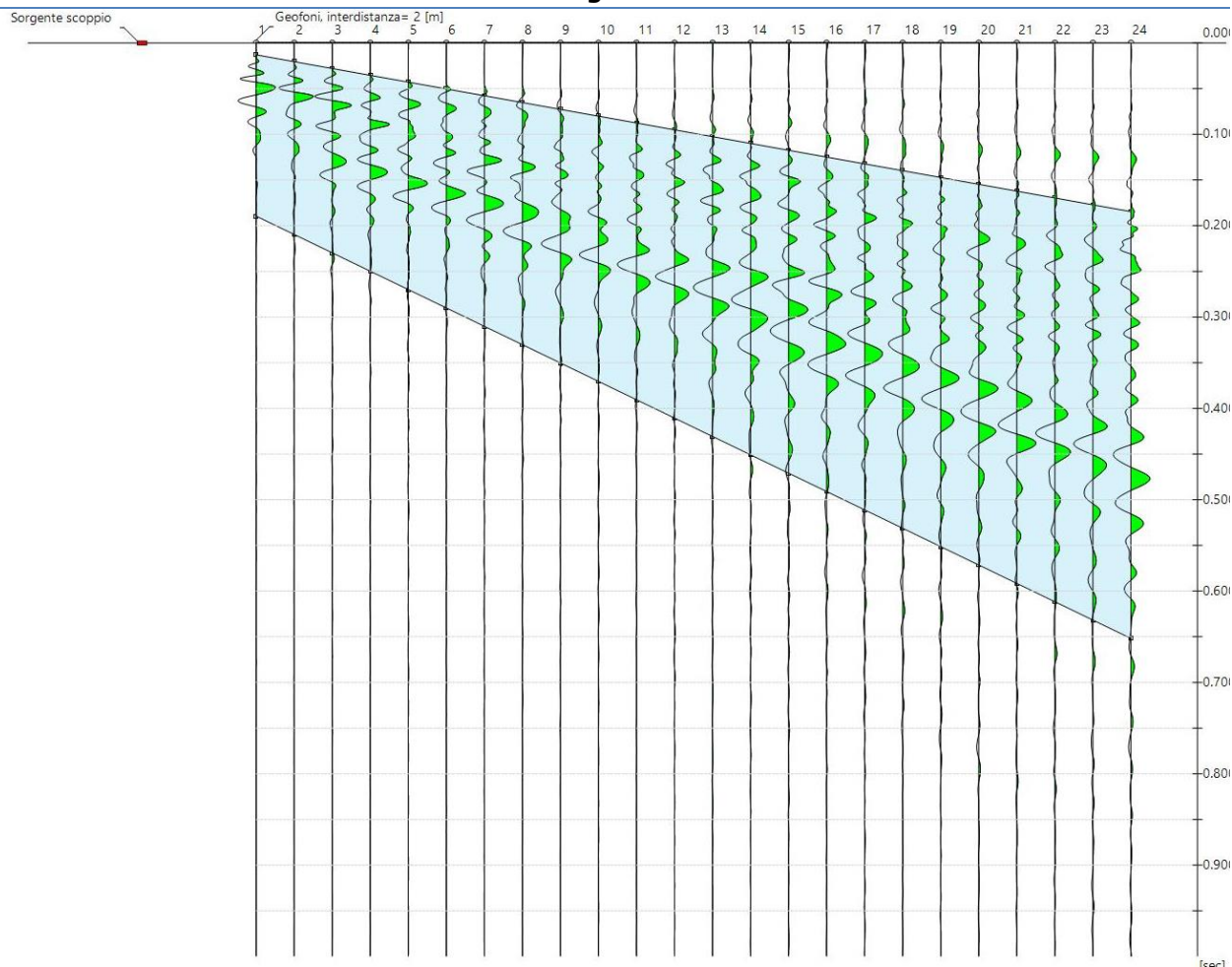
Periodo di campionamento: 0.5 ms

Interdistanza geofoni: 2 m

Distanza sorgente - primo geofono: 5 m

Selezione temporale: selezione manuale

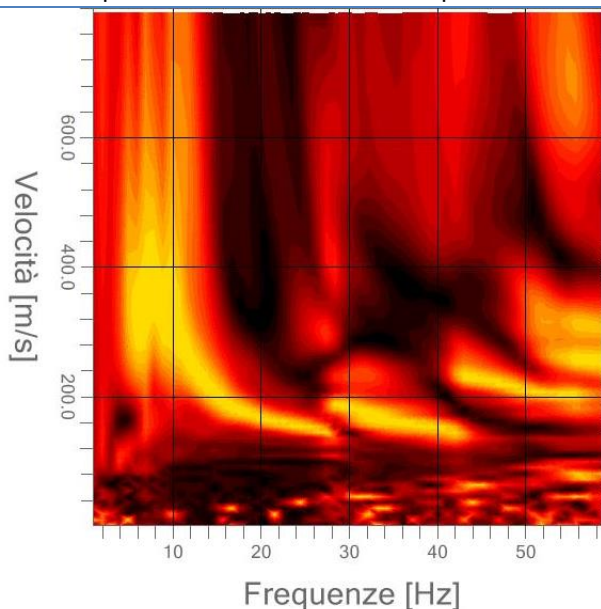
Sismogramma



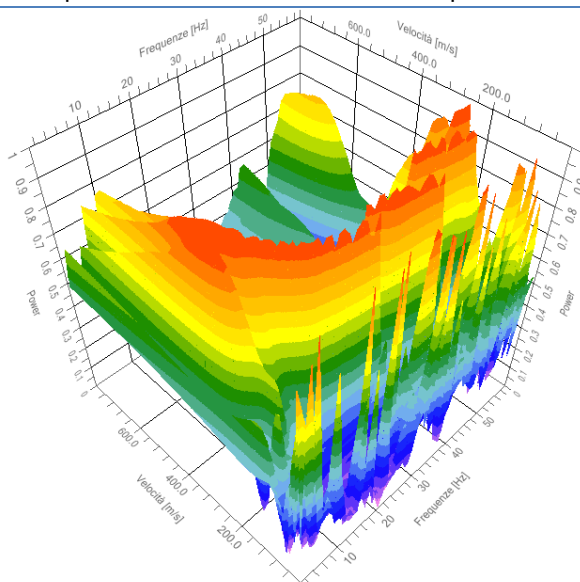
Analisi spettrale

Numero tracce utilizzate: 24
 Frequenza minima di elaborazione: 1 Hz
 Frequenza massima di elaborazione: 60 Hz
 Velocità minima di elaborazione: 1 m/s
 Velocità massima di elaborazione: 800 m/s

Spettro Velocità di fase - Frequenze



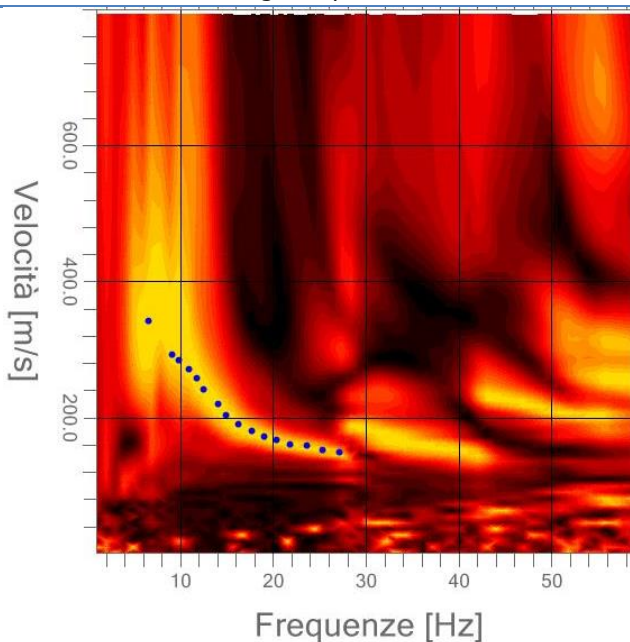
Spettro 3D Velocità di fase - Frequenze



Curva di dispersione

N° punti di picking: 16

Picking su spettro F-V



Modi vibrazionali identificati

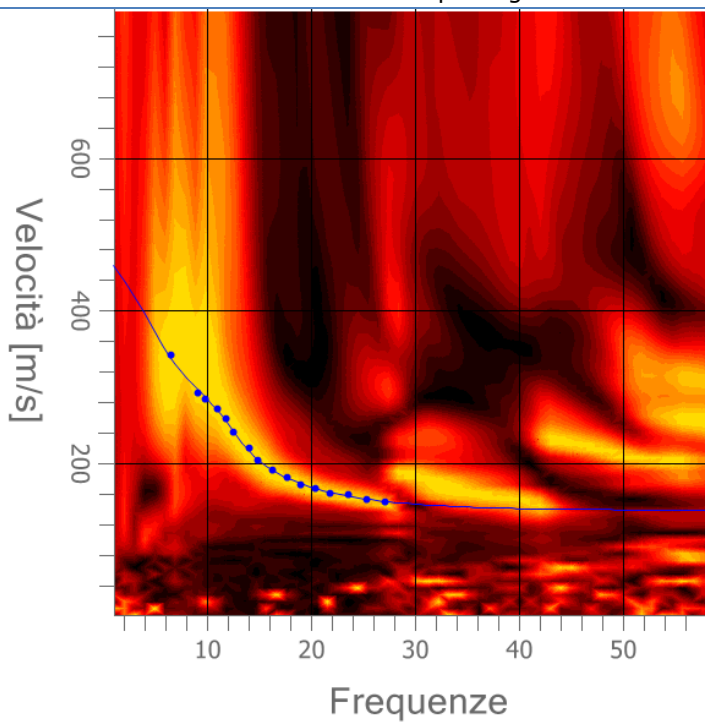
- | | | | | |
|---|--|--|--|--|
| <input checked="" type="checkbox"/> Modo fondamentale | <input type="checkbox"/> 1° modo superiore | <input type="checkbox"/> 2° modo superiore | <input type="checkbox"/> 3° modo superiore | <input type="checkbox"/> 4° modo superiore |
|---|--|--|--|--|

Inversione:

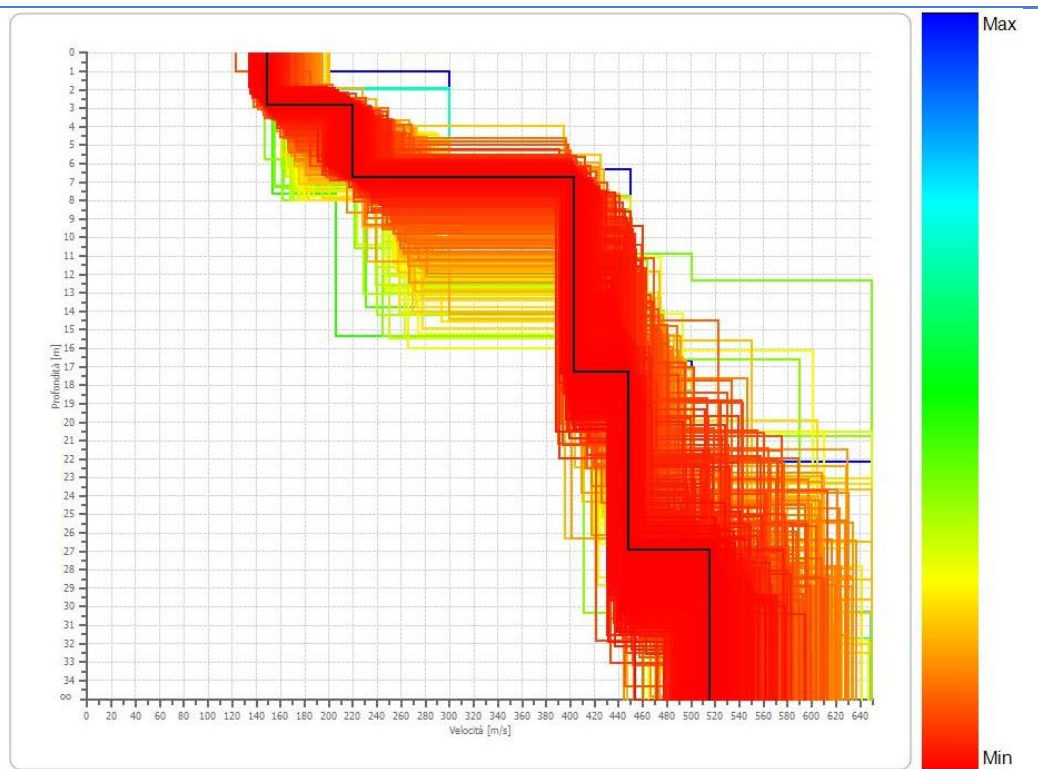
Fattore di disadattamento della soluzione (misfit): 0.009

Percentuale di errore: 0.010%

Modello sintetico su picking



Profili di Vs considerati



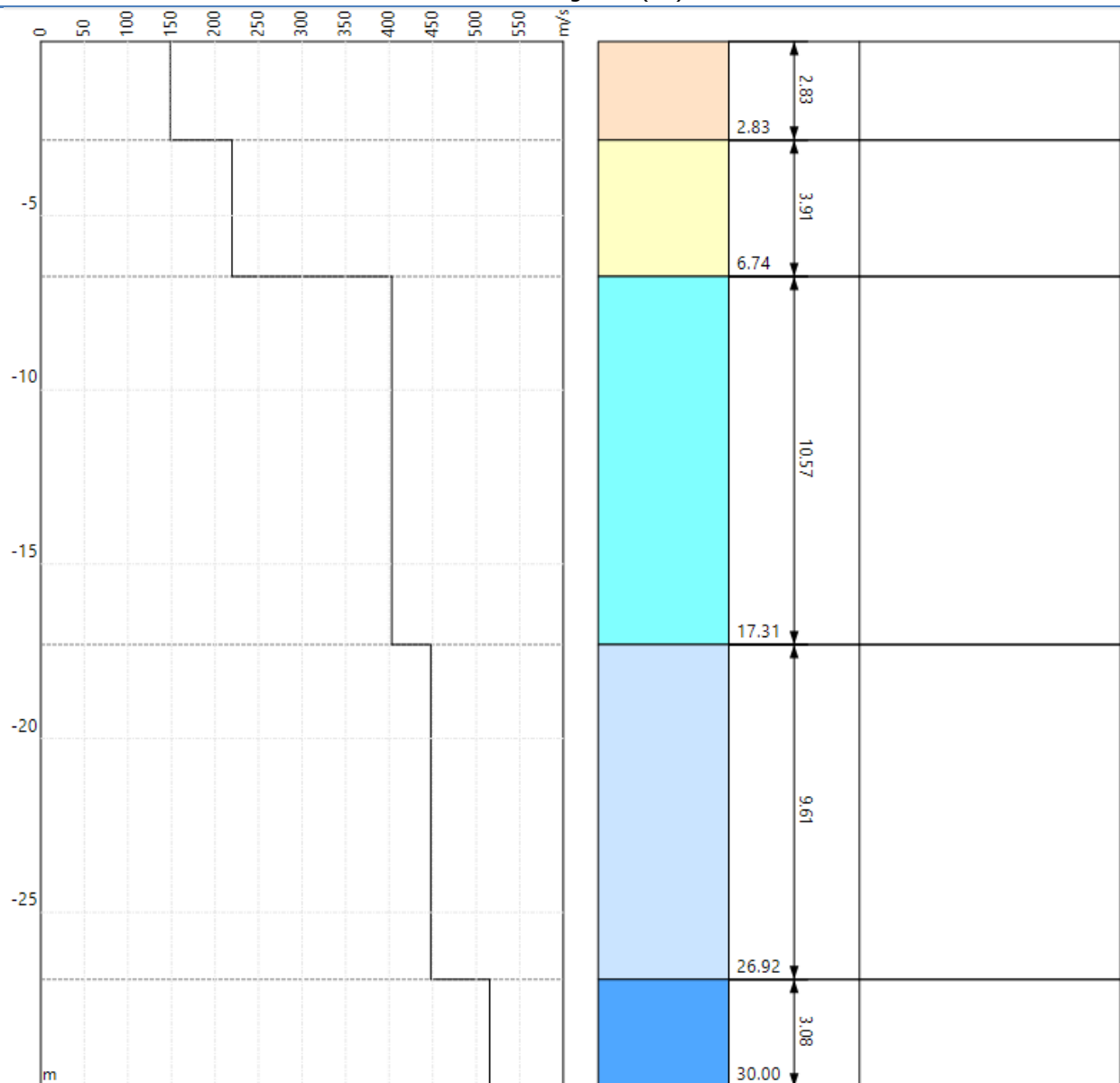
Modello sismostratigrafico:

N° di strati: 5

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio [m/s]
1	2.83	2.83	148.5
2	6.74	3.91	219.6
3	17.31	10.57	403.2
4	26.92	9.61	447.8
5	∞	∞	515.4

Valore V_{s30} : 331.4 m/s

Sismostratigrafia (Vs)




INDAGINE MASW4

Località Cotrebba Nuova	Comune Calendasco (PC)			
Cantiere MS comune di Calendasco	Data 09/06/2022	Ora 12.10		
Codice lavoro 22_003_CSTG	Committente Dott. Geol. Stefano Castagnetti			
Codice Prova MASW4	File Calendasco 4a_STK_SEG2.dat			
Operatore: Dott. Geol. Alessandro Ferrari				

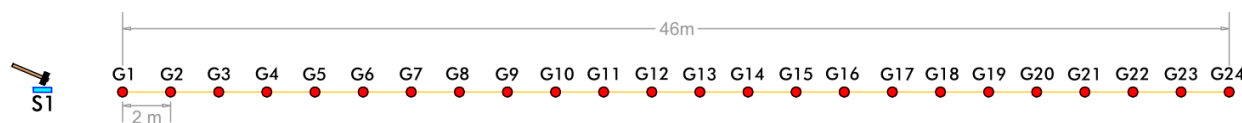
STRUMENTAZIONE

Marca: Sara Electronic Instruments	Modello: Sismografo digitale DoReMi
Marca Geofoni: Geo Space	Orientamento: <input type="checkbox"/> H <input checked="" type="checkbox"/> V Frequenza (Hz): 4.5

SPECIFICHE INDAGINE

	Tipo: MASW	Onde: <input checked="" type="checkbox"/> P <input type="checkbox"/> SH
	N°canali: 24	Lunghezza stendimento (m): 46+5
	Offset minimo (m): 5	N° shot: 5
	Durata registrazioni (sec): 1.0	
	Frequenza di campionamento (Hz): 2000	
	Tipologia energizzazione:	
	<input type="checkbox"/> Fucile sismico	Modello:
	<input checked="" type="checkbox"/> Mazza	Kg: 5
	<input type="checkbox"/> Grave	Kg:
	<input type="checkbox"/> Mazza su trave	Kg:
Stacking: usate 5 acquisizioni su 5: <input checked="" type="checkbox"/> Calendasco 4a _0105.drm <input checked="" type="checkbox"/> Calendasco 4a _0205.drm <input checked="" type="checkbox"/> Calendasco 4a _0305.drm <input checked="" type="checkbox"/> Calendasco 4a _0405.drm <input checked="" type="checkbox"/> Calendasco 4a _0505.drm		

Geometrie stendimento:



TERRENO INDAGATO

Superficie:	<input checked="" type="checkbox"/> vegetale	<input type="checkbox"/> riporto	<input type="checkbox"/> roccia	<input type="checkbox"/> pavimentazione:
Condizioni terreno:	<input checked="" type="checkbox"/> asciutto	<input type="checkbox"/> bagnato	<input type="checkbox"/> saturo	

OSSERVAZIONI: traffico moderato a circa 10 m

Tracce

Numero tracce: 24

Durata acquisizione: 1.0 s

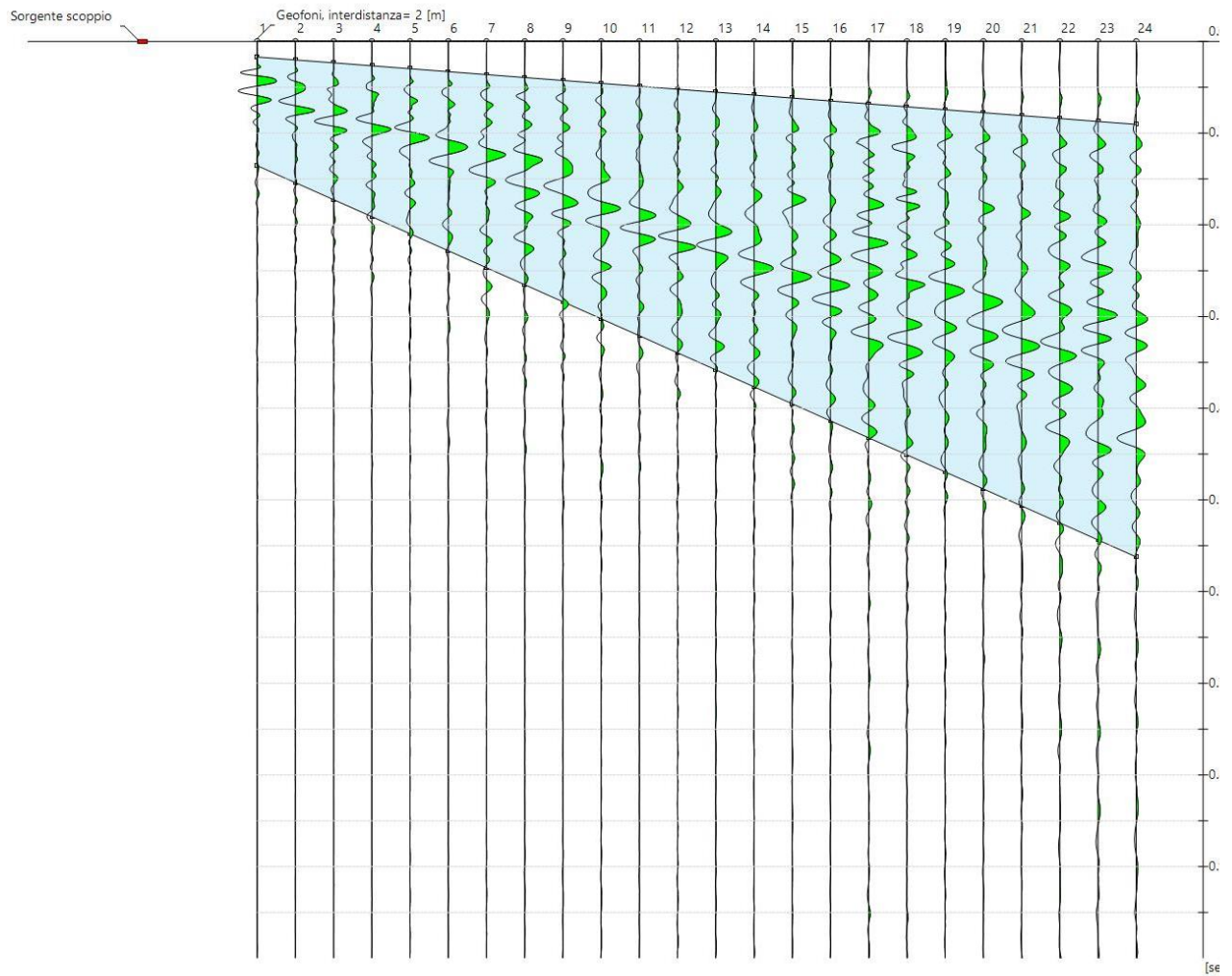
Periodo di campionamento: 0.5 ms

Interdistanza geofoni: 2 m

Distanza sorgente - primo geofono: 5 m

Selezione temporale: selezione manuale

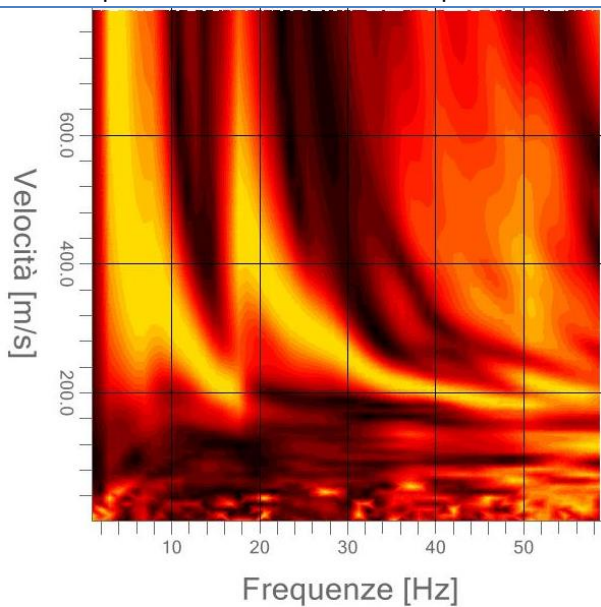
Sismogramma



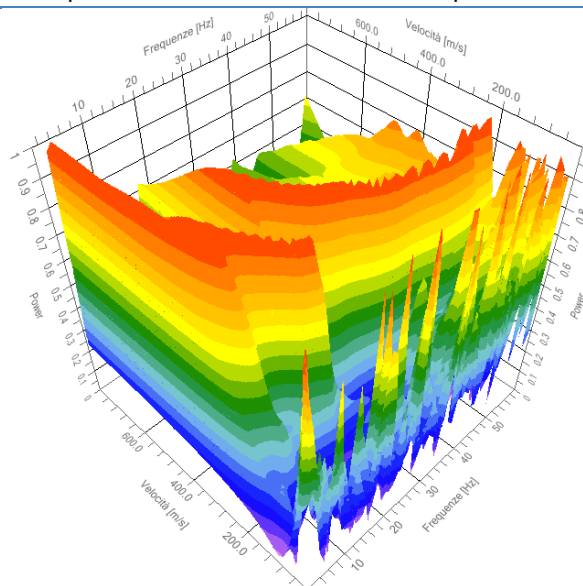
Analisi spettrale

Numero tracce utilizzate: 24
 Frequenza minima di elaborazione: 1 Hz
 Frequenza massima di elaborazione: 60 Hz
 Velocità minima di elaborazione: 1 m/s
 Velocità massima di elaborazione: 800 m/s

Spettro Velocità di fase - Frequenze



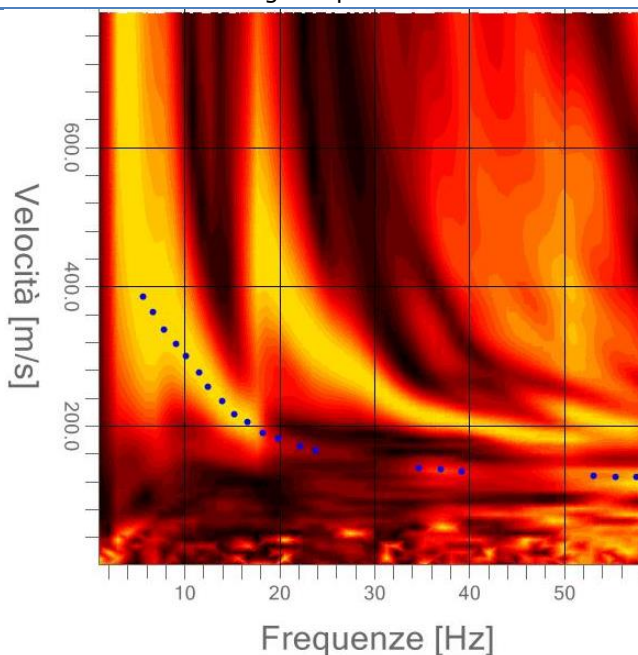
Spettro 3D Velocità di fase - Frequenze



Curva di dispersione

N° punti di picking: 20

Picking su spettro F-V



Modi vibrazionali identificati

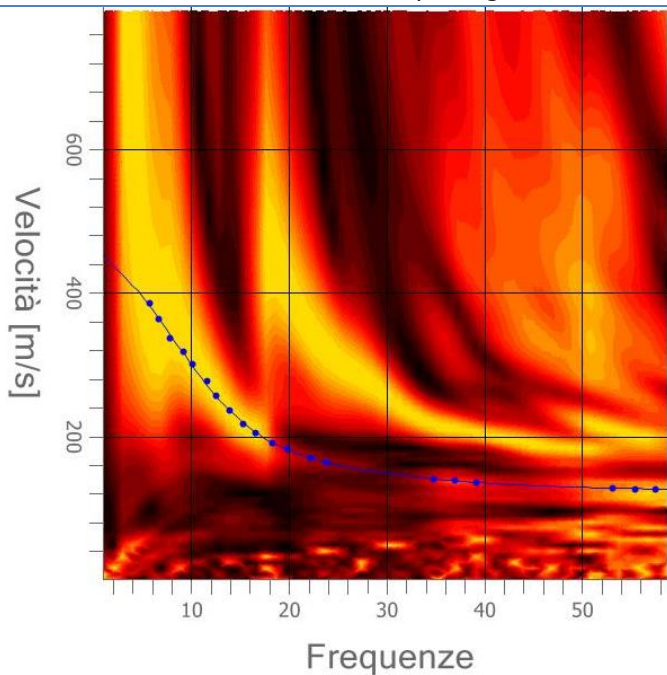
<input checked="" type="checkbox"/> Modo fondamentale	<input type="checkbox"/> 1° modo superiore	<input type="checkbox"/> 2° modo superiore	<input type="checkbox"/> 3° modo superiore	<input type="checkbox"/> 4° modo superiore
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Inversione:

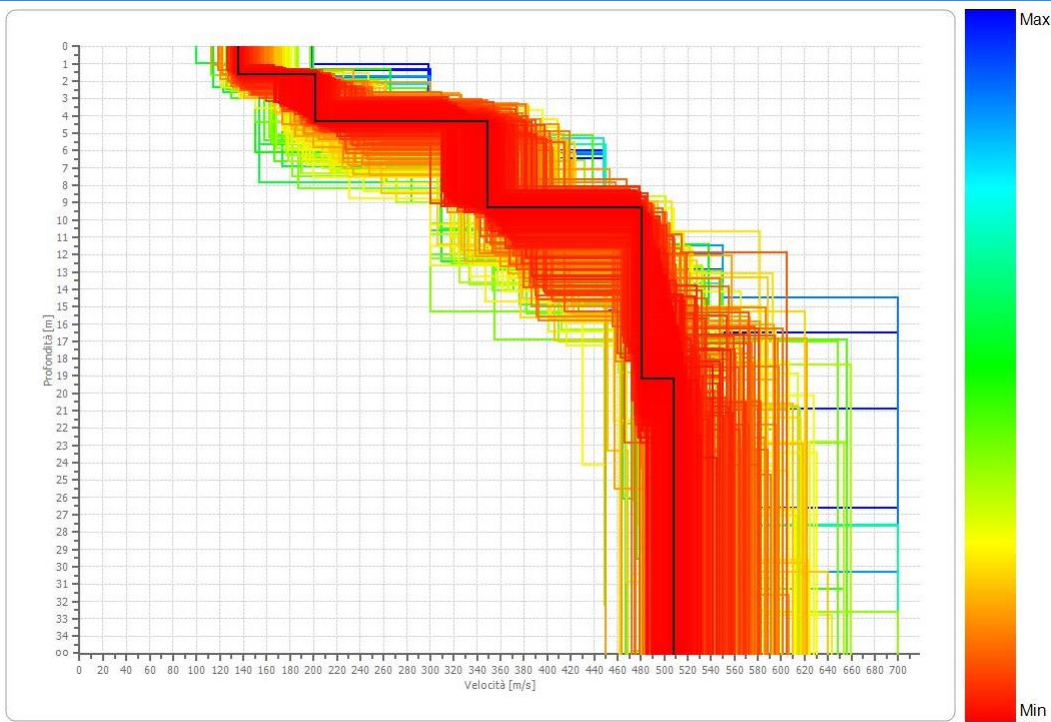
Fattore di disadattamento della soluzione (misfit): 0.009

Percentuale di errore: 0.010%

Modello sintetico su picking



Profili di Vs considerati

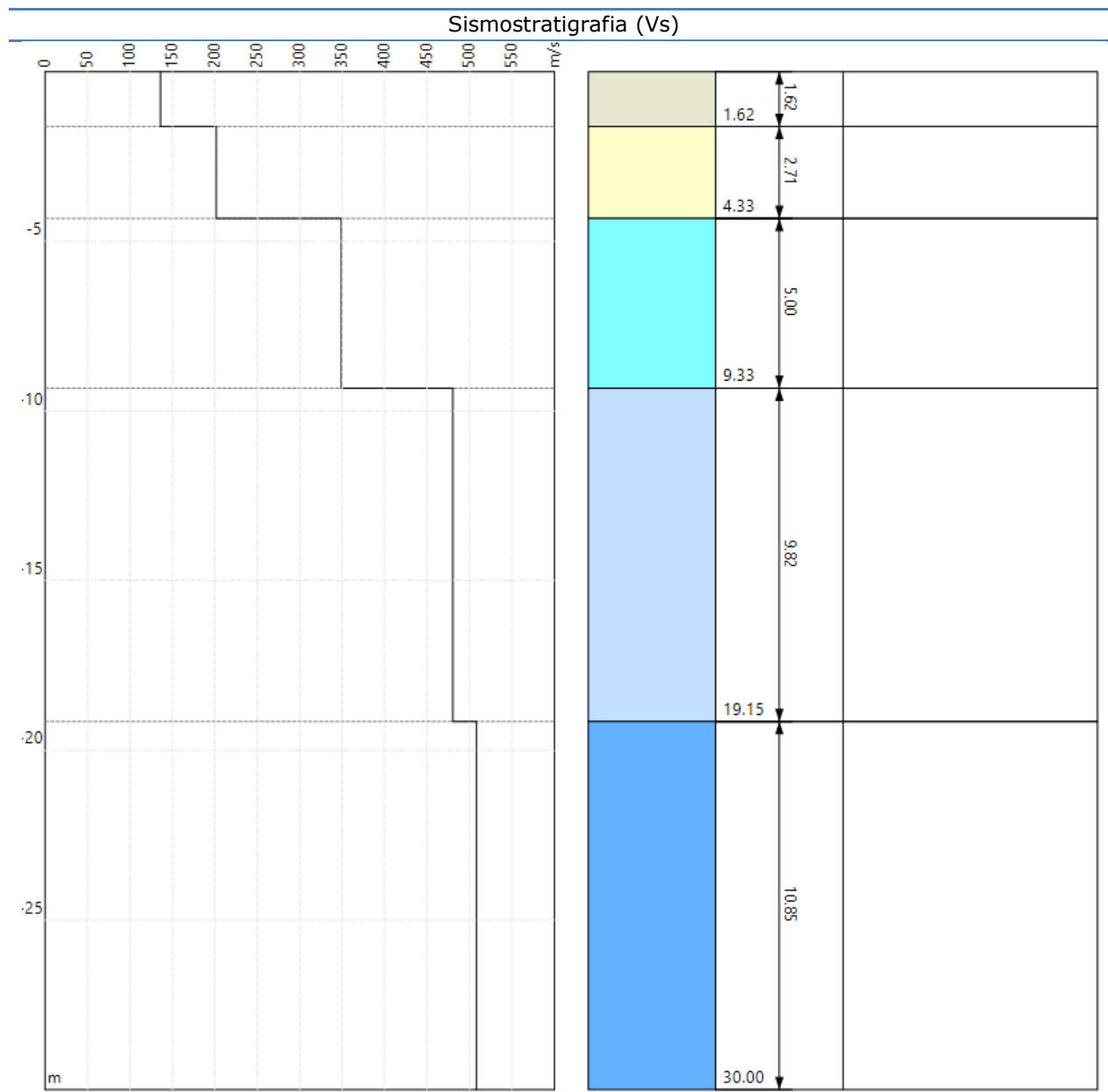


Modello sismostratigrafico:

N° di strati: 5

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio [m/s]
1	1.62	1.62	135.8
2	4.33	2.71	201.8
3	9.33	5.00	349.1
4	19.15	9.82	480.5
5	∞	∞	508.2

Valore V_{s30} : 368.3 m/s




INDAGINE MASW5

Località SP13 - Sant'Imento		Comune Calendasco (PC)		
Cantiere MS comune di Calendasco	Data 09/06/2022	Ora 14.00		
Codice lavoro 22_003_CSTG	Committente Dott. Geol. Stefano Castagnetti			
Codice Prova MASW5	File Calendasco 5b_STK_SEG2.dat			
Operatore: Dott. Geol. Alessandro Ferrari				

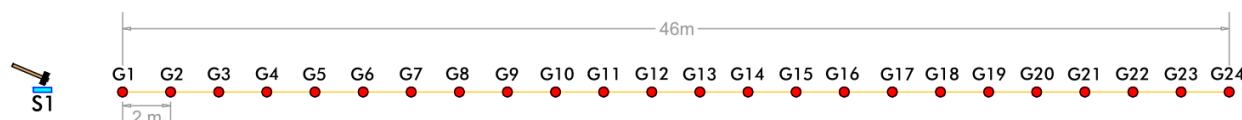
STRUMENTAZIONE

Marca: Sara Electronic Instruments	Modello: Sismografo digitale DoReMi
Marca Geofoni: Geo Space	Orientamento: <input type="checkbox"/> H <input checked="" type="checkbox"/> V Frequenza (Hz): 4.5

SPECIFICHE INDAGINE

	Tipo: MASW	Onde: <input checked="" type="checkbox"/> P <input type="checkbox"/> SH
	N°canali: 24	Lunghezza stendimento (m): 46+5
	Offset minimo (m): 5	N° shot: 5
	Durata registrazioni (sec): 1.0	
	Frequenza di campionamento (Hz): 2000	
	Tipologia energizzazione:	
	<input type="checkbox"/> Fucile sismico	Modello:
	<input checked="" type="checkbox"/> Mazza	Kg: 5
	<input type="checkbox"/> Grave	Kg:
	<input type="checkbox"/> Mazza su trave	Kg:
Stacking: usate 5 acquisizioni su 5: <input checked="" type="checkbox"/> Calendasco 5b _0105.drm <input checked="" type="checkbox"/> Calendasco 5b _0205.drm <input checked="" type="checkbox"/> Calendasco 5b _0305.drm <input checked="" type="checkbox"/> Calendasco 5b _0405.drm <input checked="" type="checkbox"/> Calendasco 5b _0505.drm		

Geometrie stendimento:



TERRENO INDAGATO

Superficie:	<input checked="" type="checkbox"/> vegetale	<input type="checkbox"/> riporto	<input type="checkbox"/> roccia	<input type="checkbox"/> pavimentazione:
Condizioni terreno:	<input checked="" type="checkbox"/> asciutto	<input type="checkbox"/> bagnato	<input type="checkbox"/> saturo	

OSSERVAZIONI: traffico moderato a circa 15 m

Tracce

Numero tracce: 24

Durata acquisizione: 1.0 s

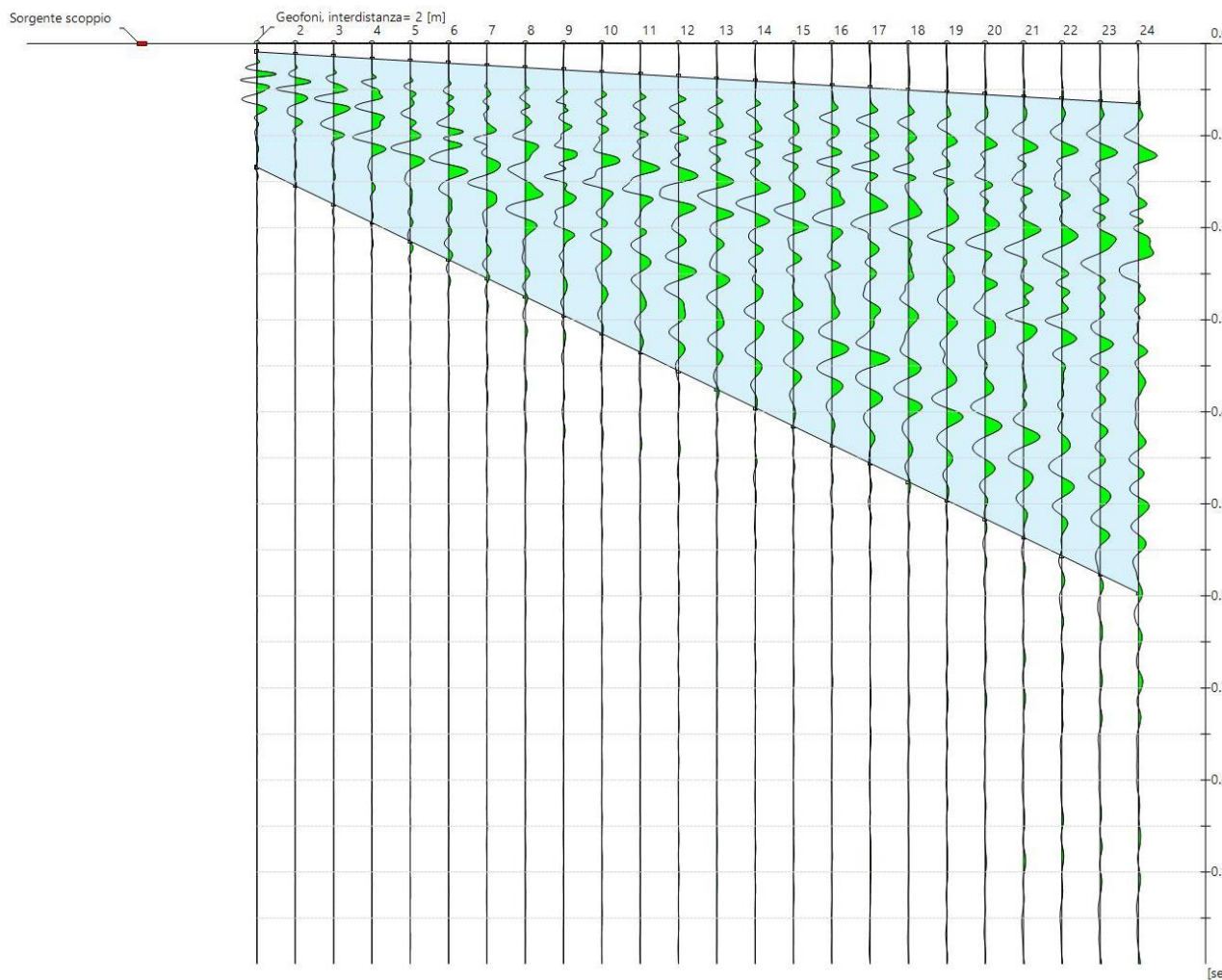
Periodo di campionamento: 0.5 ms

Interdistanza geofoni: 2 m

Distanza sorgente - primo geofono: 5 m

Selezione temporale: selezione manuale

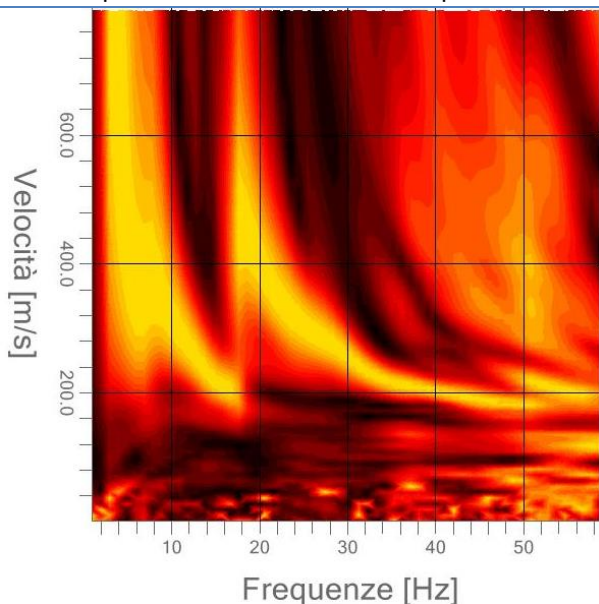
Sismogramma



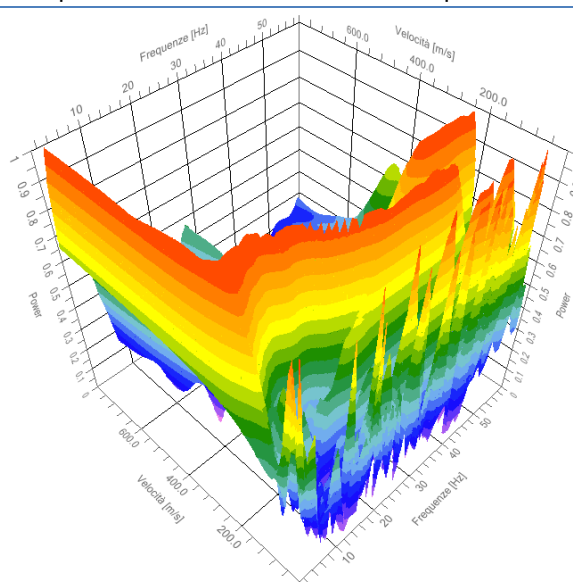
Analisi spettrale

Numero tracce utilizzate: 24
 Frequenza minima di elaborazione: 1 Hz
 Frequenza massima di elaborazione: 60 Hz
 Velocità minima di elaborazione: 1 m/s
 Velocità massima di elaborazione: 800 m/s

Spettro Velocità di fase - Frequenze



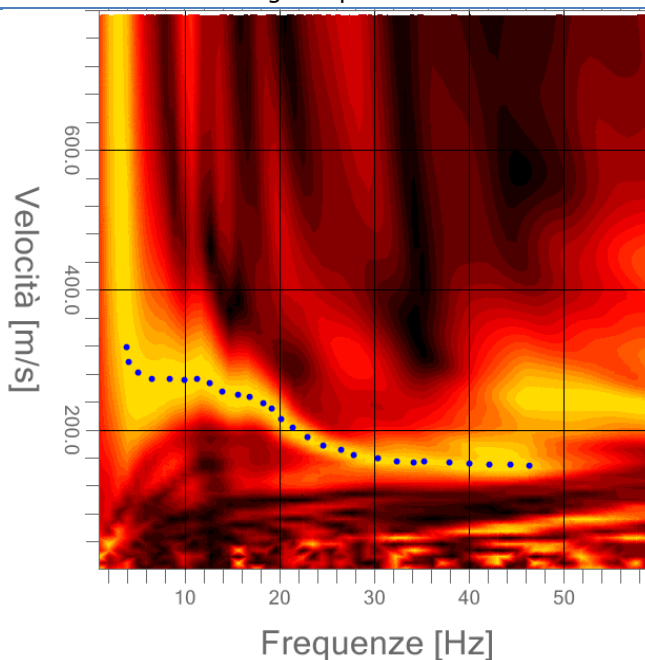
Spettro 3D Velocità di fase - Frequenze



Curva di dispersione

N° punti di picking: 28

Picking su spettro F-V



Modi vibrazionali identificati

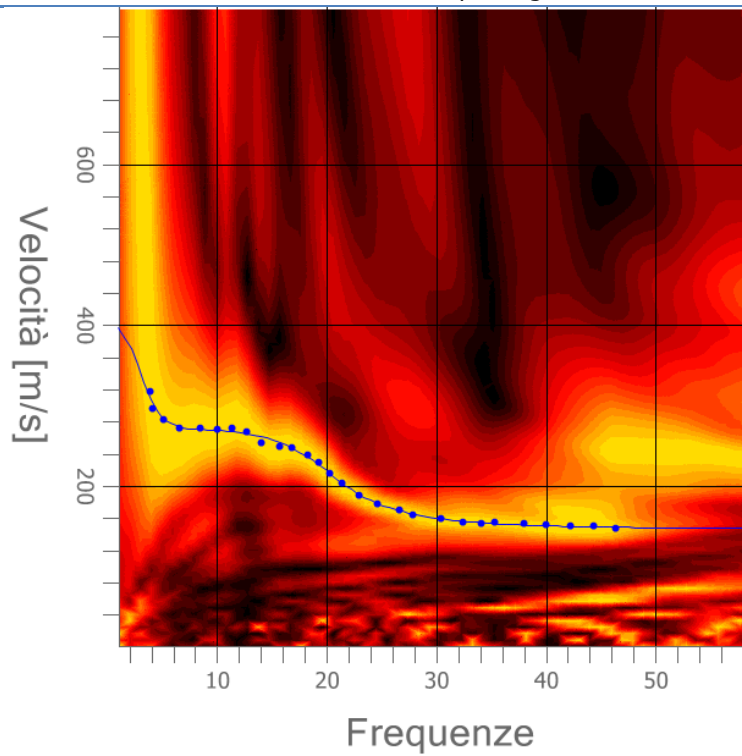
- | | | | | |
|---|--|--|--|--|
| <input checked="" type="checkbox"/> Modo fondamentale | <input type="checkbox"/> 1° modo superiore | <input type="checkbox"/> 2° modo superiore | <input type="checkbox"/> 3° modo superiore | <input type="checkbox"/> 4° modo superiore |
|---|--|--|--|--|

Inversione:

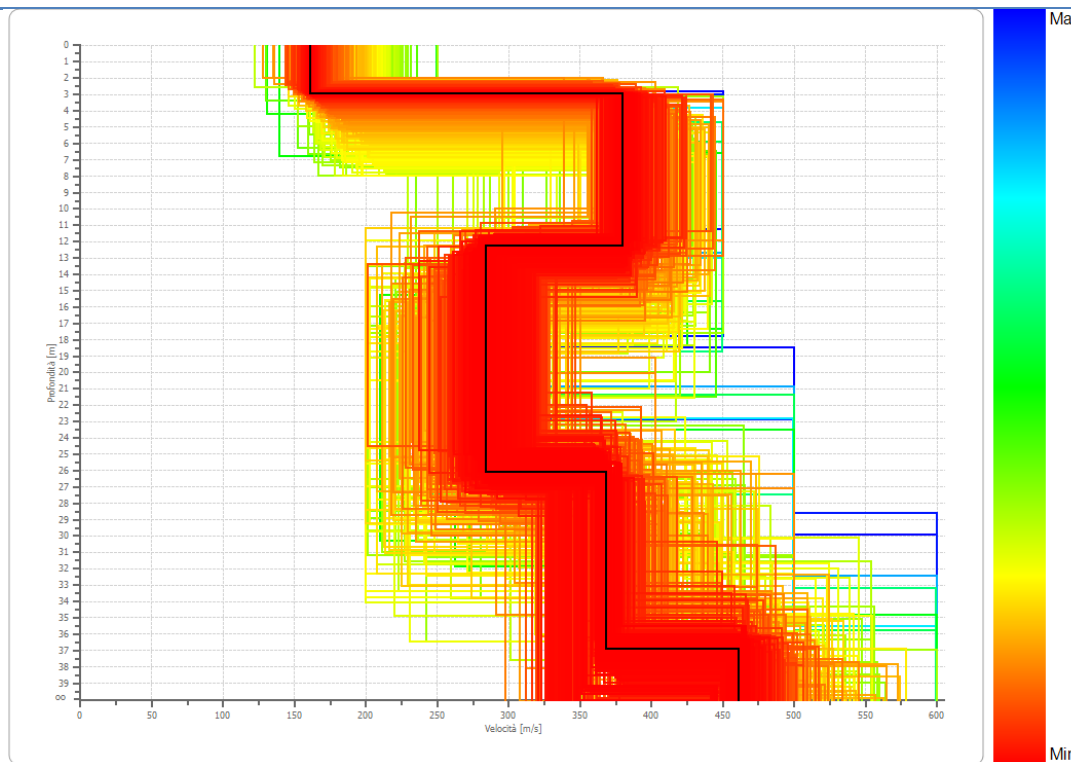
Fattore di disadattamento della soluzione (misfit): 0.012

Percentuale di errore: 0.019%

Modello sintetico su picking



Profili di Vs considerati

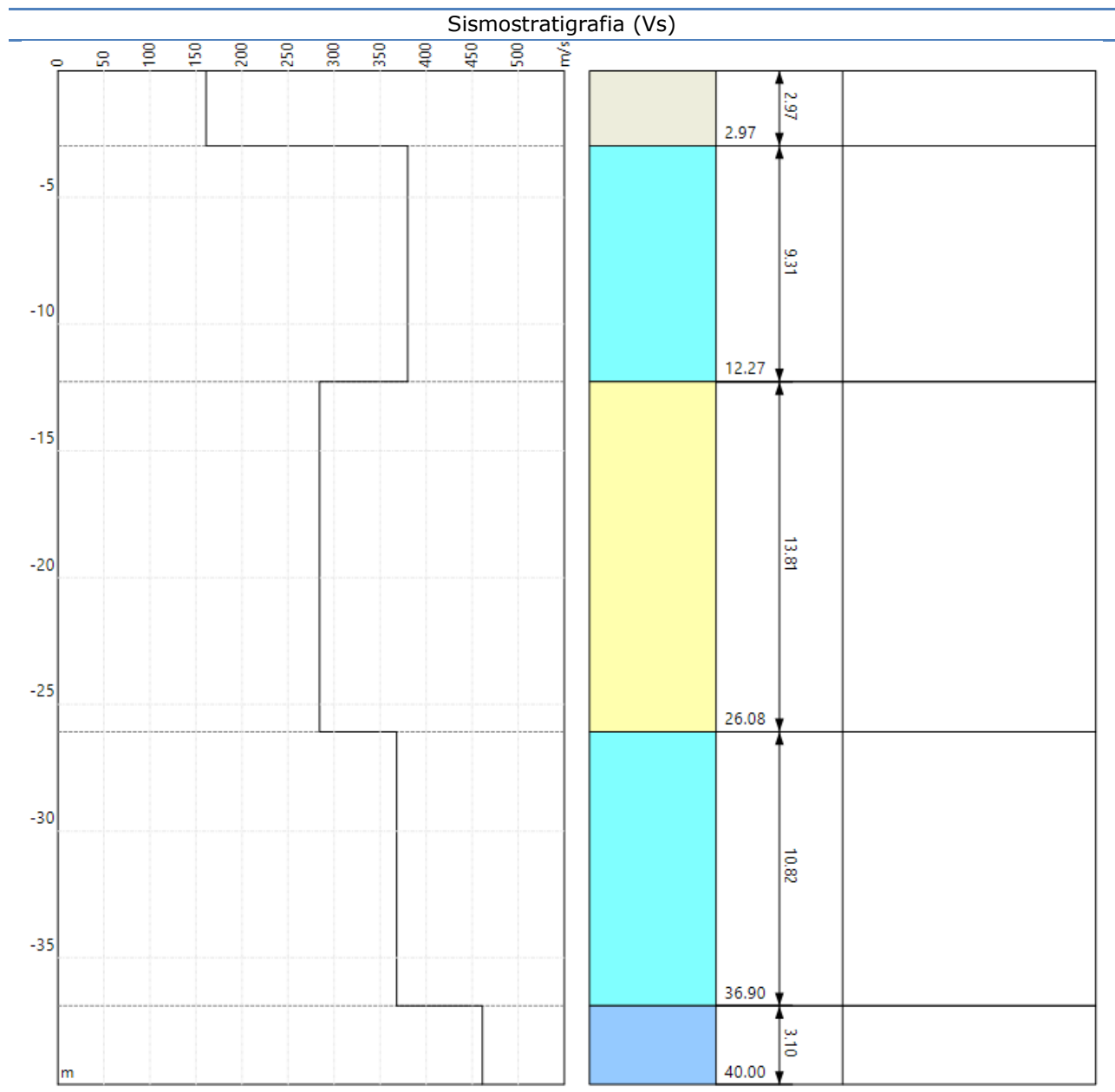


Modello sismostratigrafico:

N° di strati: 5

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio [m/s]
1	2.97	2.97	161.0
2	12.27	9.31	380.0
3	26.08	13.81	284.2
4	36.90	10.82	368.1
5	∞	∞	461.1

Valore V_{s30} : 293.7 m/s




INDAGINE MASW6

Località Centro sportivo Calendasco		Comune Calendasco (PC)		
Cantiere MS comune di Calendasco	Data 09/06/2022	Ora 15.15		
Codice lavoro 22_003_CSTG	Committente Dott. Geol. Stefano Castagnetti			
Codice Prova MASW6	File Calendasco 6b_STK_SEG2.dat			
Operatore: Dott. Geol. Alessandro Ferrari				

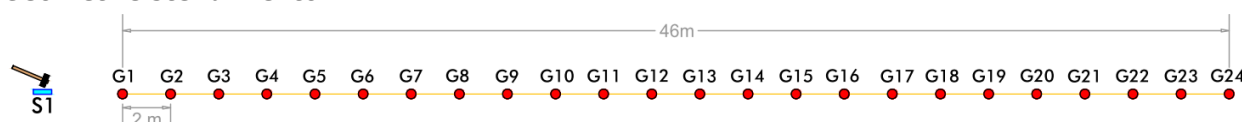
STRUMENTAZIONE

Marca: Sara Electronic Instruments	Modello: Sismografo digitale DoReMi
Marca Geofoni: Geo Space	Orientamento: <input type="checkbox"/> H <input checked="" type="checkbox"/> V Frequenza (Hz): 4.5

SPECIFICHE INDAGINE

	Tipo: MASW	Onde: <input checked="" type="checkbox"/> P <input type="checkbox"/> SH
	N°canali: 24	Lunghezza stendimento (m): 46+5
	Offset minimo (m): 5	N° shot: 5
	Durata registrazioni (sec): 1.0	
	Frequenza di campionamento (Hz): 2000	
	Tipologia energizzazione:	
	<input type="checkbox"/> Fucile sismico	Modello:
	<input checked="" type="checkbox"/> Mazza	Kg: 5
	<input type="checkbox"/> Grave	Kg:
	<input type="checkbox"/> Mazza su trave	Kg:
Stacking: usate 4 acquisizioni su 5: <input checked="" type="checkbox"/> Calendasco 6b _0105.drm <input type="checkbox"/> Calendasco 6b _0205.drm <input checked="" type="checkbox"/> Calendasco 6b _0305.drm <input checked="" type="checkbox"/> Calendasco 6b _0405.drm <input checked="" type="checkbox"/> Calendasco 6b _0505.drm		

Geometrie stendimento:



TERRENO INDAGATO

Superficie:	<input checked="" type="checkbox"/> vegetale	<input type="checkbox"/> riporto	<input type="checkbox"/> roccia	<input type="checkbox"/> pavimentazione:
Condizioni terreno:	<input checked="" type="checkbox"/> asciutto	<input type="checkbox"/> bagnato	<input type="checkbox"/> saturo	

OSSERVAZIONI:

Tracce

Numero tracce: 24

Durata acquisizione: 1.0 s

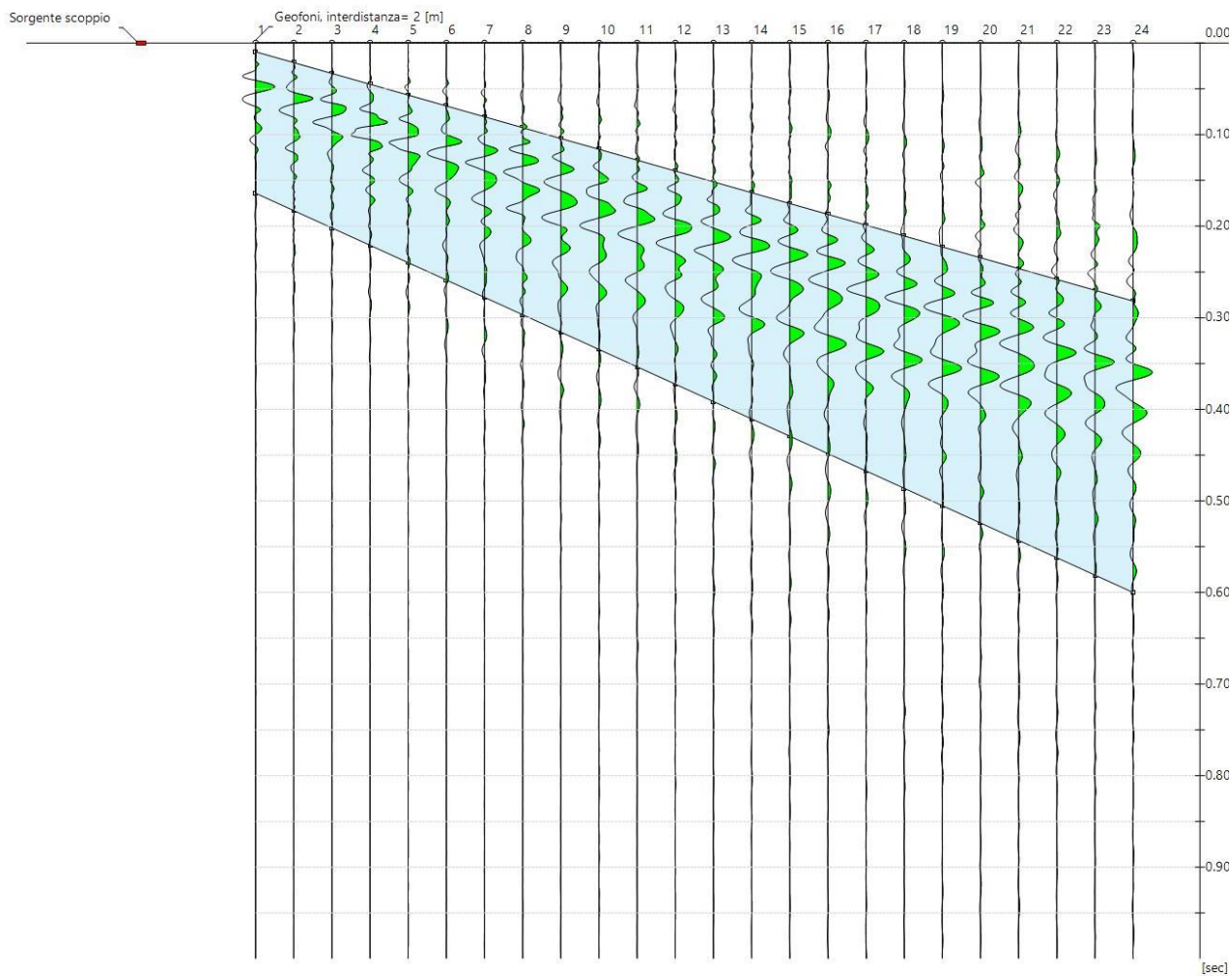
Periodo di campionamento: 0.5 ms

Interdistanza geofoni: 2 m

Distanza sorgente - primo geofono: 5 m

Selezione temporale: selezione manuale

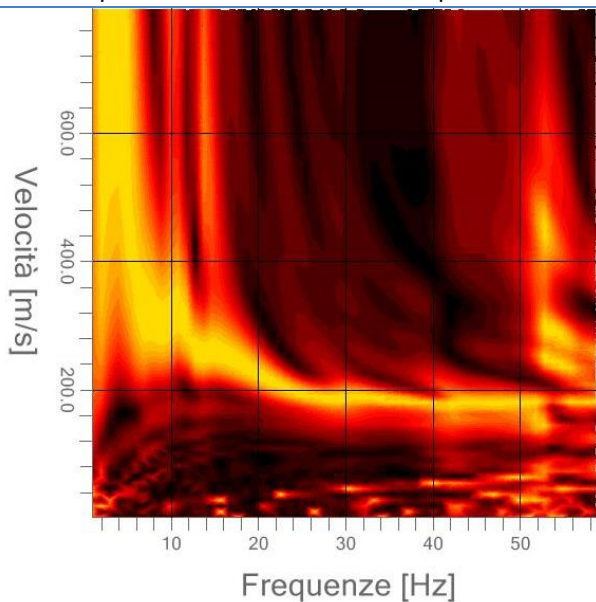
Sismogramma



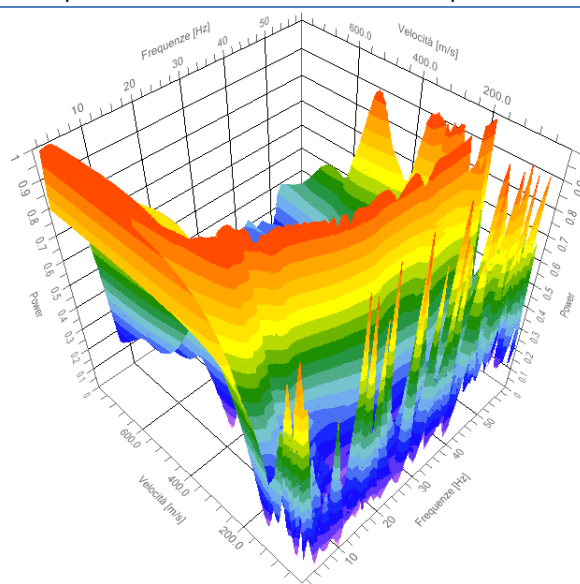
Analisi spettrale

Numero tracce utilizzate: 24
Frequenza minima di elaborazione: 1 Hz
Frequenza massima di elaborazione: 60 Hz
Velocità minima di elaborazione: 1 m/s
Velocità massima di elaborazione: 800 m/s

Spettro Velocità di fase - Frequenze



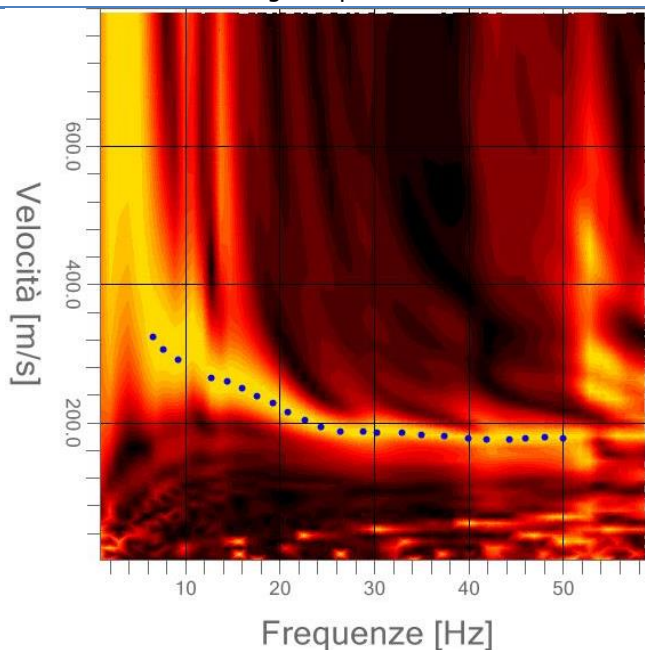
Spettro 3D Velocità di fase - Frequenze



Curva di dispersione

N° punti di picking: 23

Picking su spettro F-V



Modi vibrazionali identificati

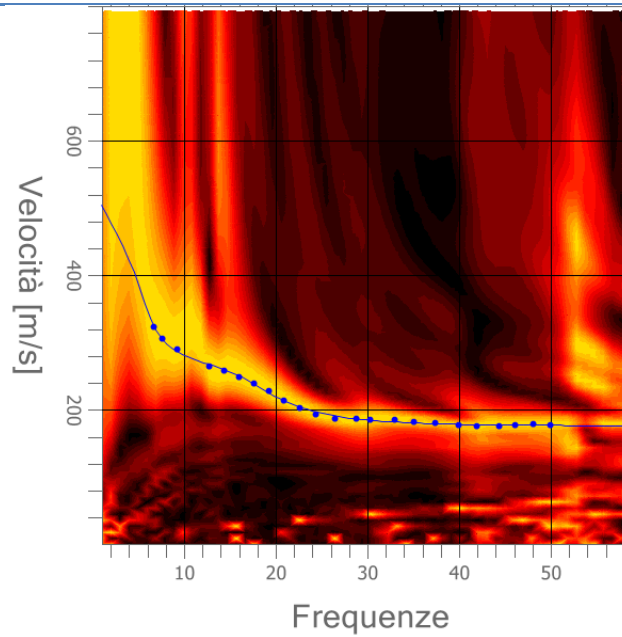
- | | | | | |
|---|--|--|--|--|
| <input checked="" type="checkbox"/> Modo fondamentale | <input type="checkbox"/> 1° modo superiore | <input type="checkbox"/> 2° modo superiore | <input type="checkbox"/> 3° modo superiore | <input type="checkbox"/> 4° modo superiore |
|---|--|--|--|--|

Inversione:

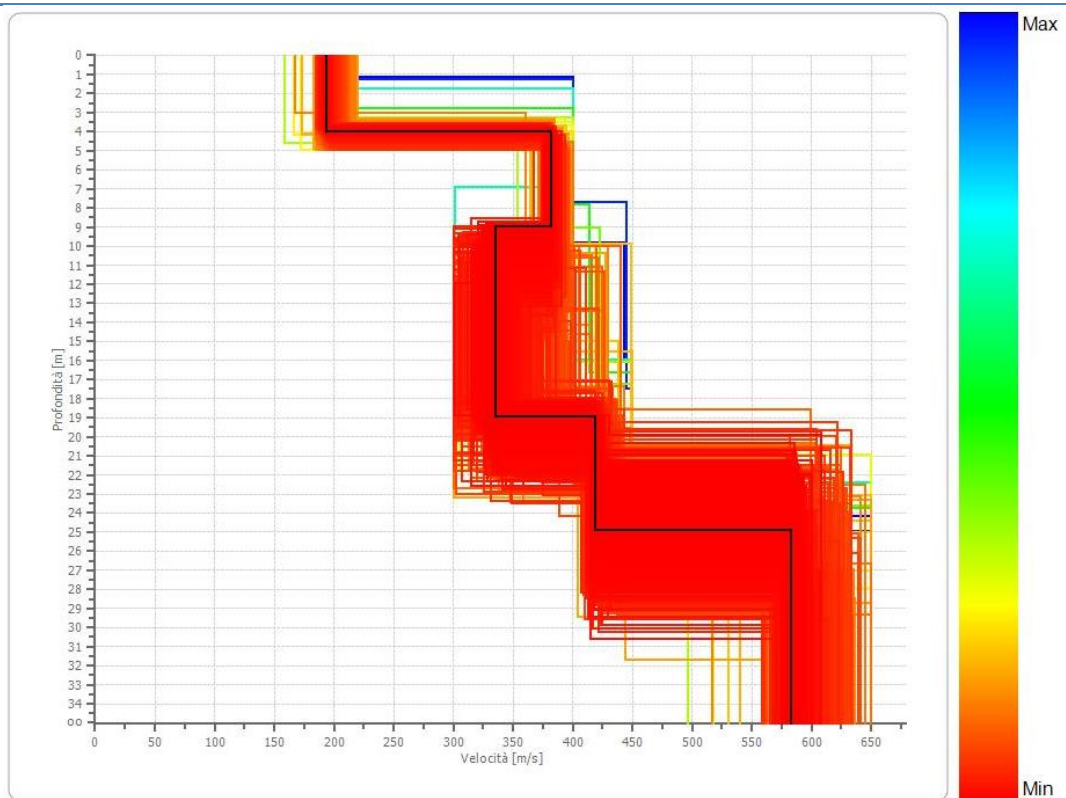
Fattore di disadattamento della soluzione (misfit): 0.010

Percentuale di errore: 0.009%

Modello sintetico su picking



Profili di Vs considerati

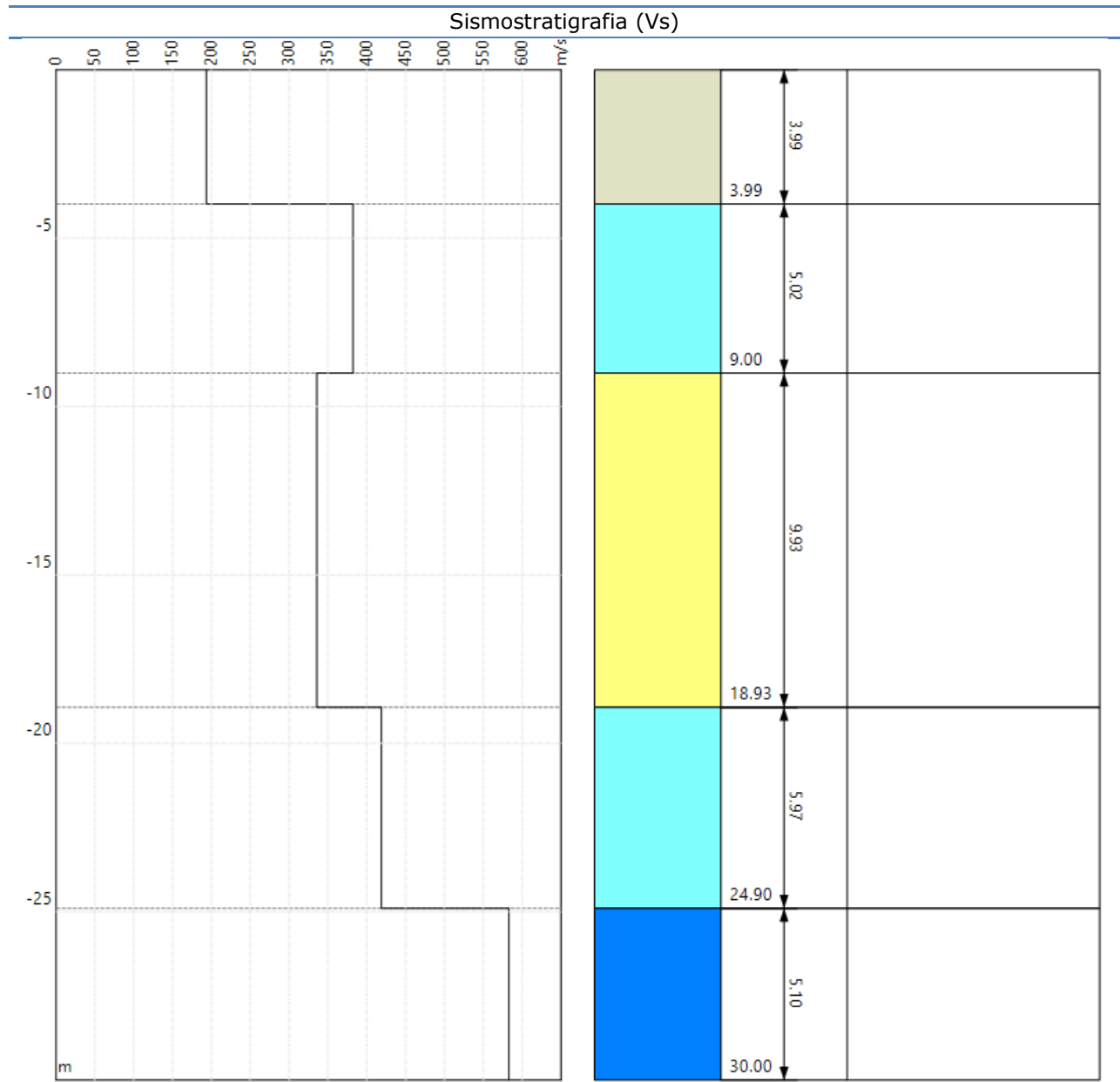


Modello sismostratigrafico:

N° di strati: 5

Strato	Profondità [m]	Spessore [m]	Velocità onde di taglio [m/s]
1	3.99	3.99	193.6
2	9.00	5.02	382.3
3	18.93	9.93	335.8
4	24.90	5.97	419.0
5	∞	∞	582.8

Valore V_{s30} : 347.7 m/s



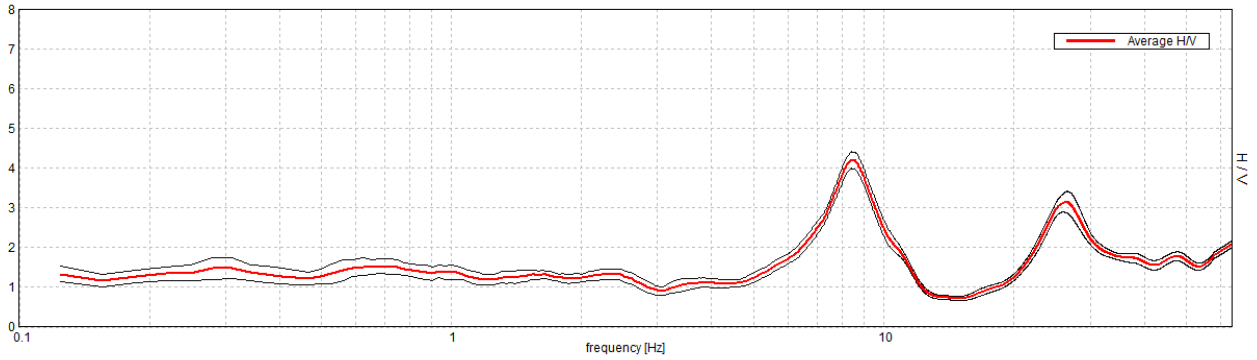
CALENDASCO MS2, HVSr1

Instrument: TRZ-0189/01-12
 Data format: 16 byte
 Start recording: 09/06/22 09:53:22
 Channel labels: NORTH SOUTH; EAST WEST; UP DOWN
 Trace length: 0h16'00". Analyzed 77% trace (manual window selection)
 Sampling rate: 128 Hz
 Smoothing type: Triangular window

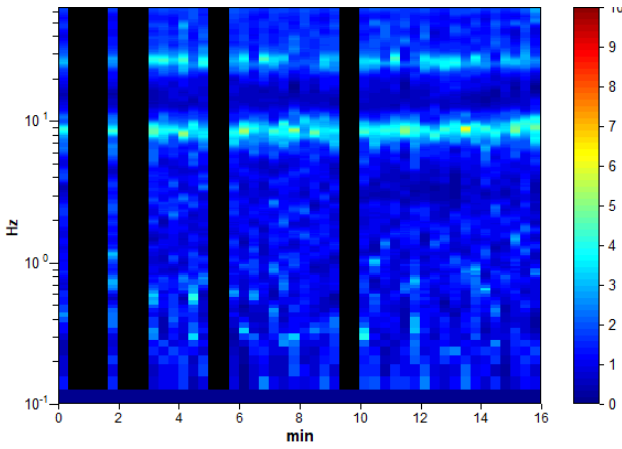
Full scale [mV]: 51
 End recording: 09/06/22 10:09:22
 Window size: 20 s
 Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

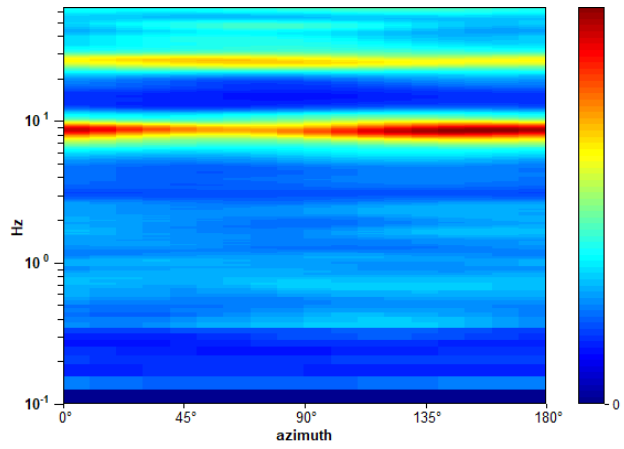
Max. H/V at 8.44 ± 0.06 Hz. (In the range 0.0 - 64.0 Hz).



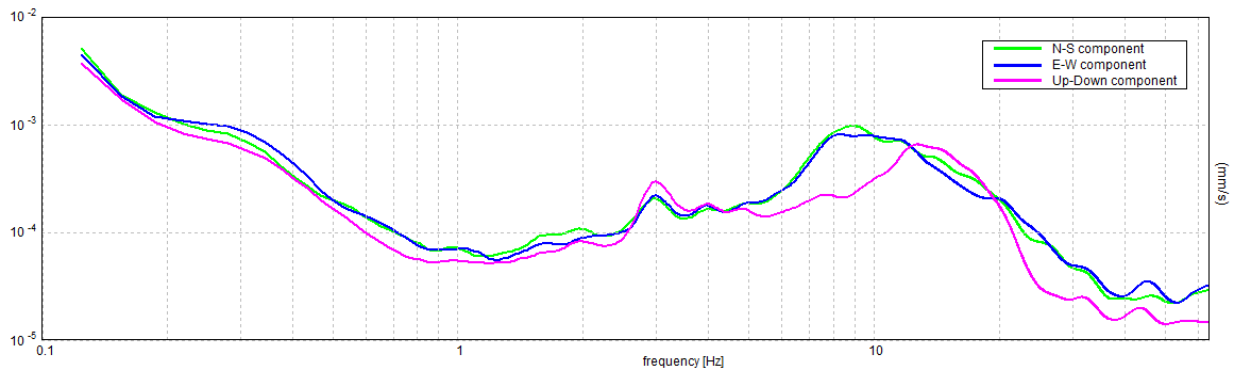
H/V TIME HISTORY



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 8.44 ± 0.06 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$8.44 > 0.50$	OK	
$n_c(f_0) > 200$	$6243.8 > 200$	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 406 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	6.563 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	10.531 Hz	OK	
$A_0 > 2$	$4.20 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.00678 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	$0.05721 < 0.42188$	OK	
$\sigma_A(f_0) < \theta(f_0)$	$0.2106 < 1.58$	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
σ_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 σ_f and $\sigma_A(f_0)$

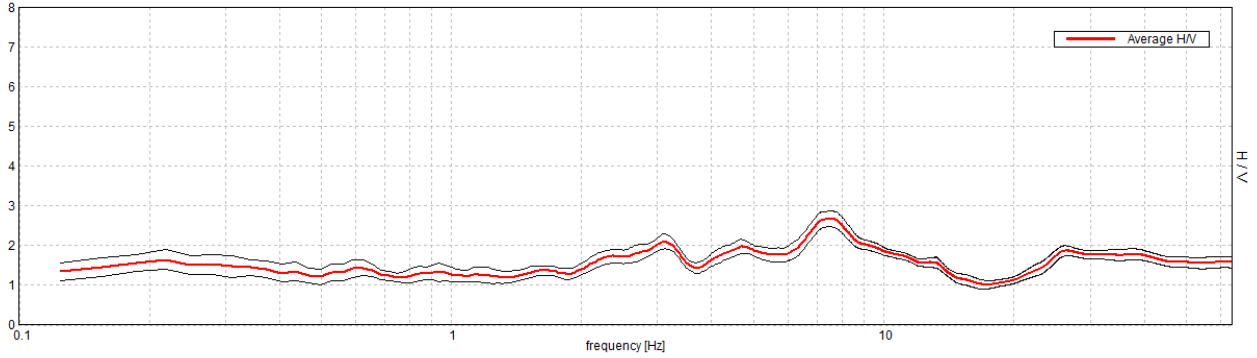
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 10

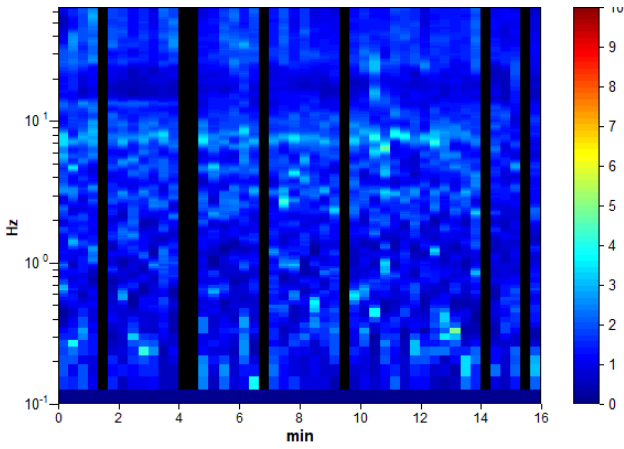
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 10:42:17 End recording: 10/06/22 10:58:18
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 85% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

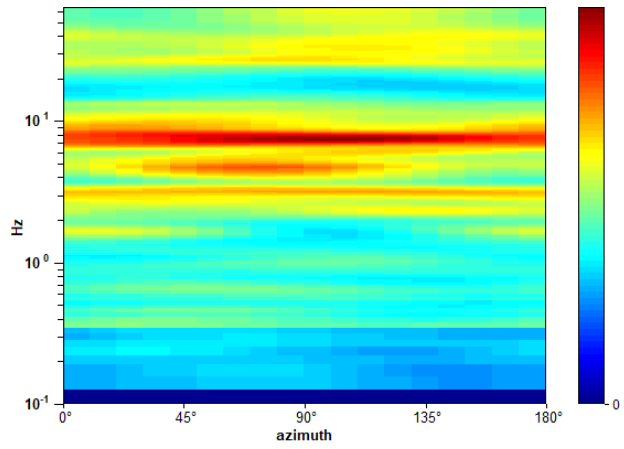
Max. H/V at 7.5 ± 0.27 Hz. (In the range 0.0 - 64.0 Hz).



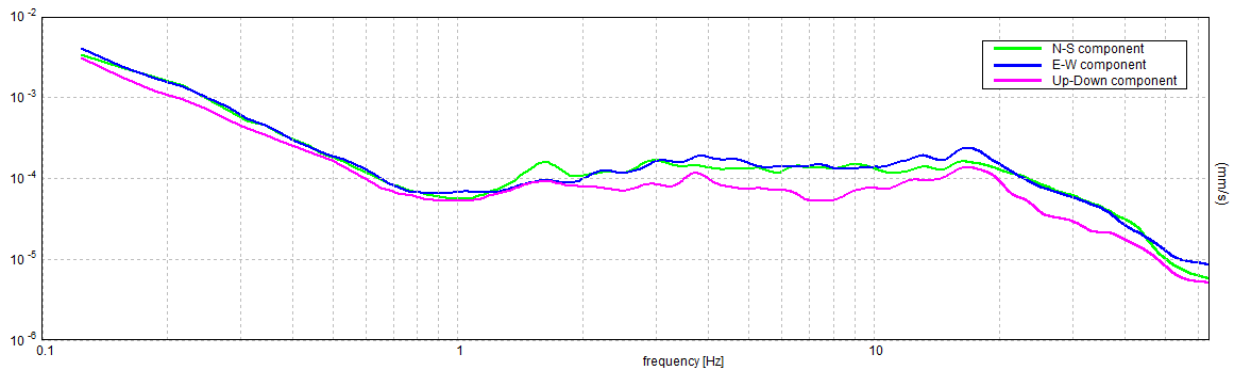
H/V TIME HISTORY



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 7.5 ± 0.27 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	7.50 > 0.50	OK	
$n_c(f_0) > 200$	6150.0 > 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 361 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	1.938 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	14.031 Hz	OK	
$A_0 > 2$	2.68 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.03552 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	0.26642 < 0.375	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1993 < 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
σ_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 σ_f and $\sigma_A(f_0)$

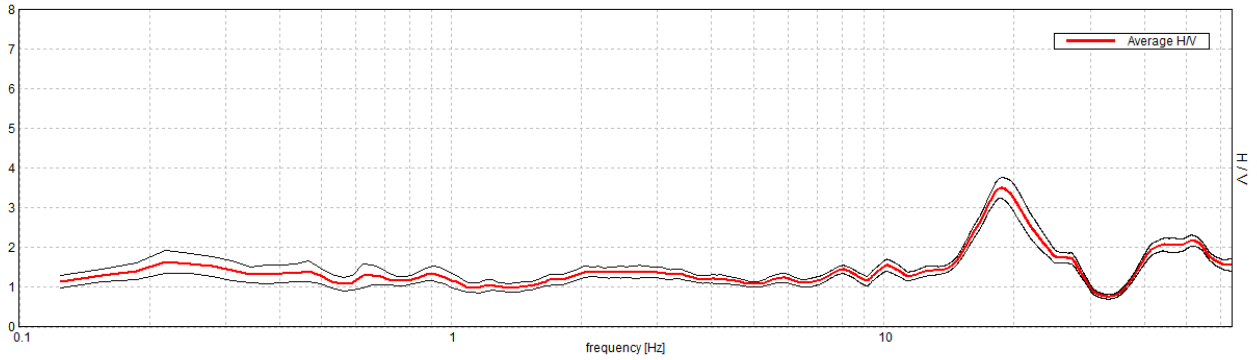
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 11

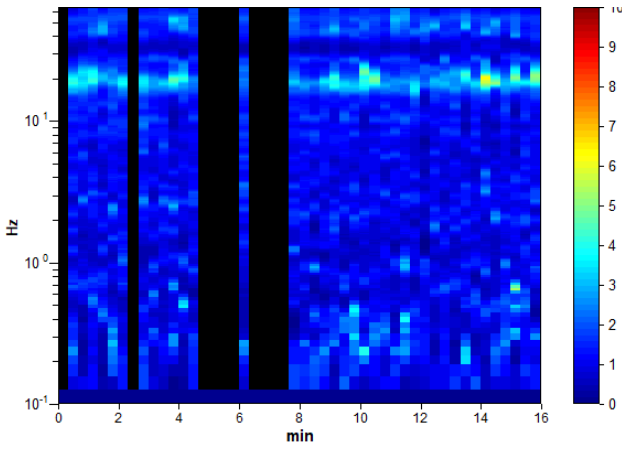
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 11:13:51 End recording: 10/06/22 11:29:51
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 79% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

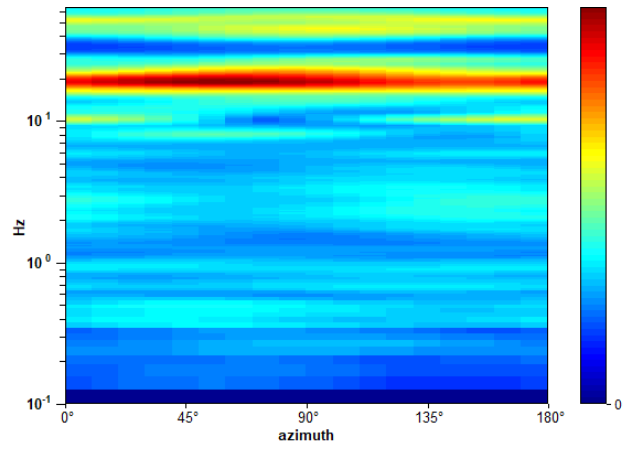
Max. H/V at 18.72 ± 0.2 Hz. (In the range 0.0 - 64.0 Hz).



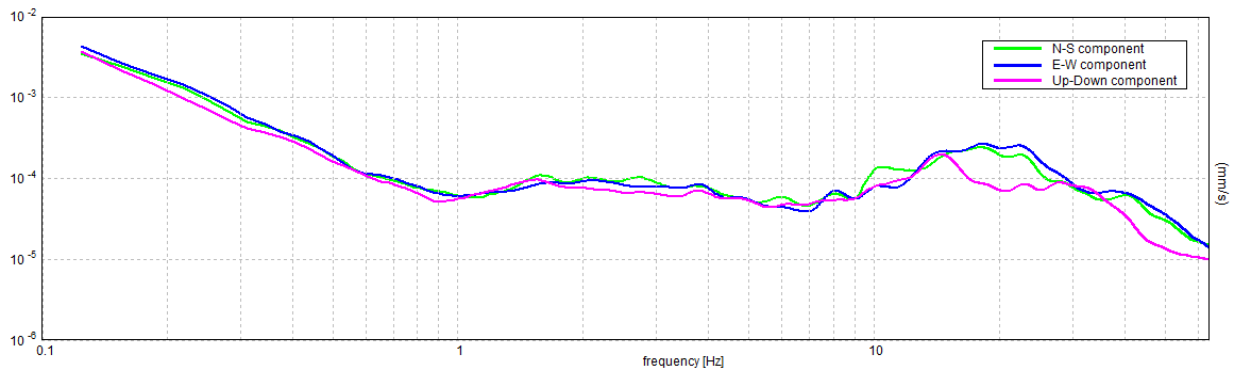
H/V TIME HISTORY



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 18.72 ± 0.2 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	18.72 > 0.50	OK	
$n_c(f_0) > 200$	14226.3 > 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 900 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	14.906 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	25.969 Hz	OK	
$A_0 > 2$	3.49 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.01064 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	0.19913 < 0.93594	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.2634 < 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
σ_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 σ_f and $\sigma_A(f_0)$

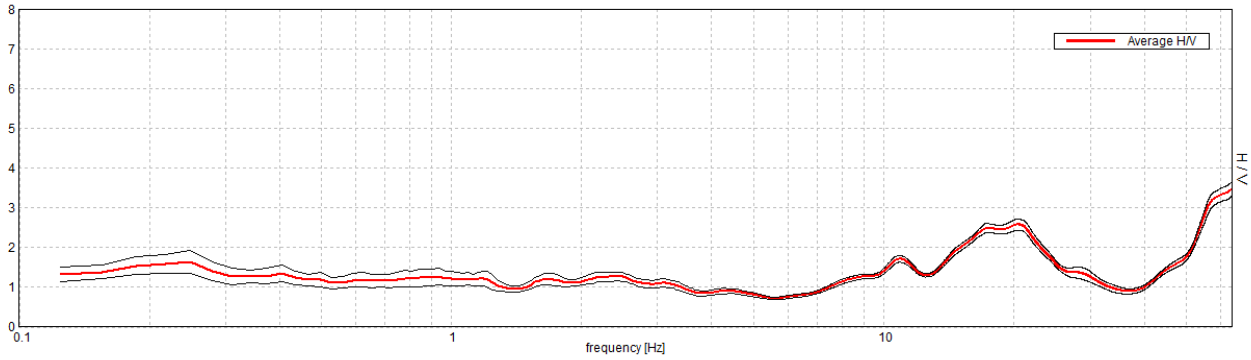
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 12

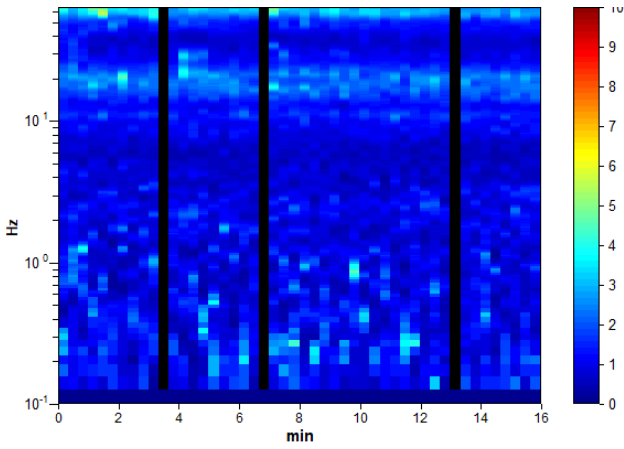
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 11:43:20 End recording: 10/06/22 11:59:20
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 94% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

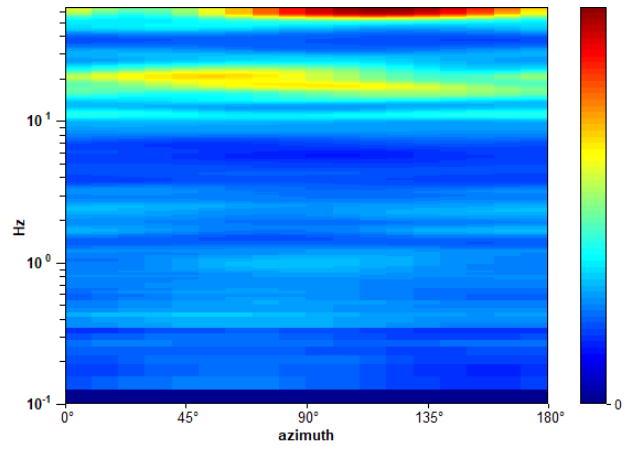
Max. H/V at 63.66 ± 0.06 Hz. (In the range 0.0 - 64.0 Hz).



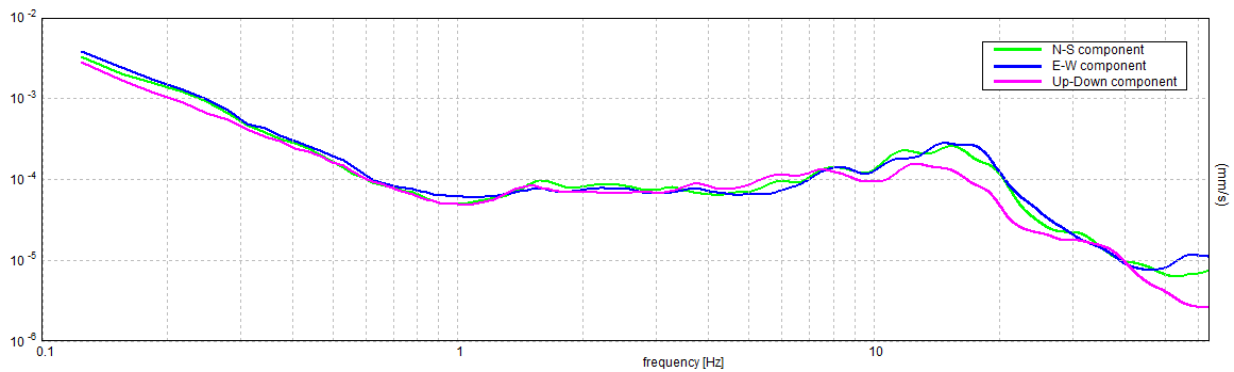
H/V TIME HISTORY



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 63.66 ± 0.06 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	63.66 > 0.50	OK	
$n_c(f_0) > 200$	57290.6 > 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 1030 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	49.719 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	3.46 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.0009 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	0.05743 < 3.18281	OK	
$\sigma_A(f_0) < \theta(f_0)$	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
σ_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 σ_f and $\sigma_A(f_0)$

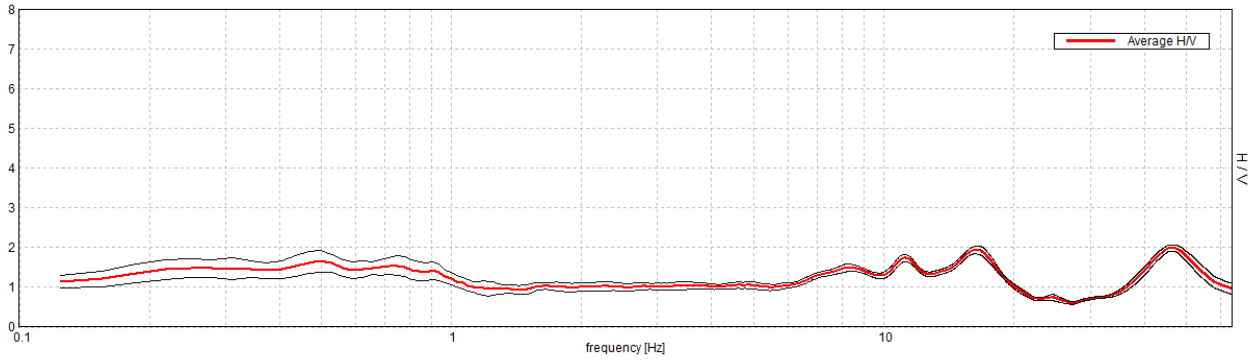
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 13

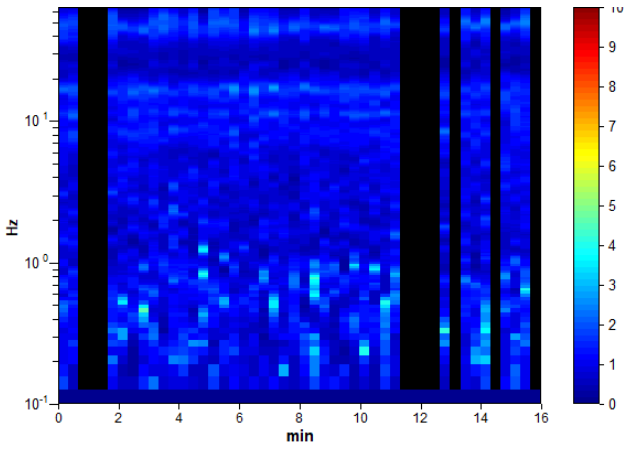
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 12:57:36 End recording: 10/06/22 13:13:36
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 79% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

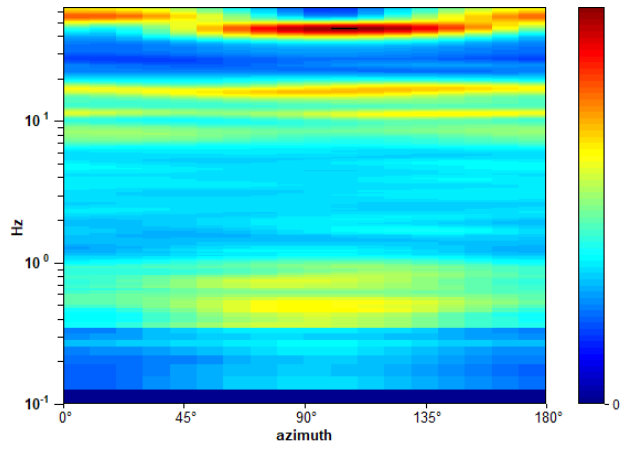
Max. H/V at 45.94 ± 27.35 Hz. (In the range 0.0 - 64.0 Hz).



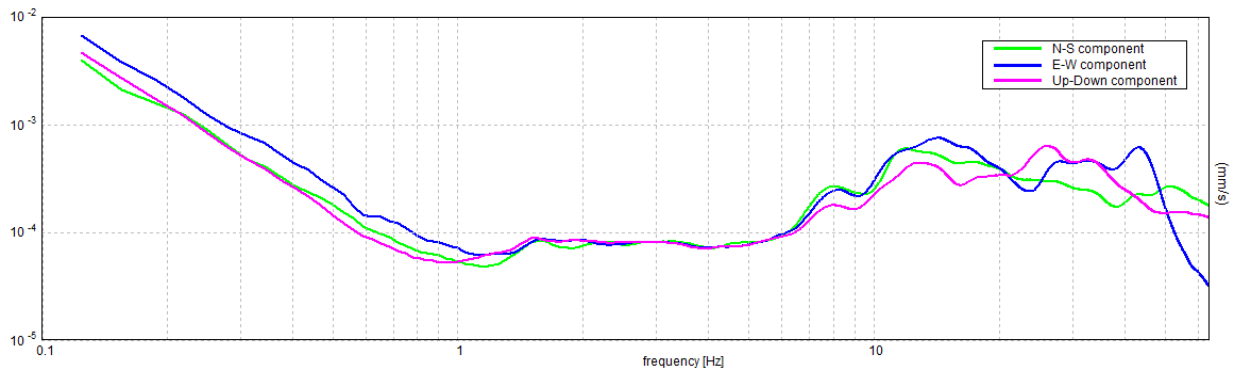
H/V TIME HISTORY



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 45.94 ± 27.35 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	45.94 > 0.50	OK	
$n_c(f_0) > 200$	34912.5 > 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 1314 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	36.406 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	62.469 Hz	OK	
$A_0 > 2$	1.99 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.59534 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	27.34836 < 2.29688		NO
$\sigma_A(f_0) < \theta(f_0)$	0.0816 < 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
σ_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 σ_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

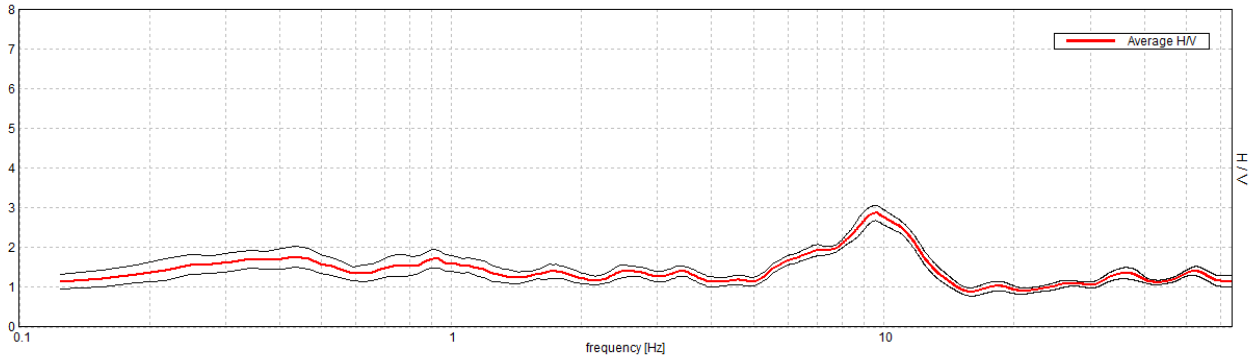
CALENDASCO MS2, HVSr 14

Instrument: TRZ-0189/01-12
 Data format: 16 byte
 Start recording: 10/06/22 14:22:08
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 73% trace (manual window selection)
 Sampling rate: 128 Hz
 Smoothing type: Triangular window

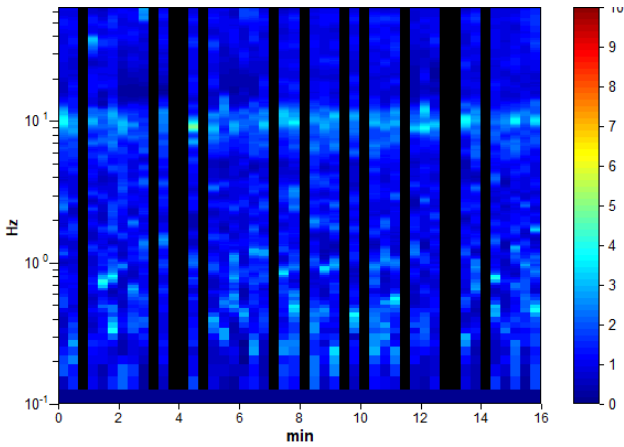
Full scale [mV]: 51
 End recording: 10/06/22 14:38:08
 Window size: 20 s
 Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

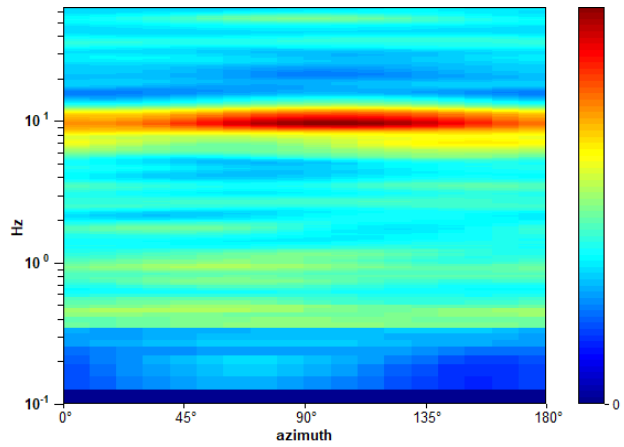
Max. H/V at 9.59 ± 0.22 Hz. (In the range 0.0 - 64.0 Hz).



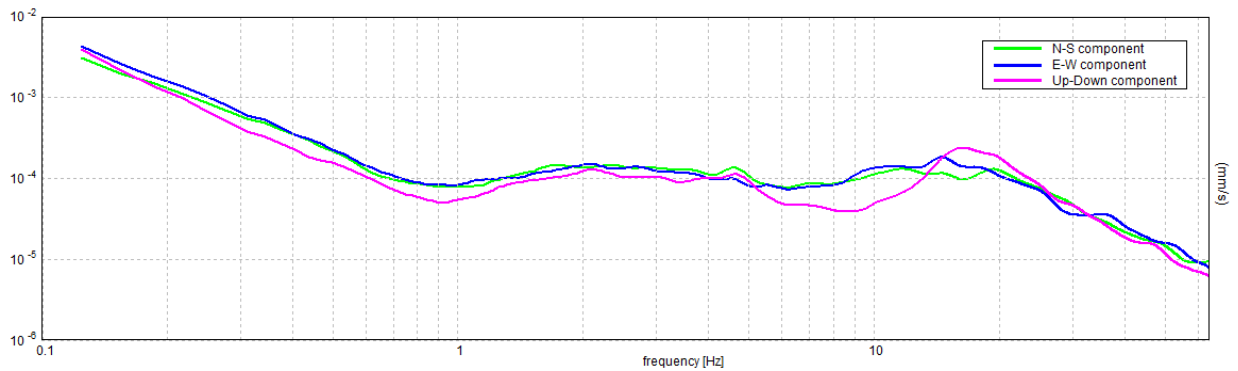
H/V TIME HISTORY



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 9.59 ± 0.22 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	9.59 > 0.50	OK	
$n_c(f_0) > 200$	6715.6 > 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 462 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	5.469 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	13.156 Hz	OK	
$A_0 > 2$	2.87 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.0225 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	0.21586 < 0.47969	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.195 < 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
σ_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 σ_f and $\sigma_A(f_0)$

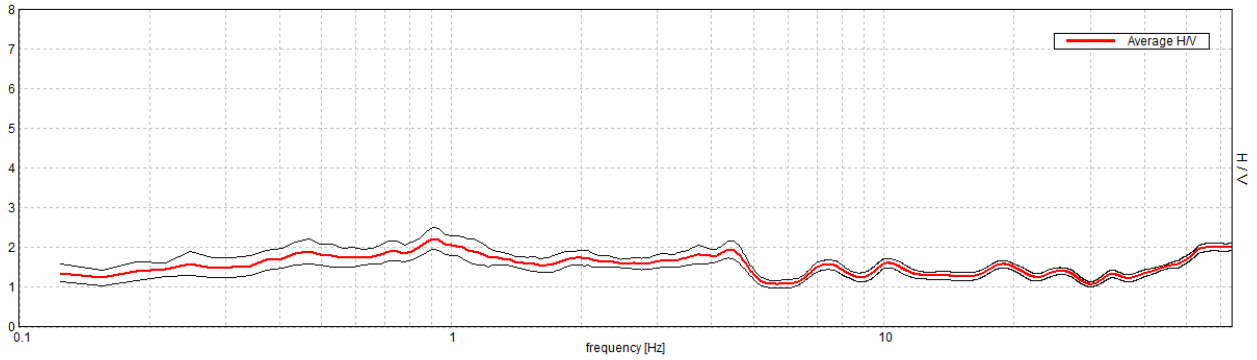
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 15

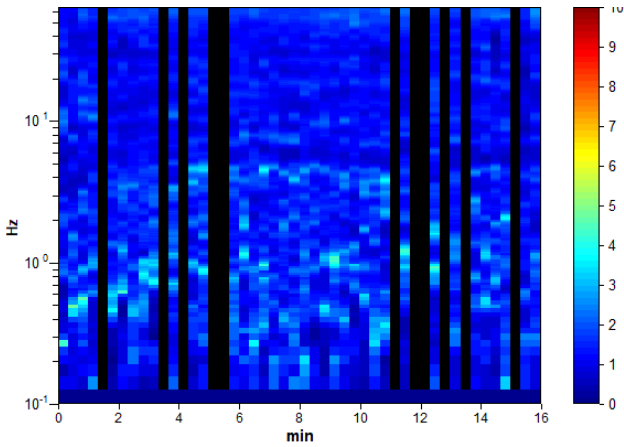
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 14:53:31 End recording: 10/06/22 15:09:31
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 77% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

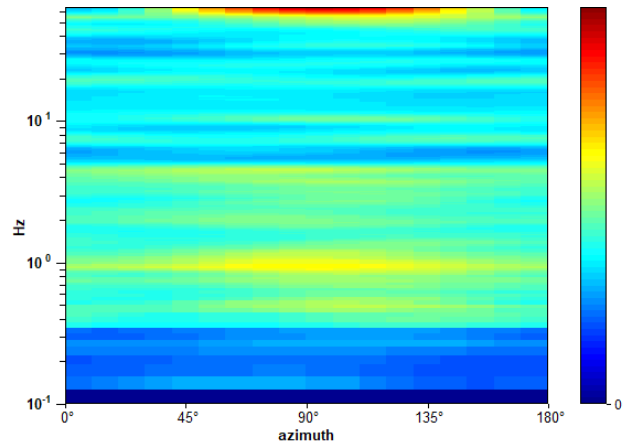
Max. H/V at 0.91 ± 0.21 Hz. (In the range 0.0 - 64.0 Hz).



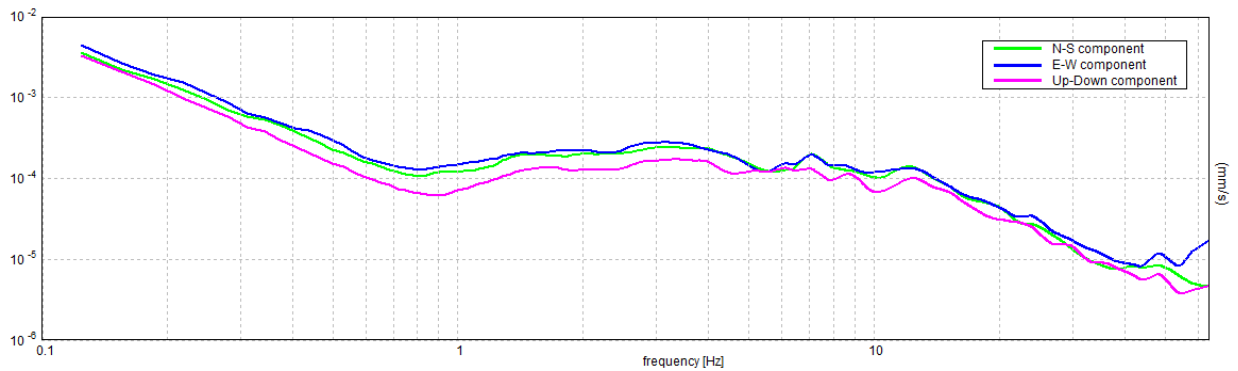
H/V TIME HISTORY



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 0.91 ± 0.21 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$0.91 > 0.50$	OK	
$n_c(f_0) > 200$	$670.6 > 200$	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 44 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
$A_0 > 2$	$2.22 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.23552 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.21344 < 0.13594$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2722 < 2.0$	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
σ_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 σ_f and $\sigma_A(f_0)$

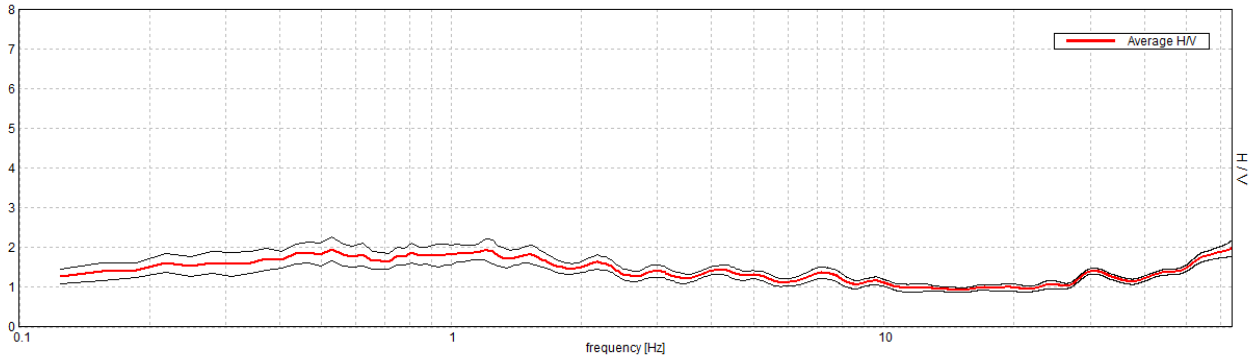
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 16

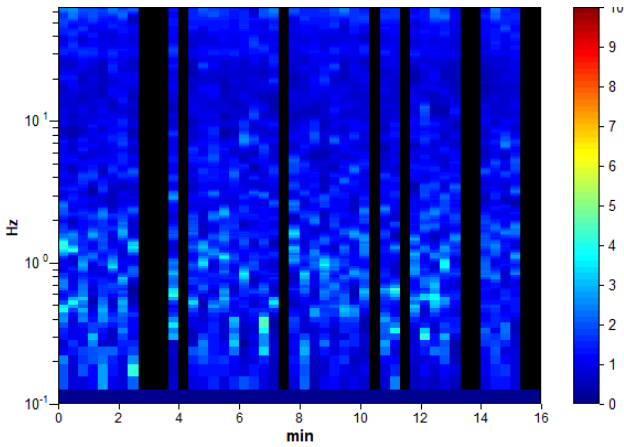
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 15:40:33 End recording: 10/06/22 15:56:33
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 77% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

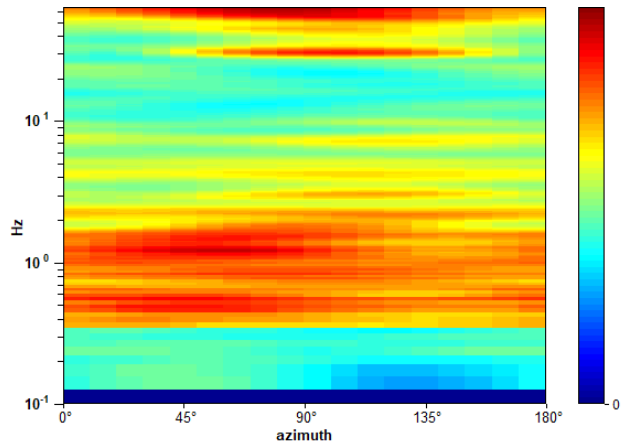
Max. H/V at 63.97 ± 38.72 Hz. (In the range 0.0 - 64.0 Hz).



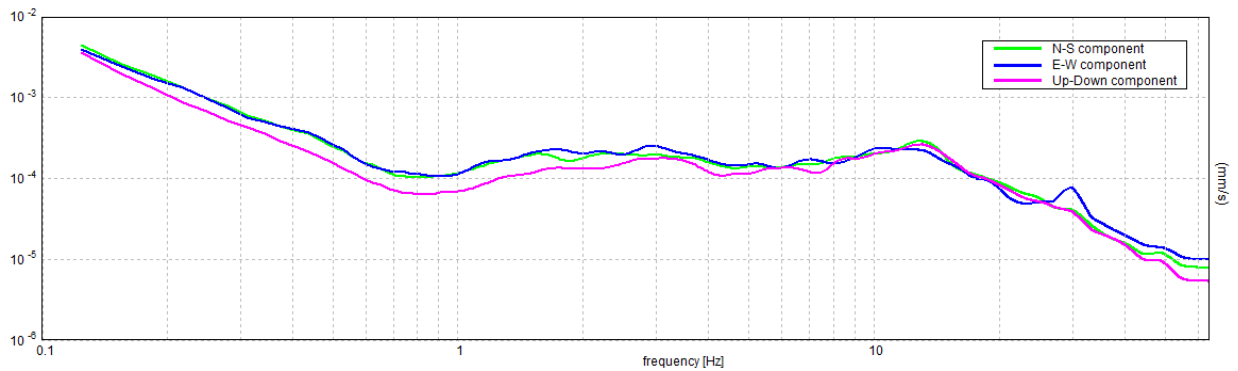
H/V TIME HISTORY



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 63.97 ± 38.72 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	63.97 > 0.50	OK	
$n_c(f_0) > 200$	47336.9 > 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 1026 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	22.781 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	2.00 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.60528 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	38.71906 < 3.19844		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2055 < 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
σ_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 σ_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

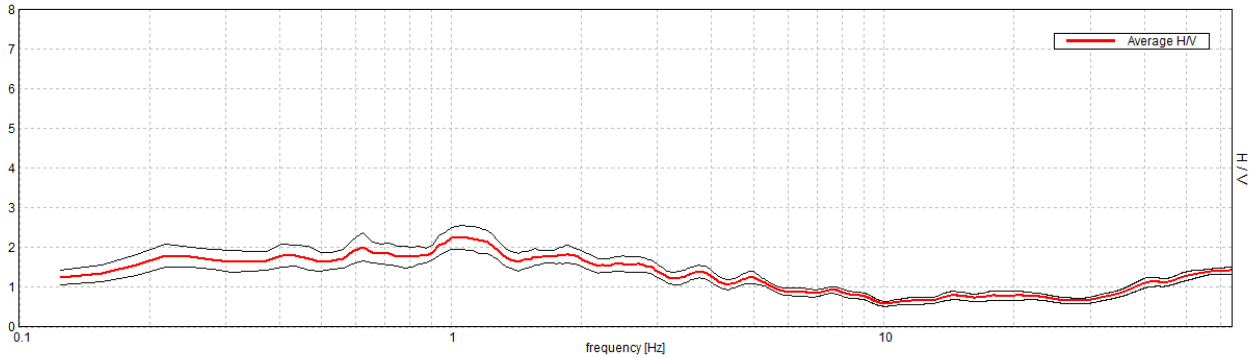
CALENDASCO MS2, HVSr 17

Instrument: TRZ-0189/01-12
 Data format: 16 byte
 Start recording: 10/06/22 16:08:37
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 77% trace (manual window selection)
 Sampling rate: 128 Hz
 Smoothing type: Triangular window

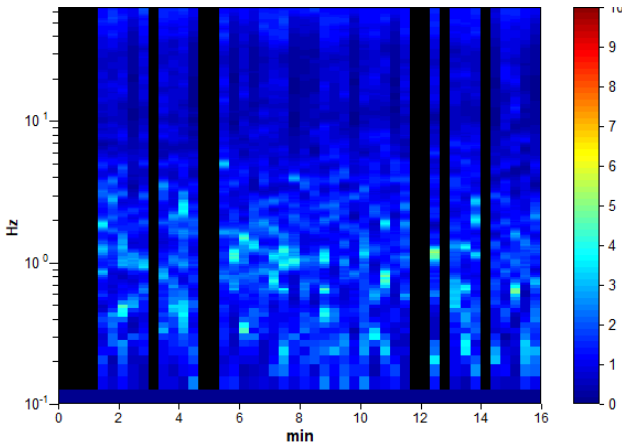
Full scale [mV]: 51
 End recording: 10/06/22 16:24:37
 Window size: 20 s
 Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

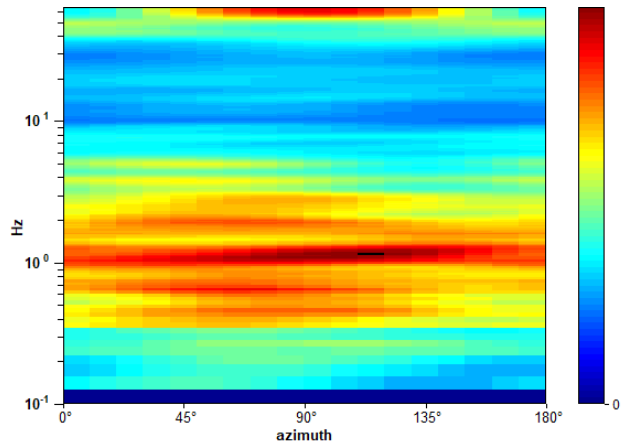
Max. H/V at 1.06 ± 0.22 Hz. (In the range 0.0 - 64.0 Hz).



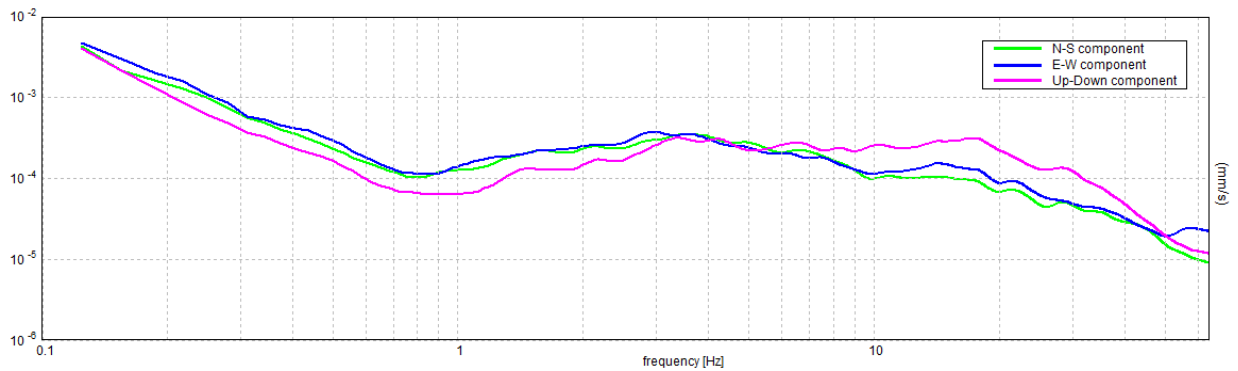
H/V TIME HISTORY



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 ± 0.22 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$1.06 > 0.50$	OK	
$n_c(f_0) > 200$	$786.3 > 200$	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 $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	4.188 Hz	OK	
$A_0 > 2$	$2.26 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.21104 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.22423 < 0.10625$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2918 < 1.78$	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
σ_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 σ_f and $\sigma_A(f_0)$

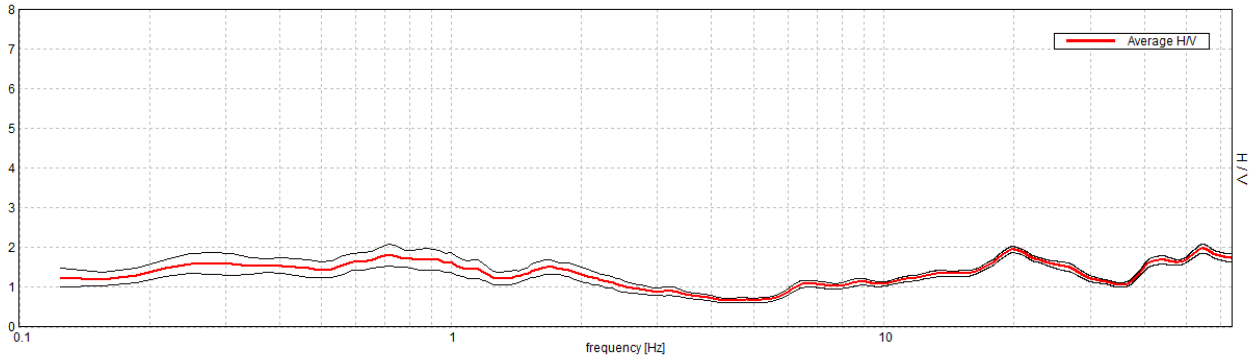
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 18

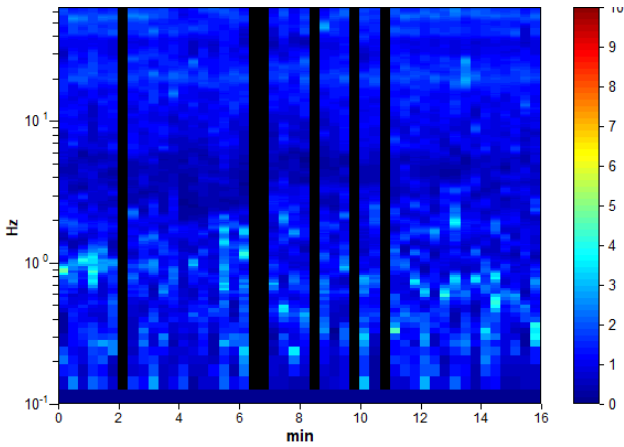
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 16:37:46 End recording: 10/06/22 16:53:46
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 88% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

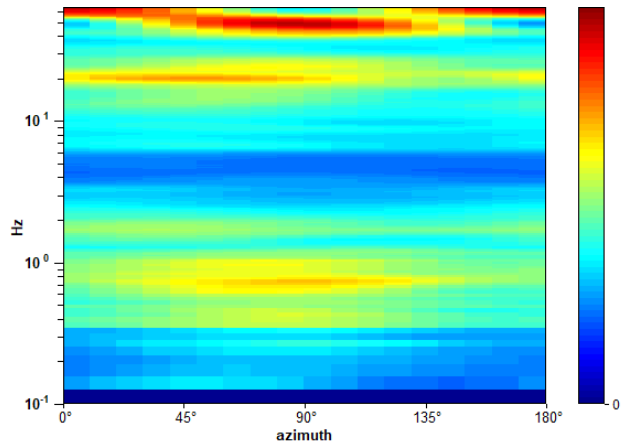
Max. H/V at 54.38 ± 45.38 Hz. (In the range 0.0 - 64.0 Hz).



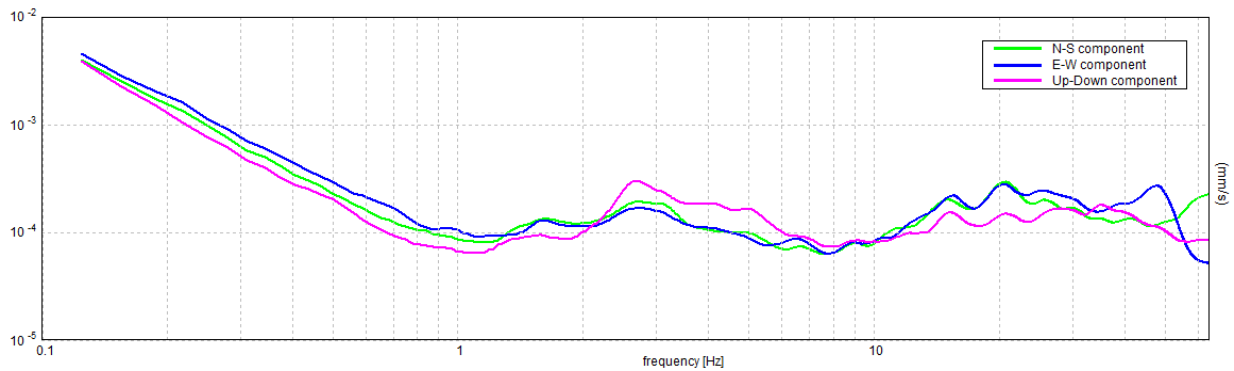
H/V TIME HISTORY



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 54.38 ± 45.38 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	54.38 > 0.50	OK	
$n_c(f_0) > 200$	45675.0 > 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 1179 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
$A_0 > 2$	1.97 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.83459 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	45.38082 < 2.71875		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1101 < 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
σ_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 $\sigma_A(f) < \theta(f_0)$

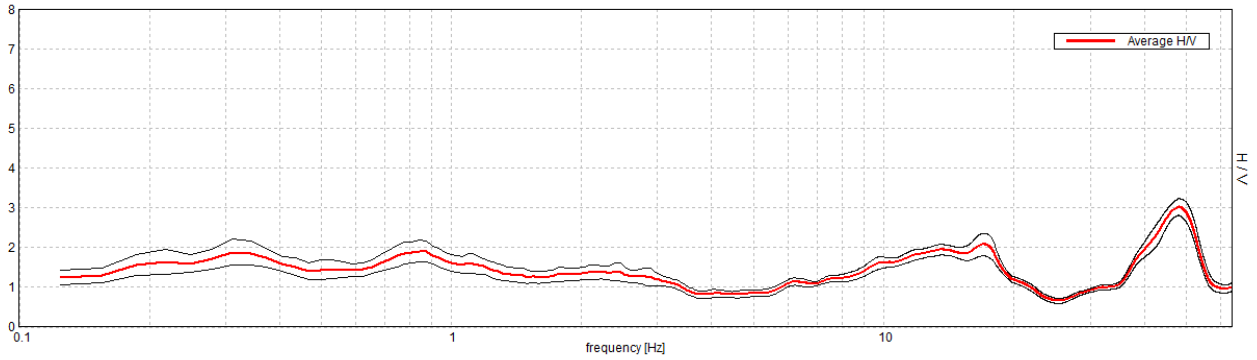
Threshold values for σ_f and $\sigma_A(f_0)$					
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25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

CALENDASCO MS2, HVSr 19

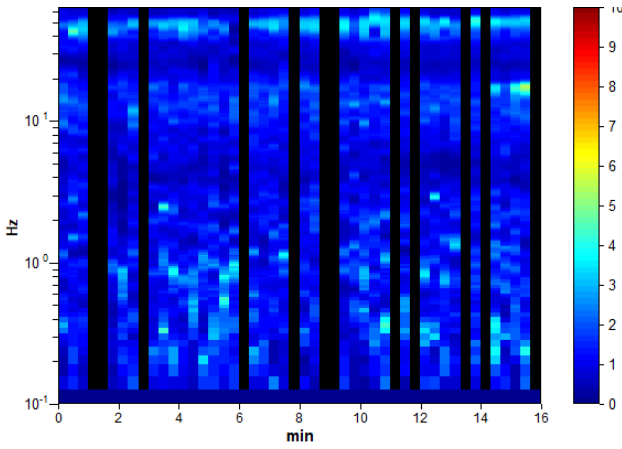
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 17:11:11 End recording: 10/06/22 17:27:11
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 75% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

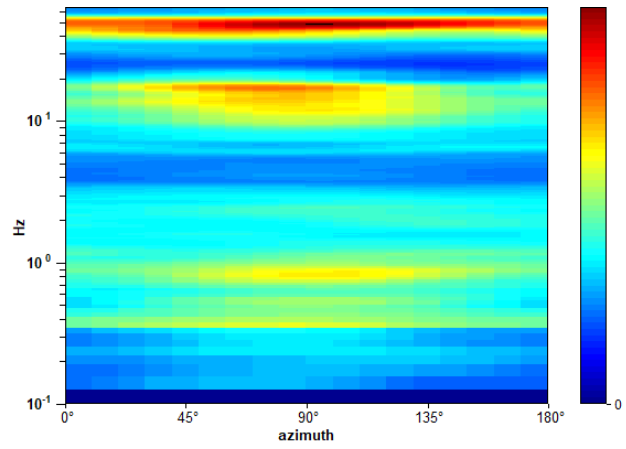
Max. H/V at 48.03 ± 8.17 Hz. (In the range 0.0 - 64.0 Hz).



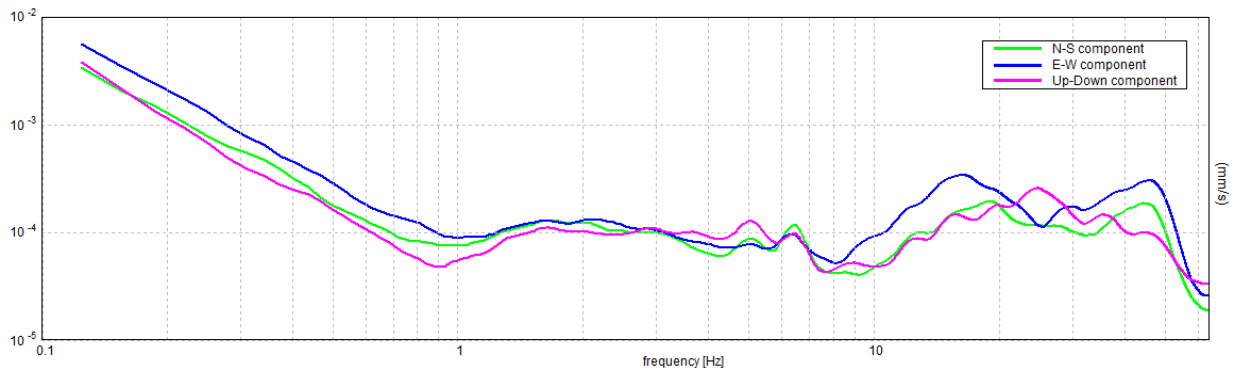
H/V TIME HISTORY



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 48.03 ± 8.17 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	48.03 > 0.50	OK	
$n_c(f_0) > 200$	34582.5 > 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 1280 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	37.406 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	55.063 Hz	OK	
$A_0 > 2$	3.02 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.17017 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	8.17366 < 2.40156		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2106 < 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
σ_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 σ_f and $\sigma_A(f_0)$

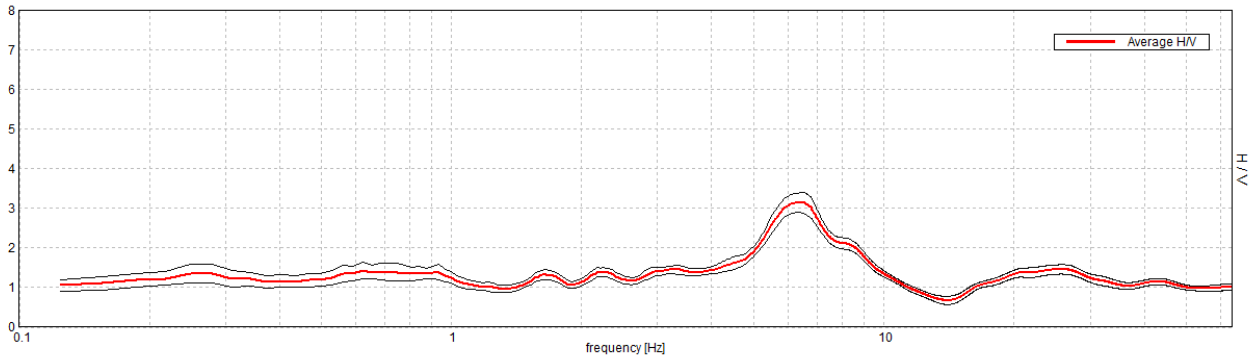
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 2

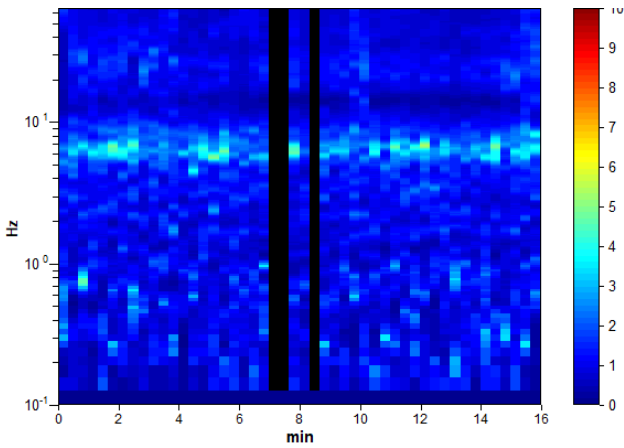
Instrument: TRZ-0189/01-12
Data format: 16 byte Full scale [mV]: 51
Start recording: 09/06/22 11:26:26 End recording: 09/06/22 11:42:26
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
Trace length: 0h16'00". Analyzed 94% trace (manual window selection)
Sampling rate: 128 Hz Window size: 20 s
Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

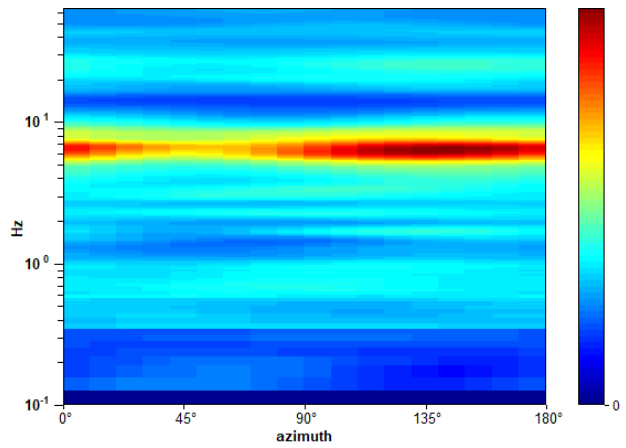
Max. H/V at 6.38 ± 0.92 Hz. (In the range 0.0 - 64.0 Hz).



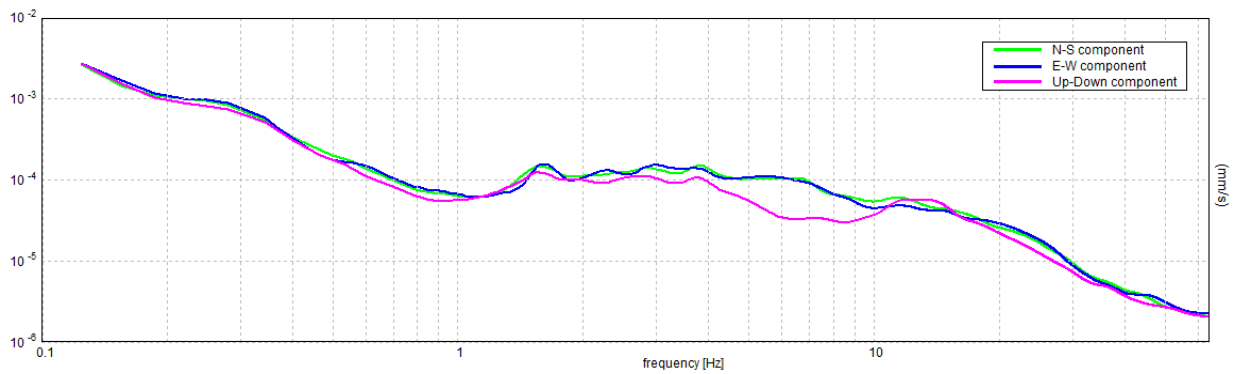
H/V TIME HISTORY



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 6.38 ± 0.92 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	6.38 > 0.50	OK	
$n_c(f_0) > 200$	5737.5 > 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 307 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	4.375 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	9.406 Hz	OK	
$A_0 > 2$	3.14 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.14498 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.92426 < 0.31875$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2437 < 1.58$	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
σ_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 σ_f and $\sigma_A(f_0)$

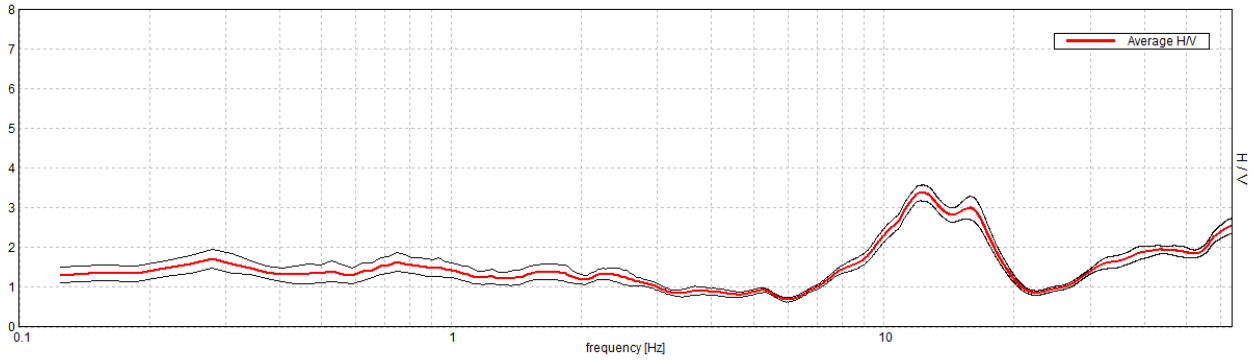
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 20

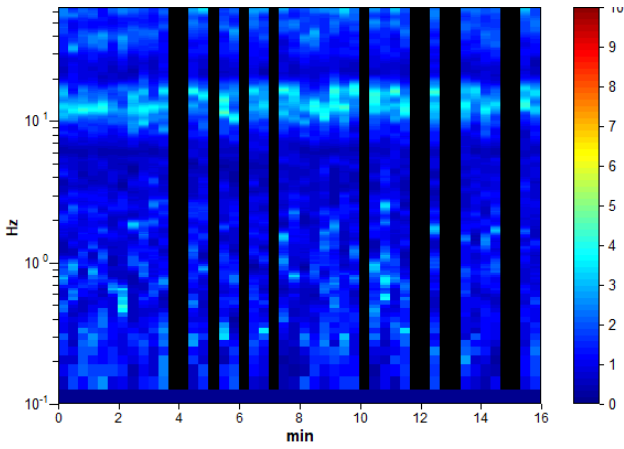
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 17:37:18 End recording: 10/06/22 17:53:18
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 75% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

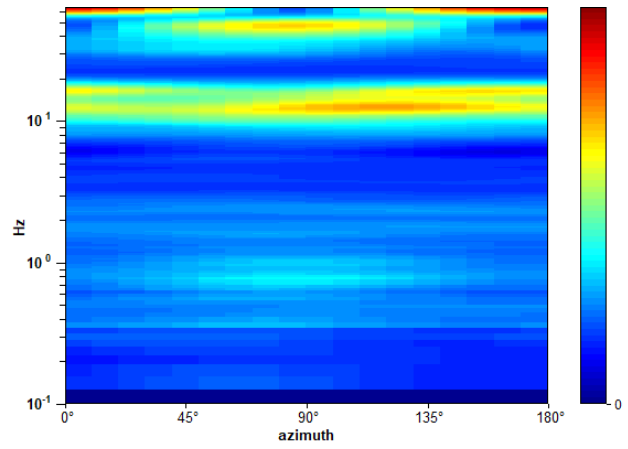
Max. H/V at 12.19 ± 0.17 Hz. (In the range 0.0 - 64.0 Hz).



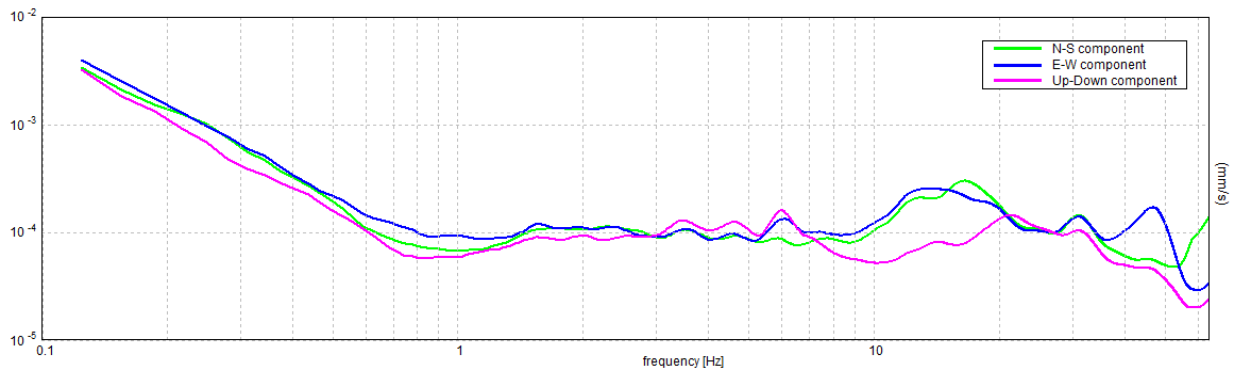
H/V TIME HISTORY



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 12.19 ± 0.17 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	12.19 > 0.50	OK	
$n_c(f_0) > 200$	8775.0 > 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 586 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	8.906 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	18.719 Hz	OK	
$A_0 > 2$	3.37 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.01417 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	0.17274 < 0.60938	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1971 < 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
σ_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 σ_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

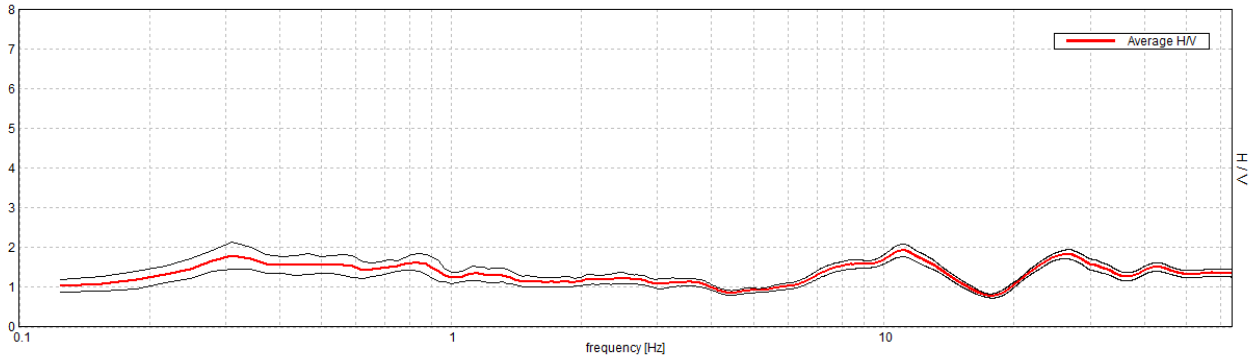
CALENDASCO MS2, HVSr 3

Instrument: TRZ-0189/01-12
 Data format: 16 byte
 Start recording: 09/06/22 14:04:16
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 79% trace (manual window selection)
 Sampling rate: 128 Hz
 Smoothing type: Triangular window

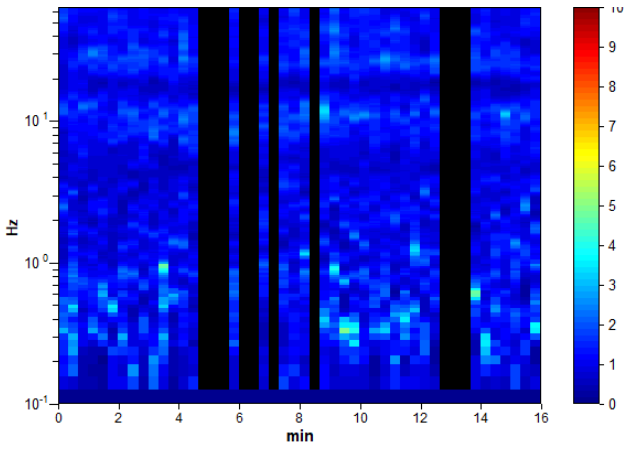
Full scale [mV]: 51
 End recording: 09/06/22 14:20:16
 Window size: 20 s
 Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

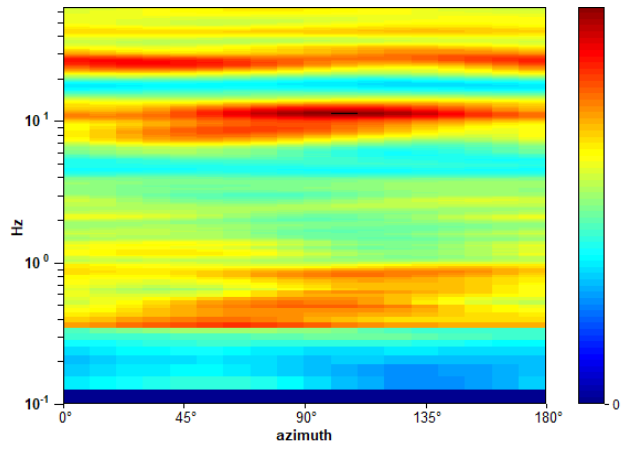
Max. H/V at 11.09 ± 8.7 Hz. (In the range 0.0 - 64.0 Hz).



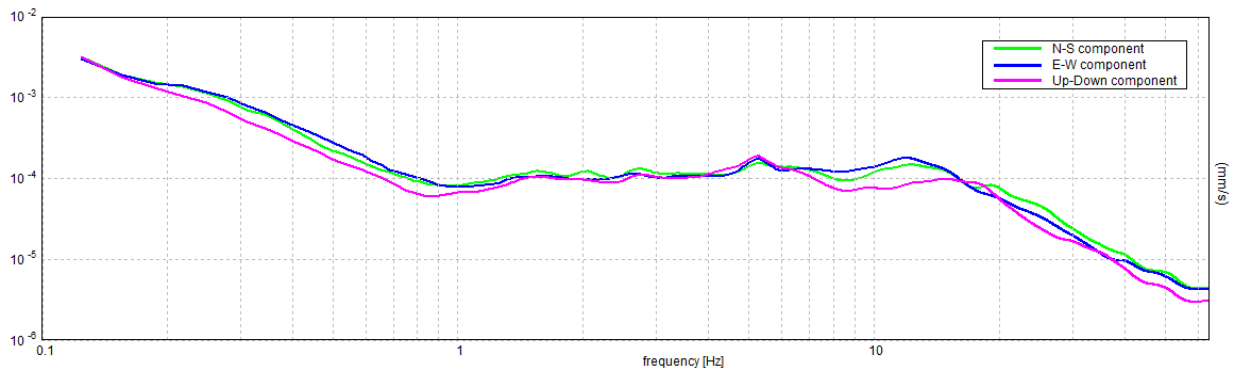
H/V TIME HISTORY



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 11.09 ± 8.7 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	11.09 > 0.50	OK	
$n_c(f_0) > 200$	8431.3 > 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 534 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	5.469 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	15.938 Hz	OK	
$A_0 > 2$	1.93 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.78427 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	8.7005 < 0.55469		NO
$\sigma_A(f_0) < \theta(f_0)$	0.158 < 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
σ_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 σ_f and $\sigma_A(f_0)$

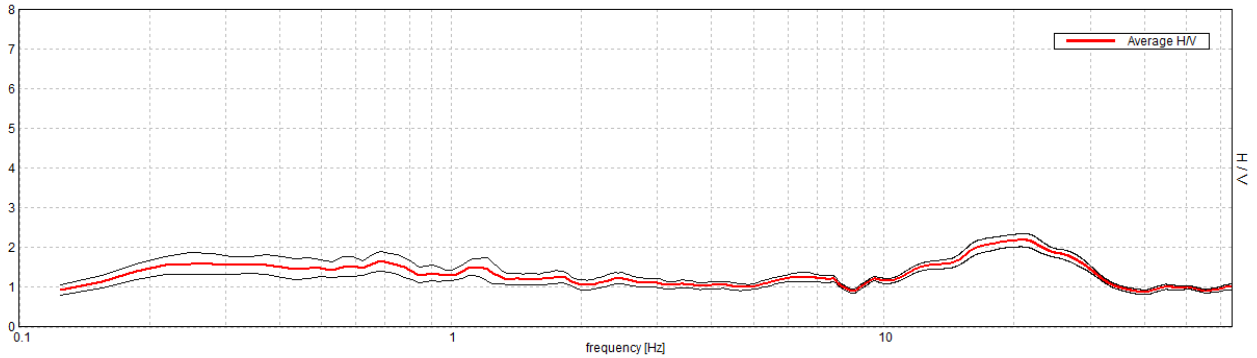
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSR 4

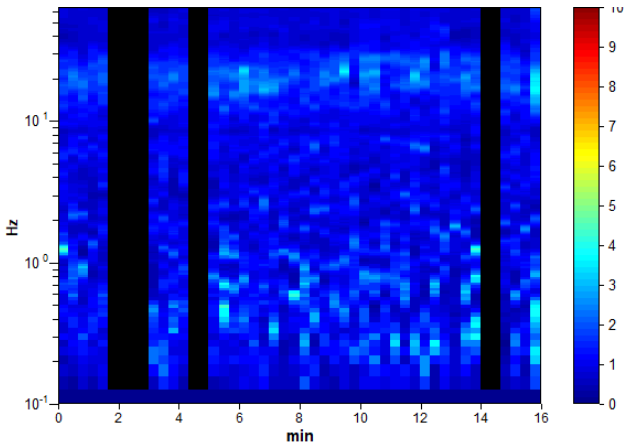
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 09/06/22 16:01:10 End recording: 09/06/22 16:17:10
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 83% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

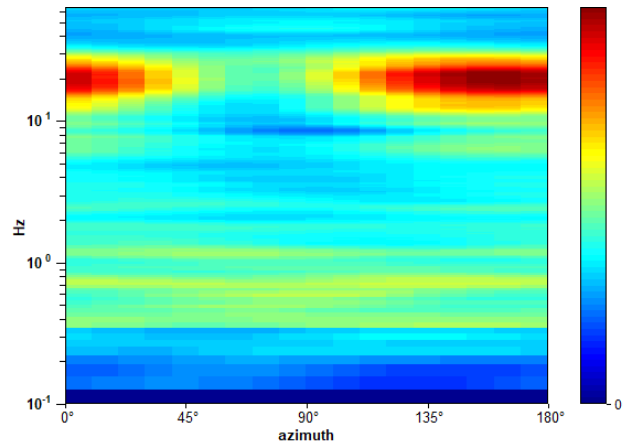
Max. H/V at 20.91 ± 4.51 Hz. (In the range 0.0 - 64.0 Hz).



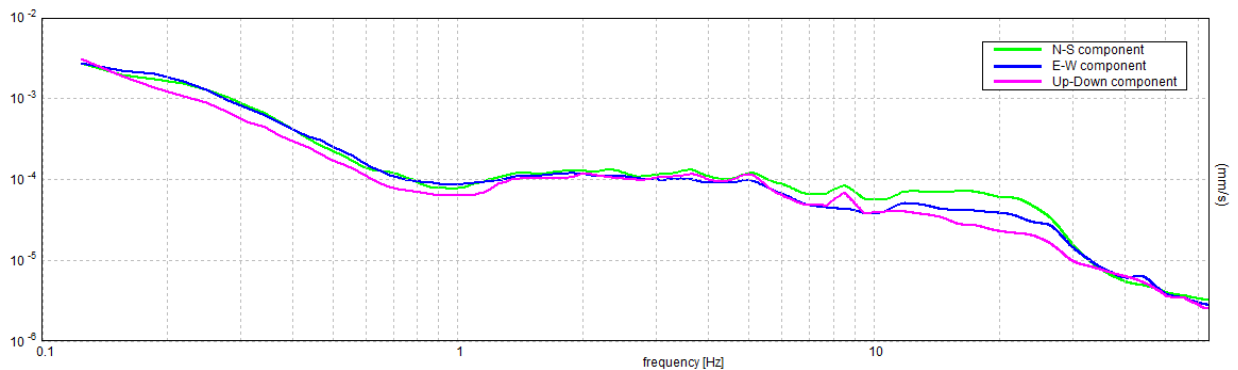
H/V TIME HISTORY



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 20.91 ± 4.51 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	20.91 > 0.50	OK	
$n_c(f_0) > 200$	16725.0 > 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 1004 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	9.094 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	33.344 Hz	OK	
$A_0 > 2$	2.19 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.21559 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	4.50727 < 1.04531		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1687 < 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
σ_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 σ_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

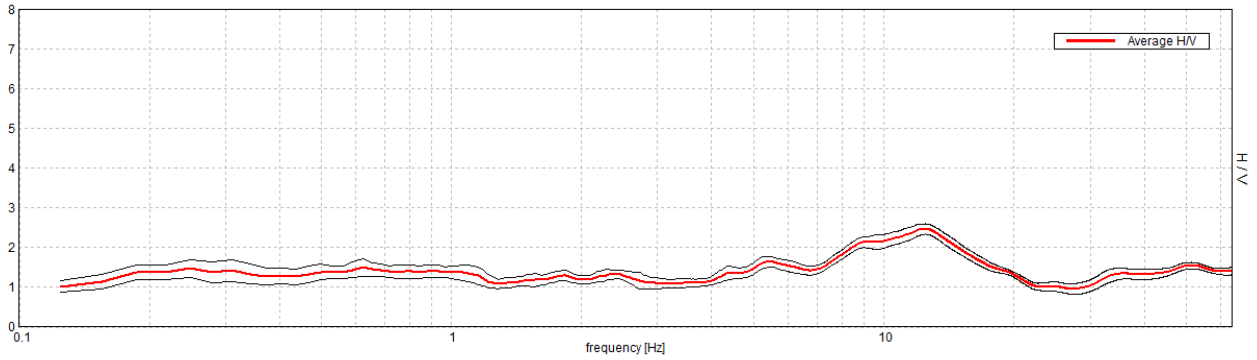
CALENDASCO MS2, HVSr 5

Instrument: TRZ-0189/01-12
 Data format: 16 byte
 Start recording: 09/06/22 16:31:24
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 88% trace (manual window selection)
 Sampling rate: 128 Hz
 Smoothing type: Triangular window

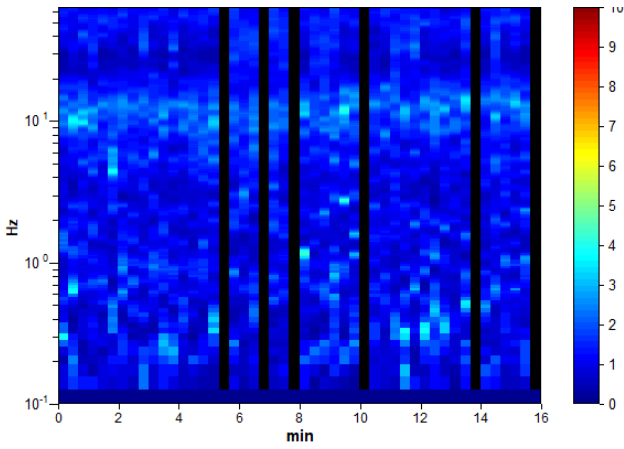
Full scale [mV]: 51
 End recording: 09/06/22 16:47:24
 Window size: 20 s
 Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

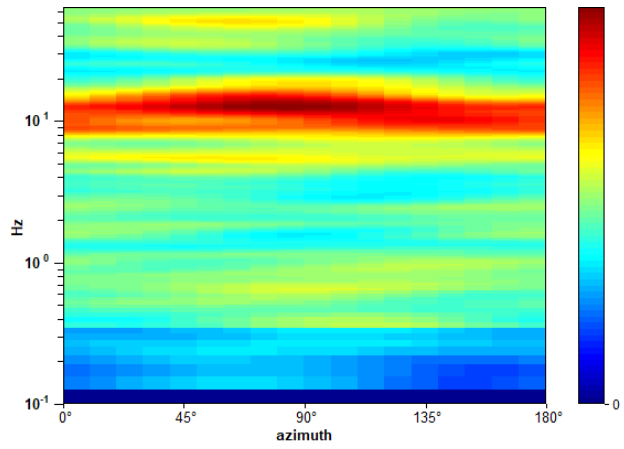
Max. H/V at 12.47 ± 2.15 Hz. (In the range 0.0 - 64.0 Hz).



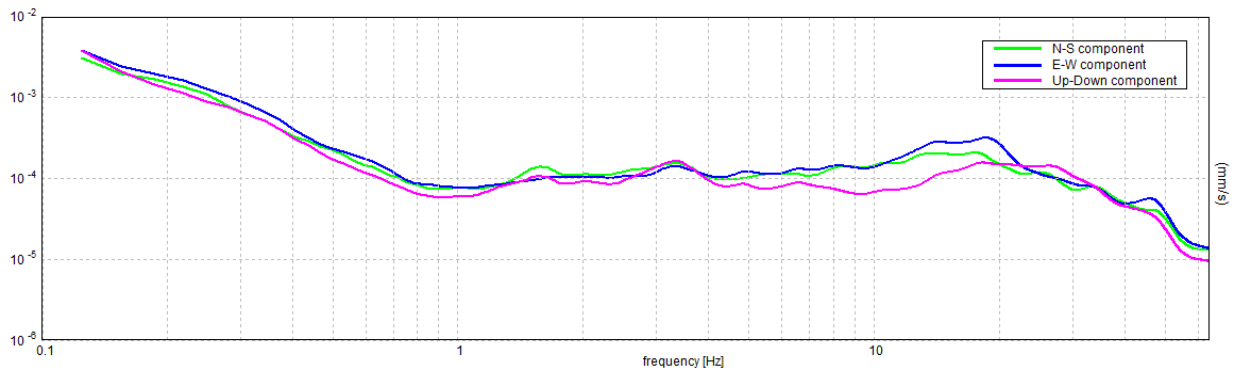
H/V TIME HISTORY



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 12.47 ± 2.15 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	12.47 > 0.50	OK	
$n_c(f_0) > 200$	10473.8 > 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 600 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	4.094 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	20.625 Hz	OK	
$A_0 > 2$	2.47 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.17238 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	2.14942 < 0.62344		NO
$\sigma_A(f_0) < \theta(f_0)$	0.131 < 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
σ_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 σ_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

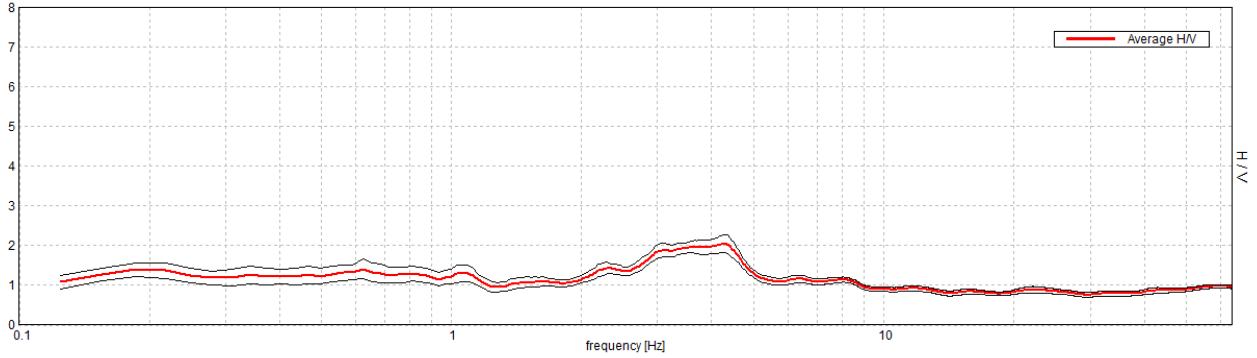
CALENDASCO MS2, HVSr 6

Instrument: TRZ-0189/01-12
 Data format: 16 byte
 Start recording: 10/06/22 08:11:06
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 90% trace (manual window selection)
 Sampling rate: 128 Hz
 Smoothing type: Triangular window

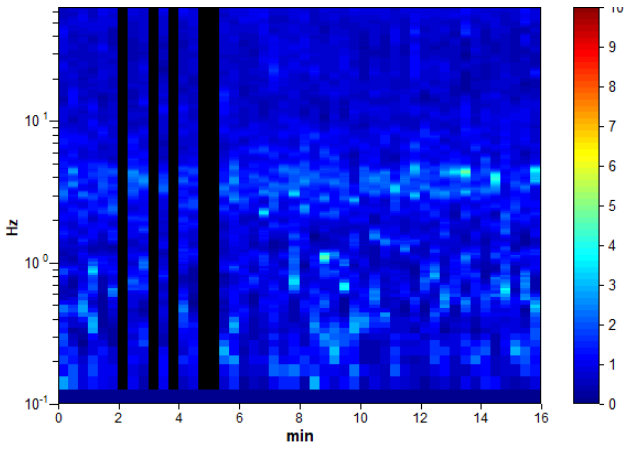
Full scale [mV]: 51
 End recording: 10/06/22 08:27:06
 Window size: 20 s
 Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

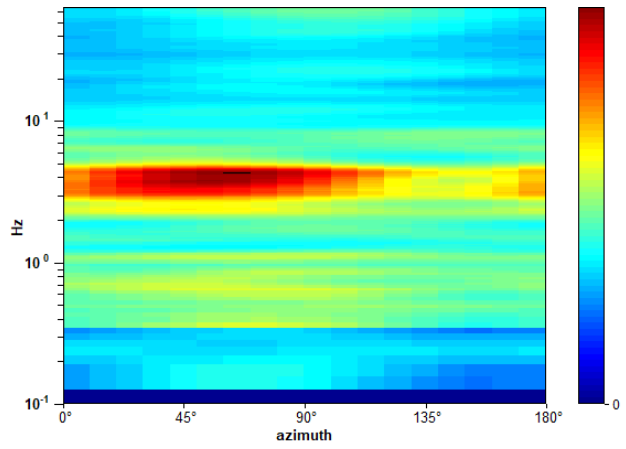
Max. H/V at 4.31 ± 1.36 Hz. (In the range 0.0 - 64.0 Hz).



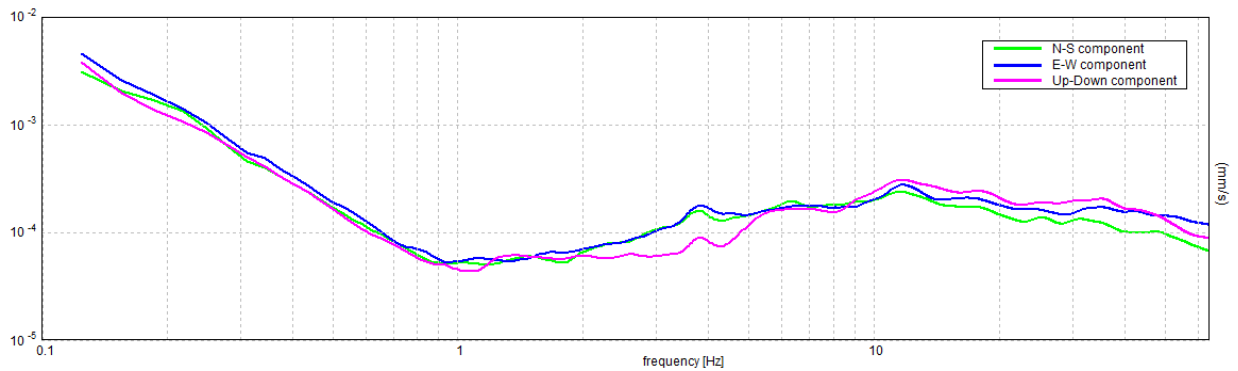
H/V TIME HISTORY



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 4.31 ± 1.36 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$4.31 > 0.50$	OK	
$n_c(f_0) > 200$	$3708.8 > 200$	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 208 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	1.344 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	8.75 Hz	OK	
$A_0 > 2$	$2.04 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.31511 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$1.35889 < 0.21563$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.2328 < 1.58$	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
σ_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 σ_f and $\sigma_A(f_0)$

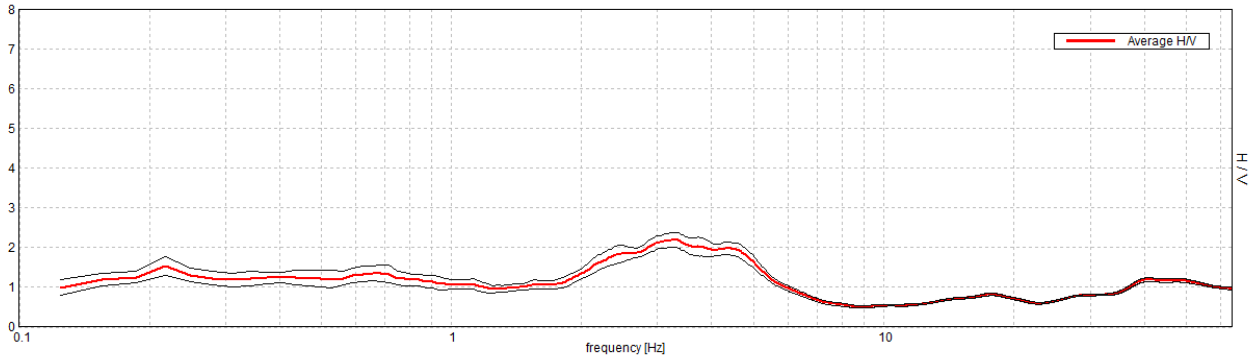
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 7

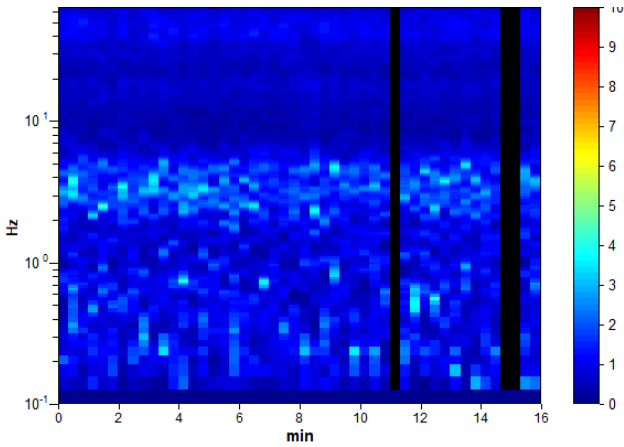
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 08:57:47 End recording: 10/06/22 09:13:47
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 94% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

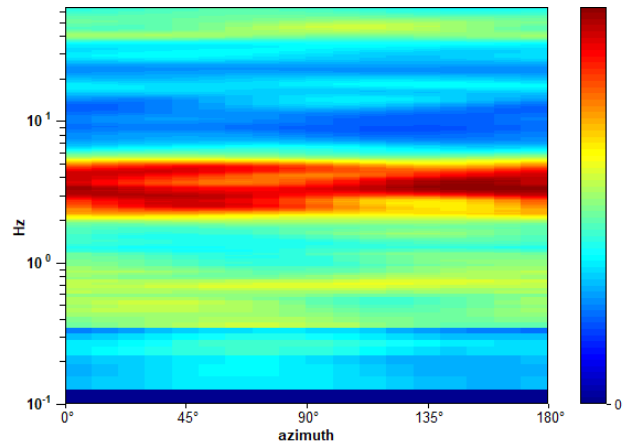
Max. H/V at 3.28 ± 0.15 Hz. (In the range 0.0 - 64.0 Hz).



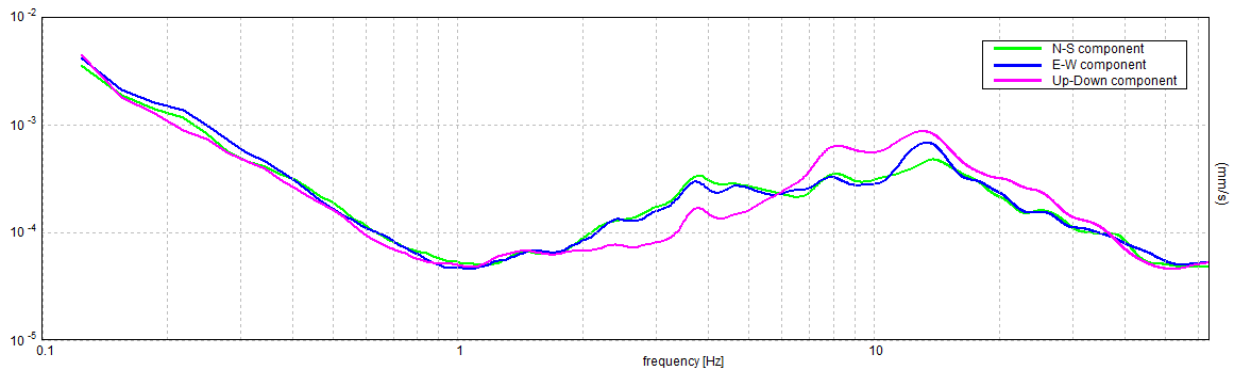
H/V TIME HISTORY



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 3.28 ± 0.15 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	$3.28 > 0.50$	OK	
$n_c(f_0) > 200$	$2953.1 > 200$	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 158 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0] \mid A_{H/V}(f^-) < A_0 / 2$	1.781 Hz	OK	
Exists f^+ in $[f_0, 4f_0] \mid A_{H/V}(f^+) < A_0 / 2$	5.688 Hz	OK	
$A_0 > 2$	$2.19 > 2$	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.04499 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	$0.14761 < 0.16406$	OK	
$\sigma_A(f_0) < \theta(f_0)$	$0.1838 < 1.58$	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
σ_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 σ_f and $\sigma_A(f_0)$

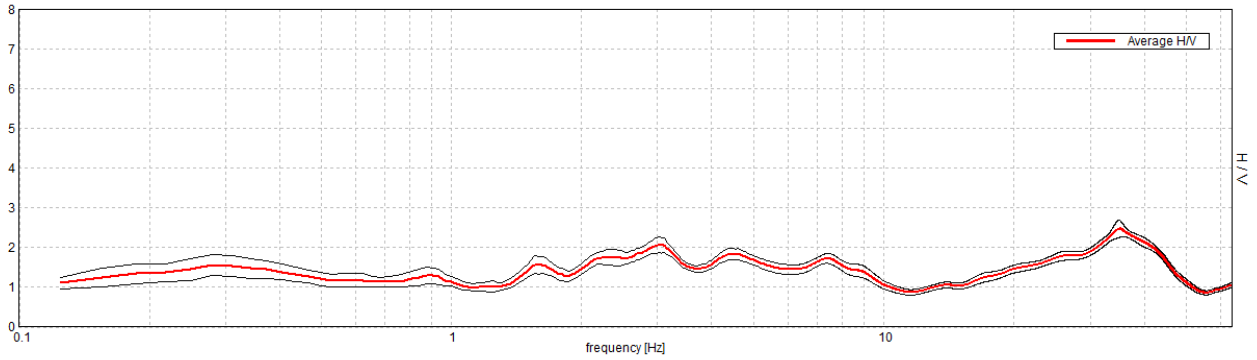
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	$0.25 f_0$	$0.2 f_0$	$0.15 f_0$	$0.10 f_0$	$0.05 f_0$
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 8

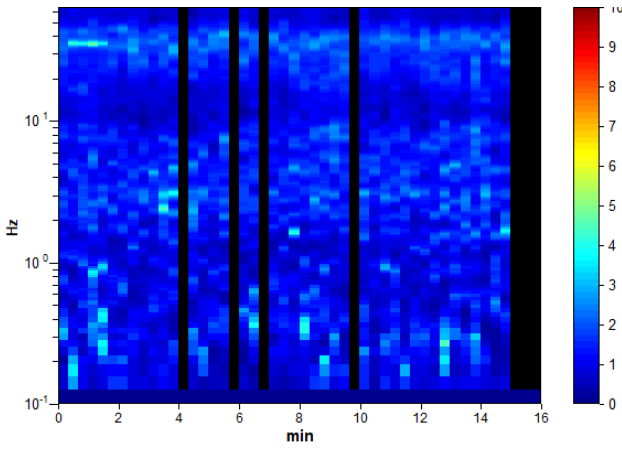
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 09:38:59 End recording: 10/06/22 09:54:59
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 85% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

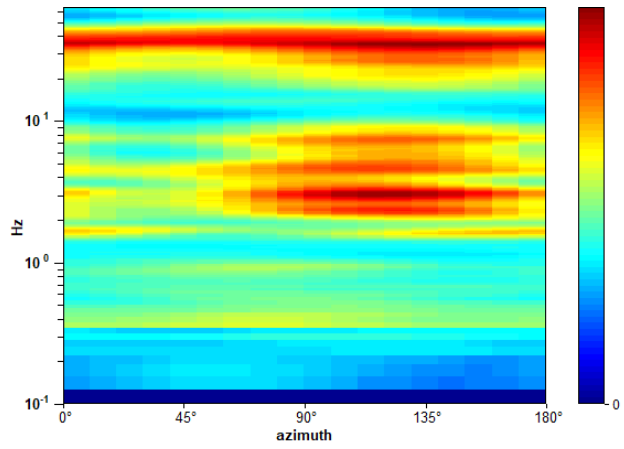
Max. H/V at 35.0 ± 5.42 Hz. (In the range 0.0 - 64.0 Hz).



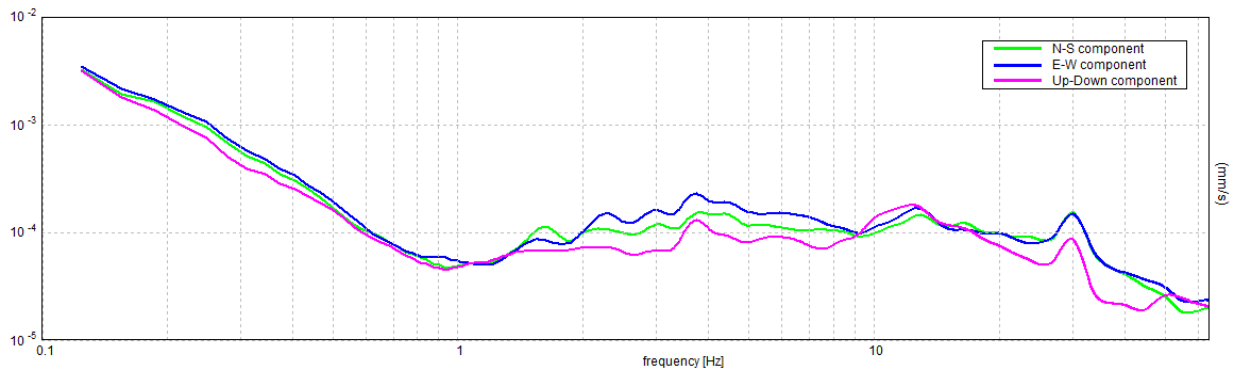
H/V TIME HISTORY



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 35.0 ± 5.42 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	35.00 > 0.50	OK	
$n_c(f_0) > 200$	28700.0 > 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 1489 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	16.875 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$	48.563 Hz	OK	
$A_0 > 2$	2.47 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.15479 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	5.41773 < 1.75		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2172 < 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
σ_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 σ_f and $\sigma_A(f_0)$

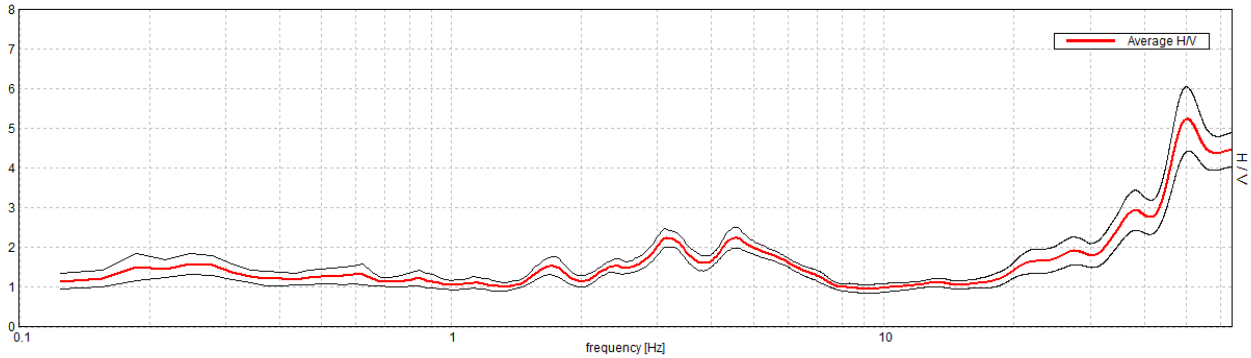
Freq. range [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ for $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
$\log \theta(f_0)$ for $\sigma_{\log H/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

CALENDASCO MS2, HVSr 9

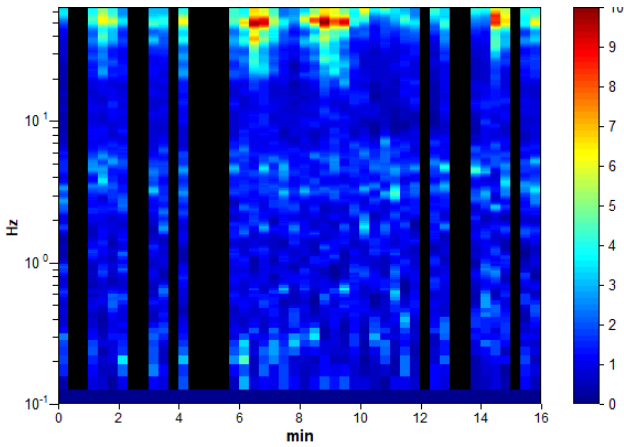
Instrument: TRZ-0189/01-12
 Data format: 16 byte Full scale [mV]: 51
 Start recording: 10/06/22 10:15:30 End recording: 10/06/22 10:31:31
 Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN
 Trace length: 0h16'00". Analyzed 73% trace (manual window selection)
 Sampling rate: 128 Hz Window size: 20 s
 Smoothing type: Triangular window Smoothing: 10%

HORIZONTAL TO VERTICAL SPECTRAL RATIO

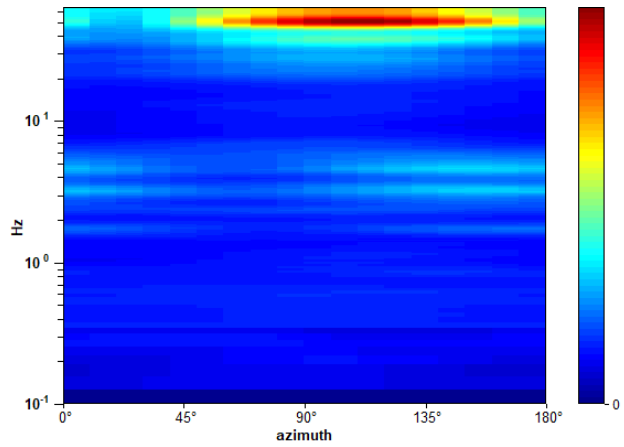
Max. H/V at 50.31 ± 1.51 Hz (in the range 0.0 - 64.0 Hz).



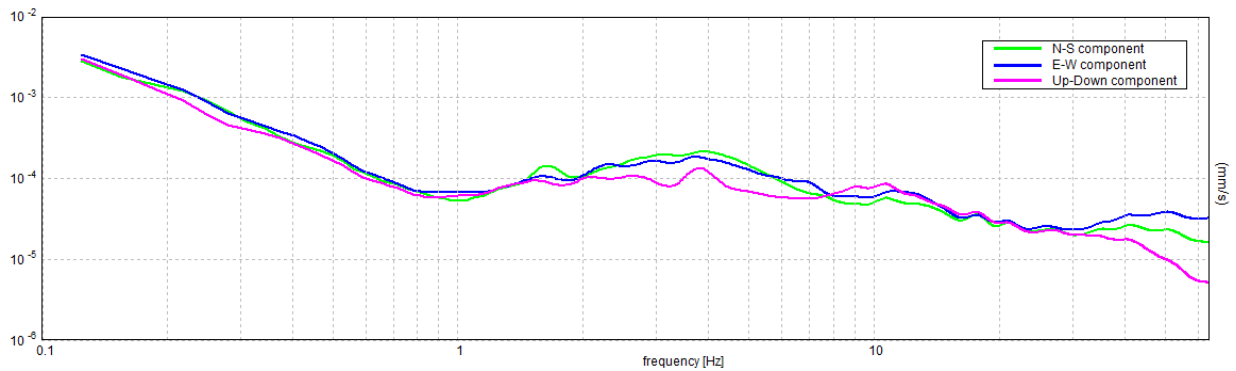
H/V TIME HISTORY



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 50.31 ± 1.51 Hz (in the range 0.0 - 64.0 Hz).

Criteria for a reliable H/V curve

[All 3 should be fulfilled]

$f_0 > 10 / L_w$	50.31 > 0.50	OK	
$n_c(f_0) > 200$	35218.8 > 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 1244 times	OK	

Criteria for a clear H/V peak

[At least 5 out of 6 should be fulfilled]

Exists f^- in $[f_0/4, f_0]$ $A_{H/V}(f^-) < A_0 / 2$	35.531 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	5.23 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.02994 < 0.05$	OK	
$\sigma_f < \varepsilon(f_0)$	1.50636 < 2.51563	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.8084 < 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
σ_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 σ_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