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RegioneEmiliaRomagna

CONFERENZA DELLE REGIONI E DELLE PROVINCE AUTONOME

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MICROZONAZIONE SISMICA

Nuove indagini

Regione Emilia-Romagna

Comune di Cavriago

Regione	Soggetto realizzatore	Data
Emilia-Romagna	Mandataria: ENGEO S.r.l. Mandanti: Dott. Geol. Stefano Castagnetti Dott. Geol. Matteo Collareda POLARIS – Studio Associato Dott. Geol. Claudia Tomassoli	Luglio 2020 MS2

REGIONE EMILIA ROMAGNA

Provincia di Reggio Emilia

STUDIO DI MICROZONAZIONE SISMICA DI LIVELLO 2

RELAZIONE TECNICA DELLE INDAGINI SISMICHE ed ELETTRICHE

(Re.Mi. – M.A.S.W. – H.V.S.R. - ERT)

Comuni di studio: CAVRIAGO (RE)

Data: Maggio 2020

1. Premesse

A supporto dello Studio di Microzonazione Sismica di Livello 2, condotto per alcuni comuni della Val d'Enza, sono state effettuate alcune misure geofisiche.

Al fine di ottenere informazioni più dettagliate sulla risposta sismica locale, necessarie per definire con maggior cura lo studio di MS, sono state condotte nel territorio comunale di Cavriago.

N° 40 misure sismiche di tipo passivo a stazione singola (H.V.S.R.)
N° 40 misure sismiche di tipo attivo in array (M.A.S.W.)
N° 40 misure sismiche di tipo passivo in array (Re.Mi.)
N° 2 stendimenti geo-elettrici 2D (ELE)

2. Indagine sismica di tipo passivo a stazione singola (H.V.S.R.)

Cenni teorici sulla strumentazione utilizzata

La tecnica sismica passiva (tecnica dei rapporti spettrali o H.V.S.R., Horizontal to Vertical Spectral Ratio) è totalmente non invasiva, molto rapida, si può applicare ovunque e non richiede nessun tipo di perforazione, né di stendimenti di cavi, né di energizzazione esterne diverse dal rumore ambientale che in natura esiste ovunque. I risultati che si possono ottenere da una registrazione di questo tipo sono:

- la frequenza caratteristica di risonanza del sito che rappresenta un parametro fondamentale per il corretto dimensionamento degli edifici in termini di risposta sismica locale. Si dovranno adottare adeguate precauzioni nel costruire edifici aventi la stessa frequenza di vibrazione del terreno per evitare l'effetto di "doppia risonanza" estremamente pericolosi per la stabilità degli stessi;
- la frequenza fondamentale di risonanza di un edificio, qualora la misura venga effettuata all'interno dello stesso. In seguito sarà possibile confrontarla con quella caratteristica del sito (free field) e capire se in caso di sisma la struttura potrà essere o meno a rischio;
- la velocità media delle onde di taglio Vs calcolata tramite un apposito codice di calcolo. È necessario, per l'affidabilità del risultato, conoscere la profondità di un riflettore noto dalla stratigrafia (prova penetrometrica, sondaggio, ecc.) e riconoscibile nella curva H/V. Sarà quindi possibile calcolare la Vs,30 e la relativa categoria di sottosuolo come esplicitamente richiesto dalle Norme Tecniche per le Costruzioni del 14 gennaio 2008;
- la stratigrafia del sottosuolo con un range di indagine compreso tra 0,5 e 700 m di profondità anche se il dettaglio maggiore si ha nei primi 100 metri. Il principio su cui si basa la presente tecnica, in termini di stratigrafia del sottosuolo, è rappresentato dalla definizione di strato inteso come unità distinta da quelle sopra e sottostante per un contrasto d'impedenza, ossia per il rapporto tra i prodotti di velocità delle onde sismiche nel mezzo e densità del mezzo stesso.

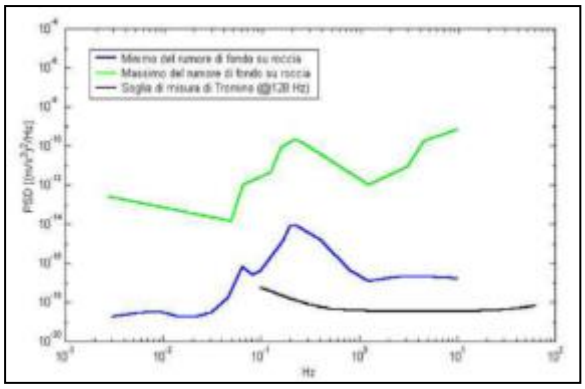
Le basi teoriche della tecnica HVSR si rifanno in parte alla sismica tradizionale (riflessione, rifrazione, diffrazione) e in parte alla teoria dei microtremori. La forma di un'onda registrata in un sito x da uno strumento dipende:

- dalla forma dell'onda prodotta dalla sorgente s;
- dal percorso dell'onda dalla sorgente s al sito x (attenuazioni, riflessioni, rifrazioni, incanalamenti per guide d'onda);
- dalla risposta dello strumento.

Possiamo scrivere questo come:

segnale registrazione al sito x =
sorgente * effetti di percorso * funzione trasferimento strumento

Il rumore sismico ambientale, presente ovunque sulla superficie terrestre, è generato dai fenomeni atmosferici (onde oceaniche, vento) e dall'attività antropica oltre che, ovviamente, dall'attività dinamica terrestre. Si chiama anche microtremore poiché riguarda oscillazioni molto piccole, molto più piccole di quelle indotte dai terremoti. I metodi che si basano sulla sua acquisizione si dicono passivi poiché il rumore non è generato ad hoc, come ad esempio le esplosioni della sismica attiva. Nel tragitto dalla sorgente s al sito x le onde elastiche (sia di terremoto che microtremore) subiscono riflessioni, rifrazioni, intrappolamenti per fenomeni di guida d'onda, attenuazioni che dipendono dalla natura del sottosuolo attraversato. Questo significa che se da un lato l'informazione riguardante la sorgente è persa e non sono più applicabili le tecniche della sismica classica, è presente comunque una parte debolmente correlata nel segnale che può essere estratta e che contiene le informazioni concernenti il percorso del segnale e, in particolare, relative alla struttura locale vicino al sensore. Dunque, anche il debole rumore sismico, che tradizionalmente costituisce la parte di segnale scartata dalla sismologia classica, contiene informazioni. Questa informazione è però "sepolta" all'interno del rumore casuale e può essere estratta attraverso tecniche opportune. Una di queste tecniche è la teoria dei rapporti spettrali o, semplicemente, HVSR che è in grado di fornire stime affidabili delle frequenze principali del sottosuolo; informazione di notevole importanza nell'ingegneria sismica.



Per l'acquisizione dei dati è stato utilizzato un tromometro digitale della ditta Moho S.r.l. modello "Tromino – engy-plus" che rappresenta la nuova generazione di strumenti ultra - leggeri e ultra - compatti in alta risoluzione adatti a tali misurazioni. Lo strumento racchiude al suo interno tre terne velocimetriche con i sensori ortogonali tra loro e con intervallo di frequenza compreso tra 0.1 e 256 Hz. Nella figura a fianco si riporta la curva di rumore di "Tromino" a confronto con i modelli standard di rumore sismico massimo (in verde) e minimo (in blu) per la Terra. Gli spettri di potenza sono espressi in termini di accelerazione e sono relativi alla componente verticale del moto.

3. Indagini sismiche in array

Indagine sismica di tipo passivo in array (Re.Mi.) - Cenni teorici sulla strumentazione utilizzata

È noto che la propagazione delle onde, nel caso di mezzi stratificati e trasversalmente isotropi, avviene in maniera diversa rispetto al caso di mezzi omogenei; non esiste più un'unica velocità, ma ogni frequenza è caratterizzata da una diversa velocità di propagazione a sua volta legata alle varie lunghezze d'onda. Queste lunghezze d'onda interessano il terreno a diverse profondità e risultano influenzate dalle caratteristiche elastiche che sono variabili, appunto, con la profondità. Questo comportamento viene definito *dispersione in frequenza* ed è fondamentale nello sviluppo dei metodi sismici che utilizzano le onde di superficie. Ovviamente, le lunghezze d'onda più grandi corrispondono alle frequenze più basse e vanno ad interessare il terreno più in profondità; al contrario, le lunghezze d'onda più piccole, poiché sono associate alle frequenze più alte, rimangono nelle immediate vicinanze della superficie. I metodi di prospezione sismica che utilizzano le onde di superficie si basano su modelli fisico-matematici nei quali il sottosuolo viene schematizzato come una serie di strati con caratteristiche elastiche lineari.

La procedura Re.Mi. è un metodo di prospezione sismica sviluppato presso l'Università di Reno in Nevada (Louie, 2001) e viene classificato come *metodo passivo* in quanto utilizza il rumore ambientale. I vantaggi derivanti da questo metodo sono molteplici poiché è veloce e semplice da usare in fase di acquisizione, raggiunge una buona profondità e risoluzione d'indagine ma, soprattutto, permette di ottenere migliori risultati in ambienti particolarmente urbanizzati. La fase di acquisizione deve essere effettuata con una serie di accorgimenti e precauzioni da adottare in sito e nella pianificazione della registrazione. Tutto è

finalizzato alla registrazione di dati contenenti la miglior informazione possibile riguardo alla propagazione delle onde di Rayleigh con buon rapporto segnale-rumore.
Il rumore incoerente, cioè di tipo casuale, rappresenta nel caso Re.Mi. la fonte del segnale utile che si vuole registrare. I microtremori generati dall'ambiente si propagano nel suolo e di questi si cerca di distinguere il modo fondamentale di vibrazione dell'onda di Rayleigh dai modi superiori e dall'*aliasing* spaziale: risulta quindi necessario soddisfare la condizione di *omnidirezionalità* delle sorgenti, cioè si suppone che il rumore ambientale provenga sostanzialmente da tutte le direzioni.

I tempi di registrazione dei microtremori sono decisamente più elevati rispetto alle indagini di tipo attivo. La registrazione viene analizzata in finestre temporali che variano dai 10 ai 30 secondi. Sono da considerare la lunghezza dello stendimento L e la distanza intergeofonica Δx, che agisce sul segnale come una specie di filtro in frequenza; supponendo, infatti, che il segnale arrivi da tutte le direzioni, maggiore è la spaziatura, minore sarà la frequenza del segnale utile campionabile e viceversa: se la frequenza è più bassa, aumenta la profondità d'indagine. La fase più delicata è quella del *data processing*, che consiste nel trattamento dei dati acquisiti con l'obiettivo di stimare la velocità di fase delle onde di Rayleigh (V_r), che sono correlabili con le velocità V_s di propagazione delle onde S ($V_s \approx 1{,}1\ V_r$). Le varie tecniche di processing trasformano l'informazione registrata nel dominio x-t (spazio tempo), in un dominio dove l'energia associata all'evento è funzione della frequenza e di altre variabili. Tutto questo allo scopo di localizzare attraverso lo spettro la densità di energia maggiore, alla quale sono di solito associate le onde di Rayleigh. Con procedura manuale vengono selezionati dei punti sullo spettro, che andranno a formare la curva di dispersione sperimentale.

La scelta di questi valori, denominata *picking*, è condizionata da alcune indicazioni ma è imprescindibile dall'abilità e dall'esperienza dell'interpretatore anche in base ad altre conoscenze in merito al sito in esame. Per ottenere un elevato dettaglio del segnale, il *sampling rate* utilizzato è stato di 512 Hz. La durata (lunghezza temporale) del segnale registrato per ogni misura è stato di circa 6 minuti. Il software utilizzato per l'analisi spettrale è Grilla v.7.4 – 2018.

Indagine sismica di tipo attivo in array (M.A.S.W) - Cenni teorici sulla strumentazione utilizzata

La procedura M.A.S.W. viene presentata nel 1999 in seguito agli studi effettuati dal Kansas Geological Survey (Park et al., 1999). L'acquisizione simultanea di molti canali, che aumentano la ridondanza statistica, insieme alla semplicità delle operazioni, permettono al M.A.S.W. di superare pienamente le limitazioni incontrate con precedenti metodi. La strumentazione necessaria è composta da uno stendimento sismico di 12 o più geofoni verticali e dal sismografo. L'energizzazione viene effettuata ad hoc a varie distanze e con varie ripetizioni (tecnica stacking) per sommare algebricamente i segnali ottenuti rendendo in tal modo la potenza del segnale superiore a quella del rumore di fondo.

Una particolare analisi spettrale permette di distinguere il modo fondamentale da quelli superiori per ricavare la curva di dispersione ed il profilo delle Vs per successiva inversione 1-D. La teoria sviluppata suggerisce di caratterizzare tale fenomeno mediante una funzione detta curva di dispersione, che associa ad ogni frequenza la velocità di propagazione dell'onda. Tale curva è estraibile dallo spettro del segnale poiché essa approssimativamente posa sui massimi del valore assoluto dello spettro.

A questo punto la curva di dispersione sperimentale deve essere confrontata con quella relativa ad un modello sintetico che verrà successivamente alterato in base alle differenze riscontrate tra le due curve, fino ad ottenere un modello sintetico a cui è associata una curva di dispersione teorica approssimativamente coincidente con la curva sperimentale. Questa delicata fase di interpretazione è comunemente detta fase di inversione e può avvenire in maniera automatica e/o manuale.

Procedure operative di acquisizione

Data la necessità di analizzare le onde di Rayleigh, con elevato dettaglio alle basse frequenze (tipicamente anche al di sotto dei 20 Hz), sono stati utilizzati massimo n°16 geofoni a 4,5 Hz ad asse verticale uniti in un *array* lineare totalmente digitale (*SoilSpy Rosina*), con un inter distanza compresa tra 2 e 5 m. Ogni geofono è munito di un digitalizzatore che converte il segnale e lo trasmette al sismografo tramite un'interfaccia USB. Tale sistema permette di avere elevati rapporti di rumore, un perfetto sincronismo e una estrema leggerezza; in tutti i canali non è stato utilizzato né filtraggio né guadagno automatico.

Non sono presenti sostanziali variazioni di quota e quindi i siti possono essere considerati orizzontali. Nel caso delle misure di tipo attivo, l'energizzazione è stata effettuata tramite una mazza su piastra battente di circa 5 Kg, a varie distanze dai geofoni e in entrambi gli estremi del profilo. Il *sampling* rate utilizzato è stato di 512 Hz in modo da ottenere un elevato dettaglio del segnale. La durata (lunghezza temporale) del segnale registrato deve essere sufficiente per consentire all'impulso emesso dalla sorgente di propagarsi da un estremo all'altro dell'array, ed inoltre consentire la naturale attenuazione su tutti i ricevitori. Nei casi in questione, dopo aver osservato nel monitor del ricevitore la prima acquisizione, è stato deciso di assumere una lunghezza temporale di circa 1 s, più che sufficiente per il nostro scopo.

Per quanto riguarda l'interpretazione delle misure si precisa che le indagini di tipo Re.Mi. sono state interpretate congiuntamente alle misure H.V.S.R., al fine di poter individuare i contrasti di rigidità profondi ed il probabile passaggio al *bedrock* geofisico. Per quanto riguarda, invece, le indagini di tipo MASW, l'elevata rigidità dei depositi non ha consentito una buona penetrazione e propagazione delle onde, pertanto il modo fondamentale non è sempre visibile in tutto il range di frequenze e ciò ha reso difficile la loro interpretazione. Pertanto, si è proceduto all'elaborazione delle misure tarandole con le rispettive Re.Mi. e senza utilizzare le indagini H.V.S.R.

Per una corretta ricostruzione sismica del sottosuolo e una buona stima delle onde Vs è necessario adottare una modellizzazione numerica che può essere rappresentata dalla seguente equazione:

$$\hat{\upsilon}_s = \frac{H}{\sum_{i=1}^{n} \frac{h_i}{\upsilon_i}} \qquad [3.1]$$

Vs = valore di velocità delle onde di taglio [m/s];
H = profondità alla quale si desidera stimare Vs [m] (30 m in caso di Vs30);
hi = spessore dello strato i – esimo [m];
vi = velocità delle onde Vs all'interno dello strato i – esimo [m/s].

In via puramente indicativa, al fine di correlare le velocità delle onde di taglio ad un tipo di suolo, si riportano i valori tabulati da Borcherdt (1992; 1994) assieme a quelli ottenuti sperimentalmente in diversi ambienti sedimentari da altri autori (Budny, 1984; Ibs von Seht e Wohlenberg, 1999; Delgado et al., 2000 a, b; Parolai et al., 2002; Scherbaum et al., 2003; D'Amico et al., 2004, 2006; Hinzen et al., 2004).

TIPO DI SUOLO	Vs min [m/s]	Vs media [m/s]	Vs max [m/s]
ROCCE MOLTO DURE (es. rocce metamorfiche molto - poco fratturate)	1400	1620	-
ROCCE DURE (es. graniti, rocce ignee, conglomerati, arenarie e argilliti, da mediamente a poco fratturate).	700	1050	1400
SUOLI GHIAIOSI e ROCCE DA TENERE A DURE (es. rocce sedimentarie ignee tenere, arenarie, argilliti, ghiaie e suoli con > 20% di ghiaia).	375	540	700

ARGILLE COMPATTE e SUOLI SABBIOSI - GHIAIOSI (es. ghiaie e suoli con < 20% di ghiaia, sabbie da sciolte a molto compatte, limi e argille sabbiose, argille da medie a compatte e argille limose).	200	290	375
TERRENI TENERI (es. terreni di riempimento sotto falda, argille da tenere a molto tenere).	100	150	200

4. Indagine geo-elettrica con inversione tomografica

Basi teoriche di tomografia elettrica

La tecnica dell'*imaging* elettrico (o tomografia elettrica) adotta una procedura automatizzata sia per l'acquisizione che per l'elaborazione e consente di raccogliere dati elettrici del sottosuolo con una densità elevata impiegando cavi *multicore* con spaziatura interelettrodica variabile (generalmente da 1-2 m a 10).

L'unità di misura è costituita da un geo-resistivimetro assistito da un *computer* che mediante un *software* dedicato gestisce la configurazione geometrica e la sequenza del grande numero di letture che vengono effettuate. Gli elettrodi da controllare sono molte decine, spesso qualche centinaio, ed i vari cavi impiegati vengono tra loro connessi e collegati all'unità di misura.

In pratica, il rilievo consiste dapprima nel posizionare gli elettrodi nel terreno secondo *arrays* 2D o 3D, quindi nell'effettuare il collegamento ai *take-out* dei cavi che portano il segnale (di input ed output) all'unità di misura. Dal *software* viene poi impostate la configurazione prescelta (Wenner, Schlumberger, dipolo-dipolo o polo-polo) ed i relativi parametri geometrici (passo di misura, numero di misure, ecc.).

Le misure sono ciclicamente ripetute fino ad un massimo di 4-6 volte qualora non si raggiunga prima una stabilizzazione della lettura (indicata da un basso scarto percentuale tra il 2-6%) e in corrente alternata con periodo di misura che può essere compreso tra 0,8s e 0,12s con cicli di alcuni secondi; i voltaggi variano da un minimo di 0,2mV a massimi di 400V mentre l'intensità di corrente varia da minimi di 0,001mA a massimi di 50mA. Le misure non soddisfacenti, comunque salvate nel *data set*, potranno essere eliminate in sede di analisi. Per ottenere una densità di valori idonea alla costruzione di una pseudosezione di resistività è necessario che il passo di misura non superi la distanza interelettrodica. Il primo risultato dell'analisi è costituito da una pseudosezione che è solo rappresentativa della sezione reale. Ritrae, infatti, l'andamento della resistività apparente, una specie di valore mediato, con la pseudoprofondità, calcolata con semplici considerazioni geometriche. Ogni misura viene posta convenzionalmente al centro del quadripolo attivo ed alla pseudoprofondità che gli compete.

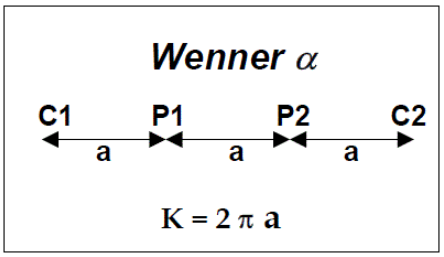
I dati acquisiti in campagna sono rappresentati secondo pseudosezioni (2D) o pseudopiani (3D) e vengono successivamente elaborati per risalire alla elettro-stratigrafia reale (resistività vera) del volume indagato che si ottiene utilizzando la tecnica di inversione.
Nelle indagini geo-elettriche è possibile scegliere diversi tipi di configurazioni in base a criteri che considerano, ad esempio, il tipo di *target* da individuare, la profondità massima da raggiungere o la sensibilità delle misurazioni condotte. Le configurazioni si distinguono in base alla distribuzione geometrica della programmazione di attivazione delle coppie di elettrodi attivati per l'acquisizione.

Strumentazione, acquisizione ed elaborazioni

Nel caso in questione è stato utilizzato il nuovo geo-resistivimetro della MoHo Srl modello **ELECTRA** in configurazione Wenner e con un *array* geometrico come riportato nella tabella seguente.

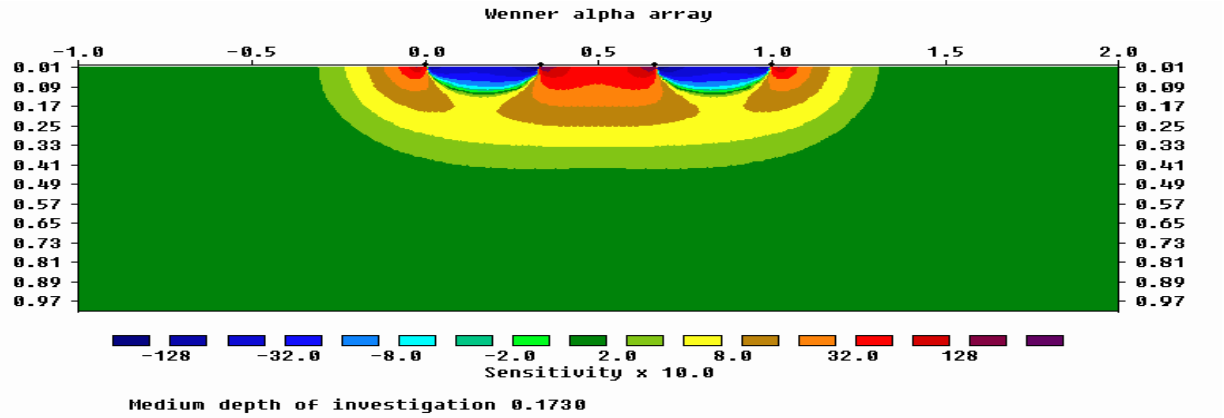
Nome Linea	N° elettrodi	Interdistanza degli elettrodi [m]	Lunghezza [m]
ERT 1	24	2,0 m	46 m
ERT 2	24	2,0 m	46 m

Array Wenner



Questo tipo di arrangiamento è caratterizzato dal fatto che gli elettrodi di potenziale sono posti al centro degli elettrodi di corrente e la distanza tra i vari elettrodi (distanza interelettrodica) è sempre la stessa ed è pari ad **a**.
Il valore del fattore geometrico relativo a tale dispositivo è pari a 2πa e quindi il fattore geometrico del Wenner, risulta essere, il più basso tra i dispositivi più comunemente utilizzati. Pertanto è il tipo di *array* che consente di ottenere la massima intensità del segnale e i dati che si misurano con questo dispositivo risultano essere poco rumorosi.

La funzione *sensitivity* per un dispositivo Wenner presenta un andamento quasi orizzontale al disotto del centro del dispositivo (figura seguente); ne consegue che questa tipologia di *array* è relativamente sensibile ai cambiamenti verticali di resistività al di sotto del centro dello stendimento, ma è meno sensibile alle variazioni orizzontali della resistività.



La pseudo-sezione di resistività (o tomografia di prima specie) fornisce un'immagine approssimativa ed immediata della distribuzione di resistività lungo la sezione verticale di sottosuolo sottesa al profilo di misura; può essere quindi considerata come un'immagine sfocata della configurazione elettrica del sottosuolo. La tomografia geoelettrica vera e propria si ottiene mettendo a fuoco l'immagine di resistività apparente in modo da definire meglio le geometrie dei corpi sepolti. È possibile risolvere questo problema (cioè passare da una pseudo-sezione a una tomografia) applicando la tecnica d'inversione di *Loke & Barker* implementata nel software Res2Dinv v4.01 prodotto dalla Geotomo (Malesia) e impiegato nel presente lavoro. Di seguito viene esposto il procedimento utilizzato comunemente per l'analisi.

- Il procedimento di calcolo prevede la suddivisione iniziale del volume in una griglia di regolarizzazione (analoga a quella impiegata nelle computazioni ad elementi finiti). Ad ogni cella della griglia viene attribuito un valore di resistività sulla base dei dati misurati ed a quelle di confine viene impostata una resistività pari alla media delle letture eseguite.
- Il modello iniziale viene quindi sottoposto ad un processo di inversione che utilizza una *routine* conosciuta con il nome di *smoothness-constrained least-square method* (De Groot-Hedlin e Constable 1990, Sasaki 1992) implementata con una tecnica di ottimizzazione quasi-Newtoniana (Loke e Barker 1996) che la velocizza notevolmente. Le elaborazioni considerano in blocco tutti i dati acquisiti ed ottimizzano un modello a celle di resistività. Questo modello è meno viziato

dalla assunzione di una elettrostratigrafia piana valida per il monodimensionale e risulta, quindi, più adattabile alle complesse geometrie che si incontrano nella realtà.

- L'inversione ha termine al momento in cui si ottiene una buona coincidenza, in senso statistico (scarto quadratico medio), tra i dati sperimentali e quelli teorici (confronto tra pseudosezioni misurate e calcolate).
- Disponendo di una taratura (sondaggio meccanico o dati desunti da scavi) il modello geoelettrico del sottosuolo proposto al termine dell'analisi può essere ricondotto a quello geolitologico.

Indagini sismiche di tipo passivo a stazione singola (H.V.S.R.)

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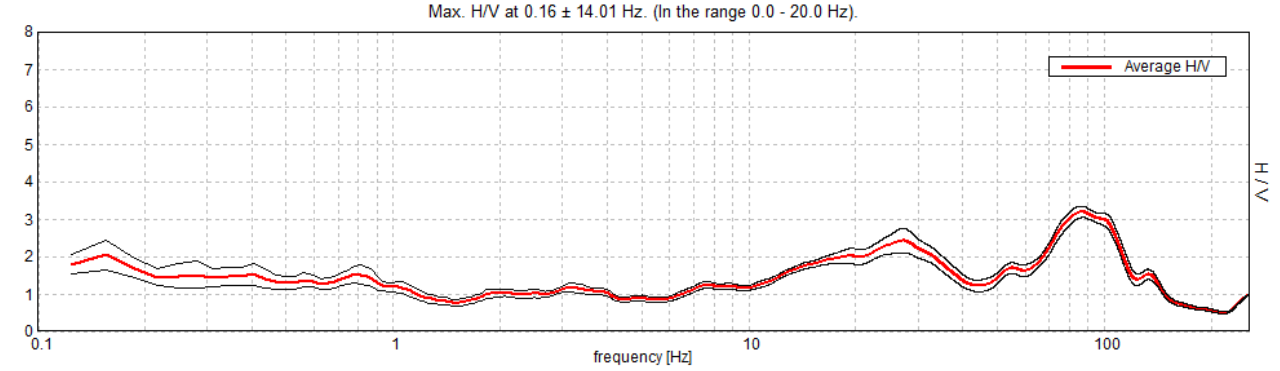
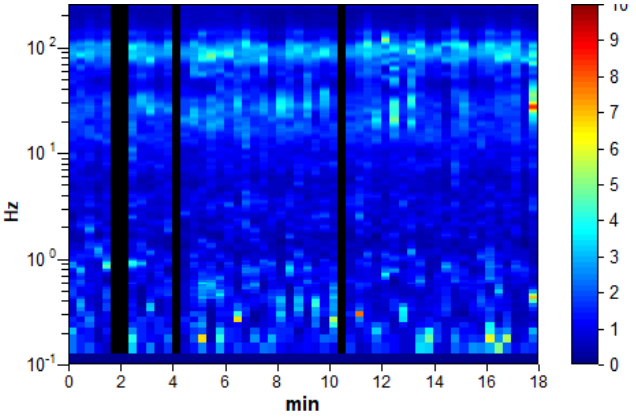
CAVRIAGO, P1

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 10:10:42 End recording: 14/02/20 10:28:42
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.4504 E, 44°41.8227 N (54.5 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analyzed 93% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

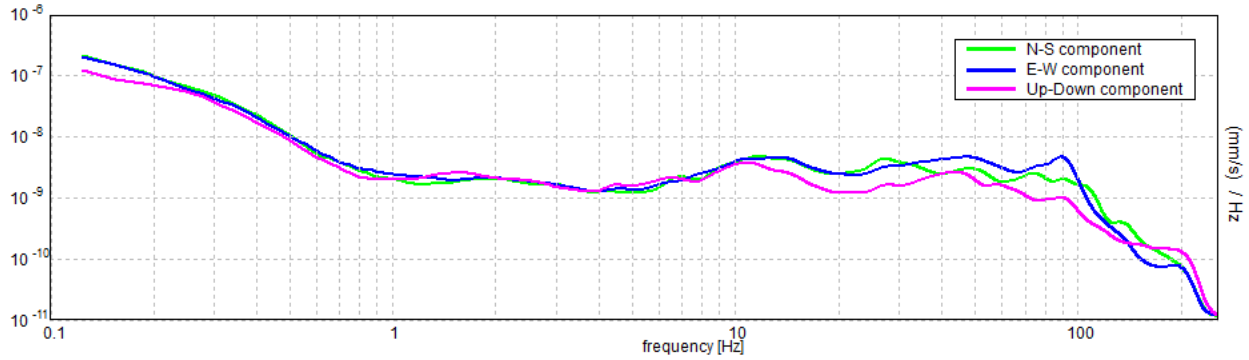
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.16 ± 14.01 Hz (in the range 0.0 - 20.0 Hz).

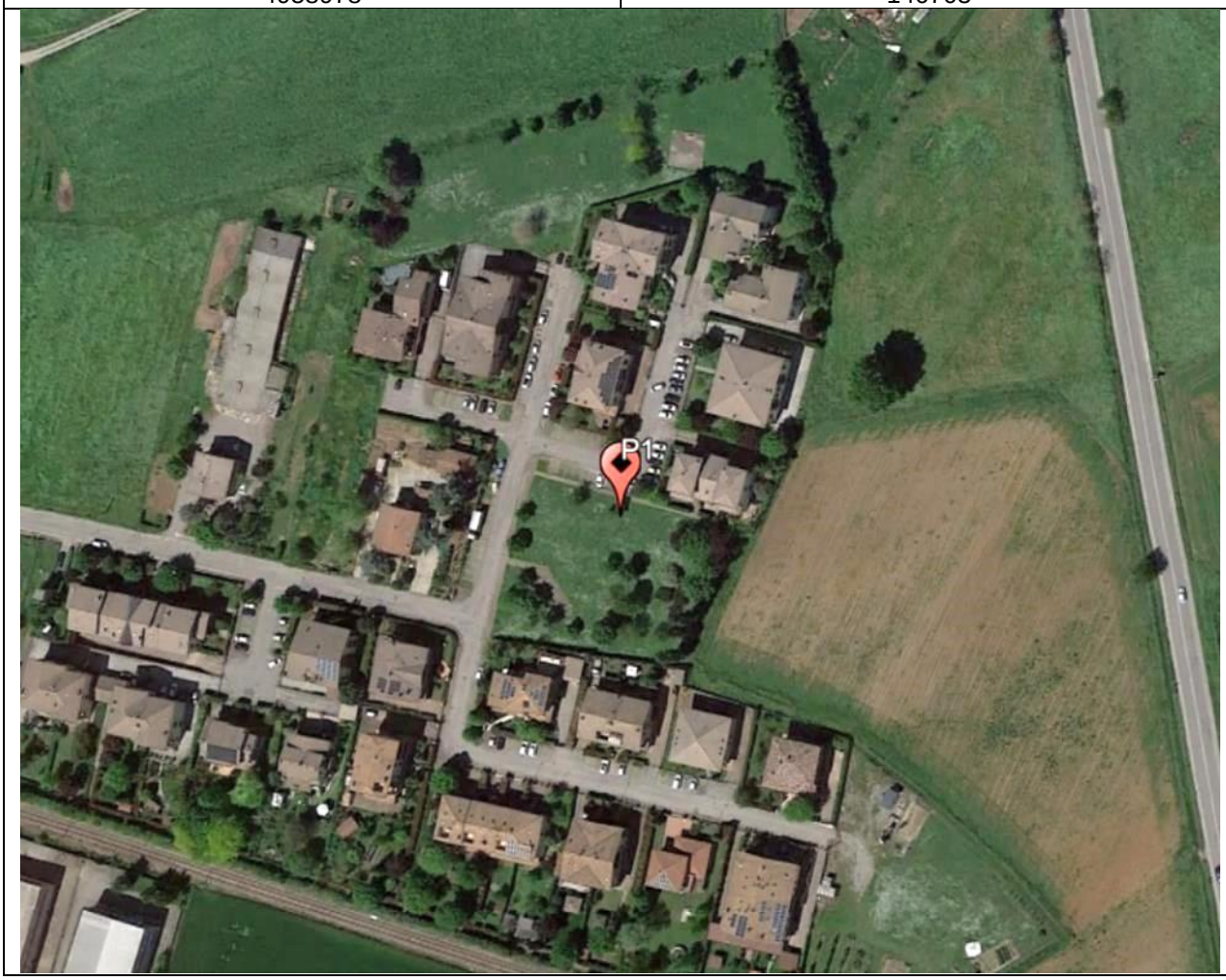
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.16 > 0.50		**NO**
$n_c(f_0) > 200$	156.3 > 200		**NO**
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 8 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			**NO**
$A_0 > 2$	2.03 > 2	**OK**	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|89.66724| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	14.01051 < 0.03906		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.4064 < 3.0	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
0,16 Hz	Bassa

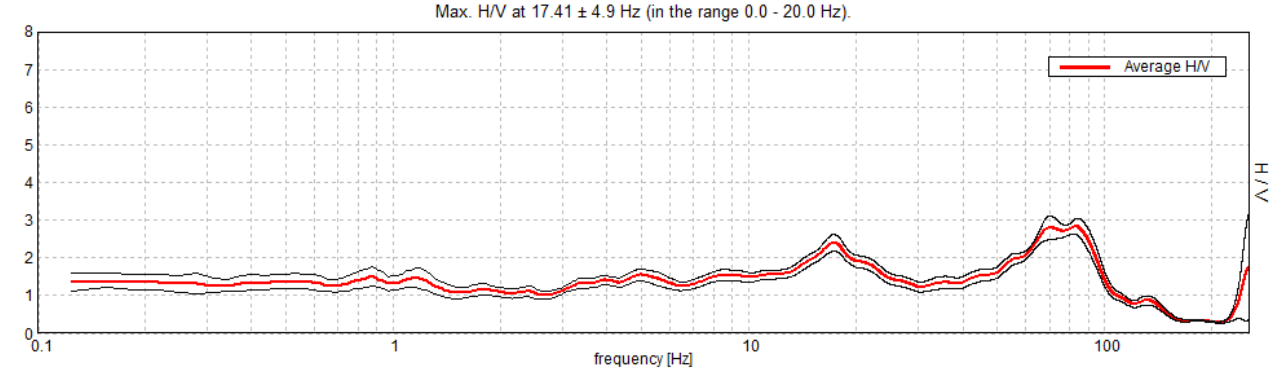
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958978	146703



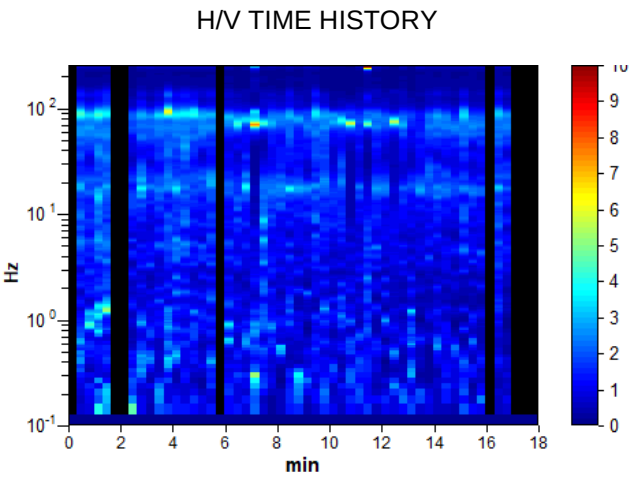
CAVRIAGO, P2

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 10:45:11 End recording: 14/02/20 11:03:11
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.0440 E, 44°41.8602 N (59.1 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analyzed 85% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

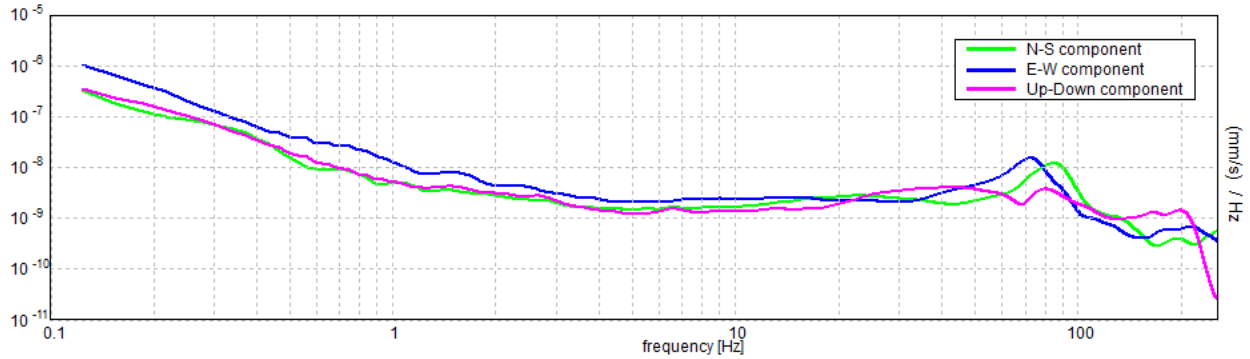
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 17.41 ± 4.9 Hz (in the range 0.0 - 20.0 Hz).

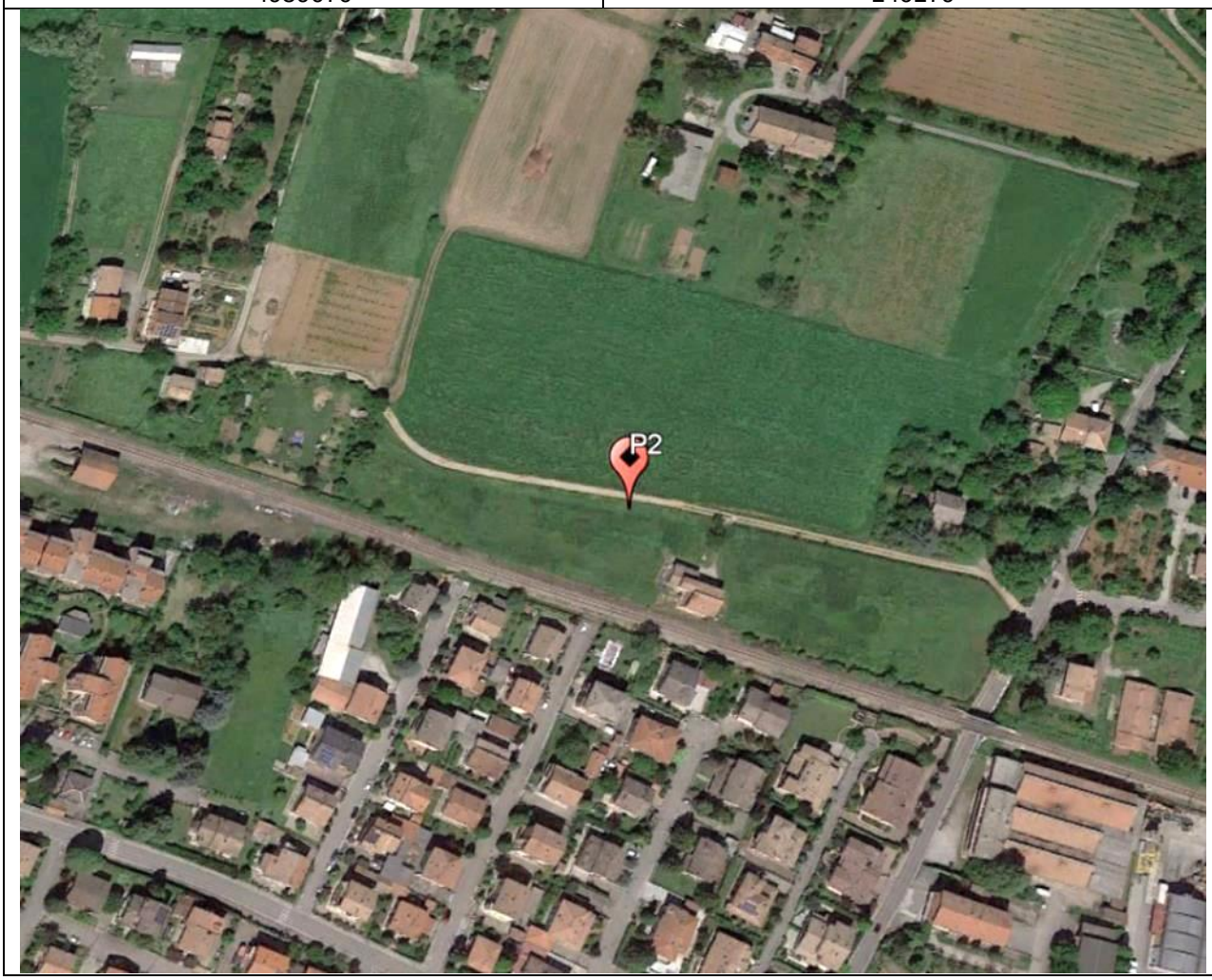
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	17.41 > 0.50	OK	
$n_c(f_0) > 200$	16013.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 836 times	OK	
Criteria for 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
$A_0 > 2$	2.40 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.28136| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	4.89734 < 0.87031		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2215 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
17,41 Hz	Bassa

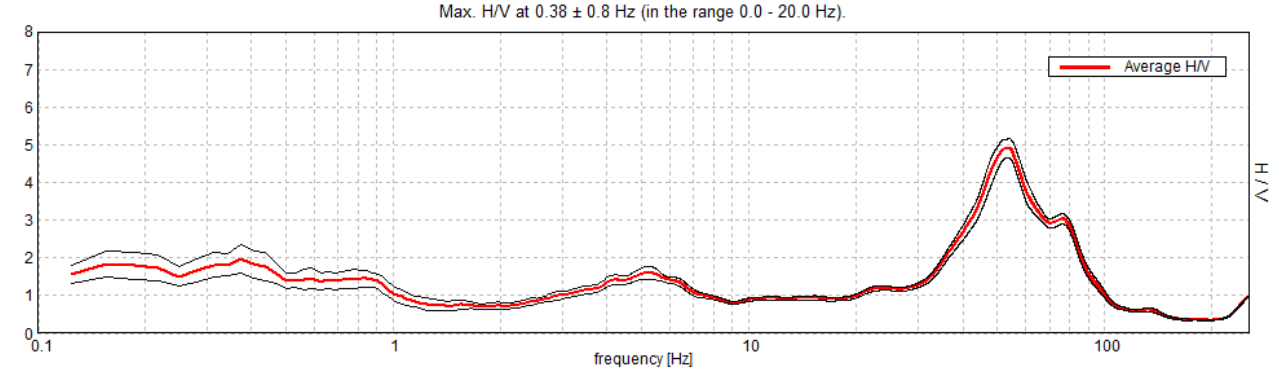
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959070	146179



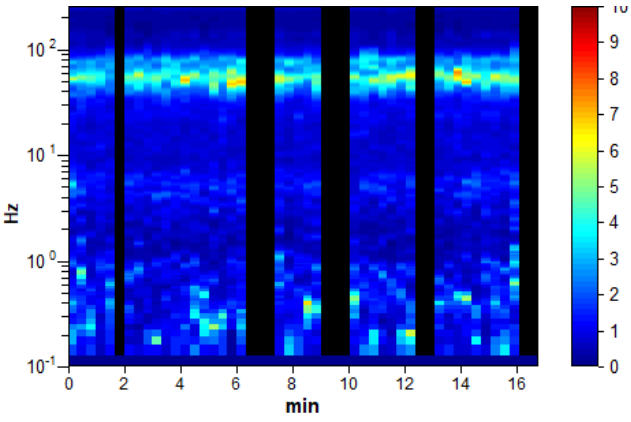
CAVRIAGO, P3

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 11:12:11 End recording: 14/02/20 11:28:59
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.9920 E, 44°41.6594 N (73.8 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'48". Analyzed 78% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

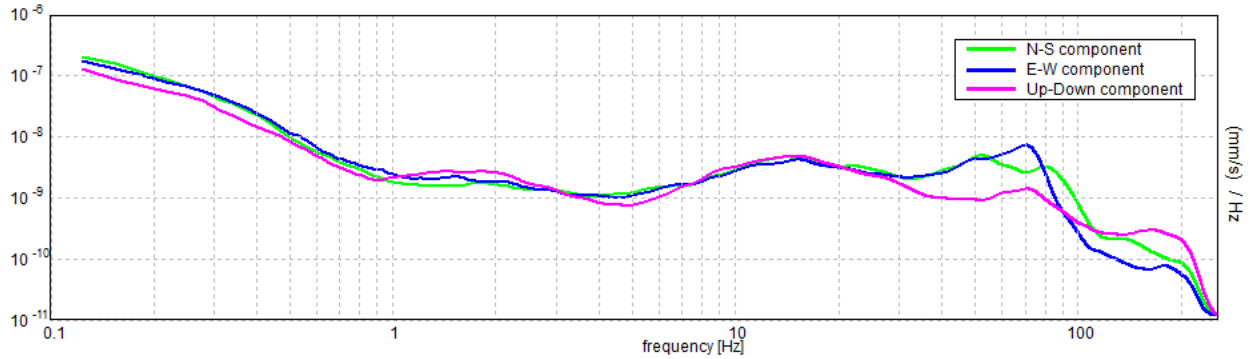
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.38 ± 0.8 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.38 > 0.50		**NO**
$n_c(f_0) > 200$	292.5 > 200	**OK**	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 19 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	1.063 Hz	**OK**	
$A_0 > 2$	1.96 > 2		**NO**
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|2.12245| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	0.79592 < 0.075		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.3785 < 2.5	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

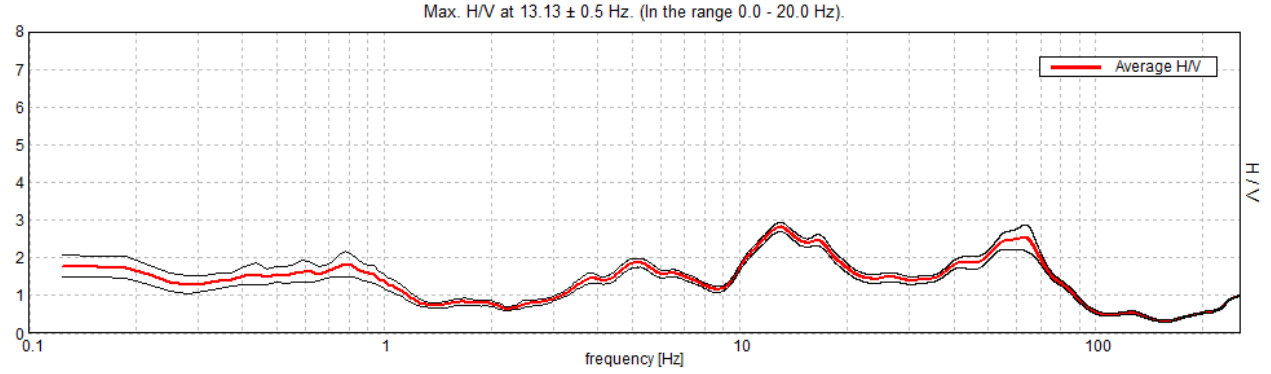
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958705	146075

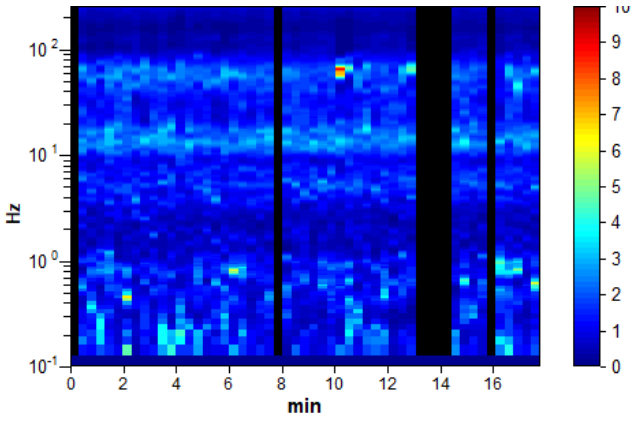
CAVRIAGO, P4

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 11:35:02 End recording: 14/02/20 11:53:00
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS data not available
Trace length: 0h17'48". Analyzed 87% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

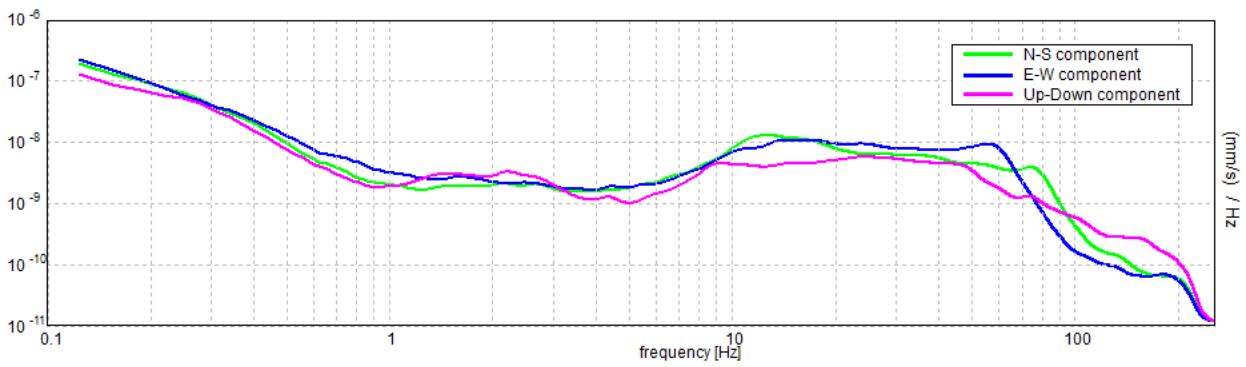
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 13.13 ± 0.5 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	13.13 > 0.50	OK	
$n_c(f_0) > 200$	12075.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 631 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	9.5 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	29.5 Hz	OK	
$A_0 > 2$	2.82 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.03814| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.50059 < 0.65625	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1275 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

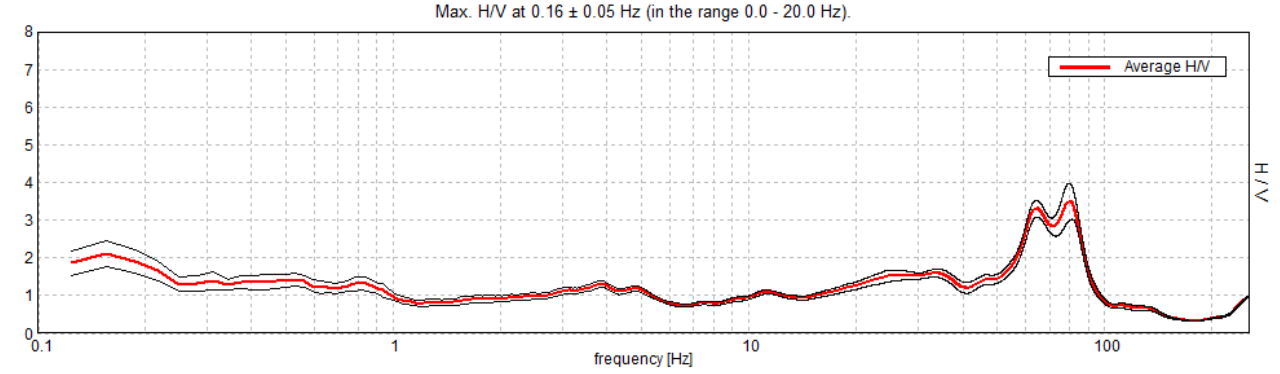
Frequenza caratteristica di sito	Precisione della stima della frequenza
13,13 Hz	Alta

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958953	145650

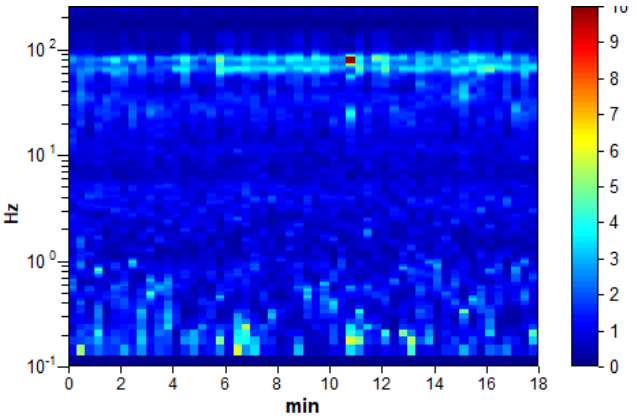
CAVRIAGO, P5

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 11:59:59 End recording: 14/02/20 12:17:59
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.5390 E, 44°41.8677 N (63.1 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

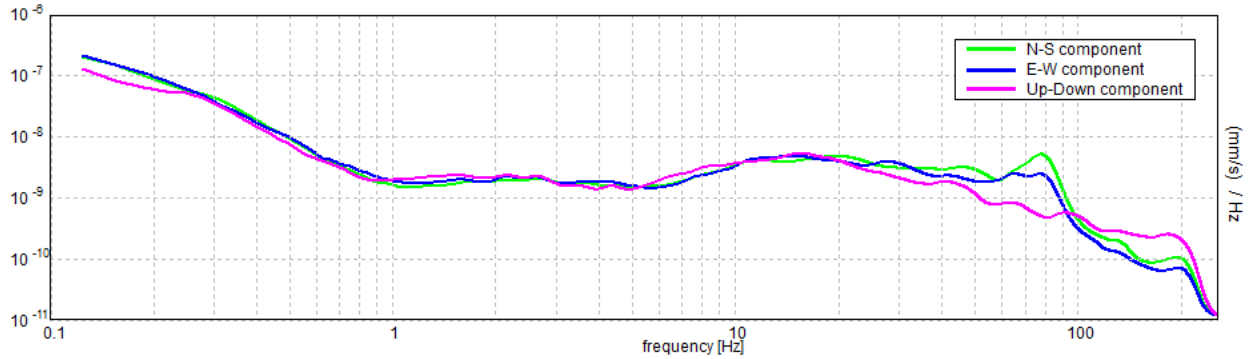
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.16 ± 0.05 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.16 > 0.50		**NO**
$n_c(f_0) > 200$	168.8 > 200		**NO**
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 8 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			**NO**
$A_0 > 2$	2.11 > 2	**OK**	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.34211| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	0.05345 < 0.03906		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.3523 < 3.0	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

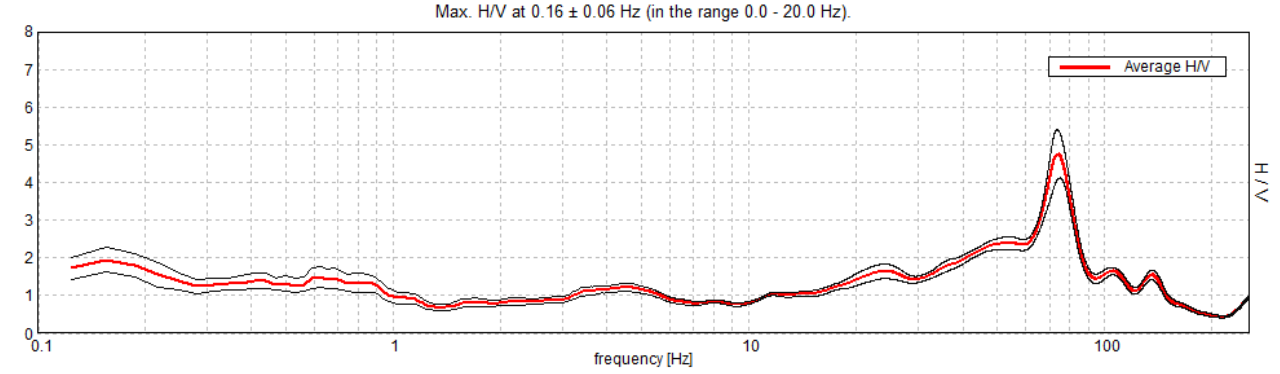
Frequenza caratteristica di sito	Precisione della stima della frequenza
0,16 Hz	Bassa

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959113	145498

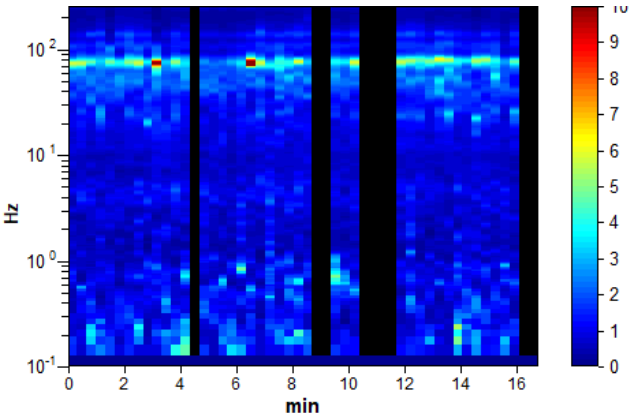
CAVRIAGO, P6

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 12:29:05 End recording: 14/02/20 12:45:53
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.3877 E, 44°41.9555 N (68.3 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h16'48". Analyzed 82% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

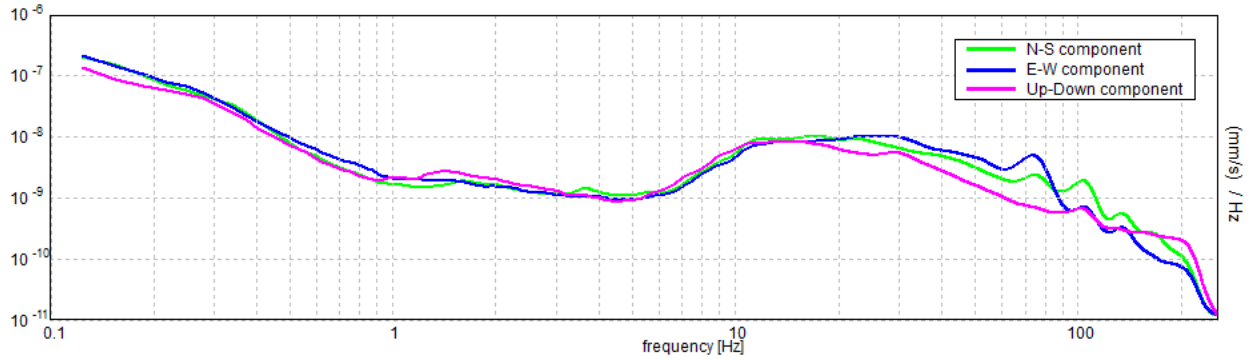
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.16 ± 0.06 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.16 > 0.50		**NO**
$n_c(f_0) > 200$	128.1 > 200		**NO**
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 8 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			**NO**
$A_0 > 2$	1.94 > 2		**NO**
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.39509| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	0.06173 < 0.03906		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.3247 < 3.0	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

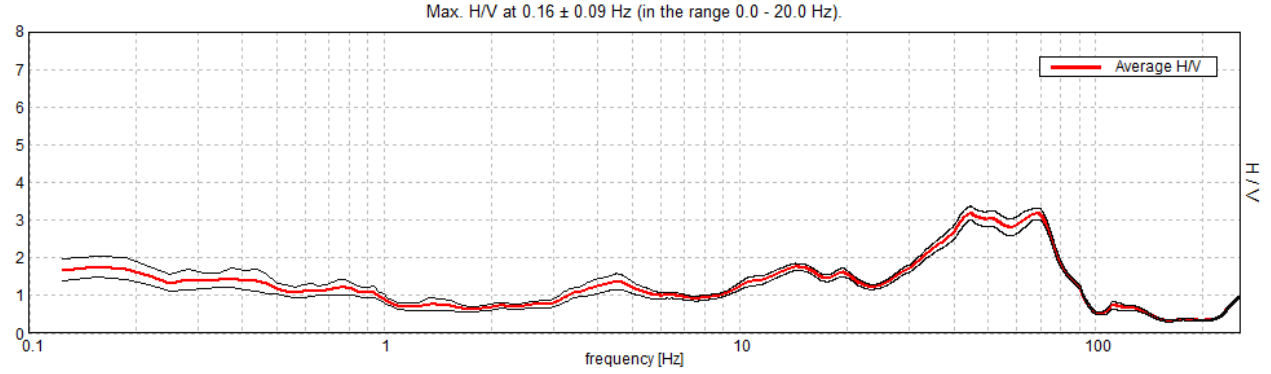
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959291	145312

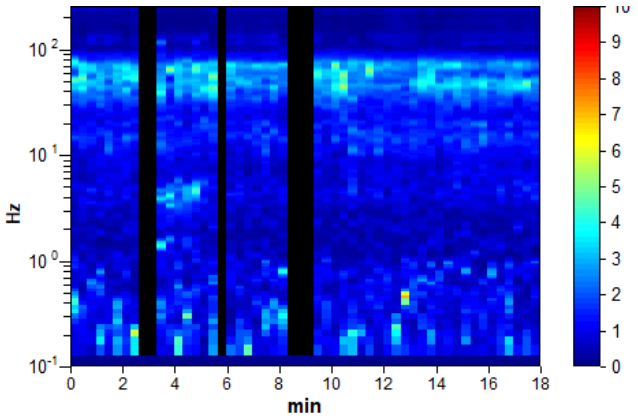
CAVRIAGO, P7

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 14:10:16 End recording: 14/02/20 14:28:16
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS data not available
Trace length: 0h18'00". Analyzed 89% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

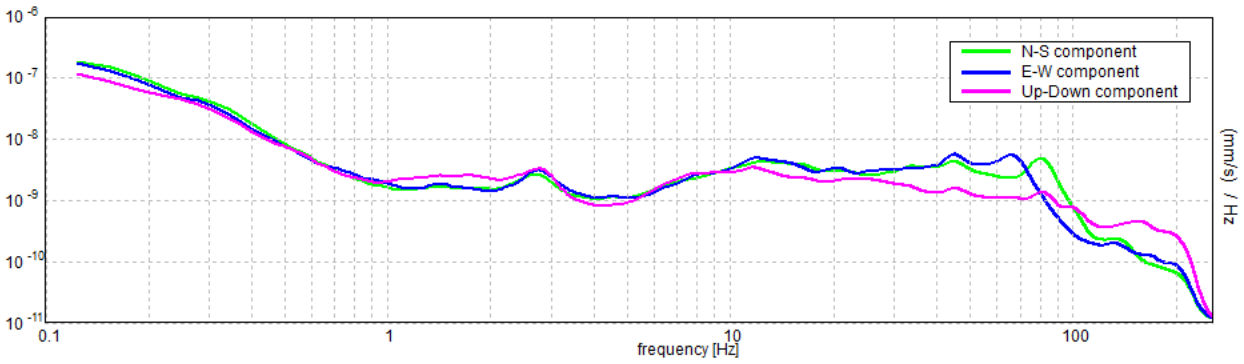
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.16 ± 0.09 Hz (in the range 0.0 - 20.0 Hz).

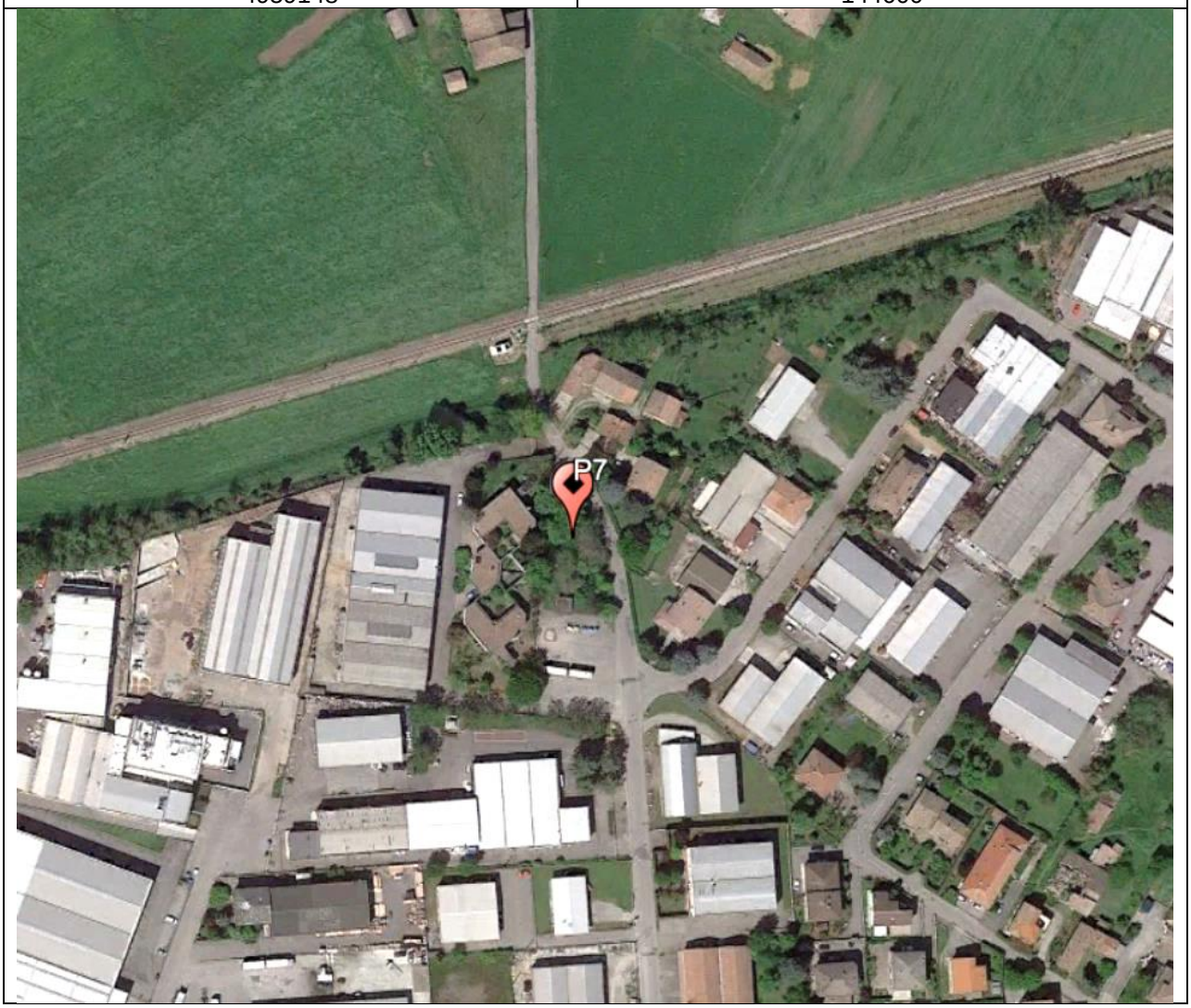
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.16 > 0.50		**NO**
$n_c(f_0) > 200$	150.0 > 200		**NO**
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 8 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			**NO**
$A_0 > 2$	1.77 > 2		**NO**
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.57591| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	0.08999 < 0.03906		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.2789 < 3.0	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

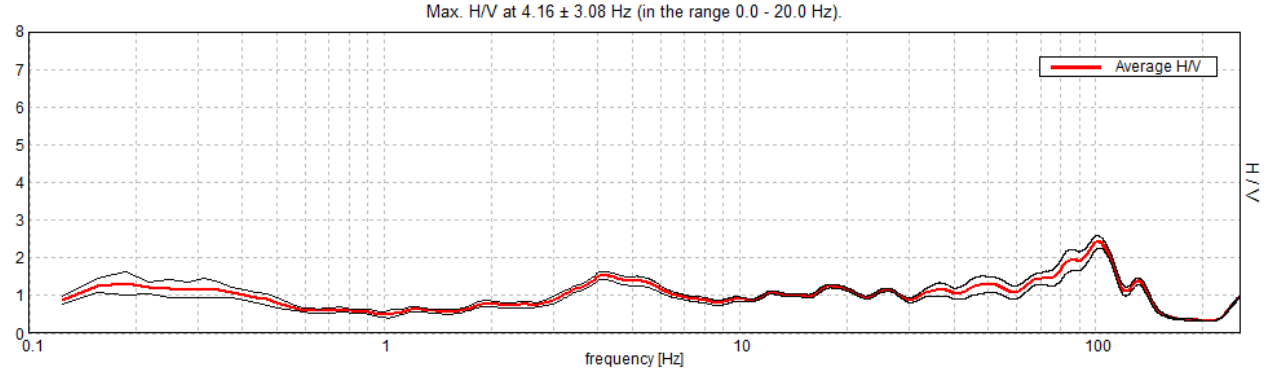
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959148	144600



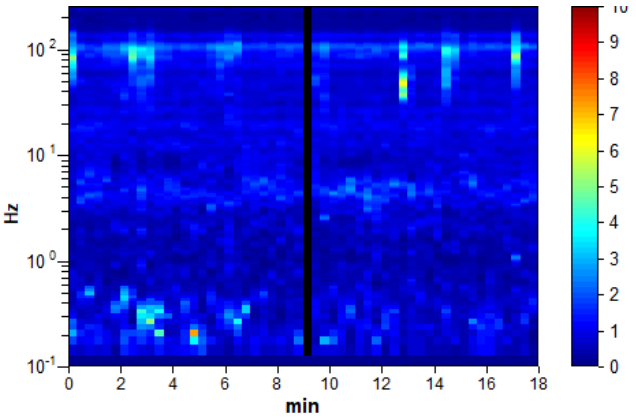
CAVRIAGO, P8

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 14/02/20 14:35:41 End recording: 14/02/20 14:53:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°30.8391 E, 44°41.8832 N (72.7 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analyzed 98% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

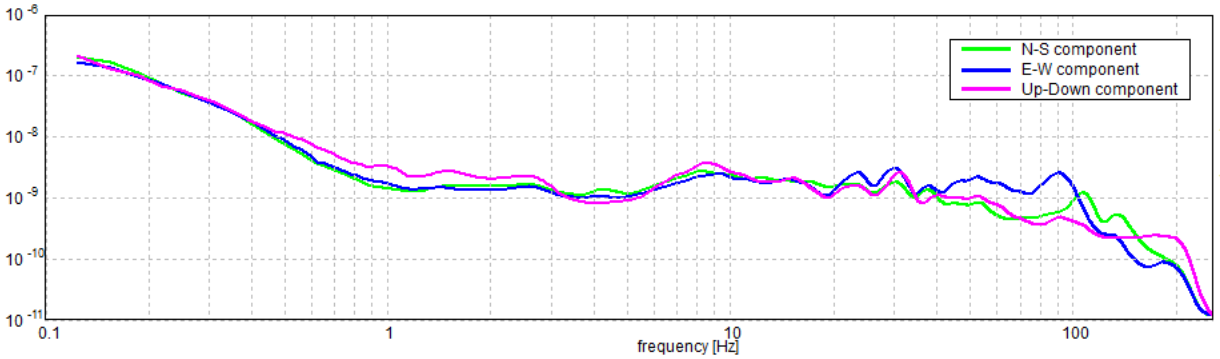
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 4.16 ± 3.08 Hz (in the range 0.0 - 20.0 Hz).

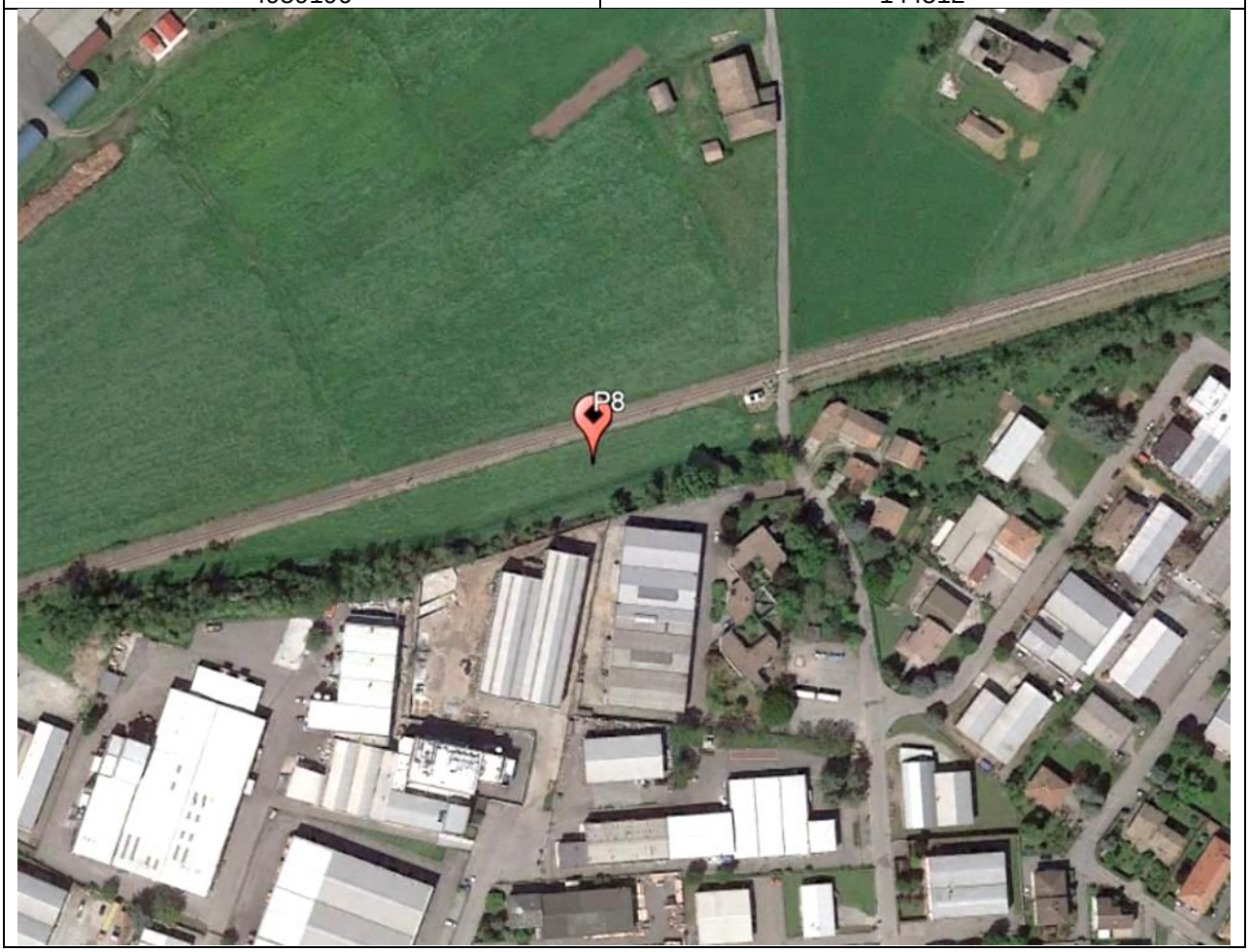
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	4.16 > 0.50	OK	
$n_c(f_0) > 200$	4405.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 200 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	2.719 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.53 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.74202| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	3.08403 < 0.20781		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1092 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

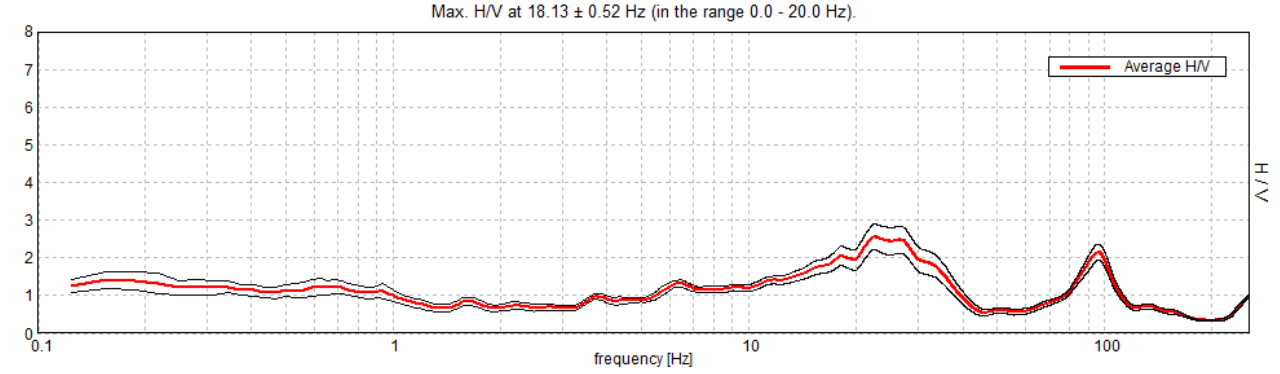
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959196	144512



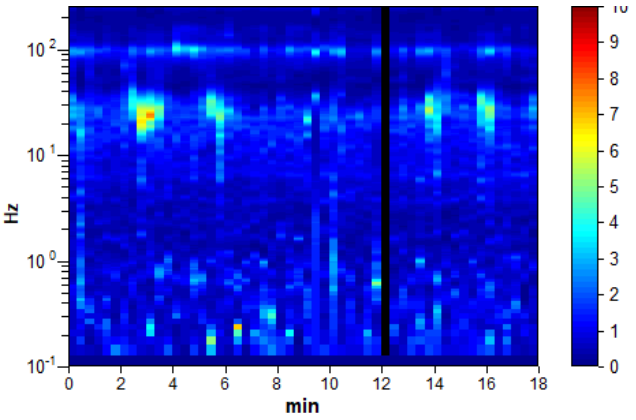
CAVRIAGO, P9

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 10:38:42 End recording: 27/02/20 10:56:42
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.8211 E, 44°42.3784 N (53.0 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analyzed 98% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

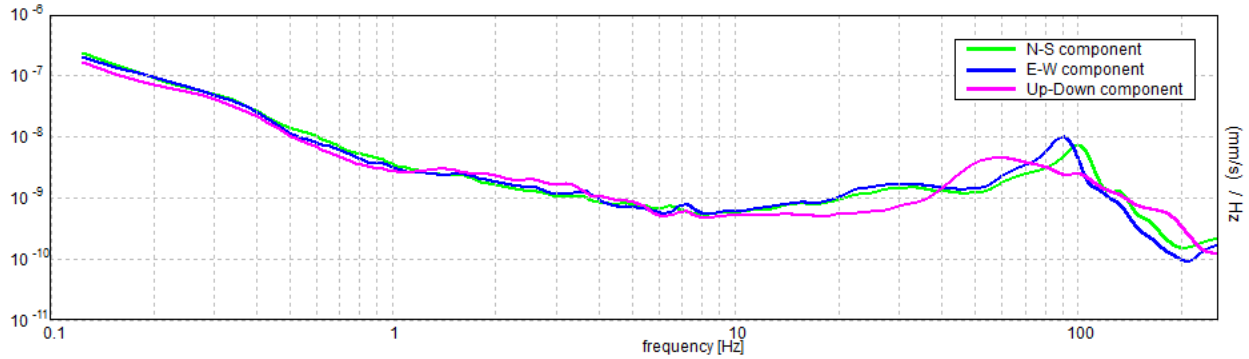
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 18.13 ± 0.52 Hz (in the range 0.0 - 20.0 Hz).

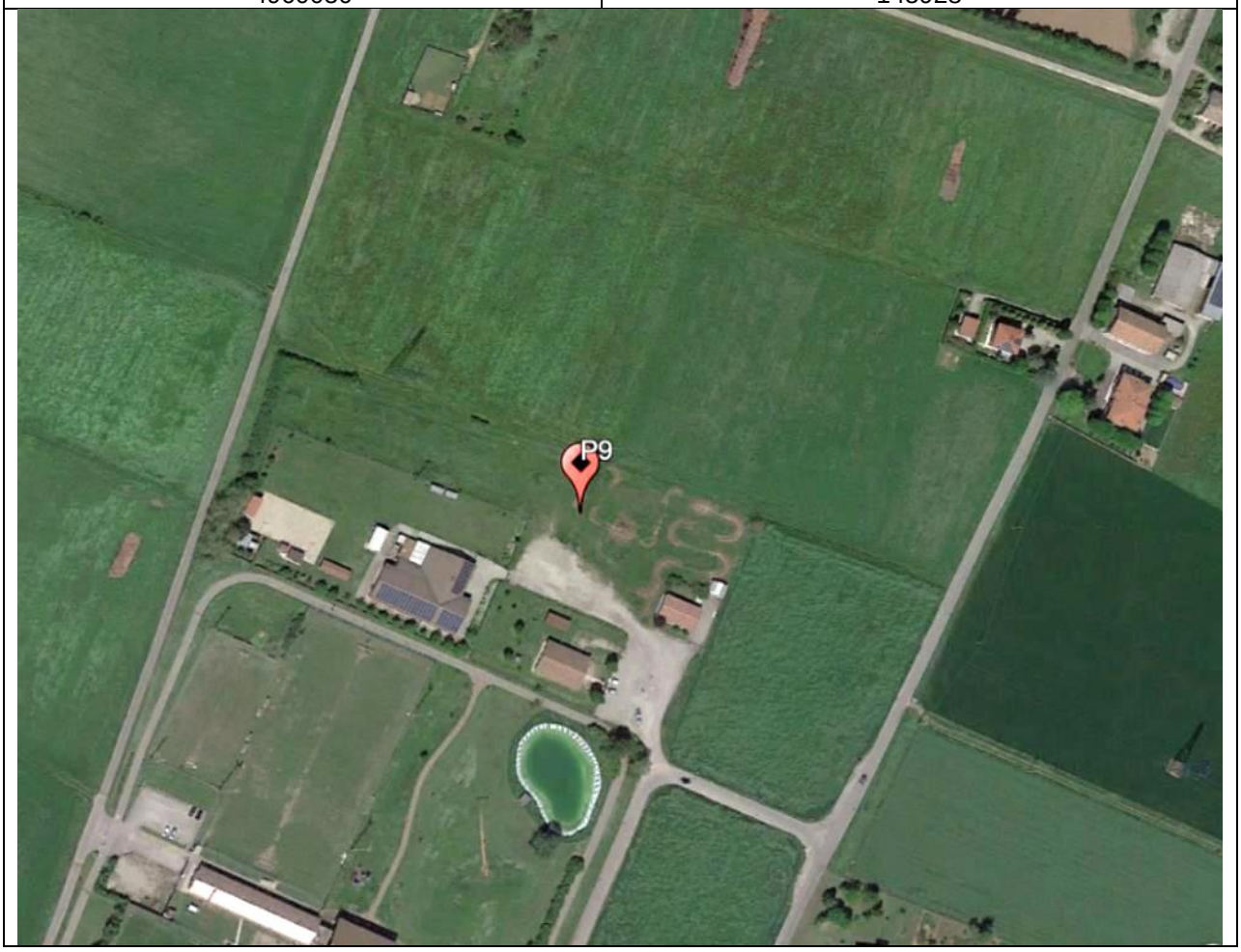
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	18.13 > 0.50	OK	
$n_c(f_0) > 200$	19212.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 871 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	5.531 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	39.156 Hz	OK	
$A_0 > 2$	2.06 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.02891| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.52392 < 0.90625	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.258 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
18,13 Hz	Media

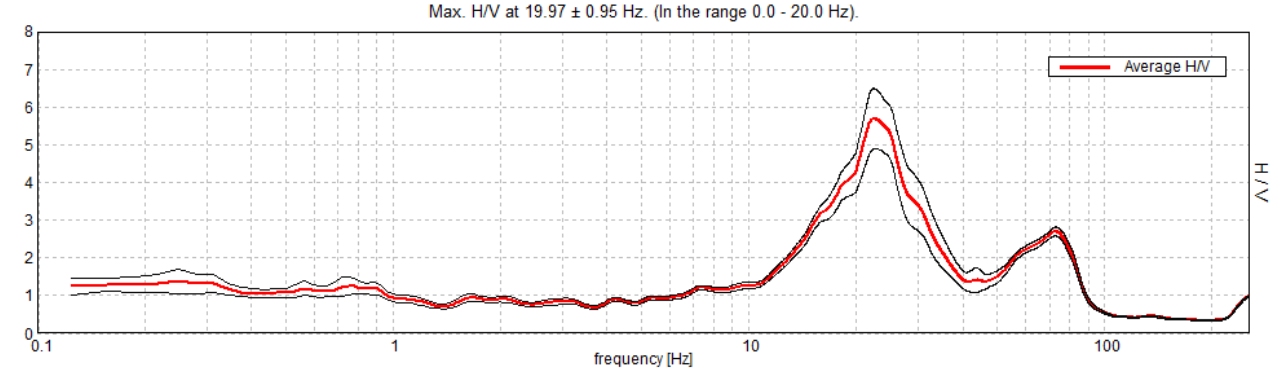
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4960050	145928



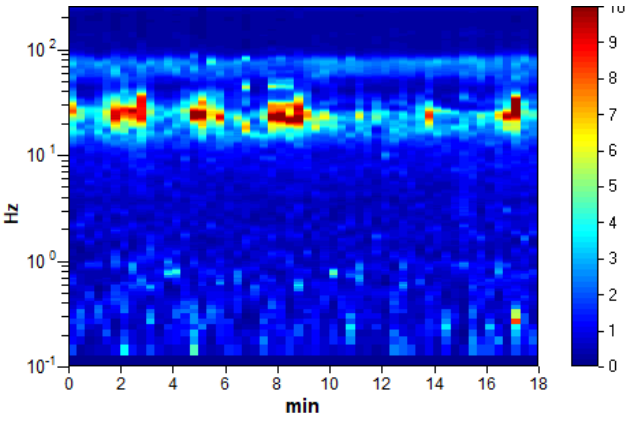
CAVRIAGO, P10

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 11:02:41 End recording: 27/02/20 11:20:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.7064 E, 44°42.1936 N (51.1 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

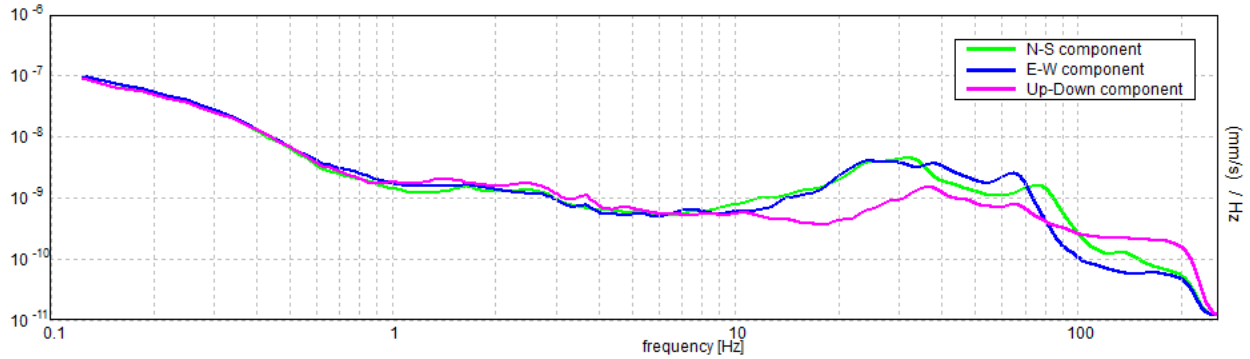
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 19.97 ± 0.95 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	19.97 > 0.50	OK	
$n_c(f_0) > 200$	21566.3 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 960 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	13.313 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	35.188 Hz	OK	
$A_0 > 2$	4.25 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.04734| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.94531 < 0.99844	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.5245 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

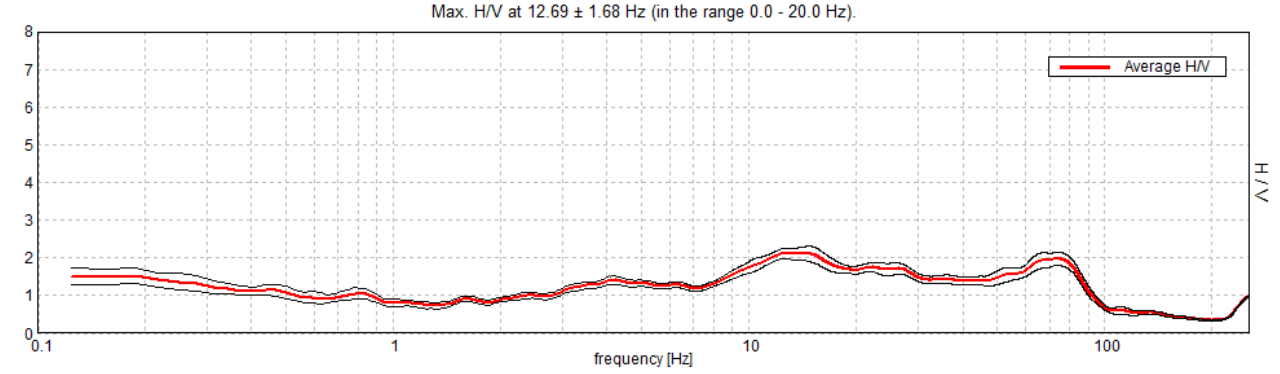
Frequenza caratteristica di sito	Precisione della stima della frequenza
19,97 Hz	Alta

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959713	145756

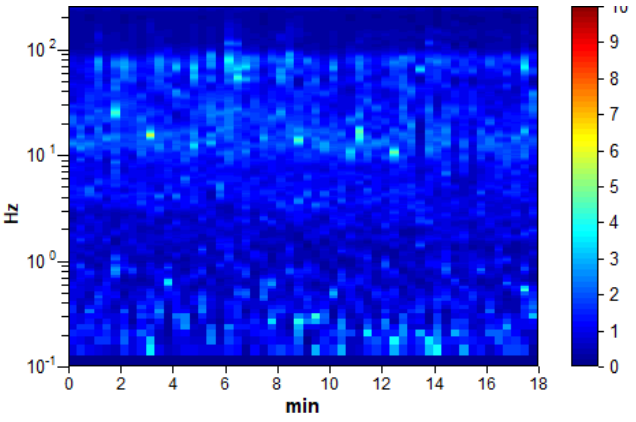
CAVRIAGO, P11

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 11:31:41 End recording: 27/02/20 11:49:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.6704 E, 44°42.0452 N (39.7 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

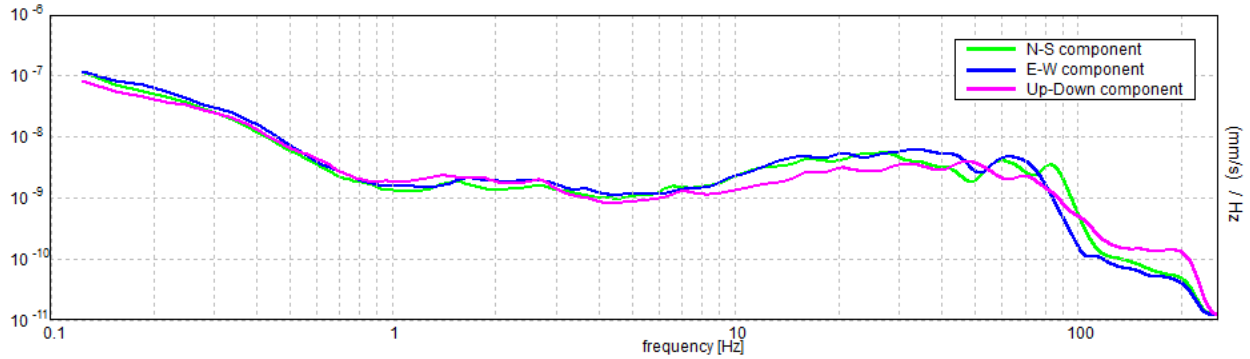
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 12.69 ± 1.68 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	12.69 > 0.50	OK	
$n_c(f_0) > 200$	13702.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 610 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
$A_0 > 2$	2.12 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.13236| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	1.67927 < 0.63438		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1366 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

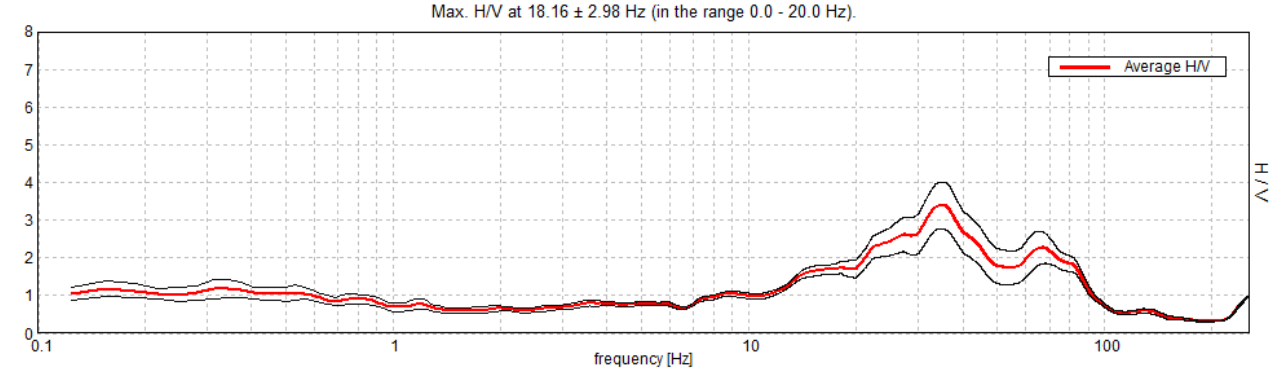
Frequenza caratteristica di sito	Precisione della stima della frequenza
12,69 Hz	Media

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959462	145692

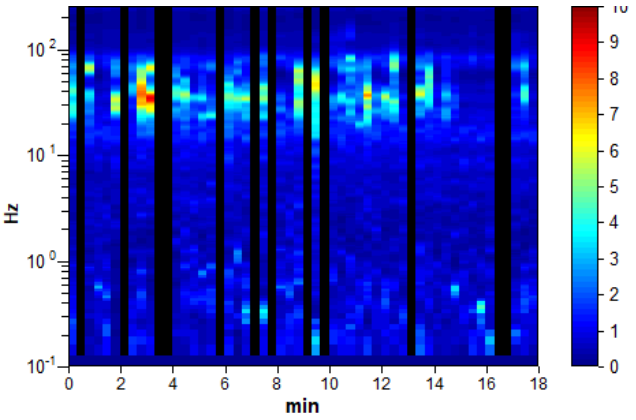
CAVRIAGO, P12

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 12:01:12 End recording: 27/02/20 12:19:12
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.5095 E, 44°42.1792 N (63.3 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 07
Trace length: 0h18'00". Analyzed 78% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

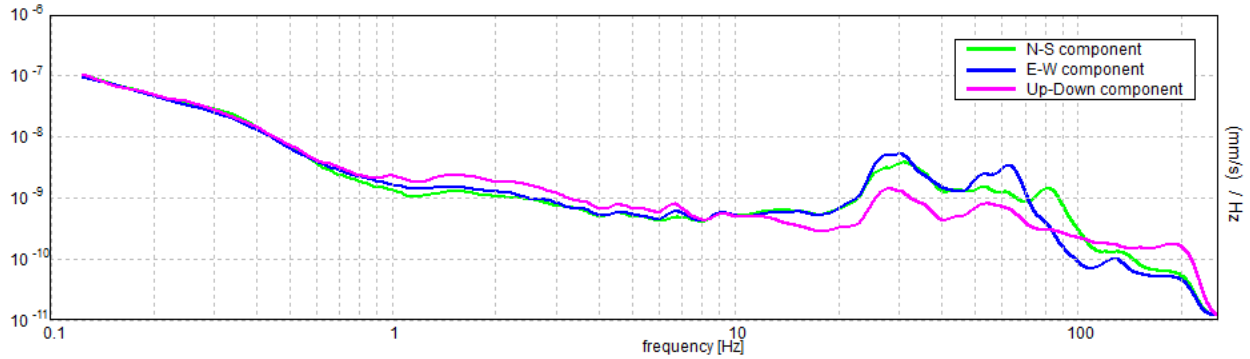
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 18.16 ± 2.98 Hz (in the range 0.0 - 20.0 Hz).

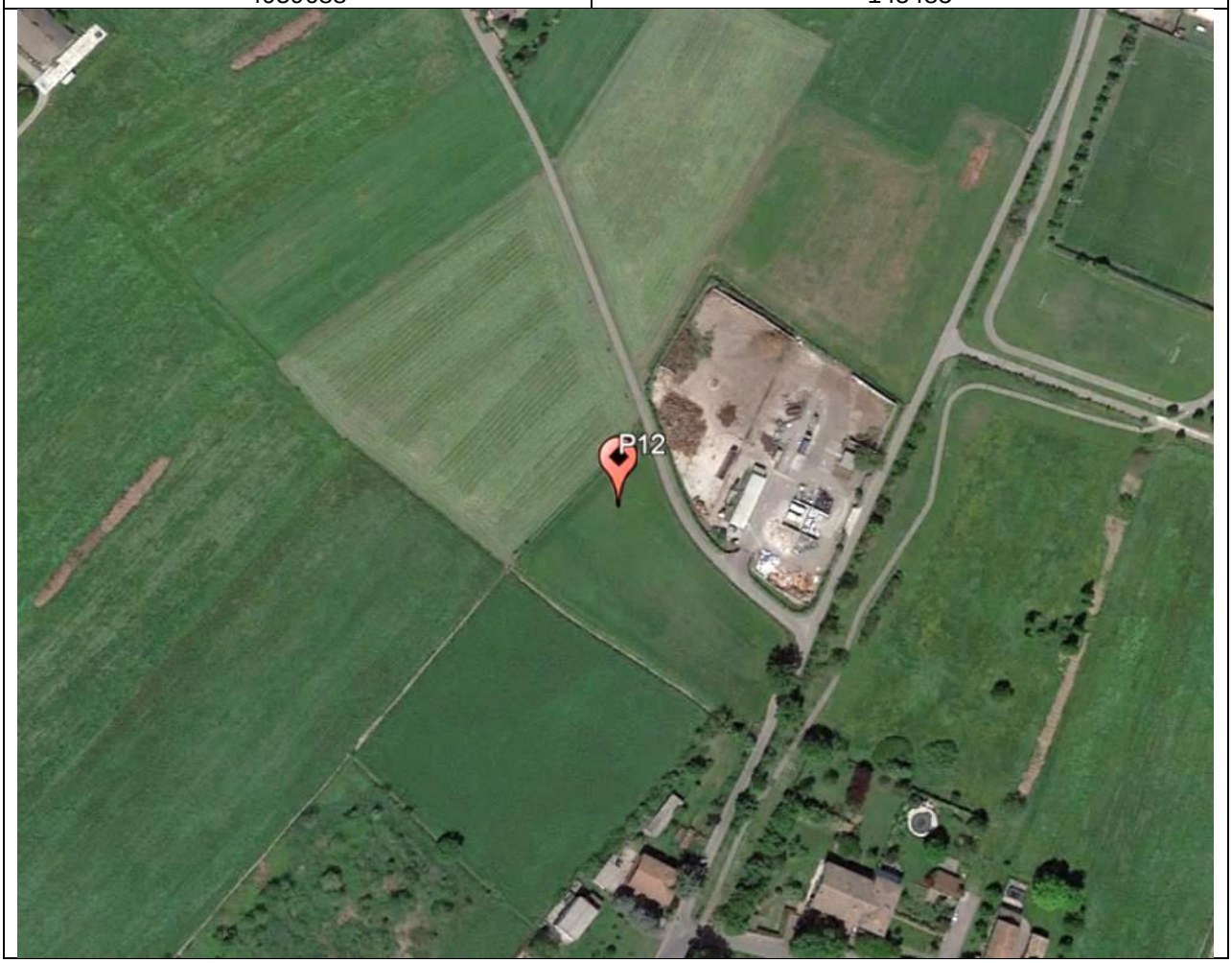
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	18.16 > 0.50	OK	
$n_c(f_0) > 200$	15251.3 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 872 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	7.281 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.75 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.16388| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	2.97543 < 0.90781		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1653 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

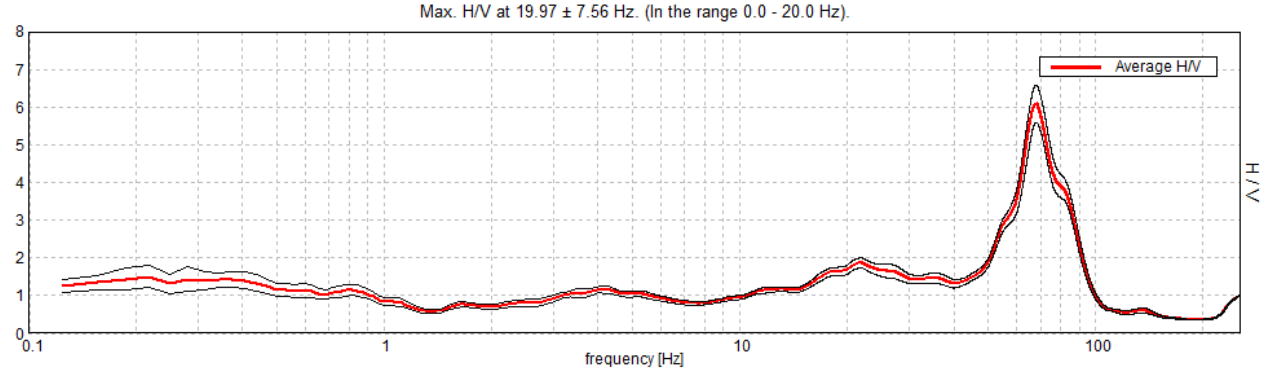
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959688	145485



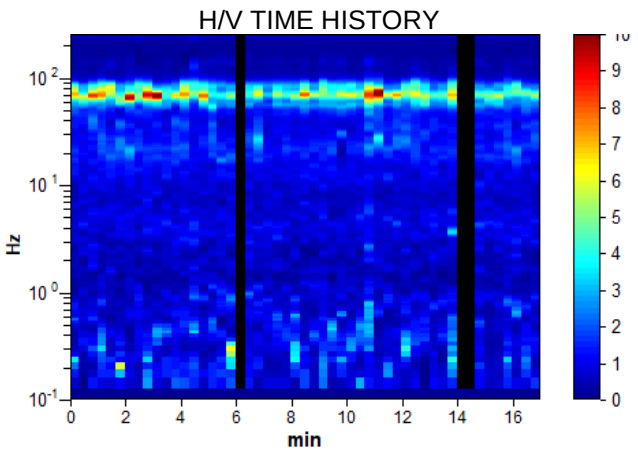
CAVRIAGO, P13

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 12:36:00 End recording: 27/02/20 12:53:00
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.2244 E, 44°41.9687 N (63.0 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h17'00". Analyzed 94% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

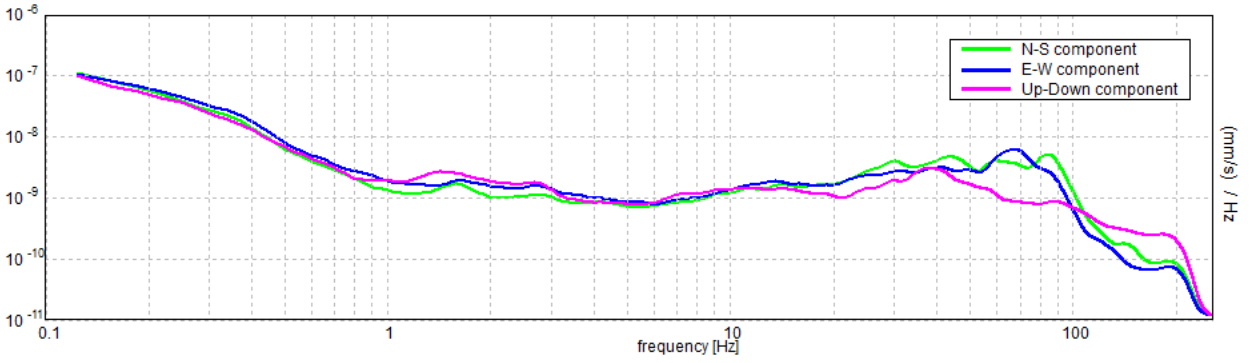
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 19.97 ± 7.56 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	19.97 > 0.50	OK	
$n_c(f_0) > 200$	19170.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 960 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	8.406 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.67 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.37864| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	7.56097 < 0.99844		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1196 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

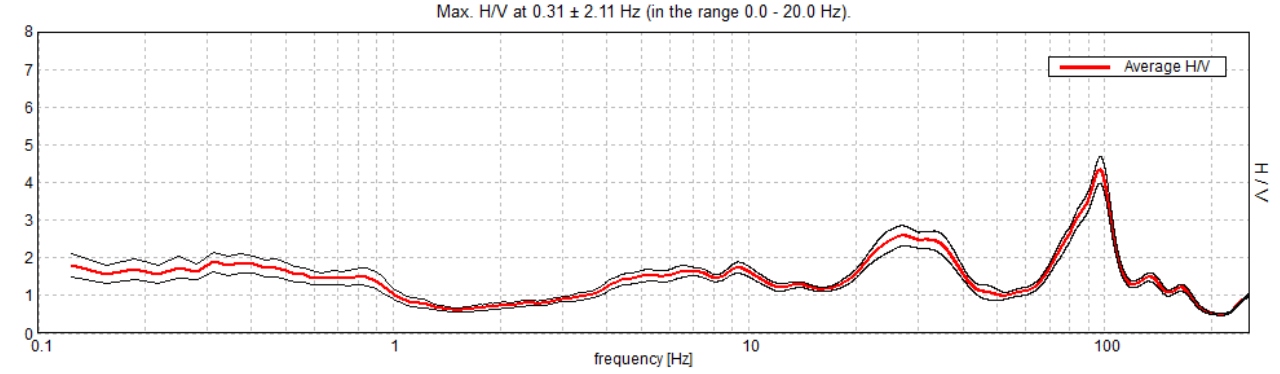
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959323	145084

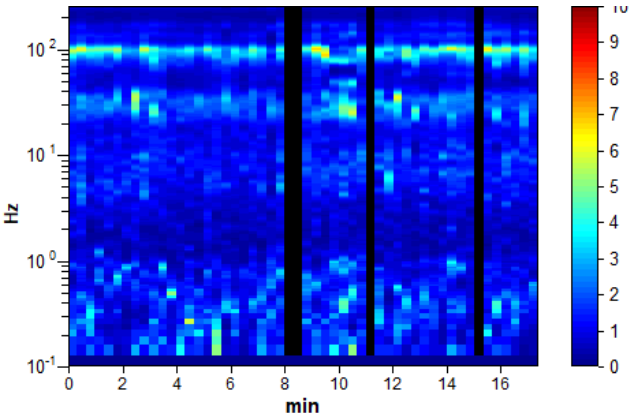
CAVRIAGO, P14

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 14:16:41 End recording: 27/02/20 14:34:05
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.2461 E, 44°41.2383 N (94.4 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h17'24". Analyzed 92% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

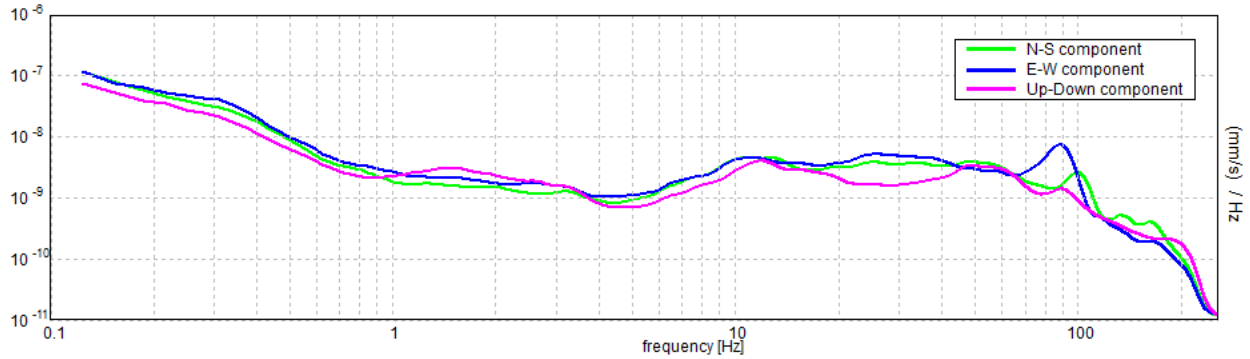
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.31 ± 2.11 Hz (in the range 0.0 - 20.0 Hz).

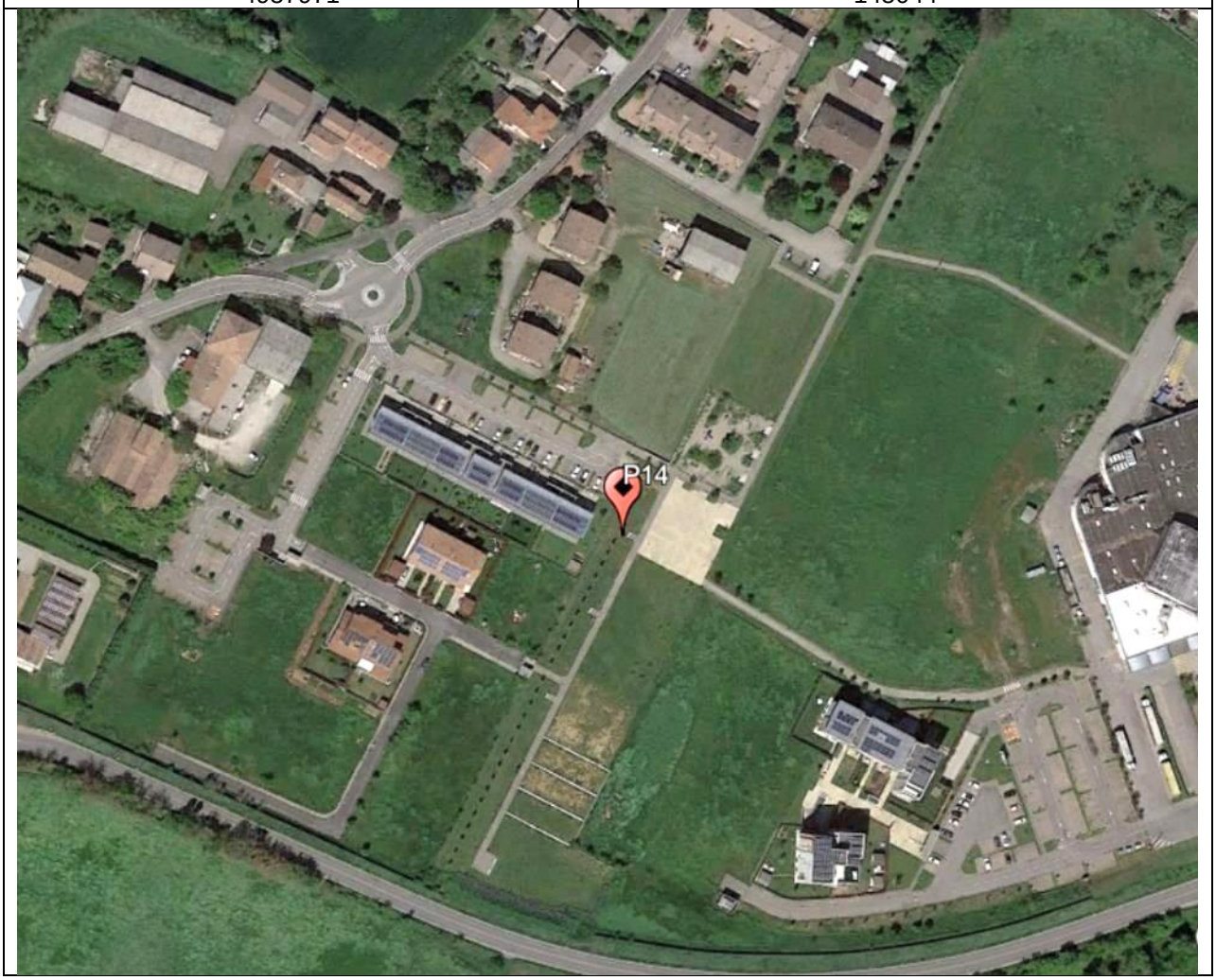
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.31 > 0.50		**NO**
$n_c(f_0) > 200$	300.0 > 200	**OK**	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 16 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	1.063 Hz	**OK**	
$A_0 > 2$	1.89 > 2		**NO**
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|6.74674| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	2.10836 < 0.0625		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.2669 < 2.5	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

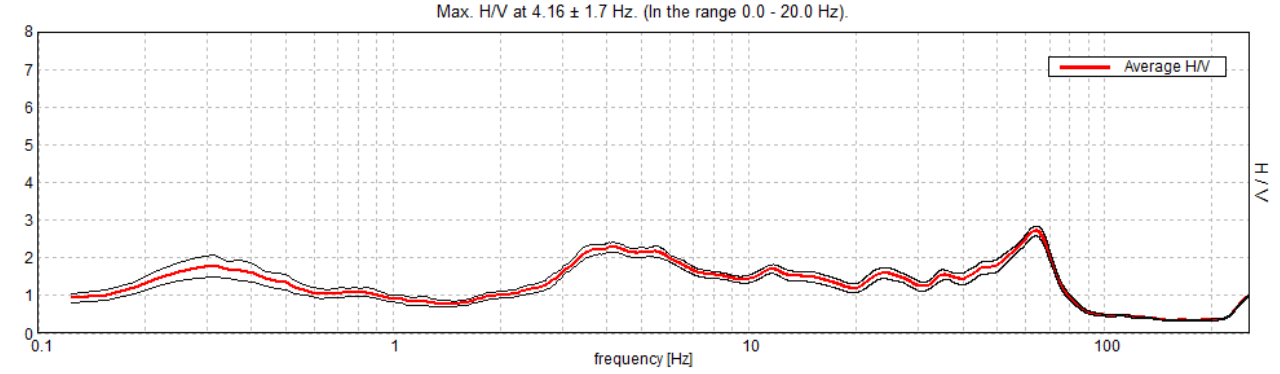
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4957971	145044



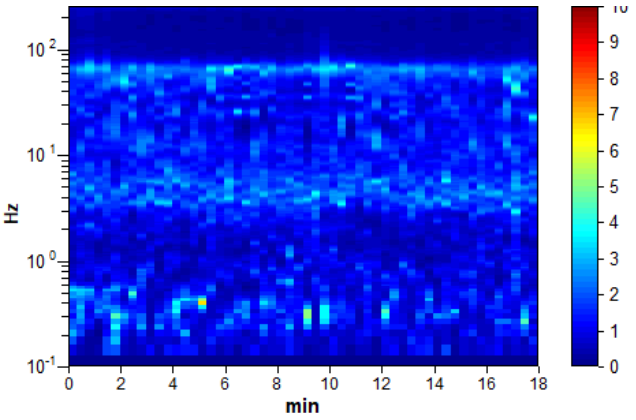
CAVRIAGO, P15

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 14:40:42 End recording: 27/02/20 14:58:42
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.4431 E, 44°41.0647 N (103.1 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

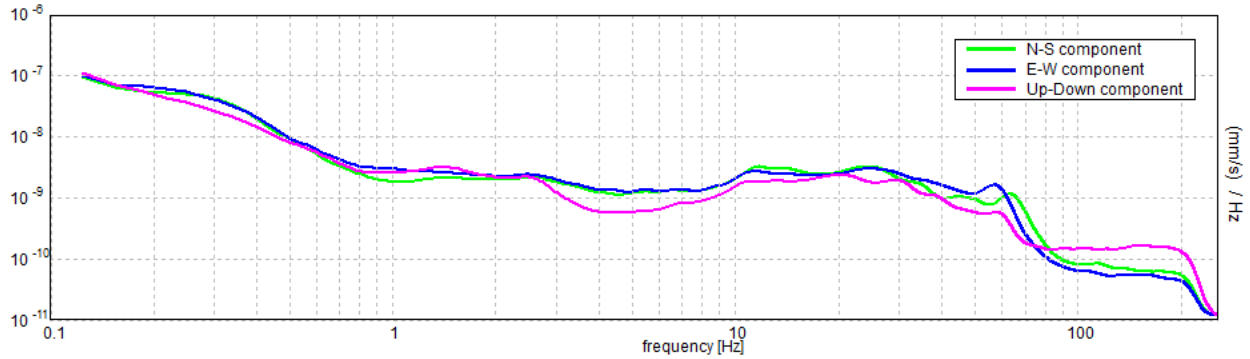
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 4.16 ± 1.7 Hz (in the range 0.0 - 20.0 Hz).

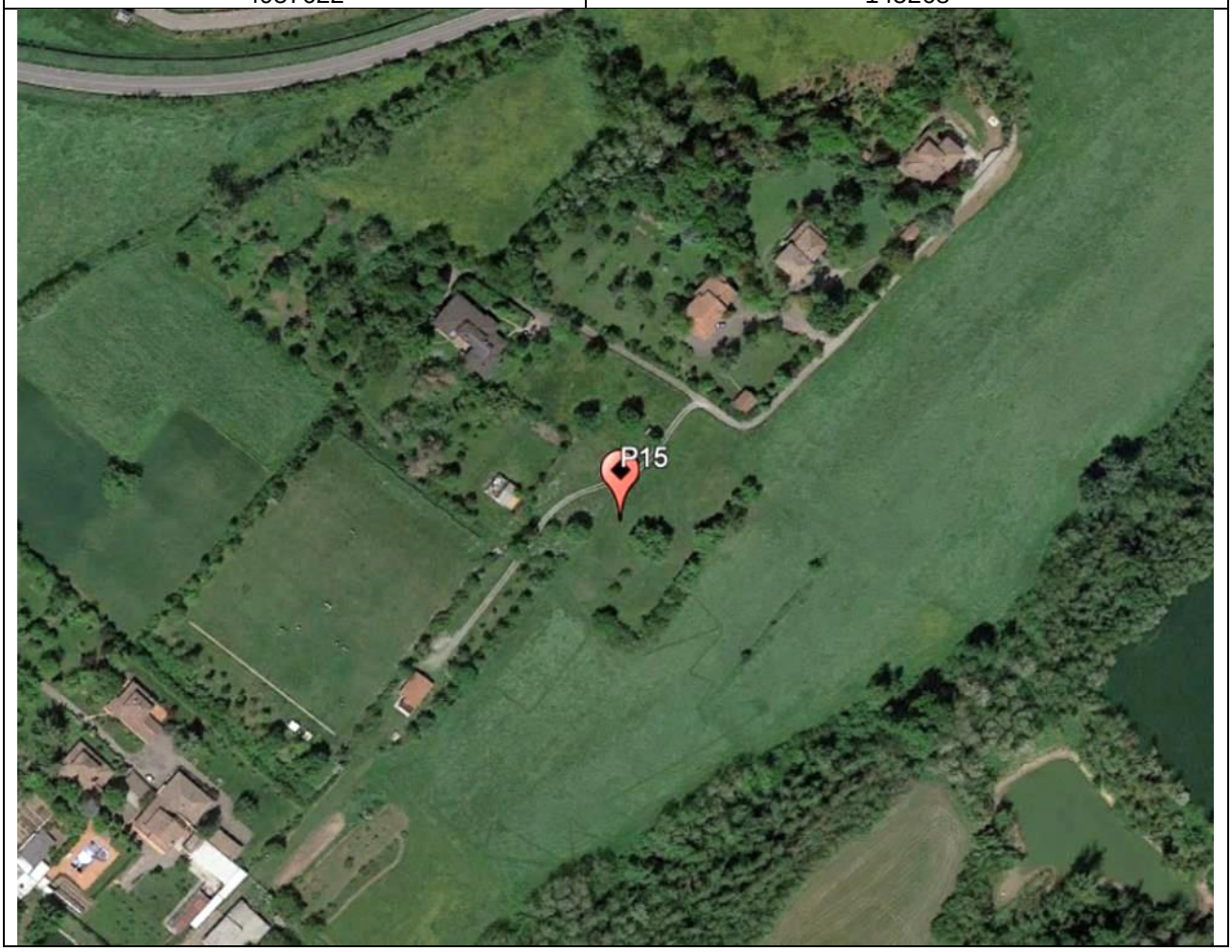
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	4.16 > 0.50	OK	
$n_c(f_0) > 200$	4488.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 200 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	2.344 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	2.28 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.40903| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	1.70005 < 0.20781		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1317 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
4,16 Hz	Alta

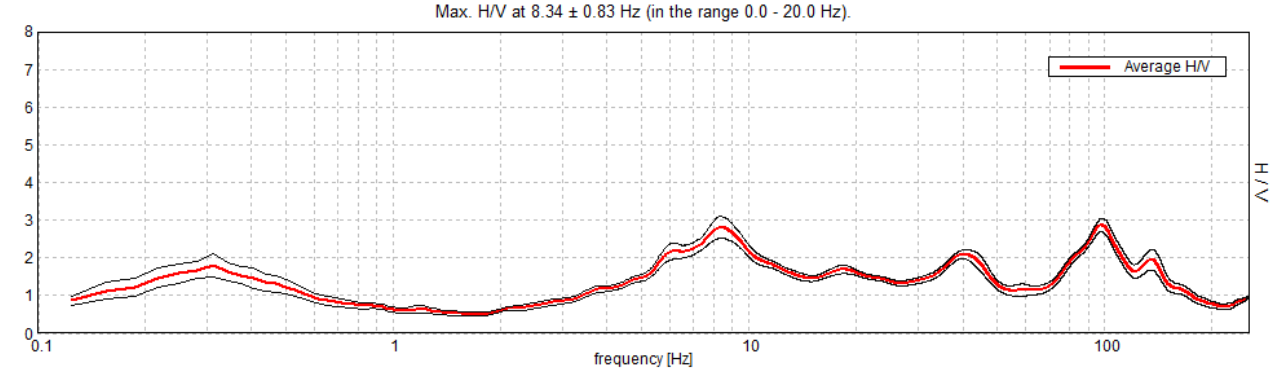
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4957622	145268



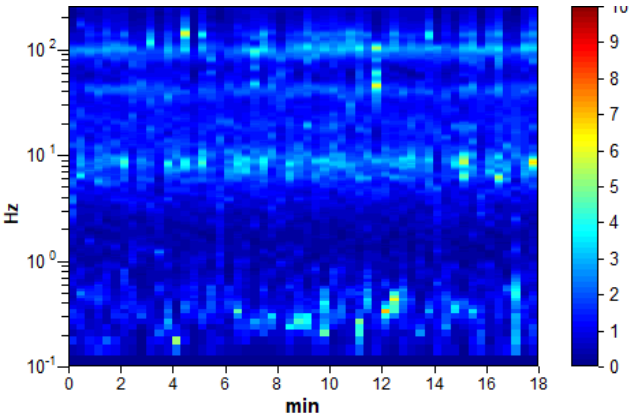
CAVRIAGO, P16

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 15:05:41 End recording: 27/02/20 15:23:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.4890 E, 44°41.1776 N (85.2 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

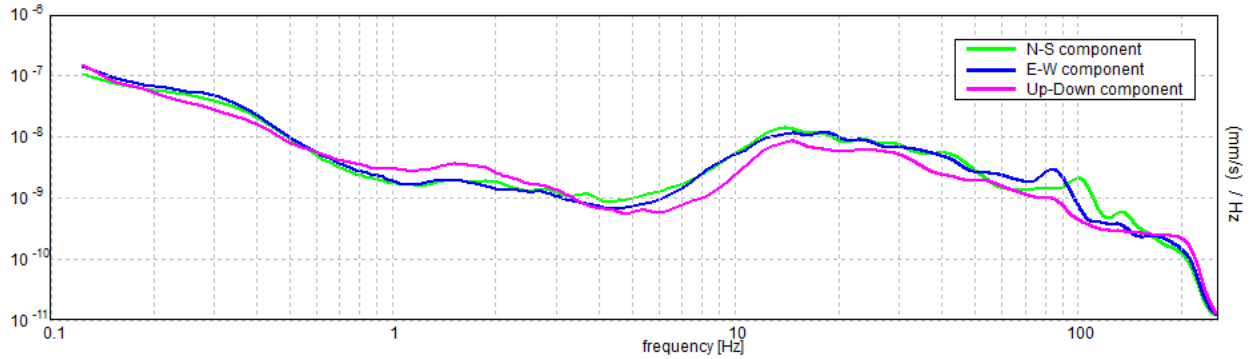
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 8.34 ± 0.83 Hz (in the range 0.0 - 20.0 Hz).

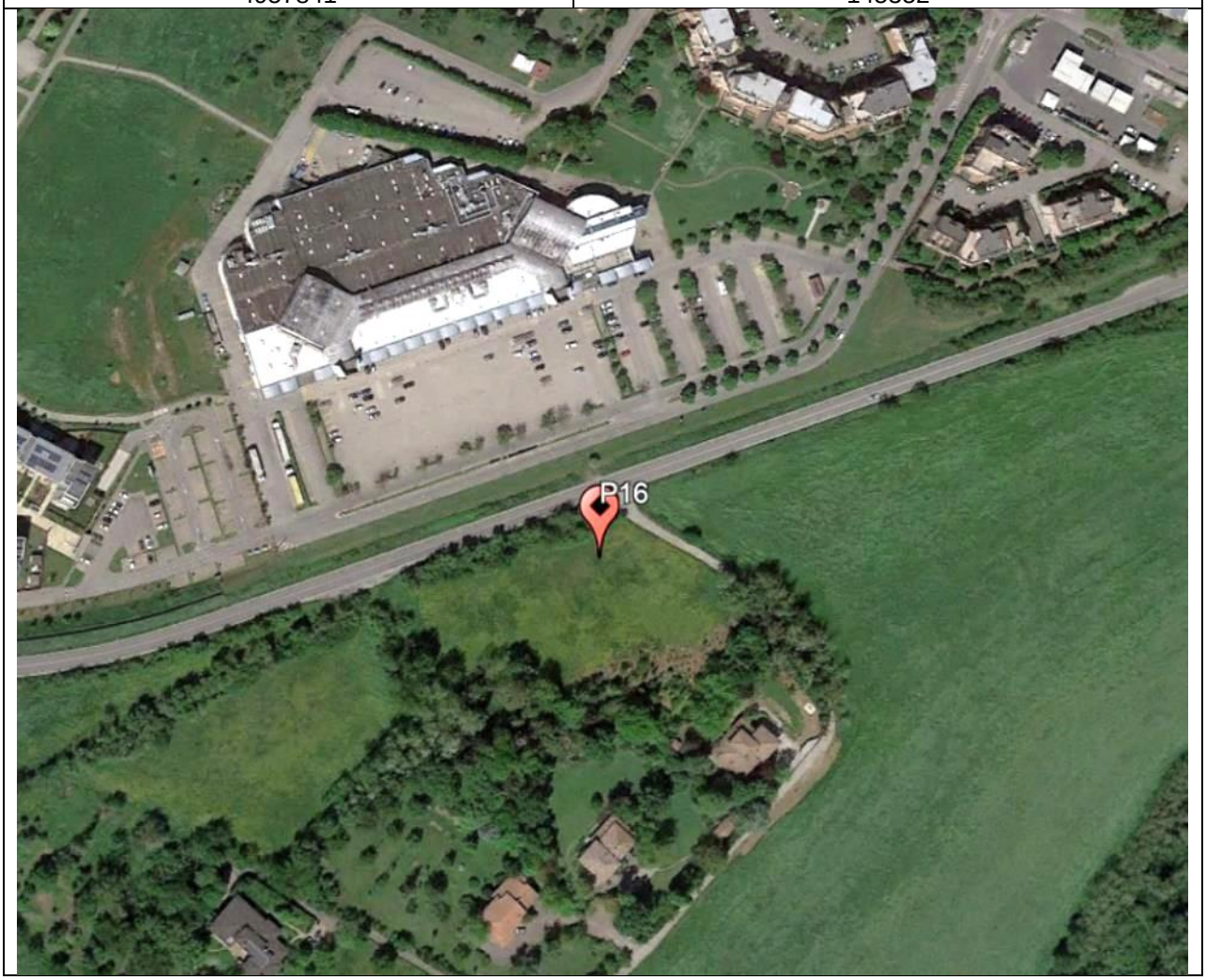
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	8.34 > 0.50	OK	
$n_c(f_0) > 200$	9011.3 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz	Exceeded 0 out of 402 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0] \mid A_{H/V}(f^-) < A_0 / 2$	4.688 Hz	OK	
Exists f^+ in $[f_0, 4f_0] \mid A_{H/V}(f^+) < A_0 / 2$	24.5 Hz	OK	
$A_0 > 2$	2.81 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.0998| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.83267 < 0.41719		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2873 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
8,34 Hz	Alta

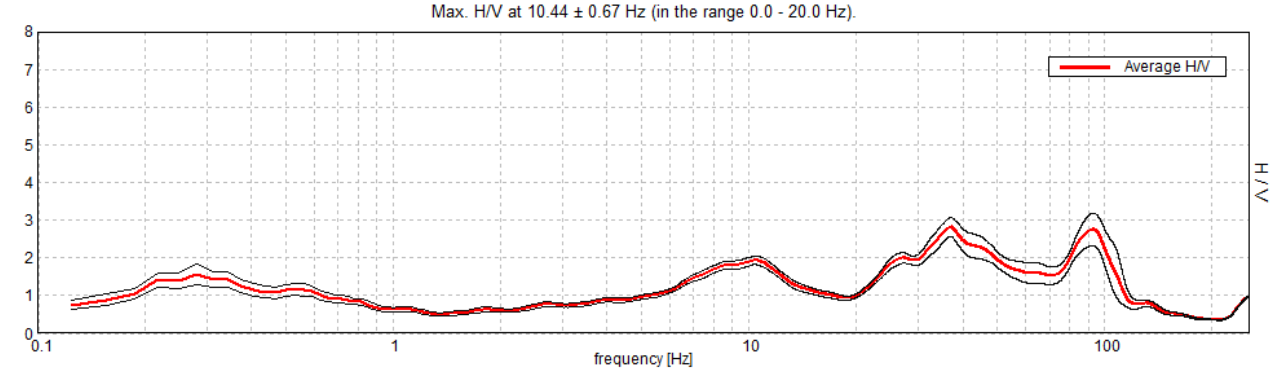
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4957841	145352



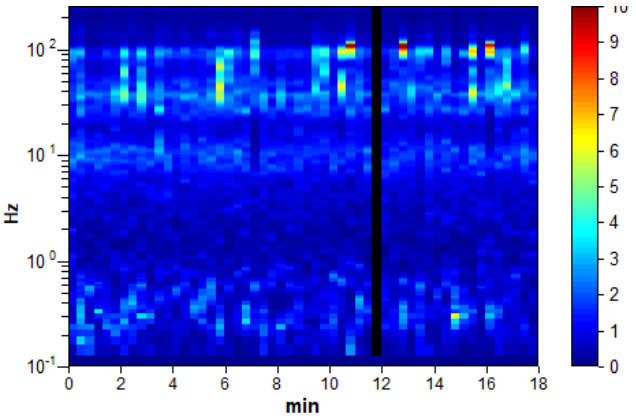
CAVRIAGO, P17

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 15:33:30 End recording: 27/02/20 15:51:30
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.2702 E, 44°41.3849 N (70.9 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analyzed 98% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

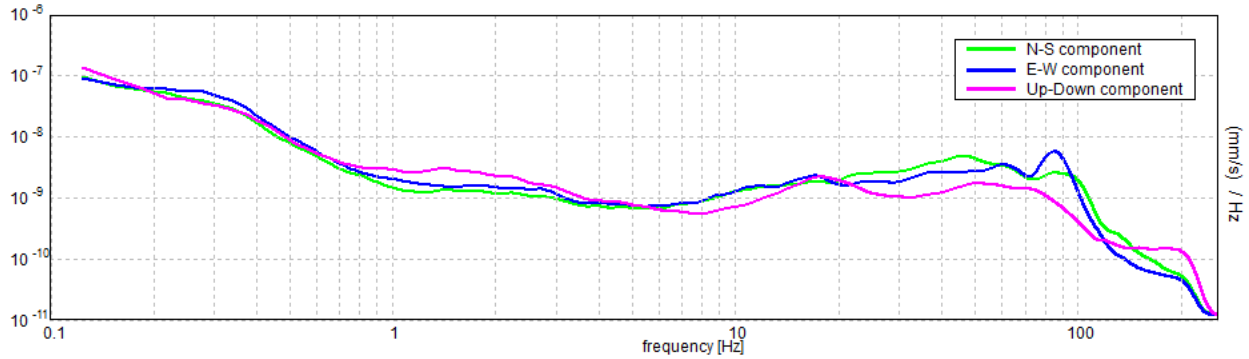
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 10.44 ± 0.67 Hz (in the range 0.0 - 20.0 Hz).

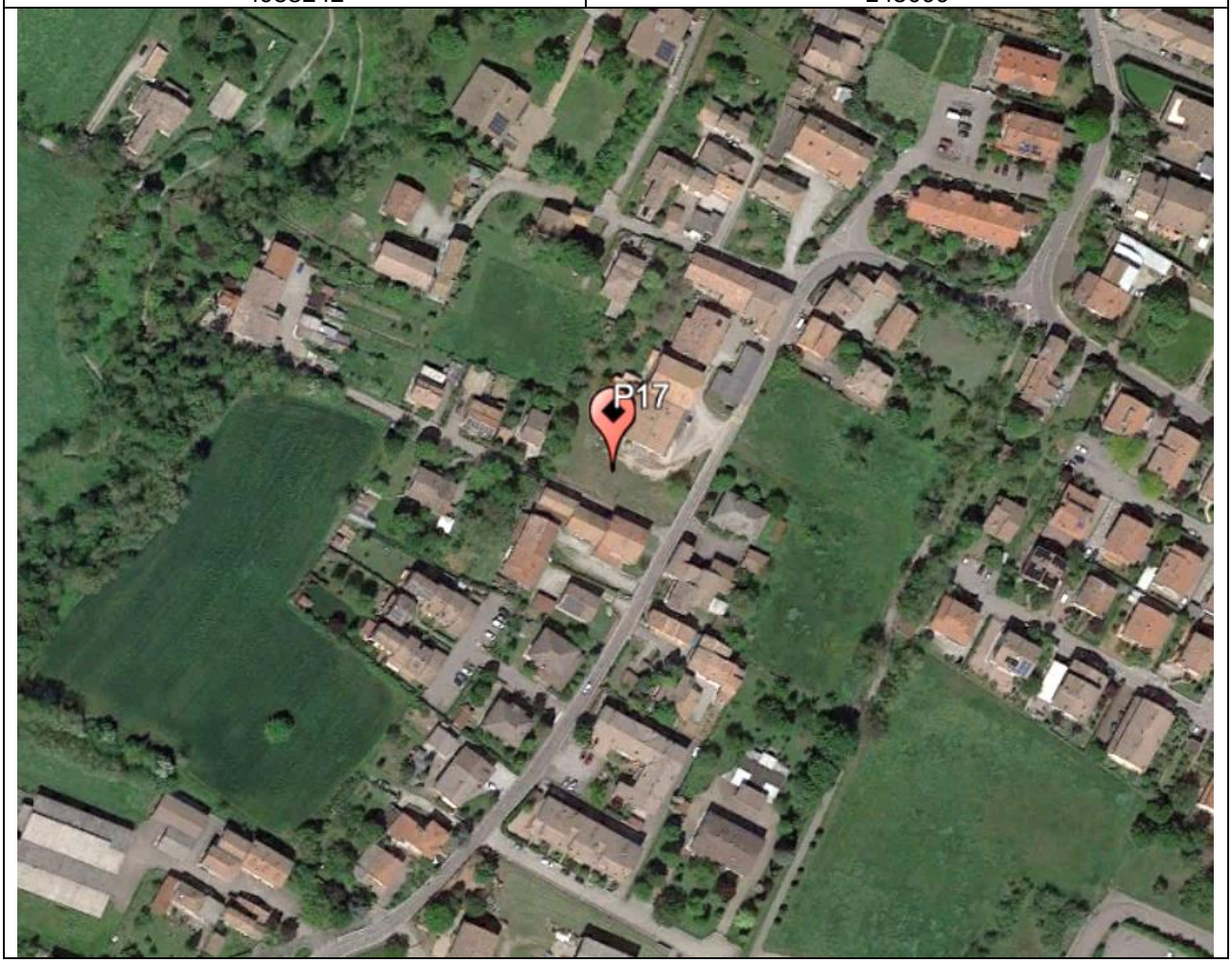
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	10.44 > 0.50	OK	
$n_c(f_0) > 200$	11063.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 502 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	5.063 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	17.688 Hz	OK	
$A_0 > 2$	1.94 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.06419| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.66998 < 0.52188		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1166 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

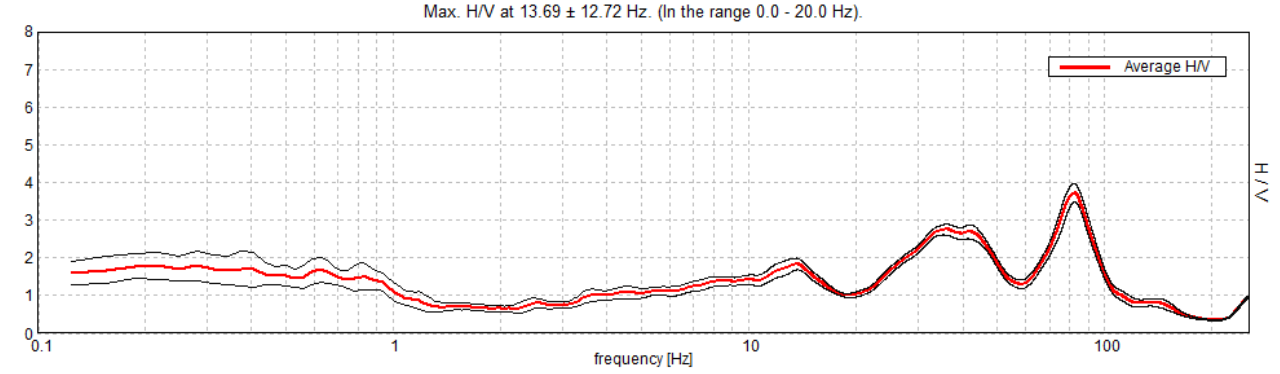
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958242	145099



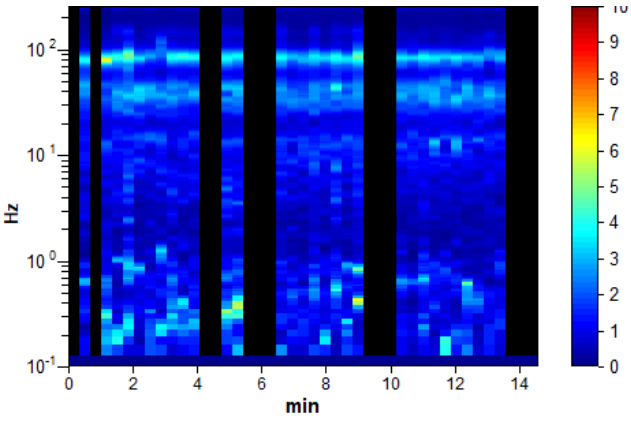
CAVRIAGO, P18

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 27/02/20 16:00:41 End recording: 27/02/20 16:15:17
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.5309 E, 44°41.3704 N (88.9 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h14'36". Analyzed 70% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

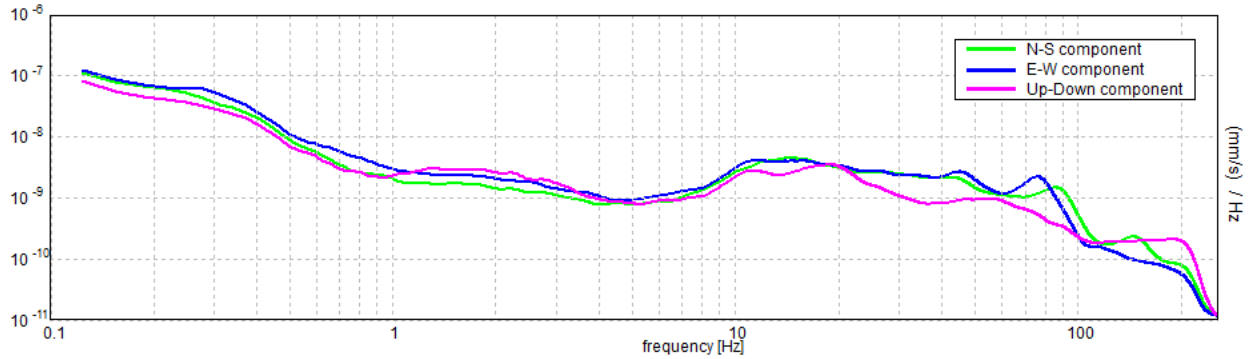
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 13.69 ± 12.72 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	13.69 > 0.50	OK	
$n_c(f_0) > 200$	8212.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 658 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
$A_0 > 2$	1.84 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.92954| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	12.72309 < 0.68438		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1514 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

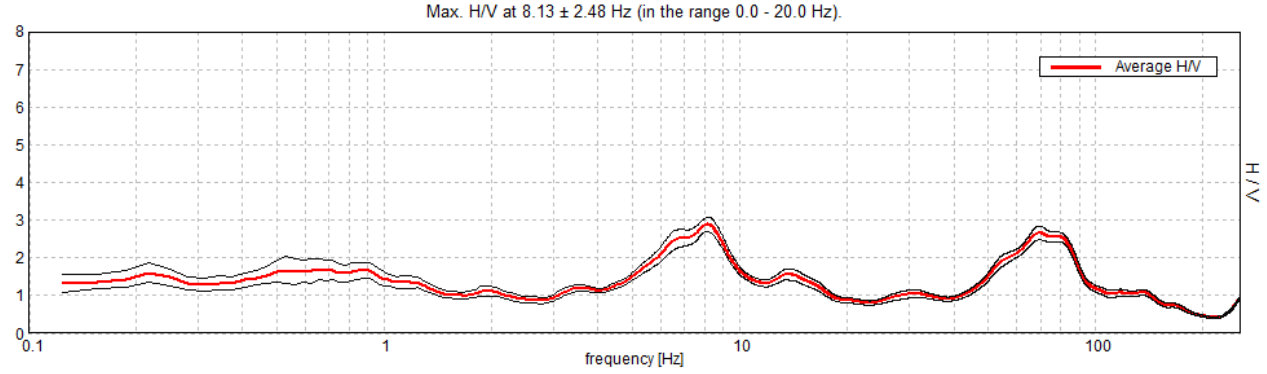
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958204	145440

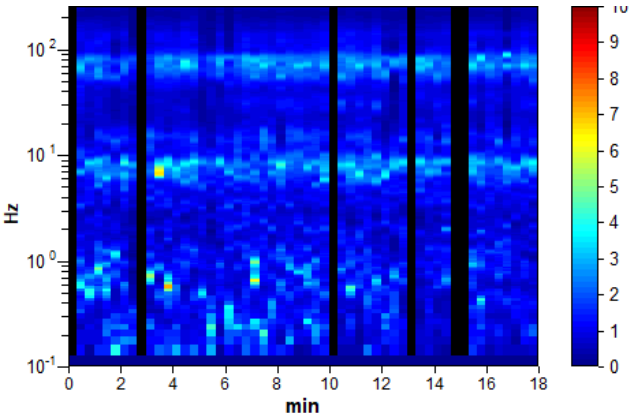
CAVRIAGO, P19

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 10:15:36 End recording: 28/02/20 10:33:36
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°33.6168 E, 44°43.1691 N (40.2 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analyzed 89% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

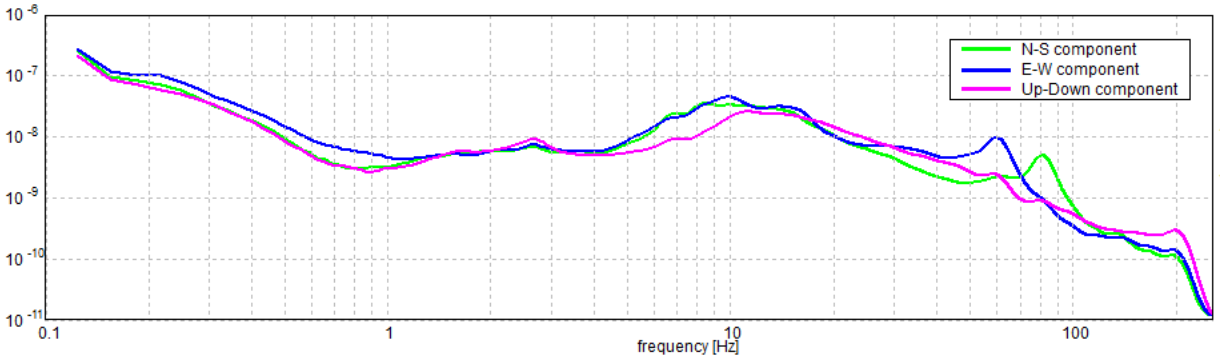
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 8.13 ± 2.48 Hz (in the range 0.0 - 20.0 Hz).

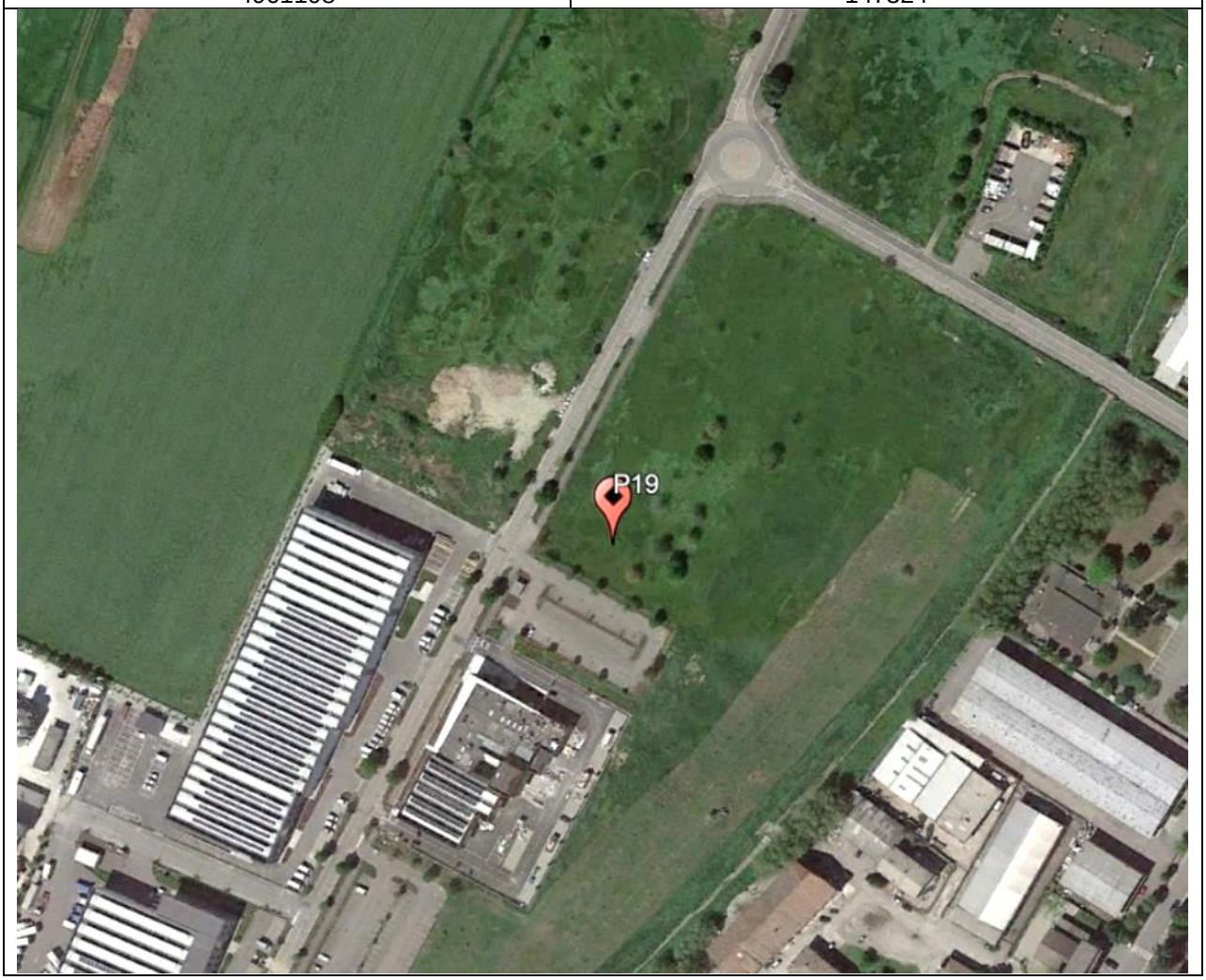
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	8.13 > 0.50	OK	
$n_c(f_0) > 200$	7800.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 391 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	4.875 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	10.719 Hz	OK	
$A_0 > 2$	2.89 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.30572| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	2.48399 < 0.40625		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1891 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
8,13 Hz	Alta

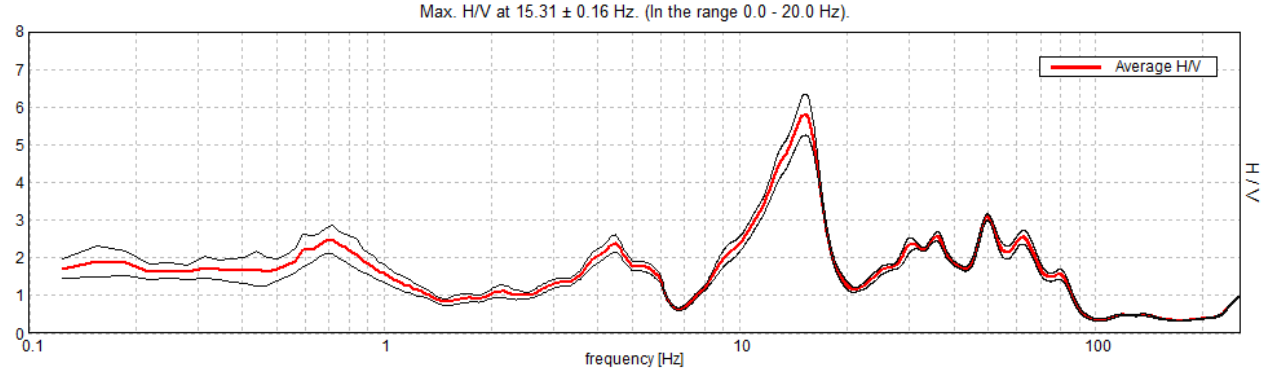
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4961198	147324



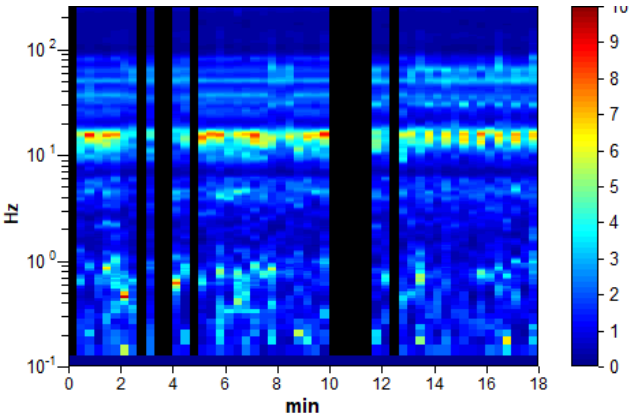
CAVRIAGO, P20

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 10:47:41 End recording: 28/02/20 11:05:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°33.0377 E, 44°42.6983 N (41.0 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analyzed 80% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

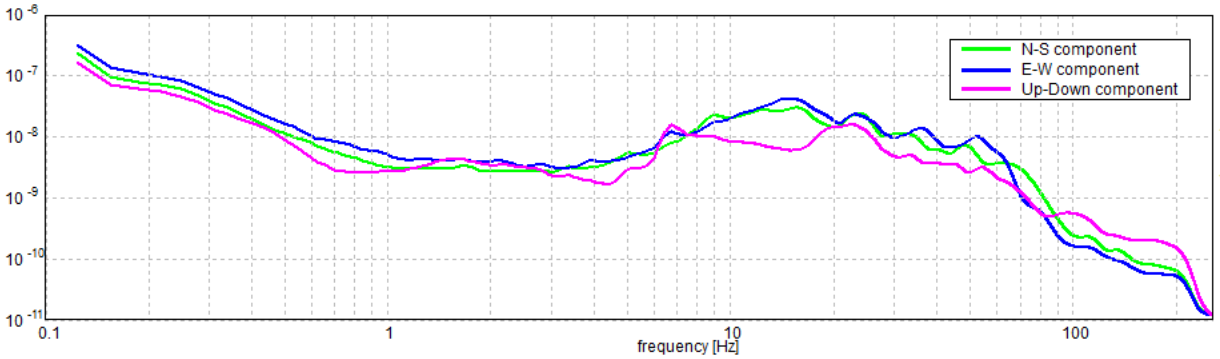
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 15.31 ± 0.16 Hz (in the range 0.0 - 20.0 Hz).

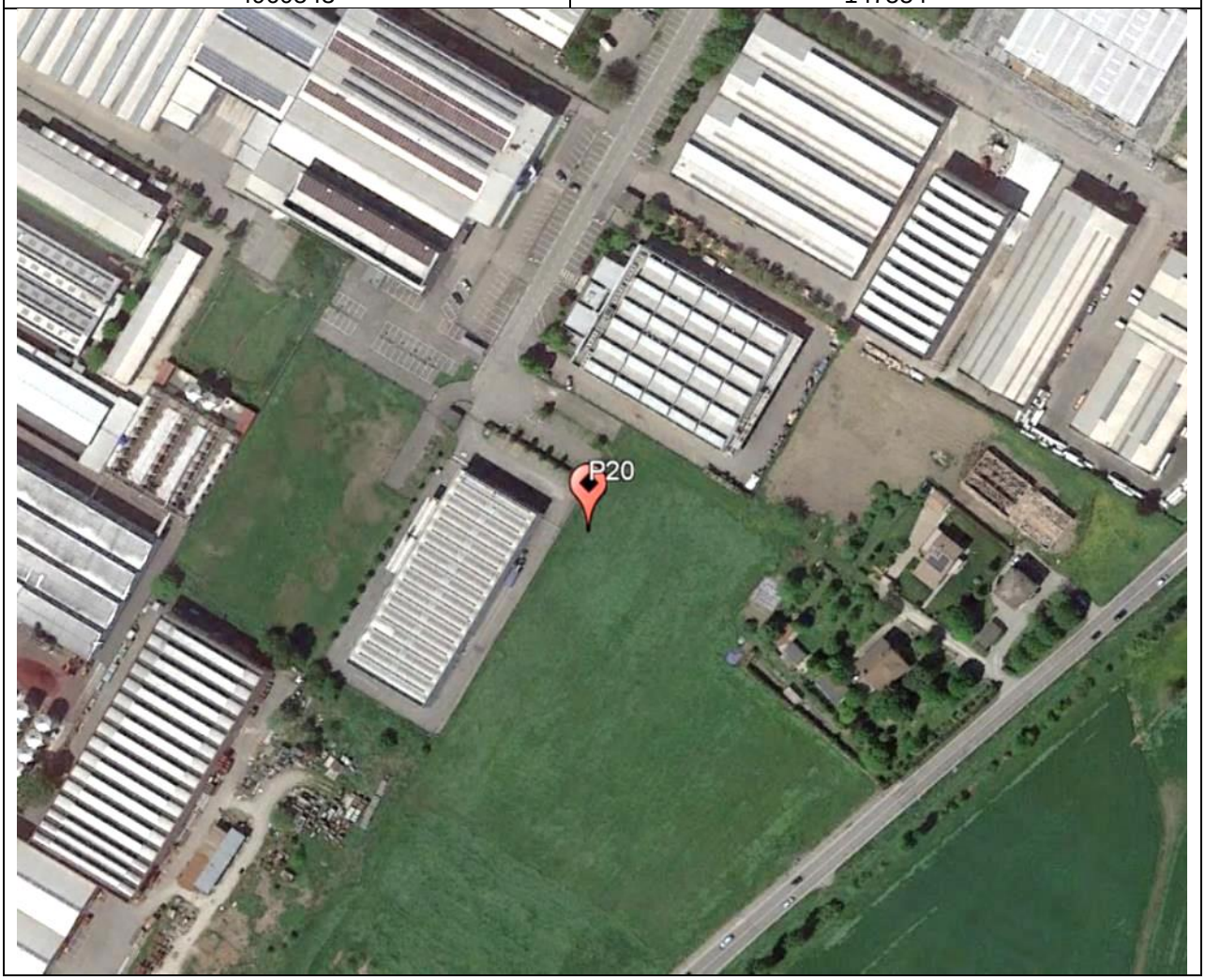
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	15.31 > 0.50	OK	
$n_c(f_0) > 200$	13168.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 736 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	10.875 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	17.469 Hz	OK	
$A_0 > 2$	5.80 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.01064| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.16287 < 0.76563	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.5459 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
15,31 Hz	Alta

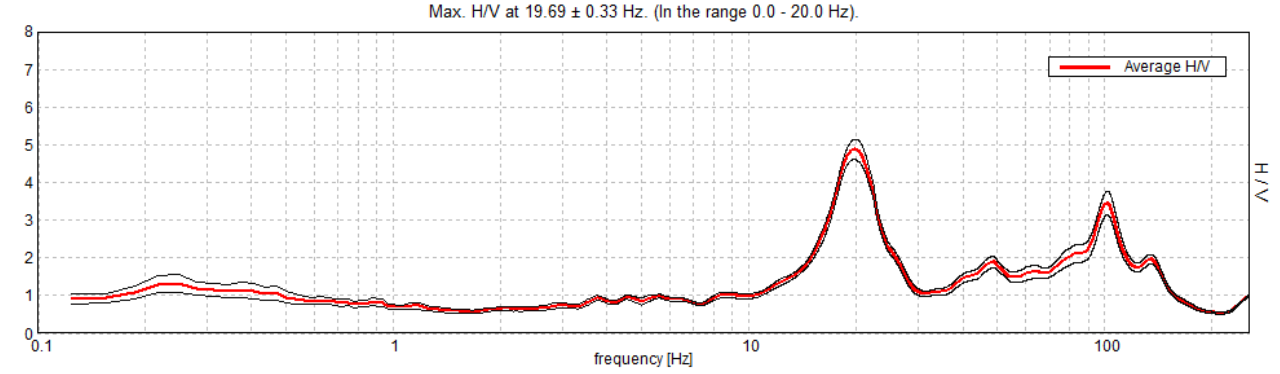
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4960543	147554



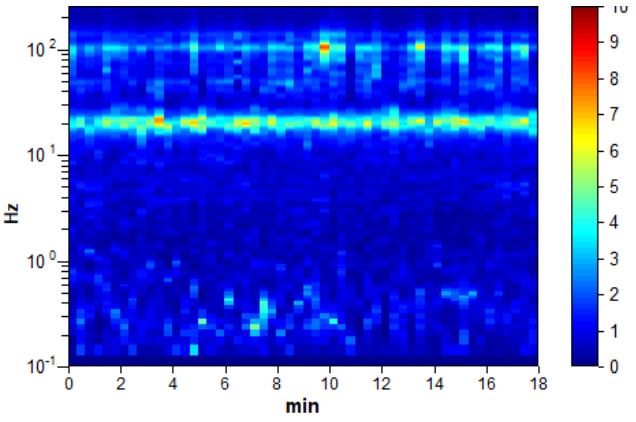
CAVRIAGO, P21

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 11:16:42 End recording: 28/02/20 11:34:42
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.9201 E, 44°42.5771 N (40.8 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

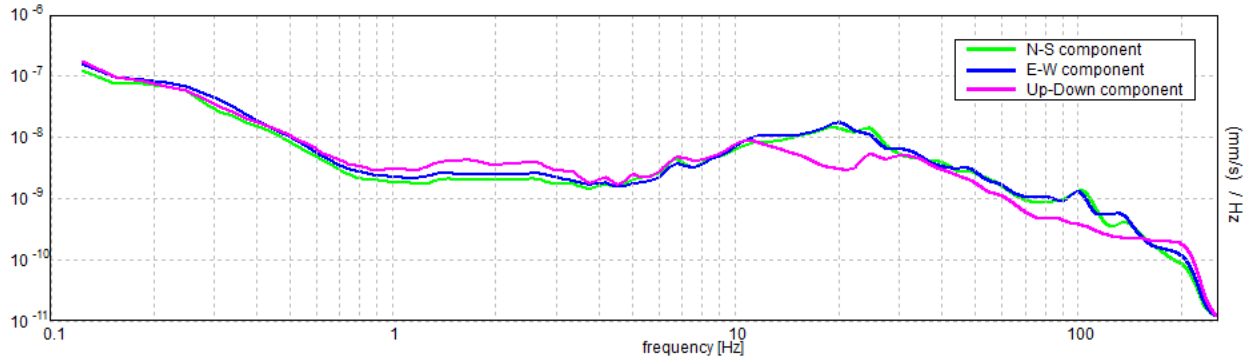
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 19.69 ± 0.33 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	19.69 > 0.50	OK	
$n_c(f_0) > 200$	21262.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 946 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	15.844 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	24.281 Hz	OK	
$A_0 > 2$	4.88 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.01668| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.32847 < 0.98438	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.2622 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

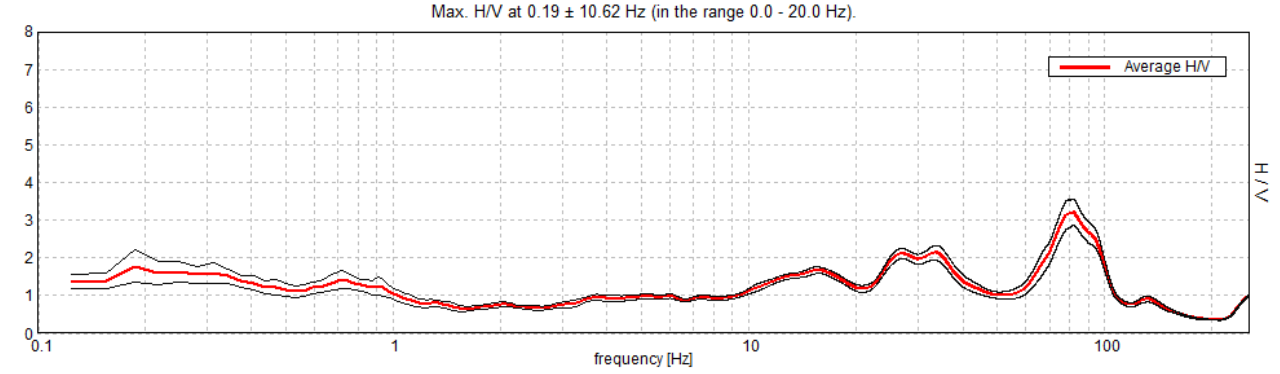
Frequenza caratteristica di sito	Precisione della stima della frequenza
19,69 Hz	Alta

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4960330	147384

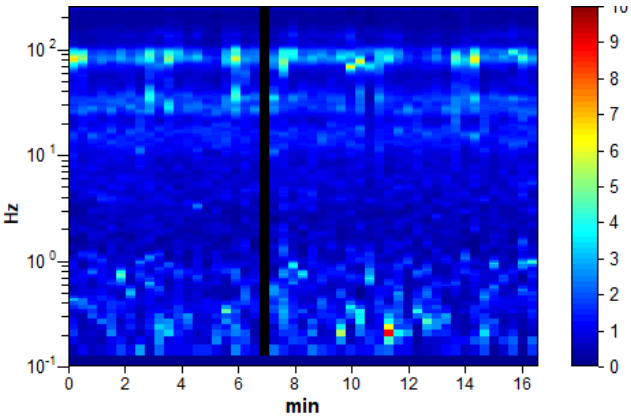
CAVRIAGO, P22

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 11:41:41 End recording: 28/02/20 11:58:17
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.4717 E, 44°41.9641 N (46.6 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'36". Analyzed 98% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

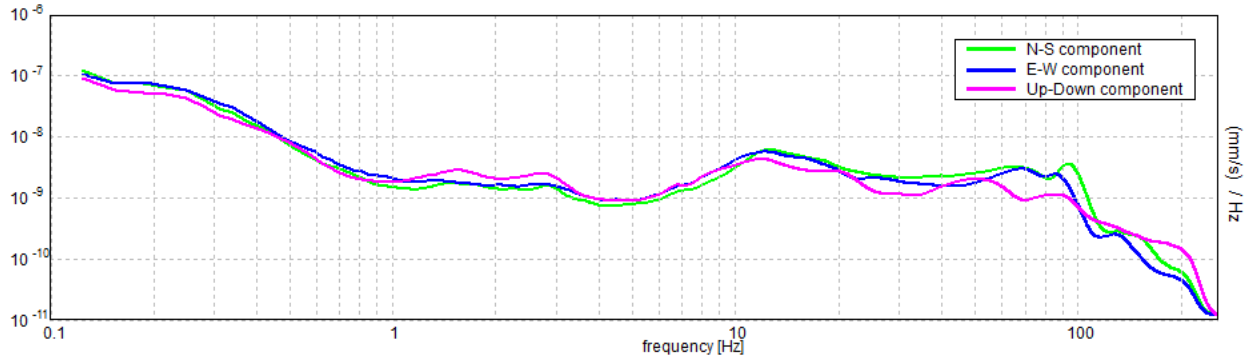
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.19 ± 10.62 Hz (in the range 0.0 - 20.0 Hz).

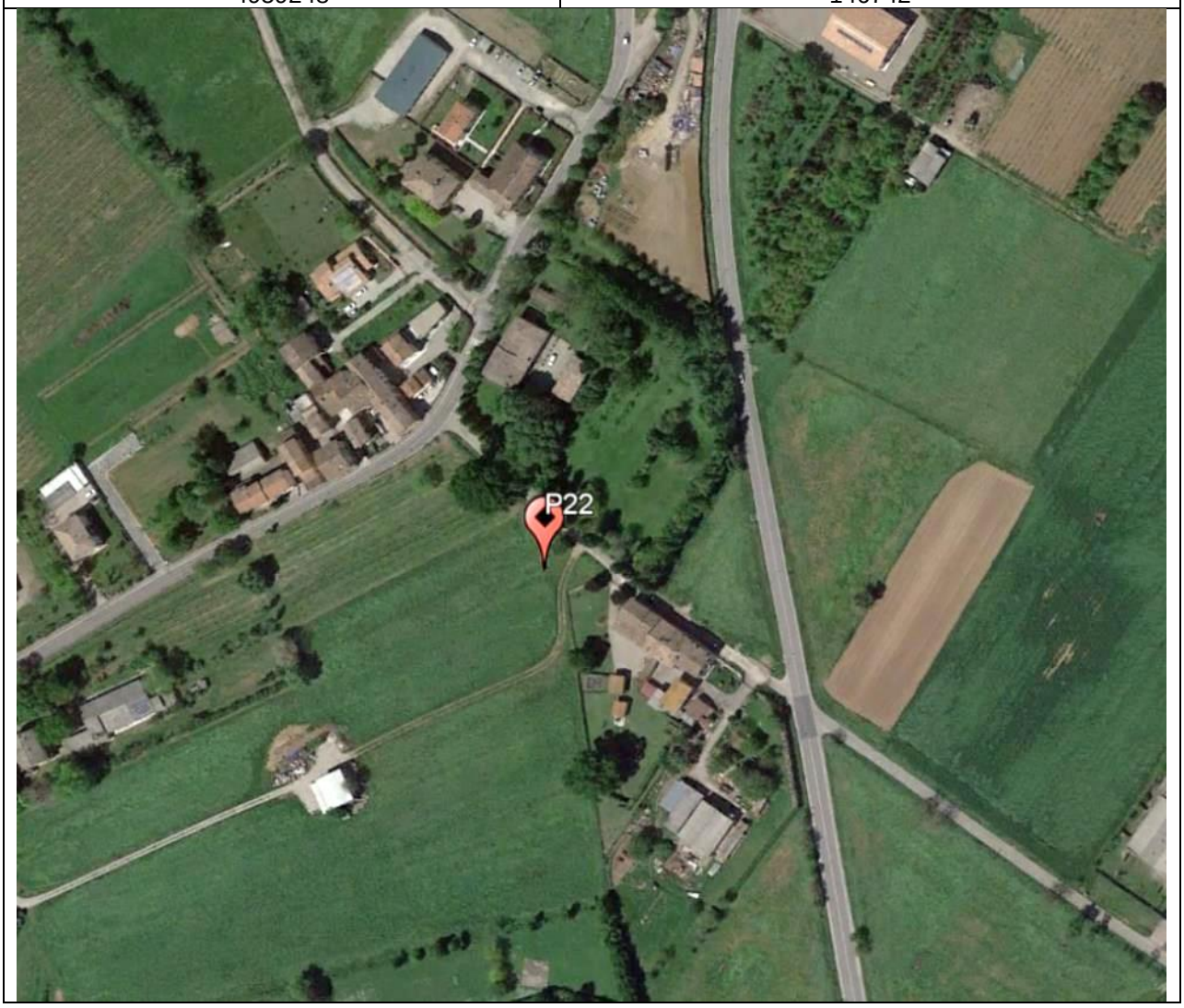
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.19 > 0.50		**NO**
$n_c(f_0) > 200$	180.0 > 200		**NO**
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 10 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			**NO**
$A_0 > 2$	1.78 > 2		**NO**
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|56.65618| < 0.05		**NO**
$\sigma_f < \varepsilon(f_0)$	10.62303 < 0.04688		**NO**
$\sigma_A(f_0) < \theta(f_0)$	0.4332 < 3.0	**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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

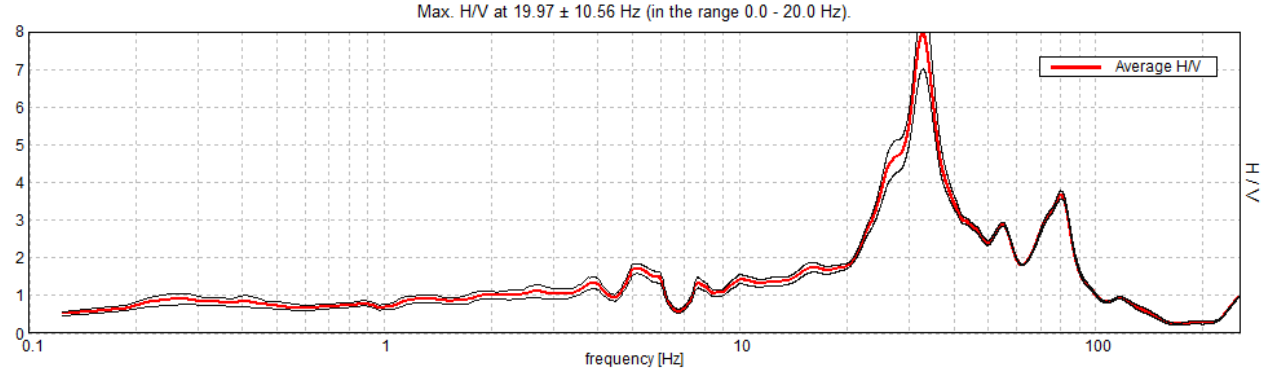
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959248	146742



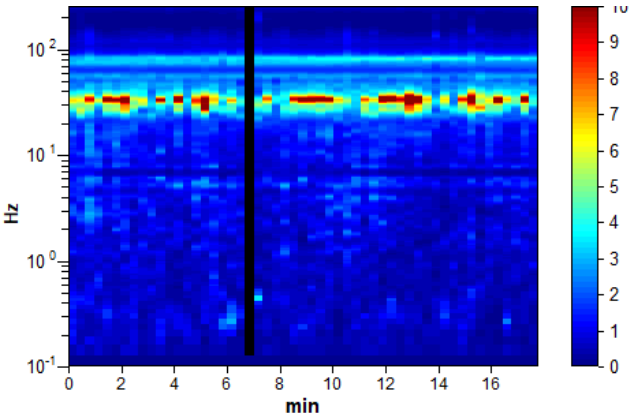
CAVRIAGO, P23

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 12:06:41 End recording: 28/02/20 12:24:29
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.0697 E, 44°42.6749 N (51.0 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 07
Trace length: 0h17'48". Analyzed 98% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

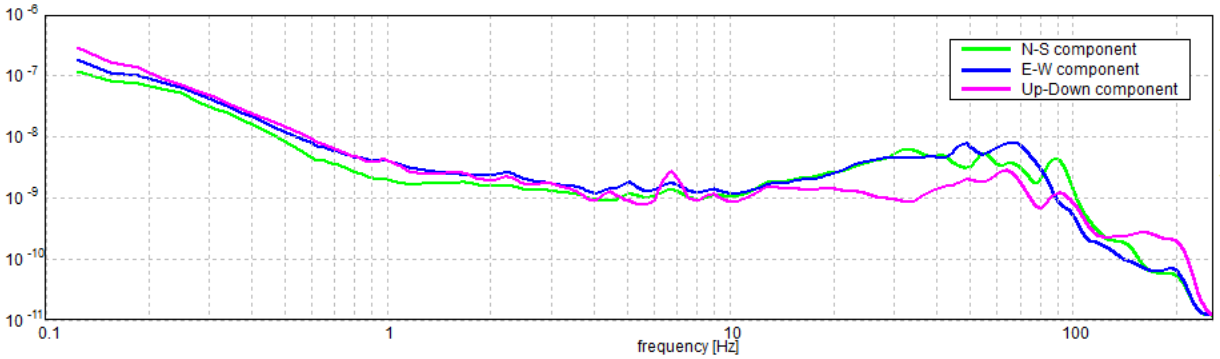
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 19.97 ± 10.56 Hz (in the range 0.0 - 20.0 Hz).

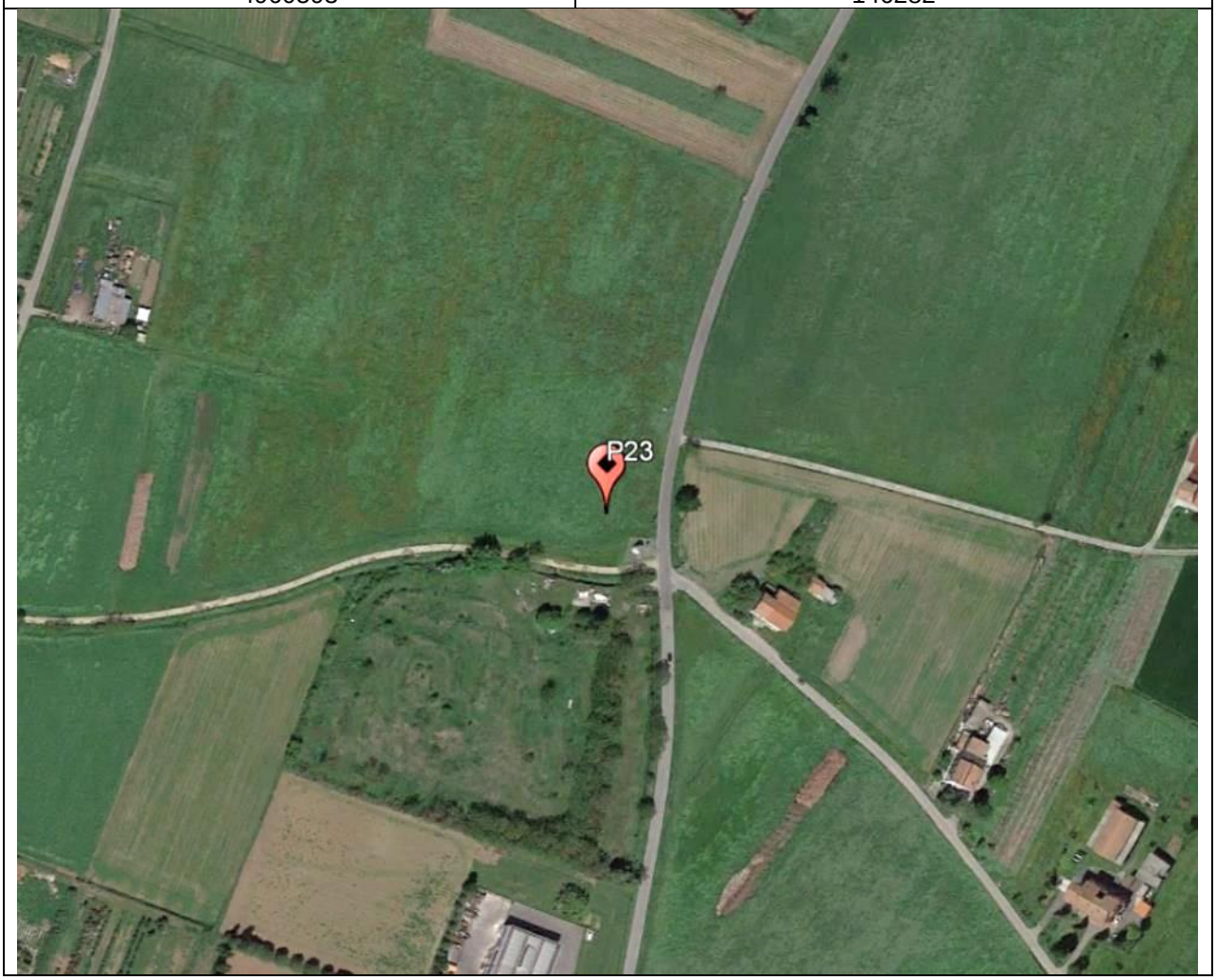
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	19.97 > 0.50	OK	
$n_c(f_0) > 200$	20767.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 960 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	7.25 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.78 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.52869| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	10.55723 < 0.99844		NO
$\sigma_A(f_0) < \theta(f_0)$	0.0688 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

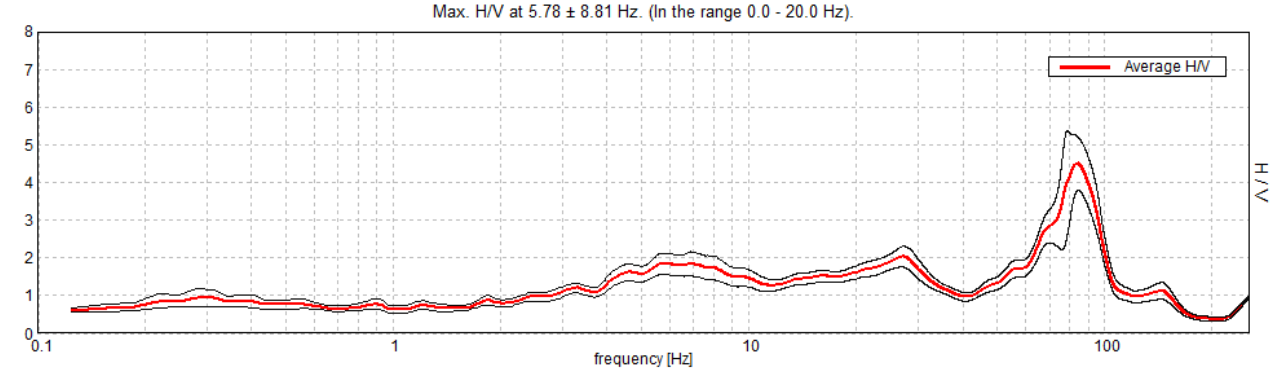
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4960593	146282



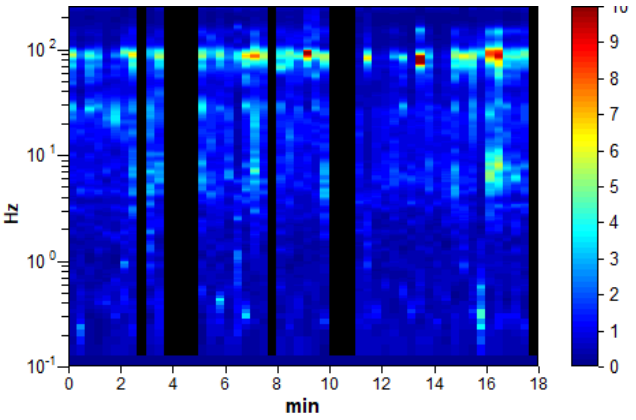
CAVRIAGO, P24

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 12:34:30 End recording: 28/02/20 12:52:30
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.1014 E, 44°43.2669 N (51.2 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h18'00". Analyzed 81% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

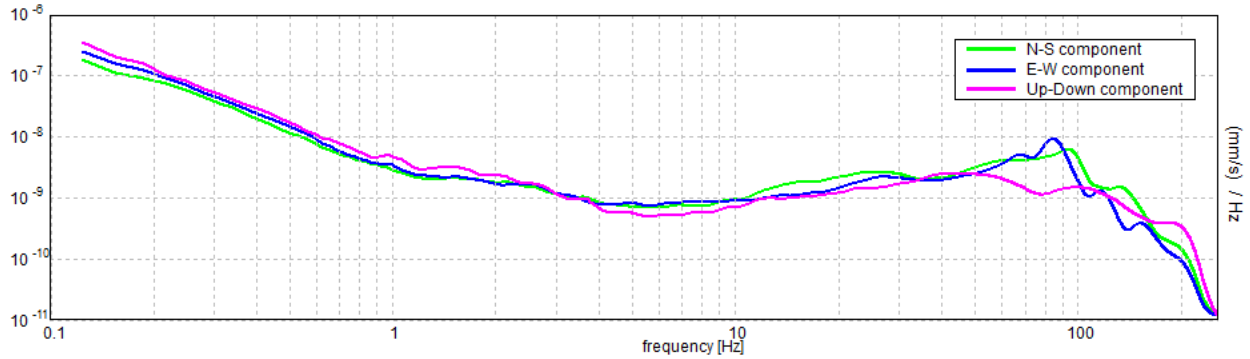
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 5.78 ± 8.81 Hz (in the range 0.0 - 20.0 Hz).

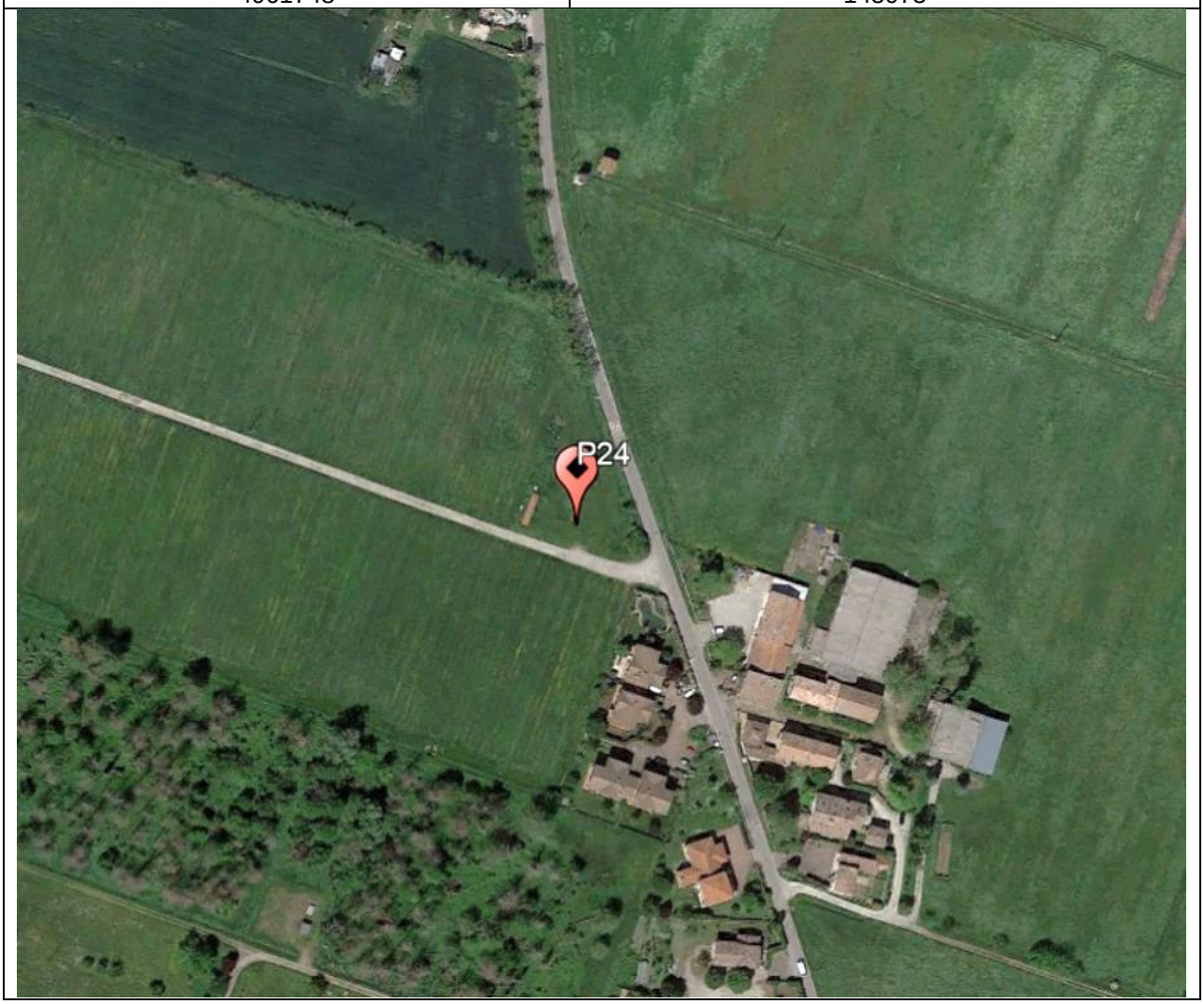
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.78 > 0.50	OK	
$n_c(f_0) > 200$	5087.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz $\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz	Exceeded 0 out of 278 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0] \mid A_{H/V}(f^-) < A_0 / 2$	2.313 Hz	OK	
Exists f^+ in $[f_0, 4f_0] \mid A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.85 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|1.52399| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	8.81055 < 0.28906		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2786 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

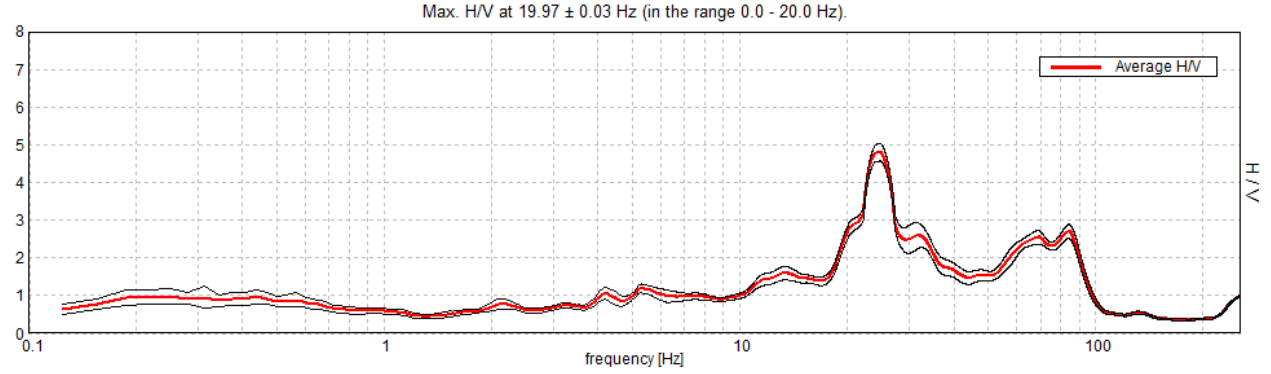
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4961748	145073



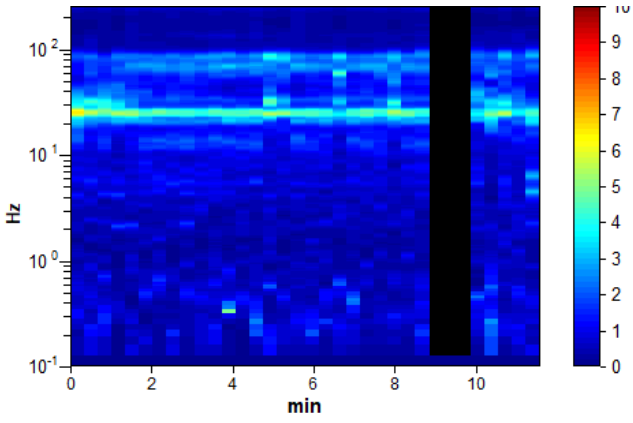
CAVRIAGO, P25

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 12:58:43 End recording: 28/02/20 13:10:19
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS data not available
Trace length: 0h11'36". Analyzed 91% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

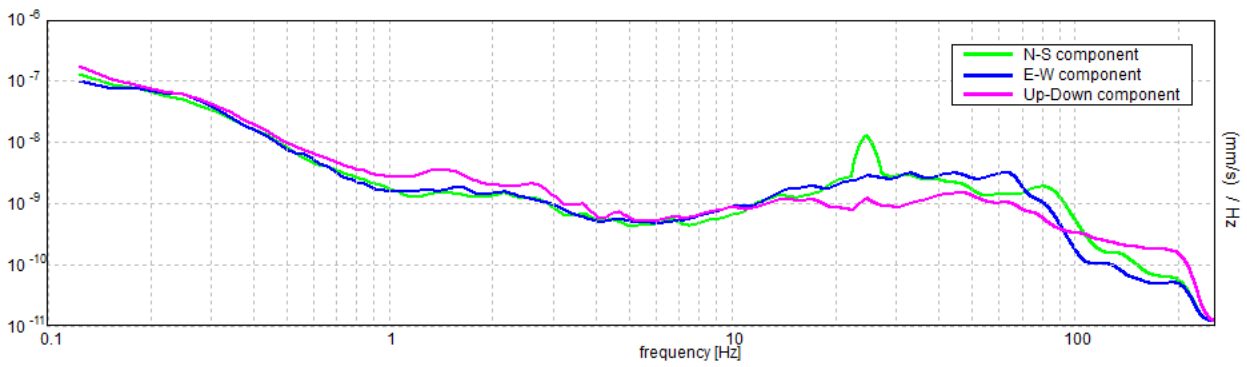
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 19.97 ± 0.03 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	19.97 > 0.50	OK	
$n_c(f_0) > 200$	12380.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 960 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	11.125 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	2.61 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.00156| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.03125 < 0.99844	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1617 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

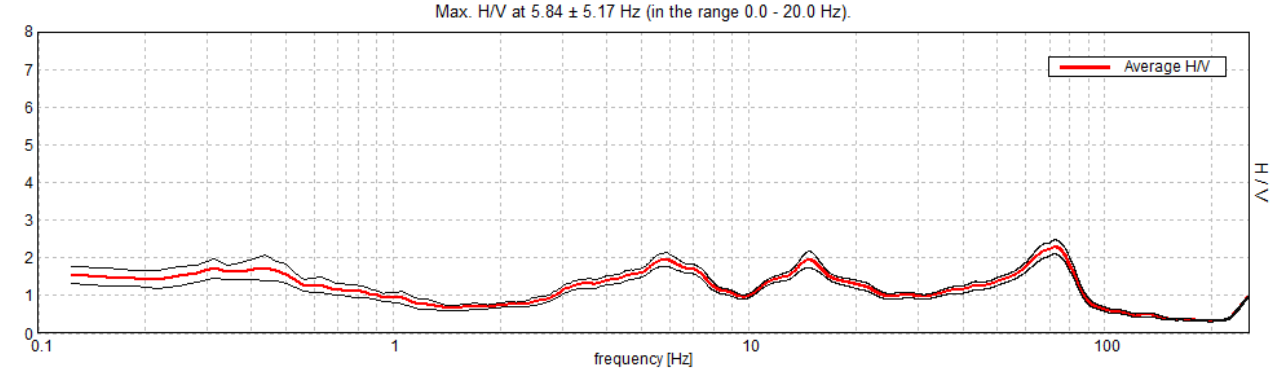
Frequenza caratteristica di sito	Precisione della stima della frequenza
19,97	Bassa

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4961434	145149

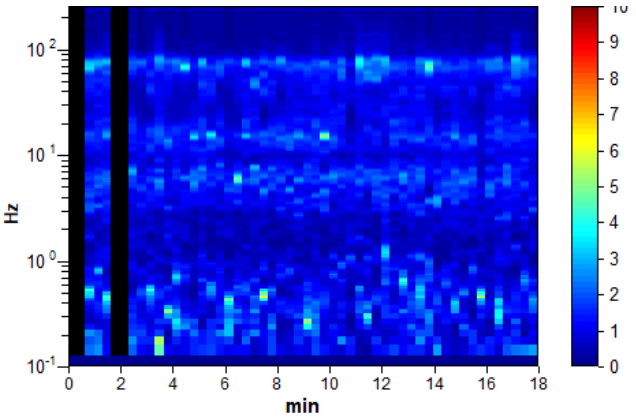
CAVRIAGO, P26

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 14:29:38 End recording: 28/02/20 14:47:38
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.4197 E, 44°41.6880 N (75.5 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h18'00". Analyzed 93% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

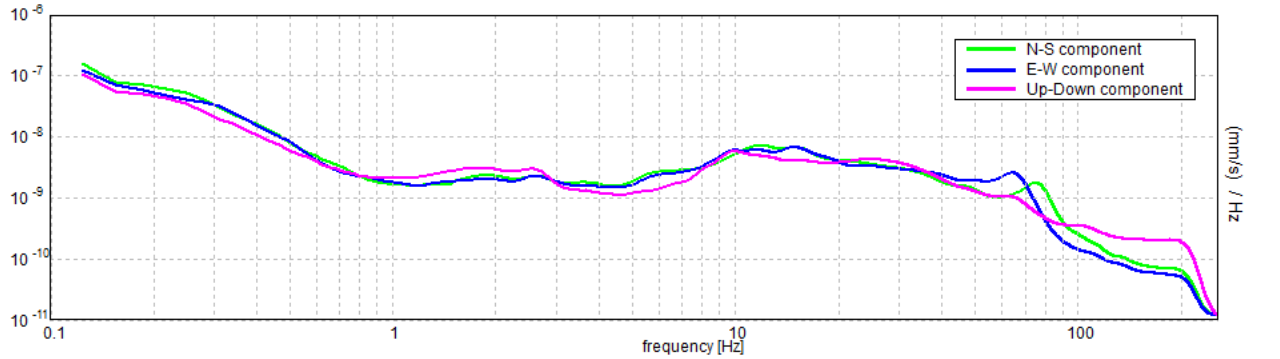
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 5.84 ± 5.17 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.84 > 0.50	OK	
$n_c(f_0) > 200$	5843.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 282 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	2.781 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	9.406 Hz	OK	
$A_0 > 2$	1.96 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.88414| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	5.16667 < 0.29219		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1769 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

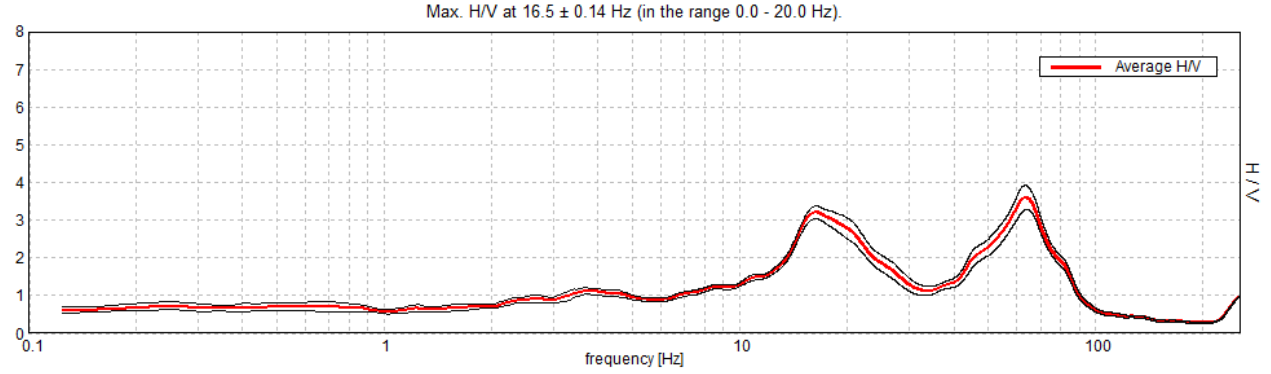
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958800	145312

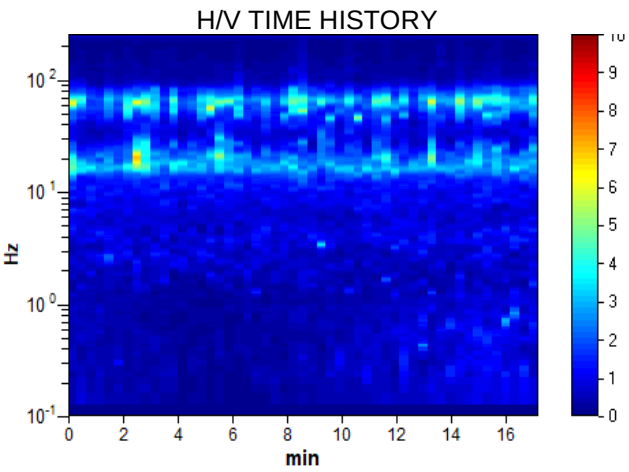
CAVRIAGO, P27

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 28/02/20 15:02:11 End recording: 28/02/20 15:19:23
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.3075 E, 44°42.0324 N (71.6 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h17'12". Analysis performed on the entire trace.
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

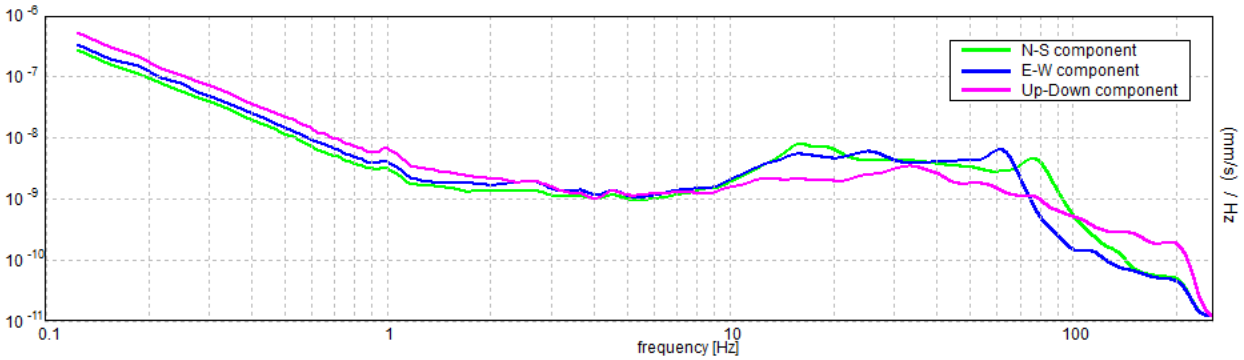
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 16.5 ± 0.14 Hz (in the range 0.0 - 20.0 Hz).

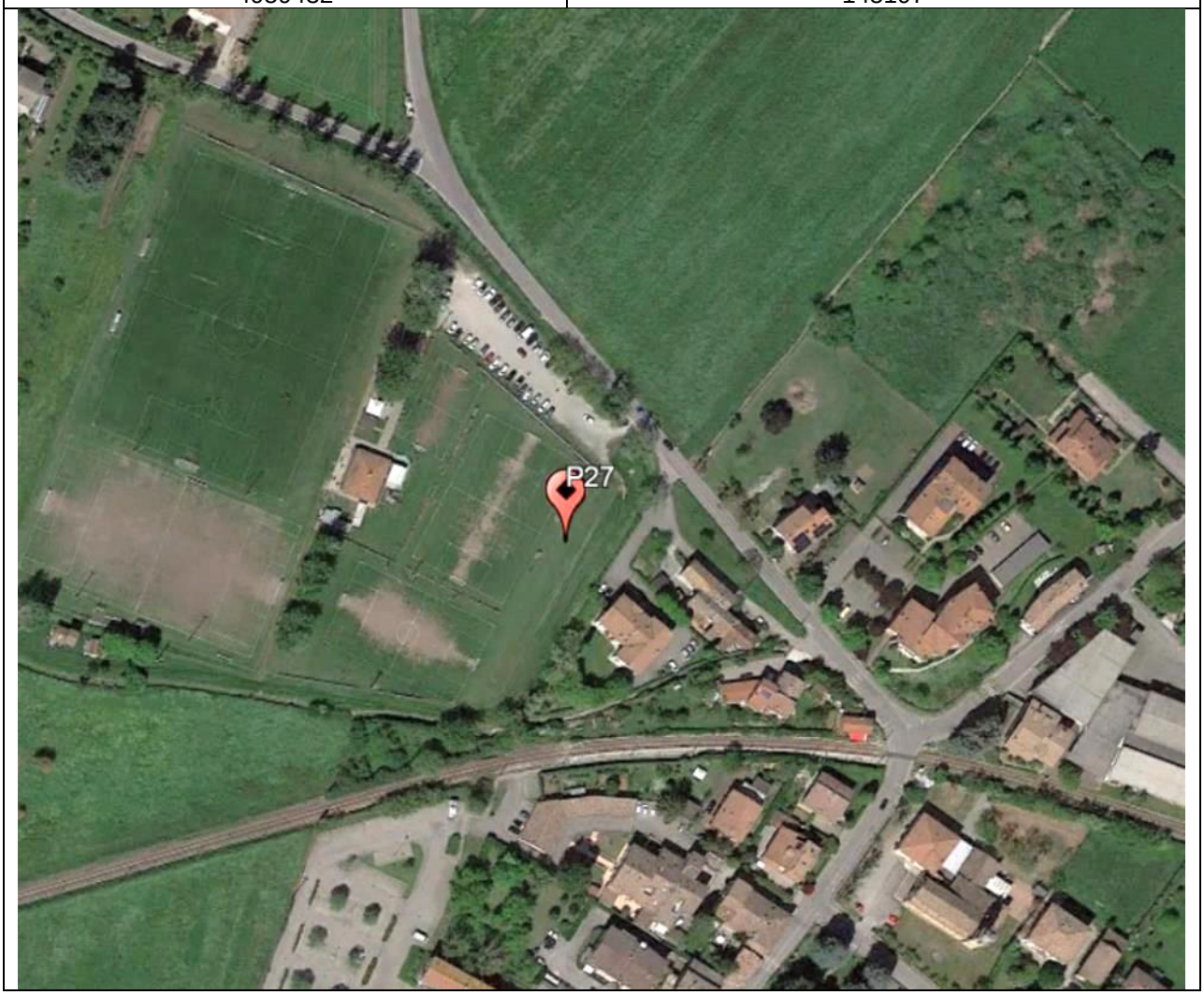
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	16.50 > 0.50	OK	
$n_c(f_0) > 200$	16830.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 793 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	12.25 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	27.438 Hz	OK	
$A_0 > 2$	3.20 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.0084| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.13865 < 0.825	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1699 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
16,5 Hz	Alta

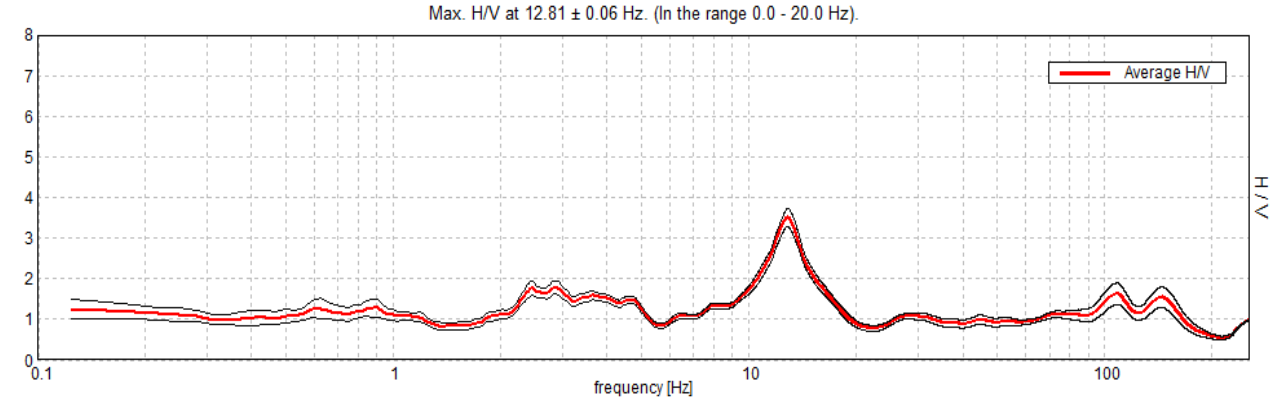
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959432	145197



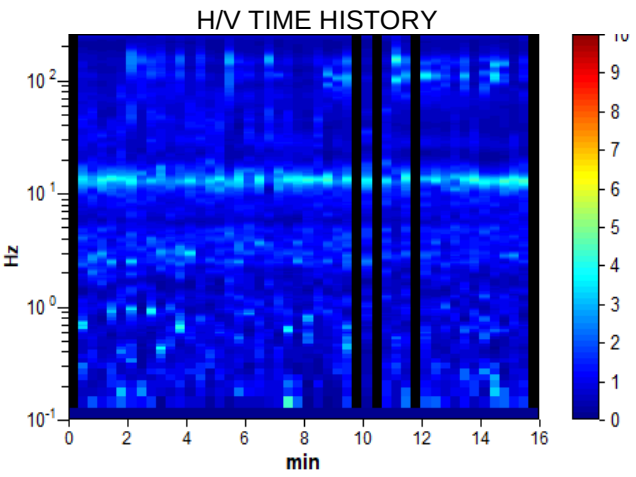
CAVRIAGO, P28

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 08:26:59 End recording: 08/05/20 08:42:59
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°33.0102 E, 44°43.0287 N (43.0 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'00". Analyzed 90% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

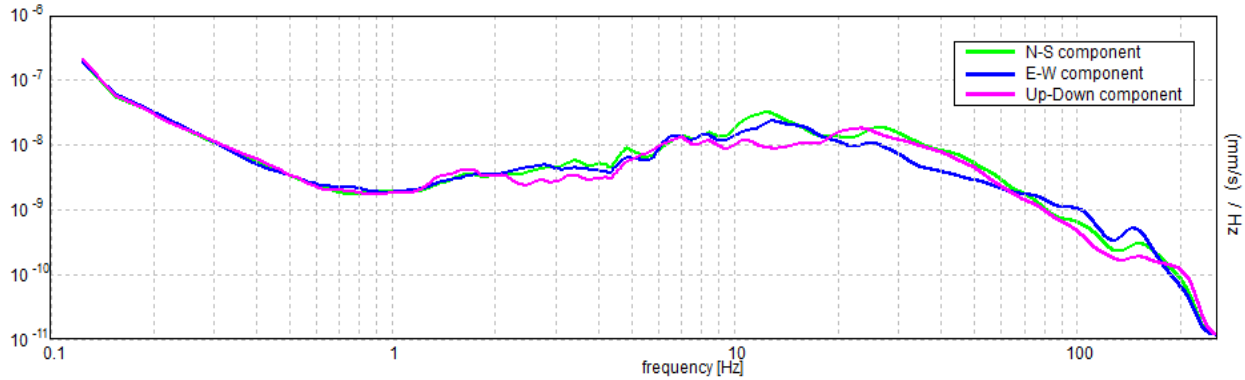
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

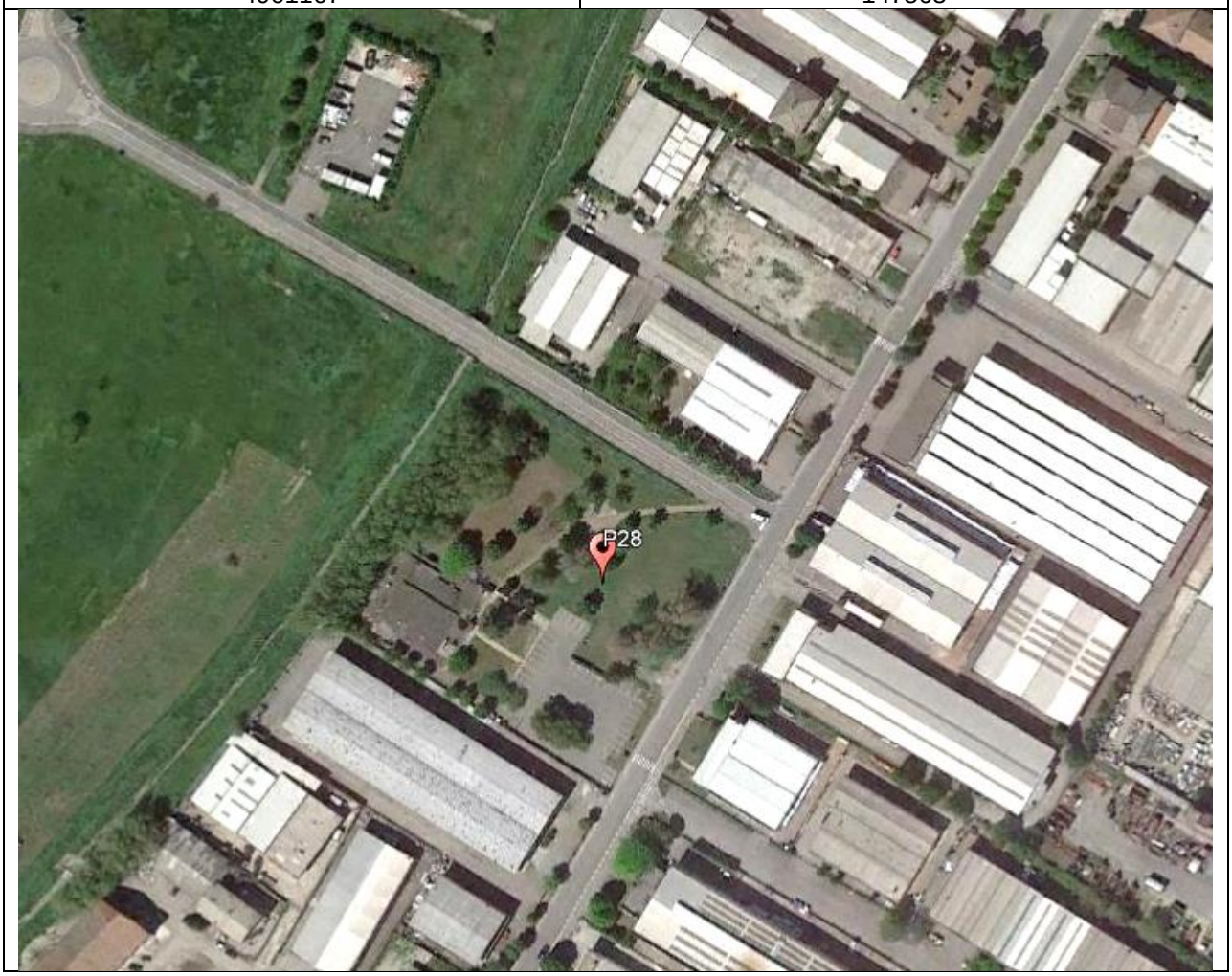
Max. H/V at 12.81 ± 0.06 Hz (in the range 0.0 - 20.0 Hz).			
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	12.81 > 0.50	**OK**	
$n_c(f_0) > 200$	11018.8 > 200	**OK**	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 616 times	**OK**	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	10.094 Hz	**OK**	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	16.188 Hz	**OK**	
$A_0 > 2$	3.52 > 2	**OK**	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.00454| < 0.05	**OK**	
$\sigma_f < \varepsilon(f_0)$	0.05817 < 0.64063	**OK**	
$\sigma_A(f_0) < \theta(f_0)$	0.2214 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
12,8 Hz	Alta

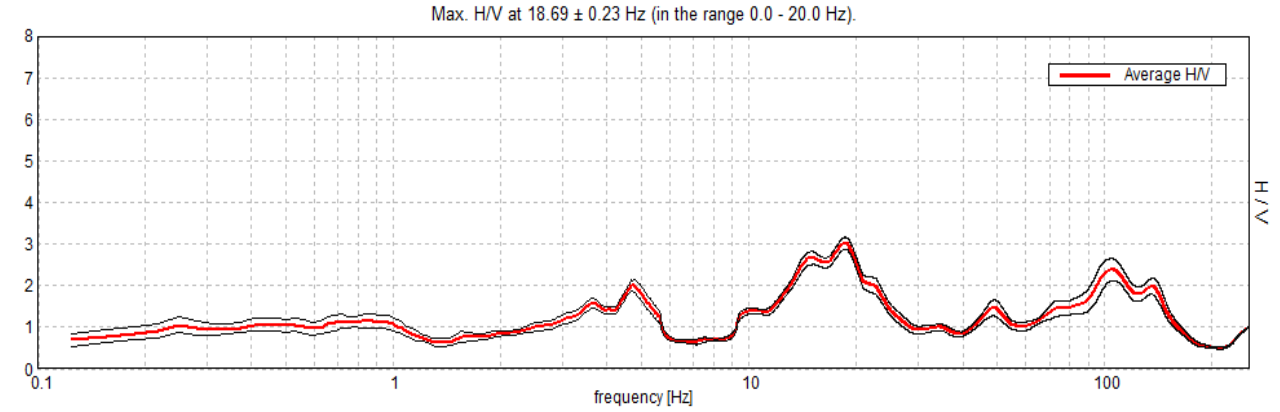
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4961167	147563



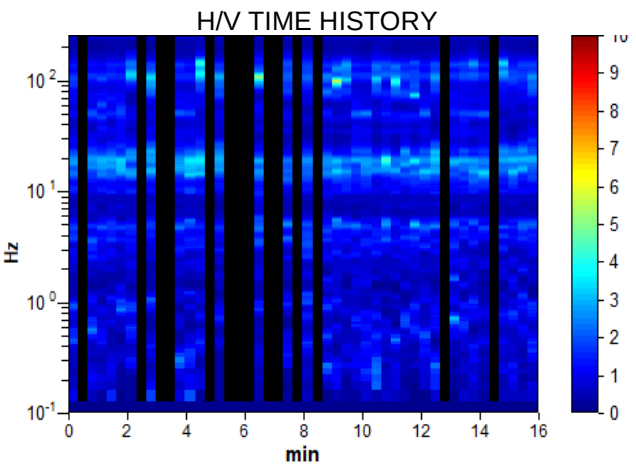
CAVRIAGO, P29

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 08:58:41 End recording: 08/05/20 09:14:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.7349 E, 44°42.8962 N (37.8 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h16'00". Analyzed 71% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

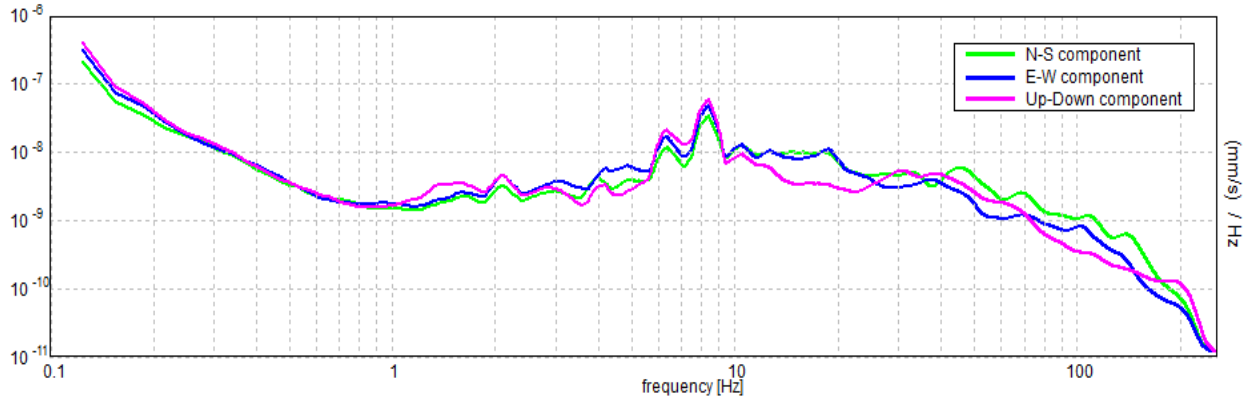
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 18.69 ± 0.23 Hz (in the range 0.0 - 20.0 Hz).

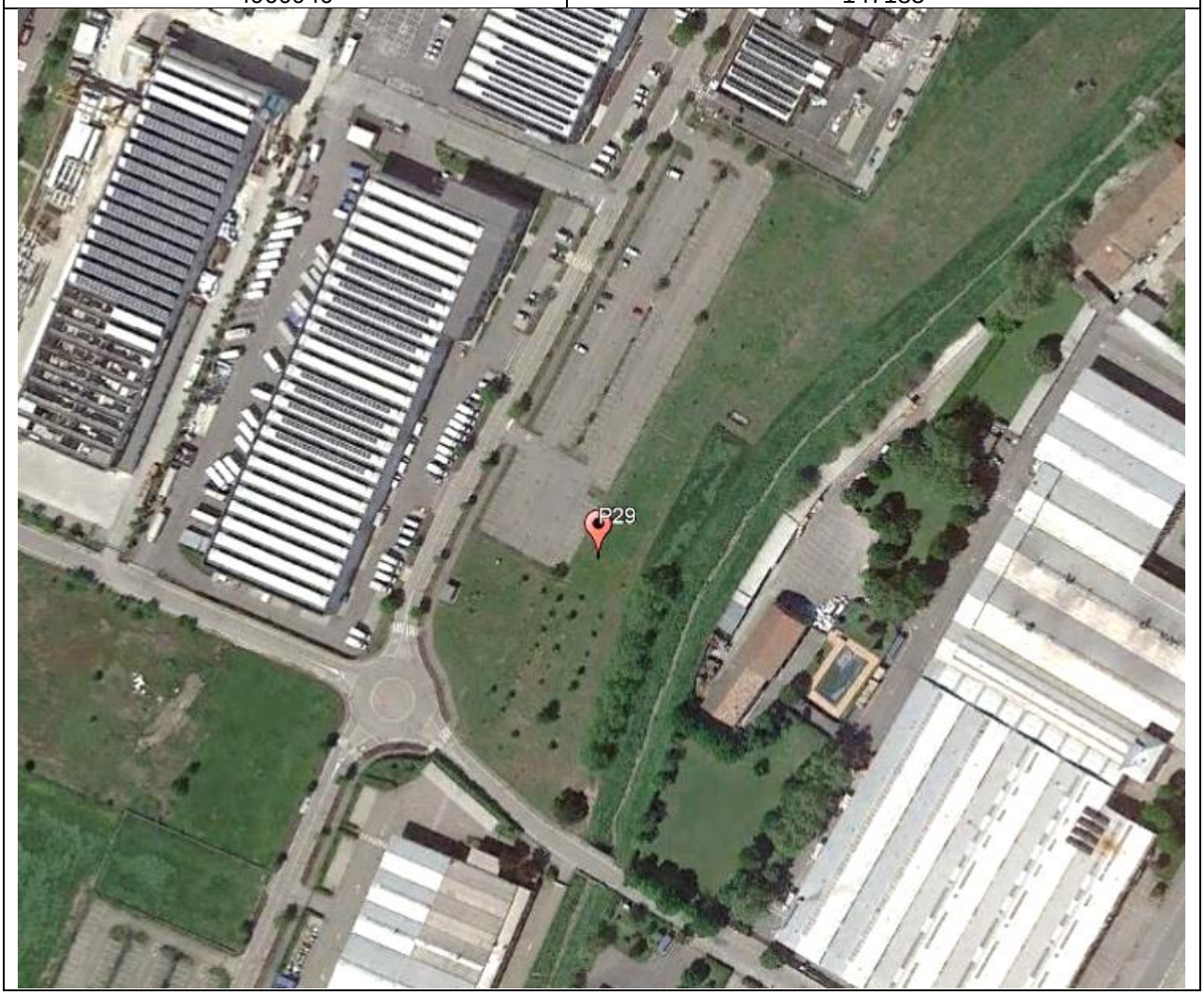
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	18.69 > 0.50	OK	
$n_c(f_0) > 200$	12707.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 898 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	11.813 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	24.625 Hz	OK	
$A_0 > 2$	3.01 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.01256| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.23477 < 0.93438	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1482 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
18,7 Hz	Alta

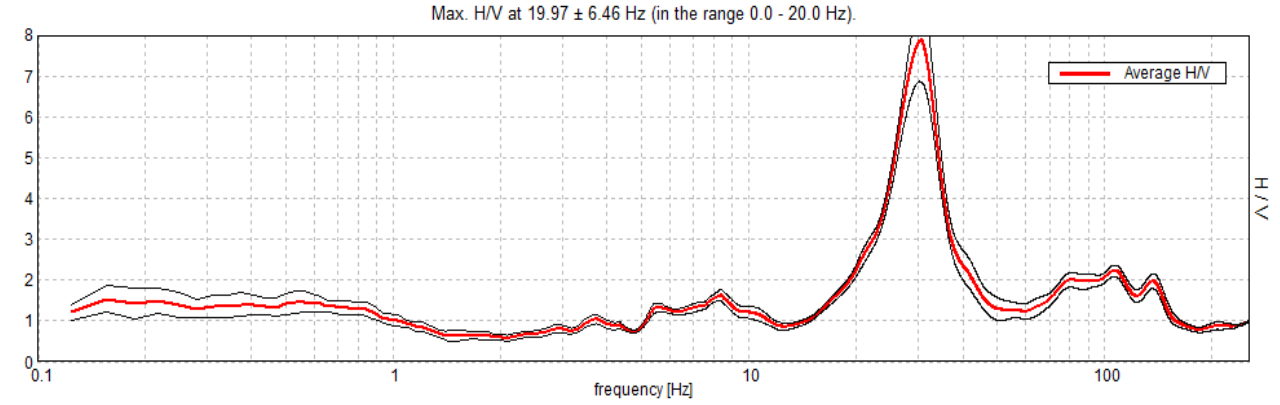
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4960940	147185



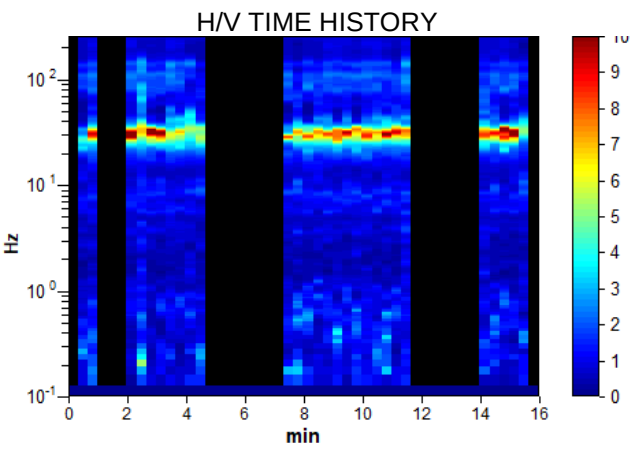
CAVRIAGO, P30

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 09:28:41 End recording: 08/05/20 09:44:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.7861 E, 44°42.3697 N (43.4 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 08
Trace length: 0h16'00". Analyzed 58% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

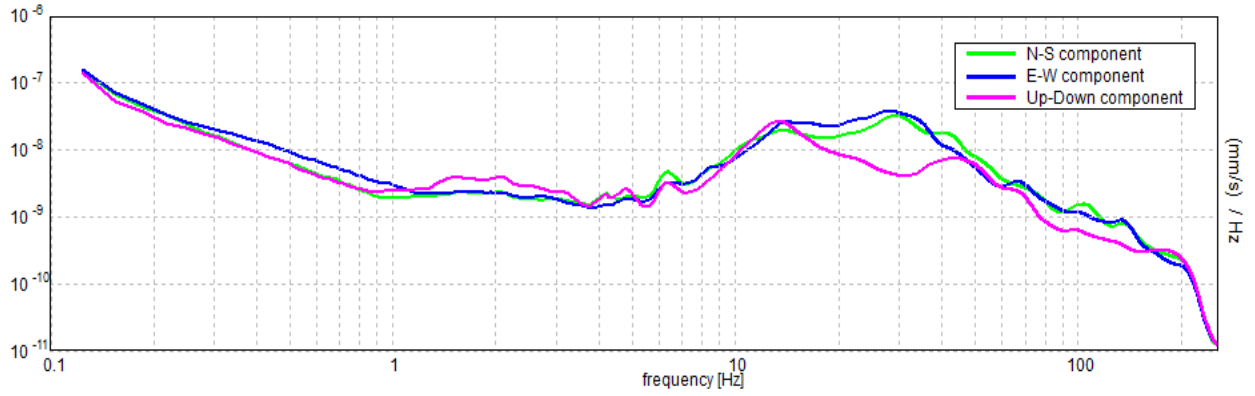
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 19.97 ± 6.46 Hz (in the range 0.0 - 20.0 Hz).

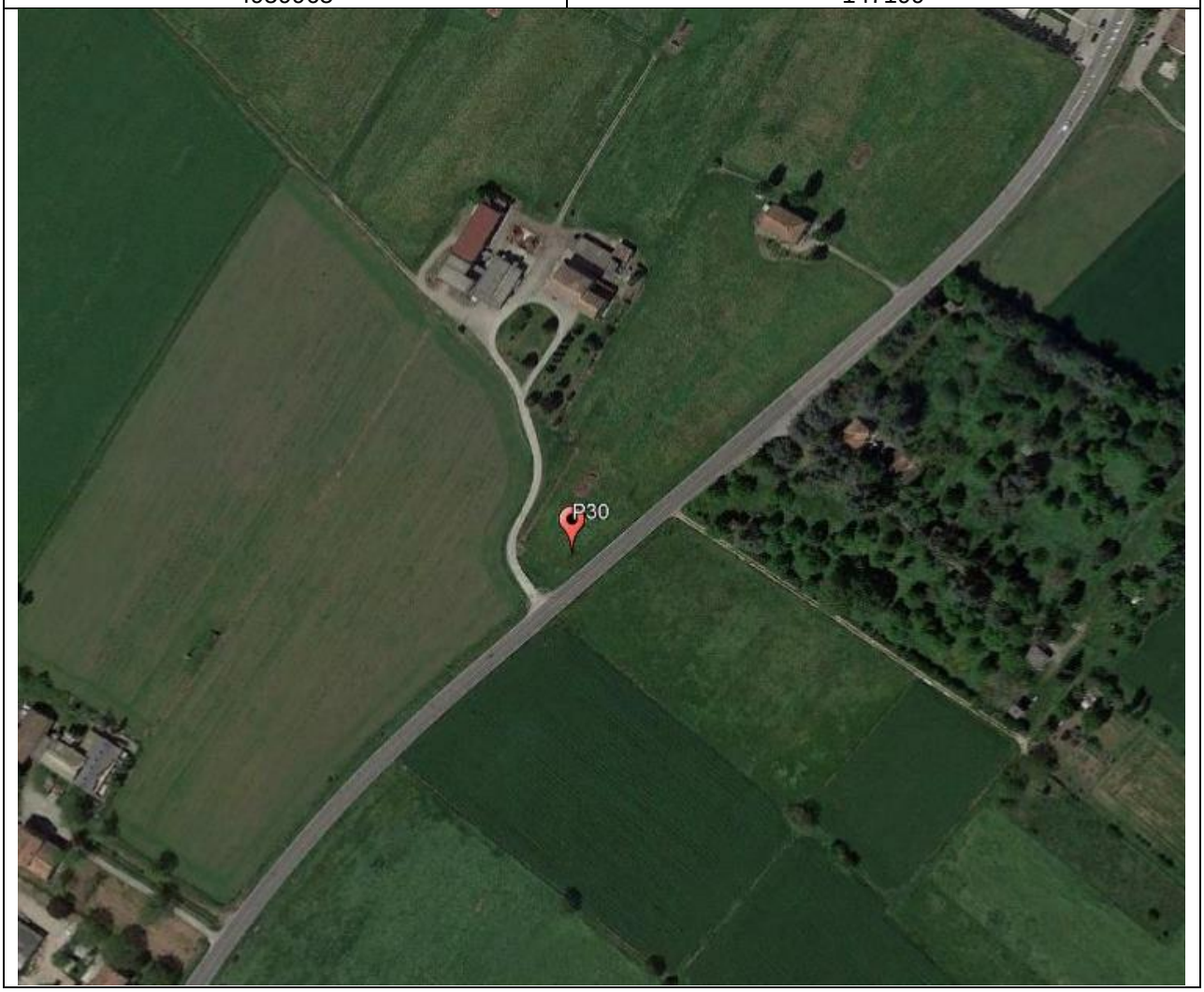
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	19.97 > 0.50	OK	
$n_c(f_0) > 200$	11182.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 960 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	15.219 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	2.20 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.32357| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	6.46137 < 0.99844		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1432 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
19,9 Hz	Media

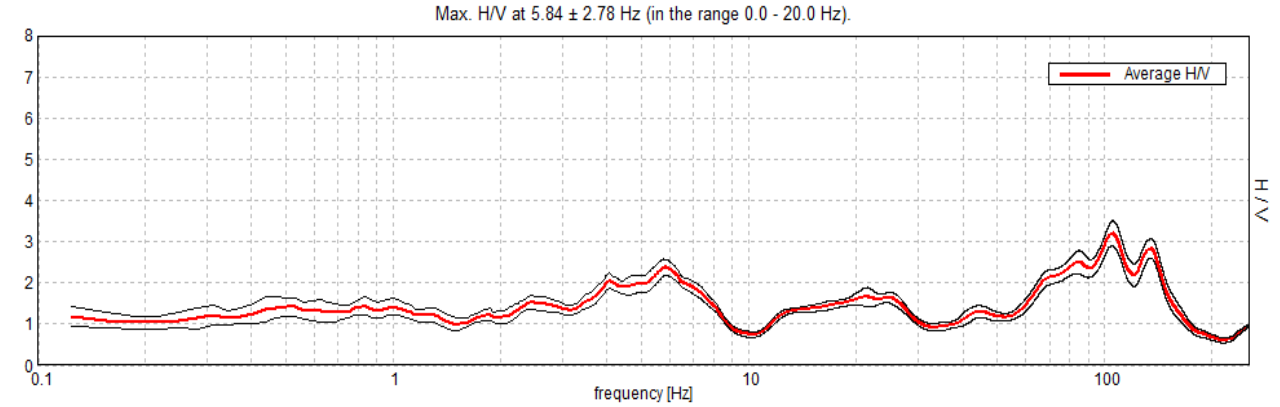
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959965	147199



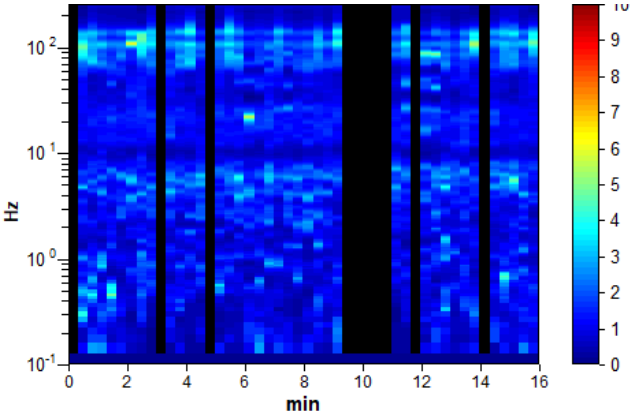
CAVRIAGO, P31

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 09:54:35 End recording: 08/05/20 10:10:35
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°33.4954 E, 44°43.0074 N (38.3 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'00". Analyzed 79% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

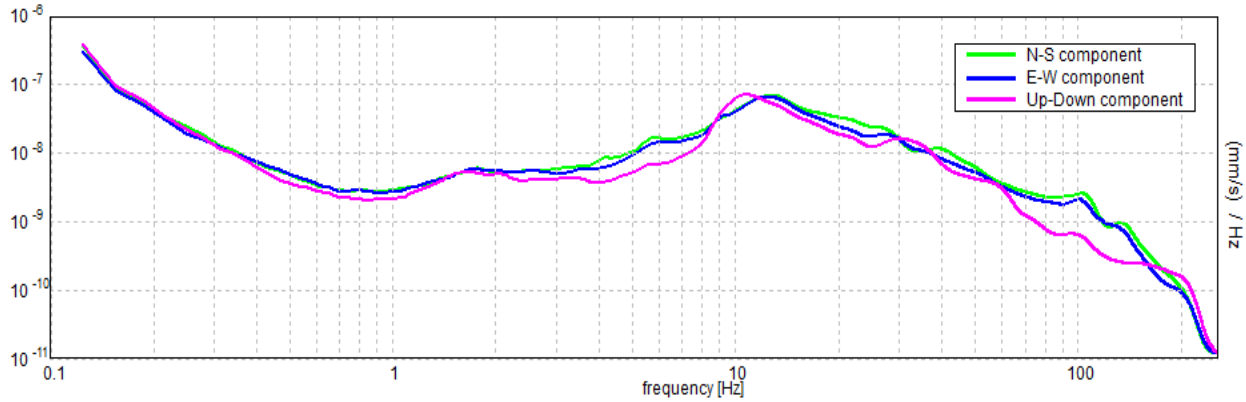
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 5.84 ± 2.78 Hz (in the range 0.0 - 20.0 Hz).

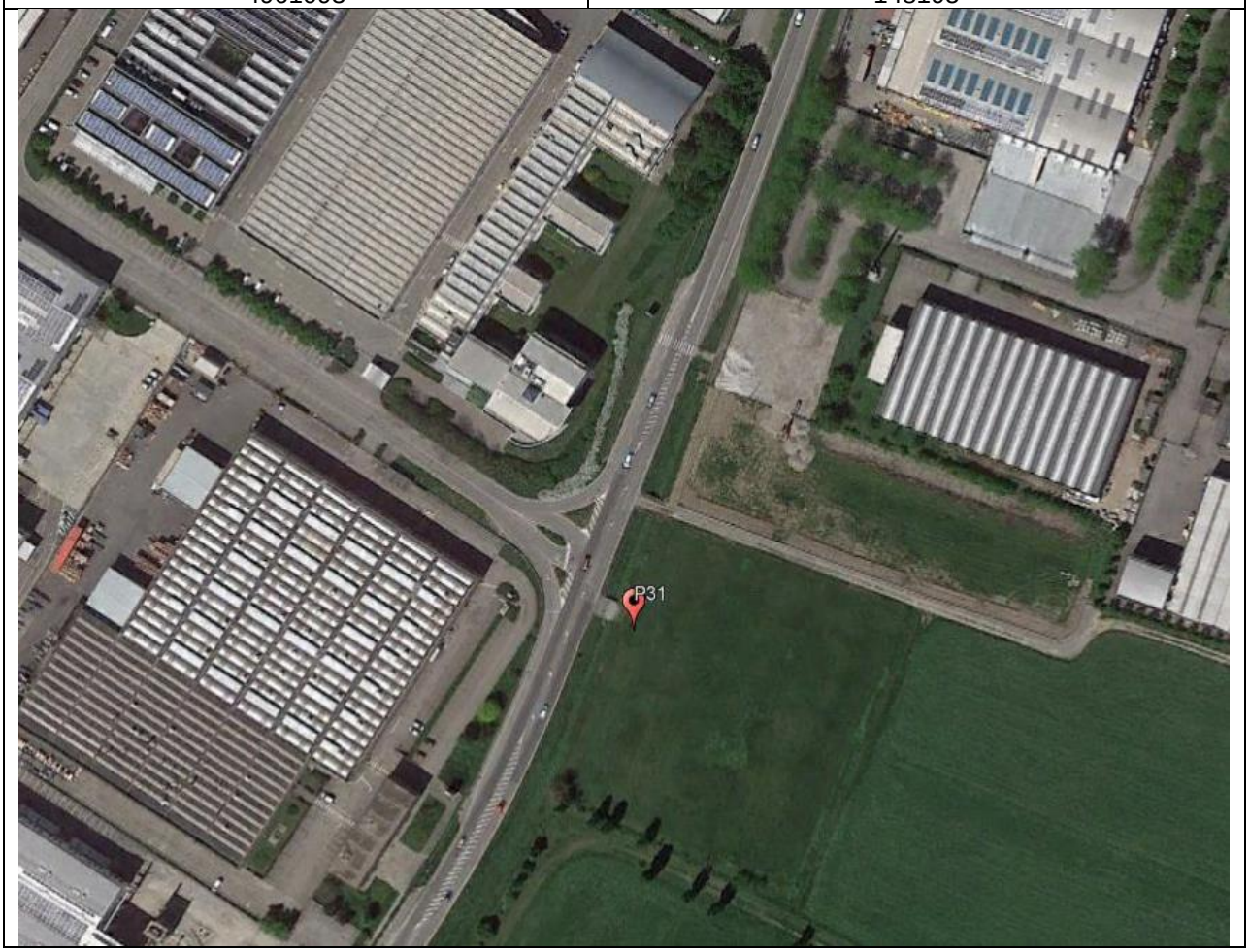
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.84 > 0.50	OK	
$n_c(f_0) > 200$	4441.3 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 282 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	2.063 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	8.438 Hz	OK	
$A_0 > 2$	2.37 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.47617| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	2.78265 < 0.29219		NO
$\sigma_A(f_0) < \theta(f_0)$	0.201 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
5,8 Hz	Alta

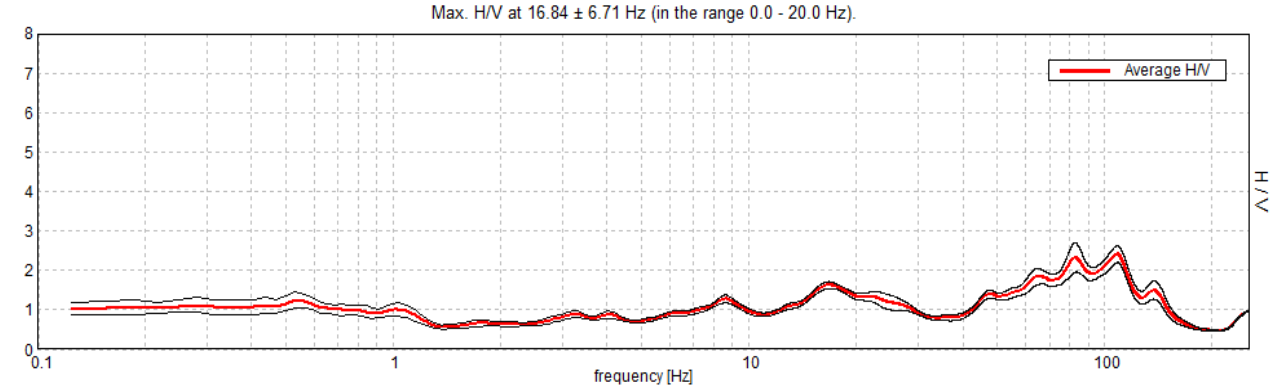
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4961093	148195



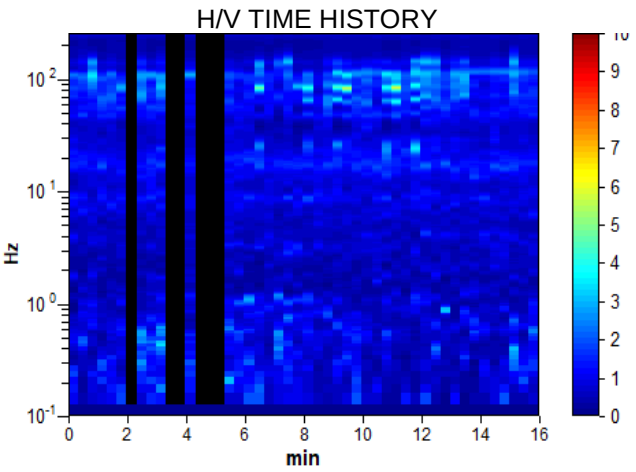
CAVRIAGO, P32

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 10:34:05 End recording: 08/05/20 10:50:05
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.0794 E, 44°41.6767 N (81.6 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'00". Analyzed 88% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

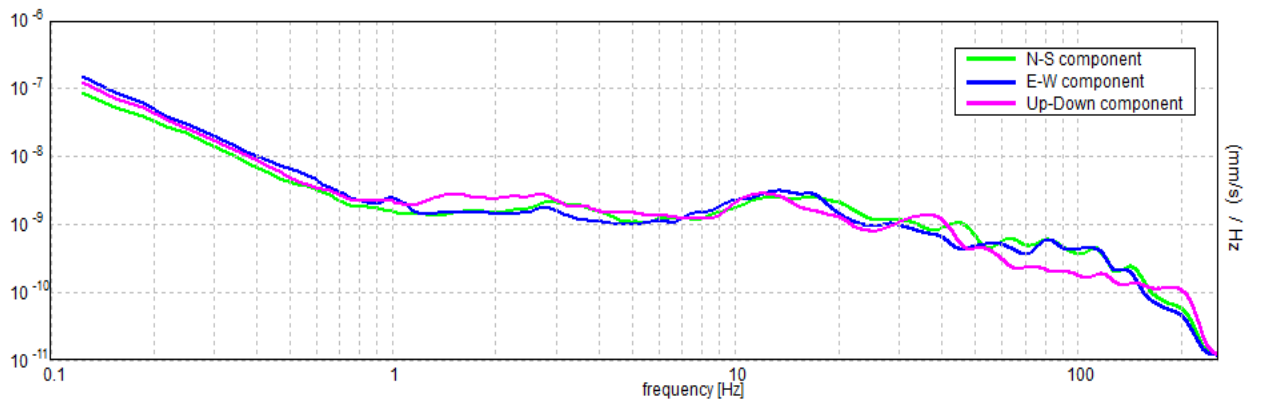
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 16.84 ± 6.71 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	16.84 > 0.50	OK	
$n_c(f_0) > 200$	14148.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 810 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	5.594 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	32.188 Hz	OK	
$A_0 > 2$	1.63 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.3985| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	6.71216 < 0.84219		NO
$\sigma_A(f_0) < \theta(f_0)$	0.0903 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

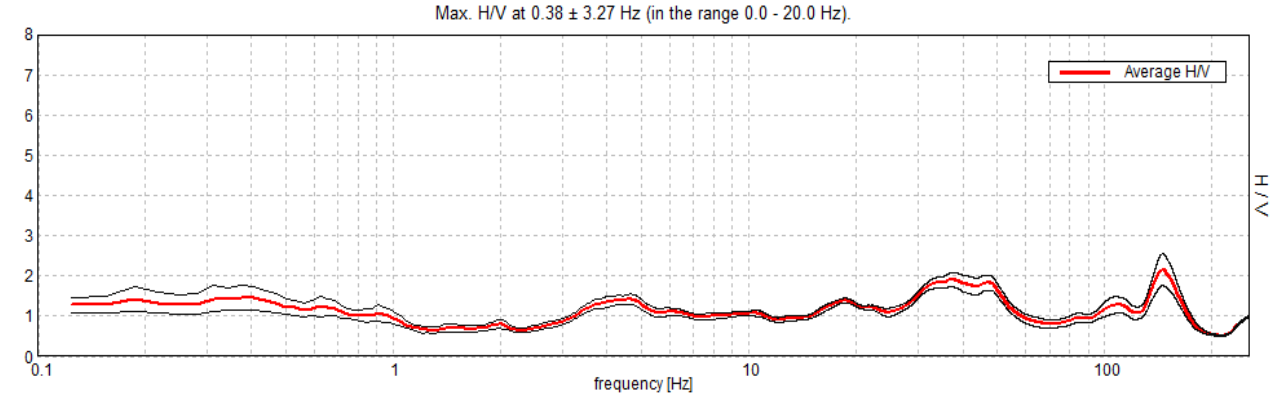
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958809	144874

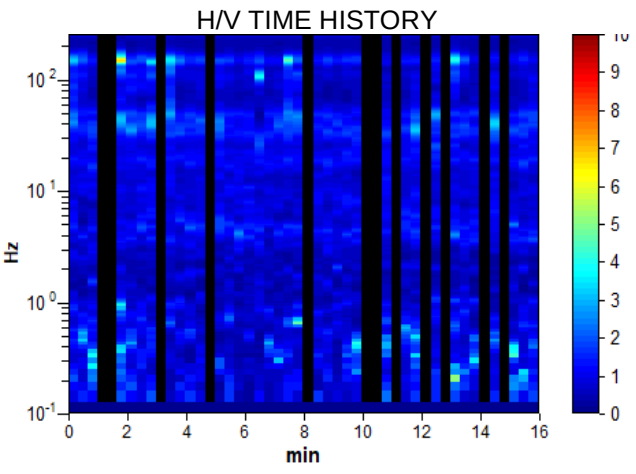
CAVRIAGO, P33

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 11:02:41 End recording: 08/05/20 11:18:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°30.7106 E, 44°41.6386 N (79.9 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h16'00". Analyzed 75% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

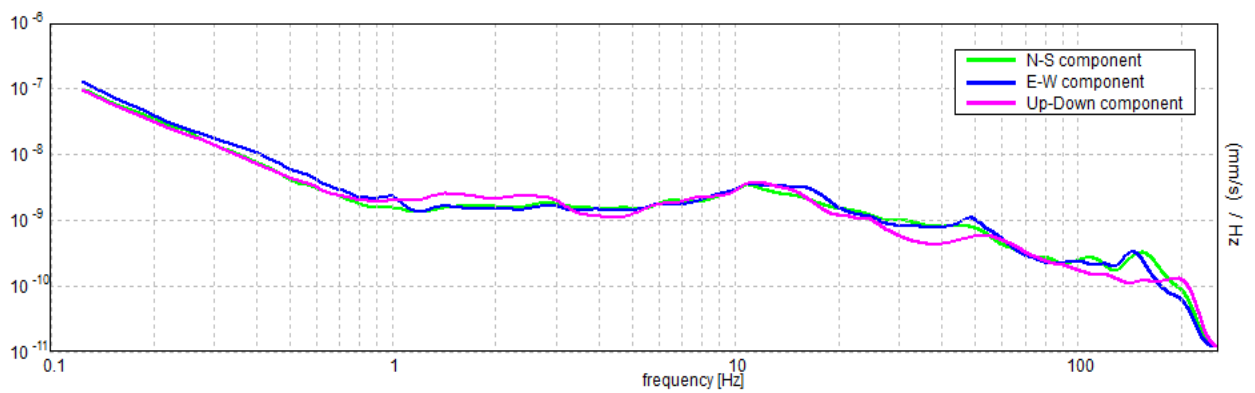
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 0.38 ± 3.27 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.38 > 0.50		NO
$n_c(f_0) > 200$	270.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 19 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	0.094 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	1.156 Hz	OK	
$A_0 > 2$	1.46 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|8.71451| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	3.26794 < 0.075		NO
$\sigma_A(f_0) < \theta(f_0)$	0.299 < 2.5	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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

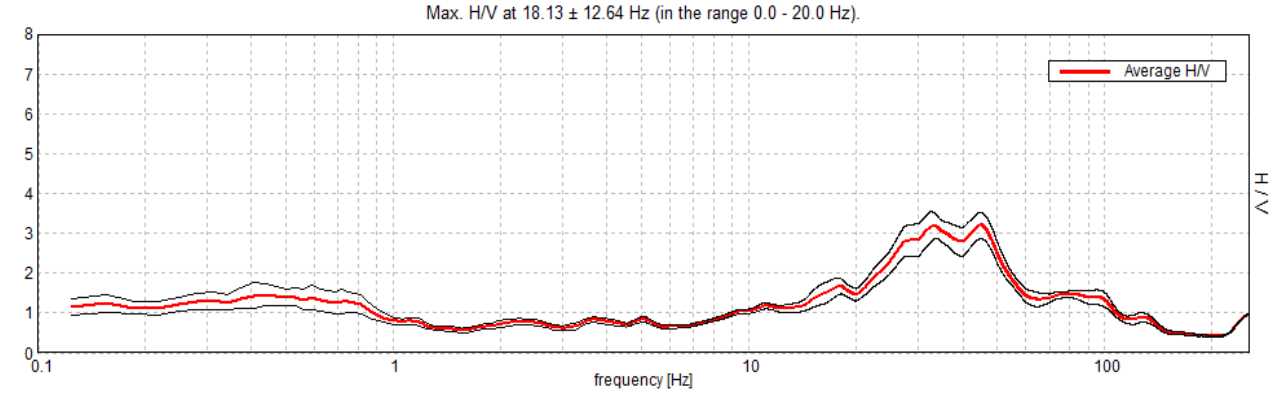
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958764	144364

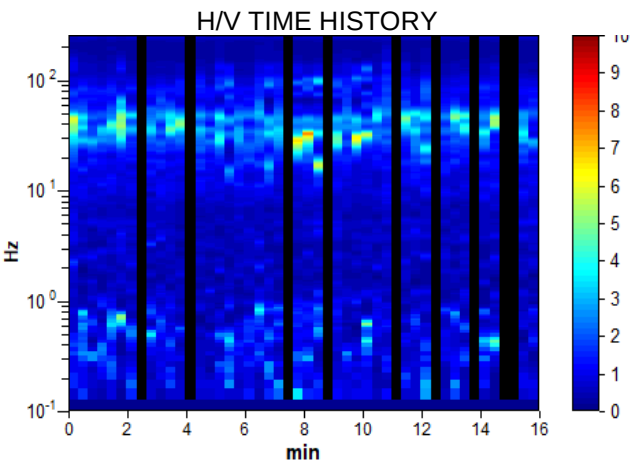
CAVRIAGO, P34

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 11:34:05 End recording: 08/05/20 11:50:05
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°30.8170 E, 44°42.0298 N (66.7 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h16'00''. Analyzed 81% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

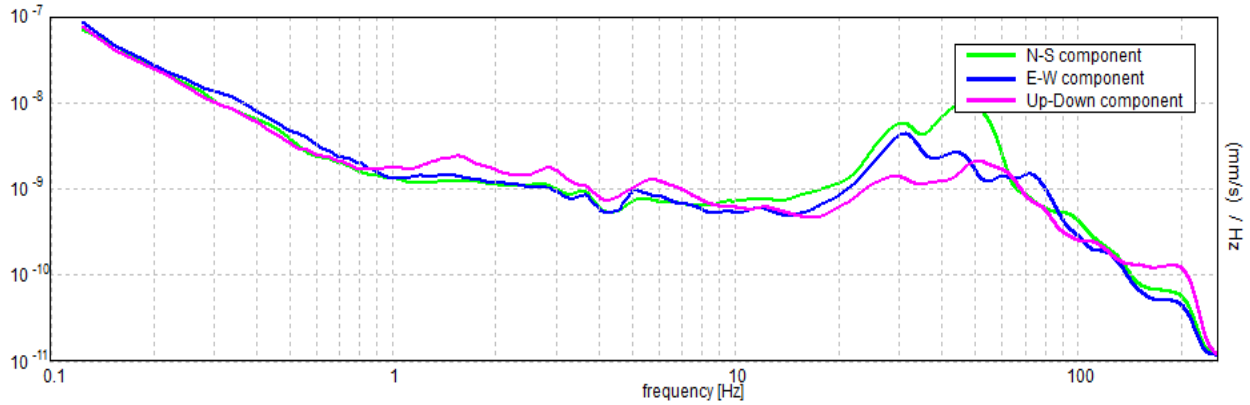
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 18.13 ± 12.64 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	18.13 > 0.50	OK	
$n_c(f_0) > 200$	14137.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 871 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	8.0 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.68 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.69713| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	12.63541 < 0.90625		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1936 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

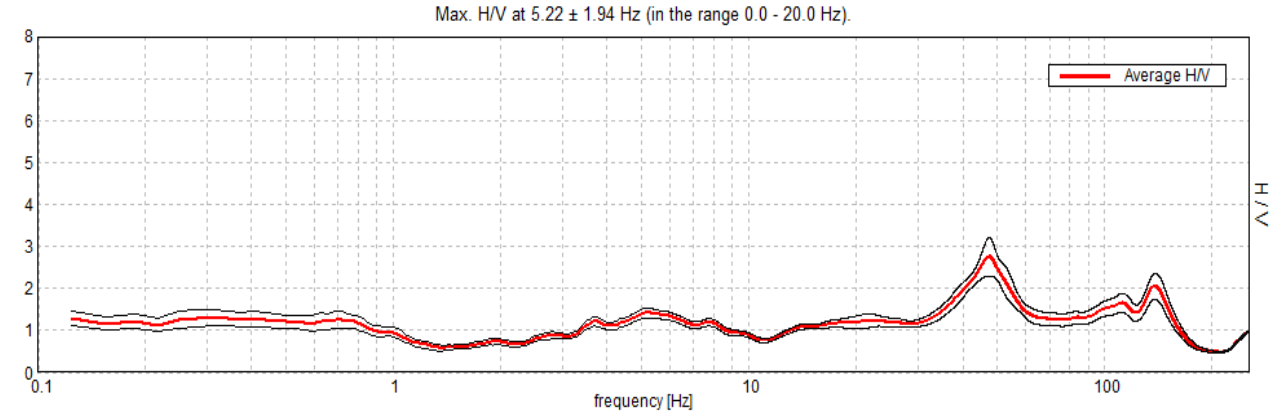
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4959474	144559

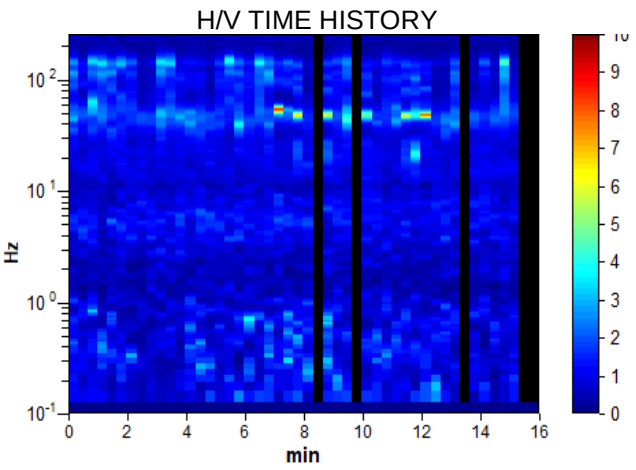
CAVRIAGO, P35

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 12:08:35 End recording: 08/05/20 12:24:35
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.8884 E, 44°41.4750 N (77.4 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'00". Analyzed 90% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

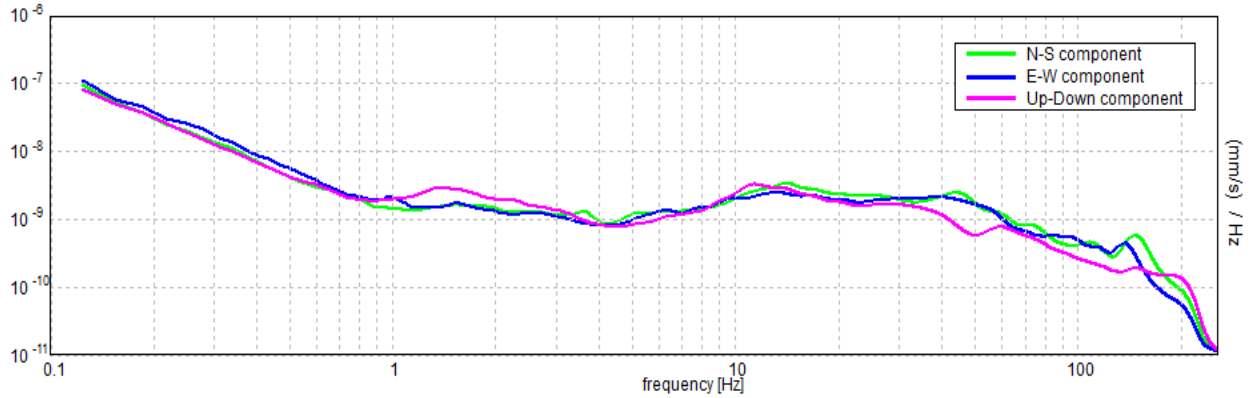
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 5.22 ± 1.94 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.22 > 0.50	OK	
$n_c(f_0) > 200$	4488.1 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 252 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	2.375 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	1.42 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.37214| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	1.94212 < 0.26094		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1214 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

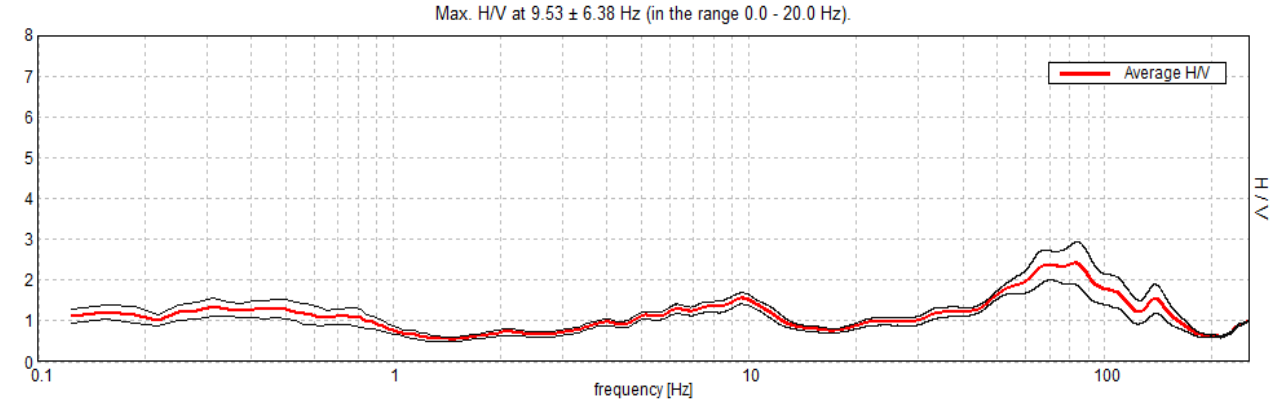
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958373	145915

CAVRIAGO, P36

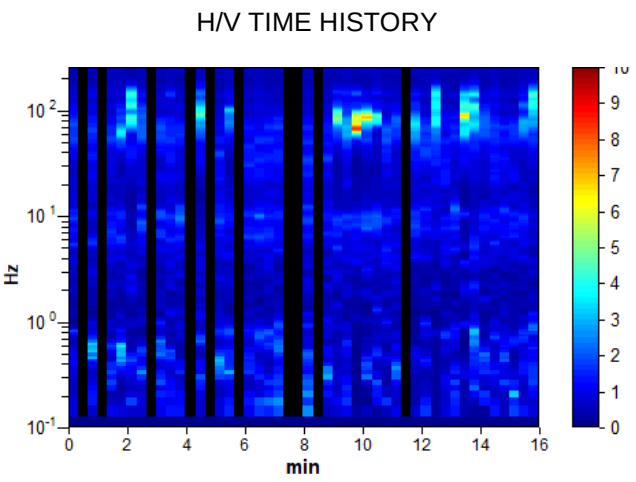
Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 13:05:52 End recording: 08/05/20 13:21:52
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS data not available

Trace length: 0h16'00''. Analyzed 79% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

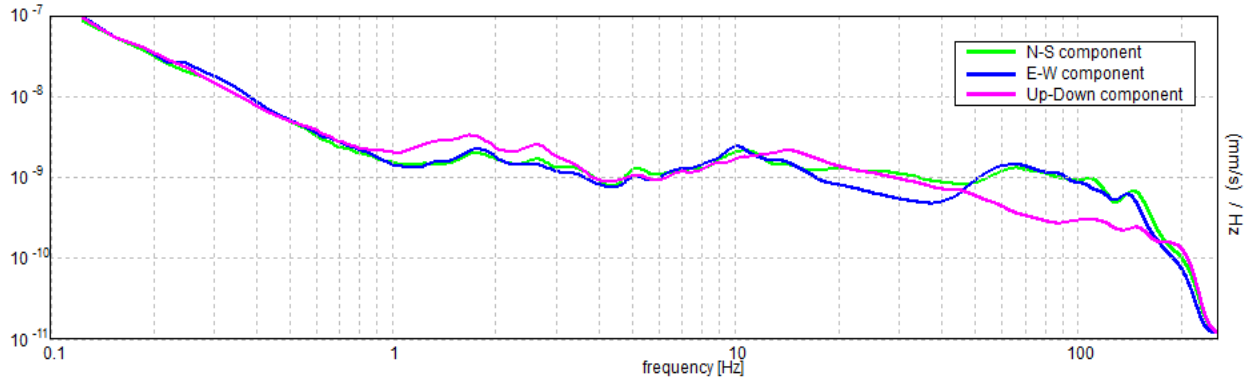
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 9.53 ± 6.38 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	9.53 > 0.50	OK	
$n_c(f_0) > 200$	7243.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 458 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	3.281 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	16.281 Hz	OK	
$A_0 > 2$	1.55 > 2		NO
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.66918| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	6.37813 < 0.47656		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1388 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

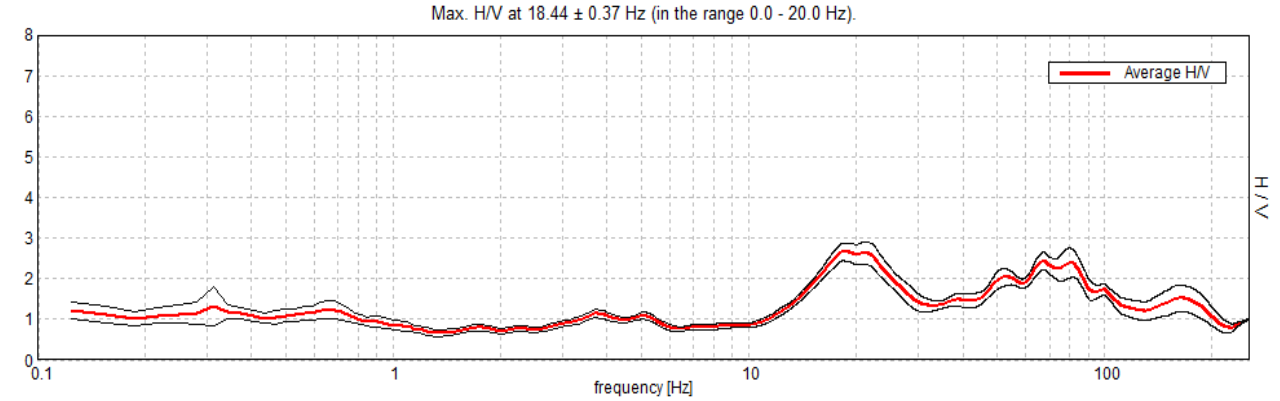
Frequenza caratteristica di sito	Precisione della stima della frequenza
Nessun picco (np)	/

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958346	145500

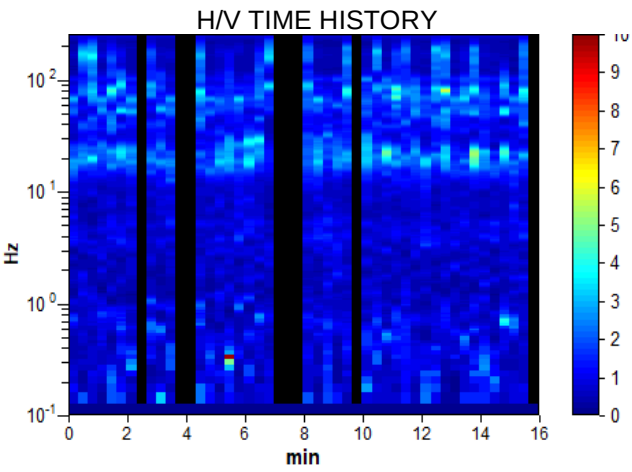
CAVRIAGO, P37

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 13:44:41 End recording: 08/05/20 14:00:41
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°30.9975 E, 44°40.7958 N (121.6 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 06
Trace length: 0h16'00". Analyzed 83% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

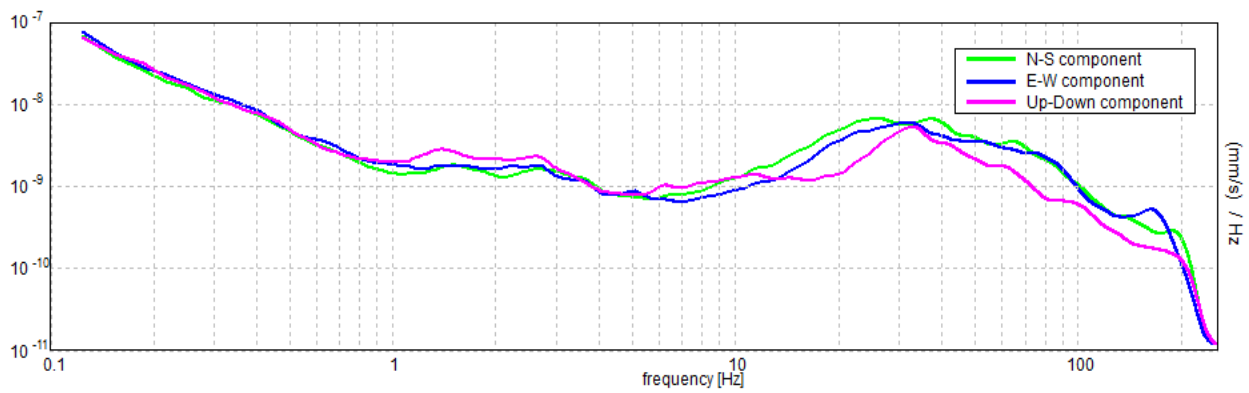
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 18.44 ± 0.37 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	18.44 > 0.50	OK	
$n_c(f_0) > 200$	14750.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 886 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	13.031 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$			NO
$A_0 > 2$	2.66 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.02005| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.36962 < 0.92188	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.2165 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

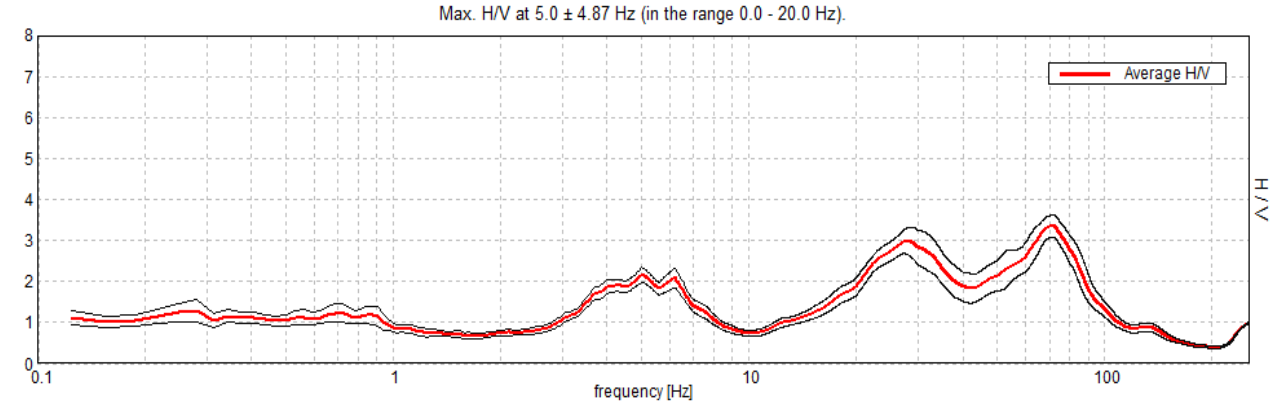
Frequenza caratteristica di sito	Precisione della stima della frequenza
18,4	Elevata

UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4957175	144675

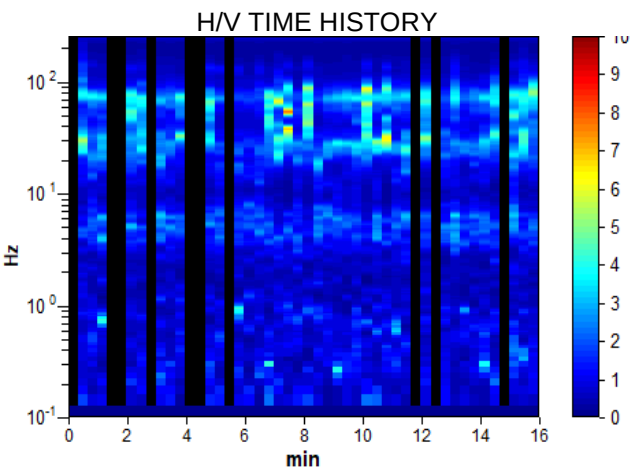
CAVRIAGO, P38

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 14:20:11 End recording: 08/05/20 14:36:11
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°31.1243 E, 44°40.9165 N (101.9 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'00''. Analyzed 79% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

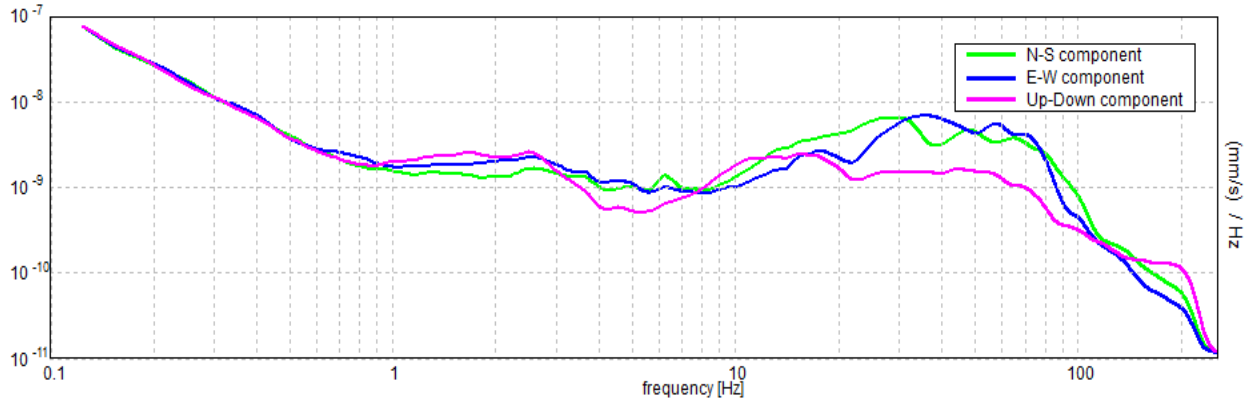
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 5.0 ± 4.87 Hz (in the range 0.0 - 20.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.00 > 0.50	OK	
$n_c(f_0) > 200$	3800.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 241 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	2.969 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	7.969 Hz	OK	
$A_0 > 2$	2.16 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.97352| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	4.86758 < 0.25		NO
$\sigma_A(f_0) < \theta(f_0)$	0.1823 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
5,0	Elevata

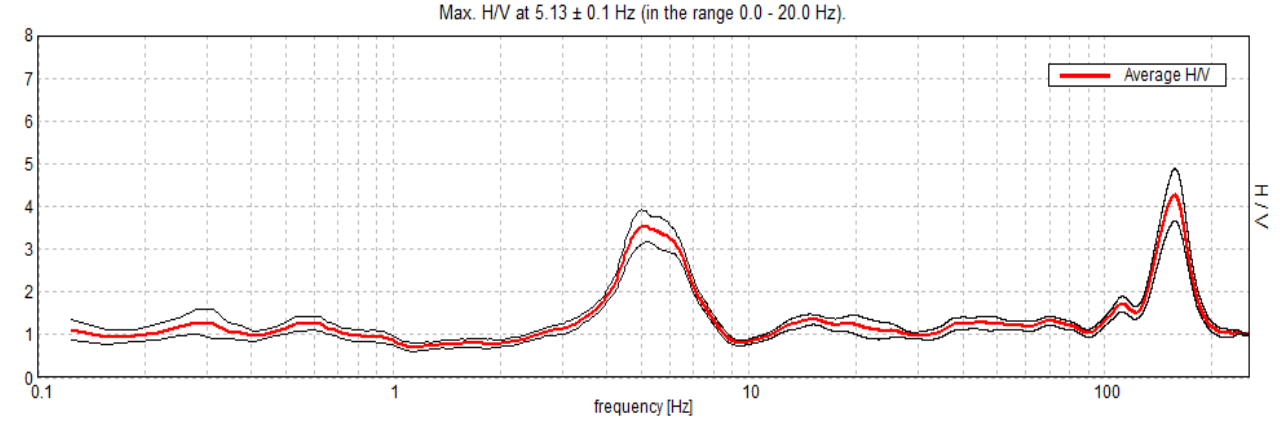
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4957395	144854

CAVRIAGO, P39

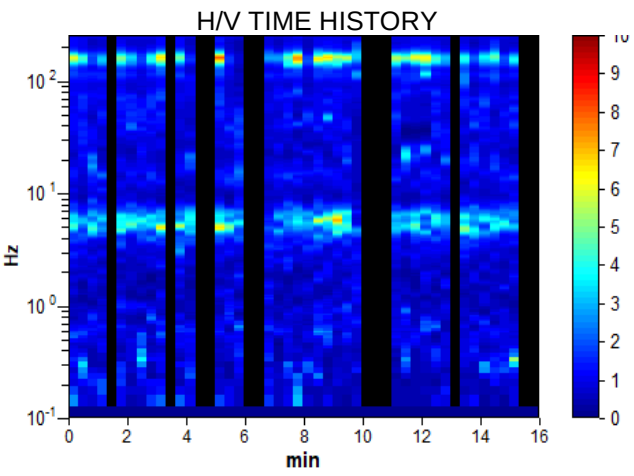
Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 14:58:17 End recording: 08/05/20 15:14:17
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS data not available

Trace length: 0h16'00''. Analyzed 75% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

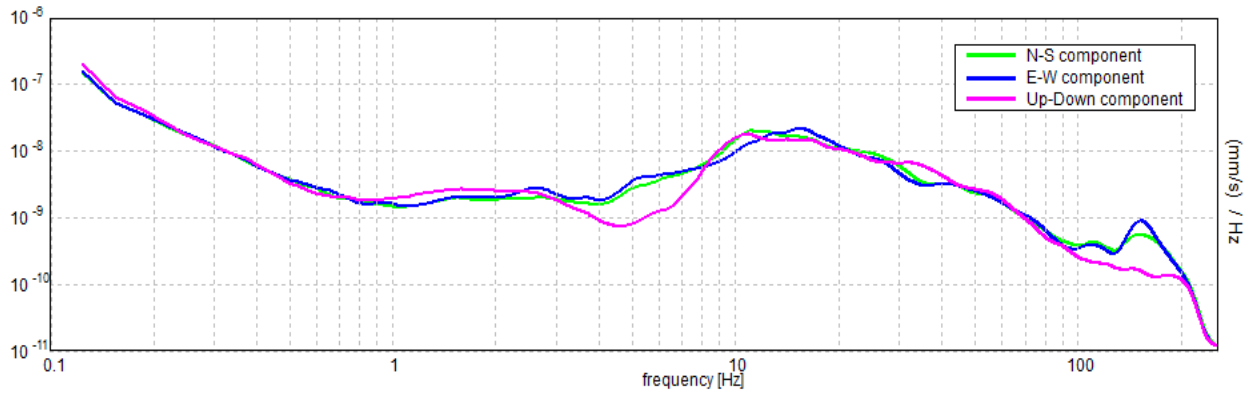
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



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

Max. H/V at 5.13 ± 0.1 Hz (in the range 0.0 - 20.0 Hz).

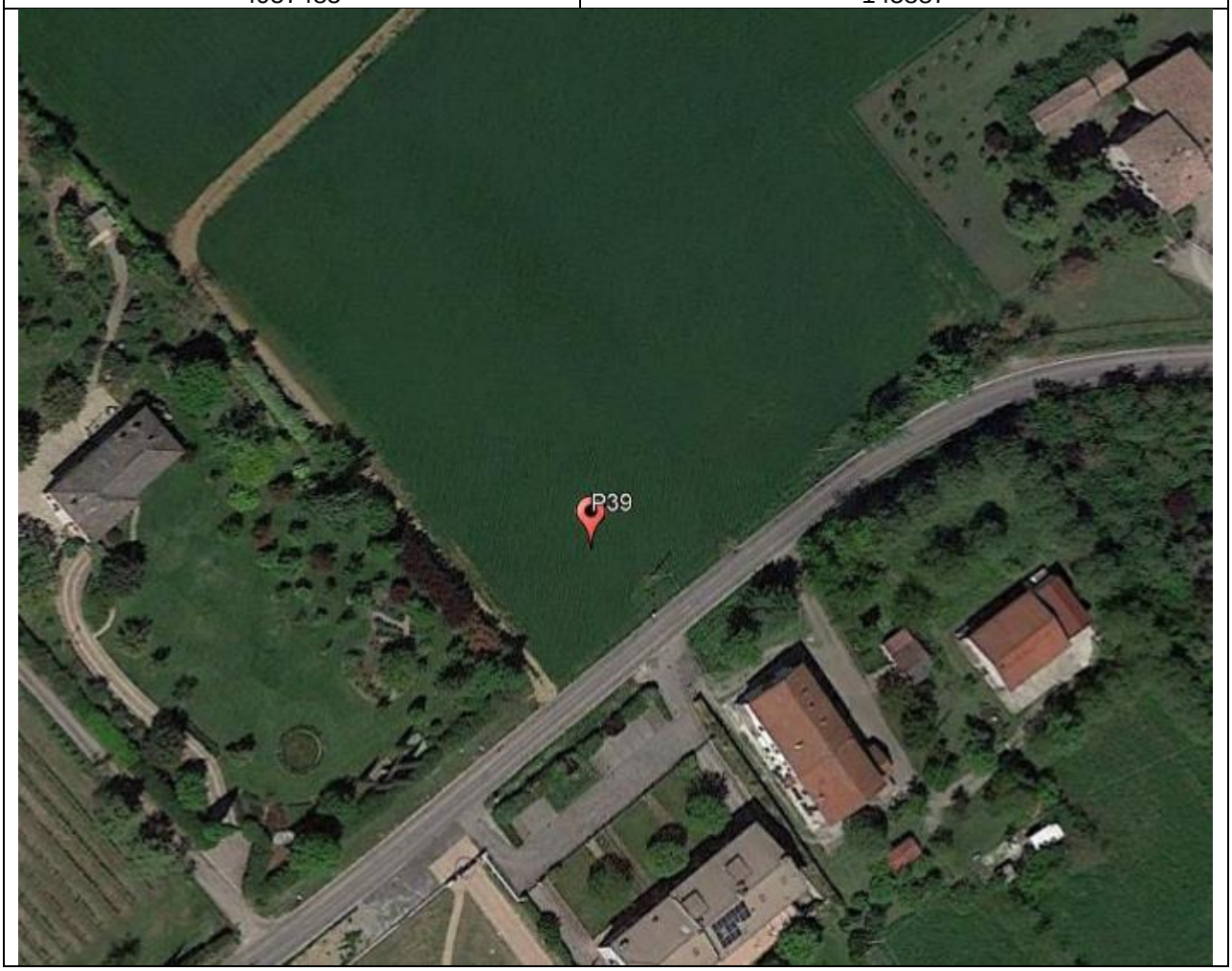
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.13 > 0.50	OK	
$n_c(f_0) > 200$	3690.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 247 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	3.875 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	7.406 Hz	OK	
$A_0 > 2$	3.53 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.01978| < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.1014 < 0.25625	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.3639 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

Frequenza caratteristica di sito	Precisione della stima della frequenza
5,1	Elevata

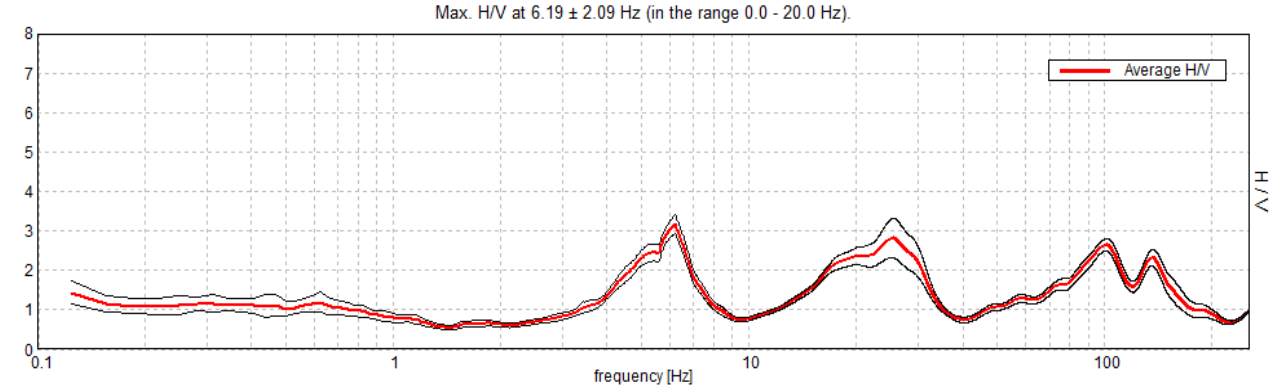
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4957485	145887



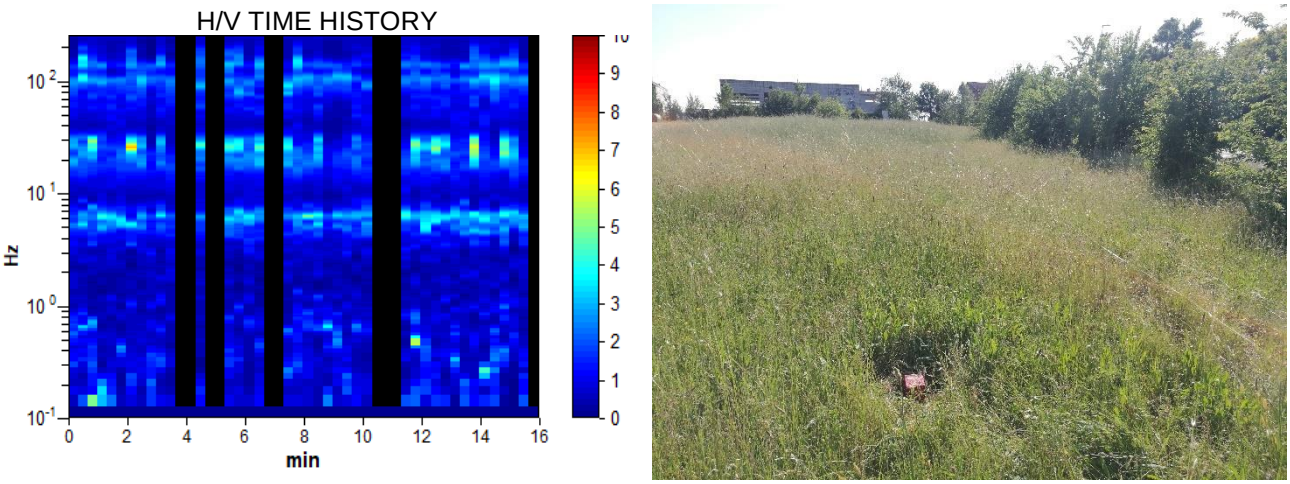
CAVRIAGO, P40

Instrument: TE3-0005/01-13
Data format: 16 byte
Full scale [mV]: 51
Start recording: 08/05/20 15:45:36 End recording: 08/05/20 16:01:36
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN ; north south; east west ; up down ; Y + Y - ; X + X - ; Z + Z -
GPS location: 010°32.4739 E, 44°41.3481 N (77.8 m)
(UTC time synchronized to the first recording sample): not available in this acquisition mode + 0 + 0 samples
Satellite no.: 05
Trace length: 0h16'00". Analyzed 79% trace (manual window selection)
Sampling rate: 512 Hz
Window size: 20 s
Smoothing type: Triangular window
Smoothing: 10%

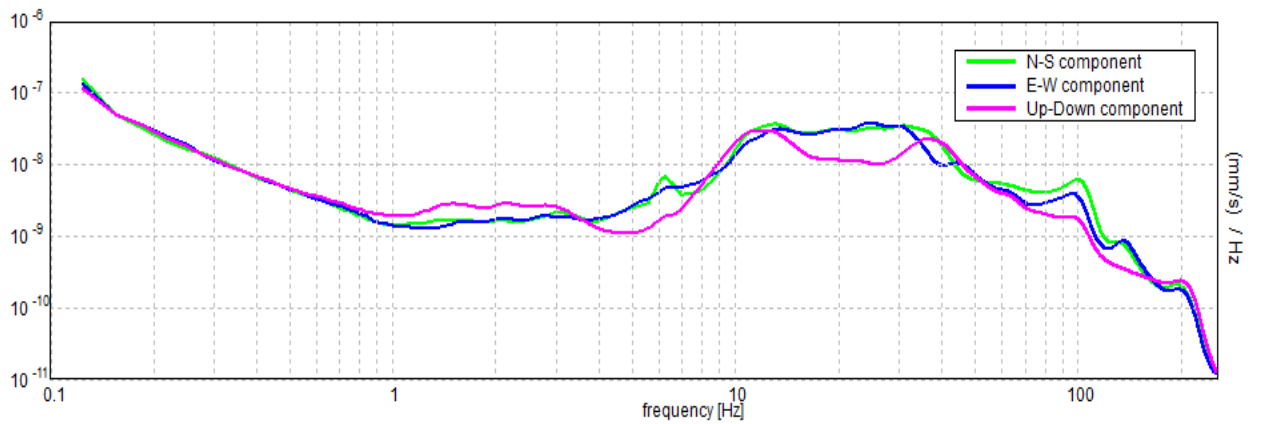
HORIZONTAL TO VERTICAL SPECTRAL RATIO



H/V TIME HISTORY



SINGLE COMPONENT SPECTRA



EXPERIMENTAL vs. SYNTHETIC H/V

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

Max. H/V at 6.19 ± 2.09 Hz (in the range 0.0 - 20.0 Hz).

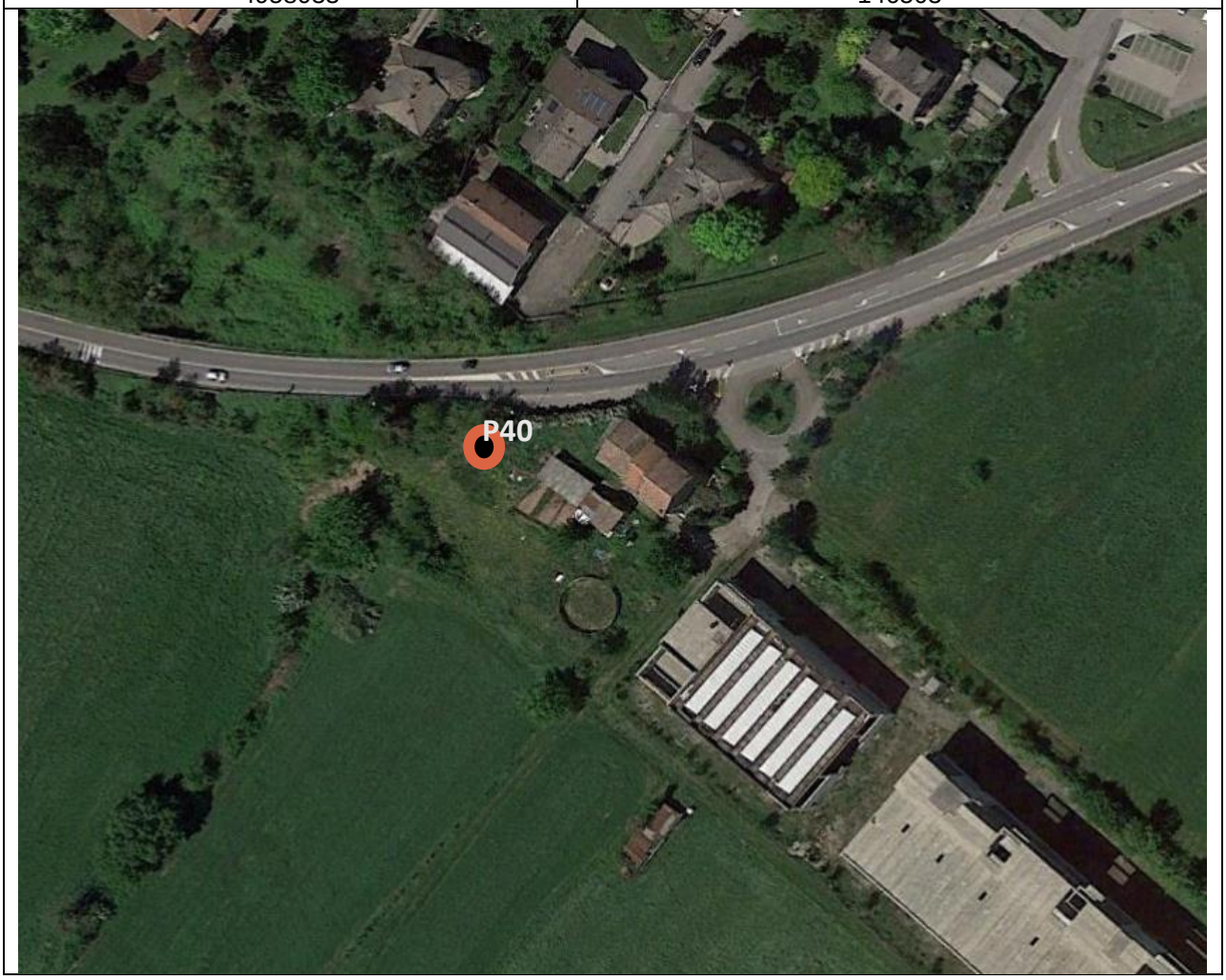
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	6.19 > 0.50	OK	
$n_c(f_0) > 200$	4702.5 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5$Hz **$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5$Hz**	Exceeded 0 out of 298 times	OK	
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$	4.188 Hz	OK	
Exists f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	7.313 Hz	OK	
$A_0 > 2$	3.17 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	|0.33734| < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	2.08731 < 0.30938		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2382 < 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
$\sigma_{logH/V}(f)$	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 $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

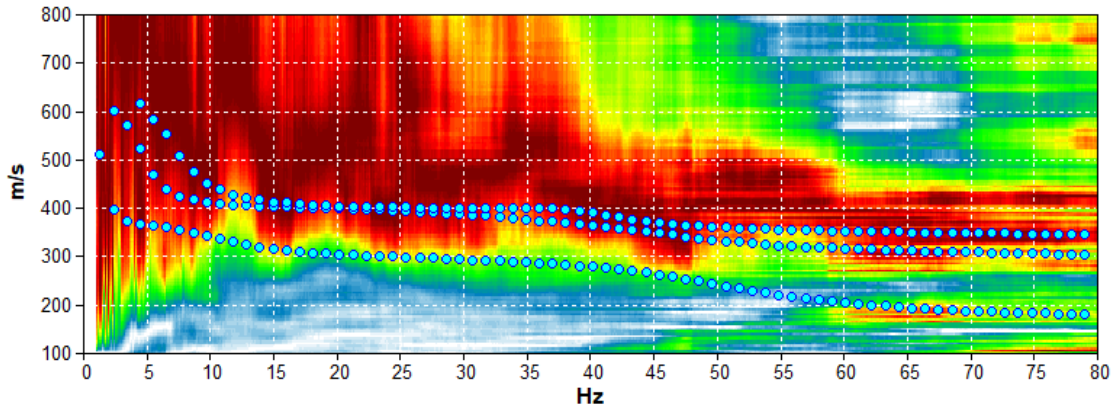
Frequenza caratteristica di sito	Precisione della stima della frequenza
6,1	Elevata

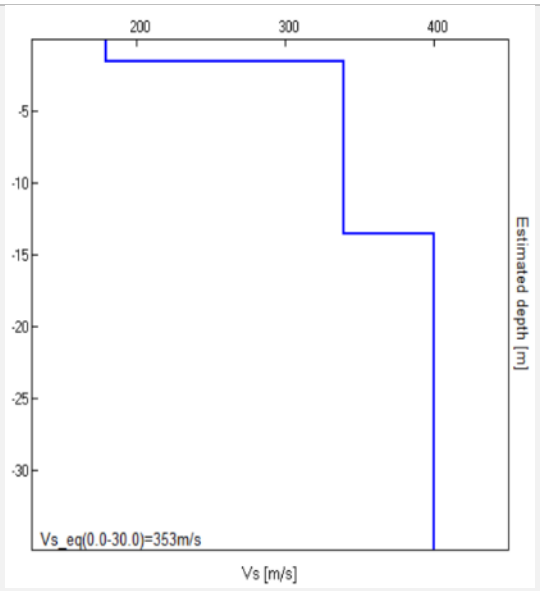
UBICAZIONE INDAGINI	
Latitudine (m)	**Longitudine (m)**
4958033	146503



Indagini sismiche di tipo attivo in array (M.A.S.W.)

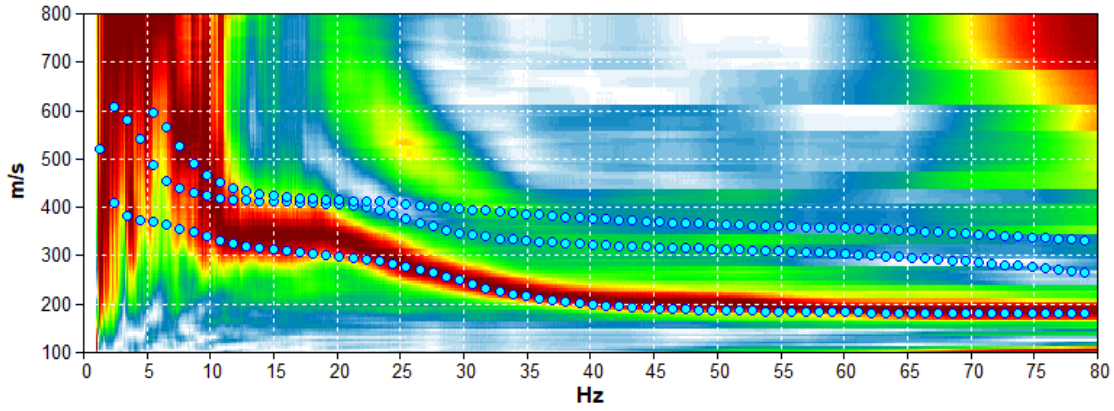
Misura sismica MASW n°1 (L1) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958979	Latitudine: 4958988
Longitudine: 146710	Longitudine: 146682

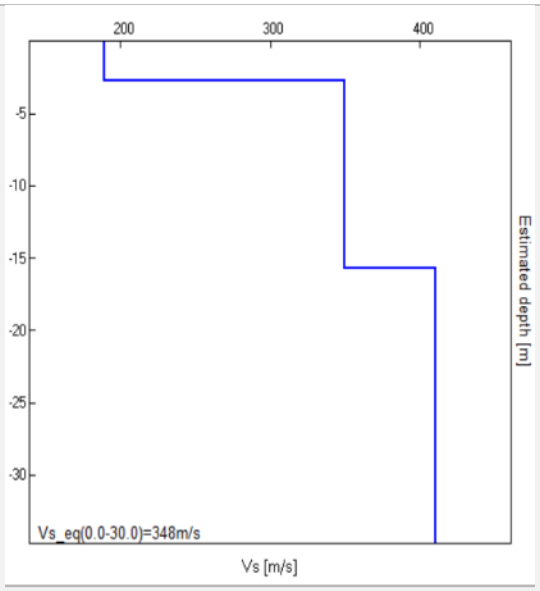




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	180
1,5 - ≈13	340
≈13 - ≈30	400
> ≈30	400

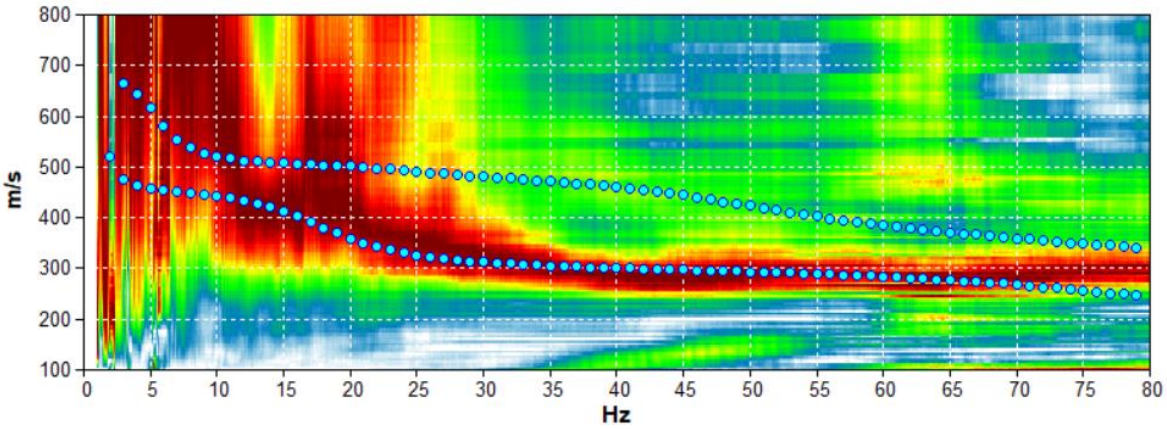
Misura sismica MASW n°2 (L2) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959062	Latitudine: 4959073
Longitudine: 146213	Longitudine: 146170

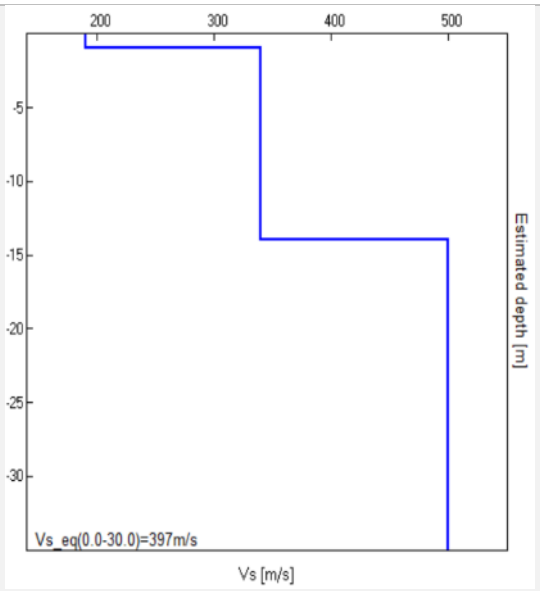




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,7	190
2,7 - ≈16	350
≈16 - ≈30	410
> ≈30	410

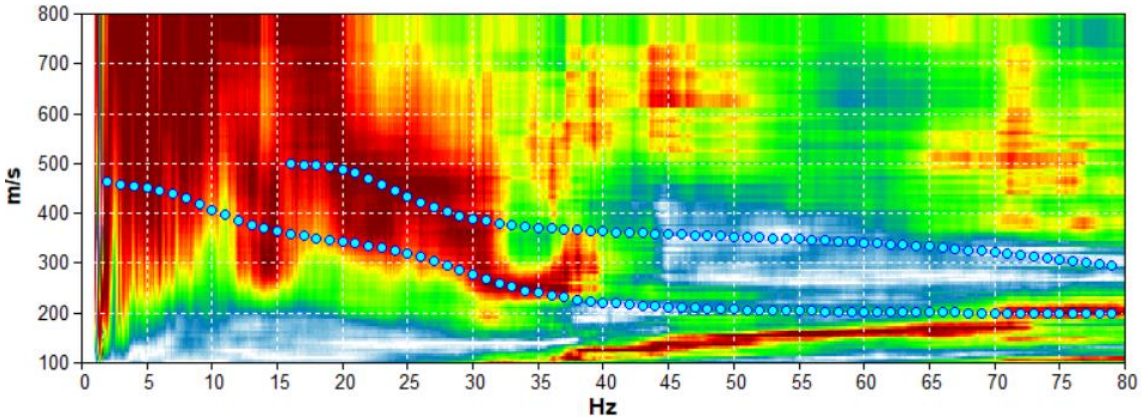
Misura sismica MASW n°3 (L3) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958694	Latitudine: 4958720
Longitudine: 146070	Longitudine: 146086

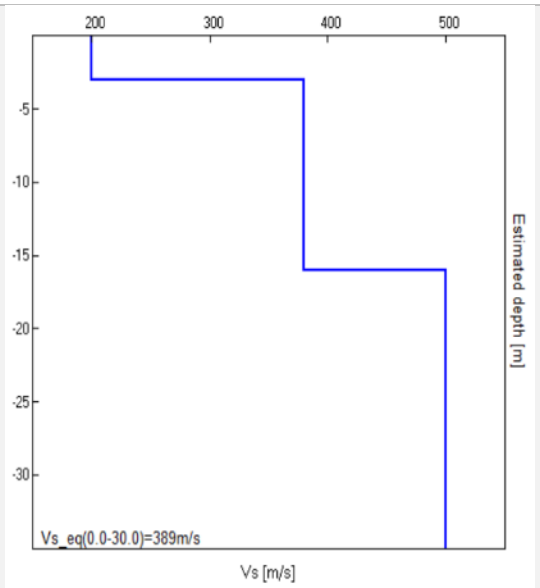




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	190
1,0 - ≈14	340
≈14 - ≈30	500
> ≈30	500

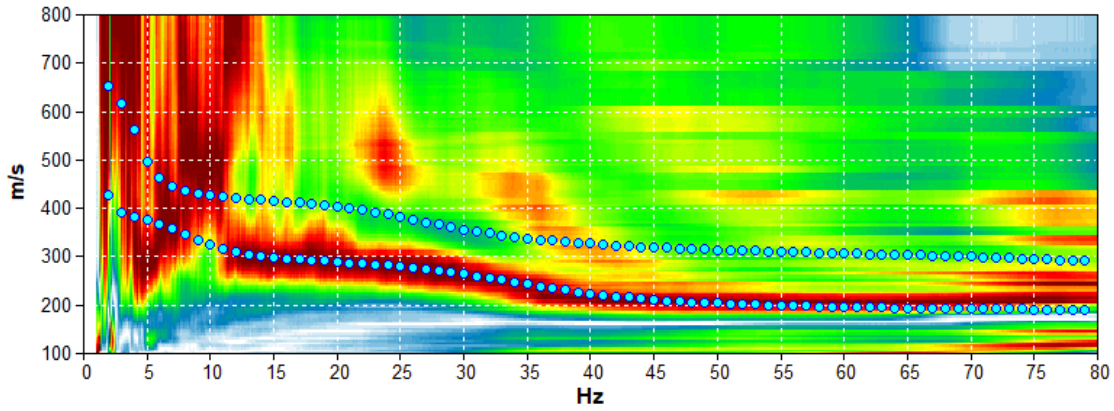
Misura sismica MASW n°4 (L4) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958960	Latitudine: 4958956
Longitudine: 145620	Longitudine: 145665

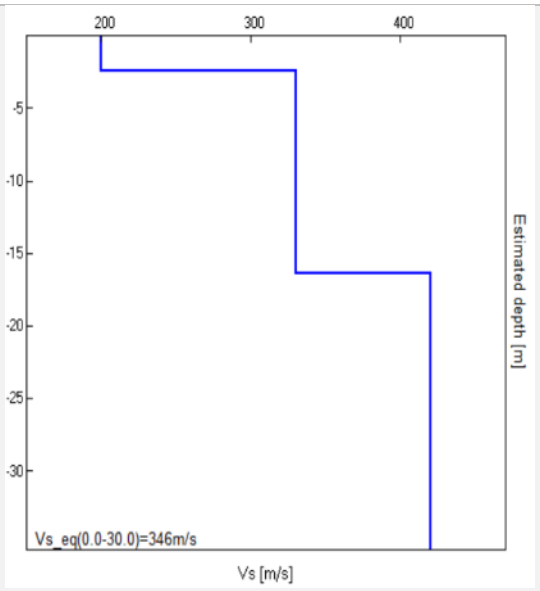




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 3,0	200
3,0 - ≈16	380
≈16 - ≈30	500
> ≈30	500

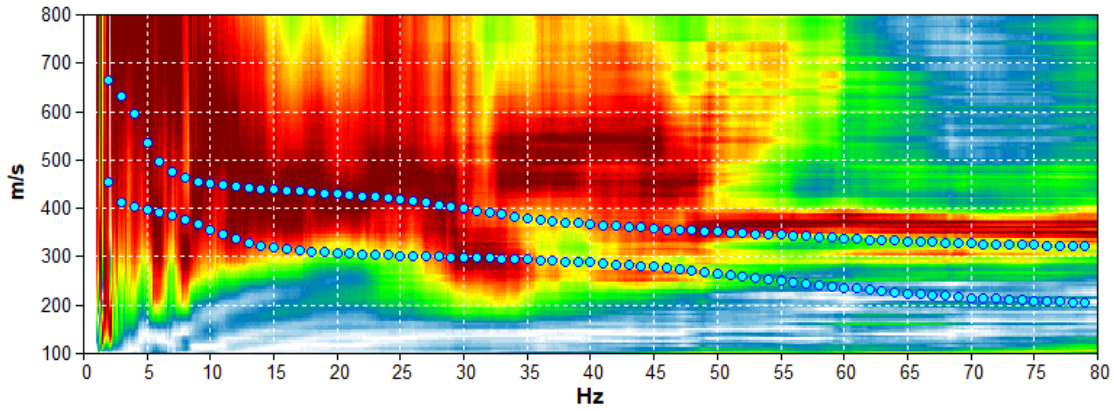
Misura sismica MASW n°5 (L5) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959131	Latitudine: 4959093
Longitudine: 145499	Longitudine: 145477

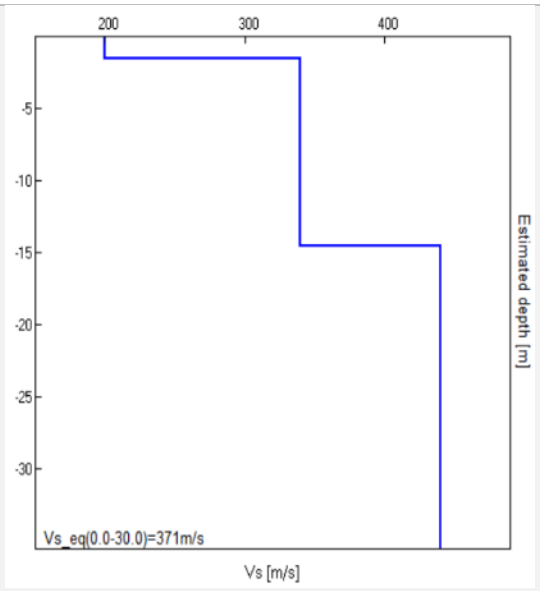




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,4	200
2,4 - ≈16	330
≈16 - ≈30	420
> ≈116	420

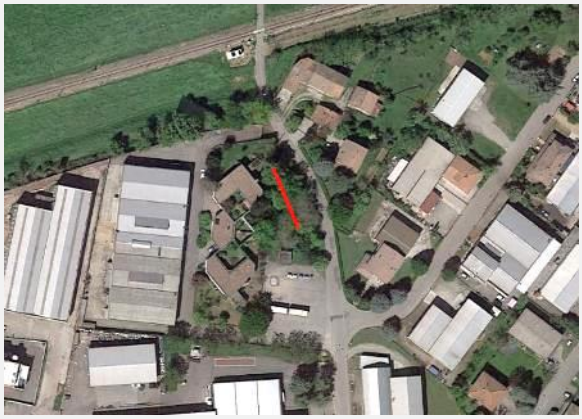
Misura sismica MASW n°6 (L6) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959291	Latitudine: 4959283
Longitudine: 145301	Longitudine: 145330

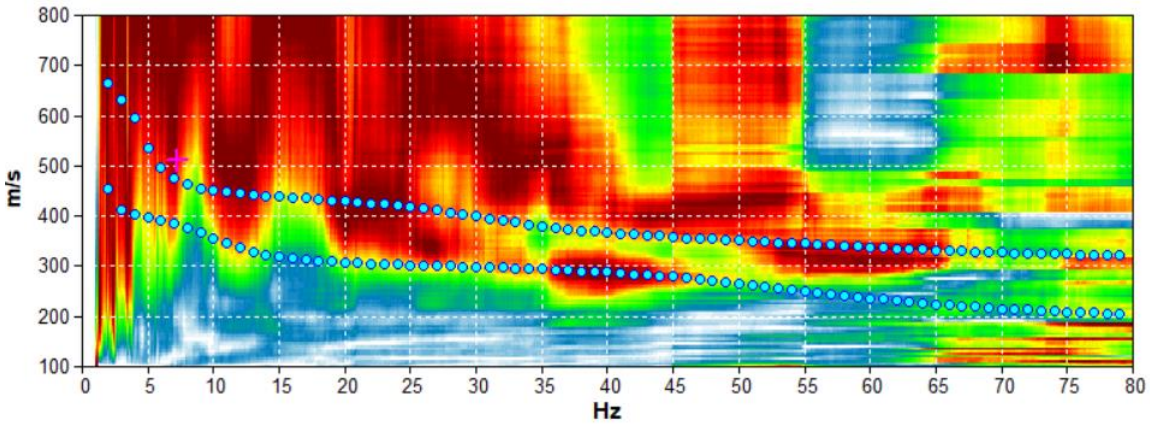


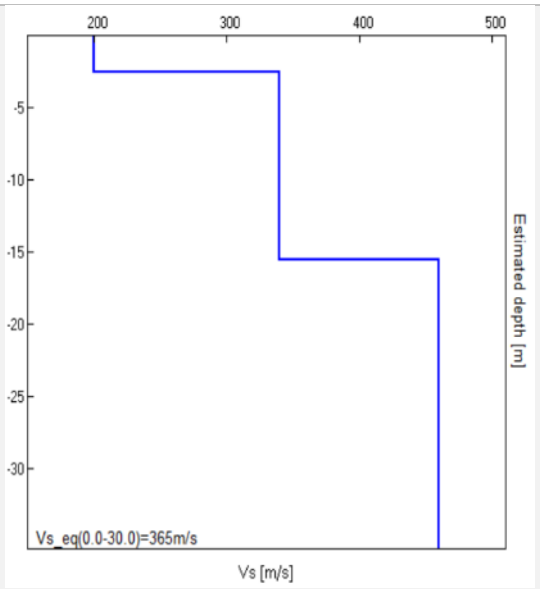


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	200
1,5 - ≈14	340
≈14 - ≈30	440
> ≈30	440

Misura sismica MASW n°7 (L7) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959165	Latitudine: 4959137
Longitudine: 144592	Longitudine: 144602

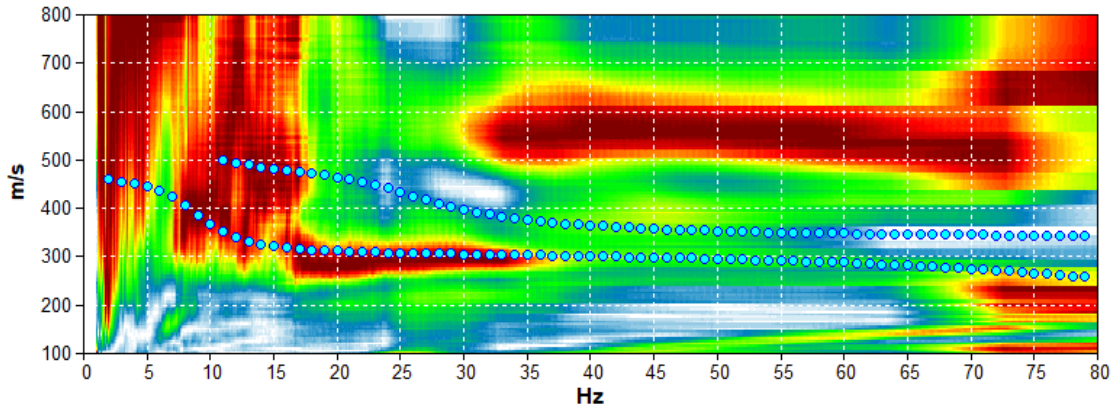


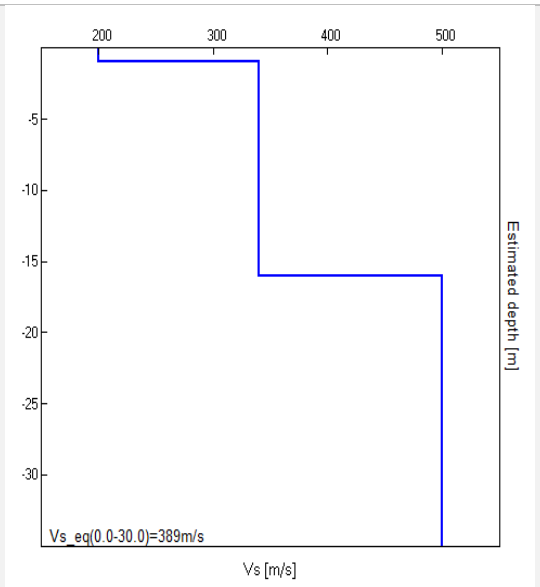




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	200
2,5 - ≈15	340
≈15 - ≈30	460
> ≈30	460

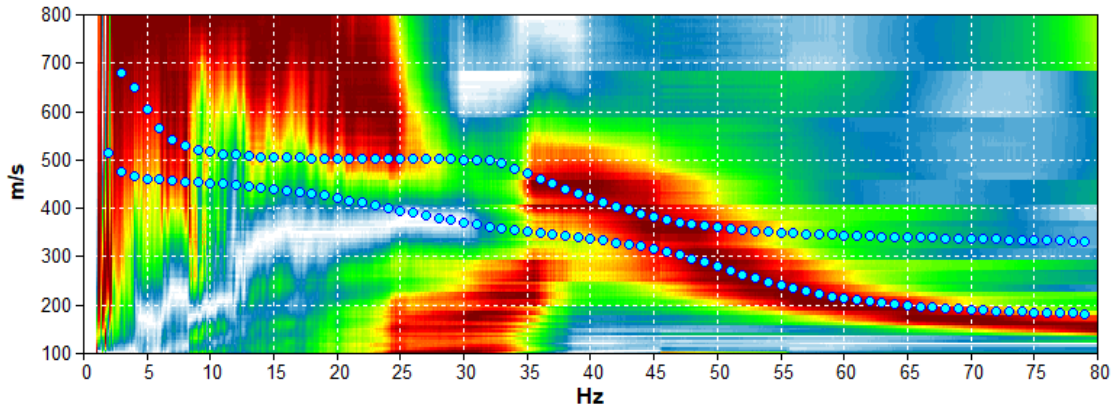
Misura sismica MASW n°8 (L8) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959203	Latitudine: 4959192
Longitudine: 144537	Longitudine: 144494

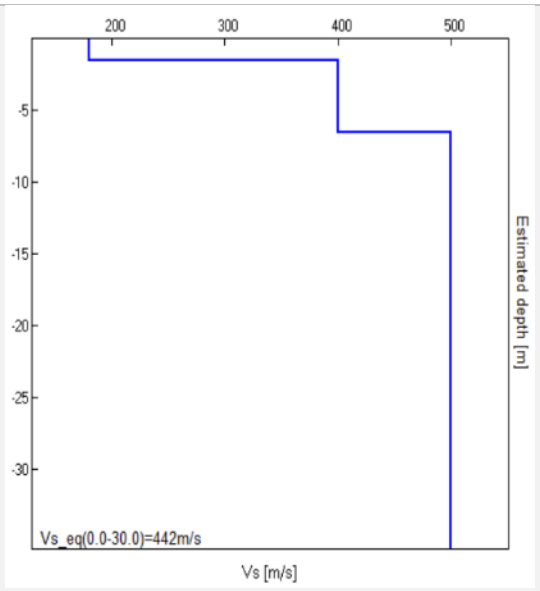




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	200
1,0 - ≈16	340
≈16 - ≈30	500
> ≈30	500

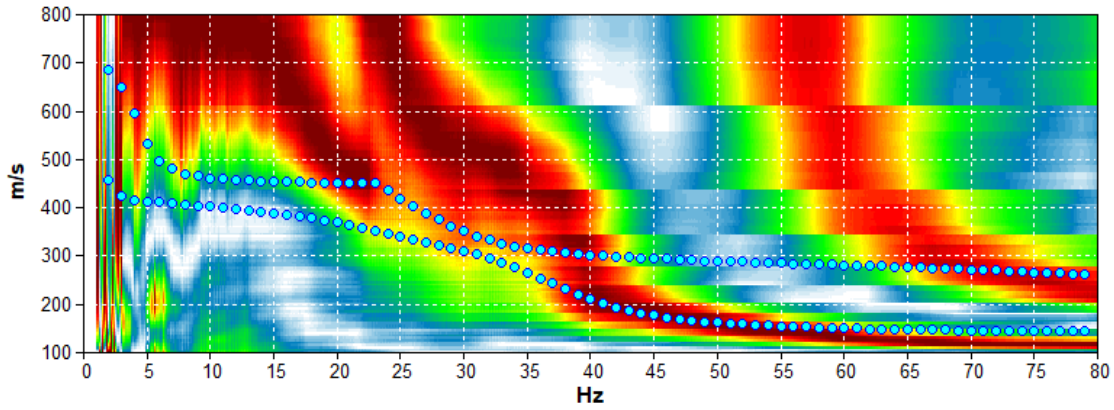
Misura sismica MASW n°9 (L9) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960044	Latitudine: 4960032
Longitudine: 145920	Longitudine: 145948

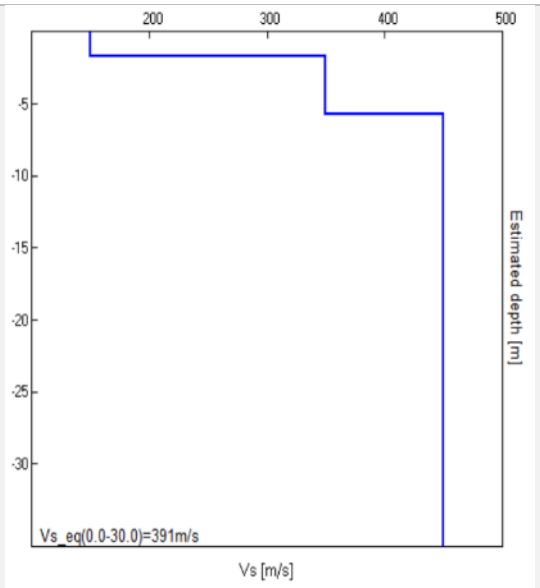




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	180
1,5 - 6,5	400
6,5 - ≈30	500
> ≈30	500

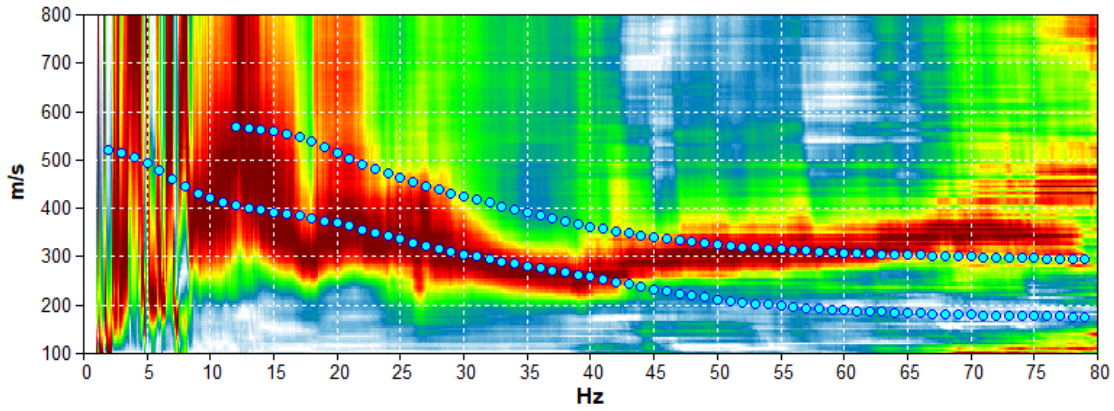
Misura sismica MASW n°10 (L10) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959709	Latitudine: 4959746
Longitudine: 145748	Longitudine: 145774

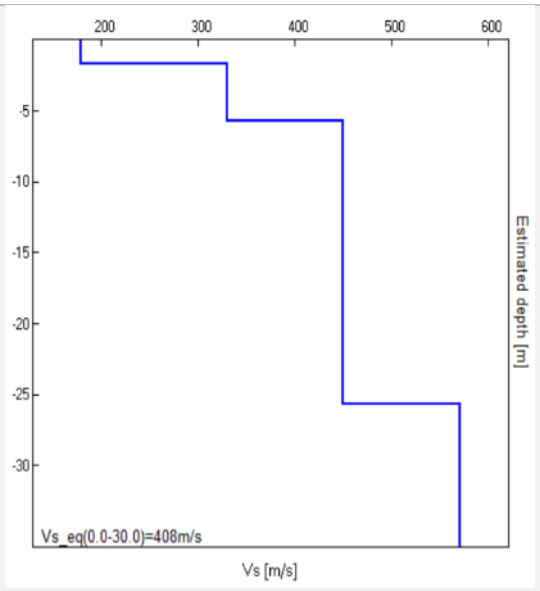




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,7	150
1,7 - 5,7	350
5,7 - ≈30	450
> ≈30	450

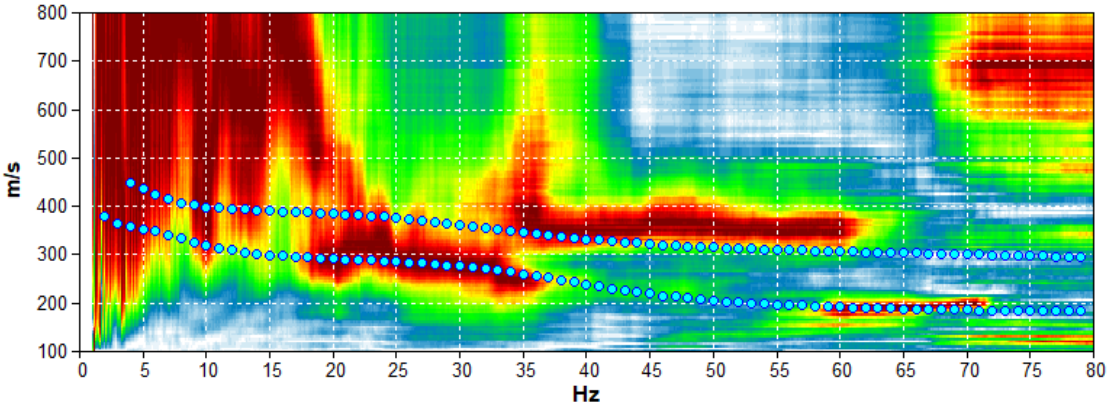
Misura sismica MASW n°11 (L11) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959451	Latitudine: 4959462
Longitudine: 145698	Longitudine: 145670

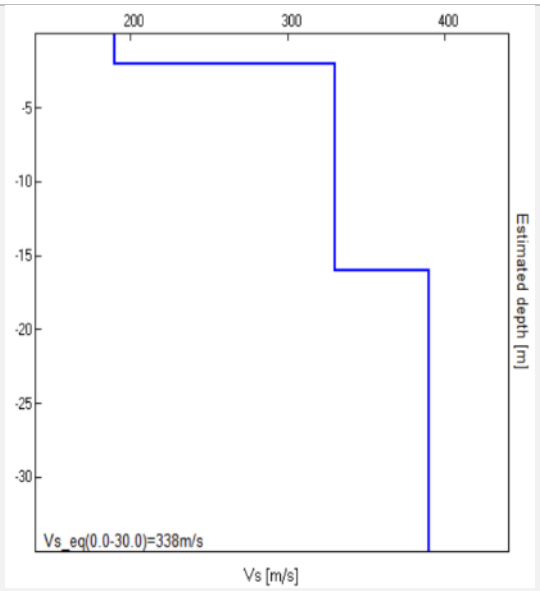




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,7	180
1,7 - 6,0	330
6,0 - ≈26	450
≈26 - ≈30	570
> ≈30	570

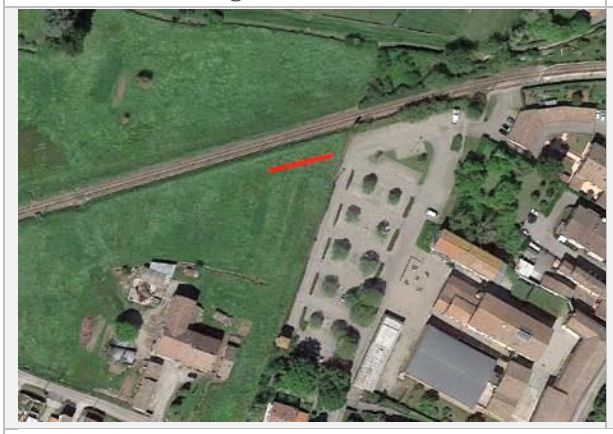
Misura sismica MASW n°12 (L12) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959709	Latitudine: 4959687
Longitudine: 145497	Longitudine: 145477

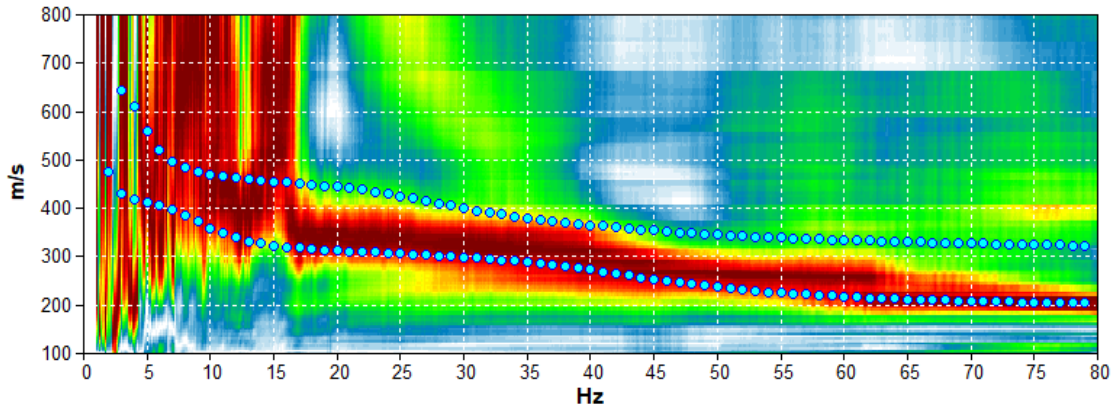


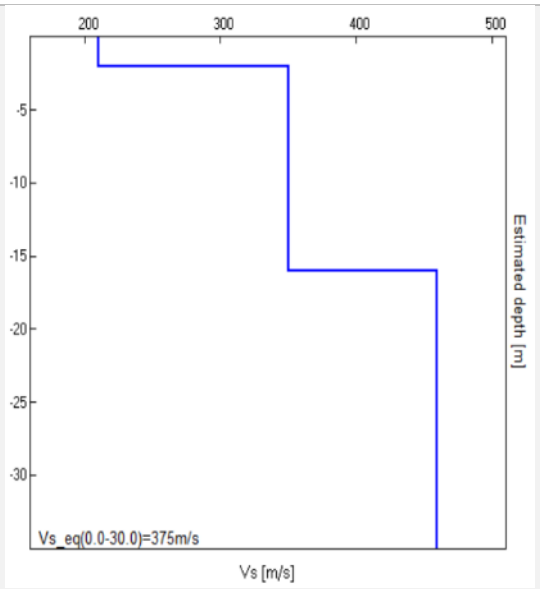


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,0	190
2,0 - ≈16	330
≈16 - ≈30	390
> ≈30	390

Misura sismica MASW n°13 (L13) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959329	Latitudine: 4959324
Longitudine: 145098	Longitudine: 145068

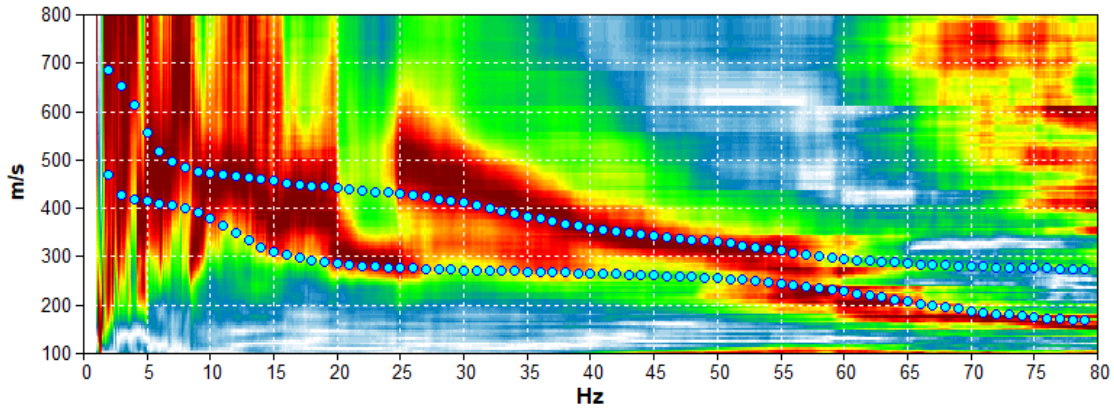


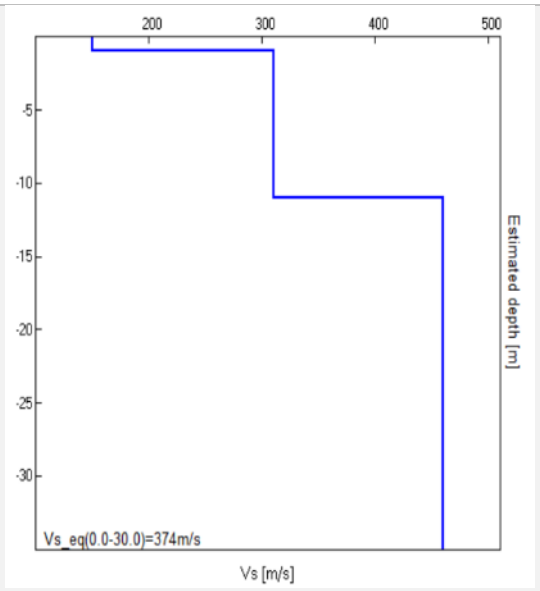




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,0	210
2,0 - ≈16	350
≈16 - ≈30	460
> ≈30	460

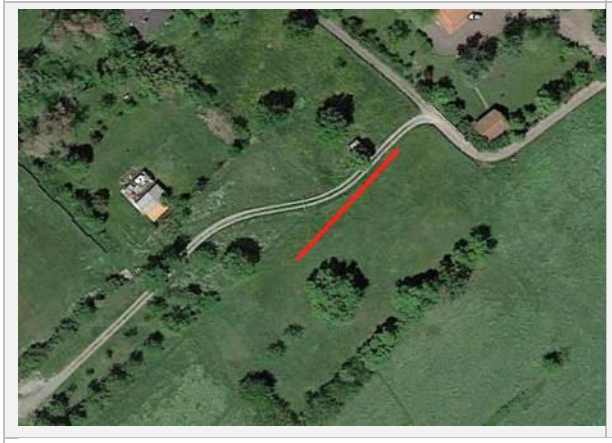
Misura sismica MASW n°14 (L14) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957986	Latitudine: 4957946
Longitudine: 145047	Longitudine: 145025

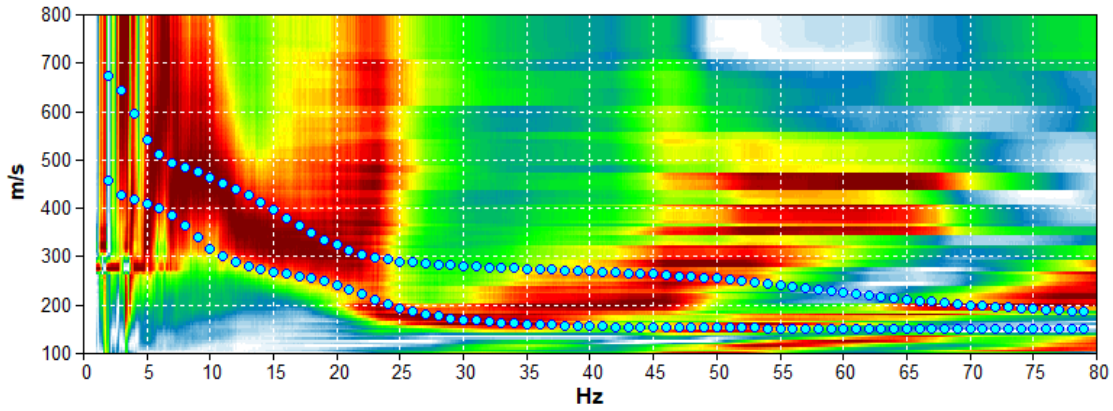


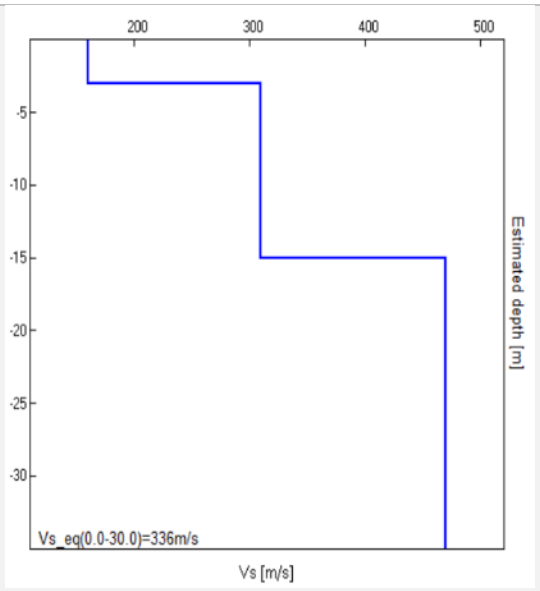


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	150
1,0 - ≈11	310
≈11 - ≈30	460
> ≈30	460

Misura sismica MASW n°15 (L15) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957658	Latitudine: 4957622
Longitudine: 145295	Longitudine: 145268

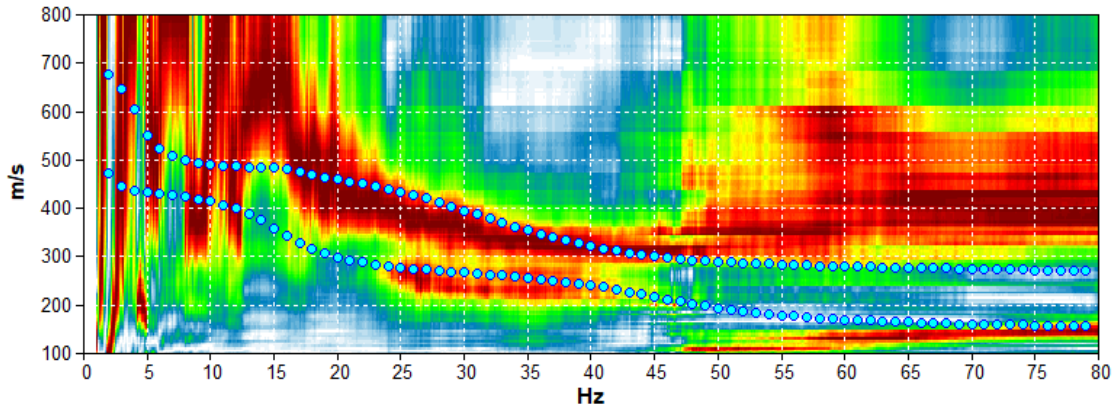


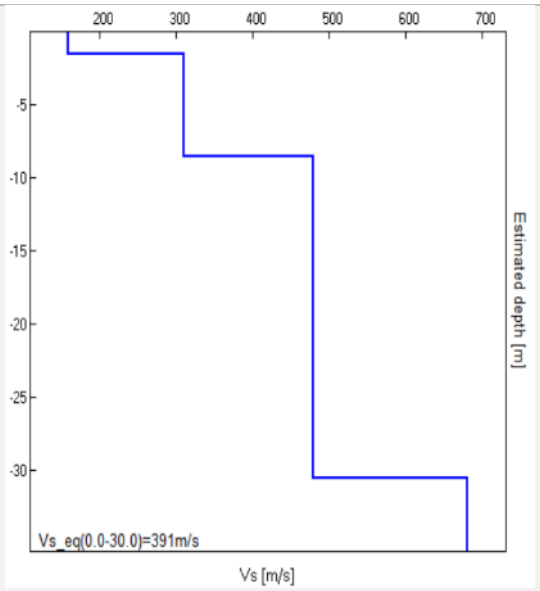




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 3,0	160
3,0 - ≈15	310
≈15 - ≈30	470
> ≈30	470

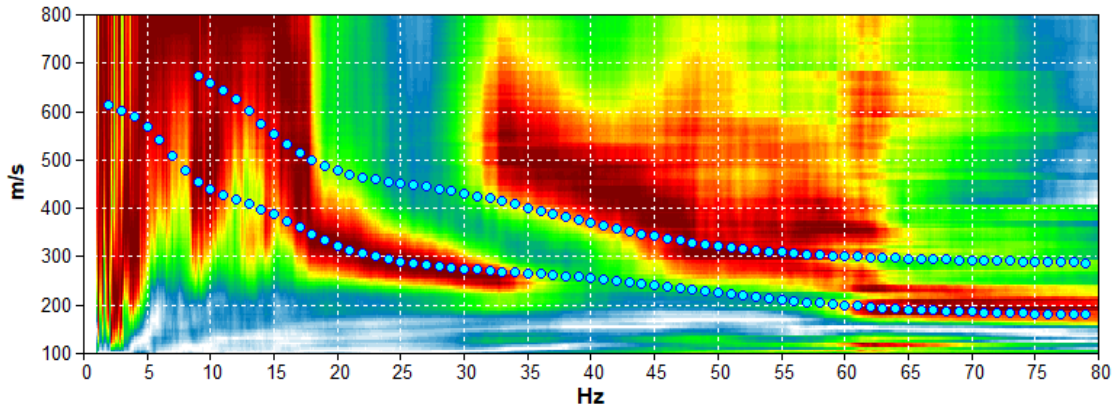
Misura sismica MASW n°16 (L16) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957846	Latitudine: 4957836
Longitudine: 145364	Longitudine: 145320

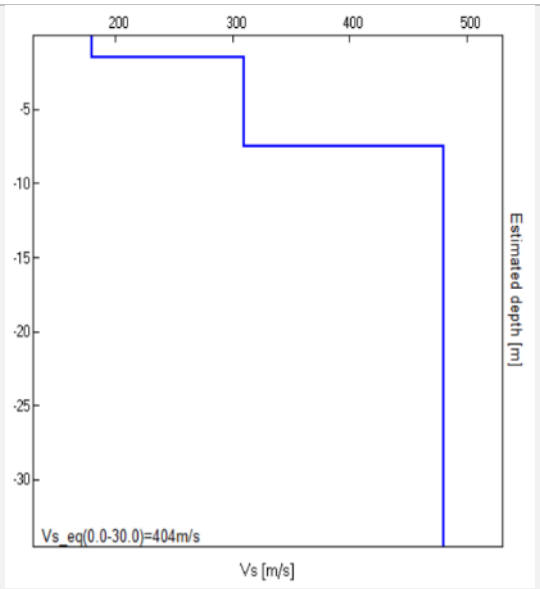




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	160
1,5 - 8,5	310
8,5 - ≈30	480
> ≈30	480

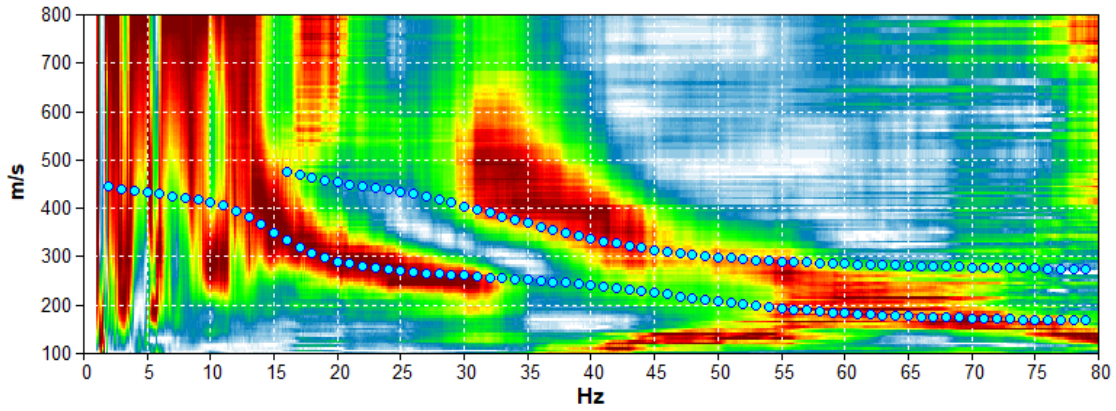
Misura sismica MASW n°17 (L17) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958246	Latitudine: 4958231
Longitudine: 145084	Longitudine: 145110

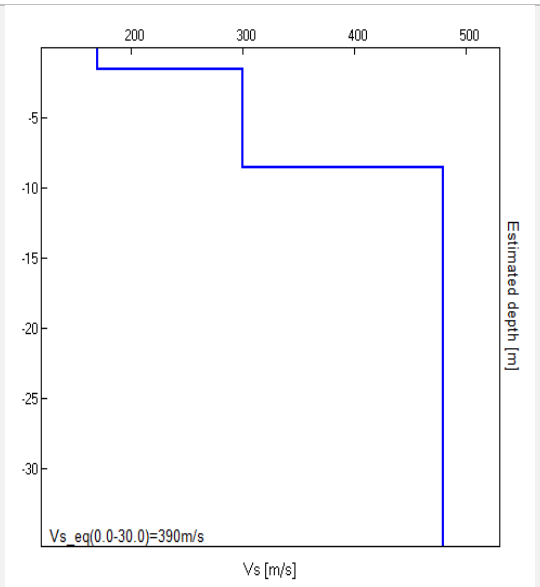




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	180
1,5 - 7,5	310
7,5 - ≈30	480
> ≈30	480

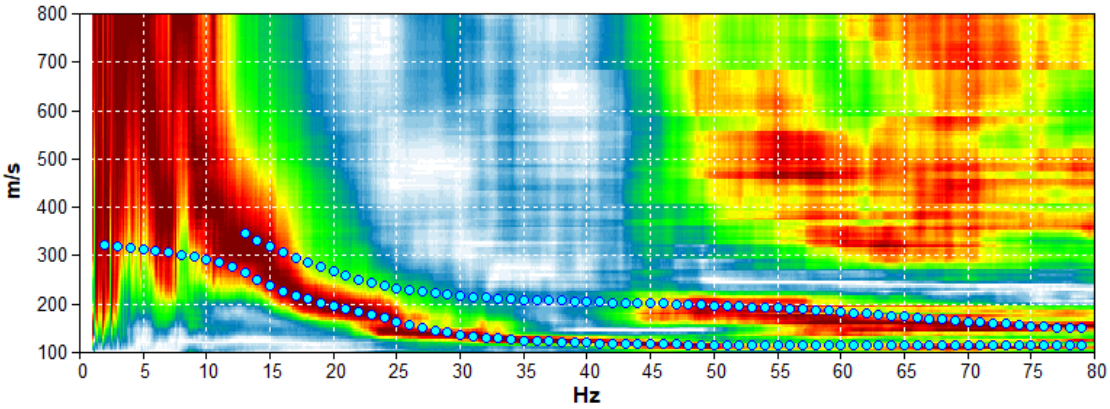
Misura sismica MASW n°18 (L18) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958208	Latitudine: 4958197
Longitudine: 145430	Longitudine: 145458

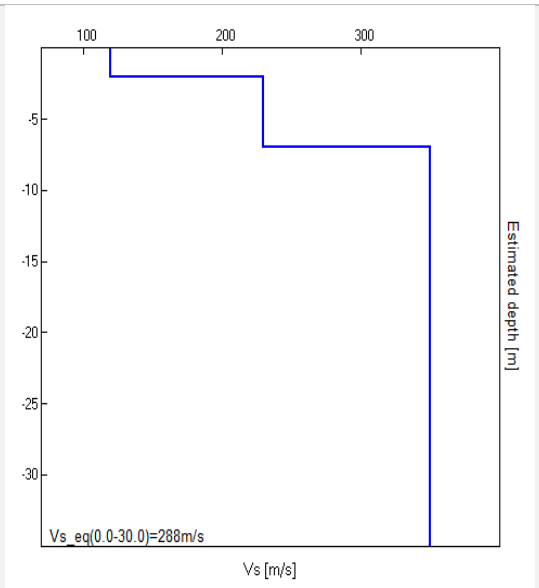




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	170
1,5 - 8,5	300
8,5 - ≈30	480
> ≈30	480

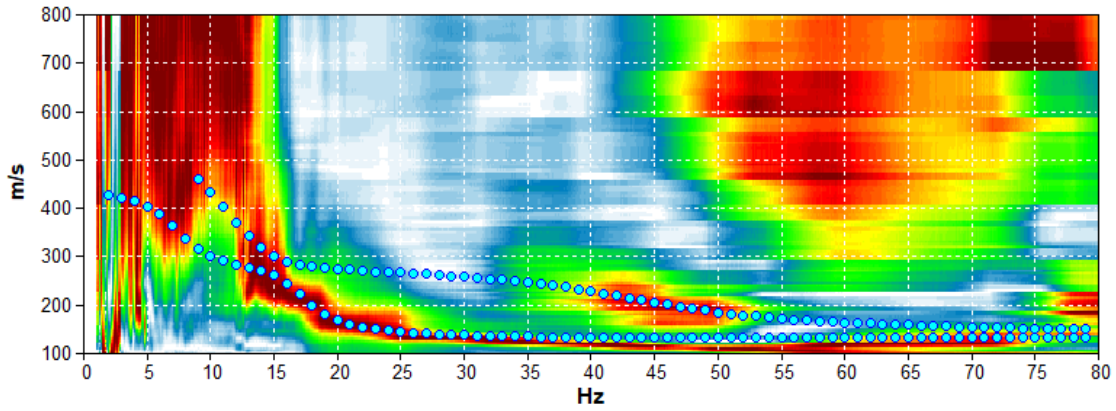
Misura sismica MASW n°19 (L19) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961206	Latitudine: 4961190
Longitudine: 147319	Longitudine: 147344

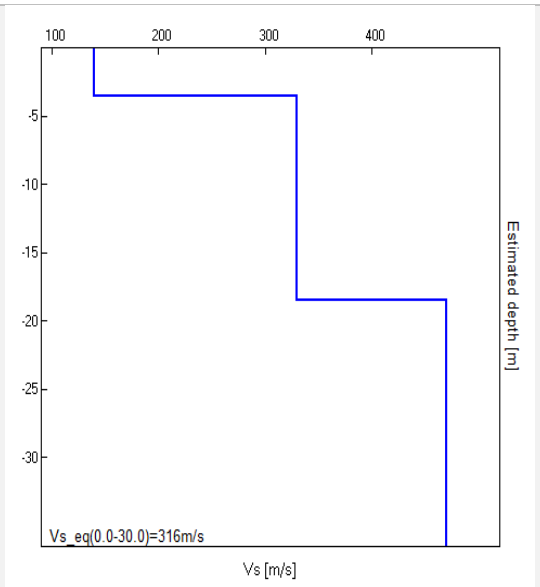




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,0	120
2,0 - 7,0	230
7,0 - ≈30	350
> ≈30	350

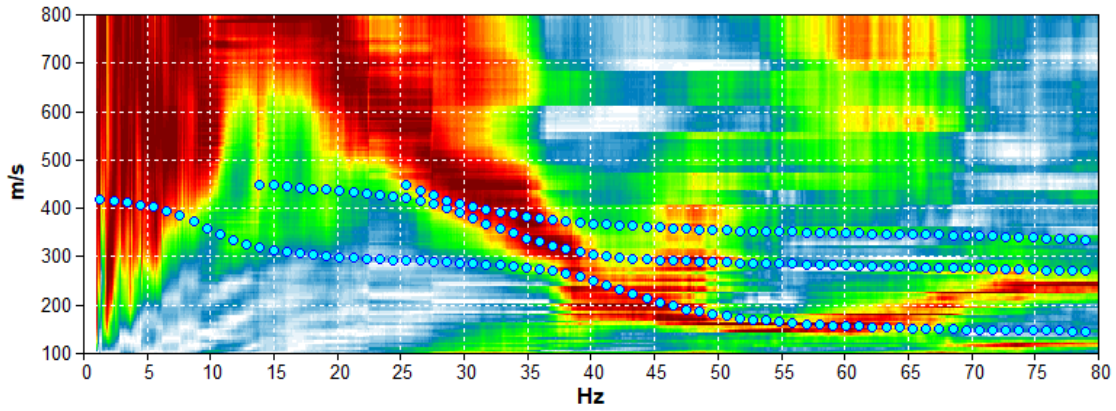
Misura sismica MASW n°20 (L20) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960531	Latitudine: 4960556
Longitudine: 147546	Longitudine: 147563

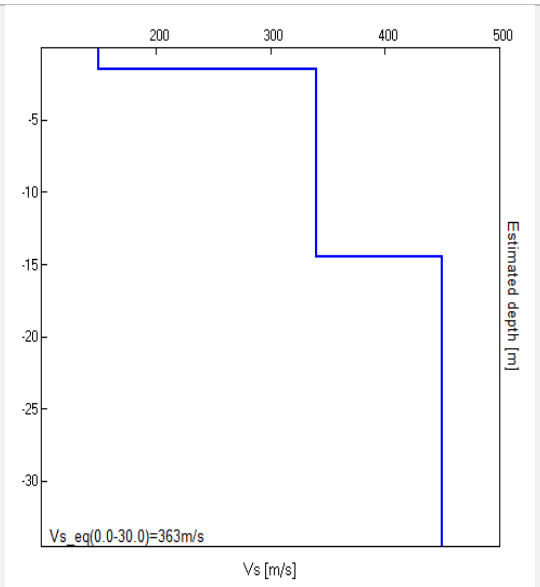




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 3,5	140
3,5 - ≈ 18	330
≈ 18 - ≈30	470
> ≈30	470

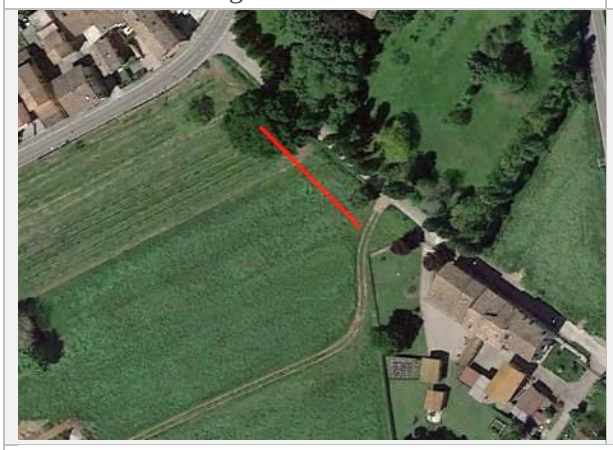
Misura sismica MASW n°21 (L21) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960304	Latitudine: 4960340
Longitudine: 147373	Longitudine: 147400

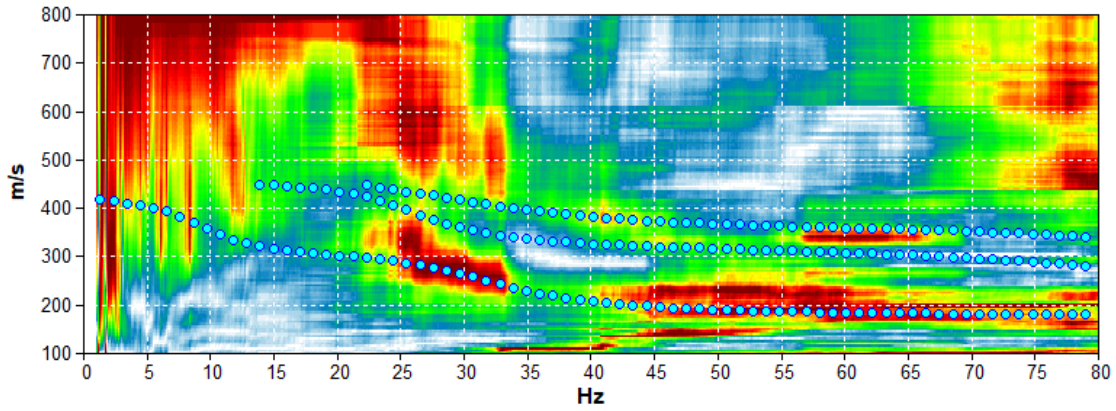


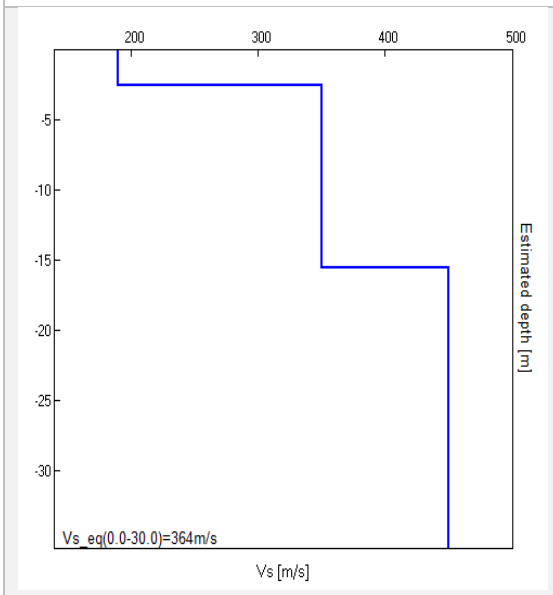


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - ≈14	340
≈14 - ≈30	450
> ≈30	450

Misura sismica MASW n°22 (L22) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959247	Latitudine: 4959281
Longitudine: 146748	Longitudine: 146718

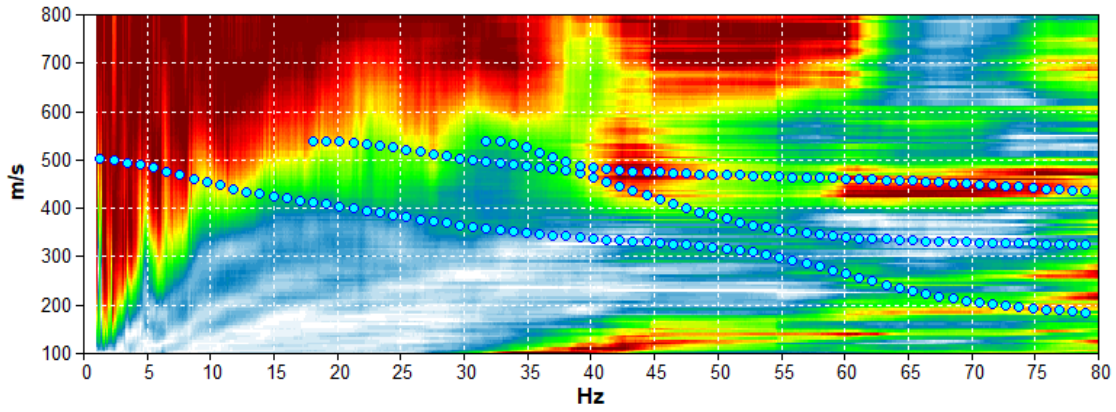


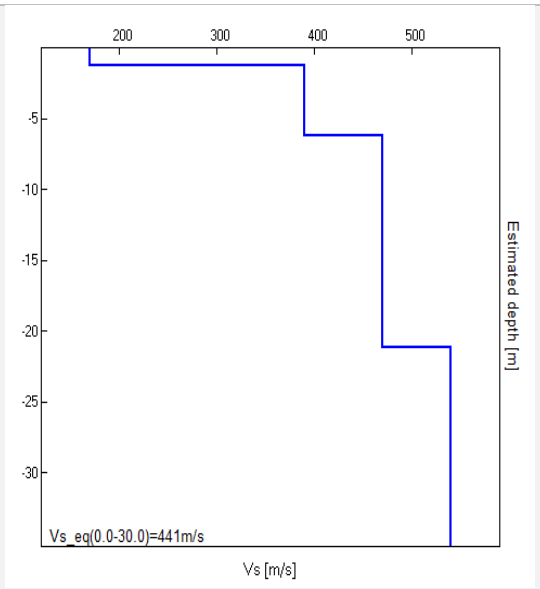




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	190
2,5 - ≈15	350
≈15 - ≈30	450
> ≈30	450

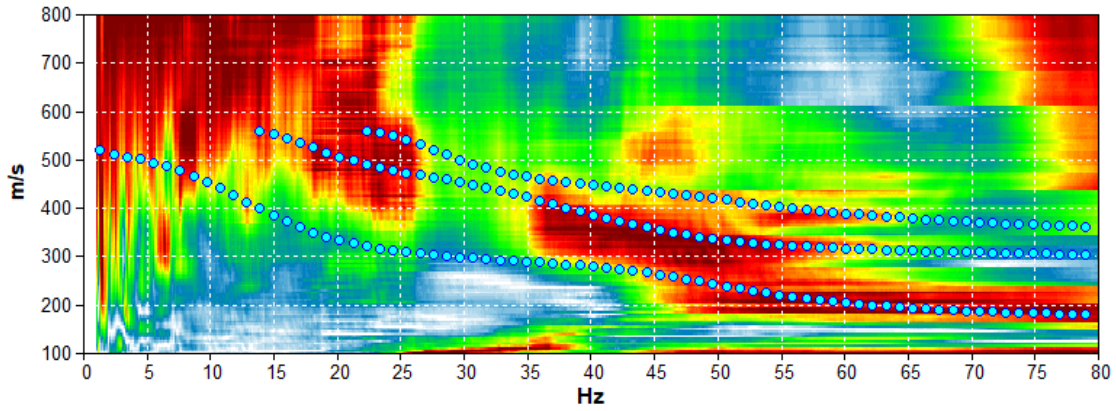
Misura sismica MASW n°23 (L23) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960635	Latitudine: 4960591
Longitudine: 146293	Longitudine: 146283

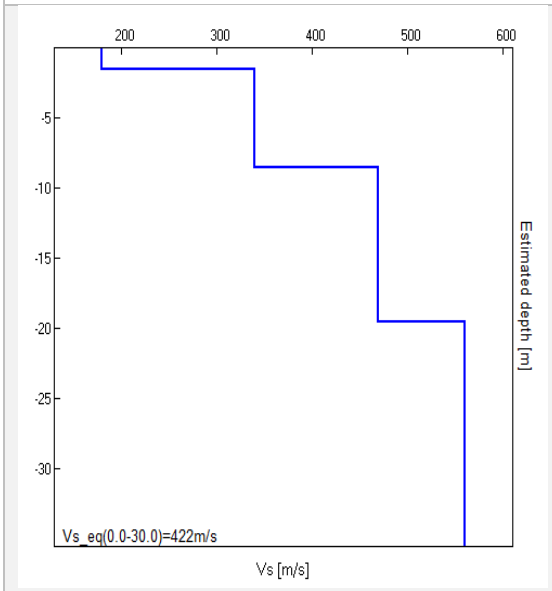




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	170
1,2 - 6,2	390
6,2 - ≈21	470
≈21 - ≈30	540
> ≈30	540

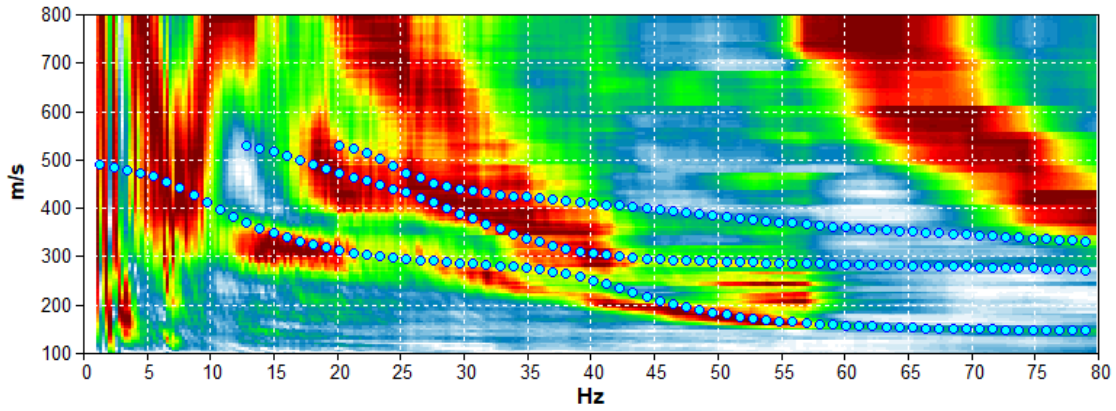
Misura sismica MASW n°24 (L24) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961789	Latitudine: 4961744
Longitudine: 145073	Longitudine: 145075

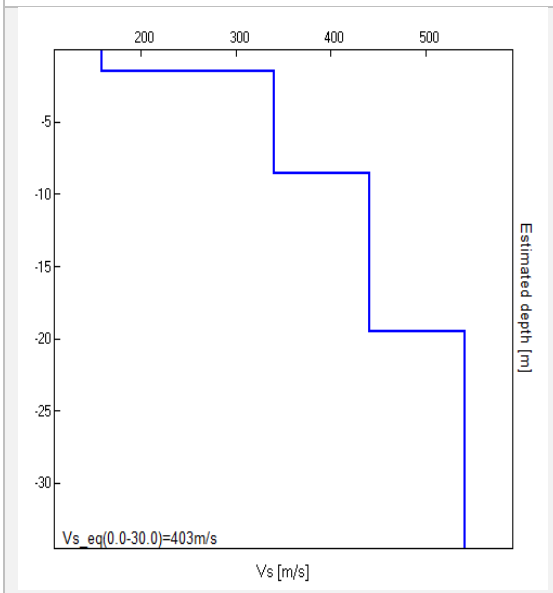




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	180
1,5 - 8,5	340
8,5 - ≈ 19	470
≈ 19 - ≈ 30	560
> ≈ 30	560

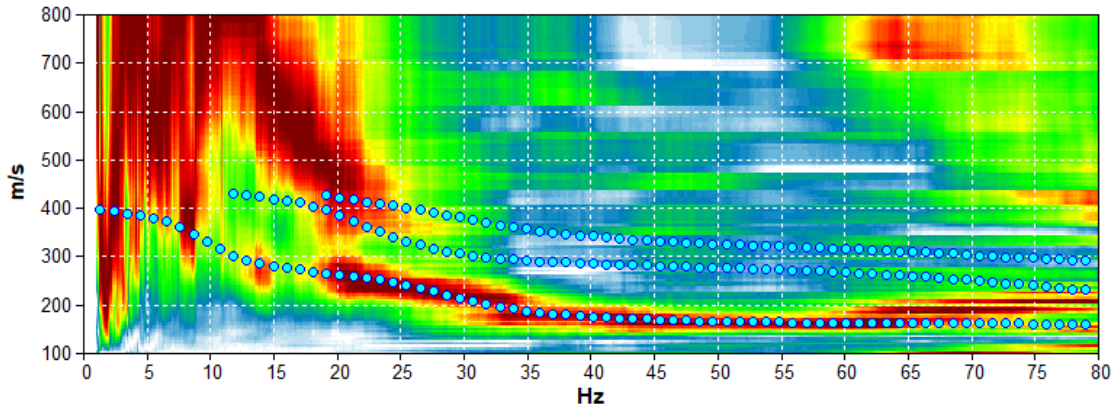
Misura sismica MASW n°25 (L25) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961474	Latitudine: 4961429
Longitudine: 145143	Longitudine: 145145

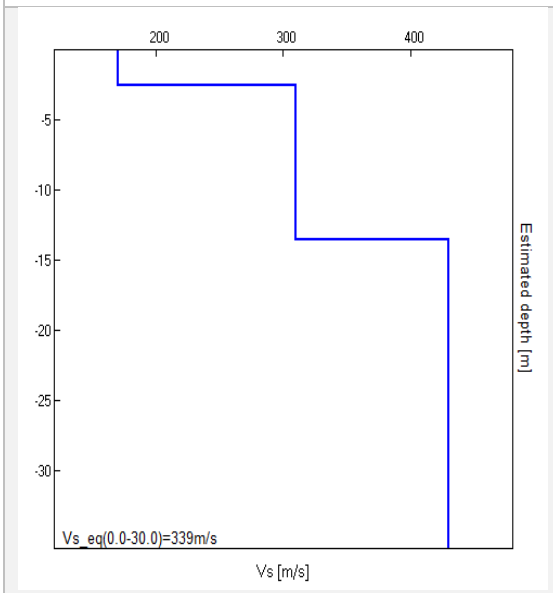




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	160
1,5 - 8,5	340
8,5 - ≈ 19	440
≈ 19 - ≈ 30	540
> ≈30	540

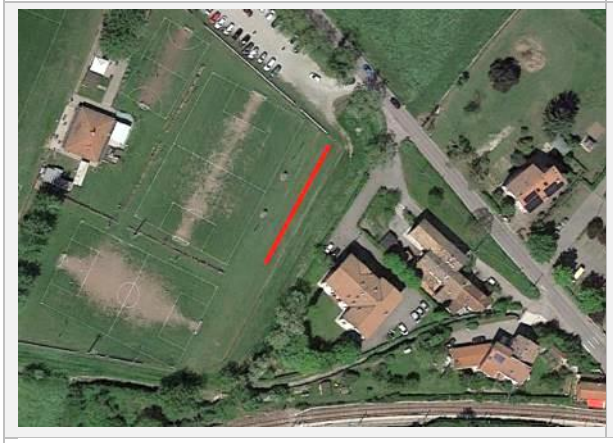
Misura sismica MASW. n°26 (L26) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958791	Latitudine: 4958802
Longitudine: 145285	Longitudine: 145328

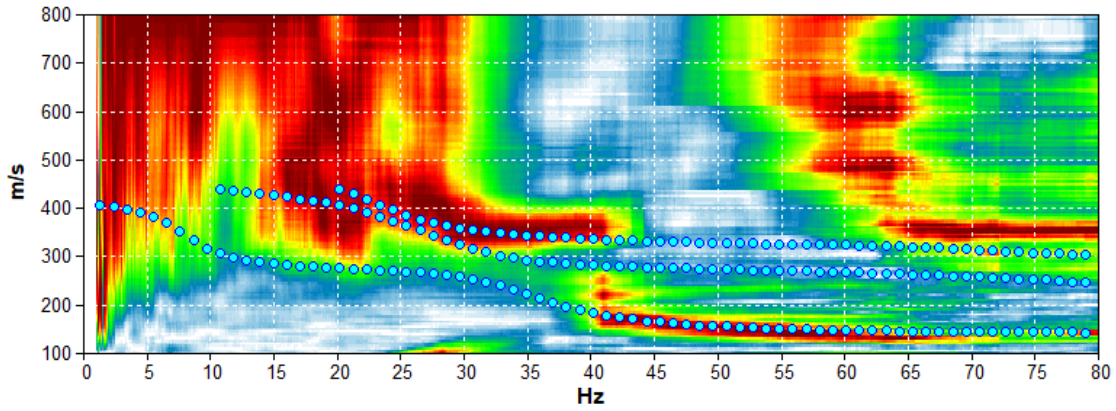


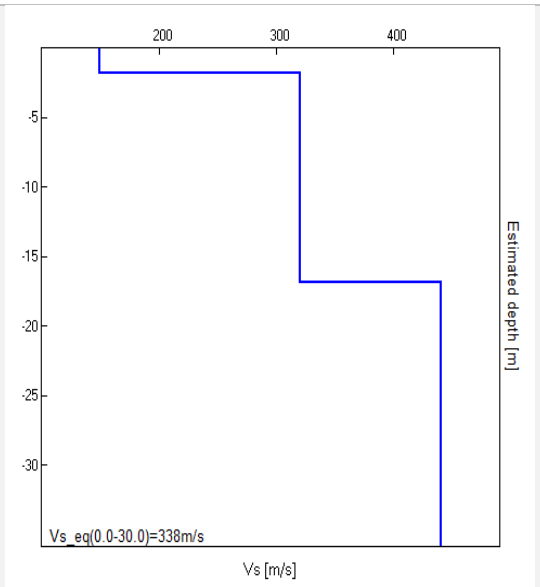


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	170
2,5 - ≈13	310
≈13 - ≈30	430
> ≈30	430

Misura sismica MASW n°27 (L27) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959450	Latitudine: 4959412
Longitudine: 145211	Longitudine: 145187

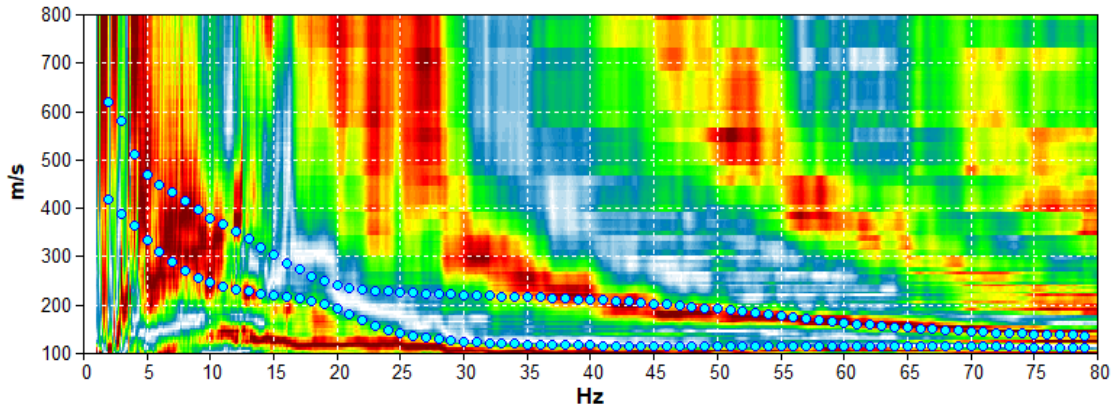


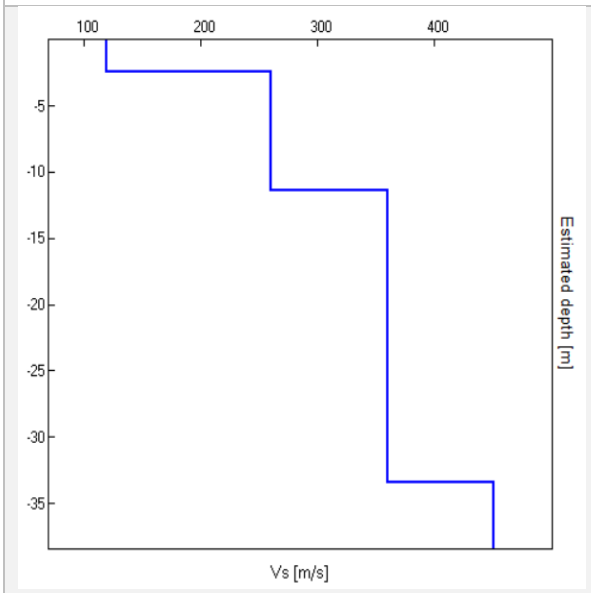




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,8	150
1,8 - ≈17	320
≈17 - ≈30	440
> ≈30	440

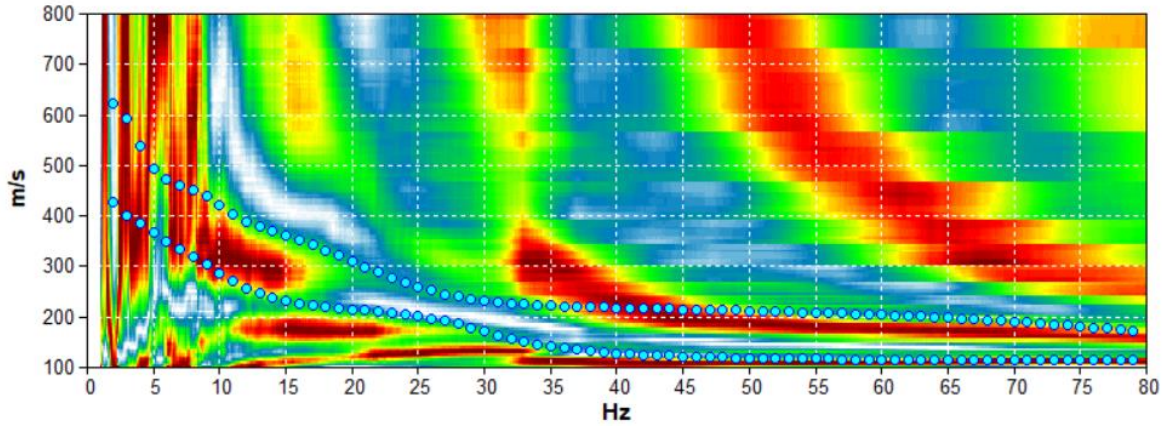
Misura sismica MASW n°28 (L28) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961178	Latitudine: 4961163
Longitudine: 147592	Longitudine: 147555

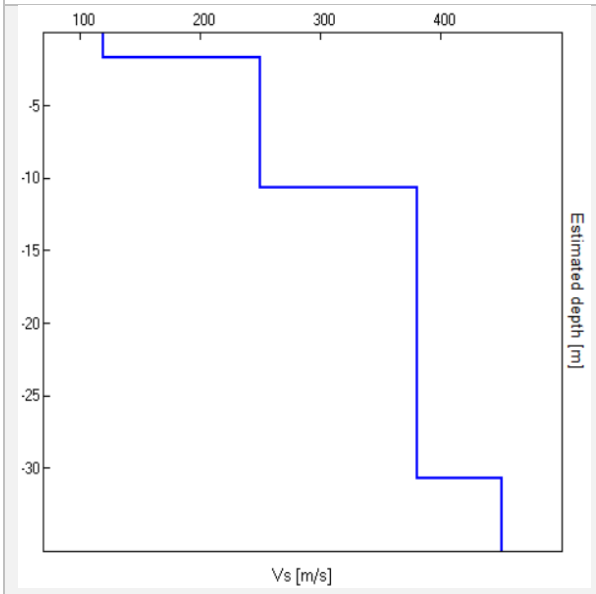




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,4	120
2,4 - ≈13	260
≈13 - ≈33	360
>33	450

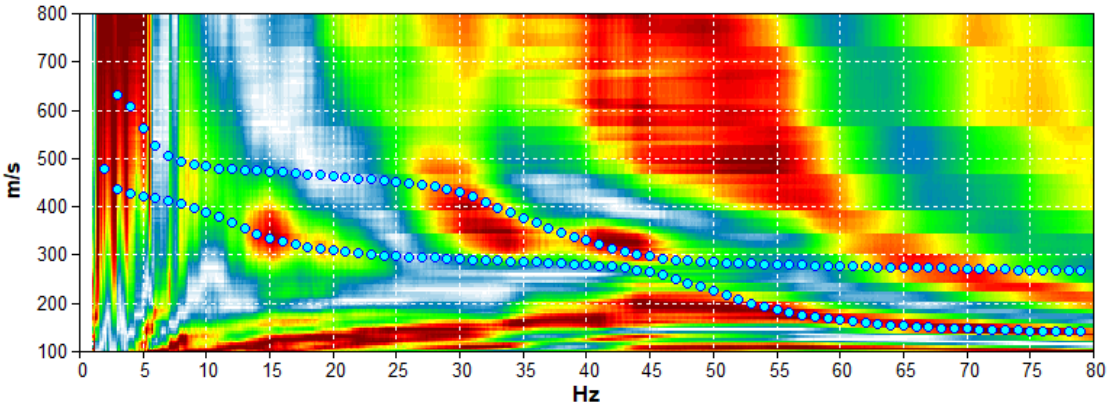
Misura sismica MASW n°29 (L29) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960973	Latitudine: 4960938
Longitudine: 147207	Longitudine: 147187

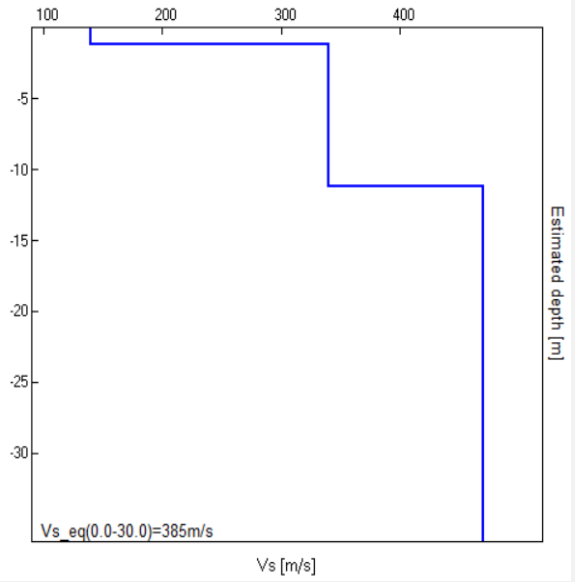




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,7	120
1,7 - ≈11	250
≈11 - ≈31	380
>≈31	450

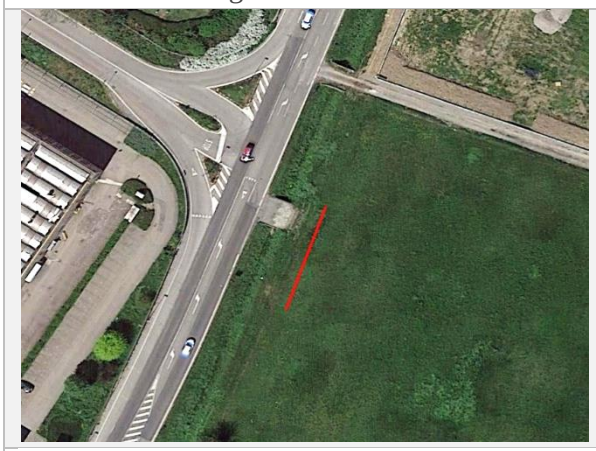
Misura sismica MASW n°30 (L30) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959993	Latitudine: 4959966
Longitudine: 147226	Longitudine: 147197

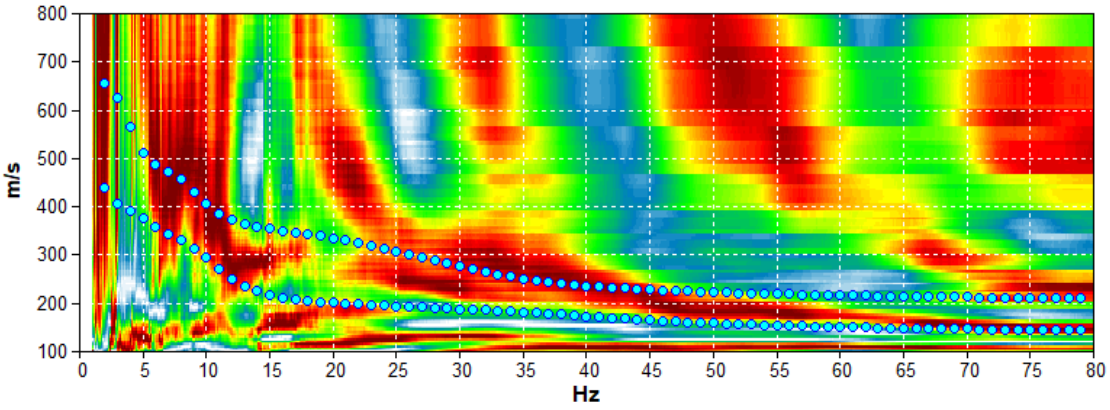


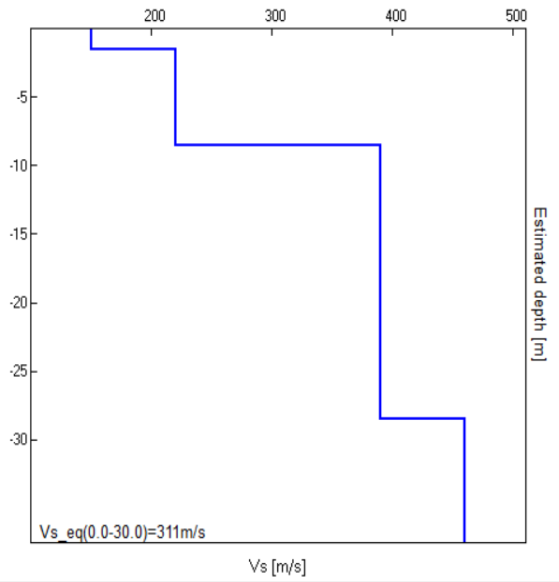


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	140
1,2 - ≈11	340
≈11 -≈30	470
>≈30	470

Misura sismica MASW n°31 (L31) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961075	Latitudine: 4961112
Longitudine: 148188	Longitudine: 148204

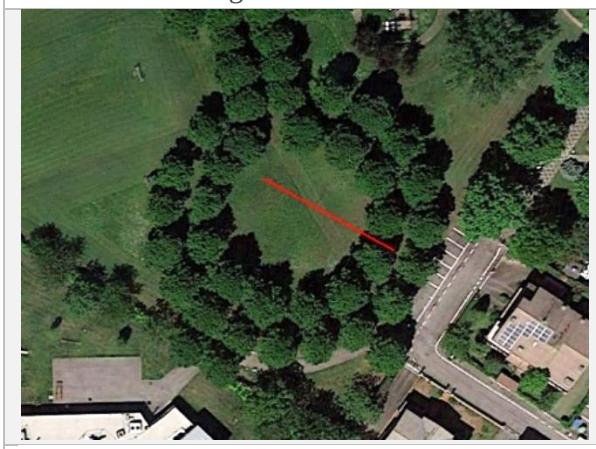


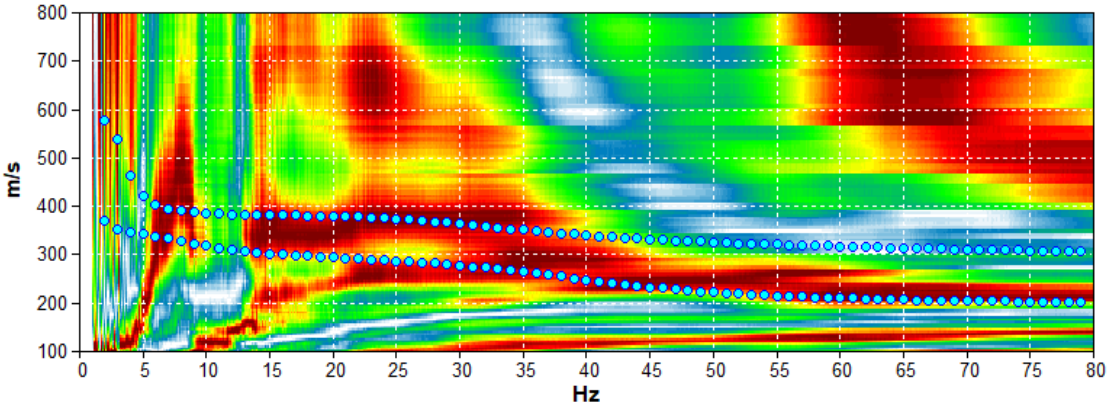


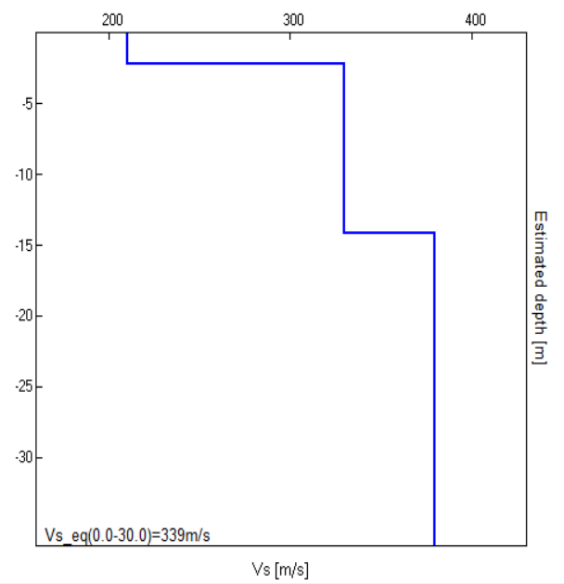


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - 8,5	220
≈8,5 - ≈28	390
≈28 - ≈30	460
>≈30	460

Misura sismica MASW n°32 (L32) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958801	Latitudine: 4958822
Longitudine: 144889	Longitudine: 144855

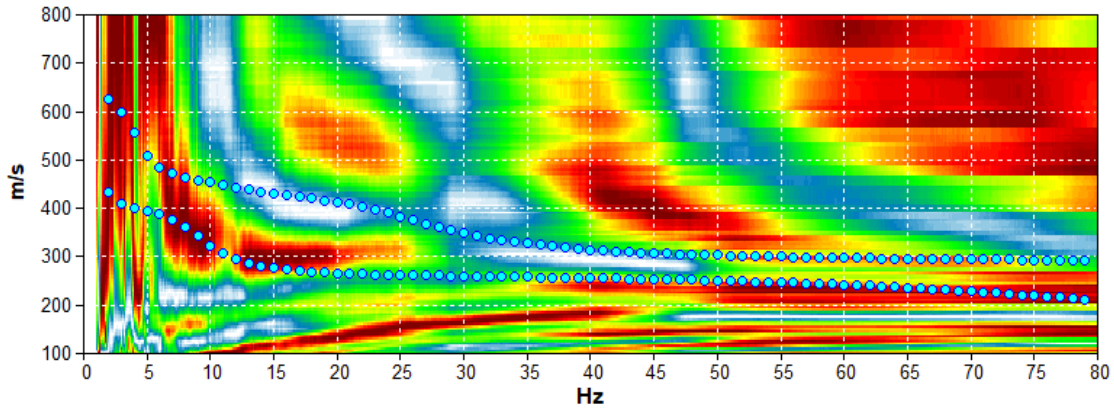


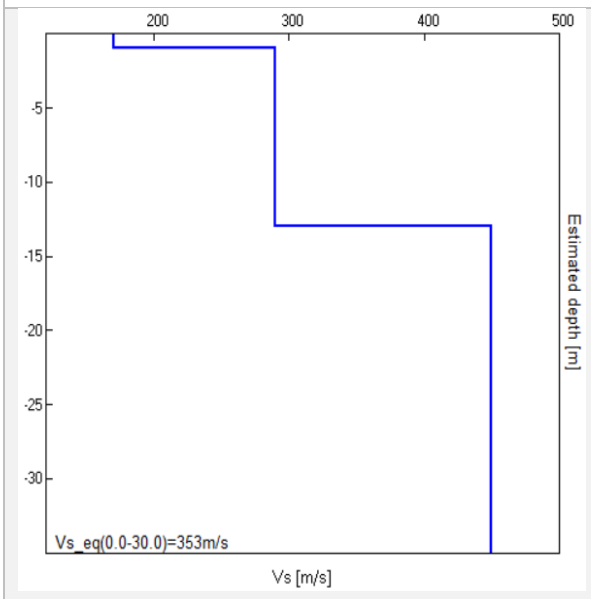




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,2	210
2,2 - ≈14	330
≈14 - ≈30	380
> ≈30	380

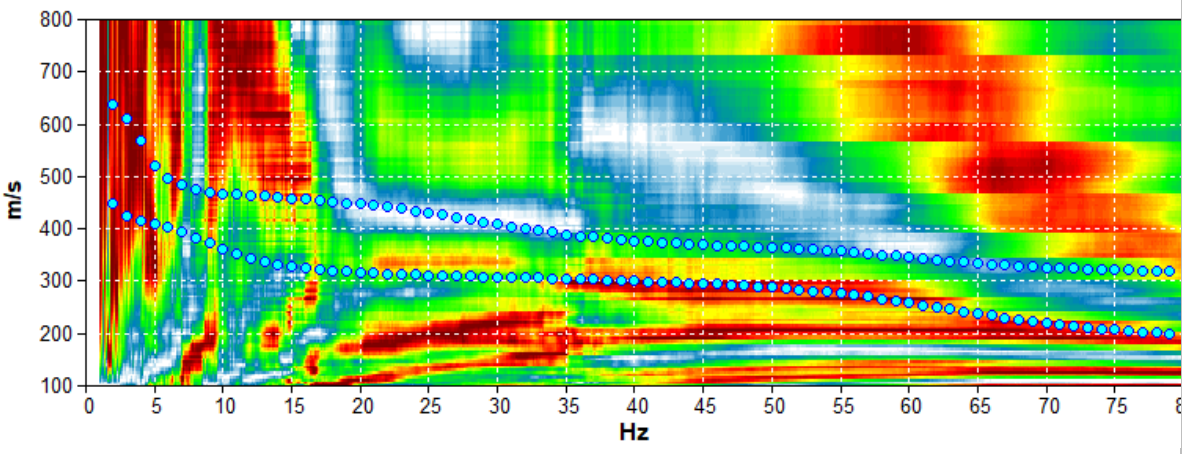
Misura sismica MASW n°33 (L33) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958778	Latitudine: 4958763
Longitudine: 144338	Longitudine: 144374

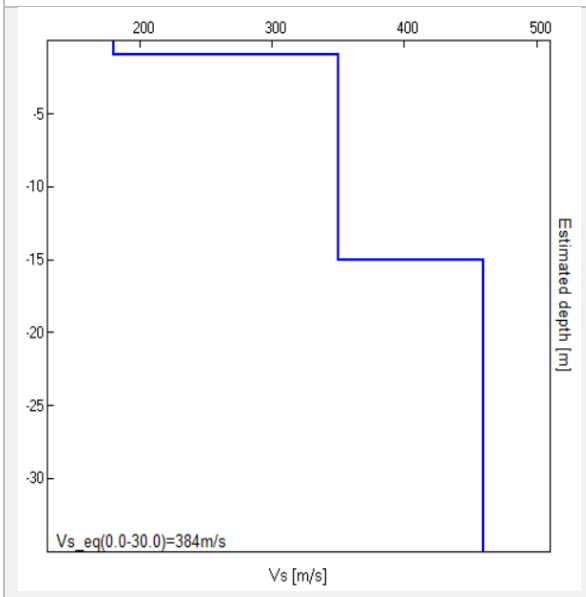




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	170
1,0 - ≈13	290
≈13 - ≈30	450
> ≈30	450

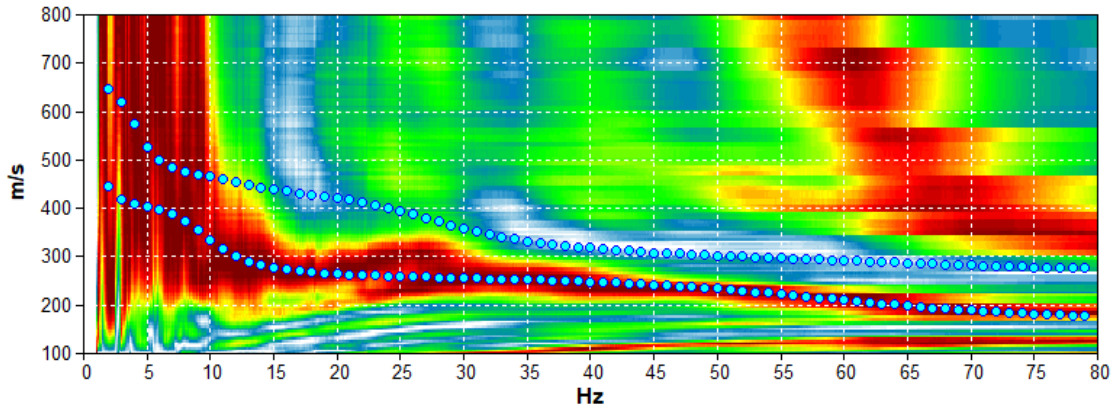
Misura sismica MASW n°34 (L34) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959482	Latitudine: 4959465
Longitudine: 144573	Longitudine: 144536

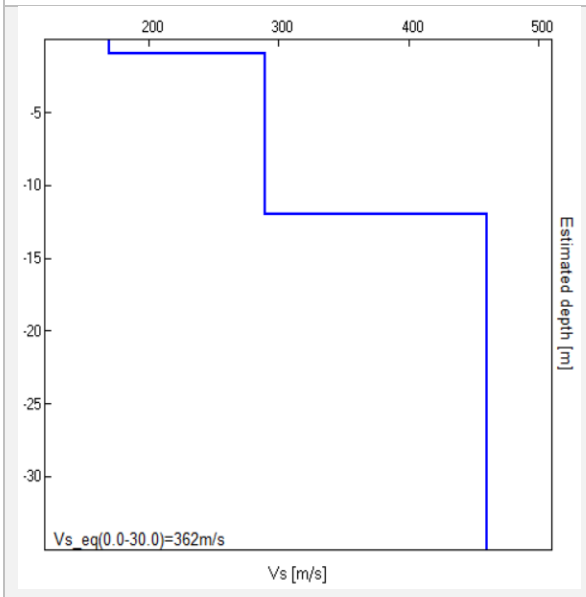




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	180
1,2 - ≈15	350
≈15 - ≈30	460
> ≈30	460

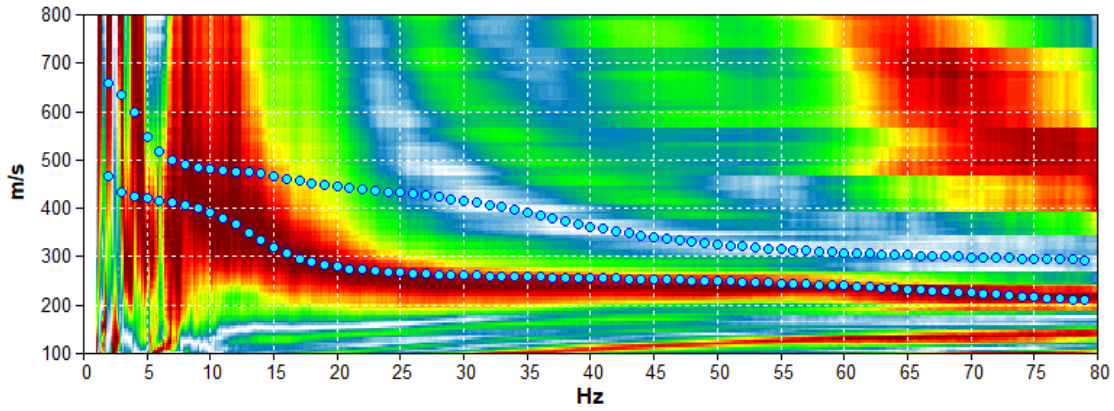
Misura sismica MASW n°35 (L35) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958362	Latitudine: 4958383
Longitudine: 145935	Longitudine: 145901

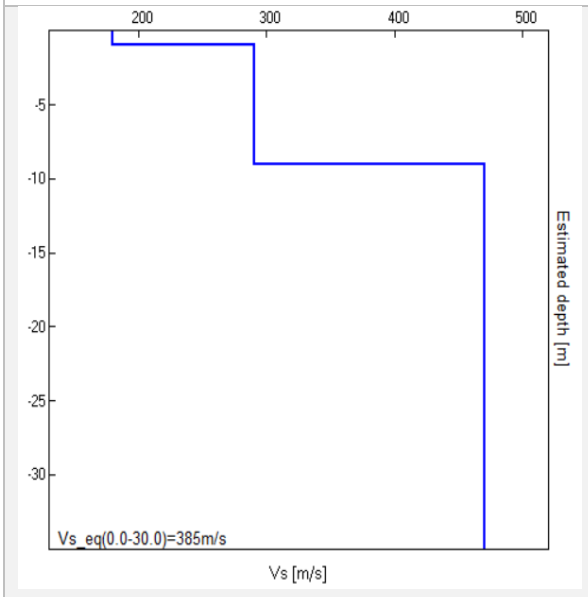




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	170
1,2 - ≈12	290
≈12 - ≈30	460
> ≈30	460

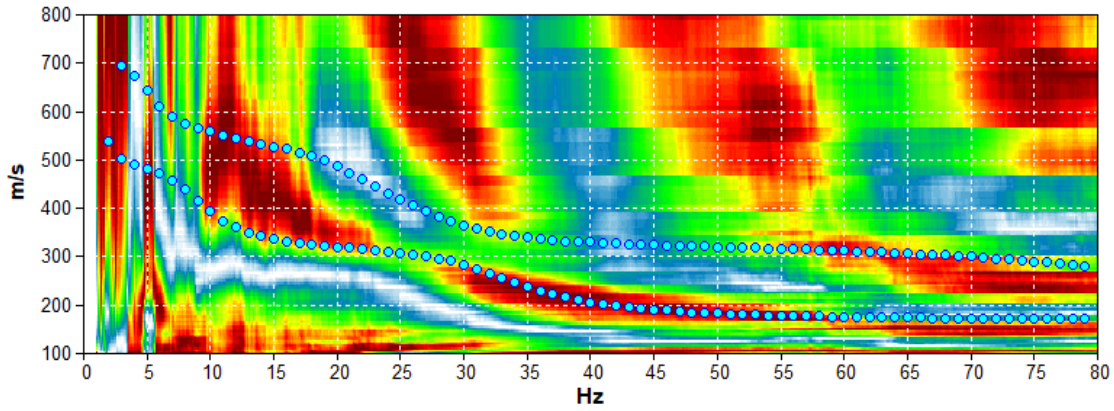
Misura sismica MASW n°36 (L36) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958341	Latitudine: 4958359
Longitudine: 145514	Longitudine: 145479

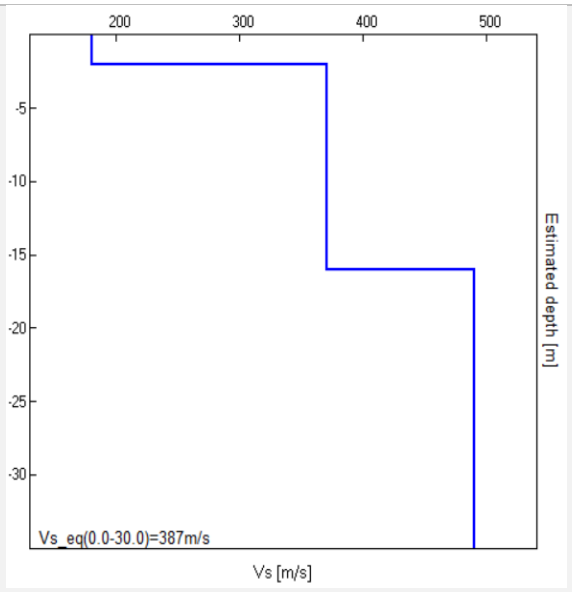




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	180
1,0 - 9,0	290
9,0 - ≈30	470
> ≈30	470

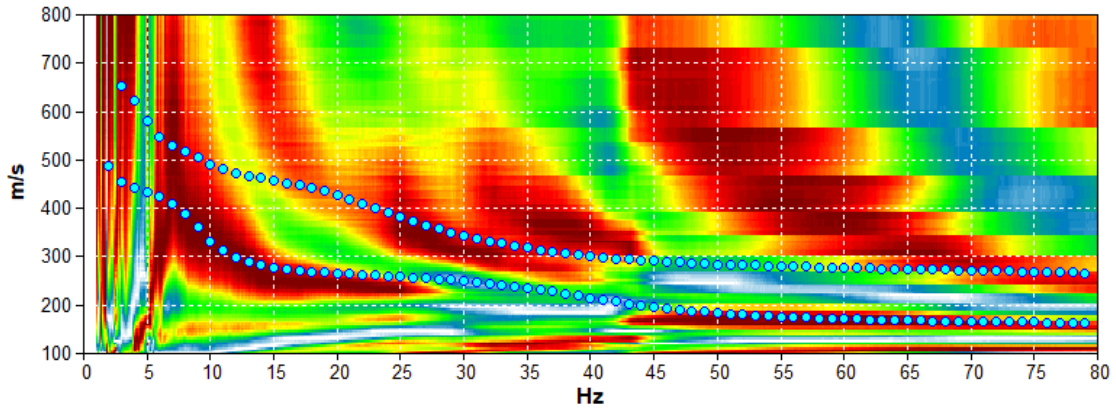
Misura sismica MASW n°37 (L37) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957155	Latitudine: 4957192
Longitudine: 144663	Longitudine: 144679

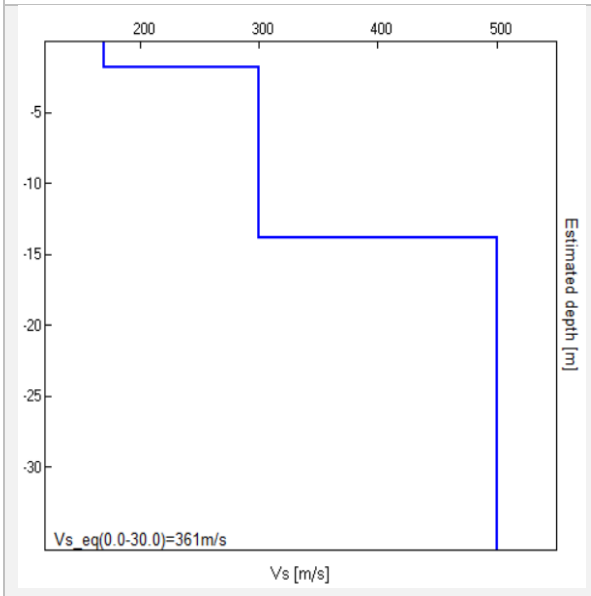




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,3	180
2,3 - ≈16	370
≈16- ≈30	490
> ≈30	490

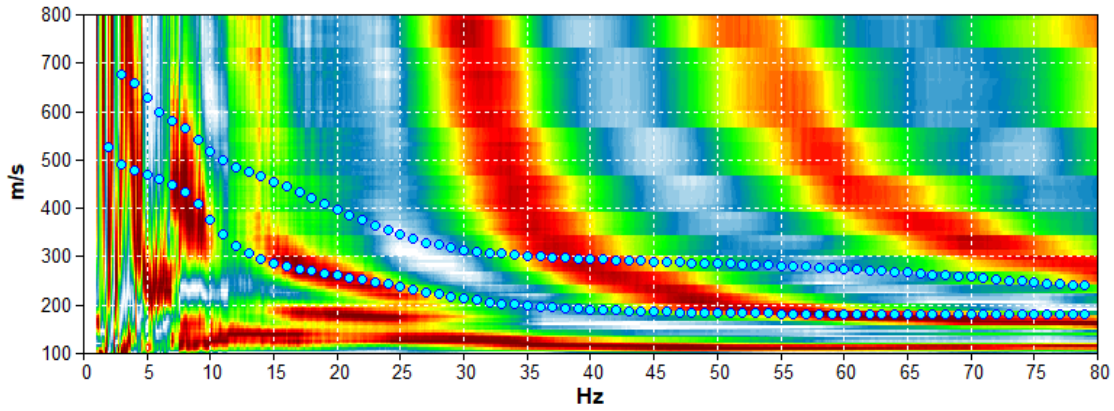
Misura sismica MASW n°38 (L38) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957415	Latitudine: 4957388
Longitudine: 144875	Longitudine: 144846

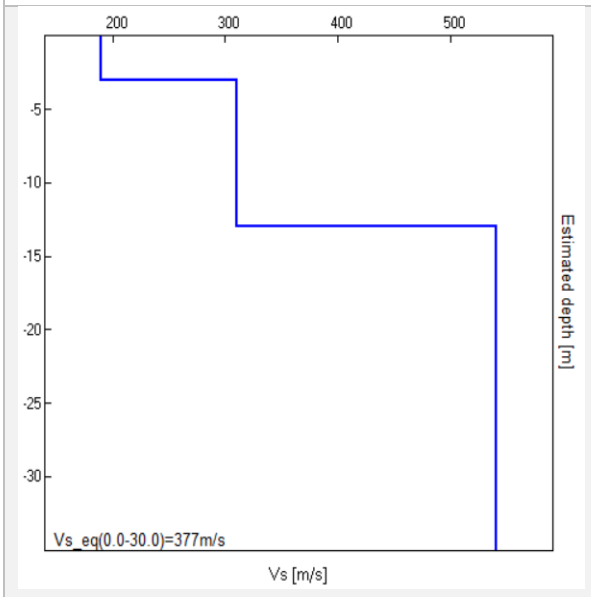




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,8	170
1,8 - ≈14	300
≈14- ≈30	500
> ≈30	500

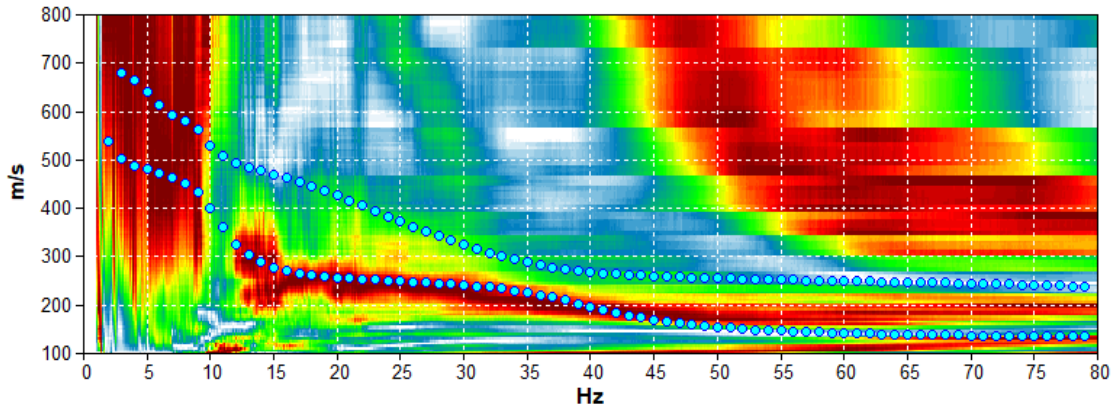
Misura sismica MASW n°39 (L39) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957517	Latitudine: 4957491
Longitudine: 145913	Longitudine: 145882

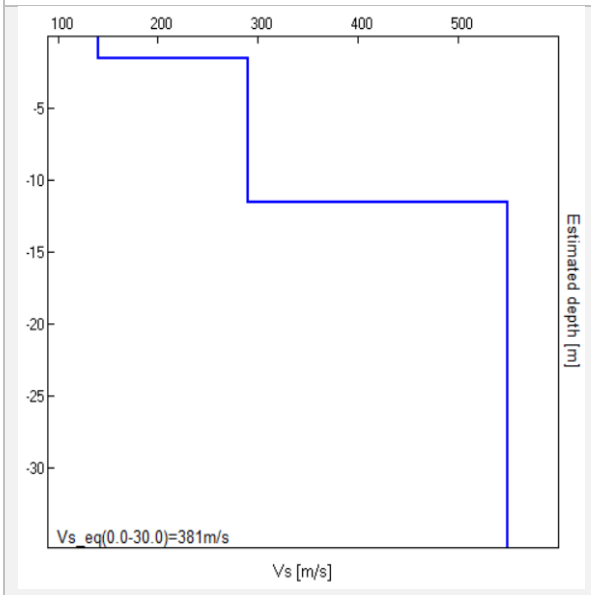




Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 3,0	190
3,0 - ≈13	310
≈13- ≈30	540
> ≈30	540

Misura sismica MASW n°40 (L40) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958030	Latitudine: 4958036
Longitudine: 146483	Longitudine: 146523



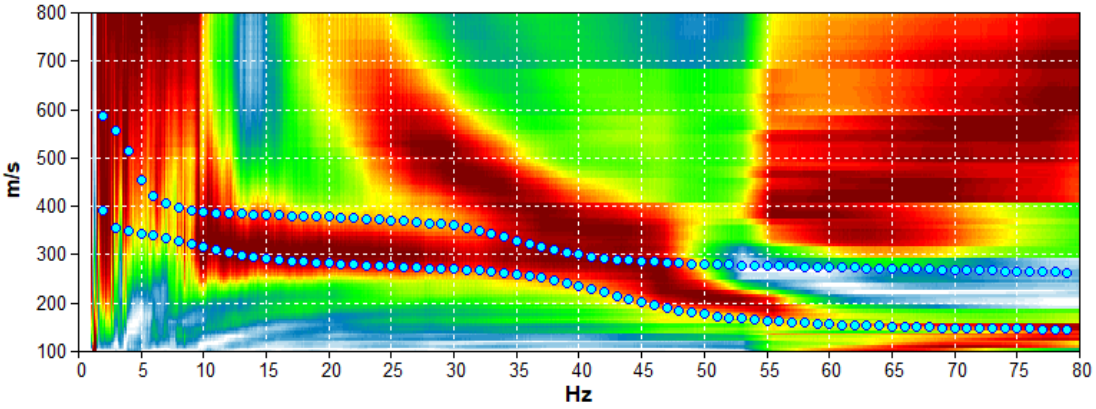


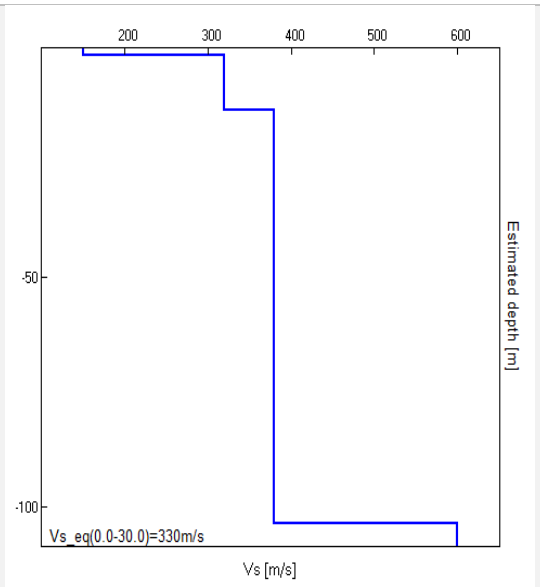
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	140
1,5 - ≈11	290
≈11- ≈30	550
> ≈30	550

Indagini sismiche di tipo passivo in array (Re.Mi.)

Geol. Matteo Collareda – Sede fiscale: Via Lungo Giara n°29, 36033 Isola Vicentina –
Tel. 3490567455 – C.F.:CLLMTT76A02I531O – P. IVA:03267380248 – mail: info@studiosisma.com – web: studiosisma.com

Misura sismica Re.Mi. n°1 (L1) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958979	Latitudine: 4958988
Longitudine: 146710	Longitudine: 146682

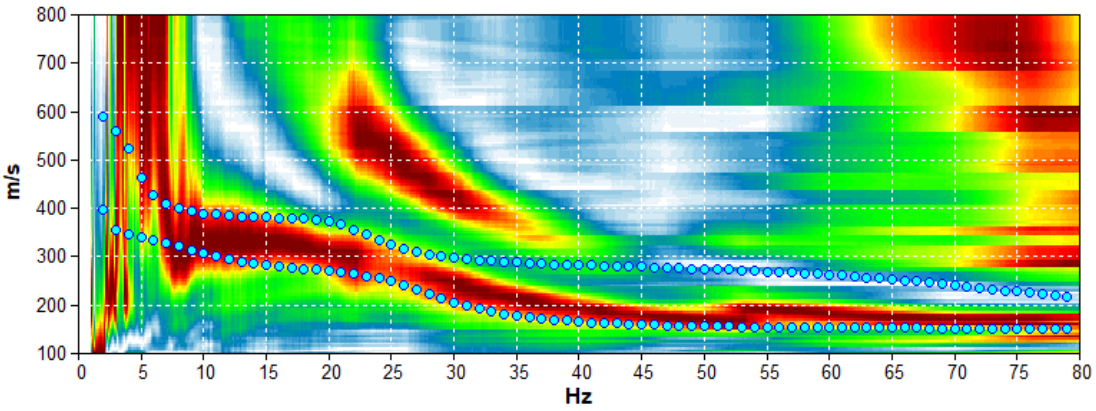


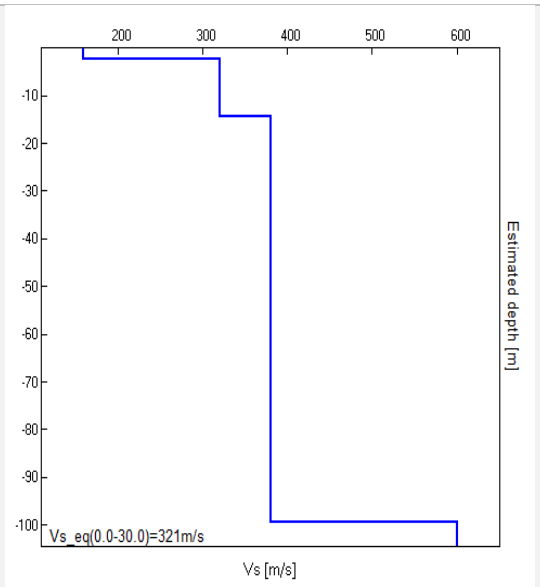


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - ≈13	320
≈13 - ≈103	380
> ≈103	600

Vs,30	**330 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°2 (L2) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959062	Latitudine: 4959073
Longitudine: 146213	Longitudine: 146170

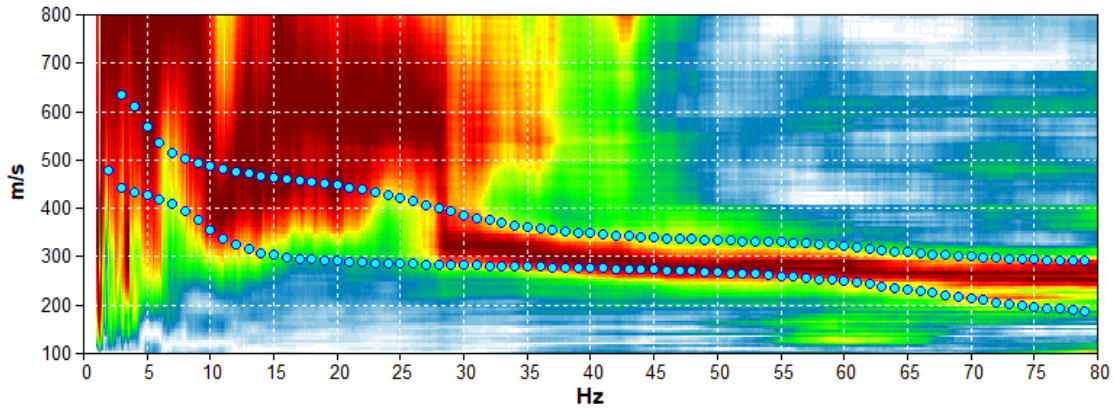


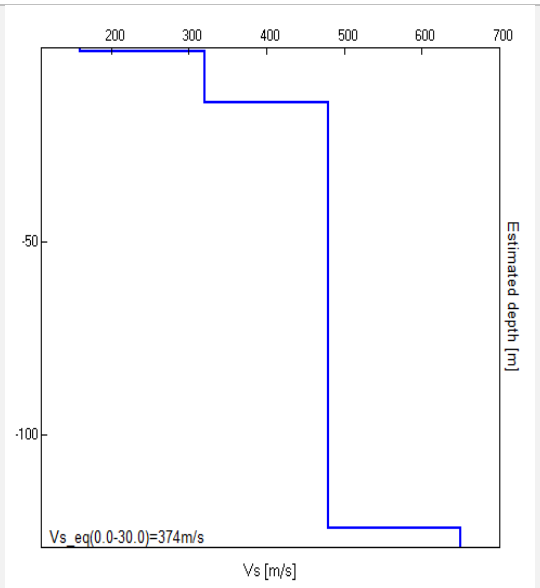


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,4	160
2,4 - ≈14	320
≈14 - ≈99	380
> ≈99	600

Vs,30	**321 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°3 (L3) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958694	Latitudine: 4958720
Longitudine: 146070	Longitudine: 146086

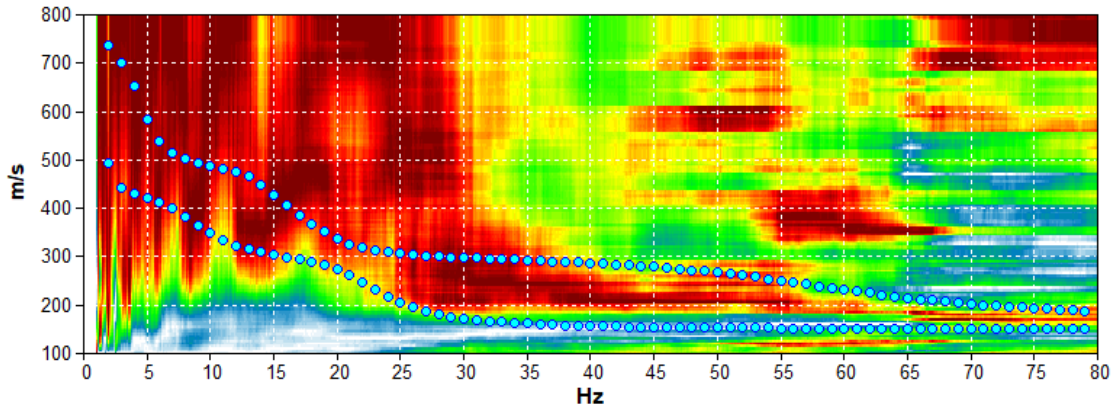


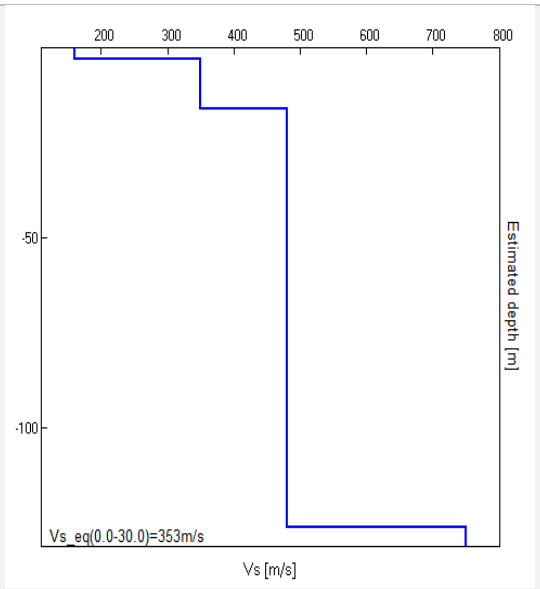


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	160
1,0 - ≈14	320
≈14 - ≈124	480
> ≈124	650

Vs,30	**374 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°4 (L4) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958960	Latitudine: 4958956
Longitudine: 145620	Longitudine: 145665

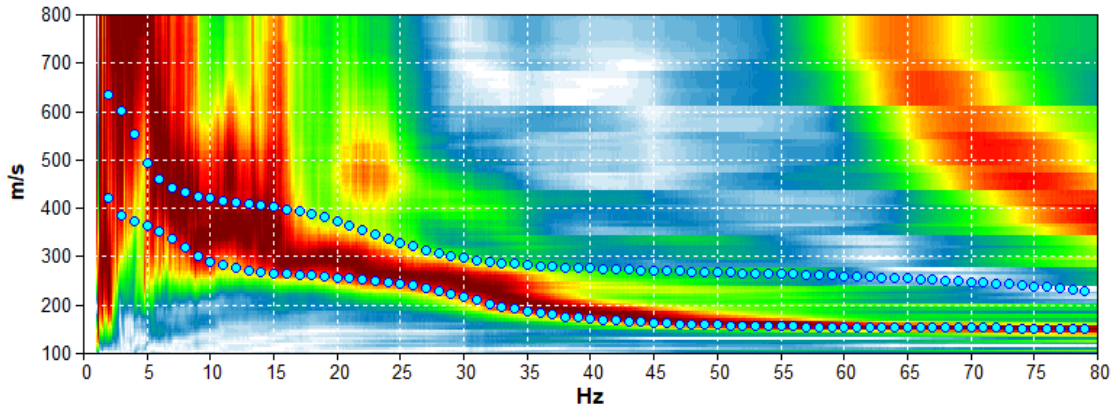


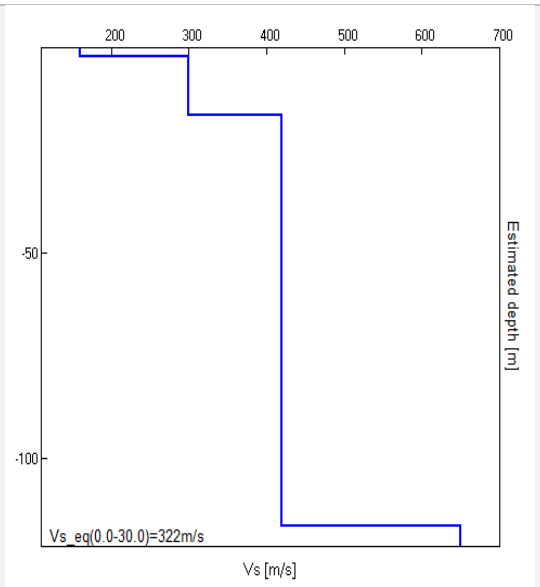


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 3,0	160
3,0 - ≈16	350
≈16 - ≈126	480
> ≈126	750

Vs,30	**353 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°5 (L5) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959131	Latitudine: 4959093
Longitudine: 145499	Longitudine: 145477

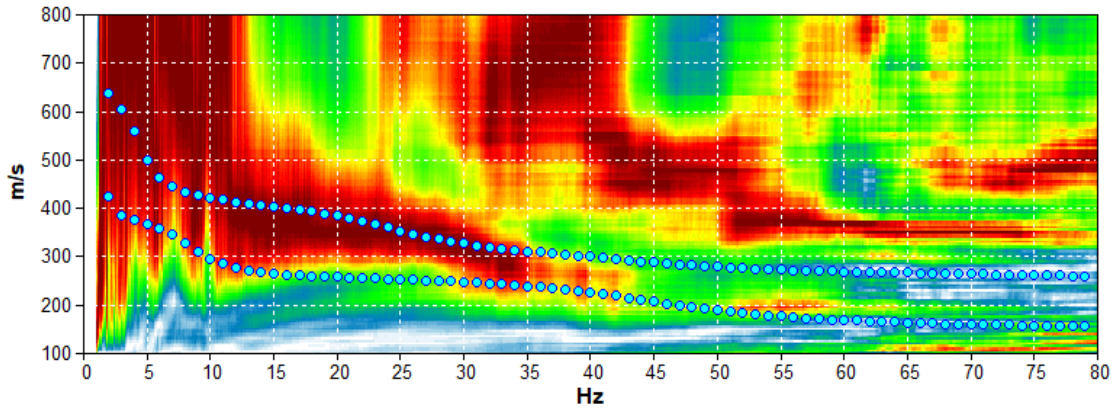


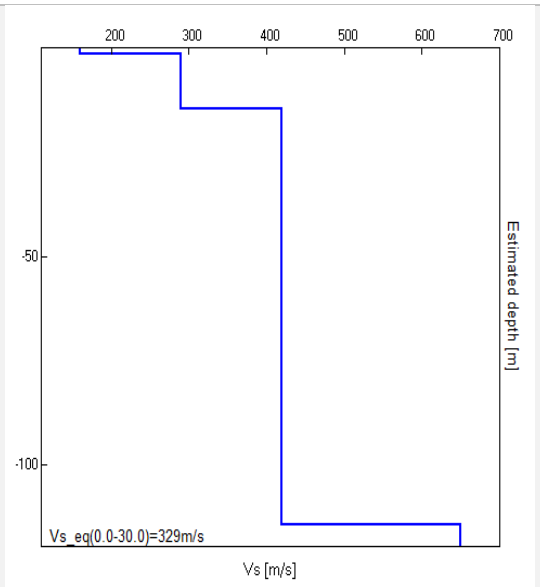


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,2	160
2,2 - ≈16	300
≈16 - ≈116	420
> ≈116	650

Vs,30	**322 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°6 (L6) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959291	Latitudine: 4959283
Longitudine: 145301	Longitudine: 145330

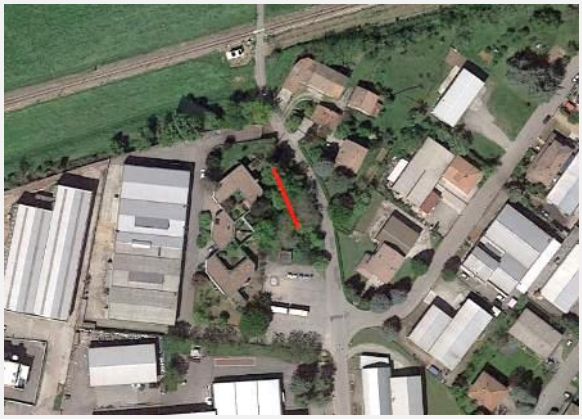


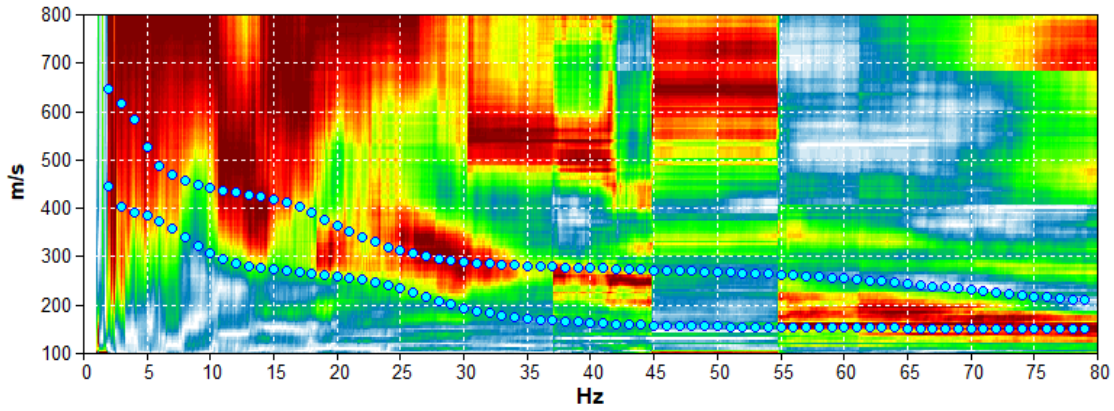


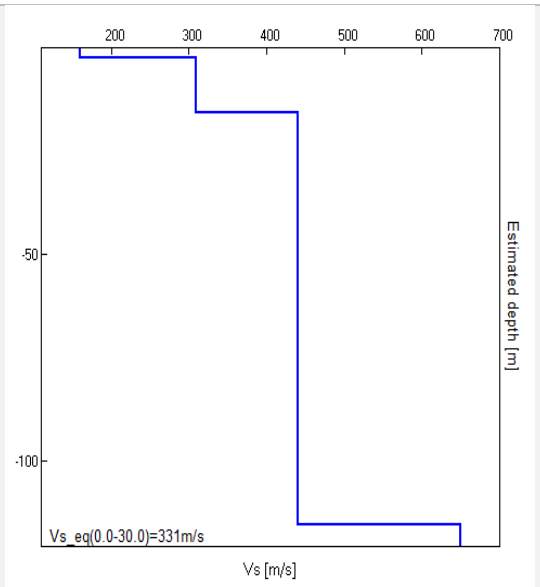
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	160
1,5 - ≈14	290
≈14 - ≈114	420
> ≈114	650

Vs,30	**329 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°7 (L7) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959165	Latitudine: 4959137
Longitudine: 144592	Longitudine: 144602



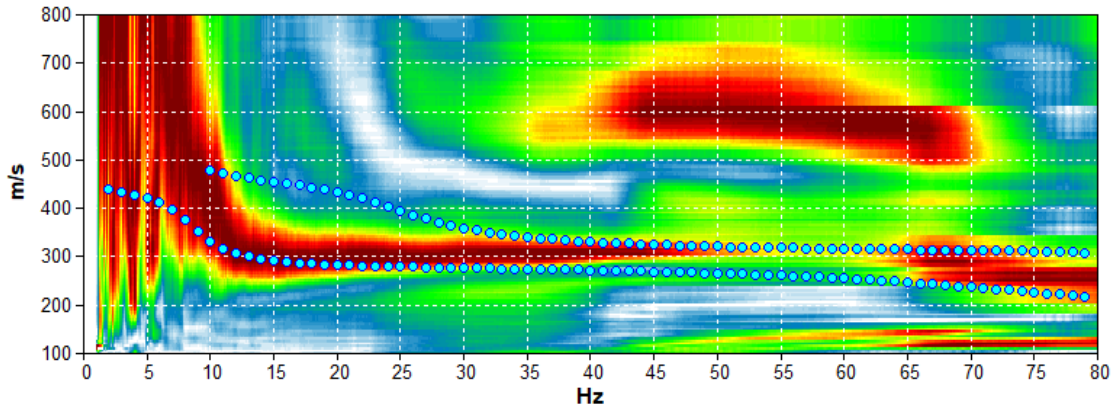


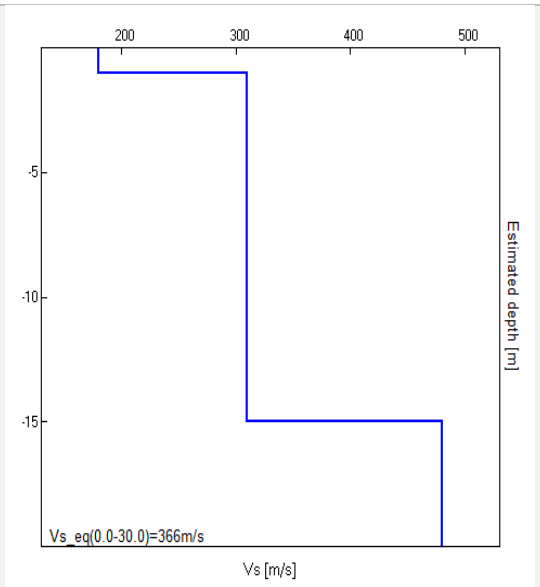


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	160
2,5 - ≈15	310
≈15 - ≈115	440
> ≈115	650

Vs,30	**331 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°8 (L8) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959203	Latitudine: 4959192
Longitudine: 144537	Longitudine: 144494

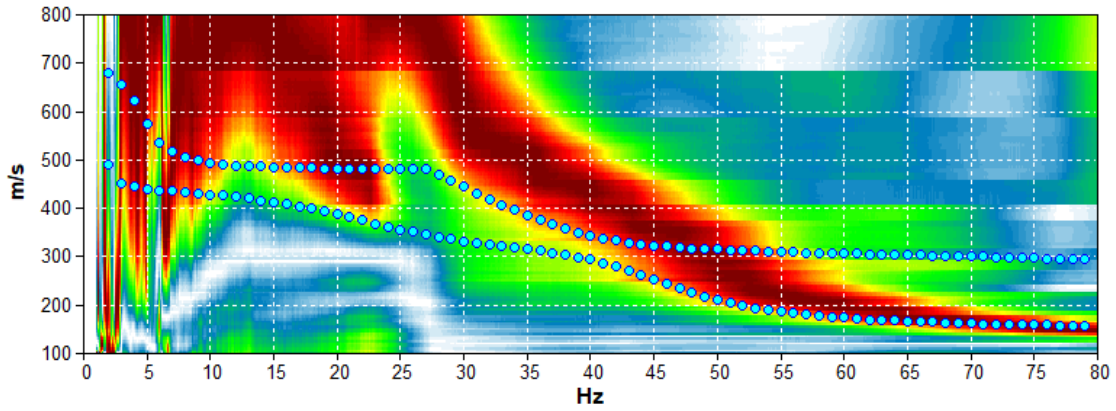


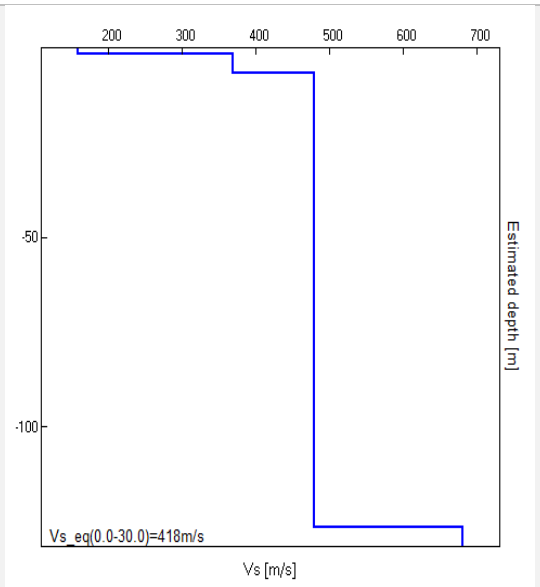


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	180
1,0 - ≈15	310
> ≈15	480

Vs,30	**366 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°9 (L9) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960044	Latitudine: 4960032
Longitudine: 145920	Longitudine: 145948

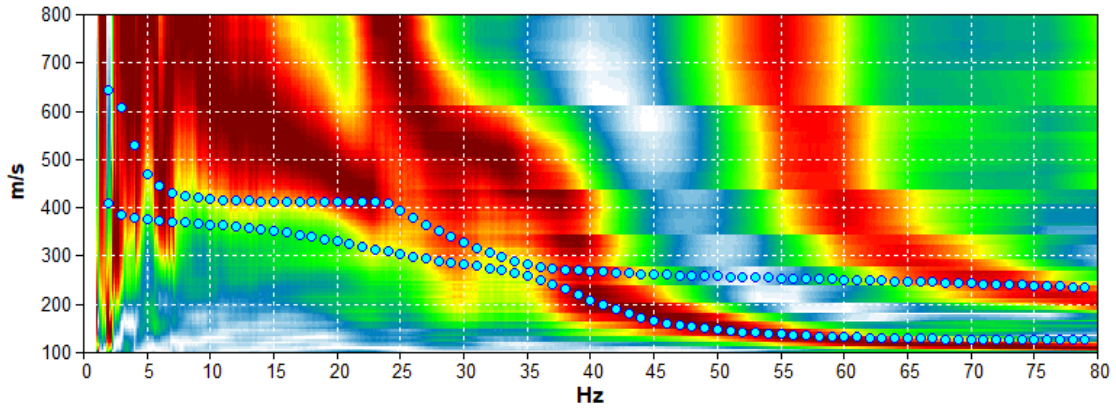


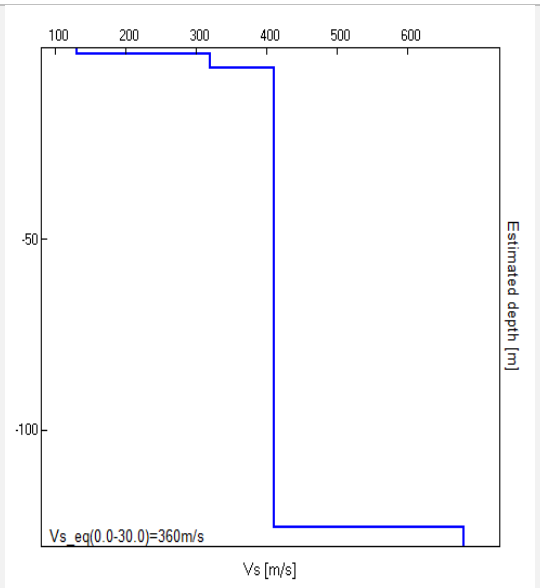


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	160
1,5 - 6,5	370
6,5 - ≈127	480
> ≈127	680

Vs,30	**418 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°10 (L10) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959709	Latitudine: 4959746
Longitudine: 145748	Longitudine: 145774

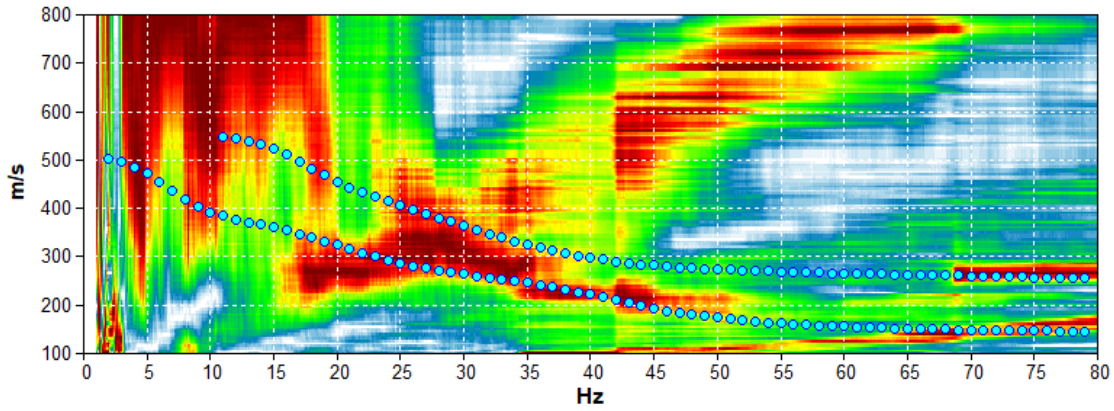


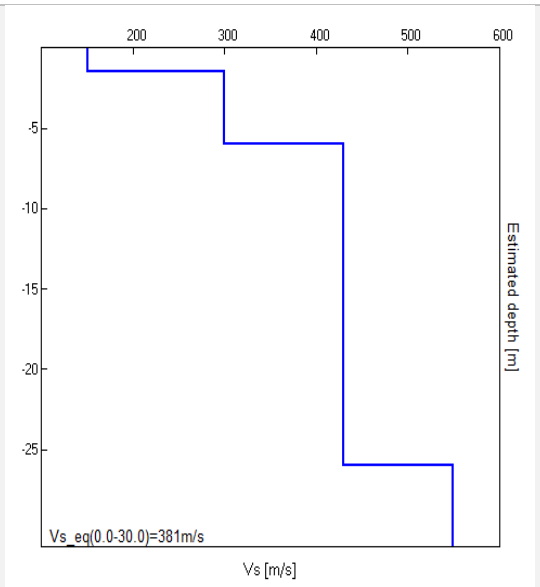


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,4	130
1,4 - 5,4	320
5,4 - ≈125	410
> ≈125	680

Vs,30	**360 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°11 (L11) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959451	Latitudine: 4959462
Longitudine: 145698	Longitudine: 145670

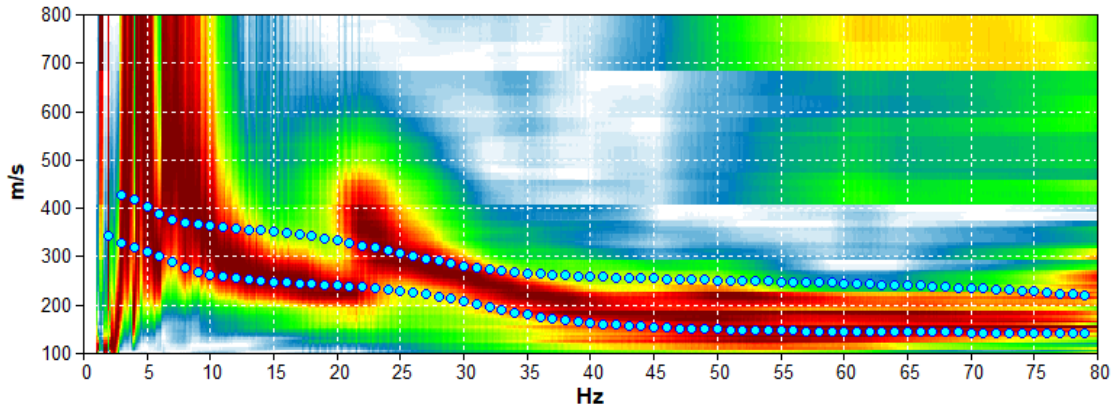


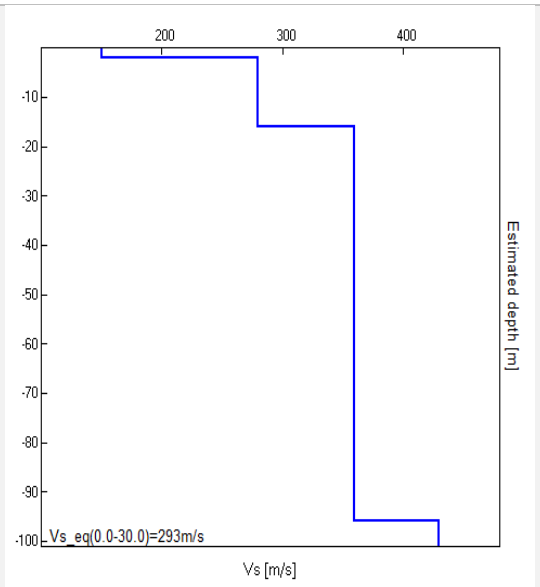


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - 6,0	300
6,0 - ≈26	430
> ≈26	550

Vs,30	**381 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°12 (L12) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959709	Latitudine: 4959687
Longitudine: 145497	Longitudine: 145477

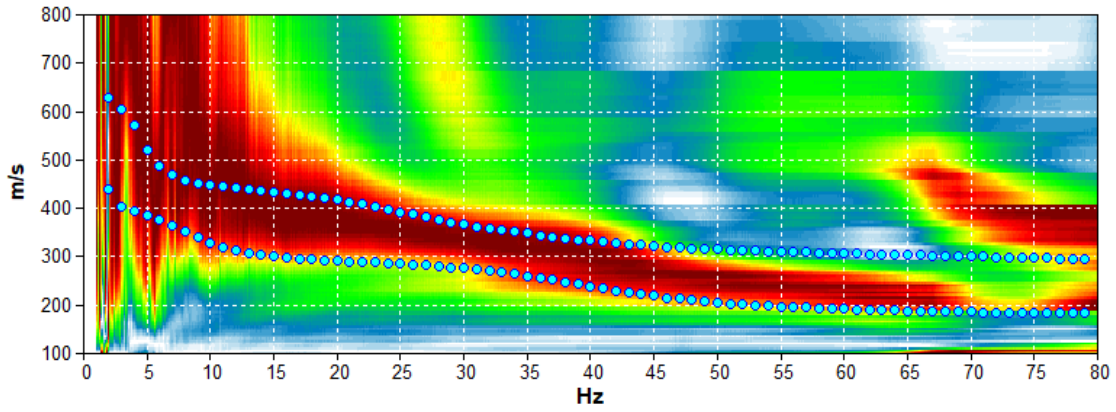


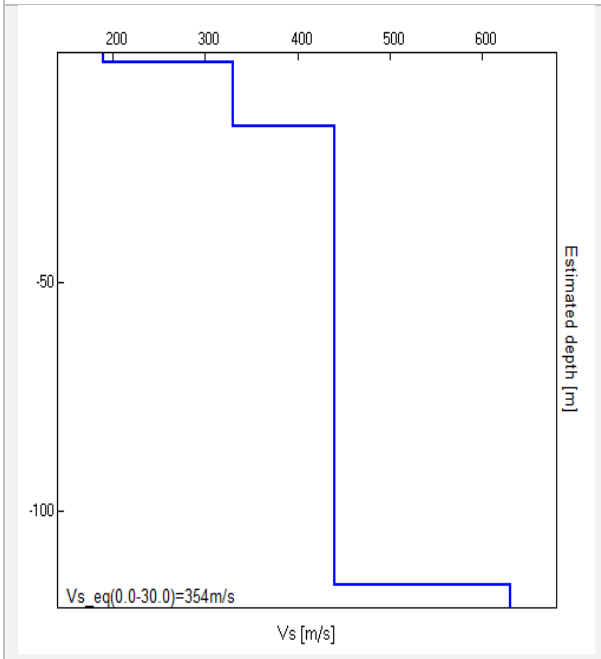


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,0	150
2,0 - ≈16	280
≈16 - ≈96	360
> ≈96	430

Vs,30	**293 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°13 (L13) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959329	Latitudine: 4959324
Longitudine: 145098	Longitudine: 145068

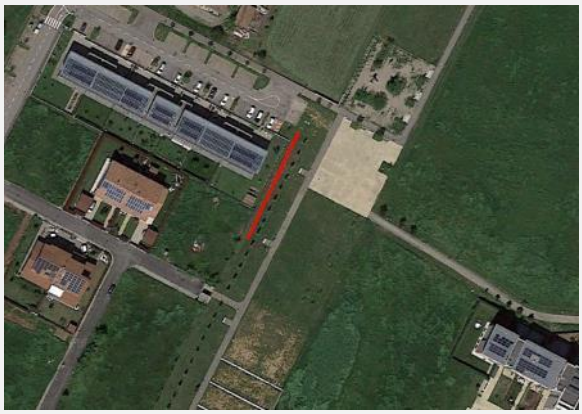


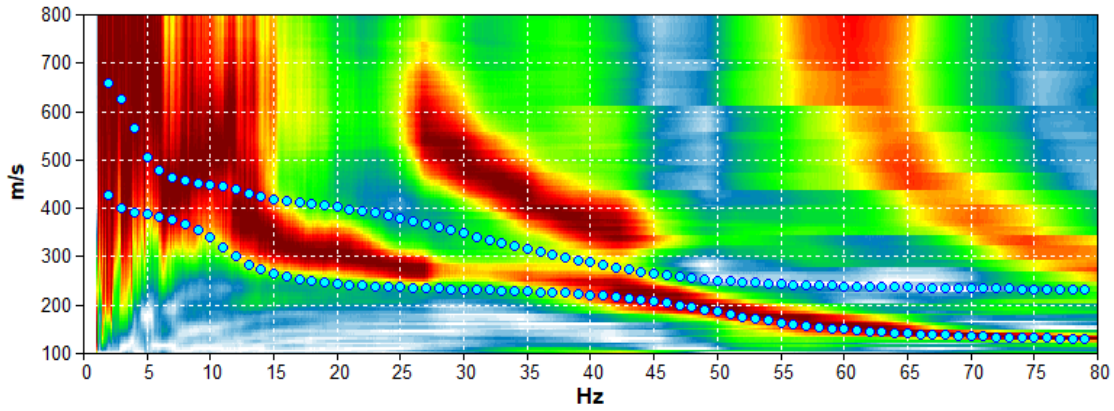


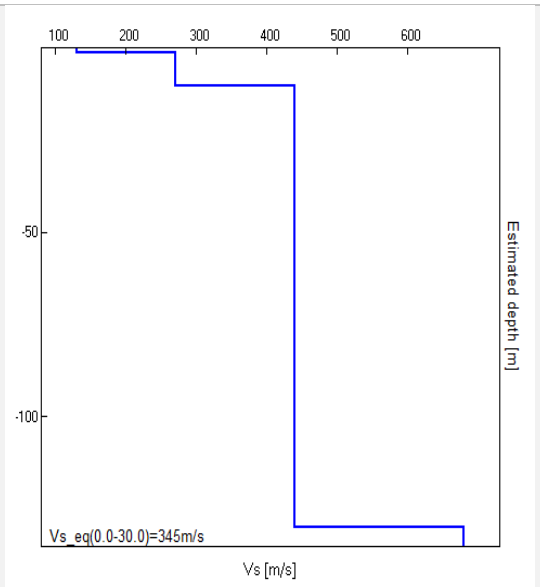
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,0	190
2,0 - ≈16	330
≈16 - ≈116	440
> ≈116	630

Vs,30	**354 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°14 (L14) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957986	Latitudine: 4957946
Longitudine: 145047	Longitudine: 145025



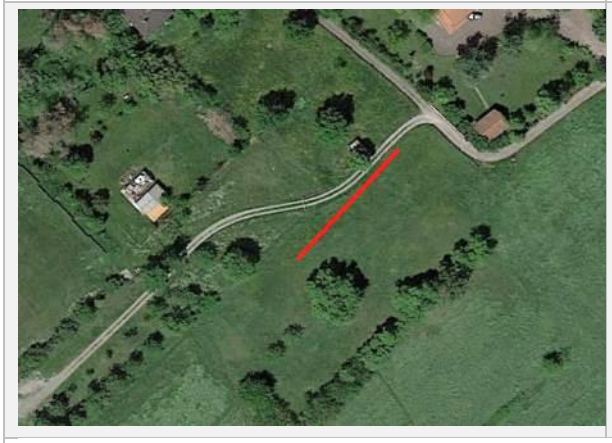


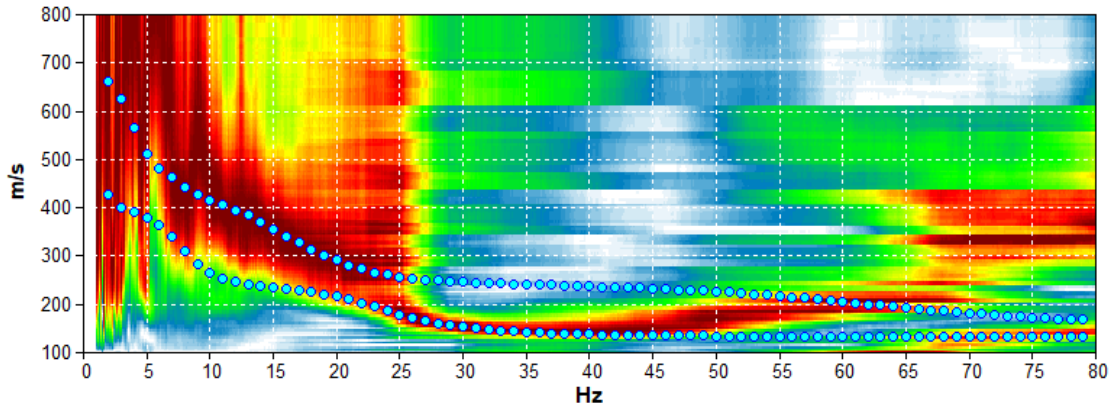


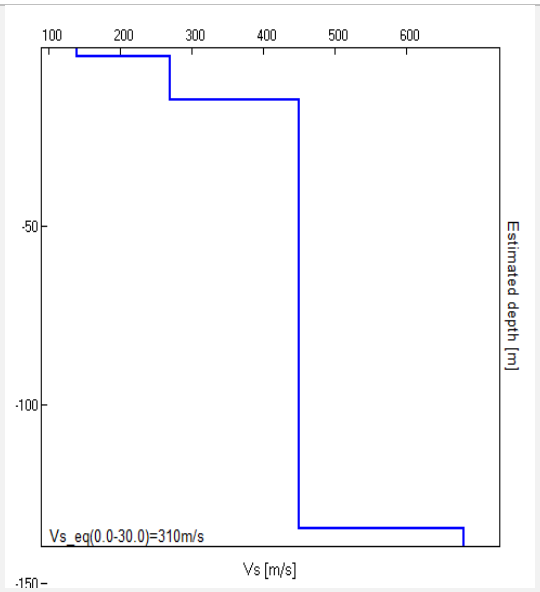
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,1	130
1,1 - ≈10	270
≈10 - ≈130	440
> ≈130	680

Vs,30	**345 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°15 (L15) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957658	Latitudine: 4957622
Longitudine: 145295	Longitudine: 145268



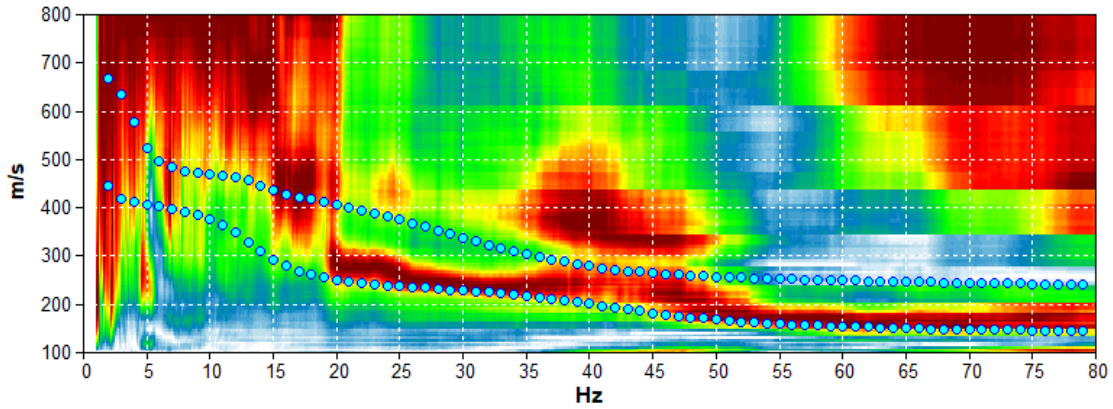


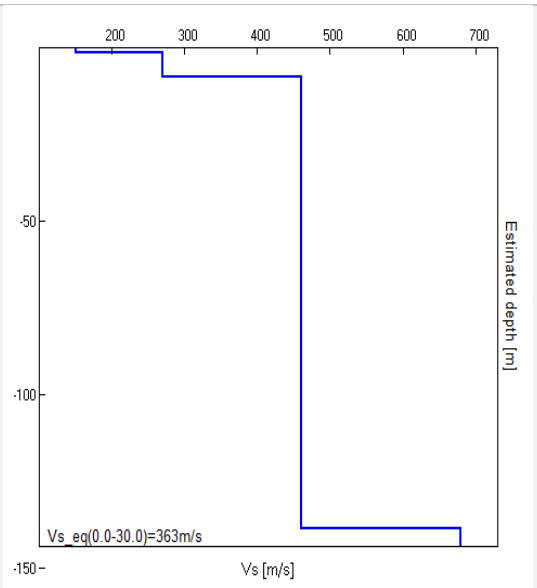


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	140
2,5 - ≈14	270
≈14 - ≈134	450
> ≈134	680

Vs,30	**310 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°16 (L16) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957846	Latitudine: 4957836
Longitudine: 145364	Longitudine: 145320

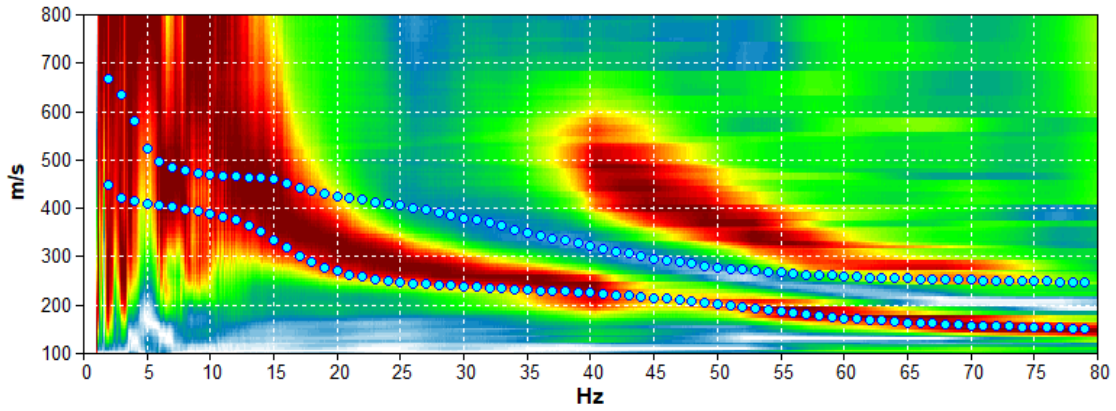


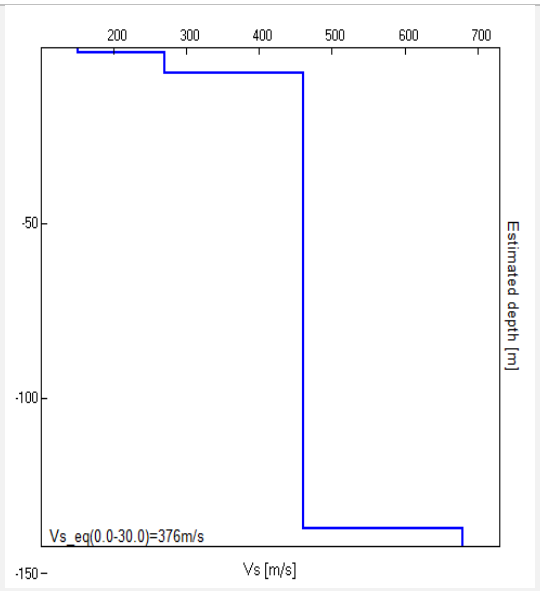


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - 8,5	270
8,5 - ≈138	460
> ≈138	680

Vs,30	**363 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°17 (L17) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958246	Latitudine: 4958231
Longitudine: 145084	Longitudine: 145110

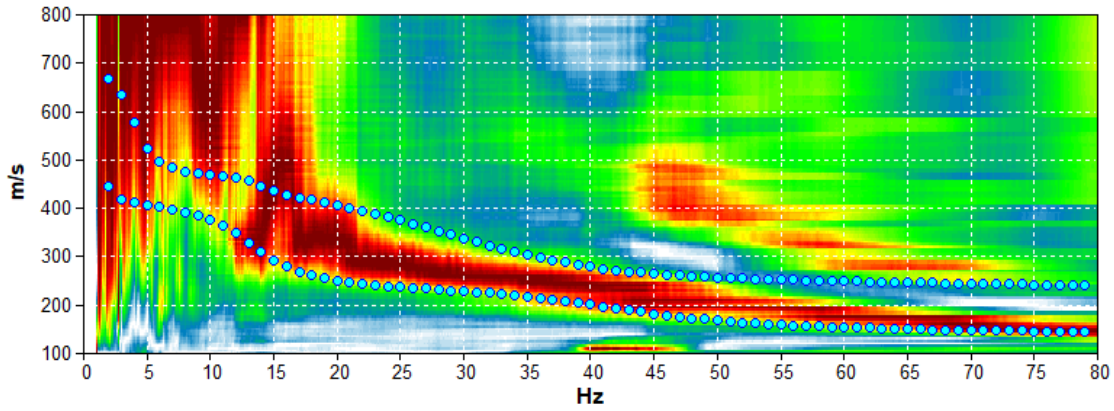


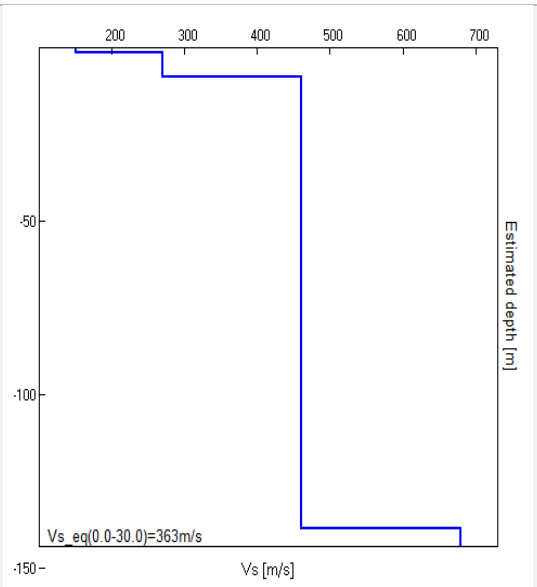


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	150
1,2 - 7,2	270
7,2 - ≈137	460
> ≈137	680

Vs,30	**376 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°18 (L18) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958208	Latitudine: 4958197
Longitudine: 145430	Longitudine: 145458

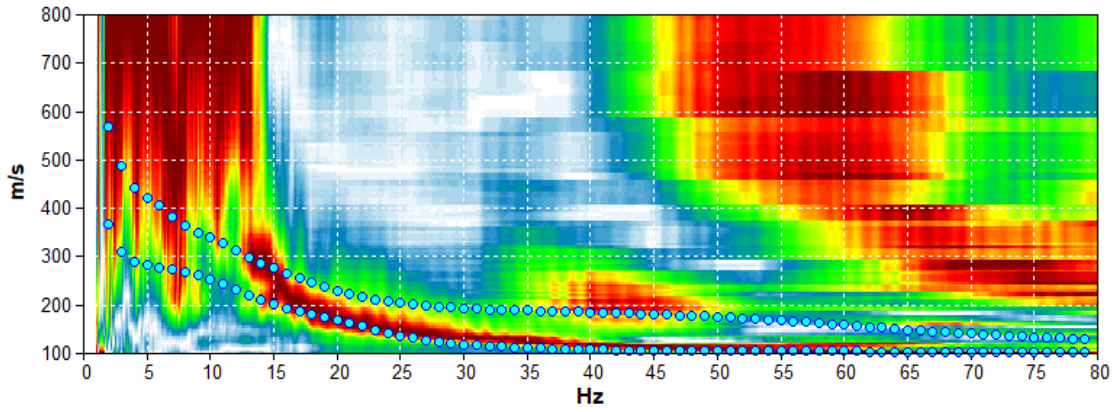


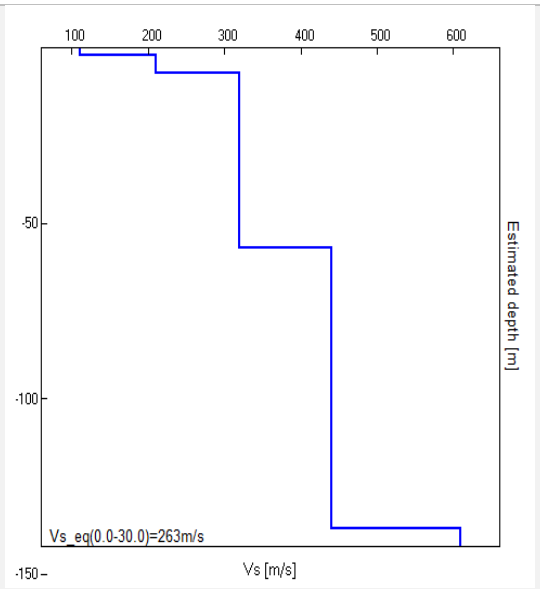


Profondità in [m] dal p.c. locale	Vs in [m/s]
0,0 - 1,5	150
1,5 - 8,5	270
8,5 - ≈138	460
> ≈138	680

Vs,30	**363 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°19 (L19) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961206	Latitudine: 4961190
Longitudine: 147319	Longitudine: 147344

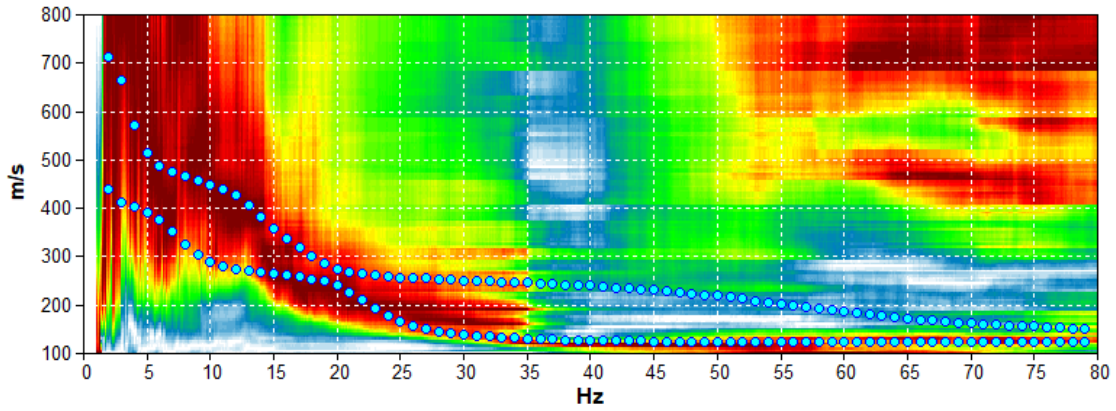


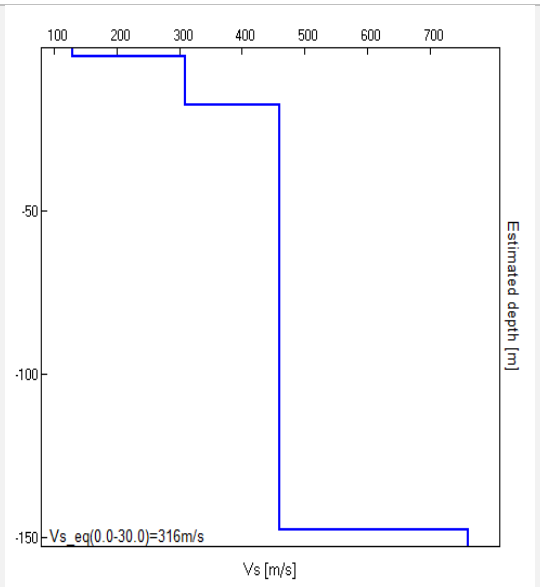


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,0	110
2,0 - 7,0	210
7,0 - ≈57	320
≈57 - ≈137	440
> ≈137	610

Vs,30	**263 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°20 (L20) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960531	Latitudine: 4960556
Longitudine: 147546	Longitudine: 147563

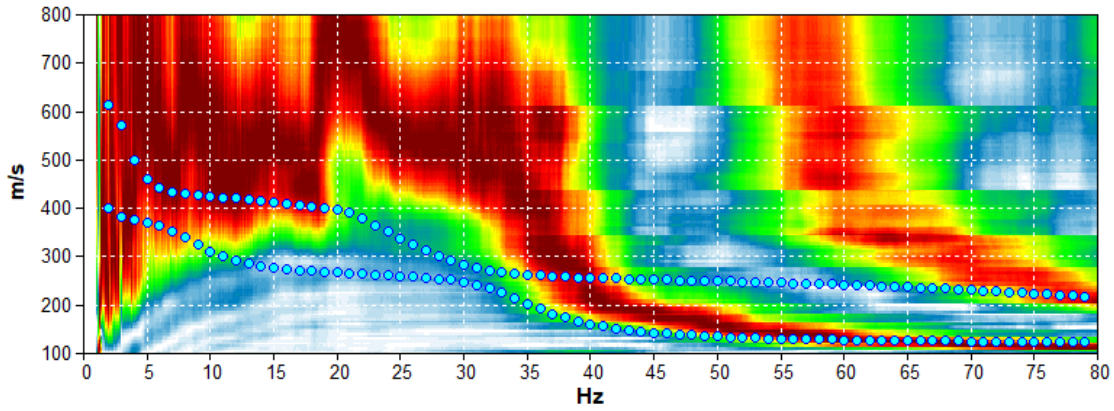


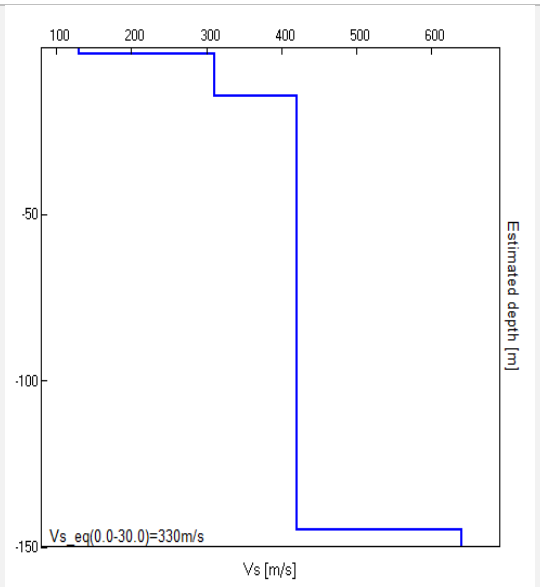


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	130
2,5 - ≈ 17	310
≈ 17- ≈ 147	460
> ≈147	760

Vs,30	**316 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°21 (L21) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960304	Latitudine: 4960340
Longitudine: 147373	Longitudine: 147400

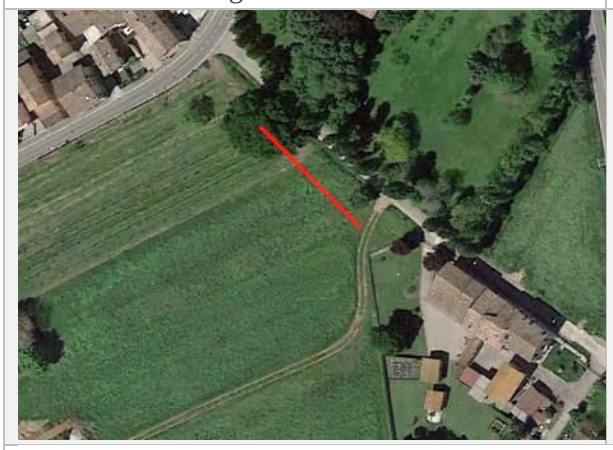


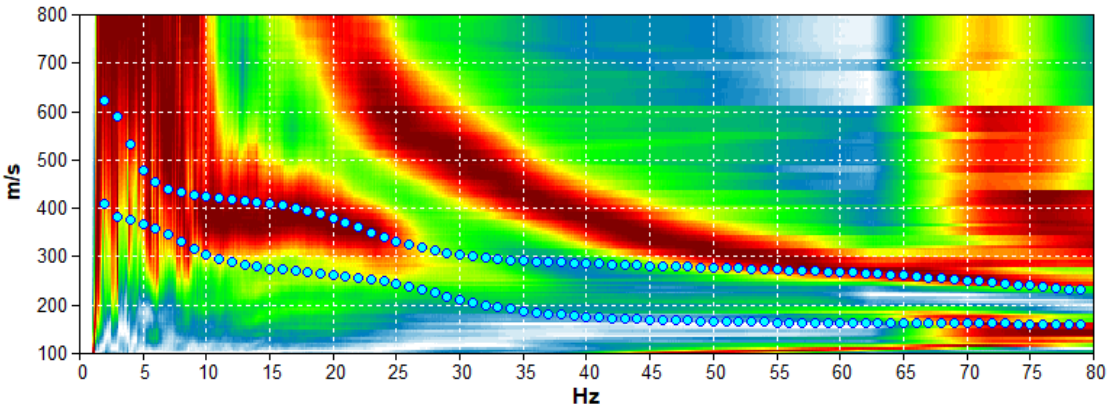


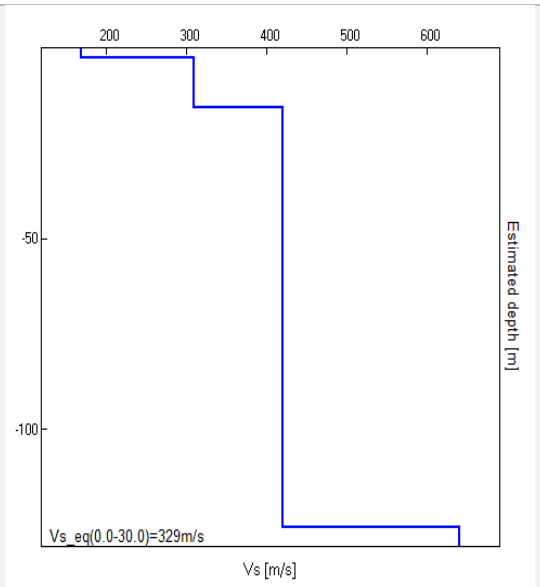
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,6	130
1,6 - ≈14	310
≈14 - ≈144	420
> ≈144	640

Vs,30	**330 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°22 (L22) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959247	Latitudine: 4959281
Longitudine: 146748	Longitudine: 146718



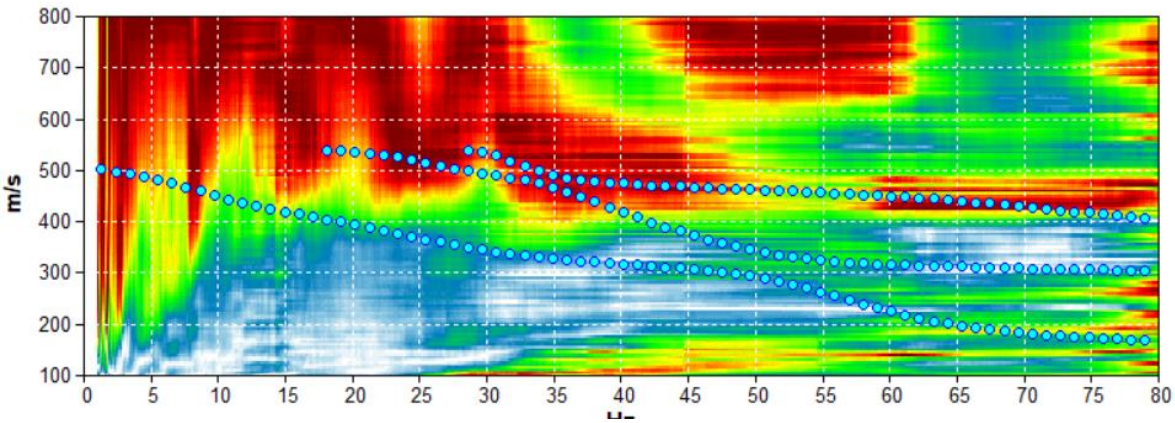


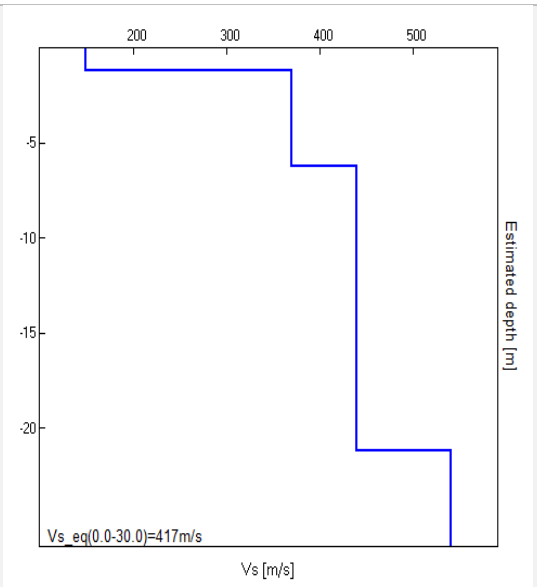


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	170
2,5 - ≈15	310
≈15 - ≈125	420
> ≈125	640

Vs,30	**329 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°23 (L23) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960635	Latitudine: 4960591
Longitudine: 146293	Longitudine: 146283

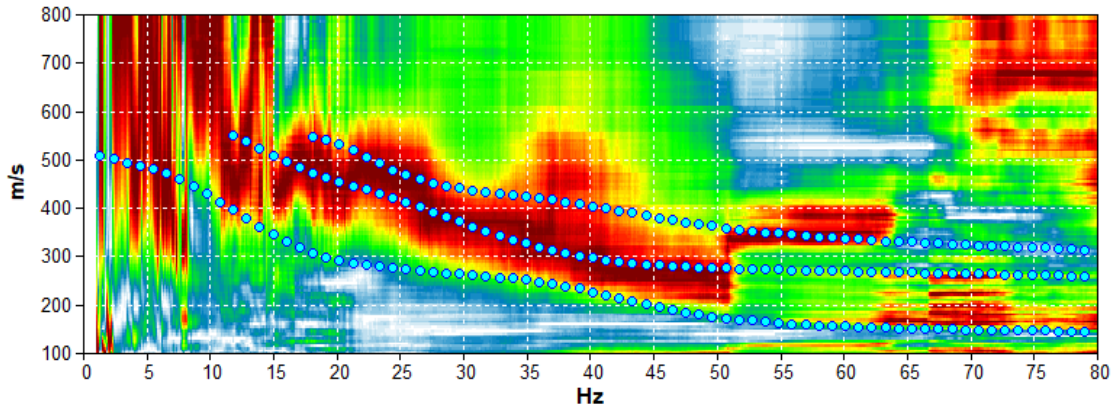


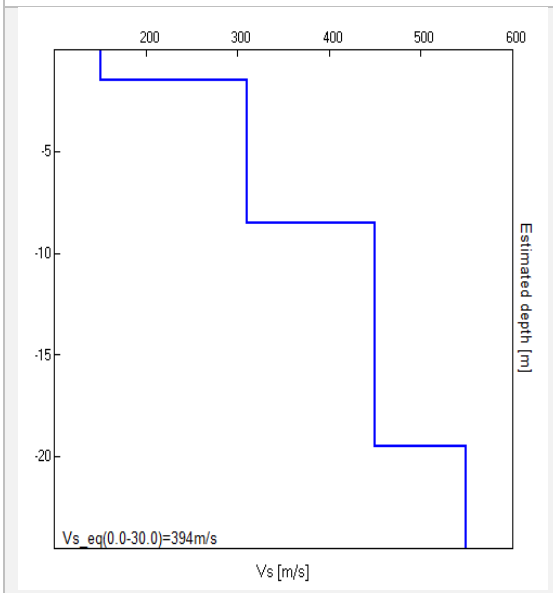


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	150
1,2 - 6,2	370
6,2 - ≈21	440
> ≈21	540

Vs,30	**417 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°24 (L24) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961789	Latitudine: 4961744
Longitudine: 145073	Longitudine: 145075

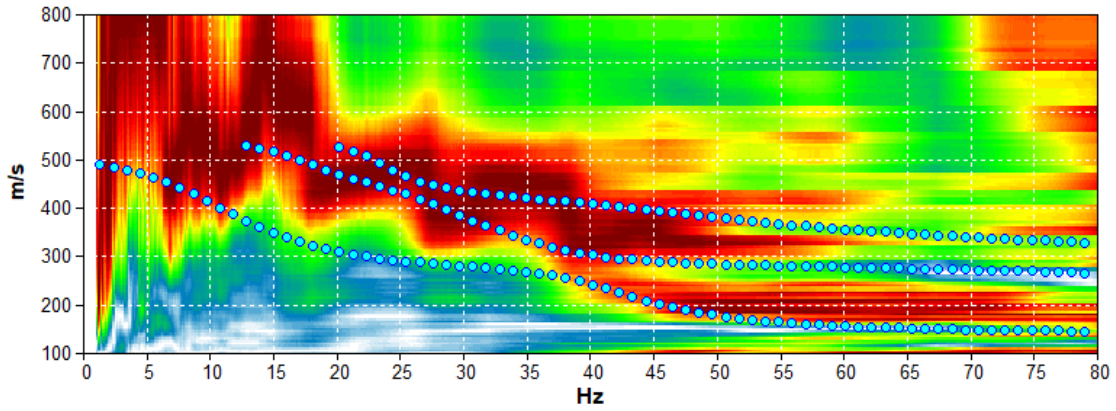


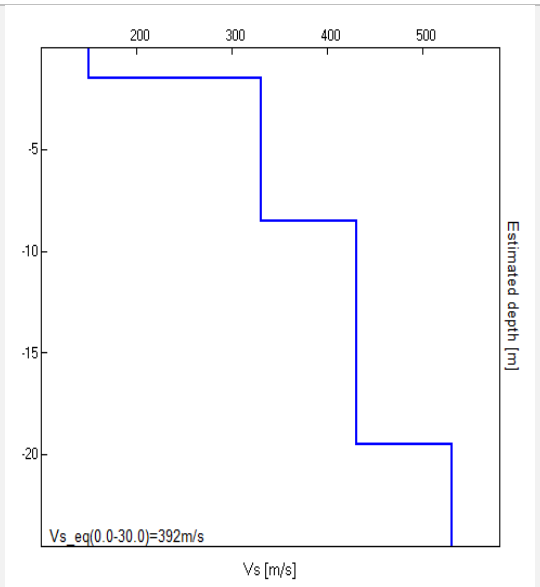


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - 8,5	310
8,5 - ≈ 19	450
> ≈19	550

Vs,30	**394 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°25 (L25) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961474	Latitudine: 4961429
Longitudine: 145143	Longitudine: 145145

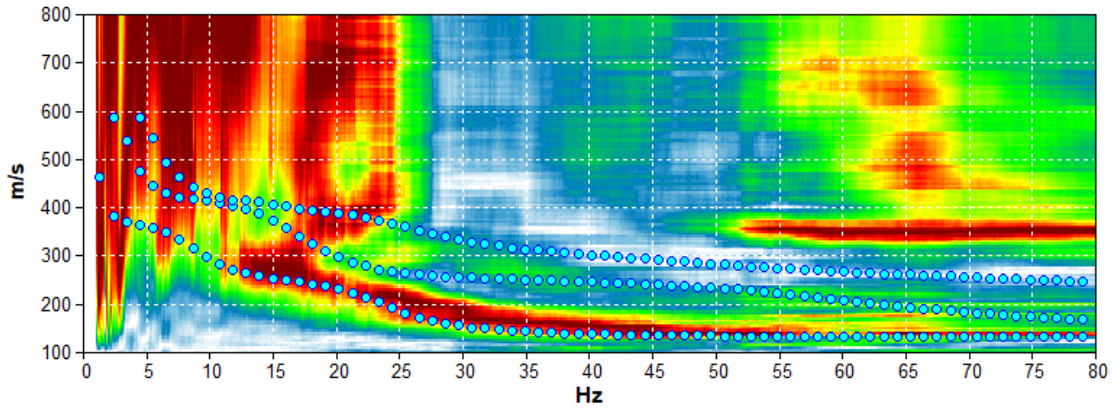


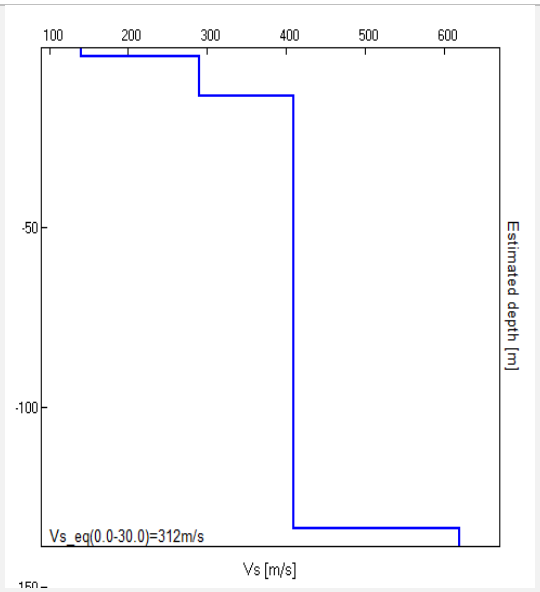


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	150
1,5 - 8,5	330
8,5 - ≈ 19	430
> ≈19	550

Vs,30	**392 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°26 (L26) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958791	Latitudine: 4958802
Longitudine: 145285	Longitudine: 145328

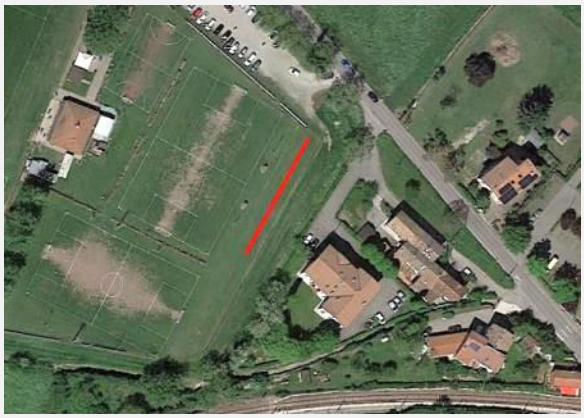


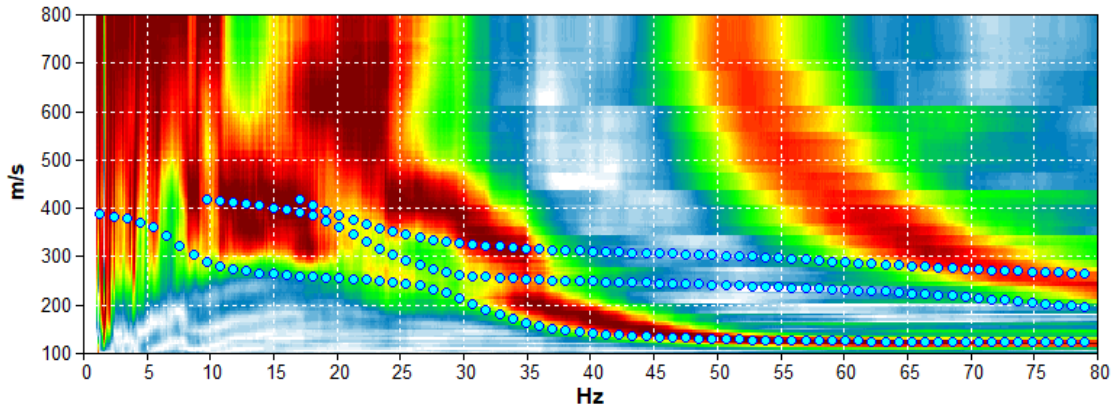


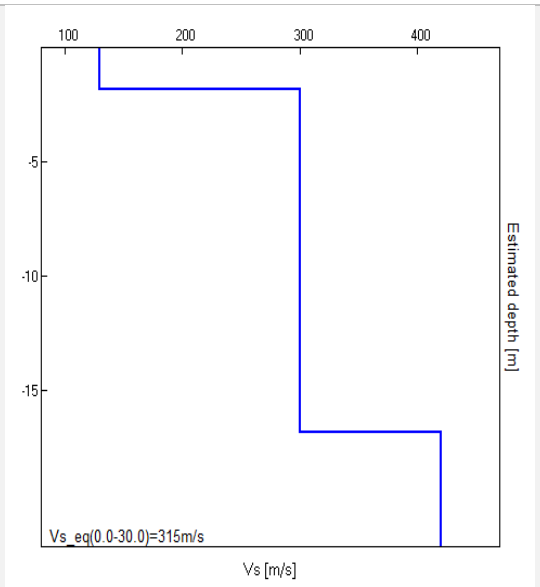
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,5	140
2,5 - ≈13	290
≈13 - ≈133	410
> ≈133	620

Vs,30	**312 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°27 (L27) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959450	Latitudine: 4959412
Longitudine: 145211	Longitudine: 145187



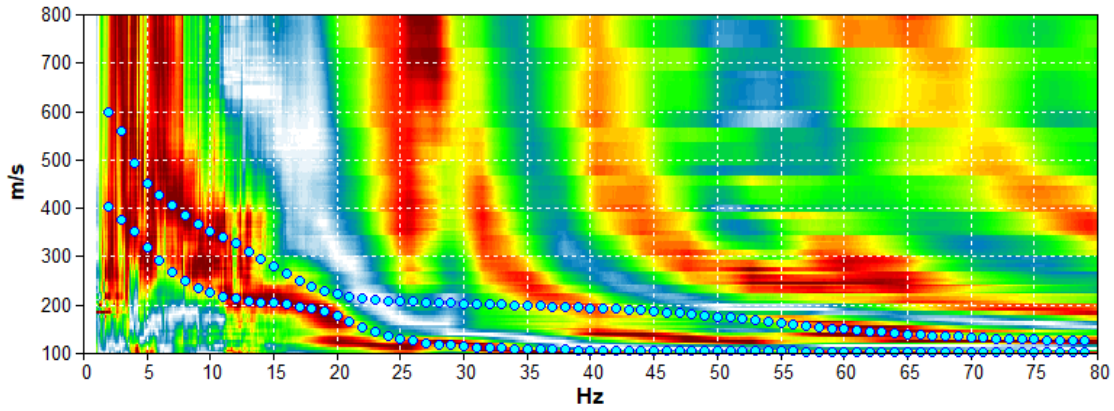


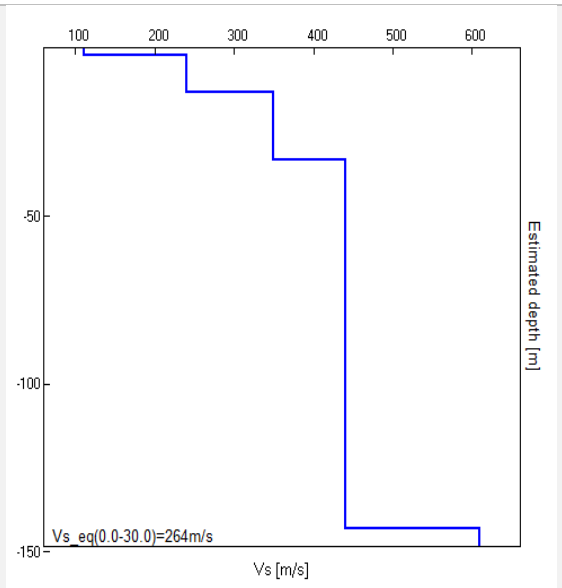


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,8	130
1,8 - ≈17	300
> ≈17	420

Vs,30	**315 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°28 (L28) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961178	Latitudine: 4961163
Longitudine: 147592	Longitudine: 147555

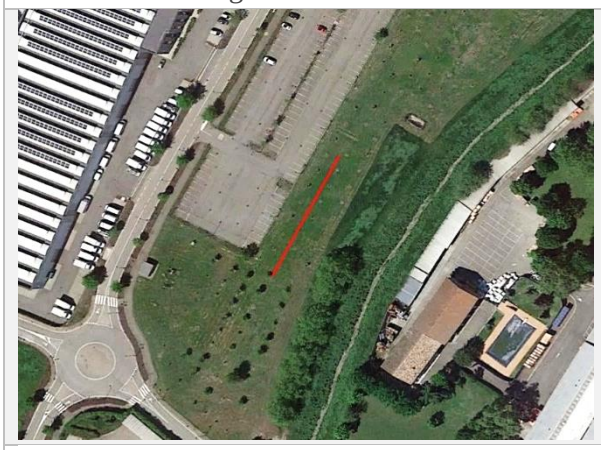


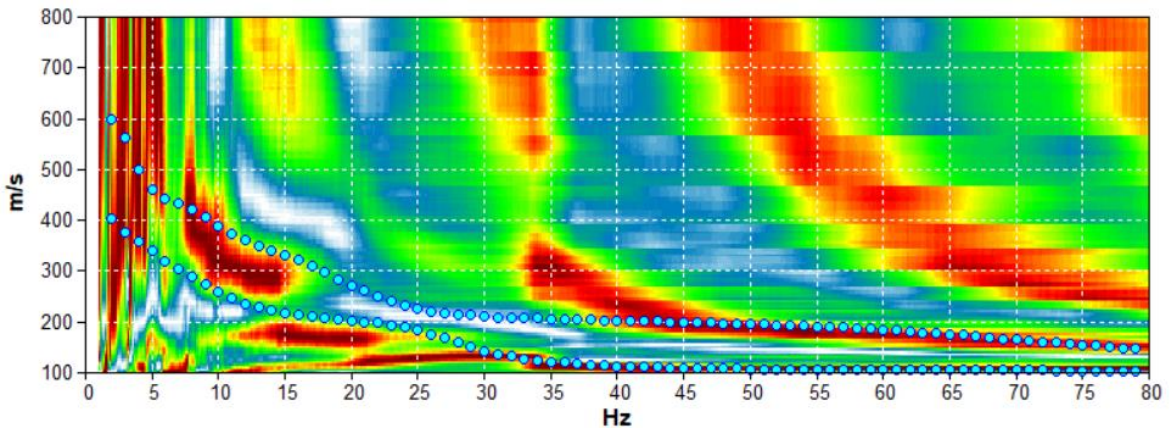


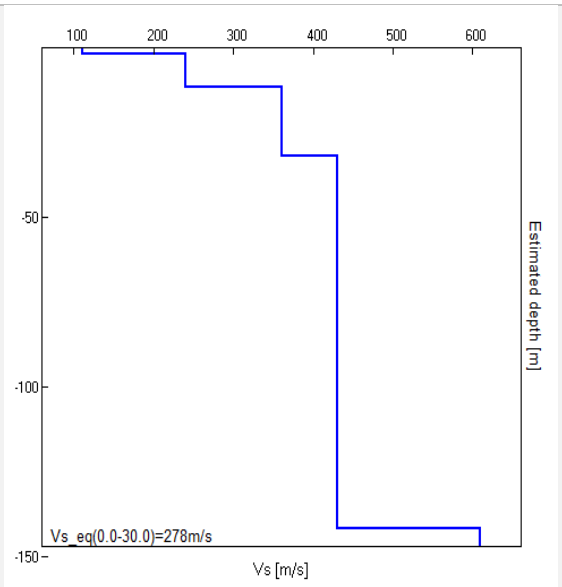
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,2	110
2,2 - ≈13	240
≈13 - ≈33	350
≈33 - ≈143	440
> ≈143	610

Vs,30	**264 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°29 (L29) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4960973	Latitudine: 4960938
Longitudine: 147207	Longitudine: 147187



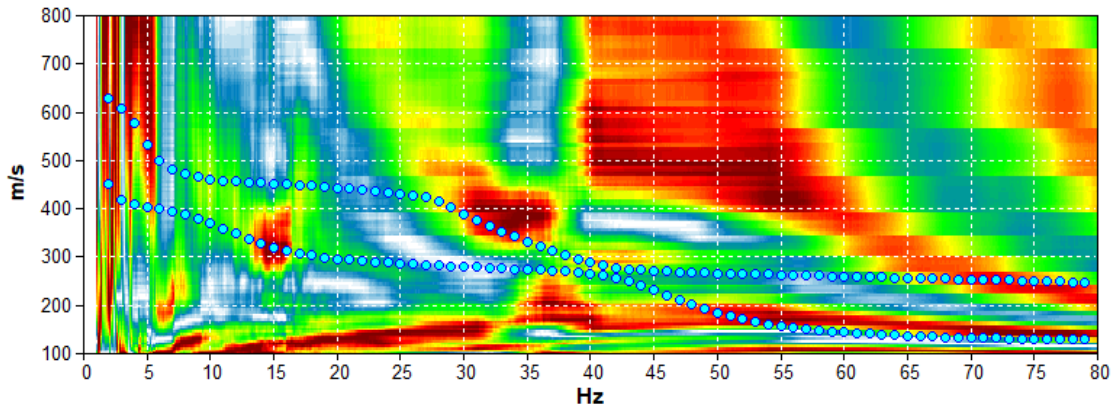


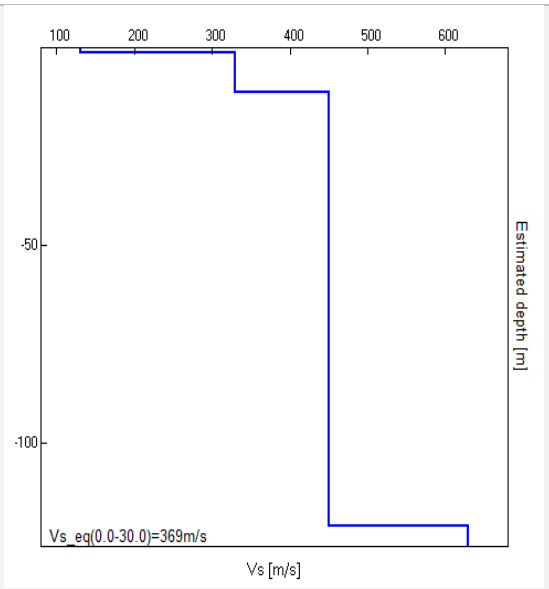


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,7	110
1,7 - ≈12	240
≈12 - ≈32	360
≈32 - ≈142	430
> ≈142	610

Vs,30	**315 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°30 (L30) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959993	Latitudine: 4959966
Longitudine: 147226	Longitudine: 147197

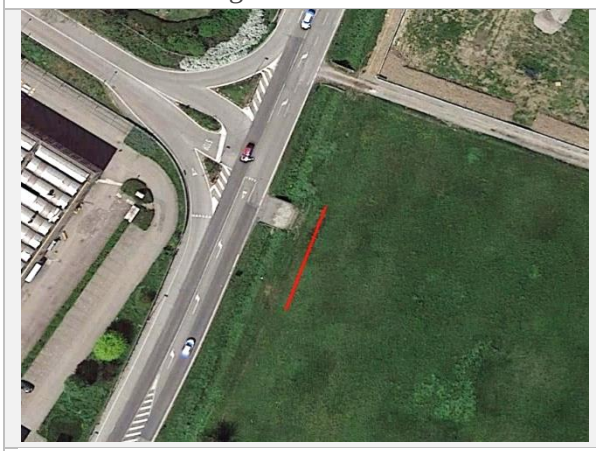


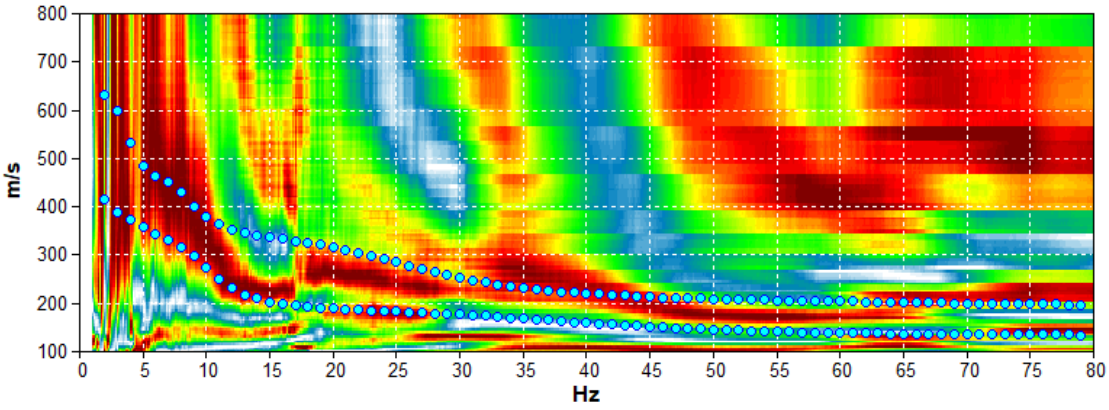


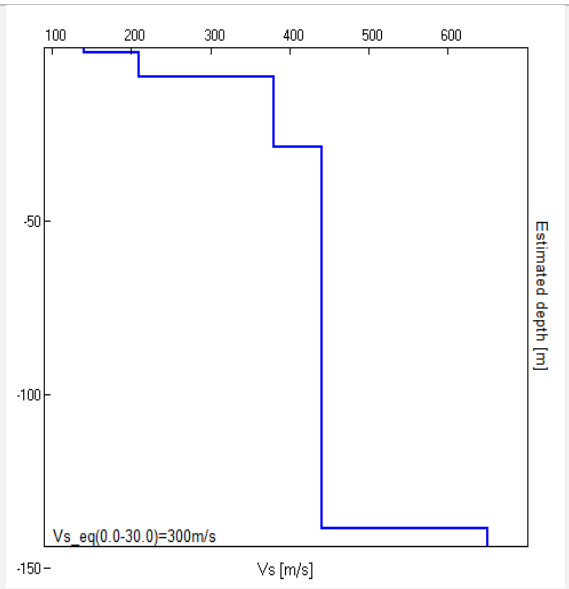
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	130
1,2 - ≈11	330
≈11 -≈121	450
>≈121	630

Vs,30	**369 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°31 (L31) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4961075	Latitudine: 4961112
Longitudine: 148188	Longitudine: 148204



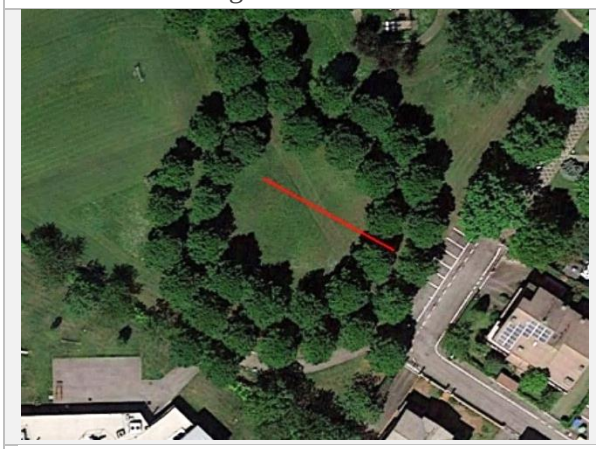


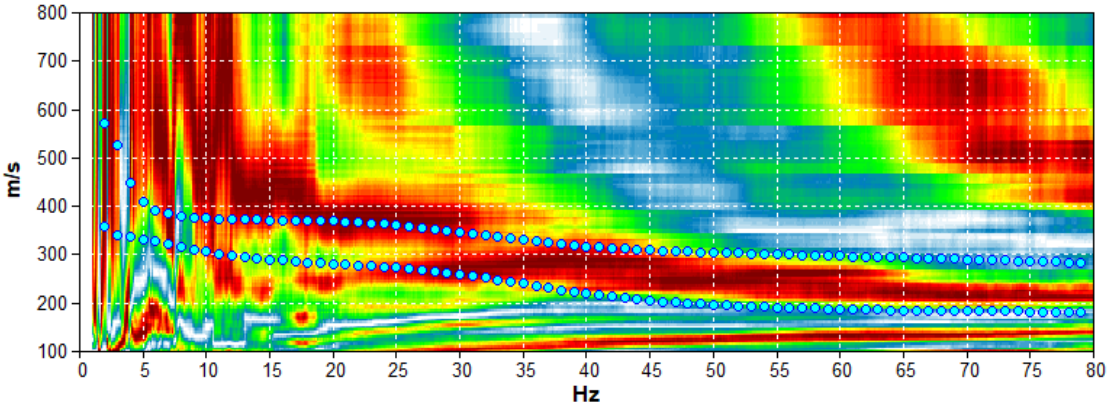


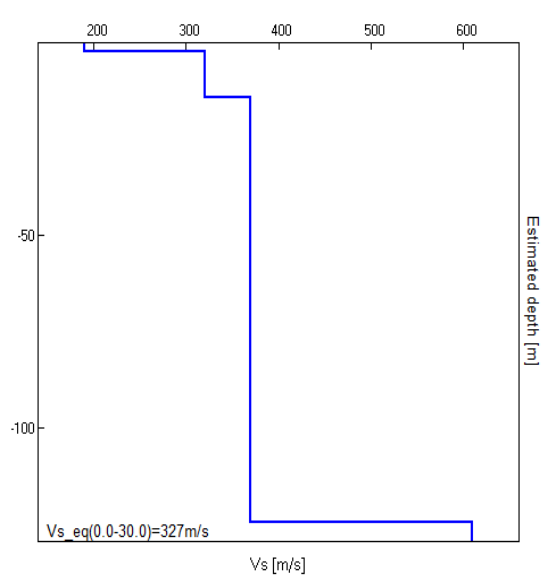
Profondità in [m] dal p.c. locale	Vs in [m/s]
0,0 - 1,5	140
1,5 - 8,5	210
≈8,5 - ≈28	380
≈28 - ≈138	440
> ≈138	650

Vs,30	**300 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°32 (L32) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958801	Latitudine: 4958822
Longitudine: 144889	Longitudine: 144855



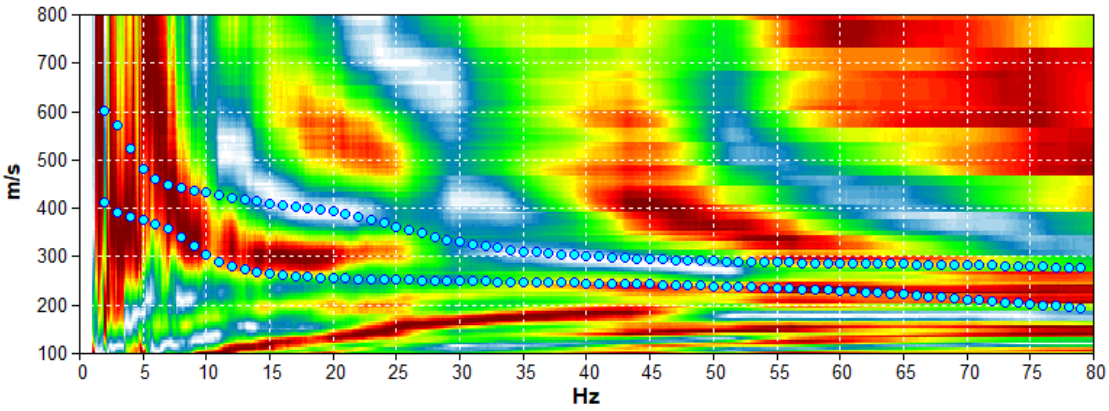


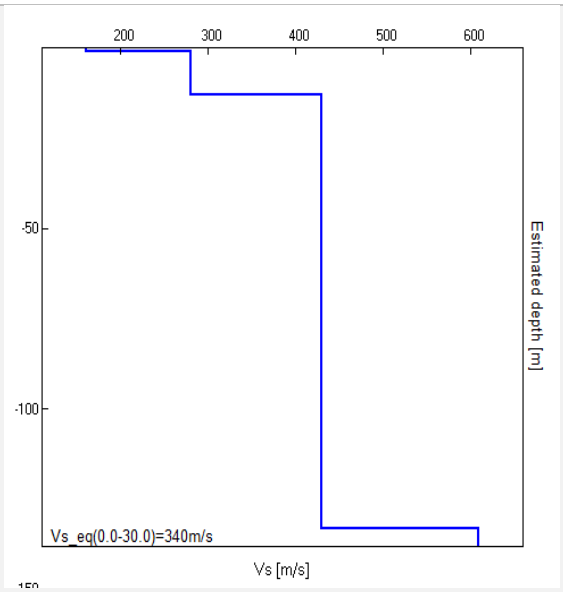


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,2	190
2,2 - ≈14	320
≈14 - ≈124	370
> ≈124	610

Vs,30	**327 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°33 (L33) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958778	Latitudine: 4958763
Longitudine: 144338	Longitudine: 144374

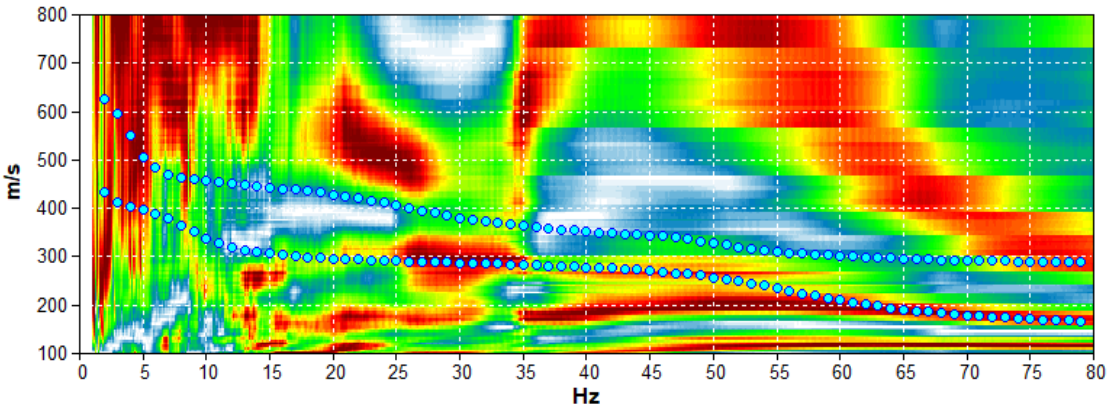


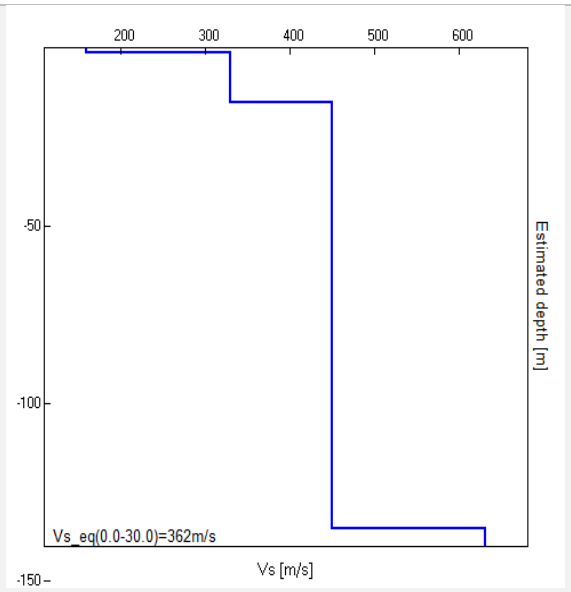


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	160
1,0 - ≈13	280
≈13 - ≈133	430
> ≈133	610

Vs,30	**340 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°34 (L34) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4959482	Latitudine: 4959465
Longitudine: 144573	Longitudine: 144536

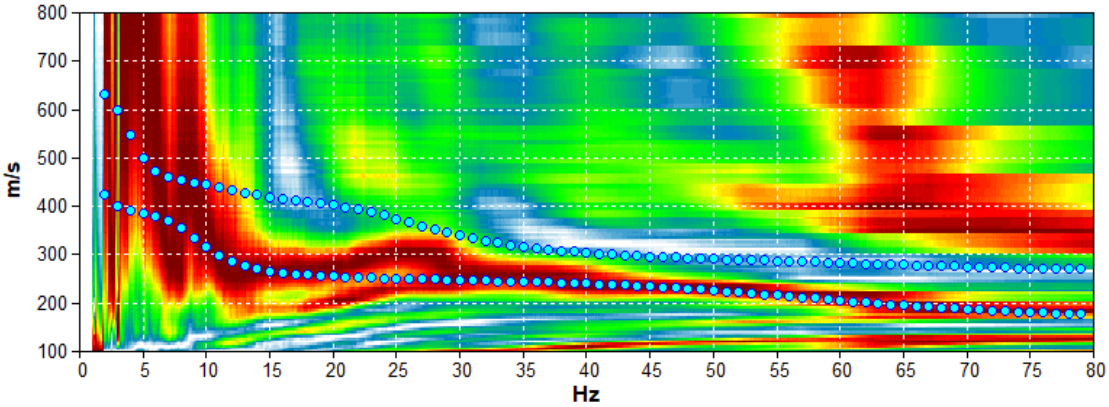


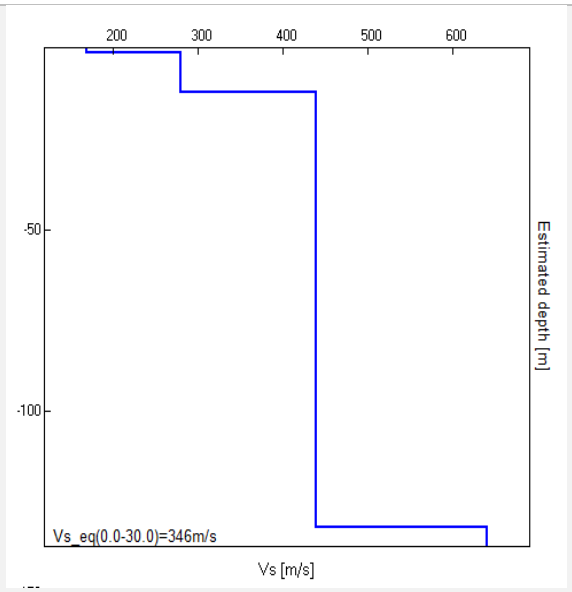


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	160
1,2 - ≈15	330
≈15 - ≈135	450
> ≈135	630

Vs,30	**362 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°35 (L35) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958362	Latitudine: 4958383
Longitudine: 145935	Longitudine: 145901

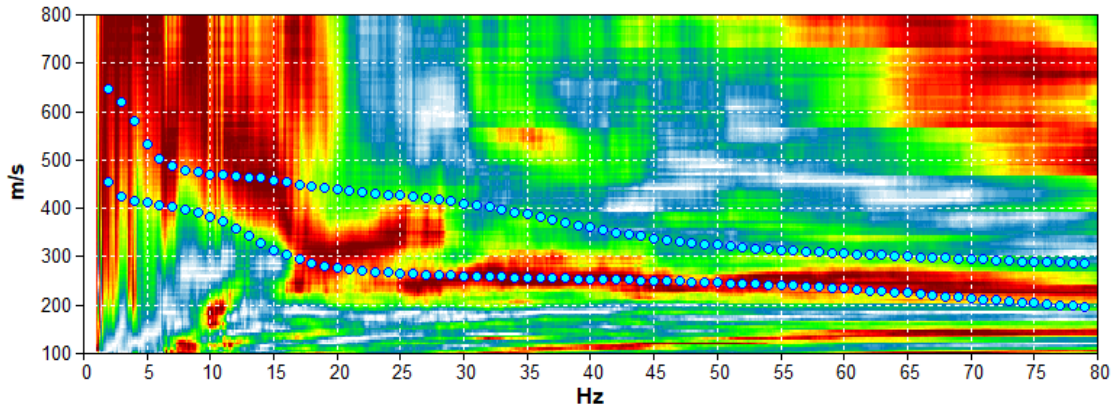


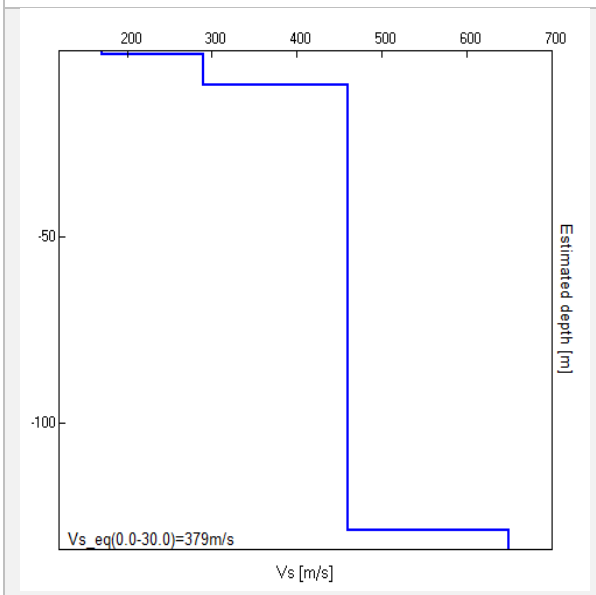


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,2	170
1,2 - ≈12	280
≈12 - ≈132	440
> ≈132	640

Vs,30	**346 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°36 (L36) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958341	Latitudine: 4958359
Longitudine: 145514	Longitudine: 145479

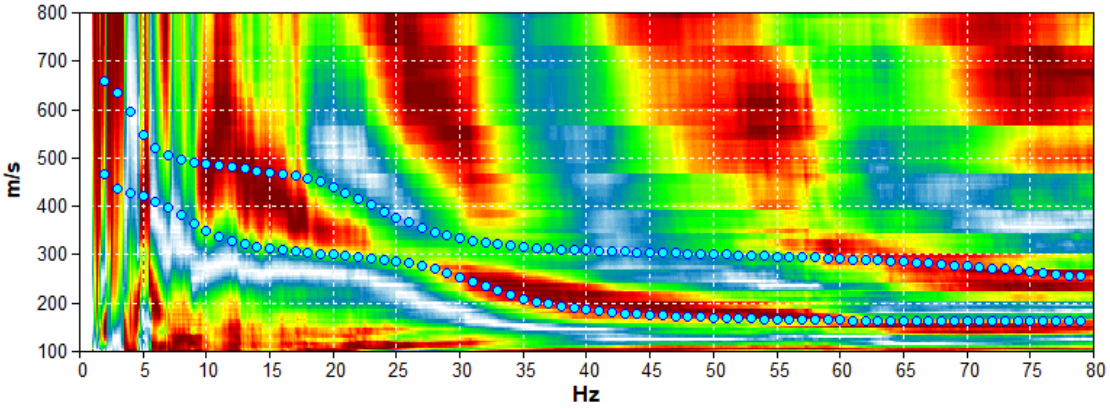


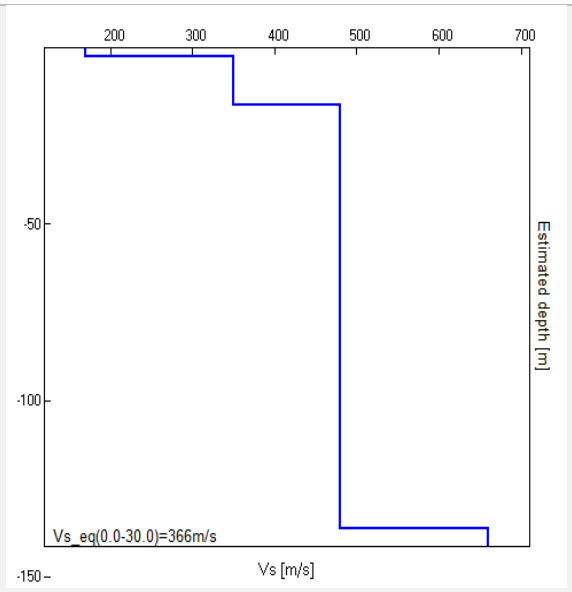


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,0	170
1,0 - 9,0	290
9,0 - ≈129	460
> ≈129	650

Vs,30	**379 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°37 (L37) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957155	Latitudine: 4957192
Longitudine: 144663	Longitudine: 144679

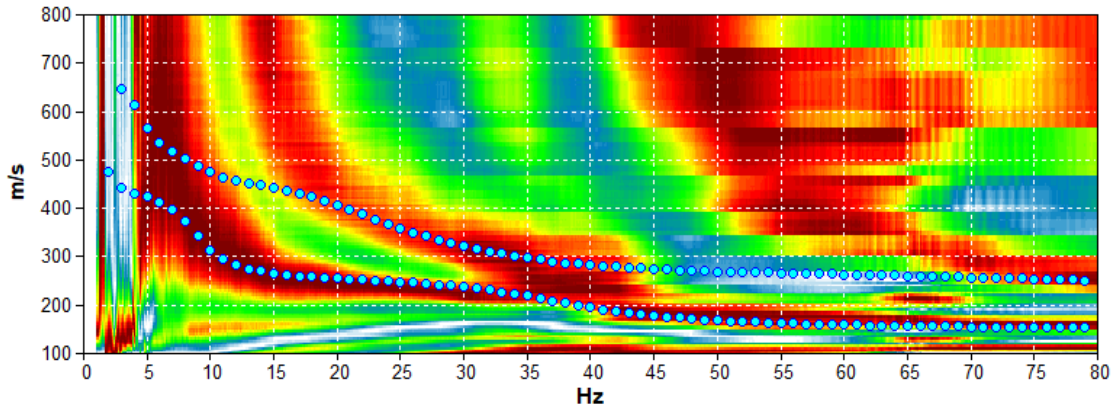


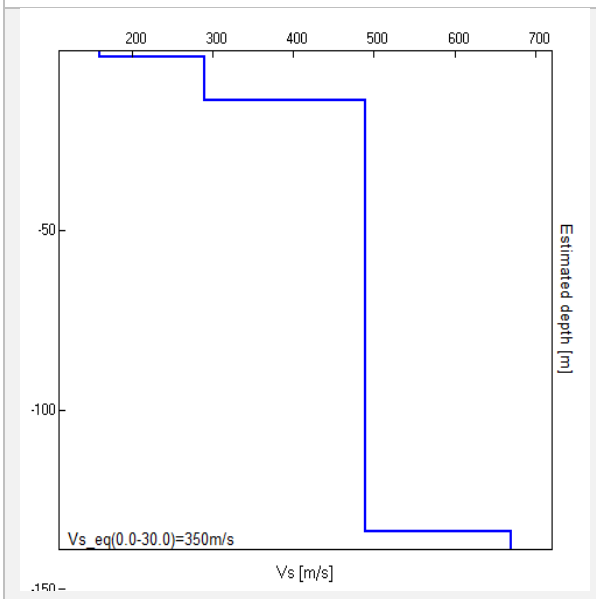


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 2,3	170
2,3 - ≈16	350
≈16- ≈136	480
> ≈136	660

Vs,30	**366 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°38 (L38) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957415	Latitudine: 4957388
Longitudine: 144875	Longitudine: 144846

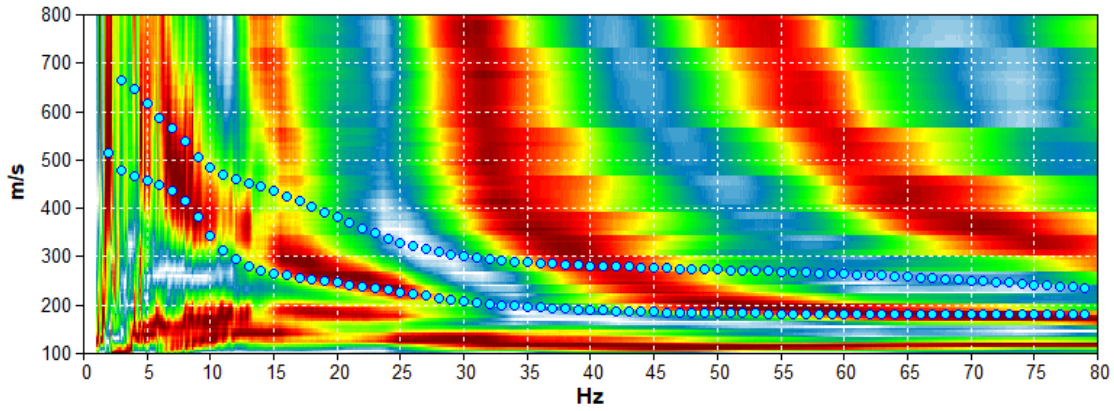


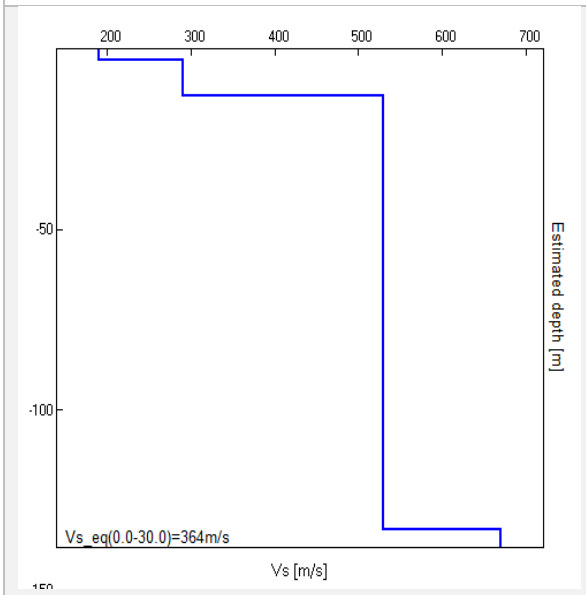


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,8	160
1,8 - ≈14	290
≈14- ≈134	490
> ≈134	670

Vs,30	**350 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°39 (L39) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4957517	Latitudine: 4957491
Longitudine: 145913	Longitudine: 145882

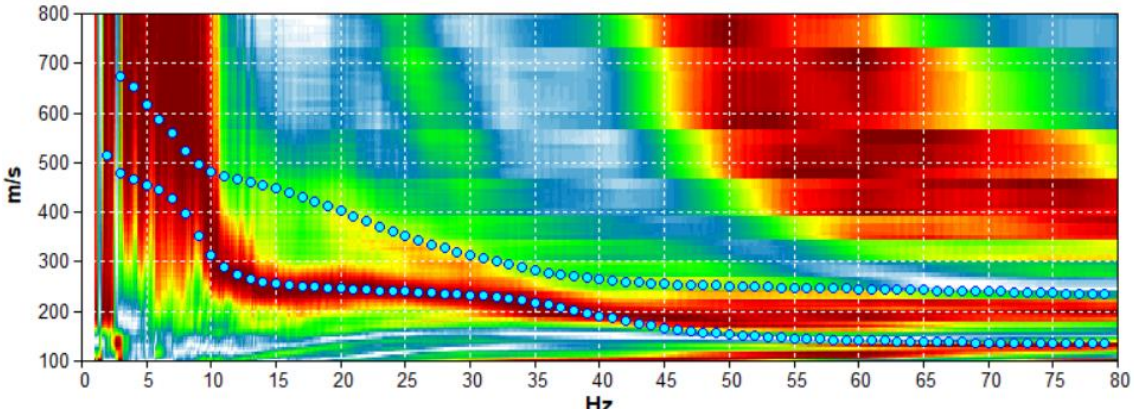


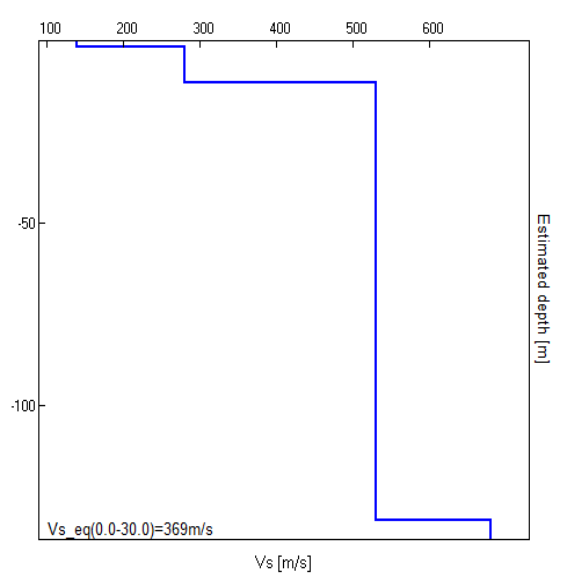


Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 3,0	190
3,0 - ≈13	290
≈13- ≈133	530
> ≈133	670

Vs,30	**364 m/s**
Profondità bedrock	**/**

Misura sismica Re.Mi. n°40 (L40) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958030	Latitudine: 4958036
Longitudine: 146483	Longitudine: 146523





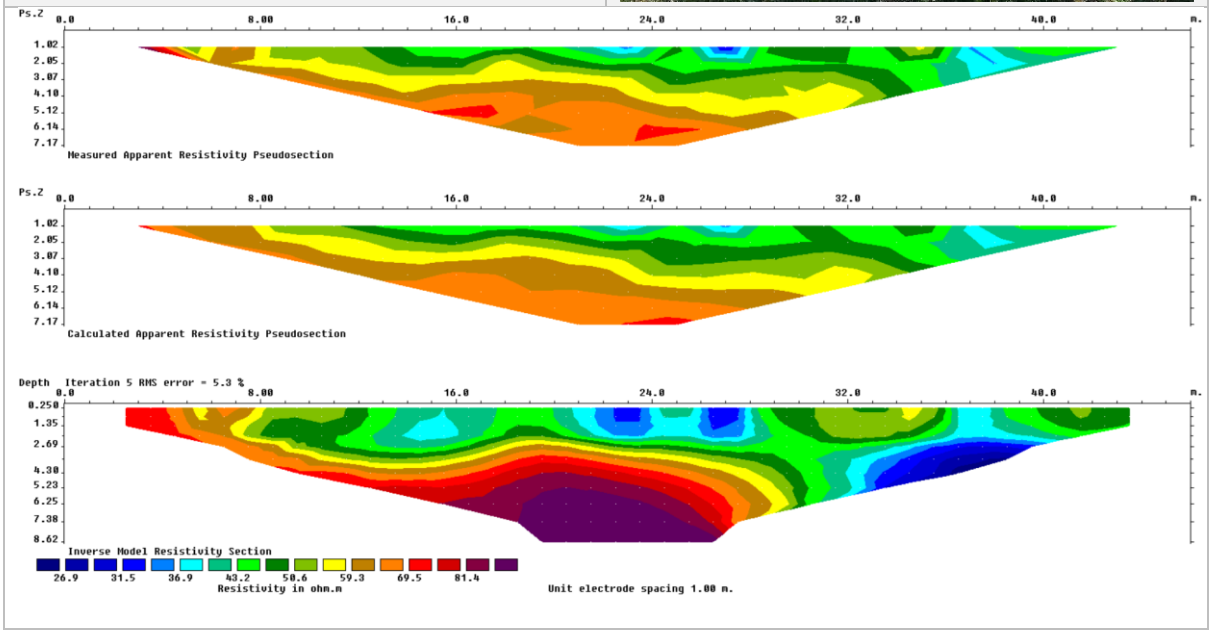
Profondità in [m] dal p.c. locale	Vs in m/s]
0,0 - 1,5	140
1,5 - ≈11	280
≈11- ≈131	530
> ≈131	680

Vs,30	**369 m/s**
Profondità bedrock	**/**

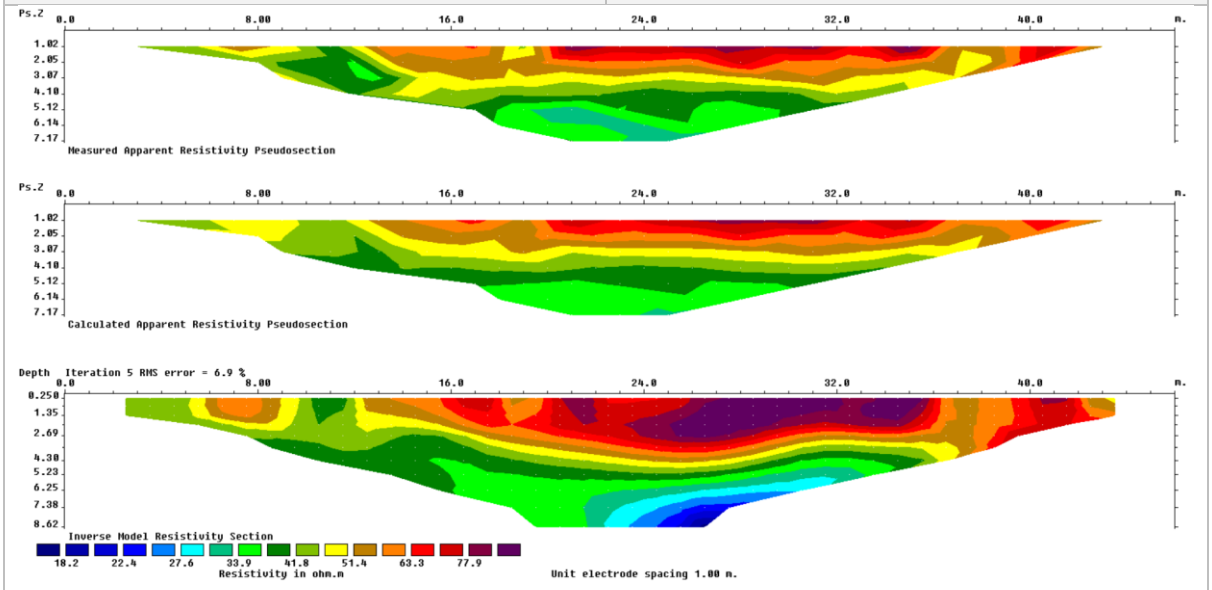
Analisi geoelettrica: misure di resistività nel sottosuolo (ELE)

Geol. Matteo Collareda – Sede fiscale: Via Lungo Giara n°29, 36033 Isola Vicentina –
Tel. 3490567455 – C.F.:CLLMTT76A02I531O – P. IVA:03267380248 – mail: info@studiosisma.com – web: studiosisma.com

Misura elettrica ERT n°1 (L41) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958986	Latitudine: 4958971
Longitudine: 146680	Longitudine: 146724



Misura elettrica ERT n°2 (L42) – Comune di Cavriago (RE)	
Coordinate in WGS 84 – 33N	
Inizio Linea	**Fine Linea**
Latitudine: 4958800	Latitudine: 4958788
Longitudine: 145330	Longitudine: 145285



Prove penetrometriche

Prove penetrometriche statiche

FERRARA DEPARTMENT
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COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Adriano Olivetti - Loc. Corte Tegge - Cavriago (RE)**

PROVA: **CPT 1** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191060/19 del 30/12/19**

PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s
0.20											
0.40	2.17	91.50	11.86								
0.60	1.78	183.01	5.44								
0.80	2.56	326.80	28.01								
1.00	1.40	91.50	11.90								
1.20	2.77	117.65	19.28								
1.40	3.75	143.79	16.89								
1.60	4.15	222.22	35.23								
1.80	5.13	117.65	43.57								
2.00	3.77	313.73	14.41								
2.20	3.96	261.44	12.63								
2.40	4.16	313.73	16.74								
2.60	4.35	248.37	12.34								
2.80	4.16	352.94	15.91								
3.00	6.72	261.44	16.59								
3.20	6.33	405.23	13.83								
3.40	6.33	457.52	13.09								
3.60	56.33	483.66	116.46								

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

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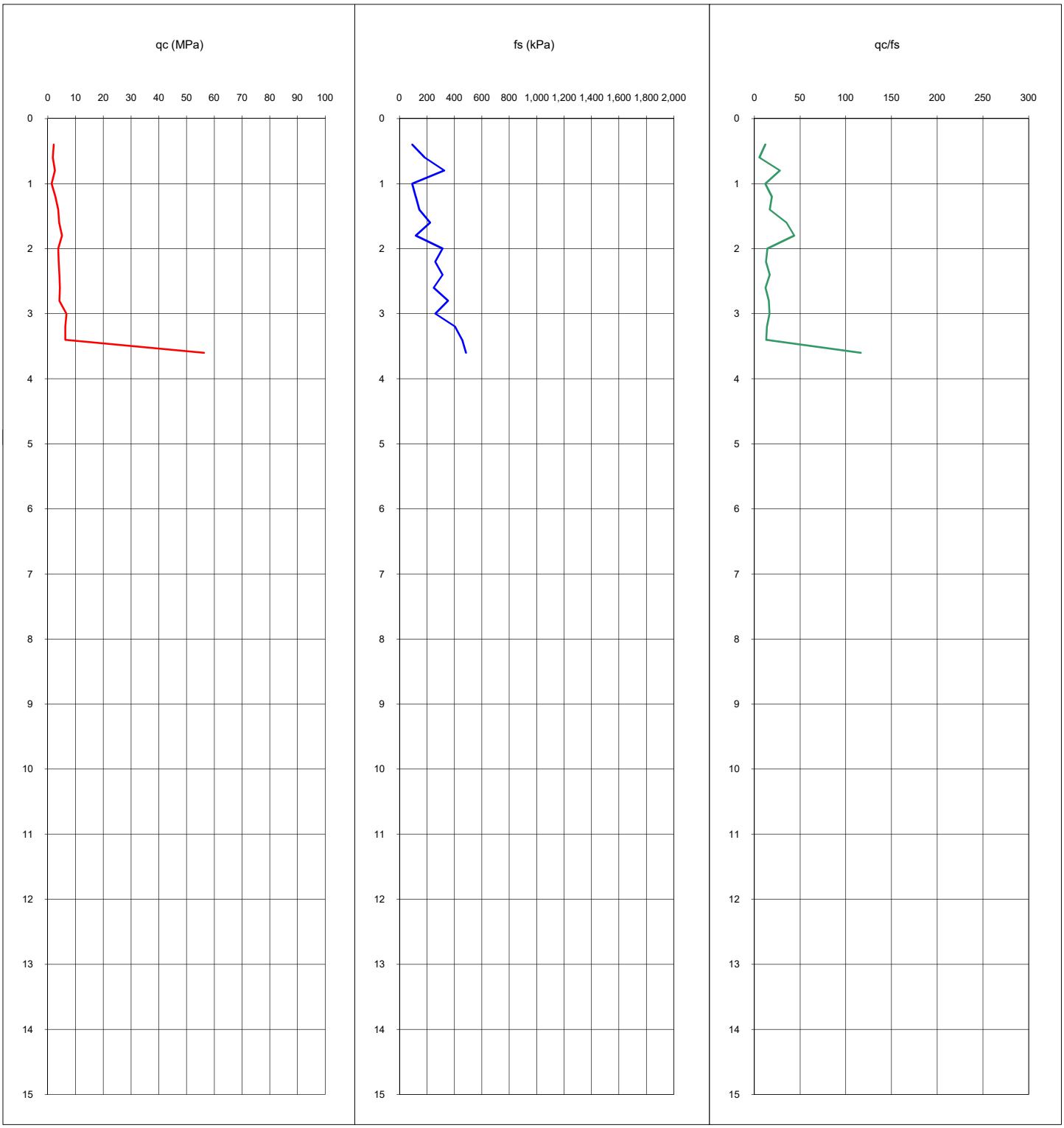
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Adriano Olivetti - Loc. Corte Tegge - Cavriago (RE)**

PROVA: **CPT 1** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191060/19 del 30/12/19**



Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

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COMMITTENTE:	**ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**					
CANTIERE:	**Via Adriano Olivetti - Loc. Corte Tegge - Cavriago (RE)**					
PROVA:	**CPT 1**	del	**18-12-19**	FALDA:	**n.r.**	**m da p.c.**
COMMESSA:	**20844FE/19**	C. SITO N°:	**SF191060/19 del 30/12/19**			

PLANIMETRIA

Località: Strada Provinciale N° 67 - Montecchio Emilia (RE)

LAT. (WGS 84):	44.717300°
LONG. (WGS 84):	10.550571°

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
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COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Novella - Loc. Corte Tegge - Cavriago (RE)**

PROVA: **CPT 2** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191061/19 del 30/12/19**

PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s
0.20											
0.40	3.35	274.51	13.48								
0.60	4.33	248.37	16.55								
0.80	4.13	261.44	15.05								
1.00	1.79	274.51	8.57								
1.20	2.97	209.15	13.36								
1.40	3.36	222.22	12.24								
1.60	3.75	274.51	9.26								
1.80	4.34	405.23	10.71								
2.00	5.53	392.16	10.08								
2.20	3.57	549.02	7.19								
2.40	9.45	496.73	17.22								
2.60	7.88	549.02	17.74								
2.80	6.90	444.44	15.09								
3.00	6.92	457.52	12.91								
3.20	9.47	535.95	22.63								
3.40	27.70	418.30	13.41								
3.60	75.94	2065.36	36.77								

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

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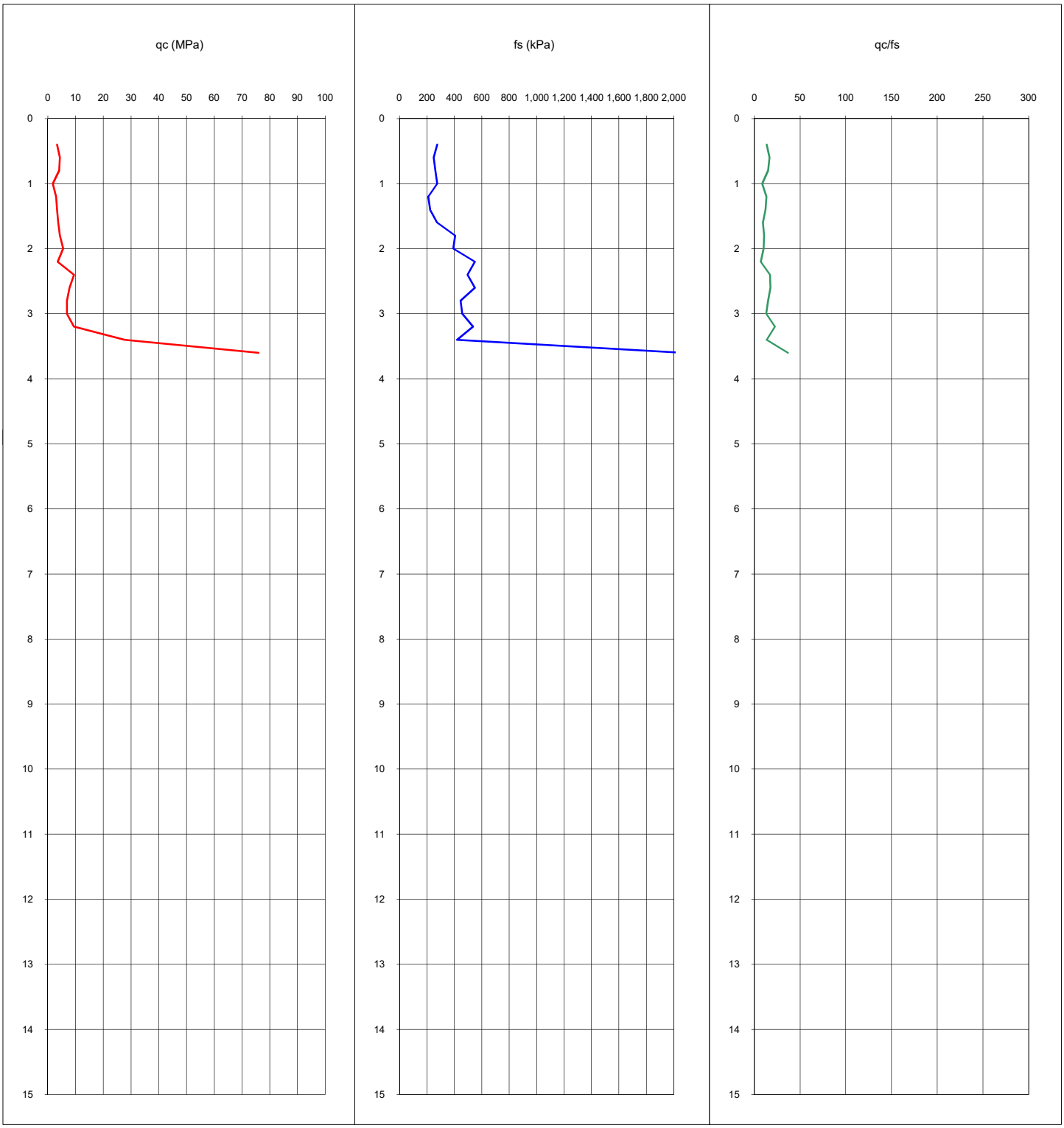
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Novella - Loc. Corte Tegge - Cavriago (RE)**

PROVA: **CPT 2** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191061/19 del 30/12/19**



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CANTIERE:	**Via Novella - Loc. Corte Tegge - Cavriago (RE)**					
PROVA:	**CPT 2**	del	**18-12-19**	FALDA:	**n.r.**	**m da p.c.**
COMMESSA:	**20844FE/19**	C. SITO N°:	**SF191061/19 del 30/12/19**			

PLANIMETRIA

Località: Strada Provinciale N° 67 - Montecchio Emilia (RE)

LAT. (WGS 84):	44.710066°
LONG. (WGS 84):	10.549305°

Il Direttore Tecnico SOA OS 20B:
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COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Guardanavona - Cavriago (RE)**

PROVA: **CPT 3** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191062/19 del 30/12/19**

PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s
0.20											
0.40	2.76	248.37	11.11								
0.60	2.56	248.37	8.52								
0.80	2.95	300.65	10.76								
1.00	4.73	274.51	12.49								
1.20	5.91	379.08	18.84								
1.40	8.46	313.73	19.03								
1.60	6.11	444.44	16.11								
1.80	5.91	379.08	15.59								
2.00	12.98	261.44	19.47								
2.20	26.12	666.67	10.63								
2.40	50.63	2457.52	32.82								
2.60	65.92	1542.48	42.74								

Il Direttore Tecnico SOA OS 20B:
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Il Direttore del settore Prove in Situ:
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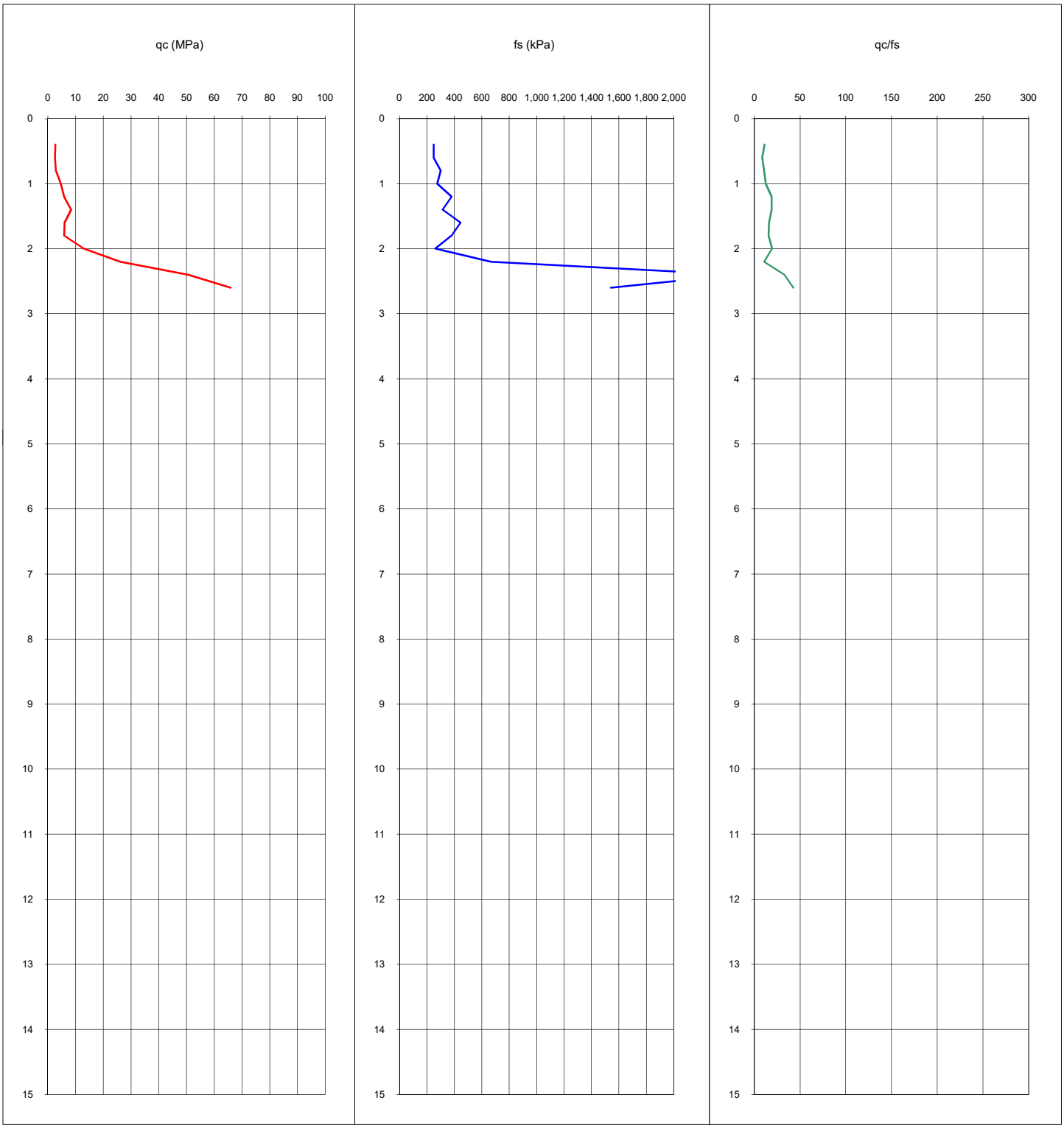
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Guardanavona - Cavriago (RE)**

PROVA: **CPT 3** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191062/19 del 30/12/19**



Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

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COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Guardanavona - Cavriago (RE)**

PROVA: **CPT 3** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191062/19 del 30/12/19**

PLANIMETRIA

Località: Via Guardanavona - Cavriago (RE)

LAT. (WGS 84): 44.703358°
LONG. (WGS 84): 10.528569°

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
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COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Fratelli Miselli - Cavriago (RE)**

PROVA: **CPT 4** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191063/19 del 30/12/19**

PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s
0.20											
0.40	2.76	287.58	15.08								
0.60	1.97	183.01	10.79								
0.80	10.80	183.01	31.77								
1.00	3.36	339.87	16.07								
1.20	2.58	209.15	16.43								
1.40	3.16	156.86	17.29								
1.60	4.73	183.01	15.09								
1.80	5.71	313.73	18.21								
2.00	9.26	287.58	28.33								
2.20	12.98	326.80	25.47								
2.40	8.28	509.80	15.44								
2.60	9.26	535.95	17.27								
1.20	7.30	509.80	16.42								
3.00	8.68	444.44	33.21								
3.20	6.92	261.44	13.57								
3.40	9.86	509.80	41.90								
3.60	8.68	235.29	36.90								
3.80	3.39	235.29	15.25								
4.00	3.40	222.22	5.42								
4.20	8.30	627.45	33.43								
4.40	4.77	248.37	22.83								
4.60	7.13	209.15	8.02								
4.80	8.70	888.89	31.68								
5.00	6.55	274.51	33.42								
5.20	6.75	196.08	30.37								
2.20	3.81	222.22	17.14								
5.60	2.44	222.22	15.53								
5.80	1.65	156.86	6.01								
6.00	4.80	274.51	26.24								
6.20	8.53	183.01	29.65								
6.40	8.72	287.58	66.74								
6.60	8.33	130.72	17.23								
6.80	8.33	483.66	17.23								
7.00	5.40	483.66	27.56								
7.20	4.42	196.08	5.37								
7.40	31.09	823.53	46.64								
7.60	18.15	666.67	22.39								
7.80	12.27	810.46	13.60								
8.00	9.93	901.96	7.91								
8.20	11.30	1254.90	10.81								
8.40	67.18	1045.75	61.92								
8.60	25.22	1084.97	10.49								
8.80	38.55	2405.23	15.52								
9.00	57.00	2483.66	26.27								
9.20	70.14	2169.93	32.32								

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

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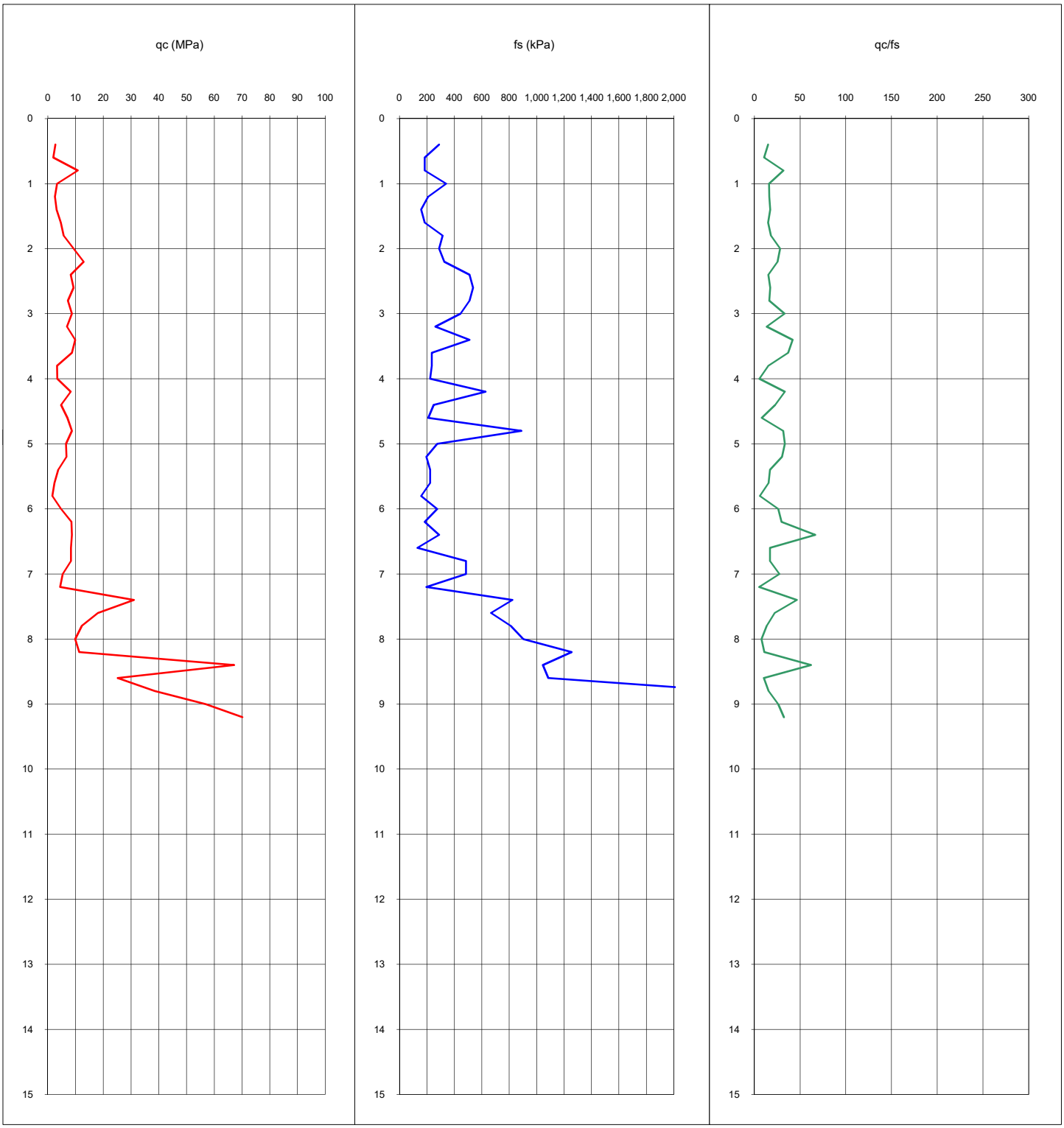
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Fratelli Miselli - Cavriago (RE)**

PROVA: **CPT 4** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191063/19 del 30/12/19**



Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

FERRARA DEPARTMENT
Via Annibale Zucchini, 69 – 44122 Ferrara (FE)
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COMMITTENTE:	**ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**					
CANTIERE:	**Via Fratelli Miselli - Cavriago (RE)**					
PROVA:	**CPT 4**	del	**18-12-19**	FALDA:	**n.r.**	**m da p.c.**
COMMESSA:	**20844FE/19**	C. SITO N°:	**SF191063/19 del 30/12/19**			

PLANIMETRIA

Località: Via Guardanavona - Cavriago (RE)

LAT. (WGS 84):	44.688303°
LONG. (WGS 84):	10.523276°

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
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FERRARA DEPARTMENT
Via Annibale Zucchini, 69 – 44122 Ferrara (FE)
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COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Dell'Indipendenza - Cavriago (RE)**

PROVA: **CPT 5** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191064/19 del 30/12/19**

PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s	PROFONDITA'	q_c (MPa)	f_s (kPa)	q_c/f_s
0.20											
0.40	5.50	196.08	21.05								
0.60	5.11	261.44	20.58								
0.80	2.37	248.37	9.05								
1.00	3.56	261.44	18.14								
1.20	4.73	196.08	19.06								
1.40	4.54	248.37	12.40								
1.60	4.15	366.01	9.91								
1.80	6.89	418.30	16.47								
2.00	12.00	352.94	30.61								
2.20	12.20	392.16	38.88								
2.40	10.83	313.73	23.00								
2.60	8.28	470.59	17.59								
1.20	9.06	836.60	12.60								
3.00	11.04	718.95	11.56								
3.20	8.09	954.25	23.82								
3.40	7.70	339.87	36.83								
3.60	5.35	209.15	25.58								
3.80	8.29	143.79	4.99								
4.00	12.42	1660.13	16.67								
4.20	15.36	745.10	20.62								
4.40	58.89	2287.58	25.74								

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

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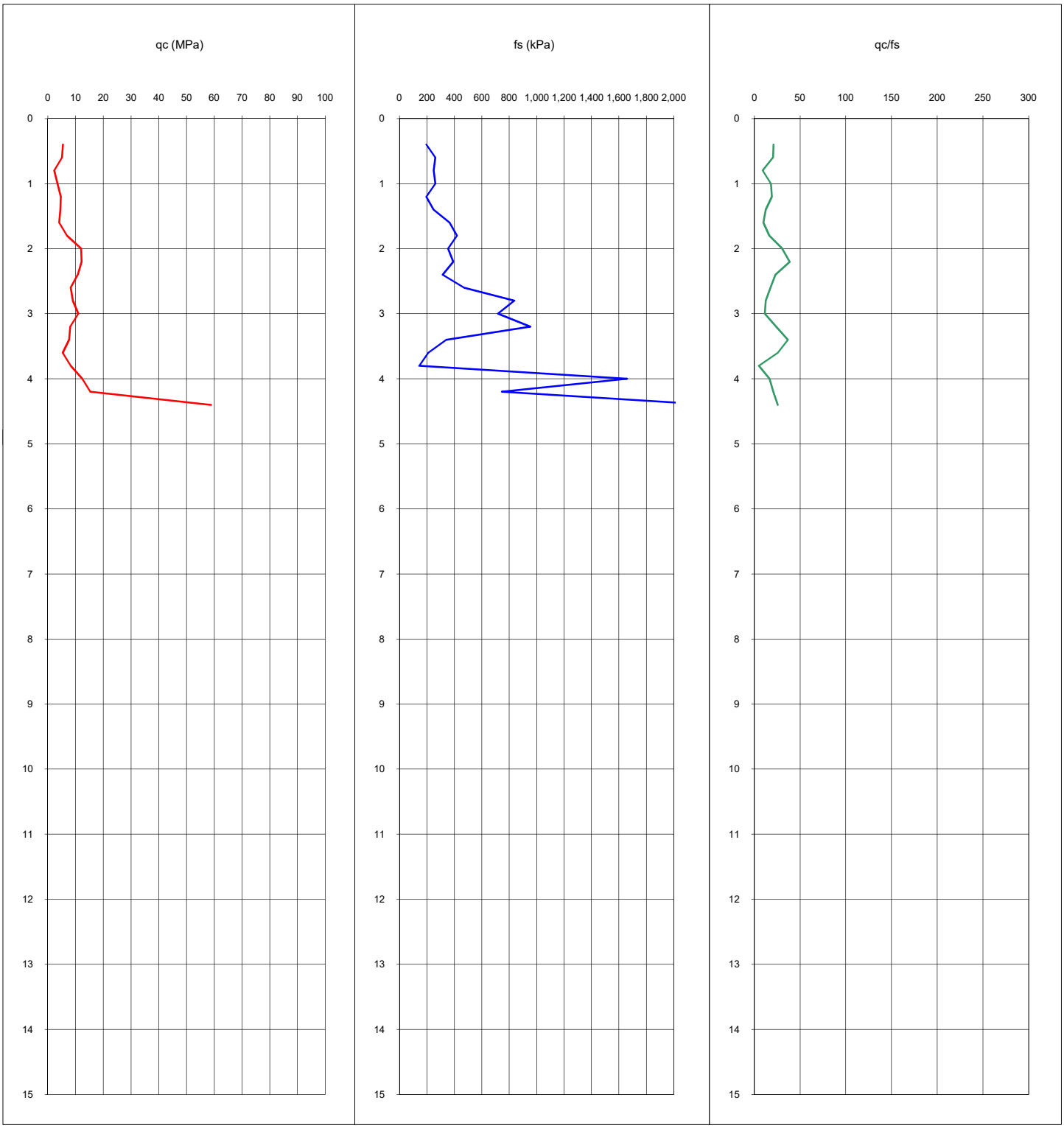
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: **Via Dell'Indipendenza - Cavriago (RE)**

PROVA: **CPT 5** del **18-12-19** FALDA: **n.r.** **m da p.c.**
COMMESSA: **20844FE/19** C. SITO N°: **SF191064/19 del 30/12/19**



Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

FERRARA DEPARTMENT
Via Annibale Zucchini, 69 – 44122 Ferrara (FE)
Tel.: +39 0532 56771 - Fax.: +39 0532 56119

SOCOTEC ITALIA Srl – P.Iva 01872430648
Headquarters: Via Bariola, 101-103 - 20020 Lainate (MI)
Tel.: +39 02 9375 0000 - Fax: +39 02 9375 0099
www.socotec.it

COMMITTENTE:	**ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**					
CANTIERE:	**Via Dell'Indipendenza - Cavriago (RE)**					
PROVA:	**CPT 5**	del	**18-12-19**	FALDA:	**n.r.**	**m da p.c.**
COMMESSA:	**20844FE/19**	C. SITO N°:	**SF191064/19 del 30/12/19**			

PLANIMETRIA

Località: Via Dell'Indipendenza - Cavriago (RE)

LAT. (WGS 84):	44.697092°
LONG. (WGS 84):	10.540661°

Il Direttore Tecnico SOA OS 20B:
ing. Massimo De Iasi

Il Direttore del settore Prove in Situ:
dott.geol. Massimo Romagnoli

Prove penetrometriche dinamiche

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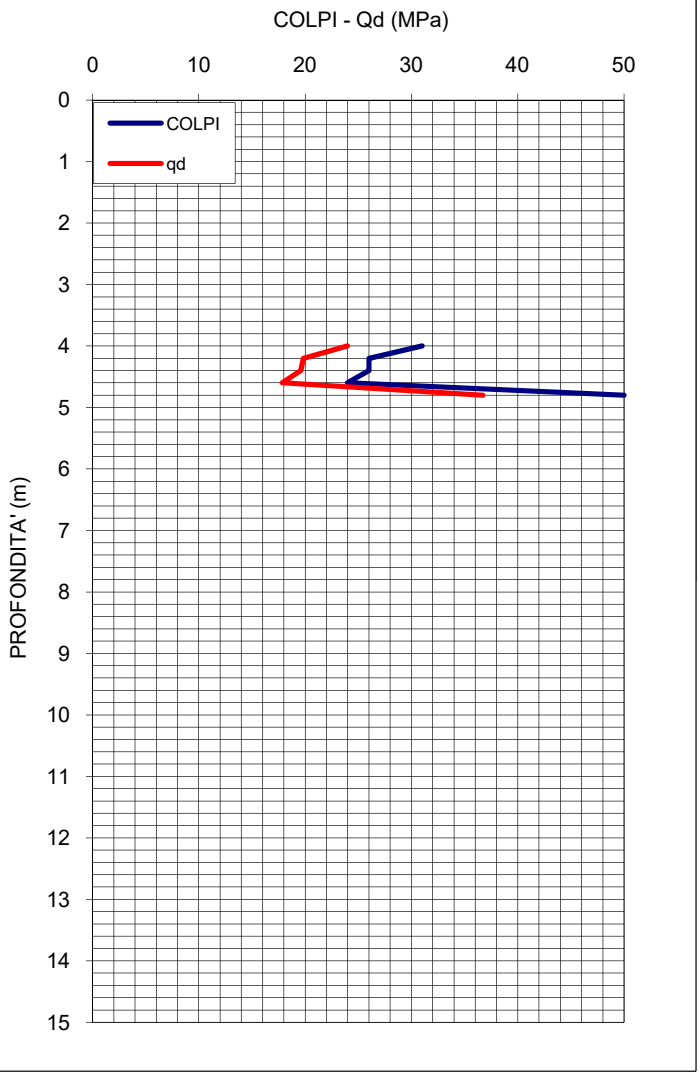
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: Via Adriano Olivetti - Loc. Corte Tegge - Cavriago (RE)
PROVA: DPSH1 DATA: 18-12-2019 FALDA: n.r.
COMMESSA: 20844FE/19 C. SITO N°: SF191072 Rev. 00 DEL: 30/12/19

PROFONDITA'	COLPI	q_d*	PROFONDITA'	COLPI	q_d*
0.20					
0.40					
0.60					
0.80					
1.00					
1.20					
1.40					
1.60					
1.80					
2.00					
2.20					
2.40					
2.60					
2.80					
3.00					
3.20					
3.40					
3.60					
3.80					
4.00	31	24.0			
4.20	26	19.8			
4.40	26	19.6			
4.60	24	17.9			
4.80	50	36.7			

CPT 1



CARATTERISTICHE PENETROMETRO

MARCA e MODELLO:	Pagani DPH		
MAGLIO:	63.5	kg	(M)
ALTEZZA CADUTA:	0.75	m	(H)
PESO TESTA:	0.5	kg	(M')
LUNGHEZZA ASTE:	1.0	m	
PESO ASTE:	6.35	kg	(M')
DIAMETRO ASTE:	32	mm	
DIAMETRO PUNTA:	50.5	mm	(A)
ANGOLO PUNTA:	60	°	

* q_d = (M/(M+M') * MgH/Ae) = MPa

Il Responsabile Prove in Sito:
dott. Massimo Romagnoli

Il Direttore Tecnico SOA:
ing. Massimo de Iasi

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COMMITTENTE:	**ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**						
CANTIERE:	Via Adriano Olivetti - Loc. Corte Tegge - Cavriago (RE)						
PROVA:	DPSH1	DATA:	18-12-2019		FALDA:	n.r.	
COMMESSA:	20844FE/19	C. SITO N°:	SF191072	Rev. 00	DEL:	30/12/19	

LAT. (WGS 84): 44.717300°
LONG. (WGS 84): 10.550571°

UBICAZIONE

Il Responsabile Prove in Sito:
dott. Massimo Romagnoli

Il Direttore Tecnico SOA:
ing. Massimo De Iasi

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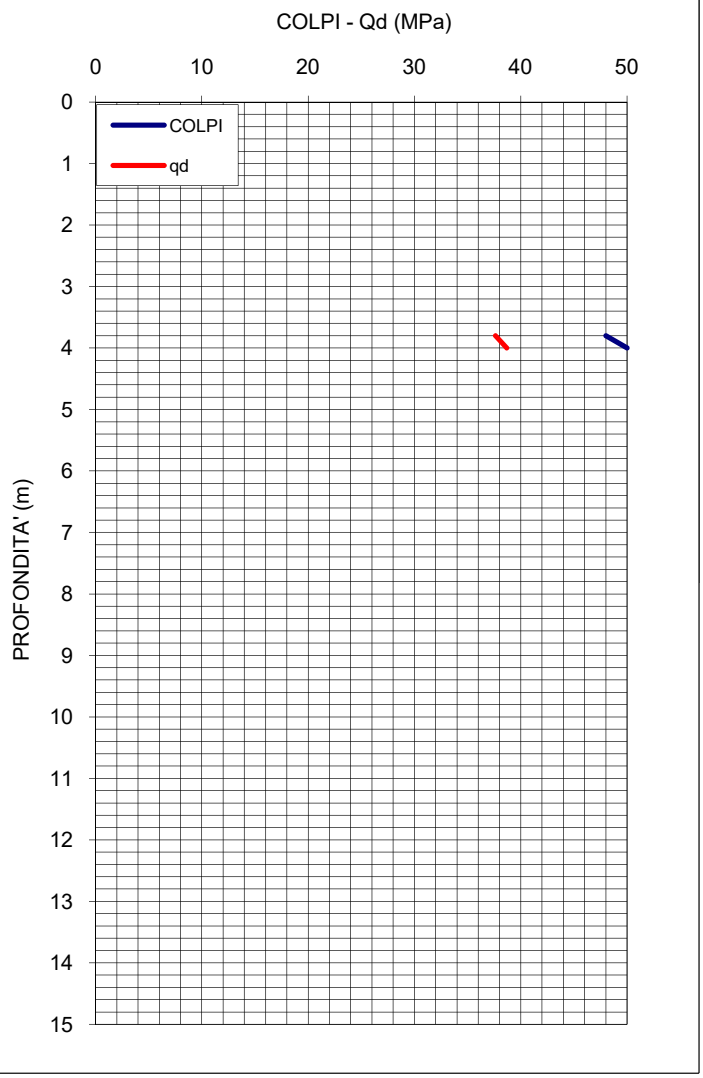
COMMITTENTE: **ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**
CANTIERE: Via Novella - Loc. Corte Tegge - Cavriago (RE)
PROVA: DPSH 2 DATA: 18-12-2019 FALDA: n.r.
COMMESSA: 20844FE/19 C. SITO N°: SF191073 Rev. 00 DEL: 30/12/19

PROFONDITA'	COLPI	q_d*	PROFONDITA'	COLPI	q_d*
0.20					
0.40					
0.60					
0.80					
1.00					
1.20					
1.40					
1.60					
1.80					
2.00					
2.20					
2.40					
2.60					
2.80					
3.00					
3.20					
3.40					
3.60					
3.80	48	37.6			
4.00	50	38.7			

CPT 2



CARATTERISTICHE PENETROMETRO

MARCA e MODELLO:	Pagani DPH		
MAGLIO:	63.5	kg	(M)
ALTEZZA CADUTA:	0.75	m	(H)
PESO TESTA:	0.5	kg	(M')
LUNGHEZZA ASTE:	1.0	m	
PESO ASTE:	6.35	kg	(M')
DIAMETRO ASTE:	32	mm	
DIAMETRO PUNTA:	50.5	mm	(A)
ANGOLO PUNTA:	60	°	

* q_d = (M/(M+M') * MgH/Ae) = MPa

Il Responsabile Prove in Sito:
dott. Massimo Romagnoli

Il Direttore Tecnico SOA:
ing. Massimo de Iasi

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COMMITTENTE:	**ENGEO S.r.l. - Via Suor Maria Adorni, 2 - 43121 Parma**					
CANTIERE:	Via Novella - Loc. Corte Tegge - Cavriago (RE)					
PROVA:	DPSH 2	DATA:	18-12-2019		FALDA:	n.r.
COMMESSA:	20844FE/19	C. SITO N°:	SF191073	Rev. 00	DEL:	30/12/19

LAT. (WGS 84): 44.710066°
LONG. (WGS 84): 10.549305°

UBICAZIONE

Il Responsabile Prove in Sito:
dott. Massimo Romagnoli

Il Direttore Tecnico SOA:
ing. Massimo De Iasi