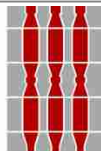




PROTEZIONE CIVILE
 Presidenza del Consiglio dei Ministri
 Dipartimento della Protezione Civile



Regione Umbria



CONFERENZA DELLE REGIONI E
 DELLE PROVINCE AUTONOME

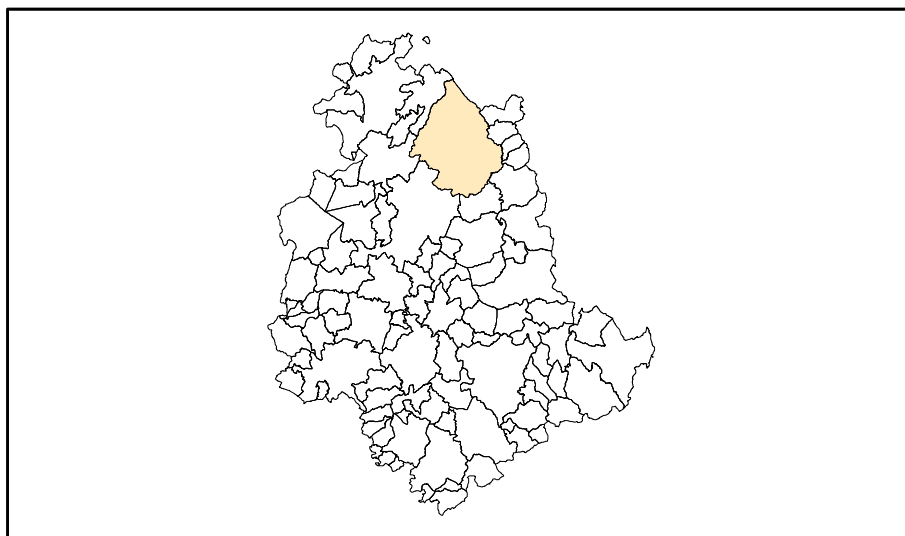
Attuazione dell'articolo 11 dalla legge 24 giugno 2009, n. 77

MICROZONAZIONE SISMICA

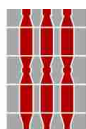
Indagini di nuova esecuzione

Regione Umbria

Comune di Gubbio



Regione



Regione Umbria

Soggetto realizzatore



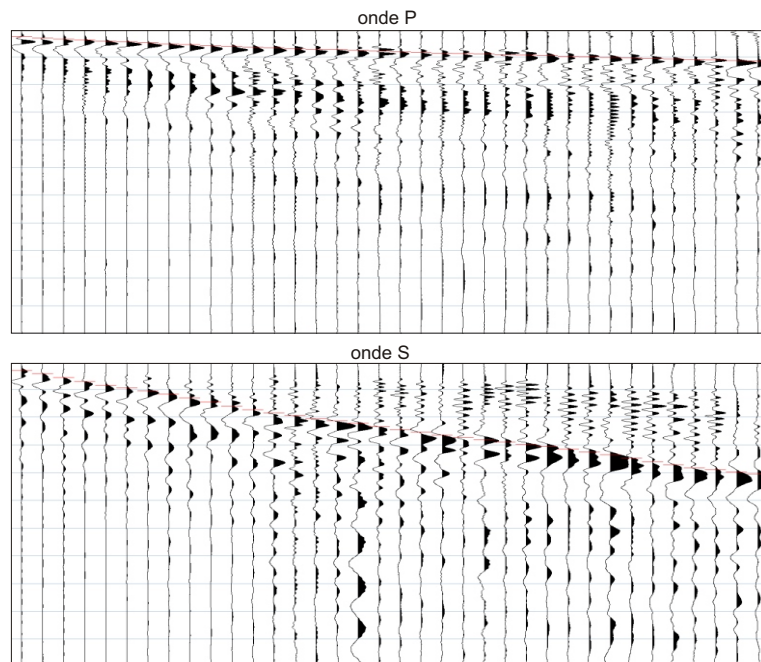
G.A.T.
 Geologia Ambiente Territorio

Studio associato G.A.T.
 Dott. Geol. Bistocchi Riccardo Maria
 Dott. Geol. Bellaveglia Stefano

Data

Gennaio 2019

SISMOGRAMMI



Codice Certificato di prova: szz-azt_DH_01

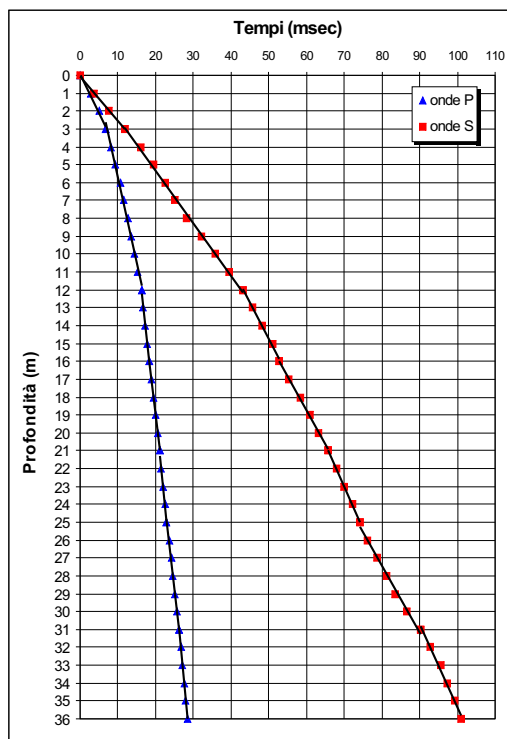
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018
Località: Gubbio, scuola Aldo Moro - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

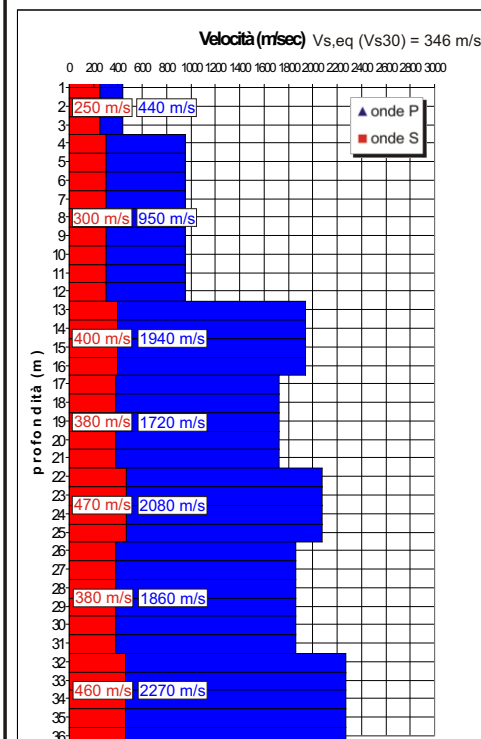
Profilo	DH_01
Tipo geofoni	triassiali
Frequenza geofoni	10.0 Hz
N° geofoni	3
N° scoppi	1 verticale e 2 orizzontali
Profondità foro	36.0 m
Passo di lettura	1.0 m
Durata acquisizione	0.512 s
Tempo di campionamento	125 µs



DROMOCRONE



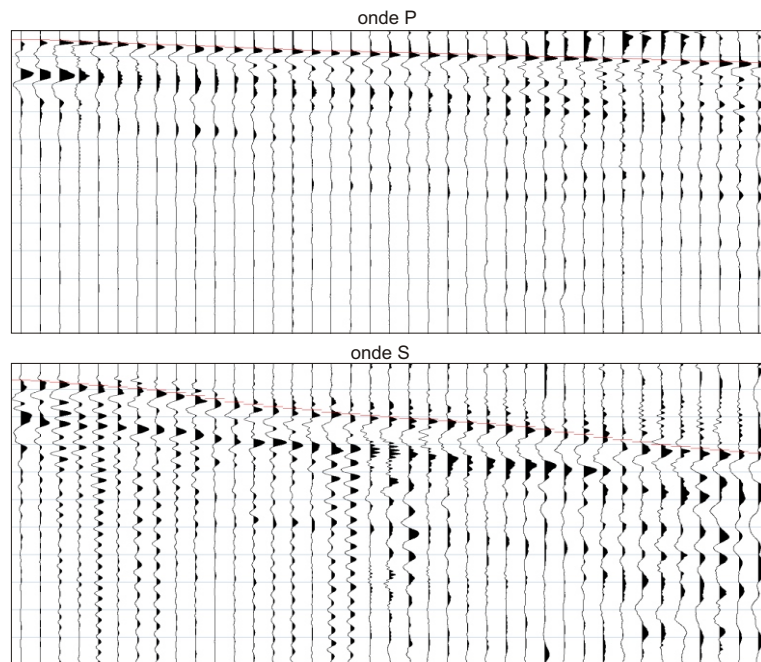
SEZIONE DI VELOCITA'



TEMPI DI ARRIVO

mdal.p.c.	ONEP		ONESH		mdal.p.c.	ONEP		ONESH	
	tempi obliqui (ms)	tempi verticali (ms)	tempi obliqui (ms)	tempi verticali (ms)		tempi obliqui (ms)	tempi verticali (ms)	tempi obliqui (ms)	tempi verticali (ms)
0	0,00	0,00	0,00	0,00	19	20,20	20,09	61,2	60,85
1	6,00	2,68	8	3,98	20	20,80	20,70	63,5	63,18
2	7,00	4,95	10,9	7,71	21	21,30	21,20	65	65,70
3	8,10	6,74	14,4	11,98	22	21,50	21,41	68,2	67,82
4	9,00	8,05	17,9	16,01	23	22,00	21,92	70,2	69,94
5	10,00	9,28	21,1	19,59	24	22,70	22,62	72,5	72,25
6	11,40	10,81	23,8	22,58	25	23,00	22,93	74,5	74,26
7	12,10	11,63	26	25,00	26	23,70	23,63	76,4	76,17
8	13,10	12,71	29,2	28,33	27	24,20	24,13	79	78,78
9	13,90	13,57	32,8	32,02	28	24,70	24,64	81,4	81,19
10	14,70	14,41	36,4	35,69	29	25,20	25,14	83,7	83,50
11	15,40	15,15	40	39,35	30	25,70	25,64	85,8	85,61
12	16,60	16,37	43,7	43,11	31	26,30	26,25	90,5	90,31
13	16,90	16,70	46,1	45,55	32	26,80	26,75	92,9	92,72
14	17,40	17,23	48,6	48,11	33	27,20	27,15	95,8	95,62
15	18,00	17,84	51,4	50,95	34	27,60	27,55	97,5	97,33
16	18,50	18,36	53,2	52,79	35	28,10	28,05	99,4	99,24
17	19,00	18,87	55,6	55,22	36	28,50	28,46	101,2	101,04
18	19,60	19,48	58,8	58,44					

SISMOGRAMMI



Codice Certificato di prova: szz-azt_DH_02

Committente: Comune di Gubbio - Data Esecuzione: 26/06/2018
Località: Gubbio, scuola Madonna del Ponte - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

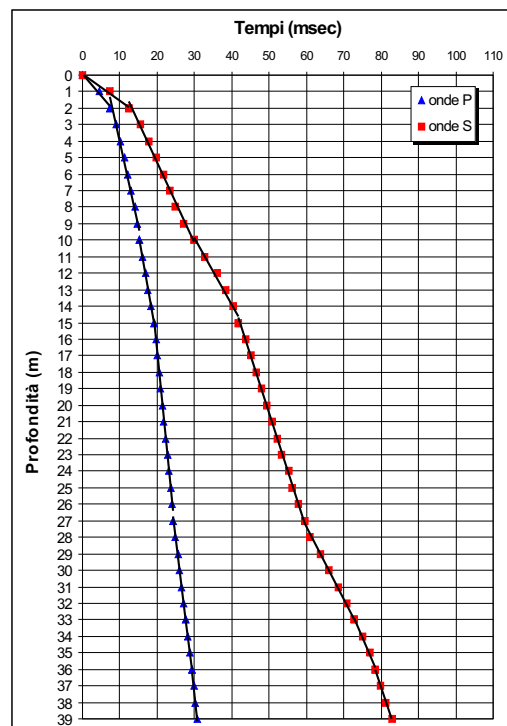
Profilo	DH_02
Tipo geofoni	triassiali
Frequenza geofoni	10.0 Hz
N° geofoni	3
N° scoppi	1 verticale e 2 orizzontali
Profondità foro	39.0 m
Passo di lettura	1.0 m
Durata acquisizione	0.512 s
Tempo di campionamento	125 µs



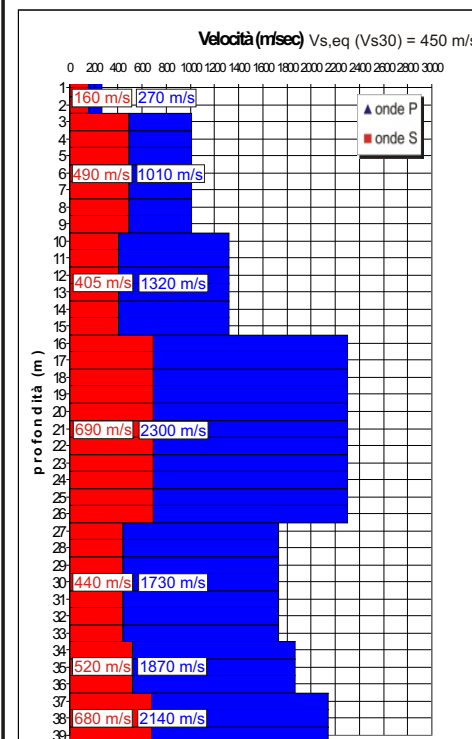
TEMPI DI ARRIVO

m dal pc.	ONDE P		ONDESH		m dal pc.	ONDE P		ONDESH	
	tempi obliqui (ms)	tempi verticali (ms)	tempi obliqui (ms)	tempi verticali (ms)		tempi obliqui (ms)	tempi verticali (ms)	tempi obliqui (ms)	tempi verticali (ms)
0	0,00	0,00	0,00	0,00	20	21,5	21,39	49,5	49,25
1	10,2	4,56	16,4	7,33	21	21,9	21,80	51,1	50,87
2	10,3	7,28	17,4	12,30	22	22,3	22,21	52,3	52,09
3	11	9,15	18,8	15,64	23	22,8	22,71	53,6	53,40
4	11,4	10,20	20	17,89	24	23,2	23,12	54,4	54,21
5	12,1	11,23	21,3	19,78	25	23,8	23,72	56,4	56,22
6	12,9	12,24	22,9	21,72	26	24,1	24,03	58	57,83
7	13,5	12,98	24,3	23,37	27	24,2	24,13	59,8	59,04
8	14,4	13,97	25,7	24,93	28	25	24,94	61,2	61,04
9	15,1	14,74	27,6	26,94	29	25,6	25,54	63,9	63,75
10	15,6	15,30	30,4	29,81	30	26,1	26,04	66,1	65,56
11	16,3	16,04	33,2	32,66	31	26,5	26,54	68,6	68,66
12	17,1	16,97	35,5	36,00	32	27,1	27,05	70,8	70,66
13	17,8	17,59	37,7	38,25	33	27,8	27,75	72,9	72,77
14	18,4	18,22	40,8	40,39	34	28,3	28,25	75,1	74,97
15	19,3	19,13	42	41,63	35	28,8	28,75	77	76,87
16	19,8	19,65	44	43,66	36	29,4	29,35	78,6	78,48
17	20,3	20,16	45,5	45,19	37	29,8	29,76	80	79,88
18	20,6	20,47	46,8	46,51	38	30,1	30,06	81,4	81,29
19	21	20,88	48,2	47,94	39	30,8	30,76	83	82,69

DROMOCRONE



SEZIONE DI VELOCITA'

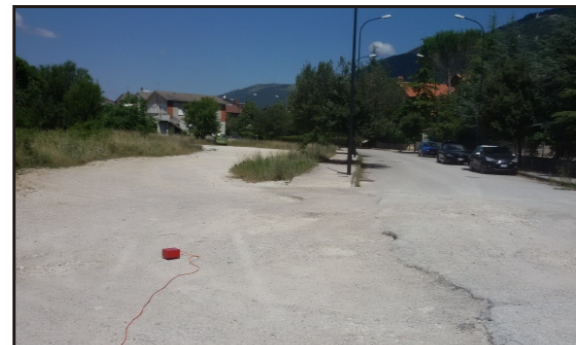


Codice Certificato di prova: szz-azt_HV_01

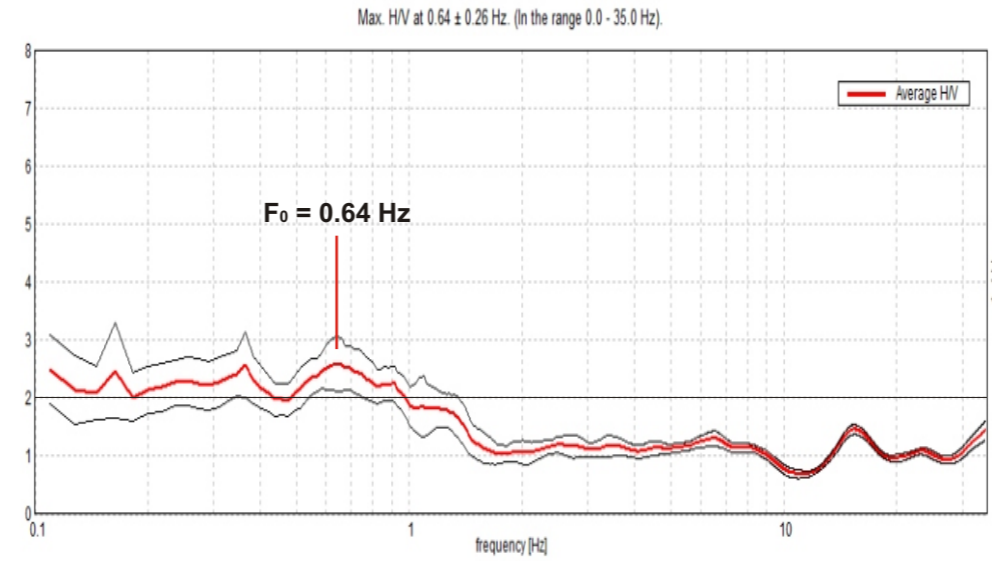
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

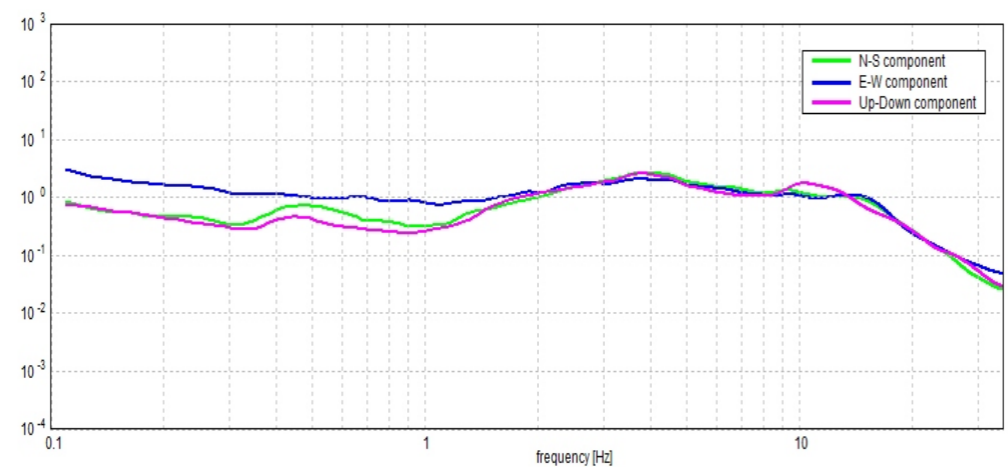
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via Benedetto Croce - Gubbio (PG)	ORA: 11:39:01 - 12:19:01
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43.341540°	LONGITUDINE: 12.592616°	ALTITUDINE: 489 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 1	SENSORI n. 3	
NOME DEL FILE: HV_01 Gubbio	PUNTO: HV_01	
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input type="checkbox"/> assente <input type="checkbox"/> debole <5 m/s <input checked="" type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 27	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input checked="" type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input type="checkbox"/> erba <input type="checkbox"/> (Cassa d'aria)	
	<input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____	
TRANSIENTI	nessuno <input type="checkbox"/> pochi <input checked="" type="checkbox"/> medi <input type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione / distanza (mt.)
auto	<input checked="" type="checkbox"/>	50
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	10
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)		<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.) Descrizione, altezza e distanza: Raccordo stradale a circa 50 m		
OSSERVAZIONI: Vento moderato e costante	CLASSE DI QUALITÀ: B2	



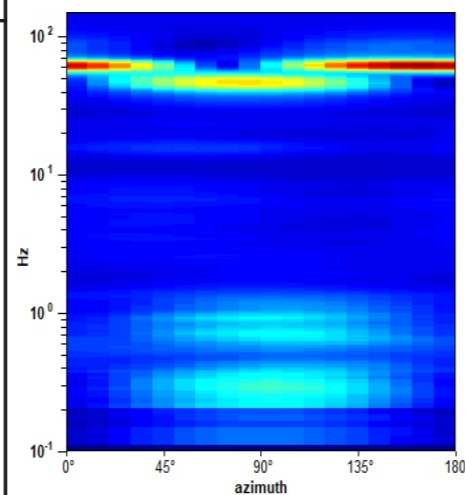
CURVA H/V SPERIMENTALE



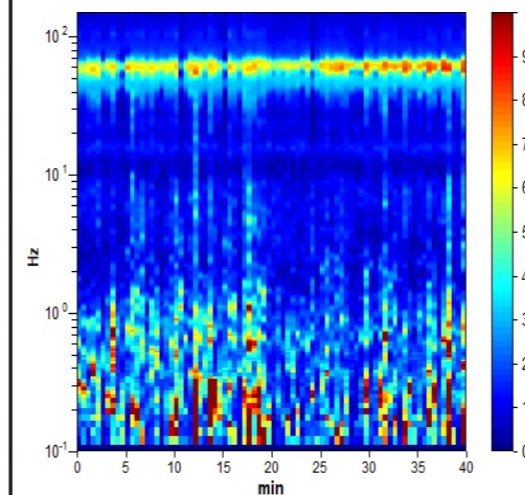
COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ



SISMOGRAMMI

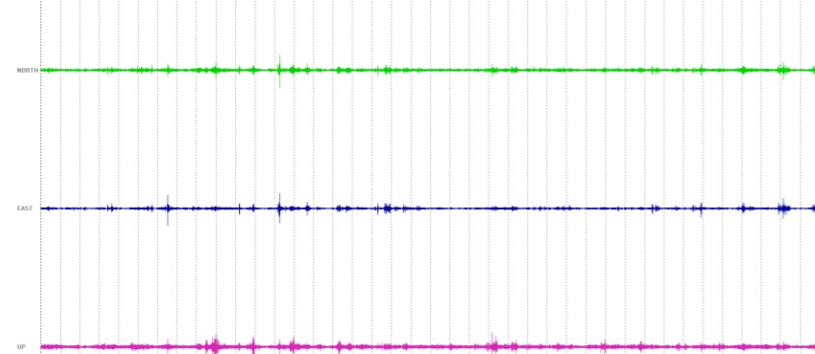


TABELLA RIASSUNTIVA

SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.64 +/- 0.26 Hz
Ampiezza	2.59

CRITERI SESAME

Max. H/V at 0.64 ± 0.26 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.64 > 0.33	OK	
$n_c(f_0) > 200$	576.8 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 54 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$		OK	NO
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	1.483 Hz	OK	
$A_0 > 2$	2.59 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.40453 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	0.25925 < 0.09613		NO
$\sigma_A(f_0) < \theta(f_0)$	0.4786 < 2.0	OK	

- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_02

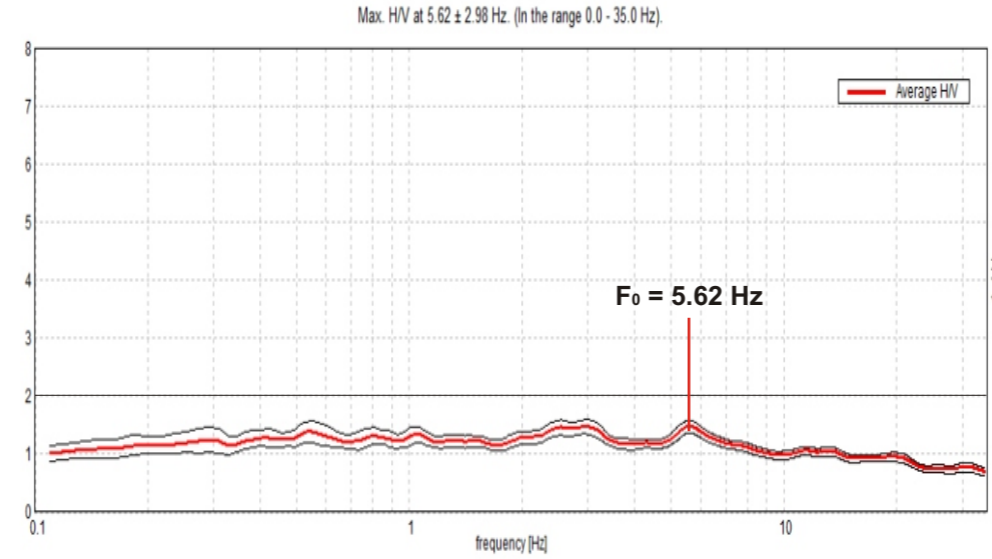
Committente: Comune di Gubbio - Data Esecuzione: 20/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

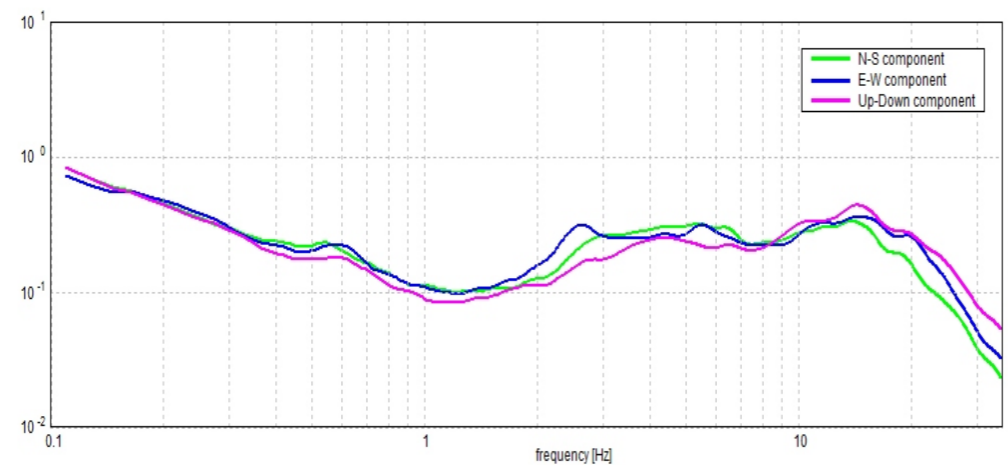
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via di Porta Romana - Gubbio (PG)	ORA: 00:29:06 - 00:59:26
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43.346524°	LONGITUDINE: 12.588063°	ALTITUDINE: 491 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 2	SENSORI n. 3	
NOME DEL FILE: HV_02 Gubbio		PUNTO: HV_02
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 1800
CONDIZIONI METEO	VENTO <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 18	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input type="checkbox"/> erba <input type="checkbox"/> (Cassa) <input type="checkbox"/> (sta)	
	<input checked="" type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo_Moderati	
TRANSIENTI	nessuno <input type="checkbox"/> pochi <input checked="" type="checkbox"/> medi <input type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione /distanza (mt.)
auto	<input checked="" type="checkbox"/>	10
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)		<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.) Descrizione, altezza e distanza: Distributore benzina		
OSSERVAZIONI:	CLASSE DI QUALITÀ: B1	



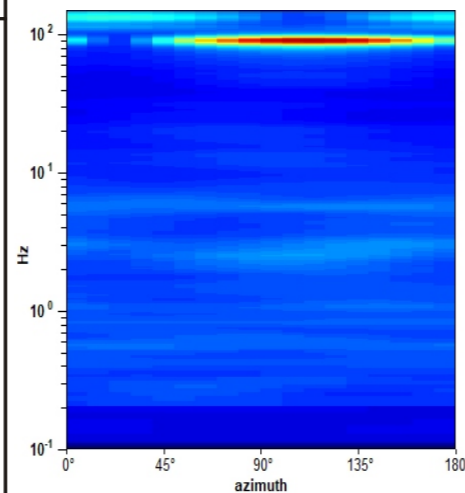
CURVA H/V SPERIMENTALE



COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ

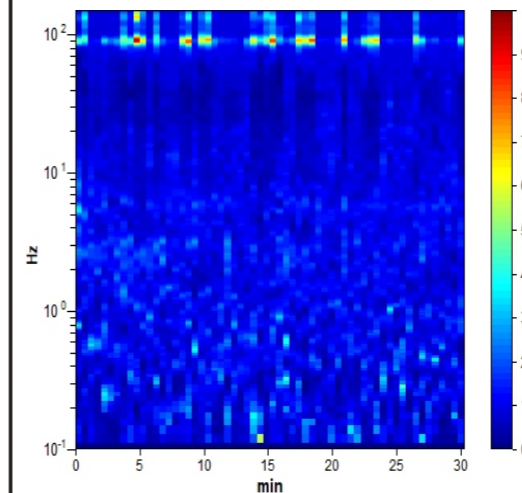


TABELLA RIASSUNTIVA

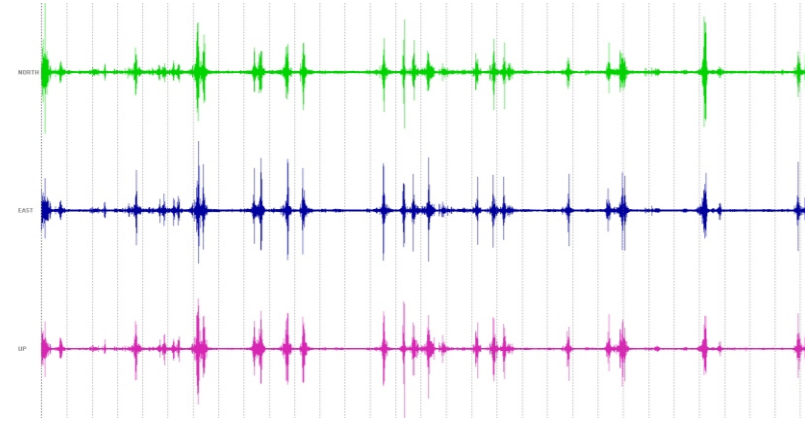
SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	5.62 +/- 2.98 Hz
Ampiezza	1.47

CRITERI SESAME

Max. H/V at 5.62 ± 2.98 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	5.62 > 0.33	OK	
$n_c(f_0) > 200$	9106.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 462 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
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
$A_0 > 2$	1.47 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.52944 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	2.97618 < 0.28107		NO
$\sigma_A(f_0) < \theta(f_0)$	0.11 < 1.58	OK	

SISMOGRAMMI



- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_03

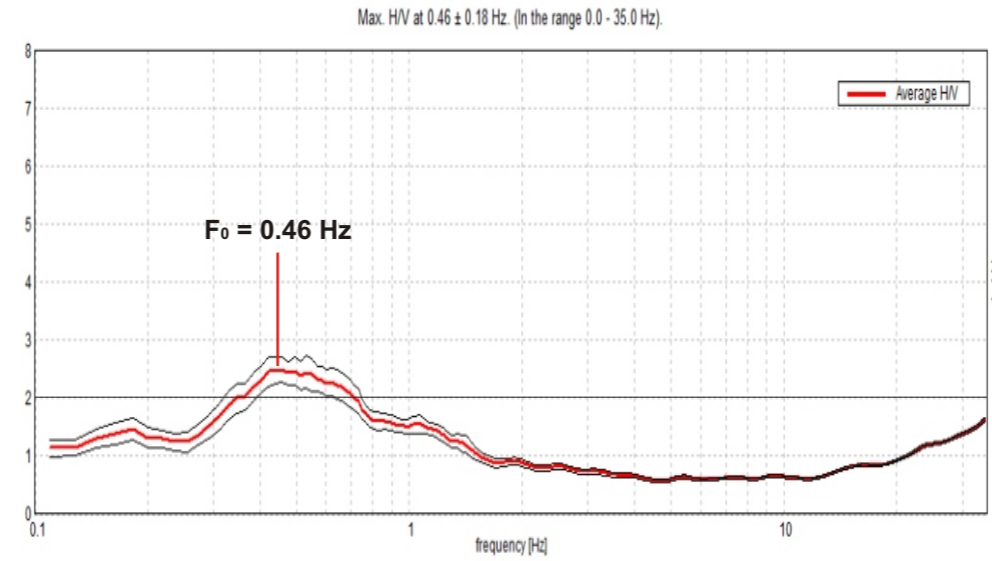
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

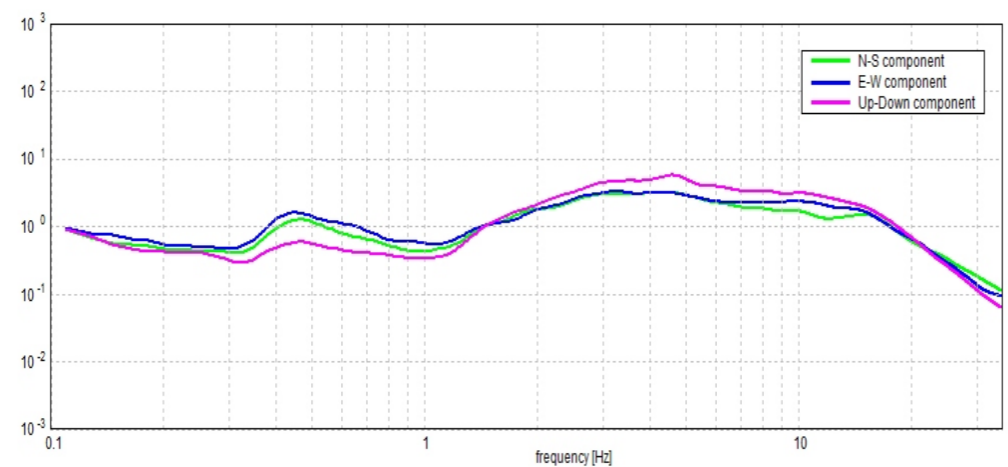
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via Frate Lupo - Gubbio (PG)	ORA: 10:39:04 - 11:19:04
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43.343487°	LONGITUDINE: 12.580312°	ALTITUDINE: 473 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 3	SENSORI n. 3	
NOME DEL FILE: HV_03 Gubbio	PUNTO: HV_03	
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input type="checkbox"/> assente <input checked="" type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 27	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input checked="" type="checkbox"/> erba = (<input type="checkbox"/> bassa <input type="checkbox"/> alta)	
	<input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
PRESENZA EDIFICI	<input checked="" type="checkbox"/> nessuno <input type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____	
TRANSIENTI	nessuno <input type="checkbox"/> pochi <input type="checkbox"/> medi <input type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione / distanza (mt.)
auto	<input type="checkbox"/>	<input checked="" type="checkbox"/> 40
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	10
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)		<input type="checkbox"/> no <input checked="" type="checkbox"/> si, tipo Tagliaerba a circa 100 m
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.)		Descrizione, altezza e distanza: Alberi sparsi
OSSERVAZIONI:		CLASSE DI QUALITÀ: B1



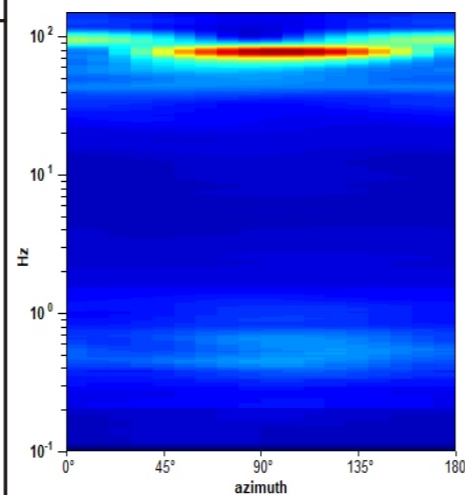
CURVA H/V SPERIMENTALE



COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ

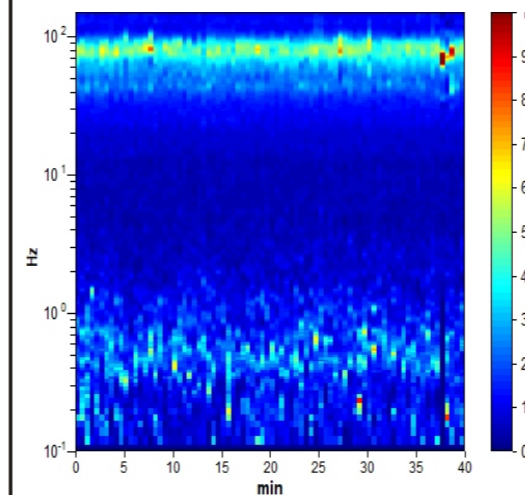


TABELLA RIASSUNTIVA

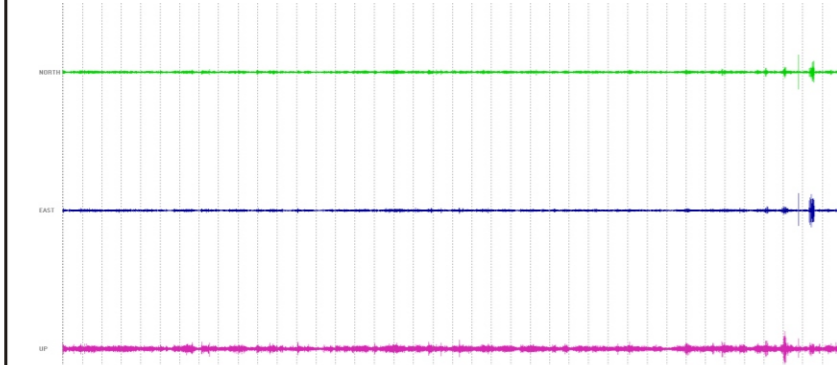
SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.46 +/- 0.18 Hz
Ampiezza	2.50

CRITERI SESAME

Max. H/V at 0.46 ± 0.18 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.46 > 0.33	OK	
$n_c(f_0) > 200$	906.4 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 38 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$	0.256 Hz	OK	
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	1.355 Hz	OK	
$A_0 > 2$	2.50 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.40106 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	$0.18359 < 0.09155$		NO
$\sigma_A(f_0) < \theta(f_0)$	$0.211 < 2.5$	OK	

SISMOGRAMMI



- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_04

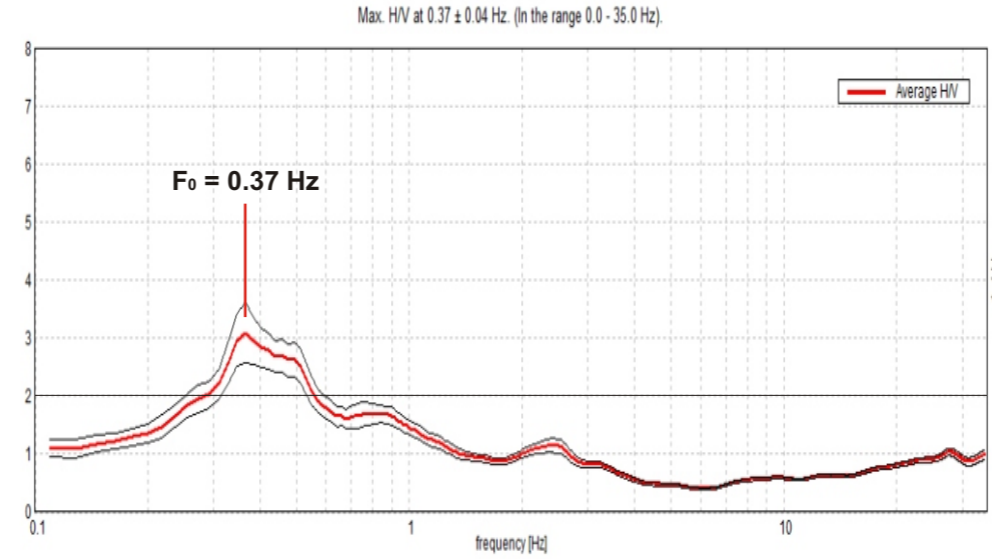
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

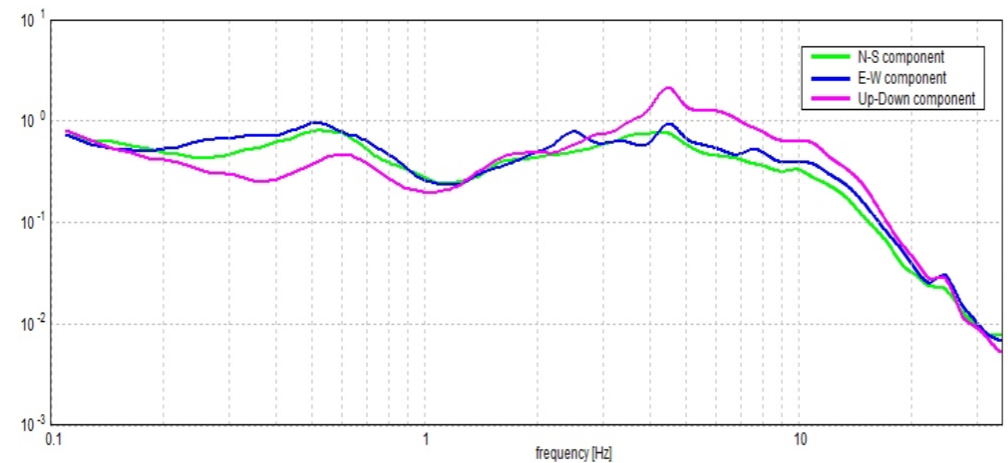
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via Madonna dei Perugini - Gubbio (PG)	ORA: 23.36.43 - 00:16.43
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43.338141°	LONGITUDINE: 12.571626°	ALTITUDINE: 454 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 4	SENSORI n. 3	
NOME DEL FILE: HV_04 Gubbio		PUNTO: HV_04
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 20	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input type="checkbox"/> erba <input type="checkbox"/> (Cassa) <input type="checkbox"/> (sta)	
	<input checked="" type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> sì, tipo _____	
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____	
TRANSIENTI	SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.) <input checked="" type="checkbox"/> no <input type="checkbox"/> sì, tipo _____	
auto <input checked="" type="checkbox"/>	STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.) Descrizione, altezza e distanza: Alberi sparsi	
camion <input checked="" type="checkbox"/>		
pedoni <input checked="" type="checkbox"/>		
altro <input checked="" type="checkbox"/>		
OSSERVAZIONI:	CLASSE DI QUALITÀ: B1	



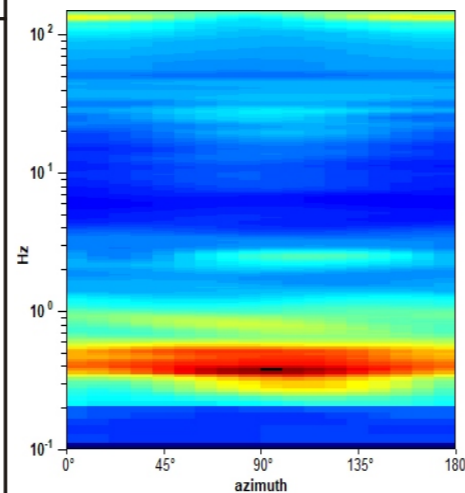
CURVA H/V SPERIMENTALE



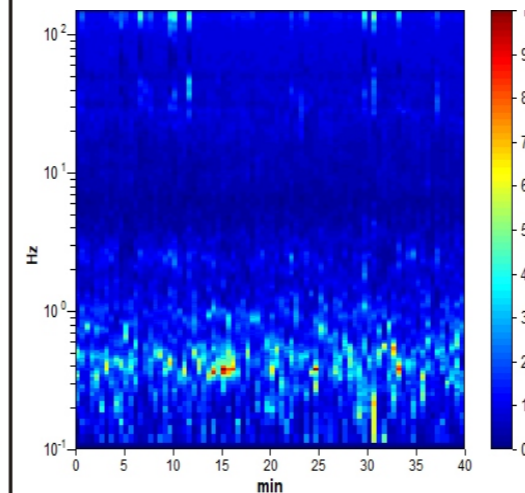
COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ



SISMOGRAMMI

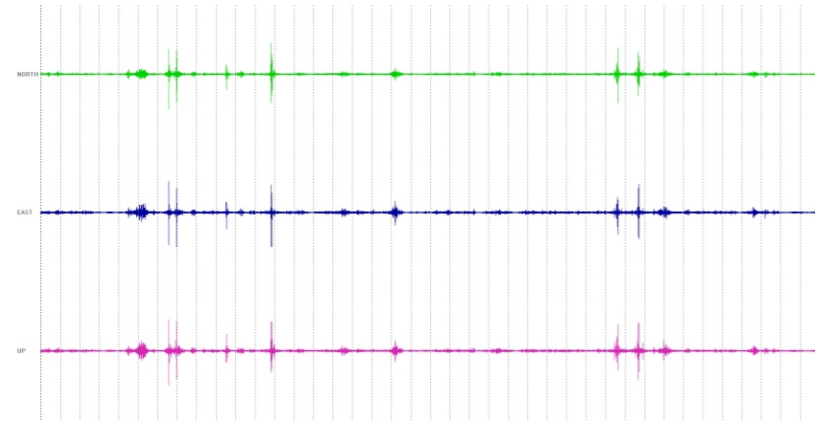


TABELLA RIASSUNTIVA

SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.37 +/- 0.04 Hz
Ampiezza	3.10

CRITERI SESAME

Max. H/V at 0.37 ± 0.04 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.37 > 0.33	OK	
$n_c(f_0) > 200$	747.1 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 31 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$	0.22 Hz	OK	
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	0.952 Hz	OK	
$A_0 > 2$	3.10 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	0.11536 < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.04225 < 0.07324	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.53 < 2.5	OK	

- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_05

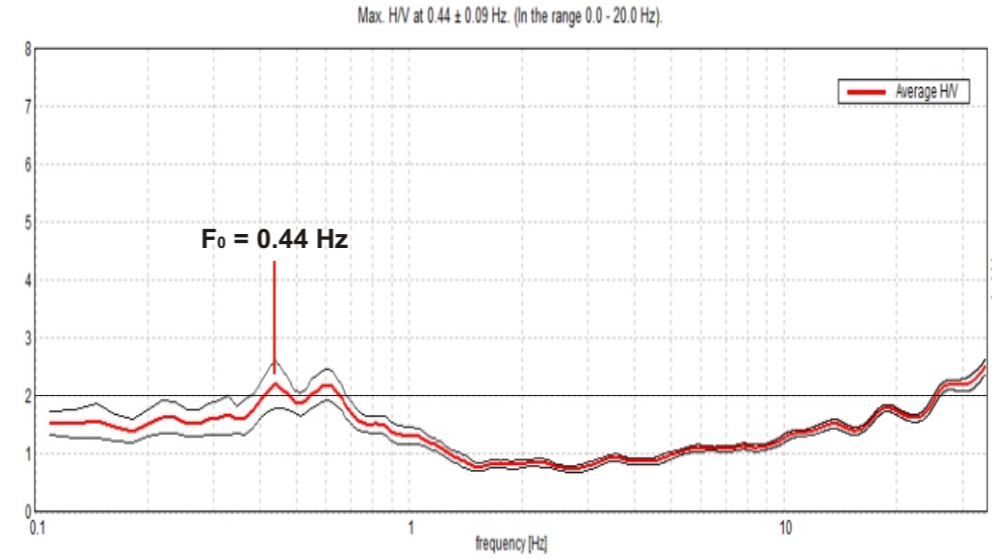
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

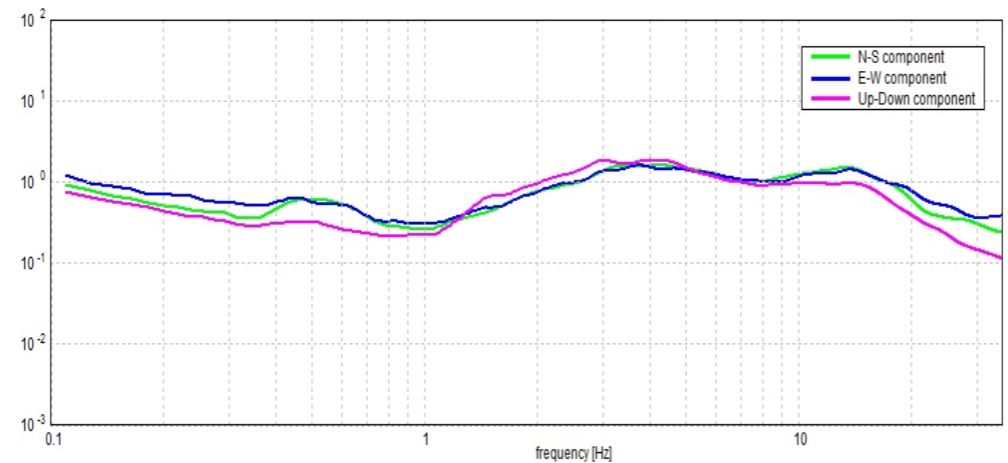
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via della Piaggiola - Gubbio (PG)	ORA: 19:04:06 - 19:44:06
OPERATORE: Dott. Geol. Stefano Bellaveglia		GPS - Sistema di rif.: WGS84
LATITUDINE: 43.347169°	LONGITUDINE: 12.578457°	ALTITUDINE: 484 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 5	SENSORI n. 3	
NOME DEL FILE: HV_05 Gubbio		PUNTO: HV_05
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 25	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input checked="" type="checkbox"/> erba = (<input type="checkbox"/> bassa <input type="checkbox"/> alta)	
	<input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPIAMENTO ARTIFICIALE SENSORE-TERRENO <input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____		
PRESENZA EDIFICI <input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____		
TRANSIENTI	<input type="checkbox"/> nessuno <input type="checkbox"/> pochi <input type="checkbox"/> medi <input type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione / distanza (mt.)
	auto <input type="checkbox"/> camion <input checked="" type="checkbox"/> pedoni <input checked="" type="checkbox"/> altro <input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.) <input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____		
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.) Descrizione, altezza e distanza: Chiesa Alberi sparsi		
OSSERVAZIONI:		CLASSE DI QUALITÀ: B2



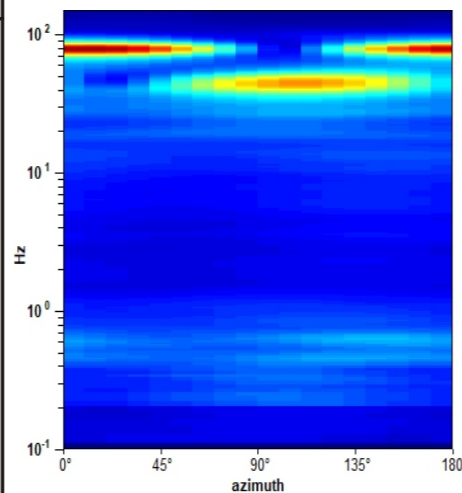
CURVA H/V SPERIMENTALE



COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ

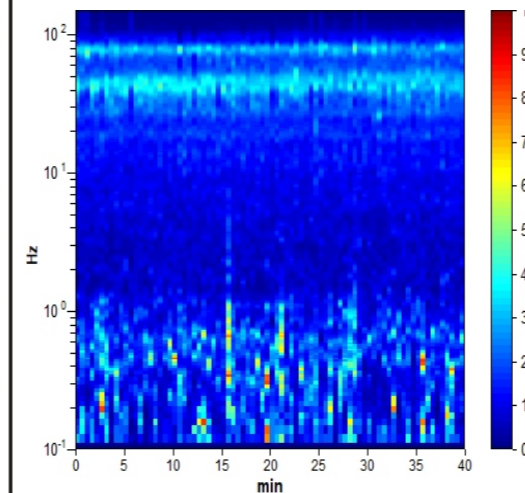


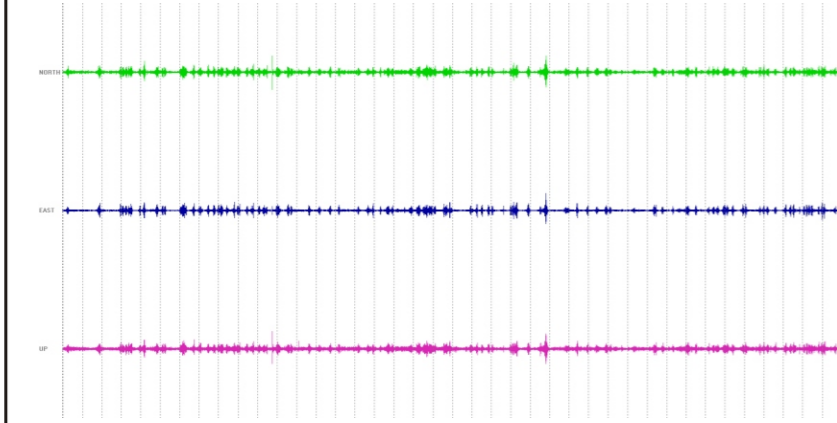
TABELLA RIASSUNTIVA

SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 20.0 Hz
Picco	0.44 +/- 0.09 Hz
Ampiezza	2.22

CRITERI SESAME

Max. H/V at 0.44 ± 0.09 Hz (in the range 0.0- 20.0 Hz).			
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.44 > 0.33	OK	
$n_c(f_0) > 200$	606.4 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 37 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$		OK	NO
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	1.227 Hz	OK	
$A_0 > 2$	2.22 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.19869 < 0.05$	OK	NO
$\sigma_f < \varepsilon(f_0)$	$0.08731 < 0.08789$	OK	
$\sigma_A(f_0) < \theta(f_0)$	$0.4235 < 2.5$	OK	

SISMOGRAMMI



- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_06

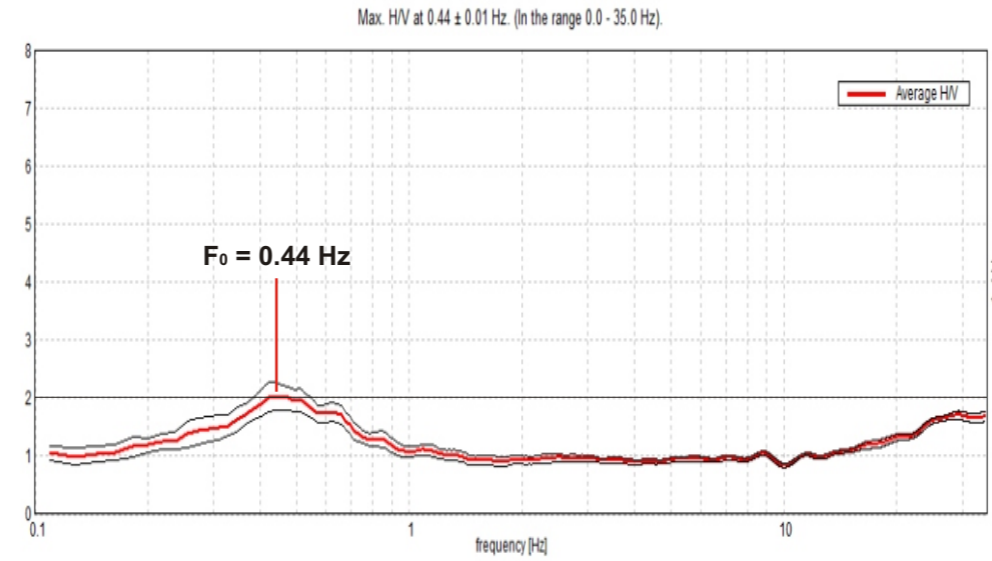
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via Gabriotti - Gubbio (PG)	ORA: 22:40:36 - 23:20:36																																			
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84																																				
LATITUDINE: 43.349261°	LONGITUDINE: 12.569081°	ALTITUDINE: 480 m s.l.m.																																			
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:																																			
STAZIONE n. 6	SENSORI n. 3																																				
NOME DEL FILE: HV_06 Gubbio	PUNTO: HV_06																																				
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400																																			
CONDIZIONI METEO	VENTO <input type="checkbox"/> assente <input checked="" type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte Temperatura (°C): 20 Note:																																				
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input checked="" type="checkbox"/> erba = (<input type="checkbox"/> bassa <input type="checkbox"/> alta) <input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro _____ <input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato NOTE:																																				
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____																																				
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo, Moderati																																				
TRANSIENTI	<table border="1"> <tr> <th></th> <th>nessuno</th> <th>pochi</th> <th>moderati</th> <th>molti</th> <th>molto molti</th> <th>direzione / distanza (mt.)</th> </tr> <tr> <td>auto</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>camion</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>pedoni</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>altro</td> <td><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>			nessuno	pochi	moderati	molti	molto molti	direzione / distanza (mt.)	auto	<input checked="" type="checkbox"/>						camion	<input checked="" type="checkbox"/>						pedoni	<input checked="" type="checkbox"/>						altro	<input checked="" type="checkbox"/>					
	nessuno	pochi	moderati	molti	molto molti	direzione / distanza (mt.)																															
auto	<input checked="" type="checkbox"/>																																				
camion	<input checked="" type="checkbox"/>																																				
pedoni	<input checked="" type="checkbox"/>																																				
altro	<input checked="" type="checkbox"/>																																				
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____																																				
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.)	Descrizione, altezza e distanza:																																				
OSSERVAZIONI:	CLASSE DI QUALITÀ: B1																																				



CURVA H/V SPERIMENTALE



COMPONENTI

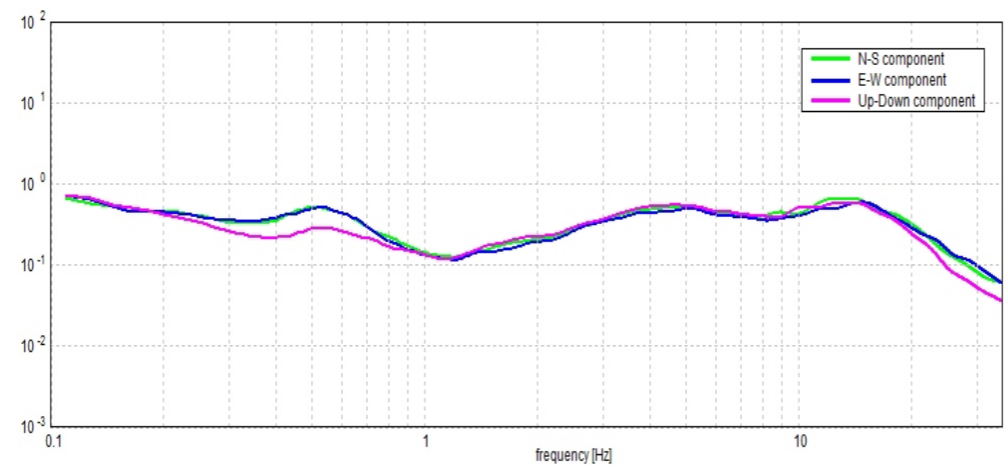


TABELLA RIASSUNTIVA

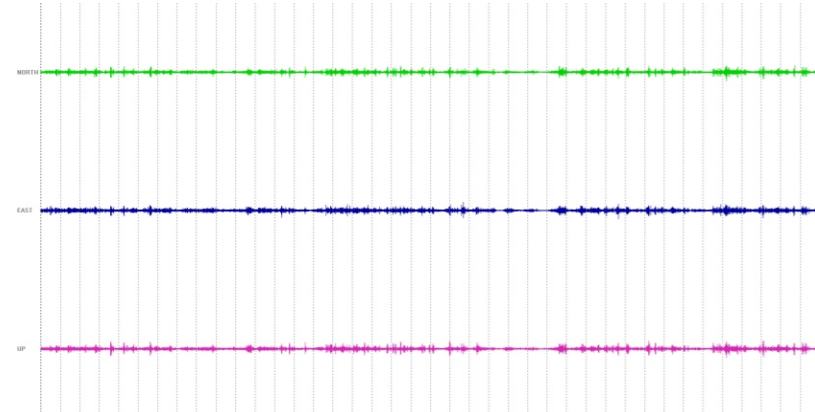
SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.44 +/- 0.01 Hz
Ampiezza	2.04

CRITERI SESAME

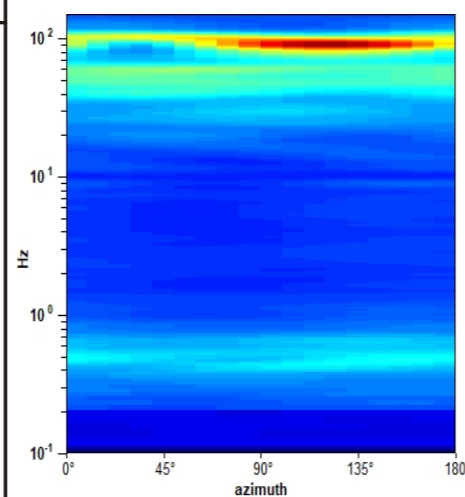
Max. H/V at 0.44 ± 0.01 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.44 > 0.33	OK	
$n_c(f_0) > 200$	830.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 37 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$	0.128 Hz	OK	
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	1.3 Hz	OK	
$A_0 > 2$	2.04 > 2	OK	
$f_{peak}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	0.03193 < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.01403 < 0.08789	OK	
$\sigma_A(f_0) < 0(f_0)$	0.2506 < 2.5	OK	

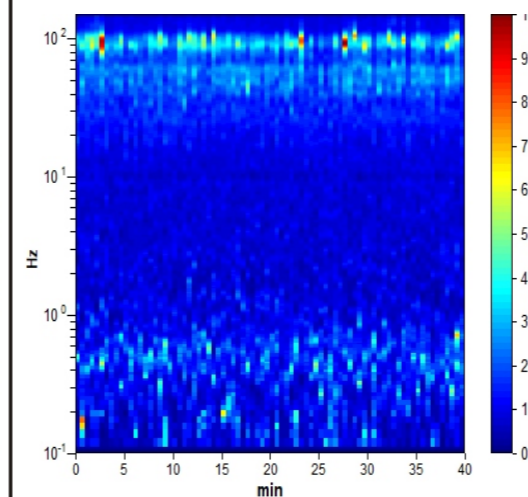
SISMOGRAMMI



DIREZIONALITÀ



STAZIONARIETÀ



- l_w = window length
- n_w = number of windows selected for the average H/V curve
- n_c = $l_w \cdot n_w$. f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_07

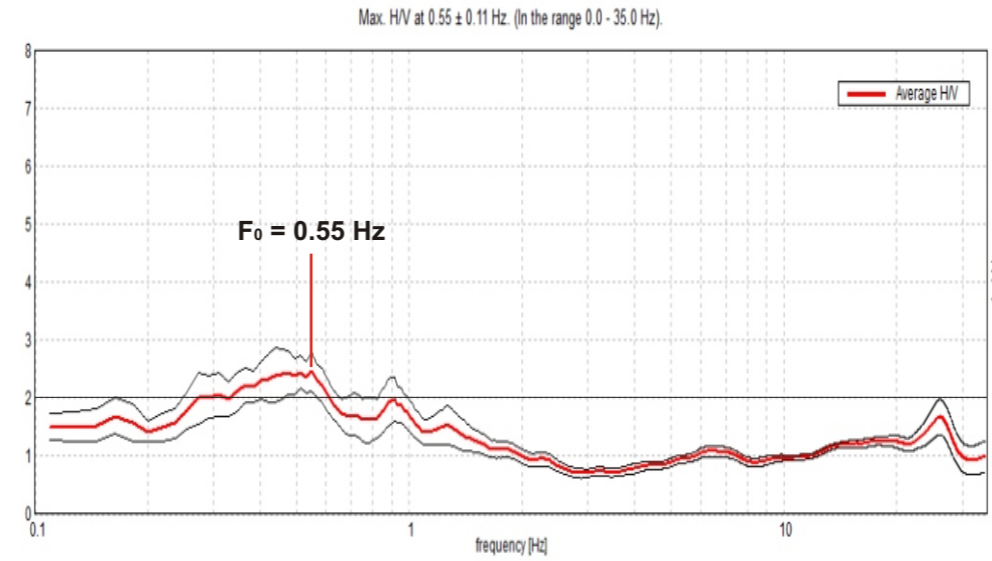
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

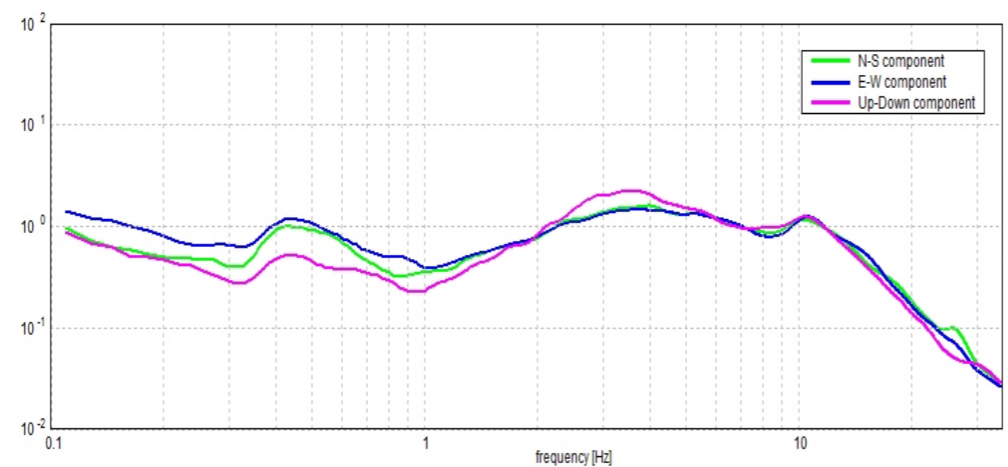
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Stadio Gubbio - Gubbio (PG)	ORA: 12:37:29 - 13:17:29
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43.350265°	LONGITUDINE: 12.566269°	ALTITUDINE: 477 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 7	SENSORI n. 3	
NOME DEL FILE: HV_07 Gubbio		PUNTO: HV_07
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input type="checkbox"/> assente <input type="checkbox"/> debole <5 m/s <input checked="" type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 26	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input type="checkbox"/> erba <input type="checkbox"/> (Cassa) <input type="checkbox"/> (sta)	
	<input checked="" type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____	
TRANSIENTI	nessuno <input checked="" type="checkbox"/> pochi <input type="checkbox"/> medi <input type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione /distanza (mt.)
auto	<input checked="" type="checkbox"/>	10
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)		
<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____		
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.)		
Descrizione, altezza e distanza:		
Stadio comunale		
OSSERVAZIONI: Vento medio-forte	CLASSE DI QUALITÀ: B1	



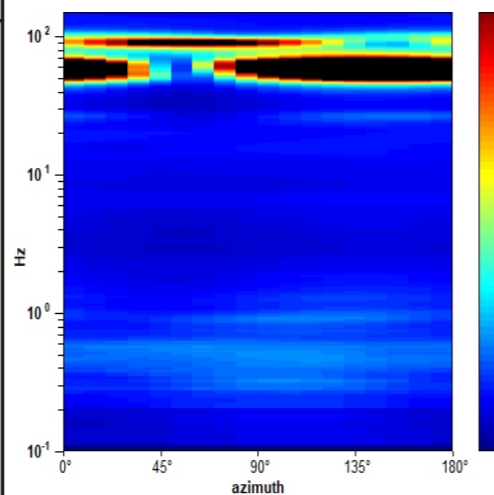
CURVA H/V SPERIMENTALE



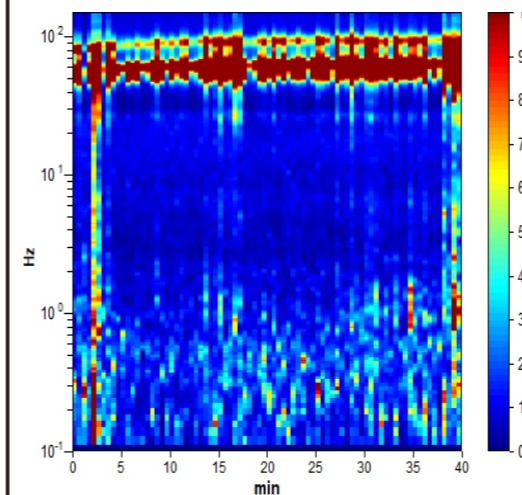
COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ



SISMOGRAMMI

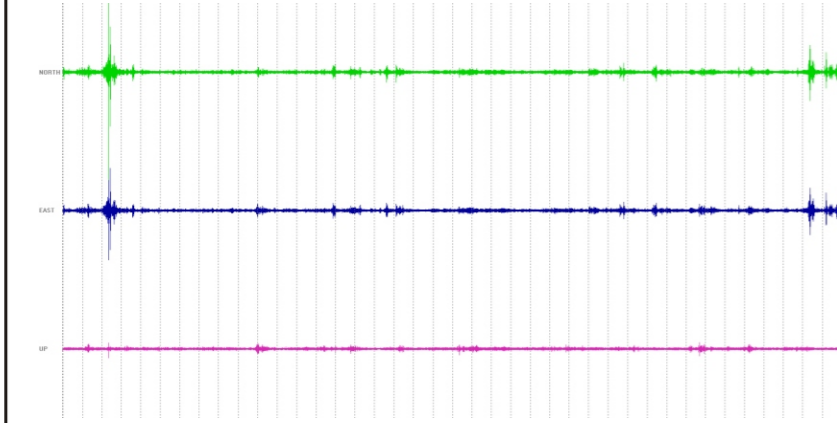


TABELLA RIASSUNTIVA

SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.55 +/- 0.11 Hz
Ampiezza	2.46

CRITERI SESAME

Max. H/V at 0.55 ± 0.11 Hz (in the range 0.0- 35.0 Hz).			
Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.55 > 0.33	OK	
$n_c(f_0) > 200$	741.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 46 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$		OK	NO
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	1.556 Hz	OK	
$A_0 > 2$	2.46 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	0.20373 < 0.05		NO
$\sigma_f < \varepsilon(f_0)$	0.11191 < 0.0824		NO
$\sigma_A(f_0) < \theta(f_0)$	0.3312 < 2.0	OK	

- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_08

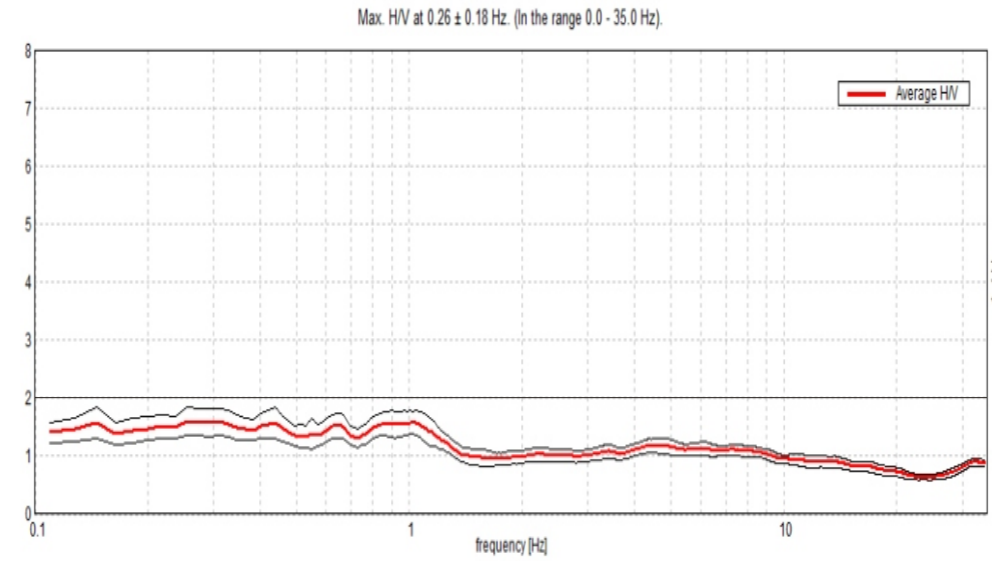
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

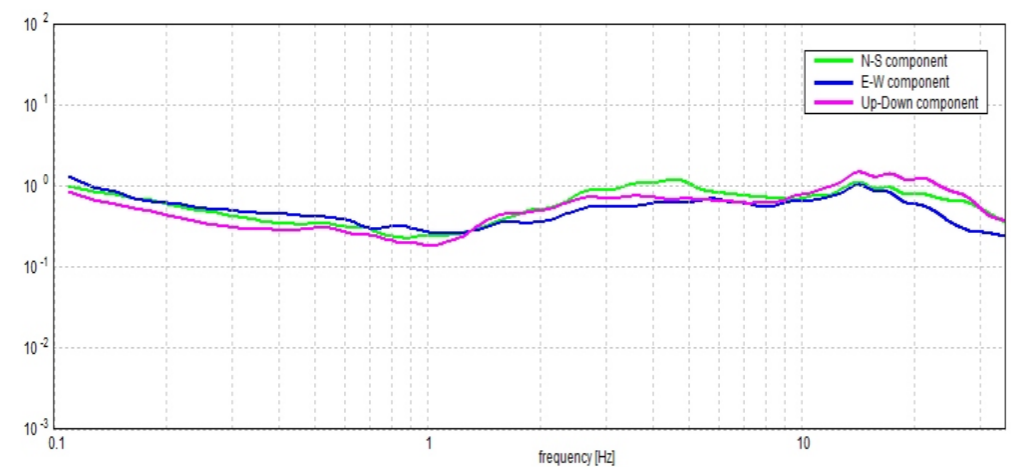
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via Tifernate - Gubbio (PG)	ORA: 21:29:42 - 22:09:42
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43.356410°	LONGITUDINE: 12.566745°	ALTITUDINE: 487 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 8	SENSORI n. 3	
NOME DEL FILE: HV_08 Gubbio		PUNTO: HV_08
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 22	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input checked="" type="checkbox"/> erba = <input type="checkbox"/> bassa <input type="checkbox"/> alta	
	<input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____	
TRANSIENTI	nessuno <input type="checkbox"/> pochi <input checked="" type="checkbox"/> medi <input type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione / distanza (mt.)
auto		10
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)		<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.) Descrizione, altezza e distanza: Park Hotel ai Cappuccini		
OSSERVAZIONI:		CLASSE DI QUALITÀ: B1



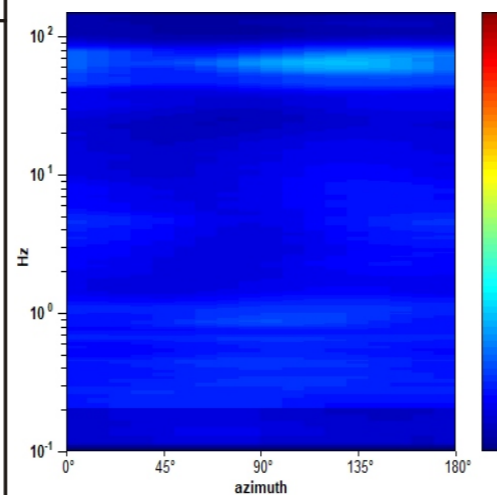
CURVA H/V SPERIMENTALE



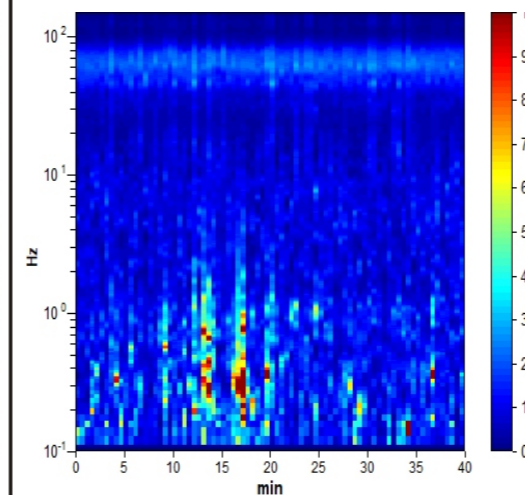
COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ



SISMOGRAMMI

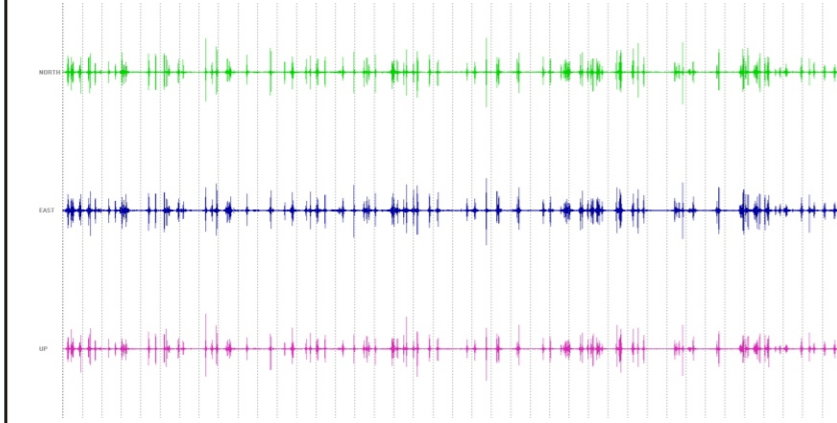


TABELLA RIASSUNTIVA

SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.26 +/- 0.18 Hz
Ampiezza	1.60

CRITERI SESAME

Max. H/V at 0.26 ± 0.18 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.26 > 0.33		NO
$n_c(f_0) > 200$	323.0 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 22 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$	0.092 Hz	OK	
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$			NO
$A_0 > 2$	1.60 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.70779 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	0.18144 < 0.05127		NO
$\sigma_A(f_0) < \theta(f_0)$	0.2295 < 2.5	OK	

- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_09

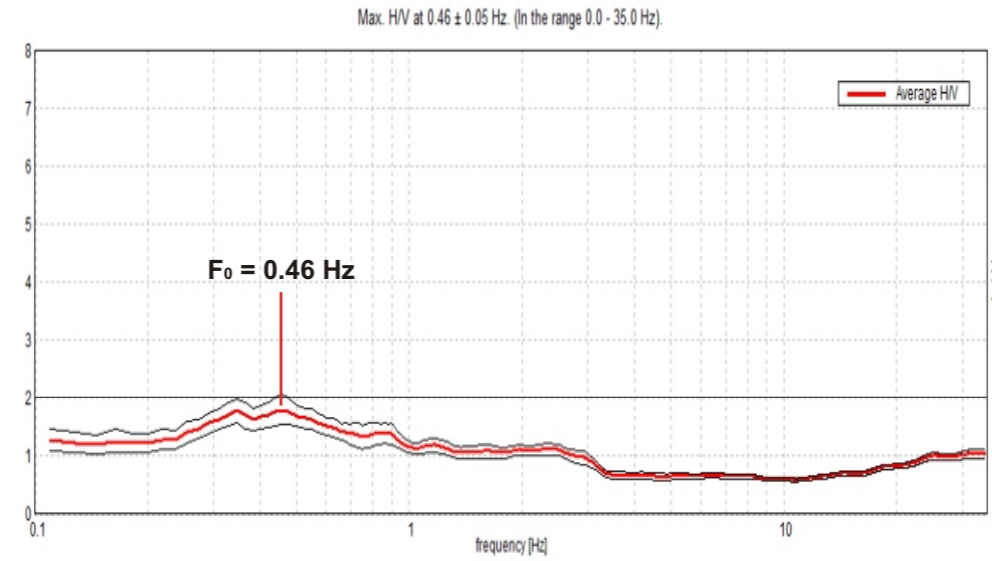
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

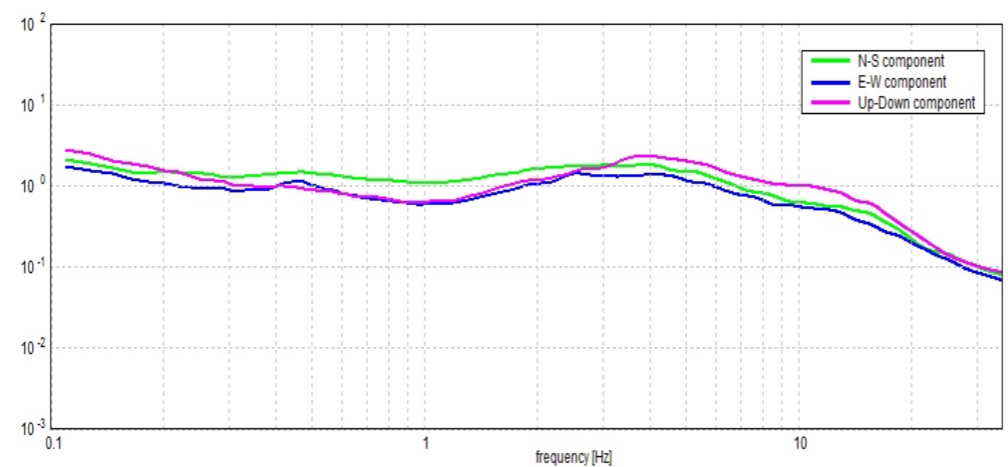
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Via Brunelleschi - Gubbio (PG)	ORA: 17:15:52 - 17:55:52
OPERATORE: Dott. Geol. Stefano Bellaveglia		GPS - Sistema di rif.: WGS84
LATITUDINE: 43.354690°	LONGITUDINE: 12.560085°	ALTITUDINE: 467 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 9	SENSORI n. 3	
NOME DEL FILE: HV_09 Gubbio		PUNTO: HV_09
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input type="checkbox"/> assente <input checked="" type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 27	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input checked="" type="checkbox"/> erba = (<input type="checkbox"/> bassa <input type="checkbox"/> alta)	
	<input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO <input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____		
PRESENZA EDIFICI <input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____		
TRANSIENTI	nessuno <input type="checkbox"/> pochi <input type="checkbox"/> medi <input checked="" type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione /distanza (mt.)
auto	<input type="checkbox"/>	5
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	5
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)		<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.) Descrizione, altezza e distanza:		
OSSERVAZIONI:		CLASSE DI QUALITÀ: B1



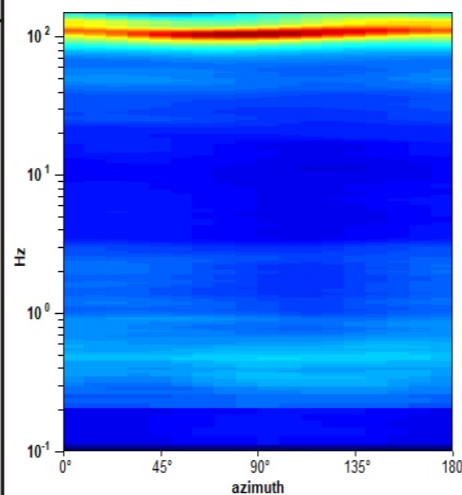
CURVA H/V SPERIMENTALE



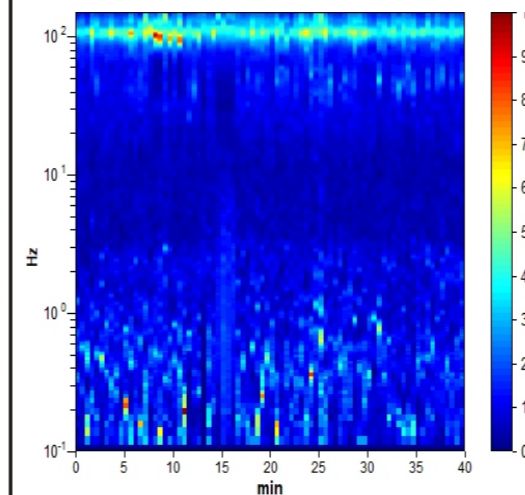
COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ



SISMOGRAMMI

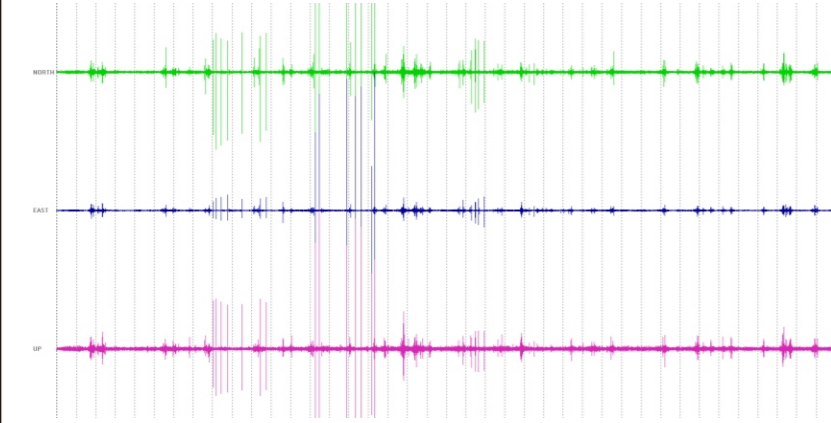


TABELLA RIASSUNTIVA

SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	0.46 +/- 0.05 Hz
Ampiezza	1.80

CRITERI SESAME

Max. H/V at 0.46 ± 0.05 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	0.46 > 0.33	OK	
$n_c(f_0) > 200$	741.6 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 38 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
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
$A_0 > 2$	1.80 > 2		NO
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	$ 0.10357 < 0.05$		NO
$\sigma_f < \varepsilon(f_0)$	0.04741 < 0.09155	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.2611 < 2.5	OK	

- l_w = window length
- n_w = number of windows selected for the average H/V curve
- n_c = $l_w \cdot n_w$. f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f^* = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f^*) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt_HV_10

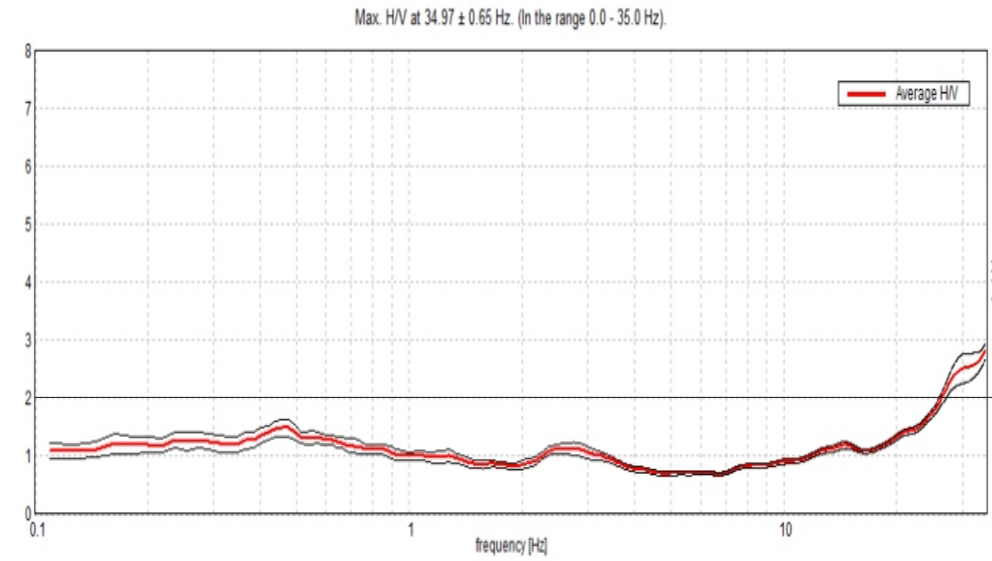
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

TABELLA CAMPAGNA

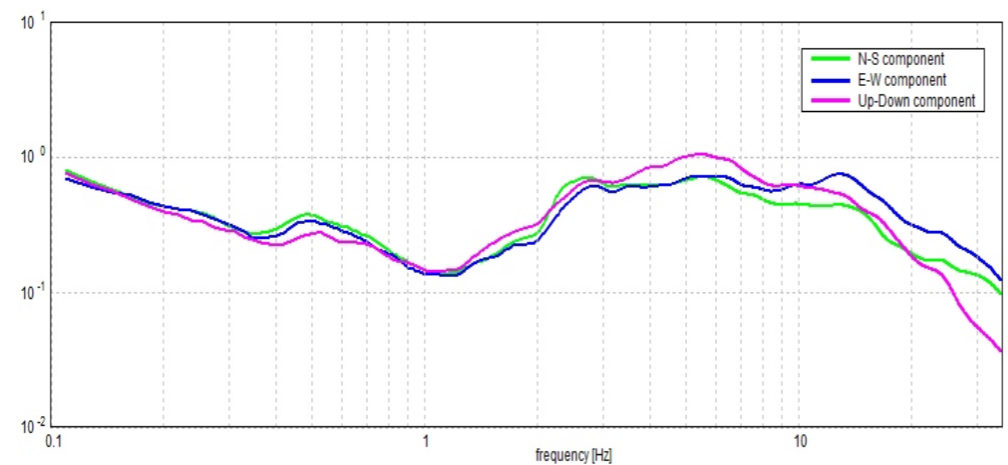
RIFERIMENTO ARCHIVIO: szz-azt	SITO: Gubbio (PG)	ORA: 20:36:41 - 21:16:41
OPERATORE: Dott. Geol. Stefano Bellaveglia	GPS - Sistema di rif.: WGS84	
LATITUDINE: 43,359560°	LONGITUDINE: 12,557284°	ALTITUDINE: 478 m s.l.m.
TIPO DI STAZIONE Sismografo digitale triassiale SR04-GEOBOX 45 (SARA s.r.l.)	TIPO DI SENSORE Velocimetri Hs1 - Geospace Technology	NOTE VARIE:
STAZIONE n. 10	SENSORI n. 3	
NOME DEL FILE: HV_09 Gubbio	PUNTO: HV_10	
FREQUENZA DI CAMP. (Hz): 300	INTERVALLO DI CAMP. (ms): 5	DURATA ACQUISIZIONE (s): 2400
CONDIZIONI METEO	VENTO <input type="checkbox"/> assente <input checked="" type="checkbox"/> debole <5 m/s <input type="checkbox"/> medio <input type="checkbox"/> forte	
	PIOGGIA <input checked="" type="checkbox"/> assente <input type="checkbox"/> debole <input type="checkbox"/> medio <input type="checkbox"/> forte	
	Temperatura (°C): 25	Note:
TIPO SUOLO	<input type="checkbox"/> argilla <input type="checkbox"/> sabbia <input type="checkbox"/> ghiaia <input type="checkbox"/> roccia <input checked="" type="checkbox"/> erba = (<input type="checkbox"/> bassa <input type="checkbox"/> alta)	
	<input type="checkbox"/> asfalto <input type="checkbox"/> cemento <input type="checkbox"/> pavimentazione Altro	
	<input checked="" type="checkbox"/> terreno asciutto <input type="checkbox"/> terreno bagnato	NOTE:
ACCOPPIAMENTO ARTIFICIALE SENSORE-TERRENO	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
PRESENZA EDIFICI	<input type="checkbox"/> nessuno <input checked="" type="checkbox"/> rari <input type="checkbox"/> molti altro, tipo _____	
TRANSIENTI	nessuno <input type="checkbox"/> pochi <input type="checkbox"/> medi <input checked="" type="checkbox"/> molti <input type="checkbox"/> moltissimi	direzione / distanza (mt.)
auto		20
camion	<input checked="" type="checkbox"/>	
pedoni	<input checked="" type="checkbox"/>	20
altro	<input checked="" type="checkbox"/>	
SORGENTI DI RUMORE MONOCROMATICO (pompe, industrie, ecc.)	<input checked="" type="checkbox"/> no <input type="checkbox"/> si, tipo _____	
STRUTTURE NELLE VICINANZE (alberi, infrastrutture, ponti, ecc.)	Descrizione, altezza e distanza:	
OSSERVAZIONI:	CLASSE DI QUALITÀ: B1	



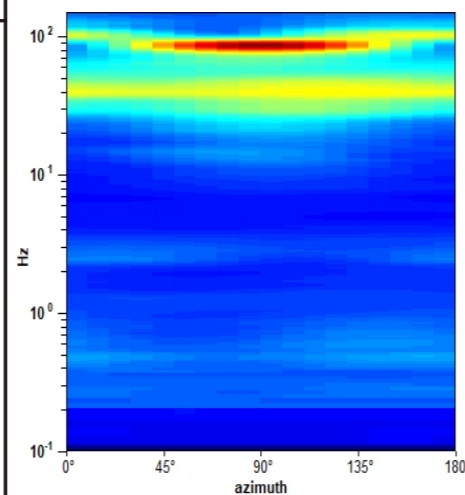
CURVA H/V SPERIMENTALE



COMPONENTI



DIREZIONALITÀ



STAZIONARIETÀ

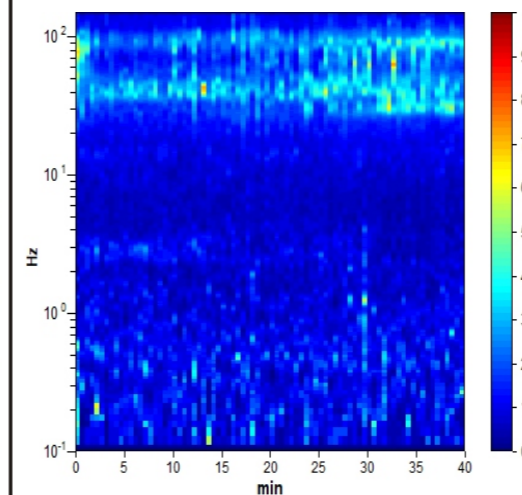


TABELLA RIASSUNTIVA

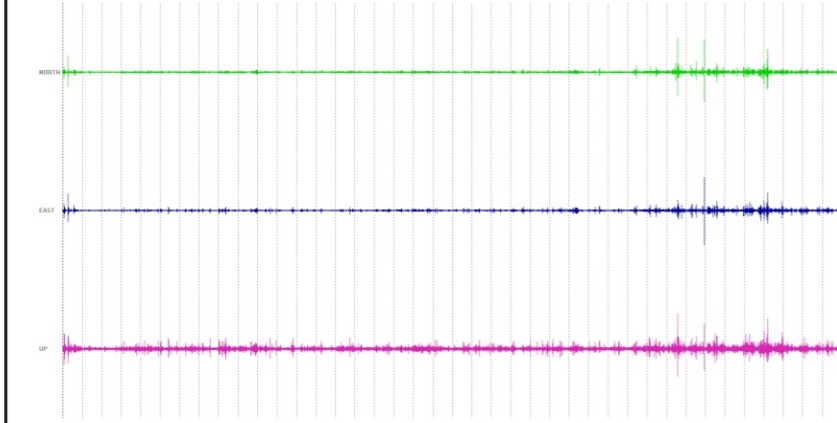
SPECIFICHE TECNICHE DI ELABORAZIONE	
Lunghezza finestra	30 s
Tipo di lisciamento	triangolare
Lisciamento	10%
Intervallo frequenze analizzate	0.0 - 35.0 Hz
Picco	34.97 +/- 0.65 Hz
Ampiezza	2.87

CRITERI SESAME

Max. H/V at 34.97 ± 0.65 Hz (in the range 0.0- 35.0 Hz).

Criteria for a reliable H/V curve [All 3 should be fulfilled]			
$f_0 > 10 / L_w$	34.97 > 0.33	OK	
$n_c(f_0) > 200$	72394.4 > 200	OK	
$\sigma_A(f) < 2$ for $0.5f_0 < f < 2f_0$ if $f_0 > 0.5\text{Hz}$	Exceeded 0 out of 2866 times	OK	
$\sigma_A(f) < 3$ for $0.5f_0 < f < 2f_0$ if $f_0 < 0.5\text{Hz}$			
Criteria for a clear H/V peak [At least 5 out of 6 should be fulfilled]			
Exists f^* in $[f_0/4, f_0]$ $A_{H/V}(f^*) < A_0 / 2$	21.881 Hz	OK	
Exists f^* in $[f_0, 4f_0]$ $A_{H/V}(f^*) < A_0 / 2$	123.615 Hz	OK	
$A_0 > 2$	2.87 > 2	OK	
$f_{\text{peak}}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$	0.01854 < 0.05	OK	
$\sigma_f < \varepsilon(f_0)$	0.64833 < 1.74866	OK	
$\sigma_A(f_0) < \theta(f_0)$	0.1328 < 1.58	OK	

SISMOGRAMMI



- l_w = window length
- n_w = number of windows selected for the average H/V curve
- $n_c = l_w \cdot n_w$, f_0 = number of significant cycles
- f = current frequency
- f_{sensor} = sensor cut-off frequency
- f_0 = H/V peak frequency
- σ_f = standard deviation of H/V peak frequency ($f_0 \pm \sigma_f$)
- $\varepsilon(f_0)$ = threshold value for the stability condition $\sigma_f < \varepsilon(f_0)$
- A_0 = H/V peak amplitude at frequency f_0
- $A_{H/V}(f)$ = H/V curve amplitude at frequency f
- f = frequency between $f_0/4$ and f_0 for which $A_{H/V}(f) < A_0/2$
- f^* = frequency between f_0 and $4f_0$ for which $A_{H/V}(f^*) < A_0/2$
- $\sigma_A(f)$ = "standard deviation" of $A_{H/V}(f)$, $\sigma_A(f)$ is the factor by which the mean $A_{H/V}(f)$ curve should be multiplied or divided
- $\sigma_{\log H/V}(f)$ = standard deviation of the $\log A_{H/V}(f)$ curve, $\sigma_{\log H/V}(f)$ is an absolute value which should be added to or subtracted from the mean $\log A_{H/V}(f)$ curve
- $\theta(f_0)$ = threshold value for the stability condition $\sigma_A(f) < \theta(f_0)$
- $V_{s,av}$ = average S-wave velocity of the total deposits
- $V_{s,surf}$ = S-wave velocity of the surface layer
- h = depth to bedrock
- h_{min} = lower-bound estimate of h

Codice Certificato di prova: szz-azt SM_01

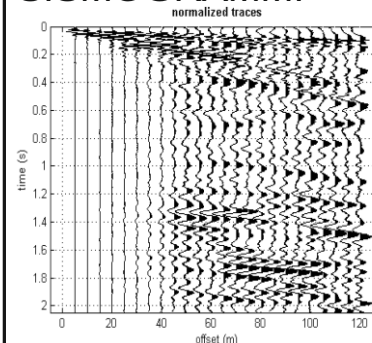
Committente: Comune di Gubbio - Data Esecuzione: 04/06/2018
Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

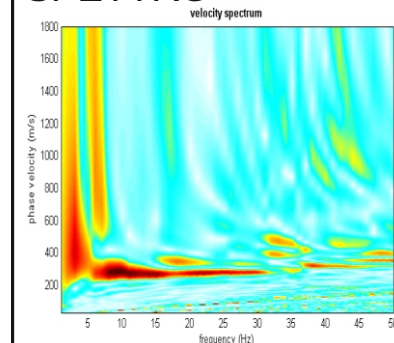
Profilo	SM_01
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	ESE - ONO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4801637 m; E 304332 m G24: N 4801668 m; E 304216 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -20.8086	-4.73859
Optimizing Vs & Thickness - generation: 2; average & best misfits: -20.9131	-3.28242
Optimizing Vs & Thickness - generation: 3; average & best misfits: -15.8788	-3.28242
Optimizing Vs & Thickness - generation: 4; average & best misfits: -20.0497	-3.24524
Optimizing Vs & Thickness - generation: 5; average & best misfits: -20.6421	-3.24524
Optimizing Vs & Thickness - generation: 6; average & best misfits: -18.0216	-3.24524
Optimizing Vs & Thickness - generation: 7; average & best misfits: -16.9087	-3.24524
Optimizing Vs & Thickness - generation: 8; average & best misfits: -19.1587	-3.24524
Optimizing Vs & Thickness - generation: 9; average & best misfits: -17.2624	-3.24524
Optimizing Vs & Thickness - generation: 10; average & best misfits: -13.6195	-3.15383
Optimizing Vs & Thickness - generation: 11; average & best misfits: -13.7094	-3.15383
Optimizing Vs & Thickness - generation: 12; average & best misfits: -14.0667	-3.15383
Optimizing Vs & Thickness - generation: 13; average & best misfits: -15.6572	-3.15383
Optimizing Vs & Thickness - generation: 14; average & best misfits: -12.8575	-3.15383
Optimizing Vs & Thickness - generation: 15; average & best misfits: -18.4436	-3.15383
Optimizing Vs & Thickness - generation: 16; average & best misfits: -15.5175	-3.15383
Optimizing Vs & Thickness - generation: 17; average & best misfits: -15.578	-3.15383
Optimizing Vs & Thickness - generation: 18; average & best misfits: -16.0336	-2.99477
Optimizing Vs & Thickness - generation: 19; average & best misfits: -15.0035	-2.99477
Optimizing Vs & Thickness - generation: 20; average & best misfits: -16.6284	-2.99477
Optimizing Vs & Thickness - generation: 21; average & best misfits: -15.0743	-2.99477
Optimizing Vs & Thickness - generation: 22; average & best misfits: -14.6411	-2.99477
Optimizing Vs & Thickness - generation: 23; average & best misfits: -14.8204	-2.99477
Optimizing Vs & Thickness - generation: 24; average & best misfits: -15.3131	-2.99477
Optimizing Vs & Thickness - generation: 25; average & best misfits: -14.7244	-2.83314
Optimizing Vs & Thickness - generation: 26; average & best misfits: -12.5709	-2.83314
Optimizing Vs & Thickness - generation: 27; average & best misfits: -13.7626	-2.83314
Optimizing Vs & Thickness - generation: 28; average & best misfits: -14.0697	-2.83314
Optimizing Vs & Thickness - generation: 29; average & best misfits: -16.0337	-2.83314
Optimizing Vs & Thickness - generation: 30; average & best misfits: -17.2132	-2.83314
Optimizing Vs & Thickness - generation: 31; average & best misfits: -15.0119	-2.83314

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -22.5542	-2.83314
Optimizing Vs & Thickness - generation: 2; average & best misfits: -20.858	-2.83314
Optimizing Vs & Thickness - generation: 3; average & best misfits: -16.9878	-2.83314
Optimizing Vs & Thickness - generation: 4; average & best misfits: -21.181	-2.83314
Optimizing Vs & Thickness - generation: 5; average & best misfits: -16.1856	-2.83314
Optimizing Vs & Thickness - generation: 6; average & best misfits: -12.9828	-2.83314
Optimizing Vs & Thickness - generation: 7; average & best misfits: -17.364	-2.83314
Optimizing Vs & Thickness - generation: 8; average & best misfits: -14.1842	-2.83314
Optimizing Vs & Thickness - generation: 9; average & best misfits: -15.1443	-2.83314

MODELLO MEDIO

VS (m/s): 236 299 296 382 402
Spessori (m): 0.5 6.9 15.0 11.4

Fundamental mode

Mean model	
f(Hz)	VR(m/s)
3.12354	347.5144
5.18969	315.4587
7.60019	289.3053
11.3881	278.4283
16.7831	275.9259
23.6702	275.2585
31.4757	274.621

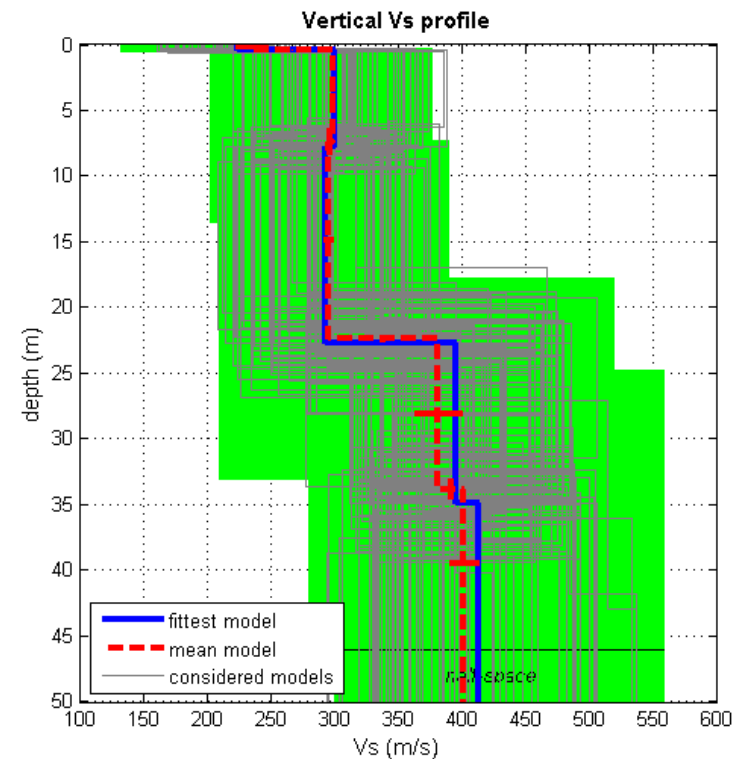
First higher mode

Mean model	
16.4387	350.0186
22.4076	322.3396
35.608	304.2675

winMASW Pro
Surface Wave Analysis

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 313 m/s



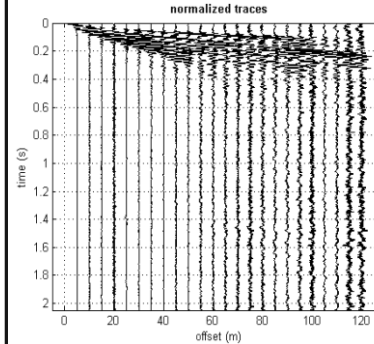
Codice Certificato di prova: szz-azt_SM_02

Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018
Località: Gubbio - Comune: Gubbio (PG)

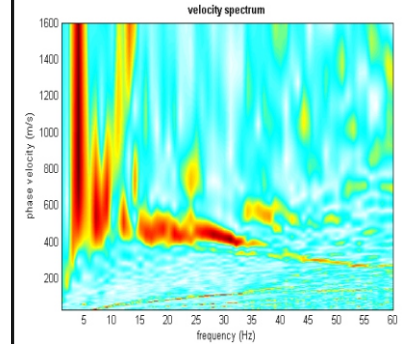
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_02
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	ENE - OSO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802197 m; E 304269 m G24: N 4802190 m; E 304149 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -32.4262	-5.92272
Optimizing Vs & Thickness - generation: 2; average & best misfits: -29.7773	-5.92272
Optimizing Vs & Thickness - generation: 3; average & best misfits: -29.528	-5.92272
Optimizing Vs & Thickness - generation: 4; average & best misfits: -28.5669	-5.89748
Optimizing Vs & Thickness - generation: 5; average & best misfits: -23.1772	-4.44816
Optimizing Vs & Thickness - generation: 6; average & best misfits: -20.6558	-4.22109
Optimizing Vs & Thickness - generation: 7; average & best misfits: -19.0486	-3.99033
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.6328	-3.30777
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.6948	-3.30777
Optimizing Vs & Thickness - generation: 10; average & best misfits: -21.7442	-3.30777
Optimizing Vs & Thickness - generation: 11; average & best misfits: -23.7793	-3.30777
Optimizing Vs & Thickness - generation: 12; average & best misfits: -23.1626	-3.30777
Optimizing Vs & Thickness - generation: 13; average & best misfits: -21.4829	-3.21901
Optimizing Vs & Thickness - generation: 14; average & best misfits: -25.0615	-3.21901
Optimizing Vs & Thickness - generation: 15; average & best misfits: -24.3519	-3.21901
Optimizing Vs & Thickness - generation: 16; average & best misfits: -24.5144	-3.21901
Optimizing Vs & Thickness - generation: 17; average & best misfits: -28.8458	-3.21901
Optimizing Vs & Thickness - generation: 18; average & best misfits: -27.8301	-3.21901
Optimizing Vs & Thickness - generation: 19; average & best misfits: -27.7269	-3.21901
Optimizing Vs & Thickness - generation: 20; average & best misfits: -29.0395	-3.21901
Optimizing Vs & Thickness - generation: 21; average & best misfits: -26.9661	-3.21901
Optimizing Vs & Thickness - generation: 22; average & best misfits: -24.6207	-3.21901
Optimizing Vs & Thickness - generation: 23; average & best misfits: -25.0196	-3.21901
Optimizing Vs & Thickness - generation: 24; average & best misfits: -24.4445	-3.21901
Optimizing Vs & Thickness - generation: 25; average & best misfits: -25.9479	-3.21901
Optimizing Vs & Thickness - generation: 26; average & best misfits: -29.0301	-3.21901
Optimizing Vs & Thickness - generation: 27; average & best misfits: -30.767	-3.21901
Optimizing Vs & Thickness - generation: 28; average & best misfits: -27.5963	-3.21901
Optimizing Vs & Thickness - generation: 29; average & best misfits: -26.6179	-3.21901
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.1558	-3.21901
Optimizing Vs & Thickness - generation: 31; average & best misfits: -29.0321	-3.21901

Inversione: fase#2

Optimizing Vs & Thickness - generation: 1; average & best misfits: -35.4044	-3.21901
Optimizing Vs & Thickness - generation: 2; average & best misfits: -33.3297	-3.21901
Optimizing Vs & Thickness - generation: 3; average & best misfits: -32.8634	-3.21901
Optimizing Vs & Thickness - generation: 4; average & best misfits: -33.2164	-3.21901
Optimizing Vs & Thickness - generation: 5; average & best misfits: -31.6683	-3.21901
Optimizing Vs & Thickness - generation: 6; average & best misfits: -30.9194	-3.21901
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.8756	-3.21901
Optimizing Vs & Thickness - generation: 8; average & best misfits: -22.5996	-3.21901
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.2954	-3.21901

MODELLO MEDIO

VS (m/s): 280 463 529 540 600 650
Spessori (m): 3.0 2.4 6.9 14.0 8.5

Fundamental mode

Mean model	f(Hz)	VR(m/s)
3.90671	569.428	
7.74109	517.815	
12.3176	476.5629	
17.2652	456.4075	
22.7075	438.2531	
27.9025	415.1336	
33.8396	374.6428	
43.24	313.0953	
54.9906	281.6116	

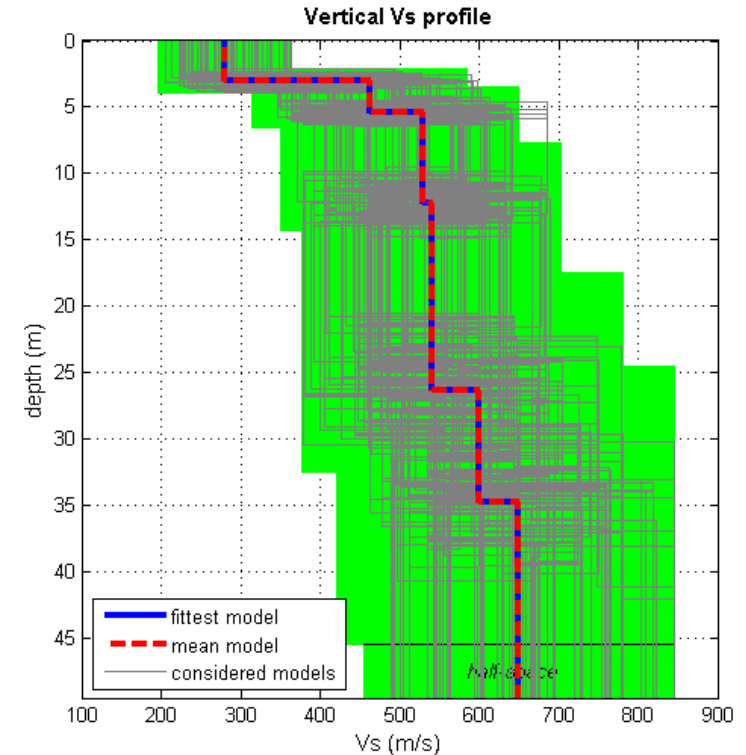
First higher mode

Mean model	f(Hz)	VR(m/s)
33.7159	533.3719	
39.5294	498.7652	

winMASW Pro
Surface Wave Analysis

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PROFILO DI VELOCITA' 1D $V_{s,eq} (V_{s30}) = 492 \text{ m/s}$



Codice Certificato di prova: szz-azt_SM_03

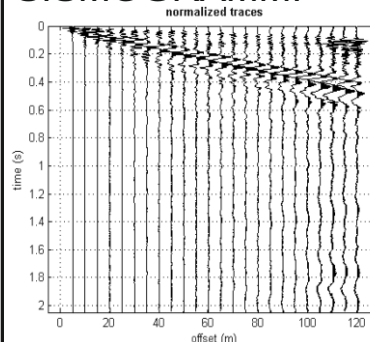
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018
Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

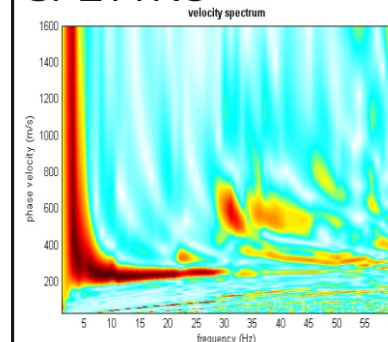
Profilo	SM_03
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4801085 m; E 302537 m G24: N 4801187 m; E 302601 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -12.8416	-4.11689
Optimizing Vs & Thickness - generation: 2; average & best misfits: -15.2632	-4.07033
Optimizing Vs & Thickness - generation: 3; average & best misfits: -15.7965	-4.07033
Optimizing Vs & Thickness - generation: 4; average & best misfits: -13.5691	-3.47304
Optimizing Vs & Thickness - generation: 5; average & best misfits: -10.4999	-3.47304
Optimizing Vs & Thickness - generation: 6; average & best misfits: -10.8609	-3.47304
Optimizing Vs & Thickness - generation: 7; average & best misfits: -13.0663	-3.47304
Optimizing Vs & Thickness - generation: 8; average & best misfits: -12.8922	-3.47304
Optimizing Vs & Thickness - generation: 9; average & best misfits: -12.0549	-3.47304
Optimizing Vs & Thickness - generation: 10; average & best misfits: -12.2651	-3.47304
Optimizing Vs & Thickness - generation: 11; average & best misfits: -12.1639	-3.47304
Optimizing Vs & Thickness - generation: 12; average & best misfits: -13.4042	-3.47304
Optimizing Vs & Thickness - generation: 13; average & best misfits: -12.2731	-3.31967
Optimizing Vs & Thickness - generation: 14; average & best misfits: -11.2444	-3.31967
Optimizing Vs & Thickness - generation: 15; average & best misfits: -11.2719	-3.31967
Optimizing Vs & Thickness - generation: 16; average & best misfits: -11.3617	-3.31967
Optimizing Vs & Thickness - generation: 17; average & best misfits: -12.0874	-3.31967
Optimizing Vs & Thickness - generation: 18; average & best misfits: -12.0983	-3.31967
Optimizing Vs & Thickness - generation: 19; average & best misfits: -12.7138	-3.31967
Optimizing Vs & Thickness - generation: 20; average & best misfits: -12.5985	-3.31967
Optimizing Vs & Thickness - generation: 21; average & best misfits: -13.3016	-3.31967
Optimizing Vs & Thickness - generation: 22; average & best misfits: -14.5212	-3.31967
Optimizing Vs & Thickness - generation: 23; average & best misfits: -14.6407	-3.31967
Optimizing Vs & Thickness - generation: 24; average & best misfits: -13.4705	-3.31967
Optimizing Vs & Thickness - generation: 25; average & best misfits: -12.2804	-3.23015
Optimizing Vs & Thickness - generation: 26; average & best misfits: -14.1405	-3.23015
Optimizing Vs & Thickness - generation: 27; average & best misfits: -14.0809	-3.23015
Optimizing Vs & Thickness - generation: 28; average & best misfits: -11.9835	-3.23015
Optimizing Vs & Thickness - generation: 29; average & best misfits: -13.8707	-3.23015
Optimizing Vs & Thickness - generation: 30; average & best misfits: -12.559	-3.23015
Optimizing Vs & Thickness - generation: 31; average & best misfits: -14.9693	-3.23015

Inversione: fase#2

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -15.5033	-3.23015
Optimizing Vs & Thickness - generation: 2; average & best misfits: -15.0168	-3.23015
Optimizing Vs & Thickness - generation: 3; average & best misfits: -15.8294	-3.23015
Optimizing Vs & Thickness - generation: 4; average & best misfits: -15.1754	-3.23015
Optimizing Vs & Thickness - generation: 5; average & best misfits: -15.3101	-3.23015
Optimizing Vs & Thickness - generation: 6; average & best misfits: -12.8989	-3.23015
Optimizing Vs & Thickness - generation: 7; average & best misfits: -13.7682	-3.23015
Optimizing Vs & Thickness - generation: 8; average & best misfits: -13.5388	-3.23015
Optimizing Vs & Thickness - generation: 9; average & best misfits: -12.7764	-3.23015

MODELLO MEDIO

VS (m/s): 273 255 221 304 289 455
Spessori (m): 2.1 1.7 5.0 14.7 11.1

Fundamental mode

Mean model	
f(Hz)	VR(m/s)
2.7935	361.837
4.40147	297.9987
6.75157	267.9781
10.0912	248.4639
15.5335	231.6546
20.8522	230.0159
27.7788	232.5222
34.5818	235.3219

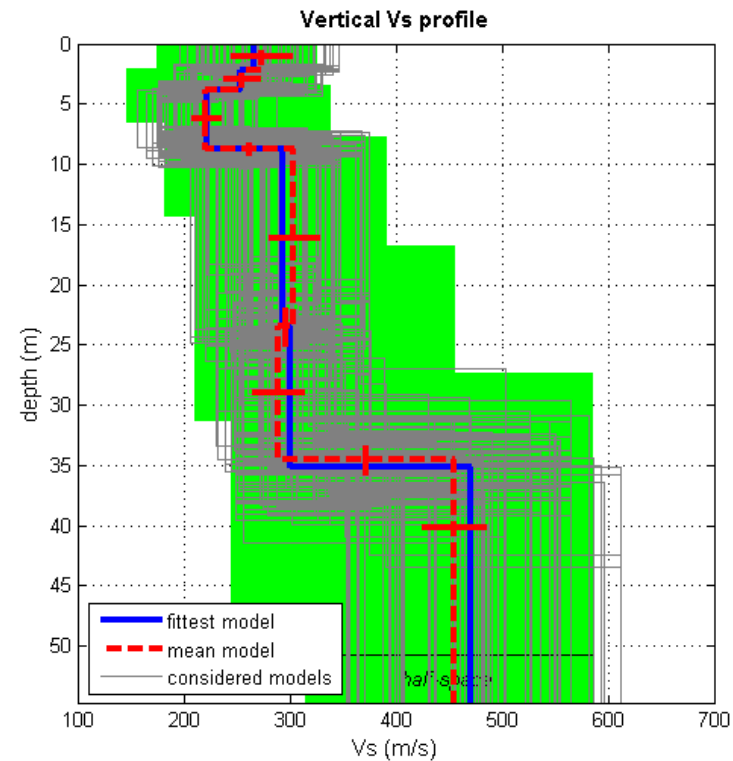
First higher mode

Mean model	
24.1918	291.2483
36.8082	267.9602
47.8166	252.0529

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PROFILO DI VELOCITA' 1D Vs, eq (Vs30) = 278 m/s



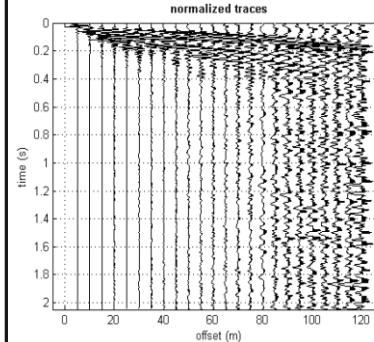
Codice Certificato di prova: szz-azt SM_04

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

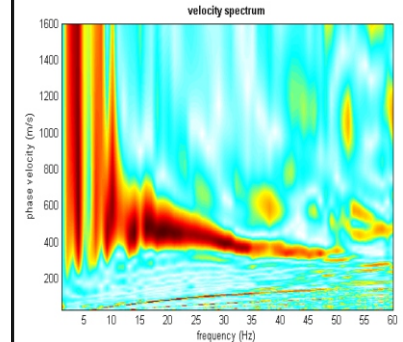
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_04
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	N - S
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802466 m; E 303609 m G24: N 4802345 m; E 303614 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -65.5773	-12.3996
Optimizing Vs & Thickness - generation: 2; average & best misfits: -55.0769	-9.18759
Optimizing Vs & Thickness - generation: 3; average & best misfits: -51.0974	-9.18759
Optimizing Vs & Thickness - generation: 4; average & best misfits: -45.8094	-9.18759
Optimizing Vs & Thickness - generation: 5; average & best misfits: -42.0295	-9.09678
Optimizing Vs & Thickness - generation: 6; average & best misfits: -32.3935	-9.09678
Optimizing Vs & Thickness - generation: 7; average & best misfits: -31.9227	-9.09639
Optimizing Vs & Thickness - generation: 8; average & best misfits: -39.0129	-7.69499
Optimizing Vs & Thickness - generation: 9; average & best misfits: -35.8526	-7.25826
Optimizing Vs & Thickness - generation: 10; average & best misfits: -35.7593	-7.25826
Optimizing Vs & Thickness - generation: 11; average & best misfits: -35.3209	-7.25826
Optimizing Vs & Thickness - generation: 12; average & best misfits: -30.1808	-7.25826
Optimizing Vs & Thickness - generation: 13; average & best misfits: -43.4233	-7.25826
Optimizing Vs & Thickness - generation: 14; average & best misfits: -50.8203	-7.25826
Optimizing Vs & Thickness - generation: 15; average & best misfits: -38.175	-7.25826
Optimizing Vs & Thickness - generation: 16; average & best misfits: -43.7523	-7.01489
Optimizing Vs & Thickness - generation: 17; average & best misfits: -47.593	-7.01489
Optimizing Vs & Thickness - generation: 18; average & best misfits: -39.0558	-7.01489
Optimizing Vs & Thickness - generation: 19; average & best misfits: -40.1531	-7.01489
Optimizing Vs & Thickness - generation: 20; average & best misfits: -40.6547	-7.01489
Optimizing Vs & Thickness - generation: 21; average & best misfits: -36.6569	-6.23638
Optimizing Vs & Thickness - generation: 22; average & best misfits: -38.4181	-6.23638
Optimizing Vs & Thickness - generation: 23; average & best misfits: -34.9517	-6.23638
Optimizing Vs & Thickness - generation: 24; average & best misfits: -34.2985	-6.23638
Optimizing Vs & Thickness - generation: 25; average & best misfits: -30.76	-6.23638
Optimizing Vs & Thickness - generation: 26; average & best misfits: -35.865	-6.23638
Optimizing Vs & Thickness - generation: 27; average & best misfits: -39.0071	-6.23638
Optimizing Vs & Thickness - generation: 28; average & best misfits: -33.5662	-6.23638
Optimizing Vs & Thickness - generation: 29; average & best misfits: -39.1447	-6.23638
Optimizing Vs & Thickness - generation: 30; average & best misfits: -32.6272	-6.23638
Optimizing Vs & Thickness - generation: 31; average & best misfits: -35.8885	-6.23638

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -44.3605	-6.23638
Optimizing Vs & Thickness - generation: 2; average & best misfits: -42.8062	-6.23638
Optimizing Vs & Thickness - generation: 3; average & best misfits: -43.6182	-6.23638
Optimizing Vs & Thickness - generation: 4; average & best misfits: -45.765	-6.23638
Optimizing Vs & Thickness - generation: 5; average & best misfits: -43.2283	-6.23638
Optimizing Vs & Thickness - generation: 6; average & best misfits: -38.05	-6.23638
Optimizing Vs & Thickness - generation: 7; average & best misfits: -36.6461	-6.23638
Optimizing Vs & Thickness - generation: 8; average & best misfits: -34.8042	-6.23638
Optimizing Vs & Thickness - generation: 9; average & best misfits: -33.763	-6.23638

MODELLO MEDIO

VS (m/s): 204 285 465 530 418 554
Spessori (m): 0.6 1.8 7.5 24.5 11.7

Fundamental mode

Mean model	f(Hz)	VR(m/s)
3.78302	470.6815	
7.12264	456.3081	
9.34906	455.815	
13.1834	449.4604	
16.8941	435.4678	
21.2233	417.6663	
27.1604	398.2369	
33.8396	380.0994	
39.7767	361.3179	
45.7138	336.6483	

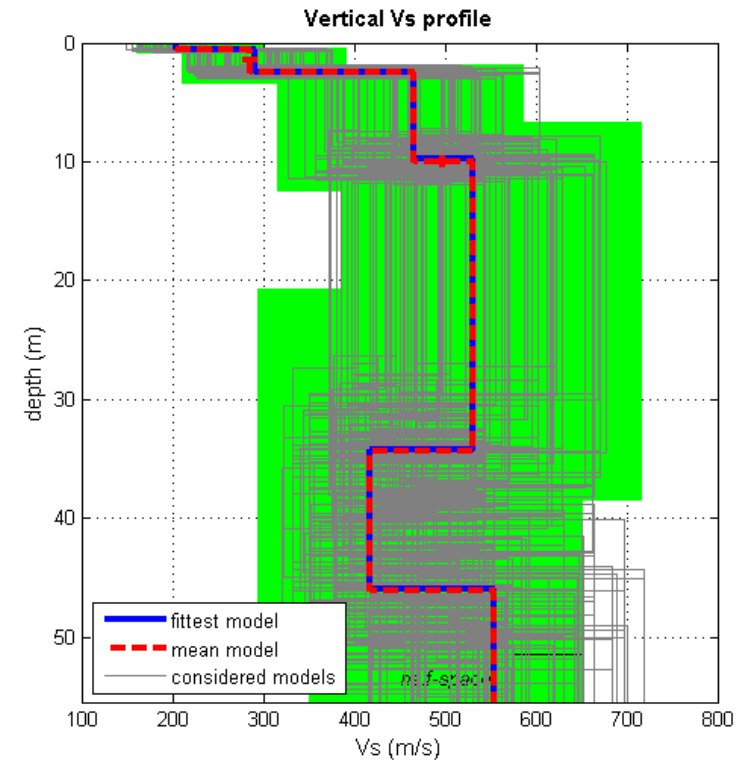
First higher mode

Mean model	f(Hz)	VR(m/s)
9.59644	551.054	
13.8019	533.7828	
19.4916	508.8852	
25.4287	492.6353	
41.7558	455.7078	
53.63	441.4688	
57.9591	438.1304	

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 474 m/s



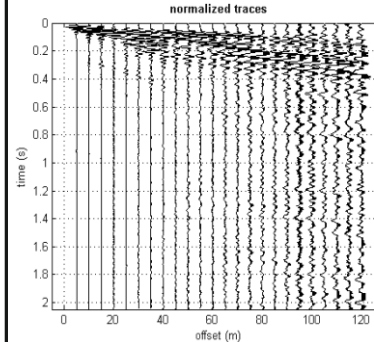
Codice Certificato di prova: szz-azt SM_05

Committente: Comune di Gubbio - Data Esecuzione: 04/06/2018
Località: Gubbio - Comune: Gubbio (PG)

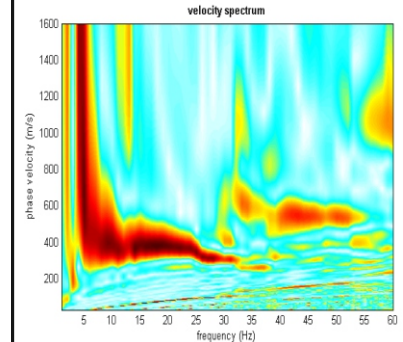
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_05
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NE - SE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802129 m; E 303058 m G24: N 4802060 m; E 303156 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -26.1437	-3.36024
Optimizing Vs & Thickness - generation: 2; average & best misfits: -25.2488	-3.36024
Optimizing Vs & Thickness - generation: 3; average & best misfits: -23.2821	-3.36024
Optimizing Vs & Thickness - generation: 4; average & best misfits: -25.6091	-3.36024
Optimizing Vs & Thickness - generation: 5; average & best misfits: -21.424	-3.36024
Optimizing Vs & Thickness - generation: 6; average & best misfits: -18.359	-3.36024
Optimizing Vs & Thickness - generation: 7; average & best misfits: -19.9568	-3.27188
Optimizing Vs & Thickness - generation: 8; average & best misfits: -18.5112	-3.27188
Optimizing Vs & Thickness - generation: 9; average & best misfits: -18.9544	-3.27188
Optimizing Vs & Thickness - generation: 10; average & best misfits: -16.4882	-3.27188
Optimizing Vs & Thickness - generation: 11; average & best misfits: -21.3485	-2.3442
Optimizing Vs & Thickness - generation: 12; average & best misfits: -19.5146	-2.3442
Optimizing Vs & Thickness - generation: 13; average & best misfits: -19.1416	-2.3442
Optimizing Vs & Thickness - generation: 14; average & best misfits: -20.6591	-2.3442
Optimizing Vs & Thickness - generation: 15; average & best misfits: -20.8575	-2.3442
Optimizing Vs & Thickness - generation: 16; average & best misfits: -21.4544	-2.3442
Optimizing Vs & Thickness - generation: 17; average & best misfits: -22.0419	-2.3442
Optimizing Vs & Thickness - generation: 18; average & best misfits: -24.9392	-2.3442
Optimizing Vs & Thickness - generation: 19; average & best misfits: -23.8687	-2.17085
Optimizing Vs & Thickness - generation: 20; average & best misfits: -16.9439	-2.17085
Optimizing Vs & Thickness - generation: 21; average & best misfits: -18.9036	-2.17085
Optimizing Vs & Thickness - generation: 22; average & best misfits: -20.0135	-2.17085
Optimizing Vs & Thickness - generation: 23; average & best misfits: -21.0677	-2.17085
Optimizing Vs & Thickness - generation: 24; average & best misfits: -18.2968	-2.17085
Optimizing Vs & Thickness - generation: 25; average & best misfits: -21.0558	-2.17085
Optimizing Vs & Thickness - generation: 26; average & best misfits: -17.0137	-2.17085
Optimizing Vs & Thickness - generation: 27; average & best misfits: -21.6774	-2.17085
Optimizing Vs & Thickness - generation: 28; average & best misfits: -19.4312	-2.17085
Optimizing Vs & Thickness - generation: 29; average & best misfits: -18.3328	-2.17085
Optimizing Vs & Thickness - generation: 30; average & best misfits: -19.9847	-2.17085
Optimizing Vs & Thickness - generation: 31; average & best misfits: -19.2805	-2.17085

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -29.2213	-2.17085
Optimizing Vs & Thickness - generation: 2; average & best misfits: -28.7773	-2.17085
Optimizing Vs & Thickness - generation: 3; average & best misfits: -24.2167	-2.17085
Optimizing Vs & Thickness - generation: 4; average & best misfits: -20.6324	-2.17085
Optimizing Vs & Thickness - generation: 5; average & best misfits: -15.7461	-2.17085
Optimizing Vs & Thickness - generation: 6; average & best misfits: -19.4754	-2.17085
Optimizing Vs & Thickness - generation: 7; average & best misfits: -22.0221	-2.17085
Optimizing Vs & Thickness - generation: 8; average & best misfits: -20.0801	-2.17085
Optimizing Vs & Thickness - generation: 9; average & best misfits: -18.1295	-2.17085

MODELLO MEDIO

VS (m/s): 250 420 440 462 550
Spessori (m): 3.2 9.3 10.0 15.4

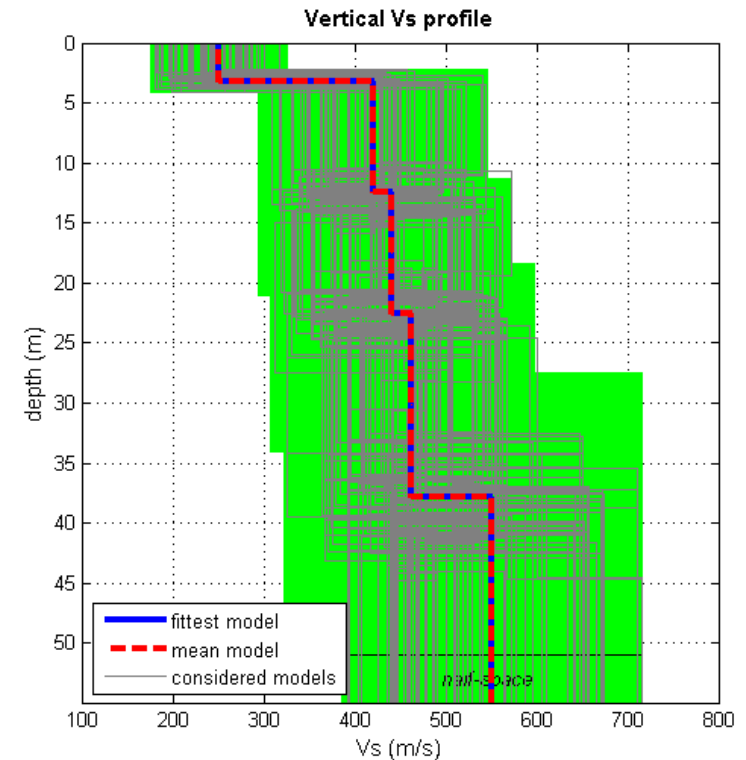
Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.65933	466.9808
	4.89623	444.1383
	7.37002	408.5074
	10.586	387.033
	14.173	373.8157
	17.8836	363.33
	22.8312	348.6788
	27.4078	329.192
	31.4895	305.5012
	37.5503	273.9404

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 406 m/s



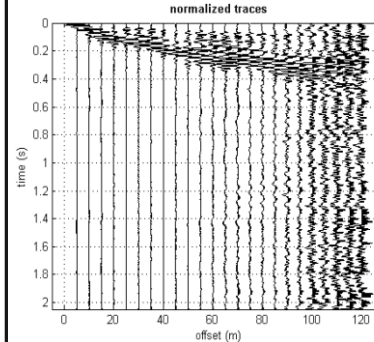
Codice Certificato di prova: szz-azt SM_06

Committente: Comune di Gubbio - Data Esecuzione: 04/06/2018
Località: Gubbio - Comune: Gubbio (PG)

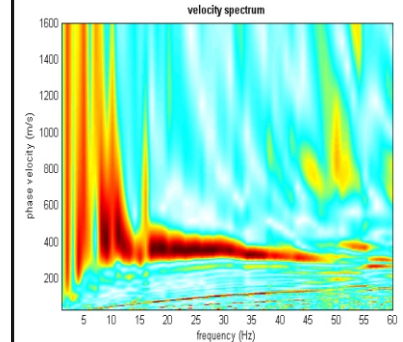
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_06
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSE - NNO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802365 m; E 302824 m G24: N 4802458 m; E 302748 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -34.08	-2.97794
Optimizing Vs & Thickness - generation: 2; average & best misfits: -28.4985	-2.97794
Optimizing Vs & Thickness - generation: 3; average & best misfits: -26.2888	-2.97794
Optimizing Vs & Thickness - generation: 4; average & best misfits: -29.9785	-2.97794
Optimizing Vs & Thickness - generation: 5; average & best misfits: -29.6378	-2.97794
Optimizing Vs & Thickness - generation: 6; average & best misfits: -26.1114	-2.97794
Optimizing Vs & Thickness - generation: 7; average & best misfits: -34.549	-2.97794
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.7941	-2.97794
Optimizing Vs & Thickness - generation: 9; average & best misfits: -29.8667	-2.97794
Optimizing Vs & Thickness - generation: 10; average & best misfits: -30.9383	-2.97794
Optimizing Vs & Thickness - generation: 11; average & best misfits: -33.9366	-2.97794
Optimizing Vs & Thickness - generation: 12; average & best misfits: -26.2029	-2.97794
Optimizing Vs & Thickness - generation: 13; average & best misfits: -28.9064	-2.97794
Optimizing Vs & Thickness - generation: 14; average & best misfits: -33.8587	-2.97794
Optimizing Vs & Thickness - generation: 15; average & best misfits: -28.0036	-2.97794
Optimizing Vs & Thickness - generation: 16; average & best misfits: -36.6088	-2.97794
Optimizing Vs & Thickness - generation: 17; average & best misfits: -44.0451	-2.97794
Optimizing Vs & Thickness - generation: 18; average & best misfits: -38.0178	-2.97794
Optimizing Vs & Thickness - generation: 19; average & best misfits: -37.4695	-2.64881
Optimizing Vs & Thickness - generation: 20; average & best misfits: -35.5071	-2.64881
Optimizing Vs & Thickness - generation: 21; average & best misfits: -36.5108	-2.64881
Optimizing Vs & Thickness - generation: 22; average & best misfits: -30.9449	-2.64881
Optimizing Vs & Thickness - generation: 23; average & best misfits: -33.2834	-2.64881
Optimizing Vs & Thickness - generation: 24; average & best misfits: -36.8368	-2.64881
Optimizing Vs & Thickness - generation: 25; average & best misfits: -26.3849	-2.64881
Optimizing Vs & Thickness - generation: 26; average & best misfits: -32.0872	-2.64881
Optimizing Vs & Thickness - generation: 27; average & best misfits: -34.6182	-2.64881
Optimizing Vs & Thickness - generation: 28; average & best misfits: -31.4374	-2.64881
Optimizing Vs & Thickness - generation: 29; average & best misfits: -27.2422	-2.64881
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.9014	-2.64881
Optimizing Vs & Thickness - generation: 31; average & best misfits: -29.0564	-2.64881

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -38.8491	-2.64881
Optimizing Vs & Thickness - generation: 2; average & best misfits: -37.9676	-2.64881
Optimizing Vs & Thickness - generation: 3; average & best misfits: -39.88	-2.64881
Optimizing Vs & Thickness - generation: 4; average & best misfits: -36.0008	-2.64881
Optimizing Vs & Thickness - generation: 5; average & best misfits: -29.8967	-2.64881
Optimizing Vs & Thickness - generation: 6; average & best misfits: -29.2555	-2.64881
Optimizing Vs & Thickness - generation: 7; average & best misfits: -35.9769	-2.64881
Optimizing Vs & Thickness - generation: 8; average & best misfits: -32.2021	-2.64881
Optimizing Vs & Thickness - generation: 9; average & best misfits: -30.5382	-2.64881

MODELLO MEDIO

VS (m/s): 291 400 417 457 515
Spessori (m): 2.5 14.5 11.8 15.2

Fundamental mode

Mean model	f(Hz)	VR(m/s)
4.89623	413.3177	
9.10168	375.9863	
12.9361	365.5875	
17.6363	359.4973	
22.0891	355.2557	
29.1394	347.8398	
35.3239	339.0732	
40.1478	330.5398	
47.4455	316.1883	

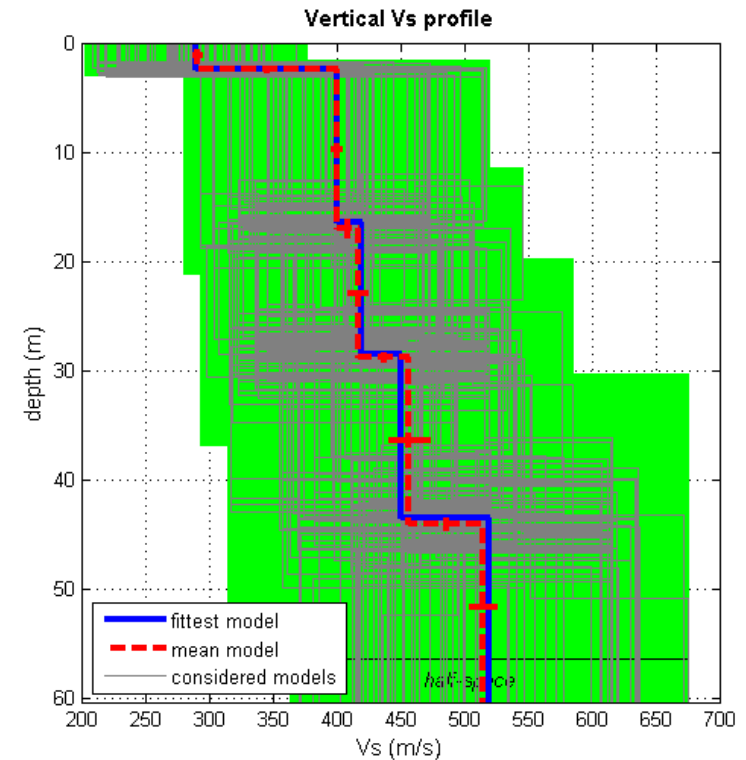
First higher mode

Mean model	f(Hz)	VR(m/s)
11.3281	493.5698	
17.2652	456.5627	
23.326	436.3902	

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 396 m/s



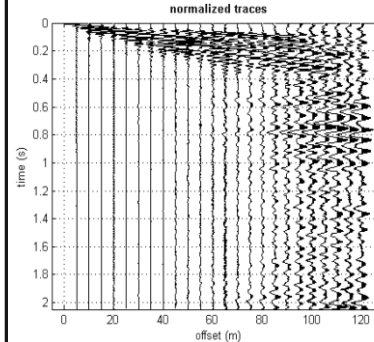
Codice Certificato di prova: szz-azt SM_07

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

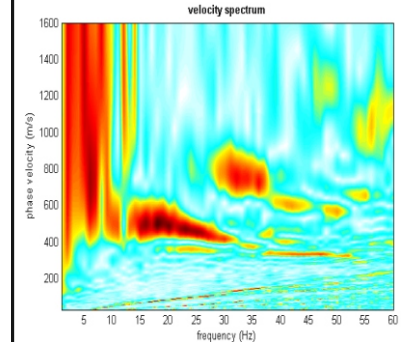
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_07
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NO - SE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802815 m; E 303001 m G24: N 4802738 m; E 303094 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -4.36384	-4.19416
Optimizing Vs & Thickness - generation: 2; average & best misfits: -35.451	-4.19416
Optimizing Vs & Thickness - generation: 3; average & best misfits: -34.7068	-4.19416
Optimizing Vs & Thickness - generation: 4; average & best misfits: -32.7619	-4.19416
Optimizing Vs & Thickness - generation: 5; average & best misfits: -30.9091	-4.19416
Optimizing Vs & Thickness - generation: 6; average & best misfits: -28.5261	-4.17597
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.2299	-3.37553
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.9609	-3.37553
Optimizing Vs & Thickness - generation: 9; average & best misfits: -26.0904	-3.37553
Optimizing Vs & Thickness - generation: 10; average & best misfits: -23.4437	-3.37553
Optimizing Vs & Thickness - generation: 11; average & best misfits: -29.5373	-3.37553
Optimizing Vs & Thickness - generation: 12; average & best misfits: -28.1453	-3.37348
Optimizing Vs & Thickness - generation: 13; average & best misfits: -24.7326	-3.37348
Optimizing Vs & Thickness - generation: 14; average & best misfits: -26.8943	-3.37348
Optimizing Vs & Thickness - generation: 15; average & best misfits: -32.9034	-3.37348
Optimizing Vs & Thickness - generation: 16; average & best misfits: -26.2926	-3.37348
Optimizing Vs & Thickness - generation: 17; average & best misfits: -32.1453	-3.37348
Optimizing Vs & Thickness - generation: 18; average & best misfits: -32.1326	-3.37348
Optimizing Vs & Thickness - generation: 19; average & best misfits: -30.4571	-3.37348
Optimizing Vs & Thickness - generation: 20; average & best misfits: -30.3631	-3.37348
Optimizing Vs & Thickness - generation: 21; average & best misfits: -25.7579	-3.37348
Optimizing Vs & Thickness - generation: 22; average & best misfits: -30.5359	-3.37348
Optimizing Vs & Thickness - generation: 23; average & best misfits: -28.4969	-3.37348
Optimizing Vs & Thickness - generation: 24; average & best misfits: -23.5253	-3.37348
Optimizing Vs & Thickness - generation: 25; average & best misfits: -27.2214	-3.37348
Optimizing Vs & Thickness - generation: 26; average & best misfits: -21.6662	-3.37348
Optimizing Vs & Thickness - generation: 27; average & best misfits: -24.813	-3.37348
Optimizing Vs & Thickness - generation: 28; average & best misfits: -22.4912	-3.37348
Optimizing Vs & Thickness - generation: 29; average & best misfits: -22.0255	-3.37348
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.0419	-3.37348
Optimizing Vs & Thickness - generation: 31; average & best misfits: -22.5848	-3.37348

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -38.2621	-3.37348
Optimizing Vs & Thickness - generation: 2; average & best misfits: -37.4799	-3.37348
Optimizing Vs & Thickness - generation: 3; average & best misfits: -33.6102	-3.37348
Optimizing Vs & Thickness - generation: 4; average & best misfits: -27.5709	-3.37348
Optimizing Vs & Thickness - generation: 5; average & best misfits: -22.2513	-3.37348
Optimizing Vs & Thickness - generation: 6; average & best misfits: -29.0947	-3.37348
Optimizing Vs & Thickness - generation: 7; average & best misfits: -29.5686	-3.37348
Optimizing Vs & Thickness - generation: 8; average & best misfits: -29.6717	-3.37348
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.2574	-3.37348

MODELLO MIGLIORE

Vs (m/s):	300	530	580	620	640
Spessori (m):	3.50	8.50	13.97	9.72	

Fundamental mode)

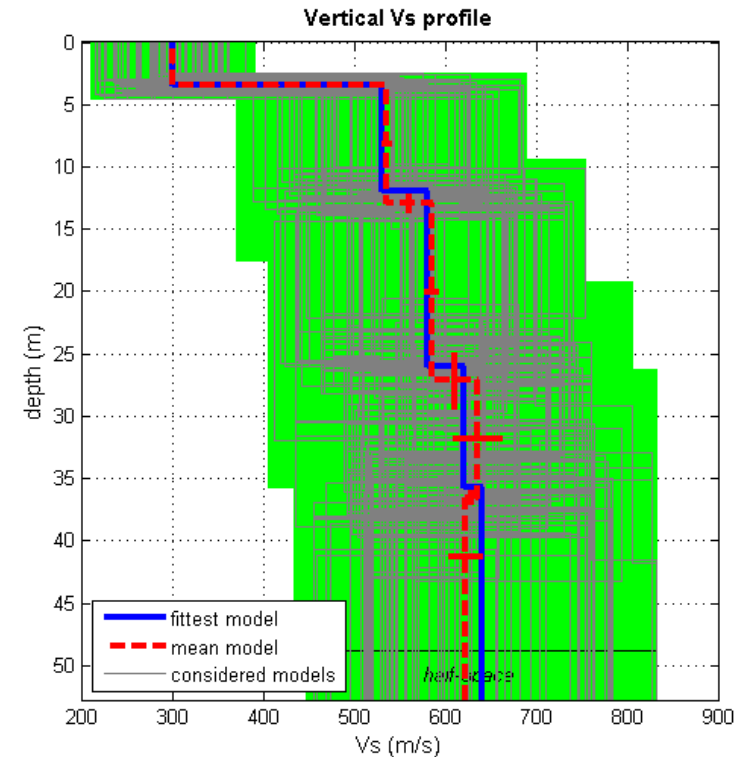
best model

F(Hz)	VR(m/s)
4.15409	567.976
6.25681	551.0754
9.84382	520.5178
13.3071	497.1686
17.2652	476.6589
22.3365	454.2607
27.7788	427.8353
33.3449	388.9106
38.6635	348.2785
45.5901	315.6705

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 515 m/s



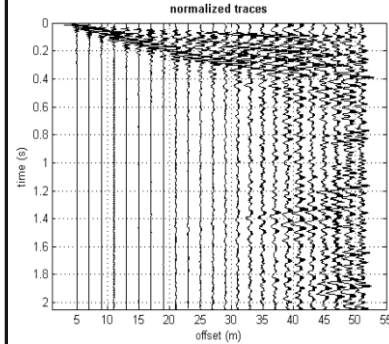
Codice Certificato di prova: szz-azt SM_08

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

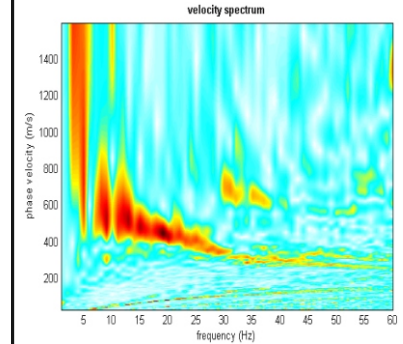
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_08
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NNE - SSO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4803017 m; E 302858 m G24: N 4802917 m; E 302792 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -31.9156	-3.50435
Optimizing Vs & Thickness - generation: 2; average & best misfits: -29.091	-3.50435
Optimizing Vs & Thickness - generation: 3; average & best misfits: -24.9987	-3.50435
Optimizing Vs & Thickness - generation: 4; average & best misfits: -28.6017	-3.50435
Optimizing Vs & Thickness - generation: 5; average & best misfits: -22.1125	-3.50108
Optimizing Vs & Thickness - generation: 6; average & best misfits: -23.1539	-3.50108
Optimizing Vs & Thickness - generation: 7; average & best misfits: -23.7399	-3.50108
Optimizing Vs & Thickness - generation: 8; average & best misfits: -22.791	-3.50108
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.1194	-3.50108
Optimizing Vs & Thickness - generation: 10; average & best misfits: -17.246	-3.50108
Optimizing Vs & Thickness - generation: 11; average & best misfits: -21.2818	-3.50108
Optimizing Vs & Thickness - generation: 12; average & best misfits: -21.7673	-3.47199
Optimizing Vs & Thickness - generation: 13; average & best misfits: -22.1908	-3.47199
Optimizing Vs & Thickness - generation: 14; average & best misfits: -21.1151	-3.47199
Optimizing Vs & Thickness - generation: 15; average & best misfits: -23.8914	-3.47199
Optimizing Vs & Thickness - generation: 16; average & best misfits: -20.3434	-3.47199
Optimizing Vs & Thickness - generation: 17; average & best misfits: -24.1616	-3.47199
Optimizing Vs & Thickness - generation: 18; average & best misfits: -25.0751	-3.47199
Optimizing Vs & Thickness - generation: 19; average & best misfits: -27.9907	-3.47199
Optimizing Vs & Thickness - generation: 20; average & best misfits: -28.6332	-3.47199
Optimizing Vs & Thickness - generation: 21; average & best misfits: -25.2896	-3.47199
Optimizing Vs & Thickness - generation: 22; average & best misfits: -28.8135	-3.47199
Optimizing Vs & Thickness - generation: 23; average & best misfits: -24.402	-3.47199
Optimizing Vs & Thickness - generation: 24; average & best misfits: -19.2653	-2.11304
Optimizing Vs & Thickness - generation: 25; average & best misfits: -26.4306	-2.11304
Optimizing Vs & Thickness - generation: 26; average & best misfits: -17.4369	-2.11304
Optimizing Vs & Thickness - generation: 27; average & best misfits: -22.3724	-2.11304
Optimizing Vs & Thickness - generation: 28; average & best misfits: -19.1029	-2.11304
Optimizing Vs & Thickness - generation: 29; average & best misfits: -19.101	-2.11304
Optimizing Vs & Thickness - generation: 30; average & best misfits: -23.4338	-2.11304
Optimizing Vs & Thickness - generation: 31; average & best misfits: -21.31	-2.11304

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -34.9867	-2.11304
Optimizing Vs & Thickness - generation: 2; average & best misfits: -34.2805	-2.11304
Optimizing Vs & Thickness - generation: 3; average & best misfits: -31.5066	-2.11304
Optimizing Vs & Thickness - generation: 4; average & best misfits: -32.0635	-2.11304
Optimizing Vs & Thickness - generation: 5; average & best misfits: -28.5868	-2.11304
Optimizing Vs & Thickness - generation: 6; average & best misfits: -28.5818	-2.11304
Optimizing Vs & Thickness - generation: 7; average & best misfits: -27.5711	-2.11304
Optimizing Vs & Thickness - generation: 8; average & best misfits: -27.3769	-2.11304
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.0936	-2.11304

MODELLO MEDIO

VS (m/s): 296 480 577 620 640
Spessori (m): 4.0 7.9 12.0 11.7

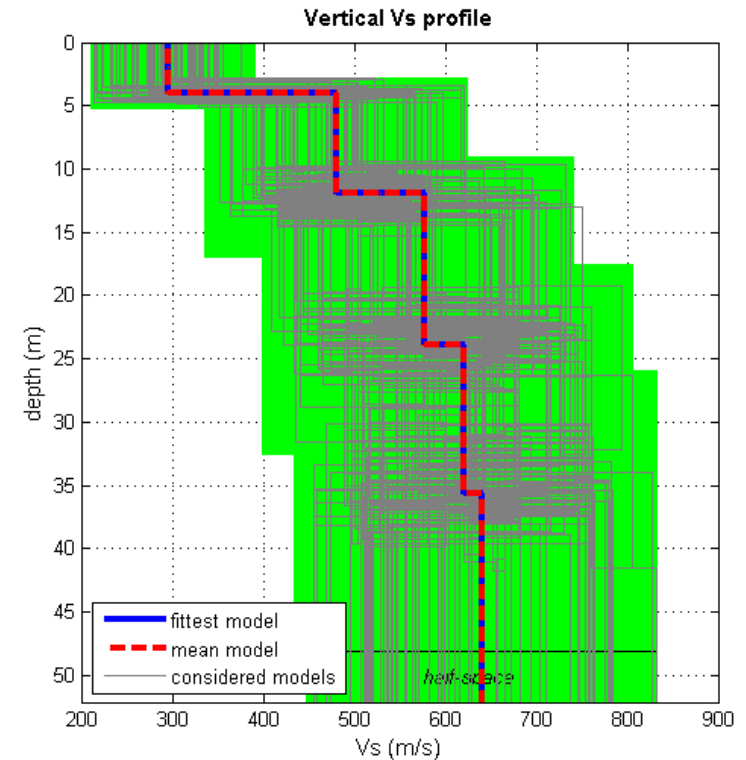
Fundamental mode

Mean model	f(Hz)	VR(m/s)
	4.89623	556.4892
	9.10168	515.7373
	13.5545	472.9577
	17.2652	442.2348
	20.3574	419.808
	25.4287	385.1087
	29.5105	356.2422
	33.9633	328.6791
	43.6111	297.0106

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 495 m/s



Codice Certificato di prova: szz-azt_SM_09

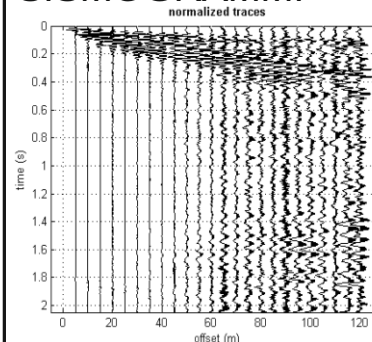
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018
Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

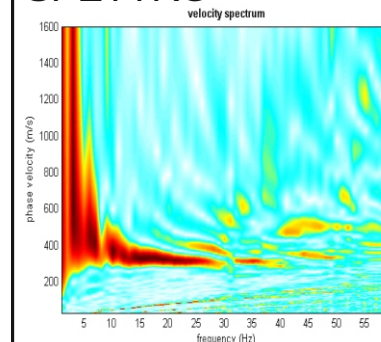
Profilo	SM_09
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4803077 m; E 302266 m G24: N 4803169 m; E 302343 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -18.2561	-3.32622
Optimizing Vs & Thickness - generation: 2; average & best misfits: -19.8095	-3.32622
Optimizing Vs & Thickness - generation: 3; average & best misfits: -19.324	-3.32622
Optimizing Vs & Thickness - generation: 4; average & best misfits: -18.0462	-3.32622
Optimizing Vs & Thickness - generation: 5; average & best misfits: -15.956	-3.32622
Optimizing Vs & Thickness - generation: 6; average & best misfits: -13.5549	-3.32622
Optimizing Vs & Thickness - generation: 7; average & best misfits: -14.5444	-3.32622
Optimizing Vs & Thickness - generation: 8; average & best misfits: -13.5467	-3.32622
Optimizing Vs & Thickness - generation: 9; average & best misfits: -15.7347	-3.32622
Optimizing Vs & Thickness - generation: 10; average & best misfits: -14.1747	-3.32622
Optimizing Vs & Thickness - generation: 11; average & best misfits: -14.7523	-3.32622
Optimizing Vs & Thickness - generation: 12; average & best misfits: -14.5505	-3.29884
Optimizing Vs & Thickness - generation: 13; average & best misfits: -13.4651	-3.29884
Optimizing Vs & Thickness - generation: 14; average & best misfits: -13.5438	-3.29884
Optimizing Vs & Thickness - generation: 15; average & best misfits: -16.6079	-3.29884
Optimizing Vs & Thickness - generation: 16; average & best misfits: -14.0595	-3.29884
Optimizing Vs & Thickness - generation: 17; average & best misfits: -15.0731	-3.29884
Optimizing Vs & Thickness - generation: 18; average & best misfits: -16.067	-3.29884
Optimizing Vs & Thickness - generation: 19; average & best misfits: -16.6494	-3.28344
Optimizing Vs & Thickness - generation: 20; average & best misfits: -14.3851	-3.28344
Optimizing Vs & Thickness - generation: 21; average & best misfits: -13.6289	-3.28344
Optimizing Vs & Thickness - generation: 22; average & best misfits: -15.5411	-3.28344
Optimizing Vs & Thickness - generation: 23; average & best misfits: -16.7295	-3.28344
Optimizing Vs & Thickness - generation: 24; average & best misfits: -14.3027	-3.28344
Optimizing Vs & Thickness - generation: 25; average & best misfits: -13.0492	-2.58222
Optimizing Vs & Thickness - generation: 26; average & best misfits: -14.2623	-2.58222
Optimizing Vs & Thickness - generation: 27; average & best misfits: -17.1122	-2.58222
Optimizing Vs & Thickness - generation: 28; average & best misfits: -15.1911	-2.58222
Optimizing Vs & Thickness - generation: 29; average & best misfits: -15.6209	-2.58222
Optimizing Vs & Thickness - generation: 30; average & best misfits: -18.3581	-2.58222
Optimizing Vs & Thickness - generation: 31; average & best misfits: -15.3738	-2.58222

Inversione: fase#2

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -20.4799	-2.58222
Optimizing Vs & Thickness - generation: 2; average & best misfits: -21.0574	-2.58222
Optimizing Vs & Thickness - generation: 3; average & best misfits: -17.2373	-2.58222
Optimizing Vs & Thickness - generation: 4; average & best misfits: -16.8961	-2.58222
Optimizing Vs & Thickness - generation: 5; average & best misfits: -14.6363	-2.58222
Optimizing Vs & Thickness - generation: 6; average & best misfits: -14.4048	-2.58222
Optimizing Vs & Thickness - generation: 7; average & best misfits: -16.2264	-2.58222
Optimizing Vs & Thickness - generation: 8; average & best misfits: -15.7028	-2.58222
Optimizing Vs & Thickness - generation: 9; average & best misfits: -16.7457	-2.58222

MODELLO MEDIO

VS (m/s): 297 349 404 490 517
Spessori (m): 3.1 8.0 14.5 11.6

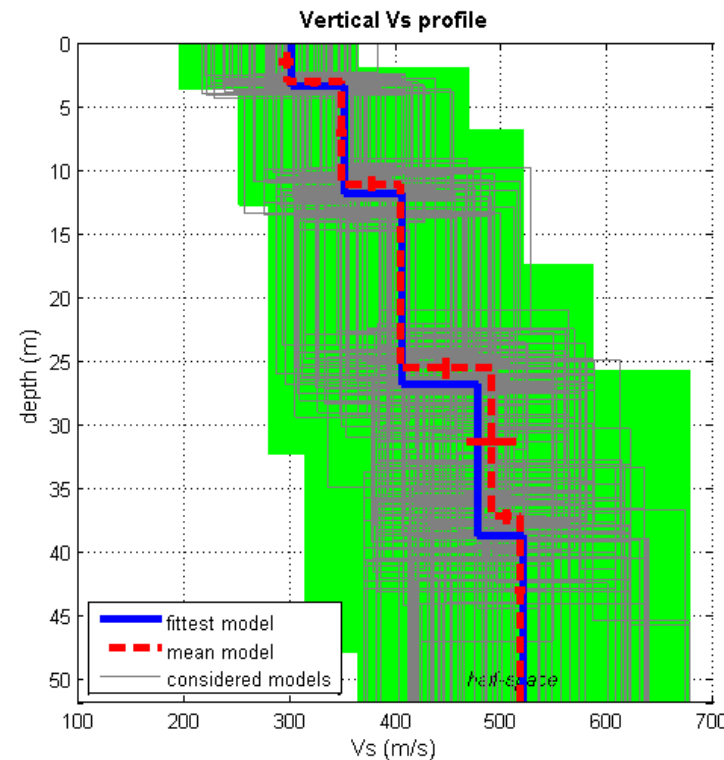
Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.04088	449.972
	4.40147	432.1611
	6.62788	394.3606
	10.3386	354.763
	15.1625	332.714
	21.347	318.624
	29.7579	307.6143
	39.7767	297.3319

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 383 m/s



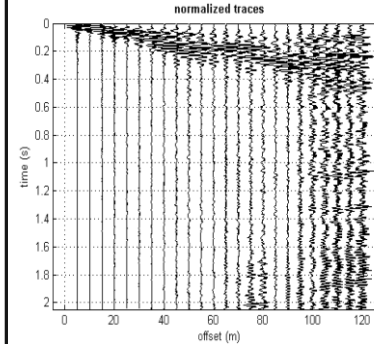
Codice Certificato di prova: szz-azt SM_10

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

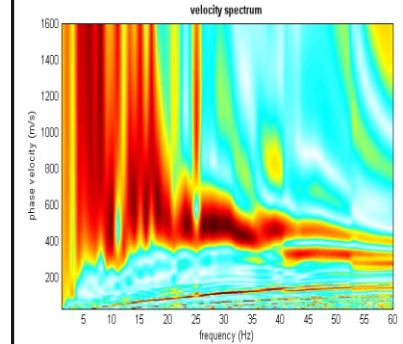
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	SM_10
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	96.0 m
Distanza intergeofonica	4.0 m
Orientazione stendimento	NO - SE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4803364 m; E 302385 m G24: N 4803294 m; E 302452 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -23.4676	-3.91618
Optimizing Vs & Thickness - generation: 2; average & best misfits: -25.1692	-3.91618
Optimizing Vs & Thickness - generation: 3; average & best misfits: -27.1687	-3.91618
Optimizing Vs & Thickness - generation: 4; average & best misfits: -23.19	-3.81212
Optimizing Vs & Thickness - generation: 5; average & best misfits: -26.5155	-3.81212
Optimizing Vs & Thickness - generation: 6; average & best misfits: -23.7744	-3.81212
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.0495	-3.81212
Optimizing Vs & Thickness - generation: 8; average & best misfits: -23.8647	-3.81212
Optimizing Vs & Thickness - generation: 9; average & best misfits: -23.3032	-3.81212
Optimizing Vs & Thickness - generation: 10; average & best misfits: -21.8744	-3.81212
Optimizing Vs & Thickness - generation: 11; average & best misfits: -21.8437	-3.81212
Optimizing Vs & Thickness - generation: 12; average & best misfits: -21.1942	-3.68655
Optimizing Vs & Thickness - generation: 13; average & best misfits: -26.5336	-3.68655
Optimizing Vs & Thickness - generation: 14; average & best misfits: -24.956	-3.68655
Optimizing Vs & Thickness - generation: 15; average & best misfits: -34.4907	-3.68655
Optimizing Vs & Thickness - generation: 16; average & best misfits: -25.4403	-3.68655
Optimizing Vs & Thickness - generation: 17; average & best misfits: -32.5133	-3.68655
Optimizing Vs & Thickness - generation: 18; average & best misfits: -27.2048	-3.68655
Optimizing Vs & Thickness - generation: 19; average & best misfits: -22.092	-3.68655
Optimizing Vs & Thickness - generation: 20; average & best misfits: -20.645	-3.68655
Optimizing Vs & Thickness - generation: 21; average & best misfits: -18.8745	-3.68655
Optimizing Vs & Thickness - generation: 22; average & best misfits: -23.0133	-3.68655
Optimizing Vs & Thickness - generation: 23; average & best misfits: -25.5952	-3.68655
Optimizing Vs & Thickness - generation: 24; average & best misfits: -22.2616	-3.68655
Optimizing Vs & Thickness - generation: 25; average & best misfits: -22.4341	-3.68655
Optimizing Vs & Thickness - generation: 26; average & best misfits: -23.2141	-3.68655
Optimizing Vs & Thickness - generation: 27; average & best misfits: -21.7939	-3.68655
Optimizing Vs & Thickness - generation: 28; average & best misfits: -18.1383	-3.68655
Optimizing Vs & Thickness - generation: 29; average & best misfits: -19.6094	-3.68655
Optimizing Vs & Thickness - generation: 30; average & best misfits: -20.3137	-3.68655
Optimizing Vs & Thickness - generation: 31; average & best misfits: -22.2986	-3.6302

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -37.3132	-3.6302
Optimizing Vs & Thickness - generation: 2; average & best misfits: -34.5734	-3.6302
Optimizing Vs & Thickness - generation: 3; average & best misfits: -28.062	-3.6302
Optimizing Vs & Thickness - generation: 4; average & best misfits: -31.8511	-3.6302
Optimizing Vs & Thickness - generation: 5; average & best misfits: -31.933	-3.6302
Optimizing Vs & Thickness - generation: 6; average & best misfits: -28.798	-3.6302
Optimizing Vs & Thickness - generation: 7; average & best misfits: -28.9162	-3.6302
Optimizing Vs & Thickness - generation: 8; average & best misfits: -31.6635	-3.6302
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.6779	-3.6302

MODELLO MEDIO

VS (m/s): 280 450 500 420 573
Spessori (m): 2.1 4.0 18.0 17.9

Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.92704	466.4163
	4.96012	446.2532
	6.91148	432.1403
	9.78113	431.3566
	13.6839	433.421
	19.3084	429.2071
	25.392	417.0378
	33.3123	397.7149
	37.6741	386.3714
	45.7091	363.0058
	54.892	332.0343

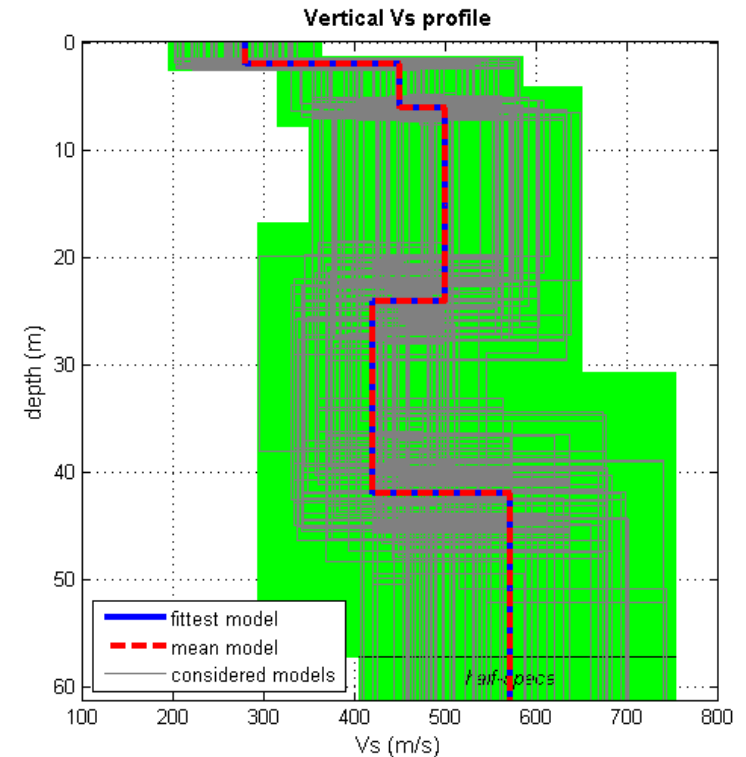
First higher mode

Mean model	f(Hz)	VR(m/s)
	13.3395	533.6064
	17.357	496.9444
	22.9815	466.8543
	27.6877	454.2543
	33.8862	443.8927
	39.7403	437.6847
	56.0399	429.0269

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Surface Wave Analysis

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 452 m/s



Codice Certificato di prova: szz-azt_P_01

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

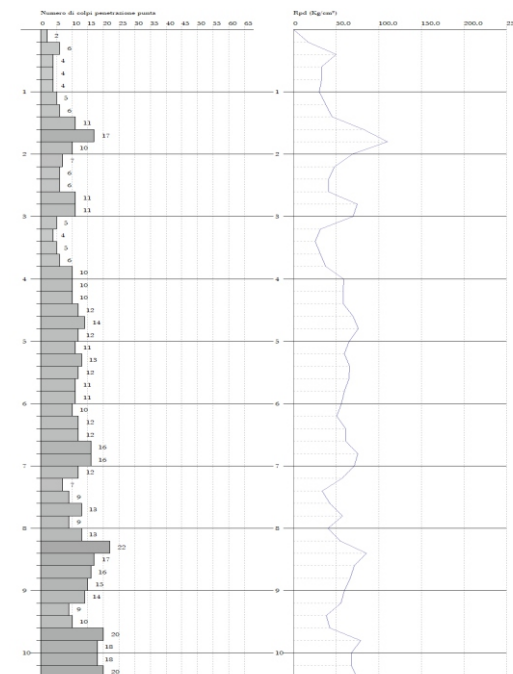
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurata	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	2	0.855	16.61	19.44
0,4	6	0.851	49.61	58.31
0,6	4	0.847	32.92	38.87
0,8	4	0.843	32.78	38.87
1	4	0.840	30.20	35.96
1,2	5	0.836	37.59	44.95
1,4	6	0.833	44.92	53.94
1,6	11	0.830	52.03	66.89
1,8	17	0.776	118.64	152.83
2	10	0.823	68.85	83.63
2,2	7	0.820	48.01	58.54
2,4	6	0.817	41.00	50.18
2,6	6	0.814	40.86	50.18
2,8	11	0.811	74.65	92.00
3	11	0.809	69.55	86.00
3,2	5	0.806	31.51	39.09
3,4	4	0.803	25.13	31.27
3,6	5	0.801	31.31	39.09
3,8	6	0.798	37.45	46.91
4	10	0.796	58.43	73.40
4,2	10	0.794	58.28	73.40
4,4	10	0.791	58.09	73.40
4,6	12	0.789	69.52	88.08
4,8	14	0.737	75.75	102.76
5	12	0.785	65.16	83.01
5,2	11	0.782	76.06	96.06
5,4	13	0.731	85.74	109.92
5,6	12	0.779	64.67	83.01
5,8	11	0.777	59.14	76.09
6	11	0.775	55.79	71.94
6,2	10	0.774	50.60	65.40
6,4	12	0.772	60.59	76.48
6,6	12	0.770	60.46	76.48
6,8	16	0.719	75.21	104.64
7	16	0.717	71.17	99.24
7,2	12	0.766	56.98	74.43
7,4	7	0.764	33.18	43.42
7,6	9	0.763	42.57	55.82
7,8	13	0.711	57.35	80.63
8	9	0.760	40.33	53.08
8,2	13	0.709	54.32	76.67
8,4	22	0.657	85.27	129.74
8,6	17	0.706	70.78	100.26
8,8	16	0.705	66.50	94.36
9	15	0.703	59.32	84.32

Profondità (m)	N. colpi della punta misurata	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	14	0.702	55.27	78.70
9,4	9	0.751	38.00	50.59
9,6	10	0.750	42.16	58.21
9,8	20	0.699	78.56	112.42
10	18	0.698	67.44	96.65
10,2	18	0.697	67.33	96.65
10,4	20	0.696	74.69	107.39
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_02

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	stabilizzato



SPECIFICHE TECNICHE STRUMENTAZIONE

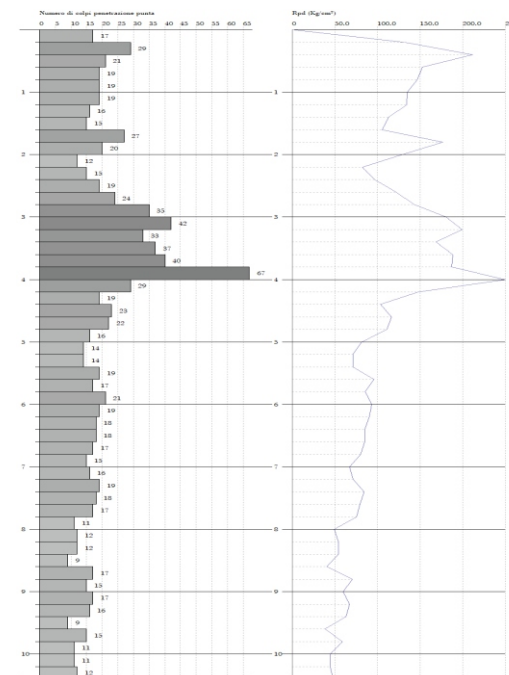
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	17	0.805	132.93	165.20
0,4	29	0.751	211.59	281.82
0,6	21	0.747	152.44	204.07
0,8	19	0.793	146.48	184.64
1	19	0.790	134.90	170.81
1,2	19	0.786	134.30	170.81
1,4	16	0.783	112.61	143.84
1,6	15	0.780	105.12	134.85
1,8	27	0.728	176.30	242.73
2	20	0.773	129.33	167.27
2,2	12	0.820	82.31	100.36
2,4	15	0.767	96.24	125.45
2,6	19	0.764	121.44	158.90
2,8	24	0.711	142.90	200.72
3	35	0.659	190.24	273.65
3,2	42	0.606	199.00	328.38
3,4	33	0.653	168.58	258.01
3,6	37	0.651	188.29	289.28
3,8	40	0.598	187.15	312.74
4	67	0.596	293.12	491.80
4,2	29	0.694	147.67	212.87
4,4	19	0.741	103.40	139.47
4,6	23	0.689	116.36	168.83
4,8	22	0.687	110.96	161.49
5	16	0.735	81.35	110.67
5,2	14	0.733	70.98	96.94
5,4	14	0.731	70.79	96.94
5,6	19	0.729	95.83	131.43
5,8	17	0.727	85.52	117.59
6	21	0.675	92.77	137.34
6,2	19	0.724	89.93	124.26
6,4	18	0.722	85.00	117.72
6,6	18	0.720	84.90	117.72
6,8	17	0.719	79.91	111.18
7	15	0.717	66.72	93.03
7,2	16	0.716	71.02	99.24
7,4	19	0.714	84.16	117.84
7,6	18	0.713	79.57	106.58
7,8	17	0.711	75.00	105.44
8	11	0.760	49.30	64.87
8,2	12	0.759	53.68	70.77
8,4	12	0.757	53.99	70.77
8,6	9	0.756	40.12	53.08
8,8	17	0.705	70.65	100.26
9	15	0.703	59.32	84.32

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	17	0.702	67.11	95.56
9,4	16	0.701	63.06	89.94
9,6	9	0.750	37.94	50.59
9,8	15	0.699	58.92	84.32
10	11	0.748	44.16	59.07
10,2	11	0.747	44.10	59.07
10,4	12	0.746	48.04	64.44
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_03

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

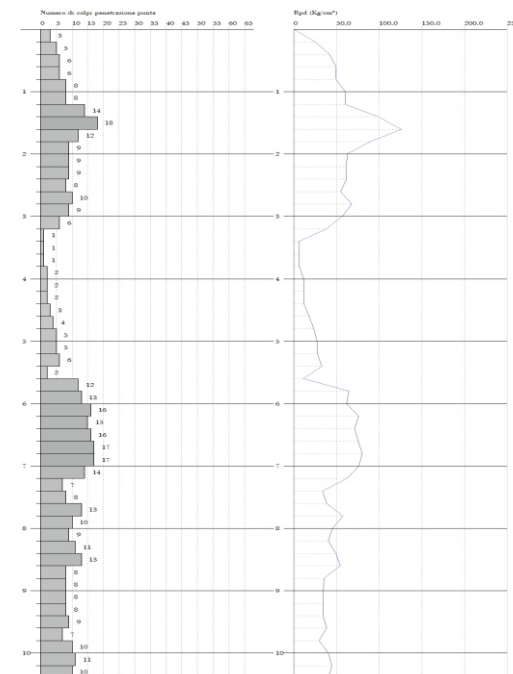
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurata	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	3	0,855	24,92	29,15
0,4	5	0,851	41,34	48,59
0,6	6	0,847	49,39	58,31
0,8	6	0,843	49,17	58,31
1	8	0,840	60,39	71,92
1,2	8	0,836	60,14	71,92
1,4	14	0,783	98,53	125,86
1,6	18	0,780	126,15	161,82
1,8	12	0,826	89,14	107,98
2	9	0,823	61,96	75,27
2,2	9	0,820	61,73	75,27
2,4	9	0,817	61,51	75,27
2,6	8	0,814	54,48	66,91
2,8	10	0,811	67,86	83,63
3	9	0,809	56,90	70,37
3,2	6	0,806	37,81	46,91
3,4	1	0,803	6,28	7,82
3,6	1	0,801	6,26	7,82
3,8	1	0,798	6,24	7,82
4	2	0,796	11,89	14,68
4,2	2	0,794	11,65	14,68
4,4	2	0,791	11,62	14,68
4,6	3	0,789	17,38	22,02
4,8	4	0,787	23,11	29,36
5	5	0,785	27,15	34,59
5,2	5	0,783	27,08	34,59
5,4	6	0,781	32,42	41,50
5,6	2	0,779	10,78	13,83
5,8	12	0,777	64,52	83,01
6	13	0,725	61,88	85,02
6,2	16	0,724	75,73	104,64
6,4	15	0,722	70,83	98,10
6,6	16	0,720	75,38	104,64
6,8	17	0,719	79,91	111,18
7	17	0,717	75,62	105,44
7,2	14	0,716	62,14	86,83
7,4	7	0,764	33,18	43,42
7,6	8	0,763	37,84	49,62
7,8	13	0,711	57,35	80,63
8	10	0,760	44,82	58,97
8,2	9	0,759	40,26	53,08
8,4	11	0,757	49,12	64,87
8,6	13	0,706	54,12	76,67
8,8	8	0,755	35,61	47,18
9	8	0,753	33,88	44,97

Profondità (m)	N. colpi della punta misurata	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	8	0,752	33,83	44,97
9,4	8	0,751	33,76	44,97
9,6	9	0,750	37,94	50,59
9,8	7	0,749	29,46	39,35
10	10	0,748	40,15	53,70
10,2	11	0,747	44,10	59,07
10,4	10	0,746	40,03	53,70
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_04

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

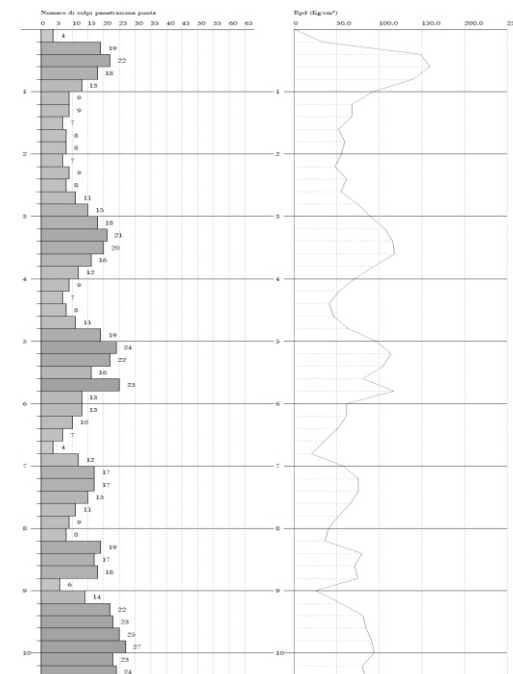
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	4	0.855	33.22	38.87
0,4	19	0.801	147.85	184.64
0,6	22	0.747	159.70	213.79
0,8	18	0.793	138.77	174.92
1	13	0.790	92.30	116.87
1,2	9	0.836	67.66	80.91
1,4	9	0.833	67.39	80.91
1,6	7	0.830	52.20	62.93
1,8	8	0.826	59.43	71.92
2	8	0.823	55.08	66.91
2,2	7	0.820	48.01	58.54
2,4	9	0.817	61.51	75.27
2,6	8	0.814	54.48	66.91
2,8	11	0.811	74.65	92.00
3	15	0.759	88.98	117.28
3,2	18	0.756	106.39	140.73
3,4	21	0.703	115.49	164.19
3,6	20	0.751	117.41	156.37
3,8	16	0.748	93.62	125.10
4	12	0.796	70.12	88.08
4,2	9	0.794	52.43	66.06
4,4	7	0.791	40.67	51.38
4,6	8	0.789	46.35	58.72
4,8	11	0.787	63.65	80.74
5	19	0.735	96.60	131.43
5,2	24	0.683	113.39	169.01
5,4	22	0.681	103.64	152.18
5,6	16	0.729	80.70	110.67
5,8	25	0.677	117.12	172.93
6	13	0.725	61.88	85.02
6,2	13	0.724	61.53	85.02
6,4	10	0.772	50.49	66.40
6,6	7	0.770	35.27	45.78
6,8	4	0.769	20.11	26.16
7	12	0.767	57.10	74.43
7,2	17	0.716	75.46	105.44
7,4	17	0.714	75.30	105.44
7,6	15	0.713	68.30	93.03
7,8	11	0.761	51.94	68.22
8	9	0.760	40.33	53.08
8,2	8	0.759	35.79	47.18
8,4	19	0.707	79.25	112.05
8,6	17	0.706	70.78	100.26
8,8	8	0.705	74.81	106.15
9	6	0.753	25.41	33.73

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	14	0.702	55.27	78.70
9,4	22	0.651	80.52	123.67
9,6	23	0.650	84.03	129.29
9,8	25	0.649	91.18	140.53
10	27	0.648	93.90	144.98
10,2	23	0.647	79.86	123.50
10,4	24	0.646	83.19	128.87
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_05

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

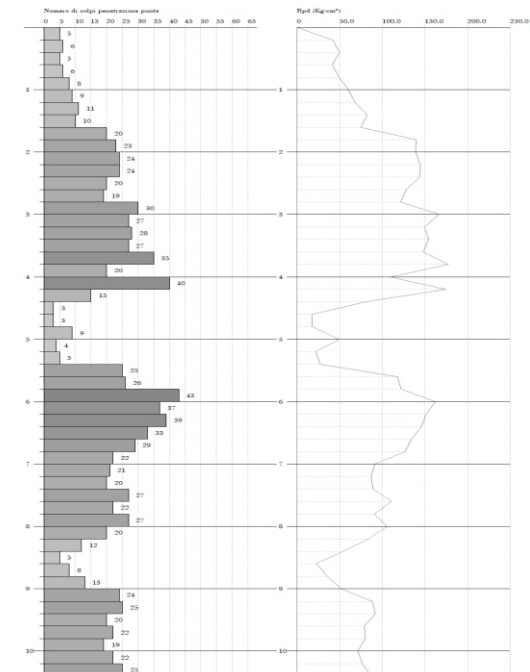
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurata	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	5	0.855	41.53	48.59
0,4	6	0.851	49.61	58.31
0,6	5	0.847	41.16	48.59
0,8	6	0.843	49.17	58.31
1	8	0.840	60.39	71.92
1,2	9	0.836	67.66	80.91
1,4	11	0.833	82.36	98.89
1,6	10	0.830	74.58	89.90
1,8	20	0.778	139.58	179.80
2	23	0.723	139.11	192.36
2,2	24	0.720	144.54	200.72
2,4	24	0.717	143.95	200.72
2,6	20	0.764	127.83	167.27
2,8	19	0.761	120.99	158.90
3	30	0.709	166.22	234.55
3,2	27	0.706	149.04	211.10
3,4	28	0.703	153.99	218.92
3,6	27	0.701	147.95	211.10
3,8	35	0.648	177.44	273.65
4	20	0.746	109.52	146.81
4,2	40	0.594	174.32	233.61
4,4	15	0.741	81.64	110.10
4,6	3	0.789	17.38	22.02
4,8	3	0.787	17.33	22.02
5	9	0.785	48.87	62.25
5,2	4	0.783	21.68	27.87
5,4	5	0.781	27.01	34.59
5,6	25	0.679	117.44	172.93
5,8	26	0.677	121.81	179.85
6	43	0.575	181.84	281.23
6,2	37	0.624	150.93	241.99
6,4	39	0.572	145.90	255.07
6,6	33	0.620	133.89	215.83
6,8	29	0.669	126.84	189.67
7	22	0.667	91.03	136.45
7,2	21	0.666	86.70	130.25
7,4	20	0.714	88.99	124.04
7,6	27	0.663	110.98	167.46
7,8	22	0.661	90.23	136.45
8	27	0.660	105.08	159.23
8,2	20	0.709	83.57	117.95
8,4	12	0.757	53.99	70.77
8,6	5	0.756	22.29	29.49
8,8	8	0.755	35.61	47.18
9	13	0.703	51.41	73.08

Profondità (m)	N. colpi della punta misurata	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	24	0.652	86.52	134.91
9,4	25	0.651	91.50	140.53
9,6	20	0.700	78.69	112.42
9,8	22	0.649	80.24	123.67
10	19	0.698	71.18	102.02
10,2	22	0.647	76.38	118.13
10,4	25	0.646	86.65	134.24
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_06

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	asfalto



SPECIFICHE TECNICHE STRUMENTAZIONE

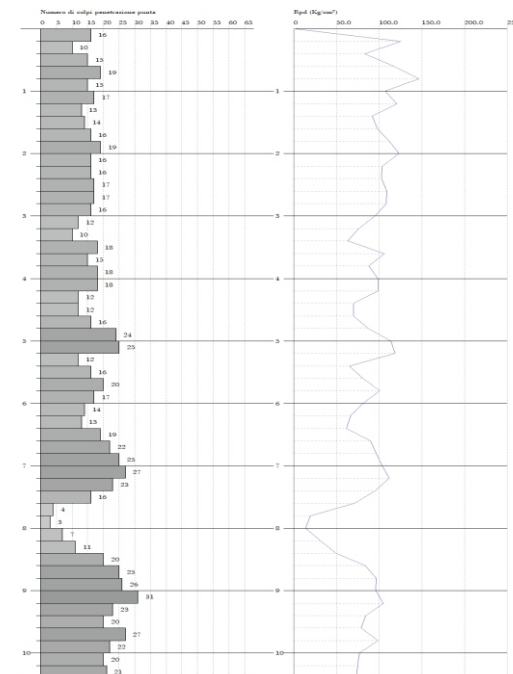
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	16	0.805	125.11	155.49
0,4	10	0.851	82.88	97.18
0,6	15	0.797	116.18	145.77
0,8	19	0.793	146.48	184.64
1	15	0.790	106.50	134.85
1,2	17	0.786	120.16	152.83
1,4	13	0.783	91.49	116.87
1,6	14	0.780	98.11	125.86
1,8	16	0.776	111.67	143.84
2	19	0.773	122.86	158.90
2,2	16	0.770	103.05	133.81
2,4	16	0.767	102.65	133.81
2,6	17	0.764	108.66	142.18
2,8	17	0.761	108.26	142.18
3	16	0.759	94.91	125.10
3,2	12	0.806	75.62	93.82
3,4	10	0.803	62.81	78.18
3,6	18	0.751	105.67	140.73
3,8	15	0.748	87.77	117.28
4	18	0.746	98.57	132.12
4,2	19	0.744	132.12	166.28
4,4	12	0.791	69.71	88.08
4,6	12	0.789	69.52	88.08
4,8	16	0.737	86.57	117.44
5	24	0.685	113.72	166.01
5,2	25	0.683	118.11	172.80
5,4	12	0.781	84.83	107.01
5,6	16	0.729	80.70	110.67
5,8	20	0.727	100.61	138.34
6	17	0.725	80.66	111.18
6,2	14	0.724	86.27	111.56
6,4	13	0.722	85.39	110.92
6,6	19	0.720	89.51	124.26
6,8	22	0.669	96.22	143.88
7	25	0.667	103.45	155.05
7,2	27	0.666	111.47	167.46
7,4	23	0.664	94.74	142.65
7,6	16	0.713	70.73	90.24
7,8	4	0.761	18.89	24.81
8	3	0.760	13.44	17.69
8,2	7	0.759	31.31	41.28
8,4	11	0.757	49.12	64.87
8,6	20	0.706	83.27	117.95
8,8	26	0.655	96.53	147.44
9	28	0.653	95.51	146.15

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	31	0.602	104.95	174.26
9,4	23	0.651	84.18	129.29
9,6	20	0.700	78.69	112.42
9,8	27	0.649	98.47	151.77
10	22	0.648	76.51	118.13
10,2	20	0.697	74.81	107.39
10,4	21	0.646	72.79	112.76
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_07

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

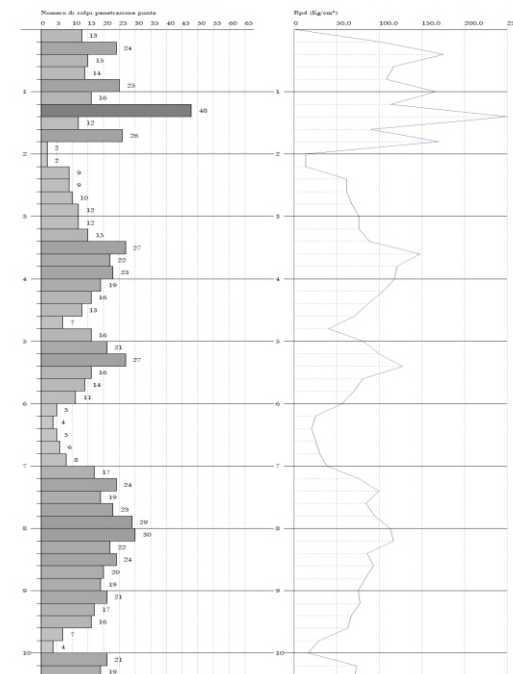
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	13	0.805	101.65	126.33
0,4	24	0.751	175.10	233.23
0,6	15	0.797	116.18	145.77
0,8	14	0.793	107.93	136.05
1	25	0.740	166.26	224.75
1,2	16	0.786	113.09	143.84
1,4	48	0.633	273.09	431.51
1,6	12	0.830	89.49	107.88
1,8	28	0.728	169.77	233.74
2	2	0.823	13.77	16.73
2,2	2	0.820	13.72	16.73
2,4	9	0.817	61.51	75.27
2,6	9	0.814	61.29	75.27
2,8	10	0.811	67.88	83.63
3	12	0.809	75.87	93.82
3,2	12	0.806	75.62	93.82
3,4	15	0.753	88.36	117.28
3,6	27	0.701	147.95	211.10
3,8	22	0.698	120.13	172.01
4	23	0.696	117.51	168.83
4,2	19	0.744	103.72	132.22
4,4	16	0.741	87.08	117.44
4,6	13	0.739	70.54	95.42
4,8	7	0.787	40.44	51.38
5	16	0.735	81.35	110.67
5,2	21	0.683	98.21	145.26
5,4	27	0.681	127.19	186.76
5,6	16	0.729	80.70	110.67
5,8	14	0.727	70.43	96.84
6	11	0.775	55.79	71.94
6,2	5	0.774	25.30	32.70
6,4	4	0.772	26.30	33.44
6,6	5	0.770	25.19	32.70
6,8	6	0.769	30.17	39.24
7	8	0.767	38.07	49.62
7,2	17	0.716	75.46	105.44
7,4	24	0.664	98.86	148.85
7,6	19	0.713	83.99	117.84
7,8	23	0.661	94.33	142.65
8	29	0.660	112.86	171.02
8,2	30	0.659	116.51	176.92
8,4	22	0.657	85.27	129.74
8,6	24	0.656	92.84	141.54
8,8	20	0.705	83.12	117.95
9	19	0.703	75.13	106.80

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	21	0.652	77.00	118.04
9,4	17	0.701	67.00	95.56
9,6	16	0.700	62.96	89.94
9,8	7	0.749	29.46	39.35
10	4	0.748	16.06	21.48
10,2	21	0.647	72.91	112.76
10,4	19	0.696	70.96	102.02
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_08

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

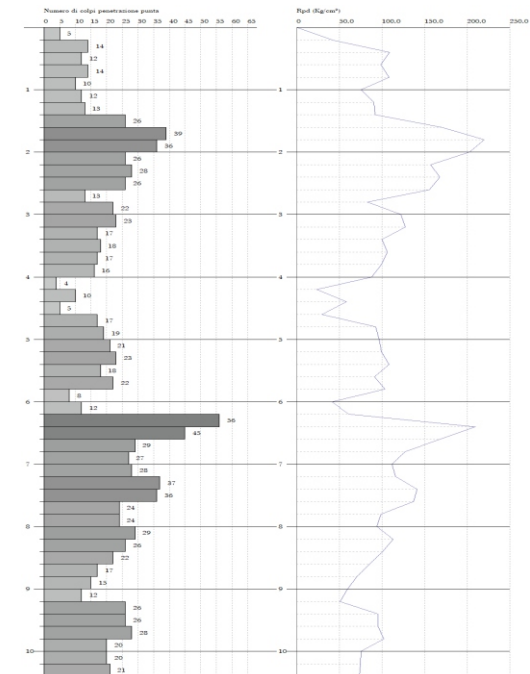
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	5	0,855	41,53	48,59
0,4	14	0,801	108,94	136,05
0,6	12	0,847	98,77	116,61
0,8	14	0,793	107,93	136,05
1	10	0,840	75,49	89,90
1,2	12	0,836	90,21	107,88
1,4	13	0,783	91,49	116,87
1,6	26	0,730	170,52	233,74
1,8	39	0,626	219,59	350,60
2	36	0,673	202,68	301,08
2,2	26	0,720	156,59	217,45
2,4	28	0,717	167,94	234,17
2,6	26	0,714	155,31	217,45
2,8	23	0,761	82,78	108,72
3	22	0,709	121,90	172,01
3,2	23	0,706	126,96	179,83
3,4	17	0,753	100,14	132,91
3,6	18	0,751	105,67	140,73
3,8	17	0,748	99,47	132,91
4	16	0,746	87,62	117,44
4,2	4	0,794	23,36	29,36
4,4	10	0,791	58,09	73,40
4,6	5	0,789	28,97	36,70
4,8	17	0,737	91,98	124,78
5	19	0,735	96,60	131,43
5,2	21	0,683	99,21	145,26
5,4	23	0,681	108,35	159,10
5,6	18	0,729	90,78	124,51
5,8	22	0,677	103,07	152,18
6	8	0,775	40,57	52,32
6,2	12	0,774	60,72	78,48
6,4	56	0,572	209,50	366,25
6,6	45	0,570	167,86	294,31
6,8	29	0,669	126,84	189,67
7	27	0,667	111,72	167,46
7,2	28	0,666	115,60	173,66
7,4	37	0,614	140,94	229,48
7,6	38	0,613	136,80	223,28
7,8	24	0,661	98,43	148,85
8	24	0,660	93,40	141,54
8,2	29	0,659	112,63	171,02
8,4	26	0,657	100,78	153,33
8,6	22	0,656	85,11	129,74
8,8	17	0,705	70,65	100,26
9	15	0,703	69,32	84,32

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	12	0,752	50,74	67,45
9,4	26	0,651	95,16	146,15
9,6	26	0,650	94,99	146,15
9,8	28	0,649	102,12	157,39
10	20	0,698	74,93	107,39
10,2	20	0,697	74,81	107,39
10,4	21	0,646	72,79	112,76
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_09

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

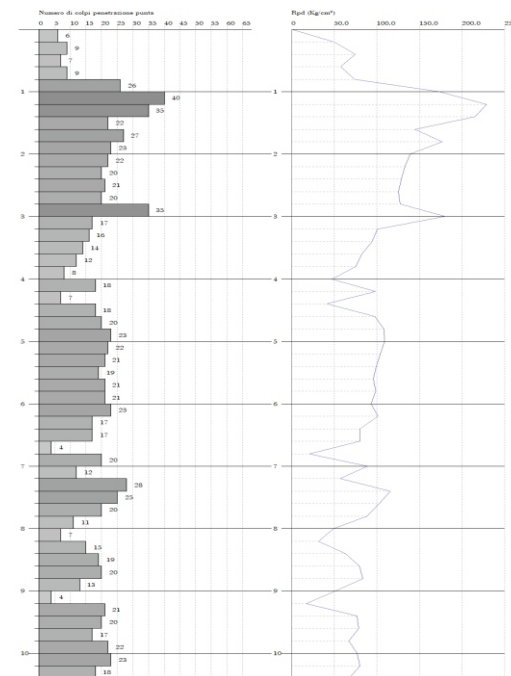
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	6	0.855	49.83	58.31
0,4	9	0.851	74.41	87.46
0,6	7	0.847	57.62	68.02
0,8	9	0.843	73.76	87.46
1	26	0.740	172.91	233.74
1,2	40	0.636	228.80	359.59
1,4	35	0.683	214.86	314.65
1,6	22	0.730	144.29	197.78
1,8	27	0.728	176.30	242.73
2	23	0.723	139.11	192.36
2,2	22	0.720	132.50	183.99
2,4	20	0.767	126.32	167.27
2,6	21	0.714	125.44	175.63
2,8	20	0.761	127.36	167.27
3	35	0.659	190.24	273.65
3,2	17	0.756	100.48	132.91
3,4	16	0.753	94.25	125.10
3,6	14	0.751	82.19	109.46
3,8	12	0.798	74.91	93.82
4	8	0.796	46.74	58.72
4,2	19	0.744	98.26	132.12
4,4	7	0.791	40.67	51.38
4,6	18	0.739	97.67	132.12
4,8	20	0.737	108.21	146.81
5	23	0.685	108.98	159.10
5,2	22	0.683	103.94	152.18
5,4	21	0.681	98.93	145.26
5,6	19	0.729	95.83	131.43
5,8	21	0.677	98.38	145.26
6	21	0.675	92.77	137.34
6,2	23	0.674	101.34	150.42
6,4	17	0.722	80.28	111.18
6,6	17	0.720	80.09	111.18
6,8	4	0.769	20.11	26.16
7	20	0.717	88.96	124.04
7,2	12	0.766	56.98	74.43
7,4	28	0.664	115.34	173.66
7,6	25	0.663	102.76	155.05
7,8	20	0.711	88.23	124.04
8	11	0.760	49.30	64.87
8,2	7	0.759	31.31	41.28
8,4	15	0.707	62.66	88.46
8,6	19	0.706	79.10	112.05
8,8	20	0.705	83.12	117.95
9	13	0.703	51.41	73.08

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	4	0.752	16.91	22.48
9,4	21	0.651	76.86	118.04
9,6	20	0.700	78.69	112.42
9,8	17	0.699	66.78	95.56
10	22	0.648	76.51	118.13
10,2	23	0.647	79.86	123.50
10,4	18	0.696	67.22	96.65
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GRAFICO n.colpi-resistenza dinamica



Codice Certificato di prova: szz-azt_P_10

Committente: Comune di Gubbio - Data Esecuzione: 25/09/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE	
Tipo di prova	penetrometria dinamica
Configurazione strumento	DPSH-B
Profondità della prova	10.4 m
Rifiuto	NO
Livello piezometrico	n.d.
Chiusura foro	n.d.
Superficie prova	terreno



SPECIFICHE TECNICHE STRUMENTAZIONE

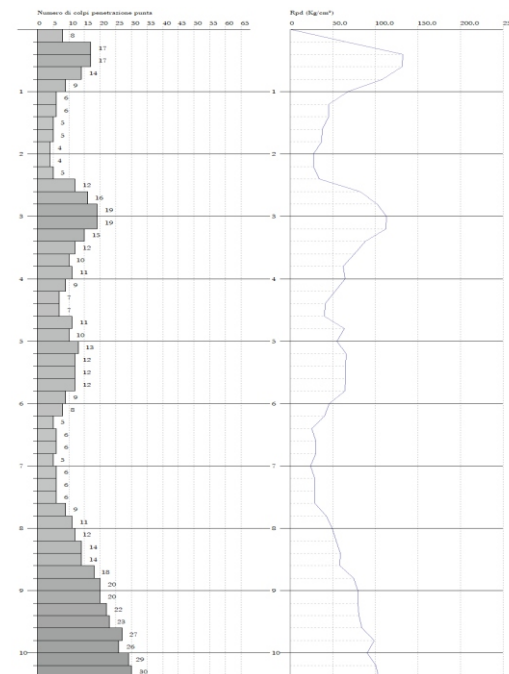
Marca strumentazione	PAGANI
Modello strumentazione	TG 63/200
Norma tecnica di riferimento	EN ISO 22476-2:2005/Amd 1:2011
Massa del maglio	63.5 kg
Altezza di caduta	75 cm
Lunghezza delle aste	1 ml
Massa aste	6.2 kg/m
Diametro aste	32 mm
Diametro base punta conica	51 mm
Angolo apertura punta conica	90°
Penetrazione standard	20 cm

TABULATO DELLA PROVA

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda Chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
0,2	8	0.855	66.44	77.74
0,4	17	0.801	132.29	165.20
0,6	17	0.797	131.67	165.20
0,8	14	0.793	107.93	136.05
1	9	0.840	67.94	80.91
1,2	6	0.836	45.11	53.94
1,4	6	0.833	44.92	53.94
1,6	5	0.830	37.29	44.95
1,8	5	0.826	37.14	44.95
2	4	0.823	27.54	33.45
2,2	4	0.820	27.44	33.45
2,4	5	0.817	34.17	41.82
2,6	12	0.814	81.72	100.36
2,8	16	0.761	101.89	133.81
3	19	0.759	112.70	148.55
3,2	19	0.756	112.30	148.55
3,4	15	0.753	88.36	117.28
3,6	12	0.801	75.14	93.82
3,8	10	0.798	62.42	78.18
4	11	0.796	64.27	80.74
4,2	9	0.794	52.43	66.06
4,4	7	0.791	40.67	51.38
4,6	7	0.789	40.55	51.38
4,8	11	0.787	63.55	80.74
5	10	0.785	54.30	69.17
5,2	13	0.732	65.91	86.92
5,4	12	0.781	64.83	83.01
5,6	12	0.779	64.67	83.01
5,8	12	0.777	64.52	83.01
6	9	0.775	45.65	58.86
6,2	8	0.774	40.48	52.32
6,4	5	0.772	25.25	32.70
6,6	6	0.770	30.23	39.24
6,8	6	0.769	30.17	39.24
7	5	0.767	23.79	31.01
7,2	6	0.766	28.49	37.21
7,4	6	0.764	28.44	37.21
7,6	6	0.763	28.38	37.21
7,8	9	0.761	42.49	55.82
8	11	0.760	49.30	64.87
8,2	12	0.759	53.68	70.77
8,4	14	0.707	58.39	82.56
8,6	14	0.706	58.29	82.56
8,8	18	0.705	74.81	106.15
9	20	0.703	79.09	112.42

Profondità (m)	N. colpi della punta misurato	Calcolo coeff. riduzione sonda chi	Res dinamica ridotta (Kg/cm ²)	Res. Dinamica (Kg/cm ²)
9,2	20	0.702	78.95	112.42
9,4	22	0.651	80.52	123.67
9,6	23	0.650	84.03	129.29
9,8	27	0.649	98.47	151.77
10	26	0.648	90.43	139.61
10,2	29	0.647	100.69	155.72
10,4	30	0.646	103.99	161.09
10,6				
10,8				
10,9				
11				
11,2				
11,4				
11,6				
11,8				
12				
12,2				
12,4				
12,6				
12,8				
13				
13,2				
13,4				
13,6				
13,8				
14				
14,2				
14,4				
14,6				
14,8				
15				
15,2				
15,4				
15,6				
15,8				
16				
16,2				
16,4				
16,6				
16,8				
17				
17,2				
17,4				
17,6				
17,8				
18				

GRAFICO n.colpi-resistenza dinamica



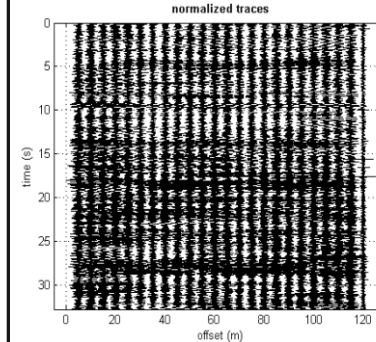
Codice Certificato di prova: szz-azt_RM_01

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

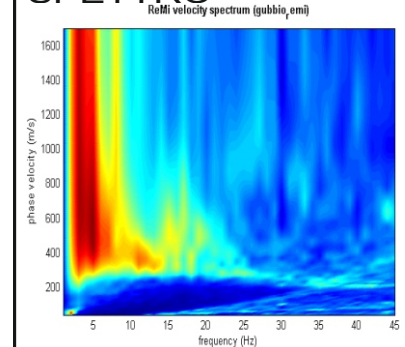
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_01
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	ESE - ONO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4801637 m; E 304332 m G24: N 4801668 m; E 304216 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -20.8086	-4.73859
Optimizing Vs & Thickness - generation: 2; average & best misfits: -20.9131	-3.28242
Optimizing Vs & Thickness - generation: 3; average & best misfits: -15.8788	-3.28242
Optimizing Vs & Thickness - generation: 4; average & best misfits: -20.0497	-3.24524
Optimizing Vs & Thickness - generation: 5; average & best misfits: -20.6421	-3.24524
Optimizing Vs & Thickness - generation: 6; average & best misfits: -18.0216	-3.24524
Optimizing Vs & Thickness - generation: 7; average & best misfits: -16.9087	-3.24524
Optimizing Vs & Thickness - generation: 8; average & best misfits: -19.1587	-3.24524
Optimizing Vs & Thickness - generation: 9; average & best misfits: -17.2624	-3.24524
Optimizing Vs & Thickness - generation: 10; average & best misfits: -13.6195	-3.15383
Optimizing Vs & Thickness - generation: 11; average & best misfits: -13.7094	-3.15383
Optimizing Vs & Thickness - generation: 12; average & best misfits: -14.0667	-3.15383
Optimizing Vs & Thickness - generation: 13; average & best misfits: -15.6572	-3.15383
Optimizing Vs & Thickness - generation: 14; average & best misfits: -12.8575	-3.15383
Optimizing Vs & Thickness - generation: 15; average & best misfits: -18.4436	-3.15383
Optimizing Vs & Thickness - generation: 16; average & best misfits: -15.5175	-3.15383
Optimizing Vs & Thickness - generation: 17; average & best misfits: -15.578	-2.99477
Optimizing Vs & Thickness - generation: 18; average & best misfits: -16.0336	-2.99477
Optimizing Vs & Thickness - generation: 19; average & best misfits: -15.0035	-2.99477
Optimizing Vs & Thickness - generation: 20; average & best misfits: -16.6284	-2.99477
Optimizing Vs & Thickness - generation: 21; average & best misfits: -15.0743	-2.99477
Optimizing Vs & Thickness - generation: 22; average & best misfits: -14.6411	-2.99477
Optimizing Vs & Thickness - generation: 23; average & best misfits: -14.8204	-2.99477
Optimizing Vs & Thickness - generation: 24; average & best misfits: -15.3131	-2.83314
Optimizing Vs & Thickness - generation: 25; average & best misfits: -14.7244	-2.83314
Optimizing Vs & Thickness - generation: 26; average & best misfits: -12.5709	-2.83314
Optimizing Vs & Thickness - generation: 27; average & best misfits: -13.7626	-2.83314
Optimizing Vs & Thickness - generation: 28; average & best misfits: -14.0697	-2.83314
Optimizing Vs & Thickness - generation: 29; average & best misfits: -16.0337	-2.83314
Optimizing Vs & Thickness - generation: 30; average & best misfits: -17.2132	-2.83314
Optimizing Vs & Thickness - generation: 31; average & best misfits: -15.0119	-2.83314

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -22.5542	-2.83314
Optimizing Vs & Thickness - generation: 2; average & best misfits: -20.858	-2.83314
Optimizing Vs & Thickness - generation: 3; average & best misfits: -16.9878	-2.83314
Optimizing Vs & Thickness - generation: 4; average & best misfits: -21.181	-2.83314
Optimizing Vs & Thickness - generation: 5; average & best misfits: -16.1856	-2.83314
Optimizing Vs & Thickness - generation: 6; average & best misfits: -12.9828	-2.83314
Optimizing Vs & Thickness - generation: 7; average & best misfits: -17.364	-2.83314
Optimizing Vs & Thickness - generation: 8; average & best misfits: -14.1842	-2.83314
Optimizing Vs & Thickness - generation: 9; average & best misfits: -15.1443	-2.83314

MODELLO MEDIO

VS (m/s): 236 299 296 382 402
Spessori (m): 0.5 6.9 15.0 11.4

Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.12354	347.5144
	5.18969	315.4587
	7.60019	289.3053
	11.3881	278.4283
	16.7831	275.9259
	23.6702	275.2585
	31.4757	274.621

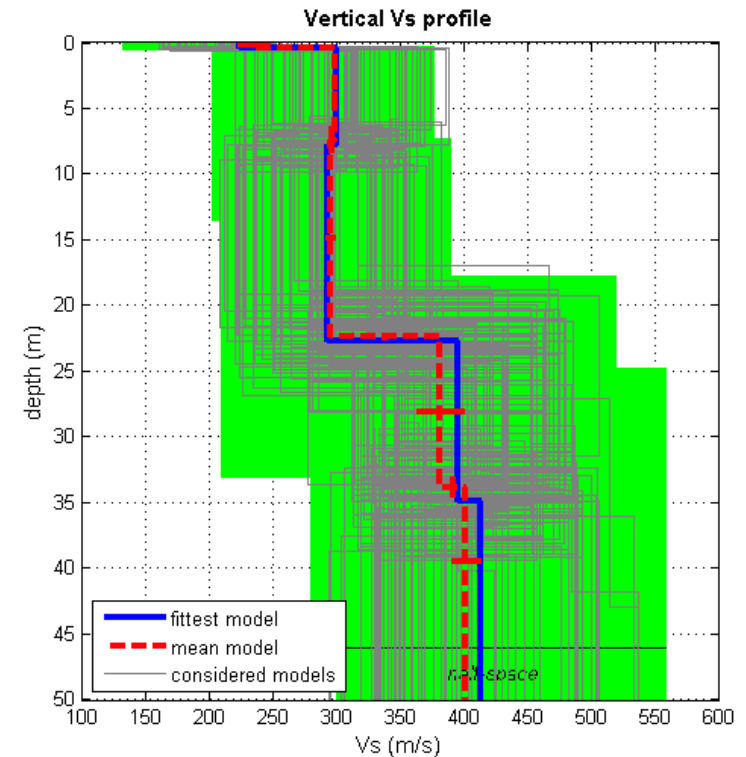
First higher mode

Mean model	f(Hz)	VR(m/s)
	16.4387	350.0186
	22.4076	322.3396
	35.608	304.2675

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Surface Wave Analysis

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PROFILO DI VELOCITA' 1D $V_{s,eq} (V_{s30}) = 313 \text{ m/s}$



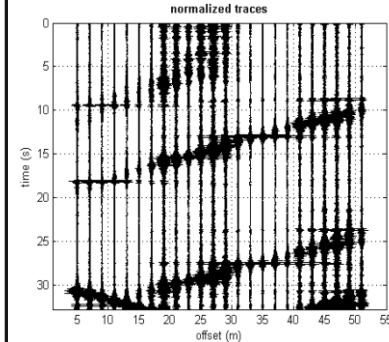
Codice Certificato di prova: szz-azt_RM_02

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

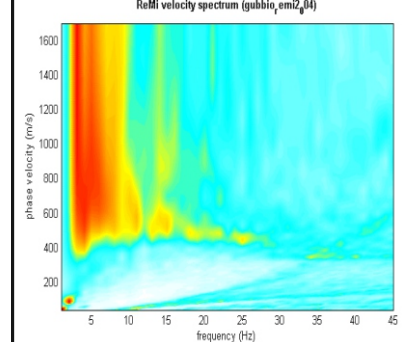
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_02
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	ENE - OSO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802197 m; E 304269 m G24: N 4802190 m; E 304149 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -32.4262	-5.92272
Optimizing Vs & Thickness - generation: 2; average & best misfits: -29.7773	-5.92272
Optimizing Vs & Thickness - generation: 3; average & best misfits: -29.528	-5.92272
Optimizing Vs & Thickness - generation: 4; average & best misfits: -28.5669	-5.89748
Optimizing Vs & Thickness - generation: 5; average & best misfits: -23.1772	-4.44816
Optimizing Vs & Thickness - generation: 6; average & best misfits: -20.6558	-4.22109
Optimizing Vs & Thickness - generation: 7; average & best misfits: -19.0486	-3.99033
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.6328	-3.30777
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.6948	-3.30777
Optimizing Vs & Thickness - generation: 10; average & best misfits: -21.7442	-3.30777
Optimizing Vs & Thickness - generation: 11; average & best misfits: -23.7793	-3.30777
Optimizing Vs & Thickness - generation: 12; average & best misfits: -23.1626	-3.30777
Optimizing Vs & Thickness - generation: 13; average & best misfits: -21.4829	-3.21901
Optimizing Vs & Thickness - generation: 14; average & best misfits: -25.0615	-3.21901
Optimizing Vs & Thickness - generation: 15; average & best misfits: -24.3519	-3.21901
Optimizing Vs & Thickness - generation: 16; average & best misfits: -24.5144	-3.21901
Optimizing Vs & Thickness - generation: 17; average & best misfits: -28.8458	-3.21901
Optimizing Vs & Thickness - generation: 18; average & best misfits: -27.8301	-3.21901
Optimizing Vs & Thickness - generation: 19; average & best misfits: -27.7269	-3.21901
Optimizing Vs & Thickness - generation: 20; average & best misfits: -29.0395	-3.21901
Optimizing Vs & Thickness - generation: 21; average & best misfits: -26.9661	-3.21901
Optimizing Vs & Thickness - generation: 22; average & best misfits: -24.6207	-3.21901
Optimizing Vs & Thickness - generation: 23; average & best misfits: -25.0196	-3.21901
Optimizing Vs & Thickness - generation: 24; average & best misfits: -24.4445	-3.21901
Optimizing Vs & Thickness - generation: 25; average & best misfits: -25.9479	-3.21901
Optimizing Vs & Thickness - generation: 26; average & best misfits: -29.0301	-3.21901
Optimizing Vs & Thickness - generation: 27; average & best misfits: -30.767	-3.21901
Optimizing Vs & Thickness - generation: 28; average & best misfits: -27.5963	-3.21901
Optimizing Vs & Thickness - generation: 29; average & best misfits: -26.6179	-3.21901
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.1558	-3.21901
Optimizing Vs & Thickness - generation: 31; average & best misfits: -29.0321	-3.21901

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -35.4044	-3.21901
Optimizing Vs & Thickness - generation: 2; average & best misfits: -33.3297	-3.21901
Optimizing Vs & Thickness - generation: 3; average & best misfits: -32.8634	-3.21901
Optimizing Vs & Thickness - generation: 4; average & best misfits: -33.2164	-3.21901
Optimizing Vs & Thickness - generation: 5; average & best misfits: -31.6683	-3.21901
Optimizing Vs & Thickness - generation: 6; average & best misfits: -30.9194	-3.21901
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.8756	-3.21901
Optimizing Vs & Thickness - generation: 8; average & best misfits: -22.5996	-3.21901
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.2954	-3.21901

MODELLO MEDIO

VS (m/s): 280 463 529 540 600 650
Spessori (m): 3.0 2.4 6.9 14.0 8.5

Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.90671	569.428
	7.74109	517.815
	12.3176	476.5629
	17.2652	456.4075
	22.7075	438.2531
	27.9025	415.1336
	33.8396	374.6428
	43.24	313.0953
	54.9906	281.6116

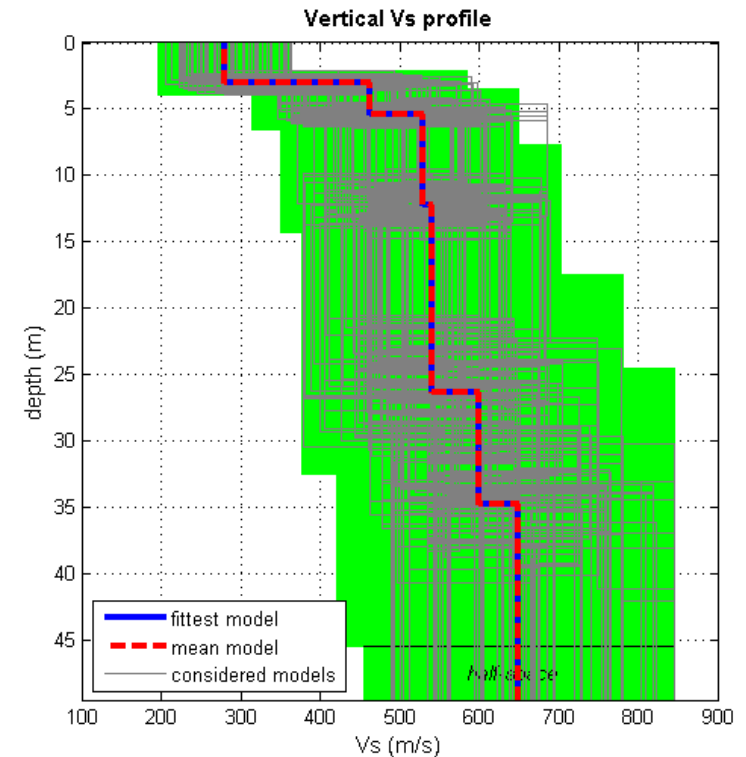
First higher mode

Mean model	f(Hz)	VR(m/s)
	33.7159	533.3719
	39.5294	498.7652

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PROFILO DI VELOCITA' 1D $V_{s,eq} (V_{s30}) = 492 \text{ m/s}$



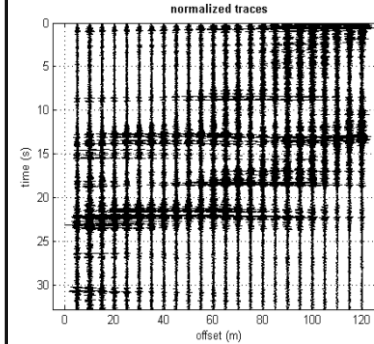
Codice Certificato di prova: szz-azt_RM_03

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

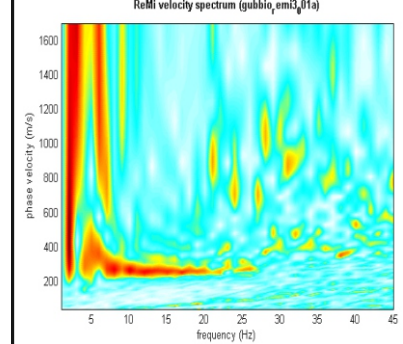
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_03
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4801085 m; E 302537 m G24: N 4801187 m; E 302601 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -12.8416	-4.11689
Optimizing Vs & Thickness - generation: 2; average & best misfits: -15.2632	-4.07033
Optimizing Vs & Thickness - generation: 3; average & best misfits: -15.7965	-4.07033
Optimizing Vs & Thickness - generation: 4; average & best misfits: -13.5691	-3.47304
Optimizing Vs & Thickness - generation: 5; average & best misfits: -10.4999	-3.47304
Optimizing Vs & Thickness - generation: 6; average & best misfits: -10.8609	-3.47304
Optimizing Vs & Thickness - generation: 7; average & best misfits: -13.0663	-3.47304
Optimizing Vs & Thickness - generation: 8; average & best misfits: -12.8922	-3.47304
Optimizing Vs & Thickness - generation: 9; average & best misfits: -12.0549	-3.47304
Optimizing Vs & Thickness - generation: 10; average & best misfits: -12.2651	-3.47304
Optimizing Vs & Thickness - generation: 11; average & best misfits: -12.1639	-3.47304
Optimizing Vs & Thickness - generation: 12; average & best misfits: -13.4042	-3.47304
Optimizing Vs & Thickness - generation: 13; average & best misfits: -12.2731	-3.31967
Optimizing Vs & Thickness - generation: 14; average & best misfits: -11.2444	-3.31967
Optimizing Vs & Thickness - generation: 15; average & best misfits: -11.2719	-3.31967
Optimizing Vs & Thickness - generation: 16; average & best misfits: -11.3617	-3.31967
Optimizing Vs & Thickness - generation: 17; average & best misfits: -12.0874	-3.31967
Optimizing Vs & Thickness - generation: 18; average & best misfits: -12.0983	-3.31967
Optimizing Vs & Thickness - generation: 19; average & best misfits: -12.7138	-3.31967
Optimizing Vs & Thickness - generation: 20; average & best misfits: -12.5985	-3.31967
Optimizing Vs & Thickness - generation: 21; average & best misfits: -13.3016	-3.31967
Optimizing Vs & Thickness - generation: 22; average & best misfits: -14.5212	-3.31967
Optimizing Vs & Thickness - generation: 23; average & best misfits: -14.6407	-3.31967
Optimizing Vs & Thickness - generation: 24; average & best misfits: -13.4705	-3.31967
Optimizing Vs & Thickness - generation: 25; average & best misfits: -12.2804	-3.23015
Optimizing Vs & Thickness - generation: 26; average & best misfits: -14.1405	-3.23015
Optimizing Vs & Thickness - generation: 27; average & best misfits: -14.0809	-3.23015
Optimizing Vs & Thickness - generation: 28; average & best misfits: -11.9835	-3.23015
Optimizing Vs & Thickness - generation: 29; average & best misfits: -13.8707	-3.23015
Optimizing Vs & Thickness - generation: 30; average & best misfits: -12.559	-3.23015
Optimizing Vs & Thickness - generation: 31; average & best misfits: -14.9693	-3.23015

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -15.5033	-3.23015
Optimizing Vs & Thickness - generation: 2; average & best misfits: -15.0168	-3.23015
Optimizing Vs & Thickness - generation: 3; average & best misfits: -15.8294	-3.23015
Optimizing Vs & Thickness - generation: 4; average & best misfits: -15.1754	-3.23015
Optimizing Vs & Thickness - generation: 5; average & best misfits: -15.3101	-3.23015
Optimizing Vs & Thickness - generation: 6; average & best misfits: -12.8989	-3.23015
Optimizing Vs & Thickness - generation: 7; average & best misfits: -13.7682	-3.23015
Optimizing Vs & Thickness - generation: 8; average & best misfits: -13.5388	-3.23015
Optimizing Vs & Thickness - generation: 9; average & best misfits: -12.7764	-3.23015

MODELLO MEDIO

VS (m/s): 273 255 221 304 289 455
Spessori (m): 2.1 1.7 5.0 14.7 11.1

Fundamental mode

Mean model	
f(Hz)	VR(m/s)
2.7935	361.837
4.40147	297.9987
6.75157	267.9781
10.0912	248.4639
15.5335	231.6546
20.8522	230.0159
27.7788	232.5222
34.5818	235.3219

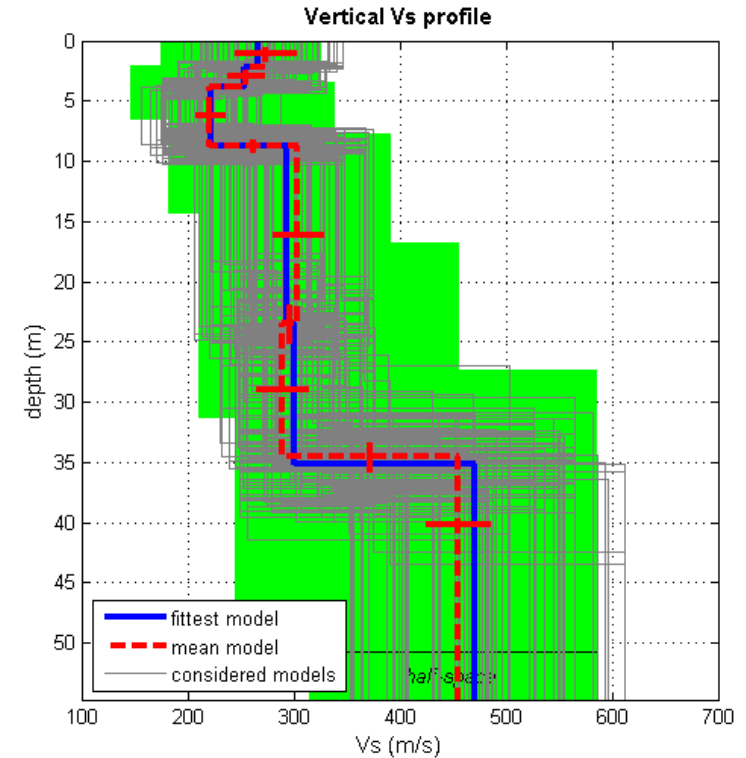
First higher mode

Mean model	
24.1918	291.2483
36.8082	267.9602
47.8166	252.0529

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PROFILO DI VELOCITA' 1D Vs, eq (Vs30) = 278 m/s



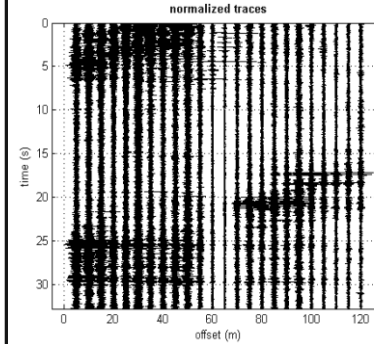
Codice Certificato di prova: szz-azt_RM_04

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

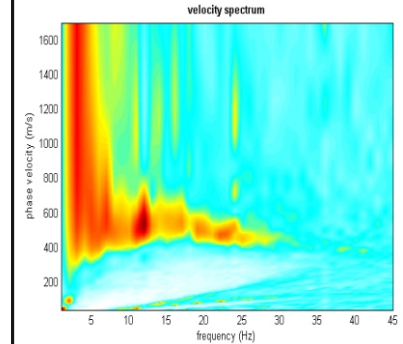
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_04
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	N - S
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802466 m; E 303609 m G24: N 4802345 m; E 303614 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -32.4262	-5.92272
Optimizing Vs & Thickness - generation: 2; average & best misfits: -29.7773	-5.92272
Optimizing Vs & Thickness - generation: 3; average & best misfits: -29.528	-5.92272
Optimizing Vs & Thickness - generation: 4; average & best misfits: -28.5669	-5.89748
Optimizing Vs & Thickness - generation: 5; average & best misfits: -23.1772	-4.44816
Optimizing Vs & Thickness - generation: 6; average & best misfits: -20.6558	-4.22109
Optimizing Vs & Thickness - generation: 7; average & best misfits: -19.0486	-3.99033
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.6328	-3.30777
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.6948	-3.30777
Optimizing Vs & Thickness - generation: 10; average & best misfits: -21.7442	-3.30777
Optimizing Vs & Thickness - generation: 11; average & best misfits: -23.7793	-3.30777
Optimizing Vs & Thickness - generation: 12; average & best misfits: -23.1626	-3.30777
Optimizing Vs & Thickness - generation: 13; average & best misfits: -21.4829	-3.21901
Optimizing Vs & Thickness - generation: 14; average & best misfits: -25.0615	-3.21901
Optimizing Vs & Thickness - generation: 15; average & best misfits: -24.3519	-3.21901
Optimizing Vs & Thickness - generation: 16; average & best misfits: -24.5144	-3.21901
Optimizing Vs & Thickness - generation: 17; average & best misfits: -28.8458	-3.21901
Optimizing Vs & Thickness - generation: 18; average & best misfits: -27.8301	-3.21901
Optimizing Vs & Thickness - generation: 19; average & best misfits: -27.7269	-3.21901
Optimizing Vs & Thickness - generation: 20; average & best misfits: -29.0395	-3.21901
Optimizing Vs & Thickness - generation: 21; average & best misfits: -26.9661	-3.21901
Optimizing Vs & Thickness - generation: 22; average & best misfits: -24.6207	-3.21901
Optimizing Vs & Thickness - generation: 23; average & best misfits: -25.0196	-3.21901
Optimizing Vs & Thickness - generation: 24; average & best misfits: -24.4445	-3.21901
Optimizing Vs & Thickness - generation: 25; average & best misfits: -25.9479	-3.21901
Optimizing Vs & Thickness - generation: 26; average & best misfits: -29.0301	-3.21901
Optimizing Vs & Thickness - generation: 27; average & best misfits: -30.767	-3.21901
Optimizing Vs & Thickness - generation: 28; average & best misfits: -27.5963	-3.21901
Optimizing Vs & Thickness - generation: 29; average & best misfits: -26.6179	-3.21901
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.1558	-3.21901
Optimizing Vs & Thickness - generation: 31; average & best misfits: -29.0321	-3.21901

Inversione: fase#2

Optimizing Vs & Thickness - generation: 1; average & best misfits: -35.4044	-3.21901
Optimizing Vs & Thickness - generation: 2; average & best misfits: -33.3297	-3.21901
Optimizing Vs & Thickness - generation: 3; average & best misfits: -32.8634	-3.21901
Optimizing Vs & Thickness - generation: 4; average & best misfits: -33.2164	-3.21901
Optimizing Vs & Thickness - generation: 5; average & best misfits: -31.6683	-3.21901
Optimizing Vs & Thickness - generation: 6; average & best misfits: -30.9194	-3.21901
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.8756	-3.21901
Optimizing Vs & Thickness - generation: 8; average & best misfits: -22.5996	-3.21901
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.2954	-3.21901

MODELLO MEDIO

VS (m/s): 280 463 529 540 600 650
Spessori (m): 3.0 2.4 6.9 14.0 8.5

Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.90671	569.428
	7.74109	517.815
	12.3176	476.5629
	17.2652	456.4075
	22.7075	438.2531
	27.9025	415.1336
	33.8396	374.6428
	43.24	313.0953
	54.9906	281.6116

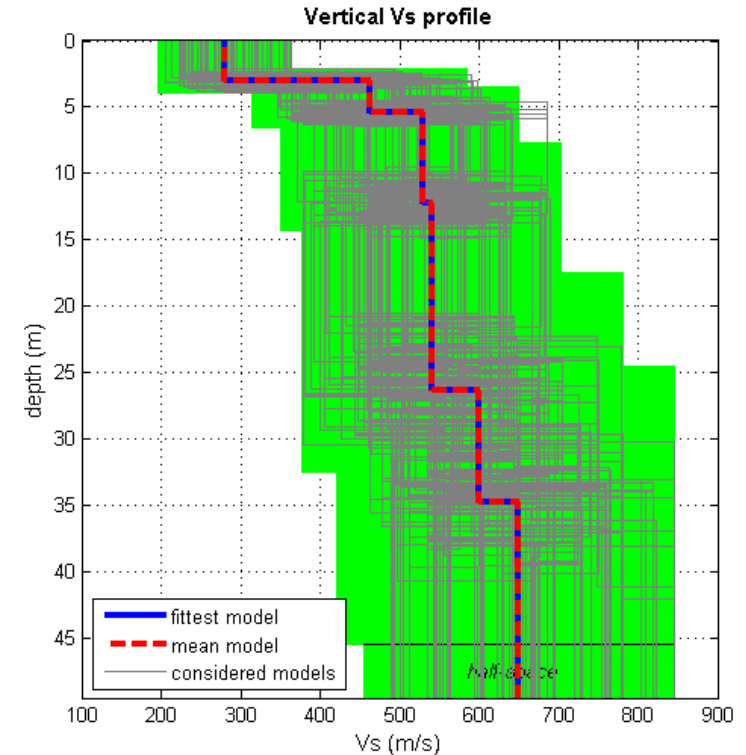
First higher mode

Mean model	f(Hz)	VR(m/s)
	33.7159	533.3719
	39.5294	498.7652

winMASW Pro
Surface Wave Analysis

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PROFILO DI VELOCITA' 1D $V_{s,eq} (V_{s30}) = 492 \text{ m/s}$



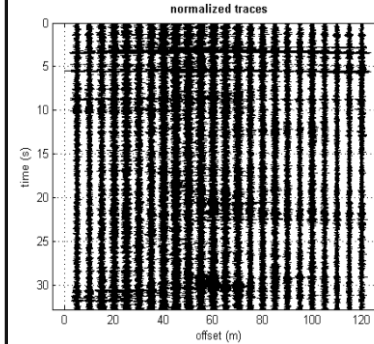
Codice Certificato di prova: szz-azt_RM_05

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

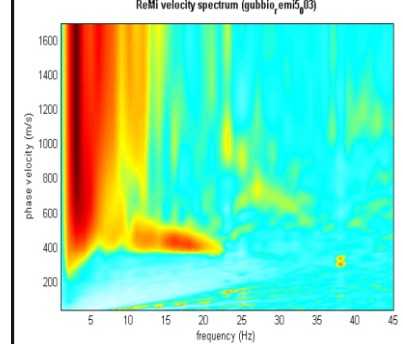
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_05
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	N - S
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802466 m; E 303609 m G24: N 4802345 m; E 303614 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -26.1437	-3.36024
Optimizing Vs & Thickness - generation: 2; average & best misfits: -25.2488	-3.36024
Optimizing Vs & Thickness - generation: 3; average & best misfits: -23.2821	-3.36024
Optimizing Vs & Thickness - generation: 4; average & best misfits: -25.6091	-3.36024
Optimizing Vs & Thickness - generation: 5; average & best misfits: -21.424	-3.36024
Optimizing Vs & Thickness - generation: 6; average & best misfits: -18.359	-3.36024
Optimizing Vs & Thickness - generation: 7; average & best misfits: -19.9568	-3.27188
Optimizing Vs & Thickness - generation: 8; average & best misfits: -18.5112	-3.27188
Optimizing Vs & Thickness - generation: 9; average & best misfits: -18.9544	-3.27188
Optimizing Vs & Thickness - generation: 10; average & best misfits: -16.4882	-2.3442
Optimizing Vs & Thickness - generation: 11; average & best misfits: -21.3485	-2.3442
Optimizing Vs & Thickness - generation: 12; average & best misfits: -19.5146	-2.3442
Optimizing Vs & Thickness - generation: 13; average & best misfits: -19.1416	-2.3442
Optimizing Vs & Thickness - generation: 14; average & best misfits: -20.6591	-2.3442
Optimizing Vs & Thickness - generation: 15; average & best misfits: -20.8575	-2.3442
Optimizing Vs & Thickness - generation: 16; average & best misfits: -21.4544	-2.3442
Optimizing Vs & Thickness - generation: 17; average & best misfits: -22.0419	-2.3442
Optimizing Vs & Thickness - generation: 18; average & best misfits: -24.9392	-2.17085
Optimizing Vs & Thickness - generation: 19; average & best misfits: -23.8687	-2.17085
Optimizing Vs & Thickness - generation: 20; average & best misfits: -16.9439	-2.17085
Optimizing Vs & Thickness - generation: 21; average & best misfits: -18.9036	-2.17085
Optimizing Vs & Thickness - generation: 22; average & best misfits: -20.0135	-2.17085
Optimizing Vs & Thickness - generation: 23; average & best misfits: -21.0677	-2.17085
Optimizing Vs & Thickness - generation: 24; average & best misfits: -18.2968	-2.17085
Optimizing Vs & Thickness - generation: 25; average & best misfits: -21.0558	-2.17085
Optimizing Vs & Thickness - generation: 26; average & best misfits: -17.0137	-2.17085
Optimizing Vs & Thickness - generation: 27; average & best misfits: -21.6774	-2.17085
Optimizing Vs & Thickness - generation: 28; average & best misfits: -19.4312	-2.17085
Optimizing Vs & Thickness - generation: 29; average & best misfits: -18.3328	-2.17085
Optimizing Vs & Thickness - generation: 30; average & best misfits: -19.9847	-2.17085
Optimizing Vs & Thickness - generation: 31; average & best misfits: -19.2805	-2.17085

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -29.2213	-2.17085
Optimizing Vs & Thickness - generation: 2; average & best misfits: -28.7773	-2.17085
Optimizing Vs & Thickness - generation: 3; average & best misfits: -24.2167	-2.17085
Optimizing Vs & Thickness - generation: 4; average & best misfits: -20.6324	-2.17085
Optimizing Vs & Thickness - generation: 5; average & best misfits: -15.7461	-2.17085
Optimizing Vs & Thickness - generation: 6; average & best misfits: -19.4754	-2.17085
Optimizing Vs & Thickness - generation: 7; average & best misfits: -22.0221	-2.17085
Optimizing Vs & Thickness - generation: 8; average & best misfits: -20.0801	-2.17085
Optimizing Vs & Thickness - generation: 9; average & best misfits: -18.1295	-2.17085

MODELLO MEDIO

VS (m/s): 250 420 440 462 550
Spessori (m): 3.2 9.3 10.0 15.4

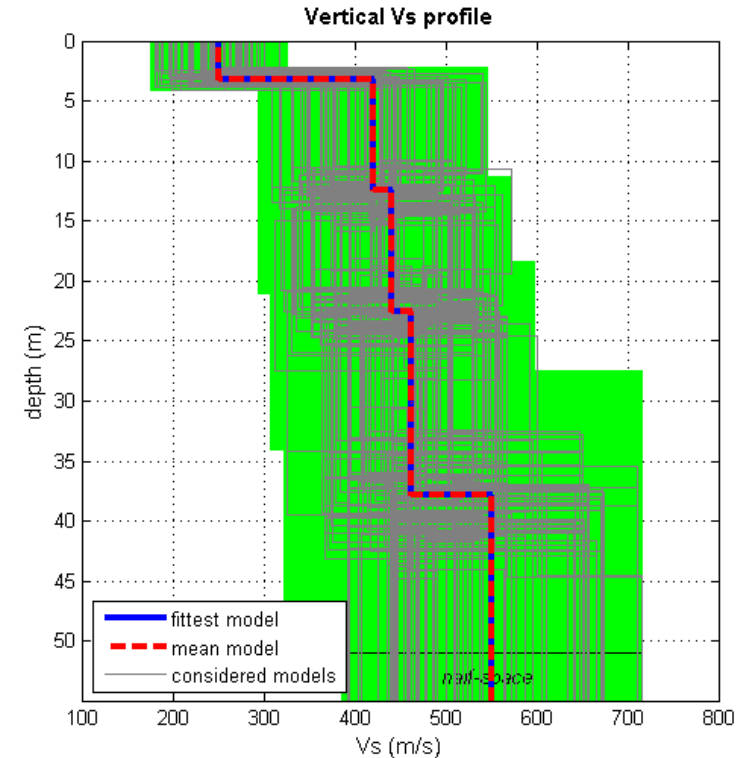
Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.65933	466.9808
	4.89623	444.1383
	7.37002	408.5074
	10.586	387.033
	14.173	373.8157
	17.8836	363.33
	22.8312	348.6788
	27.4078	329.192
	31.4895	305.5012
	37.5503	273.9404

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 406 m/s



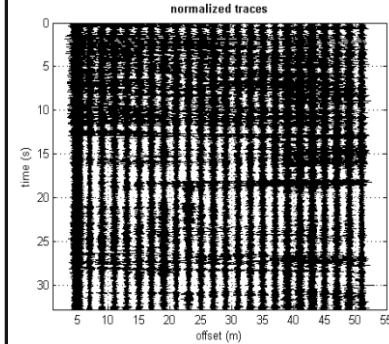
Codice Certificato di prova: szz-azt_RM_06

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

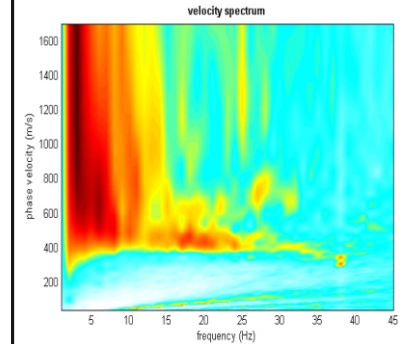
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_06
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSE - NNO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802365 m; E 302824 m G24: N 4802458 m; E 302748 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -34.08	-2.97794
Optimizing Vs & Thickness - generation: 2; average & best misfits: -28.4985	-2.97794
Optimizing Vs & Thickness - generation: 3; average & best misfits: -26.2888	-2.97794
Optimizing Vs & Thickness - generation: 4; average & best misfits: -29.9785	-2.97794
Optimizing Vs & Thickness - generation: 5; average & best misfits: -29.6378	-2.97794
Optimizing Vs & Thickness - generation: 6; average & best misfits: -26.1114	-2.97794
Optimizing Vs & Thickness - generation: 7; average & best misfits: -34.549	-2.97794
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.7941	-2.97794
Optimizing Vs & Thickness - generation: 9; average & best misfits: -29.8667	-2.97794
Optimizing Vs & Thickness - generation: 10; average & best misfits: -30.9383	-2.97794
Optimizing Vs & Thickness - generation: 11; average & best misfits: -33.9366	-2.97794
Optimizing Vs & Thickness - generation: 12; average & best misfits: -26.2029	-2.97794
Optimizing Vs & Thickness - generation: 13; average & best misfits: -28.9064	-2.97794
Optimizing Vs & Thickness - generation: 14; average & best misfits: -33.8587	-2.97794
Optimizing Vs & Thickness - generation: 15; average & best misfits: -28.0036	-2.97794
Optimizing Vs & Thickness - generation: 16; average & best misfits: -36.6088	-2.97794
Optimizing Vs & Thickness - generation: 17; average & best misfits: -44.0451	-2.97794
Optimizing Vs & Thickness - generation: 18; average & best misfits: -38.0178	-2.97794
Optimizing Vs & Thickness - generation: 19; average & best misfits: -37.4695	-2.64881
Optimizing Vs & Thickness - generation: 20; average & best misfits: -35.5071	-2.64881
Optimizing Vs & Thickness - generation: 21; average & best misfits: -36.5108	-2.64881
Optimizing Vs & Thickness - generation: 22; average & best misfits: -30.9449	-2.64881
Optimizing Vs & Thickness - generation: 23; average & best misfits: -33.2834	-2.64881
Optimizing Vs & Thickness - generation: 24; average & best misfits: -36.8368	-2.64881
Optimizing Vs & Thickness - generation: 25; average & best misfits: -26.3849	-2.64881
Optimizing Vs & Thickness - generation: 26; average & best misfits: -32.0872	-2.64881
Optimizing Vs & Thickness - generation: 27; average & best misfits: -34.6182	-2.64881
Optimizing Vs & Thickness - generation: 28; average & best misfits: -31.4374	-2.64881
Optimizing Vs & Thickness - generation: 29; average & best misfits: -27.2422	-2.64881
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.9014	-2.64881
Optimizing Vs & Thickness - generation: 31; average & best misfits: -29.0564	-2.64881

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -38.8491	-2.64881
Optimizing Vs & Thickness - generation: 2; average & best misfits: -37.9676	-2.64881
Optimizing Vs & Thickness - generation: 3; average & best misfits: -39.88	-2.64881
Optimizing Vs & Thickness - generation: 4; average & best misfits: -36.0008	-2.64881
Optimizing Vs & Thickness - generation: 5; average & best misfits: -29.8967	-2.64881
Optimizing Vs & Thickness - generation: 6; average & best misfits: -29.2555	-2.64881
Optimizing Vs & Thickness - generation: 7; average & best misfits: -35.9769	-2.64881
Optimizing Vs & Thickness - generation: 8; average & best misfits: -32.2021	-2.64881
Optimizing Vs & Thickness - generation: 9; average & best misfits: -30.5382	-2.64881

MODELLO MEDIO

VS (m/s): 291 400 417 457 515
Spessori (m): 2.5 14.5 11.8 15.2

Fundamental mode

Mean model	
f(Hz)	VR(m/s)
4.89623	413.3177
9.10168	375.9863
12.9361	365.5875
17.6363	359.4973
22.0891	355.2557
29.1394	347.8398
35.3239	339.0732
40.1478	330.5398
47.4455	316.1883

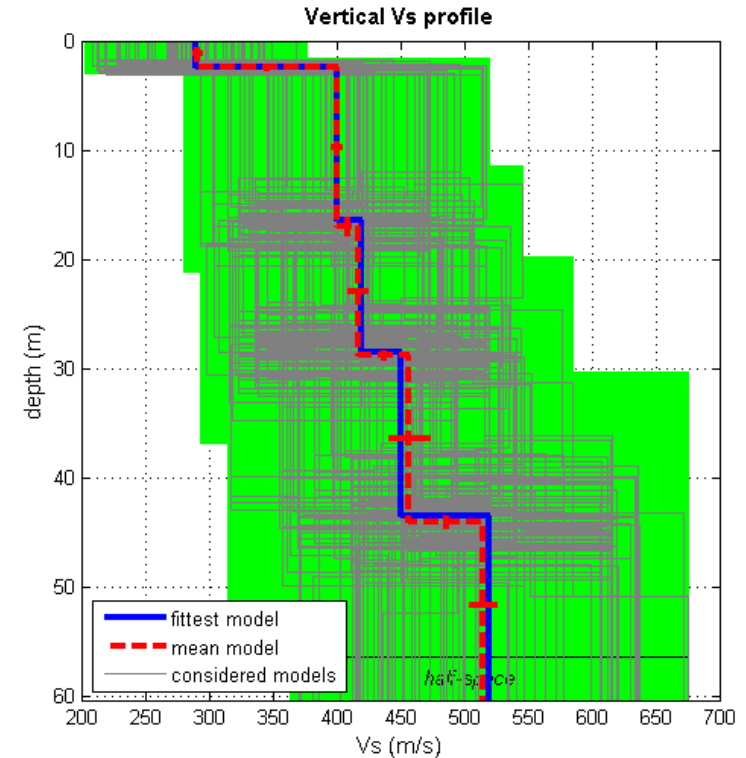
First higher mode

Mean model	
11.3281	493.5698
17.2652	456.5627
23.326	436.3902

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Surface Wave Analysis

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 396 m/s



Codice Certificato di prova: szz-azt_RM_07

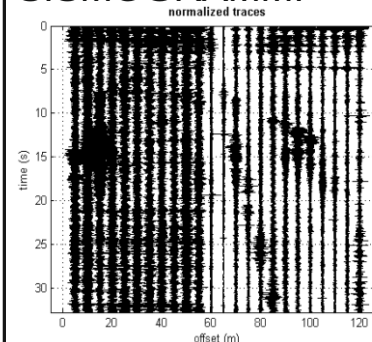
Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

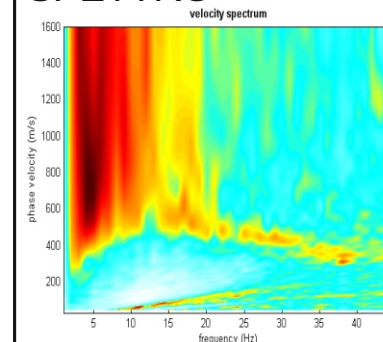
Profilo	RM_07
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NO - SE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4802815 m; E 303001 m G24: N 4802738 m; E 303094 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -4.36384 -4.19416
Optimizing Vs & Thickness - generation: 2; average & best misfits: -35.451 -4.19416
Optimizing Vs & Thickness - generation: 3; average & best misfits: -34.7068 -4.19416
Optimizing Vs & Thickness - generation: 4; average & best misfits: -32.7619 -4.19416
Optimizing Vs & Thickness - generation: 5; average & best misfits: -30.9091 -4.19416
Optimizing Vs & Thickness - generation: 6; average & best misfits: -28.5261 -4.17597
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.2299 -3.37553
Optimizing Vs & Thickness - generation: 8; average & best misfits: -21.9609 -3.37553
Optimizing Vs & Thickness - generation: 9; average & best misfits: -26.0904 -3.37553
Optimizing Vs & Thickness - generation: 10; average & best misfits: -23.4437 -3.37553
Optimizing Vs & Thickness - generation: 11; average & best misfits: -29.5373 -3.37553
Optimizing Vs & Thickness - generation: 12; average & best misfits: -28.1453 -3.37348
Optimizing Vs & Thickness - generation: 13; average & best misfits: -24.7326 -3.37348
Optimizing Vs & Thickness - generation: 14; average & best misfits: -26.8943 -3.37348
Optimizing Vs & Thickness - generation: 15; average & best misfits: -32.9034 -3.37348
Optimizing Vs & Thickness - generation: 16; average & best misfits: -26.2926 -3.37348
Optimizing Vs & Thickness - generation: 17; average & best misfits: -32.1453 -3.37348
Optimizing Vs & Thickness - generation: 18; average & best misfits: -32.1326 -3.37348
Optimizing Vs & Thickness - generation: 19; average & best misfits: -30.4571 -3.37348
Optimizing Vs & Thickness - generation: 20; average & best misfits: -30.3631 -3.37348
Optimizing Vs & Thickness - generation: 21; average & best misfits: -25.7579 -3.37348
Optimizing Vs & Thickness - generation: 22; average & best misfits: -30.5359 -3.37348
Optimizing Vs & Thickness - generation: 23; average & best misfits: -28.4969 -3.37348
Optimizing Vs & Thickness - generation: 24; average & best misfits: -23.5253 -3.37348
Optimizing Vs & Thickness - generation: 25; average & best misfits: -27.2214 -3.37348
Optimizing Vs & Thickness - generation: 26; average & best misfits: -21.6662 -3.37348
Optimizing Vs & Thickness - generation: 27; average & best misfits: -24.813 -3.37348
Optimizing Vs & Thickness - generation: 28; average & best misfits: -22.4912 -3.37348
Optimizing Vs & Thickness - generation: 29; average & best misfits: -22.0255 -3.37348
Optimizing Vs & Thickness - generation: 30; average & best misfits: -29.0419 -3.37348
Optimizing Vs & Thickness - generation: 31; average & best misfits: -22.5848 -3.37348

Inversione: fase#2

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -38.2621 -3.37348
Optimizing Vs & Thickness - generation: 2; average & best misfits: -37.4799 -3.37348
Optimizing Vs & Thickness - generation: 3; average & best misfits: -33.6102 -3.37348
Optimizing Vs & Thickness - generation: 4; average & best misfits: -27.5709 -3.37348
Optimizing Vs & Thickness - generation: 5; average & best misfits: -22.2513 -3.37348
Optimizing Vs & Thickness - generation: 6; average & best misfits: -29.0947 -3.37348
Optimizing Vs & Thickness - generation: 7; average & best misfits: -29.5686 -3.37348
Optimizing Vs & Thickness - generation: 8; average & best misfits: -29.6717 -3.37348
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.2574 -3.37348

MODELLO MIGLIORE

Vs (m/s):	300	530	580	620	640
Spessori (m):	3.50	8.50	13.97	9.72	

Fundamental mode)

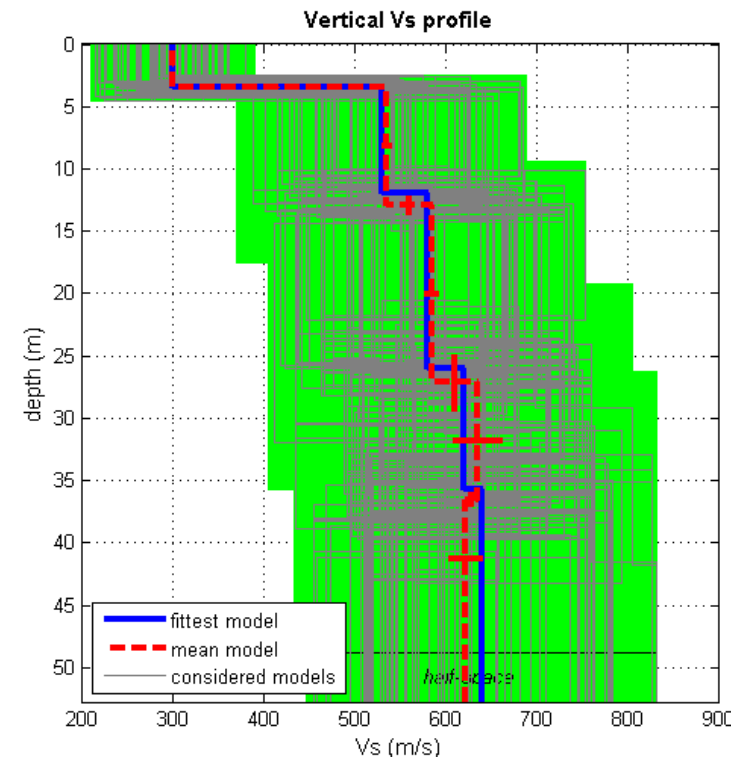
best model

F(Hz)	VR(m/s)
4.15409	567.976
6.25681	551.0754
9.84382	520.5178
13.3071	497.1686
17.2652	476.6589
22.3365	454.2607
27.7788	427.8353
33.3449	388.9106
38.6635	348.2785
45.5901	315.6705

winMASW Pro
Surface Wave Analysis

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 515 m/s



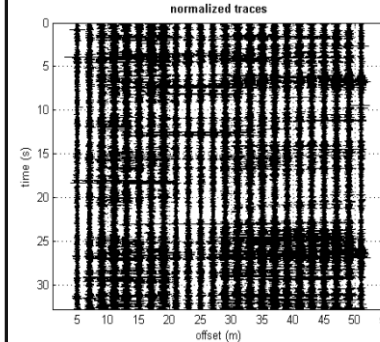
Codice Certificato di prova: szz-azt_RM_08

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

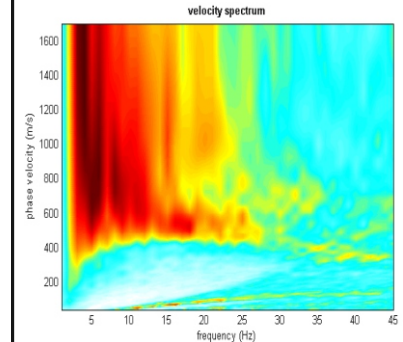
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_08
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NNE - SSO
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4803017 m; E 302858 m G24: N 4802917 m; E 302792 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -31.9156	-3.50435
Optimizing Vs & Thickness - generation: 2; average & best misfits: -29.091	-3.50435
Optimizing Vs & Thickness - generation: 3; average & best misfits: -24.9987	-3.50435
Optimizing Vs & Thickness - generation: 4; average & best misfits: -28.6017	-3.50435
Optimizing Vs & Thickness - generation: 5; average & best misfits: -22.1125	-3.50108
Optimizing Vs & Thickness - generation: 6; average & best misfits: -23.1539	-3.50108
Optimizing Vs & Thickness - generation: 7; average & best misfits: -23.7399	-3.50108
Optimizing Vs & Thickness - generation: 8; average & best misfits: -22.791	-3.50108
Optimizing Vs & Thickness - generation: 9; average & best misfits: -20.1194	-3.50108
Optimizing Vs & Thickness - generation: 10; average & best misfits: -17.246	-3.50108
Optimizing Vs & Thickness - generation: 11; average & best misfits: -21.2818	-3.50108
Optimizing Vs & Thickness - generation: 12; average & best misfits: -21.7673	-3.47199
Optimizing Vs & Thickness - generation: 13; average & best misfits: -22.1908	-3.47199
Optimizing Vs & Thickness - generation: 14; average & best misfits: -21.1151	-3.47199
Optimizing Vs & Thickness - generation: 15; average & best misfits: -23.8914	-3.47199
Optimizing Vs & Thickness - generation: 16; average & best misfits: -20.3434	-3.47199
Optimizing Vs & Thickness - generation: 17; average & best misfits: -24.1616	-3.47199
Optimizing Vs & Thickness - generation: 18; average & best misfits: -25.0751	-3.47199
Optimizing Vs & Thickness - generation: 19; average & best misfits: -27.9907	-3.47199
Optimizing Vs & Thickness - generation: 20; average & best misfits: -28.6332	-3.47199
Optimizing Vs & Thickness - generation: 21; average & best misfits: -25.2896	-3.47199
Optimizing Vs & Thickness - generation: 22; average & best misfits: -28.8135	-3.47199
Optimizing Vs & Thickness - generation: 23; average & best misfits: -24.402	-3.47199
Optimizing Vs & Thickness - generation: 24; average & best misfits: -19.2653	-2.11304
Optimizing Vs & Thickness - generation: 25; average & best misfits: -26.4306	-2.11304
Optimizing Vs & Thickness - generation: 26; average & best misfits: -17.4369	-2.11304
Optimizing Vs & Thickness - generation: 27; average & best misfits: -22.3724	-2.11304
Optimizing Vs & Thickness - generation: 28; average & best misfits: -19.1029	-2.11304
Optimizing Vs & Thickness - generation: 29; average & best misfits: -19.101	-2.11304
Optimizing Vs & Thickness - generation: 30; average & best misfits: -23.4338	-2.11304
Optimizing Vs & Thickness - generation: 31; average & best misfits: -21.31	-2.11304

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -34.9867	-2.11304
Optimizing Vs & Thickness - generation: 2; average & best misfits: -34.2805	-2.11304
Optimizing Vs & Thickness - generation: 3; average & best misfits: -31.5066	-2.11304
Optimizing Vs & Thickness - generation: 4; average & best misfits: -32.0635	-2.11304
Optimizing Vs & Thickness - generation: 5; average & best misfits: -28.5868	-2.11304
Optimizing Vs & Thickness - generation: 6; average & best misfits: -28.5818	-2.11304
Optimizing Vs & Thickness - generation: 7; average & best misfits: -27.5711	-2.11304
Optimizing Vs & Thickness - generation: 8; average & best misfits: -27.3769	-2.11304
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.0936	-2.11304

MODELLO MEDIO

VS (m/s): 296 480 577 620 640
Spessori (m): 4.0 7.9 12.0 11.7

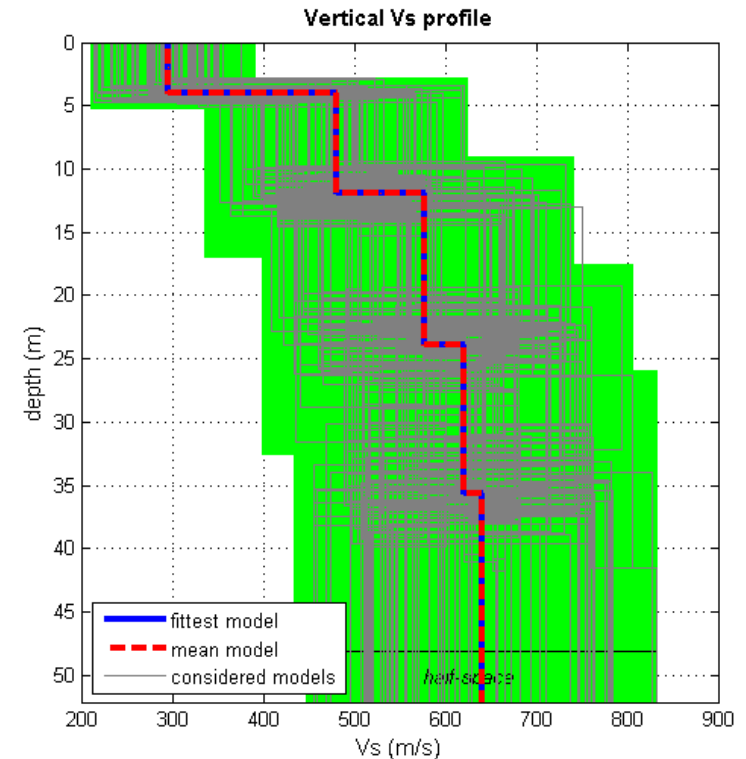
Fundamental mode

Mean model
f(Hz) VR(m/s)
4.89623 556.4892
9.10168 515.7373
13.5545 472.9577
17.2652 442.2348
20.3574 419.808
25.4287 385.1087
29.5105 356.2422
33.9633 328.6791
43.6111 297.0106

winMASW Pro
Surface Wave Analysis

www.eliosoft.it

PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 495 m/s



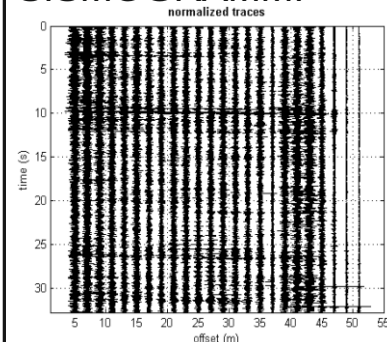
Codice Certificato di prova: szz-azt_RM_09

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

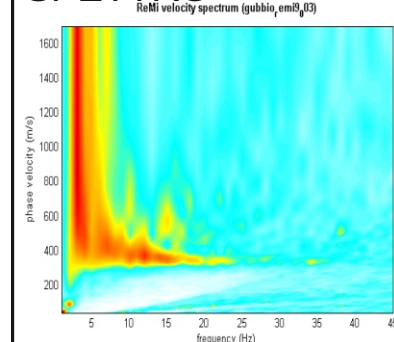
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_09
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4803077 m; E 302266 m G24: N 4803169 m; E 302343 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -18.2561	-3.32622
Optimizing Vs & Thickness - generation: 2; average & best misfits: -19.8095	-3.32622
Optimizing Vs & Thickness - generation: 3; average & best misfits: -19.324	-3.32622
Optimizing Vs & Thickness - generation: 4; average & best misfits: -18.0462	-3.32622
Optimizing Vs & Thickness - generation: 5; average & best misfits: -15.956	-3.32622
Optimizing Vs & Thickness - generation: 6; average & best misfits: -13.5549	-3.32622
Optimizing Vs & Thickness - generation: 7; average & best misfits: -14.5444	-3.32622
Optimizing Vs & Thickness - generation: 8; average & best misfits: -13.5467	-3.32622
Optimizing Vs & Thickness - generation: 9; average & best misfits: -15.7347	-3.32622
Optimizing Vs & Thickness - generation: 10; average & best misfits: -14.1747	-3.32622
Optimizing Vs & Thickness - generation: 11; average & best misfits: -14.7523	-3.32622
Optimizing Vs & Thickness - generation: 12; average & best misfits: -14.5505	-3.29884
Optimizing Vs & Thickness - generation: 13; average & best misfits: -13.4651	-3.29884
Optimizing Vs & Thickness - generation: 14; average & best misfits: -13.5438	-3.29884
Optimizing Vs & Thickness - generation: 15; average & best misfits: -16.6079	-3.29884
Optimizing Vs & Thickness - generation: 16; average & best misfits: -14.0595	-3.29884
Optimizing Vs & Thickness - generation: 17; average & best misfits: -15.0731	-3.29884
Optimizing Vs & Thickness - generation: 18; average & best misfits: -16.067	-3.29884
Optimizing Vs & Thickness - generation: 19; average & best misfits: -16.6494	-3.28344
Optimizing Vs & Thickness - generation: 20; average & best misfits: -14.3851	-3.28344
Optimizing Vs & Thickness - generation: 21; average & best misfits: -13.6289	-3.28344
Optimizing Vs & Thickness - generation: 22; average & best misfits: -15.5411	-3.28344
Optimizing Vs & Thickness - generation: 23; average & best misfits: -16.7295	-3.28344
Optimizing Vs & Thickness - generation: 24; average & best misfits: -14.3027	-3.28344
Optimizing Vs & Thickness - generation: 25; average & best misfits: -13.0492	-2.58222
Optimizing Vs & Thickness - generation: 26; average & best misfits: -14.2623	-2.58222
Optimizing Vs & Thickness - generation: 27; average & best misfits: -17.1122	-2.58222
Optimizing Vs & Thickness - generation: 28; average & best misfits: -15.1911	-2.58222
Optimizing Vs & Thickness - generation: 29; average & best misfits: -15.6209	-2.58222
Optimizing Vs & Thickness - generation: 30; average & best misfits: -18.3581	-2.58222
Optimizing Vs & Thickness - generation: 31; average & best misfits: -15.3738	-2.58222

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -20.4799	-2.58222
Optimizing Vs & Thickness - generation: 2; average & best misfits: -21.0574	-2.58222
Optimizing Vs & Thickness - generation: 3; average & best misfits: -17.2373	-2.58222
Optimizing Vs & Thickness - generation: 4; average & best misfits: -16.8961	-2.58222
Optimizing Vs & Thickness - generation: 5; average & best misfits: -14.6363	-2.58222
Optimizing Vs & Thickness - generation: 6; average & best misfits: -14.4048	-2.58222
Optimizing Vs & Thickness - generation: 7; average & best misfits: -16.2264	-2.58222
Optimizing Vs & Thickness - generation: 8; average & best misfits: -15.7028	-2.58222
Optimizing Vs & Thickness - generation: 9; average & best misfits: -16.7457	-2.58222

MODELLO MEDIO

VS (m/s): 297 349 404 490 517
Spessori (m): 3.1 8.0 14.5 11.6

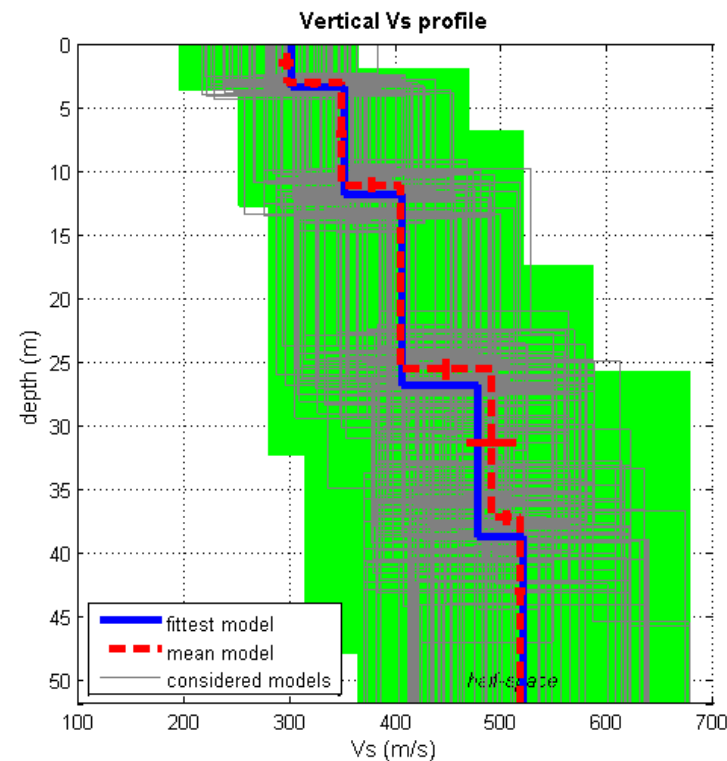
Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.04088	449.972
	4.40147	432.1611
	6.62788	394.3606
	10.3386	354.763
	15.1625	332.714
	21.347	318.624
	29.7579	307.6143
	39.7767	297.3319

winMASW Pro
Surface Wave Analysis

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PROFILO DI VELOCITA' 1D Vs,eq (Vs30) = 383 m/s



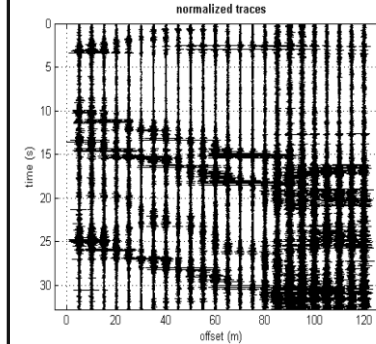
Codice Certificato di prova: szz-azt_RM_10

Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018
Località: Gubbio - Comune: Gubbio (PG)

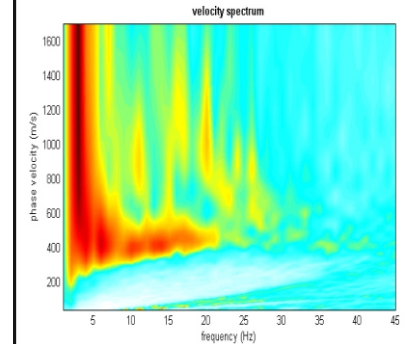
SPECIFICHE TECNICHE DI ACQUISIZIONE	
Profilo	RM_10
Tipo geofoni	verticali
Frequenza geofoni	4.5 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	96.0 m
Distanza intergeofonica	4.0 m
Orientazione stendimento	NO - SE
Coordinate estremi (WGS 84 UTM 33N)	G1: N 4803364 m; E 302385 m G24: N 4803294 m; E 302452 m
Durata acquisizione	2 s
Tempo di campionamento	500 ms
Superficie di esecuzione	terreno



SISMOGRAMMI



SPETTRO



DATI NUMERICI

Rayleigh wave analysis

Optimizing Vs & Thickness - generation: 1; average & best misfits: -23.4676	-3.91618
Optimizing Vs & Thickness - generation: 2; average & best misfits: -25.1692	-3.91618
Optimizing Vs & Thickness - generation: 3; average & best misfits: -27.1687	-3.91618
Optimizing Vs & Thickness - generation: 4; average & best misfits: -23.19	-3.81212
Optimizing Vs & Thickness - generation: 5; average & best misfits: -26.5155	-3.81212
Optimizing Vs & Thickness - generation: 6; average & best misfits: -23.7744	-3.81212
Optimizing Vs & Thickness - generation: 7; average & best misfits: -26.0495	-3.81212
Optimizing Vs & Thickness - generation: 8; average & best misfits: -23.8647	-3.81212
Optimizing Vs & Thickness - generation: 9; average & best misfits: -23.3032	-3.81212
Optimizing Vs & Thickness - generation: 10; average & best misfits: -21.8744	-3.81212
Optimizing Vs & Thickness - generation: 11; average & best misfits: -21.8437	-3.81212
Optimizing Vs & Thickness - generation: 12; average & best misfits: -21.1942	-3.68655
Optimizing Vs & Thickness - generation: 13; average & best misfits: -26.5336	-3.68655
Optimizing Vs & Thickness - generation: 14; average & best misfits: -24.956	-3.68655
Optimizing Vs & Thickness - generation: 15; average & best misfits: -34.4907	-3.68655
Optimizing Vs & Thickness - generation: 16; average & best misfits: -25.4403	-3.68655
Optimizing Vs & Thickness - generation: 17; average & best misfits: -32.5133	-3.68655
Optimizing Vs & Thickness - generation: 18; average & best misfits: -27.2048	-3.68655
Optimizing Vs & Thickness - generation: 19; average & best misfits: -22.092	-3.68655
Optimizing Vs & Thickness - generation: 20; average & best misfits: -20.645	-3.68655
Optimizing Vs & Thickness - generation: 21; average & best misfits: -18.8745	-3.68655
Optimizing Vs & Thickness - generation: 22; average & best misfits: -23.0133	-3.68655
Optimizing Vs & Thickness - generation: 23; average & best misfits: -25.5952	-3.68655
Optimizing Vs & Thickness - generation: 24; average & best misfits: -22.2616	-3.68655
Optimizing Vs & Thickness - generation: 25; average & best misfits: -22.4341	-3.68655
Optimizing Vs & Thickness - generation: 26; average & best misfits: -23.2141	-3.68655
Optimizing Vs & Thickness - generation: 27; average & best misfits: -21.7939	-3.68655
Optimizing Vs & Thickness - generation: 28; average & best misfits: -18.1383	-3.68655
Optimizing Vs & Thickness - generation: 29; average & best misfits: -19.6094	-3.68655
Optimizing Vs & Thickness - generation: 30; average & best misfits: -20.3137	-3.68655
Optimizing Vs & Thickness - generation: 31; average & best misfits: -22.2986	-3.6302

Inversione: fase#2

Rayleigh wave analysis	
Optimizing Vs & Thickness - generation: 1; average & best misfits: -37.3132	-3.6302
Optimizing Vs & Thickness - generation: 2; average & best misfits: -34.5734	-3.6302
Optimizing Vs & Thickness - generation: 3; average & best misfits: -28.062	-3.6302
Optimizing Vs & Thickness - generation: 4; average & best misfits: -31.8511	-3.6302
Optimizing Vs & Thickness - generation: 5; average & best misfits: -31.933	-3.6302
Optimizing Vs & Thickness - generation: 6; average & best misfits: -28.798	-3.6302
Optimizing Vs & Thickness - generation: 7; average & best misfits: -28.9162	-3.6302
Optimizing Vs & Thickness - generation: 8; average & best misfits: -31.6635	-3.6302
Optimizing Vs & Thickness - generation: 9; average & best misfits: -28.6779	-3.6302

MODELLO MEDIO

VS (m/s): 280 450 500 420 573
Spessori (m): 2.1 4.0 18.0 17.9

Fundamental mode

Mean model	f(Hz)	VR(m/s)
	3.92704	466.4163
	4.96012	446.2532
	6.91148	432.1403
	9.78113	431.3566
	13.6839	433.421
	19.3084	429.2071
	25.392	417.0378
	33.3123	397.7149
	37.6741	386.3714
	45.7091	363.0058
	54.892	332.0343

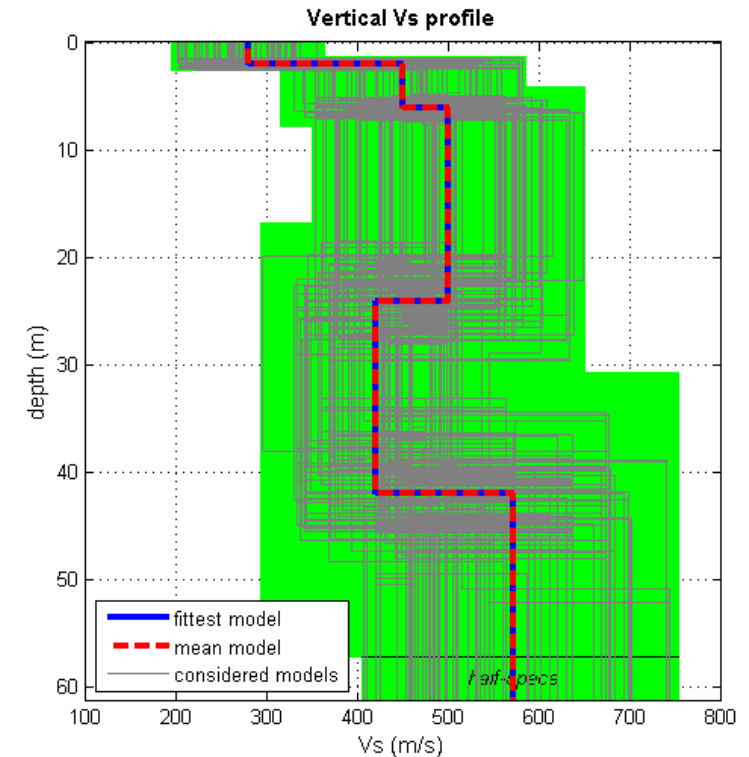
First higher mode

Mean model	f(Hz)	VR(m/s)
	13.3395	533.6064
	17.357	496.9444
	22.9815	466.8543
	27.6877	454.2543
	33.8862	443.8927
	39.7403	437.6847
	56.0399	429.0269

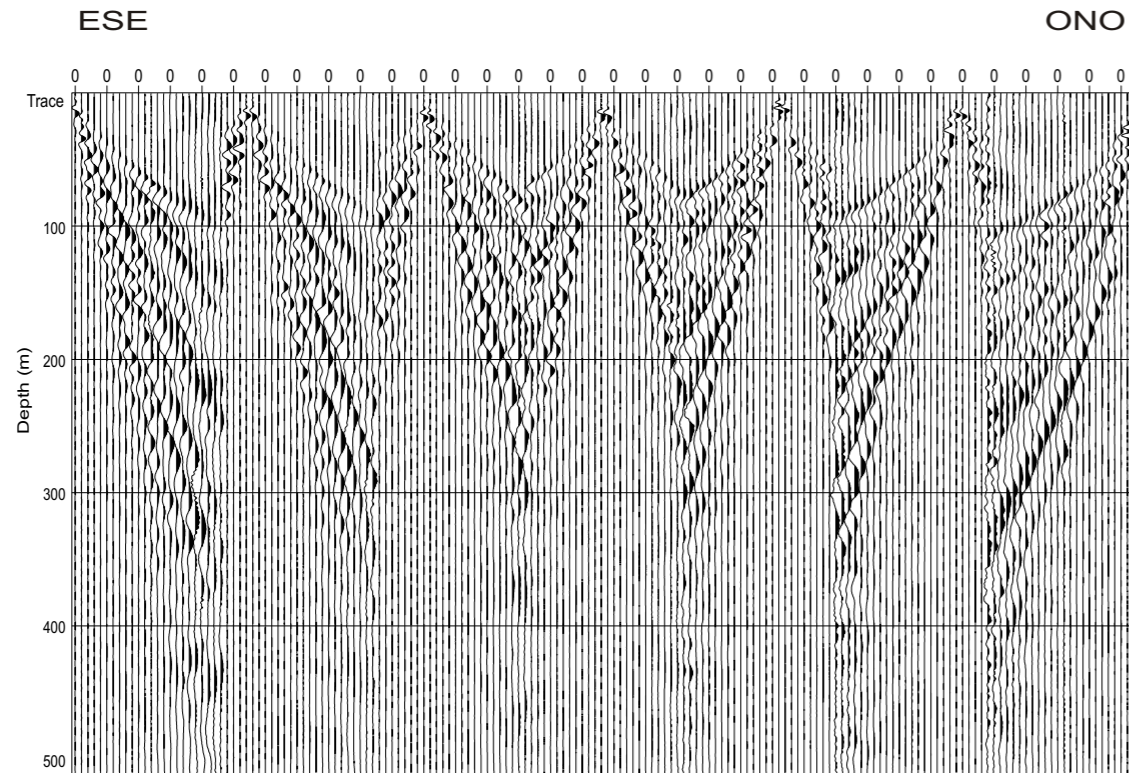
winMASW Pro
Surface Wave Analysis

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PROFILO DI VELOCITA' 1D $V_{s,eq} (V_{s30}) = 452 \text{ m/s}$



SISMOGRAMMI



Codice Certificato di prova: **szz-azt_SRP_01**

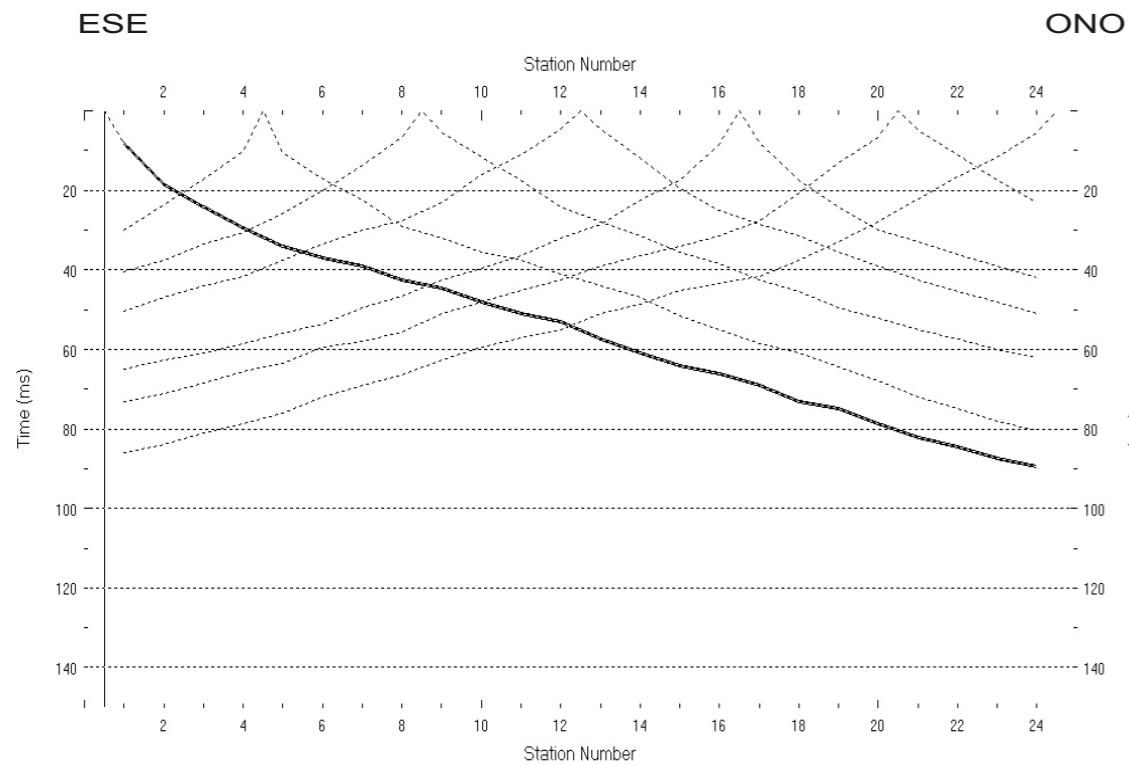
Committente: Comune di Gubbio - Data Esecuzione: 04/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

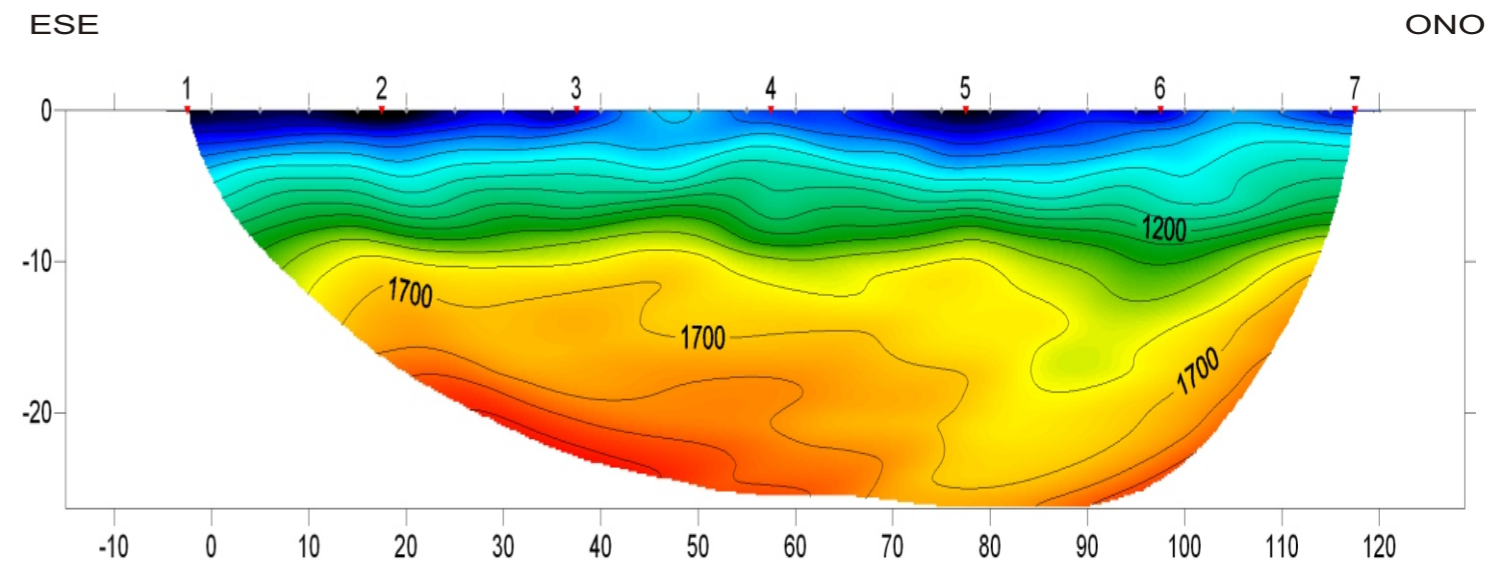
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	ESE - ONO
Coordinate estremi (WGS84 UTM33N)	G1: N 4801637 m; E 304332 m G24: N 4801668 m; E 304216 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



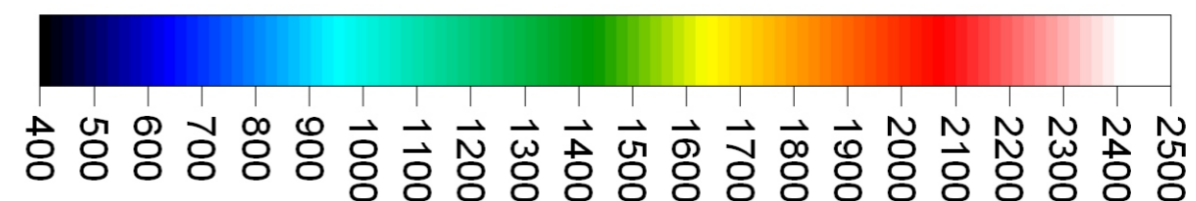
DROMOCRONE



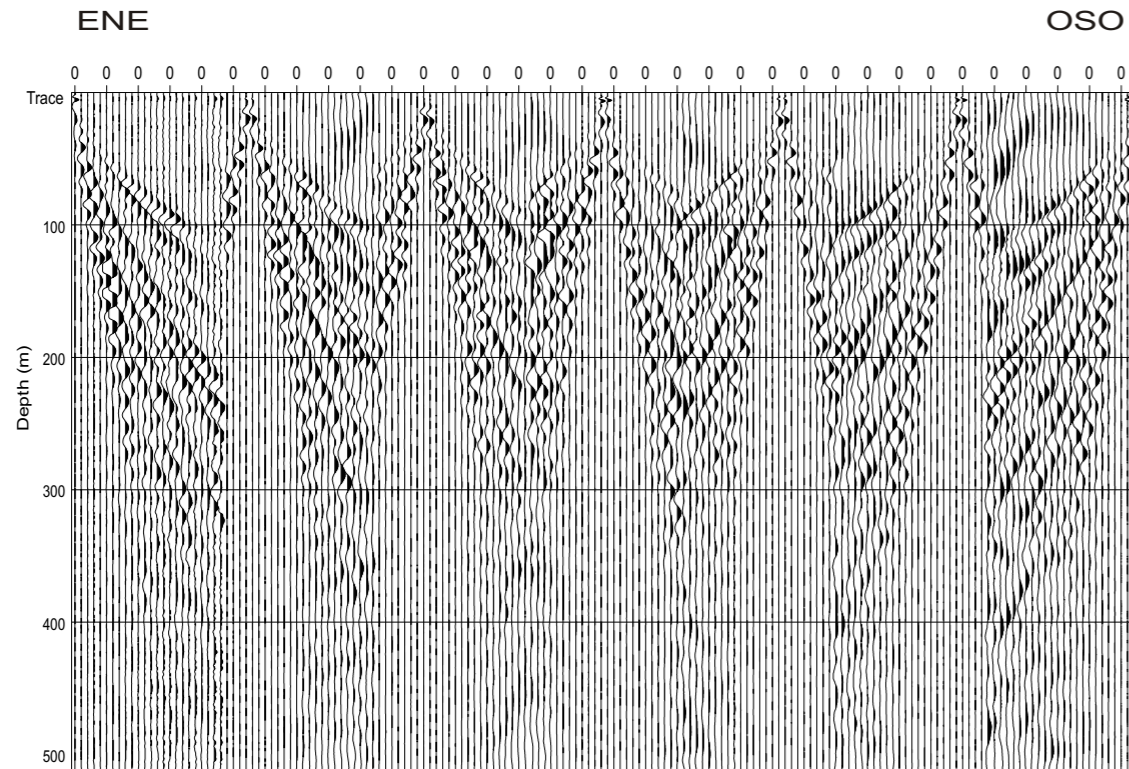
PROFILO SISMICO 2D



P-Velocity (V_p) (m/sec)



SISMOGRAMMI



Codice Certificato di prova: szz-azt_SRP_02

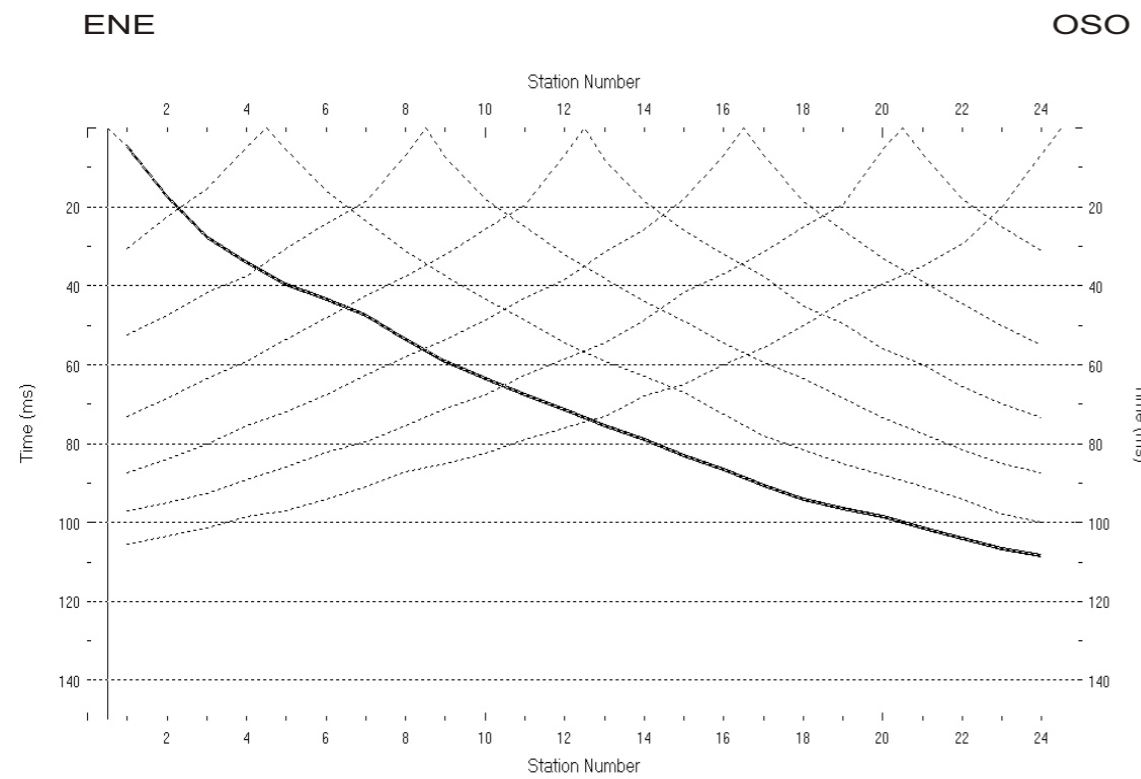
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

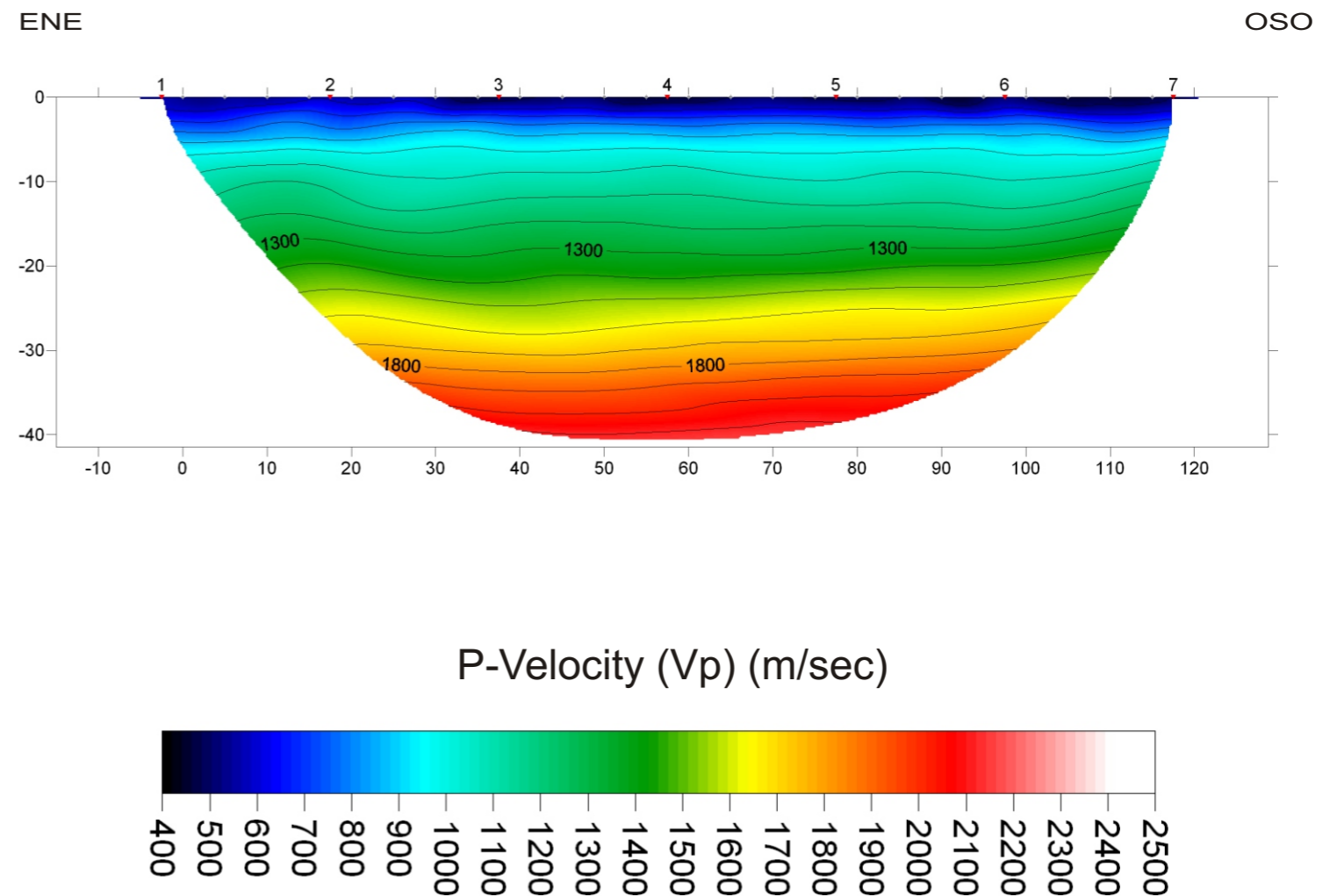
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	ENE - OSO
Coordinate estremi (WGS84 UTM33N)	G1: N 4802197 m; E 304269 m G24: N 4802190 m; E 304149 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



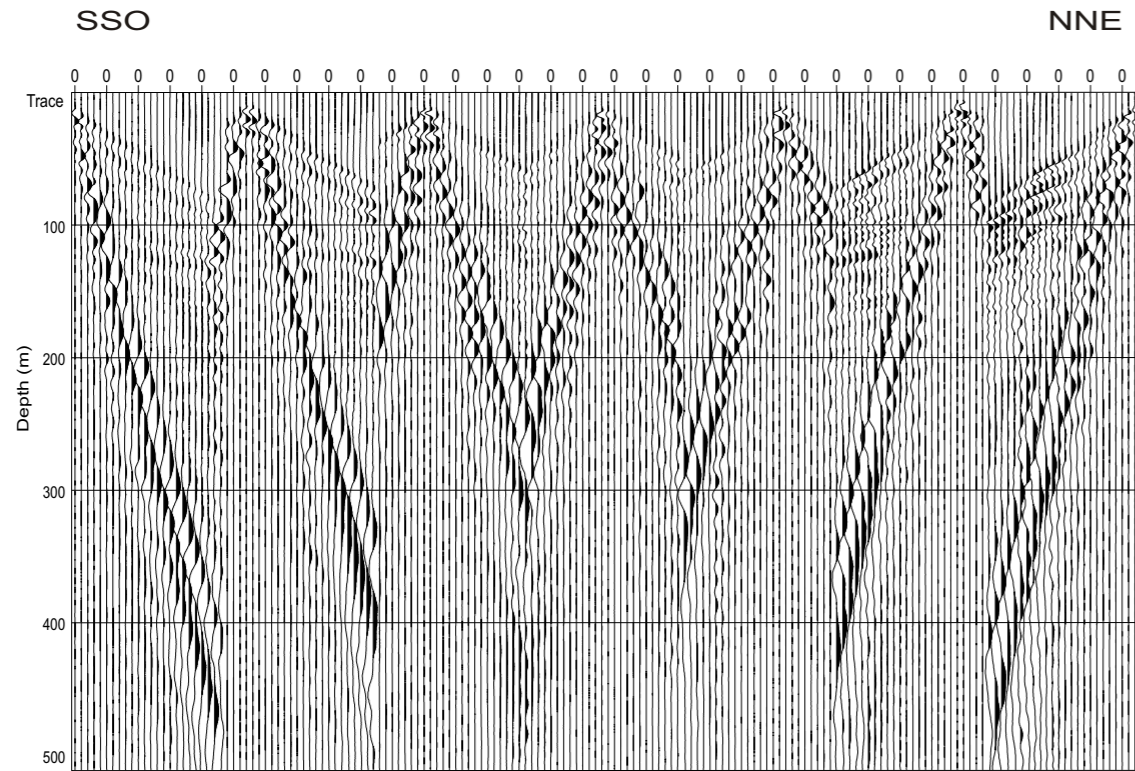
DROMOCRONE



PROFILO SISMICO 2D



SISMOGRAMMI



Codice Certificato di prova: szz-azt_SRP_03

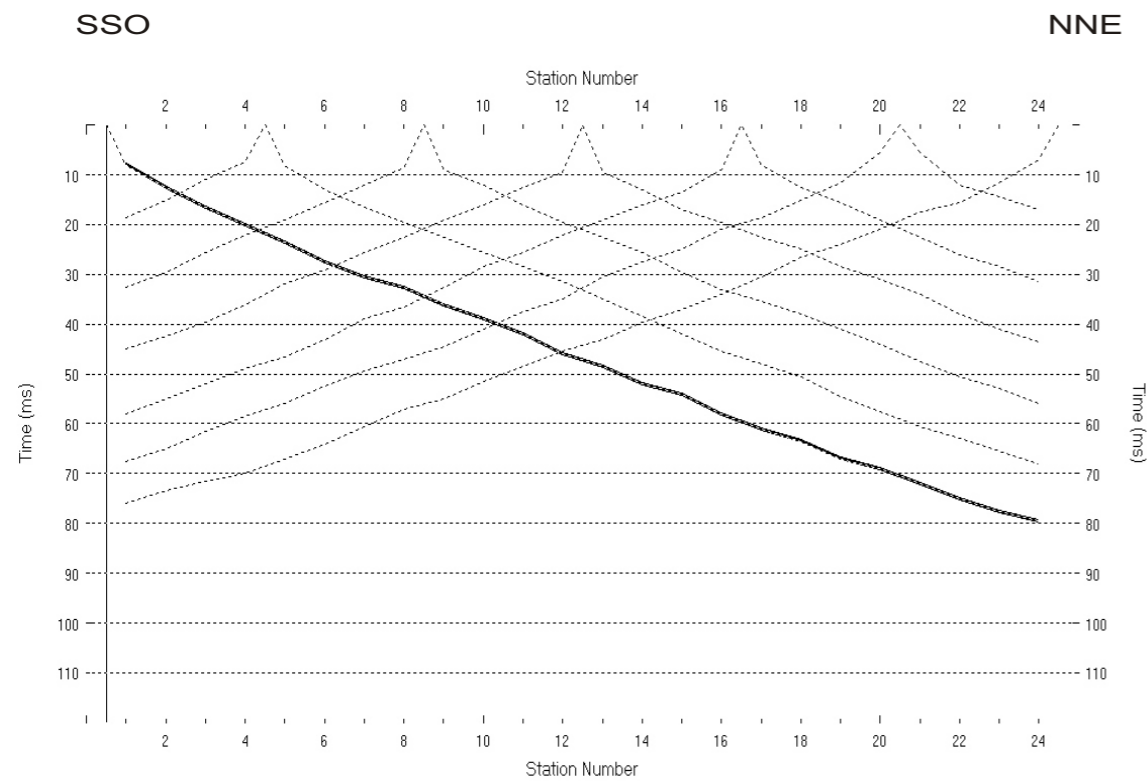
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

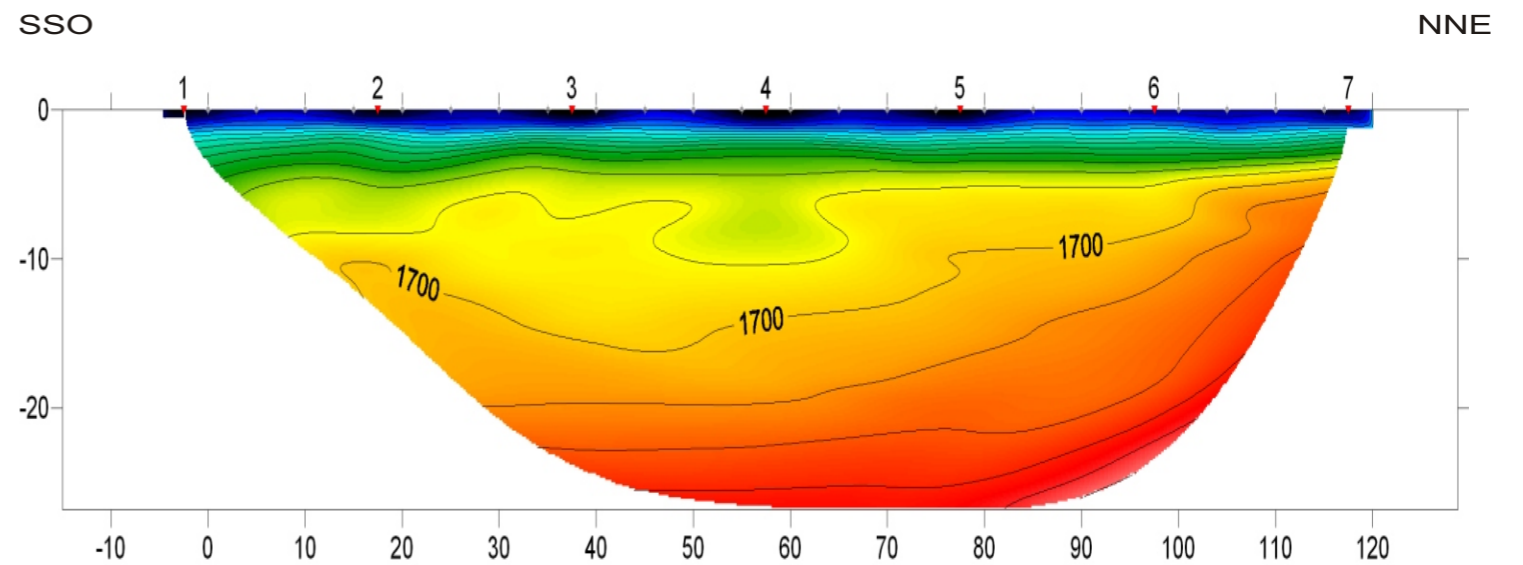
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS84 UTM33N)	G1: N 4801085 m; E 302537 m G24: N 4801187 m; E 302601 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



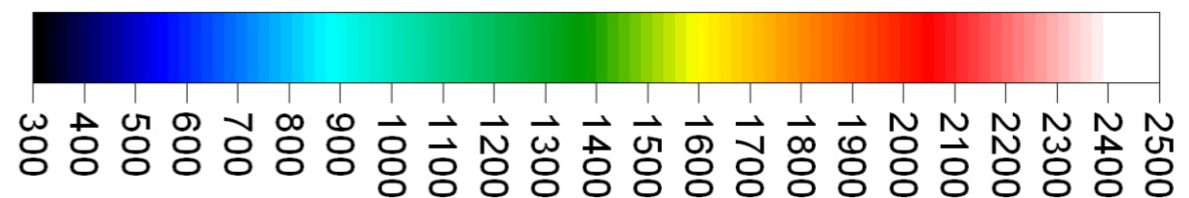
DROMOCRONE



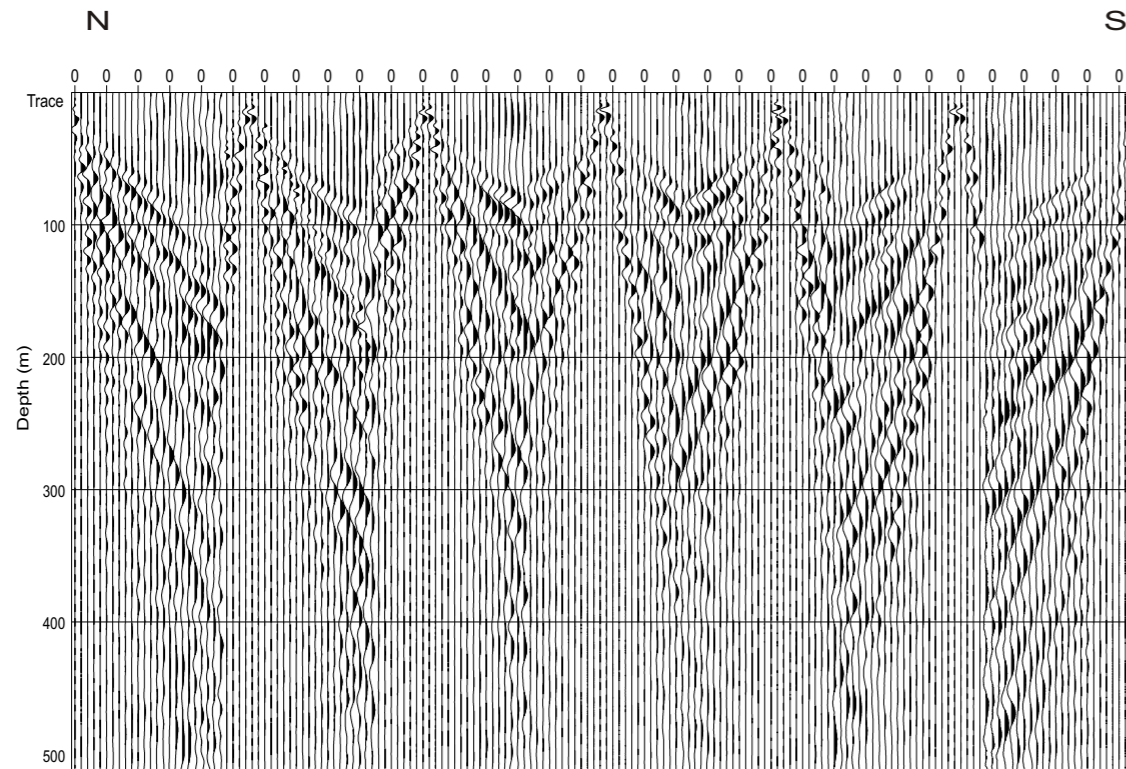
PROFILO SISMICO 2D



P-Velocity (Vp) (m/sec)



SISMOGRAMMI



Codice Certificato di prova: szz-azt_SRP_04

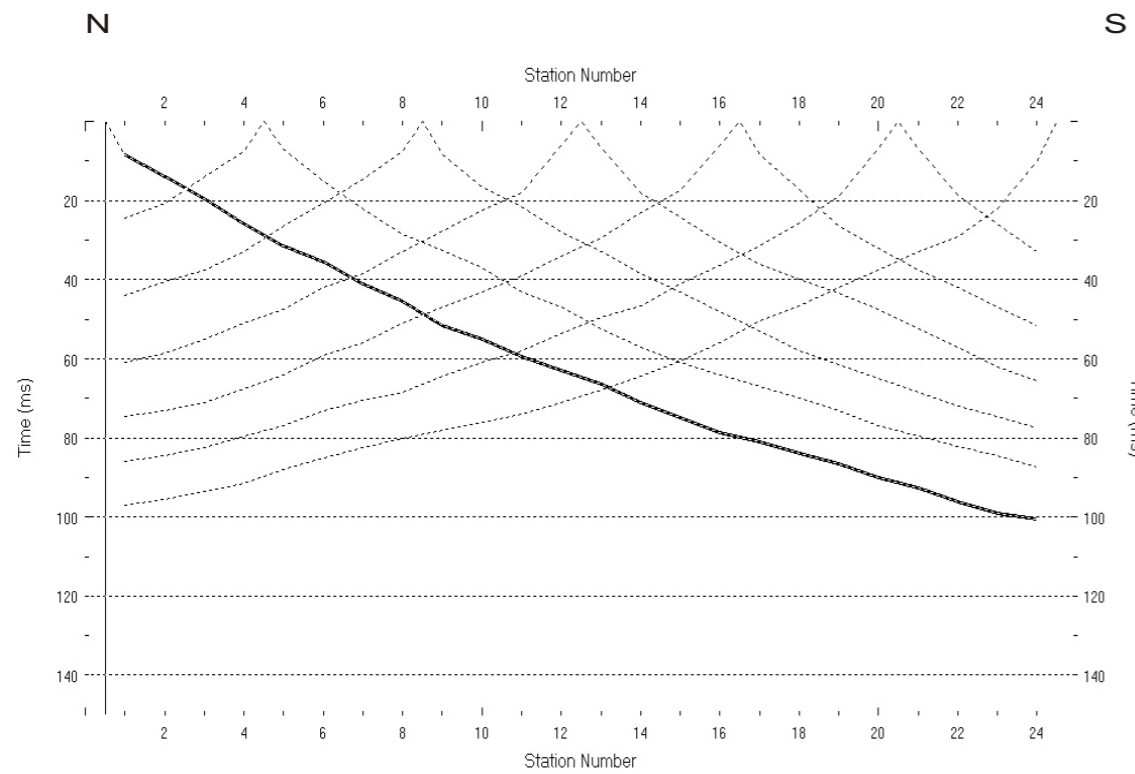
Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

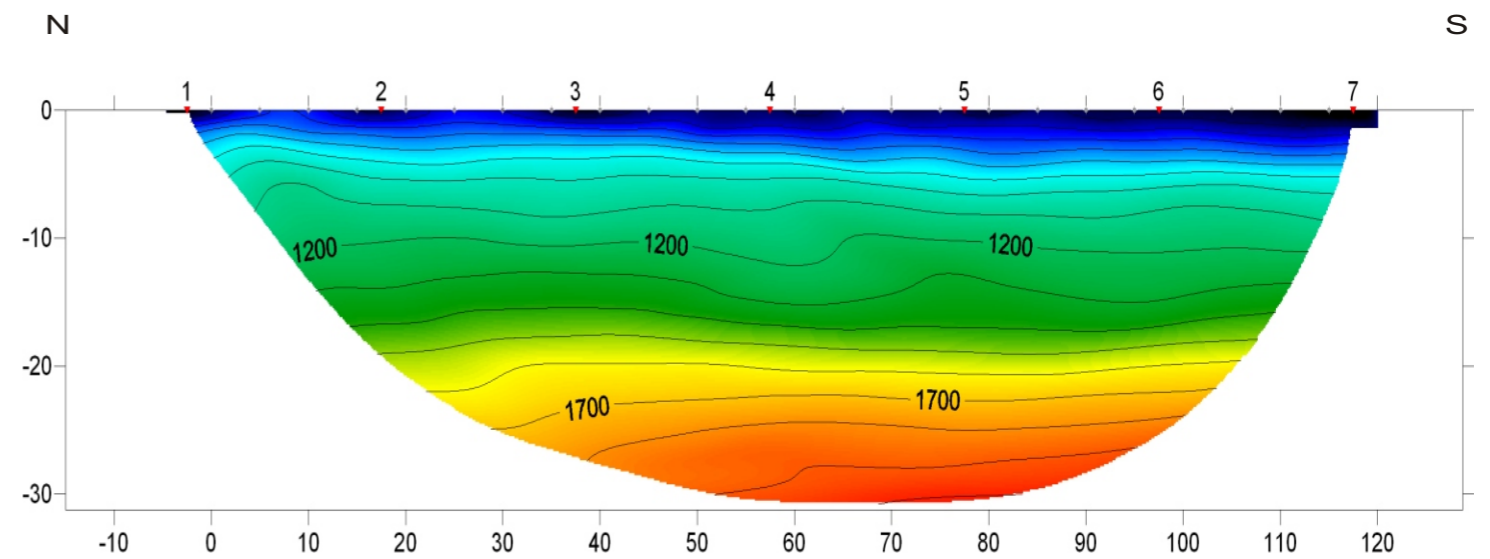
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	N - S
Coordinate estremi (WGS84 UTM33N)	G1: N 4802466 m; E 303609 m G24: N 4802345 m; E 303614 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



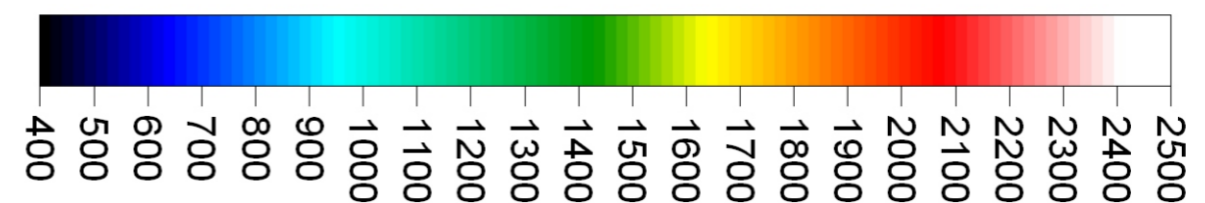
DROMOCRONE



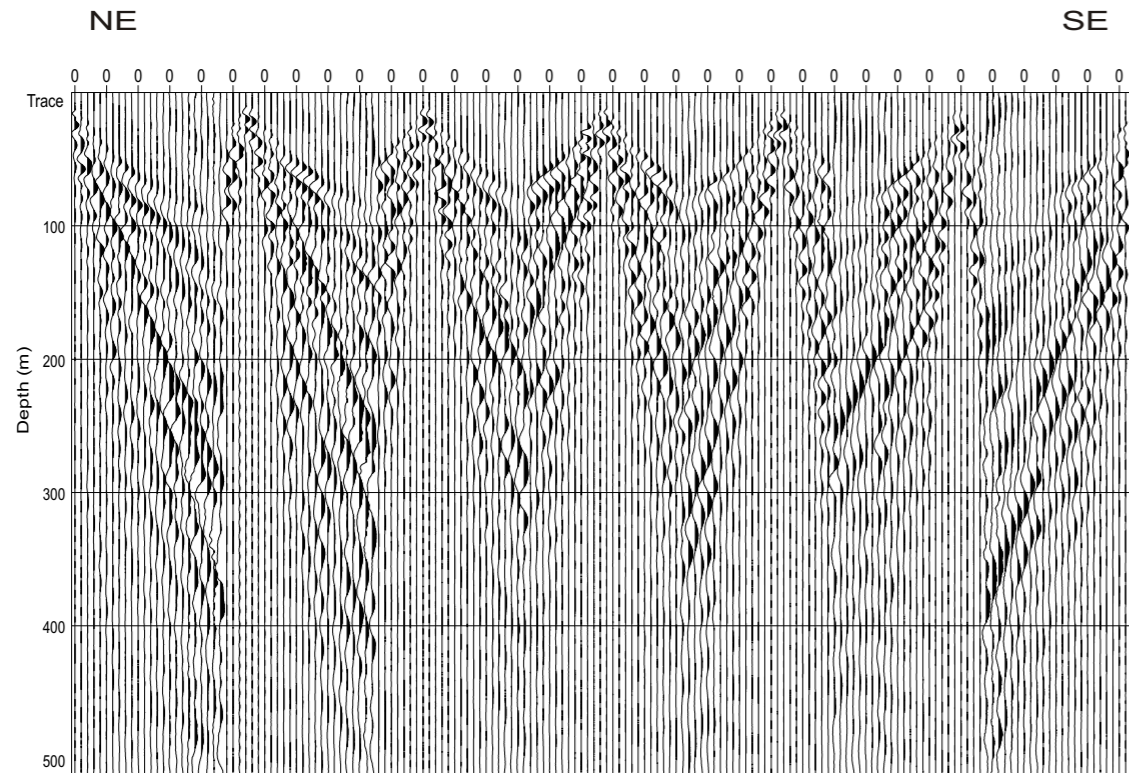
PROFILO SISMICO 2D



P-Velocity (Vp) (m/sec)



SISMOGRAMMI



Codice Certificato di prova: szz-azt_SRP_05

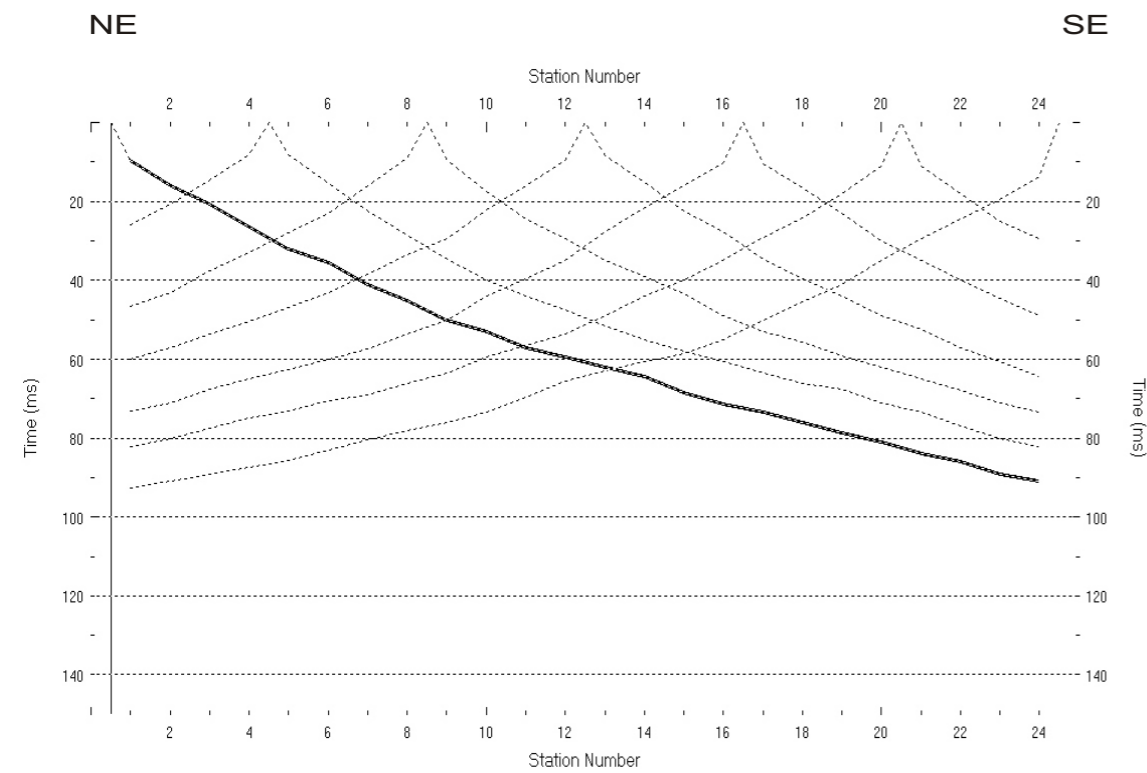
Committente: Comune di Gubbio - Data Esecuzione:04/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

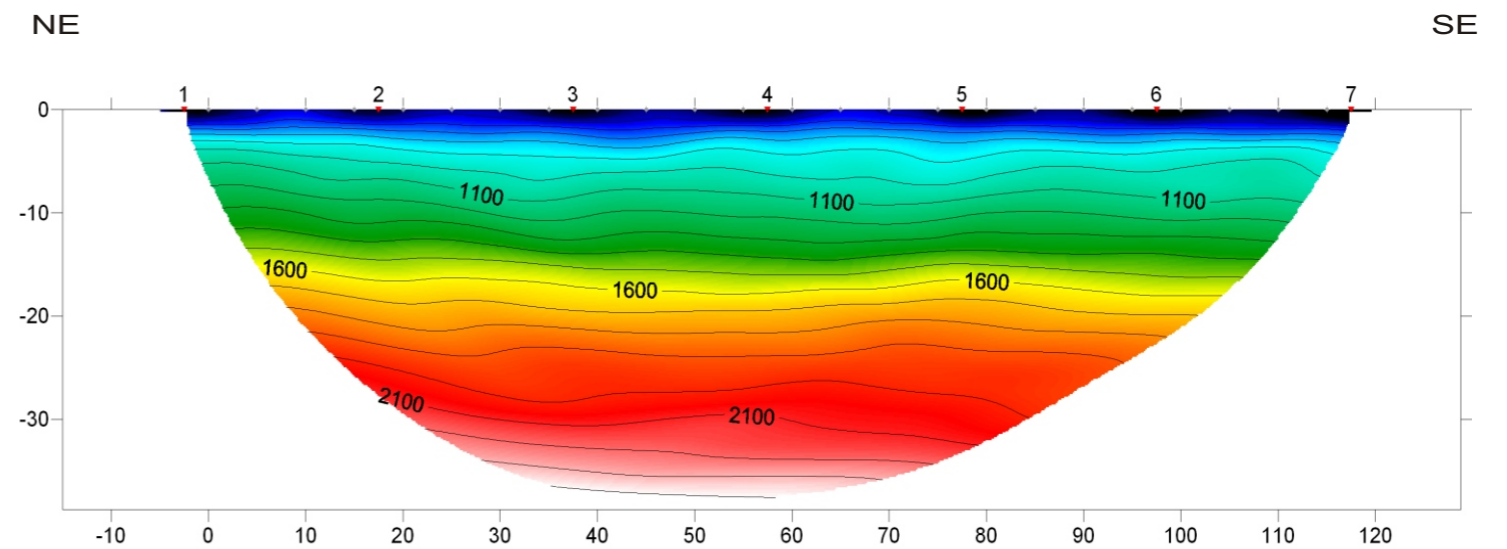
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NE - SE
Coordinate estremi (WGS84 UTM33N)	G1: N 4802129 m; E 303058 m G24: N 4802060 m; E 303156 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



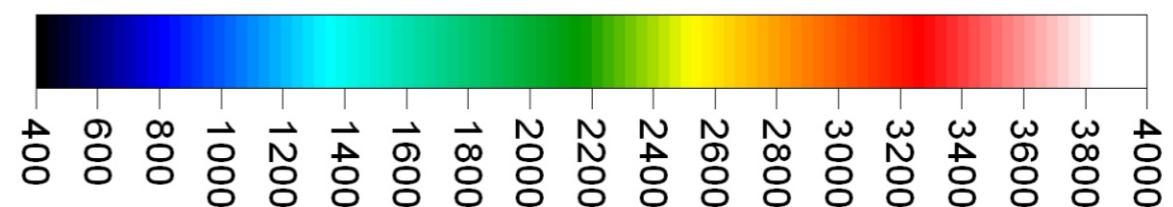
DROMOCRONE



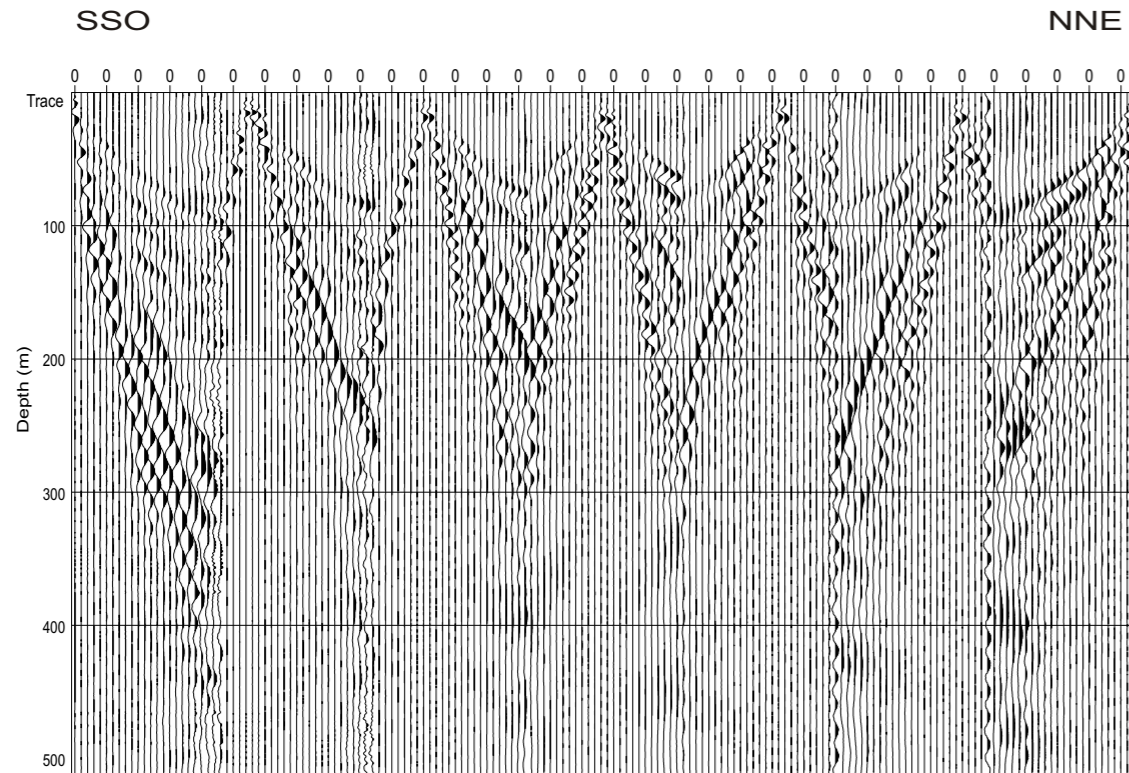
PROFILO SISMICO 2D



P-Velocity (V_p) (m/sec)



SISMOGRAMMI



Codice Certificato di prova: **szz-azt_SRP_06**

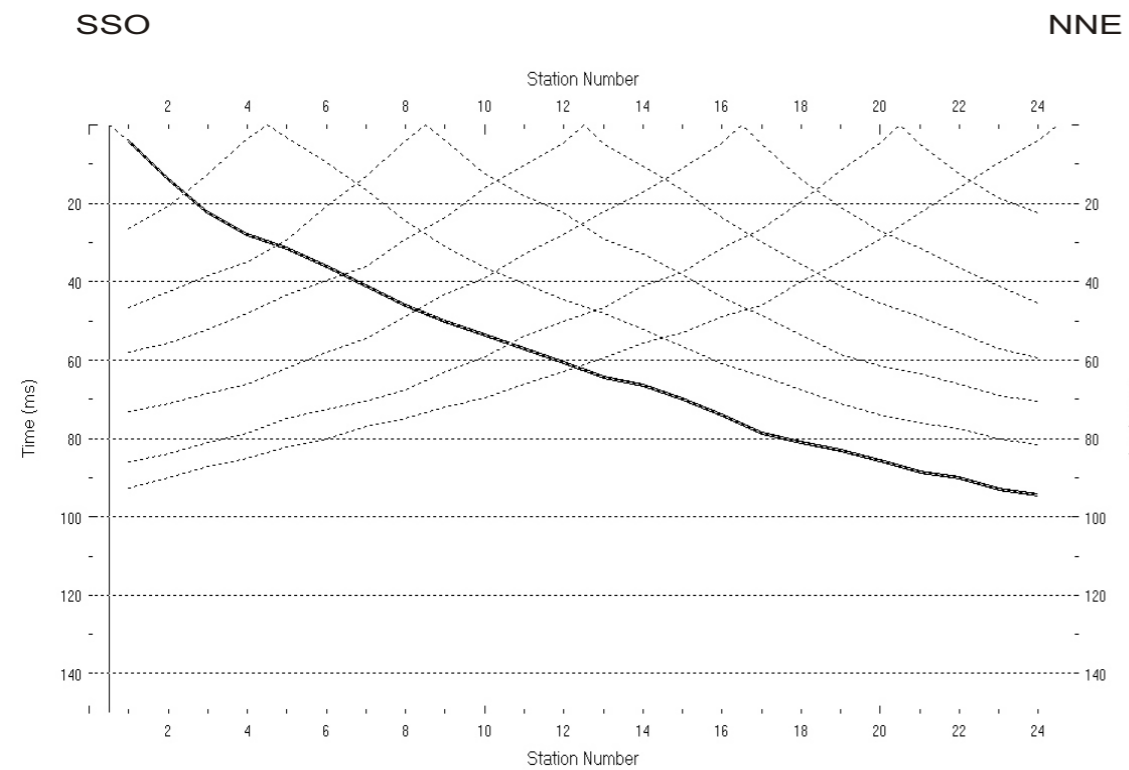
Committente: Comune di Gubbio - Data Esecuzione: 04/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

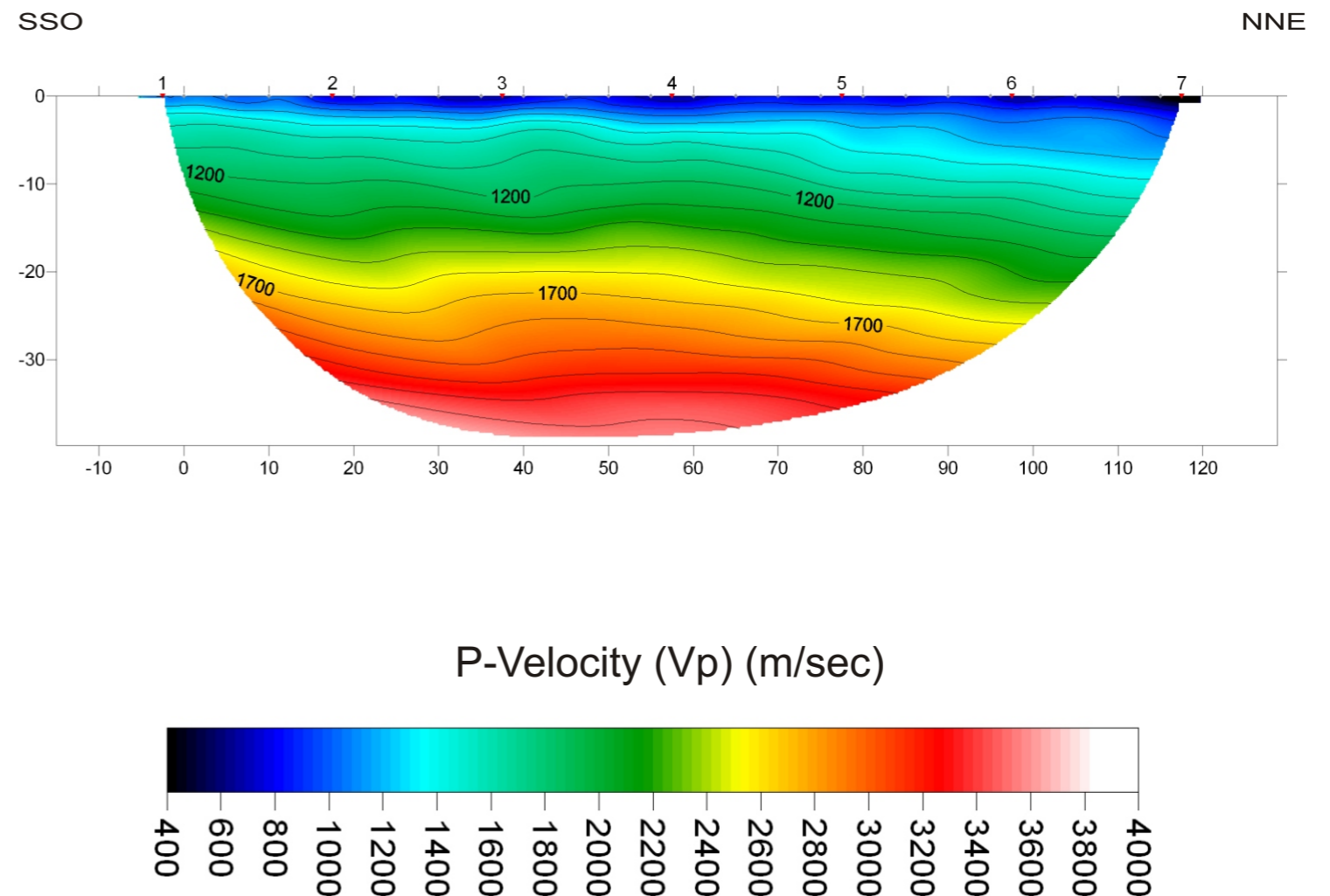
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS84 UTM33N)	G1: N 4802365 m; E 302824 m G24: N 4802458 m; E 302748 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



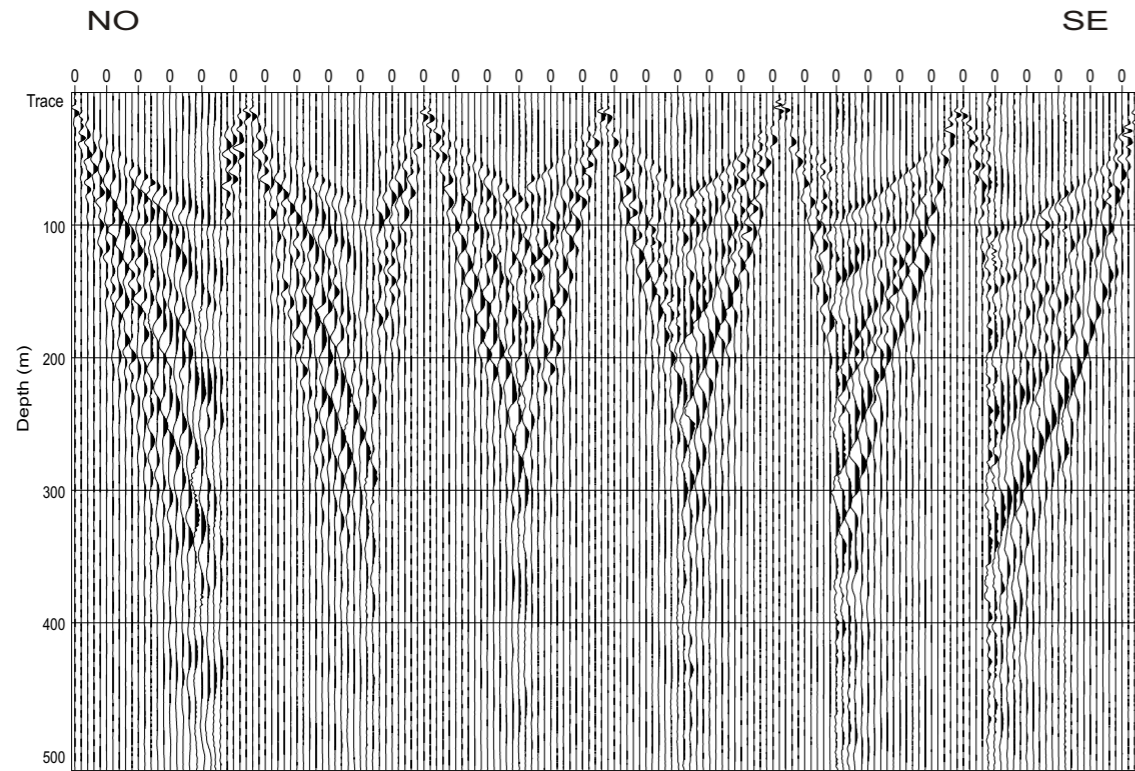
DROMOCRONE



PROFILO SISMICO 2D



SISMOGRAMMI



Codice Certificato di prova: **szz-azt_SRP_07**

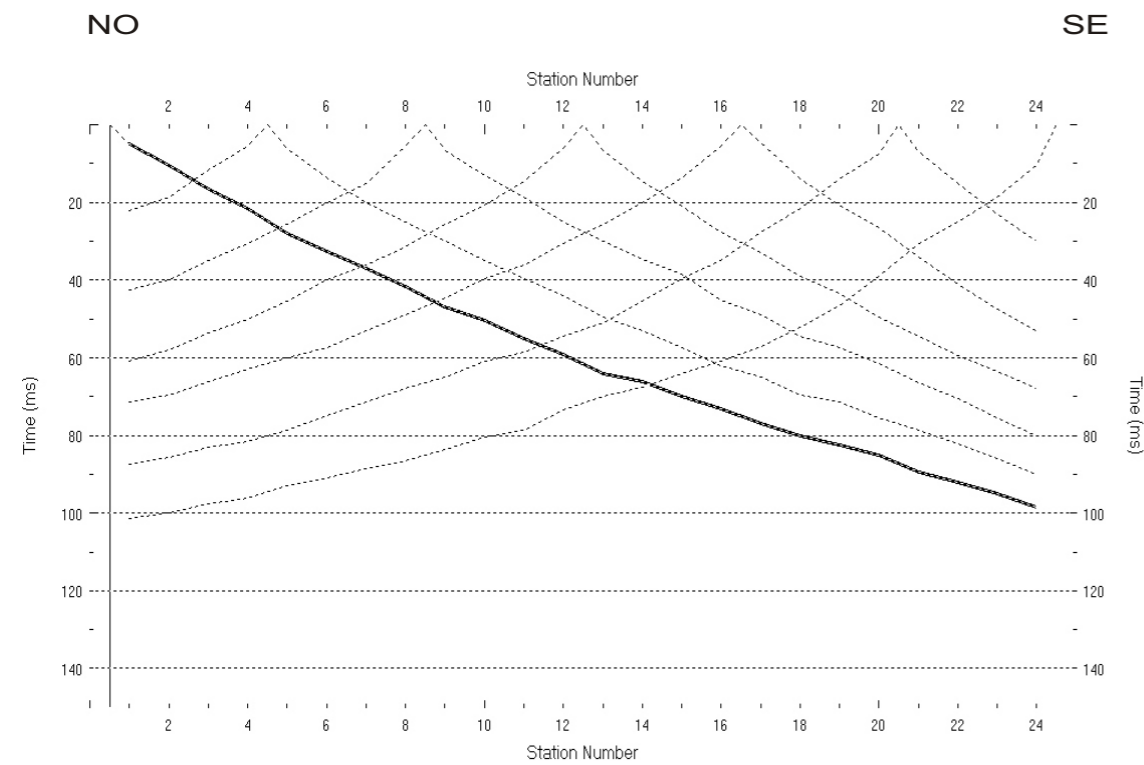
Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

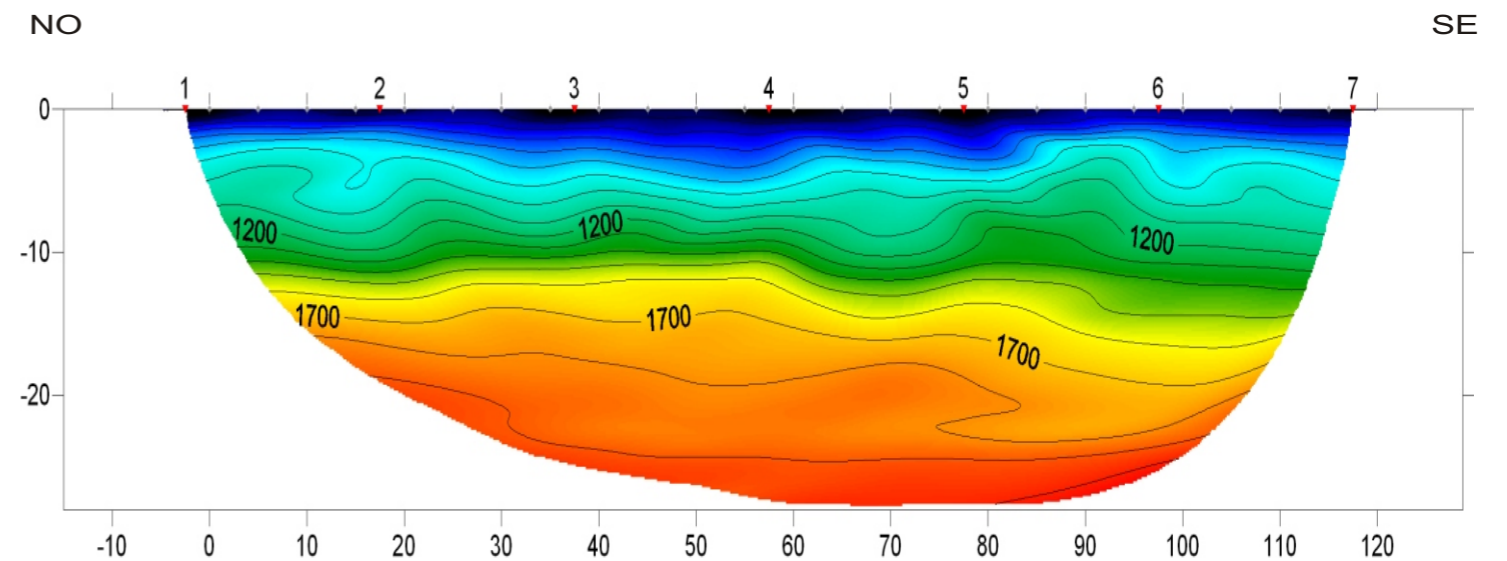
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NO - SE
Coordinate estremi (WGS84 UTM33N)	G1: N 4802815 m; E 303001 m G24: N 4802738 m; E 303094 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



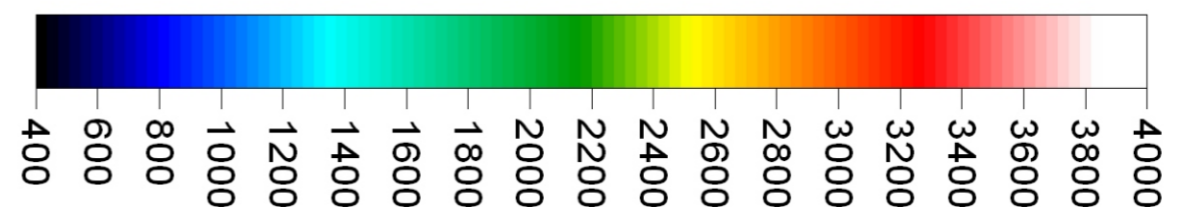
DROMOCRONE



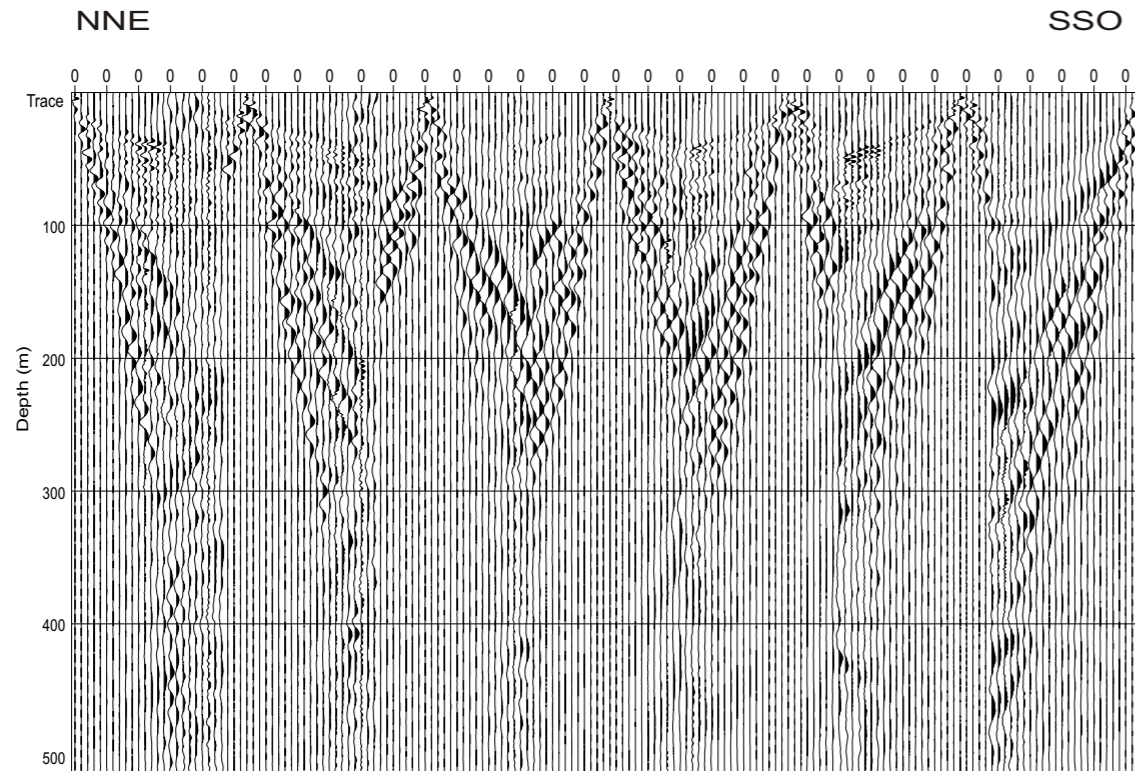
PROFILO SISMICO 2D



P-Velocity (V_p) (m/sec)



SISMOGRAMMI



Codice Certificato di prova: szz-azt_SRP_08

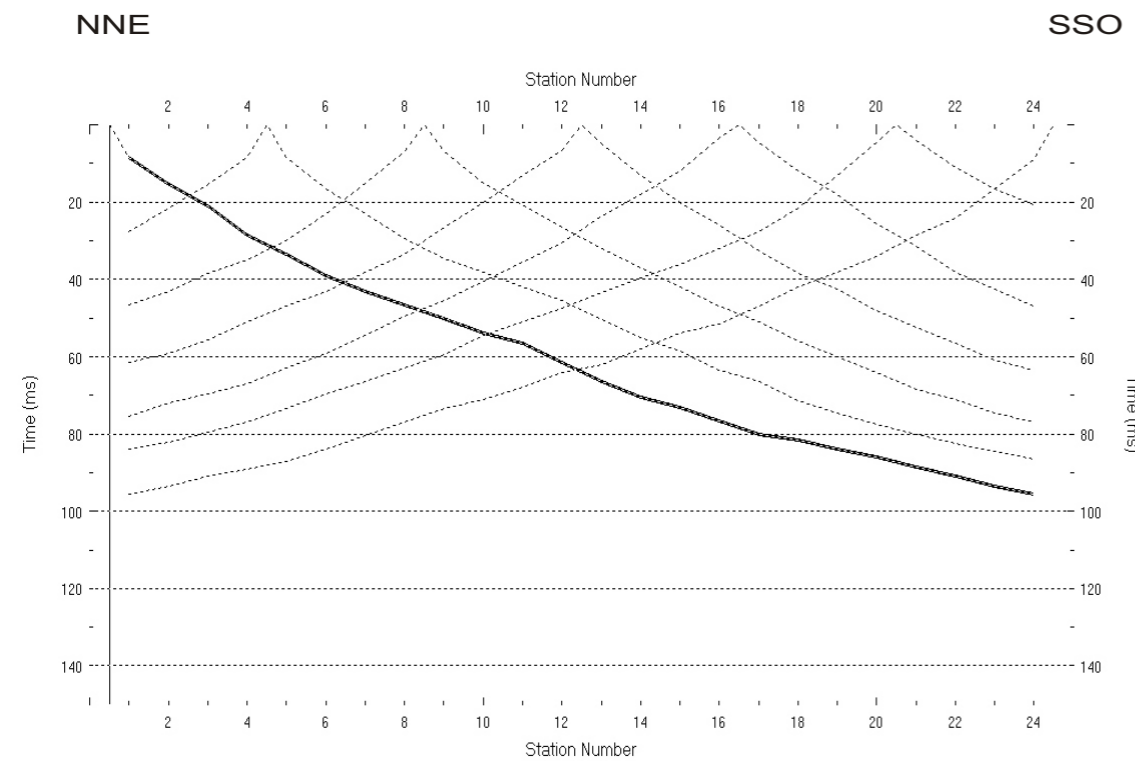
Committente: Comune di Gubbio - Data Esecuzione:27/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

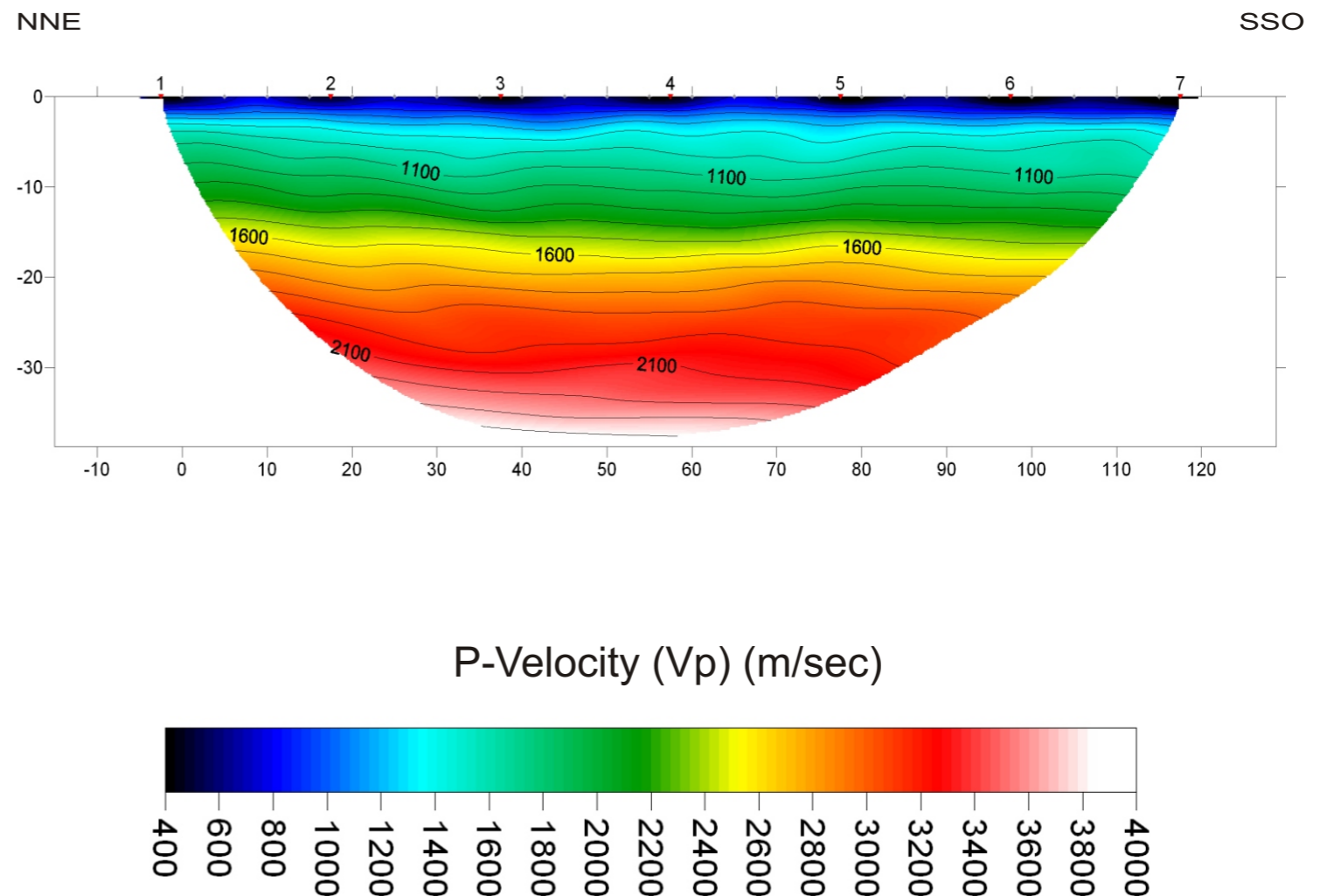
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NNE - SSO
Coordinate estremi (WGS84 UTM33N)	G1: N 4803017 m; E 302858 m G24: N 4802917 m; E 302792 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



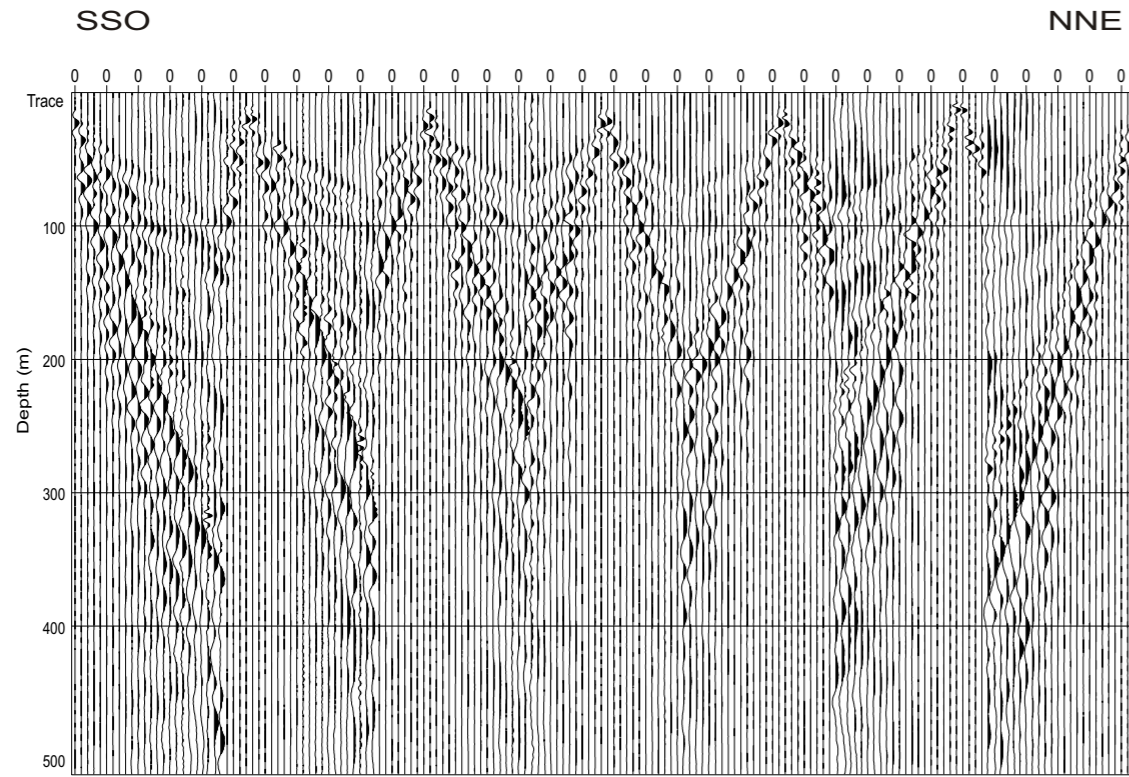
DROMOCRONE



PROFILO SISMICO 2D



SISMOGRAMMI



Codice Certificato di prova: **szz-azt_SRP_09**

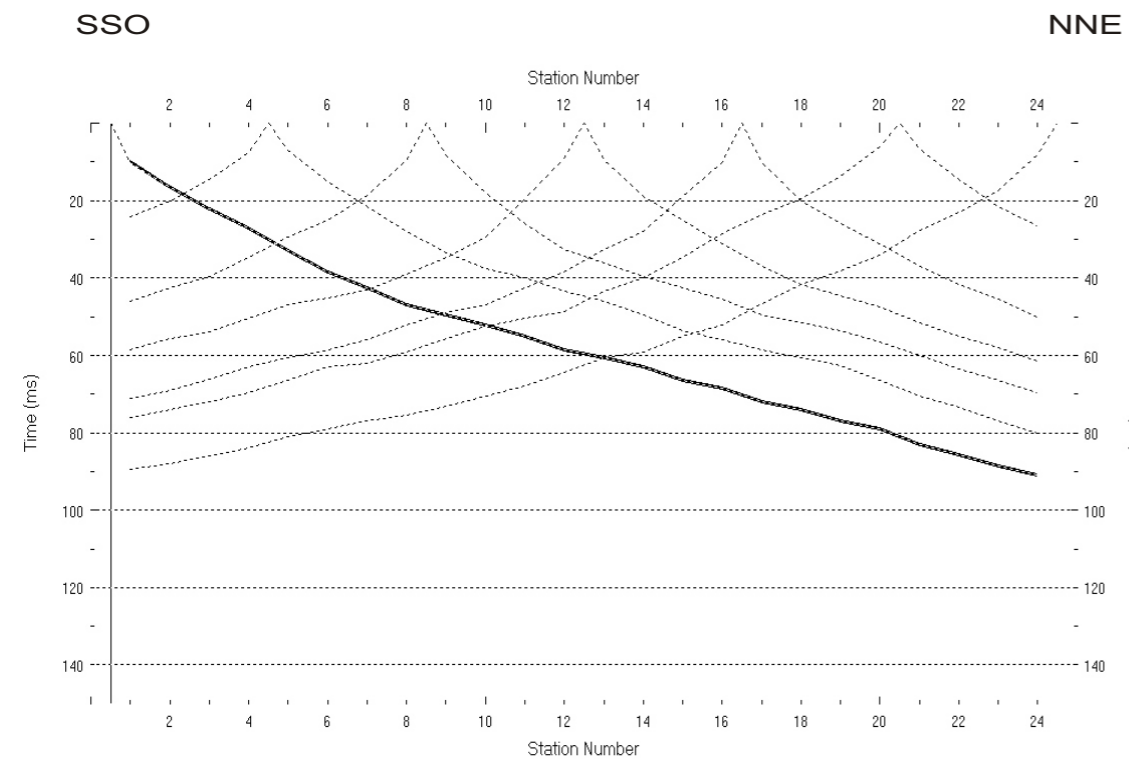
Committente: Comune di Gubbio - Data Esecuzione: 19/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

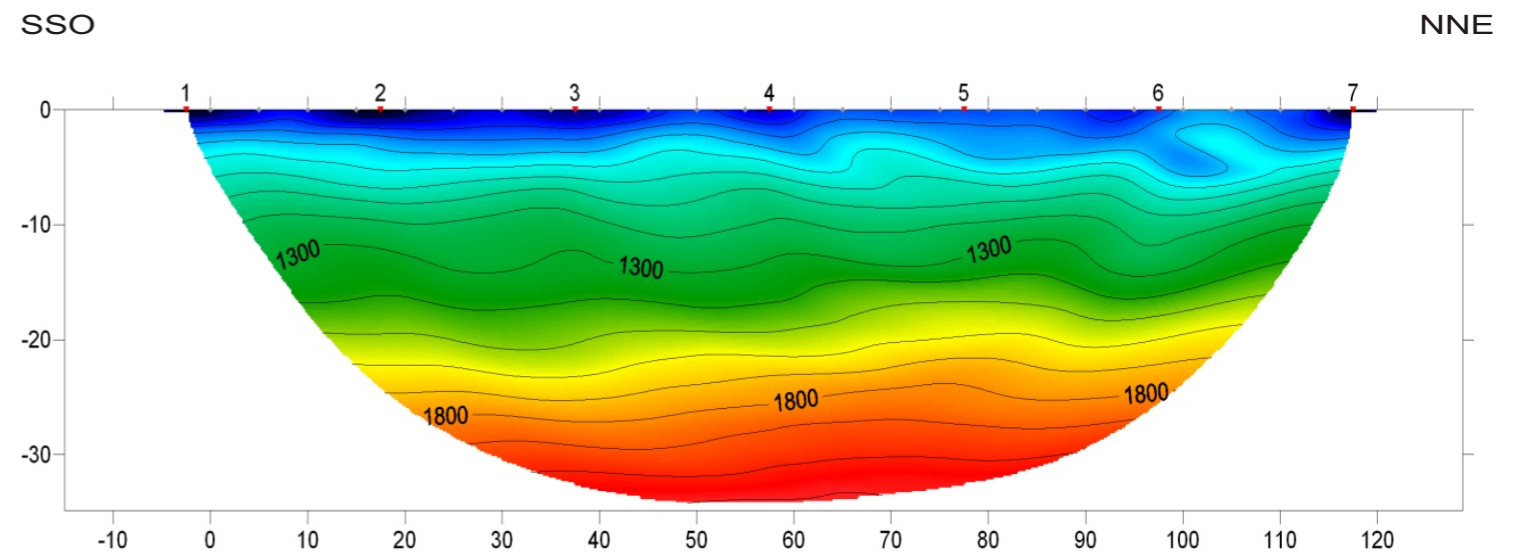
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	SSO - NNE
Coordinate estremi (WGS84 UTM33N)	G1: N 4803364 m; E 302266 m G24: N 4803077 m; E 302343 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



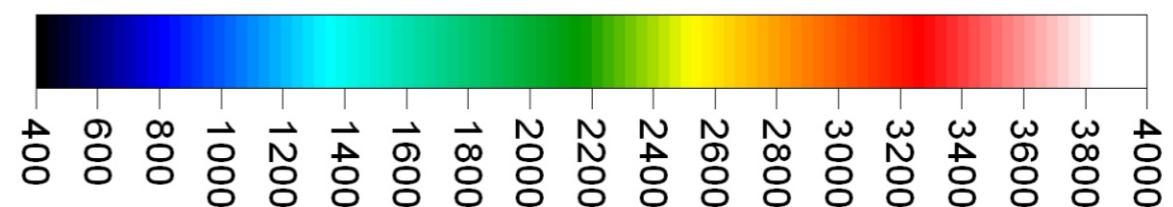
DROMOCRONE



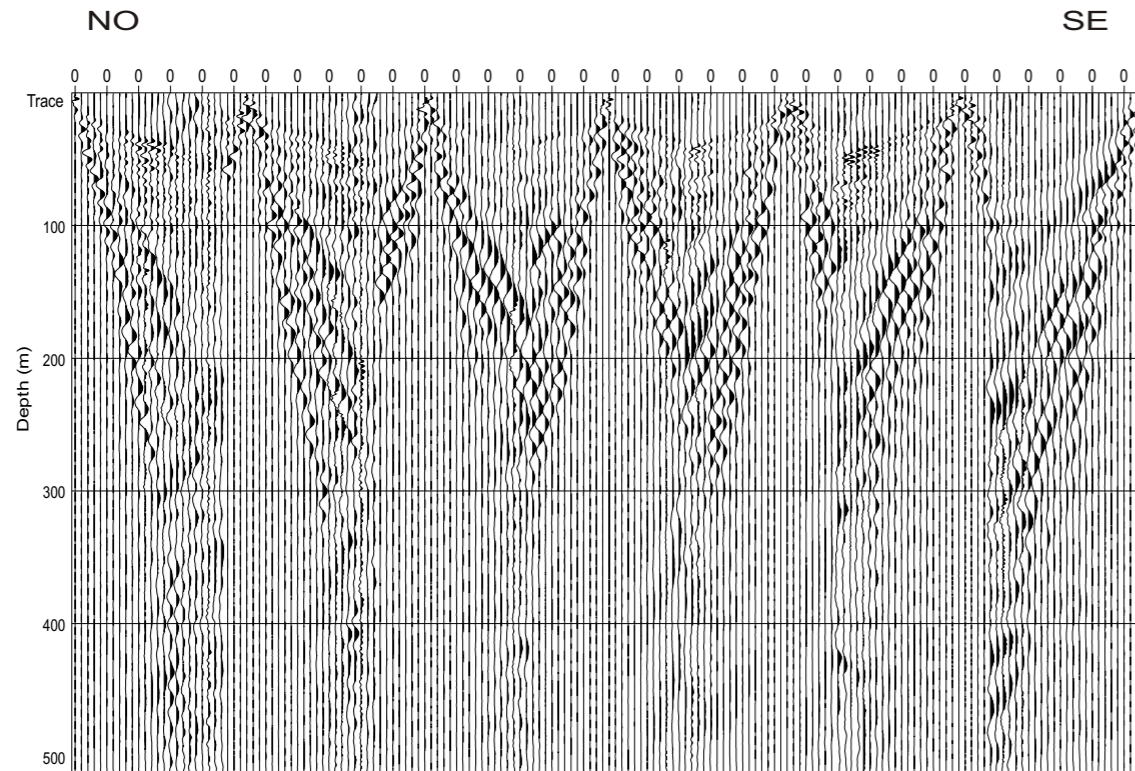
PROFILO SISMICO 2D



P-Velocity (Vp) (m/sec)



SISMOGRAMMI



Codice Certificato di prova: **szz-azt_SRP_10**

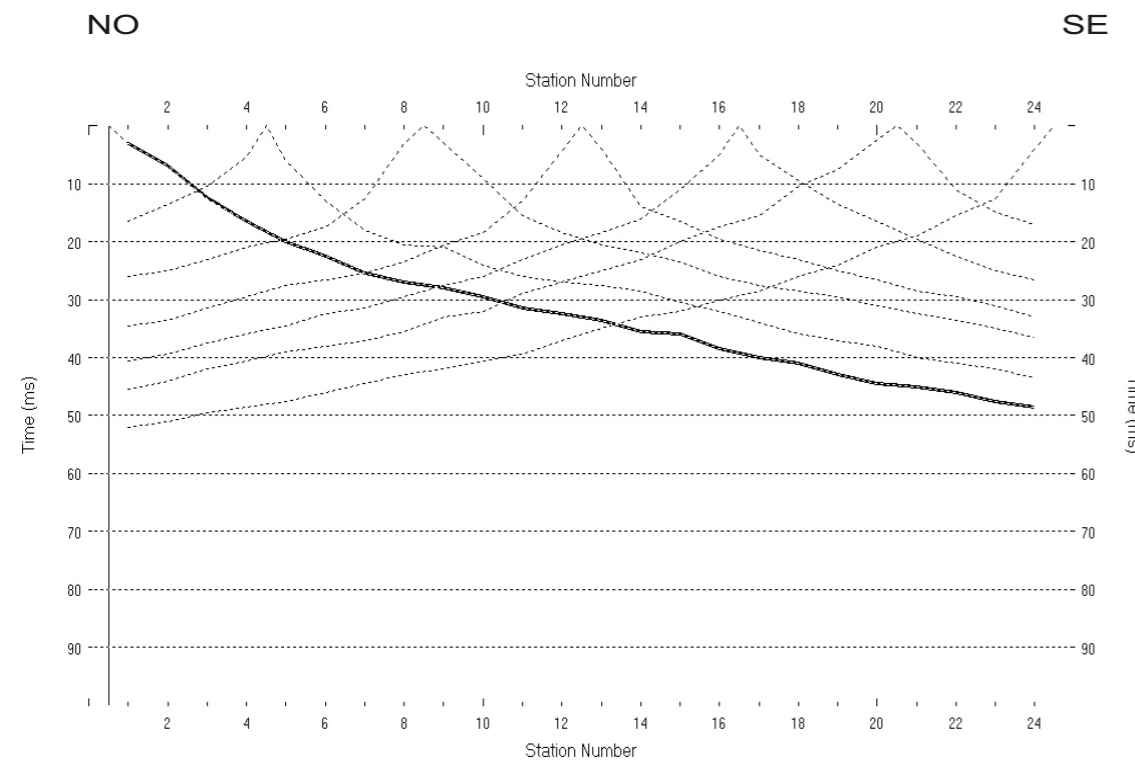
Committente: Comune di Gubbio - Data Esecuzione: 27/06/2018 - Località: Gubbio - Comune: Gubbio (PG)

SPECIFICHE TECNICHE DI ACQUISIZIONE

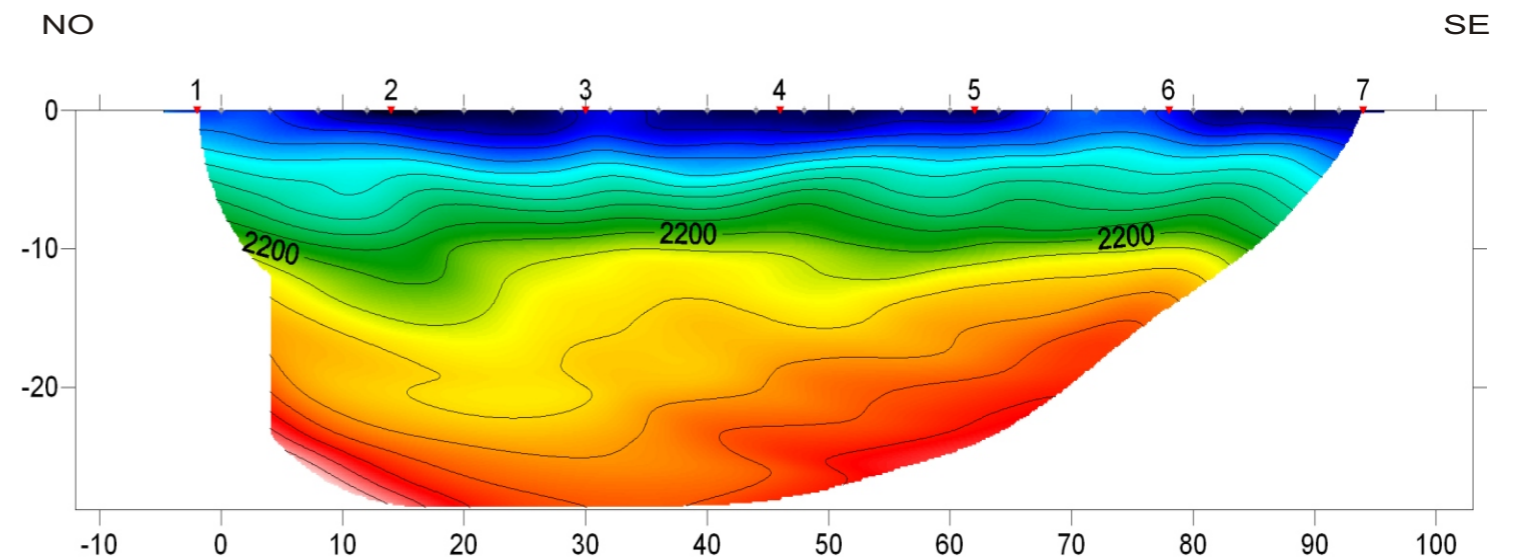
Tipo geofoni	verticali
Frequenza geofoni	14.0 Hz
N° geofoni	24
N° scoppi	7
Lunghezza stendimento	120.0 m
Distanza intergeofonica	5.0 m
Orientazione stendimento	NO - SE
Coordinate estremi (WGS84 UTM33N)	G1: N 4803364 m; E 302385 m G24: N 4803294 m; E 302452 m
Durata acquisizione	1 s
Tempo di campionamento	500 ms



DROMOCRONE



PROFILO SISMICO 2D



P-Velocity (V_p) (m/sec)

