

# Piano Strutturale Comunale



COMUNE DI MIRANDOLA  
Provincia di Modena



Sindaco: Maino Benatti

Assessore Economia e Sviluppo  
Sostenibile: Roberto Ganzerli

## B - SISTEMA NATURALE E AMBIENTALE MICROZONAZIONE SISMICA

Allegato alla relazione illustrativa

Comune di Mirandola  
Servizio urbanistica

Arch. Adele Rampolla  
Arch. Carlo Caleffi  
Geom. Angela Zibordi

gruppo di lavoro:

Studio di Geologia Tarabusi

Dott. Geol. Gabriele Tarabusi  
Dott. Geol. Ruggero Mazzoni  
Dott. Geol. Margherita Aguzzi

Adozione: delibera C.C. n. 60 del 09/04/2014

Approvazione: delibera C.C. n. 111 del 27/07/2015

Elaborato

QC\_B\_REL1  
ALL



## 8. ALLEGATO – RAPPORTI INDAGINI GEOGNOSTICHE E GEOFISICHE

## PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

CPT 1

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
0.20	13.0	18.0	13.0	0.67	19.0	10.20	82.0	97.0	82.0	5.20	16.0
0.40	15.0	25.0	15.0	0.87	17.0	10.40	48.0	126.0	48.0	1.47	33.0
0.60	15.0	28.0	15.0	1.20	12.0	10.60	108.0	130.0	108.0	1.93	56.0
0.80	20.0	38.0	20.0	0.93	21.0	10.80	73.0	102.0	73.0	1.60	46.0
<b>1.00</b>	36.0	50.0	36.0	1.67	22.0	<b>11.00</b>	86.0	110.0	86.0	1.20	72.0
1.20	34.0	59.0	34.0	1.20	28.0	11.20	90.0	108.0	90.0	3.13	29.0
1.40	28.0	46.0	28.0	1.53	18.0	11.40	78.0	125.0	78.0	2.33	33.0
1.60	22.0	45.0	22.0	1.13	19.0	11.60	148.0	183.0	148.0	3.07	48.0
1.80	25.0	42.0	25.0	1.27	20.0	11.80	120.0	166.0	120.0	2.60	46.0
<b>2.00</b>	18.0	37.0	18.0	1.20	15.0	<b>12.00</b>	128.0	167.0	128.0	2.60	49.0
2.20	15.0	33.0	15.0	1.40	11.0	12.20	146.0	185.0	146.0	4.07	36.0
2.40	16.0	37.0	16.0	1.13	14.0	12.40	127.0	188.0	127.0	2.27	56.0
2.60	16.0	33.0	16.0	0.73	22.0	12.60	138.0	172.0	138.0	2.87	48.0
2.80	13.0	24.0	13.0	0.53	24.0	12.80	134.0	177.0	134.0	3.00	45.0
<b>3.00</b>	12.0	20.0	12.0	0.47	26.0	<b>13.00</b>	111.0	156.0	111.0	2.73	41.0
3.20	27.0	34.0	27.0	0.27	101.0	13.20	113.0	154.0	113.0	2.13	53.0
3.40	31.0	35.0	31.0	0.73	42.0	13.40	97.0	129.0	97.0	2.33	42.0
3.60	14.0	25.0	14.0	1.07	13.0	13.60	89.0	124.0	89.0	2.47	36.0
3.80	14.0	30.0	14.0	0.80	17.0	13.80	106.0	143.0	106.0	3.33	32.0
<b>4.00</b>	11.0	23.0	11.0	0.67	16.0	<b>14.00</b>	144.0	194.0	144.0	2.13	67.0
4.20	13.0	23.0	13.0	0.60	22.0	14.20	132.0	164.0	132.0	3.13	42.0
4.40	15.0	24.0	15.0	0.60	25.0	14.40	128.0	175.0	128.0	1.53	83.0
4.60	23.0	32.0	23.0	1.20	19.0	14.60	119.0	142.0	119.0	2.07	58.0
4.80	19.0	37.0	19.0	1.20	16.0	14.80	112.0	143.0	112.0	2.93	38.0
<b>5.00</b>	18.0	36.0	18.0	0.93	19.0	<b>15.00</b>	133.0	177.0	133.0	3.40	39.0
5.20	20.0	34.0	20.0	0.87	23.0	15.20	172.0	223.0	172.0	2.60	66.0
5.40	18.0	31.0	18.0	1.00	18.0	15.40	158.0	197.0	158.0	2.80	56.0
5.60	14.0	29.0	14.0	0.67	21.0	15.60	109.0	151.0	109.0	2.47	44.0
5.80	14.0	24.0	14.0	0.73	19.0	15.80	111.0	148.0	111.0	2.47	45.0
<b>6.00</b>	9.0	20.0	9.0	0.80	11.0	<b>16.00</b>	149.0	186.0	149.0	3.33	45.0
6.20	10.0	22.0	10.0	0.47	21.0	16.20	140.0	190.0	140.0	2.93	48.0
6.40	43.0	50.0	43.0	1.07	40.0	16.40	138.0	182.0	138.0	2.33	59.0
6.60	37.0	53.0	37.0	0.33	111.0	16.60	135.0	170.0	135.0	2.67	51.0
6.80	18.0	23.0	18.0	1.00	18.0	16.80	165.0	205.0	165.0	3.73	44.0
<b>7.00</b>	10.0	25.0	10.0	0.60	17.0	<b>17.00</b>	185.0	241.0	185.0	3.13	59.0
7.20	14.0	23.0	14.0	0.73	19.0	17.20	147.0	194.0	147.0	3.73	39.0
7.40	18.0	29.0	18.0	0.87	21.0	17.40	117.0	173.0	117.0	3.47	34.0
7.60	20.0	33.0	20.0	0.93	21.0	17.60	136.0	188.0	136.0	2.47	55.0
7.80	19.0	33.0	19.0	1.27	15.0	17.80	154.0	191.0	154.0	3.20	48.0
<b>8.00</b>	19.0	38.0	19.0	1.13	17.0	<b>18.00</b>	136.0	184.0	136.0	2.33	58.0
8.20	17.0	34.0	17.0	0.93	18.0	18.20	113.0	148.0	113.0	2.47	46.0
8.40	19.0	33.0	19.0	1.20	16.0	18.40	102.0	139.0	102.0	1.80	57.0
8.60	28.0	46.0	28.0	1.47	19.0	18.60	102.0	129.0	102.0	2.87	36.0
8.80	28.0	50.0	28.0	1.20	23.0	18.80	88.0	131.0	88.0	2.07	43.0
<b>9.00</b>	28.0	46.0	28.0	2.40	12.0	<b>19.00</b>	128.0	159.0	128.0	2.60	49.0
9.20	46.0	82.0	46.0	1.20	38.0	19.20	127.0	166.0	127.0	3.33	38.0
9.40	63.0	81.0	63.0	1.87	34.0	19.40	136.0	186.0	136.0	3.00	45.0
9.60	113.0	141.0	113.0	1.67	68.0	19.60	146.0	191.0	146.0	2.87	51.0
9.80	86.0	111.0	86.0	3.87	22.0	19.80	171.0	214.0	171.0	3.27	52.0
<b>10.00</b>	119.0	177.0	119.0	1.00	119.0	<b>20.00</b>	136.0	185.0	136.0	3.87	35.0

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

**PROVA PENETROMETRICA STATICA**  
**LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

**CPT 1**

3.010496-117

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prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
20.20	131.0	189.0	131.0	4.20	31.0	25.20	195.0	269.0	195.0	4.13	47.0
20.40	164.0	227.0	164.0	0.67	246.0	25.40	176.0	238.0	176.0	2.80	63.0
20.60	173.0	183.0	173.0	2.87	60.0	25.60	190.0	232.0	190.0	2.60	73.0
20.80	112.0	155.0	112.0	2.87	39.0	25.80	186.0	225.0	186.0	4.53	41.0
<b>21.00</b>	110.0	153.0	110.0	4.00	28.0	<b>26.00</b>	234.0	302.0	234.0	5.40	43.0
21.20	143.0	203.0	143.0	9.80	15.0	26.20	218.0	299.0	218.0	4.20	52.0
21.40	124.0	271.0	124.0	3.93	32.0	26.40	91.0	154.0	91.0	1.60	57.0
21.60	160.0	219.0	160.0	4.47	36.0	26.60	206.0	230.0	206.0	5.80	36.0
21.80	160.0	227.0	160.0	3.80	42.0	26.80	132.0	219.0	132.0	3.13	42.0
<b>22.00</b>	199.0	256.0	199.0	5.13	39.0	<b>27.00</b>	127.0	174.0	127.0	5.87	22.0
22.20	276.0	353.0	276.0	6.80	41.0	27.20	248.0	336.0	248.0	8.87	28.0
22.40	157.0	259.0	157.0	4.73	33.0	27.40	170.0	303.0	170.0	4.60	37.0
22.60	195.0	266.0	195.0	4.00	49.0	27.60	143.0	212.0	143.0	3.73	38.0
22.80	171.0	231.0	171.0	4.07	42.0	27.80	151.0	207.0	151.0	4.00	38.0
<b>23.00</b>	147.0	208.0	147.0	2.60	57.0	<b>28.00</b>	145.0	205.0	145.0	3.67	40.0
23.20	93.0	132.0	93.0	1.93	48.0	28.20	228.0	283.0	228.0	4.80	47.0
23.40	16.0	45.0	16.0	2.13	7.0	28.40	233.0	305.0	233.0	4.93	47.0
23.60	85.0	117.0	85.0	3.67	23.0	28.60	167.0	241.0	167.0	4.60	36.0
23.80	168.0	223.0	168.0	4.40	38.0	28.80	151.0	220.0	151.0	4.20	36.0
<b>24.00</b>	193.0	259.0	193.0	4.00	48.0	<b>29.00</b>	175.0	238.0	175.0	3.53	50.0
24.20	157.0	217.0	157.0	3.27	48.0	29.20	197.0	250.0	197.0	9.40	21.0
24.40	175.0	224.0	175.0	1.60	109.0	29.40	254.0	395.0	254.0	6.47	39.0
24.60	183.0	207.0	183.0	8.67	21.0	29.60	295.0	392.0	295.0	5.40	55.0
24.80	146.0	276.0	146.0	5.40	27.0	29.80	293.0	374.0	293.0	7.27	40.0
<b>25.00</b>	220.0	301.0	220.0	4.93	45.0	<b>30.00</b>	153.0	262.0	153.0	-----	----

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
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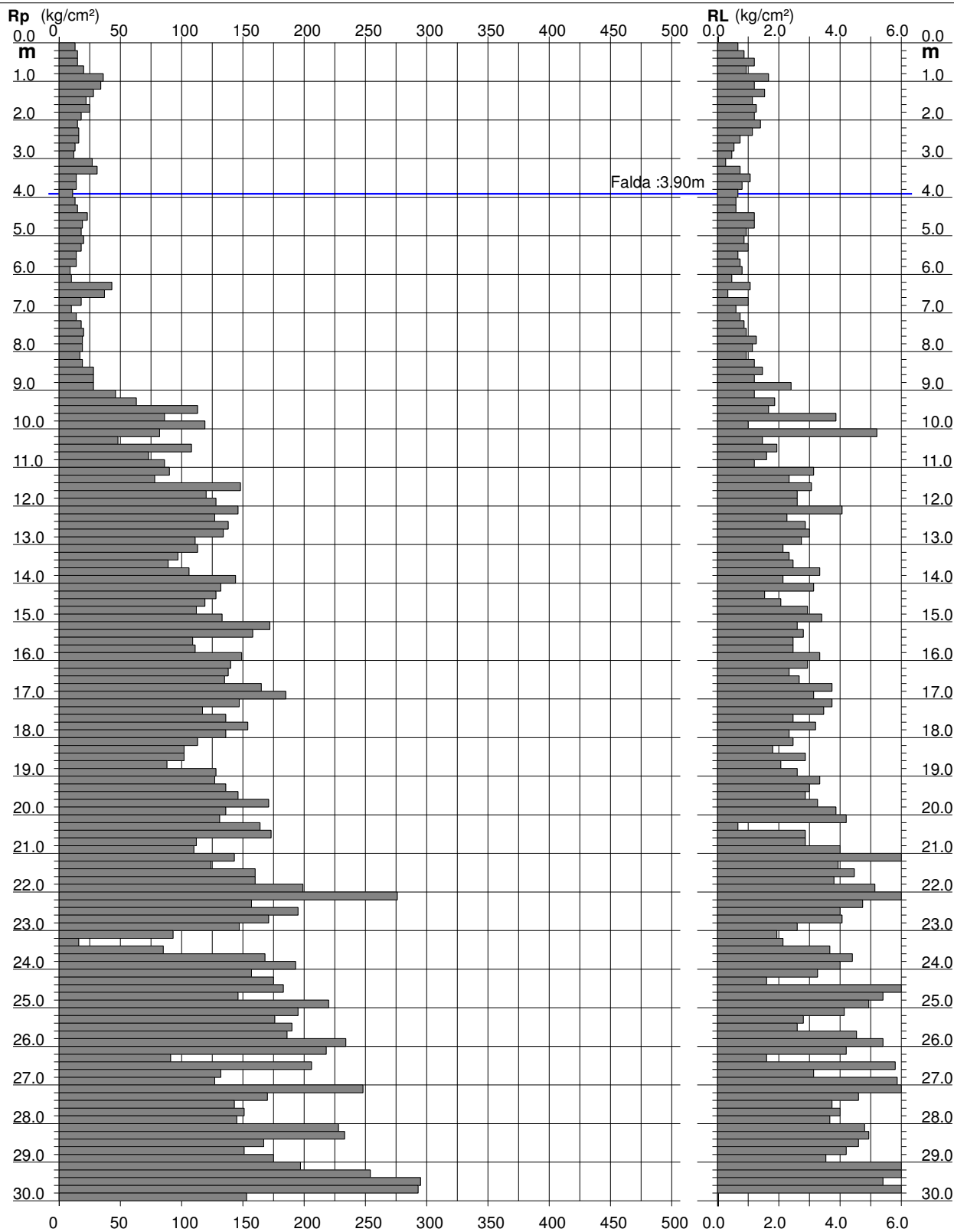
# PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 1

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio



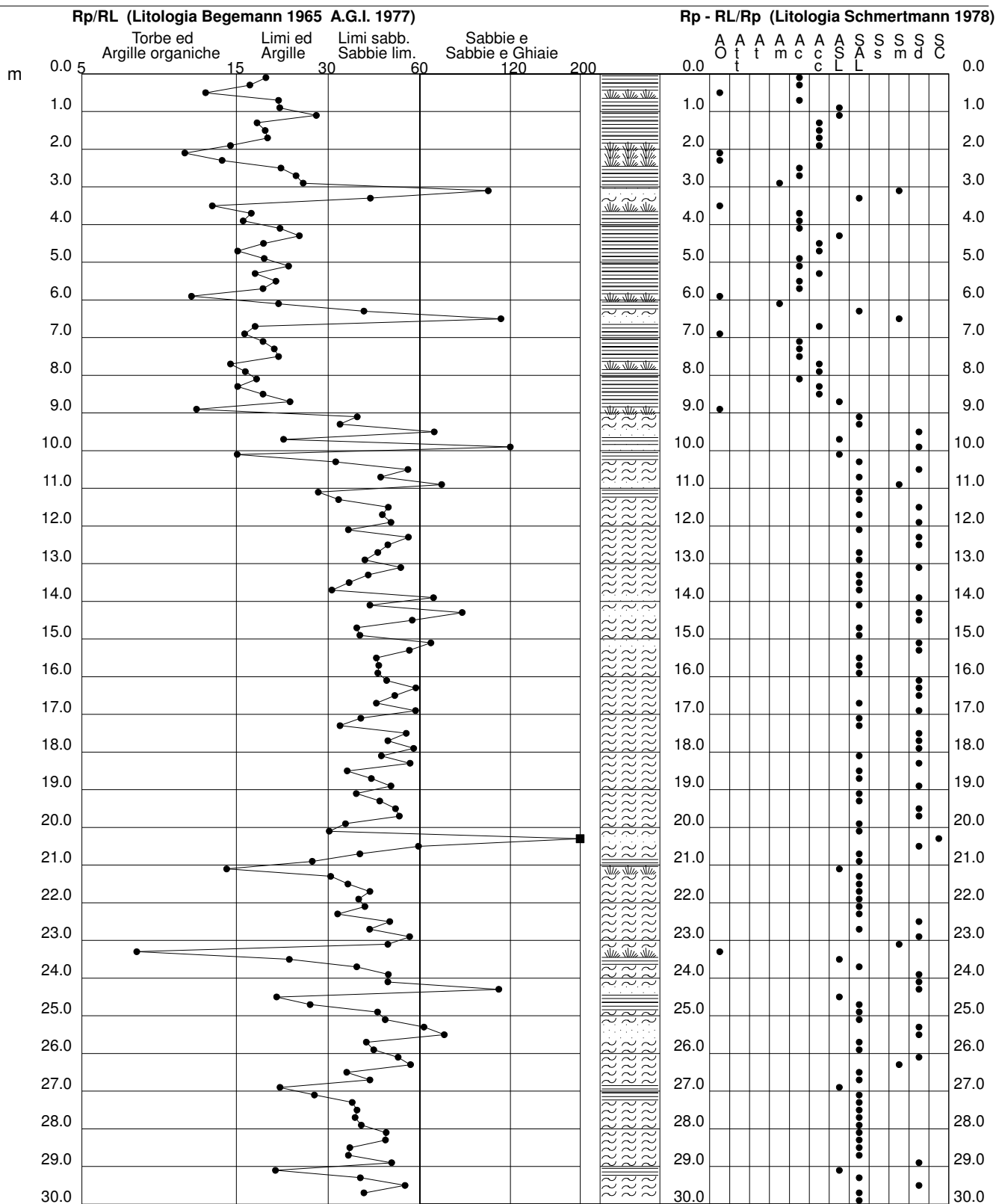
# PROVA PENETROMETRICA STATICA VALUTAZIONI LITOLOGICHE

CPT 1

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio







**PROVA PENETROMETRICA STATICA**  
**TABELLA PARAMETRI GEOTECNICI**

**CPT 1**

3.010496-117

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NATURA COESIVA											NATURA GRANULARE										
Prof. m	Rp kg/cm <sup>2</sup>	Rp/RI (-)	Natura Litol.	Y' t/m <sup>3</sup>	p'vo kg/cm <sup>2</sup>	Cu kg/cm <sup>2</sup>	OCR (-)	Eu50 kg/cm <sup>2</sup>	Eu25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>	Dr %	σ1s (°)	σ2s (°)	σ3s (°)	σ4s (°)	σdm (°)	σmy (°)	Amax/g (-)	E'50 kg/cm <sup>2</sup>	E'25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>
20.20	131	31	3:::	1.05	2.35	--	--	--	--	--	60	36	38	41	43	34	35	0.132	218	328	393
20.40	164	246	3:::	1.10	2.37	--	--	--	--	--	68	38	39	41	43	35	37	0.153	273	410	492
20.60	173	60	3:::	1.11	2.40	--	--	--	--	--	69	38	40	42	44	35	37	0.158	288	433	519
20.80	112	39	3:::	1.02	2.42	--	--	--	--	--	54	36	38	40	42	33	34	0.115	187	280	336
21.00	110	28	4:/:	1.06	2.44	3.67	10.5	623	935	330	54	35	38	40	42	33	34	0.113	183	275	330
21.20	143	15	4:/:	1.08	2.46	4.77	14.4	810	1216	429	62	37	39	41	43	34	36	0.137	238	358	429
21.40	124	32	3:::	1.04	2.48	--	--	--	--	--	57	36	38	40	43	33	35	0.123	207	310	372
21.60	160	36	3:::	1.09	2.50	--	--	--	--	--	66	37	39	41	43	34	36	0.147	267	400	480
21.80	160	42	3:::	1.09	2.52	--	--	--	--	--	66	37	39	41	43	34	36	0.146	267	400	480
22.00	199	39	3:::	1.15	2.55	--	--	--	--	--	73	38	40	42	44	36	38	0.168	332	498	597
22.20	276	41	3:::	1.15	2.57	--	--	--	--	--	84	40	41	43	45	37	40	0.202	460	690	828
22.40	157	33	3:::	1.09	2.59	--	--	--	--	--	64	37	39	41	43	34	36	0.142	262	393	471
22.60	195	49	3:::	1.14	2.61	--	--	--	--	--	71	38	40	42	44	35	38	0.164	325	488	585
22.80	171	42	3:::	1.11	2.64	--	--	--	--	--	67	37	39	41	43	35	37	0.150	285	428	513
23.00	147	57	3:::	1.07	2.66	--	--	--	--	--	61	37	39	41	43	34	36	0.134	245	368	441
23.20	93	48	3:::	0.99	2.68	--	--	--	--	--	45	34	37	39	42	31	33	0.093	155	233	279
23.40	16	7	2////	0.96	2.70	0.70	1.2	414	621	52	--	--	--	--	--	--	--	--	--	--	--
23.60	85	23	4:/:	1.04	2.72	2.83	6.6	696	1044	255	42	34	36	39	41	30	33	0.084	142	213	255
23.80	168	38	3:::	1.10	2.74	--	--	--	--	--	65	37	39	41	43	34	37	0.145	280	420	504
24.00	193	48	3:::	1.14	2.76	--	--	--	--	--	70	38	40	42	44	35	38	0.158	322	483	579
24.20	157	48	3:::	1.09	2.78	--	--	--	--	--	63	37	39	41	43	34	36	0.137	262	393	471
24.40	175	109	3:::	1.11	2.81	--	--	--	--	--	66	37	39	41	43	34	37	0.147	292	438	525
24.60	183	21	4:/:	1.11	2.83	6.10	16.4	1037	1556	549	67	37	39	41	43	35	37	0.151	305	458	549
24.80	146	27	4:/:	1.08	2.85	4.87	12.3	827	1241	438	59	36	38	41	43	33	36	0.129	243	365	438
25.00	220	45	3:::	1.15	2.87	--	--	--	--	--	73	38	40	42	44	35	38	0.169	367	550	660
25.20	195	47	3:::	1.14	2.90	--	--	--	--	--	69	38	40	41	44	35	38	0.156	325	488	585
25.40	176	63	3:::	1.11	2.92	--	--	--	--	--	65	37	39	41	43	34	37	0.145	293	440	528
25.60	190	73	3:::	1.14	2.94	--	--	--	--	--	68	37	39	41	43	35	37	0.152	317	475	570
25.80	186	41	3:::	1.13	2.96	--	--	--	--	--	67	37	39	41	43	34	37	0.150	310	465	558
26.00	234	43	3:::	1.15	2.99	--	--	--	--	--	75	38	40	42	44	36	39	0.173	390	585	702
26.20	218	52	3:::	1.15	3.01	--	--	--	--	--	72	38	40	42	44	35	38	0.165	363	545	654
26.40	91	57	3:::	0.99	3.03	--	--	--	--	--	42	34	36	39	41	30	33	0.084	152	228	278
26.60	206	36	3:::	1.15	3.05	--	--	--	--	--	70	38	40	42	44	35	38	0.158	343	515	618
26.80	132	42	3:::	1.05	3.07	--	--	--	--	--	54	36	38	40	42	32	35	0.115	220	330	396
27.00	127	22	4:/:	1.07	3.09	4.23	9.3	738	1107	381	53	35	38	40	42	32	35	0.111	212	318	381
27.20	248	28	4:/:	1.13	3.12	8.27	21.2	1405	2108	744	75	39	40	42	44	36	39	0.176	413	620	744
27.40	170	37	3:::	1.11	3.14	--	--	--	--	--	62	37	39	41	43	34	37	0.137	283	425	510
27.60	143	38	3:::	1.06	3.16	--	--	--	--	--	56	36	38	40	42	33	36	0.120	238	358	429
27.80	151	38	3:::	1.08	3.18	--	--	--	--	--	58	36	38	40	43	33	36	0.125	252	378	453
28.00	145	40	3:::	1.07	3.20	--	--	--	--	--	56	36	38	40	43	33	36	0.121	242	363	435
28.20	228	47	3:::	1.15	3.23	--	--	--	--	--	72	38	40	42	44	35	39	0.164	380	570	684
28.40	233	47	3:::	1.15	3.25	--	--	--	--	--	72	38	40	42	44	35	39	0.166	388	583	699
28.60	167	36	3:::	1.10	3.27	--	--	--	--	--	61	36	39	41	43	33	37	0.132	278	418	501
28.80	151	36	3:::	1.08	3.29	--	--	--	--	--	57	36	38	40	43	33	36	0.122	252	378	453
29.00	175	50	3:::	1.11	3.32	--	--	--	--	--	62	37	39	41	43	33	37	0.136	292	438	525
29.20	197	21	4:/:	1.12	3.34	6.57	14.6	1116	1675	591	66	37	39	41	43	34	38	0.147	328	493	591
29.40	254	39	3:::	1.15	3.36	--	--	--	--	--	74	38	40	42	44	35	39	0.173	423	635	762
29.60	295	55	3:::	1.15	3.38	--	--	--	--	--	79	39	41	43	44	36	40	0.188	492	738	885
29.80	293	40	3:::	1.15	3.41	--	--	--	--	--	79	39	41	42	44	36	40	0.187	488	733	879
30.00	153	--	3:::	1.08	3.43	--	--	--	--	--	57	36	38	40	43	32	36	0.121	255	383	459

## PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

**CPT 2**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.60 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
0.20	13.0	20.0	13.0	1.00	13.0	10.20	5.0	10.0	5.0	0.33	15.0
0.40	16.0	31.0	16.0	1.87	9.0	10.40	5.0	10.0	5.0	0.40	12.0
0.60	26.0	54.0	26.0	1.93	13.0	10.60	6.0	12.0	6.0	0.47	13.0
0.80	33.0	62.0	33.0	3.13	11.0	10.80	12.0	19.0	12.0	0.60	20.0
<b>1.00</b>	31.0	78.0	31.0	2.07	15.0	<b>11.00</b>	16.0	25.0	16.0	0.87	18.0
1.20	35.0	66.0	35.0	2.27	15.0	11.20	18.0	31.0	18.0	1.20	15.0
1.40	29.0	63.0	29.0	2.07	14.0	11.40	24.0	42.0	24.0	1.13	21.0
1.60	27.0	58.0	27.0	1.80	15.0	11.60	22.0	39.0	22.0	1.20	18.0
1.80	22.0	49.0	22.0	1.60	14.0	11.80	20.0	38.0	20.0	1.07	19.0
<b>2.00</b>	18.0	42.0	18.0	1.13	16.0	<b>12.00</b>	16.0	32.0	16.0	0.93	17.0
2.20	18.0	35.0	18.0	0.73	25.0	12.20	11.0	25.0	11.0	0.60	18.0
2.40	20.0	31.0	20.0	1.00	20.0	12.40	11.0	20.0	11.0	0.53	21.0
2.60	21.0	36.0	21.0	0.53	39.0	12.60	9.0	17.0	9.0	0.53	17.0
2.80	24.0	32.0	24.0	0.80	30.0	12.80	15.0	23.0	15.0	0.73	20.0
<b>3.00</b>	14.0	26.0	14.0	0.53	26.0	<b>13.00</b>	16.0	27.0	16.0	1.00	16.0
3.20	16.0	24.0	16.0	0.67	24.0	13.20	19.0	34.0	19.0	0.93	20.0
3.40	15.0	25.0	15.0	0.67	22.0	13.40	22.0	36.0	22.0	1.40	16.0
3.60	17.0	27.0	17.0	0.73	23.0	13.60	30.0	51.0	30.0	1.00	30.0
3.80	18.0	29.0	18.0	0.80	22.0	13.80	22.0	37.0	22.0	0.80	27.0
<b>4.00</b>	18.0	30.0	18.0	1.00	18.0	<b>14.00</b>	20.0	32.0	20.0	0.87	23.0
4.20	18.0	33.0	18.0	0.80	22.0	14.20	8.0	21.0	8.0	2.13	4.0
4.40	16.0	28.0	16.0	0.87	18.0	14.40	9.0	41.0	9.0	1.00	9.0
4.60	19.0	32.0	19.0	0.80	24.0	14.60	89.0	104.0	89.0	2.07	43.0
4.80	17.0	29.0	17.0	0.73	23.0	14.80	104.0	135.0	104.0	2.40	43.0
<b>5.00</b>	17.0	28.0	17.0	0.87	20.0	<b>15.00</b>	117.0	153.0	117.0	2.60	45.0
5.20	15.0	28.0	15.0	0.80	19.0	15.20	133.0	172.0	133.0	2.47	54.0
5.40	15.0	27.0	15.0	0.73	20.0	15.40	132.0	169.0	132.0	2.60	51.0
5.60	13.0	24.0	13.0	0.67	19.0	15.60	93.0	132.0	93.0	2.80	33.0
5.80	10.0	20.0	10.0	0.53	19.0	15.80	104.0	146.0	104.0	2.40	43.0
<b>6.00</b>	9.0	17.0	9.0	0.47	19.0	<b>16.00</b>	154.0	190.0	154.0	2.40	64.0
6.20	8.0	15.0	8.0	0.47	17.0	16.20	116.0	152.0	116.0	2.53	46.0
6.40	9.0	16.0	9.0	0.47	19.0	16.40	124.0	162.0	124.0	1.20	103.0
6.60	10.0	17.0	10.0	0.47	21.0	16.60	165.0	183.0	165.0	3.80	43.0
6.80	6.0	13.0	6.0	0.40	15.0	16.80	113.0	170.0	113.0	3.13	36.0
<b>7.00</b>	6.0	12.0	6.0	0.33	18.0	<b>17.00</b>	119.0	166.0	119.0	2.67	45.0
7.20	9.0	14.0	9.0	0.53	17.0	17.20	161.0	201.0	161.0	3.13	51.0
7.40	11.0	19.0	11.0	0.60	18.0	17.40	191.0	238.0	191.0	2.73	70.0
7.60	11.0	20.0	11.0	0.67	16.0	17.60	150.0	191.0	150.0	3.73	40.0
7.80	13.0	23.0	13.0	0.80	16.0	17.80	156.0	212.0	156.0	2.60	60.0
<b>8.00</b>	15.0	27.0	15.0	0.80	19.0	<b>18.00</b>	178.0	217.0	178.0	4.27	42.0
8.20	12.0	24.0	12.0	0.73	16.0	18.20	183.0	247.0	183.0	3.80	48.0
8.40	8.0	19.0	8.0	0.60	13.0	18.40	207.0	264.0	207.0	3.80	54.0
8.60	8.0	17.0	8.0	0.47	17.0	18.60	163.0	220.0	163.0	3.33	49.0
8.80	9.0	16.0	9.0	0.60	15.0	18.80	133.0	183.0	133.0	3.07	43.0
<b>9.00</b>	8.0	17.0	8.0	0.33	24.0	<b>19.00</b>	122.0	168.0	122.0	2.80	44.0
9.20	14.0	19.0	14.0	0.73	19.0	19.20	122.0	164.0	122.0	3.60	34.0
9.40	15.0	26.0	15.0	1.00	15.0	19.40	134.0	188.0	134.0	4.73	28.0
9.60	8.0	23.0	8.0	0.93	9.0	19.60	193.0	264.0	193.0	3.53	55.0
9.80	8.0	22.0	8.0	0.53	15.0	19.80	194.0	247.0	194.0	3.67	53.0
<b>10.00</b>	7.0	15.0	7.0	0.33	21.0	<b>20.00</b>	188.0	243.0	188.0	4.80	39.0

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

## PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

**CPT 2**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.60 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
20.20	172.0	244.0	172.0	4.07	42.0	25.20	109.0	163.0	109.0	4.87	22.0
20.40	190.0	251.0	190.0	3.13	61.0	25.40	228.0	301.0	228.0	5.80	39.0
20.60	181.0	228.0	181.0	3.40	53.0	25.60	226.0	313.0	226.0	4.60	49.0
20.80	185.0	236.0	185.0	3.73	50.0	25.80	204.0	273.0	204.0	3.40	60.0
<b>21.00</b>	148.0	204.0	148.0	5.07	29.0	<b>26.00</b>	207.0	258.0	207.0	4.40	47.0
21.20	153.0	229.0	153.0	3.60	43.0	26.20	203.0	269.0	203.0	4.87	42.0
21.40	219.0	273.0	219.0	3.67	60.0	26.40	215.0	288.0	215.0	3.67	59.0
21.60	240.0	295.0	240.0	4.67	51.0	26.60	184.0	239.0	184.0	4.53	41.0
21.80	256.0	326.0	256.0	2.80	91.0	26.80	162.0	230.0	162.0	4.47	36.0
<b>22.00</b>	191.0	233.0	191.0	4.80	40.0	<b>27.00</b>	177.0	244.0	177.0	4.33	41.0
22.20	165.0	237.0	165.0	3.80	43.0	27.20	153.0	218.0	153.0	3.53	43.0
22.40	188.0	245.0	188.0	3.87	49.0	27.40	229.0	282.0	229.0	4.87	47.0
22.60	231.0	289.0	231.0	4.20	55.0	27.60	161.0	234.0	161.0	4.20	38.0
22.80	221.0	284.0	221.0	3.40	65.0	27.80	199.0	262.0	199.0	4.13	48.0
<b>23.00</b>	213.0	264.0	213.0	3.40	63.0	<b>28.00</b>	230.0	292.0	230.0	4.13	56.0
23.20	180.0	231.0	180.0	3.87	47.0	28.20	205.0	267.0	205.0	3.87	53.0
23.40	146.0	204.0	146.0	4.60	32.0	28.40	196.0	254.0	196.0	3.73	52.0
23.60	246.0	315.0	246.0	4.20	59.0	28.60	200.0	256.0	200.0	3.80	53.0
23.80	263.0	326.0	263.0	5.47	48.0	28.80	199.0	256.0	199.0	4.07	49.0
<b>24.00</b>	236.0	318.0	236.0	5.20	45.0	<b>29.00</b>	195.0	256.0	195.0	4.00	49.0
24.20	231.0	309.0	231.0	4.00	58.0	29.20	197.0	257.0	197.0	3.67	54.0
24.40	241.0	301.0	241.0	4.73	51.0	29.40	194.0	249.0	194.0	3.87	50.0
24.60	214.0	285.0	214.0	4.73	45.0	29.60	203.0	261.0	203.0	4.13	49.0
24.80	258.0	329.0	258.0	4.53	57.0	29.80	237.0	299.0	237.0	5.53	43.0
<b>25.00</b>	215.0	283.0	215.0	3.60	60.0	<b>30.00</b>	290.0	373.0	290.0	-----	----

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

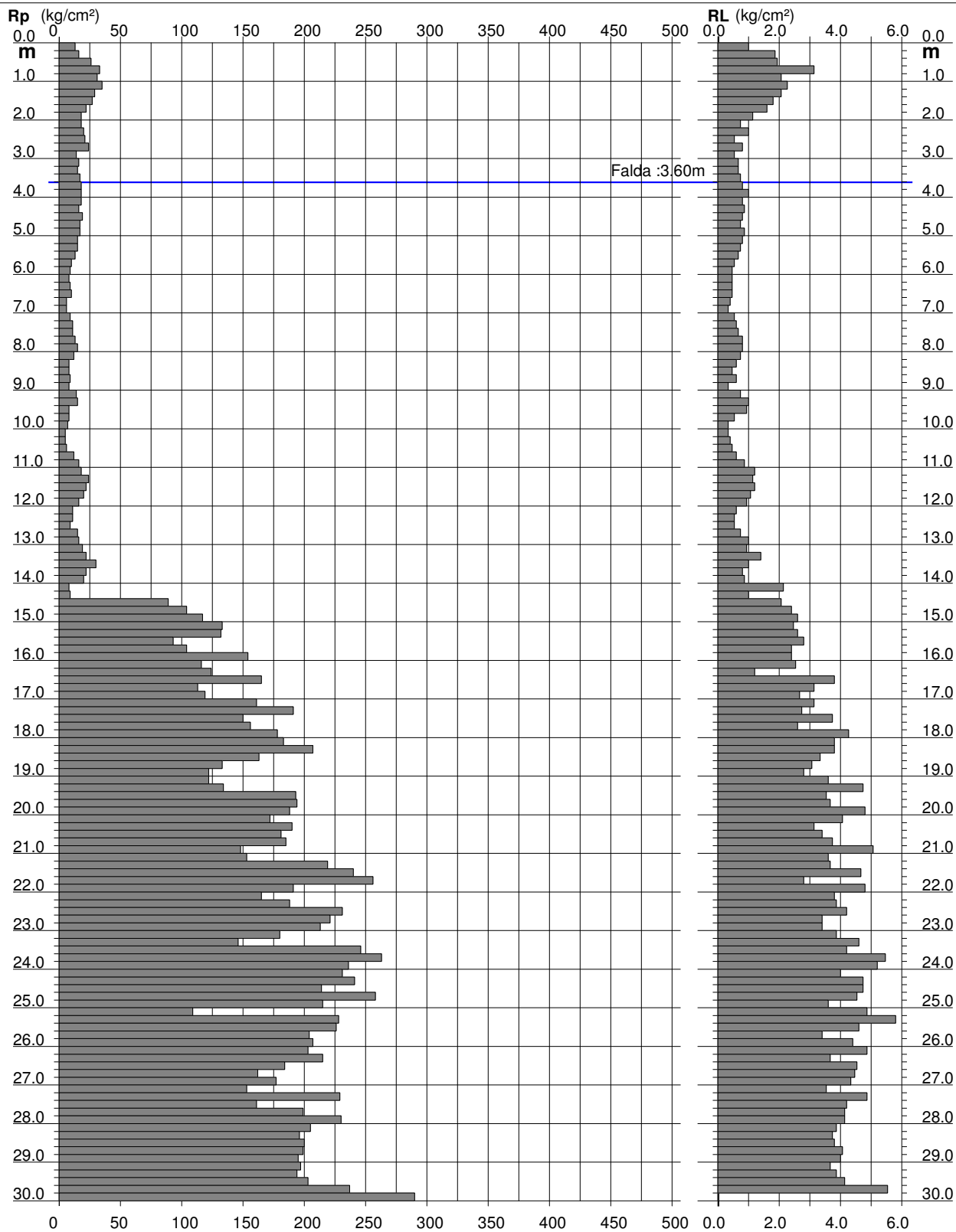
# PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 2

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss.: 19/01/2012

- data prova: 15/12/2011  
- quota inizio: Piano Campagna  
- prof. falda: 3.60 m da quota inizio



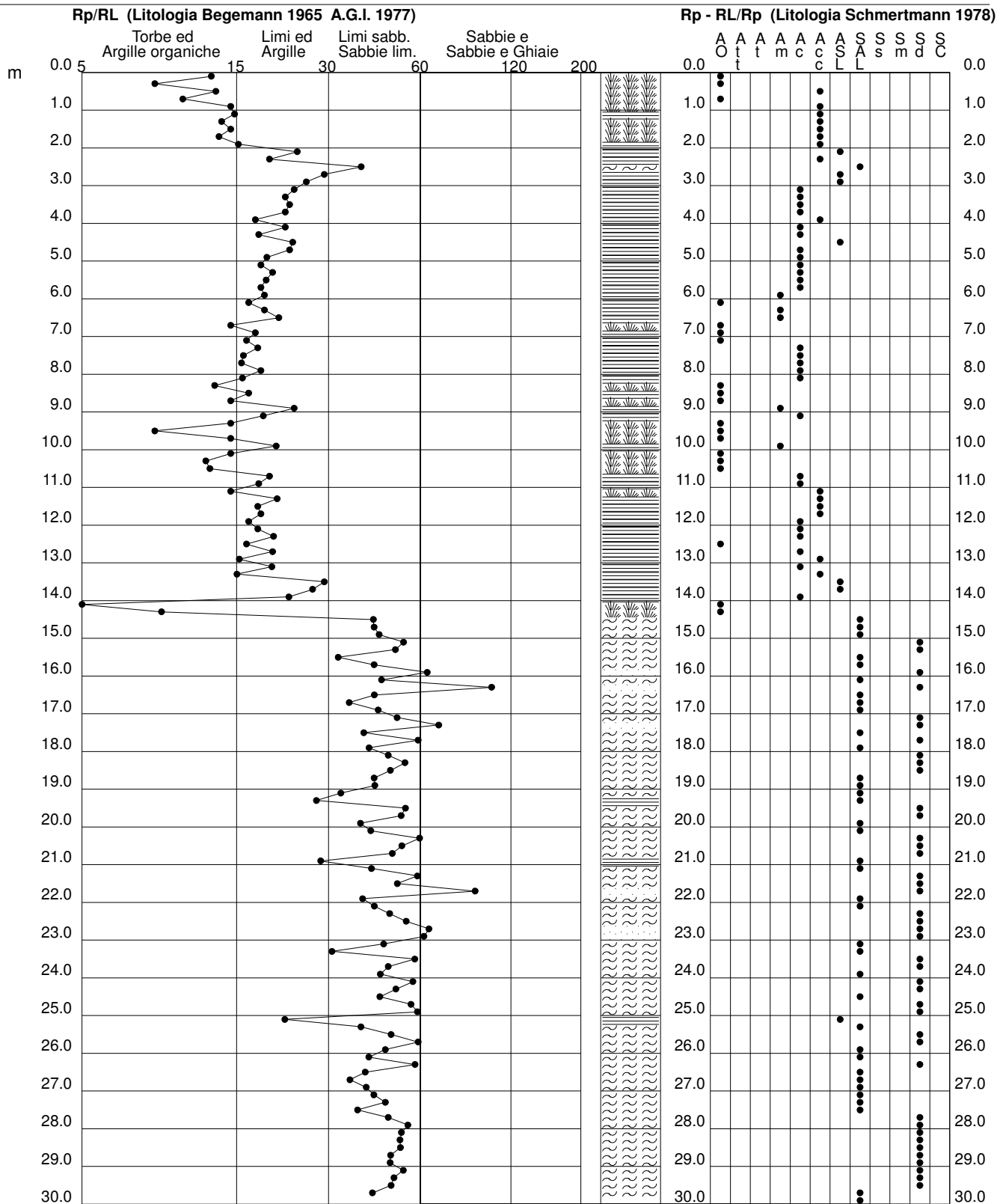
# PROVA PENETROMETRICA STATICA VALUTAZIONI LITOLOGICHE

CPT 2

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.60 m da quota inizio





**PROVA PENETROMETRICA STATICA  
TABELLA PARAMETRI GEOTECNICI**

**CPT 2**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.60 m da quota inizio

NATURA COESIVA											NATURA GRANULARE										
Prof. m	Rp kg/cm <sup>2</sup>	Rp/RI (-)	Natura Litol.	Y' t/m <sup>3</sup>	p'vo kg/cm <sup>2</sup>	Cu kg/cm <sup>2</sup>	OCR (-)	Eu50 kg/cm <sup>2</sup>	Eu25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>	Dr %	σ1s (°)	σ2s (°)	σ3s (°)	σ4s (°)	σdm (°)	σmy (°)	Amax/g (-)	E'50 kg/cm <sup>2</sup>	E'25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>
20.20	172	42	3:::	1.11	2.23	--	--	--	--	--	71	38	40	42	44	36	37	0.162	287	430	516
20.40	190	61	3:::	1.14	2.25	--	--	--	--	--	74	38	40	42	44	36	37	0.172	317	475	570
20.60	181	53	3:::	1.12	2.27	--	--	--	--	--	72	38	40	42	44	36	37	0.166	302	453	543
20.80	185	50	3:::	1.13	2.29	--	--	--	--	--	73	38	40	42	44	36	37	0.168	308	463	555
21.00	148	29	4/!:	1.09	2.31	4.93	16.2	839	1258	444	65	37	39	41	43	34	36	0.144	247	370	444
21.20	153	43	3:::	1.08	2.34	--	--	--	--	--	66	37	39	41	43	35	36	0.147	255	383	459
21.40	219	60	3:::	1.15	2.36	--	--	--	--	--	78	39	41	42	44	37	38	0.184	365	548	657
21.60	240	51	3:::	1.15	2.38	--	--	--	--	--	81	39	41	43	44	37	39	0.193	400	600	720
21.80	256	91	3:::	1.15	2.41	--	--	--	--	--	83	40	41	43	45	37	39	0.199	427	640	768
22.00	191	40	3:::	1.14	2.43	--	--	--	--	--	73	38	40	42	44	36	37	0.167	318	478	573
22.20	165	43	3:::	1.10	2.45	--	--	--	--	--	67	37	39	41	43	35	37	0.151	275	413	495
22.40	188	49	3:::	1.13	2.47	--	--	--	--	--	72	38	40	42	44	35	37	0.164	313	470	564
22.60	231	55	3:::	1.15	2.50	--	--	--	--	--	78	39	41	42	44	37	39	0.185	385	578	693
22.80	221	65	3:::	1.15	2.52	--	--	--	--	--	77	39	40	42	44	36	38	0.180	368	553	663
23.00	213	63	3:::	1.15	2.54	--	--	--	--	--	75	39	40	42	44	36	38	0.175	355	533	639
23.20	180	47	3:::	1.12	2.56	--	--	--	--	--	69	38	40	41	44	35	37	0.157	300	450	540
23.40	146	32	3:::	1.07	2.59	--	--	--	--	--	62	37	39	41	43	34	36	0.135	243	365	438
23.60	246	59	3:::	1.15	2.61	--	--	--	--	--	80	39	41	43	44	37	39	0.188	410	615	738
23.80	263	48	3:::	1.15	2.63	--	--	--	--	--	82	39	41	43	45	37	40	0.195	438	658	789
24.00	236	45	3:::	1.15	2.65	--	--	--	--	--	78	39	41	42	44	36	39	0.183	393	590	708
24.20	231	58	3:::	1.15	2.68	--	--	--	--	--	77	39	40	42	44	36	39	0.180	385	578	693
24.40	241	51	3:::	1.15	2.70	--	--	--	--	--	78	39	41	42	44	36	39	0.184	402	603	723
24.60	214	45	3:::	1.15	2.72	--	--	--	--	--	74	38	40	42	44	36	38	0.170	357	535	642
24.80	258	57	3:::	1.15	2.75	--	--	--	--	--	80	39	41	43	44	37	39	0.190	430	645	774
25.00	215	60	3:::	1.15	2.77	--	--	--	--	--	73	38	40	42	44	36	38	0.169	358	538	645
25.20	109	22	4/!:	1.06	2.79	3.63	8.7	661	991	327	50	35	37	40	42	32	34	0.104	182	273	327
25.40	228	39	3:::	1.15	2.81	--	--	--	--	--	75	39	40	42	44	36	39	0.174	380	570	684
25.60	226	49	3:::	1.15	2.84	--	--	--	--	--	75	38	40	42	44	36	39	0.173	377	565	678
25.80	204	60	3:::	1.15	2.86	--	--	--	--	--	71	38	40	42	44	35	38	0.162	340	510	612
26.00	207	47	3:::	1.15	2.88	--	--	--	--	--	71	38	40	42	44	35	38	0.163	345	518	621
26.20	203	42	3:::	1.15	2.91	--	--	--	--	--	70	38	40	42	44	35	38	0.160	338	508	609
26.40	215	59	3:::	1.15	2.93	--	--	--	--	--	72	38	40	42	44	35	38	0.165	358	538	645
26.60	184	41	3:::	1.13	2.95	--	--	--	--	--	67	37	39	41	43	34	37	0.149	307	460	552
26.80	162	36	3:::	1.09	2.97	--	--	--	--	--	62	37	39	41	43	34	36	0.136	270	405	486
27.00	177	41	3:::	1.12	3.00	--	--	--	--	--	65	37	39	41	43	34	37	0.144	295	443	531
27.20	153	43	3:::	1.08	3.02	--	--	--	--	--	60	36	38	41	43	33	36	0.130	255	383	459
27.40	229	47	3:::	1.15	3.04	--	--	--	--	--	73	38	40	42	44	35	39	0.169	382	573	687
27.60	161	38	3:::	1.09	3.06	--	--	--	--	--	61	37	39	41	43	33	36	0.133	268	403	483
27.80	199	48	3:::	1.15	3.08	--	--	--	--	--	68	38	39	41	43	35	38	0.154	332	498	597
28.00	230	56	3:::	1.15	3.11	--	--	--	--	--	73	38	40	42	44	35	39	0.168	383	575	690
28.20	205	53	3:::	1.15	3.13	--	--	--	--	--	69	38	40	41	44	35	38	0.156	342	513	615
28.40	196	52	3:::	1.14	3.15	--	--	--	--	--	67	37	39	41	43	34	38	0.151	327	490	588
28.60	200	53	3:::	1.15	3.18	--	--	--	--	--	68	37	39	41	43	34	38	0.152	333	500	600
28.80	199	49	3:::	1.15	3.20	--	--	--	--	--	67	37	39	41	43	34	38	0.151	332	498	597
29.00	195	49	3:::	1.14	3.22	--	--	--	--	--	66	37	39	41	43	34	38	0.148	325	488	585
29.20	197	54	3:::	1.15	3.25	--	--	--	--	--	67	37	39	41	43	34	38	0.149	328	493	591
29.40	194	50	3:::	1.14	3.27	--	--	--	--	--	66	37	39	41	43	34	38	0.147	323	485	582
29.60	203	49	3:::	1.15	3.29	--	--	--	--	--	67	37	39	41	43	34	38	0.151	338	508	609
29.80	237	43	3:::	1.15	3.31	--	--	--	--	--	72	38	40	42	44	35	39	0.166	395	593	711
30.00	290	--	3:::	1.15	3.34	--	--	--	--	--	79	39	41	42	44	36	40	0.187	483	725	870

## PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

**CPT 3**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.35 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
0.20	144.0	174.0	144.0	1.07	135.0	10.20	34.0	57.0	34.0	1.80	19.0
0.40	49.0	65.0	49.0	2.40	20.0	10.40	23.0	50.0	23.0	1.33	17.0
0.60	21.0	57.0	21.0	1.20	17.0	10.60	22.0	42.0	22.0	1.00	22.0
0.80	26.0	44.0	26.0	1.27	21.0	10.80	19.0	34.0	19.0	1.00	19.0
<b>1.00</b>	27.0	46.0	27.0	2.20	12.0	<b>11.00</b>	25.0	40.0	25.0	1.00	25.0
1.20	26.0	59.0	26.0	1.20	22.0	11.20	17.0	32.0	17.0	1.13	15.0
1.40	26.0	44.0	26.0	1.33	19.0	11.40	21.0	38.0	21.0	1.00	21.0
1.60	23.0	43.0	23.0	1.60	14.0	11.60	27.0	42.0	27.0	1.80	15.0
1.80	20.0	44.0	20.0	1.53	13.0	11.80	18.0	45.0	18.0	1.13	16.0
<b>2.00</b>	17.0	40.0	17.0	1.20	14.0	<b>12.00</b>	23.0	40.0	23.0	1.20	19.0
2.20	19.0	37.0	19.0	1.00	19.0	12.20	22.0	40.0	22.0	1.27	17.0
2.40	13.0	28.0	13.0	0.53	24.0	12.40	39.0	58.0	39.0	1.20	32.0
2.60	11.0	19.0	11.0	0.47	24.0	12.60	36.0	54.0	36.0	0.67	54.0
2.80	14.0	21.0	14.0	0.33	42.0	12.80	32.0	42.0	32.0	0.73	44.0
<b>3.00</b>	9.0	14.0	9.0	0.47	19.0	<b>13.00</b>	29.0	40.0	29.0	0.80	36.0
3.20	6.0	13.0	6.0	0.67	9.0	13.20	28.0	40.0	28.0	0.67	42.0
3.40	10.0	20.0	10.0	0.87	12.0	13.40	34.0	44.0	34.0	0.53	64.0
3.60	21.0	34.0	21.0	0.47	45.0	13.60	40.0	48.0	40.0	0.20	200.0
3.80	10.0	17.0	10.0	0.73	14.0	13.80	40.0	43.0	40.0	0.47	86.0
<b>4.00</b>	9.0	20.0	9.0	0.73	12.0	<b>14.00</b>	43.0	50.0	43.0	0.47	92.0
4.20	14.0	25.0	14.0	1.07	13.0	14.20	43.0	50.0	43.0	0.93	46.0
4.40	13.0	29.0	13.0	0.53	24.0	14.40	49.0	63.0	49.0	0.67	73.0
4.60	24.0	32.0	24.0	0.60	40.0	14.60	40.0	50.0	40.0	0.80	50.0
4.80	10.0	19.0	10.0	1.00	10.0	14.80	38.0	50.0	38.0	0.73	52.0
<b>5.00</b>	13.0	28.0	13.0	0.67	19.0	<b>15.00</b>	36.0	47.0	36.0	0.67	54.0
5.20	13.0	23.0	13.0	0.67	19.0	15.20	46.0	56.0	46.0	0.93	49.0
5.40	8.0	18.0	8.0	0.47	17.0	15.40	46.0	60.0	46.0	0.93	49.0
5.60	10.0	17.0	10.0	0.40	25.0	15.60	40.0	54.0	40.0	0.40	100.0
5.80	9.0	15.0	9.0	0.47	19.0	15.80	40.0	46.0	40.0	0.47	86.0
<b>6.00</b>	10.0	17.0	10.0	0.33	30.0	<b>16.00</b>	42.0	49.0	42.0	0.87	48.0
6.20	17.0	22.0	17.0	0.87	20.0	16.20	48.0	61.0	48.0	0.73	65.0
6.40	13.0	26.0	13.0	0.73	18.0	16.40	56.0	67.0	56.0	0.93	60.0
6.60	12.0	23.0	12.0	0.67	18.0	16.60	51.0	65.0	51.0	0.13	382.0
6.80	12.0	22.0	12.0	0.87	14.0	16.80	52.0	54.0	52.0	0.47	111.0
<b>7.00</b>	10.0	23.0	10.0	0.87	12.0	<b>17.00</b>	50.0	57.0	50.0	0.53	94.0
7.20	13.0	26.0	13.0	1.07	12.0	17.20	48.0	56.0	48.0	0.60	80.0
7.40	18.0	34.0	18.0	1.07	17.0	17.40	47.0	56.0	47.0	0.40	117.0
7.60	20.0	36.0	20.0	1.33	15.0	17.60	26.0	32.0	26.0	1.67	16.0
7.80	19.0	39.0	19.0	1.20	16.0	17.80	13.0	38.0	13.0	0.67	19.0
<b>8.00</b>	19.0	37.0	19.0	1.13	17.0	<b>18.00</b>	23.0	33.0	23.0	1.33	17.0
8.20	19.0	36.0	19.0	1.60	12.0	18.20	21.0	41.0	21.0	1.40	15.0
8.40	19.0	43.0	19.0	1.07	18.0	18.40	36.0	57.0	36.0	1.53	23.0
8.60	23.0	39.0	23.0	1.27	18.0	18.60	32.0	55.0	32.0	1.67	19.0
8.80	24.0	43.0	24.0	1.20	20.0	18.80	28.0	53.0	28.0	1.67	17.0
<b>9.00</b>	24.0	42.0	24.0	1.60	15.0	<b>19.00</b>	25.0	50.0	25.0	1.80	14.0
9.20	24.0	48.0	24.0	1.80	13.0	19.20	26.0	53.0	26.0	1.87	14.0
9.40	26.0	53.0	26.0	1.47	18.0	19.40	43.0	71.0	43.0	48.13	1.0
9.60	23.0	45.0	23.0	1.60	14.0	19.60	39.0	761.0	39.0	2.53	15.0
9.80	25.0	49.0	25.0	1.33	19.0	19.80	25.0	63.0	25.0	1.80	14.0
<b>10.00</b>	29.0	49.0	29.0	1.53	19.0	<b>20.00</b>	21.0	48.0	21.0	1.33	16.0

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)



**PROVA PENETROMETRICA STATICA**  
**LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

**CPT 3**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.35 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
20.20	25.0	45.0	25.0	1.93	13.0	24.40	25.0	47.0	25.0	1.13	22.0
20.40	32.0	61.0	32.0	1.73	18.0	24.60	19.0	36.0	19.0	1.07	18.0
20.60	21.0	47.0	21.0	1.47	14.0	24.80	20.0	36.0	20.0	1.13	18.0
20.80	20.0	42.0	20.0	1.13	18.0	<b>25.00</b>	22.0	39.0	22.0	1.40	16.0
<b>21.00</b>	24.0	41.0	24.0	1.40	17.0	25.20	21.0	42.0	21.0	1.93	11.0
21.20	44.0	65.0	44.0	3.07	14.0	25.40	30.0	59.0	30.0	1.27	24.0
21.40	43.0	89.0	43.0	2.27	19.0	25.60	24.0	43.0	24.0	1.33	18.0
21.60	30.0	64.0	30.0	2.13	14.0	25.80	21.0	41.0	21.0	1.27	17.0
21.80	35.0	67.0	35.0	1.67	21.0	<b>26.00</b>	22.0	41.0	22.0	1.47	15.0
<b>22.00</b>	29.0	54.0	29.0	1.73	17.0	26.20	21.0	43.0	21.0	2.00	10.0
22.20	26.0	52.0	26.0	1.93	13.0	26.40	26.0	56.0	26.0	1.27	21.0
22.40	28.0	57.0	28.0	1.80	16.0	26.60	48.0	67.0	48.0	2.20	22.0
22.60	34.0	61.0	34.0	1.80	19.0	26.80	51.0	84.0	51.0	2.07	25.0
22.80	38.0	65.0	38.0	2.07	18.0	<b>27.00</b>	37.0	68.0	37.0	1.73	21.0
<b>23.00</b>	26.0	57.0	26.0	1.87	14.0	27.20	45.0	71.0	45.0	2.67	17.0
23.20	27.0	55.0	27.0	2.07	13.0	27.40	32.0	72.0	32.0	1.40	23.0
23.40	27.0	58.0	27.0	1.47	18.0	27.60	41.0	62.0	41.0	4.53	9.0
23.60	22.0	44.0	22.0	1.27	17.0	27.80	248.0	316.0	248.0	1.60	155.0
23.80	23.0	42.0	23.0	1.40	16.0	<b>28.00</b>	420.0	444.0	420.0	3.80	111.0
<b>24.00</b>	21.0	42.0	21.0	1.40	15.0	28.20	410.0	467.0	410.0	-----	----
24.20	22.0	43.0	22.0	1.47	15.0						

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\phi = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

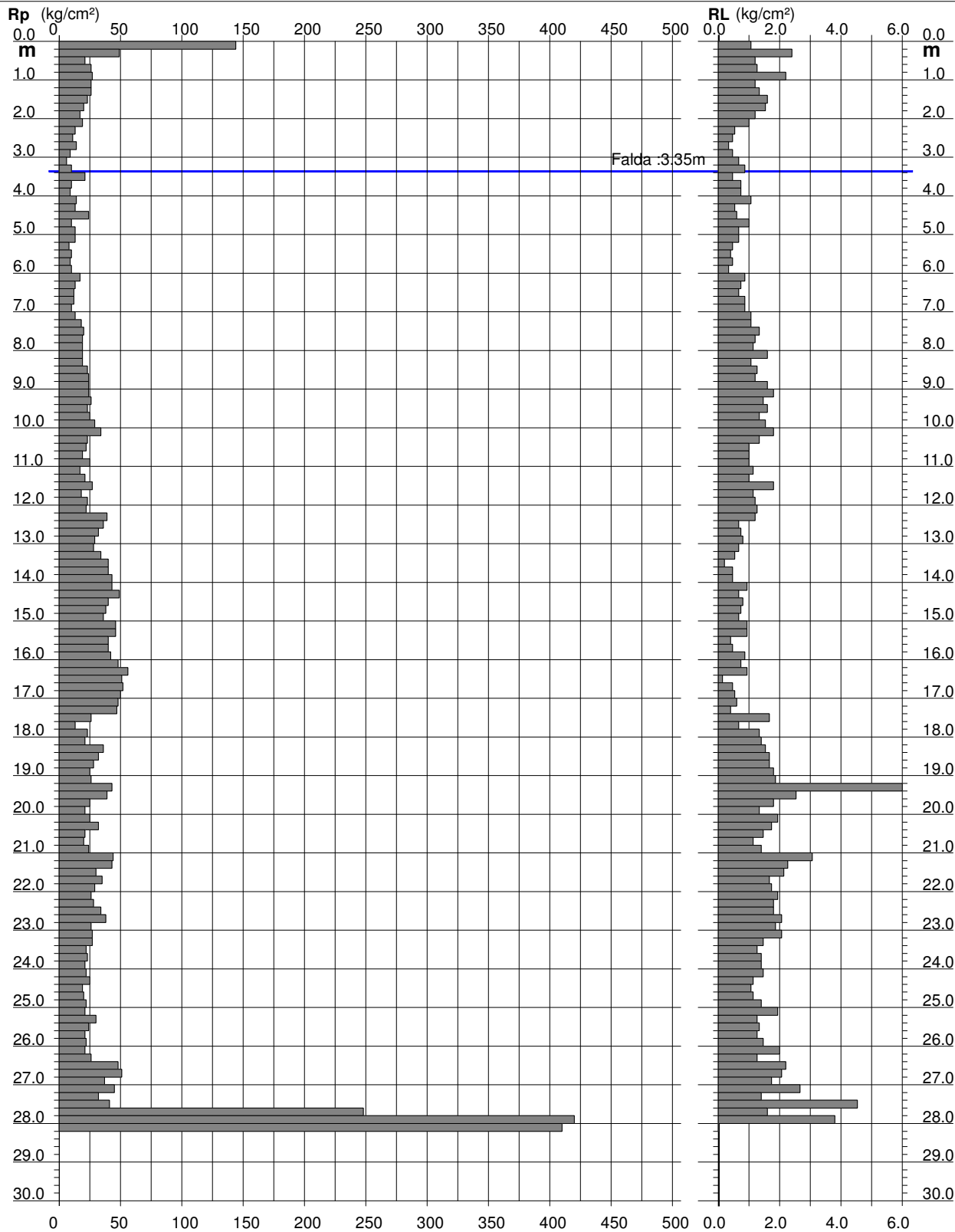
# PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 3

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.35 m da quota inizio



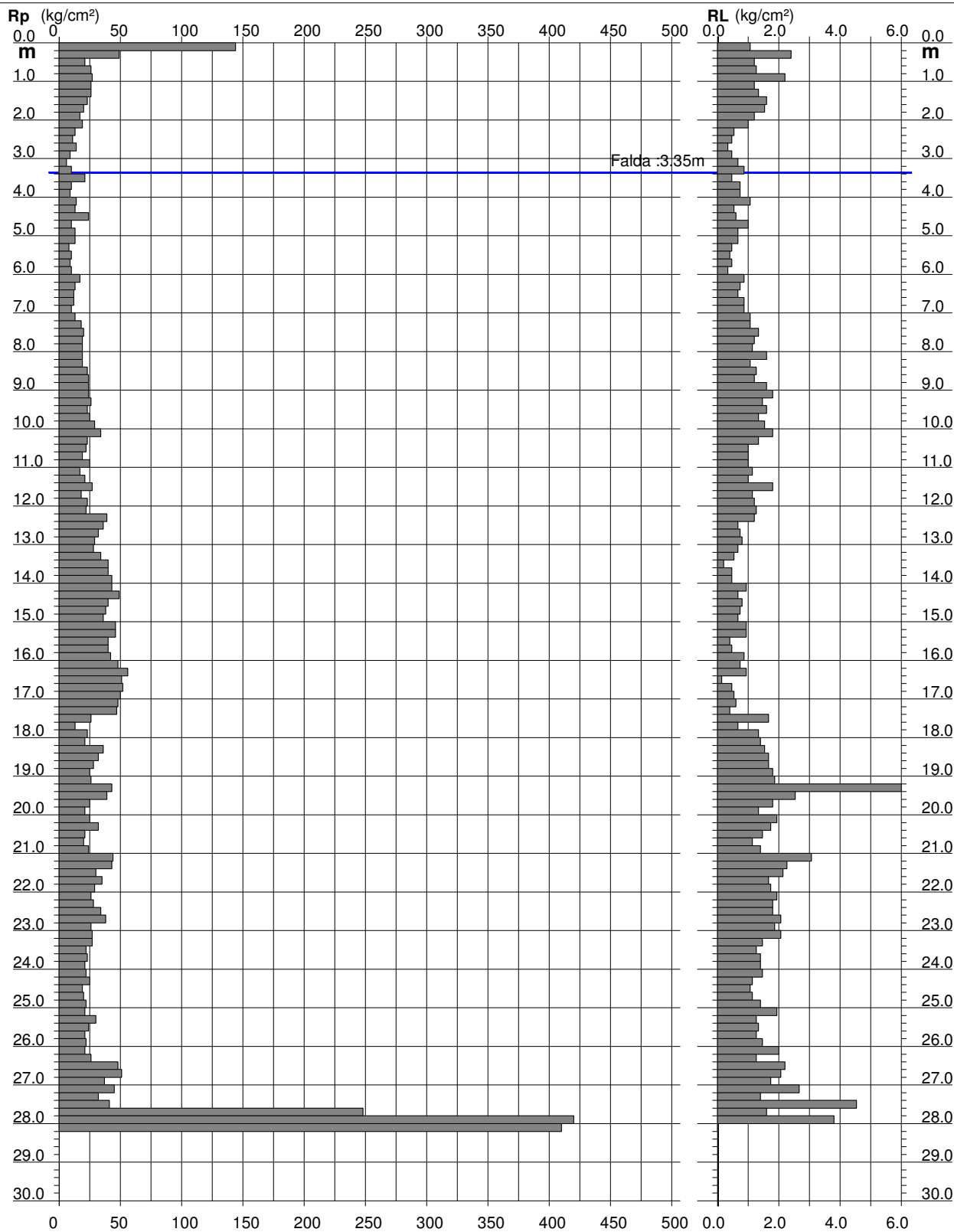
# PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 3

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.35 m da quota inizio





**PROVA PENETROMETRICA STATICA  
TABELLA PARAMETRI GEOTECNICI**

**CPT 3**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 15/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.35 m da quota inizio

NATURA COESIVA											NATURA GRANULARE										
Prof. m	Rp kg/cm <sup>2</sup>	Rp/Rl (-)	Natura Litol.	Y' t/m <sup>3</sup>	p'vo kg/cm <sup>2</sup>	Cu kg/cm <sup>2</sup>	OCR (-)	Eu50 kg/cm <sup>2</sup>	Eu25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>	Dr %	σ1s (°)	σ2s (°)	σ3s (°)	σ4s (°)	σdm (°)	σmy (°)	Amax/g (-)	E'50 kg/cm <sup>2</sup>	E'25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>
20.20	25	13	4/:	0.94	2.17	0.91	2.1	503	755	75	5	29	32	35	38	25	28	0.013	42	63	75
20.40	32	18	4/:	0.97	2.19	1.07	2.6	561	842	96	14	30	33	36	39	26	29	0.027	53	80	96
20.60	21	14	4/:	0.93	2.21	0.82	1.8	468	702	63	--	28	31	35	38	25	27	--	35	53	63
20.80	20	18	4/:	0.93	2.22	0.80	1.7	458	687	60	--	28	31	35	38	25	27	--	33	50	60
21.00	24	17	4/:	0.94	2.24	0.89	2.0	499	749	72	3	28	32	35	38	25	28	0.008	40	60	72
21.20	44	14	4/:	1.00	2.26	1.47	3.7	639	958	132	24	31	34	37	40	28	31	0.045	73	110	132
21.40	43	19	4/:	1.00	2.28	1.43	3.5	644	966	129	23	31	34	37	40	28	30	0.043	72	108	129
21.60	30	14	4/:	0.96	2.30	1.00	2.2	548	822	90	10	29	32	36	39	26	29	0.021	50	75	90
21.80	35	21	4/:	0.98	2.32	1.17	2.7	606	909	105	15	30	33	36	39	26	29	0.030	58	88	105
22.00	29	17	4/:	0.96	2.34	0.98	2.1	544	816	87	9	29	32	35	39	25	29	0.018	48	73	87
22.20	26	13	4/:	0.95	2.36	0.93	2.0	522	783	78	5	29	32	35	38	25	28	0.012	43	65	78
22.40	28	16	4/:	0.96	2.38	0.97	2.0	539	808	84	7	29	32	35	39	25	28	0.016	47	70	84
22.60	34	19	4/:	0.98	2.40	1.13	2.5	604	906	102	14	30	33	36	39	26	29	0.026	57	85	102
22.80	38	18	4/:	0.99	2.42	1.27	2.8	645	967	114	17	30	33	36	39	27	30	0.033	63	95	114
23.00	26	14	4/:	0.95	2.44	0.93	1.9	526	789	78	4	29	32	35	38	25	28	0.010	43	65	78
23.20	27	13	4/:	0.95	2.46	0.95	1.9	535	803	81	5	29	32	35	38	25	28	0.013	45	68	81
23.40	27	18	4/:	0.95	2.48	0.95	1.9	536	804	81	5	29	32	35	38	25	28	0.012	45	68	81
23.60	22	17	4/:	0.93	2.49	0.85	1.6	489	734	66	--	28	31	35	38	25	28	--	37	55	66
23.80	23	16	4/:	0.94	2.51	0.87	1.7	500	751	69	--	28	31	35	38	25	28	--	38	58	69
24.00	21	15	4/:	0.93	2.53	0.82	1.5	479	718	63	--	28	31	35	38	25	27	--	35	53	63
24.20	22	15	4/:	0.93	2.55	0.85	1.6	491	736	66	--	28	31	35	38	25	28	--	37	55	66
24.40	25	22	4/:	0.94	2.57	0.91	1.7	522	783	75	1	28	31	35	38	25	28	0.003	42	63	75
24.60	19	18	2////	0.99	2.59	0.78	1.4	456	683	58	--	--	--	--	--	--	--	--	--	--	--
24.80	20	18	4/:	0.93	2.61	0.80	1.4	469	703	60	--	28	31	35	38	25	27	--	33	50	60
25.00	22	16	4/:	0.93	2.63	0.85	1.5	493	739	66	--	28	31	35	38	25	28	--	37	55	66
25.20	21	11	4/:	0.93	2.64	0.82	1.5	482	723	63	--	28	31	35	38	25	27	--	35	53	63
25.40	30	24	4/:	0.96	2.66	1.00	1.8	568	852	90	7	29	32	35	39	25	29	0.015	50	75	90
25.60	24	18	4/:	0.94	2.68	0.89	1.6	516	773	72	--	28	31	35	38	25	28	--	40	60	72
25.80	21	17	4/:	0.93	2.70	0.82	1.4	483	724	63	--	28	31	35	38	25	27	--	35	53	63
26.00	22	15	4/:	0.93	2.72	0.85	1.5	495	742	66	--	28	31	35	38	25	28	--	37	55	66
26.20	21	10	4/:	0.93	2.74	0.82	1.4	484	725	63	--	28	31	35	38	25	27	--	35	53	63
26.40	26	21	4/:	0.95	2.76	0.93	1.6	537	806	78	1	28	31	35	38	25	28	0.002	43	65	78
26.60	48	22	4/:	1.01	2.78	1.60	3.2	770	1154	144	22	31	34	37	40	27	31	0.041	80	120	144
26.80	51	25	4/:	1.01	2.80	1.70	3.4	786	1178	153	24	31	34	37	40	27	31	0.045	85	128	153
27.00	37	21	4/:	0.99	2.82	1.23	2.2	674	1011	111	13	30	33	36	39	26	30	0.025	62	93	111
27.20	45	17	4/:	1.00	2.84	1.50	2.8	760	1140	135	19	31	34	36	40	27	31	0.036	75	113	135
27.40	32	23	4/:	0.97	2.86	1.07	1.8	606	910	96	7	29	32	35	39	25	29	0.016	53	80	96
27.60	41	9	4/:	1.00	2.88	1.37	2.5	727	1090	123	16	30	33	36	39	26	30	0.030	68	103	123
27.80	248	155	3:::	1.15	2.90	--	--	--	--	--	77	39	41	42	44	36	39	0.181	413	620	744
28.00	420	111	3:::	1.15	2.92	--	--	--	--	--	95	41	43	44	46	39	40	0.241	700	1050	1260
28.20	410	--	3:::	1.15	2.95	--	--	--	--	--	94	41	43	44	46	39	40	0.237	683	1025	1230

## PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

**CPT 4**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
0.20	17.0	25.0	17.0	1.67	10.0	10.20	186.0	234.0	186.0	3.40	55.0
0.40	13.0	38.0	13.0	0.93	14.0	10.40	187.0	238.0	187.0	3.67	51.0
0.60	39.0	53.0	39.0	1.40	28.0	10.60	201.0	256.0	201.0	3.47	58.0
0.80	63.0	84.0	63.0	4.13	15.0	10.80	229.0	281.0	229.0	3.53	65.0
<b>1.00</b>	47.0	109.0	47.0	2.93	16.0	<b>11.00</b>	213.0	266.0	213.0	4.20	51.0
1.20	33.0	77.0	33.0	2.13	15.0	11.20	177.0	240.0	177.0	4.13	43.0
1.40	22.0	54.0	22.0	1.67	13.0	11.40	188.0	250.0	188.0	2.60	72.0
1.60	14.0	39.0	14.0	1.00	14.0	11.60	198.0	237.0	198.0	2.93	67.0
1.80	17.0	32.0	17.0	0.73	23.0	11.80	167.0	211.0	167.0	3.27	51.0
<b>2.00</b>	11.0	22.0	11.0	0.53	21.0	<b>12.00</b>	148.0	197.0	148.0	3.07	48.0
2.20	16.0	24.0	16.0	0.47	34.0	12.20	161.0	207.0	161.0	3.33	48.0
2.40	19.0	26.0	19.0	0.53	36.0	12.40	166.0	216.0	166.0	3.33	50.0
2.60	17.0	25.0	17.0	0.73	23.0	12.60	211.0	261.0	211.0	3.33	63.0
2.80	17.0	28.0	17.0	0.80	21.0	12.80	205.0	255.0	205.0	3.40	60.0
<b>3.00</b>	16.0	28.0	16.0	0.80	20.0	<b>13.00</b>	177.0	228.0	177.0	3.33	53.0
3.20	18.0	30.0	18.0	0.80	22.0	13.20	122.0	172.0	122.0	2.53	48.0
3.40	17.0	29.0	17.0	0.80	21.0	13.40	89.0	127.0	89.0	2.60	34.0
3.60	17.0	29.0	17.0	0.80	21.0	13.60	145.0	184.0	145.0	3.40	43.0
3.80	17.0	29.0	17.0	1.00	17.0	13.80	167.0	218.0	167.0	3.47	48.0
<b>4.00</b>	14.0	29.0	14.0	0.80	17.0	<b>14.00</b>	167.0	219.0	167.0	2.33	72.0
4.20	14.0	26.0	14.0	0.67	21.0	14.20	175.0	210.0	175.0	3.47	50.0
4.40	19.0	29.0	19.0	0.67	28.0	14.40	196.0	248.0	196.0	4.00	49.0
4.60	18.0	28.0	18.0	0.73	25.0	14.60	213.0	273.0	213.0	3.87	55.0
4.80	11.0	22.0	11.0	0.53	21.0	14.80	205.0	263.0	205.0	4.13	50.0
<b>5.00</b>	8.0	16.0	8.0	0.40	20.0	<b>15.00</b>	243.0	305.0	243.0	3.47	70.0
5.20	12.0	18.0	12.0	0.53	22.0	15.20	181.0	233.0	181.0	3.33	54.0
5.40	16.0	24.0	16.0	1.07	15.0	15.40	161.0	211.0	161.0	2.80	58.0
5.60	17.0	33.0	17.0	0.87	20.0	15.60	237.0	279.0	237.0	3.00	79.0
5.80	19.0	32.0	19.0	1.07	18.0	15.80	216.0	261.0	216.0	4.47	48.0
<b>6.00</b>	21.0	37.0	21.0	1.00	21.0	<b>16.00</b>	159.0	226.0	159.0	3.53	45.0
6.20	19.0	34.0	19.0	1.20	16.0	16.20	141.0	194.0	141.0	4.60	31.0
6.40	19.0	37.0	19.0	1.07	18.0	16.40	213.0	282.0	213.0	3.33	64.0
6.60	22.0	38.0	22.0	1.07	21.0	16.60	186.0	236.0	186.0	4.20	44.0
6.80	25.0	41.0	25.0	1.27	20.0	16.80	163.0	226.0	163.0	3.47	47.0
<b>7.00</b>	19.0	38.0	19.0	1.27	15.0	<b>17.00</b>	182.0	234.0	182.0	4.73	38.0
7.20	49.0	68.0	49.0	1.67	29.0	17.20	177.0	248.0	177.0	4.33	41.0
7.40	35.0	60.0	35.0	1.80	19.0	17.40	130.0	195.0	130.0	2.67	49.0
7.60	27.0	54.0	27.0	1.33	20.0	17.60	121.0	161.0	121.0	3.20	38.0
7.80	35.0	55.0	35.0	1.33	26.0	17.80	139.0	187.0	139.0	2.53	55.0
<b>8.00</b>	63.0	83.0	63.0	1.07	59.0	<b>18.00</b>	56.0	94.0	56.0	2.33	24.0
8.20	67.0	83.0	67.0	1.13	59.0	18.20	29.0	64.0	29.0	1.60	18.0
8.40	107.0	124.0	107.0	2.13	50.0	18.40	28.0	52.0	28.0	1.33	21.0
8.60	90.0	122.0	90.0	1.20	75.0	18.60	28.0	48.0	28.0	1.60	17.0
8.80	84.0	102.0	84.0	1.87	45.0	18.80	27.0	51.0	27.0	1.80	15.0
<b>9.00</b>	83.0	111.0	83.0	1.40	59.0	<b>19.00</b>	24.0	51.0	24.0	1.73	14.0
9.20	116.0	137.0	116.0	1.87	62.0	19.20	28.0	54.0	28.0	2.07	14.0
9.40	122.0	150.0	122.0	2.13	57.0	19.40	24.0	55.0	24.0	2.00	12.0
9.60	132.0	164.0	132.0	2.13	62.0	19.60	31.0	61.0	31.0	2.07	15.0
9.80	145.0	177.0	145.0	2.67	54.0	19.80	34.0	65.0	34.0	2.67	13.0
<b>10.00</b>	174.0	214.0	174.0	3.20	54.0	<b>20.00</b>	35.0	75.0	35.0	2.27	15.0

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

## PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

**CPT 4**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
20.20	51.0	85.0	51.0	2.40	21.0	25.20	18.0	38.0	18.0	1.33	13.0
20.40	33.0	69.0	33.0	2.47	13.0	25.40	19.0	39.0	19.0	1.13	17.0
20.60	31.0	68.0	31.0	2.53	12.0	25.60	17.0	34.0	17.0	1.07	16.0
20.80	27.0	65.0	27.0	1.93	14.0	25.80	16.0	32.0	16.0	1.00	16.0
<b>21.00</b>	28.0	57.0	28.0	2.07	14.0	<b>26.00</b>	15.0	30.0	15.0	0.93	16.0
21.20	30.0	61.0	30.0	2.00	15.0	26.20	14.0	28.0	14.0	0.87	16.0
21.40	32.0	62.0	32.0	2.07	15.0	26.40	16.0	29.0	16.0	0.87	18.0
21.60	29.0	60.0	29.0	2.13	14.0	26.60	15.0	28.0	15.0	0.87	17.0
21.80	28.0	60.0	28.0	2.00	14.0	26.80	15.0	28.0	15.0	0.93	16.0
<b>22.00</b>	32.0	62.0	32.0	1.93	17.0	<b>27.00</b>	15.0	29.0	15.0	0.93	16.0
22.20	33.0	62.0	33.0	2.27	15.0	27.20	17.0	31.0	17.0	1.07	16.0
22.40	40.0	74.0	40.0	2.53	16.0	27.40	19.0	35.0	19.0	1.20	16.0
22.60	31.0	69.0	31.0	2.20	14.0	27.60	24.0	42.0	24.0	1.40	17.0
22.80	29.0	62.0	29.0	1.60	18.0	27.80	21.0	42.0	21.0	1.67	13.0
<b>23.00</b>	21.0	45.0	21.0	1.47	14.0	<b>28.00</b>	27.0	52.0	27.0	1.80	15.0
23.20	29.0	51.0	29.0	1.33	22.0	28.20	27.0	54.0	27.0	2.20	12.0
23.40	23.0	43.0	23.0	1.40	16.0	28.40	37.0	70.0	37.0	2.13	17.0
23.60	18.0	39.0	18.0	1.47	12.0	28.60	41.0	73.0	41.0	2.80	15.0
23.80	33.0	55.0	33.0	1.67	20.0	28.80	34.0	76.0	34.0	1.53	22.0
<b>24.00</b>	46.0	71.0	46.0	1.60	29.0	<b>29.00</b>	32.0	55.0	32.0	5.73	6.0
24.20	38.0	62.0	38.0	1.33	28.0	29.20	106.0	192.0	106.0	3.60	29.0
24.40	25.0	45.0	25.0	1.53	16.0	29.40	220.0	274.0	220.0	0.73	300.0
24.60	21.0	44.0	21.0	1.60	13.0	29.60	297.0	308.0	297.0	2.53	117.0
24.80	20.0	44.0	20.0	1.53	13.0	29.80	210.0	248.0	210.0	6.00	35.0
<b>25.00</b>	20.0	43.0	20.0	1.33	15.0	<b>30.00</b>	173.0	263.0	173.0	-----	----

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\phi = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

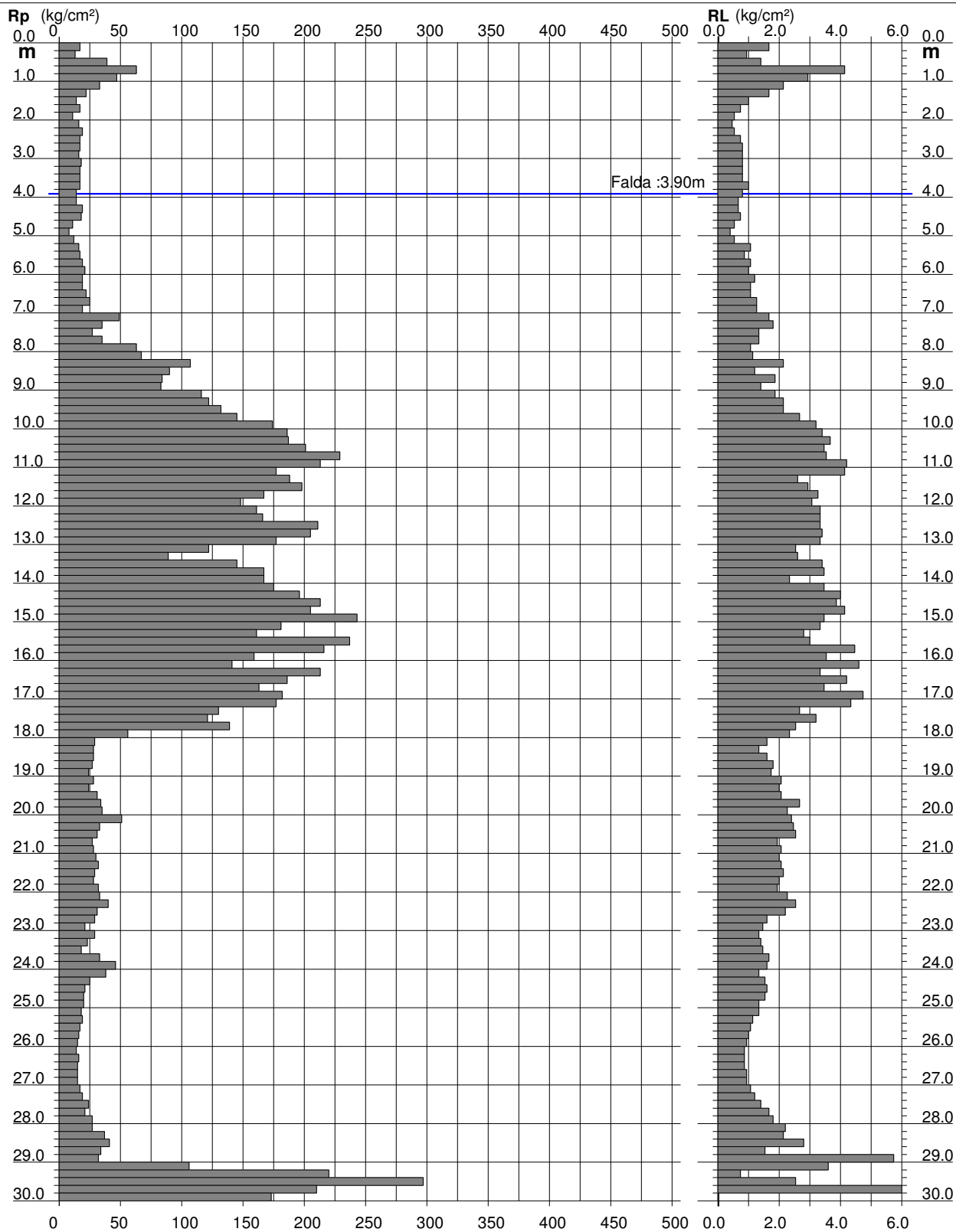
# PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 4

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss.: 19/01/2012

- data prova: 16/12/2011  
- quota inizio: Piano Campagna  
- prof. falda: 3.90 m da quota inizio





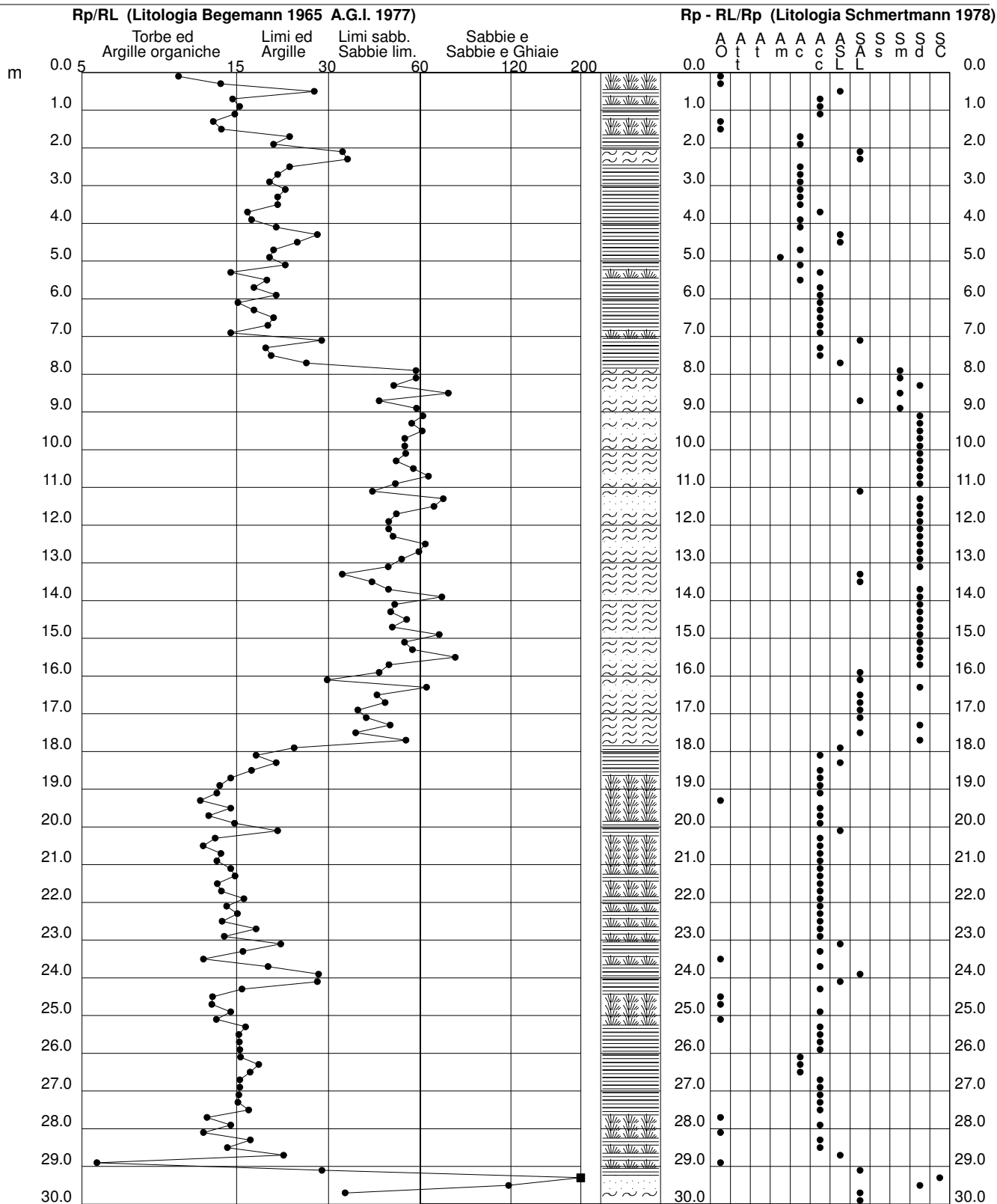
# PROVA PENETROMETRICA STATICA VALUTAZIONI LITOLOGICHE

CPT 4

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio





# PROVA PENETROMETRICA STATICA TABELLA PARAMETRI GEOTECNICI

CPT 4

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 3.90 m da quota inizio

Prof. m	Rp kg/cm <sup>2</sup>	Rp/Rl (-)	Natura Litol.	Y' t/m <sup>3</sup>	p'vo kg/cm <sup>2</sup>	Cu kg/cm <sup>2</sup>	OCR (-)	NATURA COESIVA				NATURA GRANULARE							Amax/g (-)	E'50 kg/cm <sup>2</sup>	E'25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>
								Eu50 kg/cm <sup>2</sup>	Eu25 kg/cm <sup>2</sup>	Mo kg/cm <sup>2</sup>	Dr %	σ1s (°)	σ2s (°)	σ3s (°)	σ4s (°)	σdm (°)	σmy (°)					
20.20	51	21	4:/:	1.01	2.41	1.70	4.1	671	1007	153	27	32	35	37	40	28	31	0.052	85	128	153	
20.40	33	13	4:/:	0.97	2.43	1.10	2.3	595	892	99	12	30	33	36	39	26	29	0.024	55	83	99	
20.60	31	12	4:/:	0.97	2.44	1.03	2.1	571	856	93	10	29	32	36	39	25	29	0.020	52	78	93	
20.80	27	14	4:/:	0.95	2.46	0.95	1.9	535	803	81	5	29	32	35	38	25	28	0.012	45	68	81	
21.00	28	14	4:/:	0.96	2.48	0.97	1.9	544	816	84	6	29	32	35	38	25	28	0.014	47	70	84	
21.20	30	15	4:/:	0.96	2.50	1.00	2.0	560	840	90	8	29	32	35	39	25	29	0.018	50	75	90	
21.40	32	15	4:/:	0.97	2.52	1.07	2.1	589	883	96	10	29	32	36	39	25	29	0.021	53	80	96	
21.60	29	14	4:/:	0.96	2.54	0.98	1.9	555	832	87	7	29	32	35	39	25	29	0.015	48	73	87	
21.80	28	14	4:/:	0.96	2.56	0.97	1.9	548	822	84	5	29	32	35	38	25	28	0.013	47	70	84	
22.00	32	17	4:/:	0.97	2.58	1.07	2.1	593	889	96	10	29	32	35	39	25	29	0.020	53	80	96	
22.20	33	15	4:/:	0.97	2.60	1.10	2.1	607	911	99	11	29	33	36	39	25	29	0.021	55	83	99	
22.40	40	16	4:/:	1.00	2.62	1.33	2.7	688	1032	120	17	30	33	36	39	26	30	0.033	67	100	120	
22.60	31	14	4:/:	0.97	2.64	1.03	1.9	582	872	93	8	29	32	35	39	25	29	0.017	52	78	93	
22.80	29	18	4:/:	0.96	2.66	0.98	1.8	560	840	87	6	29	32	35	38	25	29	0.013	48	73	87	
23.00	21	14	4:/:	0.93	2.68	0.82	1.4	482	724	63	--	28	31	35	38	25	27	--	35	53	63	
23.20	29	22	4:/:	0.96	2.69	0.98	1.8	561	842	87	5	29	32	35	38	25	29	0.013	48	73	87	
23.40	23	16	4:/:	0.94	2.71	0.87	1.5	506	759	69	--	28	31	35	38	25	28	--	38	58	69	
23.60	18	12	2////	0.98	2.73	0.75	1.2	444	667	56	--	--	--	--	--	--	--	--	--	--	--	
23.80	33	20	4:/:	0.97	2.75	1.10	2.0	616	924	99	9	29	32	35	39	25	29	0.019	55	83	99	
24.00	46	29	4:/:	1.01	2.77	1.53	3.0	757	1136	138	20	31	34	37	40	27	31	0.039	77	115	138	
24.20	38	28	4:/:	0.99	2.79	1.27	2.3	685	1027	114	14	30	33	36	39	26	30	0.027	63	95	114	
24.40	25	16	4:/:	0.94	2.81	0.91	1.5	529	794	75	--	28	31	35	38	25	28	--	42	63	75	
24.60	21	13	4:/:	0.93	2.83	0.82	1.3	485	728	63	--	28	31	35	38	25	27	--	35	53	63	
24.80	20	13	4:/:	0.93	2.85	0.80	1.3	473	710	60	--	28	31	35	38	25	27	--	33	50	60	
25.00	20	15	4:/:	0.93	2.87	0.80	1.3	473	710	60	--	28	31	35	38	25	27	--	33	50	60	
25.20	18	13	2////	0.98	2.89	0.75	1.2	446	670	56	--	--	--	--	--	--	--	--	--	--	--	
25.40	19	17	2////	0.99	2.91	0.78	1.2	461	691	58	--	--	--	--	--	--	--	--	--	--	--	
25.60	17	16	2////	0.97	2.93	0.72	1.1	432	648	54	--	--	--	--	--	--	--	--	--	--	--	
25.80	16	16	2////	0.96	2.95	0.70	1.0	417	625	52	--	--	--	--	--	--	--	--	--	--	--	
26.00	15	16	2////	0.95	2.96	0.67	1.0	400	600	50	--	--	--	--	--	--	--	--	--	--	--	
26.20	14	16	2////	0.94	2.98	0.64	0.9	382	573	48	--	--	--	--	--	--	--	--	--	--	--	
26.40	16	18	2////	0.96	3.00	0.70	1.0	417	626	52	--	--	--	--	--	--	--	--	--	--	--	
26.60	15	17	2////	0.95	3.02	0.67	0.9	400	600	50	--	--	--	--	--	--	--	--	--	--	--	
26.80	15	16	2////	0.95	3.04	0.67	0.9	400	600	50	--	--	--	--	--	--	--	--	--	--	--	
27.00	15	16	2////	0.95	3.06	0.67	0.9	400	600	50	--	--	--	--	--	--	--	--	--	--	--	
27.20	17	16	2////	0.97	3.08	0.72	1.0	434	650	54	--	--	--	--	--	--	--	--	--	--	--	
27.40	19	16	2////	0.99	3.10	0.78	1.1	463	694	58	--	--	--	--	--	--	--	--	--	--	--	
27.60	24	17	4:/:	0.94	3.12	0.89	1.3	525	787	72	--	28	31	35	38	25	28	--	40	60	72	
27.80	21	13	4:/:	0.93	3.14	0.82	1.2	490	735	63	--	28	31	35	38	25	27	--	35	53	63	
28.00	27	15	4:/:	0.95	3.15	0.95	1.4	556	835	81	--	28	31	35	38	25	28	--	45	68	81	
28.20	27	12	4:/:	0.95	3.17	0.95	1.4	557	835	81	--	28	31	35	38	25	28	--	45	68	81	
28.40	37	17	4:/:	0.99	3.19	1.23	1.9	696	1045	111	9	29	32	35	39	25	30	0.020	62	93	111	
28.60	41	15	4:/:	1.00	3.21	1.37	2.2	754	1130	123	13	30	33	36	39	25	30	0.025	68	103	123	
28.80	34	22	4:/:	0.98	3.23	1.13	1.7	652	978	102	6	29	32	35	39	25	29	0.014	57	85	102	
29.00	32	6	4:/:	0.97	3.25	1.07	1.6	620	930	96	4	29	32	35	38	25	29	0.010	53	80	96	
29.20	106	29	4:/:	1.05	3.27	3.53	6.9	825	1238	318	45	34	37	39	42	31	34	0.092	177	265	318	
29.40	220	300	3:~:~:	1.15	3.30	--	--	--	--	--	70	38	40	42	44	35	38	0.159	367	550	660	
29.60	297	117	3:~:~:	1.15	3.32	--	--	--	--	--	80	39	41	43	44	36	40	0.190	495	743	891	
29.80	210	35	3:~:~:	1.15	3.34	--	--	--	--	--	68	38	39	41	43	34	38	0.153	350	525	630	
30.00	173	--	3:~:~:	1.11	3.36	--	--	--	--	--	61	37	39	41	43	33	37	0.134	288	433	519	

**PROVA PENETROMETRICA STATICA**  
**LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

**CPT 5**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Gavello - Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 2.00 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
0.20	12.0	16.0	12.0	1.27	9.0	10.20	14.0	26.0	14.0	0.60	23.0
0.40	16.0	35.0	16.0	1.67	10.0	10.40	37.0	46.0	37.0	0.87	43.0
0.60	15.0	40.0	15.0	1.53	10.0	10.60	36.0	49.0	36.0	0.73	49.0
0.80	18.0	41.0	18.0	1.13	16.0	10.80	48.0	59.0	48.0	0.47	103.0
<b>1.00</b>	35.0	52.0	35.0	0.13	262.0	<b>11.00</b>	57.0	64.0	57.0	0.80	71.0
1.20	15.0	17.0	15.0	1.87	8.0	11.20	45.0	57.0	45.0	0.93	48.0
1.40	10.0	38.0	10.0	1.20	8.0	11.40	88.0	102.0	88.0	0.67	132.0
1.60	8.0	26.0	8.0	0.87	9.0	11.60	114.0	124.0	114.0	1.27	90.0
1.80	7.0	20.0	7.0	0.60	12.0	11.80	91.0	110.0	91.0	2.00	46.0
<b>2.00</b>	6.0	15.0	6.0	0.47	13.0	<b>12.00</b>	110.0	140.0	110.0	2.00	55.0
2.20	5.0	12.0	5.0	0.47	11.0	12.20	72.0	102.0	72.0	0.93	77.0
2.40	5.0	12.0	5.0	0.53	9.0	12.40	66.0	80.0	66.0	1.13	58.0
2.60	12.0	20.0	12.0	0.80	15.0	12.60	94.0	111.0	94.0	1.80	52.0
2.80	12.0	24.0	12.0	0.80	15.0	12.80	114.0	141.0	114.0	2.33	49.0
<b>3.00</b>	15.0	27.0	15.0	0.93	16.0	<b>13.00</b>	187.0	222.0	187.0	1.40	134.0
3.20	14.0	28.0	14.0	0.80	17.0	13.20	180.0	201.0	180.0	2.67	67.0
3.40	12.0	24.0	12.0	0.67	18.0	13.40	70.0	110.0	70.0	1.67	42.0
3.60	10.0	20.0	10.0	0.73	14.0	13.60	176.0	201.0	176.0	4.20	42.0
3.80	14.0	25.0	14.0	0.80	17.0	13.80	181.0	244.0	181.0	3.40	53.0
<b>4.00</b>	18.0	30.0	18.0	0.47	39.0	<b>14.00</b>	185.0	236.0	185.0	3.80	49.0
4.20	13.0	20.0	13.0	1.13	11.0	14.20	207.0	264.0	207.0	3.80	54.0
4.40	9.0	26.0	9.0	0.67	13.0	14.40	163.0	220.0	163.0	3.00	54.0
4.60	8.0	18.0	8.0	0.33	24.0	14.60	167.0	212.0	167.0	2.73	61.0
4.80	7.0	12.0	7.0	0.27	26.0	14.80	197.0	238.0	197.0	3.27	60.0
<b>5.00</b>	8.0	12.0	8.0	0.40	20.0	<b>15.00</b>	179.0	228.0	179.0	2.80	64.0
5.20	5.0	11.0	5.0	0.20	25.0	15.20	196.0	238.0	196.0	2.80	70.0
5.40	36.0	39.0	36.0	0.80	45.0	15.40	233.0	275.0	233.0	3.40	69.0
5.60	13.0	25.0	13.0	0.53	24.0	15.60	237.0	288.0	237.0	3.27	73.0
5.80	14.0	22.0	14.0	0.40	35.0	15.80	262.0	311.0	262.0	4.73	55.0
<b>6.00</b>	19.0	25.0	19.0	0.53	36.0	<b>16.00</b>	241.0	312.0	241.0	2.60	93.0
6.20	19.0	27.0	19.0	0.80	24.0	16.20	255.0	294.0	255.0	3.40	75.0
6.40	8.0	20.0	8.0	0.53	15.0	16.40	172.0	223.0	172.0	2.87	60.0
6.60	15.0	23.0	15.0	0.73	20.0	16.60	223.0	266.0	223.0	4.47	50.0
6.80	14.0	25.0	14.0	0.53	26.0	16.80	167.0	234.0	167.0	3.93	42.0
<b>7.00</b>	38.0	46.0	38.0	0.33	114.0	<b>17.00</b>	206.0	265.0	206.0	3.00	69.0
7.20	37.0	42.0	37.0	1.40	26.0	17.20	211.0	256.0	211.0	3.93	54.0
7.40	16.0	37.0	16.0	0.60	27.0	17.40	219.0	278.0	219.0	4.60	48.0
7.60	11.0	20.0	11.0	0.93	12.0	17.60	248.0	317.0	248.0	5.13	48.0
7.80	11.0	25.0	11.0	0.13	82.0	17.80	181.0	258.0	181.0	4.07	45.0
<b>8.00</b>	19.0	21.0	19.0	0.40	47.0	<b>18.00</b>	179.0	240.0	179.0	4.07	44.0
8.20	5.0	11.0	5.0	0.27	19.0	18.20	204.0	265.0	204.0	4.53	45.0
8.40	6.0	10.0	6.0	0.33	18.0	18.40	208.0	276.0	208.0	3.33	62.0
8.60	6.0	11.0	6.0	0.40	15.0	18.60	240.0	290.0	240.0	3.20	75.0
8.80	9.0	15.0	9.0	0.53	17.0	18.80	226.0	274.0	226.0	3.93	57.0
<b>9.00</b>	11.0	19.0	11.0	0.60	18.0	<b>19.00</b>	228.0	287.0	228.0	4.33	53.0
9.20	15.0	24.0	15.0	0.87	17.0	19.20	196.0	261.0	196.0	3.60	54.0
9.40	21.0	34.0	21.0	1.13	19.0	19.40	189.0	243.0	189.0	3.93	48.0
9.60	22.0	39.0	22.0	1.00	22.0	19.60	132.0	191.0	132.0	3.07	43.0
9.80	11.0	26.0	11.0	0.73	15.0	19.80	173.0	219.0	173.0	3.47	50.0
<b>10.00</b>	18.0	29.0	18.0	0.80	22.0	<b>20.00</b>	176.0	228.0	176.0	3.87	46.0

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\sigma = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

**PROVA PENETROMETRICA STATICA**  
**LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

**CPT 5**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Gavello - Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 2.00 m da quota inizio

prf	LP	LL	Rp	RL	Rp/RI	prf	LP	LL	Rp	RL	Rp/RI
m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-	m	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	Kg/cm <sup>2</sup>	-
20.20	193.0	251.0	193.0	4.13	47.0	25.20	62.0	91.0	62.0	1.20	52.0
20.40	176.0	238.0	176.0	3.13	56.0	25.40	54.0	72.0	54.0	3.87	14.0
20.60	87.0	134.0	87.0	1.93	45.0	25.60	71.0	129.0	71.0	3.33	21.0
20.80	145.0	174.0	145.0	4.20	35.0	25.80	59.0	109.0	59.0	1.67	35.0
<b>21.00</b>	125.0	188.0	125.0	3.33	38.0	<b>26.00</b>	58.0	83.0	58.0	2.20	26.0
21.20	127.0	177.0	127.0	2.93	43.0	26.20	137.0	170.0	137.0	2.47	56.0
21.40	134.0	178.0	134.0	2.60	52.0	26.40	92.0	129.0	92.0	0.60	153.0
21.60	128.0	167.0	128.0	2.60	49.0	26.60	38.0	47.0	38.0	2.33	16.0
21.80	124.0	163.0	124.0	3.00	41.0	26.80	55.0	90.0	55.0	1.33	41.0
<b>22.00</b>	193.0	238.0	193.0	3.27	59.0	<b>27.00</b>	74.0	94.0	74.0	1.93	38.0
22.20	217.0	266.0	217.0	4.13	53.0	27.20	40.0	69.0	40.0	2.07	19.0
22.40	204.0	266.0	204.0	4.40	46.0	27.40	140.0	171.0	140.0	2.67	52.0
22.60	177.0	243.0	177.0	3.53	50.0	27.60	239.0	279.0	239.0	2.73	87.0
22.80	162.0	215.0	162.0	4.27	38.0	27.80	263.0	304.0	263.0	3.20	82.0
<b>23.00</b>	149.0	213.0	149.0	2.60	57.0	<b>28.00</b>	229.0	277.0	229.0	5.33	43.0
23.20	152.0	191.0	152.0	2.73	56.0	28.20	231.0	311.0	231.0	5.27	44.0
23.40	180.0	221.0	180.0	3.47	52.0	28.40	205.0	284.0	205.0	3.33	62.0
23.60	196.0	248.0	196.0	3.67	53.0	28.60	209.0	259.0	209.0	3.13	67.0
23.80	201.0	256.0	201.0	3.87	52.0	28.80	241.0	288.0	241.0	4.60	52.0
<b>24.00</b>	208.0	266.0	208.0	3.60	58.0	<b>29.00</b>	169.0	238.0	169.0	4.00	42.0
24.20	184.0	238.0	184.0	4.47	41.0	29.20	217.0	277.0	217.0	1.73	125.0
24.40	207.0	274.0	207.0	3.67	56.0	29.40	295.0	321.0	295.0	4.73	62.0
24.60	194.0	249.0	194.0	2.20	88.0	29.60	315.0	386.0	315.0	6.13	51.0
24.80	135.0	168.0	135.0	2.33	58.0	29.80	319.0	411.0	319.0	5.13	62.0
<b>25.00</b>	72.0	107.0	72.0	1.93	37.0	<b>30.00</b>	289.0	366.0	289.0	-----	----

- PENETROMETRO STATICO tipo TG63-200 PAGANI SEMOVENTE da 20 t - (con anello allargatore) -  
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s  
- punta meccanica tipo Begemann  $\phi = 35.7$  mm (area punta 10 cm<sup>2</sup> - apertura 60°)  
- manicotto laterale (superficie 150 cm<sup>2</sup>)

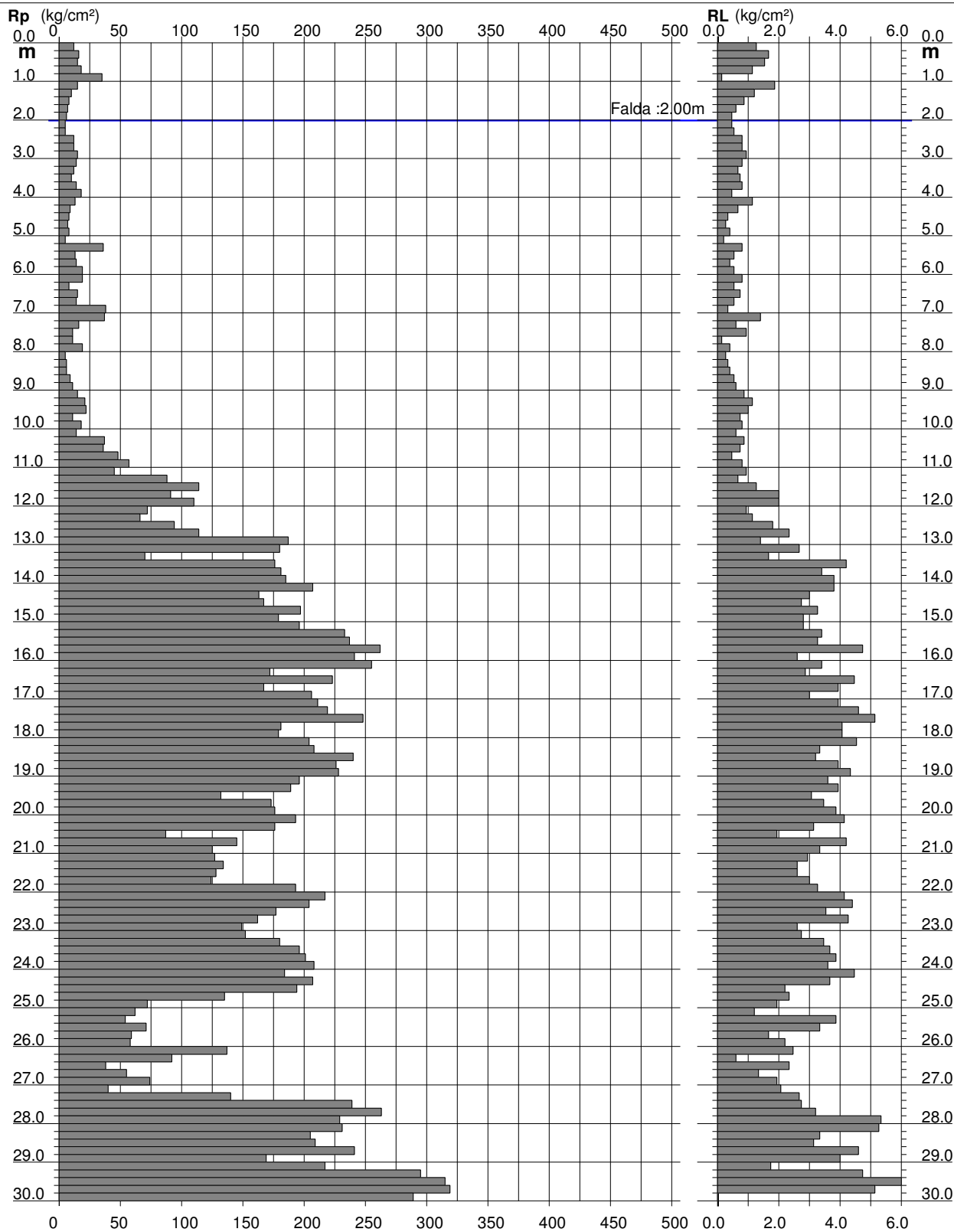
# PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 5

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Gavello - Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 2.00 m da quota inizio



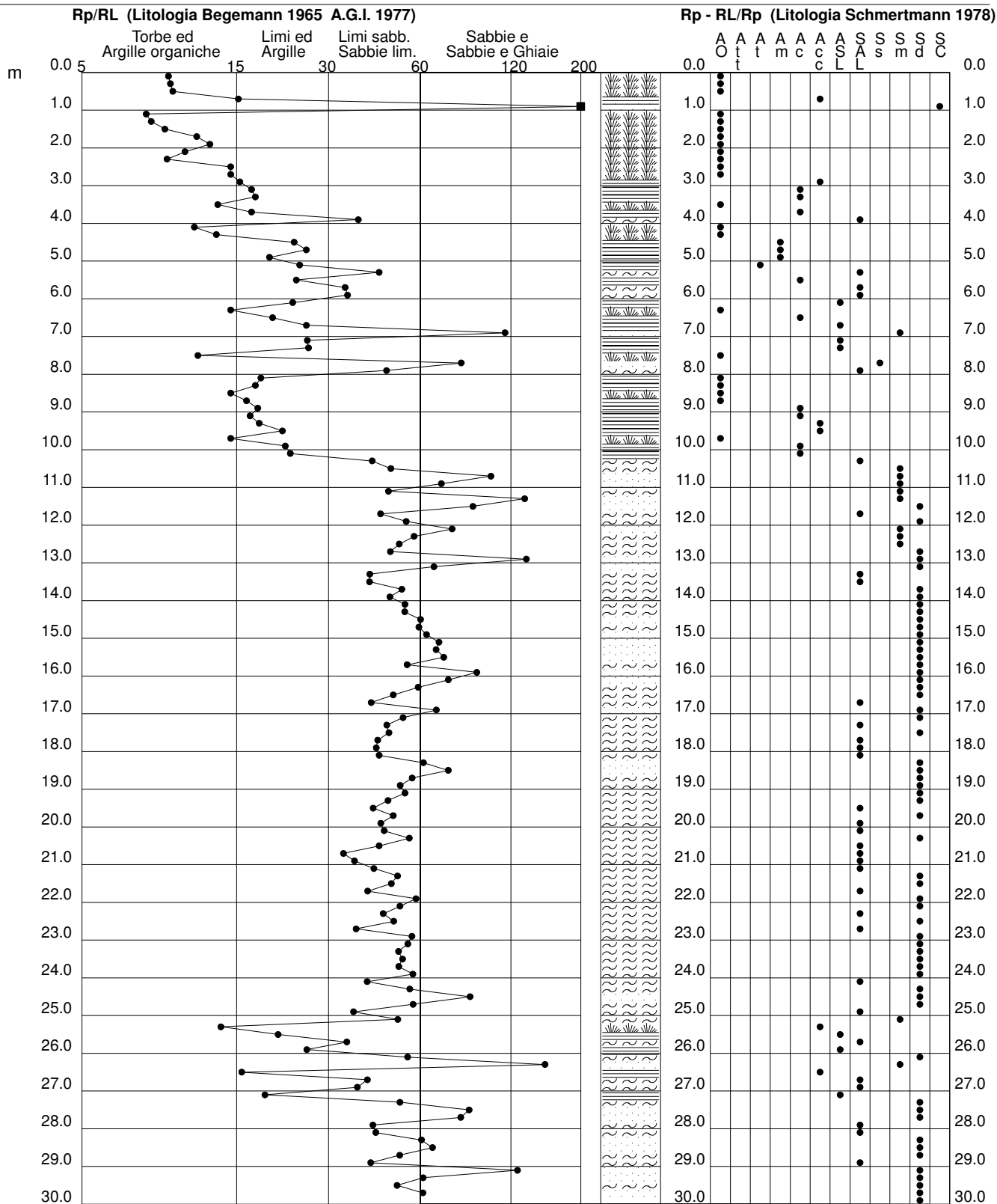
# PROVA PENETROMETRICA STATICA VALUTAZIONI LITOLOGICHE

**CPT 5**

3.010496-117

- committente: Comune di Mirandola  
- lavoro: Microzonazione sismica  
- località: Gavello - Mirandola (MO)  
- data emiss. : 19/01/2012

- data prova : 16/12/2011  
- quota inizio : Piano Campagna  
- prof. falda : 2.00 m da quota inizio



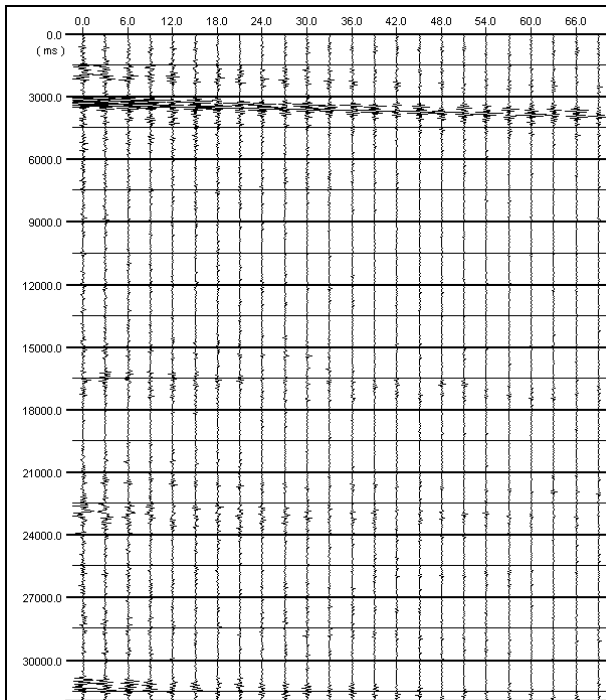




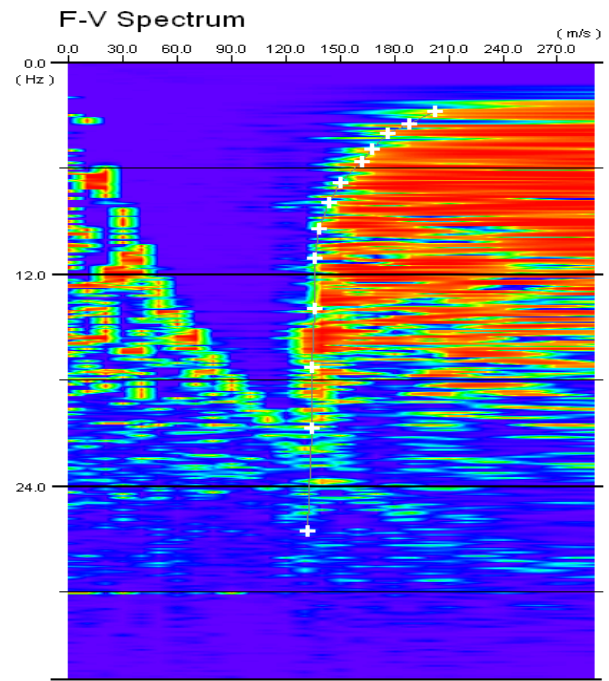


Profilo	Direzione	n° tracce	$\Delta x$ (m)	$\Delta t$ (ms)	T (s)	L (m)	Coordinate geografiche WGS 84
MASW 1	N 15° E	31	3,0	2,0	32,0	69,0	44.89063° / 11.05979°

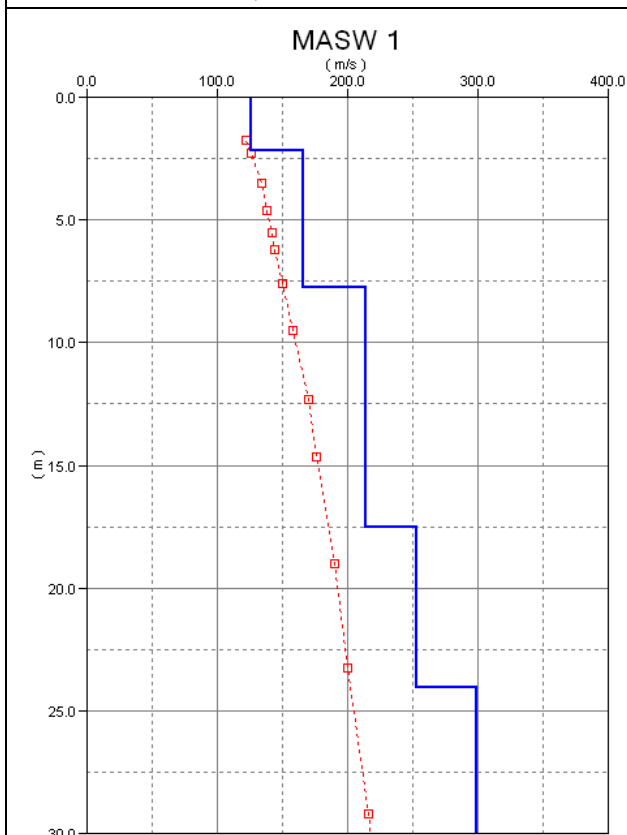
$\Delta x$ : interdistanza geofonica;  $\Delta t$ : passo di campionamento; T: durata registrazione; L tot: lunghezza totale dello stendimento



Sismogramma registrato durante le acquisizioni di microtremore sismico. In ascissa la distanza fra i geofoni (m), in ordinata il tempo (ms).



Spettro di potenza nel dominio f-v e Picking della curva sperimentale delle onde R (croci bianche).



Modello di sottosuolo (1D) descritto in termini di  $V_s$  e spessore dei sismostrati (spezzata blu) e curva di dispersione sperimentale delle onde R (curva rossa)

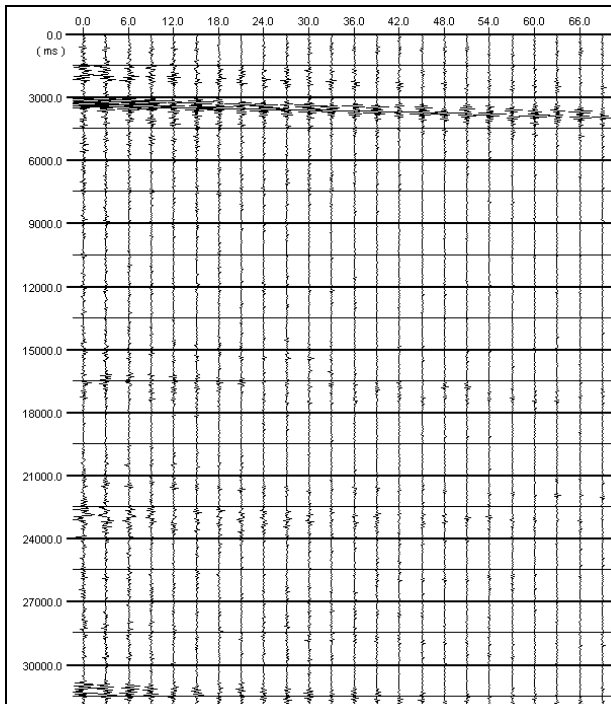
n. Strato	Profondità letto (m dal p.c.)	Spessore (m)	$V_s$ (m/s)
1	2.2	2.2	125.8
2	7.8	5.6	166.4
3	17.5	9.7	214.0
4	24.0	6.5	252.8
5	30.0	5.9	298.8

$$V_{s30} = 211 \pm 17 \text{ [m/s]}$$

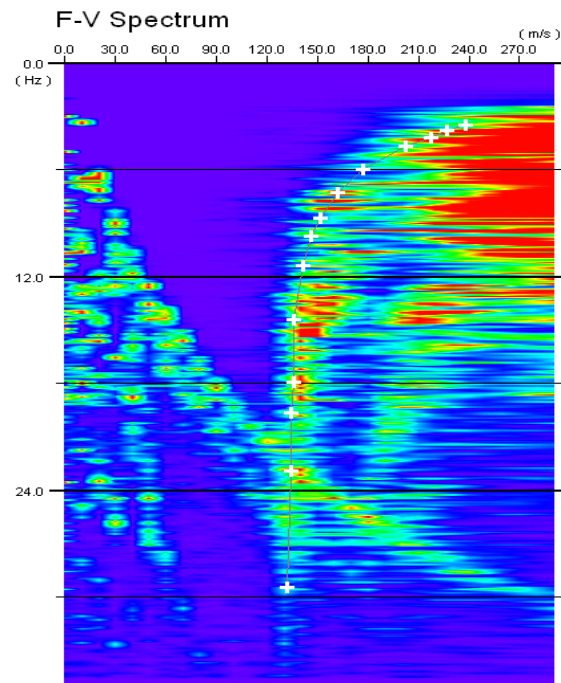
Sintesi dei parametri del modello di sottosuolo ottenuto e valore di  $V_{s30}$  calcolato

Profilo	Direzione	n° tracce	$\Delta x$ (m)	$\Delta t$ (ms)	T (s)	L (m)	Coordinate geografiche WGS 84
MASW 2	N 10° E	26	3,0	2,0	32,0	69,0	44.89205° / 11.07531°

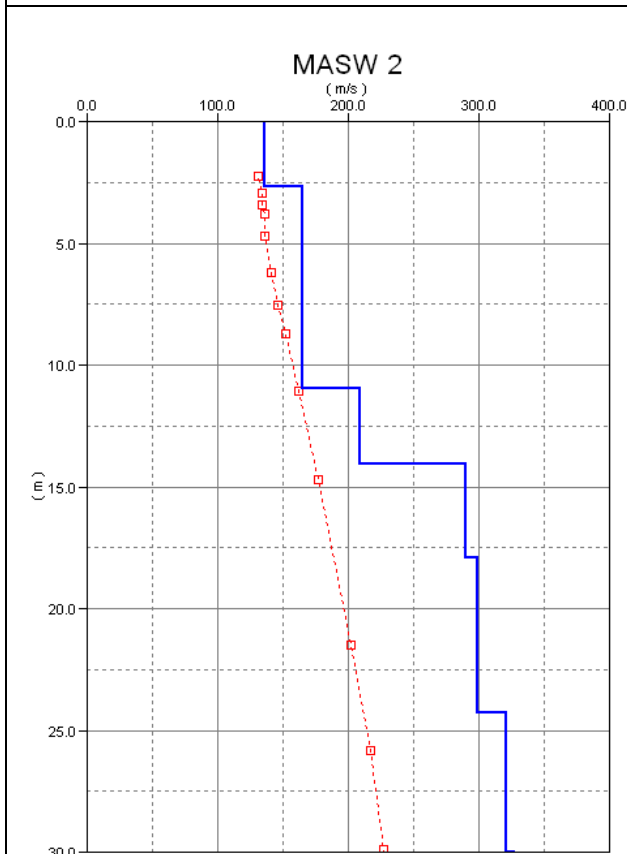
$\Delta x$ : interdistanza geofonica;  $\Delta t$ : passo di campionamento; T: durata registrazione; L: lunghezza totale dello stendimento



Sismogramma registrato durante le acquisizioni di microtremore sismico. In ascissa la distanza fra i geofoni (m), in ordinata il tempo (ms).



Spettro di potenza nel dominio f-v e Picking della curva sperimentale delle onde R (croci bianche).



Modello di sottosuolo (1D) descritto in termini di  $V_s$  e spessore dei sismostrati (spezzata blu) e curva di dispersione sperimentale delle onde R (curva rossa)

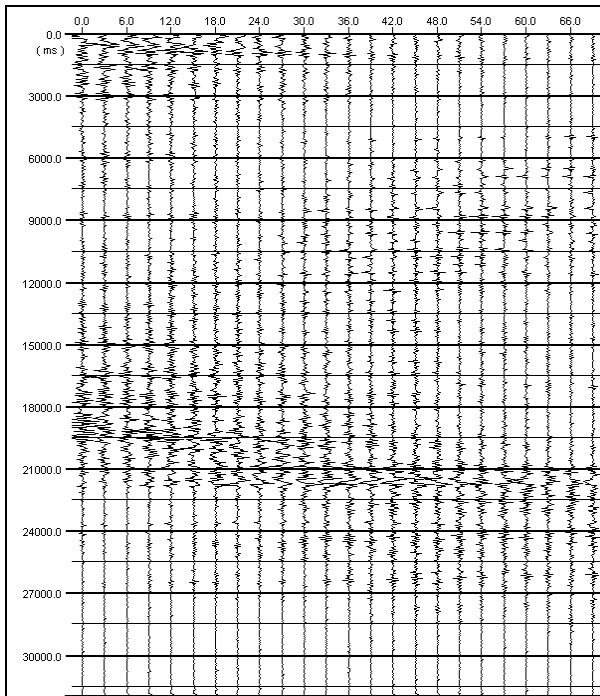
n. Strato	Profondità letto (m dal p.c.)	Spessore (m)	$V_s$ (m/s)
1	2.7	2.7	136.4
2	10.9	8.3	165.5
3	14.0	3.1	208.8
4	17.9	3.9	289.6
5	24.3	6.4	299.2
6	30.0	5.7	321.4

$$V_{s30} = 219 \pm 17 \text{ [m/s]}$$

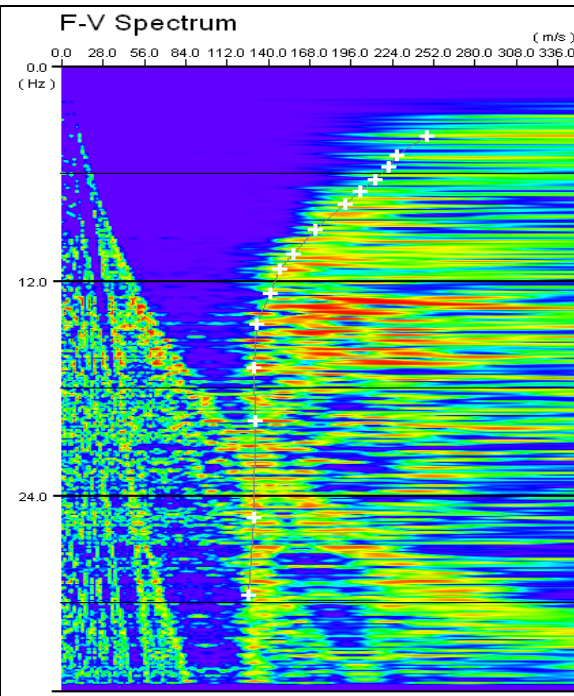
Sintesi dei parametri del modello di sottosuolo ottenuto e valore di  $V_{s30}$  calcolato

Profilo	Direzione	n° tracce	$\Delta x$ (m)	$\Delta t$ (ms)	T (s)	L (m)	Coordinate geografiche WGS 84
MASW 3	N 5° E	32	3,0	2,0	32,0	69,0	44.88075° / 11.05531°

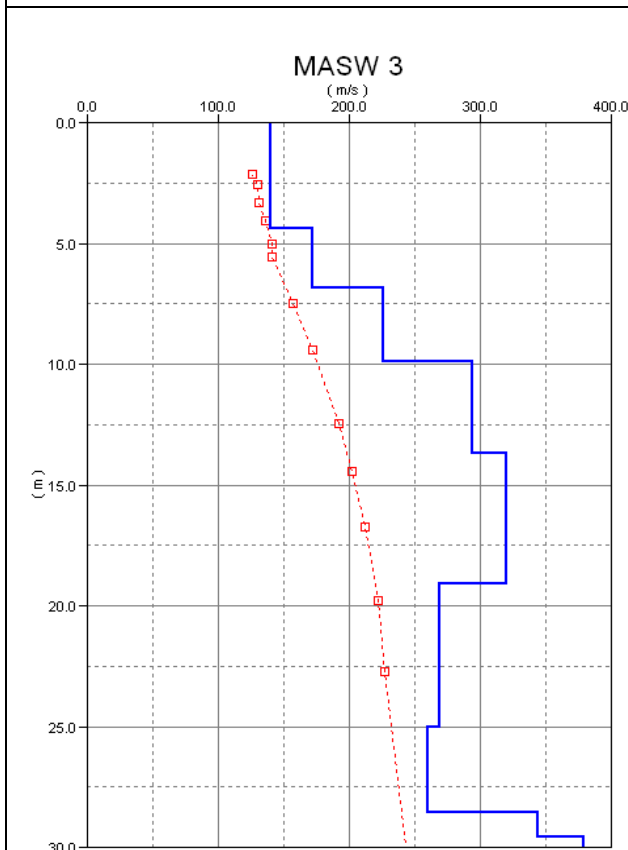
$\Delta x$ : interdistanza geofonica;  $\Delta t$ : passo di campionamento; T: durata registrazione; L tot: lunghezza totale dello stendimento



Sismogramma registrato durante le acquisizioni di microtremore sismico. In ascissa la distanza fra i geofoni (m), in ordinata il tempo (ms).



Spettro di potenza nel dominio f-v e Picking della curva sperimentale delle onde R (croci bianche).



Modello di sottosuolo (1D) descritto in termini di  $V_s$  e spessore dei sismostrati (spezzata blu) e curva di dispersione sperimentale delle onde R (curva rossa)

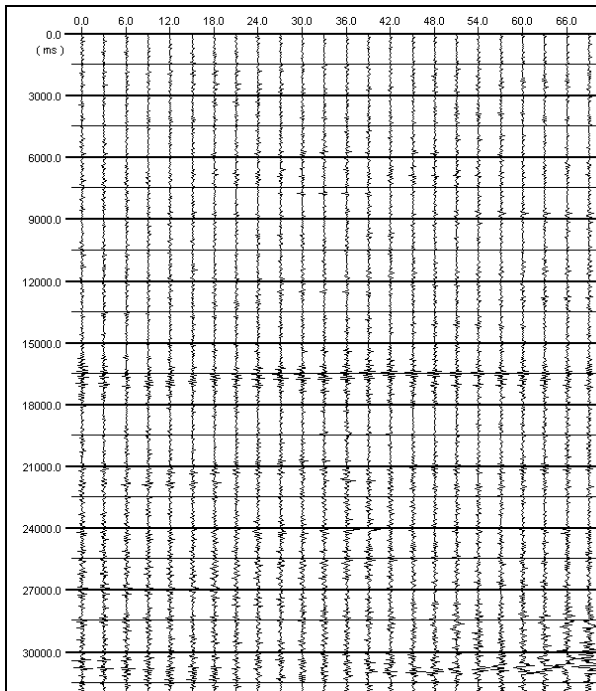
n. Strato	Profondità letto (m dal p.c.)	Spessore (m)	$V_s$ (m/s)
1	4.4	4.4	139.8
2	6.8	2.4	172.1
3	9.9	3.0	225.6
4	13.7	3.8	294.3
5	19.1	5.4	319.5
6	25.1	6.0	268.9
7	28.6	3.5	260.4
8	29.6	1.0	344.0
9	30.0	0.4	378.5

$$V_{s30} = 233 \pm 19 \text{ [m/s]}$$

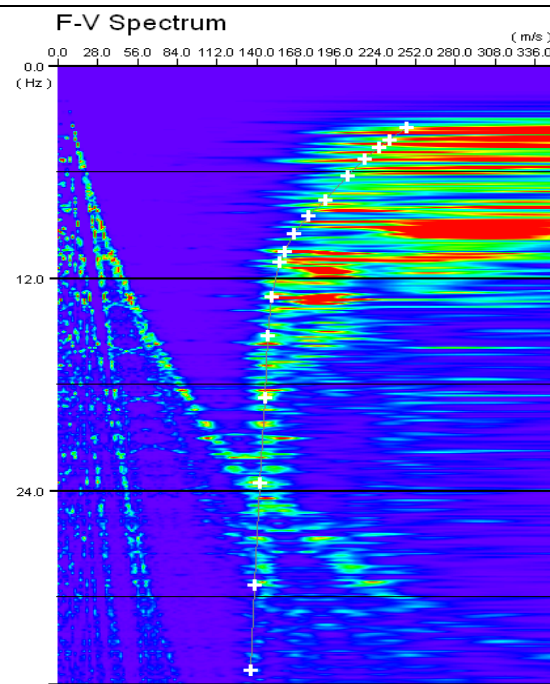
Sintesi dei parametri del modello di sottosuolo ottenuto e valore di  $V_{s30}$  calcolato

Profilo	Direzione	n° tracce	$\Delta x$ (m)	$\Delta t$ (ms)	T (s)	L (m)	Coordinate geografiche WGS 84
MASW 4	N 18° E	36	3,0	2,0	32,0	69,0	44.87668° / 11.07299°

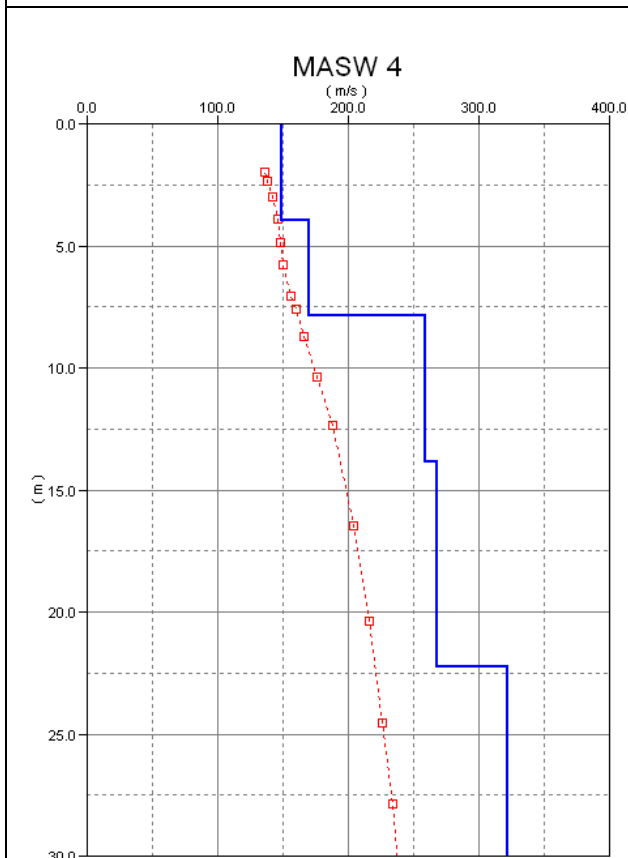
$\Delta x$ : interdistanza geofonica;  $\Delta t$ : passo di campionamento; T: durata registrazione; L tot: lunghezza totale dello stendimento



Sismogramma registrato durante le acquisizioni di microtremore sismico. In ascissa la distanza fra i geofoni (m), in ordinata il tempo (ms).



Spettro di potenza nel dominio f-v e Picking della curva sperimentale delle onde R (crocchi bianchi).



Modello di sottosuolo (1D) descritto in termini di Vs e spessore dei sismostrati (spezzata blu) e curva di dispersione sperimentale delle onde R (curva rossa)

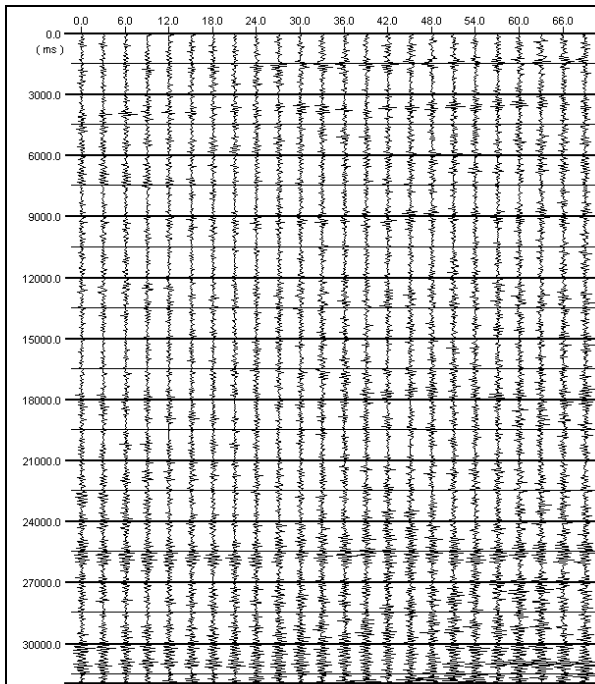
n. Strato	Profondità letto (m dal p.c.)	Spessore (m)	Vs (m/s)
1	3.9	3.9	148.8
2	7.9	3.9	169.8
3	13.9	6.0	259.5
4	22.2	8.4	267.9
5	30.0	7.8	322.2

$$V_{s30} = 234 \pm 19 \text{ [m/s]}$$

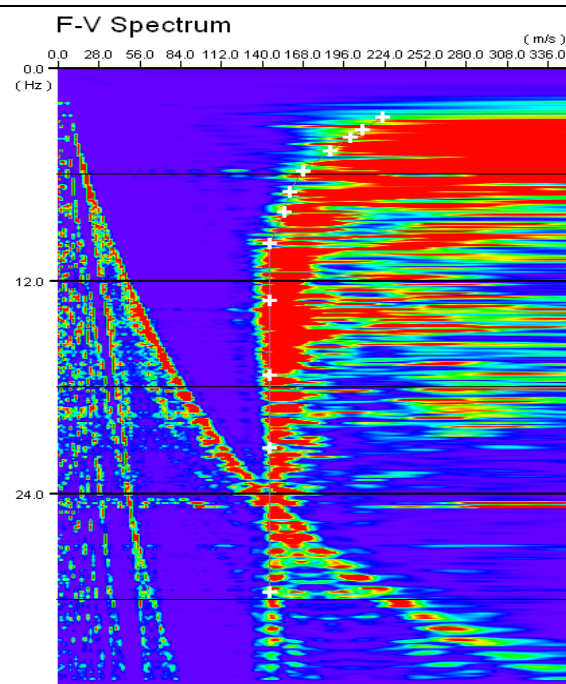
Sintesi dei parametri del modello di sottosuolo ottenuto e valore di Vs30 calcolato

Profilo	Direzione	n° tracce	$\Delta x$ (m)	$\Delta t$ (ms)	T (s)	L (m)	Coordinate geografiche WGS 84
MASW 5	N 50° E	43	3,0	2,0	32,0	69,0	44.8696° / 11.06539°

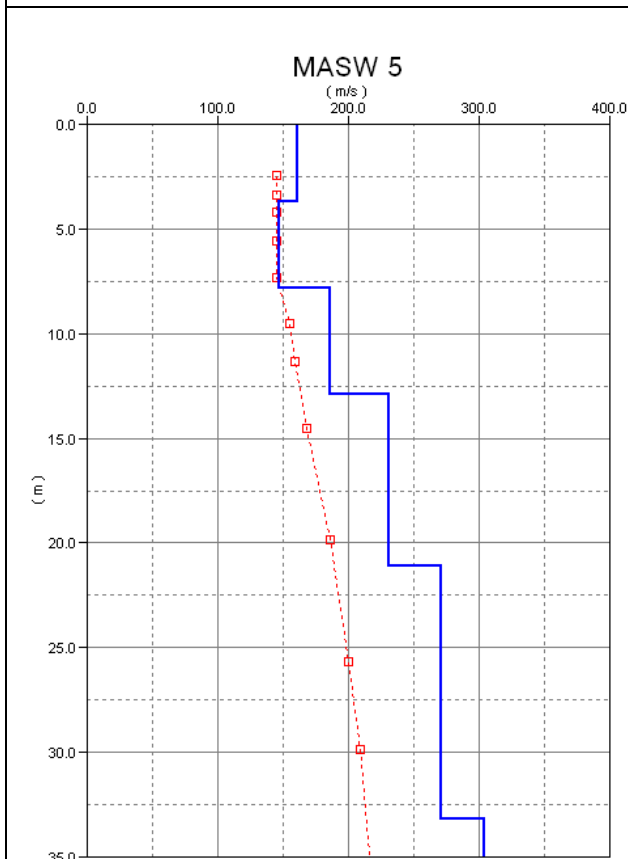
$\Delta x$ : interdistanza geofonica;  $\Delta t$ : passo di campionamento; T: durata registrazione; L tot: lunghezza totale dello stendimento



Sismogramma registrato durante le acquisizioni di microtremore sismico. In ascissa la distanza fra i geofoni (m), in ordinata il tempo (ms).



Spettro di potenza nel dominio f-v e Picking della curva sperimentale delle onde R (croci bianche).



Modello di sottosuolo (1D) descritto in termini di  $V_s$  e spessore dei sismostrati (spezzata blu) e curva di dispersione sperimentale delle onde R (curva rossa)

n. Strato	Profondità letto (m dal p.c.)	Spessore (m)	$V_s$ (m/s)
1	3.7	3.7	161.1
2	7.8	4.1	147.1
3	12.9	5.1	185.7
4	21.1	8.2	231.3
5	30.0	8.9	271.5

$$V_{s30} = 204 \pm 16 \text{ [m/s]}$$

Sintesi dei parametri del modello di sottosuolo ottenuto e valore di  $V_{s30}$  calcolato

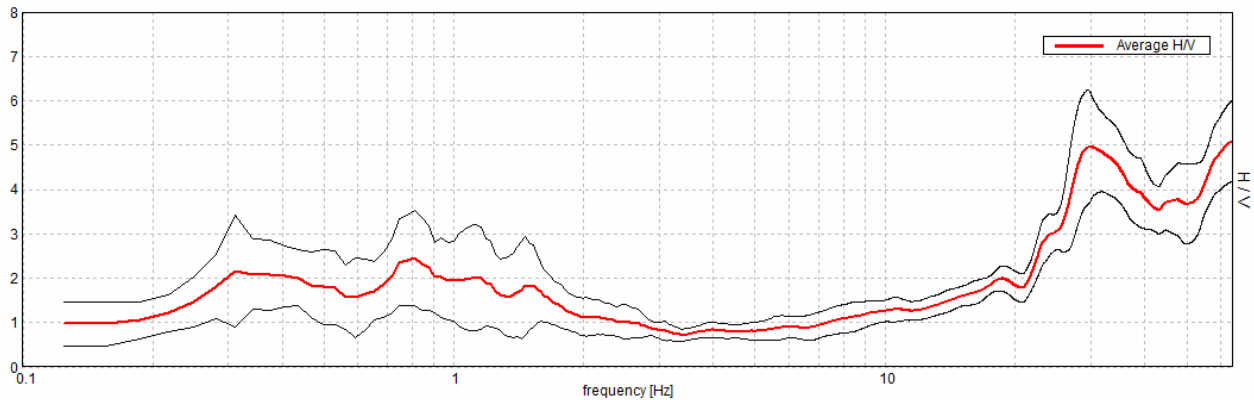
## MICROZONAZIONE MIRANDOLA, R001

Start recording: 14/10/11 11:32:57      End recording: 14/10/11 11:44:57  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

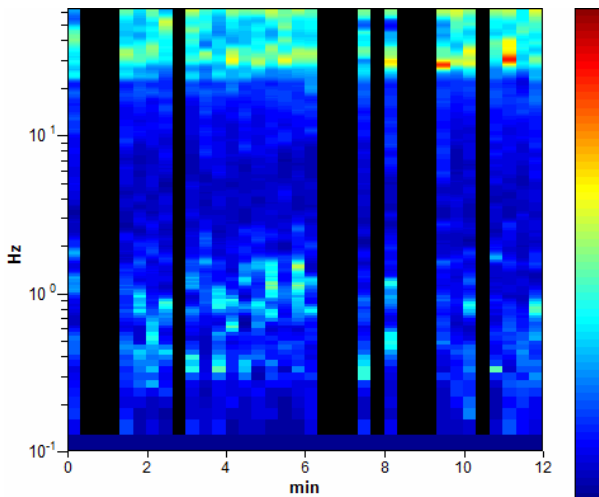
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

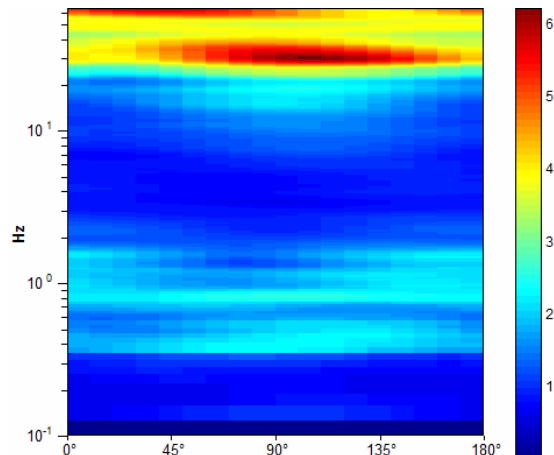
Max. H/V at  $63.88 \pm 7.45$  Hz (in the range 0.0 - 64.0 Hz).



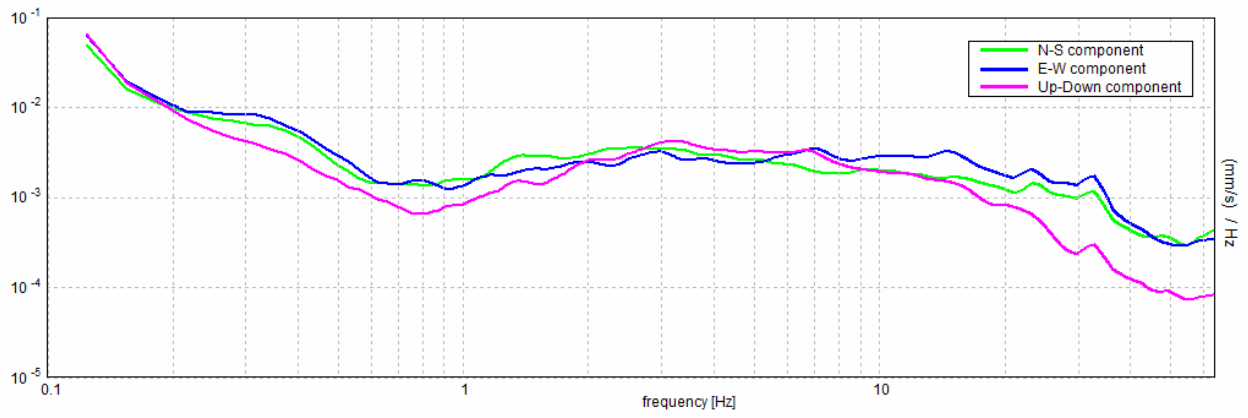
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





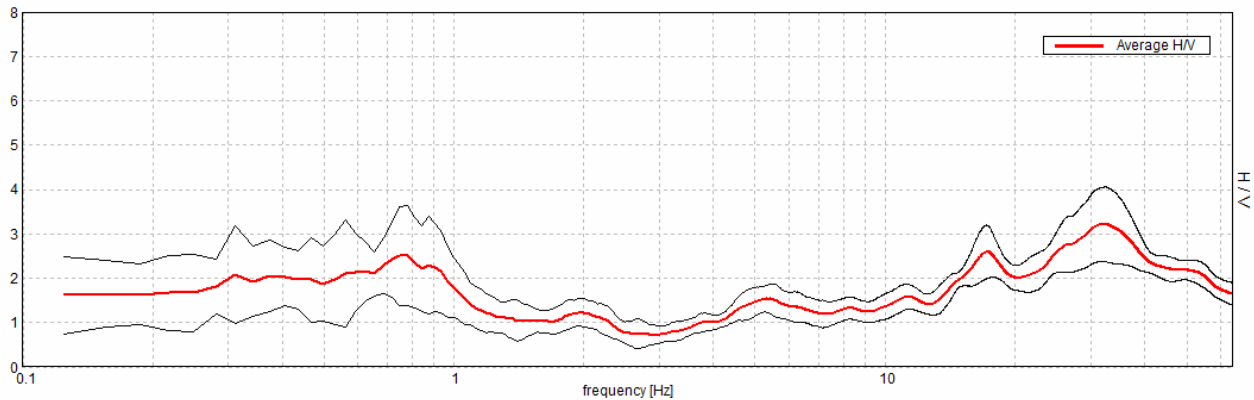
## MICROZONAZIONE MIRANDOLA, R003

Start recording: 14/10/11 12:18:03      End recording: 14/10/11 12:30:04  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

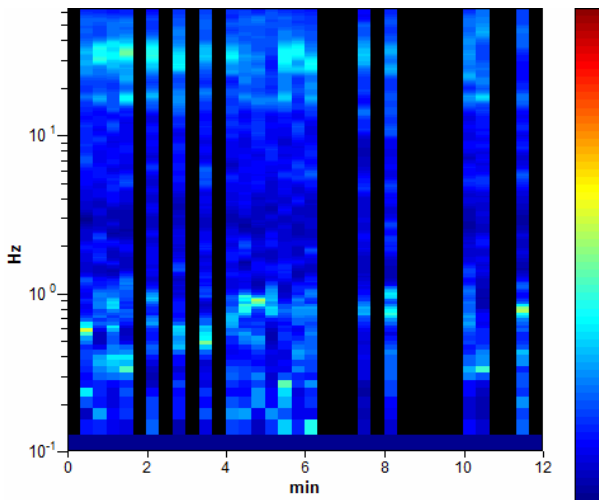
Trace length: 0h12'00".      Analyzed 53% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

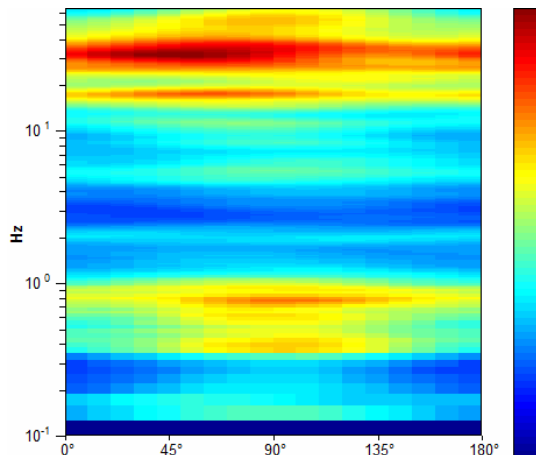
Max. H/V at  $32.19 \pm 5.09$  Hz (in the range 0.0 - 64.0 Hz).



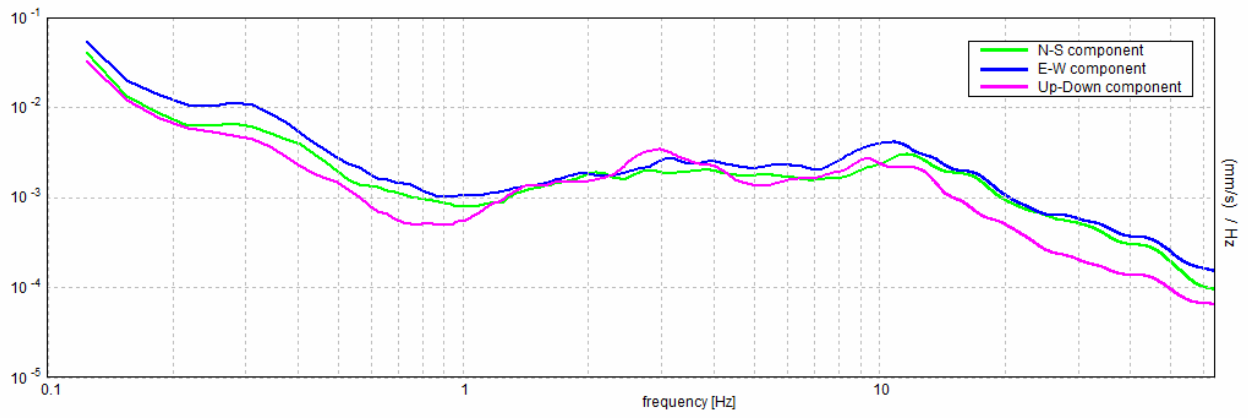
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



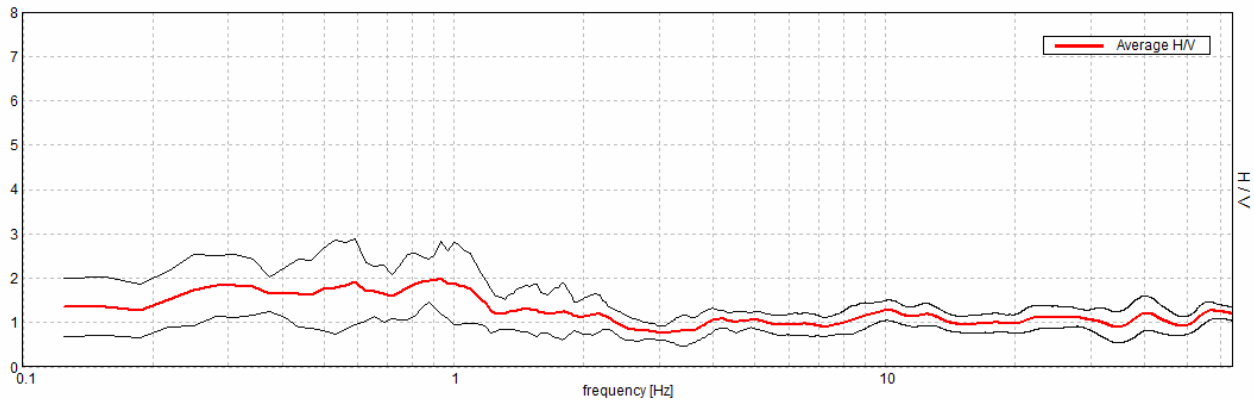
## MICROZONAZIONE MIRANDOLA, R004

Start recording: 14/10/11 12:39:40      End recording: 14/10/11 12:51:40  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

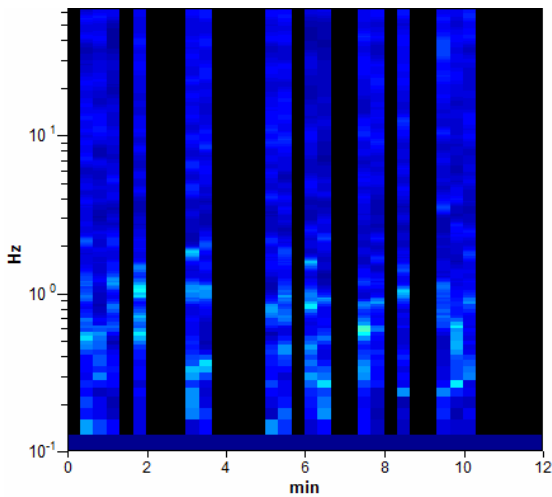
Trace length: 0h12'00".      Analyzed 44% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

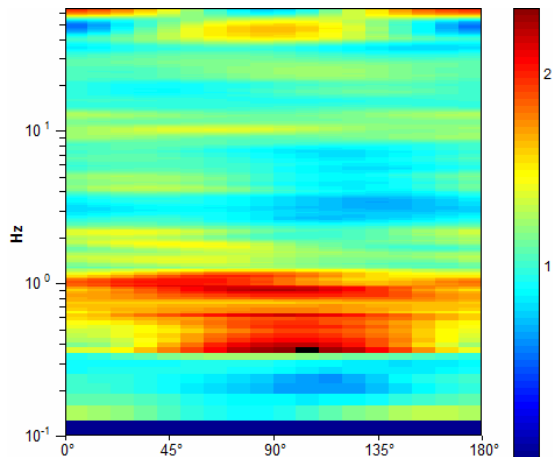
Max. H/V at  $0.94 \pm 0.13$  Hz (in the range 0.0 - 64.0 Hz).



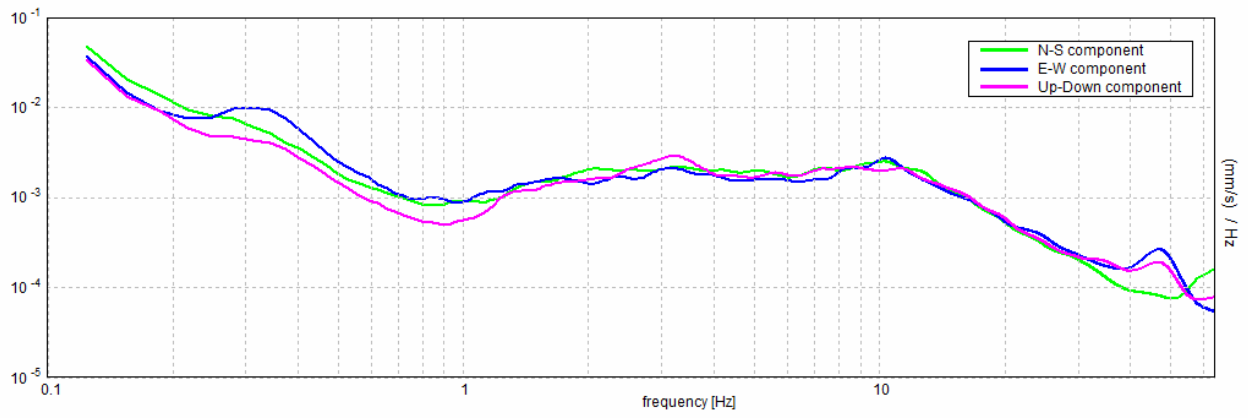
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



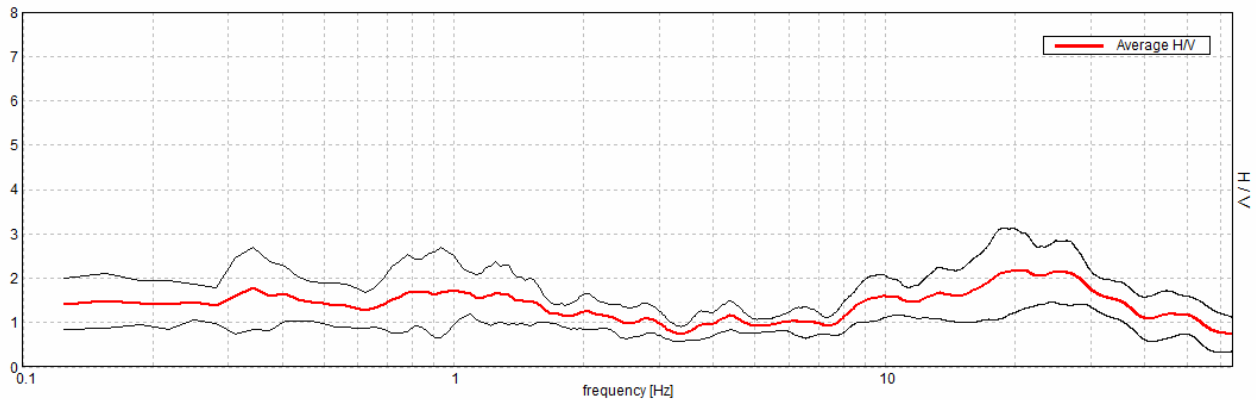
## MICROZONAZIONE MIRANDOLA, R005

Start recording: 02/11/11 10:12:13      End recording: 02/11/11 10:24:14  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

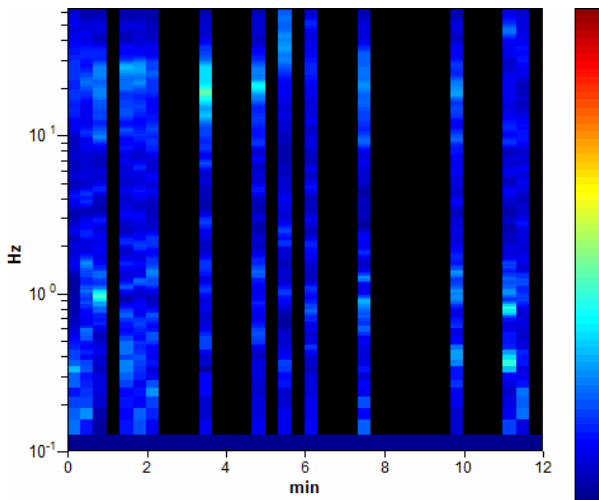
Trace length: 0h12'00".      Analyzed 39% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

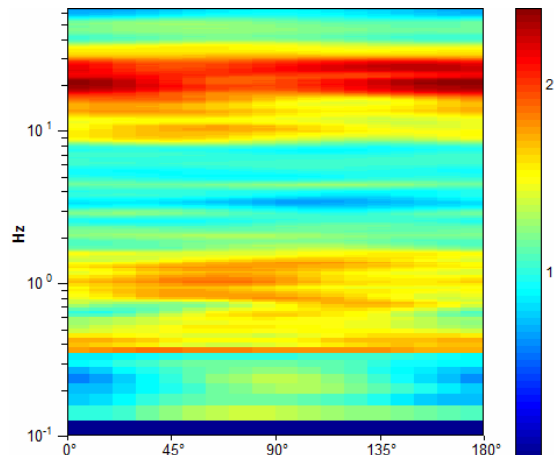
Max. H/V at 20.06 ± 5.78 Hz (in the range 0.0 - 64.0 Hz).



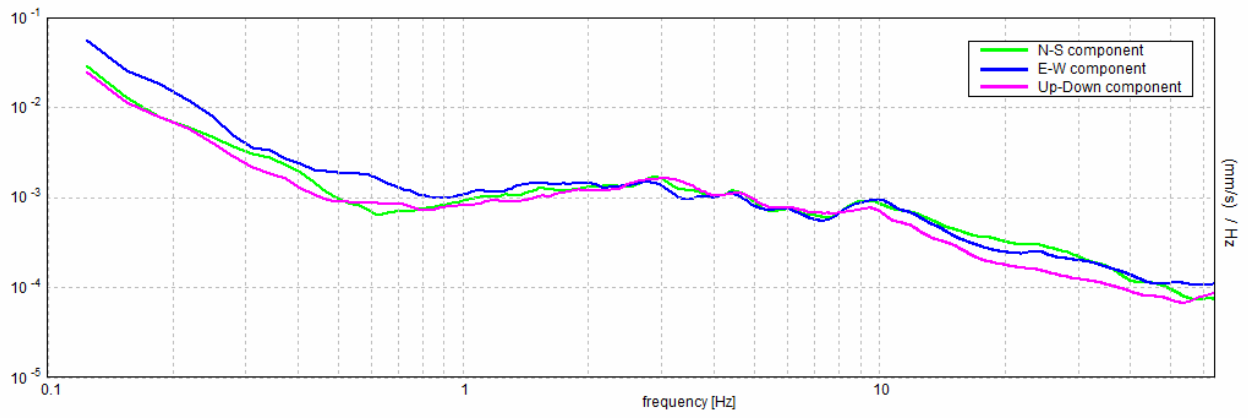
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



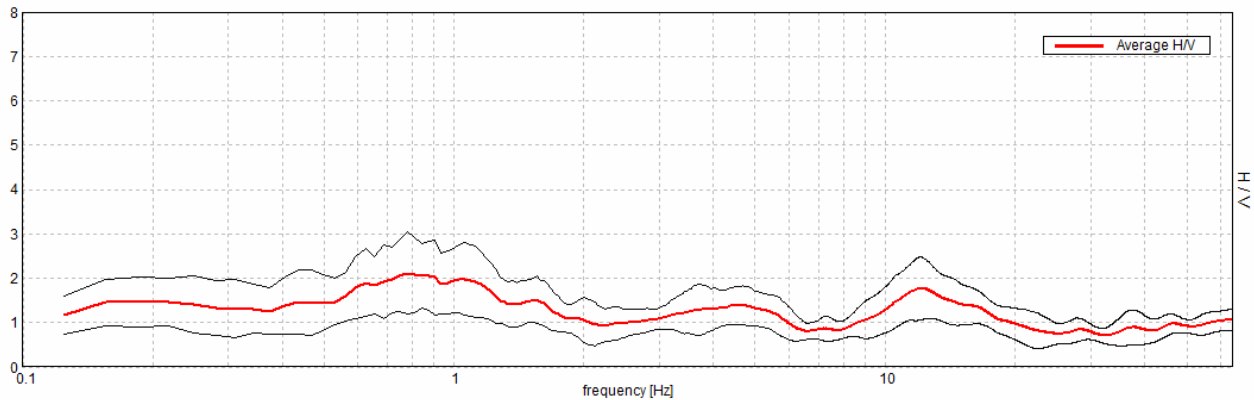
## MICROZONAZIONE MIRANDOLA, R006

Start recording: 02/11/11 11:10:27      End recording: 02/11/11 11:22:28  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

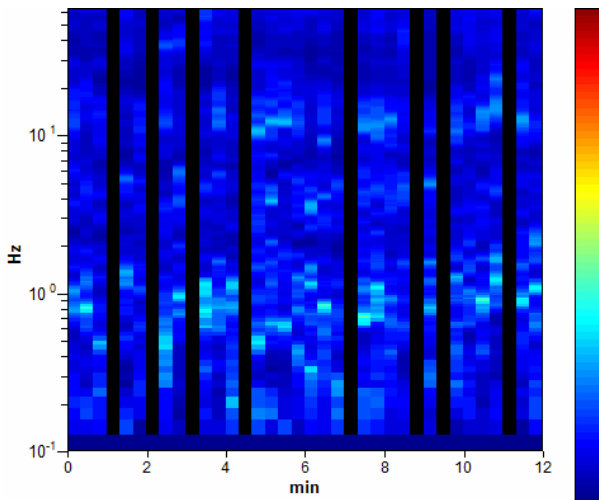
Trace length: 0h12'00".      Analyzed 78% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

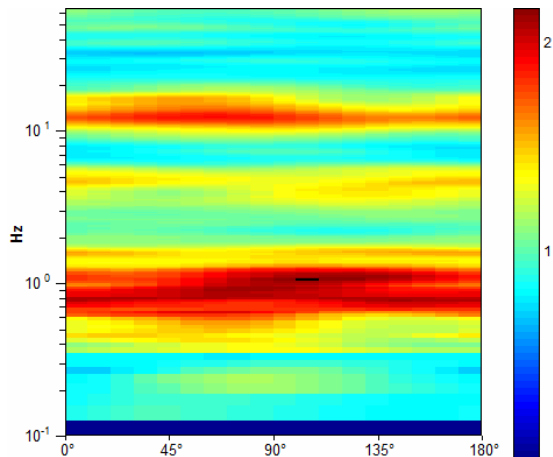
Max. H/V at  $0.78 \pm 0.01$  Hz (in the range 0.0 - 64.0 Hz).



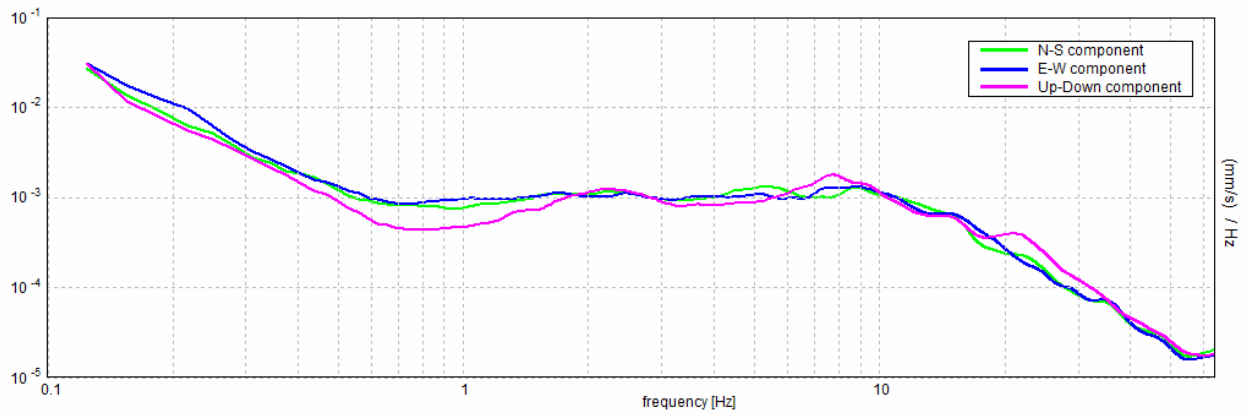
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



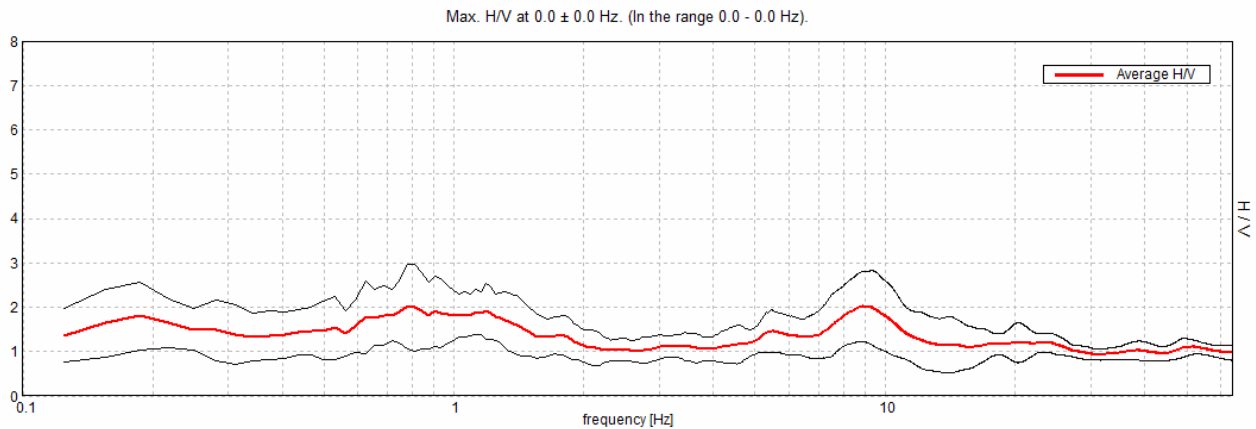


## MICROZONAZIONE MIRANDOLA, R007

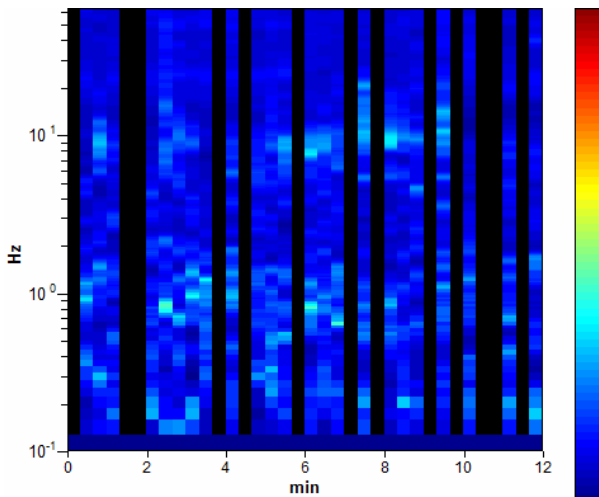
Start recording: 02/11/11 11:52:04      End recording: 02/11/11 12:04:05  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

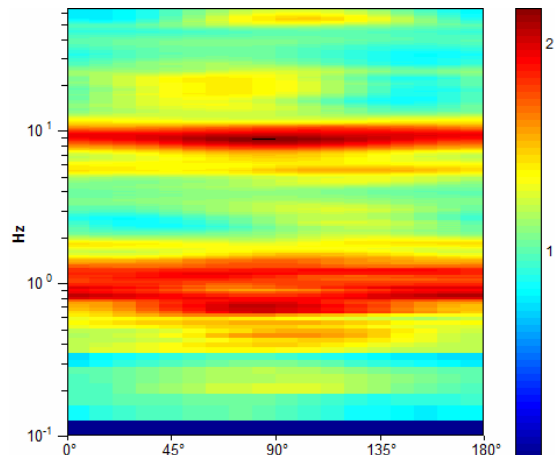
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



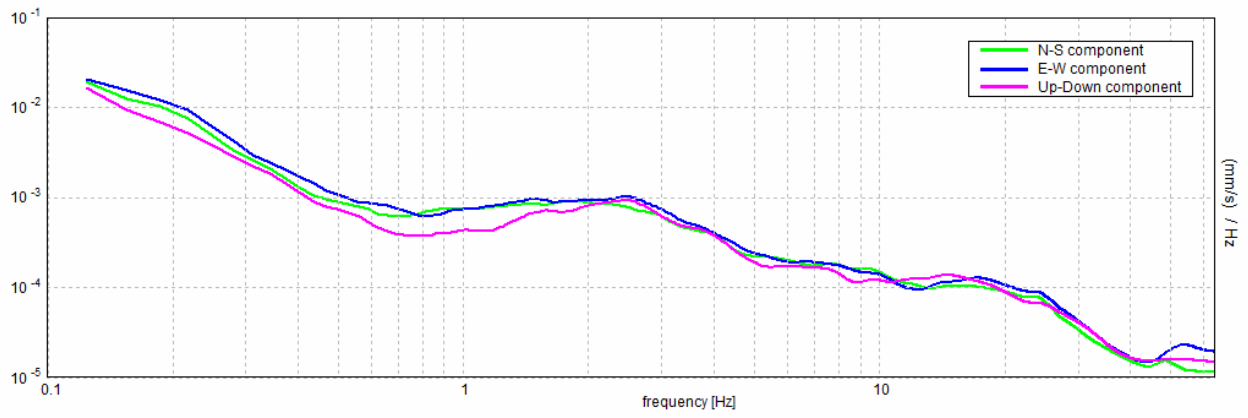
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



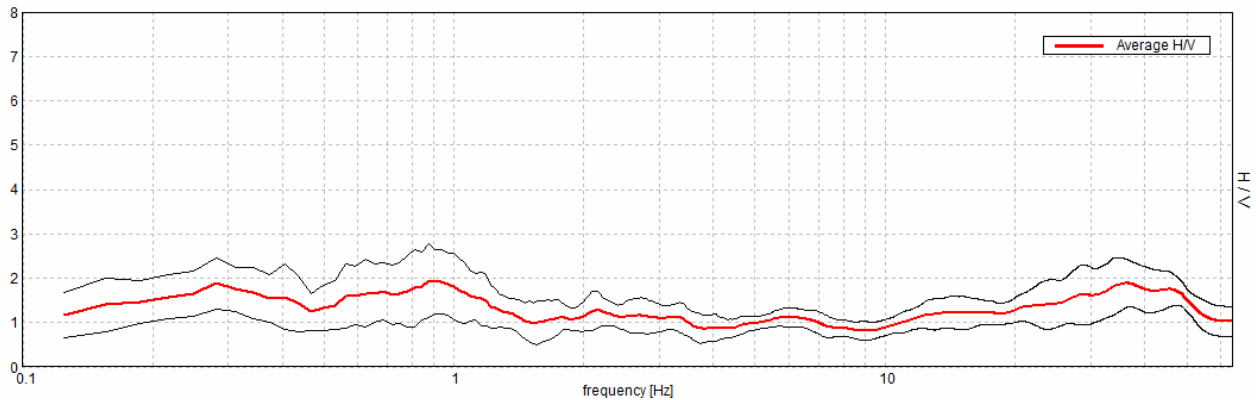
## MICROZONAZIONE MIRANDOLA, R008

Start recording: 02/11/11 12:25:56      End recording: 02/11/11 12:37:57  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

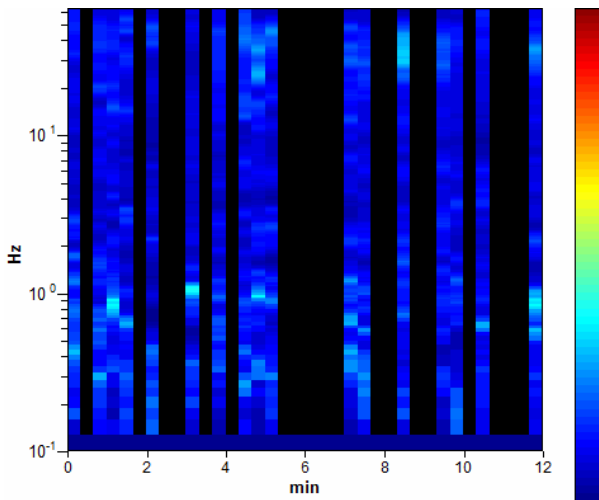
Trace length: 0h12'00".      Analyzed 47% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

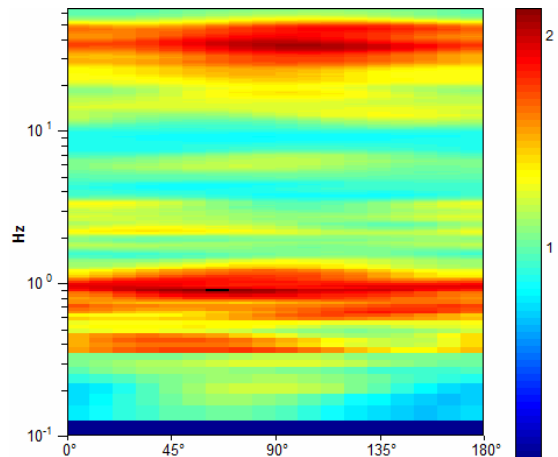
Max. H/V at  $0.88 \pm 0.26$  Hz (in the range 0.0 - 64.0 Hz).



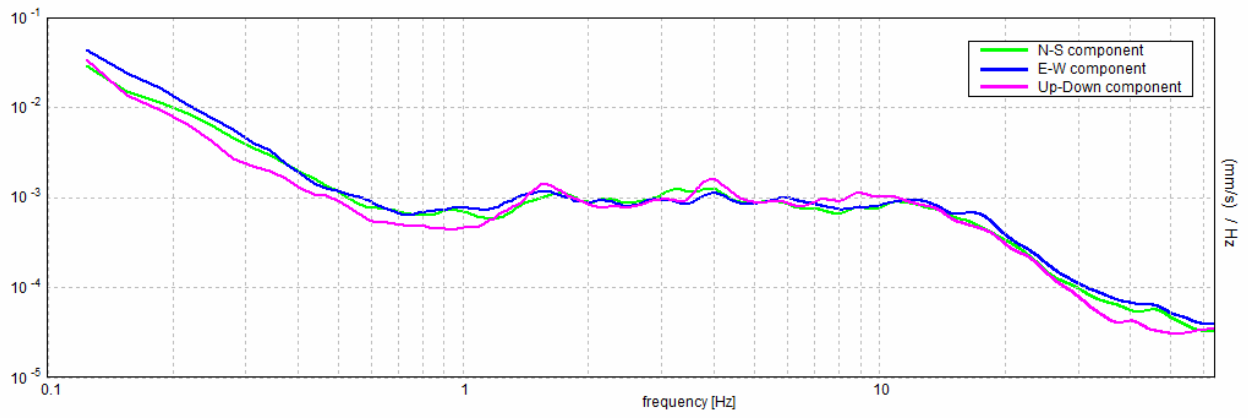
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



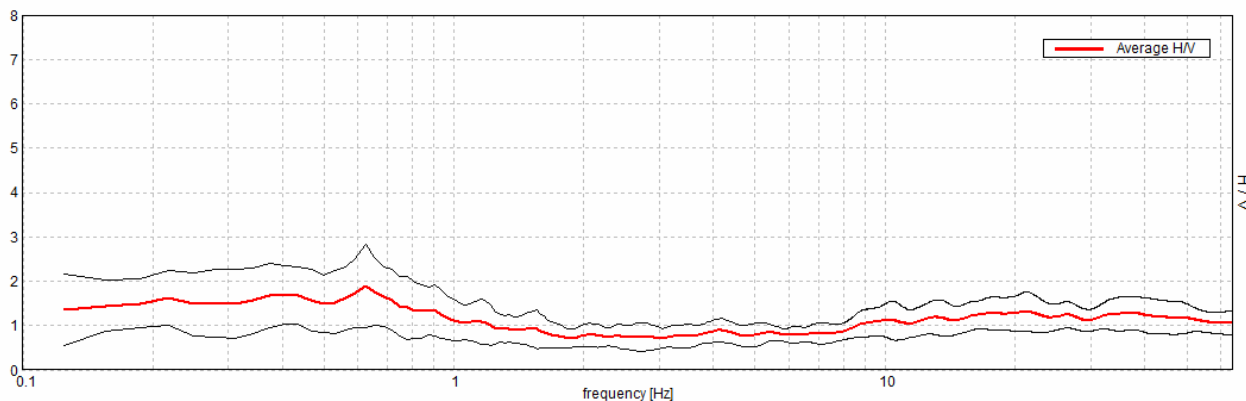
## MICROZONAZIONE MIRANDOLA, R009

Start recording: 02/11/11 12:49:55      End recording: 02/11/11 13:01:56  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

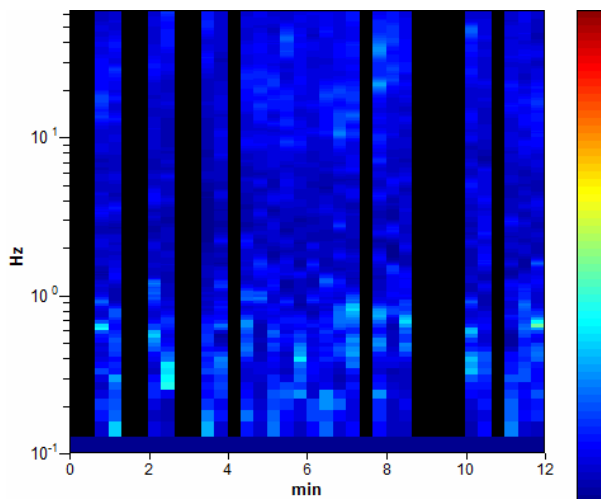
Trace length: 0h12'00".      Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

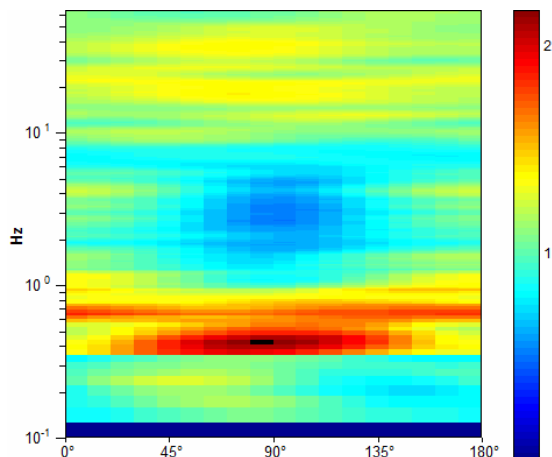
Max. H/V at  $0.63 \pm 0.05$  Hz (in the range 0.0 - 64.0 Hz).



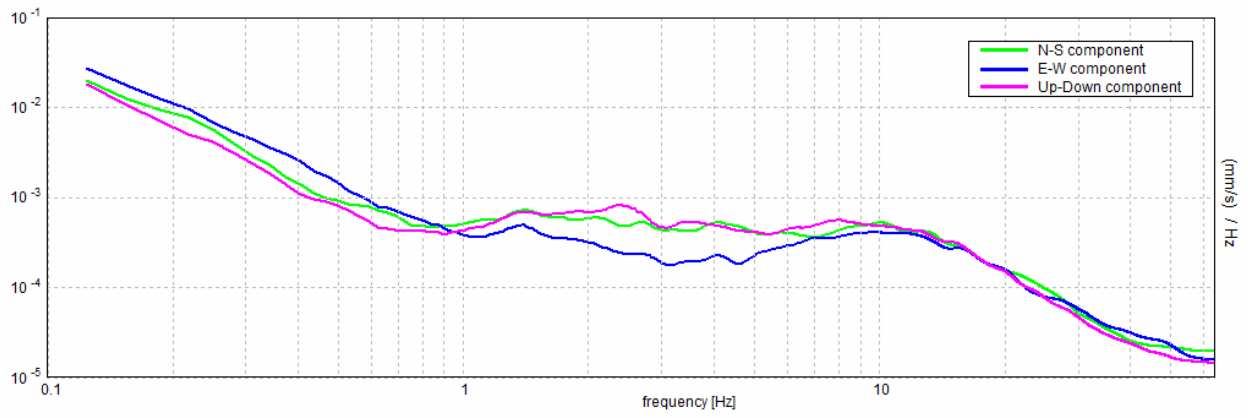
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



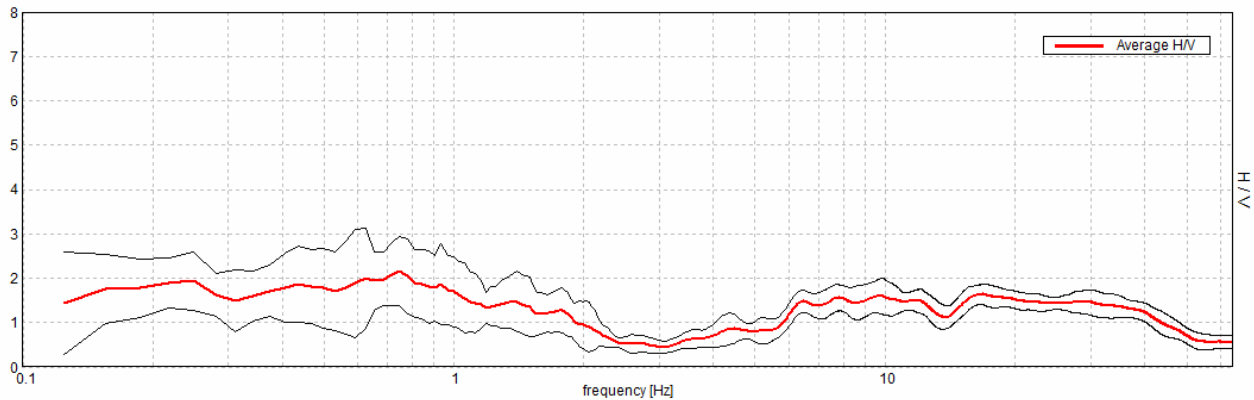
## MICROZONAZIONE MIRANDOLA, R011

Start recording: 02/11/11 14:53:48      End recording: 02/11/11 15:05:49  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

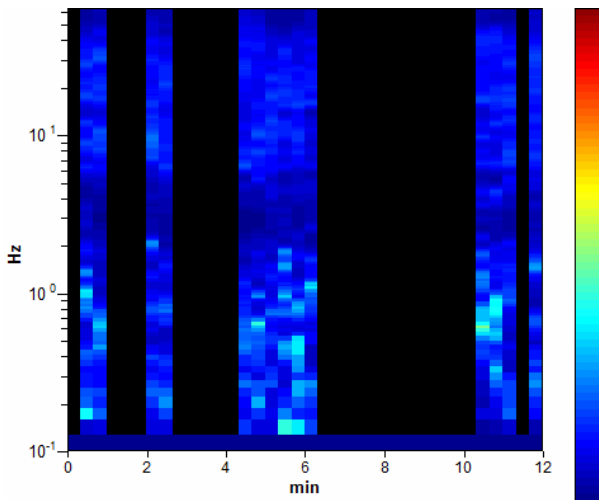
Trace length: 0h12'00".      Analyzed 39% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

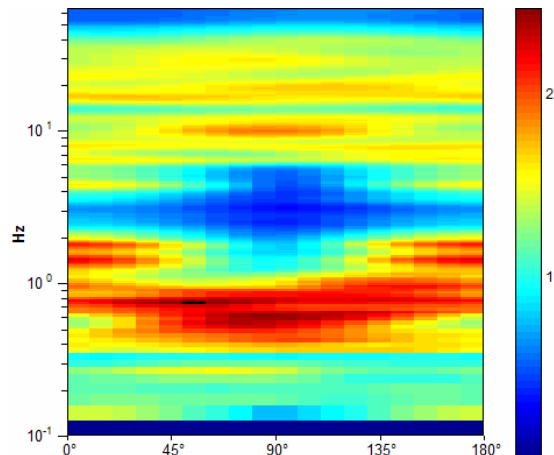
Max. H/V at  $0.75 \pm 0.2$  Hz (in the range 0.0 - 64.0 Hz).



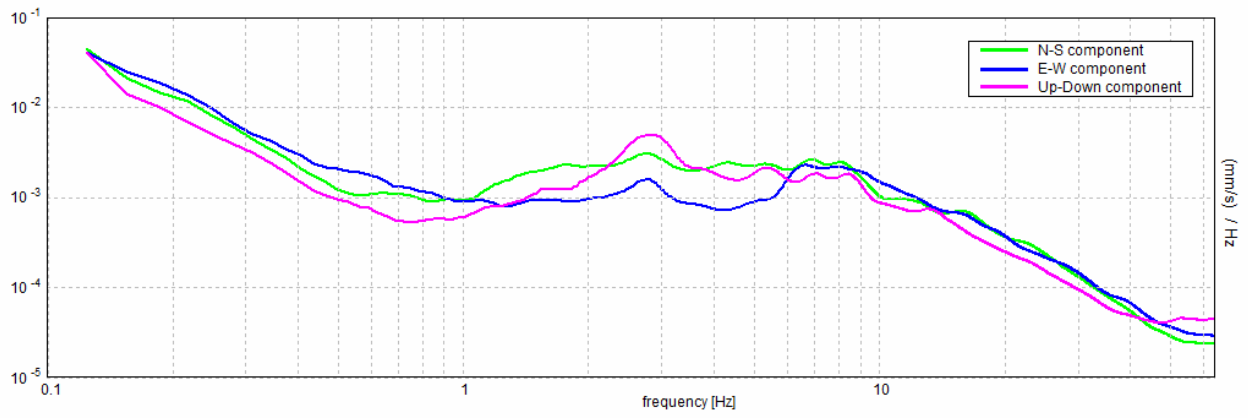
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





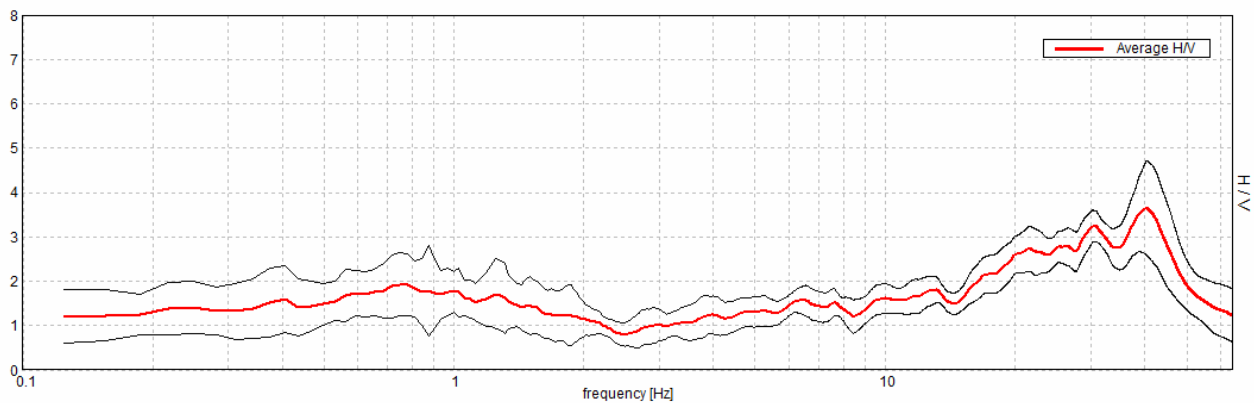
## MICROZONAZIONE MIRANDOLA, R012

Start recording: 02/11/11 15:28:43      End recording: 02/11/11 15:40:44  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

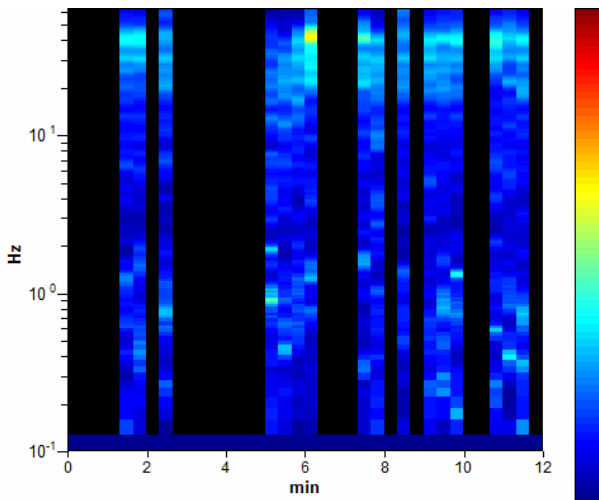
Trace length: 0h12'00".      Analyzed 44% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

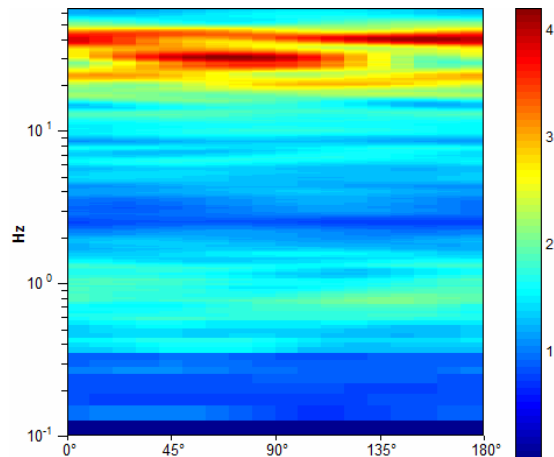
Max. H/V at  $40.31 \pm 1.95$  Hz (in the range 0.0 - 64.0 Hz).



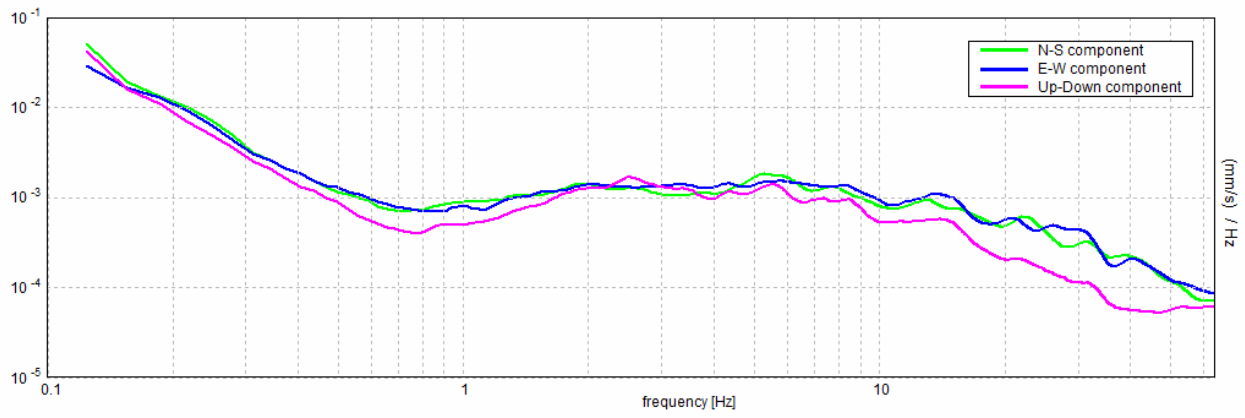
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



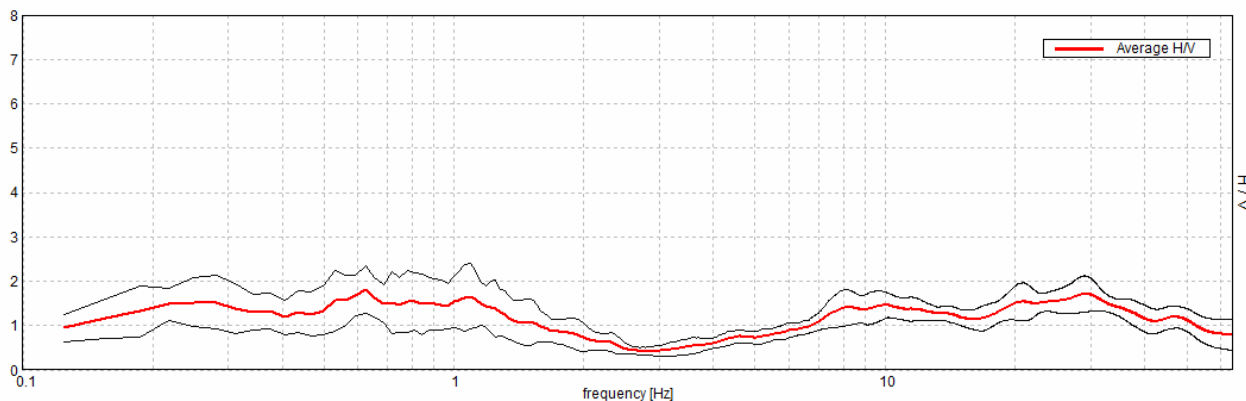
## MICROZONAZIONE MIRANDOLA, R013

Start recording: 02/11/11 15:57:55      End recording: 02/11/11 16:09:56  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

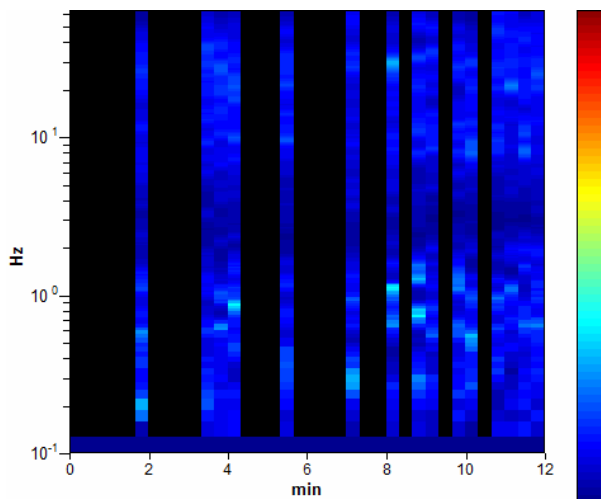
Trace length: 0h12'00".      Analyzed 42% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

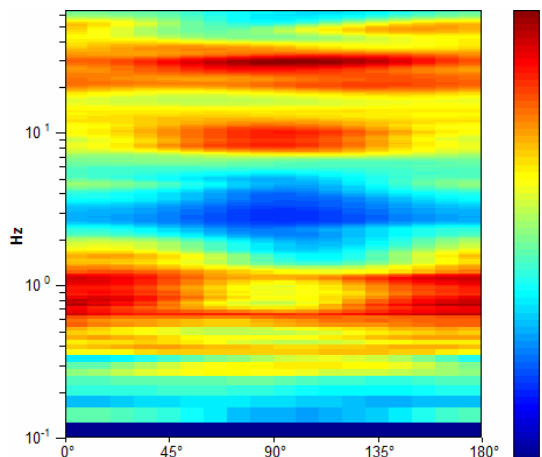
Max. H/V at  $0.63 \pm 7.36$  Hz (in the range 0.0 - 64.0 Hz).



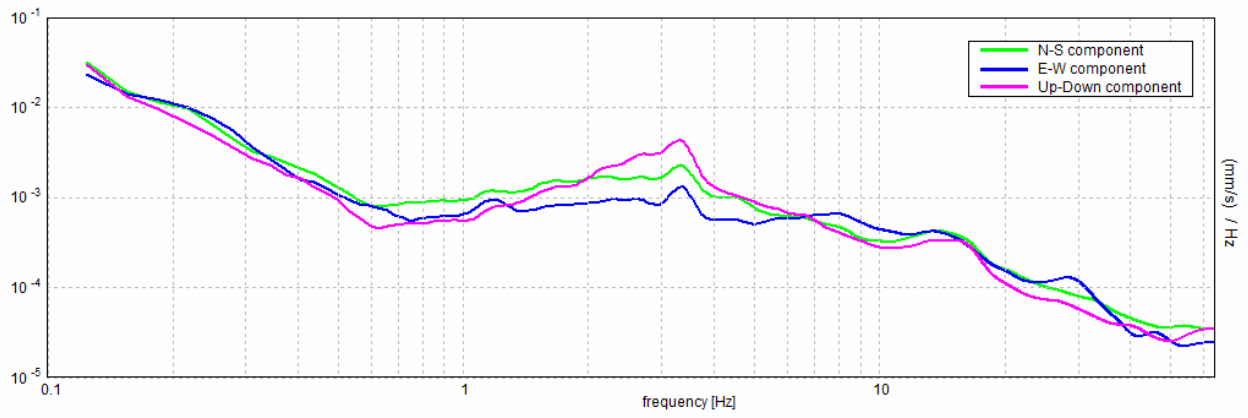
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



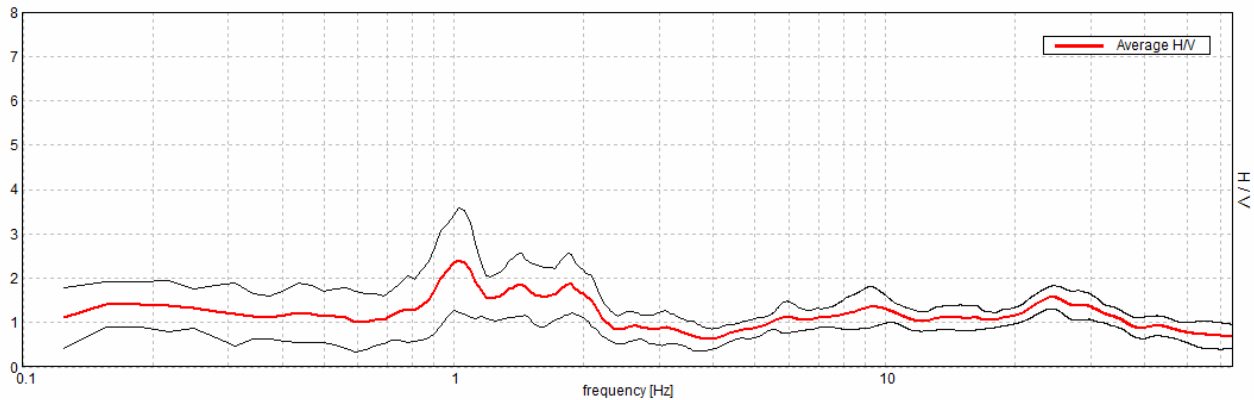
## MICROZONAZIONE MIRANDOLA, R014

Start recording: 02/11/11 16:27:12      End recording: 02/11/11 16:39:13  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

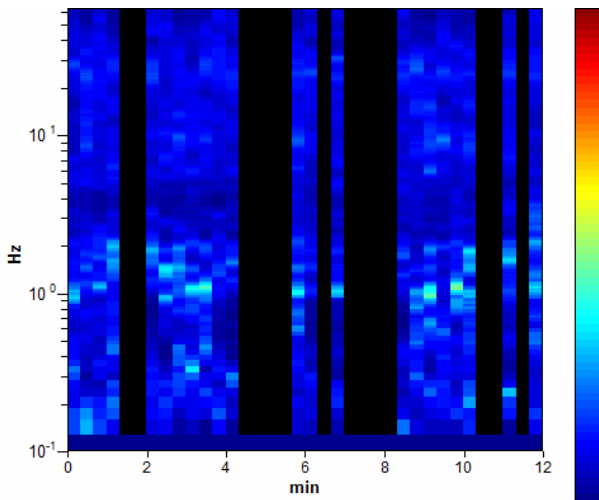
Trace length: 0h12'00".      Analyzed 61% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

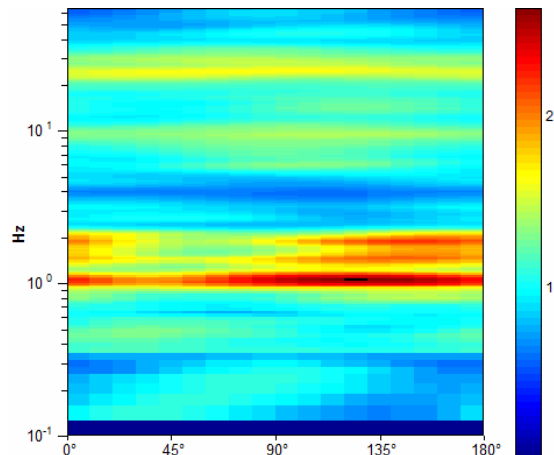
Max. H/V at  $1.03 \pm 0.11$  Hz (in the range 0.0 - 64.0 Hz).



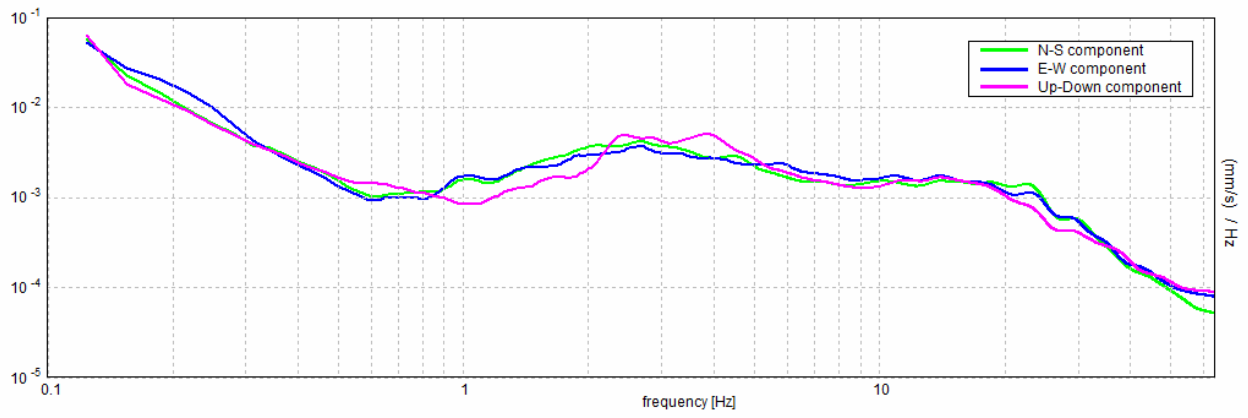
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

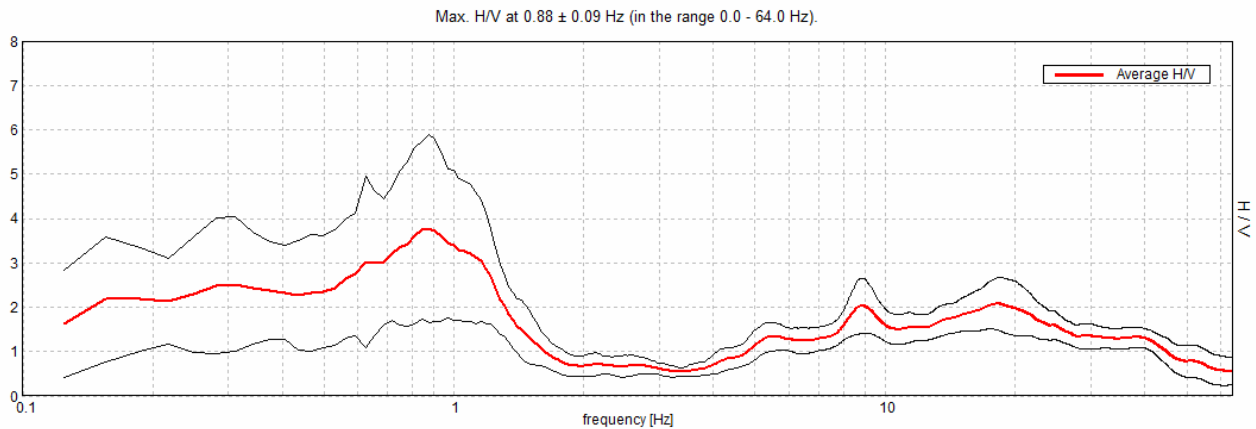


## MICROZONAZIONE MIRANDOLA, R015

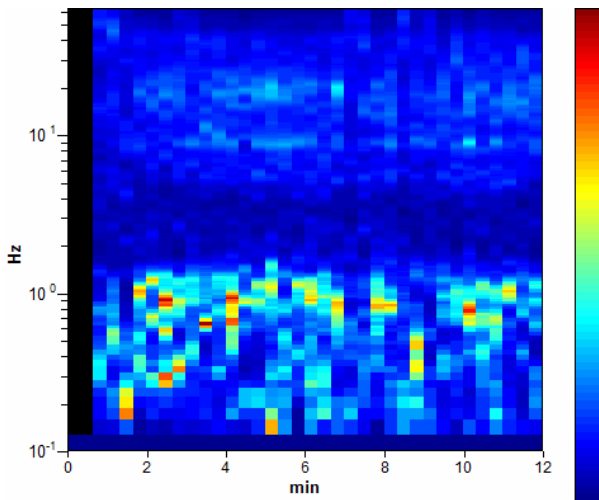
Start recording: 03/11/11 09:27:34      End recording: 03/11/11 09:39:35  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 94% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

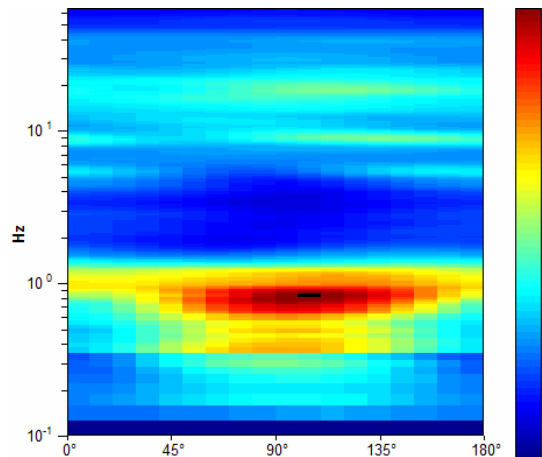
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



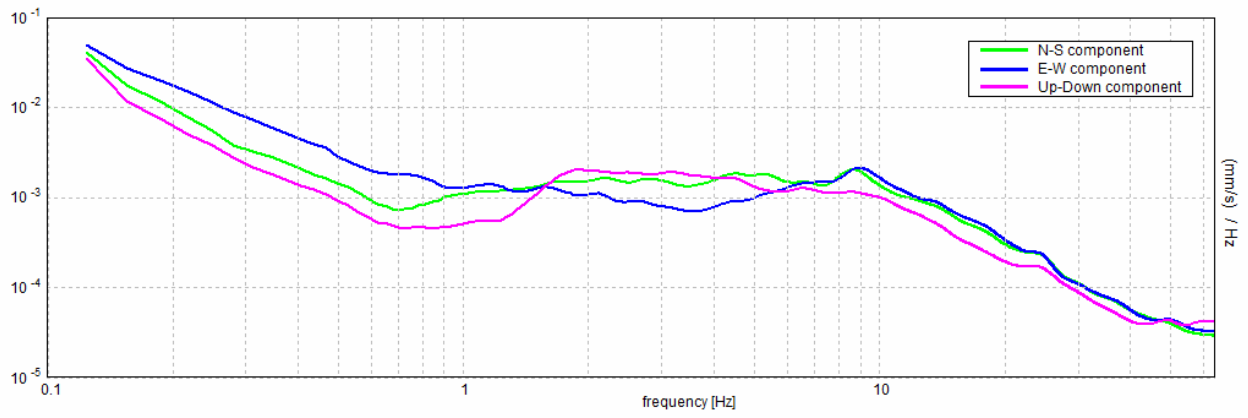
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



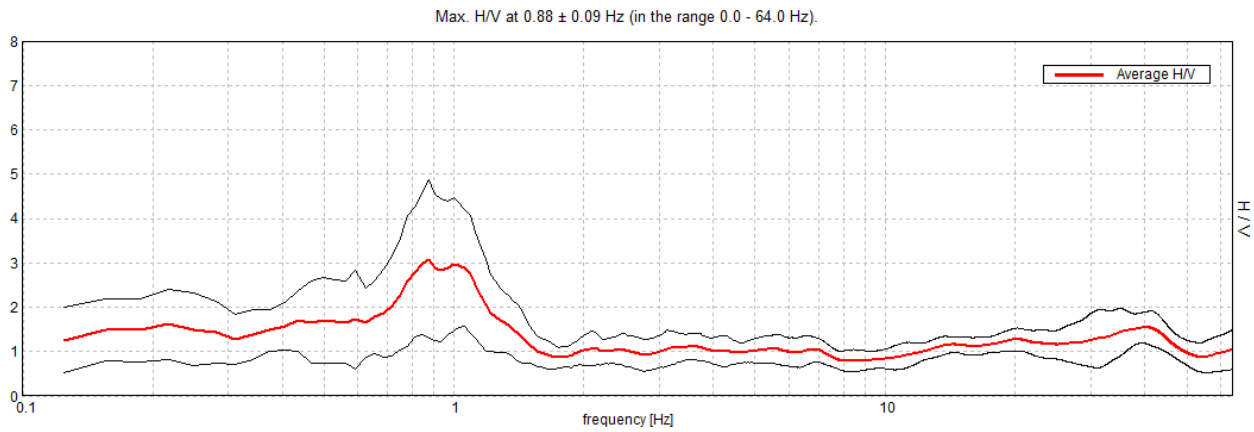


## MICROZONAZIONE MIRANDOLA, R016

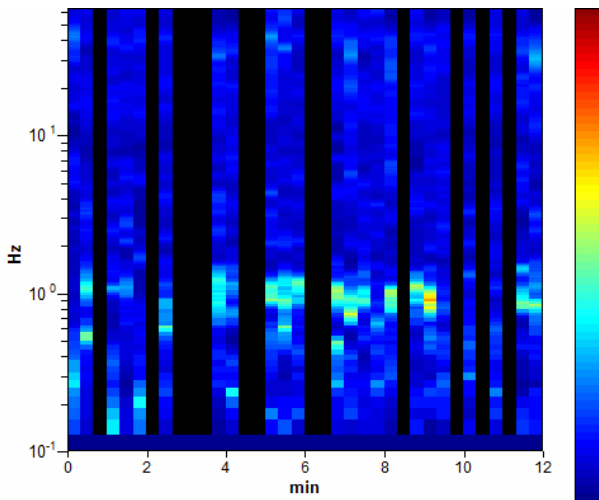
Start recording: 03/11/11 09:53:28      End recording: 03/11/11 10:05:29  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

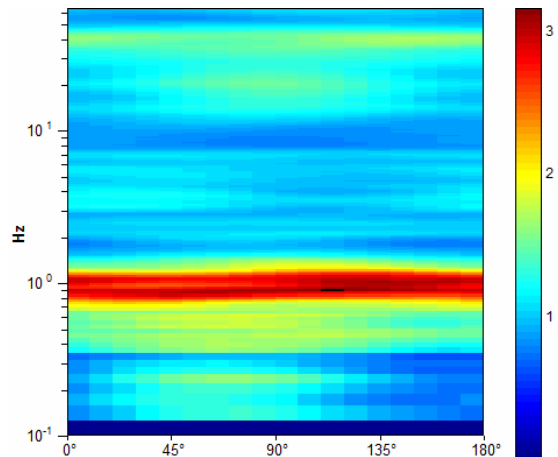
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



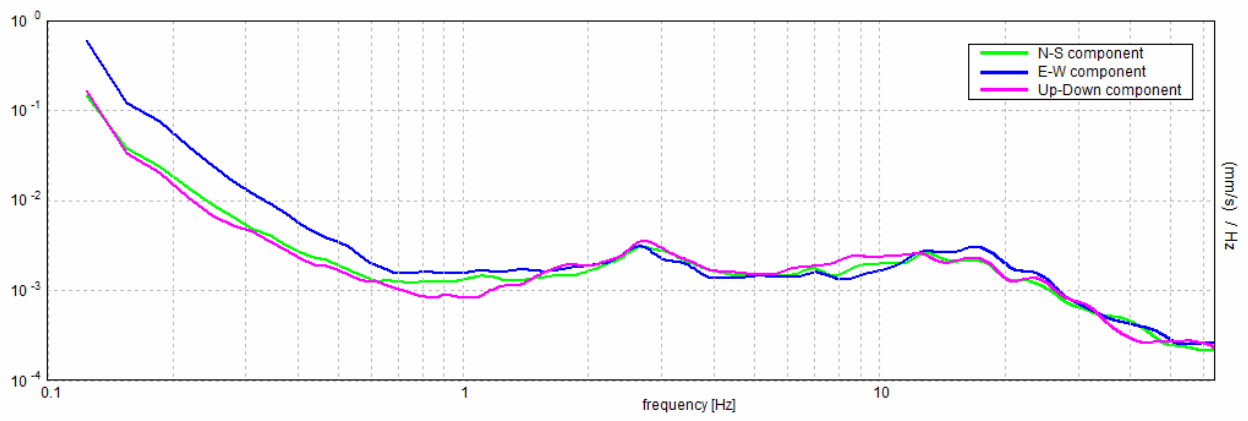
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



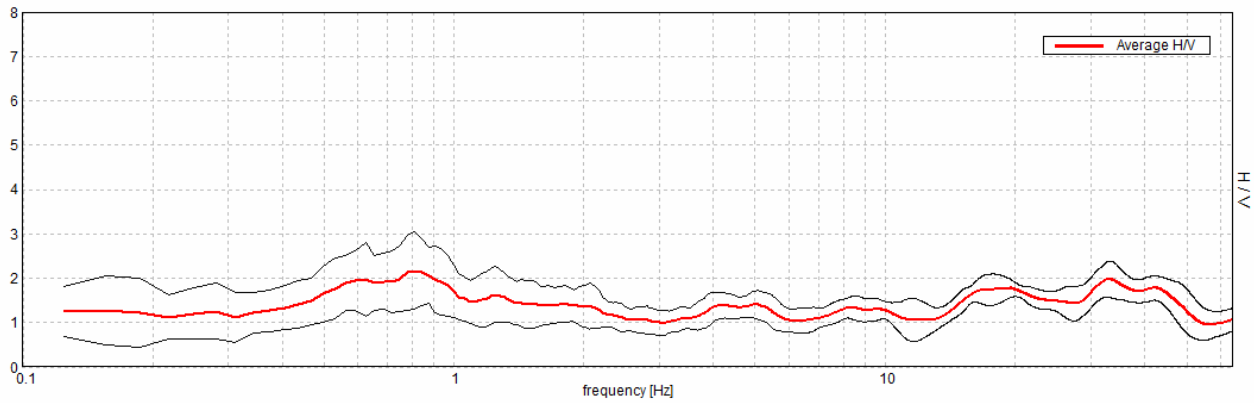
## MICROZONAZIONE MIRANDOLA, R017

Start recording: 03/11/11 10:17:47      End recording: 03/11/11 10:29:48  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

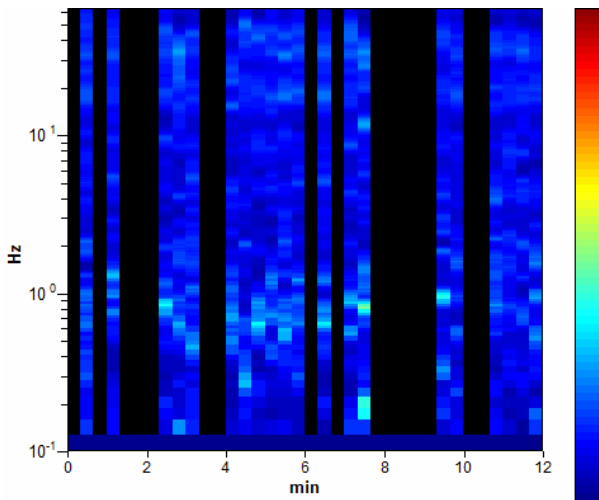
Trace length: 0h12'00".      Analyzed 56% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

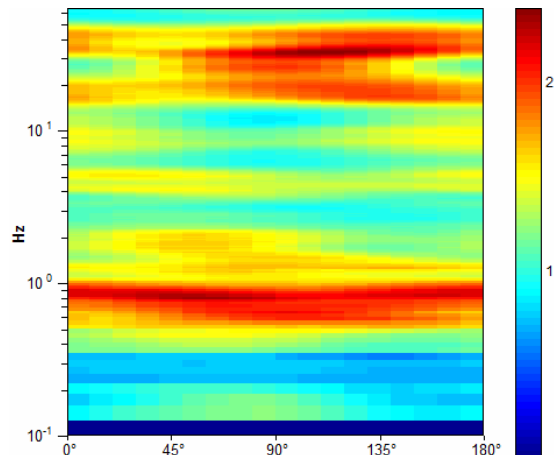
Max. H/V at  $0.81 \pm 0.07$  Hz (in the range 0.0 - 64.0 Hz).



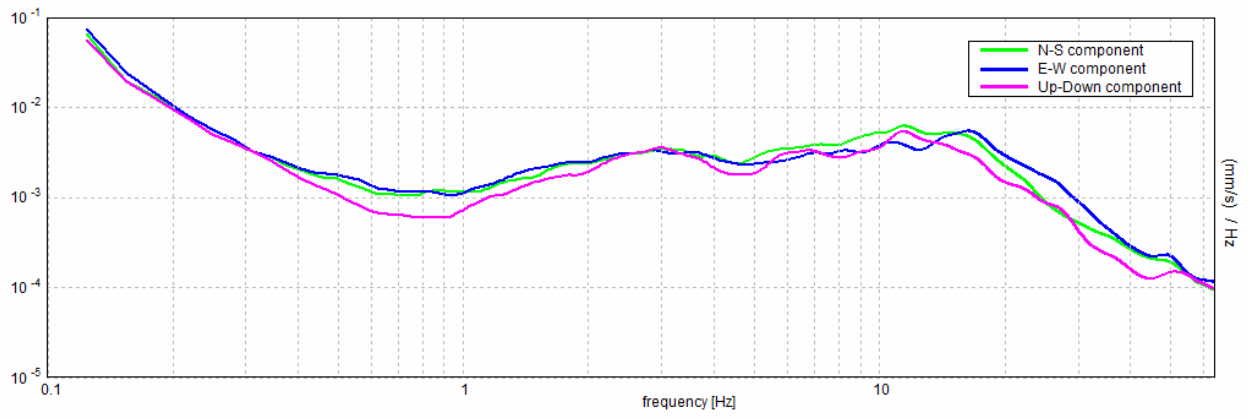
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



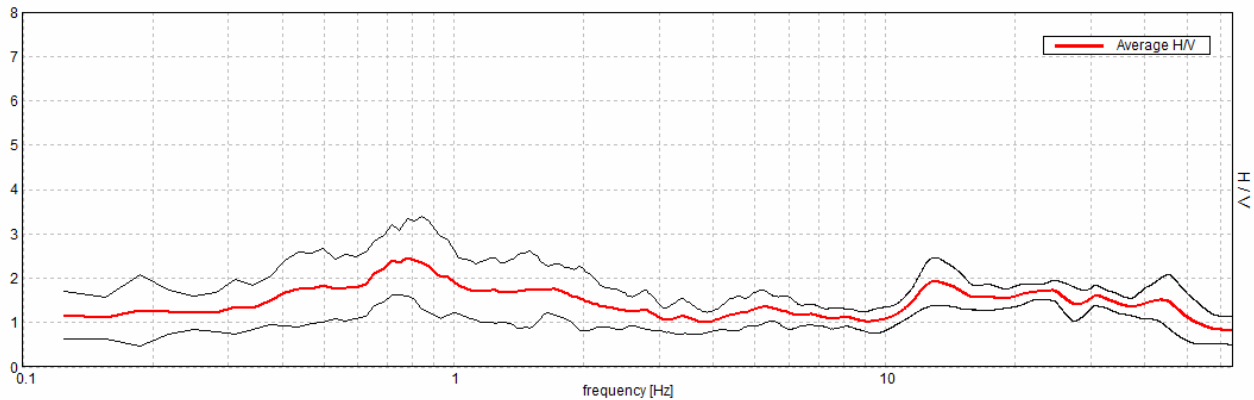
## MICROZONAZIONE MIRANDOLA, R018

Start recording: 03/11/11 10:34:55      End recording: 03/11/11 10:46:55  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

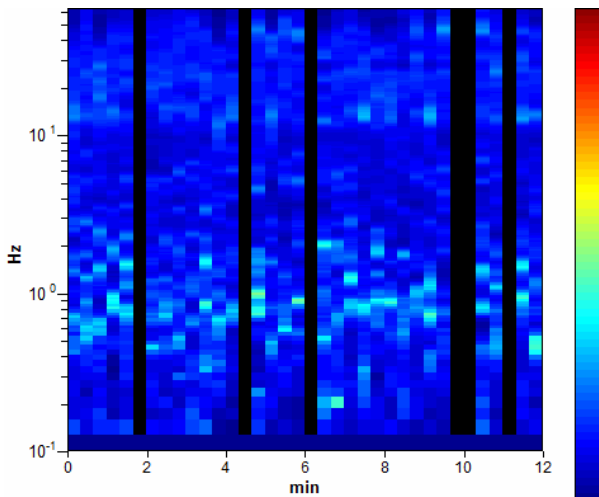
Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

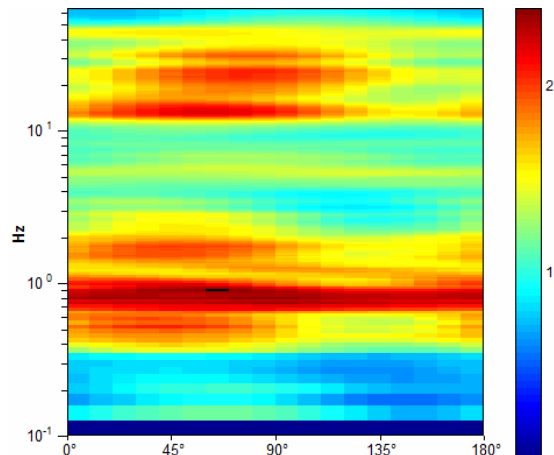
Max. H/V at  $0.78 \pm 0.03$  Hz (in the range 0.0 - 64.0 Hz).



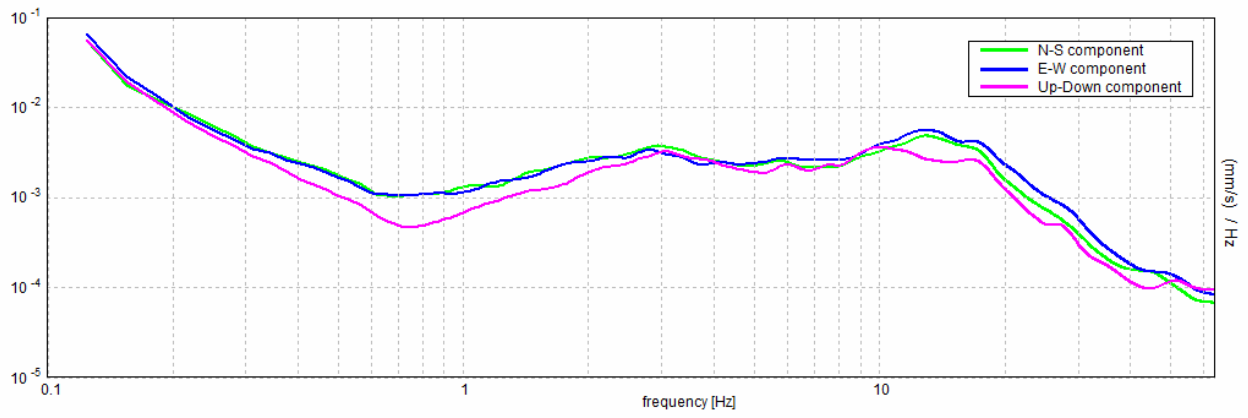
### H/V TIME HISTORY



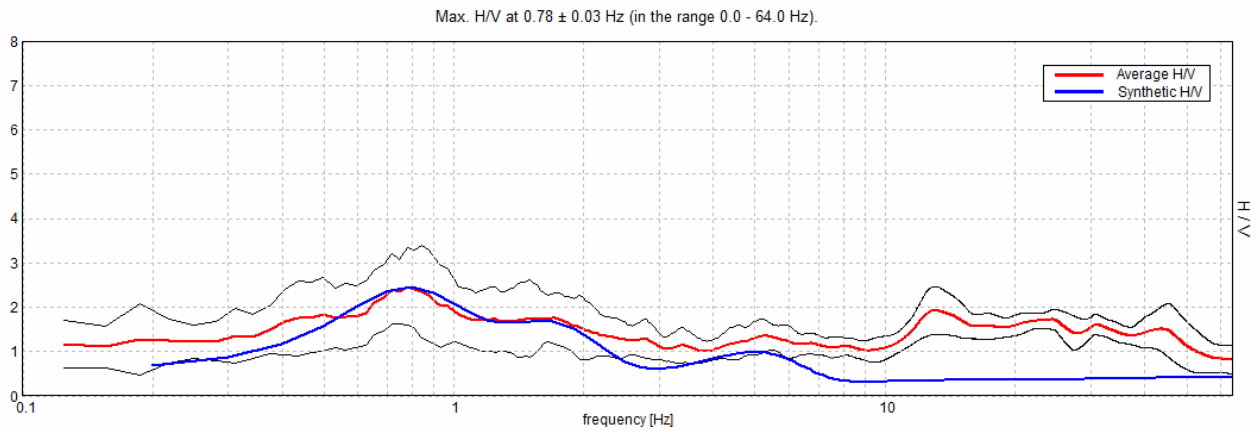
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

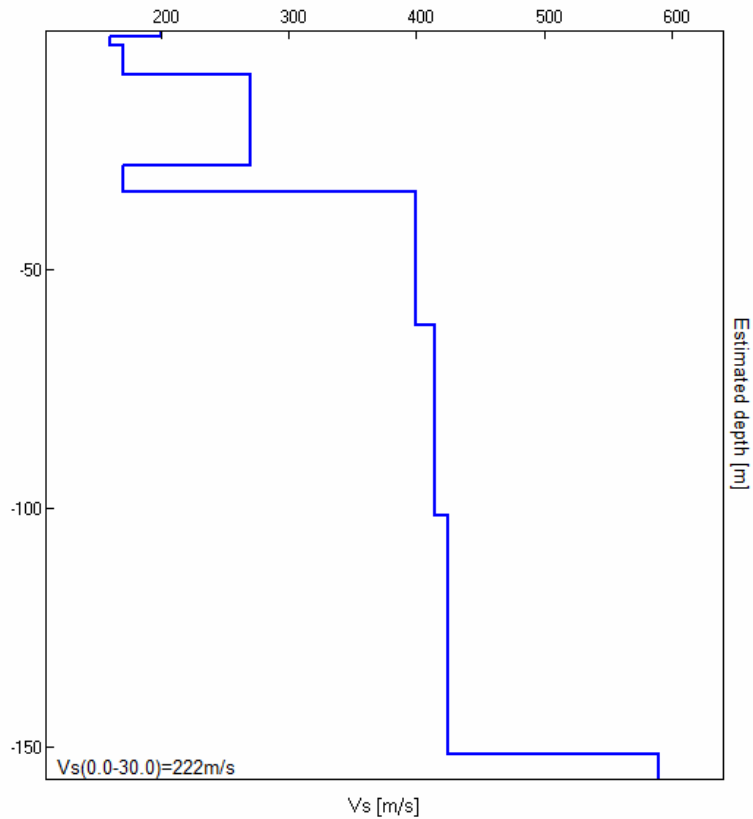


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
1.00	1.00	200
3.00	2.00	160
9.00	6.00	170
28.00	19.00	270
33.50	5.50	170
61.50	28.00	400
101.50	40.00	415
151.50	50.00	425
inf.	inf.	590

Vs30 = 222 m/s

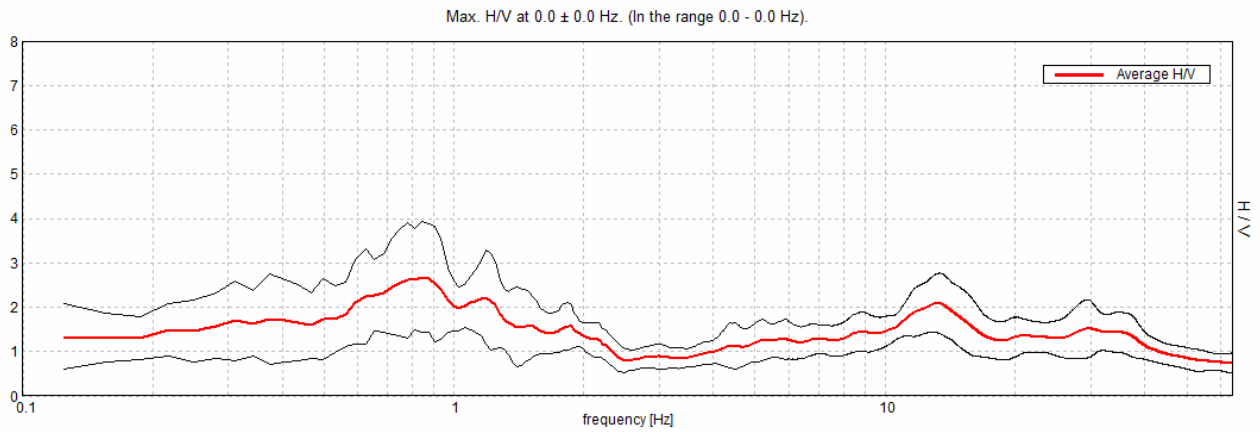


## MICROZONAZIONE MIRANDOLA, R020

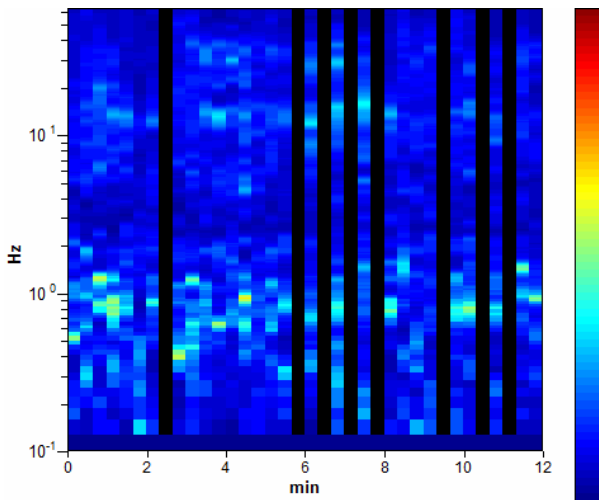
Start recording: 03/11/11 11:25:46      End recording: 03/11/11 11:37:47  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 78% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

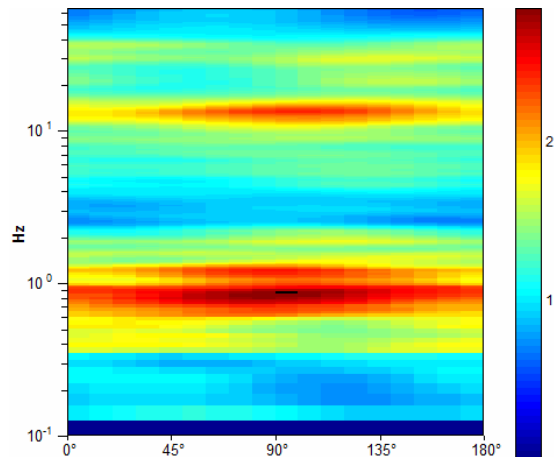
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



### H/V TIME HISTORY

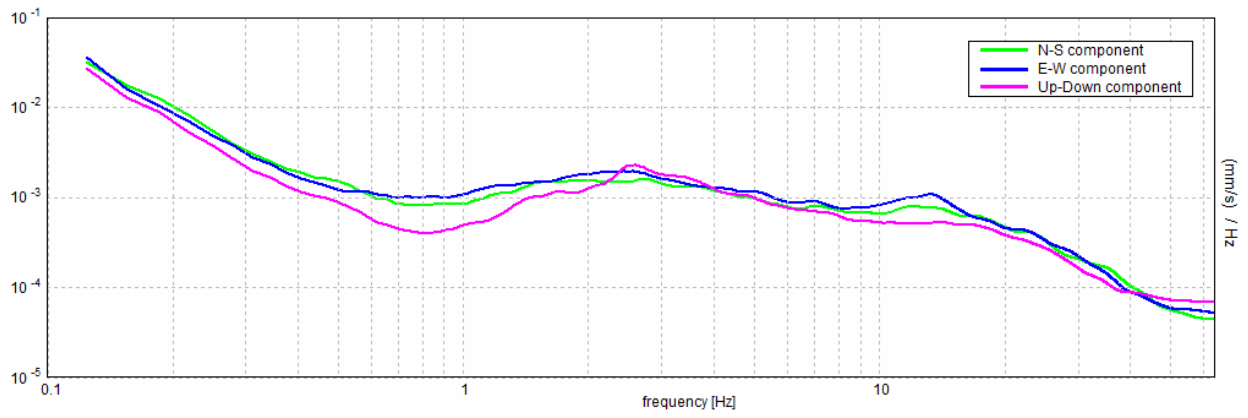


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA



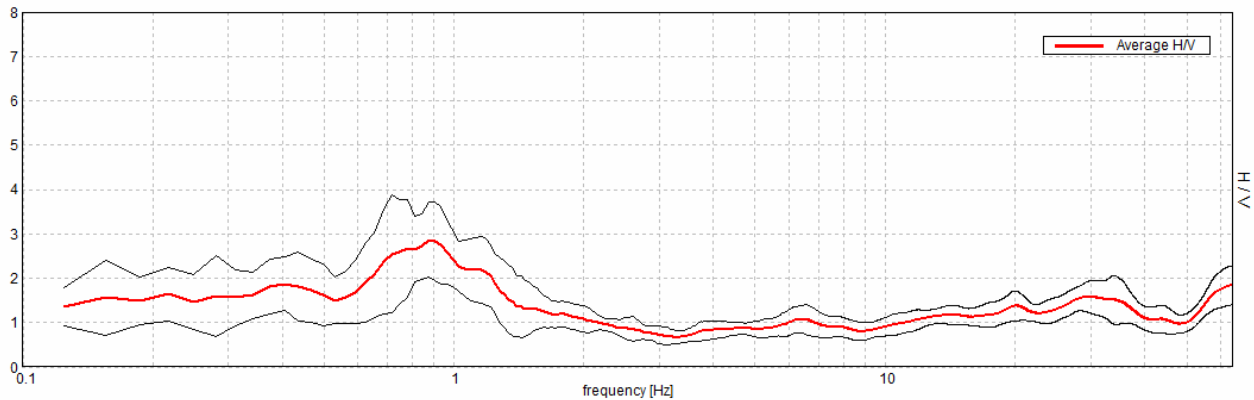
## MICROZONAZIONE MIRANDOLA, R021

Start recording: 03/11/11 11:46:25      End recording: 03/11/11 11:58:26  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

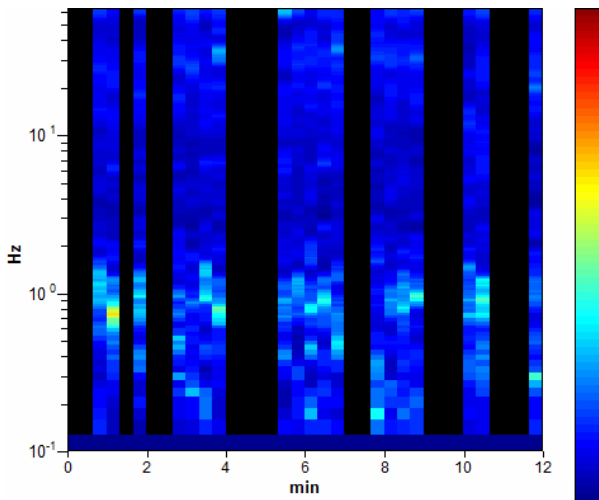
Trace length: 0h12'00".      Analyzed 53% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

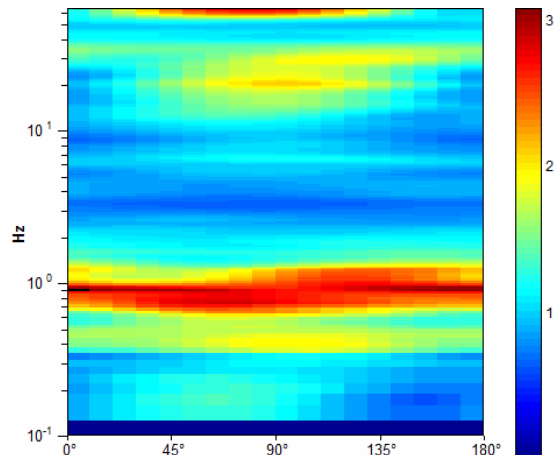
Max. H/V at  $0.88 \pm 0.06$  Hz (in the range 0.0 - 64.0 Hz).



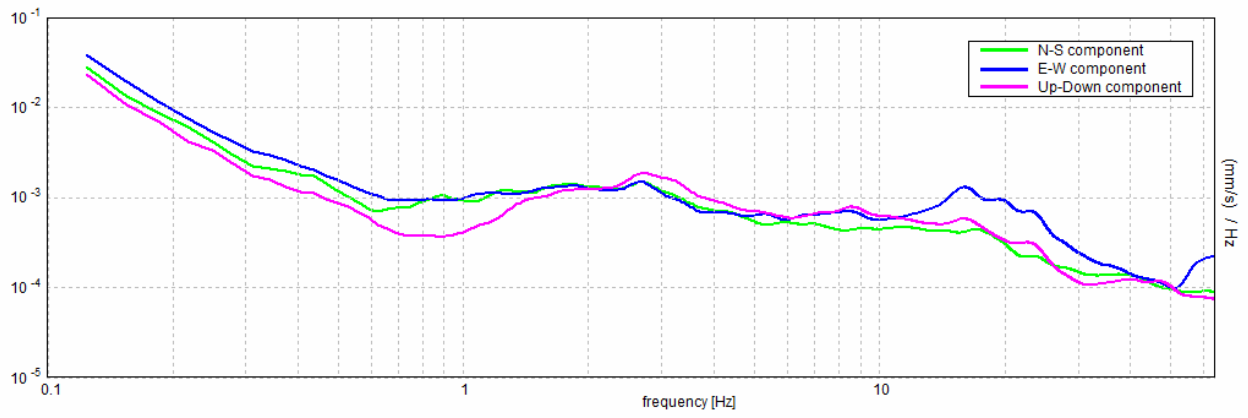
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



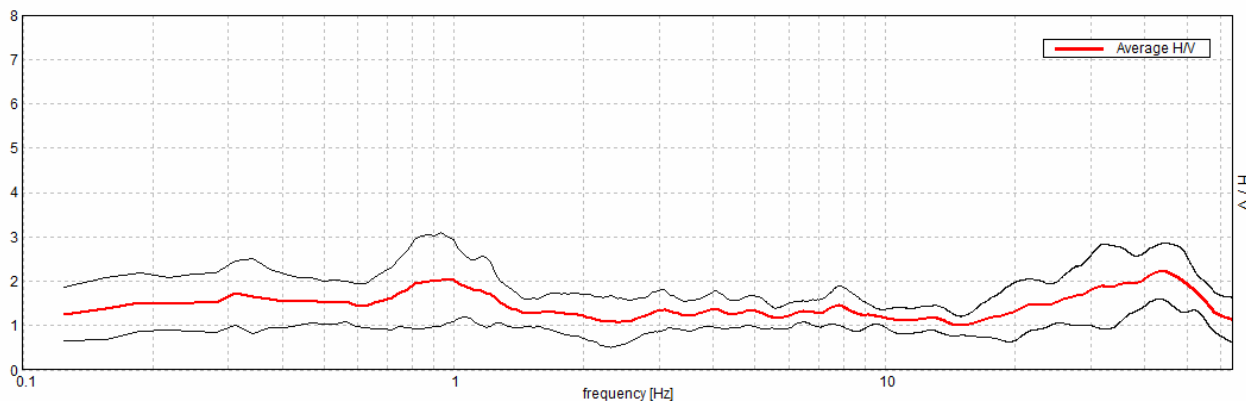
## MICROZONAZIONE MIRANDOLA, R022

Start recording: 03/11/11 12:20:34      End recording: 03/11/11 12:32:35  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

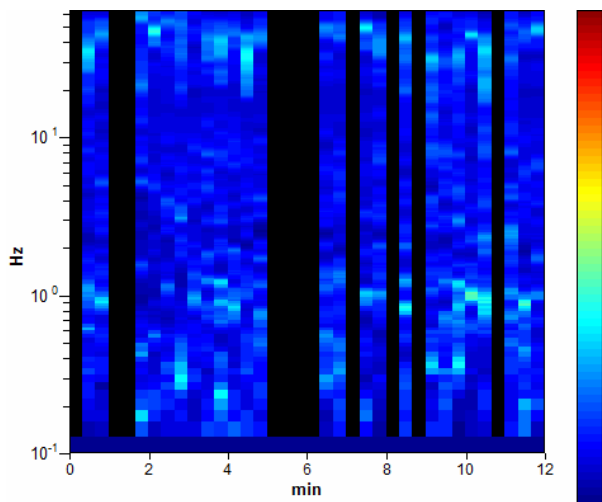
Trace length: 0h12'00".      Analyzed 69% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

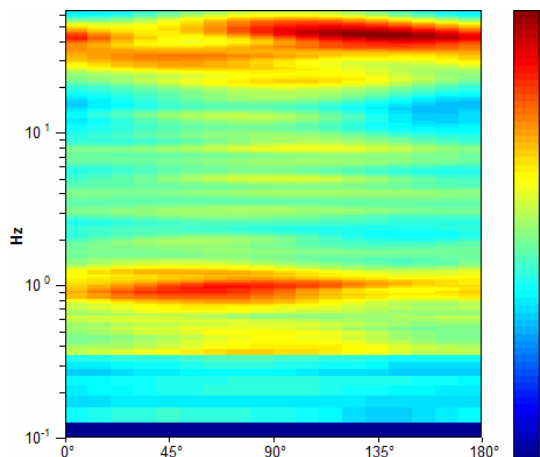
Max. H/V at  $43.75 \pm 3.81$  Hz. (In the range 0.0 - 64.0 Hz).



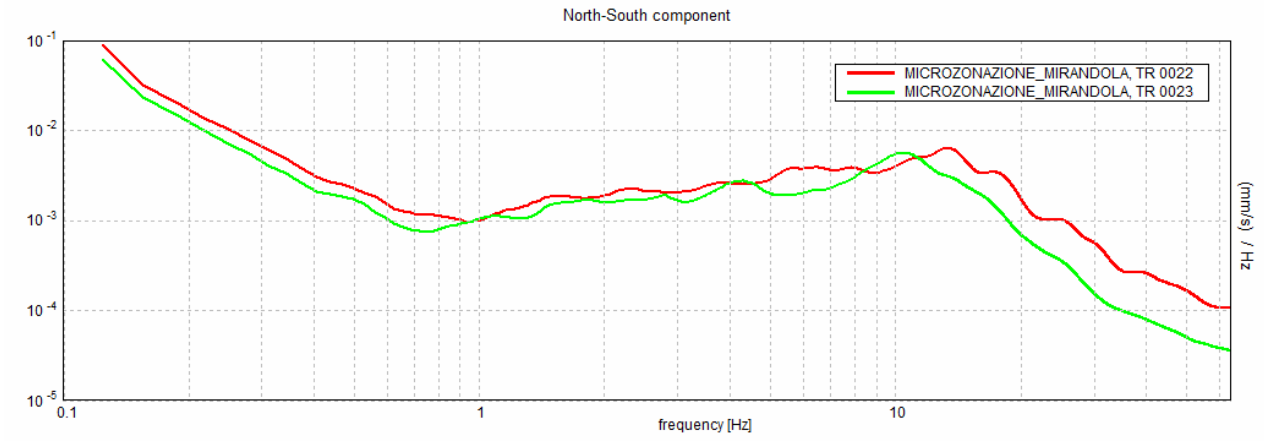
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



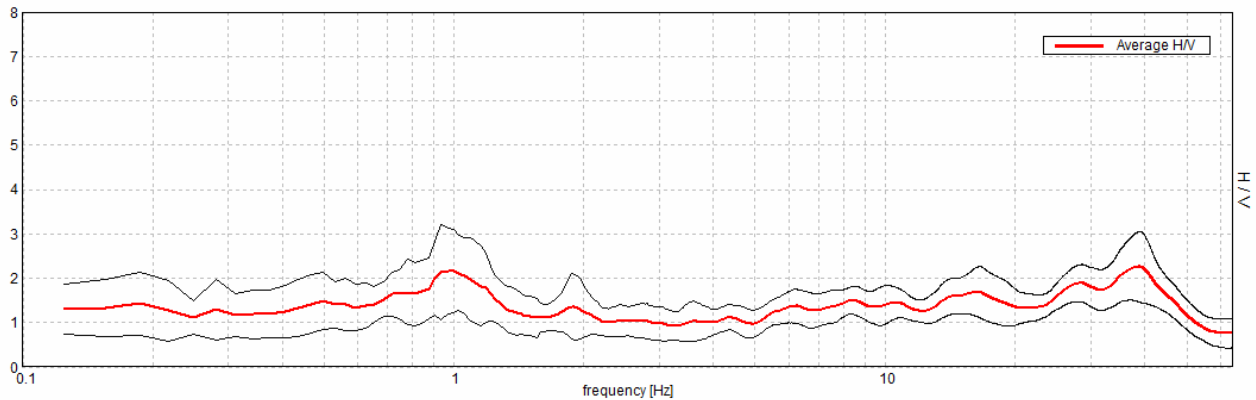
## MICROZONAZIONE MIRANDOLA, R023

Start recording: 03/11/11 12:39:19      End recording: 03/11/11 12:51:20  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

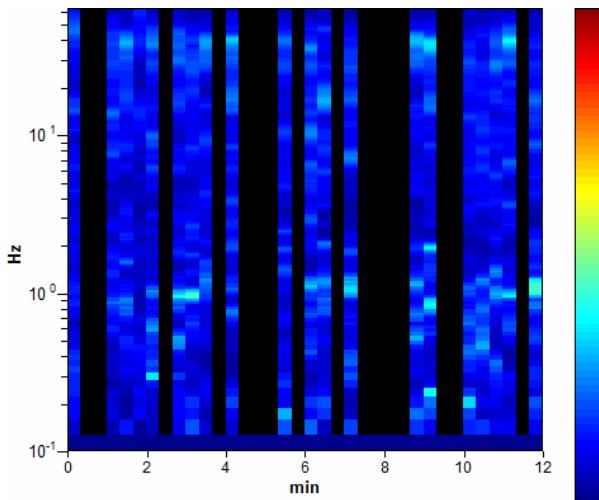
Trace length: 0h12'00".      Analyzed 56% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

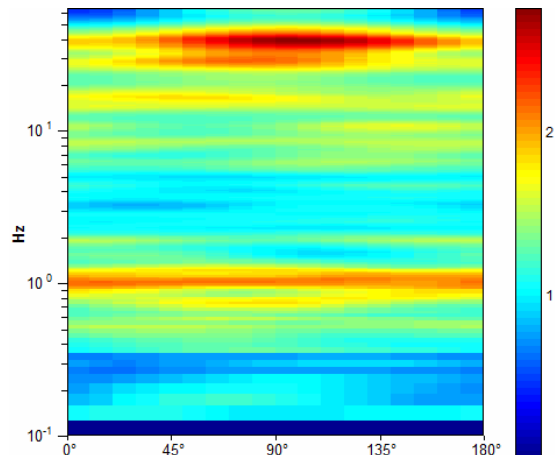
Max. H/V at  $38.75 \pm 6.38$  Hz (in the range 0.0 - 64.0 Hz).



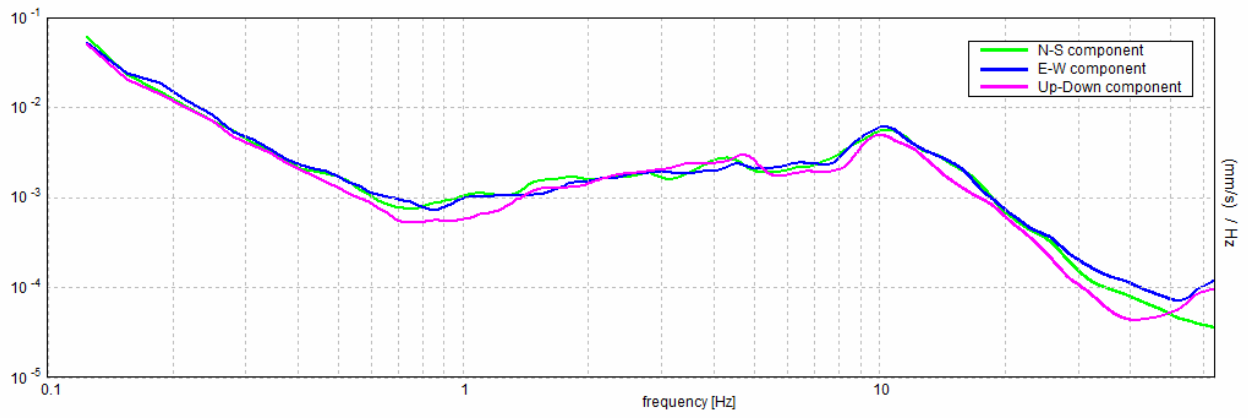
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

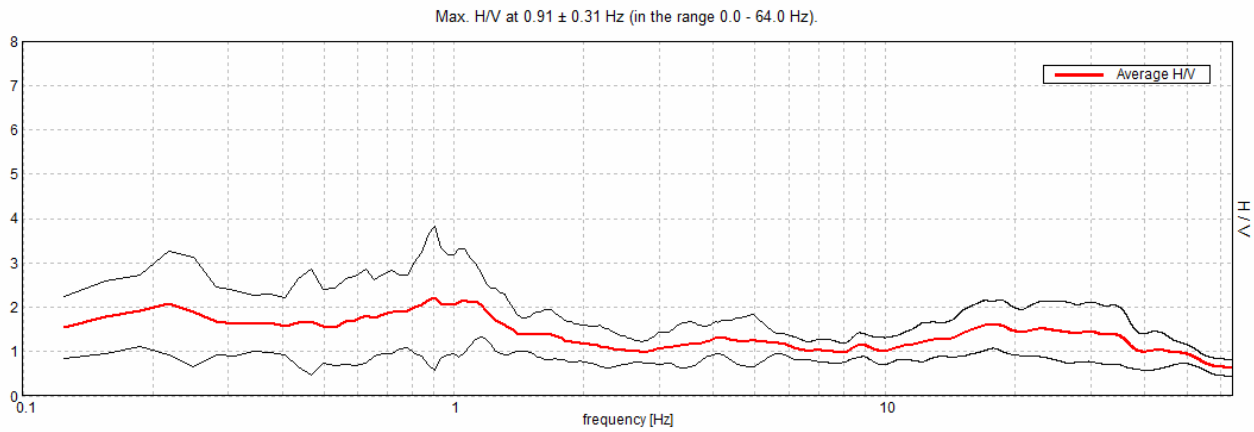


## MICROZONAZIONE MIRANDOLA, R024

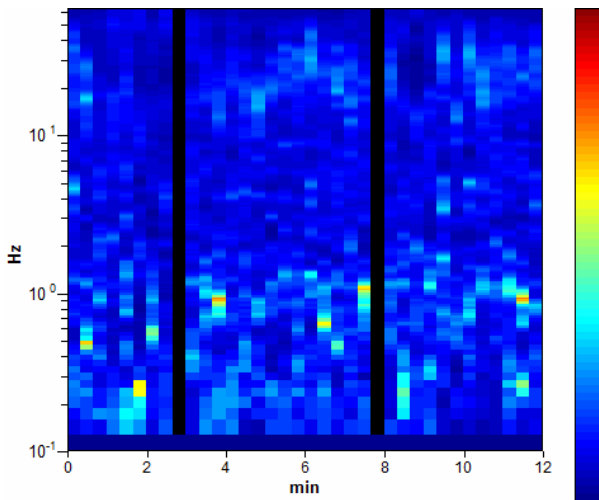
Start recording: 03/11/11 13:01:36      End recording: 03/11/11 13:13:37  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 94% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

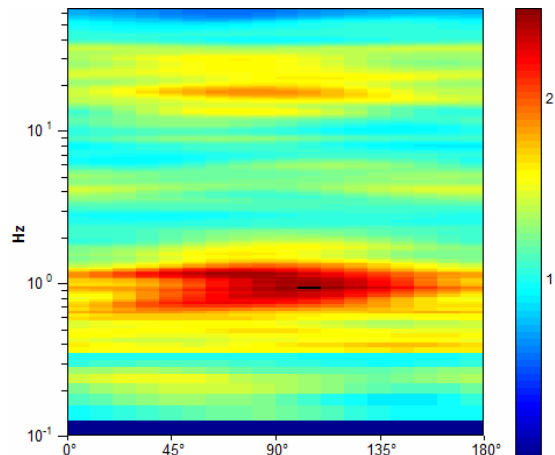
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



### H/V TIME HISTORY

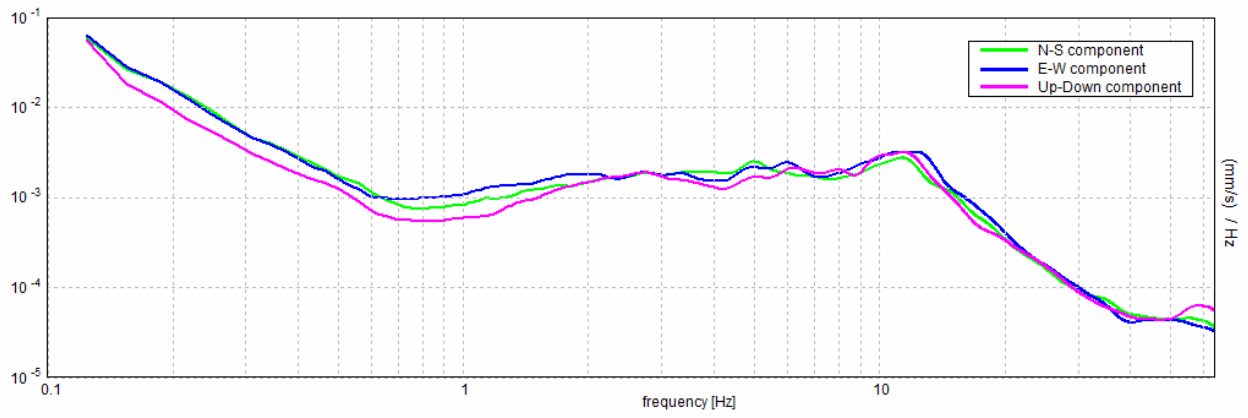


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA



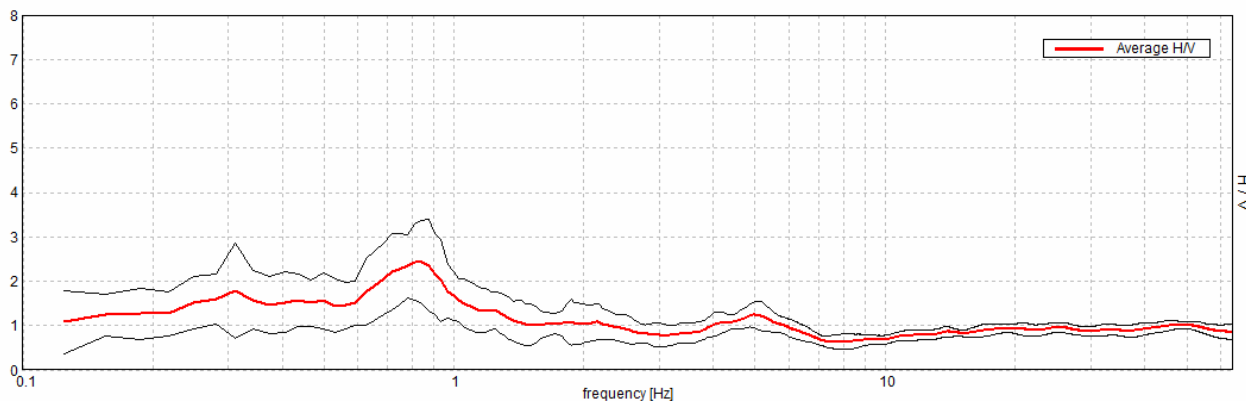
## MICROZONAZIONE MIRANDOLA, R025

Start recording: 03/11/11 14:09:35      End recording: 03/11/11 14:21:36  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

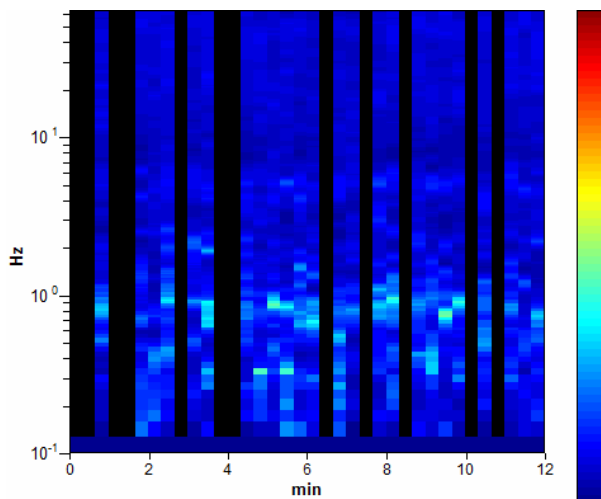
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

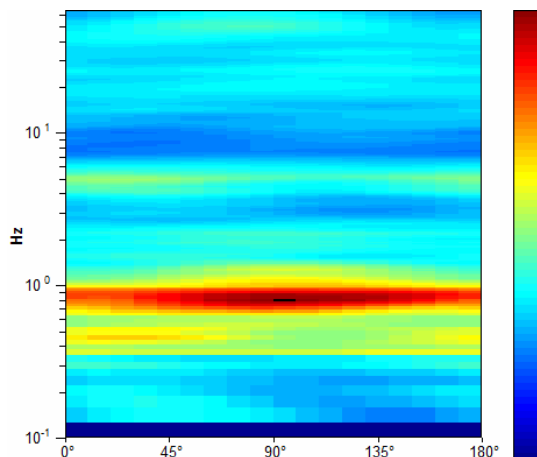
Max. H/V at  $0.81 \pm 0.02$  Hz (in the range 0.0 - 64.0 Hz).



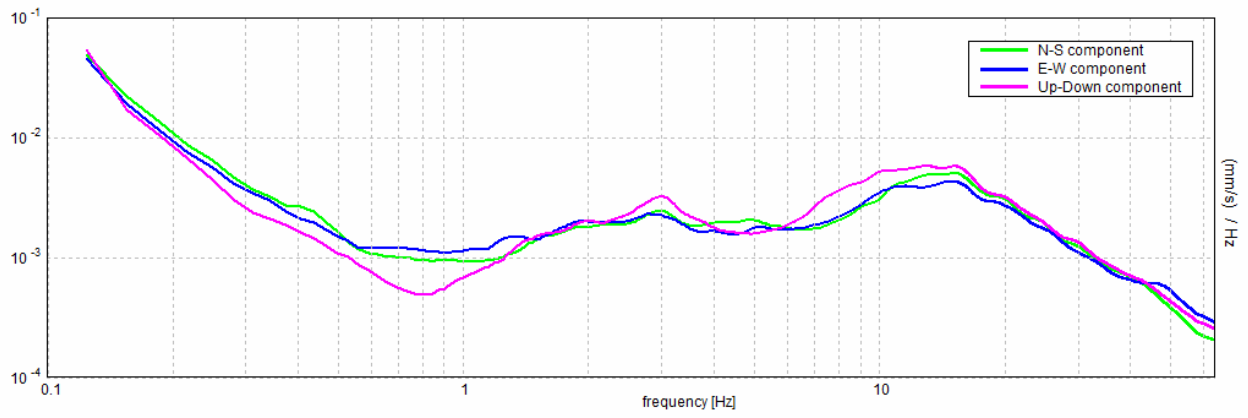
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



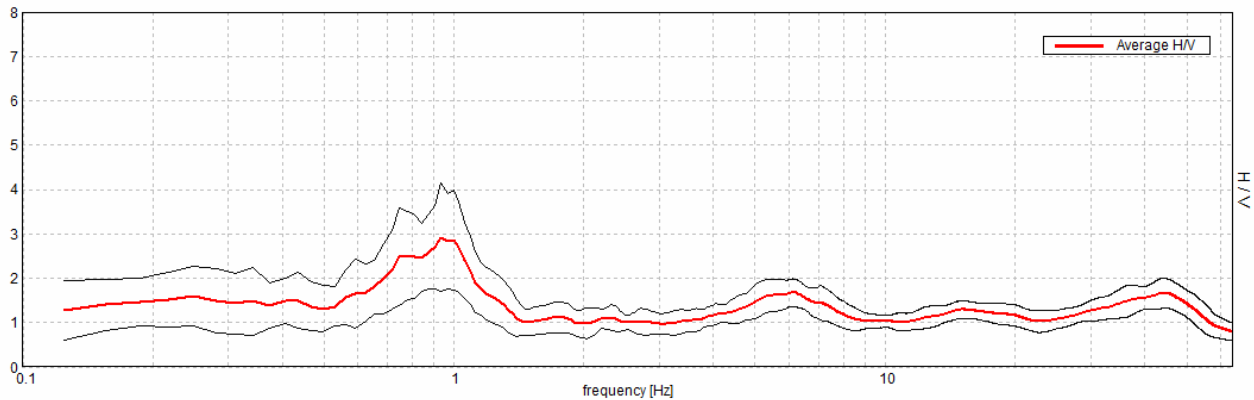
## MICROZONAZIONE MIRANDOLA, R026

Start recording: 03/11/11 14:28:42      End recording: 03/11/11 14:40:43  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

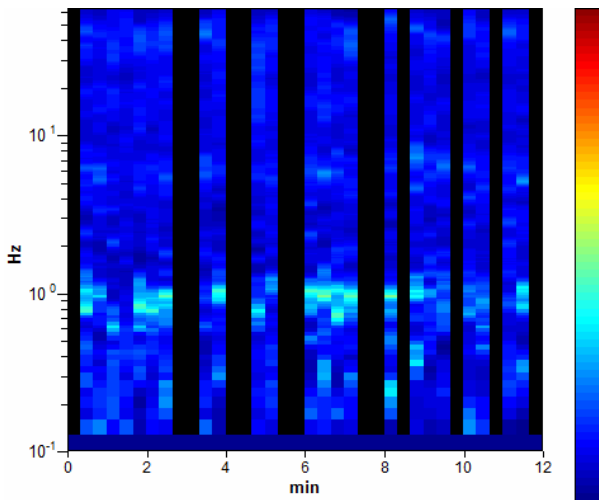
Trace length: 0h12'00".      Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

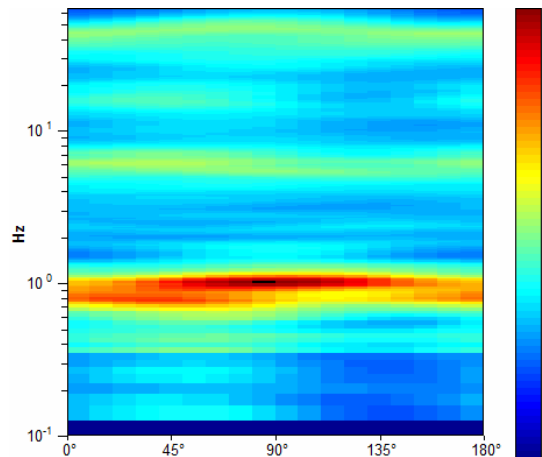
Max. H/V at  $0.94 \pm 0.05$  Hz (in the range 0.0 - 64.0 Hz).



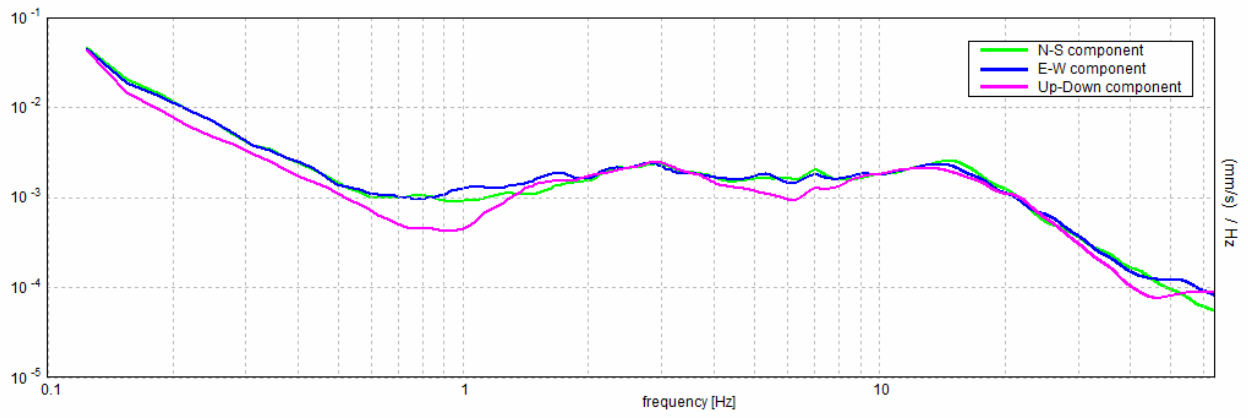
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



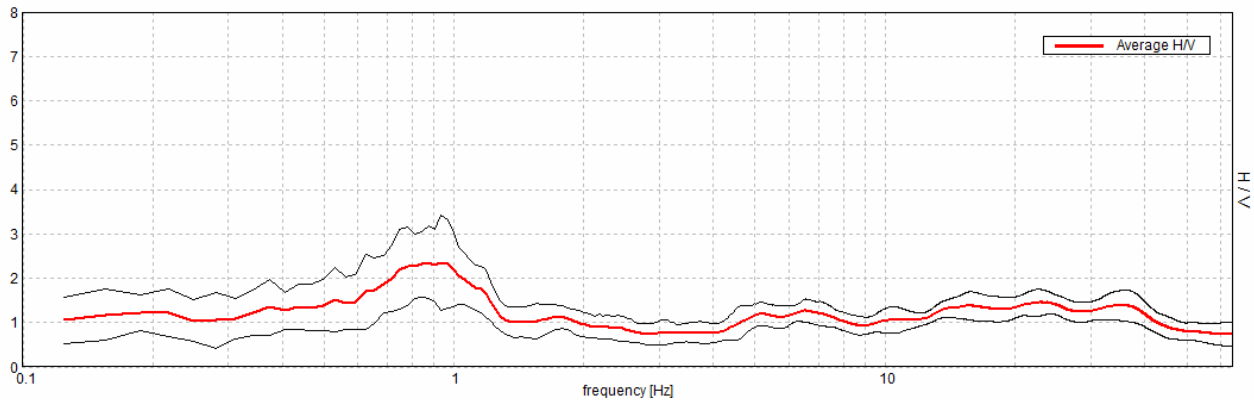
## MICROZONAZIONE MIRANDOLA, R027

Start recording: 03/11/11 14:48:41      End recording: 03/11/11 15:00:42  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

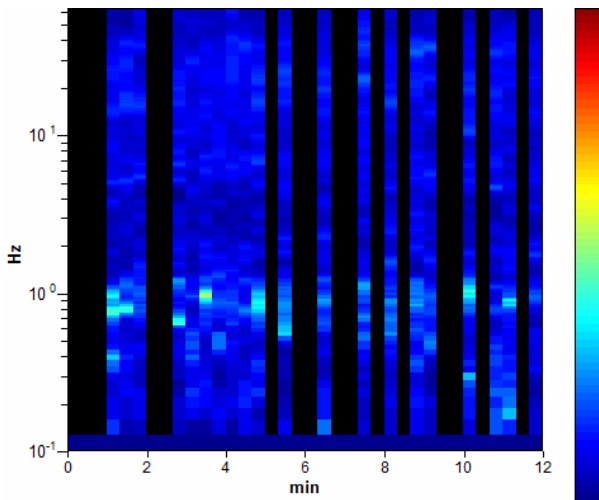
Trace length: 0h12'00".      Analyzed 56% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

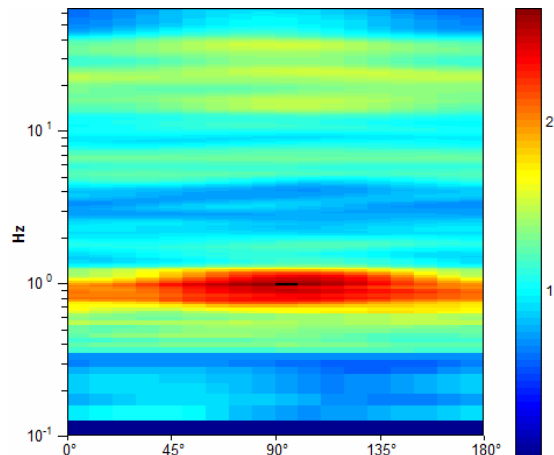
Max. H/V at  $0.88 \pm 0.04$  Hz (in the range 0.0 - 64.0 Hz).



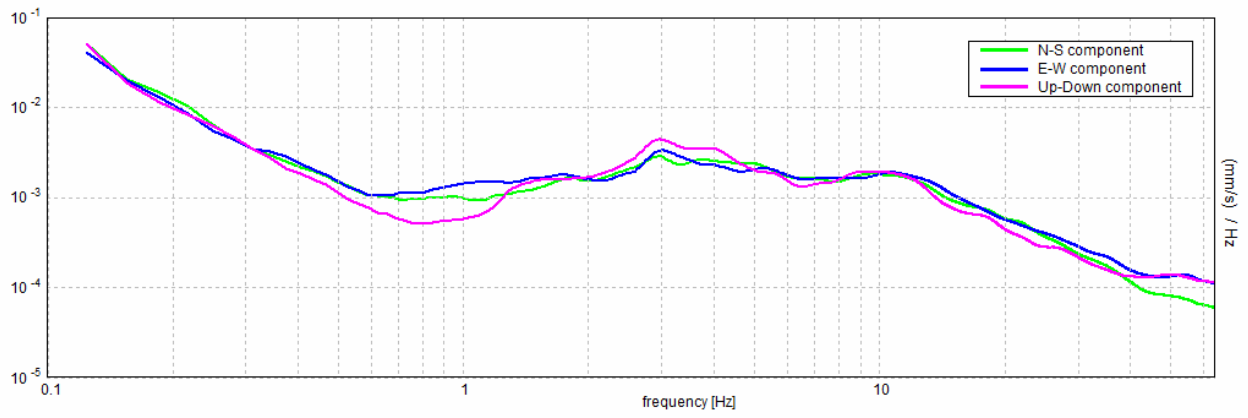
### H/V TIME HISTORY



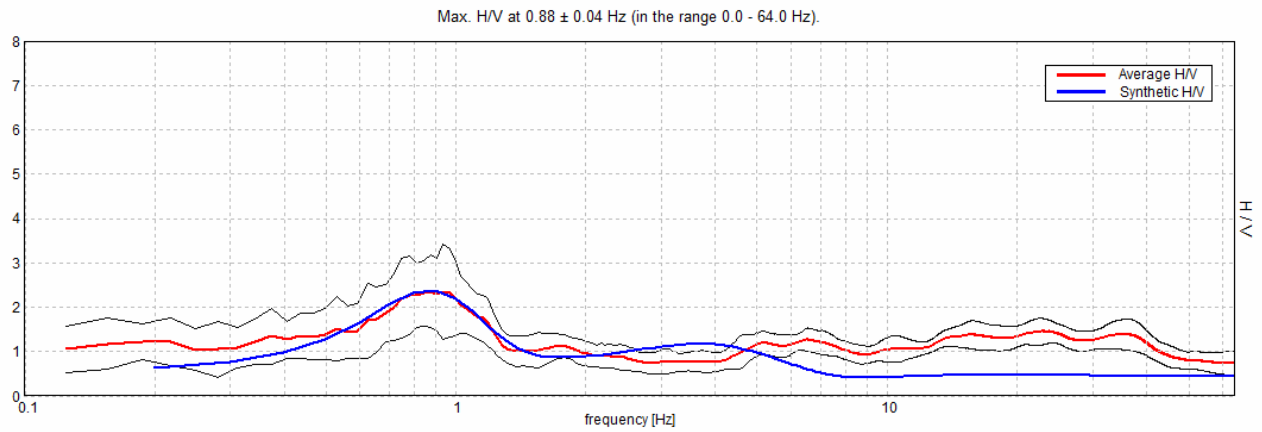
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

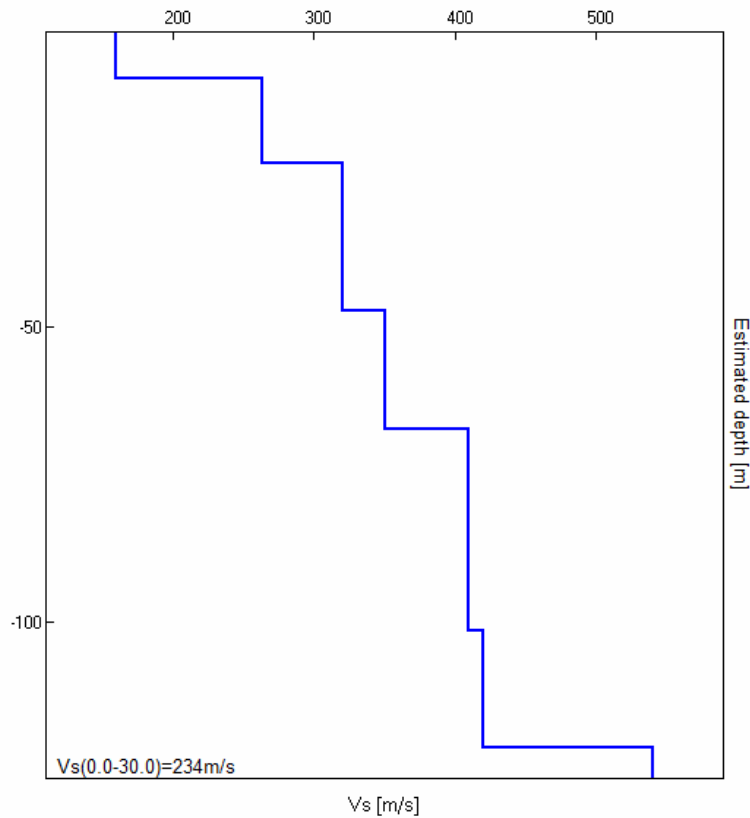


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
7.90	7.90	160
22.30	14.40	263
47.30	25.00	320
67.30	20.00	350
101.30	34.00	410
121.30	20.00	420
inf.	inf.	540

Vs30 = 234 m/s





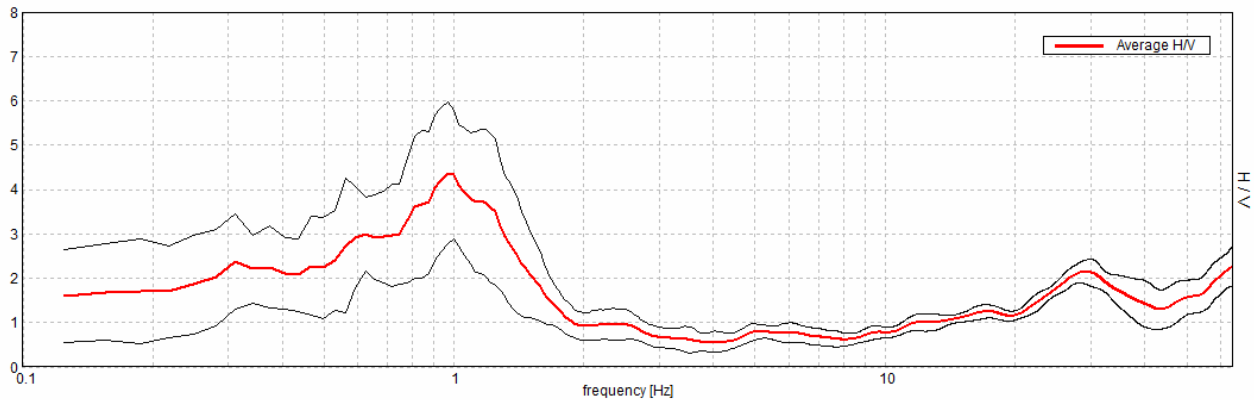
## MICROZONAZIONE MIRANDOLA, R028

Start recording: 03/11/11 15:17:36      End recording: 03/11/11 15:29:37  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

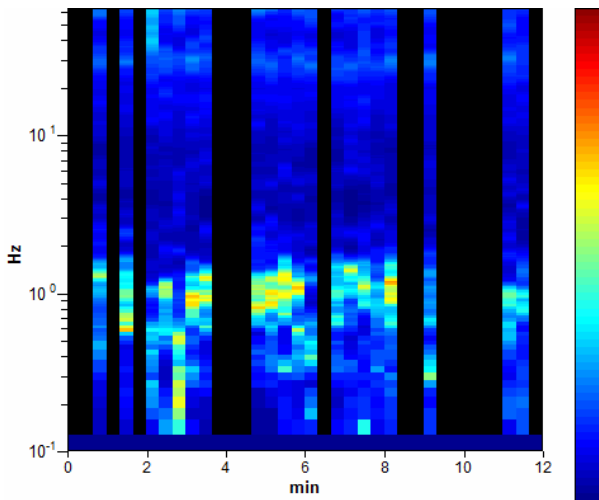
Trace length: 0h12'00".      Analyzed 56% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

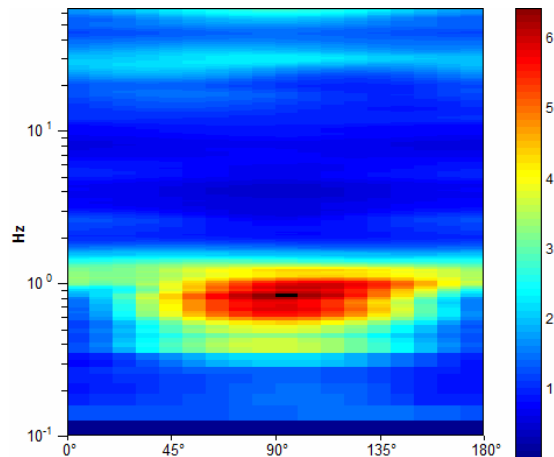
Max. H/V at  $0.97 \pm 0.09$  Hz (in the range 0.0 - 64.0 Hz).



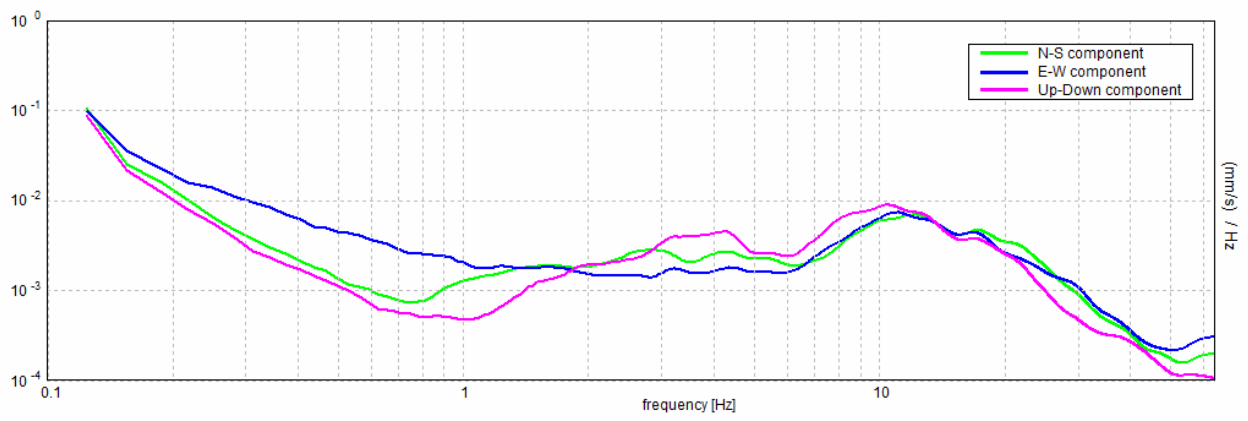
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

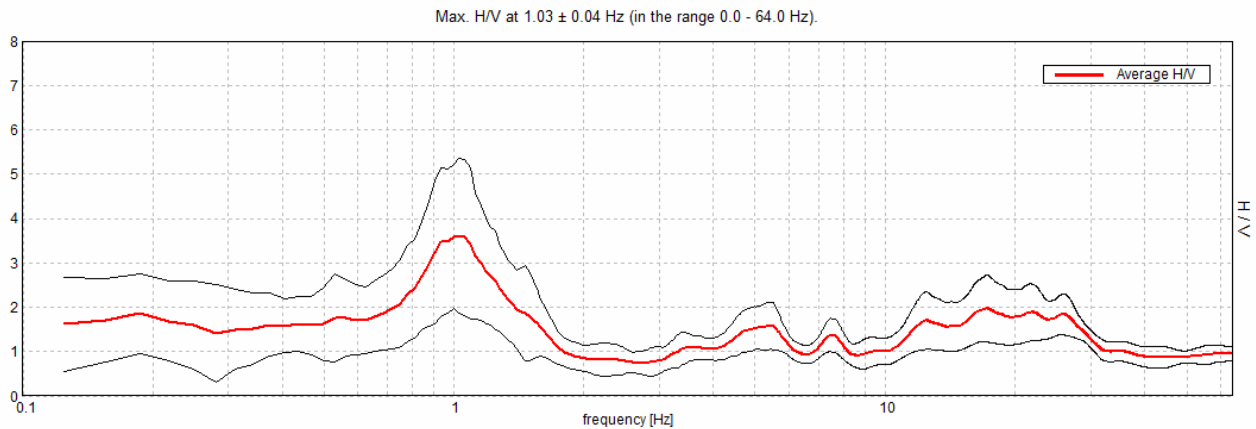


## MICROZONAZIONE MIRANDOLA, R030

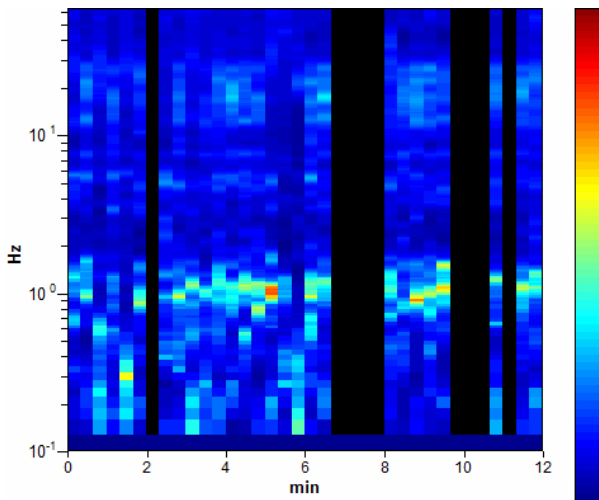
Start recording: 03/11/11 16:09:13      End recording: 03/11/11 16:21:14  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 75% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

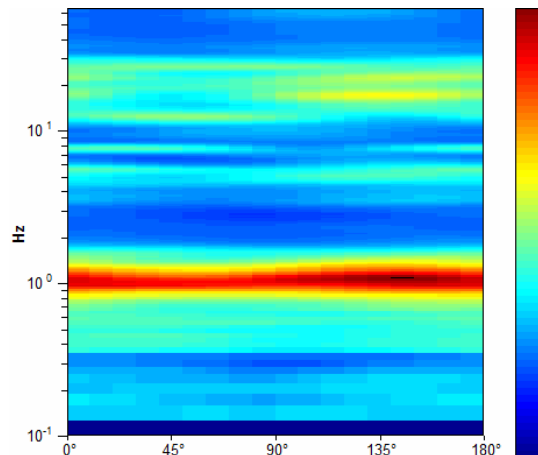
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



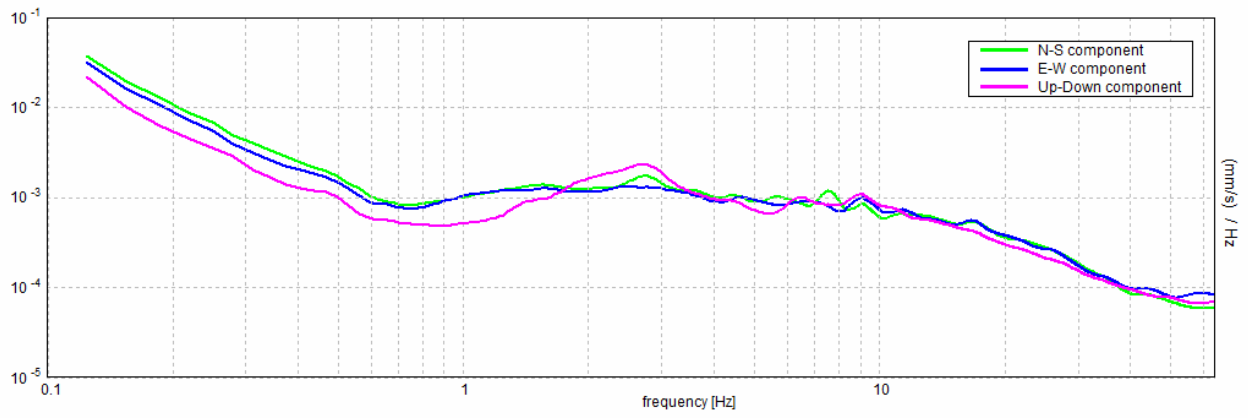
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



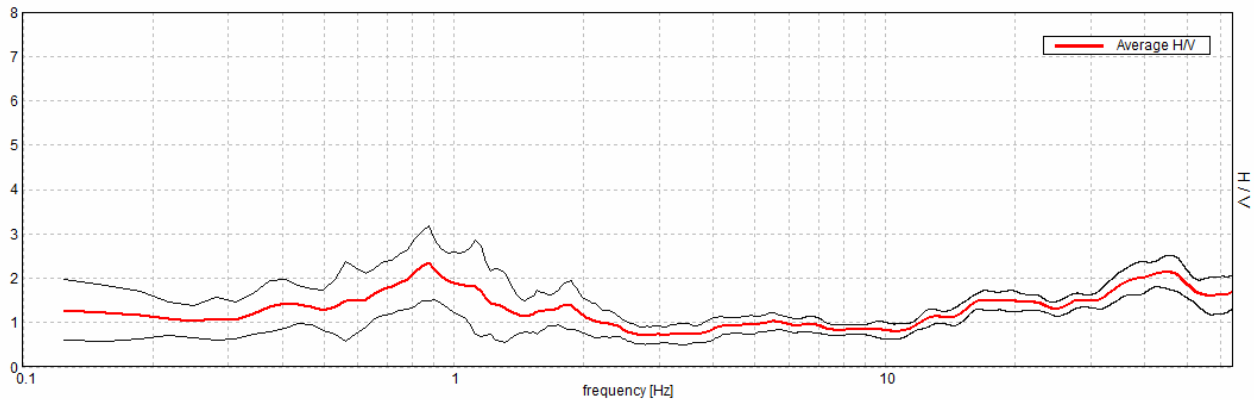
## MICROZONAZIONE MIRANDOLA, R032

Start recording: 02/11/11 10:50:09      End recording: 02/11/11 11:02:10  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

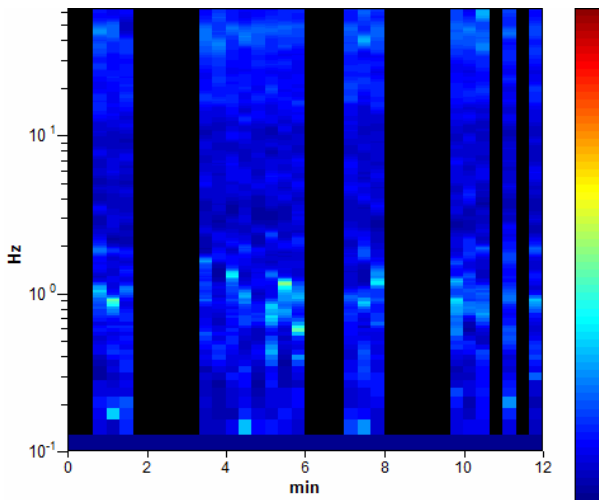
Trace length: 0h12'00".      Analyzed 53% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

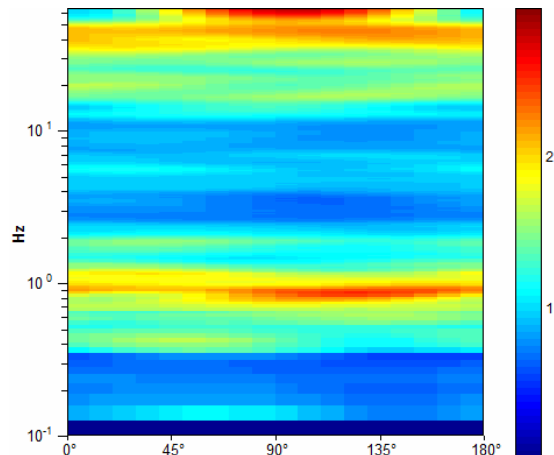
Max. H/V at  $0.88 \pm 5.05$  Hz (in the range 0.0 - 64.0 Hz).



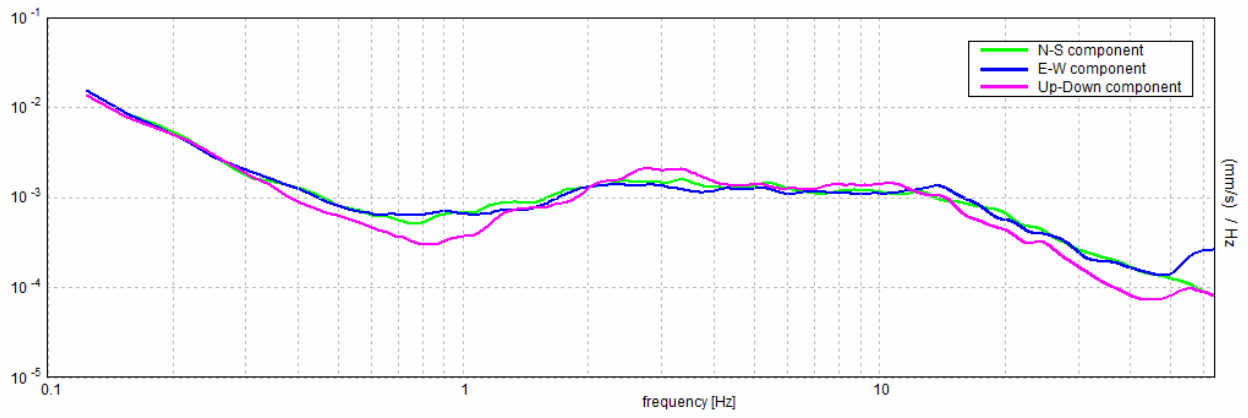
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



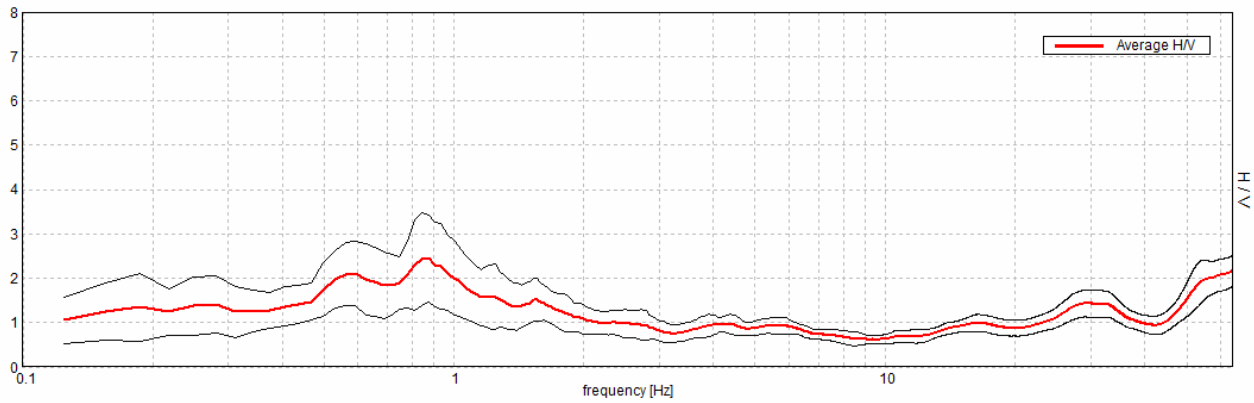
## MICROZONAZIONE MIRANDOLA, R033

Start recording: 02/11/11 11:18:48      End recording: 02/11/11 11:30:49  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

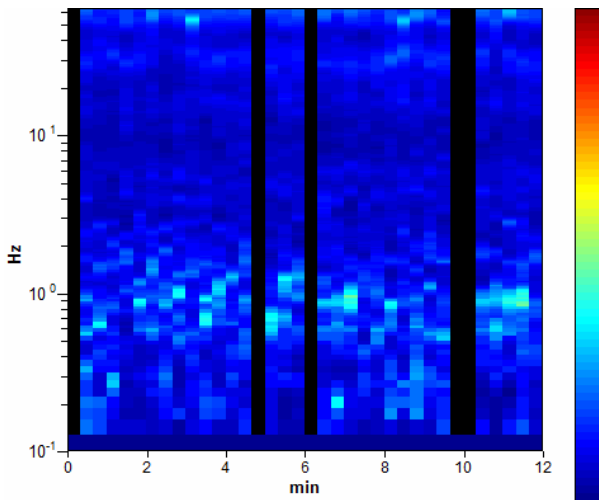
Trace length: 0h12'00".      Analyzed 86% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

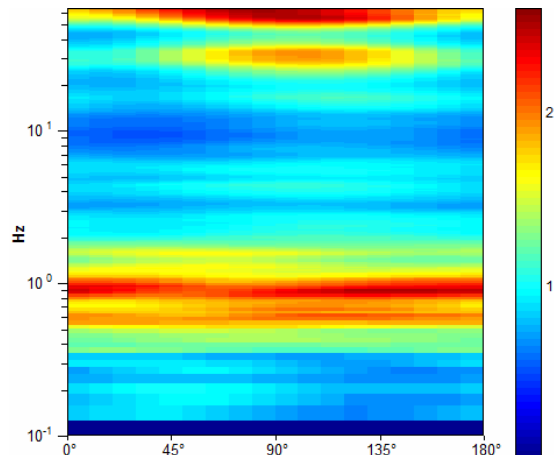
Max. H/V at  $0.88 \pm 0.04$  Hz (in the range 0.0 - 64.0 Hz).



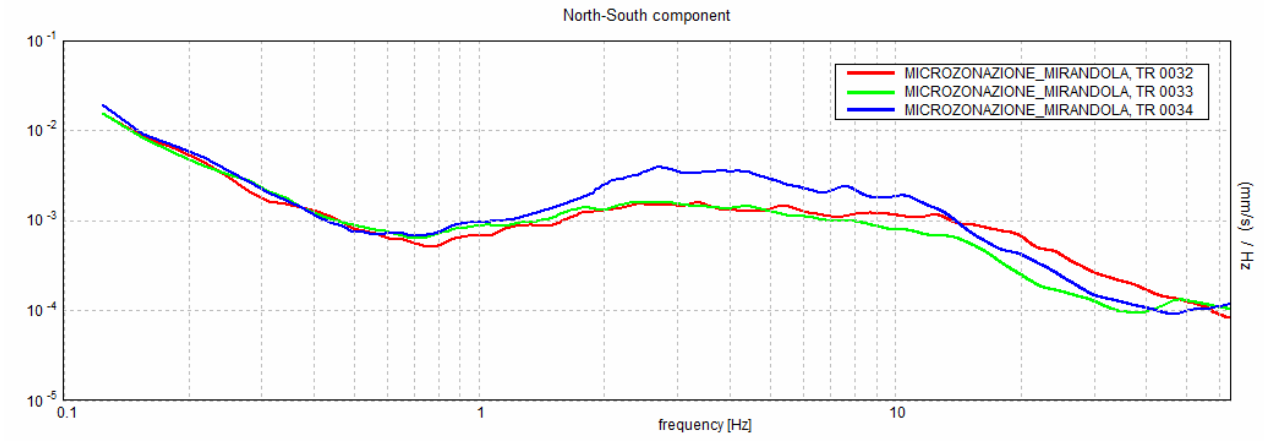
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





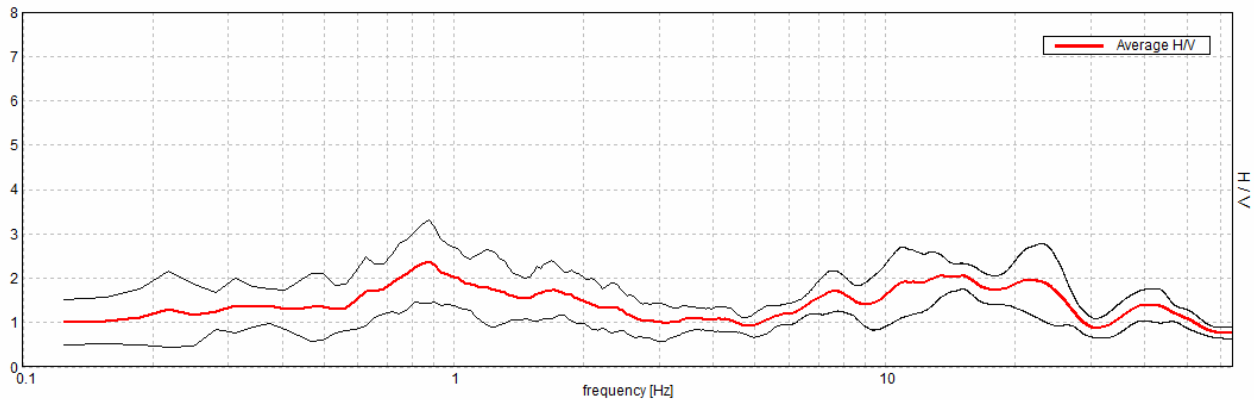
## MICROZONAZIONE MIRANDOLA, R034

Start recording: 02/11/11 11:47:08      End recording: 02/11/11 11:59:09  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

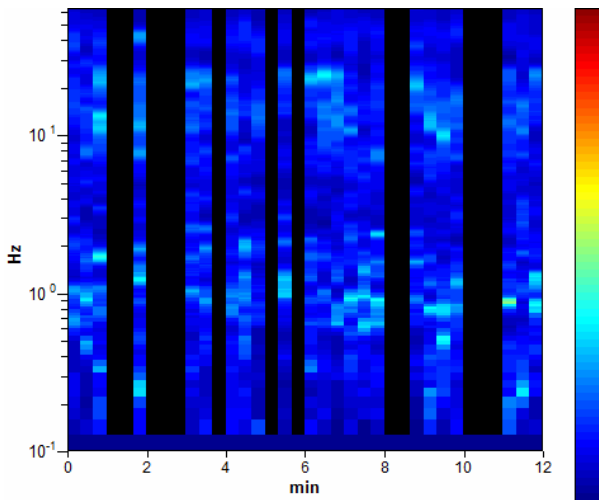
Trace length: 0h12'00".      Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

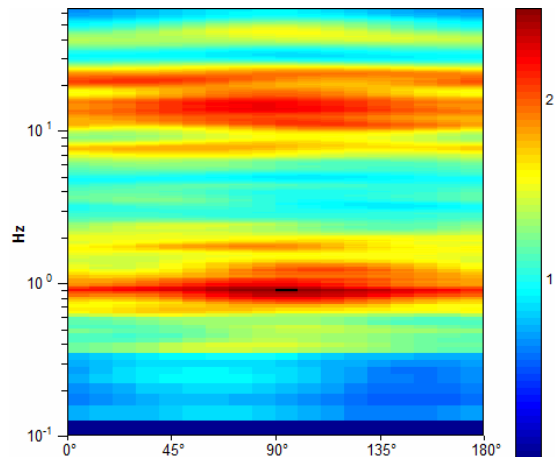
Max. H/V at  $0.88 \pm 2.32$  Hz (in the range 0.0 - 64.0 Hz).



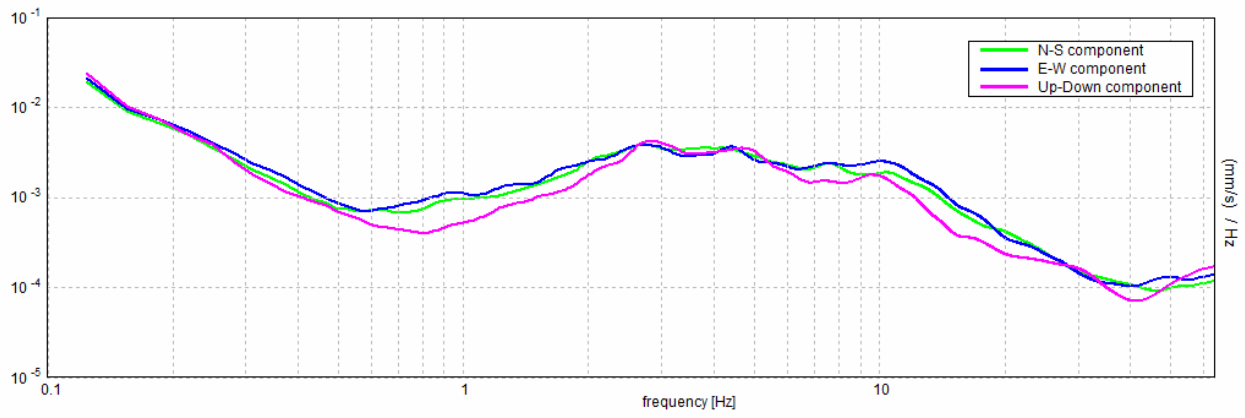
### H/V TIME HISTORY



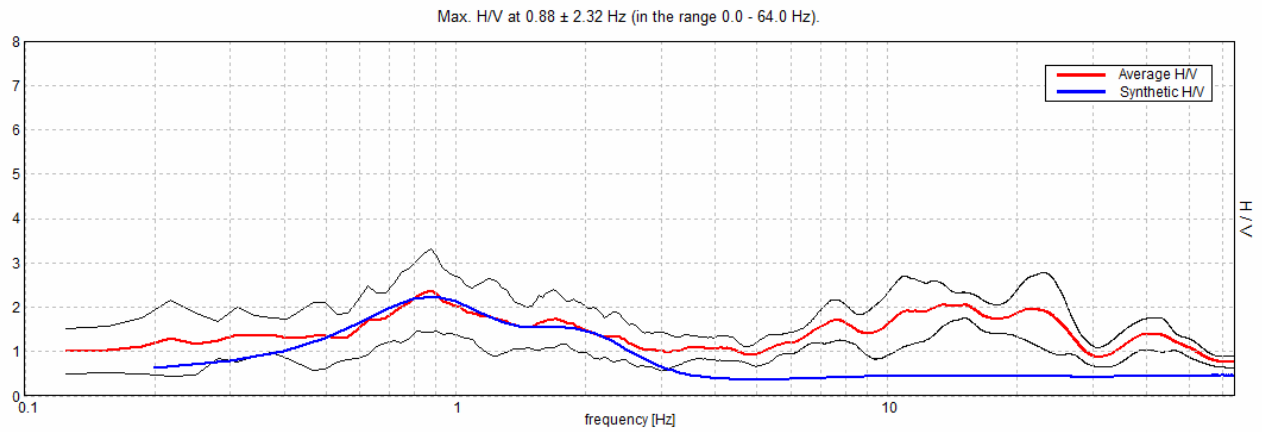
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

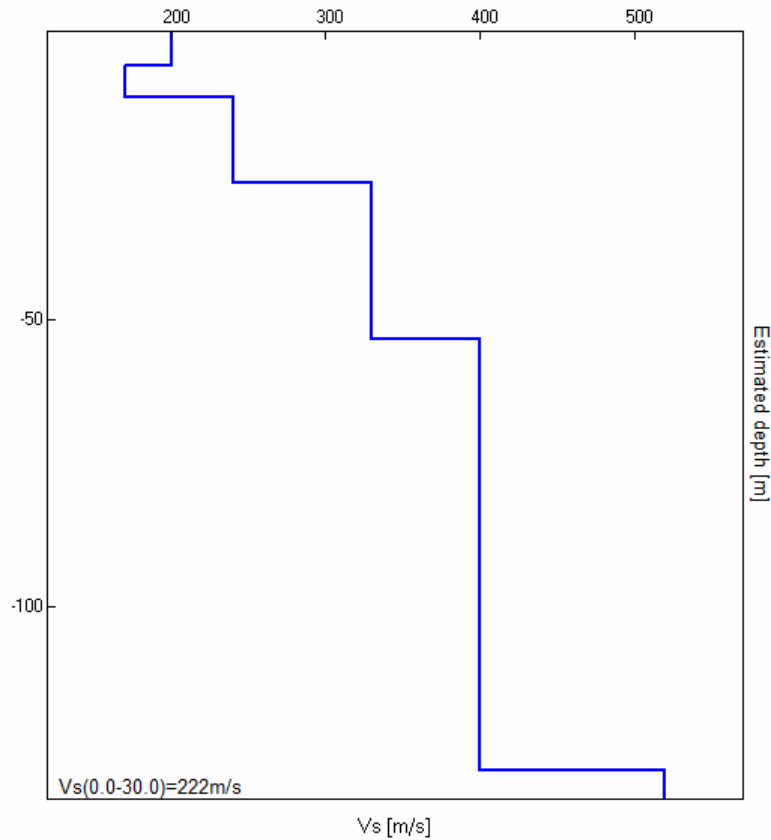


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
6.00	6.00	200
11.40	5.40	170
26.40	15.00	240
53.40	27.00	330
128.40	75.00	400
inf.	inf.	520

Vs30 = 222 m/s



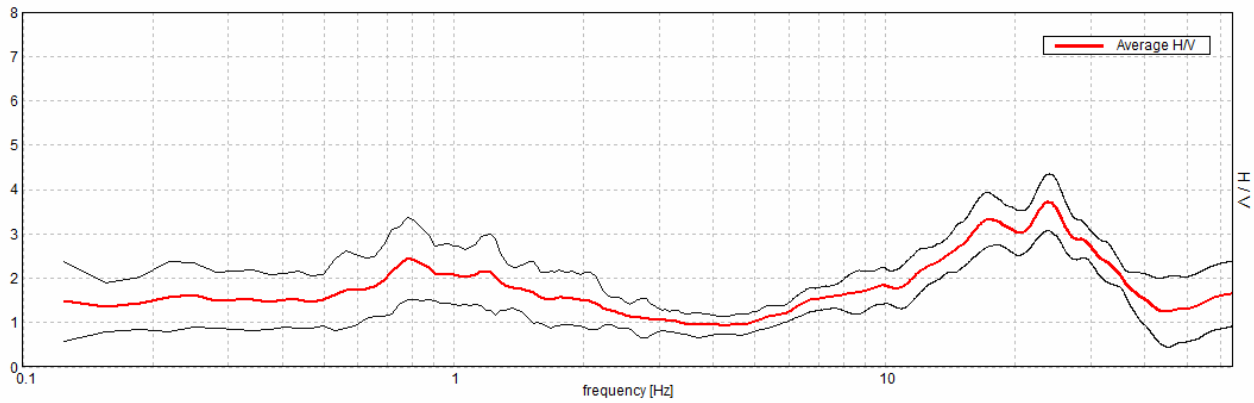
## MICROZONAZIONE MIRANDOLA, R035

Start recording: 02/11/11 12:11:08      End recording: 02/11/11 12:23:09  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

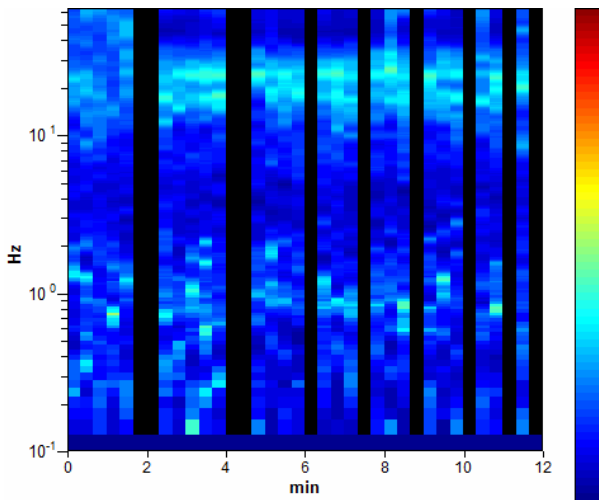
Trace length: 0h12'00".      Analyzed 72% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

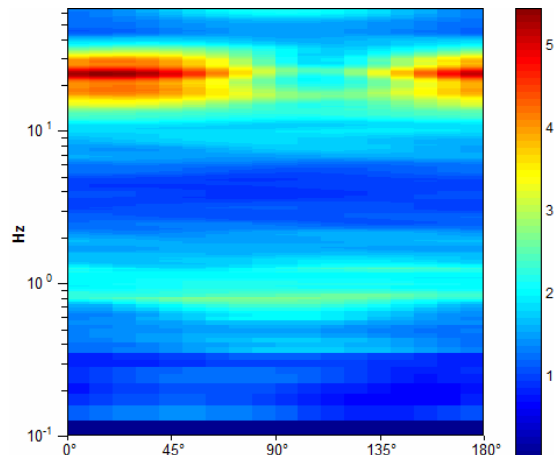
Max. H/V at  $23.72 \pm 2.65$  Hz (in the range 0.0 - 64.0 Hz).



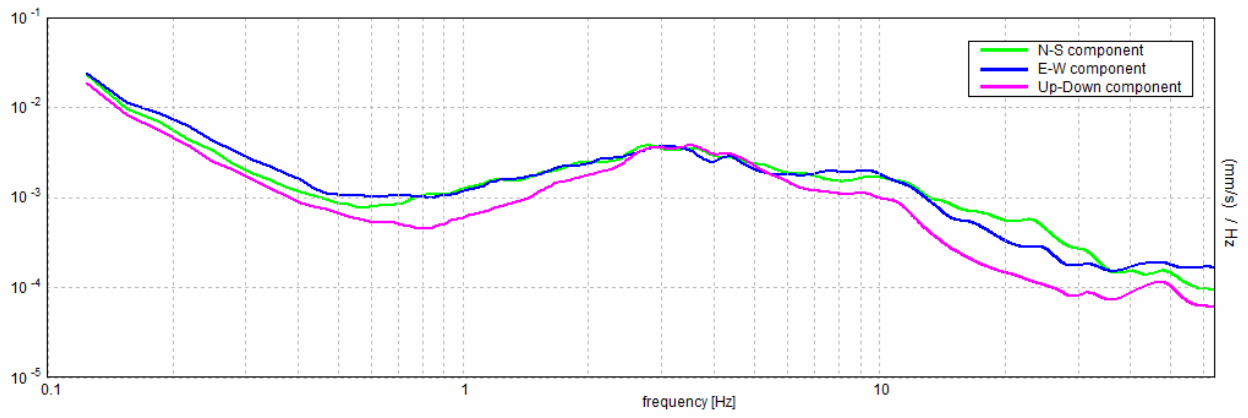
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



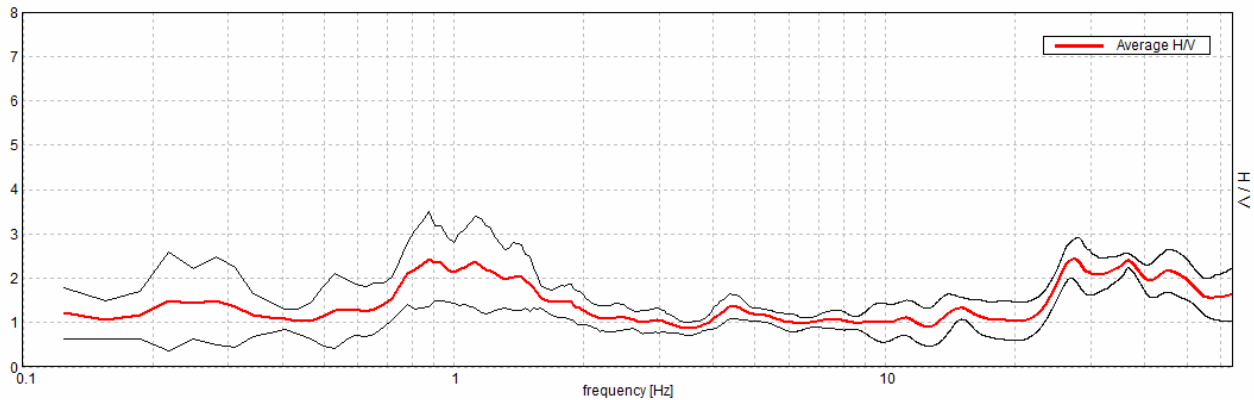
## MICROZONAZIONE MIRANDOLA, R036

Start recording: 02/11/11 12:40:11      End recording: 02/11/11 12:52:12  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

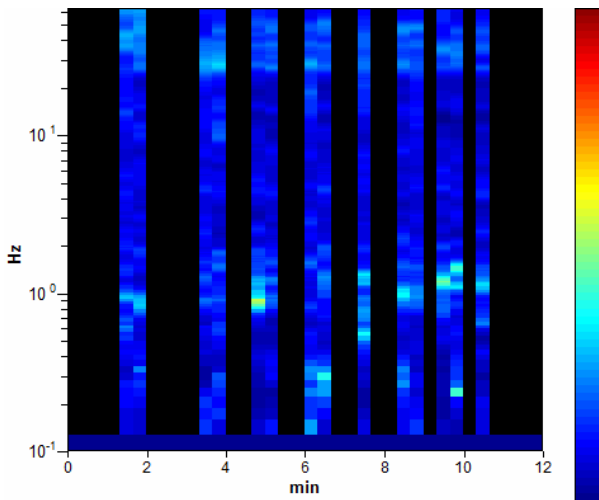
Trace length: 0h12'00".      Analyzed 39% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

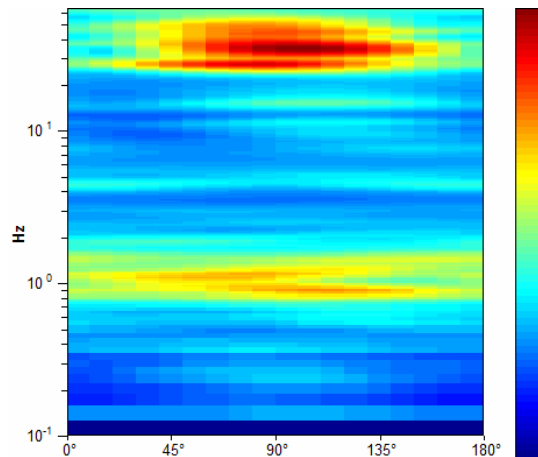
Max. H/V at  $0.88 \pm 4.31$  Hz (in the range 0.0 - 64.0 Hz).



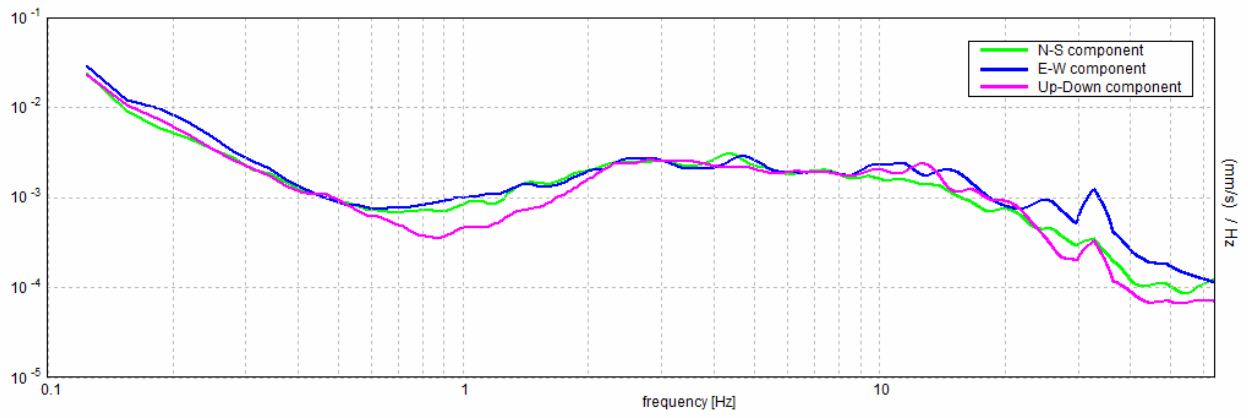
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



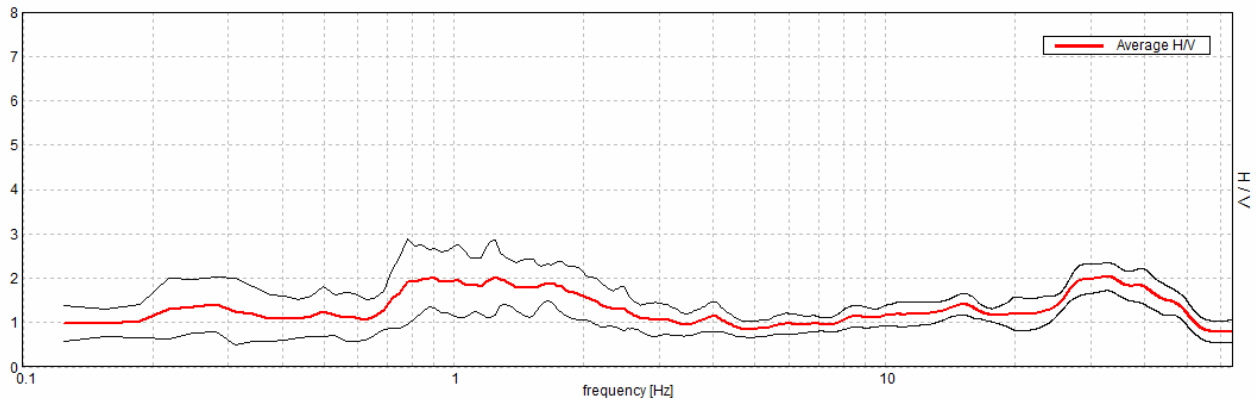
## MICROZONAZIONE MIRANDOLA, R037

Start recording: 02/11/11 13:05:08      End recording: 02/11/11 13:17:09  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

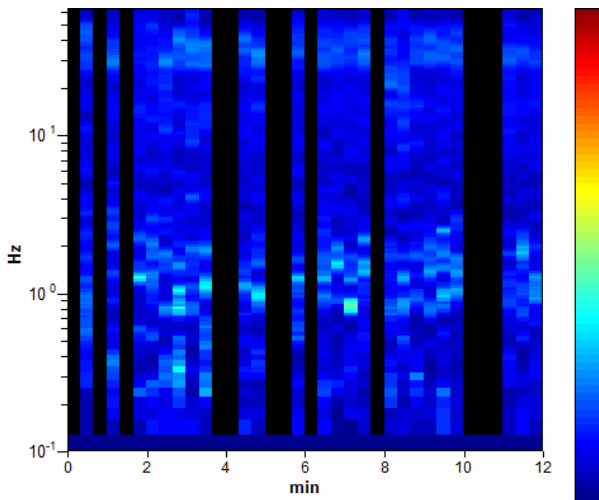
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

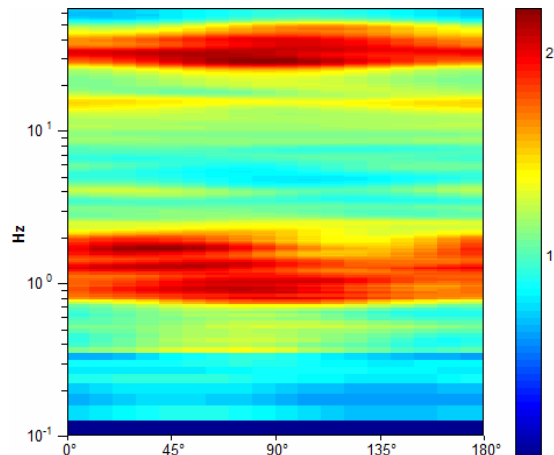
Max. H/V at  $32.81 \pm 10.82$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

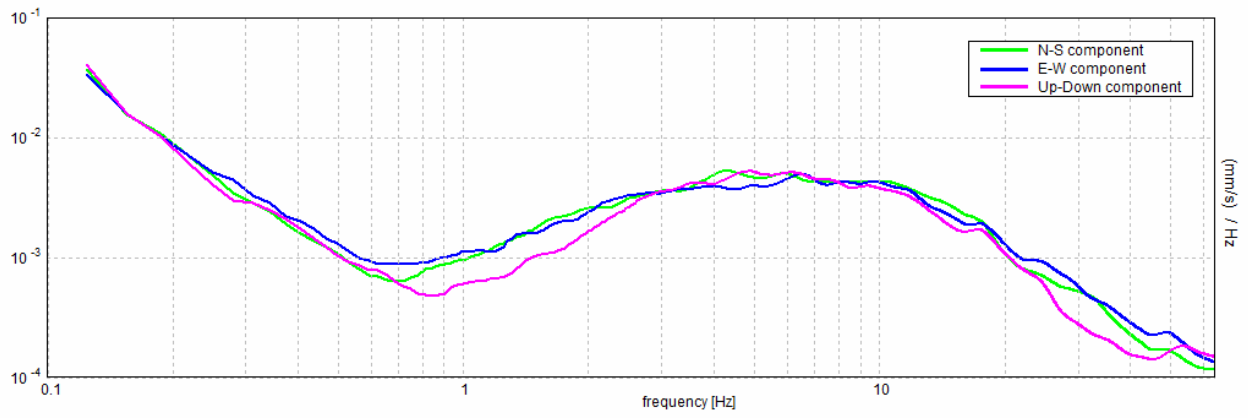


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA



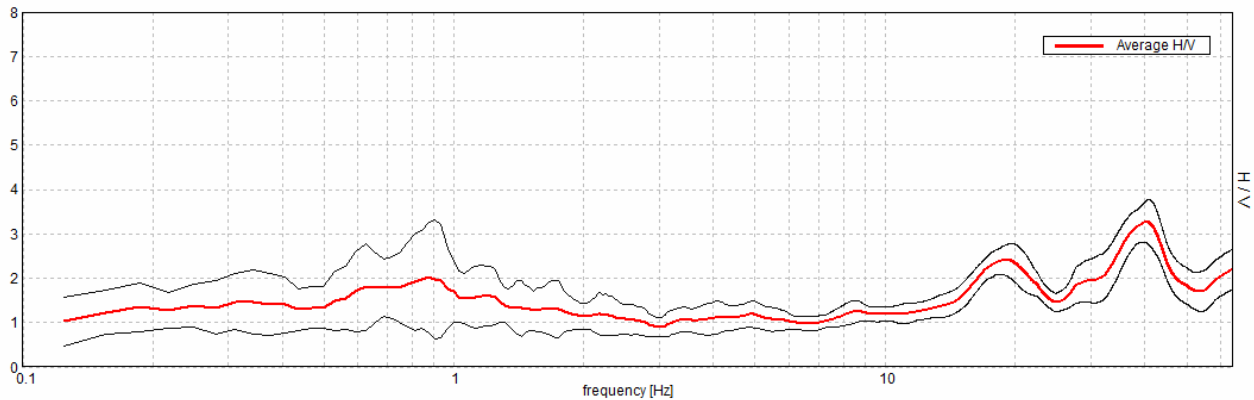
## MICROZONAZIONE MIRANDOLA, R038

Start recording: 02/11/11 13:26:22      End recording: 02/11/11 13:38:23  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

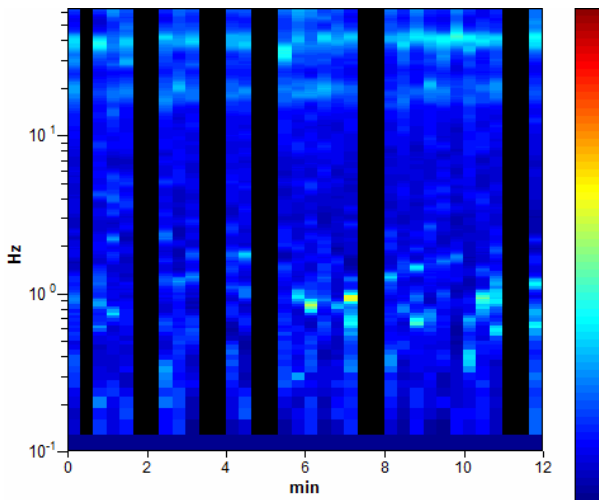
Trace length: 0h12'00".      Analyzed 69% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

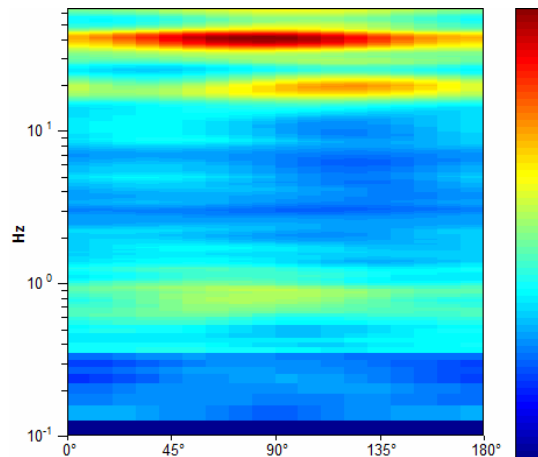
Max. H/V at  $40.31 \pm 0.71$  Hz (in the range 0.0 - 64.0 Hz).



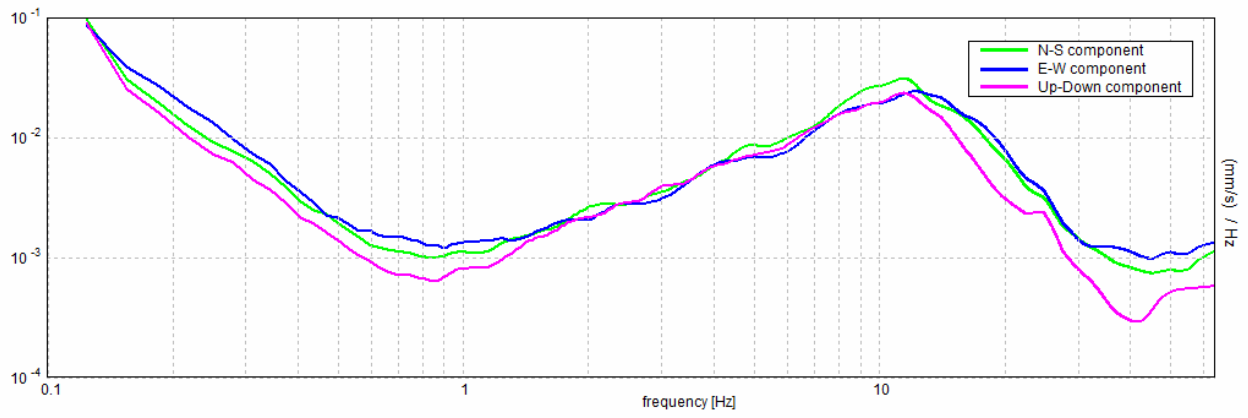
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



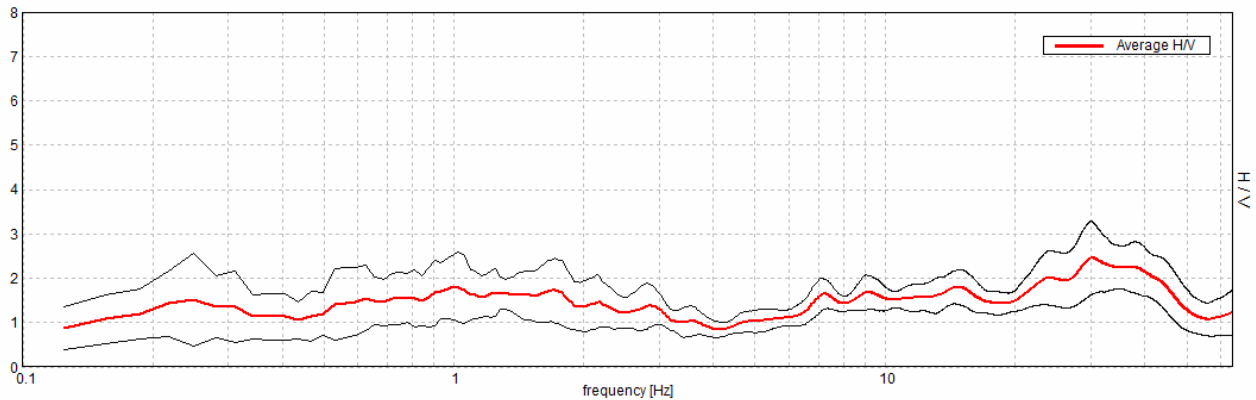
## MICROZONAZIONE MIRANDOLA, R040

Start recording: 02/11/11 14:23:34      End recording: 02/11/11 14:35:35  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

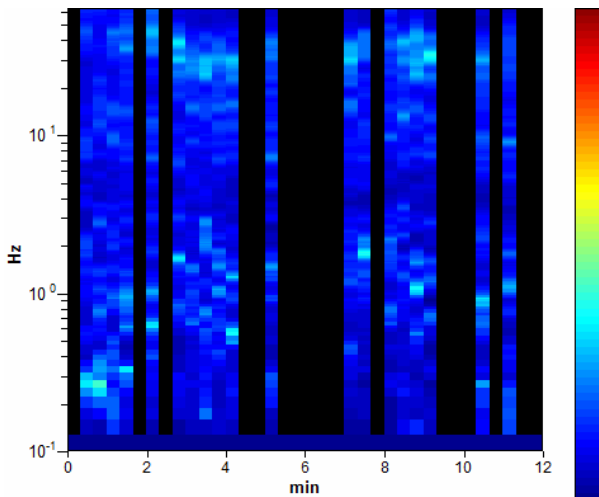
Trace length: 0h12'00".      Analyzed 53% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

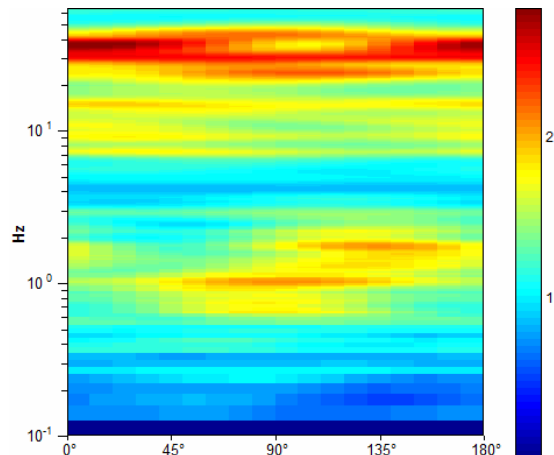
Max. H/V at  $30.25 \pm 8.47$  Hz. (In the range 0.0 - 64.0 Hz).



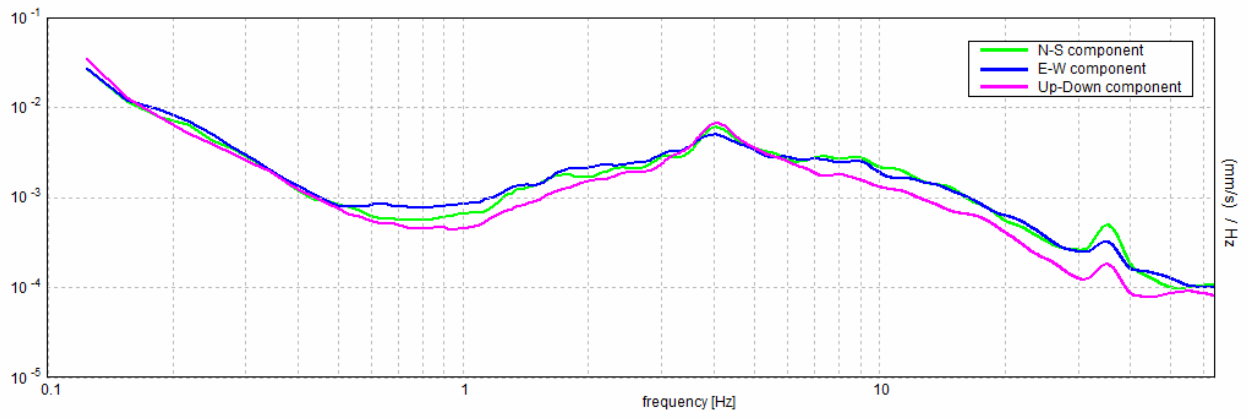
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



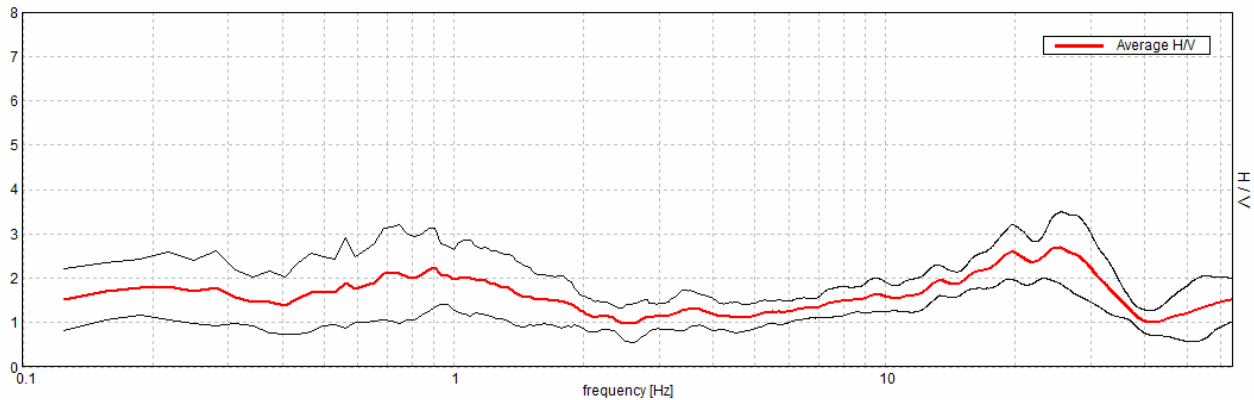
## MICROZONAZIONE MIRANDOLA, R041

Start recording: 02/11/11 15:43:21      End recording: 02/11/11 15:55:22  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

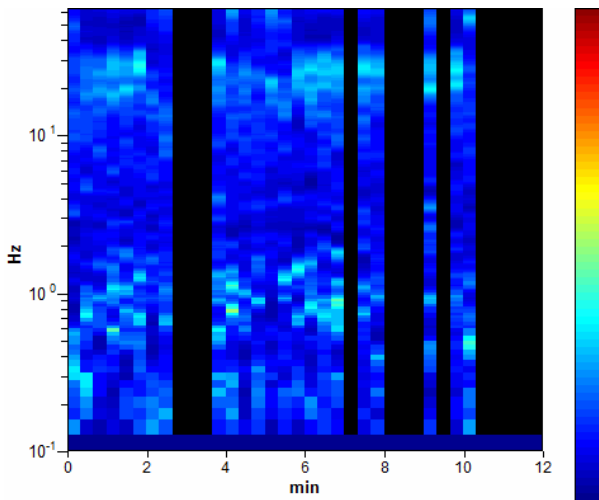
Trace length: 0h12'00".      Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

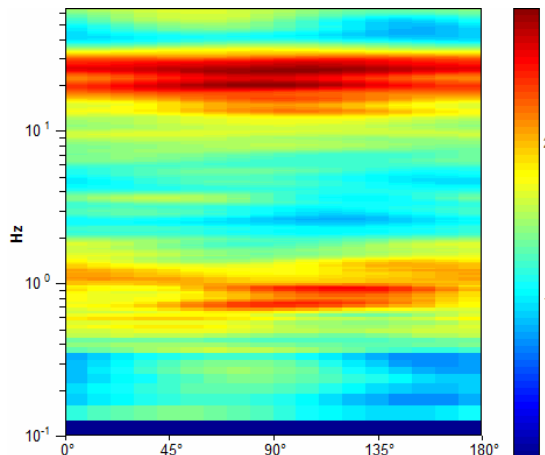
Max. H/V at  $27.81 \pm 8.66$  Hz. (In the range 0.0 - 64.0 Hz).



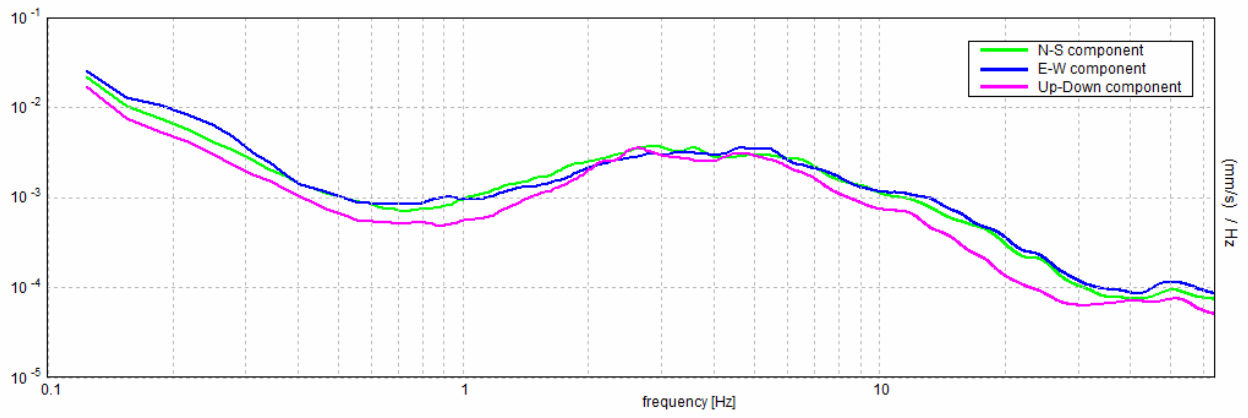
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



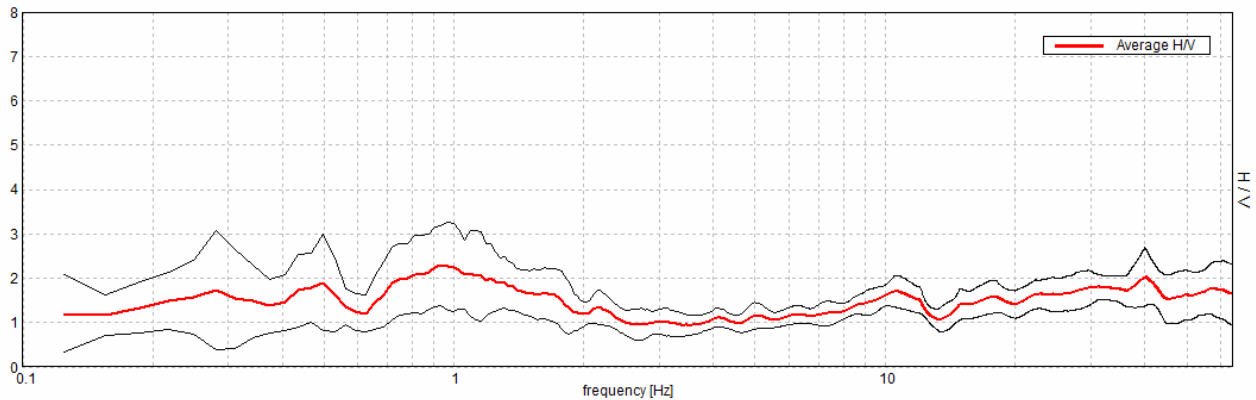
## MICROZONAZIONE MIRANDOLA, R042

Start recording: 02/11/11 16:02:15      End recording: 02/11/11 16:14:16  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

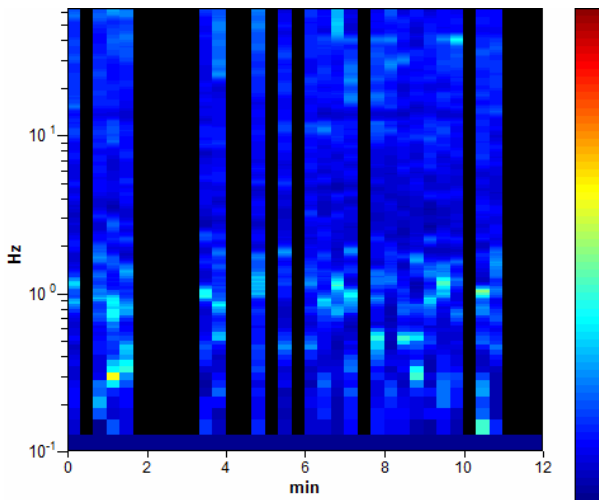
Trace length: 0h12'00".      Analyzed 58% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

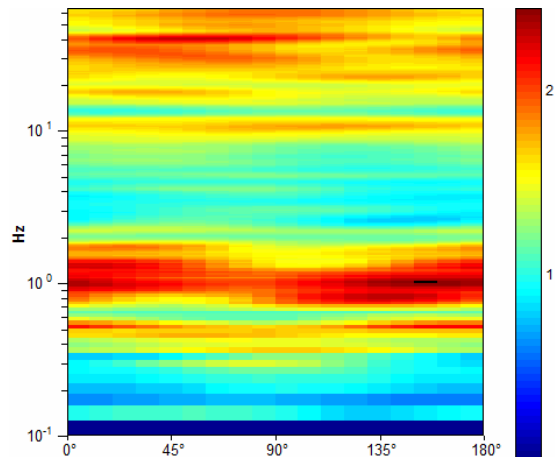
Max. H/V at  $0.94 \pm 0.03$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

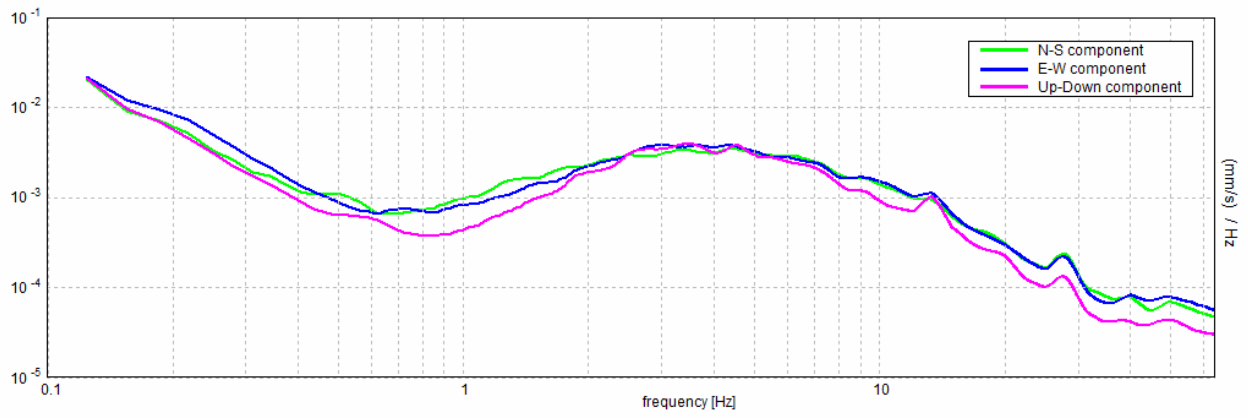


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA



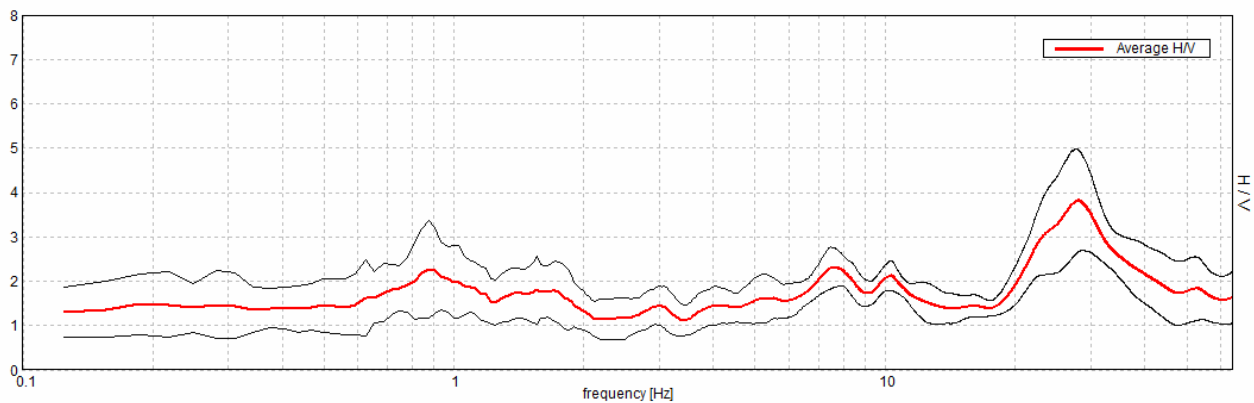
## MICROZONAZIONE MIRANDOLA, R043

Start recording: 02/11/11 16:22:50      End recording: 02/11/11 16:34:51  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

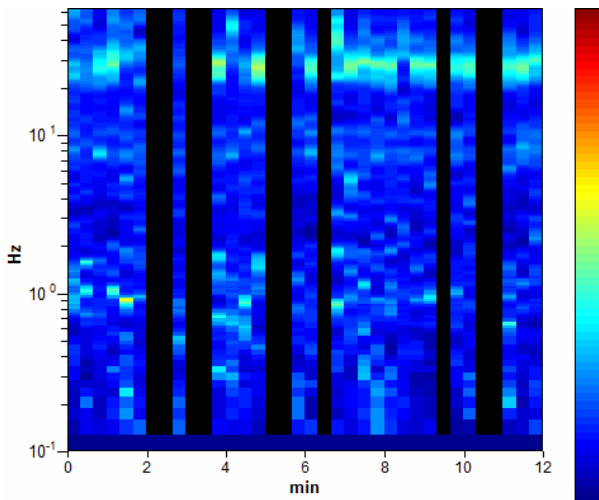
Trace length: 0h12'00".      Analyzed 72% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

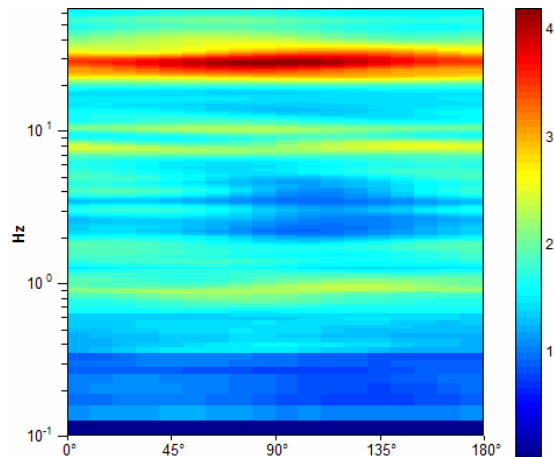
Max. H/V at  $27.94 \pm 2.21$  Hz (in the range 0.0 - 64.0 Hz).



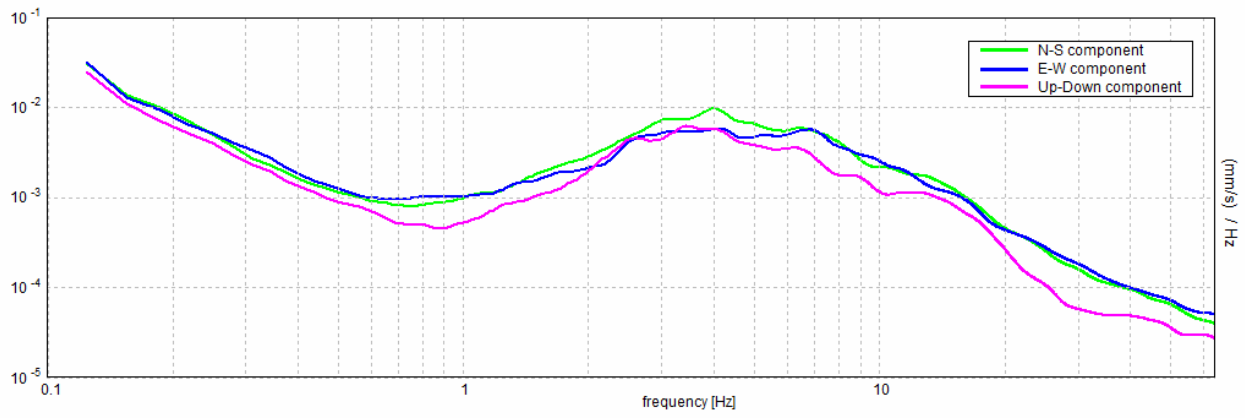
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



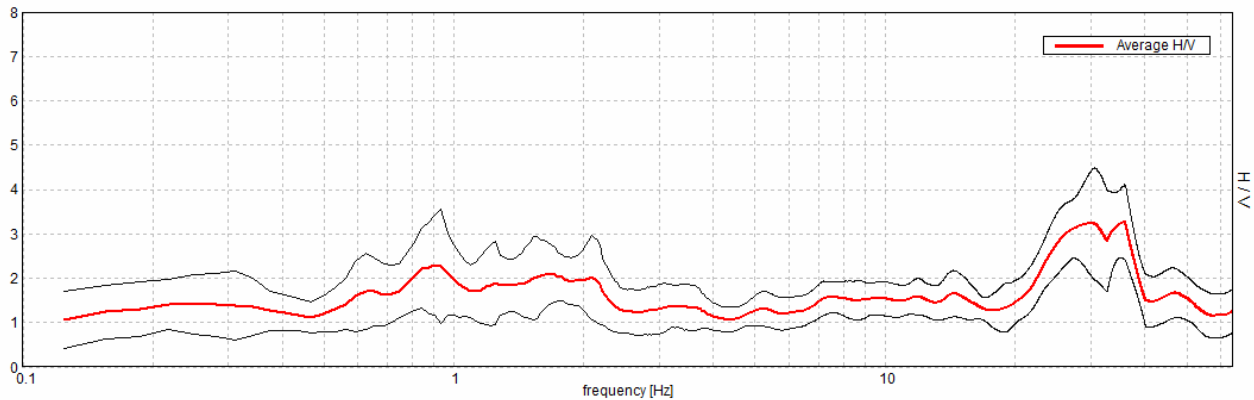
## MICROZONAZIONE MIRANDOLA, R045

Start recording: 02/11/11 17:03:42      End recording: 02/11/11 17:15:43  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

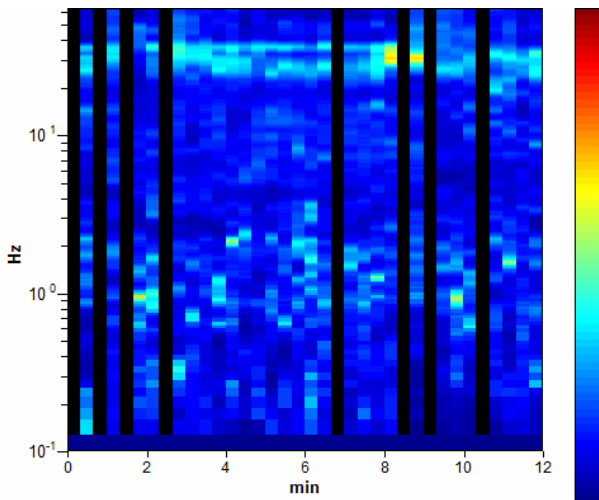
Trace length: 0h12'00".      Analyzed 78% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

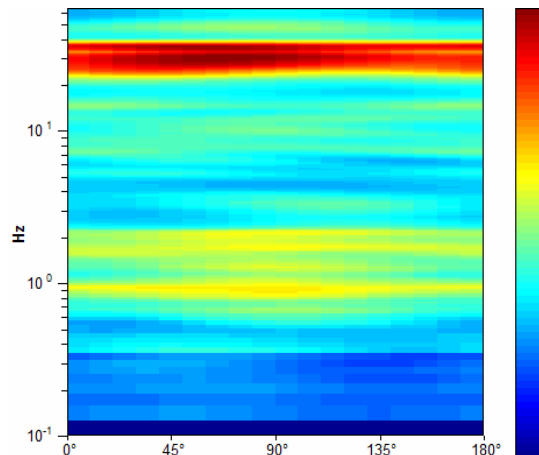
Max. H/V at 35.94 ± 3.79 Hz (in the range 0.0 - 64.0 Hz).



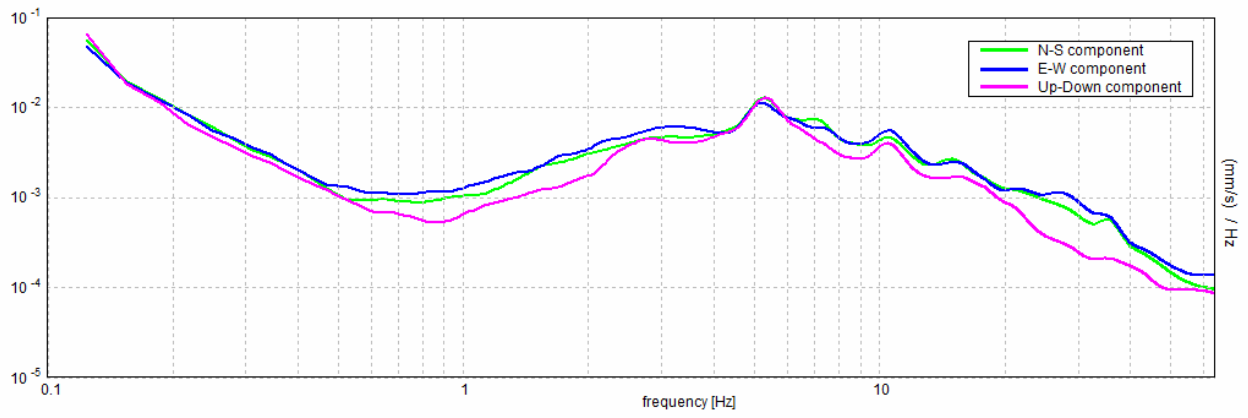
### H/V TIME HISTORY



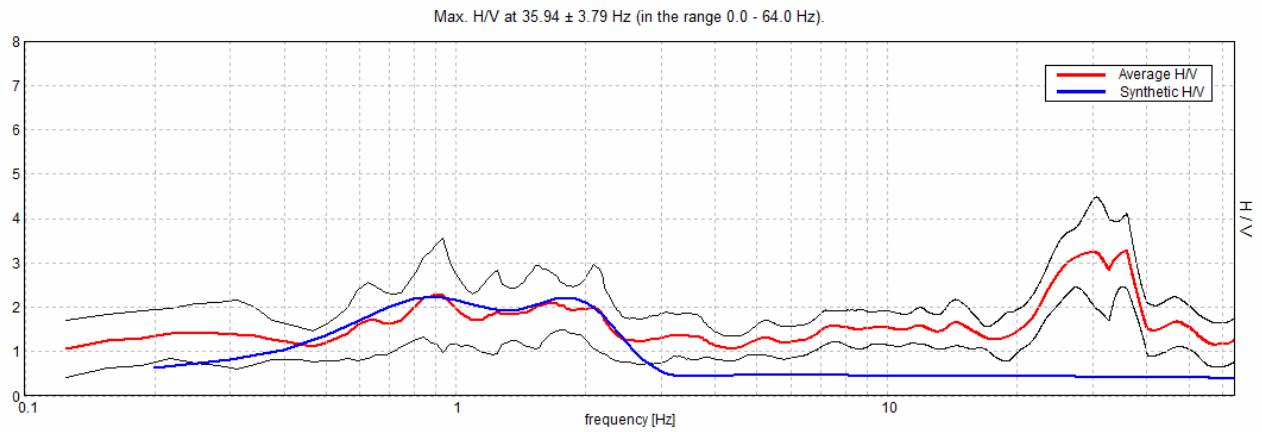
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

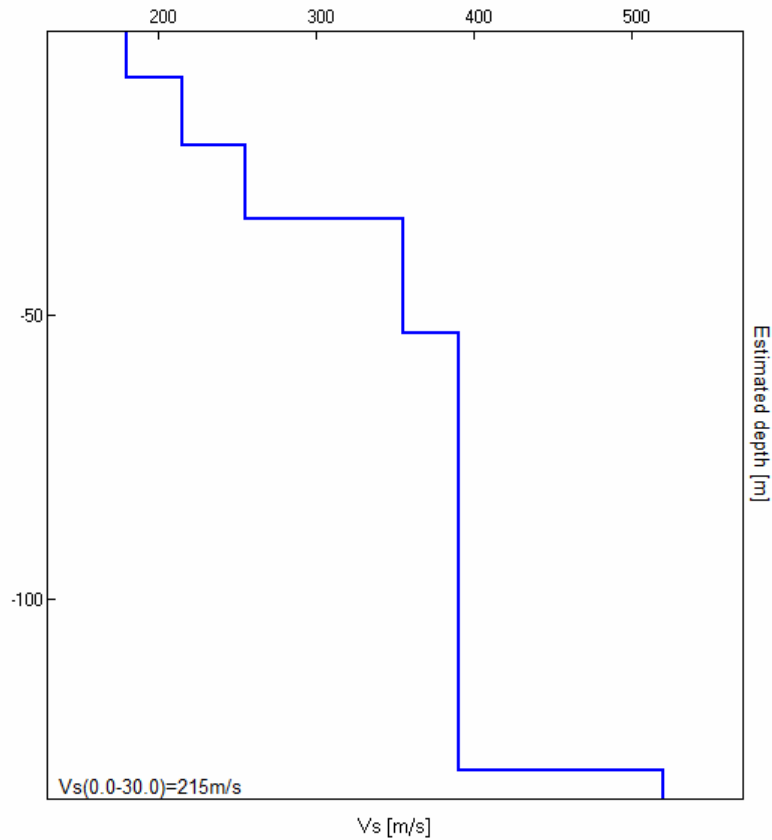


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
8.00	8.00	180
20.00	12.00	215
33.00	13.00	255
53.00	20.00	355
130.00	77.00	390
inf.	inf.	520

Vs30 = 215 m/s



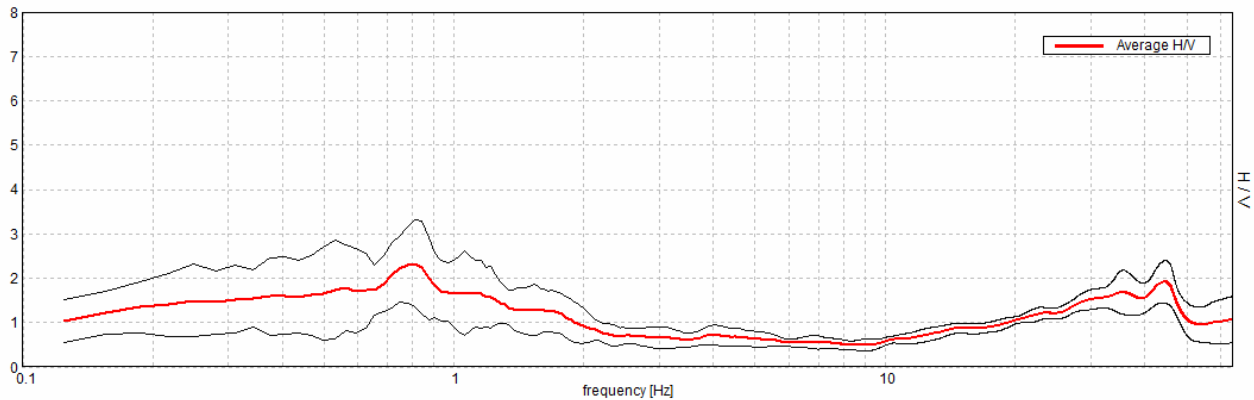
## MICROZONAZIONE MIRANDOLA, R046

Start recording: 02/11/11 17:38:21      End recording: 02/11/11 17:50:22  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

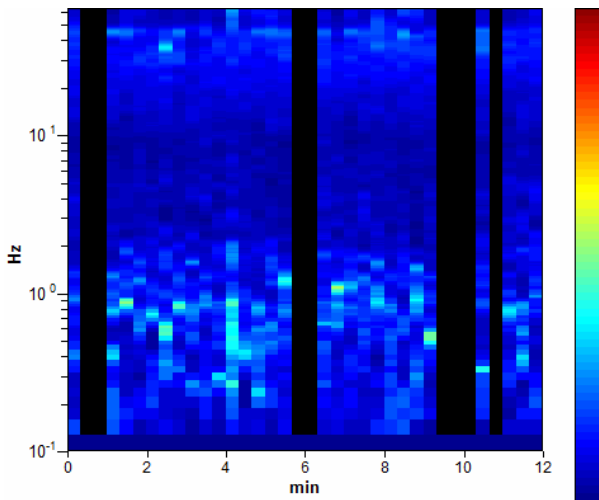
Trace length: 0h12'00".      Analyzed 78% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

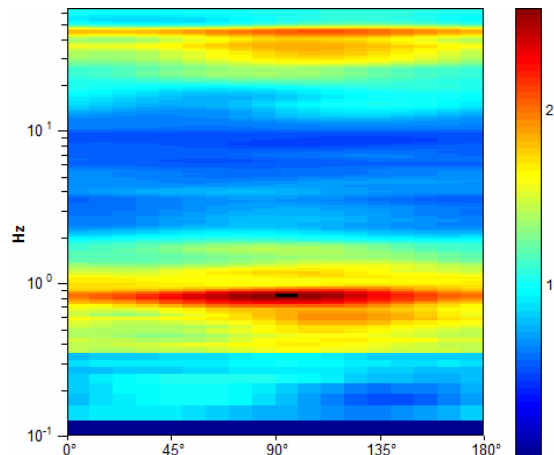
Max. H/V at  $0.81 \pm 0.03$  Hz (in the range 0.0 - 64.0 Hz).



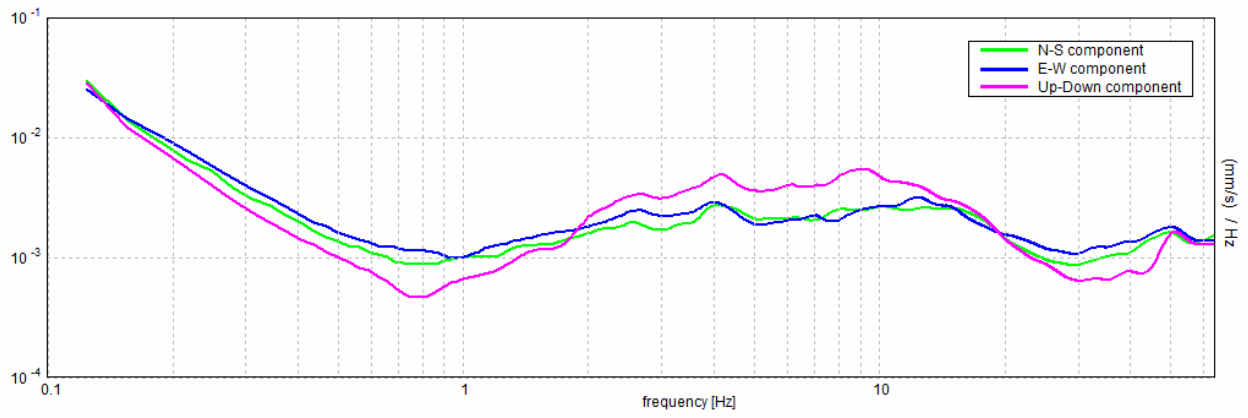
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





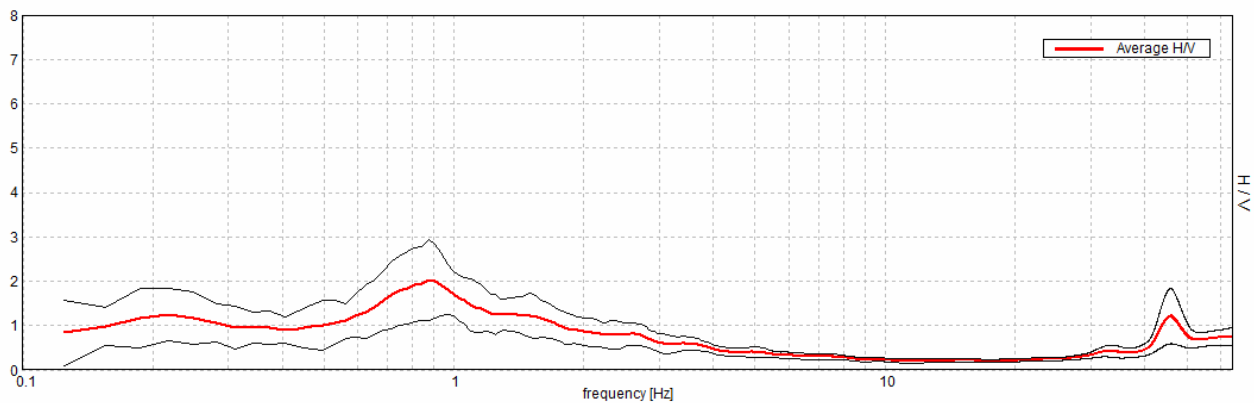
## MICROZONAZIONE MIRANDOLA, R047

Start recording: 02/11/11 18:00:42      End recording: 02/11/11 18:10:43  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

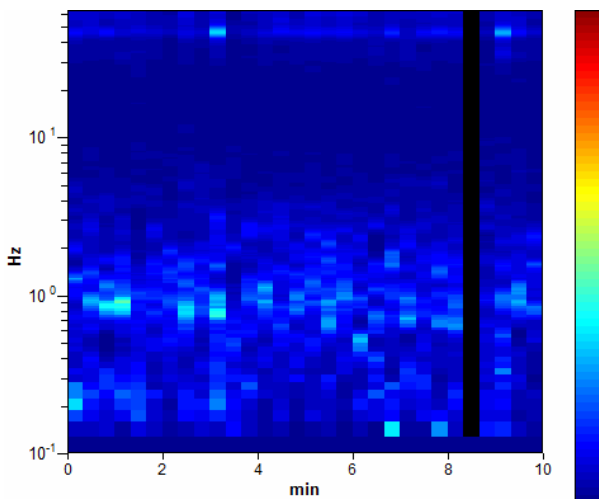
Trace length: 0h10'00".      Analyzed 97% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

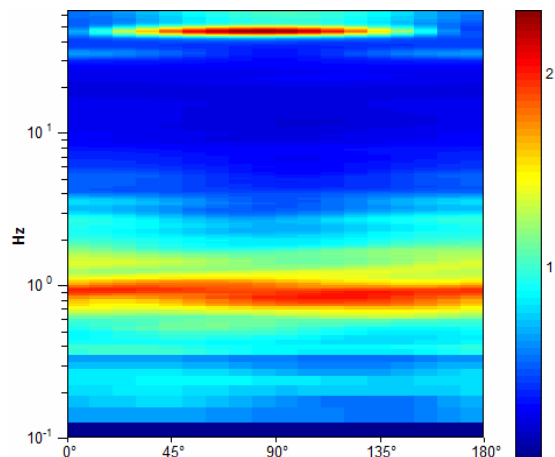
Max. H/V at  $0.88 \pm 0.07$  Hz (in the range 0.0 - 64.0 Hz).



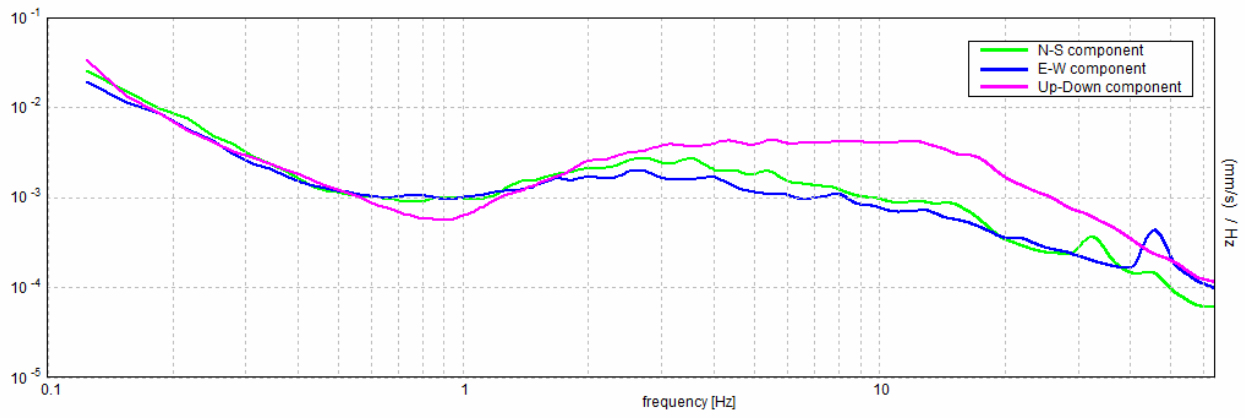
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



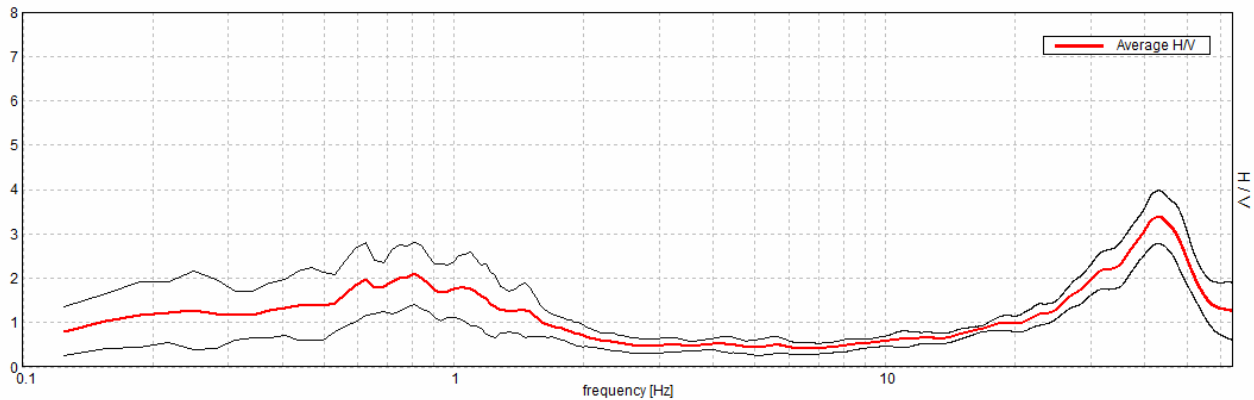
## MICROZONAZIONE MIRANDOLA, R048

Start recording: 18/11/11 10:48:45      End recording: 18/11/11 11:00:46  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

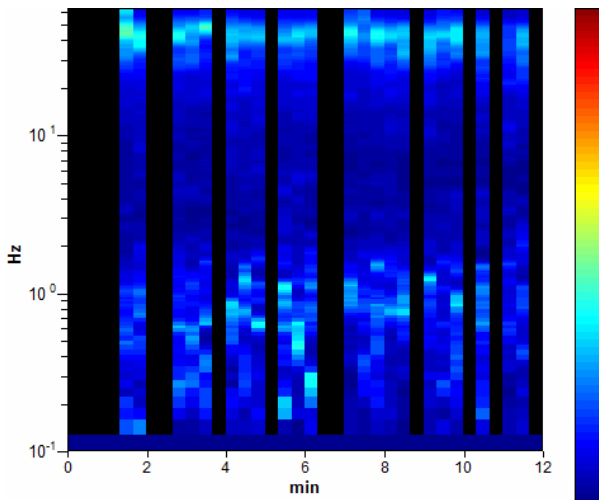
Trace length: 0h12'00".      Analyzed 61% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

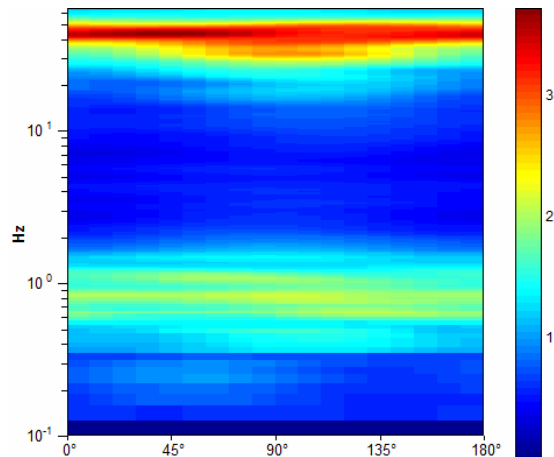
Max. H/V at  $43.13 \pm 0.23$  Hz (in the range 0.0 - 64.0 Hz).



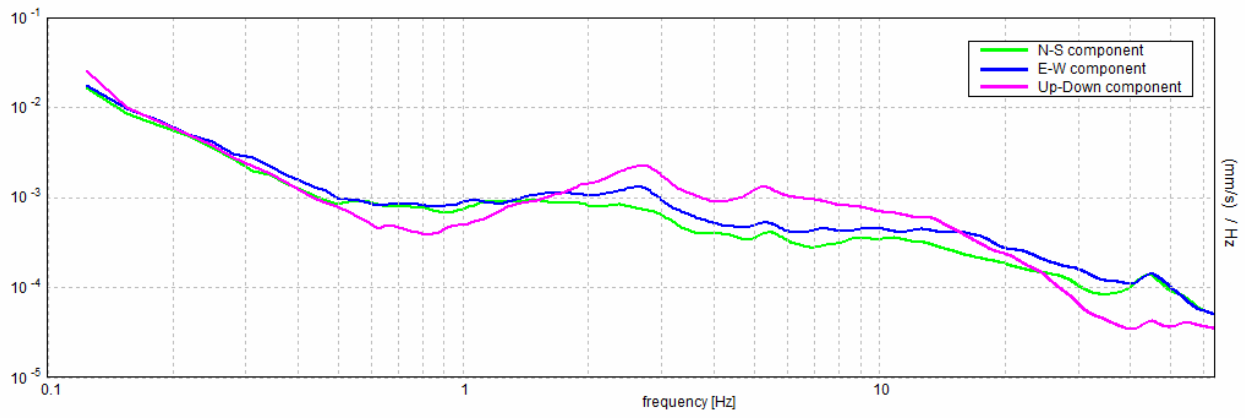
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



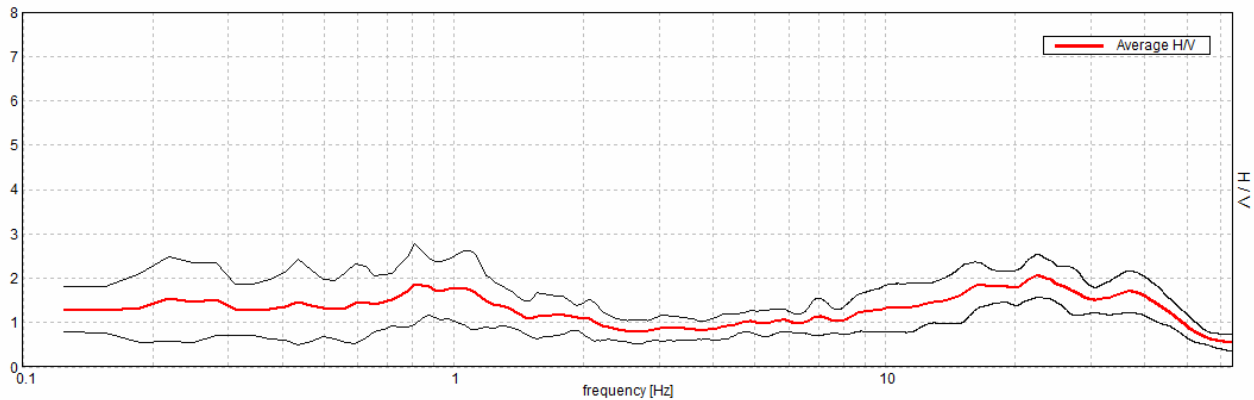
## MICROZONAZIONE MIRANDOLA, R050

Start recording: 18/11/11 12:11:29      End recording: 18/11/11 12:23:30  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

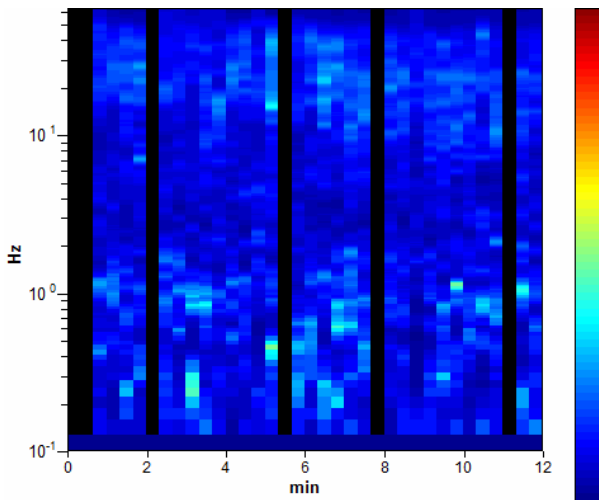
Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

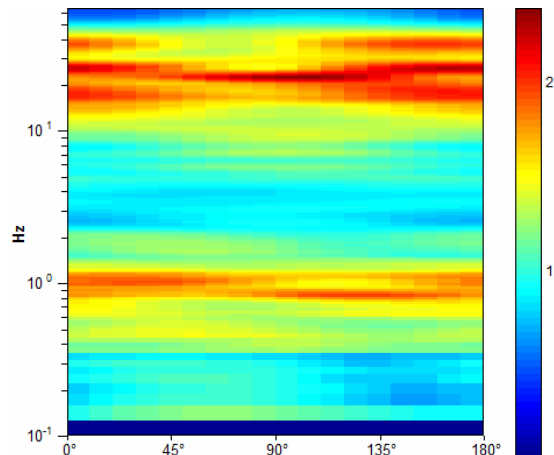
Max. H/V at  $22.47 \pm 5.36$  Hz (in the range 0.0 - 64.0 Hz).



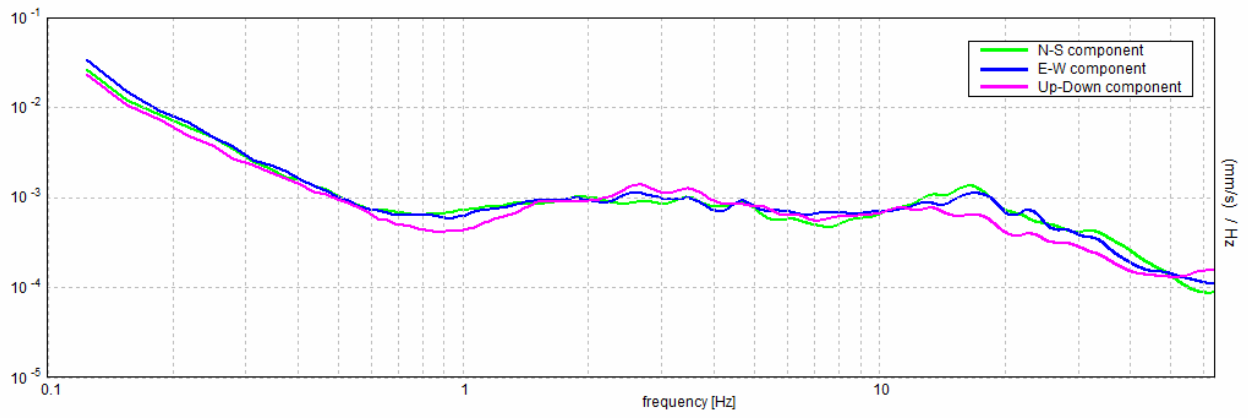
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



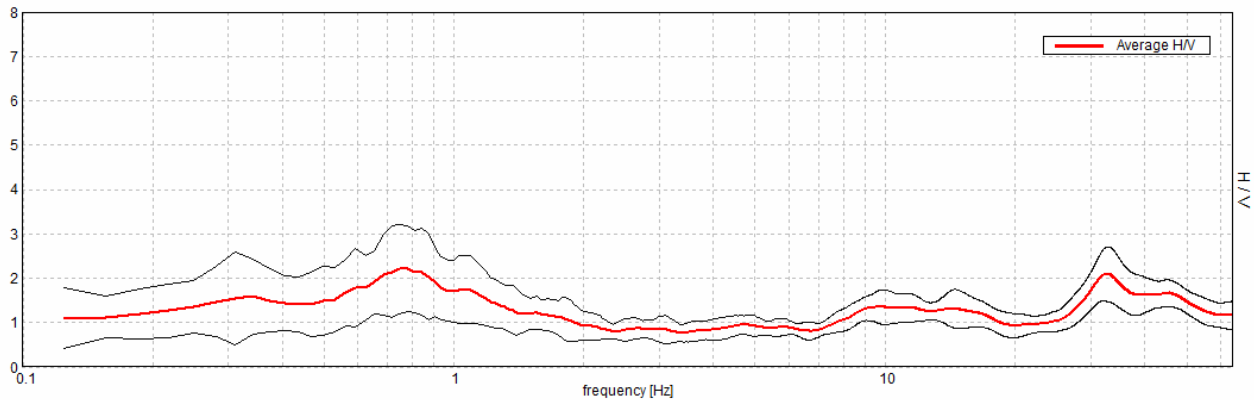
## MICROZONAZIONE MIRANDOLA, R051

Start recording: 18/11/11 12:34:36      End recording: 18/11/11 12:46:37  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

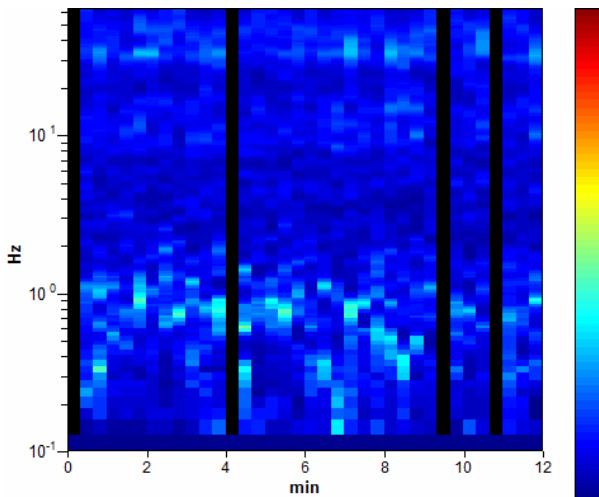
Trace length: 0h12'00".      Analyzed 89% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

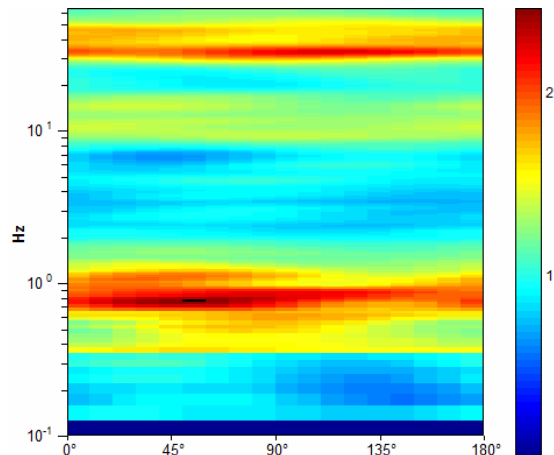
Max. H/V at  $0.78 \pm 0.07$  Hz (in the range 0.0 - 64.0 Hz).



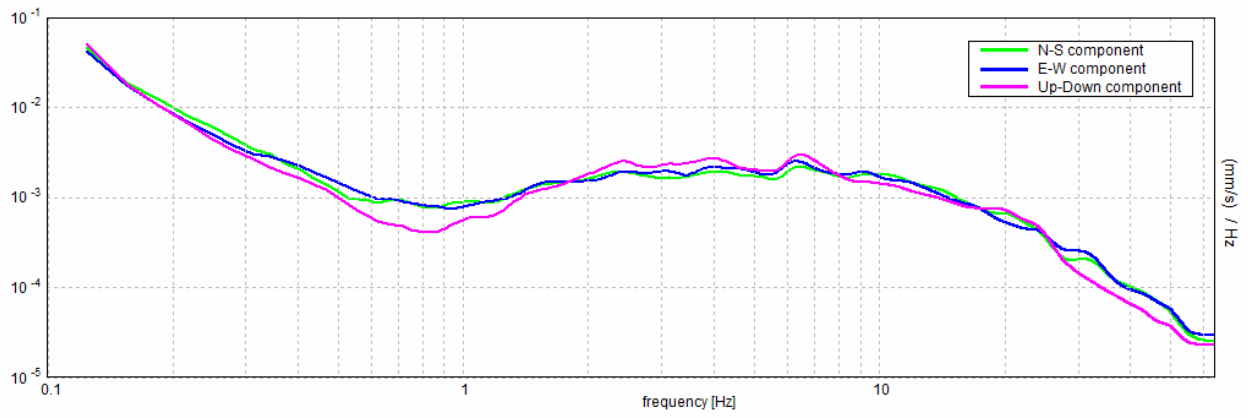
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





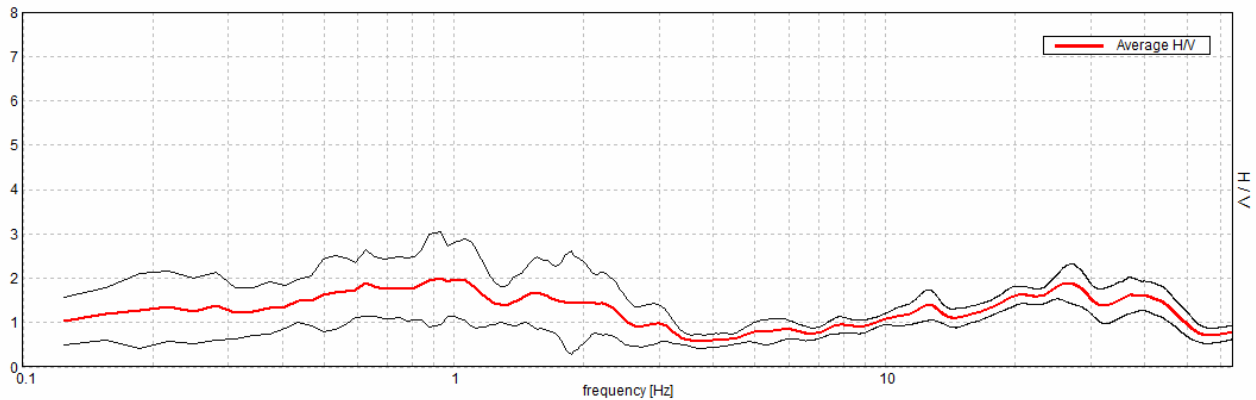
## MICROZONAZIONE MIRANDOLA, R052

Start recording: 18/11/11 13:05:18      End recording: 18/11/11 13:17:19  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

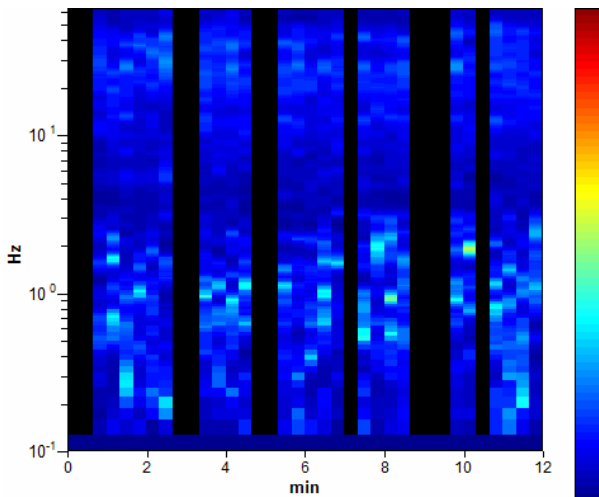
Trace length: 0h12'00".      Analyzed 69% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

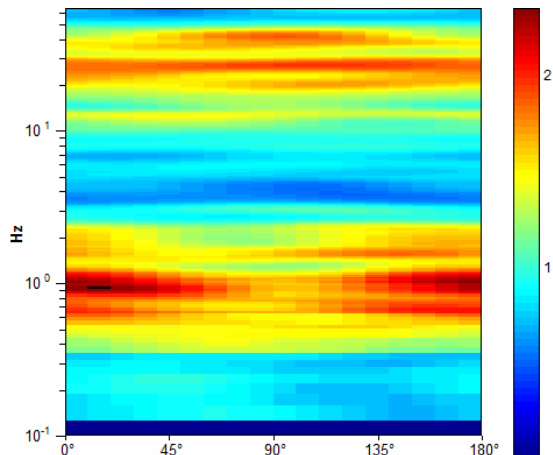
Max. H/V at  $0.94 \pm 2.14$  Hz (in the range 0.0 - 64.0 Hz).



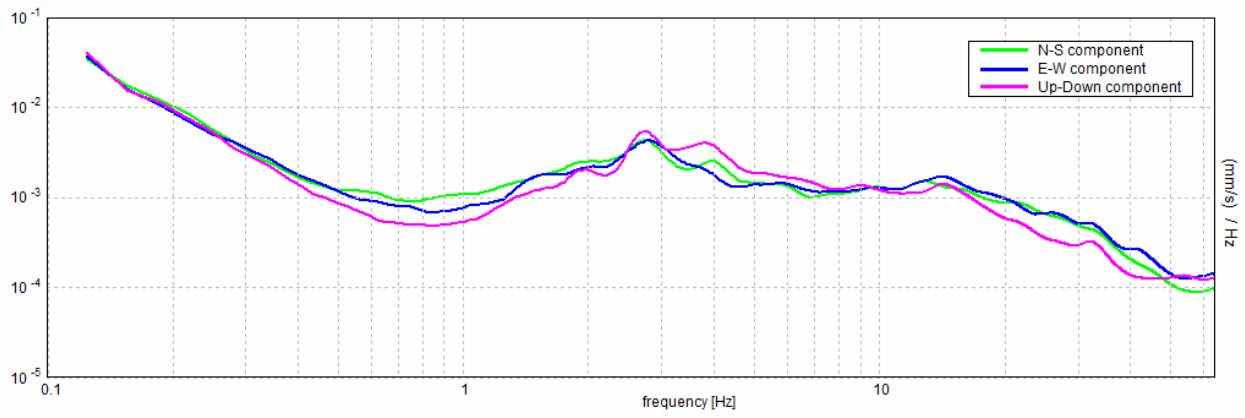
### H/V TIME HISTORY



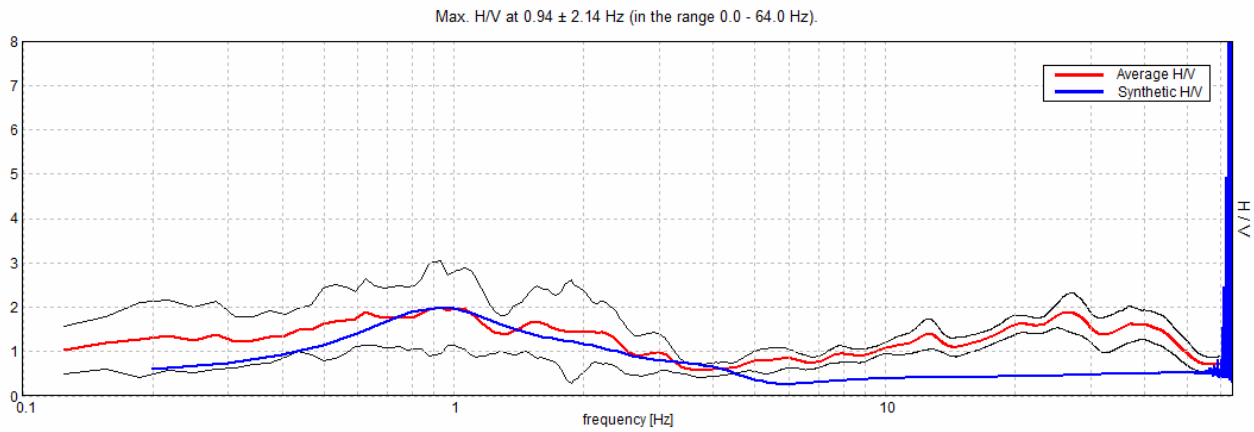
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

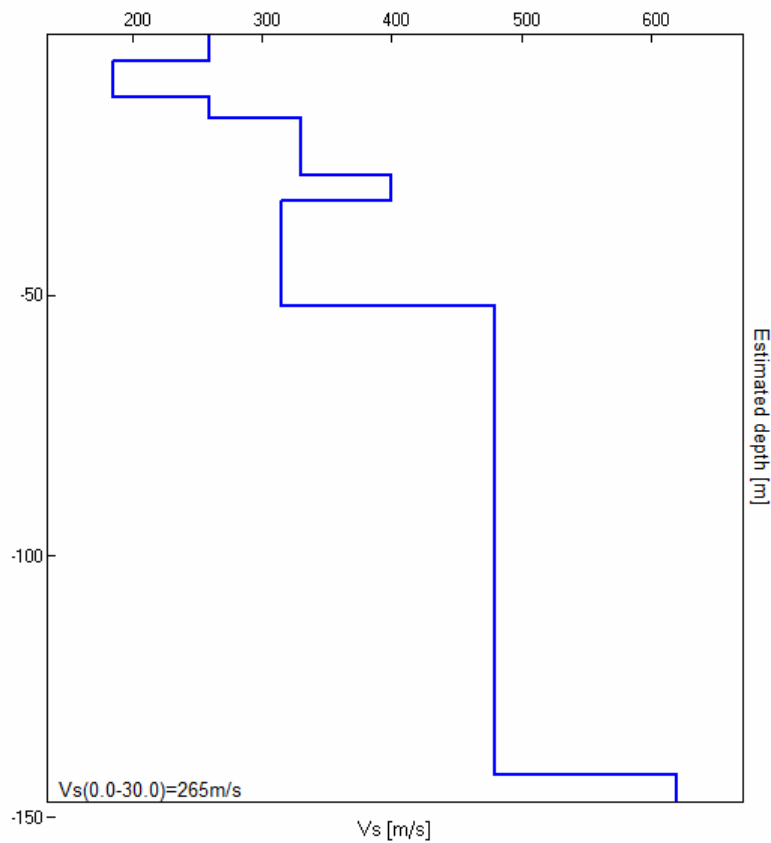


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
5.00	5.00	260
12.00	7.00	185
16.00	4.00	260
27.00	11.00	330
32.00	5.00	400
52.00	20.00	315
142.00	90.00	480
inf.	inf.	620

Vs30 = 265 m/s



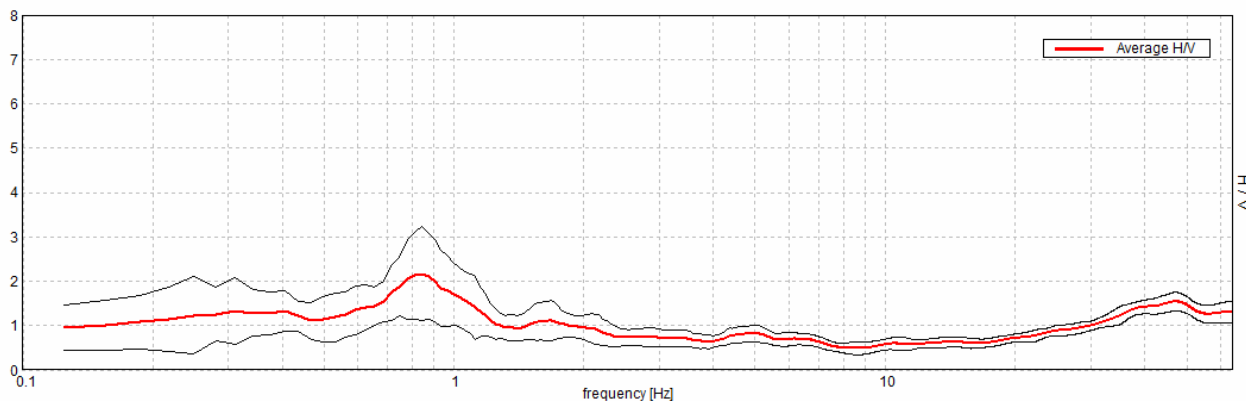
## MICROZONAZIONE MIRANDOLA, R053

Start recording: 18/11/11 14:13:11      End recording: 18/11/11 14:25:12  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

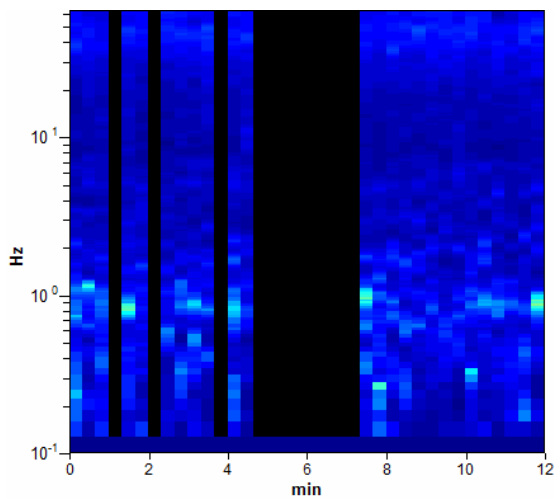
Trace length: 0h12'00".      Analyzed 69% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

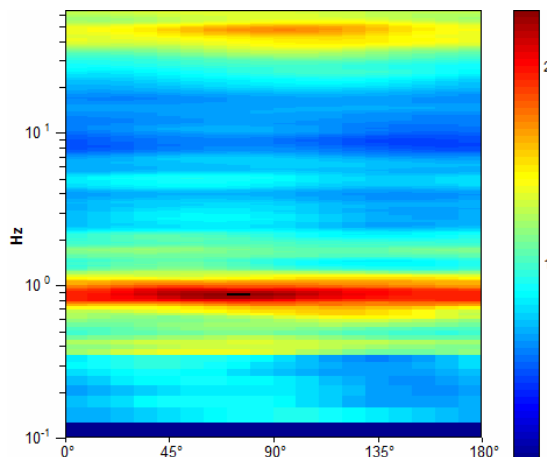
Max. H/V at  $0.84 \pm 0.06$  Hz. (In the range 0.0 - 64.0 Hz).



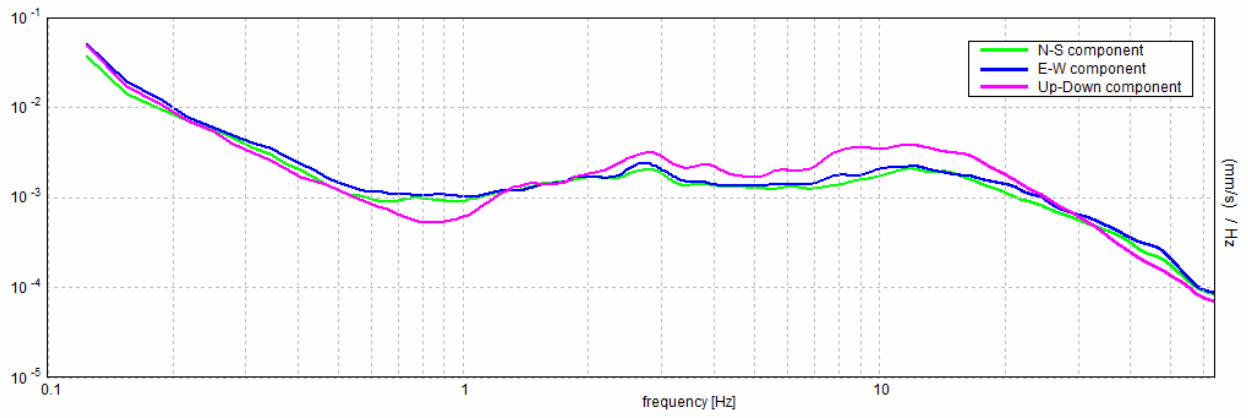
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



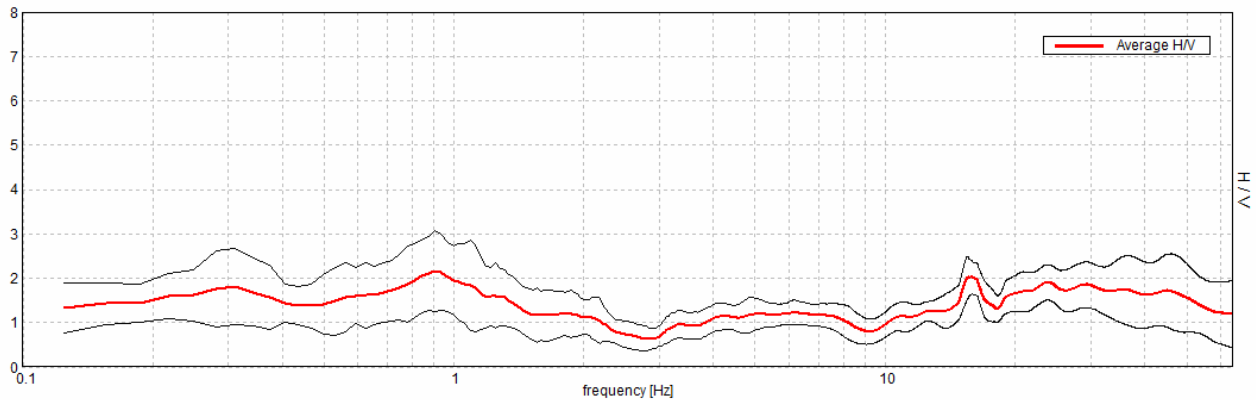
## MICROZONAZIONE MIRANDOLA, R054

Start recording: 18/11/11 15:26:18      End recording: 18/11/11 15:38:18  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

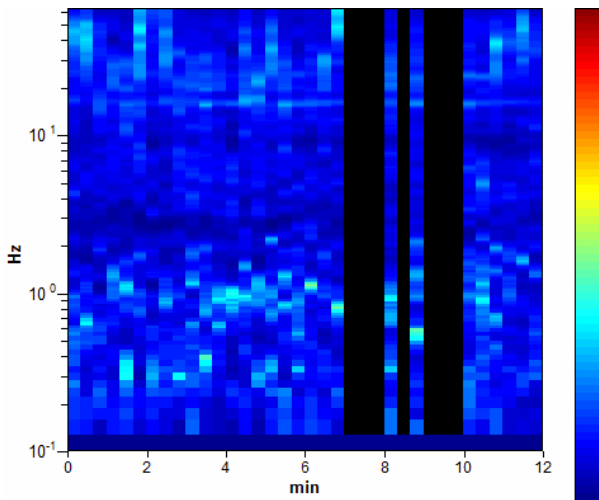
Trace length: 0h12'00".      Analyzed 81% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

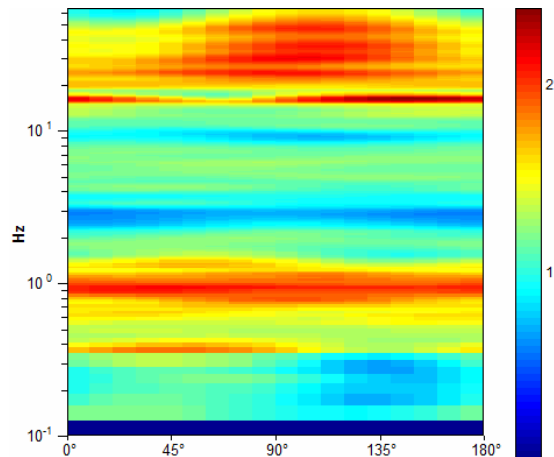
Max. H/V at  $0.91 \pm 9.35$  Hz. (In the range 0.0 - 64.0 Hz).



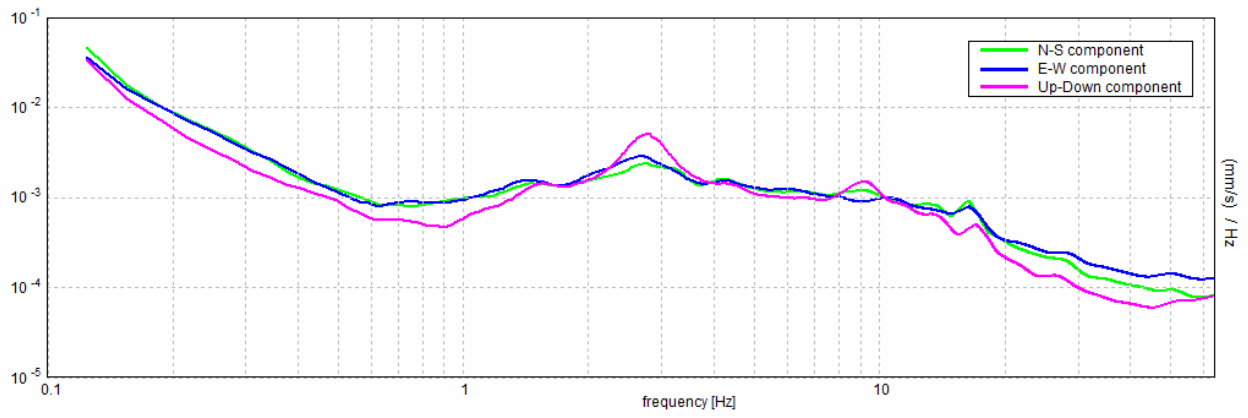
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



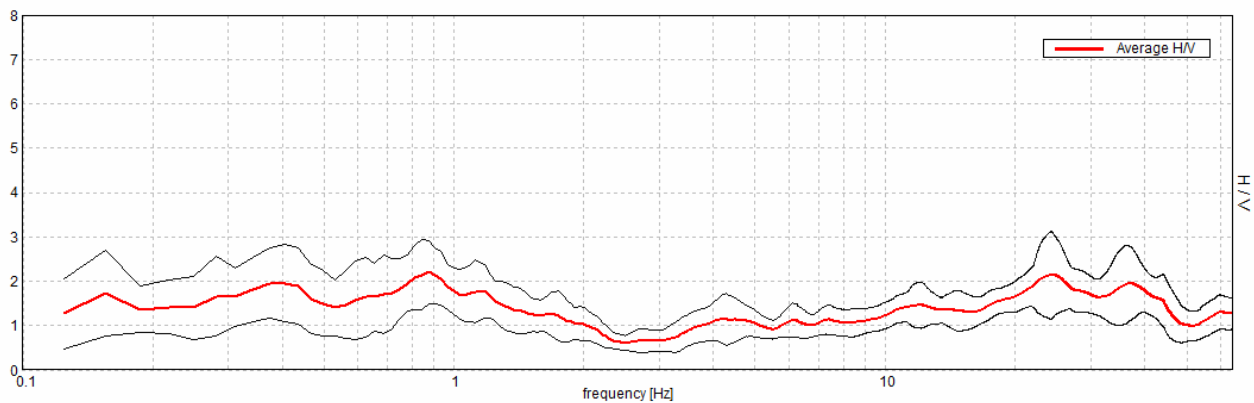
## MICROZONAZIONE MIRANDOLA, R055

Start recording: 18/11/11 15:49:28      End recording: 18/11/11 16:01:29  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

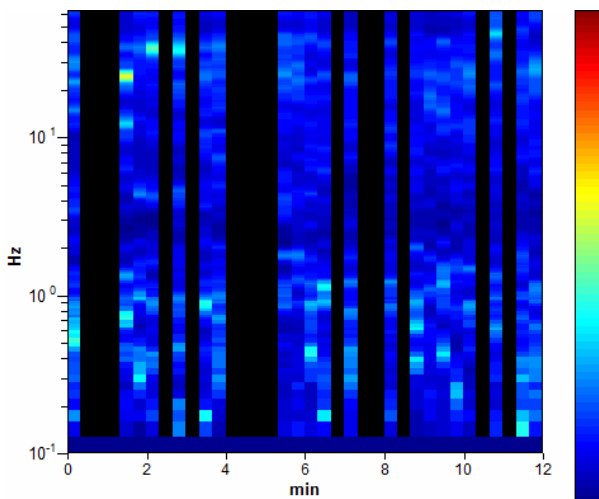
Trace length: 0h12'00".      Analyzed 58% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

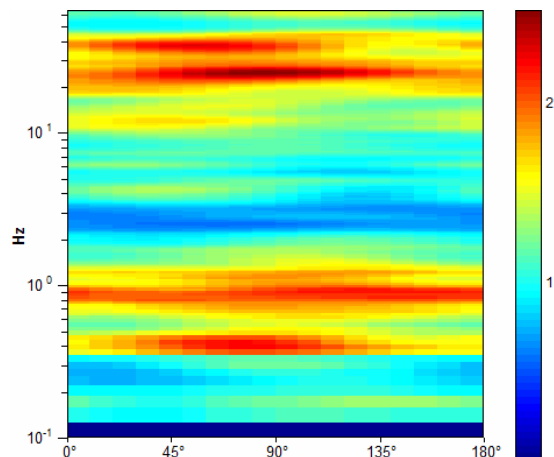
Max. H/V at  $0.88 \pm 10.12$  Hz. (In the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

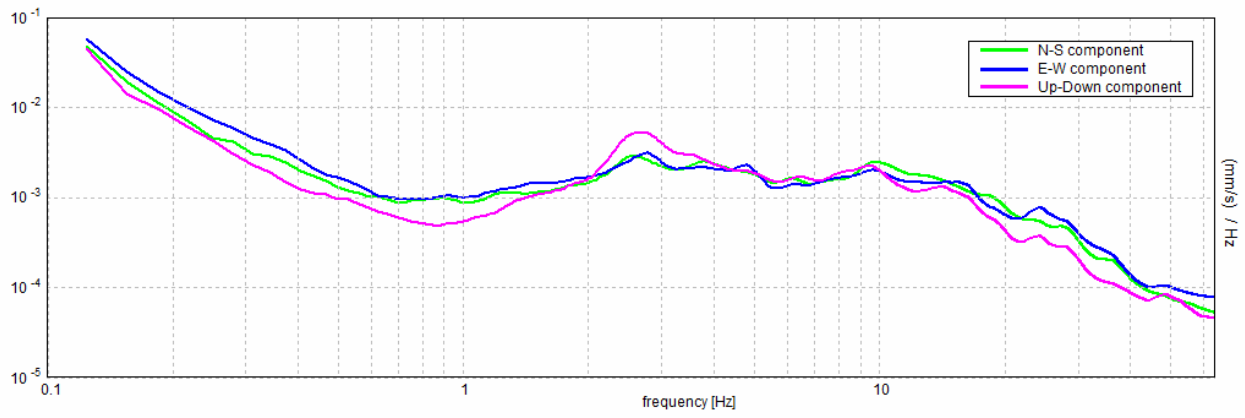


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA

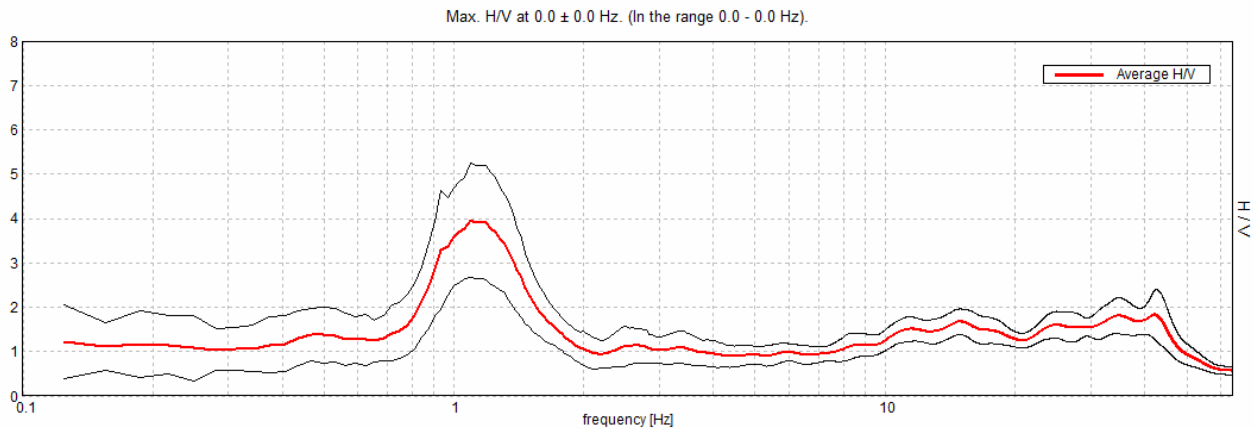


## MICROZONAZIONE MIRANDOLA, R056

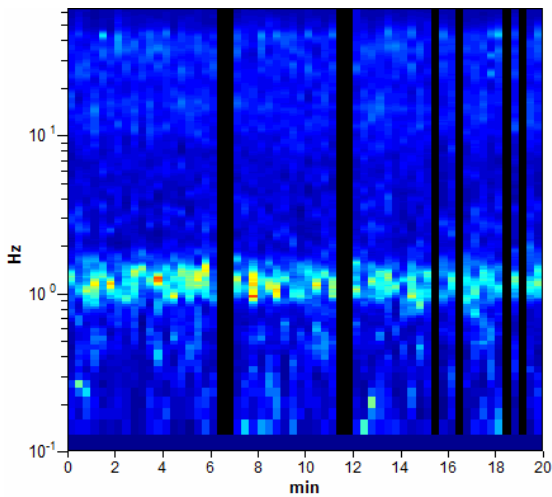
Start recording: 25/11/11 11:25:02      End recording: 25/11/11 11:45:03  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h20'00".      Analyzed 87% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

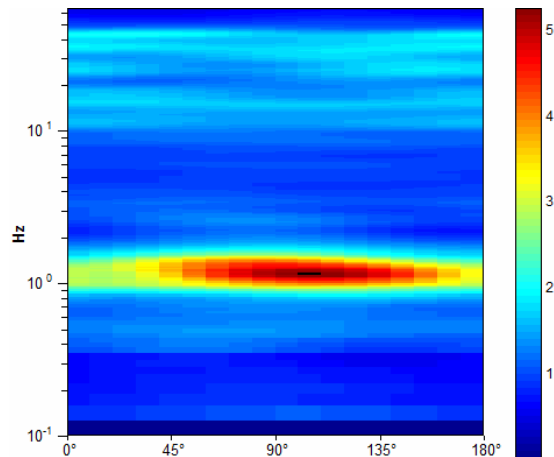
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



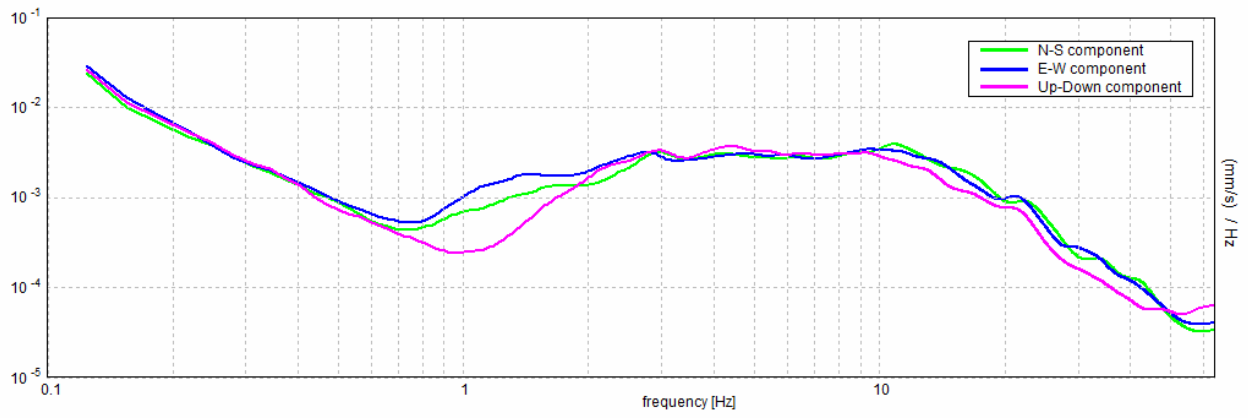
### H/V TIME HISTORY



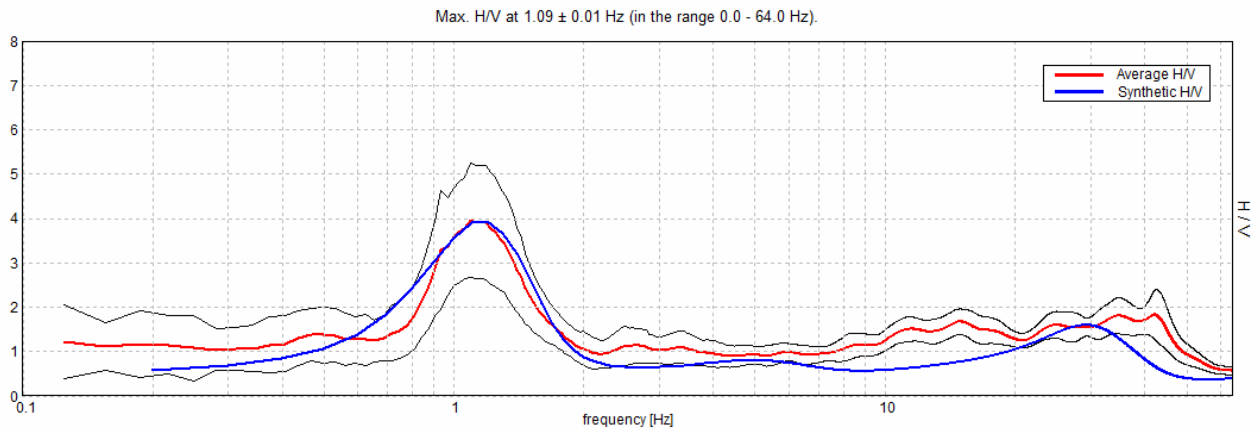
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

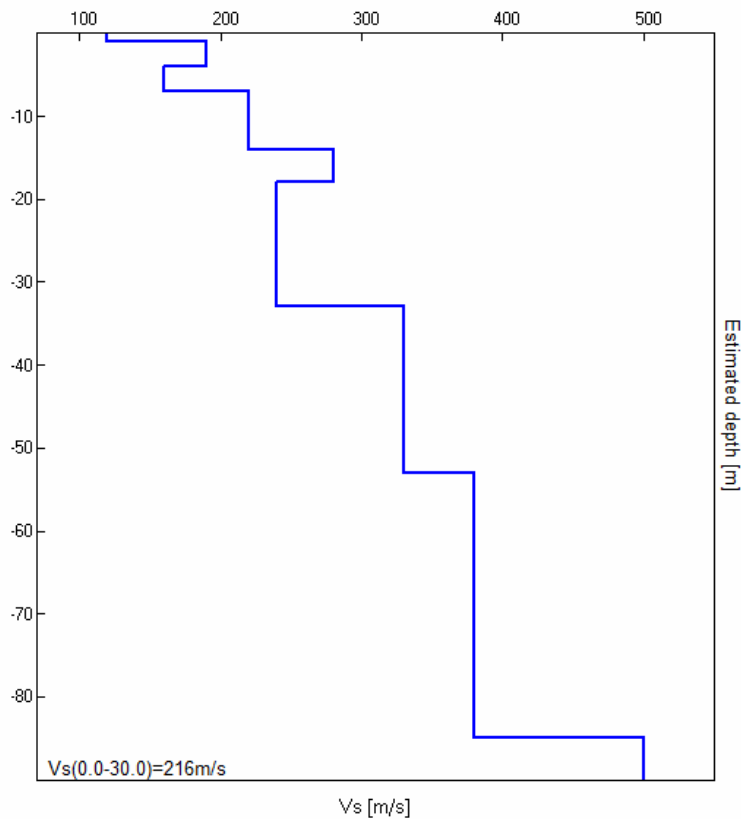


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
1.00	1.00	120
4.00	3.00	190
7.00	3.00	160
14.00	7.00	220
18.00	4.00	280
33.00	15.00	240
53.00	20.00	330
85.00	32.00	380
inf.	inf.	500

Vs30 = 216 m/s



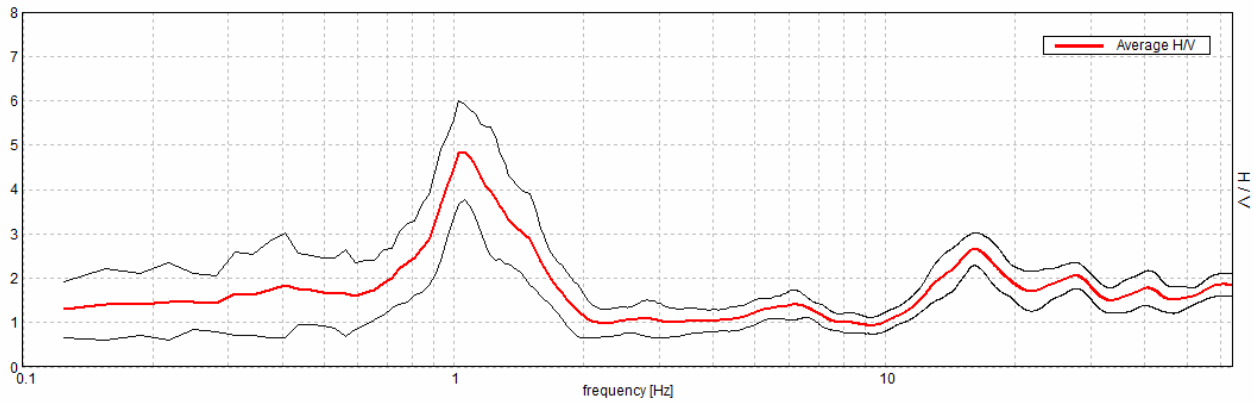
## MICROZONAZIONE MIRANDOLA, R057

Start recording: 25/11/11 10:39:27      End recording: 25/11/11 11:09:28  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

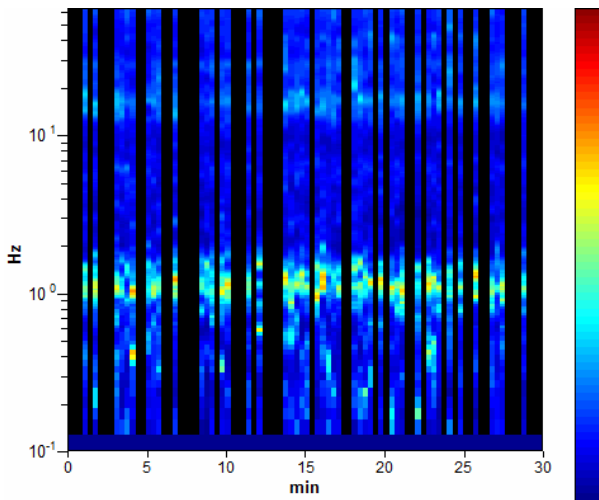
Trace length: 0h30'00".      Analyzed 51% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

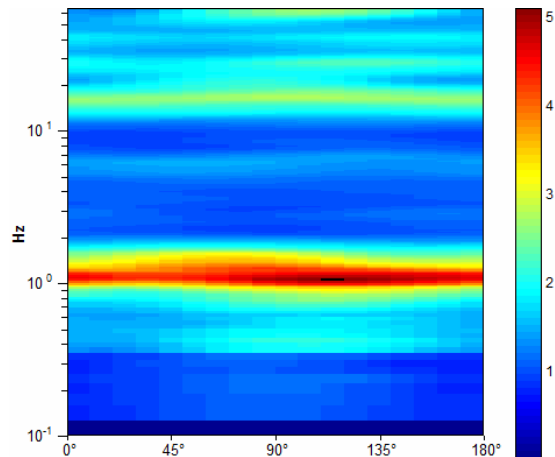
Max. H/V at  $1.06 \pm 0.01$  Hz (in the range 0.0 - 64.0 Hz).



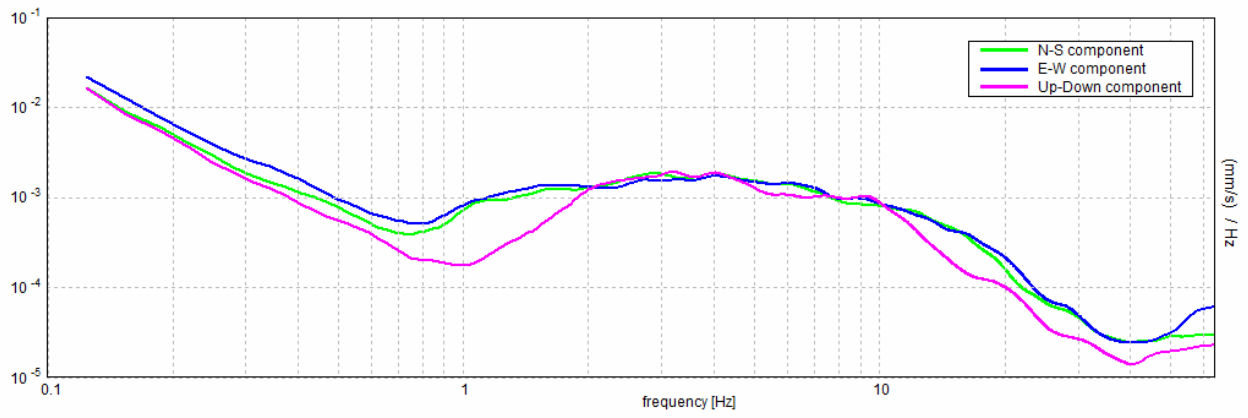
### H/V TIME HISTORY



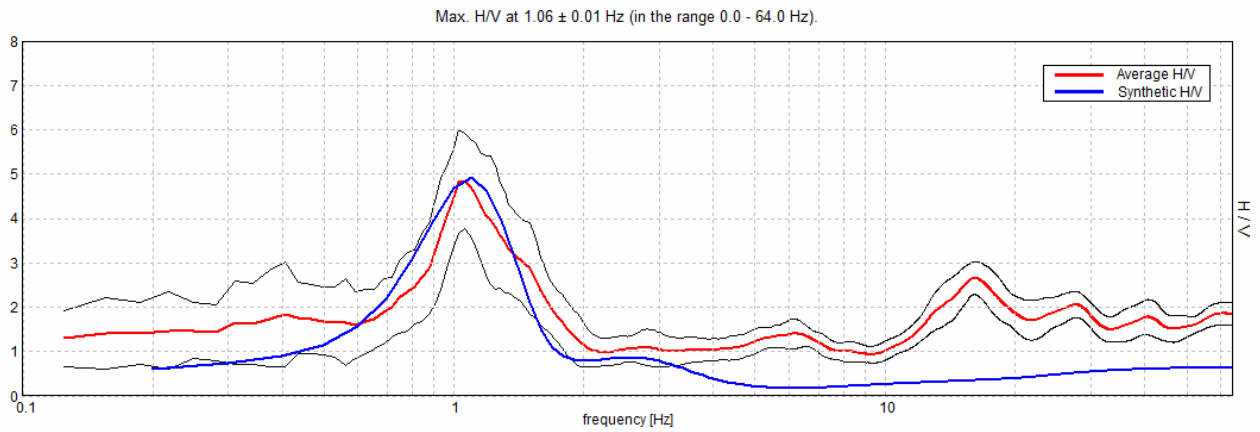
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

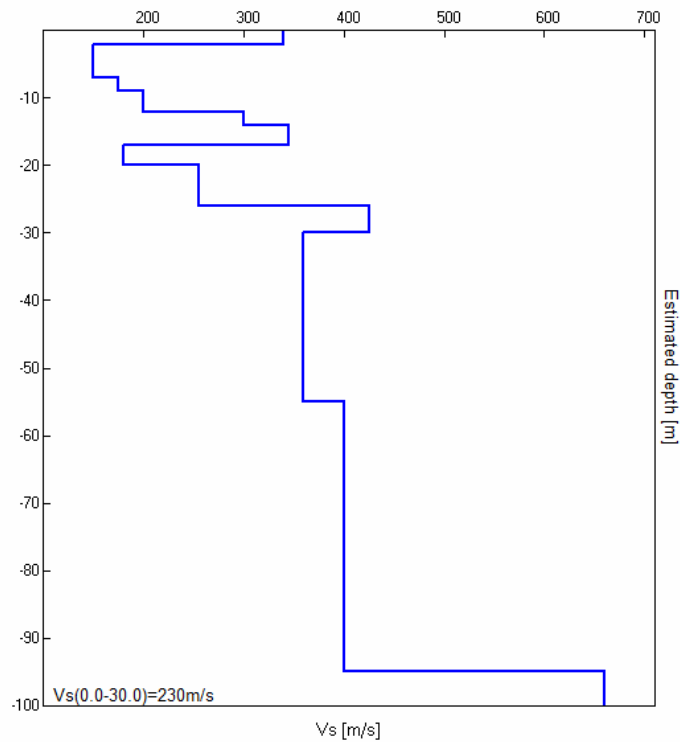


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
2.00	2.00	340
7.00	5.00	150
9.00	2.00	175
12.00	3.00	200
14.00	2.00	300
17.00	3.00	345
20.00	3.00	180
26.00	6.00	255
30.00	4.00	425
55.00	25.00	360
95.00	40.00	400
inf.	inf.	660

Vs30 = 230 m/s



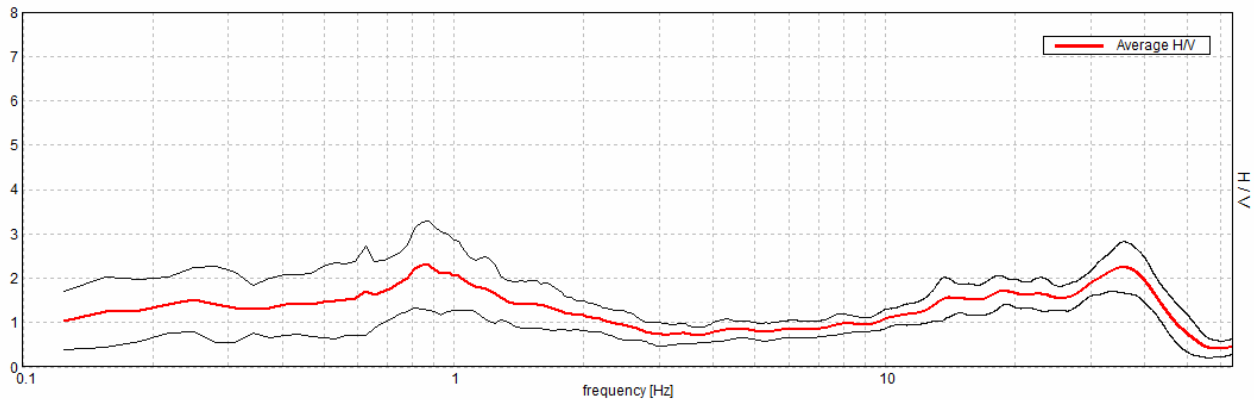
## MICROZONAZIONE MIRANDOLA, R058

Start recording: 25/11/11 11:50:31      End recording: 25/11/11 12:10:32  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

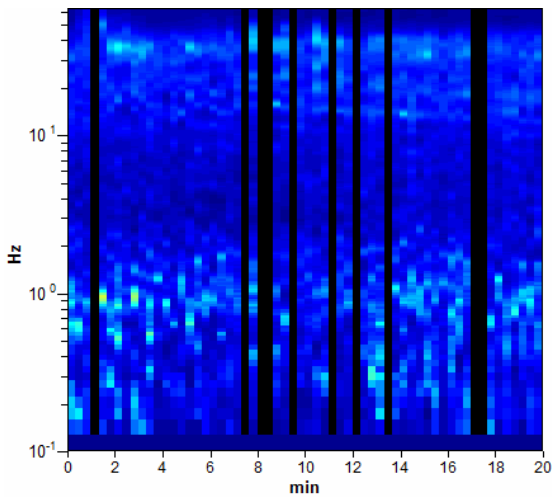
Trace length: 0h20'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

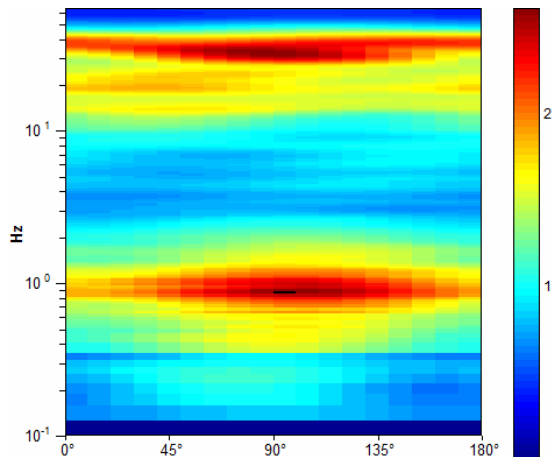
Max. H/V at  $0.88 \pm 6.16$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

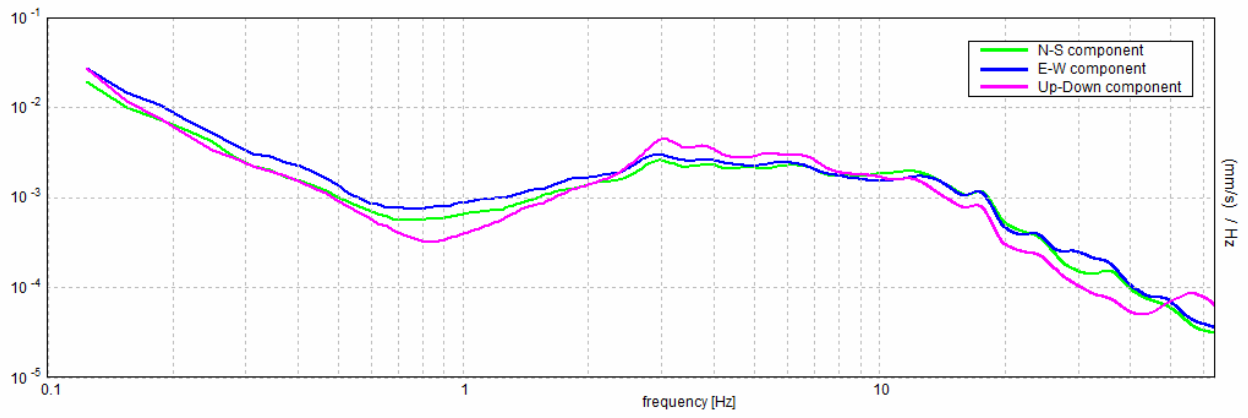


### DIRECTIONAL H/V

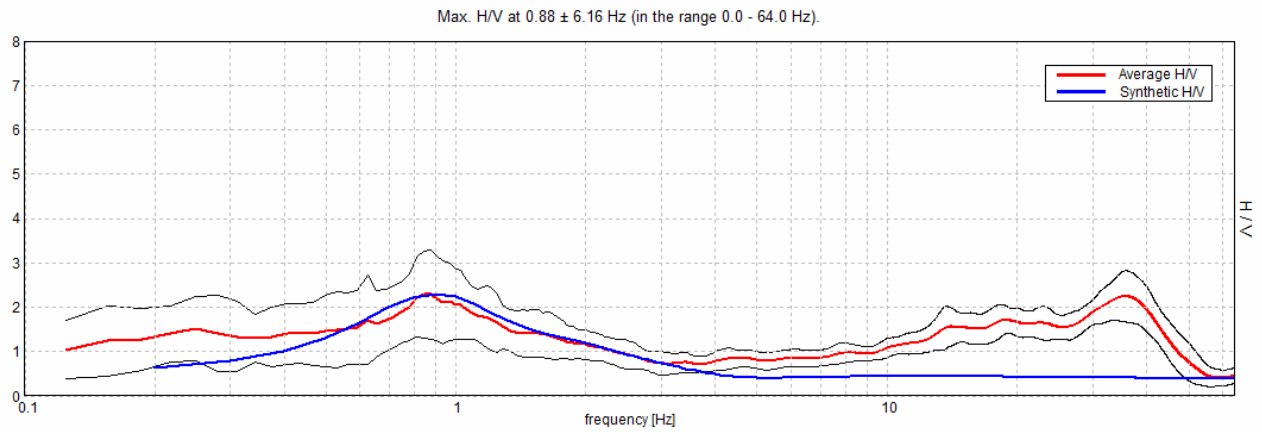




### SINGLE COMPONENT SPECTRA

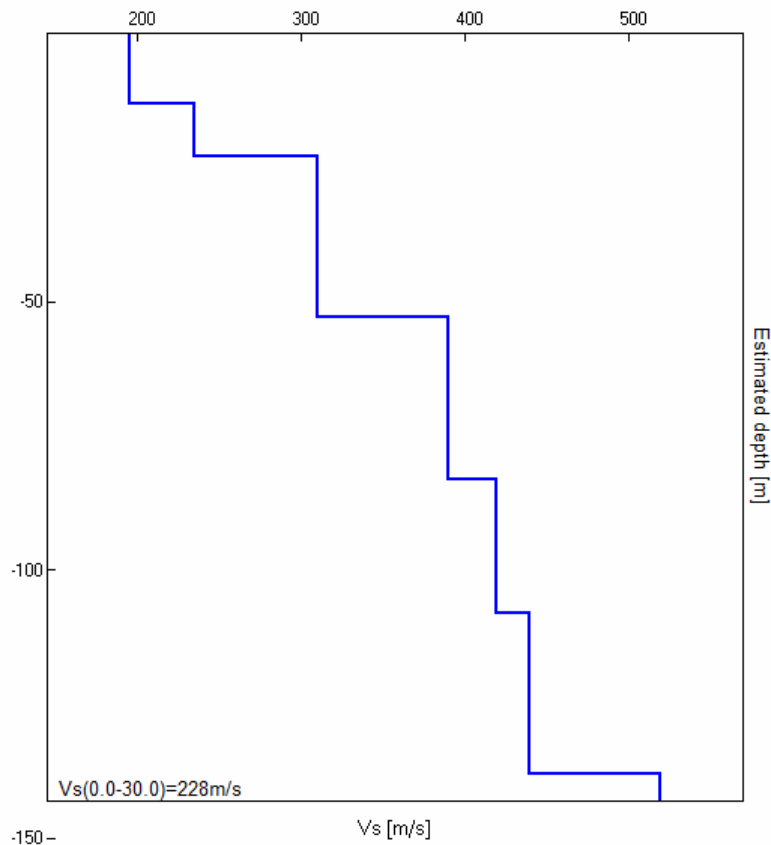


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
13.00	13.00	195
23.00	10.00	235
53.00	30.00	310
83.00	30.00	390
108.00	25.00	420
138.00	30.00	440
inf.	inf.	520

Vs30 = 228 m/s



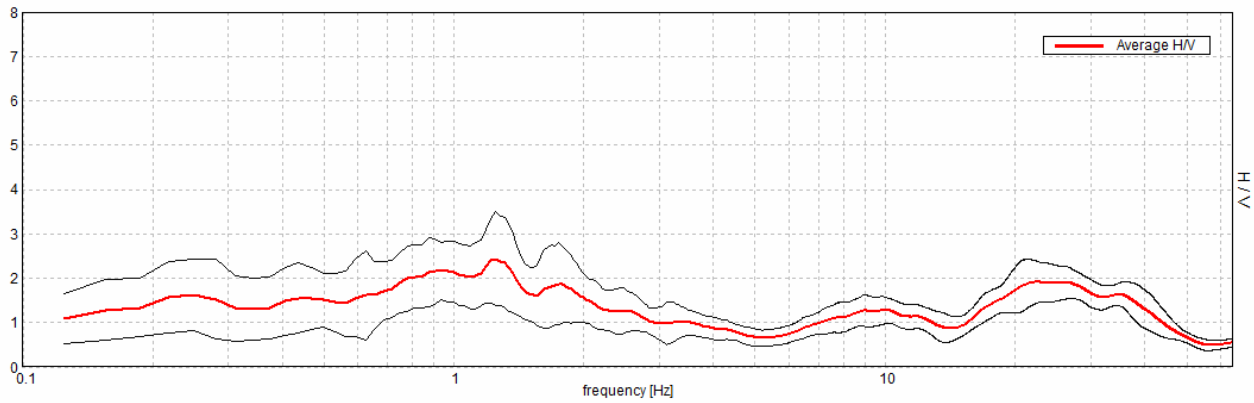
## MICROZONAZIONE MIRANDOLA, R059

Start recording: 25/11/11 14:09:39      End recording: 25/11/11 14:29:40  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

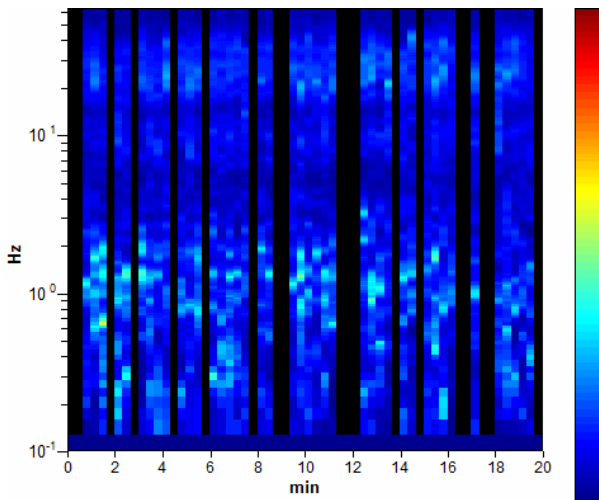
Trace length: 0h20'00".      Analyzed 68% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

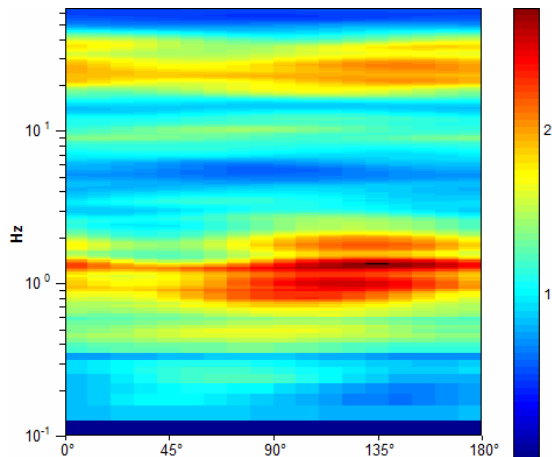
Max. H/V at  $1.25 \pm 0.03$  Hz (in the range 0.0 - 64.0 Hz).



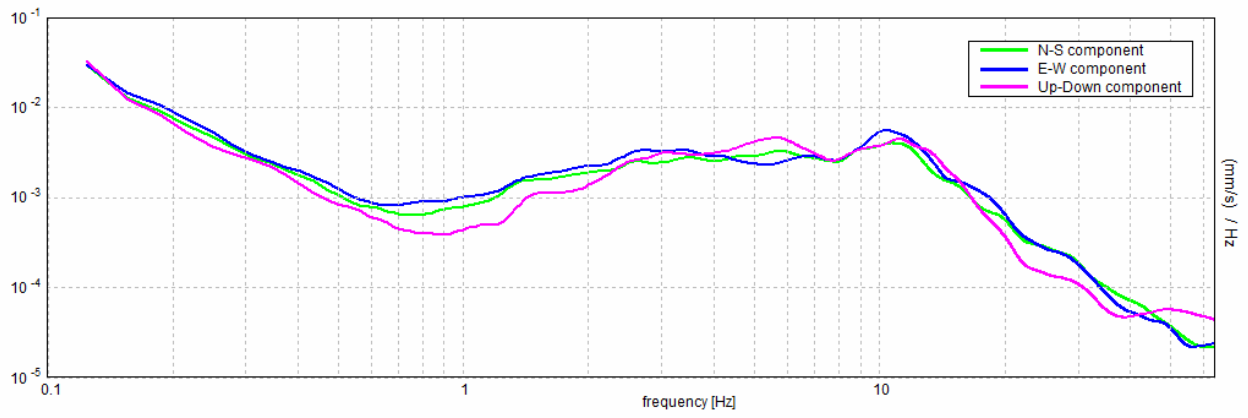
### H/V TIME HISTORY



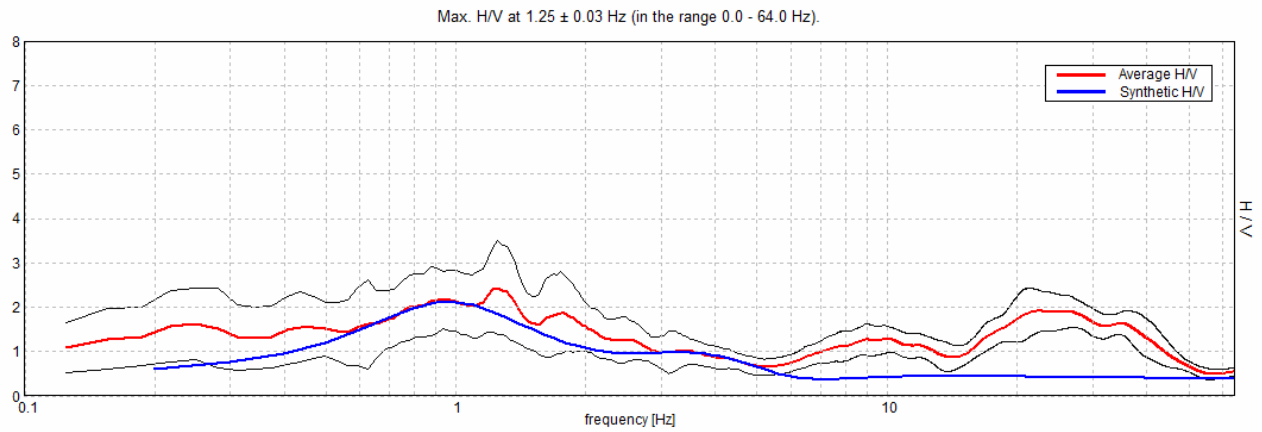
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

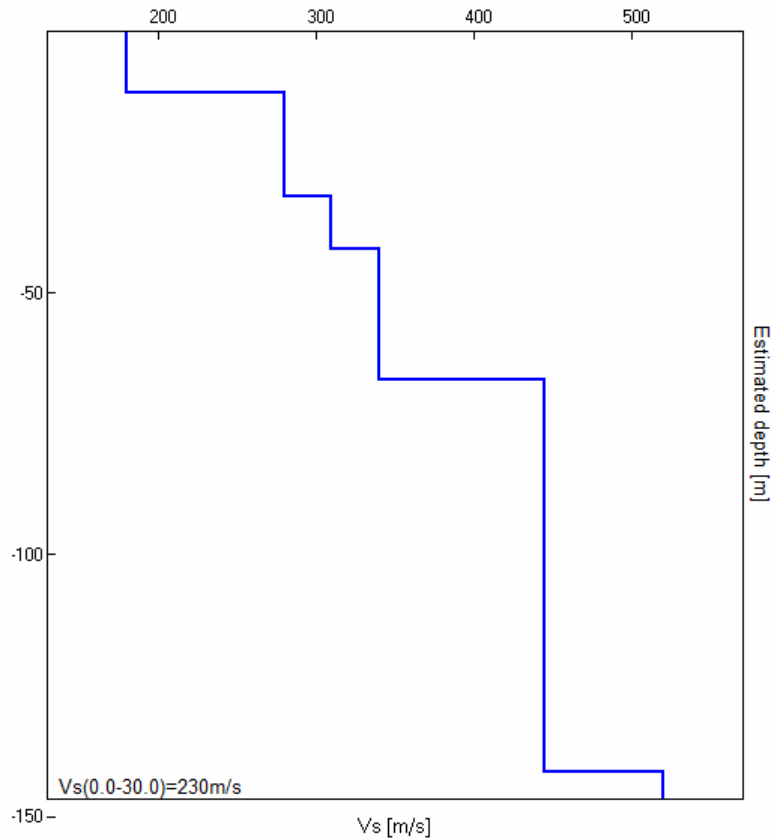


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
11.60	11.60	180
31.60	20.00	280
41.60	10.00	310
66.60	25.00	340
141.60	75.00	445
inf.	inf.	520

Vs30 = 230 m/s



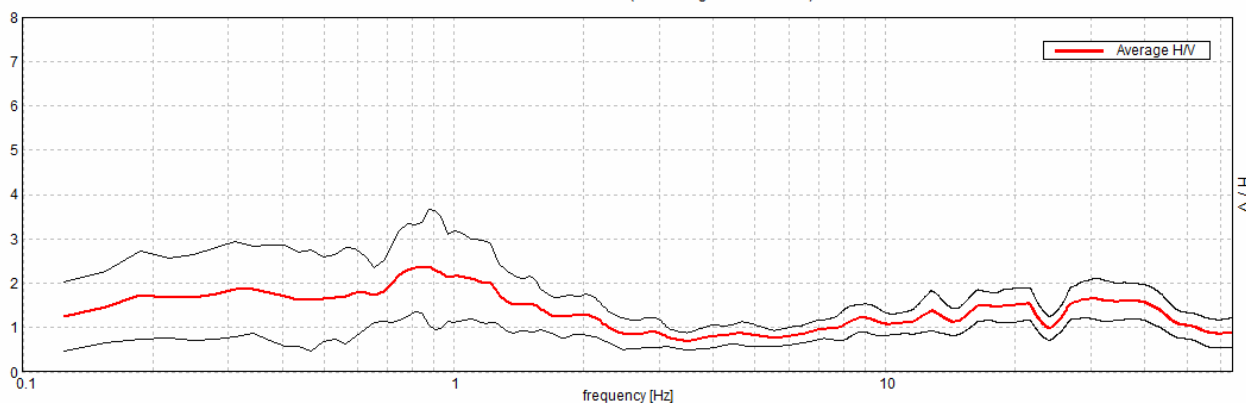
## MICROZONAZIONE MIRANDOLA, R060

Start recording: 25/11/11 15:02:21      End recording: 25/11/11 15:22:22  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

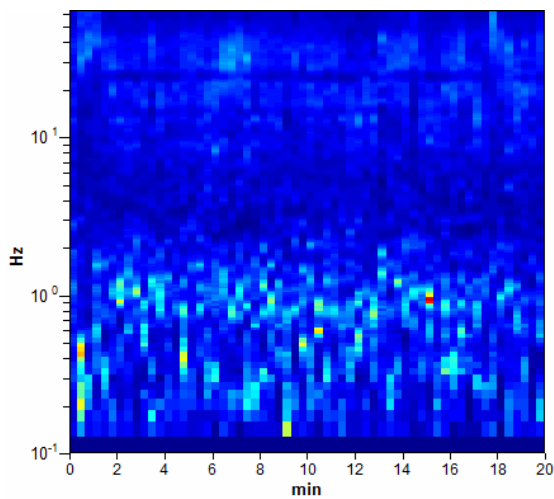
Trace length: 0h20'00".      Analysis performed on the entire trace.  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

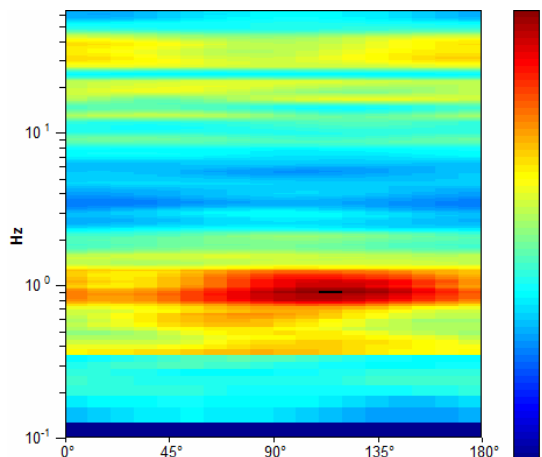
Max. H/V at  $0.88 \pm 0.05$  Hz (in the range 0.0 - 64.0 Hz).



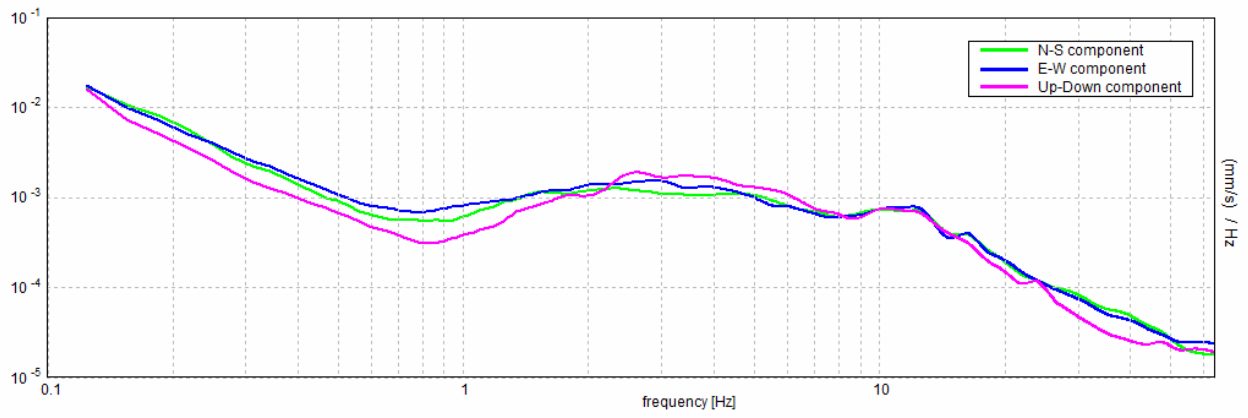
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



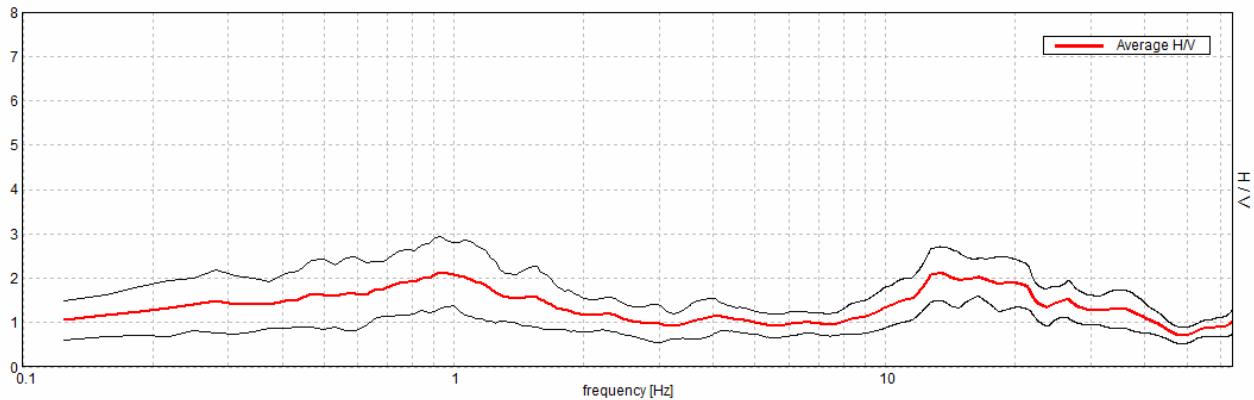
## MICROZONAZIONE MIRANDOLA, R061

Start recording: 25/11/11 15:27:53      End recording: 25/11/11 15:57:53  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

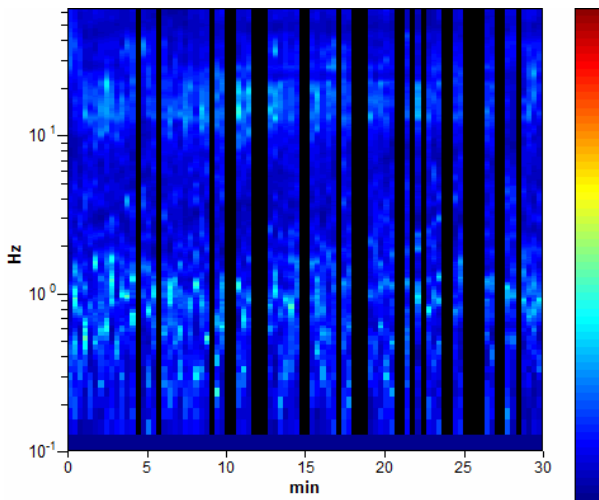
Trace length: 0h30'00".      Analyzed 70% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

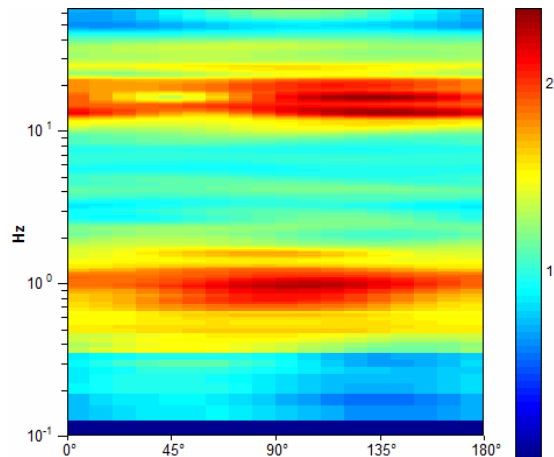
Max. H/V at  $0.94 \pm 1.96$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

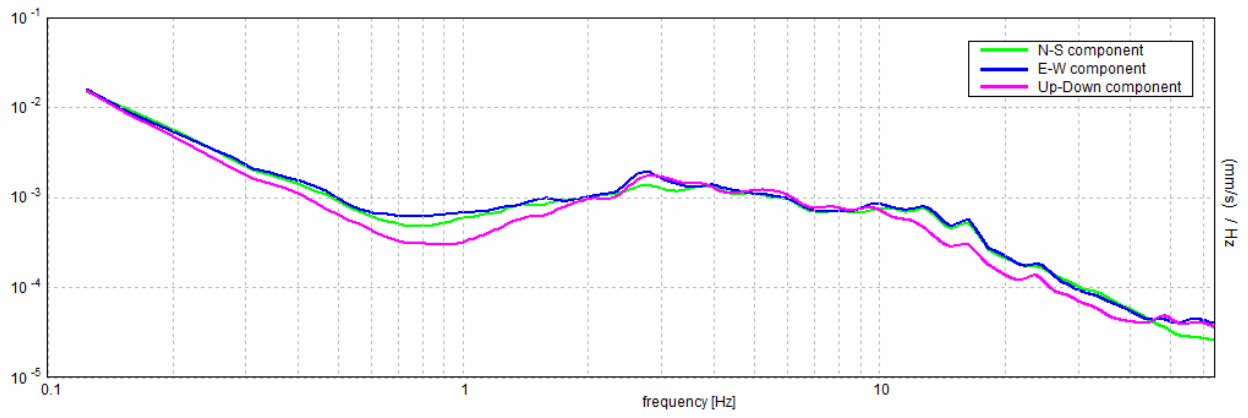


### DIRECTIONAL H/V

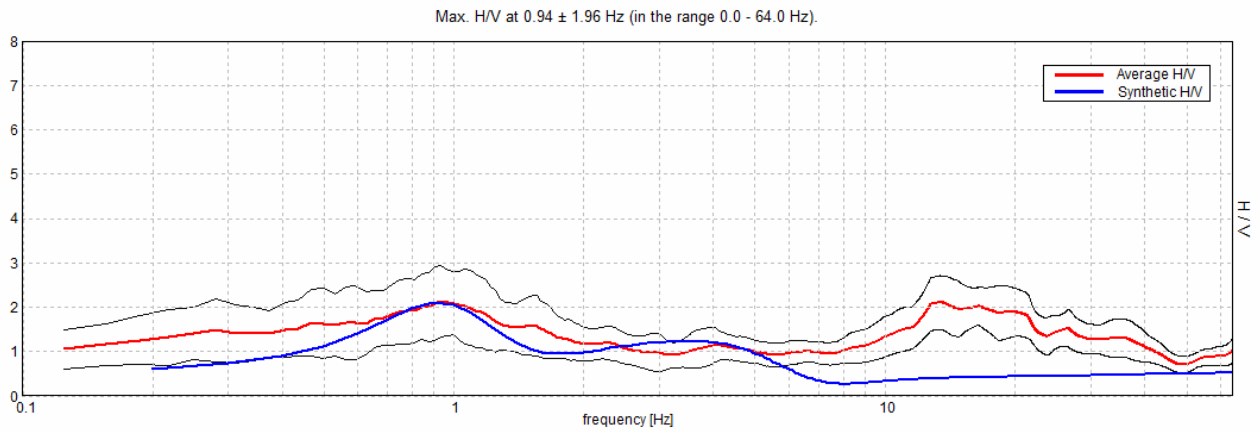




### SINGLE COMPONENT SPECTRA

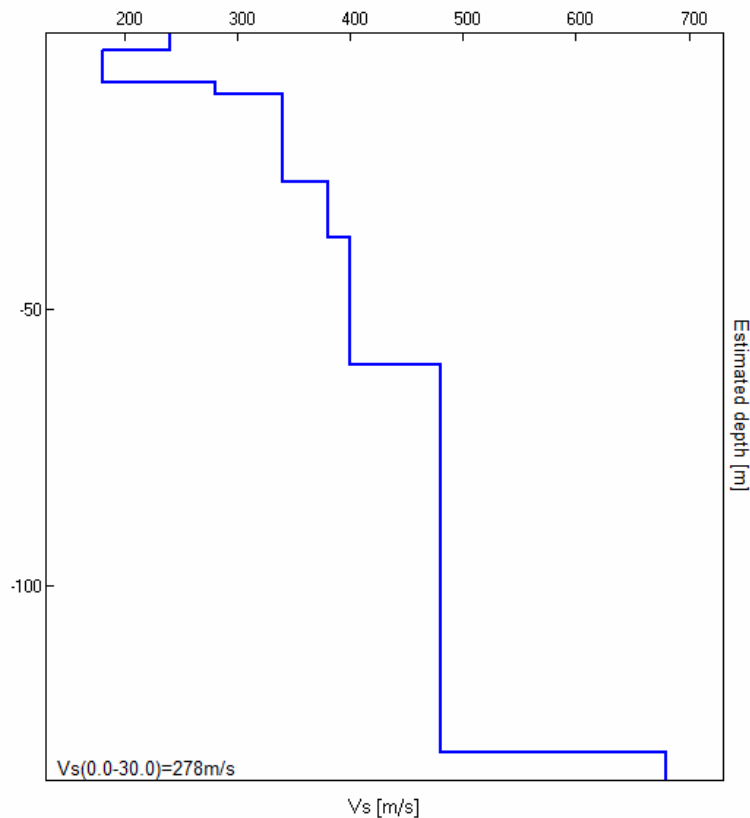


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
3.00	3.00	240
9.00	6.00	180
11.00	2.00	280
27.00	16.00	340
37.00	10.00	380
60.00	23.00	400
130.00	70.00	480
inf.	inf.	680

Vs30 = 278 m/s



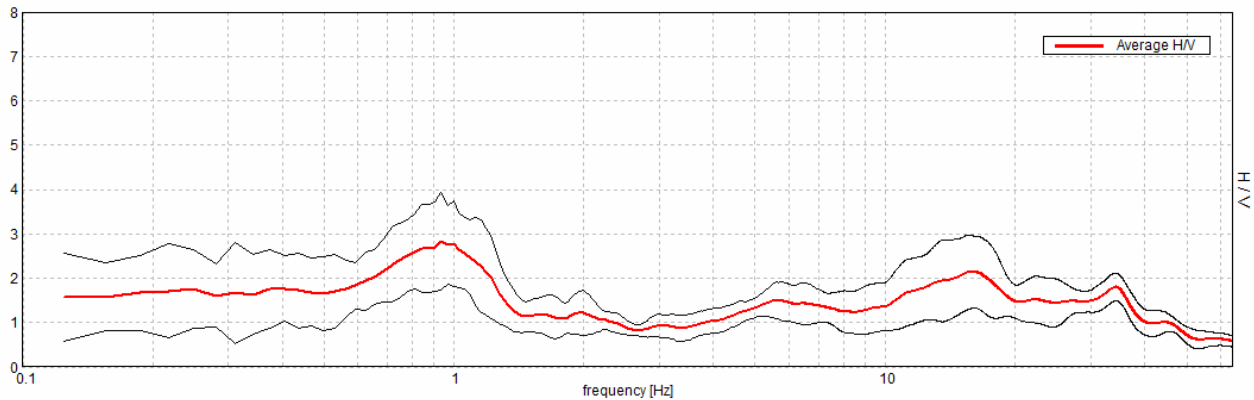
## MICROZONAZIONE MIRANDOLA, R062

Start recording: 07/12/11 09:53:58      End recording: 07/12/00 10:05:59  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

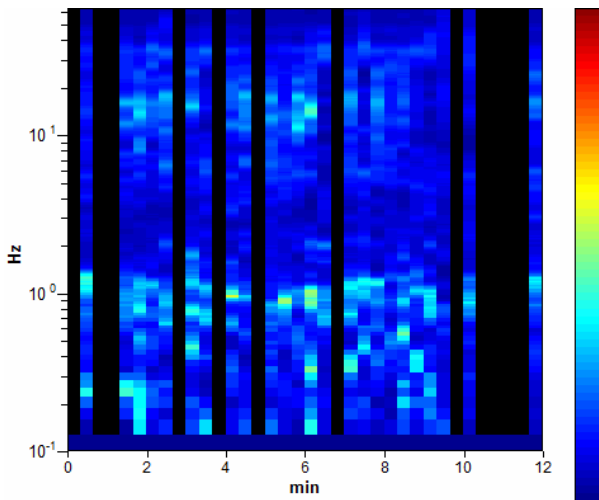
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

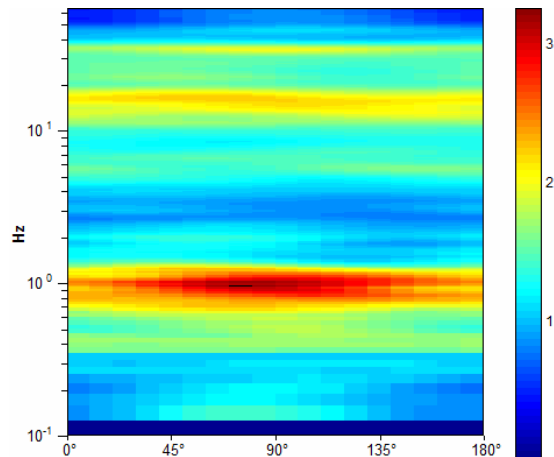
Max. H/V at  $0.94 \pm 0.13$  Hz (in the range 0.0 - 64.0 Hz).



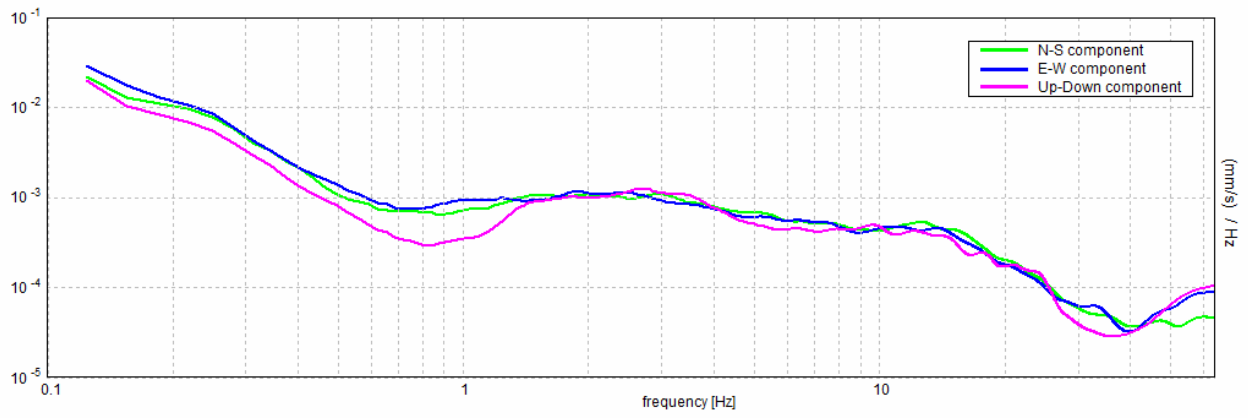
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



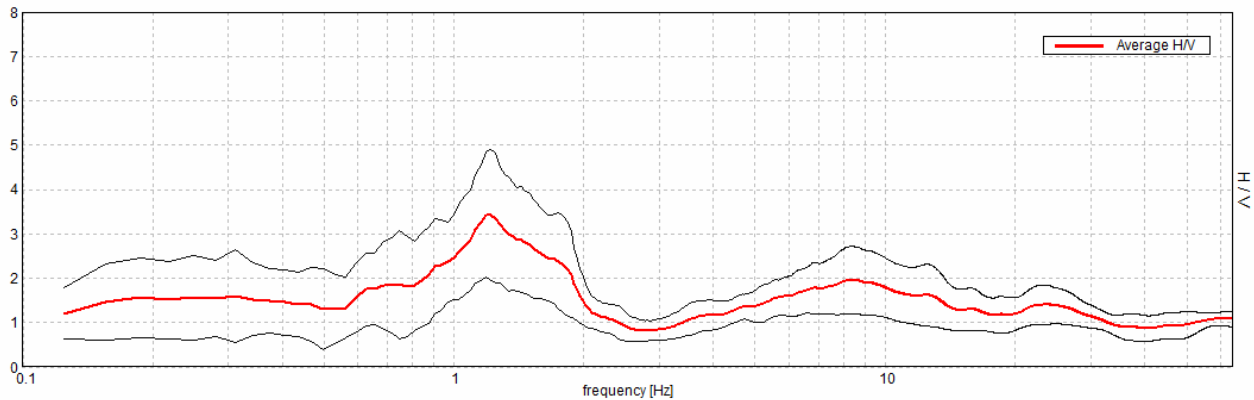
## MICROZONAZIONE MIRANDOLA, R063

Start recording: 07/12/11 10:27:11      End recording: 07/12/00 10:47:12  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

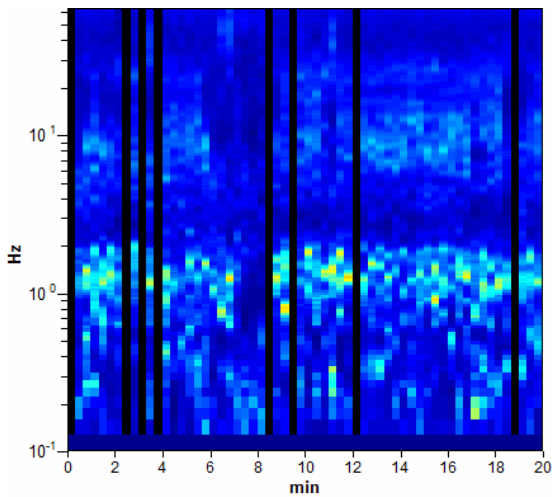
Trace length: 0h20'00".      Analyzed 87% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

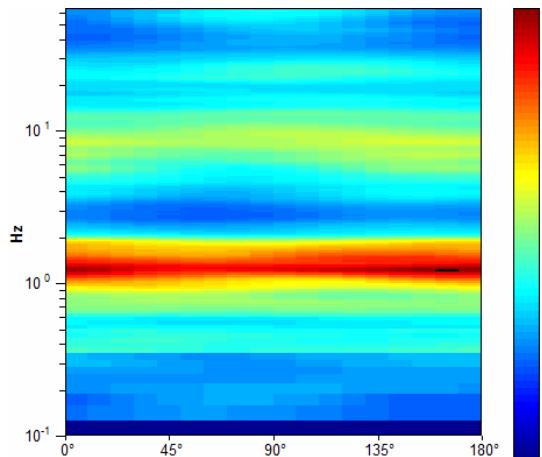
Max. H/V at  $1.19 \pm 0.01$  Hz (in the range 0.0 - 64.0 Hz).



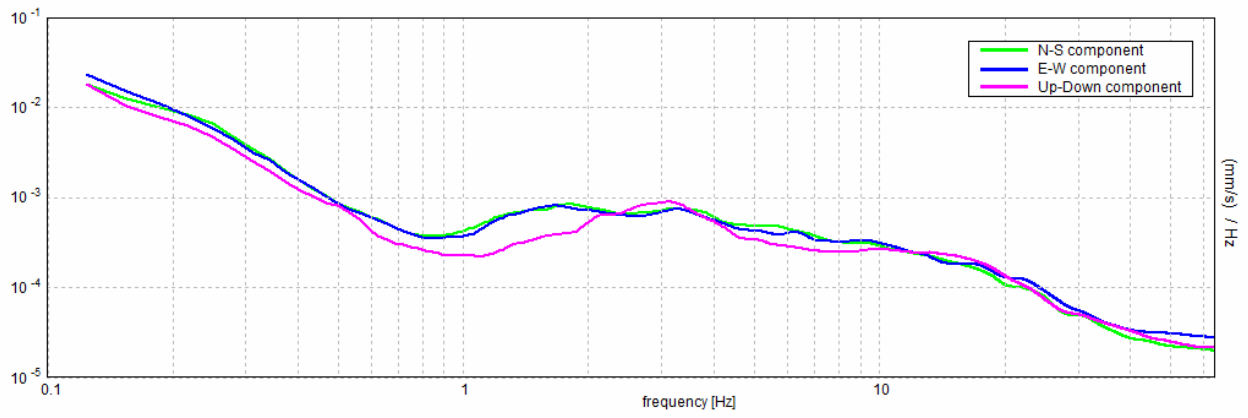
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



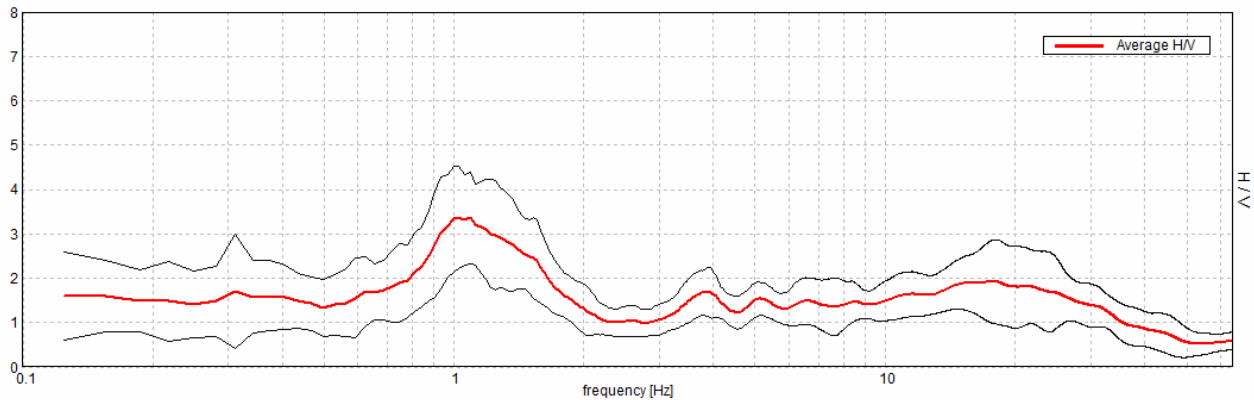
## MICROZONAZIONE MIRANDOLA, R064

Start recording: 07/12/11 10:59:11      End recording: 07/12/00 11:19:12  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

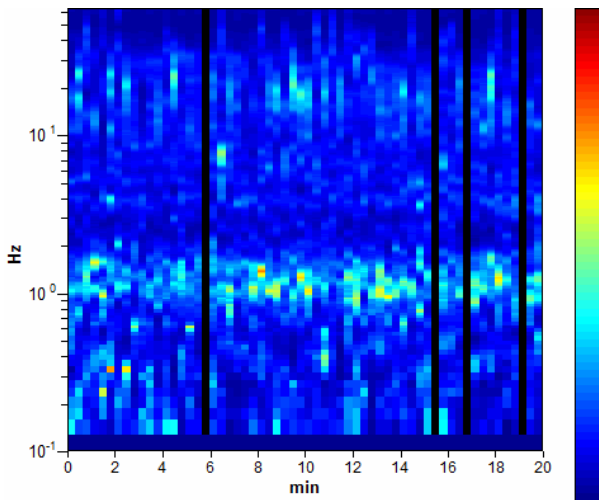
Trace length: 0h20'00".      Analyzed 93% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

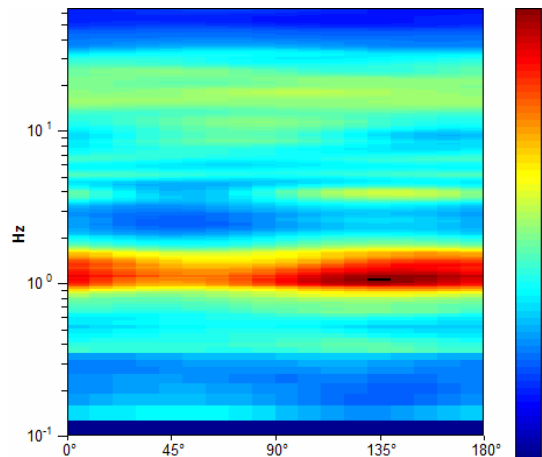
Max. H/V at  $1.03 \pm 0.02$  Hz (in the range 0.0 - 64.0 Hz).



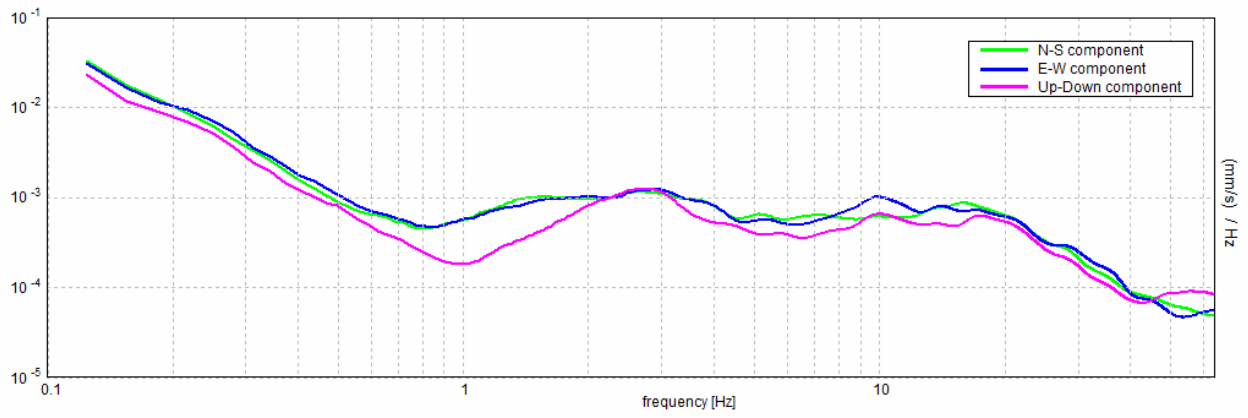
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



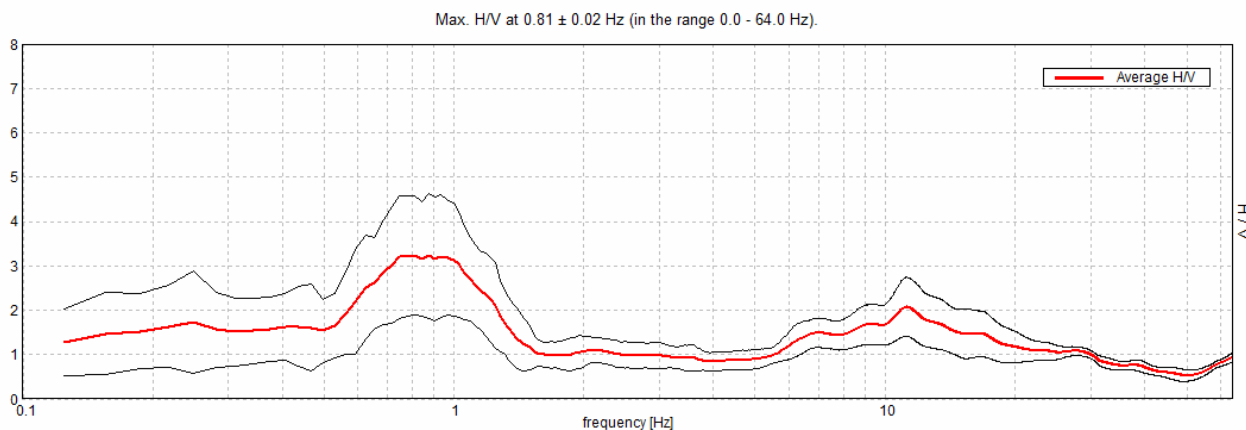


## MICROZONAZIONE MIRANDOLA, R065

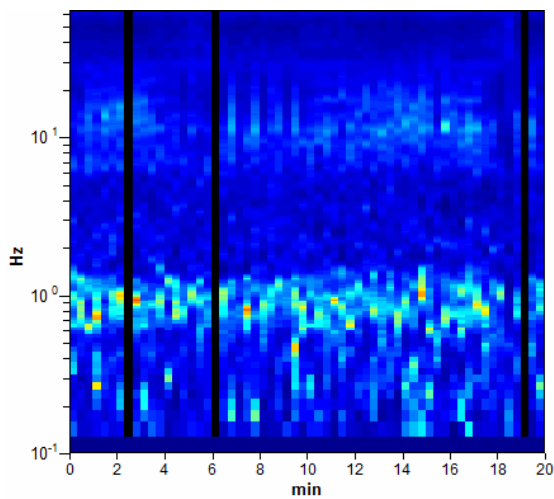
Start recording: 07/12/11 11:49:47      End recording: 07/12/00 12:09:48  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h20'00".      Analyzed 95% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

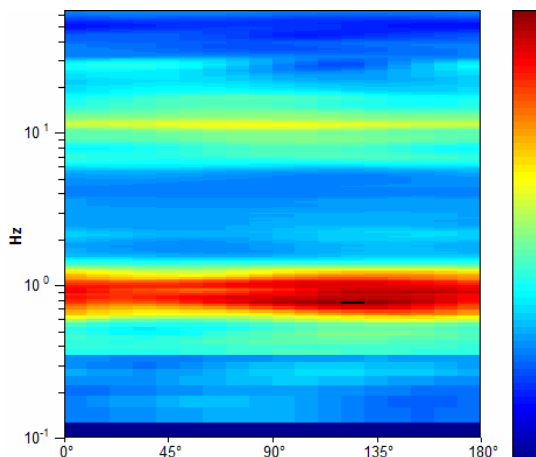
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



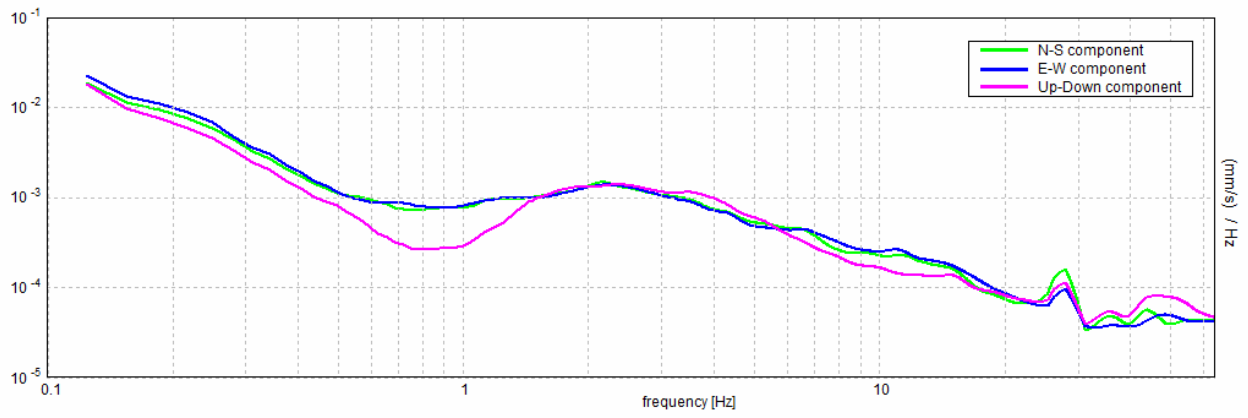
### H/V TIME HISTORY



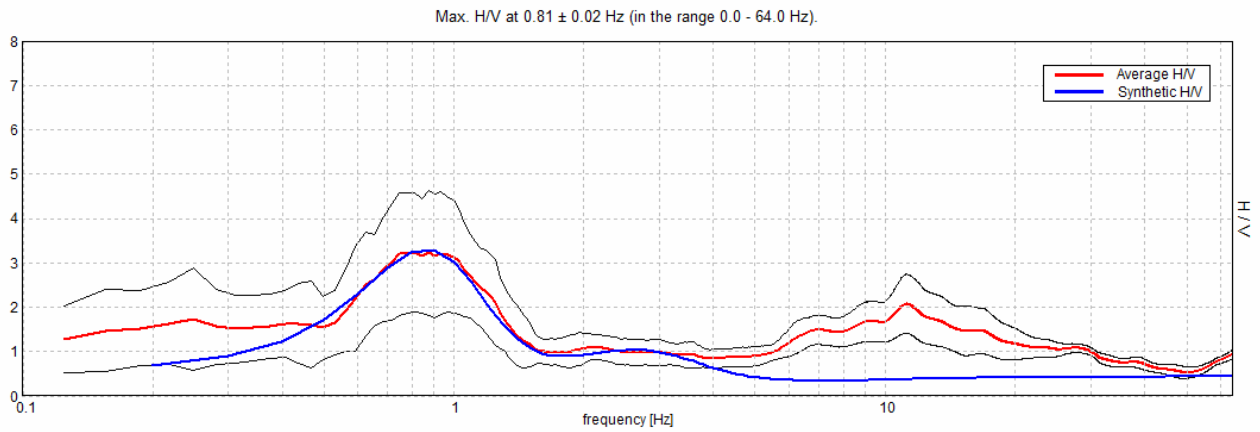
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

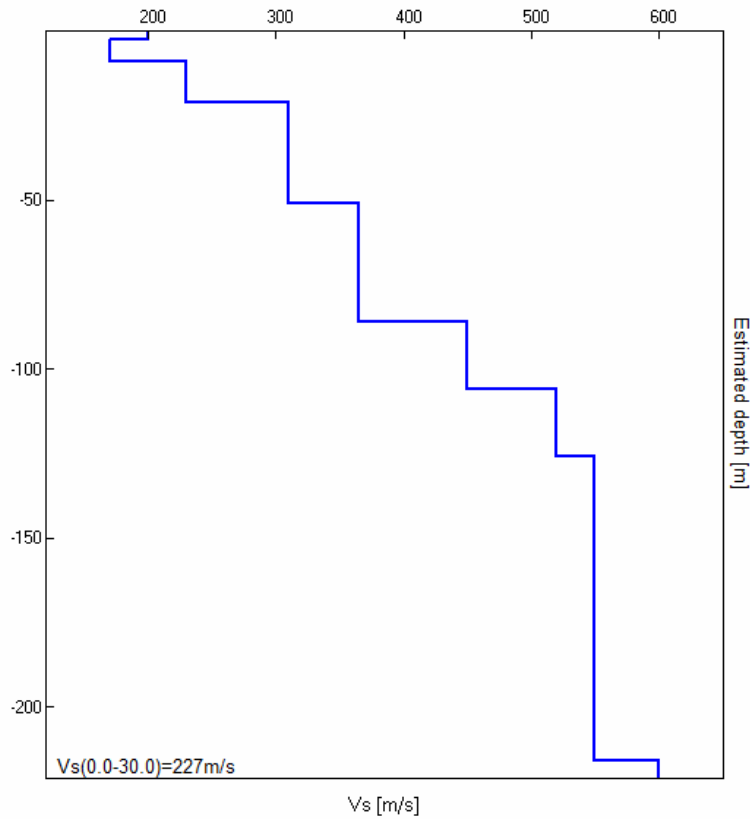


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
2.50	2.50	200
9.00	6.50	170
21.00	12.00	230
51.00	30.00	310
86.00	35.00	365
106.00	20.00	450
126.00	20.00	520
216.00	90.00	550
inf.	inf.	600

Vs30 = 227 m/s



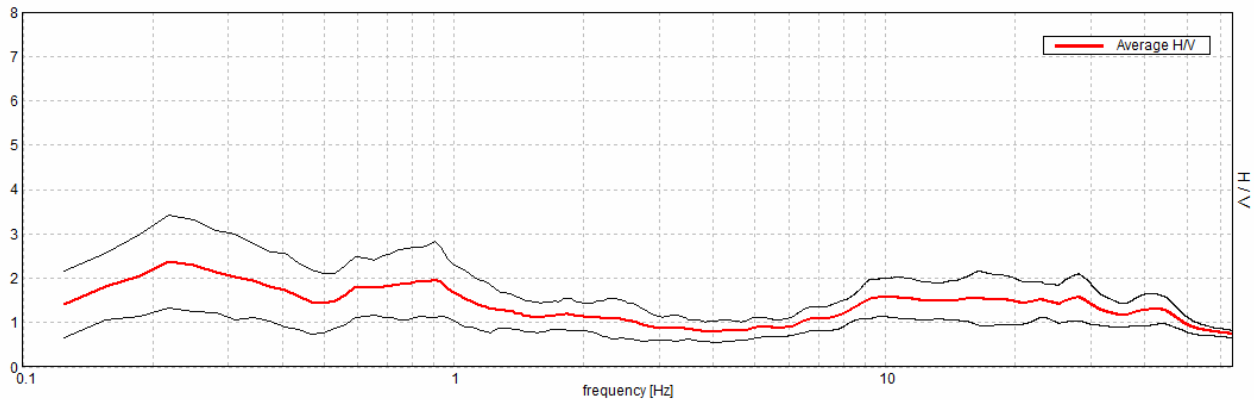
## MICROZONAZIONE MIRANDOLA, R066

Start recording: 07/12/11 13:17:46      End recording: 07/12/00 13:47:47  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

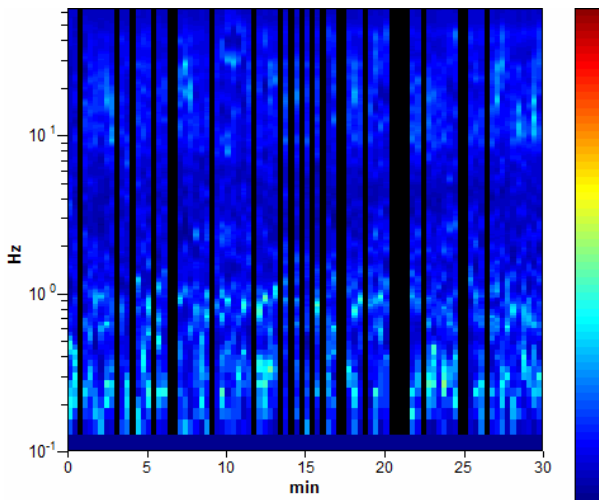
Trace length: 0h30'00".      Analyzed 73% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

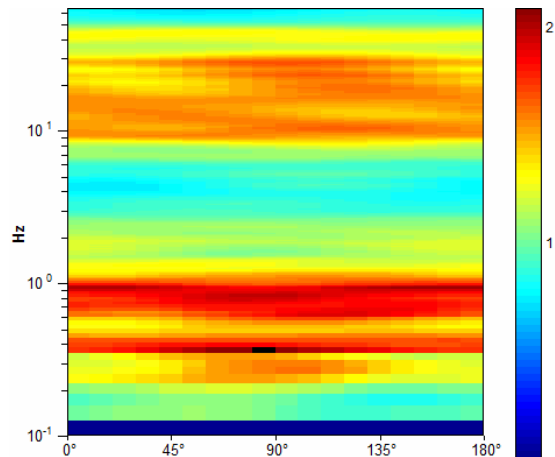
Max. H/V at  $0.22 \pm 0.01$  Hz (in the range 0.0 - 64.0 Hz).



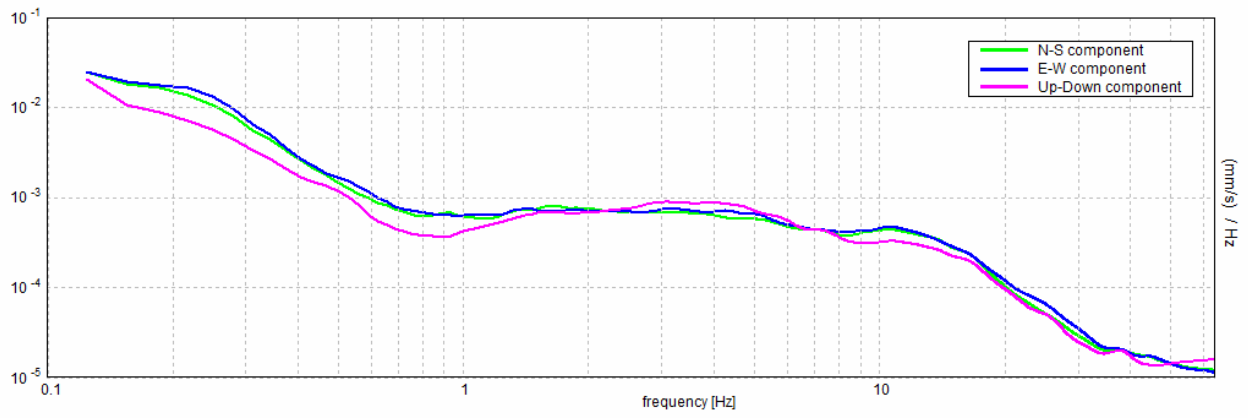
### H/V TIME HISTORY



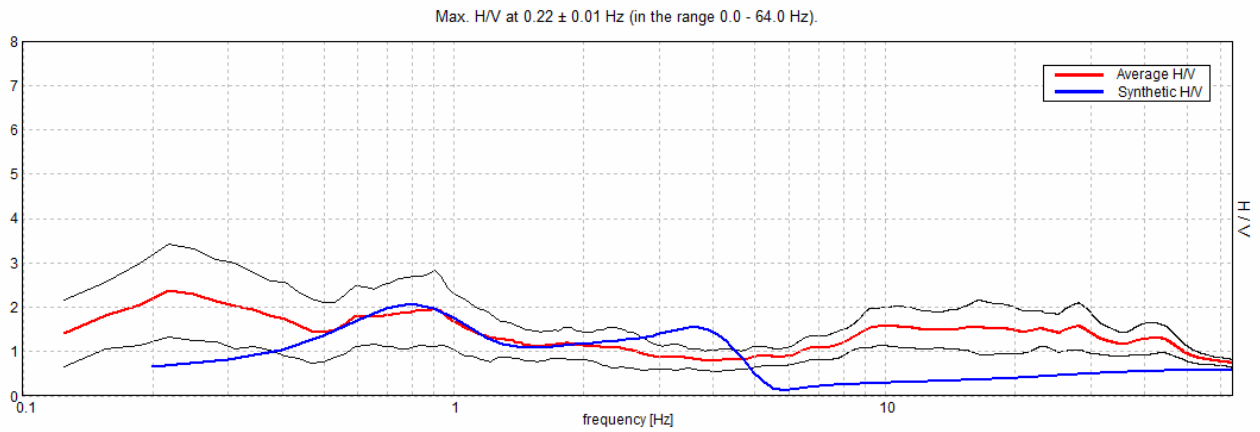
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

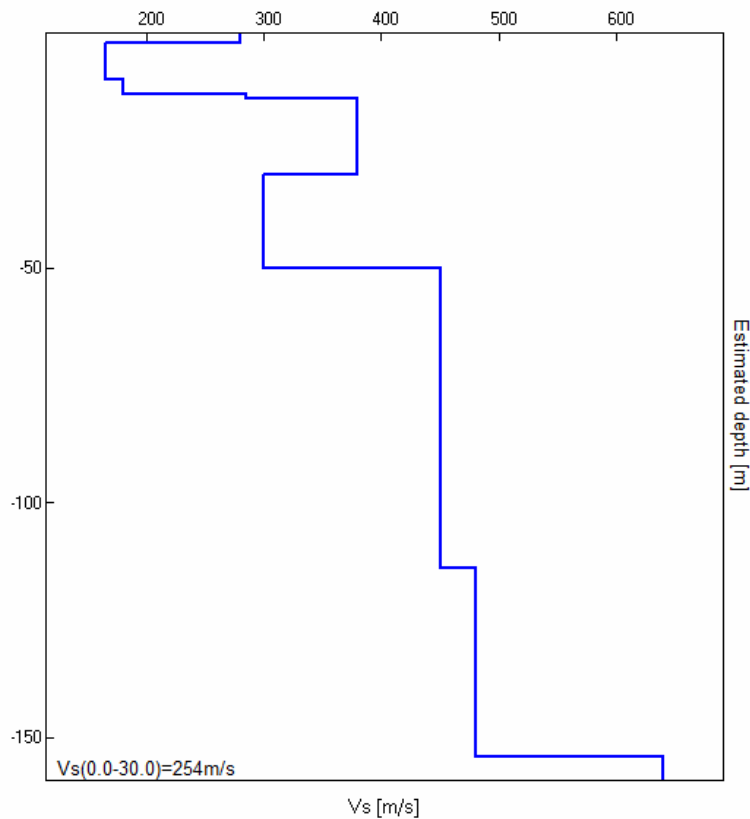


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
2.00	2.00	280
10.00	8.00	165
13.00	3.00	180
14.00	1.00	285
30.00	16.00	380
50.00	20.00	300
114.00	64.00	450
154.00	40.00	480
inf.	inf.	640

Vs30 = 254 m/s



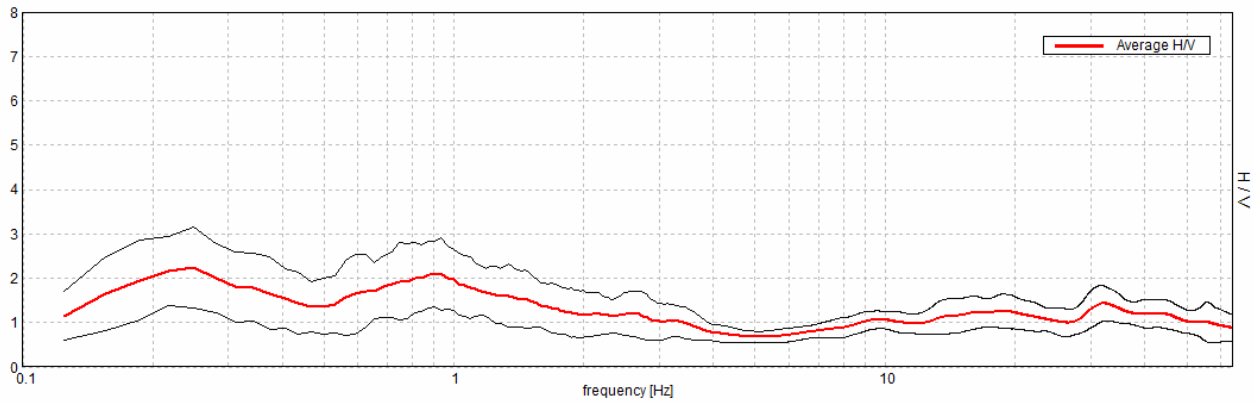
## MICROZONAZIONE MIRANDOLA, R067

Start recording: 07/12/11 13:56:48      End recording: 07/12/00 14:16:49  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

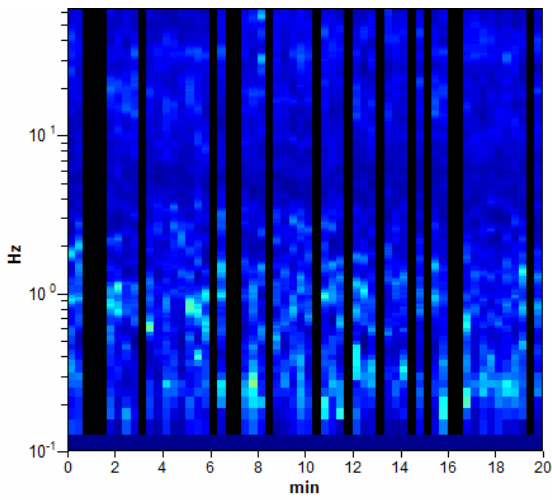
Trace length: 0h20'00".      Analyzed 73% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

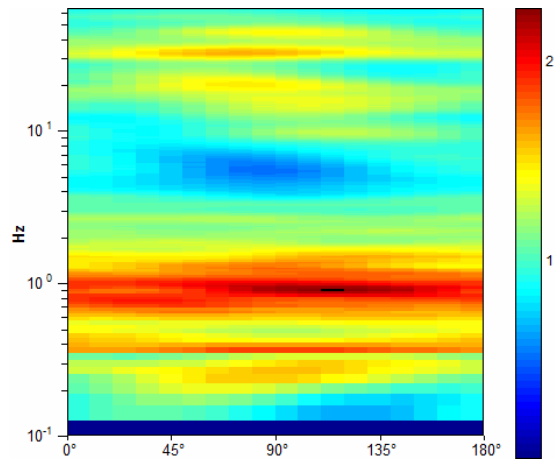
Max. H/V at  $0.25 \pm 0.2$  Hz. (In the range 0.0 - 64.0 Hz).



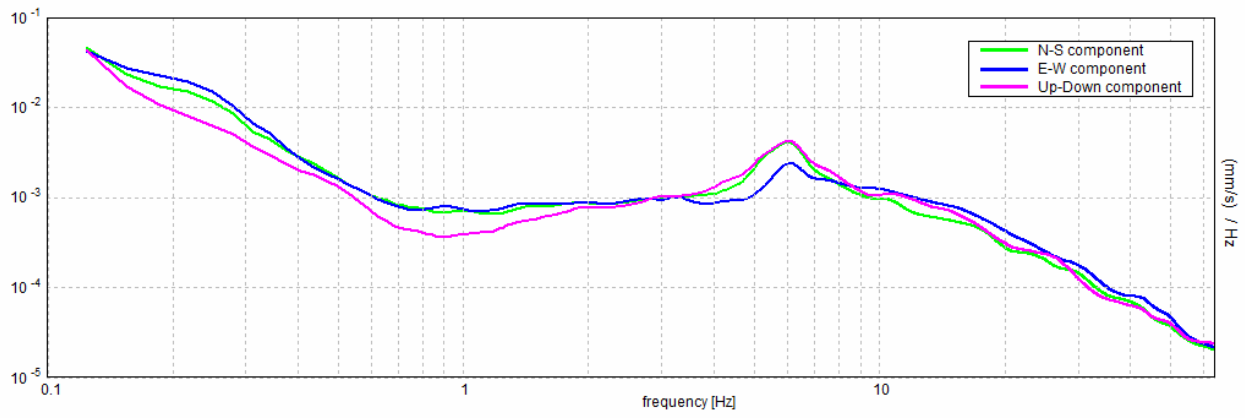
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





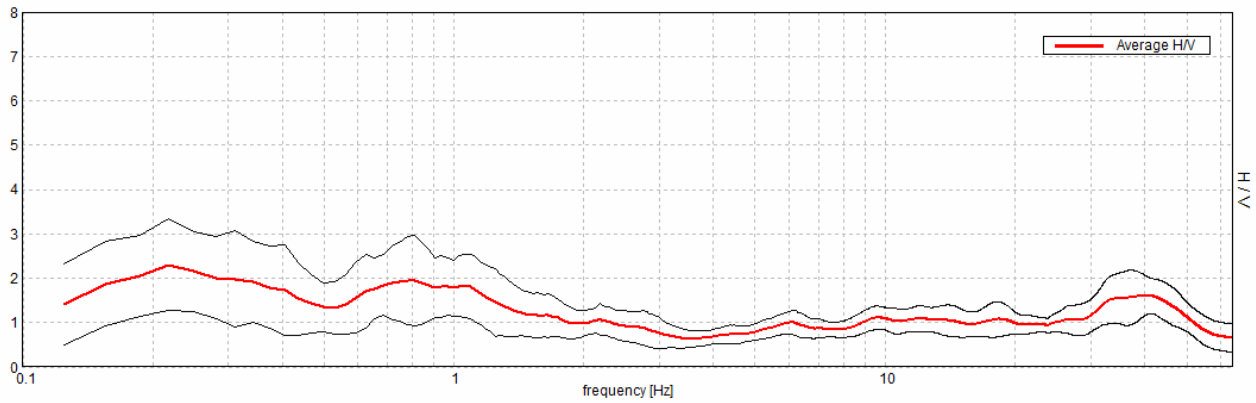
## MICROZONAZIONE MIRANDOLA, R068

Start recording: 07/12/11 14:24:40      End recording: 07/12/00 14:44:41  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

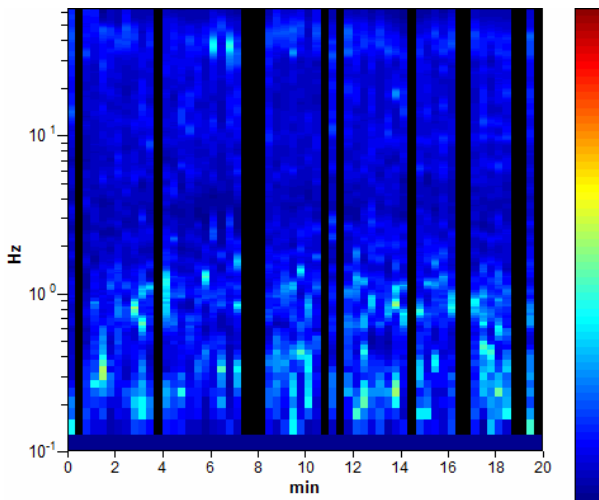
Trace length: 0h20'00".      Analyzed 78% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

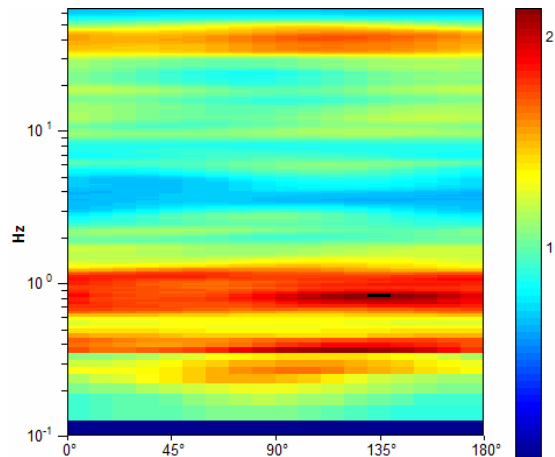
Max. H/V at  $0.22 \pm 0.01$  Hz. (In the range 0.0 - 64.0 Hz).



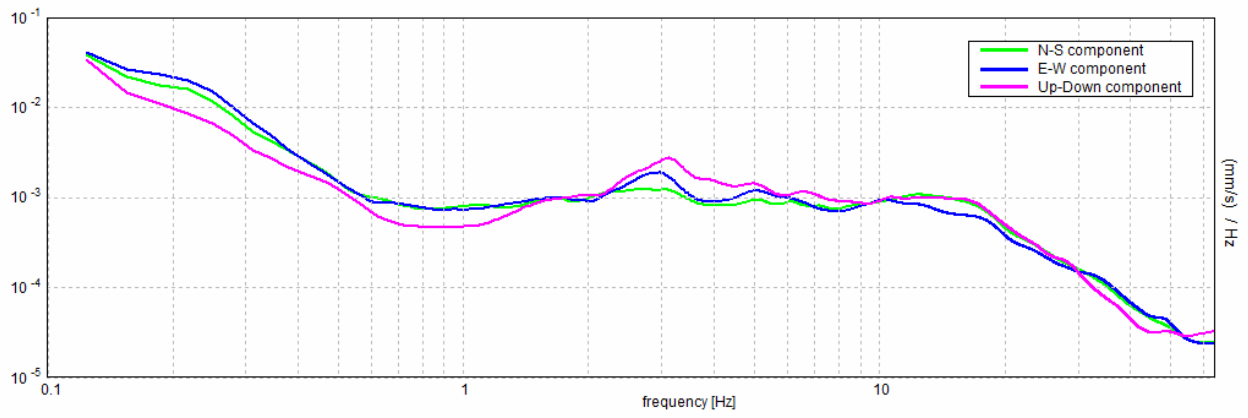
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



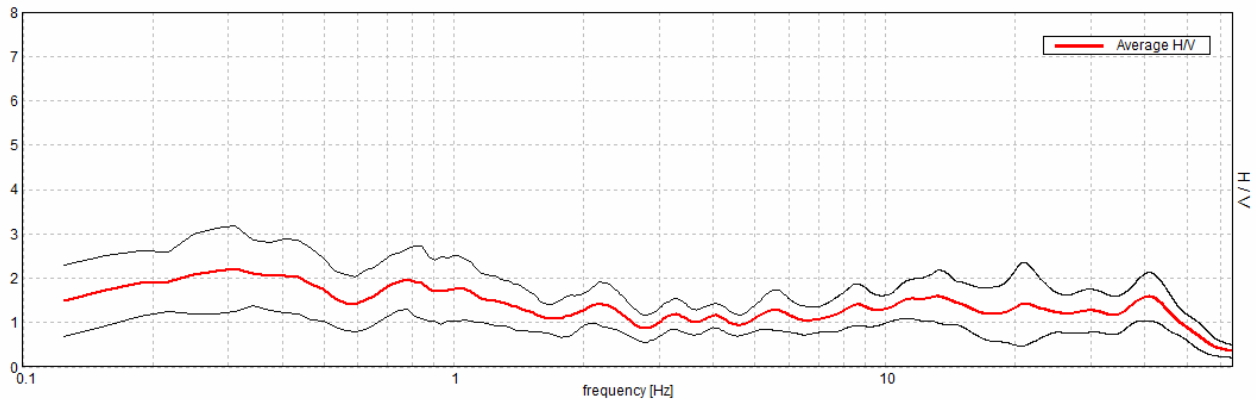
## MICROZONAZIONE MIRANDOLA, R069

Start recording: 07/12/11 15:09:00    End recording: 07/12/00 15:39:01  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

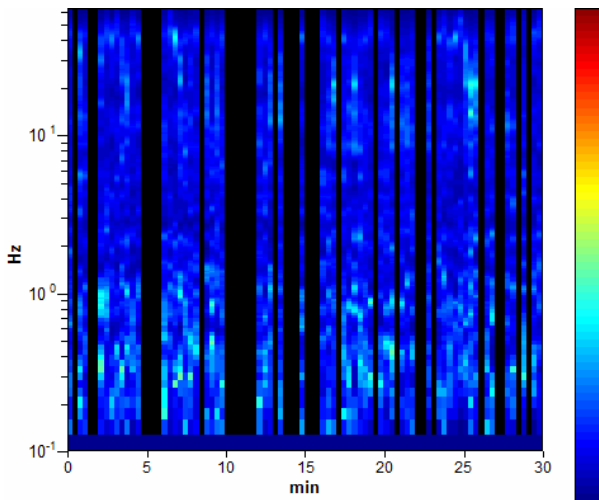
Trace length: 0h30'00".    Analyzed 64% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

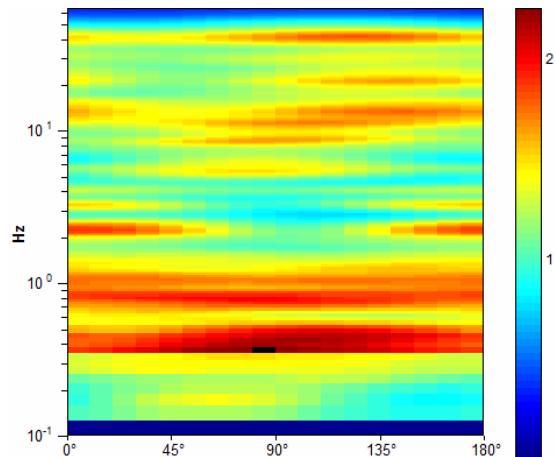
Max. H/V at  $0.31 \pm 0.02$  Hz (in the range 0.0 - 64.0 Hz).



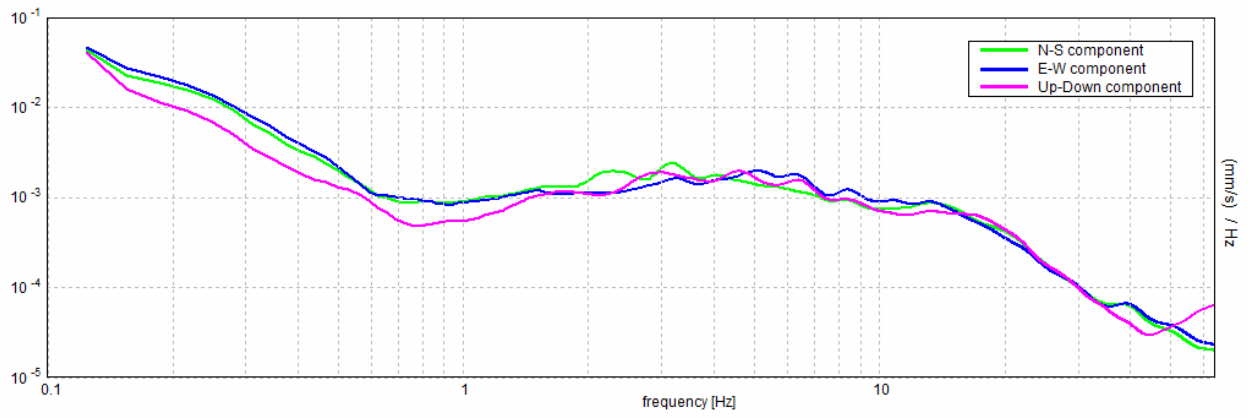
### H/V TIME HISTORY



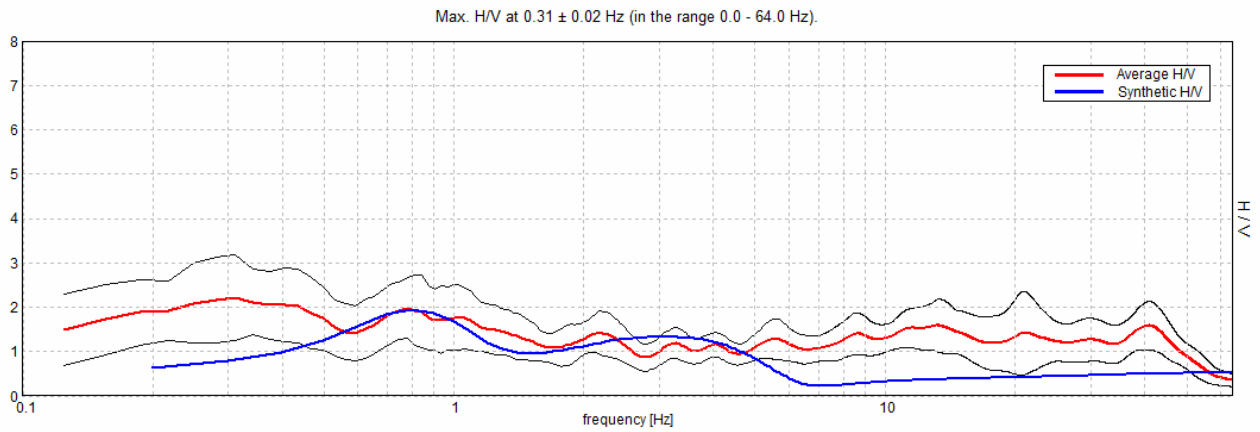
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

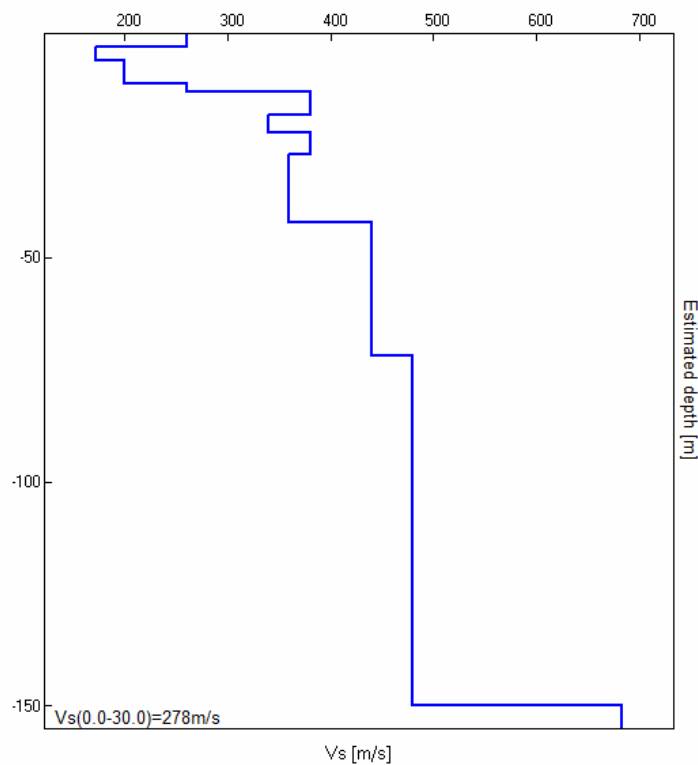


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
3.00	3.00	260
6.00	3.00	172
11.00	5.00	200
13.00	2.00	260
18.00	5.00	380
22.00	4.00	340
27.00	5.00	380
42.00	15.00	360
72.00	30.00	440
150.00	78.00	480
inf.	inf.	683

Vs30 = 278 m/s

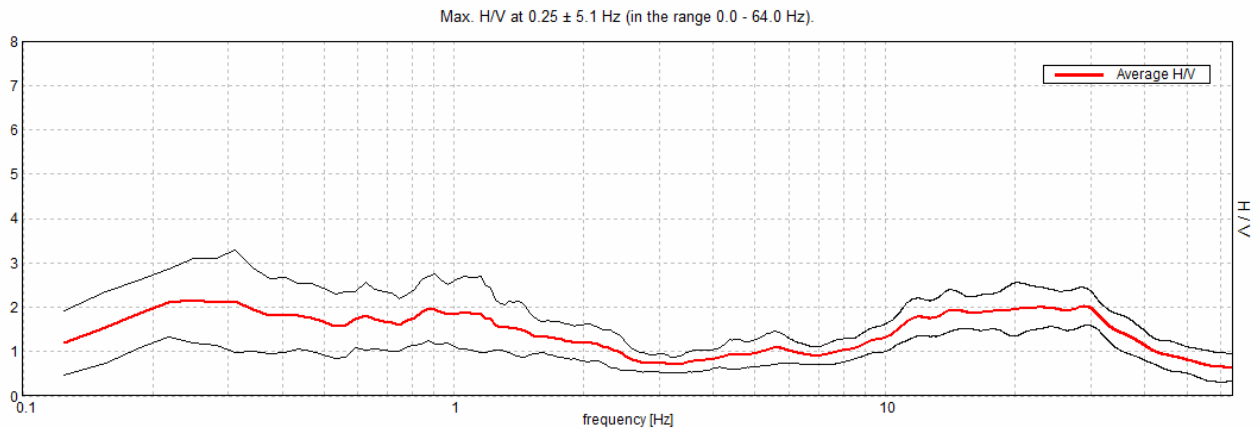


## MICROZONAZIONE MIRANDOLA, R070

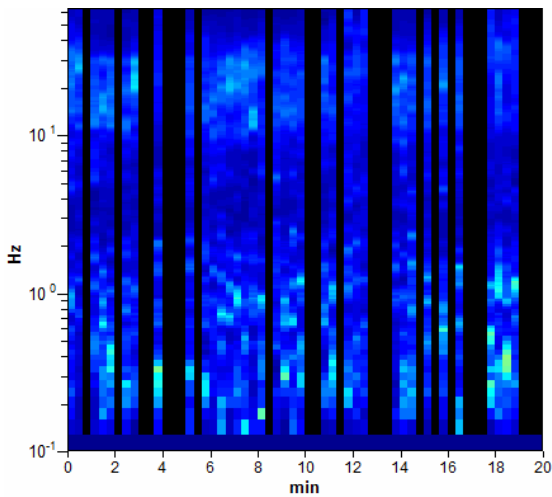
Start recording: 07/12/11 15:48:33      End recording: 07/12/00 16:28:34  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h20'00".      Analyzed 60% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

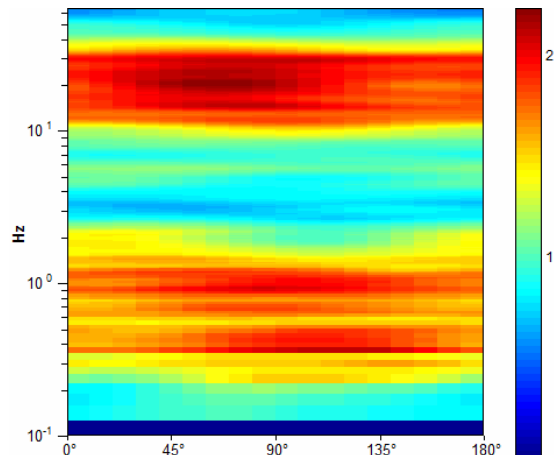
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



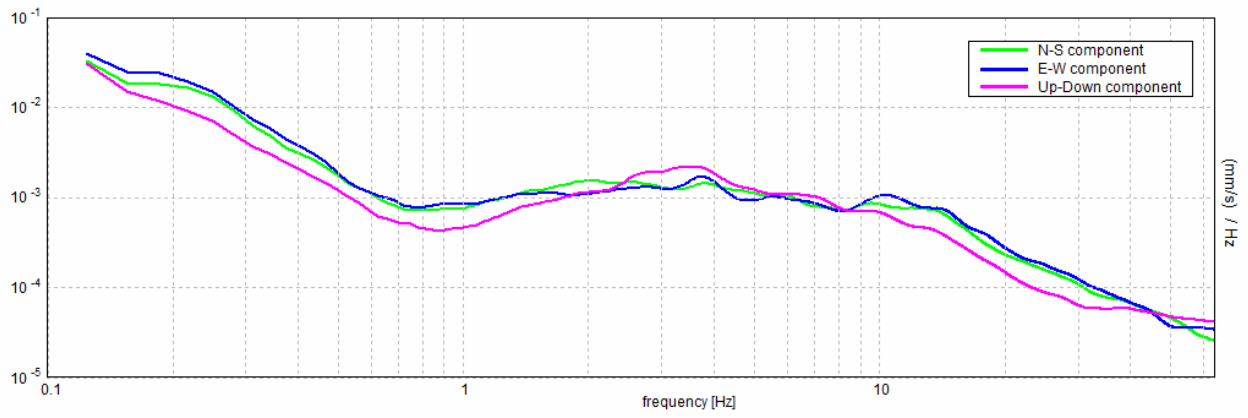
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



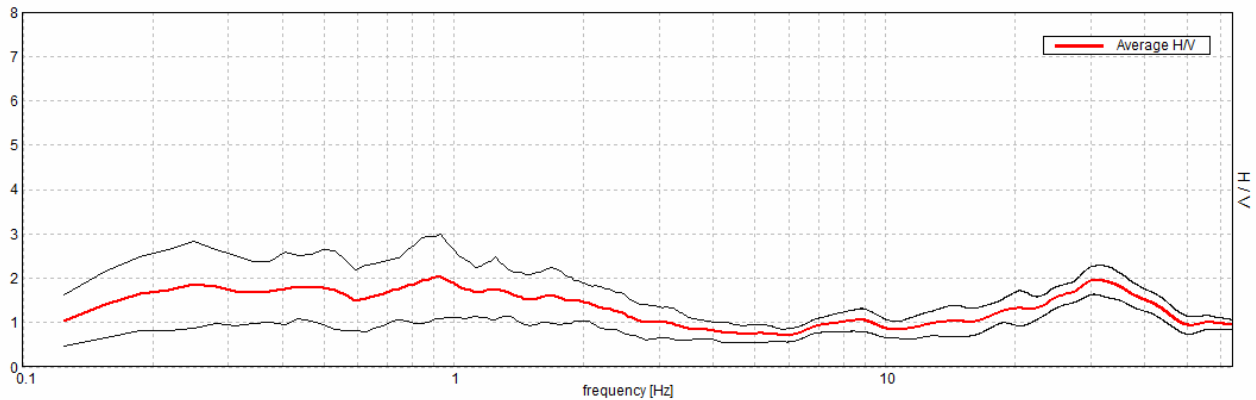
## MICROZONAZIONE MIRANDOLA, R071

Start recording: 07/12/11 16:25:09      End recording: 07/12/00 16:55:10  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

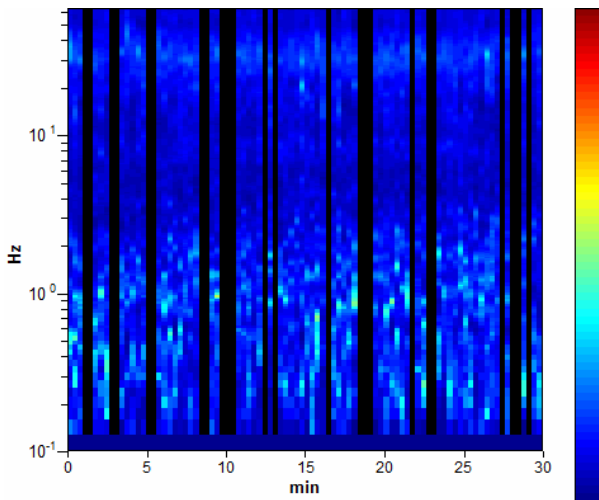
Trace length: 0h30'00".      Analyzed 73% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

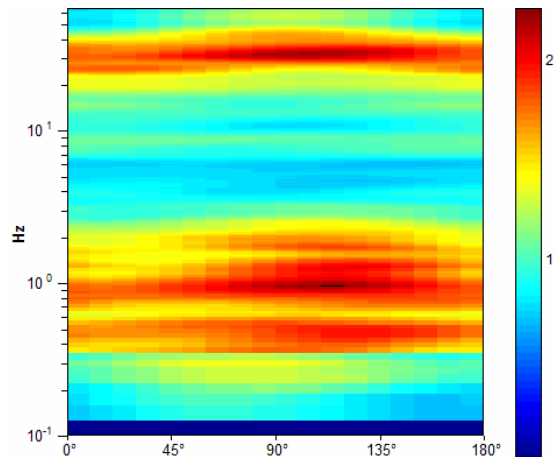
Max. H/V at  $0.94 \pm 0.05$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

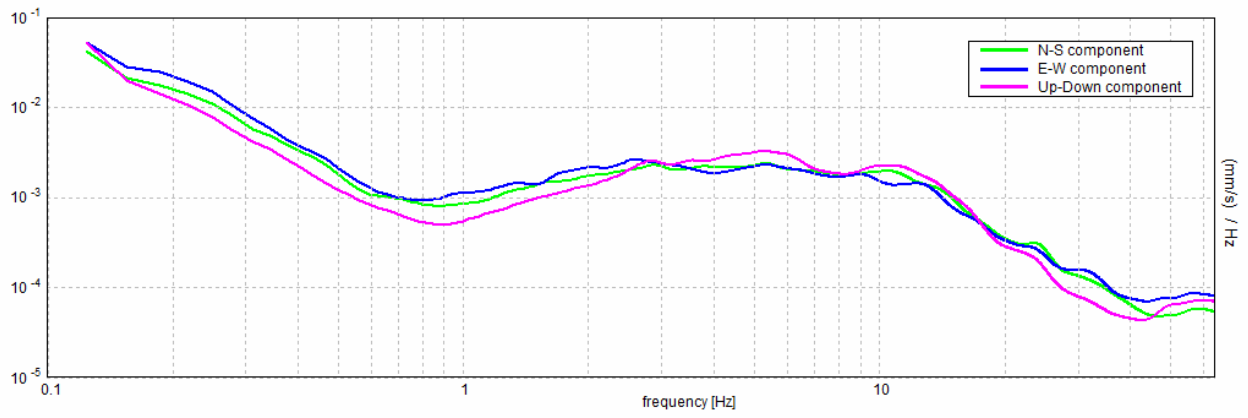


### DIRECTIONAL H/V

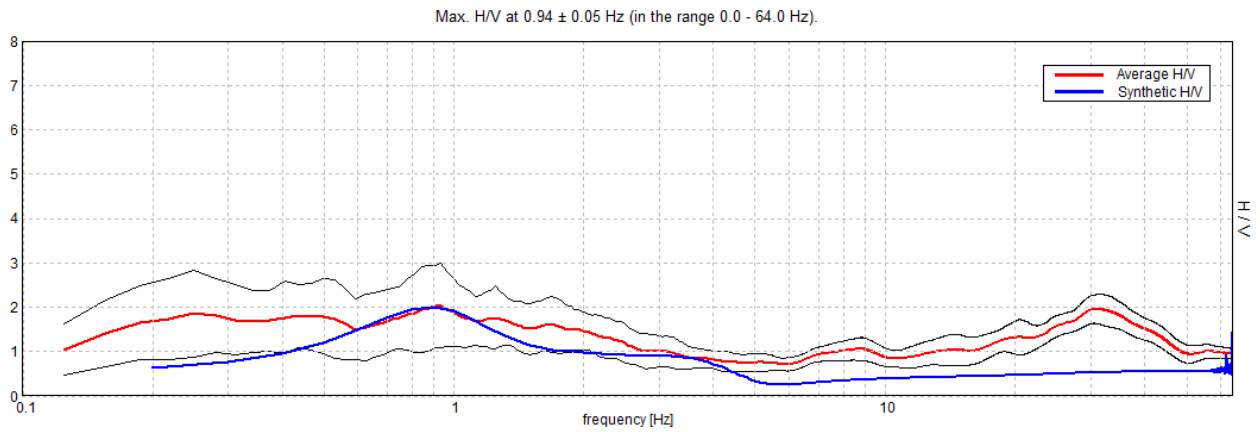




### SINGLE COMPONENT SPECTRA

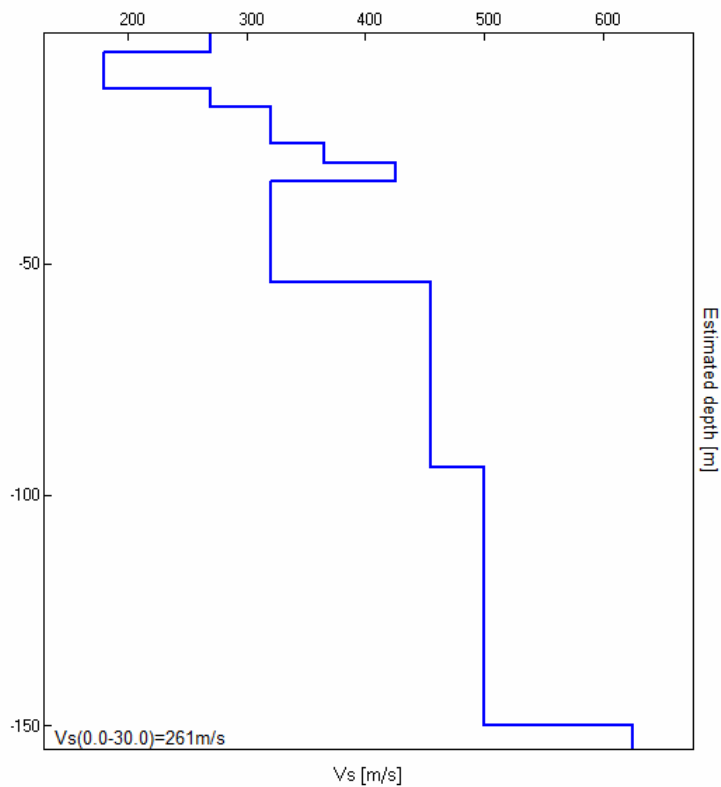


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
4.00	4.00	270
12.00	8.00	180
16.00	4.00	270
24.00	8.00	320
28.00	4.00	365
32.00	4.00	425
54.00	22.00	320
94.00	40.00	455
150.00	56.00	500
inf.	inf.	625

Vs30 = 261 m/s



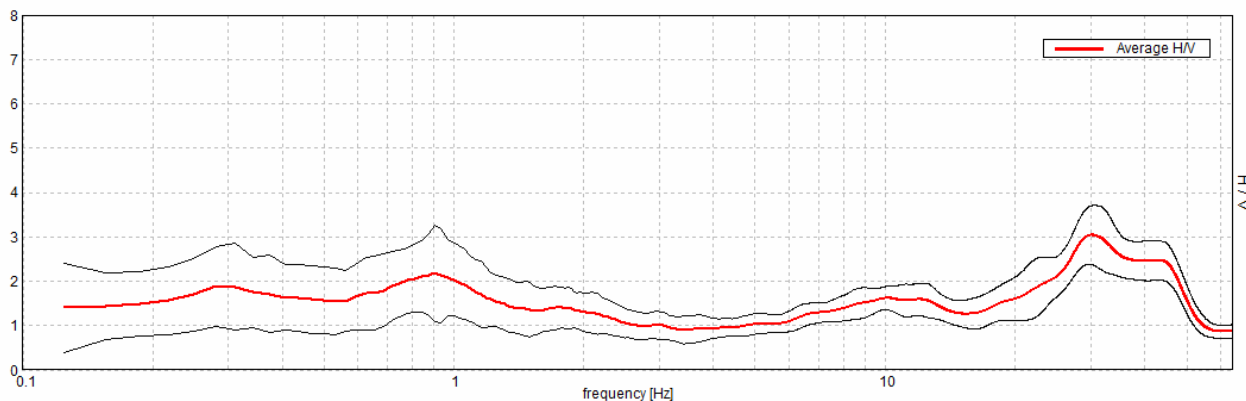
## MICROZONAZIONE MIRANDOLA, R072

Start recording: 13/12/11 09:36:41      End recording: 13/12/11 10:06:42  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

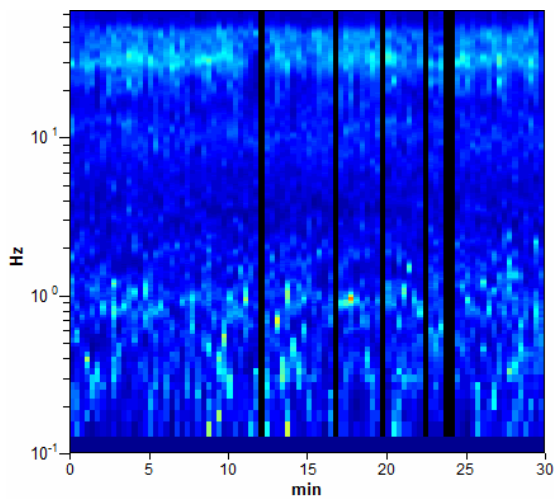
Trace length: 0h30'00".      Analyzed 93% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

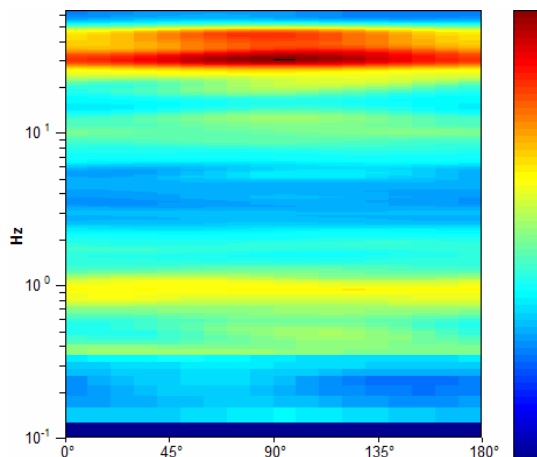
Max. H/V at  $30.0 \pm 0.11$  Hz (in the range 0.0 - 64.0 Hz).



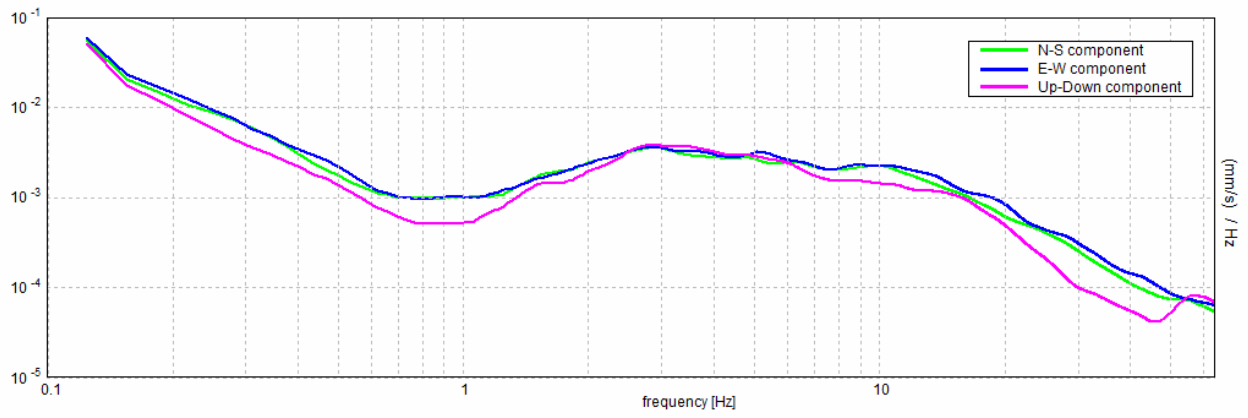
### H/V TIME HISTORY



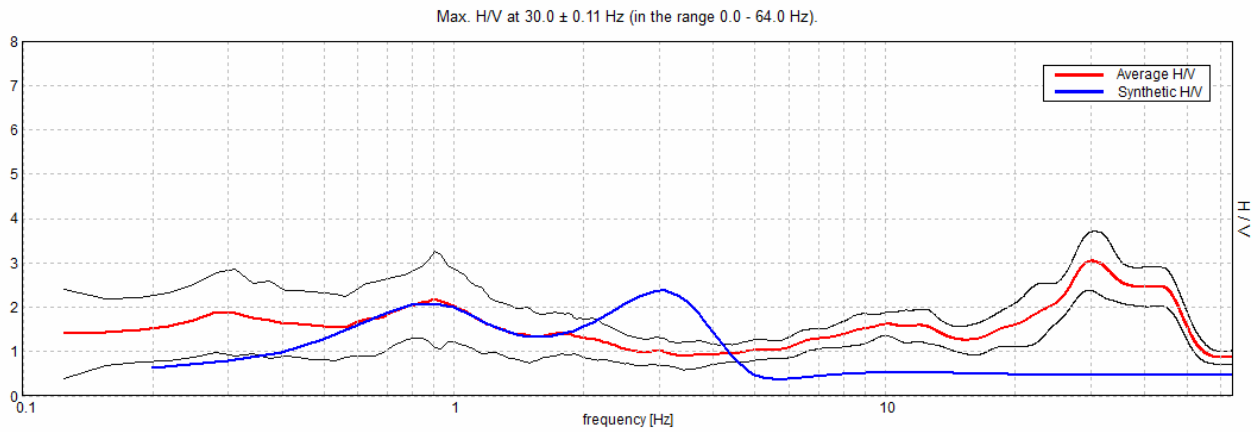
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

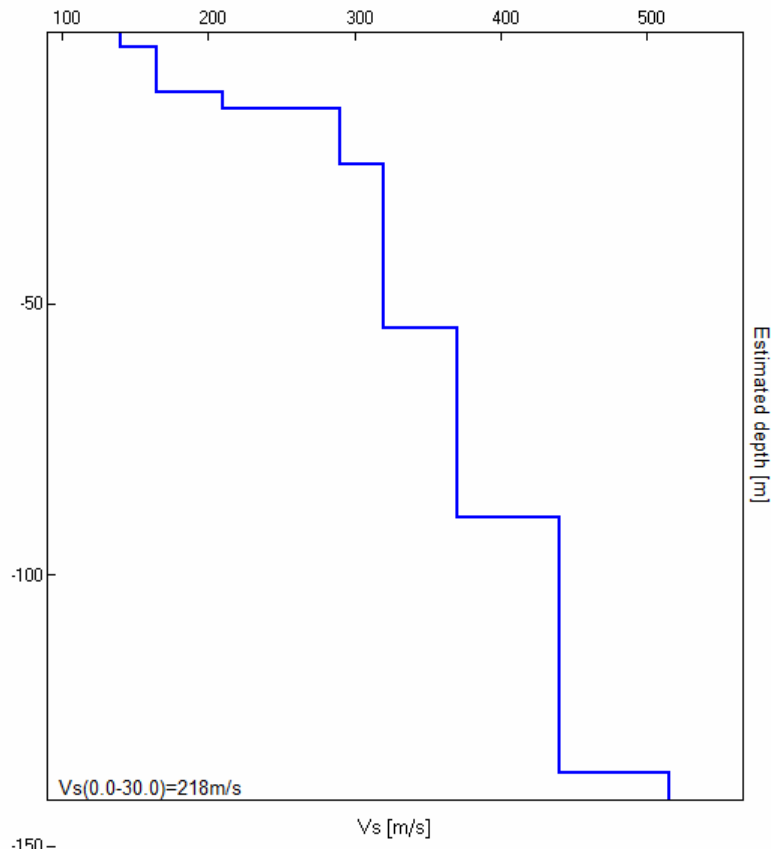


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
2.70	2.70	140
11.00	8.30	165
14.10	3.10	210
24.40	10.30	290
54.40	30.00	320
89.40	35.00	370
136.40	47.00	440
inf.	inf.	515

Vs30 = 218 m/s



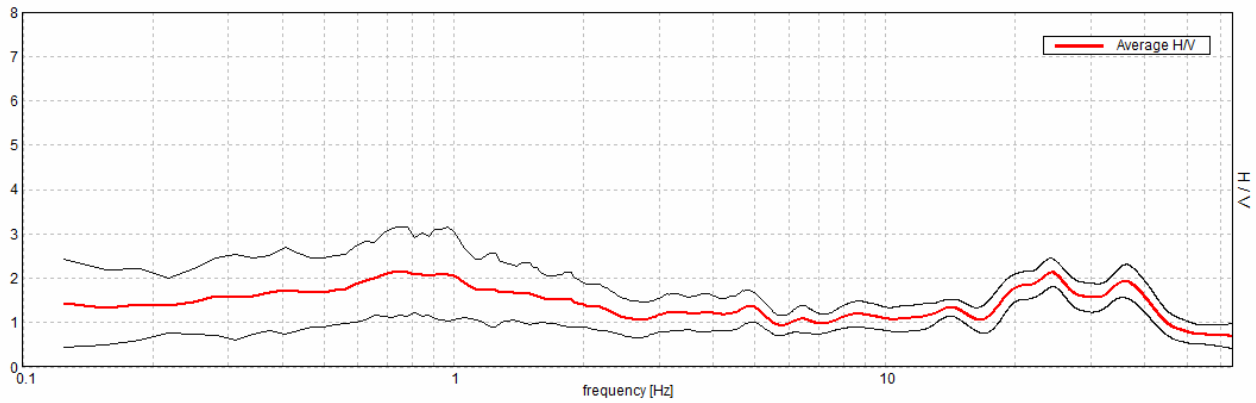
## MICROZONAZIONE MIRANDOLA, R073

Start recording: 13/12/11 10:49:06      End recording: 13/12/11 11:19:07  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

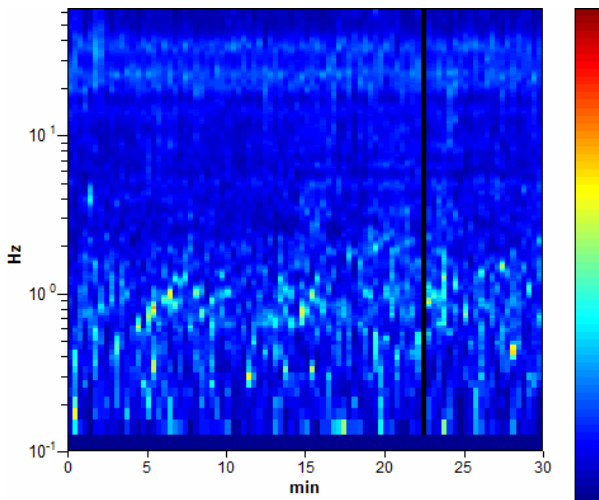
Trace length: 0h30'00".      Analyzed 99% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

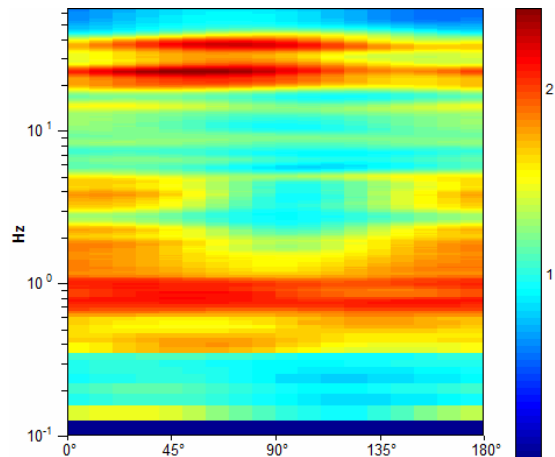
Max. H/V at  $0.75 \pm 2.63$  Hz (in the range 0.0 - 64.0 Hz).



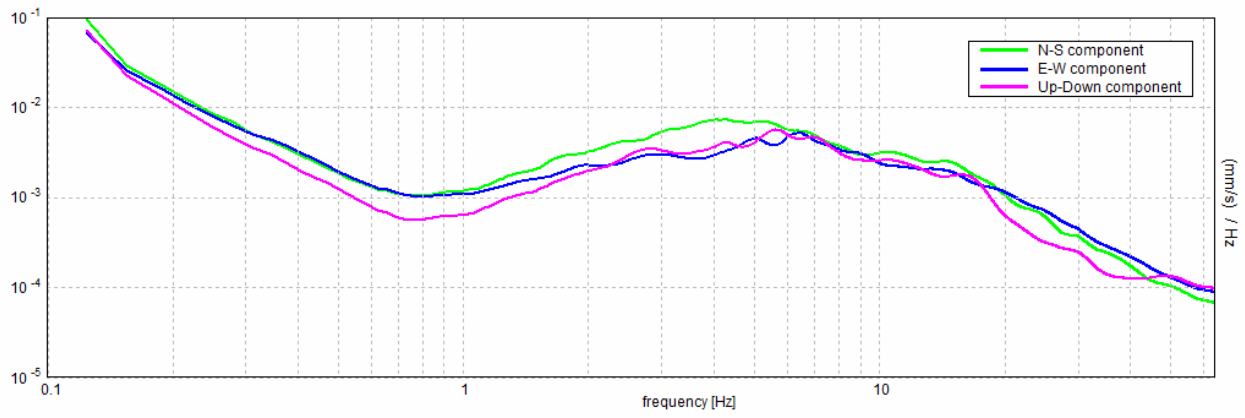
### H/V TIME HISTORY



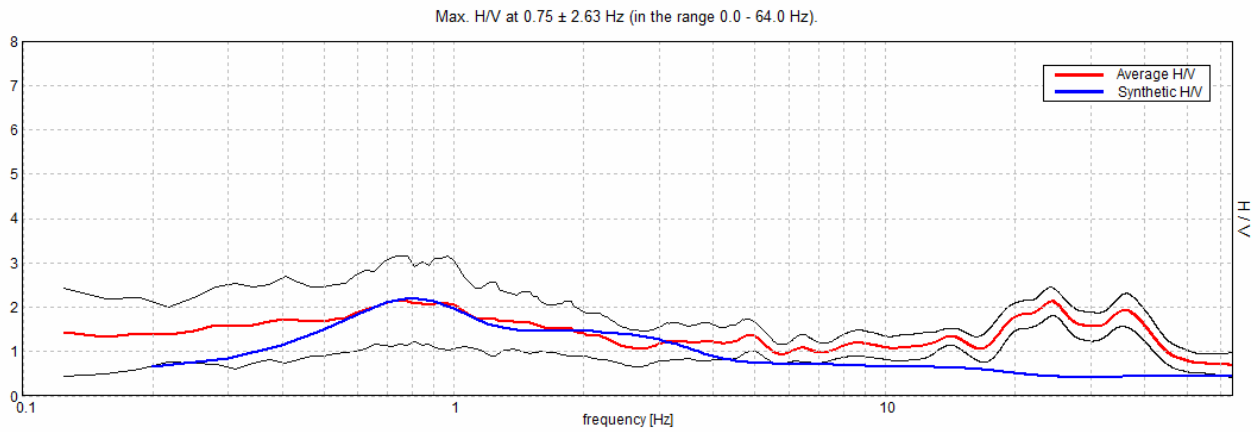
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

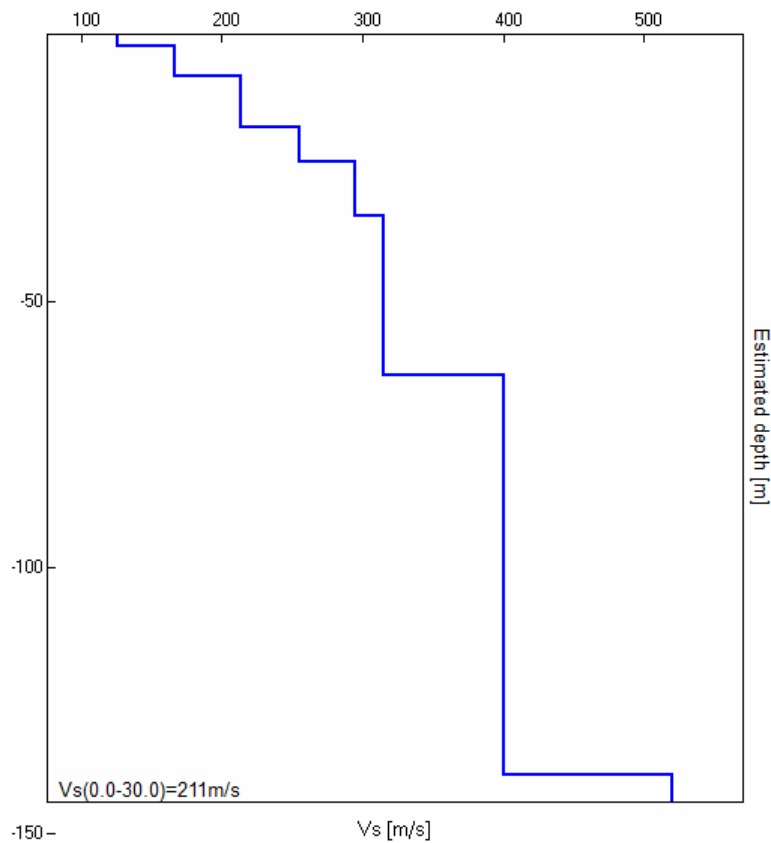


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
2.20	2.20	126
7.80	5.60	166
17.50	9.70	214
24.00	6.50	255
34.00	10.00	295
64.00	30.00	315
139.00	75.00	400
inf.	inf.	520

Vs30 = 211 m/s





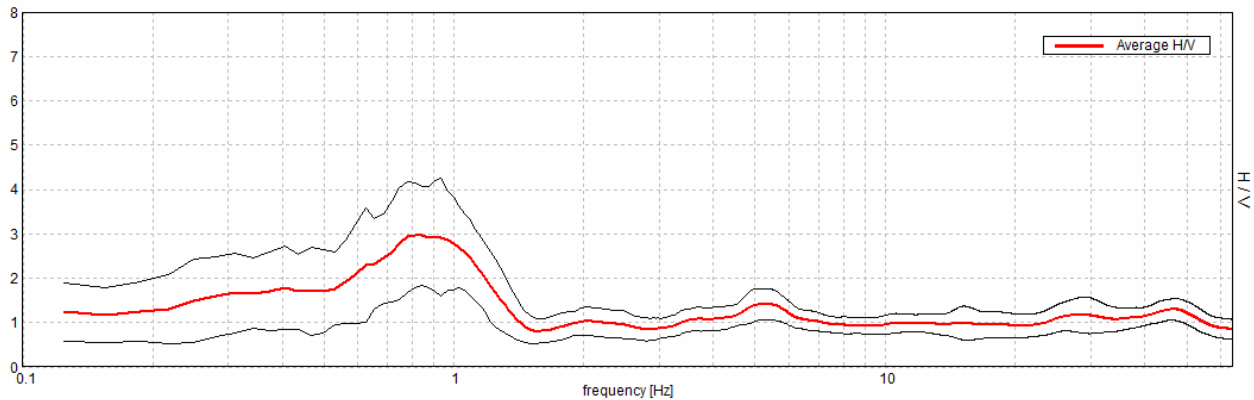
## MICROZONAZIONE MIRANDOLA, R074

Start recording: 13/12/11 11:55:28      End recording: 13/12/11 12:25:29  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

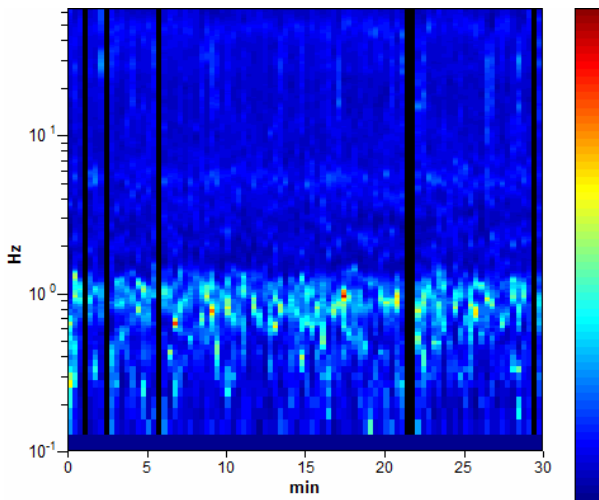
Trace length: 0h30'00".      Analyzed 93% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

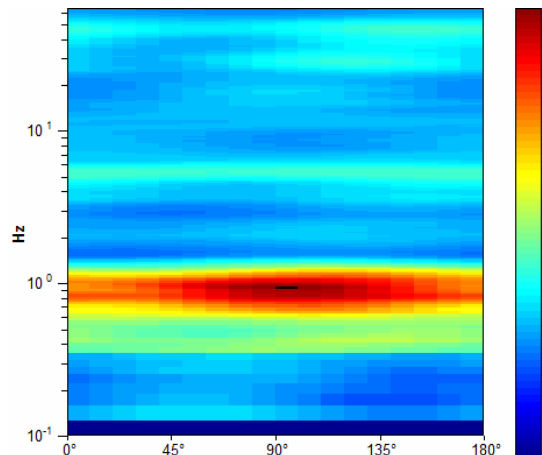
Max. H/V at  $0.81 \pm 0.04$  Hz (in the range 0.0 - 64.0 Hz).



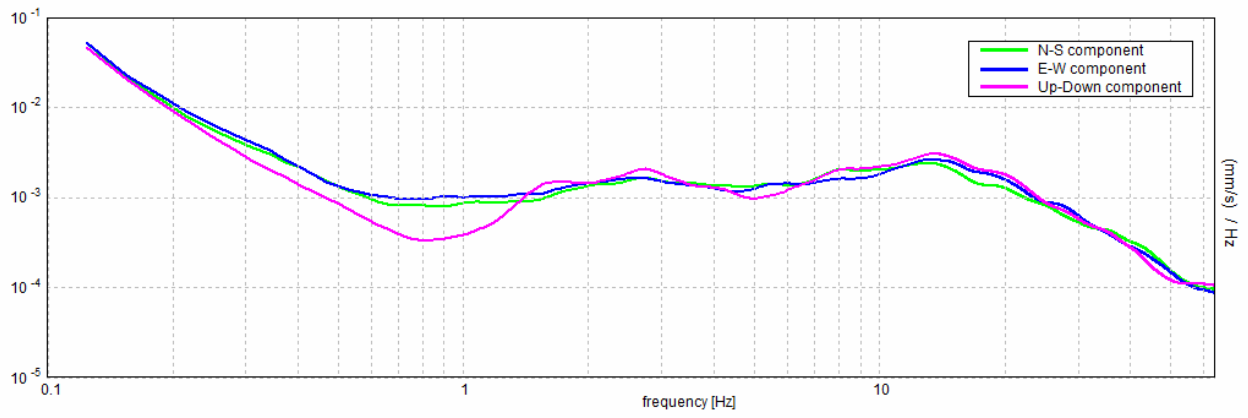
### H/V TIME HISTORY



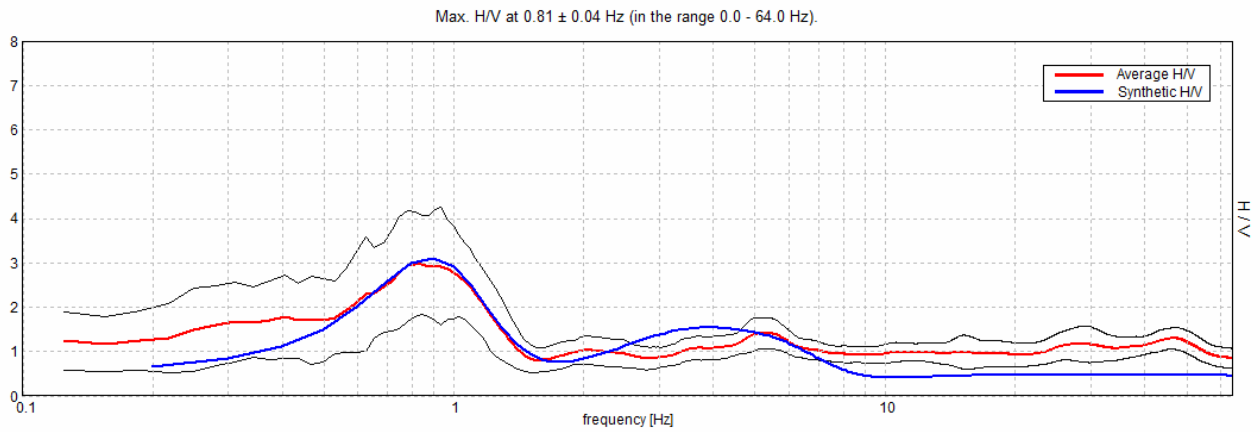
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

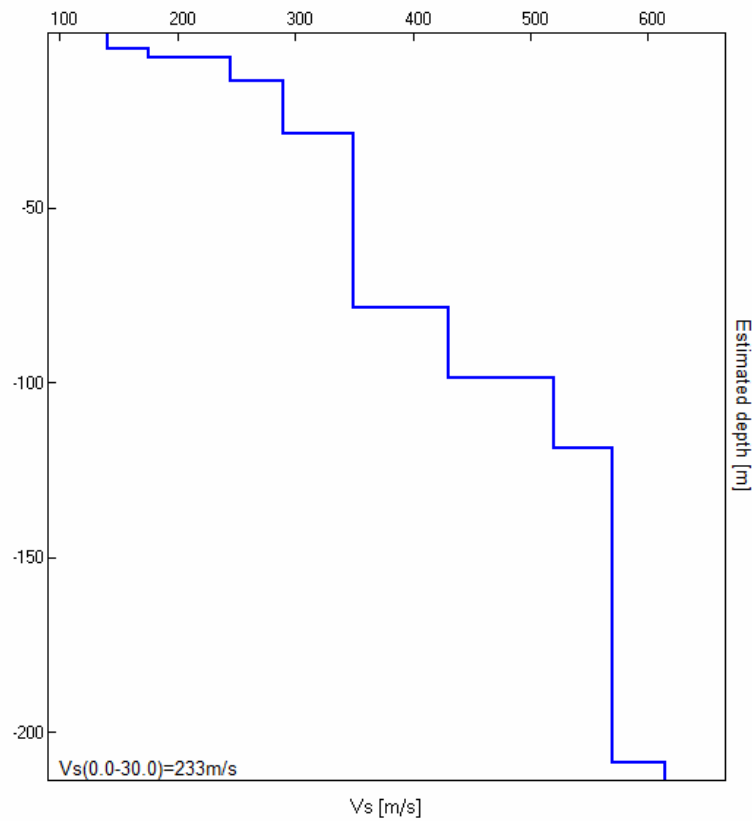


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
4.40	4.40	140
6.80	2.40	175
13.60	6.80	245
28.60	15.00	290
78.60	50.00	350
98.60	20.00	430
118.60	20.00	520
208.60	90.00	570
inf.	inf.	615

Vs30 = 233 m/s



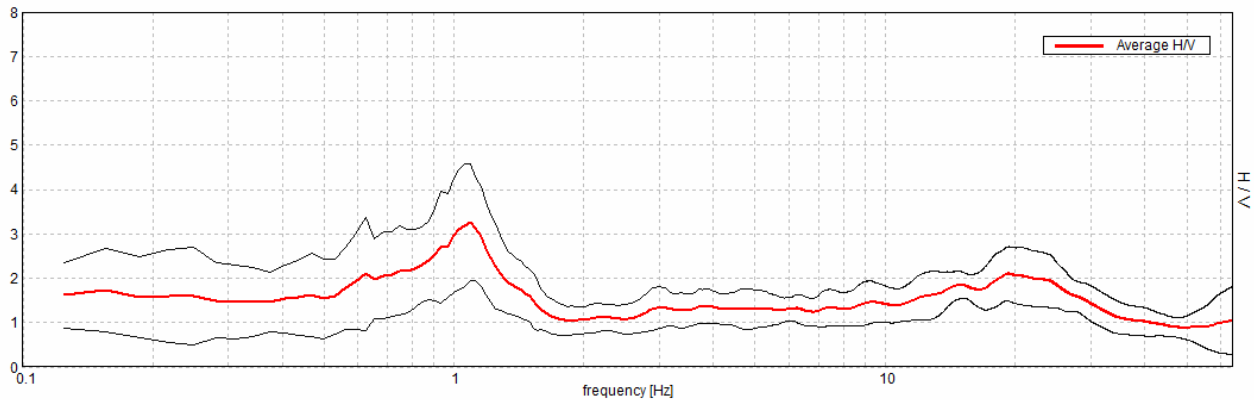
## MICROZONAZIONE MIRANDOLA, R075

Start recording: 13/12/11 12:37:51      End recording: 13/12/11 12:57:52  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

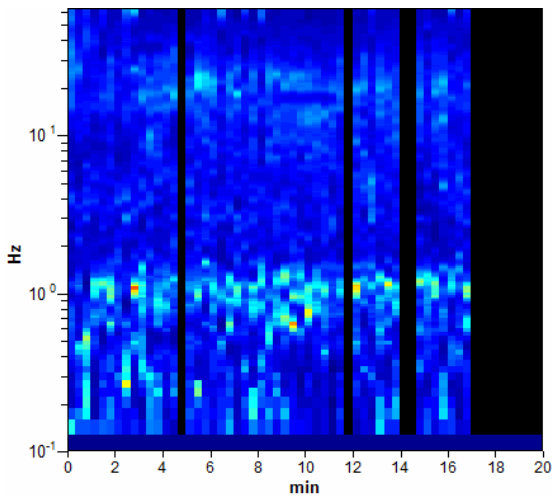
Trace length: 0h20'00".      Analyzed 78% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

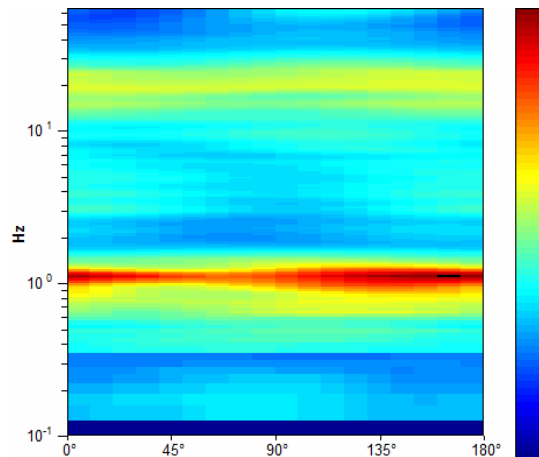
Max. H/V at  $1.09 \pm 0.07$  Hz (in the range 0.0 - 64.0 Hz).



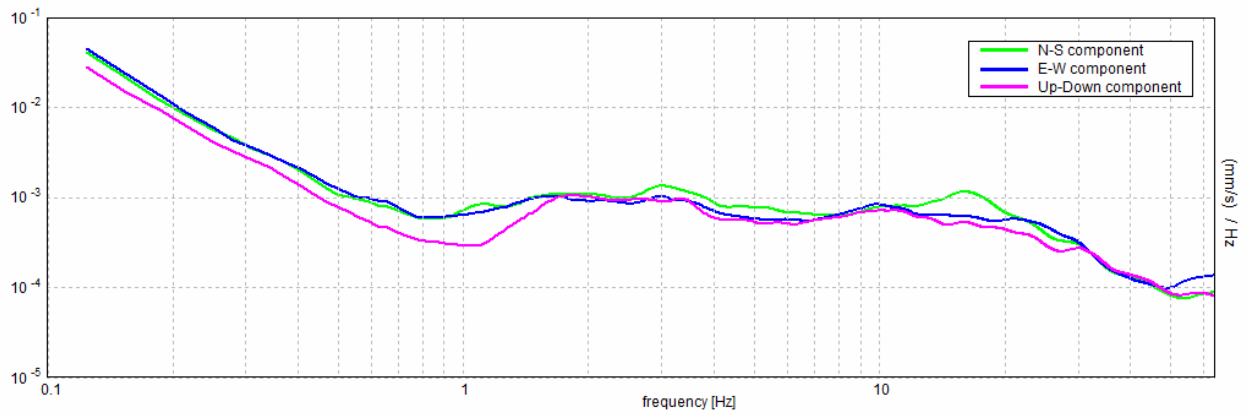
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



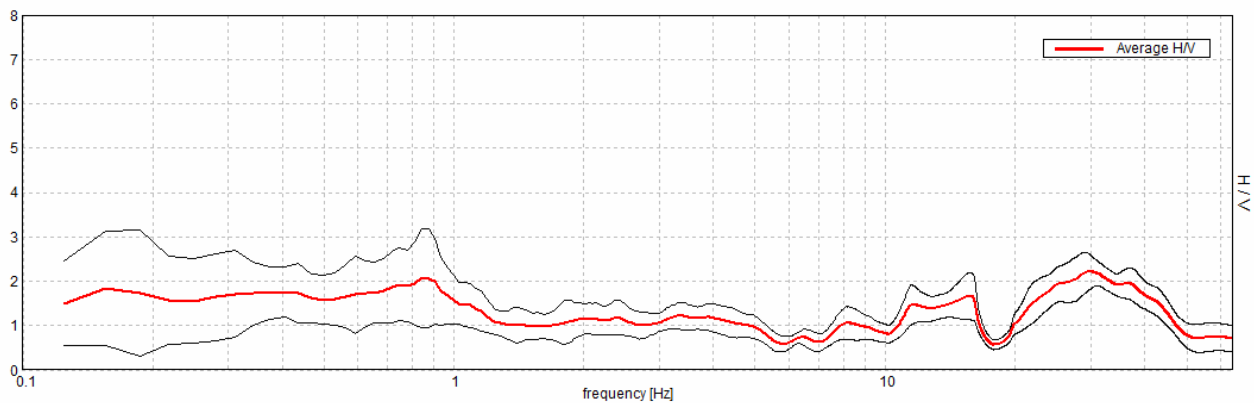
## MICROZONAZIONE MIRANDOLA, R076

Start recording: 13/12/11 14:37:39      End recording: 13/12/11 14:49:40  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

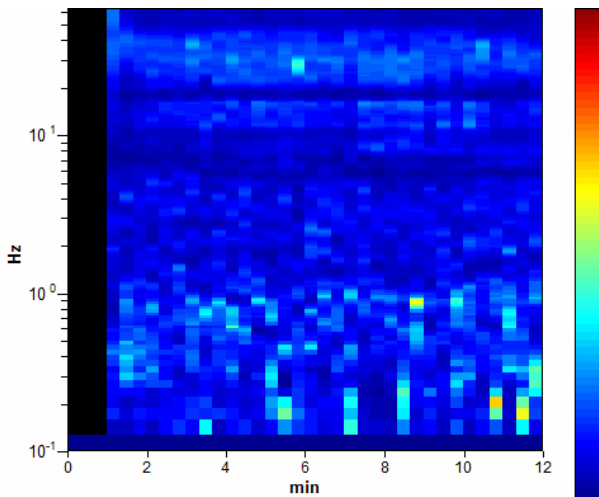
Trace length: 0h12'00".      Analyzed 92% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

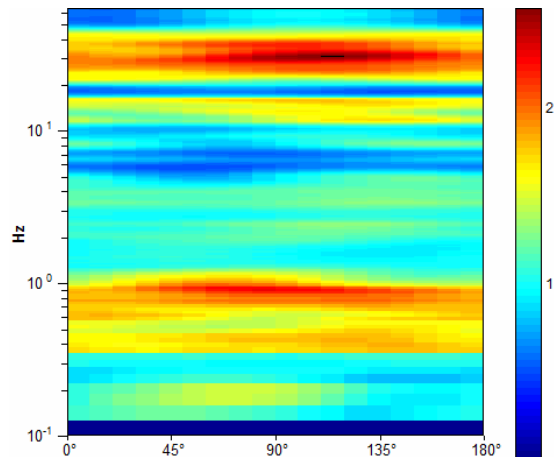
Max. H/V at  $29.69 \pm 5.23$  Hz (in the range 0.0 - 64.0 Hz).



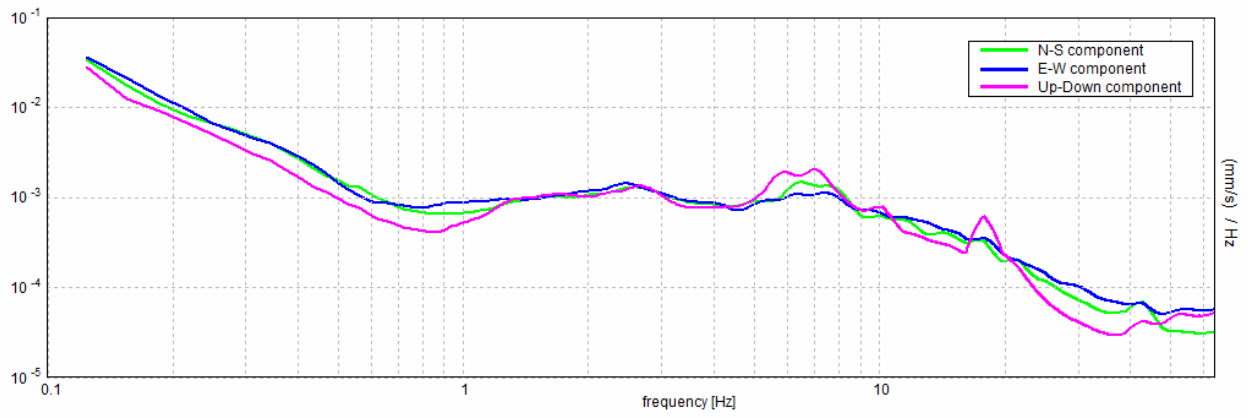
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

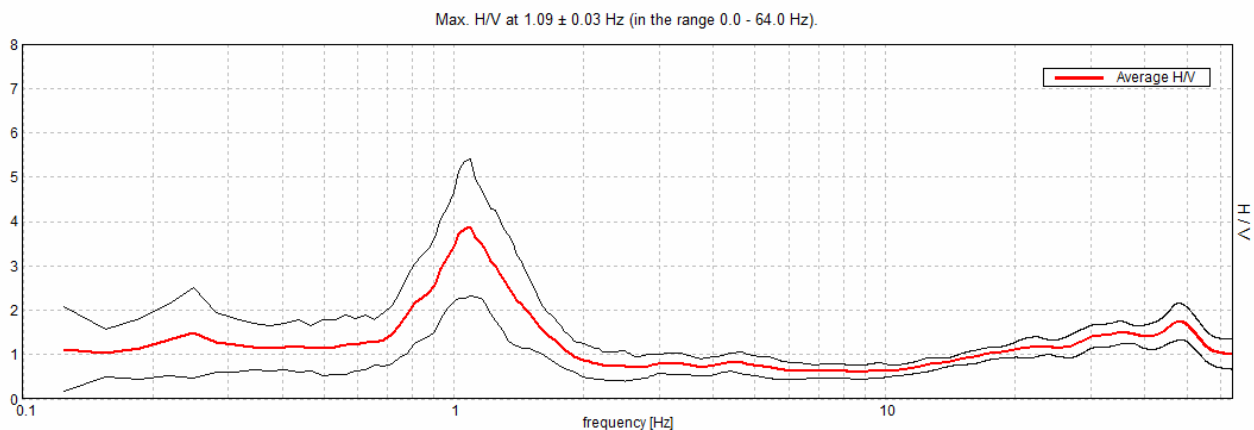


## MICROZONAZIONE MIRANDOLA, R077

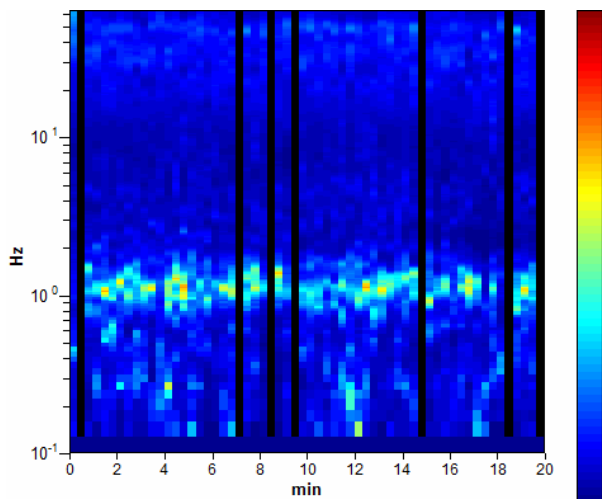
Start recording: 13/12/11 15:00:25      End recording: 13/12/11 15:20:26  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h20'00".      Analyzed 88% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

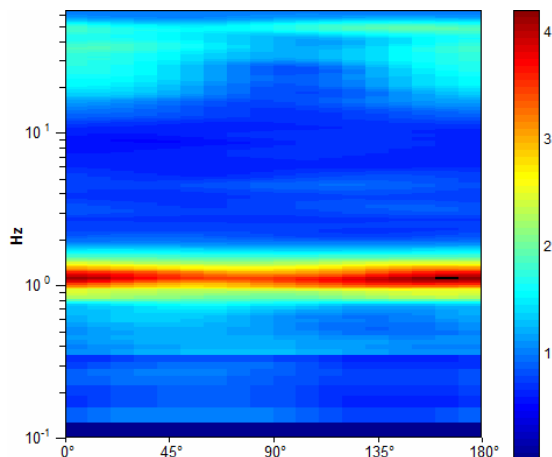
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



### H/V TIME HISTORY

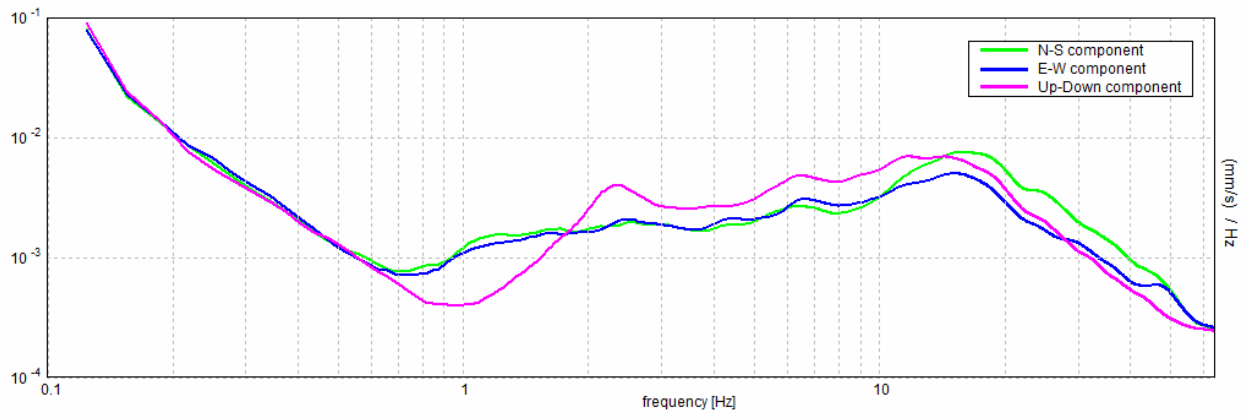


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA

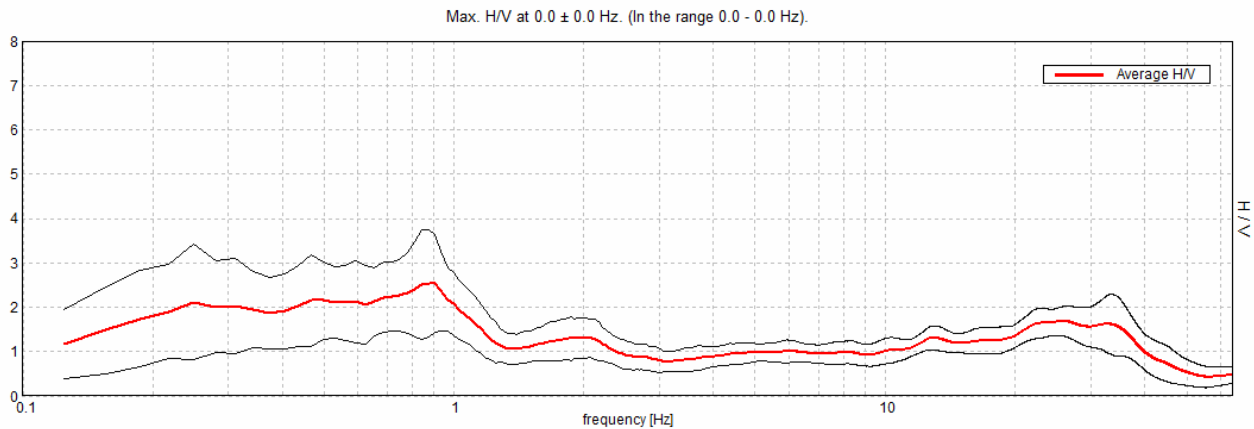


## MICROZONAZIONE MIRANDOLA, R078

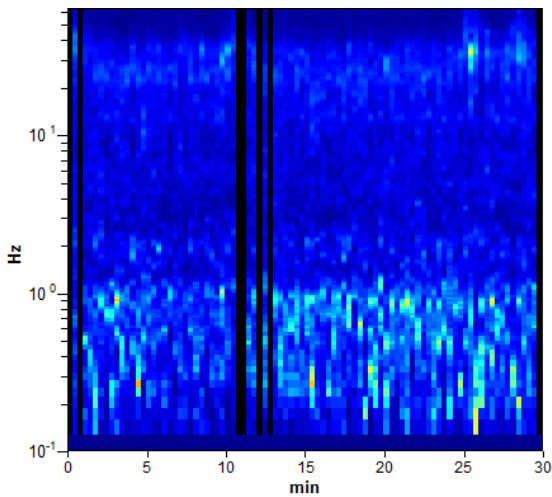
Start recording: 15/12/11 08:29:41      End recording: 15/12/11 08:59:42  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h30'00".      Analyzed 92% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

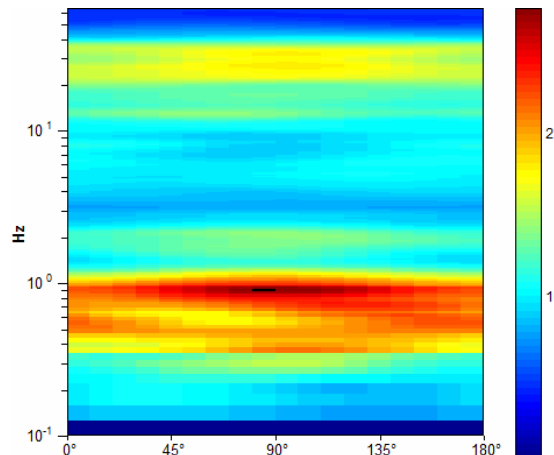
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



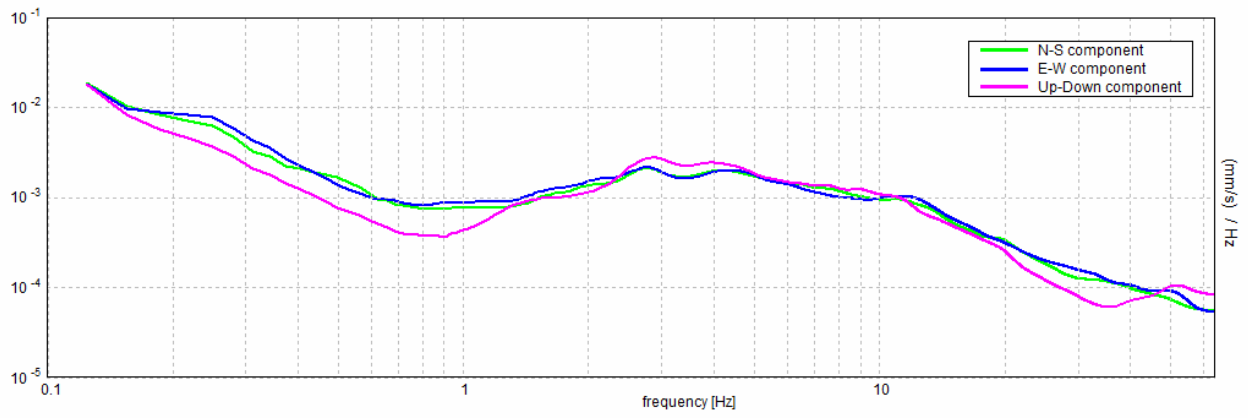
### H/V TIME HISTORY



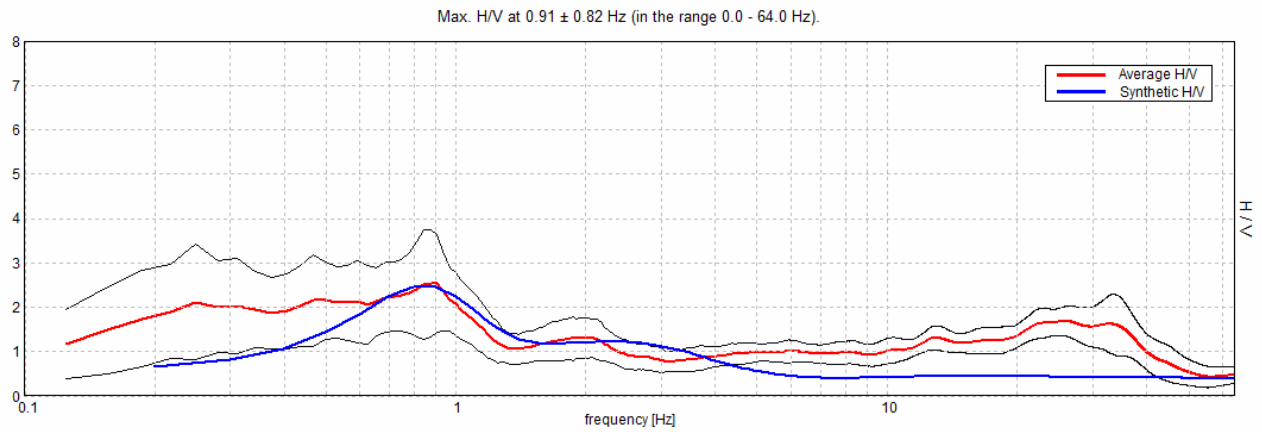
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

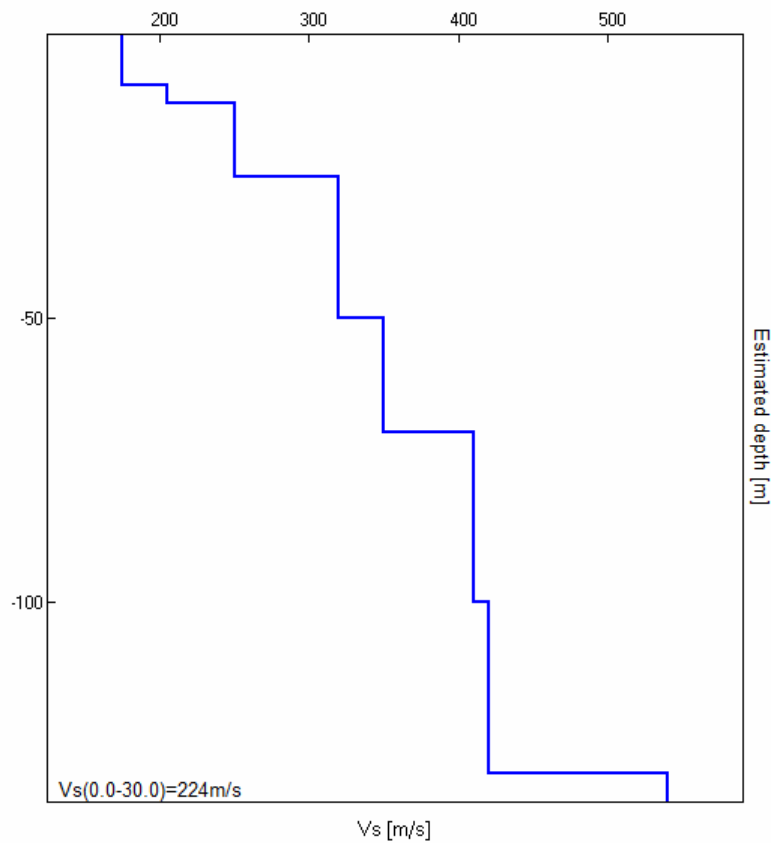


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
9.00	9.00	175
12.00	3.00	205
25.00	13.00	250
50.00	25.00	320
70.00	20.00	350
100.00	30.00	410
130.00	30.00	420
inf.	inf.	540

Vs30 = 224 m/s

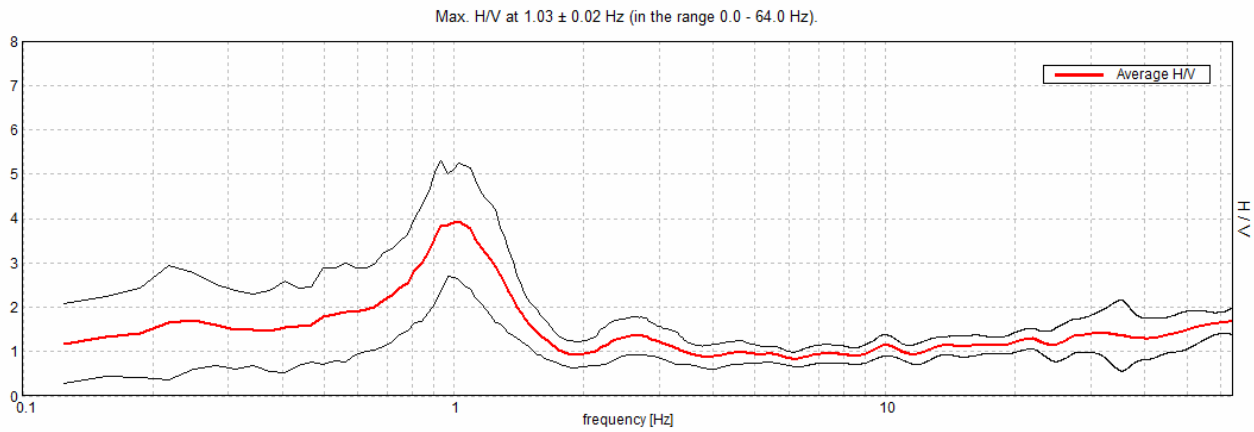


## MICROZONAZIONE MIRANDOLA, R079

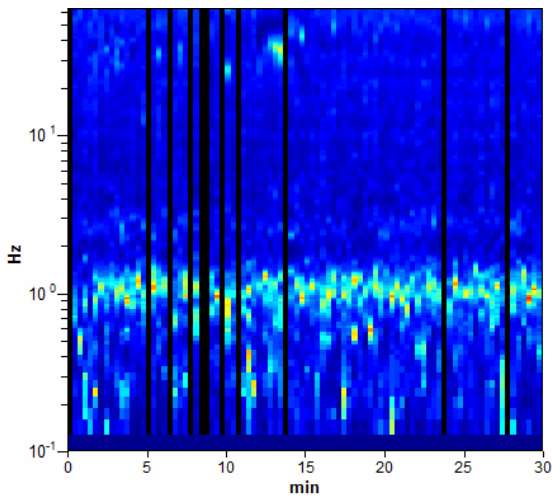
Start recording: 15/12/11 09:30:32      End recording: 15/12/11 10:00:32  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h30'00".      Analyzed 88% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

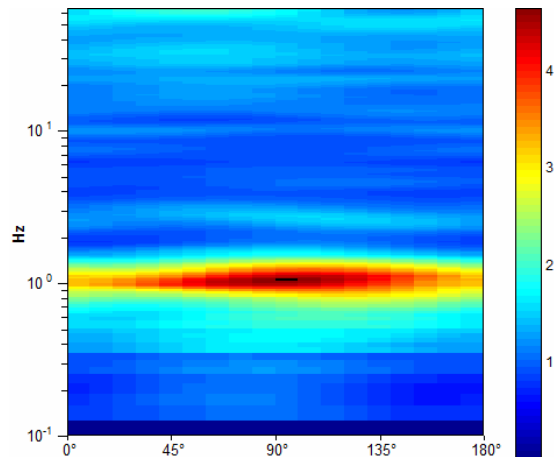
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



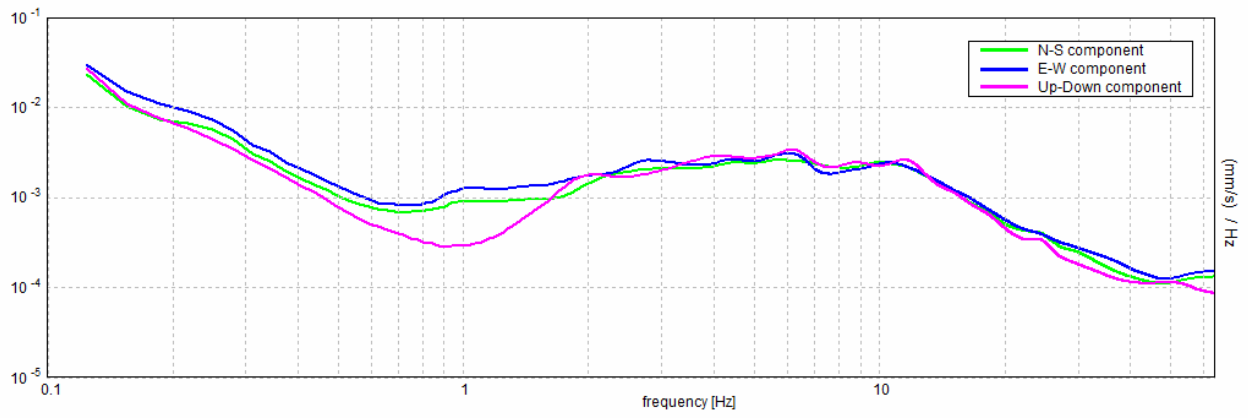
### H/V TIME HISTORY



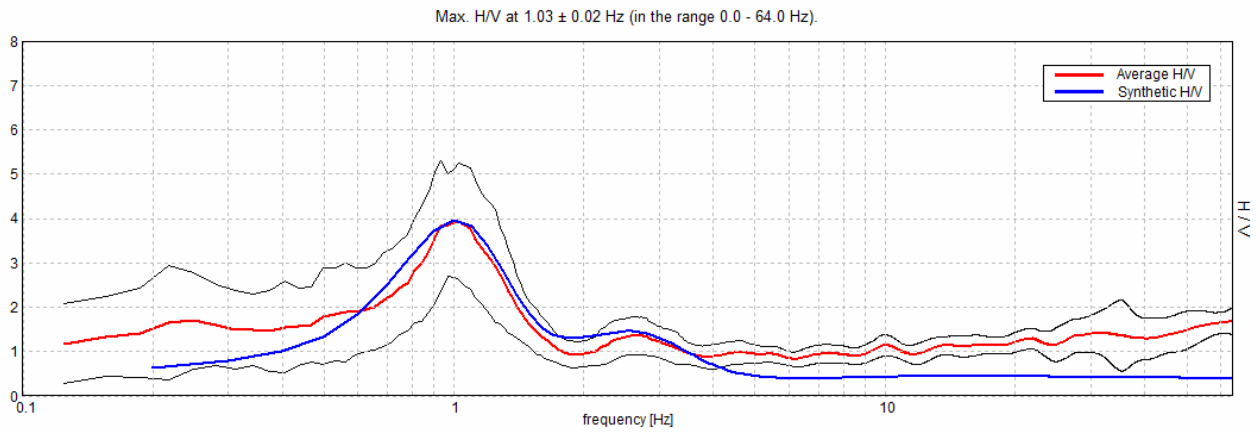
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

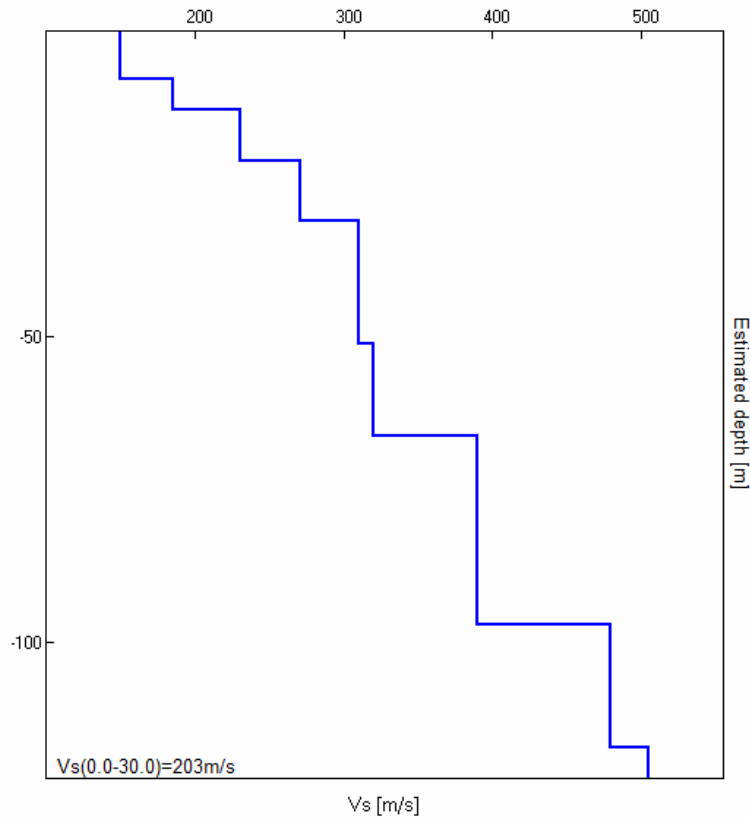


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
7.80	7.80	150
12.90	5.10	185
21.10	8.20	231
31.10	10.00	271
51.10	20.00	310
66.10	15.00	320
97.10	31.00	390
117.10	20.00	480
inf.	inf.	505

Vs30 = 203 m/s



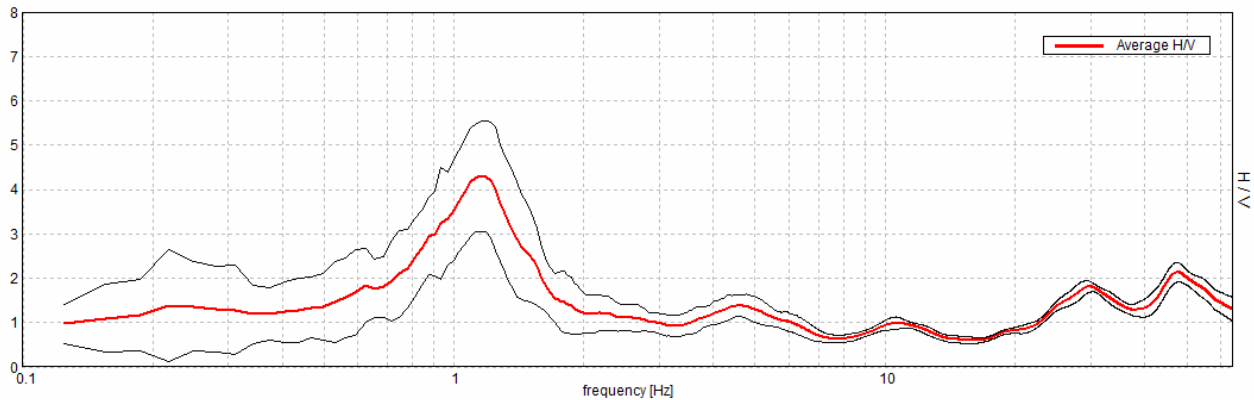
## MICROZONAZIONE MIRANDOLA, R080

Start recording: 15/12/11 10:17:14      End recording: 15/12/11 10:29:15  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

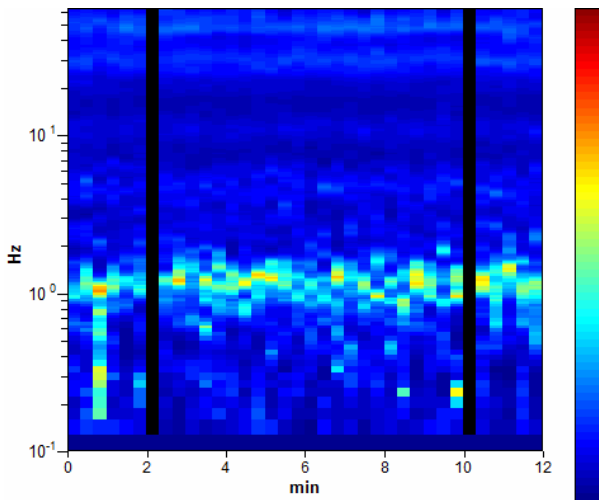
Trace length: 0h12'00".      Analyzed 94% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

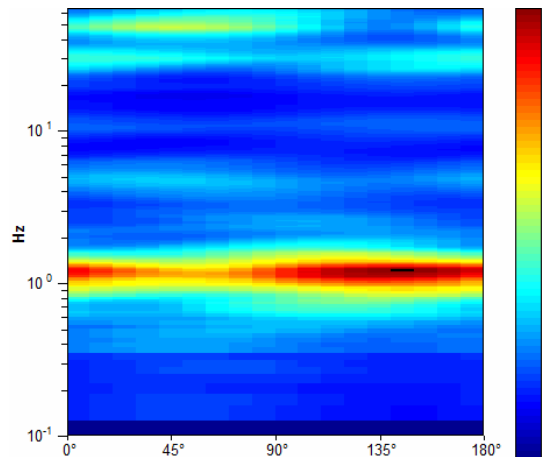
Max. H/V at  $1.16 \pm 0.02$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

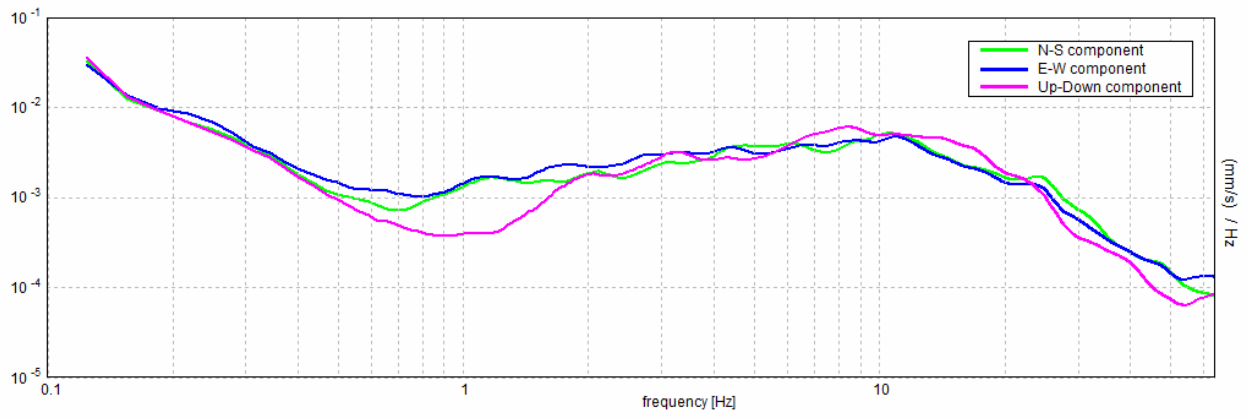


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA

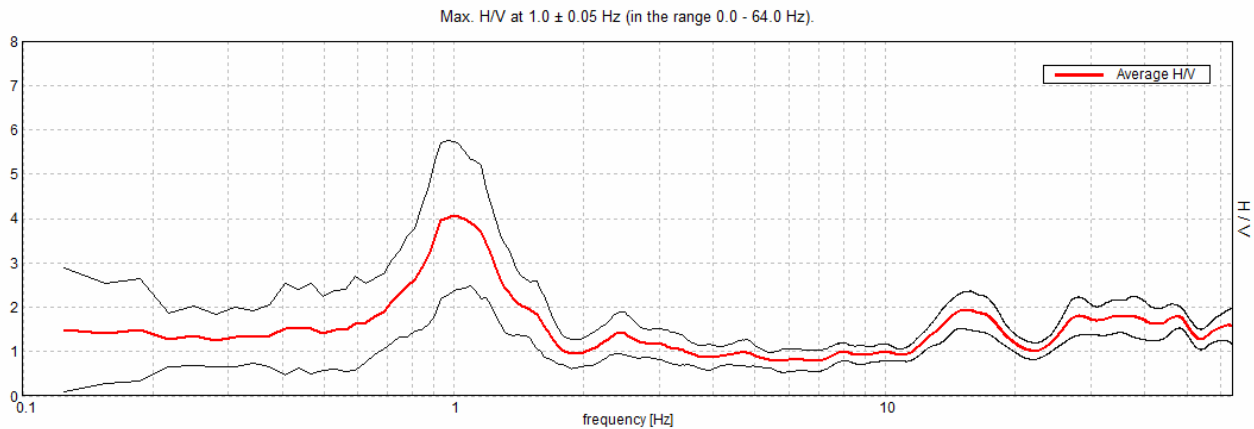


## MICROZONAZIONE MIRANDOLA, R081

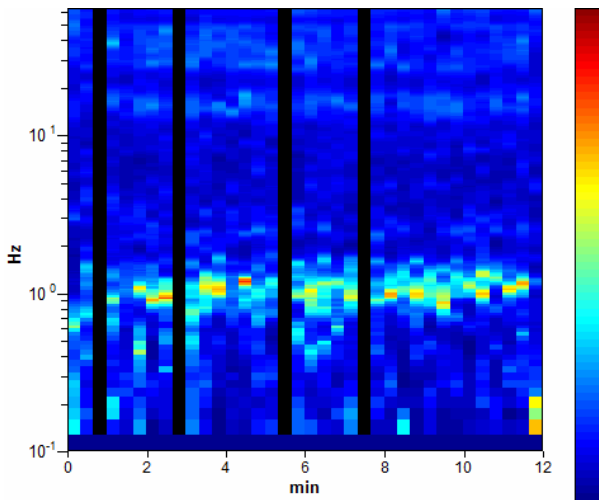
Start recording: 15/12/11 10:40:38      End recording: 15/12/11 10:52:39  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 89% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

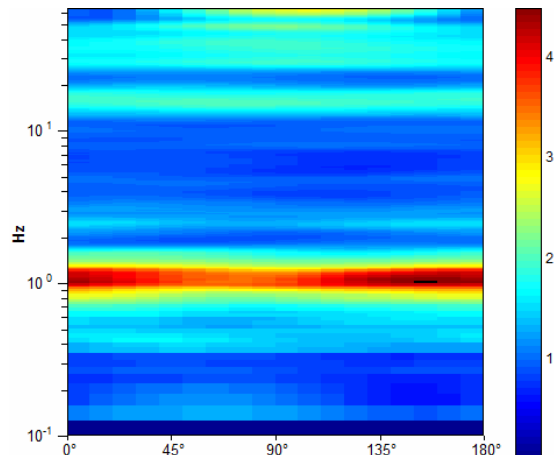
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



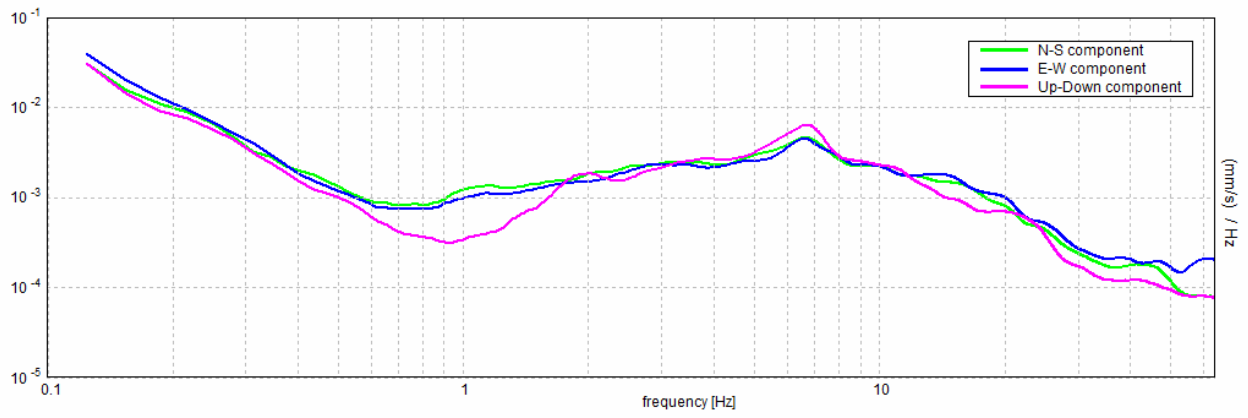
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

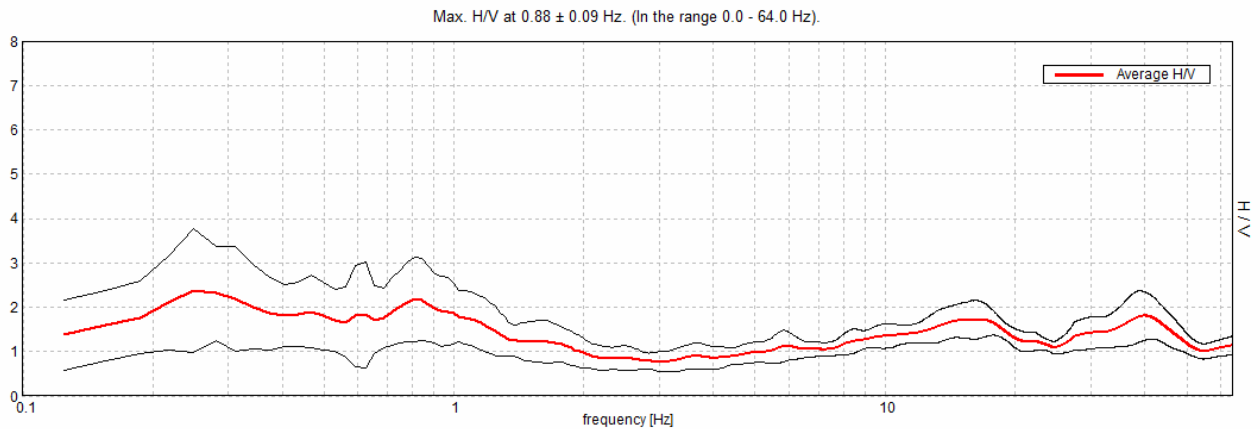


## MICROZONAZIONE MIRANDOLA, R082

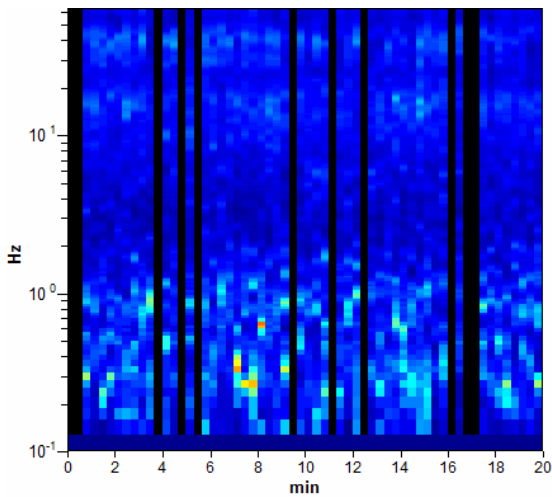
Start recording: 15/12/11 11:45:45    End recording: 15/12/11 12:05:46  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h20'00".    Analyzed 82% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

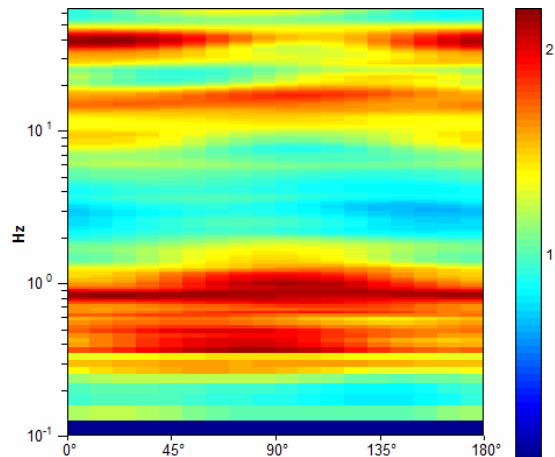
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



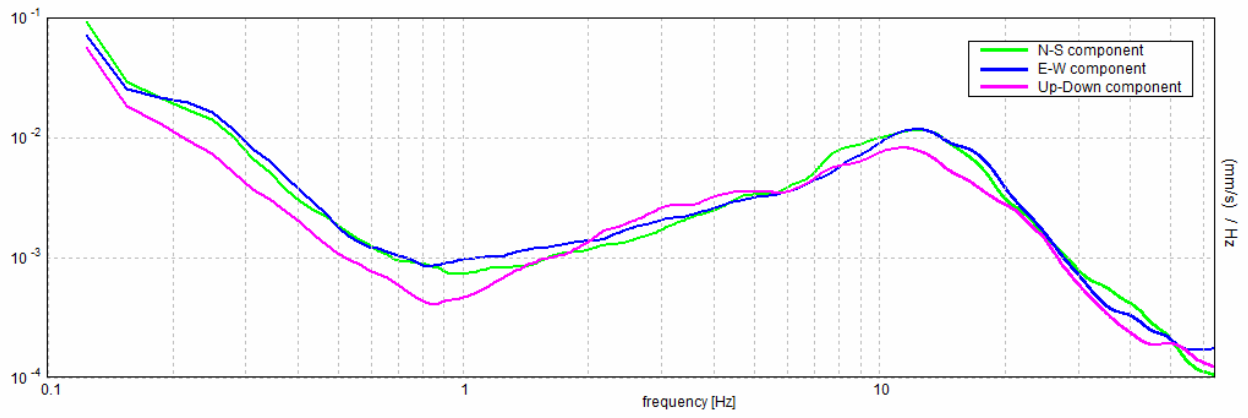
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



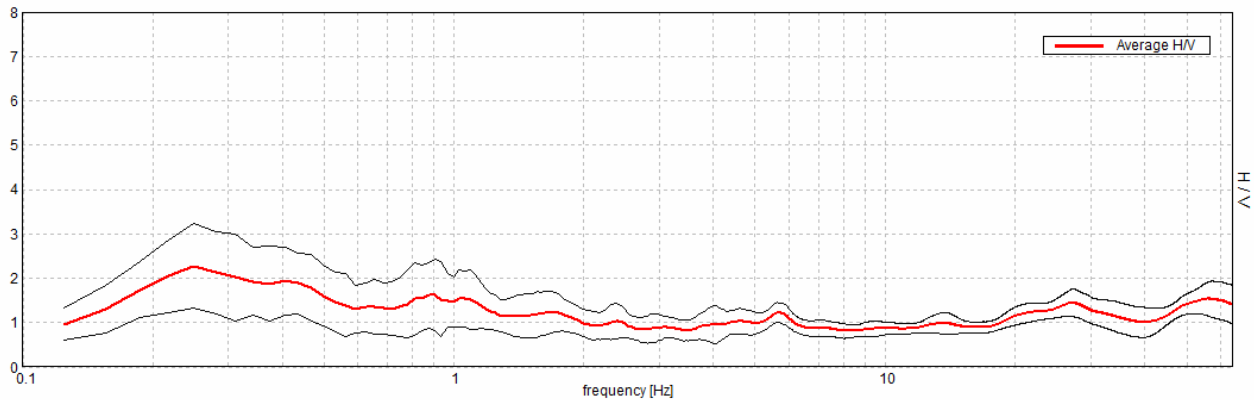
## MICROZONAZIONE MIRANDOLA, R083

Start recording: 15/12/11 12:28:46      End recording: 15/12/11 12:48:47  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

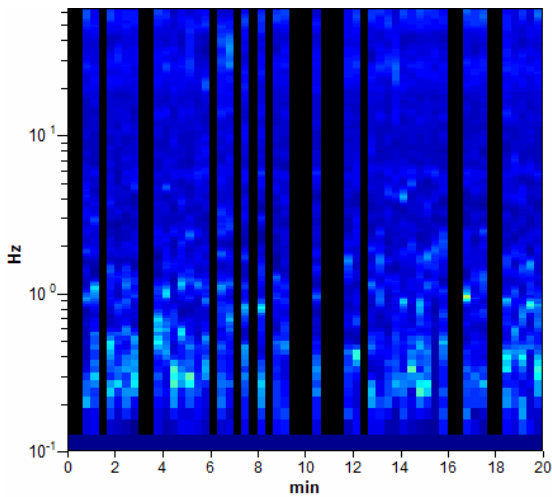
Trace length: 0h20'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

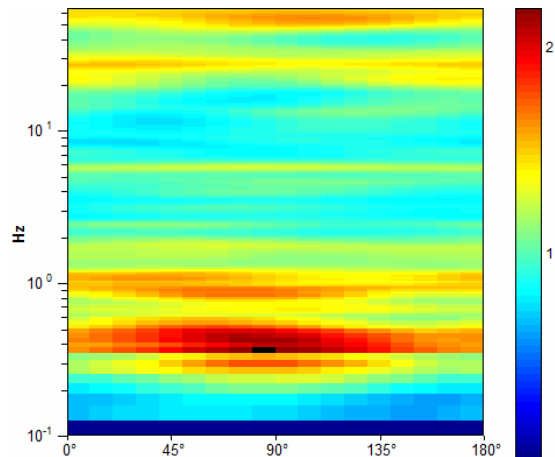
Max. H/V at  $0.25 \pm 0.05$  Hz (in the range 0.0 - 64.0 Hz).



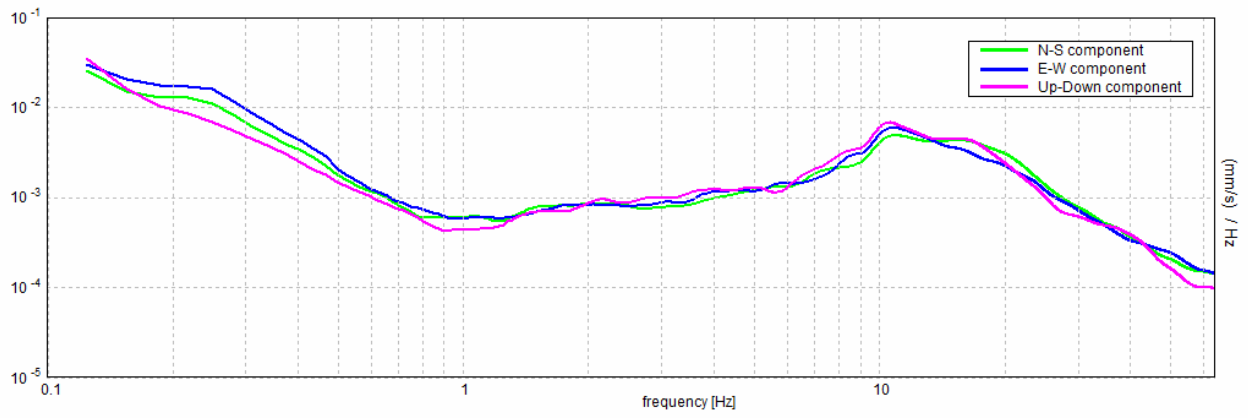
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



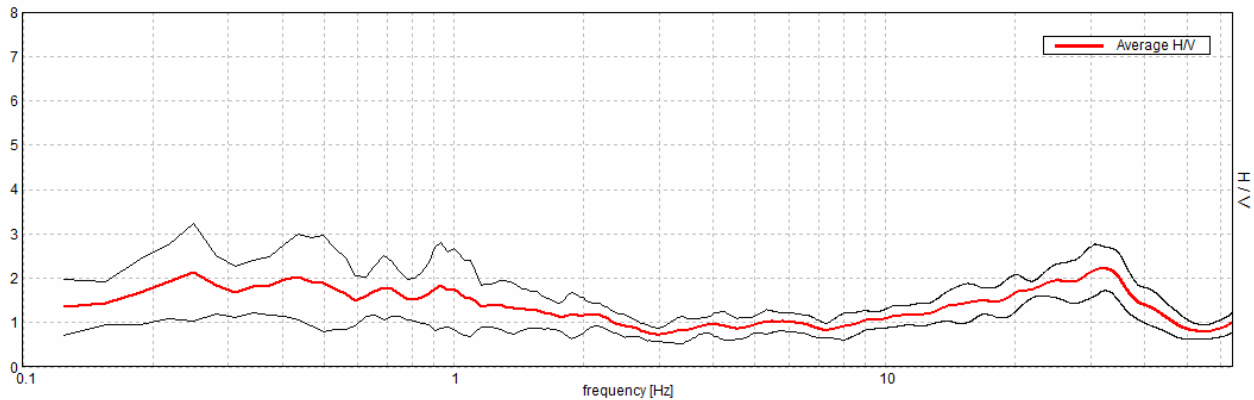
## MICROZONAZIONE MIRANDOLA, R084

Start recording: 15/12/11 13:00:35      End recording: 15/12/11 13:12:36  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

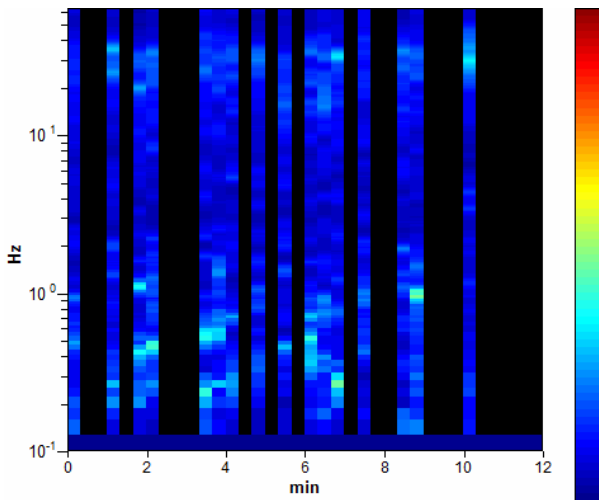
Trace length: 0h12'00".      Analyzed 44% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

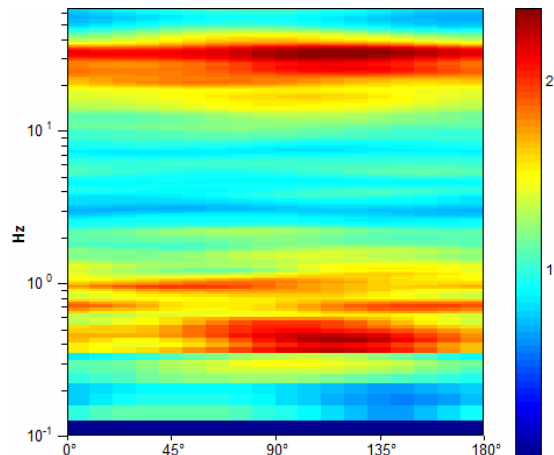
Max. H/V at  $31.88 \pm 16.24$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

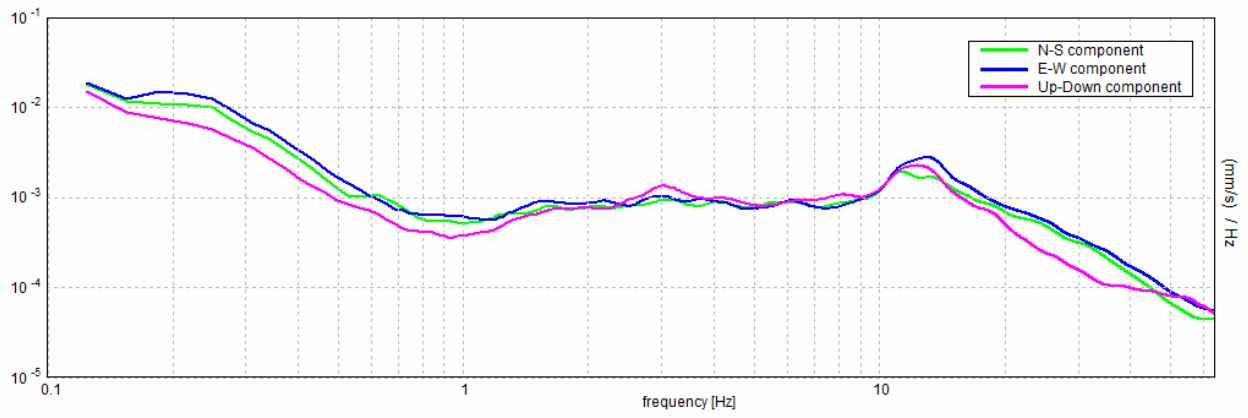


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA



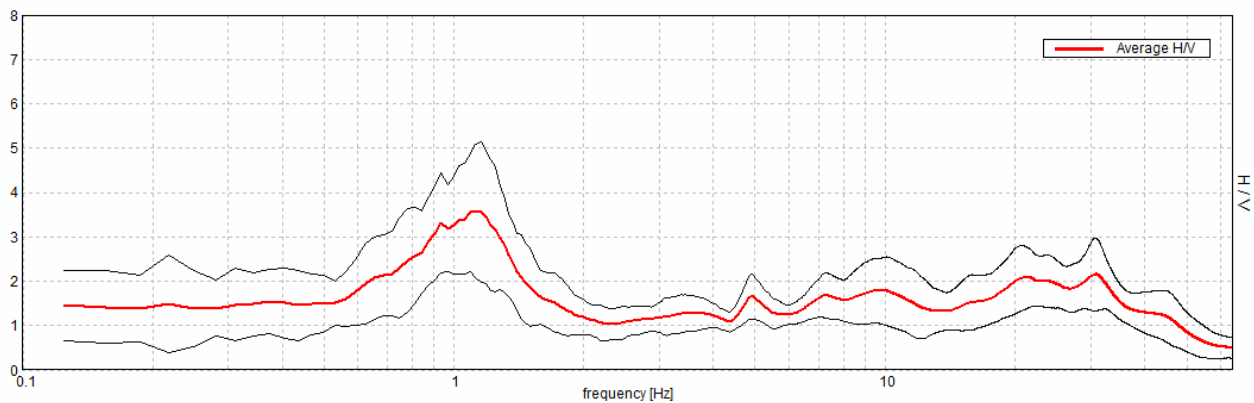
## MICROZONAZIONE MIRANDOLA, R085

Start recording: 15/12/11 14:59:59      End recording: 15/12/11 15:12:00  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

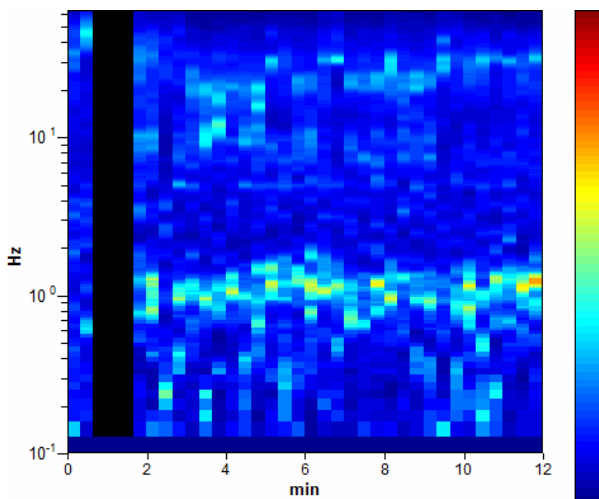
Trace length: 0h12'00".      Analyzed 92% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

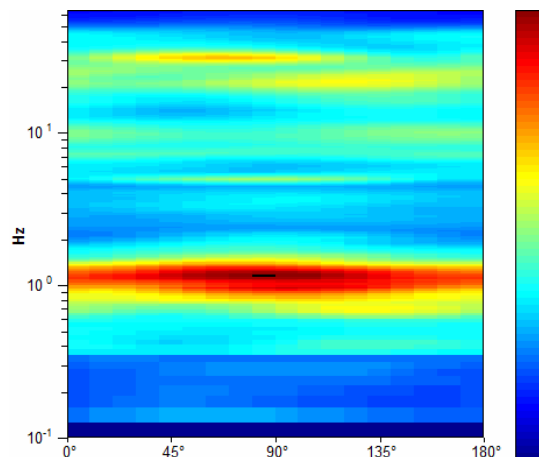
Max. H/V at  $1.13 \pm 3.86$  Hz (in the range 0.0 - 64.0 Hz).



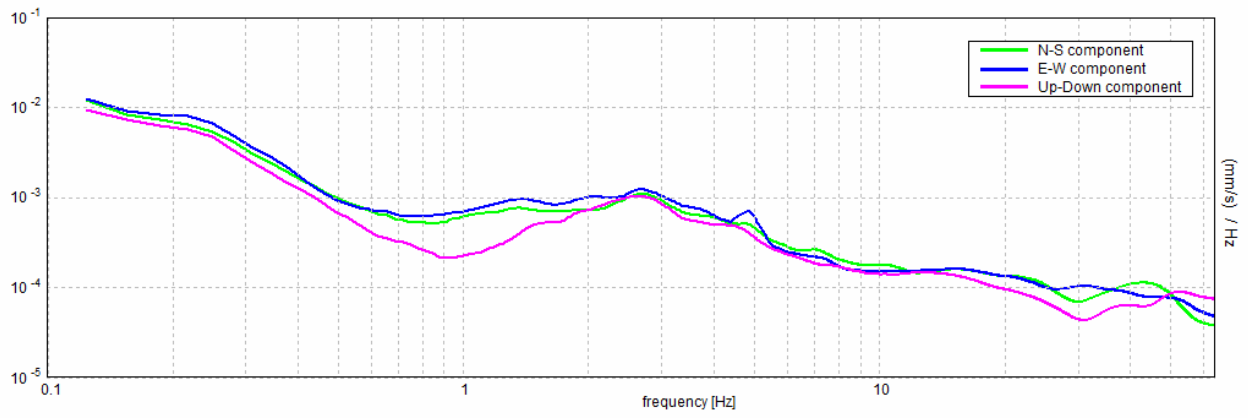
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



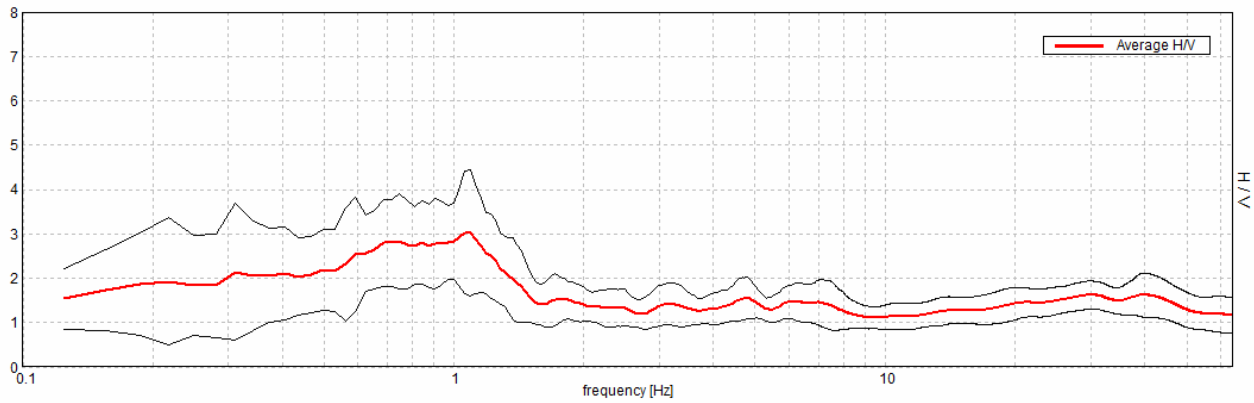
## MICROZONAZIONE MIRANDOLA, R086

Start recording: 15/12/11 15:28:49      End recording: 15/12/11 15:40:50  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

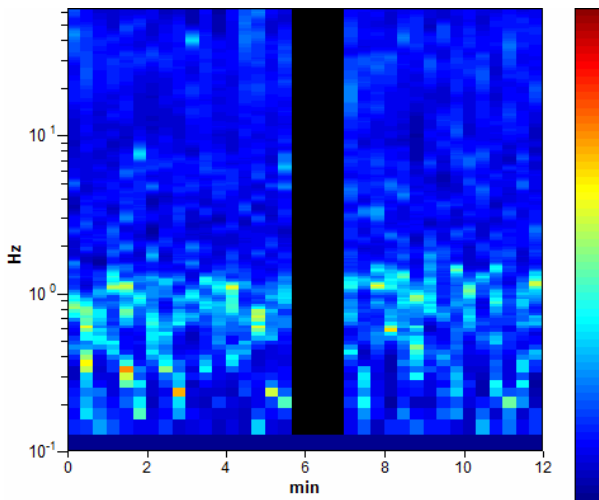
Trace length: 0h12'00".      Analyzed 89% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

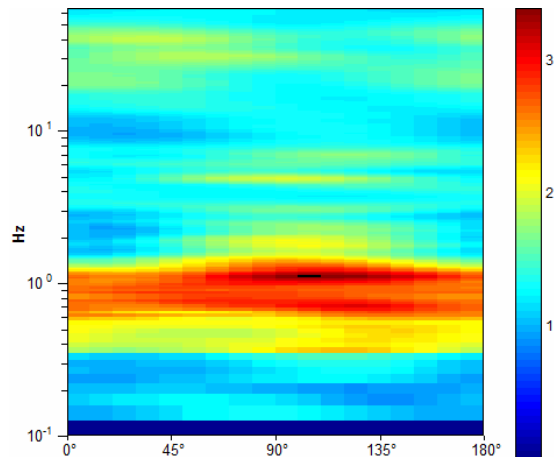
Max. H/V at  $1.06 \pm 0.09$  Hz (in the range 0.0 - 64.0 Hz).



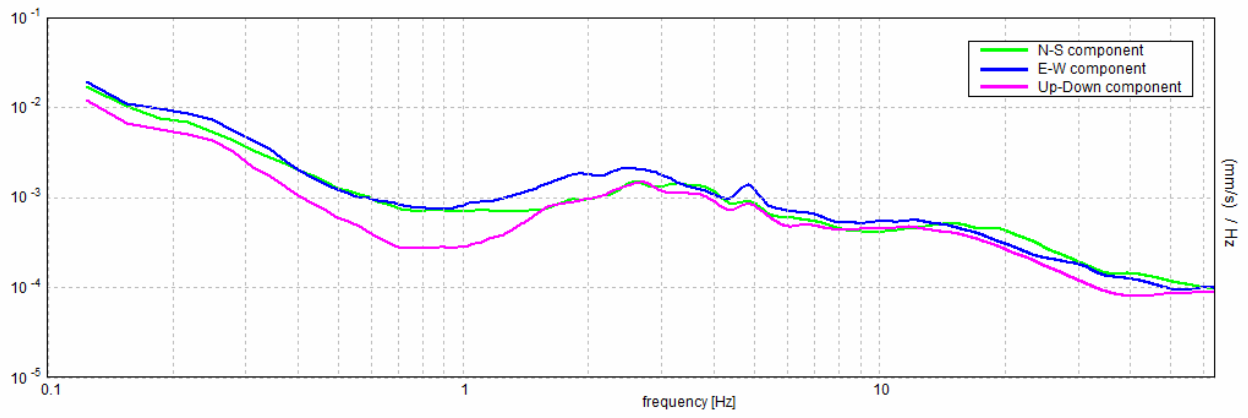
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



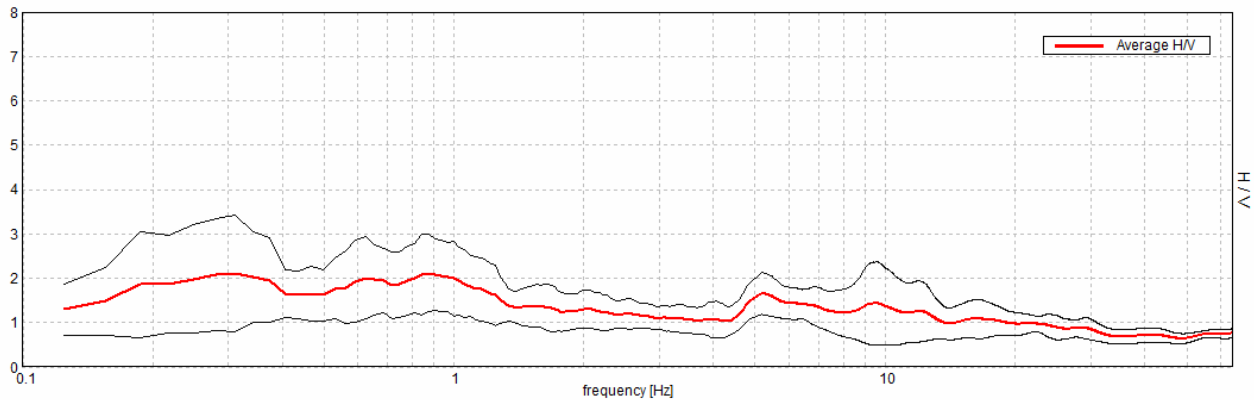
## MICROZONAZIONE MIRANDOLA, R087

Start recording: 15/12/11 15:59:26      End recording: 15/12/11 16:11:27  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

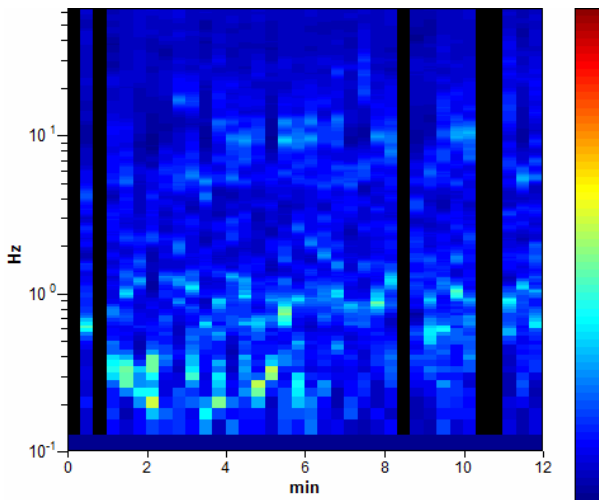
Trace length: 0h12'00".      Analyzed 86% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

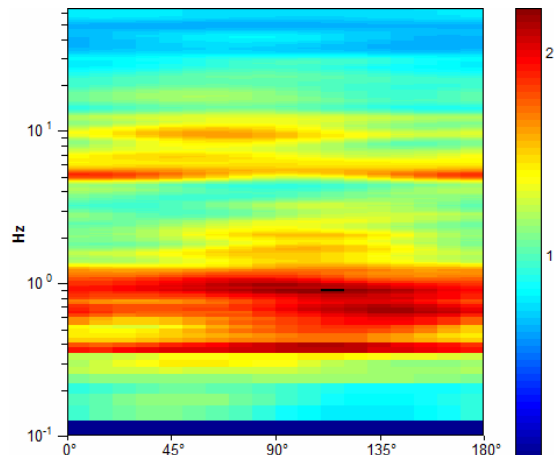
Max. H/V at  $0.88 \pm 0.2$  Hz (in the range 0.0 - 64.0 Hz).



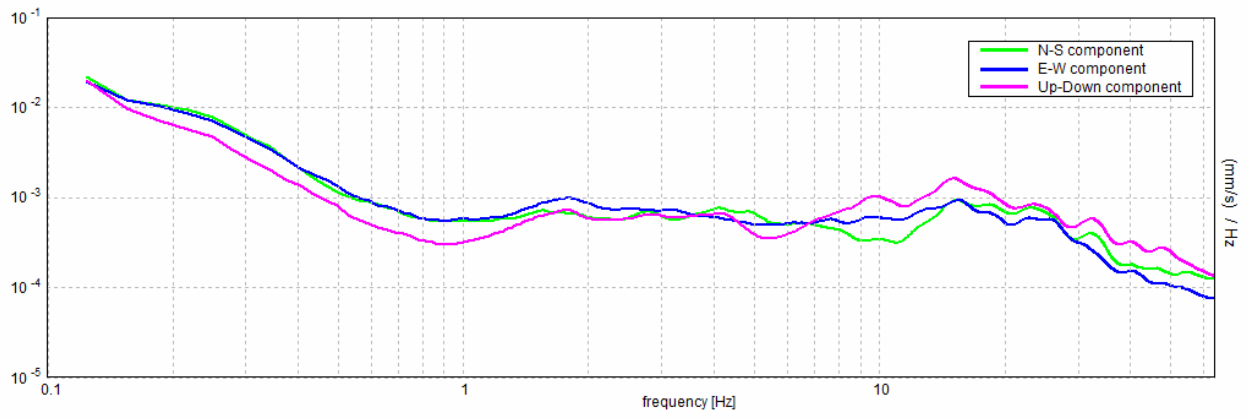
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



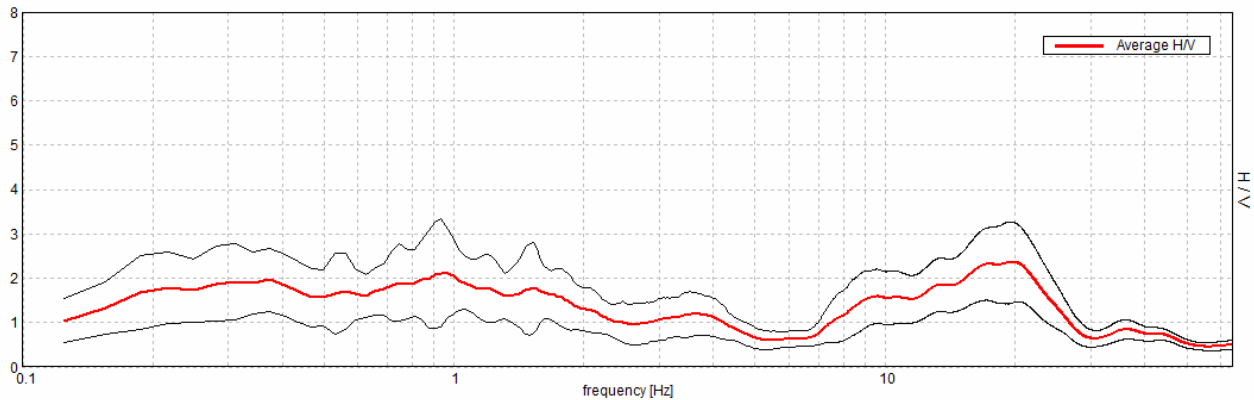
## MICROZONAZIONE MIRANDOLA, R089

Start recording: 16/12/11 10:15:42      End recording: 16/12/11 10:35:43  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

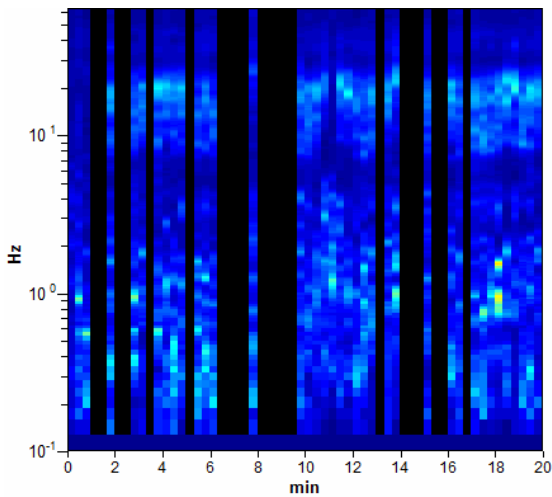
Trace length: 0h20'00".      Analyzed 63% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

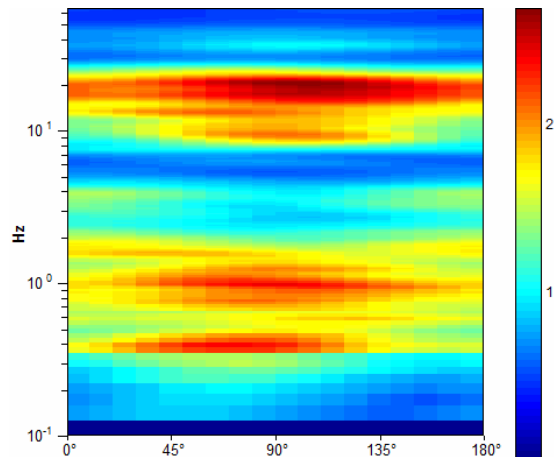
Max. H/V at  $19.84 \pm 4.54$  Hz (in the range 0.0 - 64.0 Hz).



### H/V TIME HISTORY

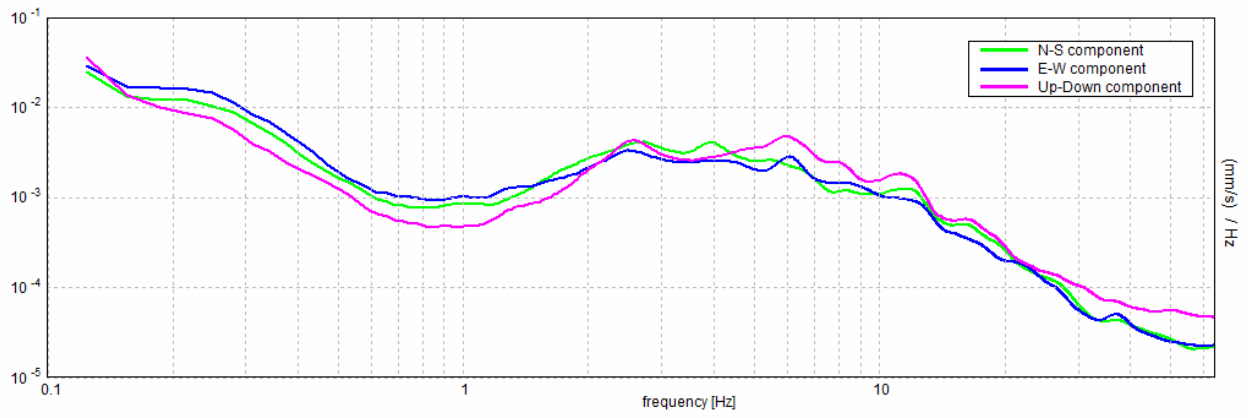


### DIRECTIONAL H/V





### SINGLE COMPONENT SPECTRA

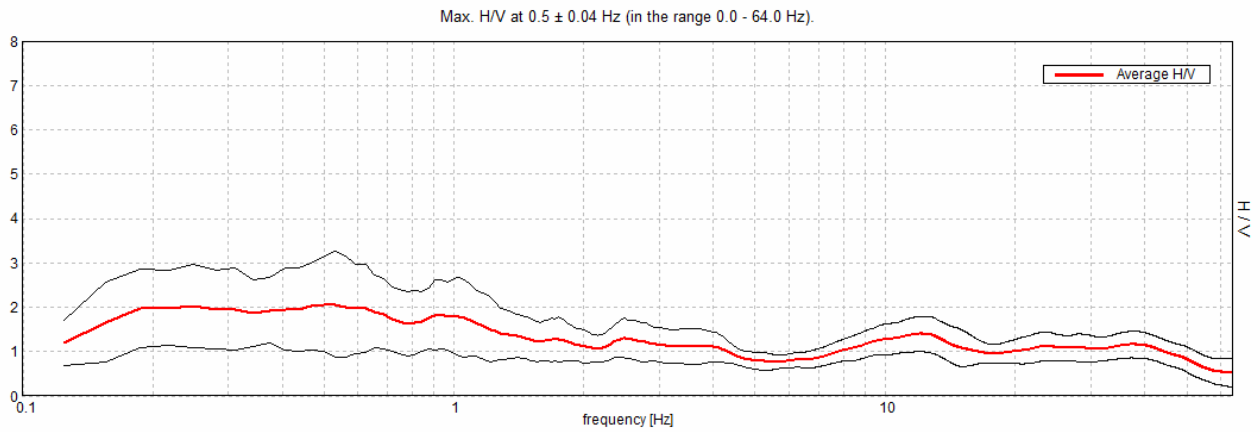


## MICROZONAZIONE MIRANDOLA, R090

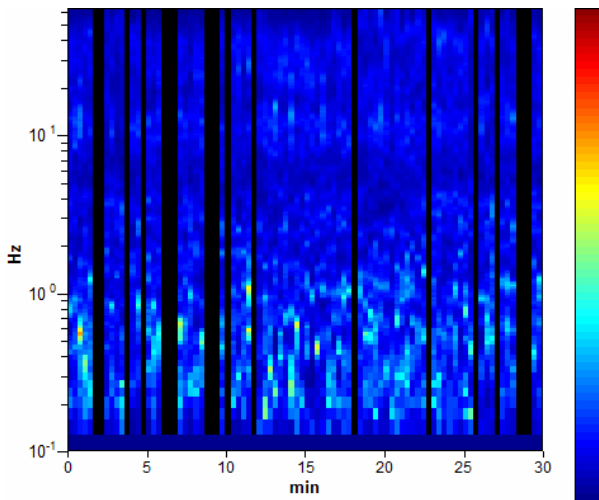
Start recording: 16/12/11 10:53:24      End recording: 16/12/11 11:23:25  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h30'00".      Analyzed 79% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

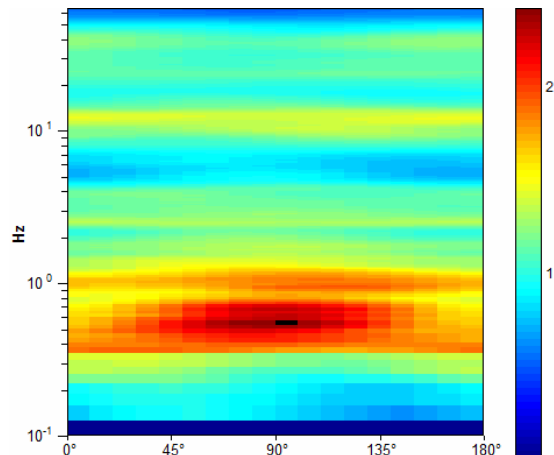
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



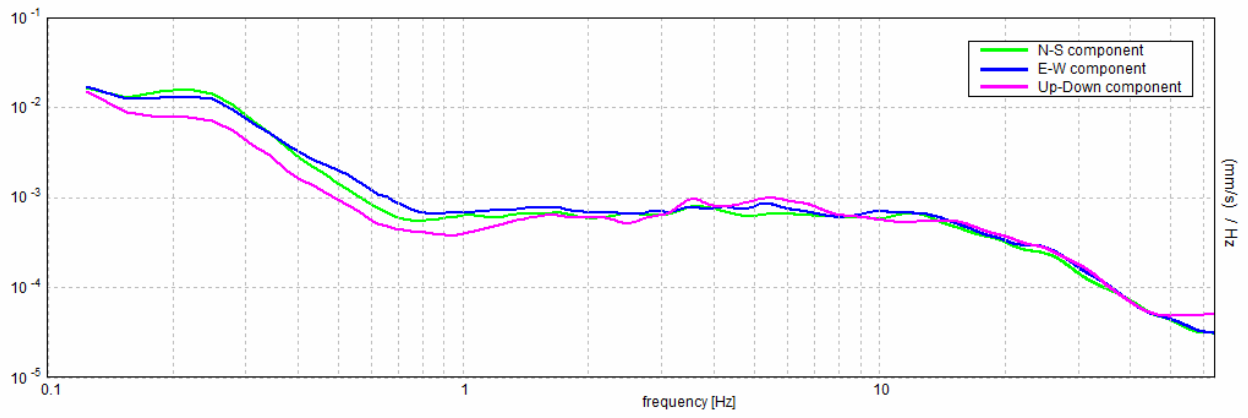
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



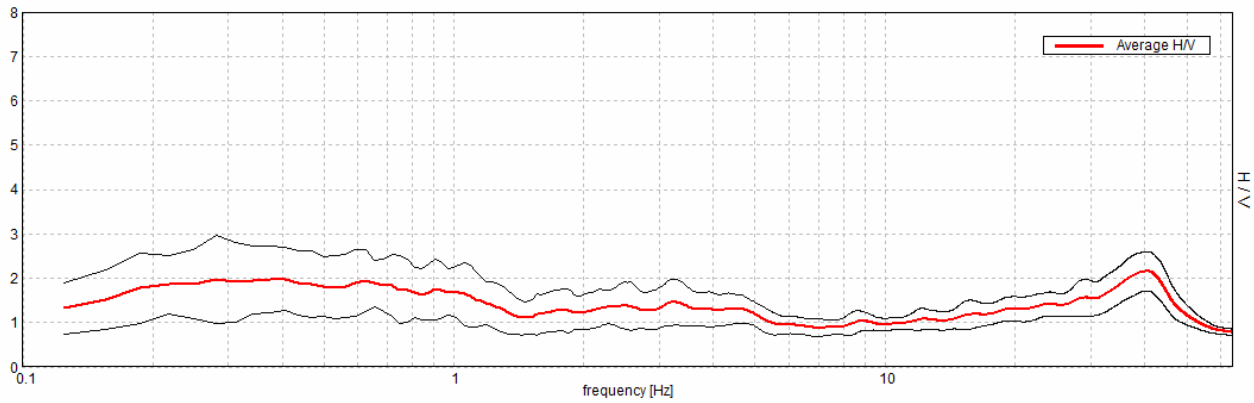
## MICROZONAZIONE MIRANDOLA, R091

Start recording: 16/12/11 12:12:26      End recording: 16/12/11 12:42:27  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

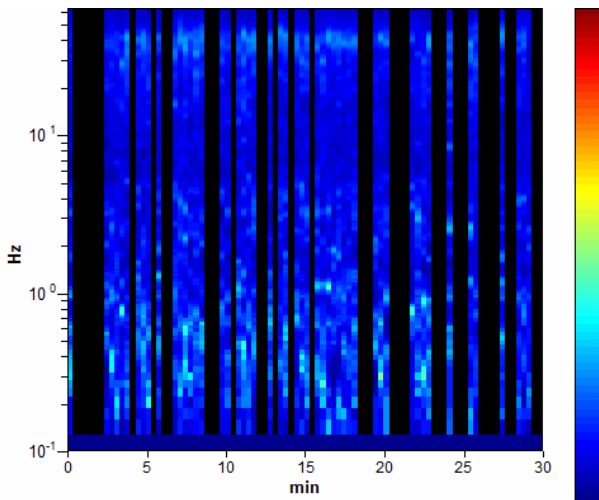
Trace length: 0h30'00".      Analyzed 56% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

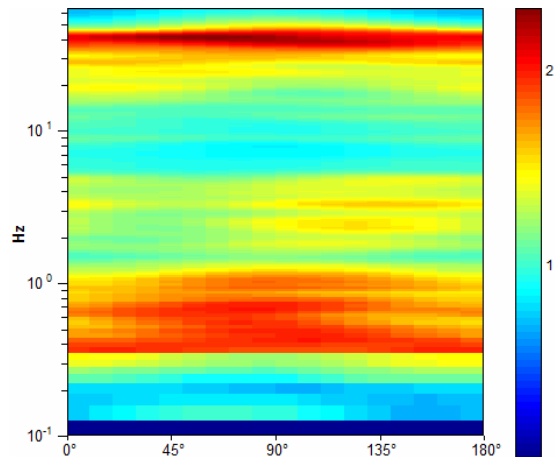
Max. H/V at  $40.31 \pm 6.07$  Hz (in the range 0.0 - 64.0 Hz).



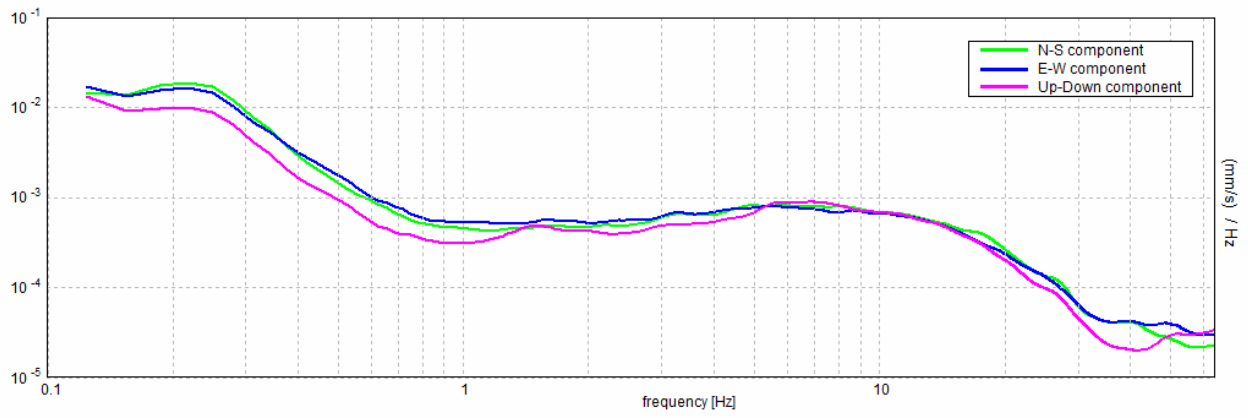
### H/V TIME HISTORY



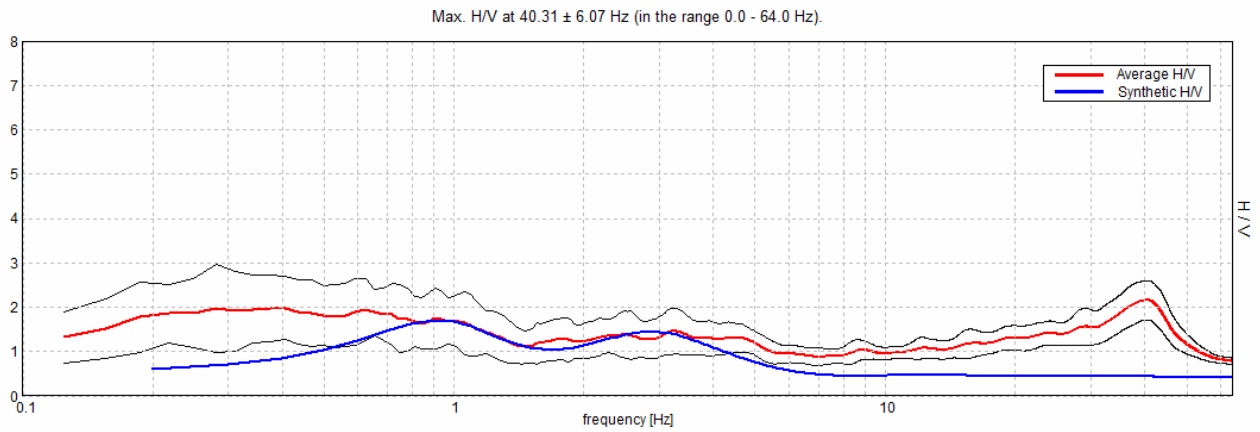
### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

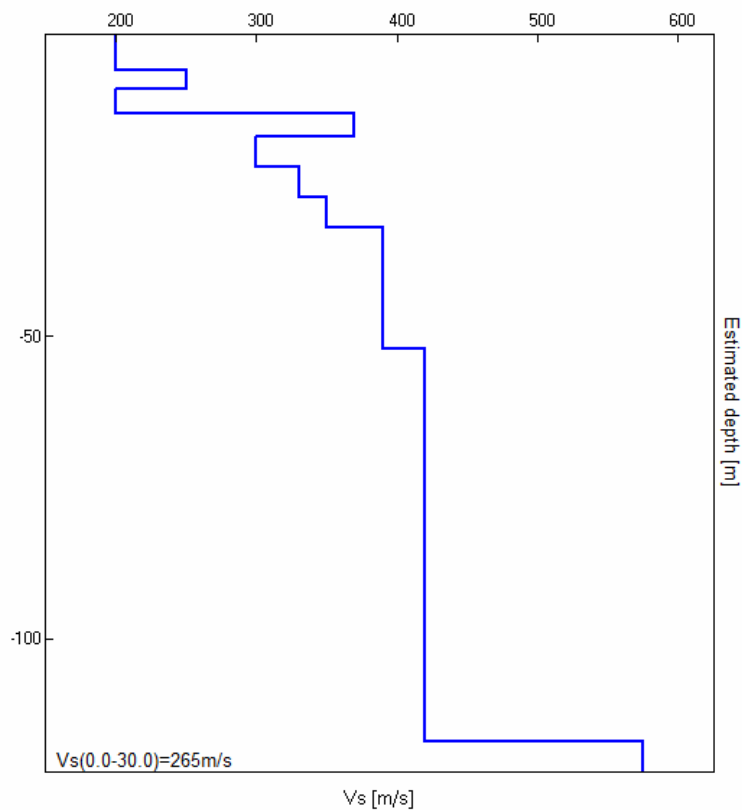


EXPERIMENTAL VS. SYNTHETIC H/V



Depth at the bottom of the layer [m]	Thickness [m]	Vs [m/s]
6.00	6.00	200
9.00	3.00	250
13.00	4.00	200
17.00	4.00	370
22.00	5.00	300
27.00	5.00	330
32.00	5.00	350
52.00	20.00	390
117.00	65.00	420
inf.	inf.	575

Vs30 = 265 m/s



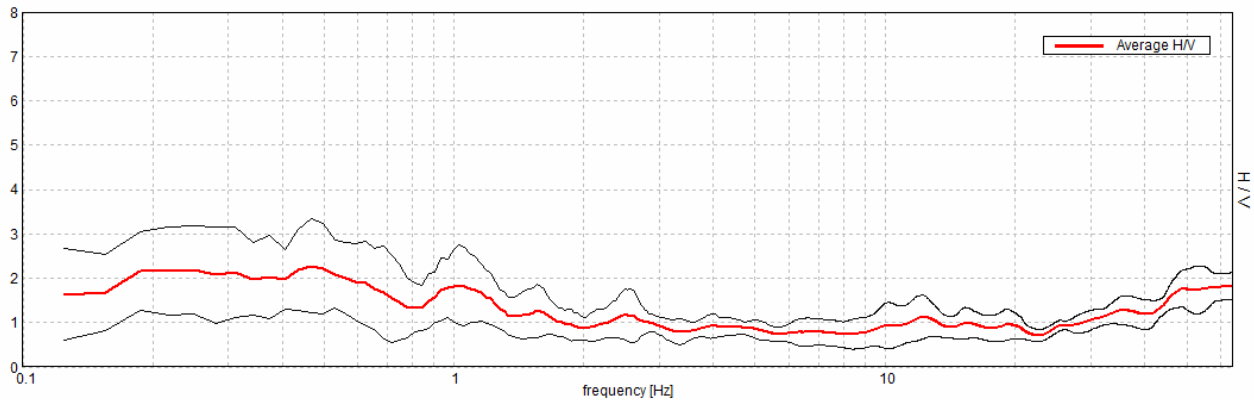
## MICROZONAZIONE MIRANDOLA, R092

Start recording: 16/12/11 12:47:47      End recording: 16/12/11 12:59:48  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

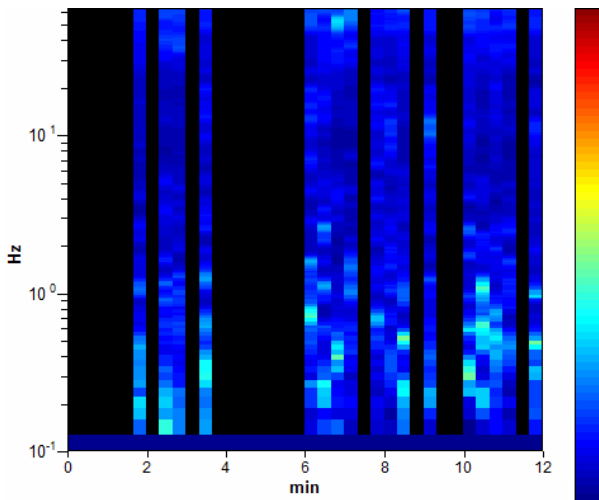
Trace length: 0h12'00".      Analyzed 47% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

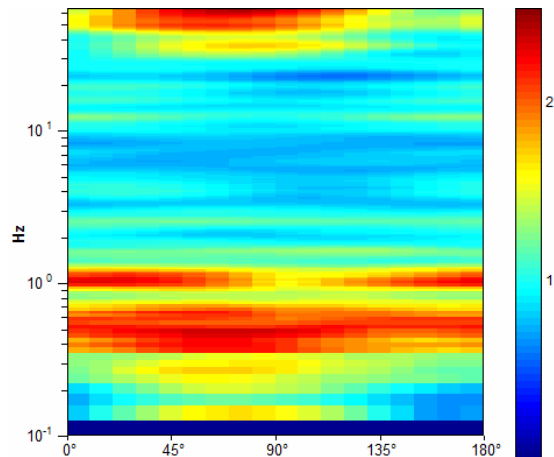
Max. H/V at  $0.47 \pm 0.13$  Hz (in the range 0.0 - 64.0 Hz).



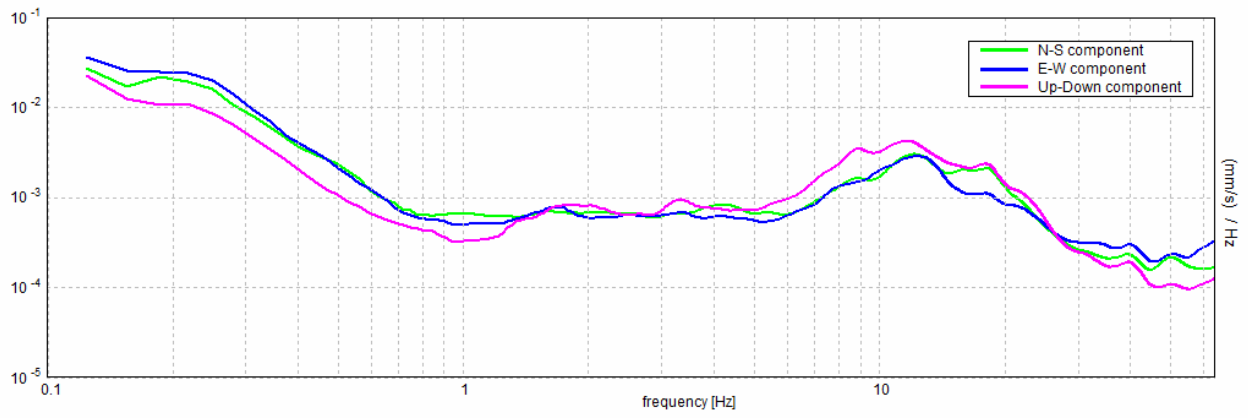
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



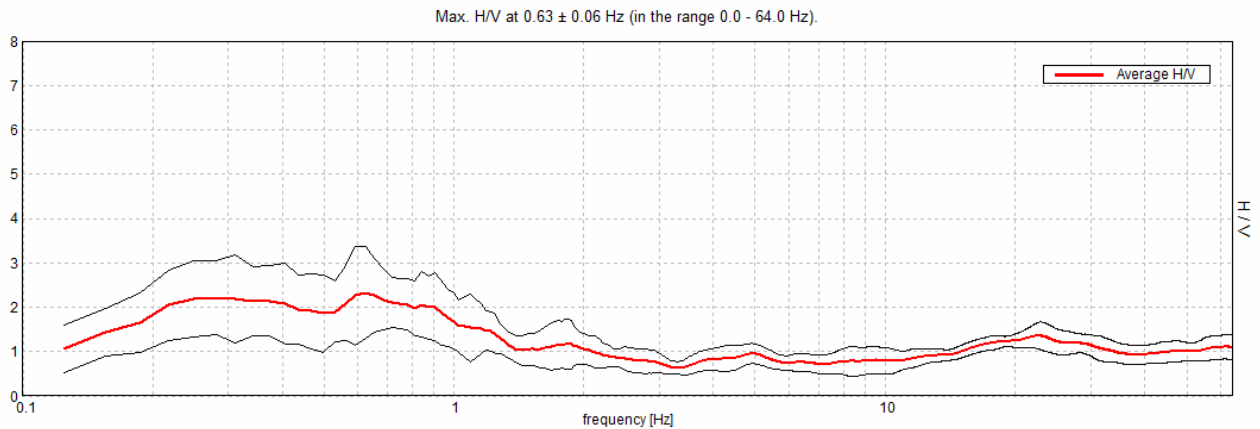


## MICROZONAZIONE MIRANDOLA, R093

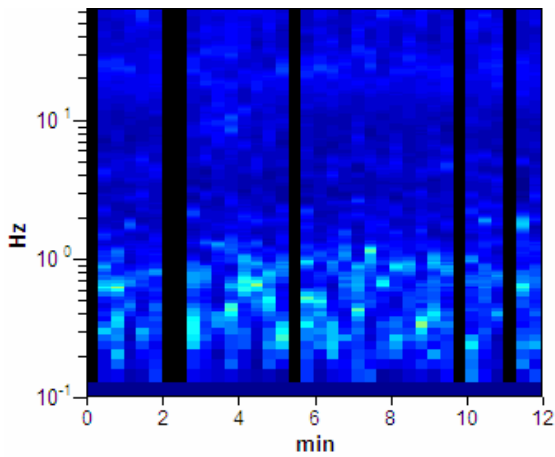
Start recording: 16/12/11 13:40:40    End recording: 16/12/11 13:52:41  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".    Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

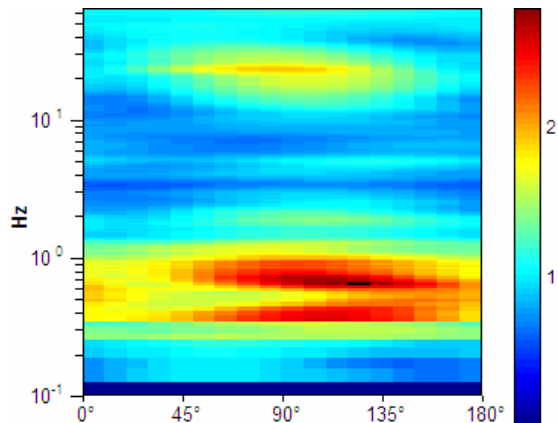
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



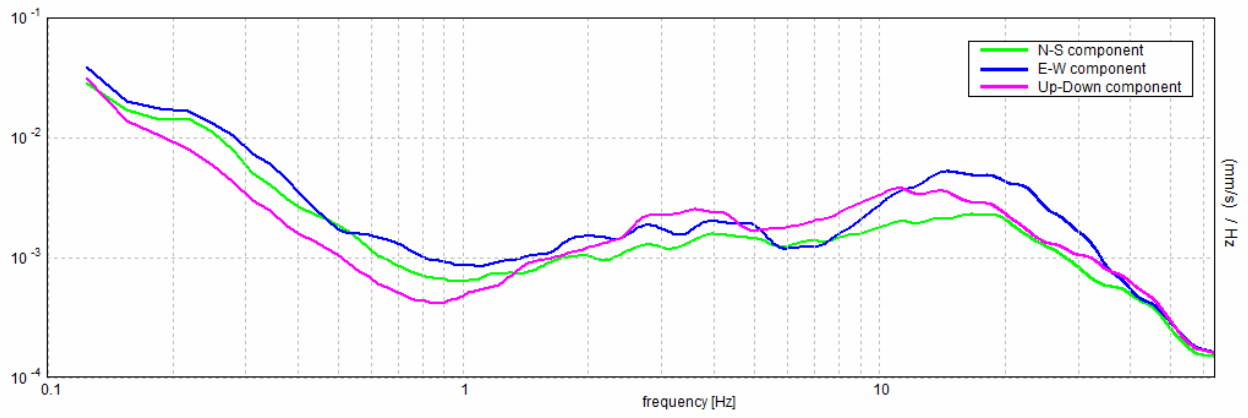
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

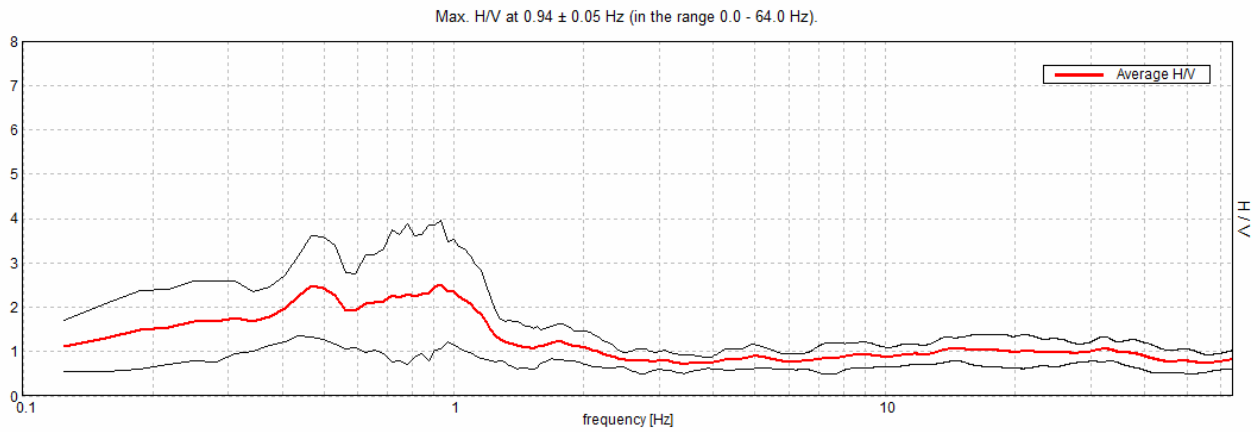


## MICROZONAZIONE MIRANDOLA, R094

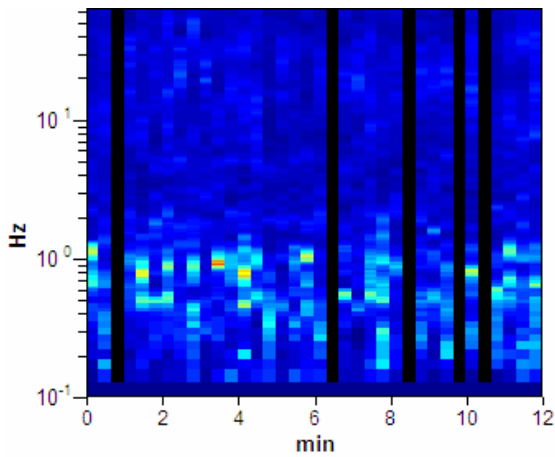
Start recording: 16/12/11 13:59:20    End recording: 16/12/11 14:11:21  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".    Analyzed 86% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

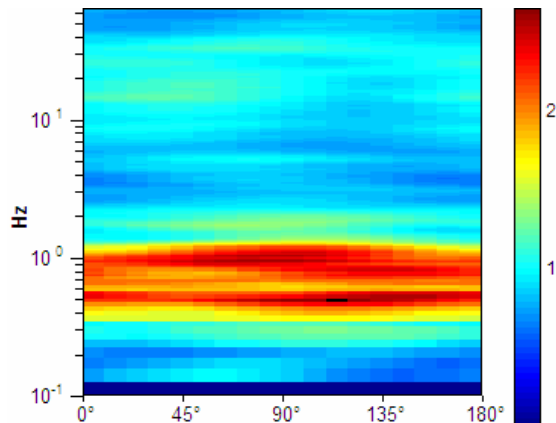
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



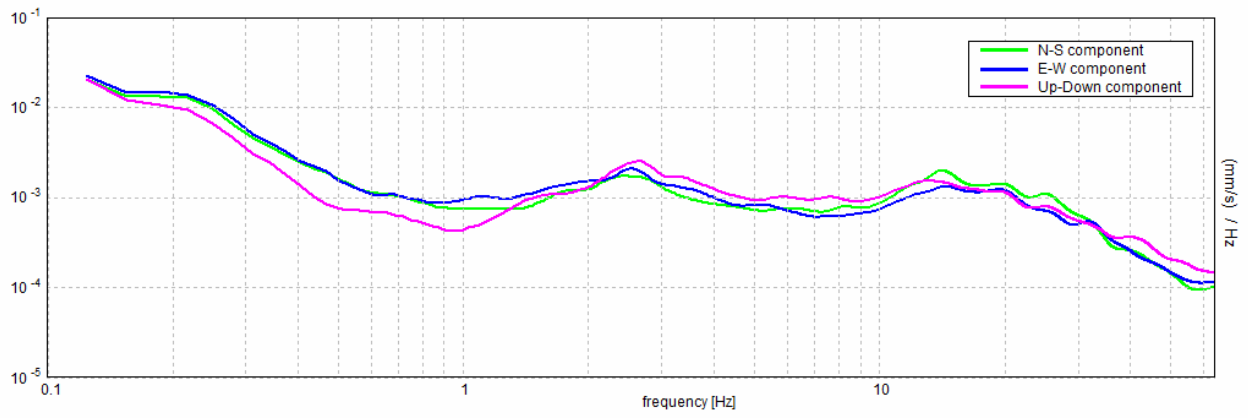
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

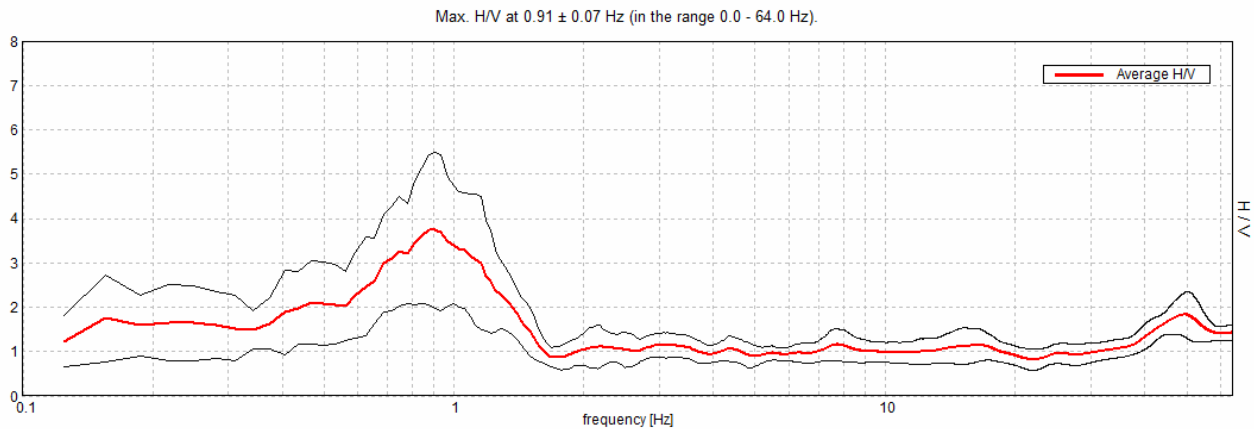


## MICROZONAZIONE MIRANDOLA, R095

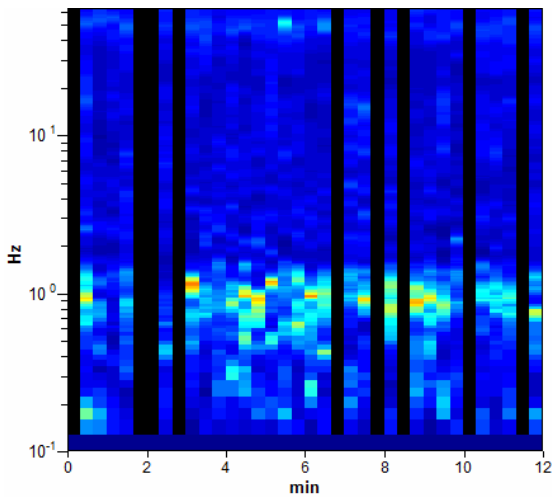
Start recording: 16/12/11 14:16:35      End recording: 16/12/11 14:28:36  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 75% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

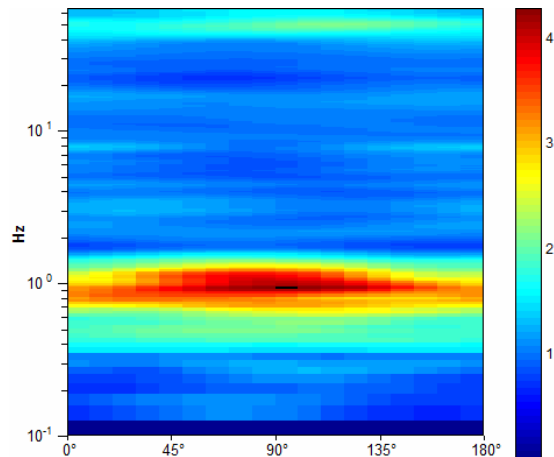
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



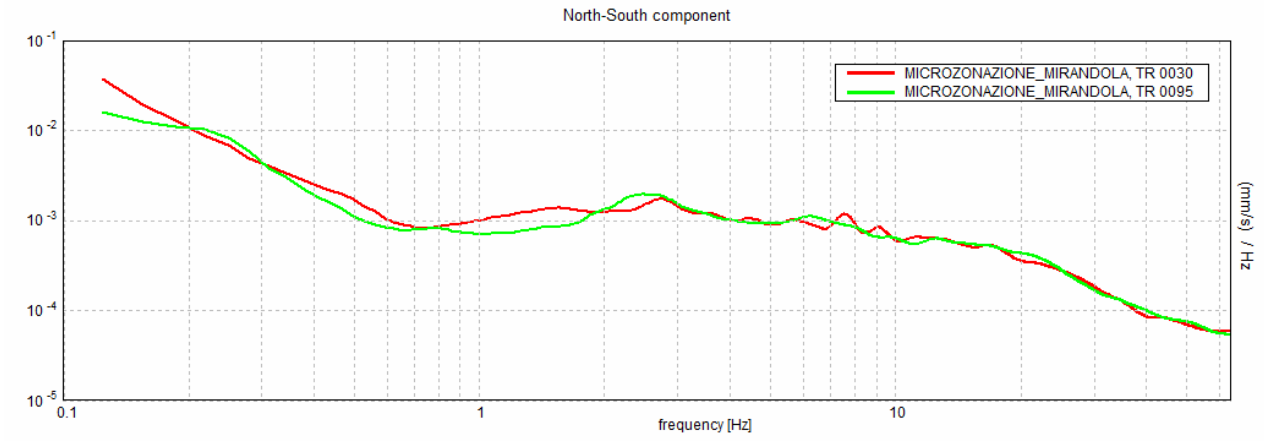
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

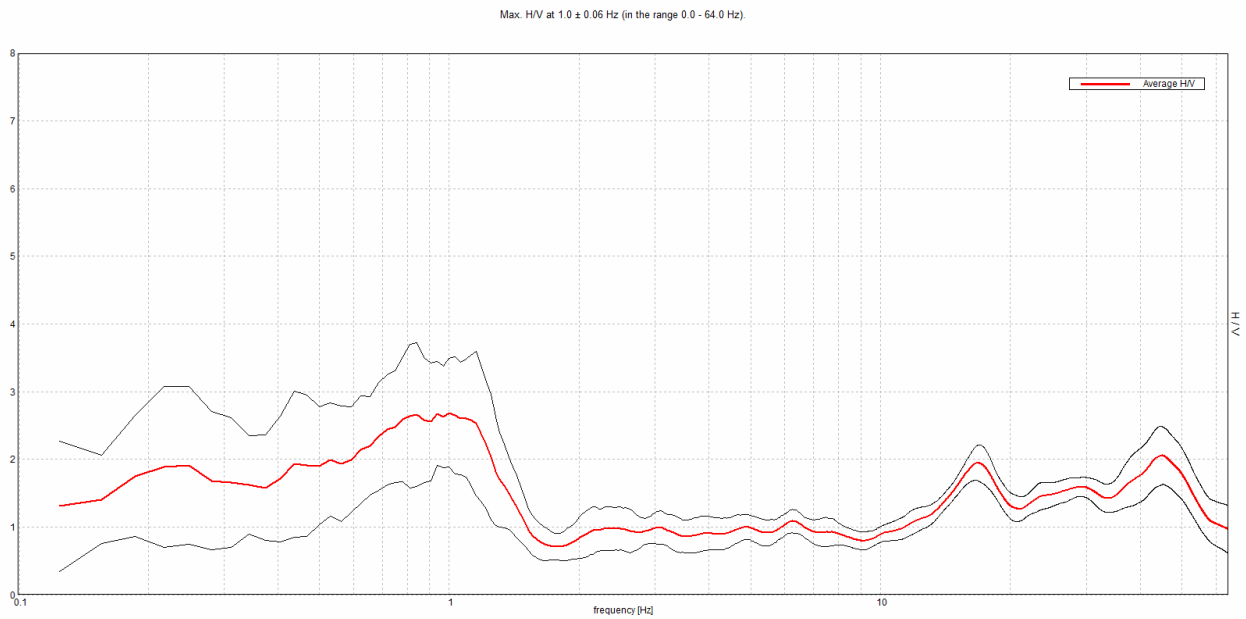


## MICROZONAZIONE MIRANDOLA, R096

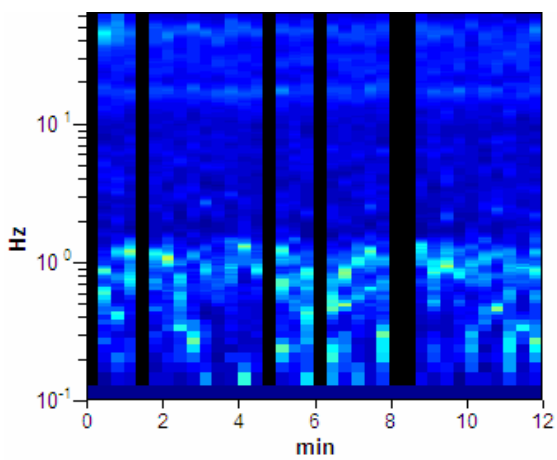
Start recording: 16/12/11 14:35:11      End recording: 16/12/11 14:47:12  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

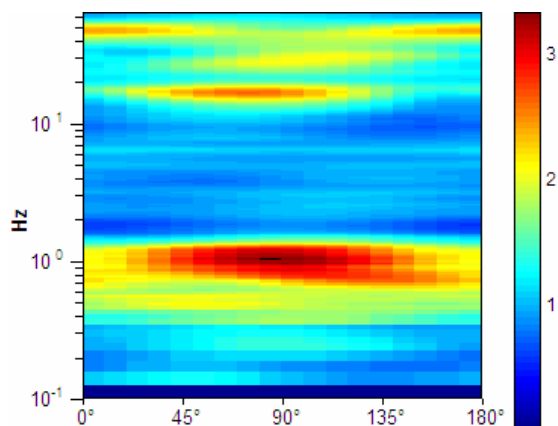
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



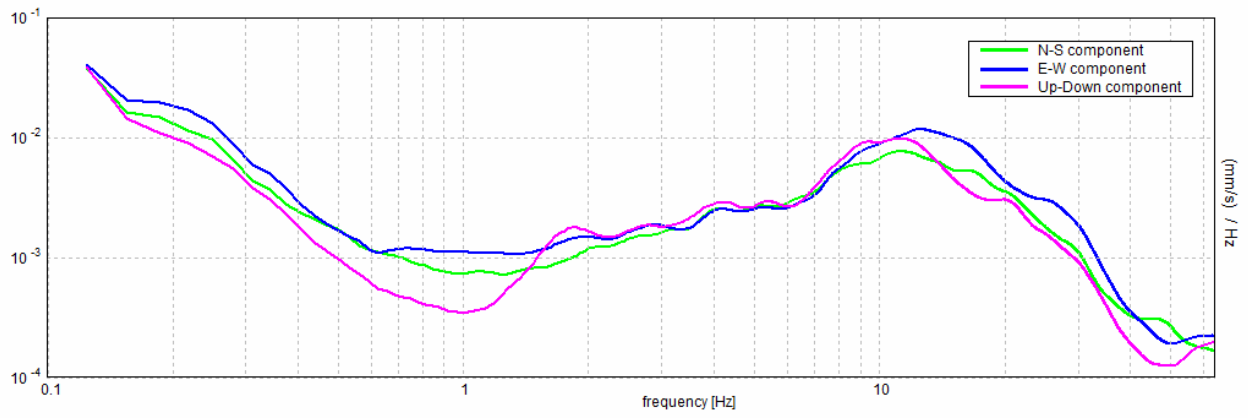
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





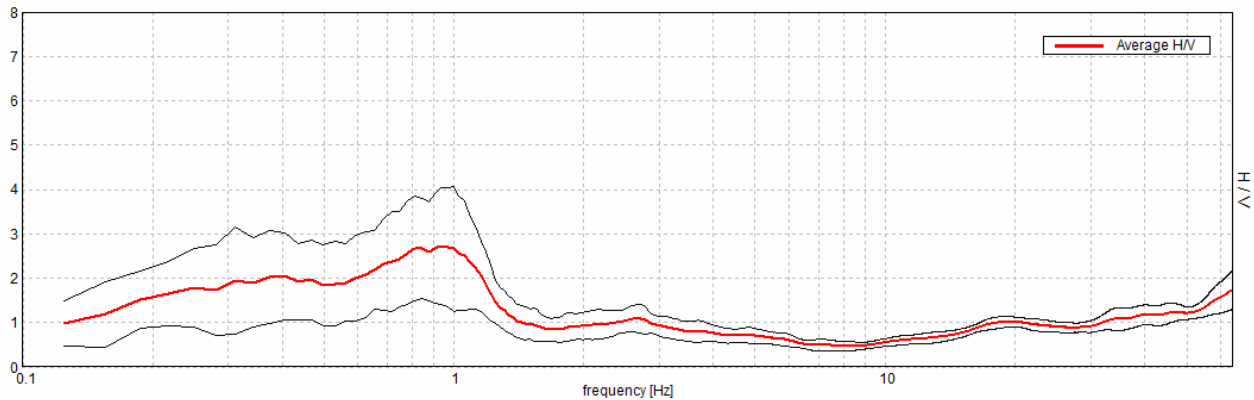
## MICROZONAZIONE MIRANDOLA, R097

Start recording: 16/12/11 14:51:06      End recording: 16/12/11 15:03:07  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

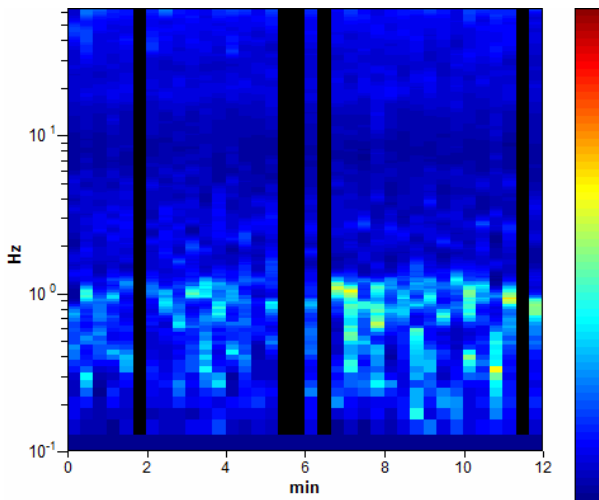
Trace length: 0h12'00".      Analyzed 86% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

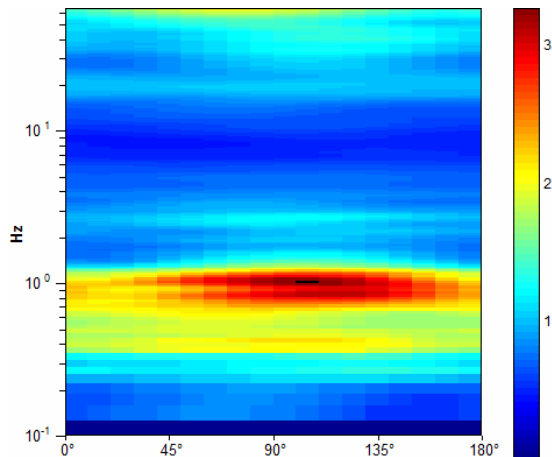
Max. H/V at  $0.94 \pm 0.03$  Hz (in the range 0.0 - 64.0 Hz).



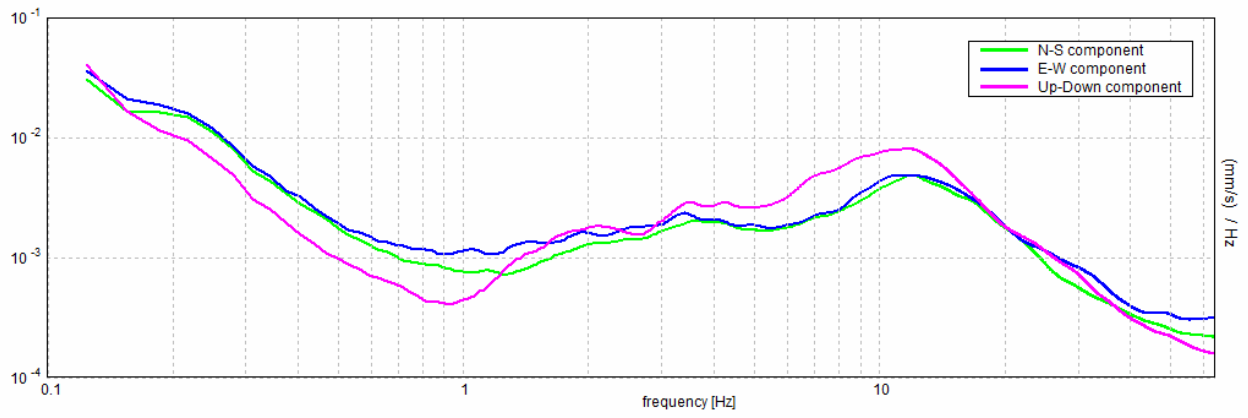
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

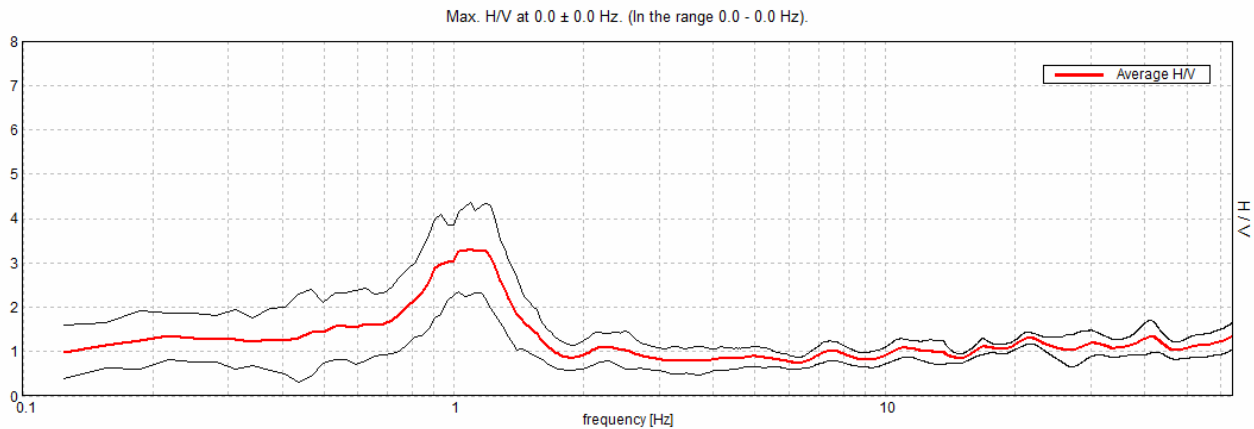


## MICROZONAZIONE MIRANDOLA, R102

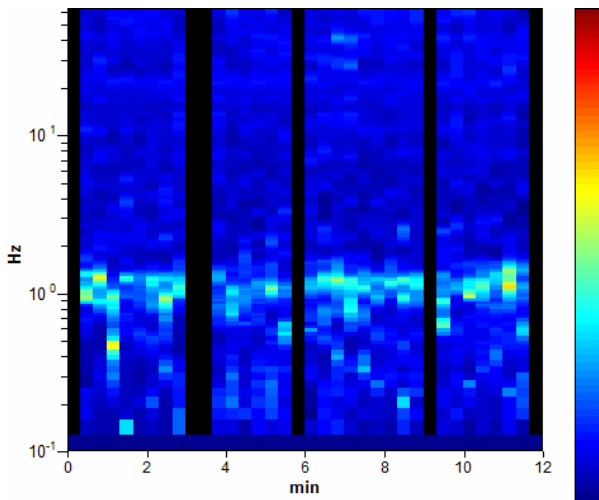
Start recording: 22/12/11 09:57:02      End recording: 22/12/11 10:09:03  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

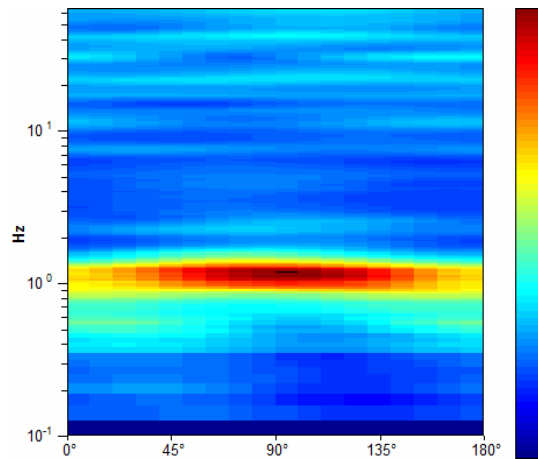
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



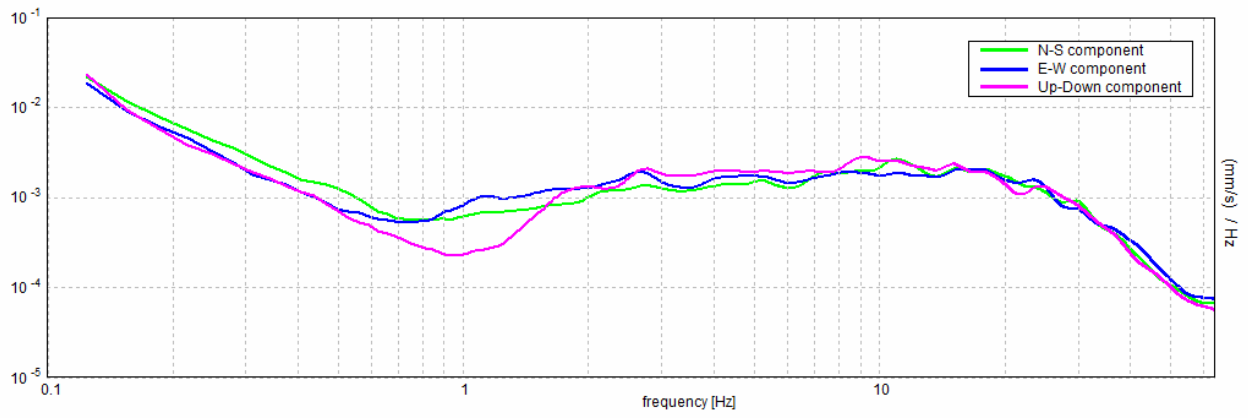
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

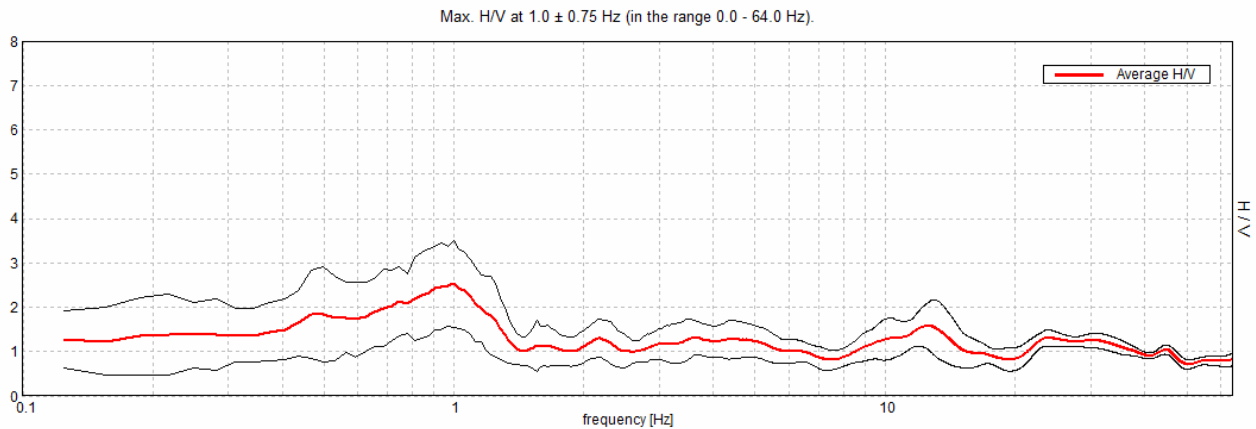


## MICROZONAZIONE MIRANDOLA, R103

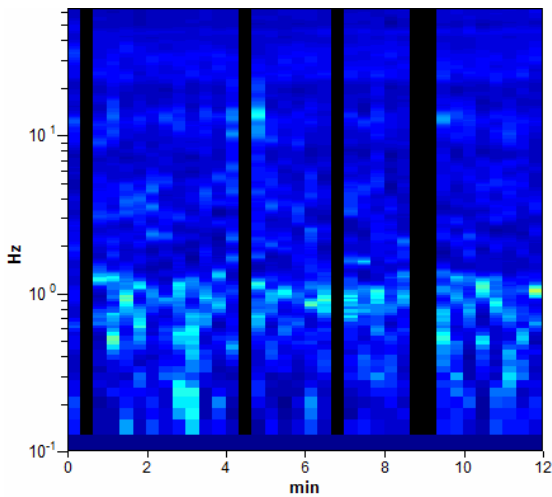
Start recording: 22/12/11 10:26:18      End recording: 22/12/11 10:38:19  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 86% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

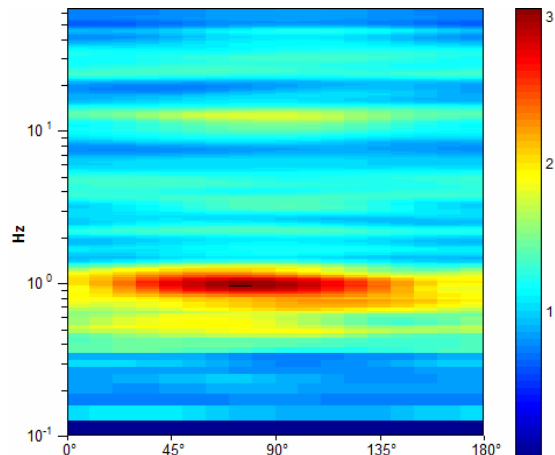
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



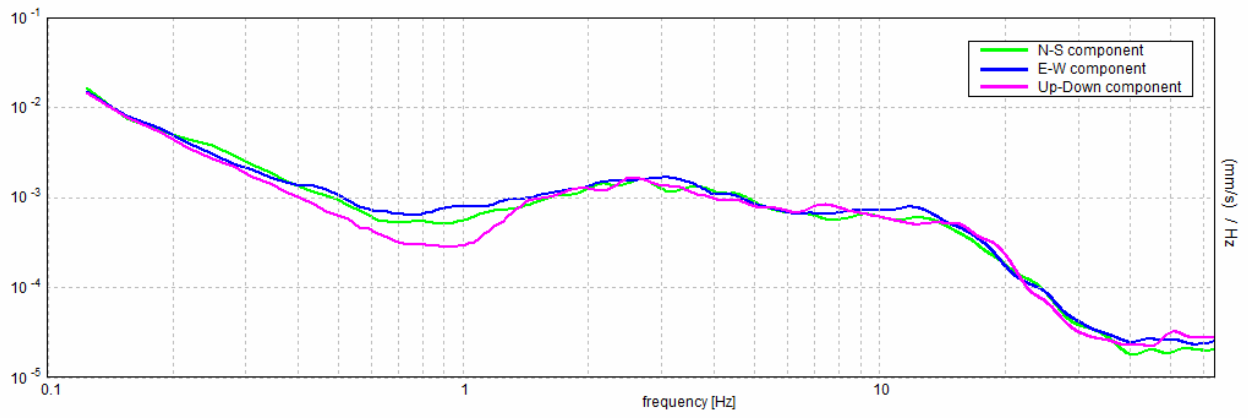
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



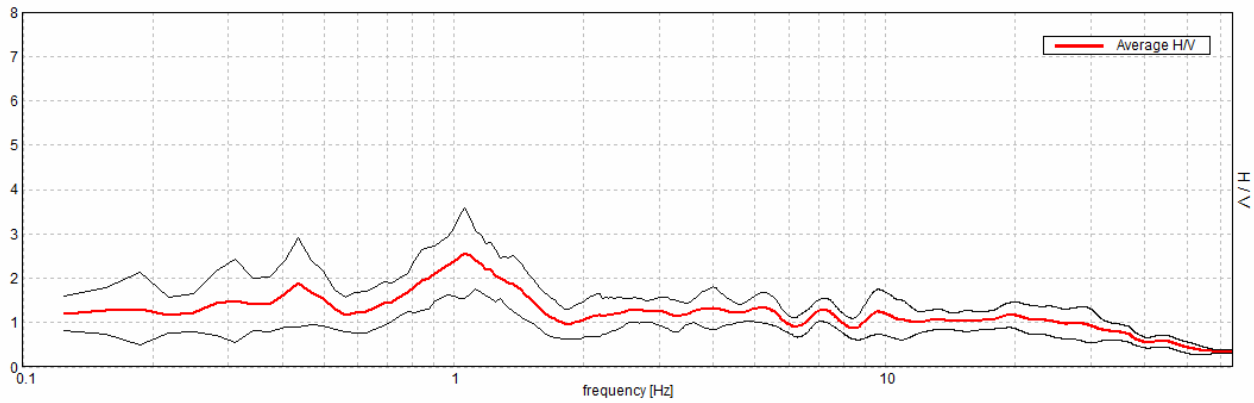
## MICROZONAZIONE MIRANDOLA, R104

Start recording: 22/12/11 10:53:39      End recording: 22/12/11 11:05:40  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

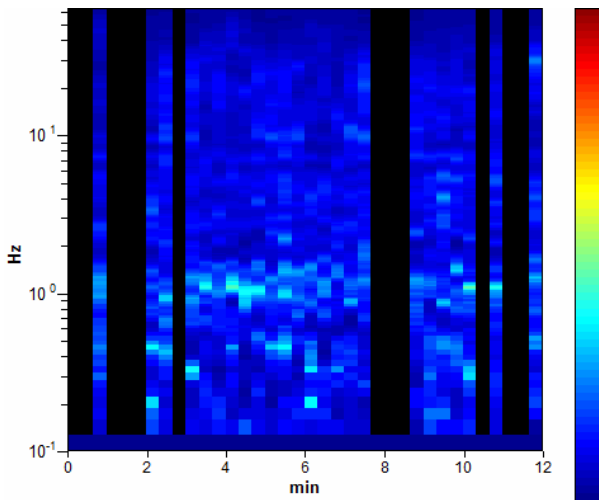
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

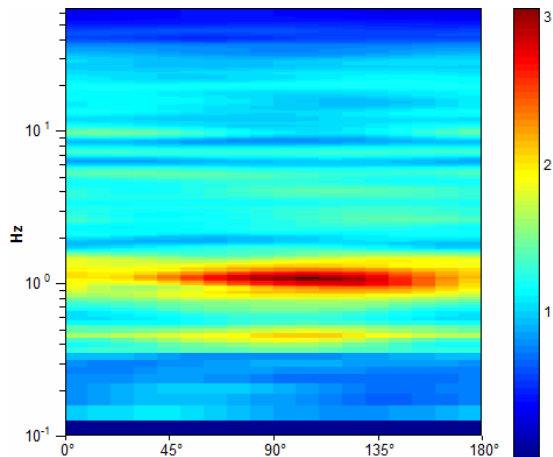
Max. H/V at  $1.06 \pm 0.08$  Hz (in the range 0.0 - 64.0 Hz).



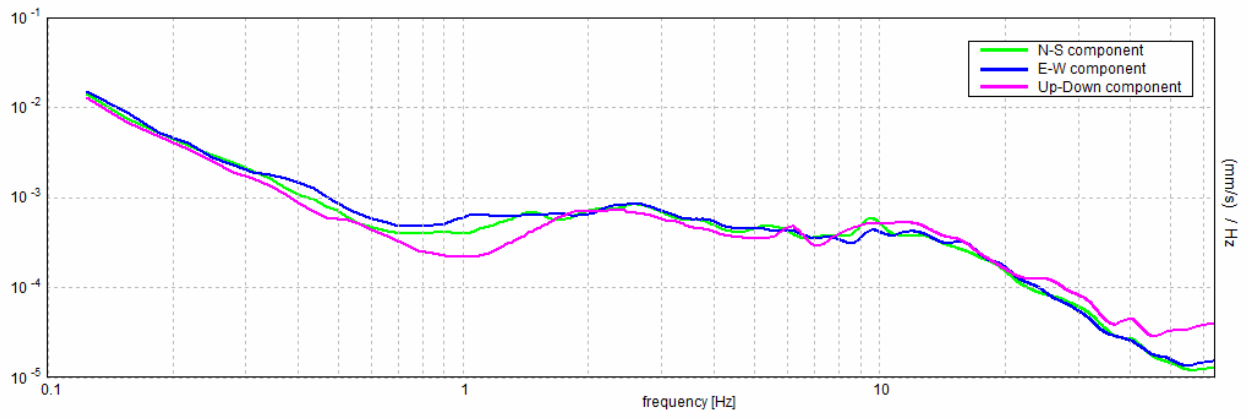
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





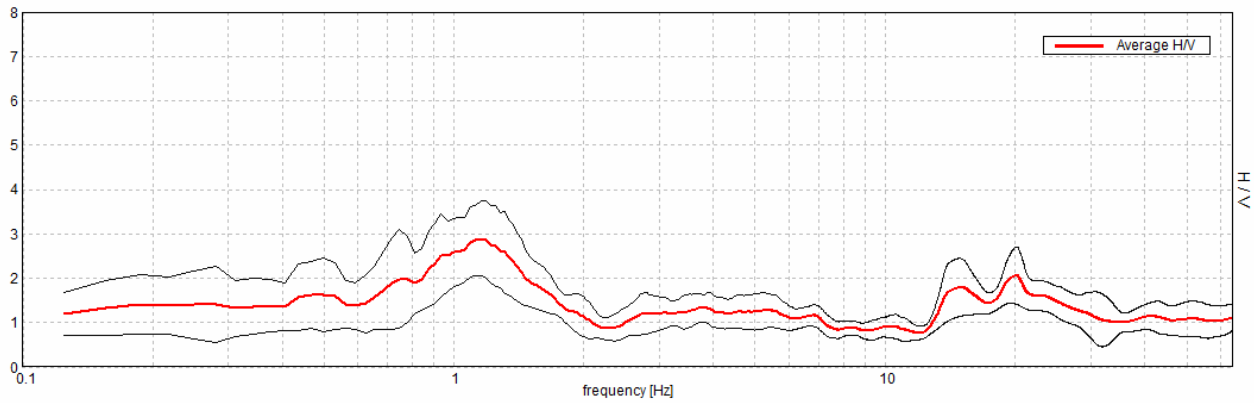
## MICROZONAZIONE MIRANDOLA, R105

Start recording: 22/12/11 11:17:11      End recording: 22/12/11 11:29:11  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

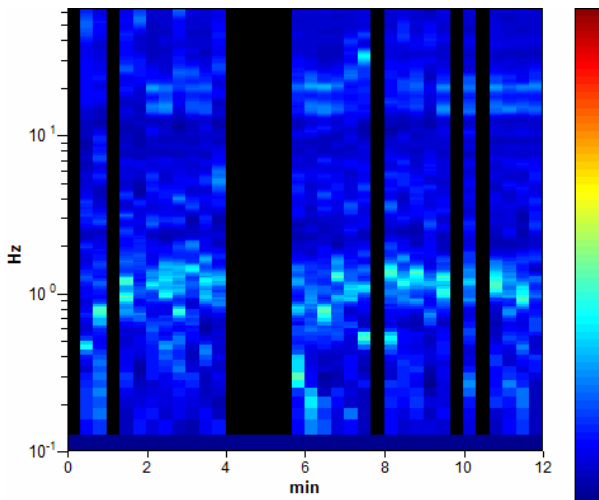
Trace length: 0h12'00".      Analyzed 72% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

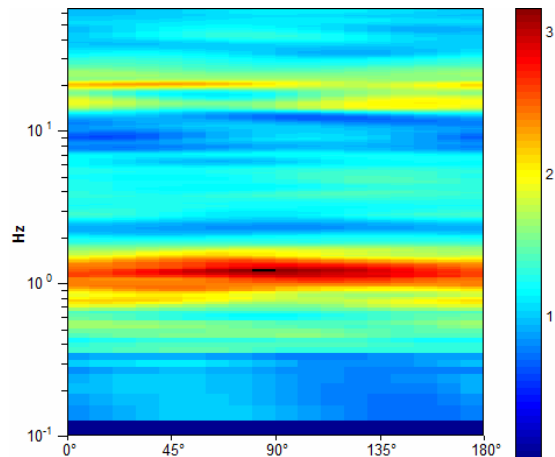
Max. H/V at  $1.16 \pm 0.08$  Hz (in the range 0.0 - 64.0 Hz).



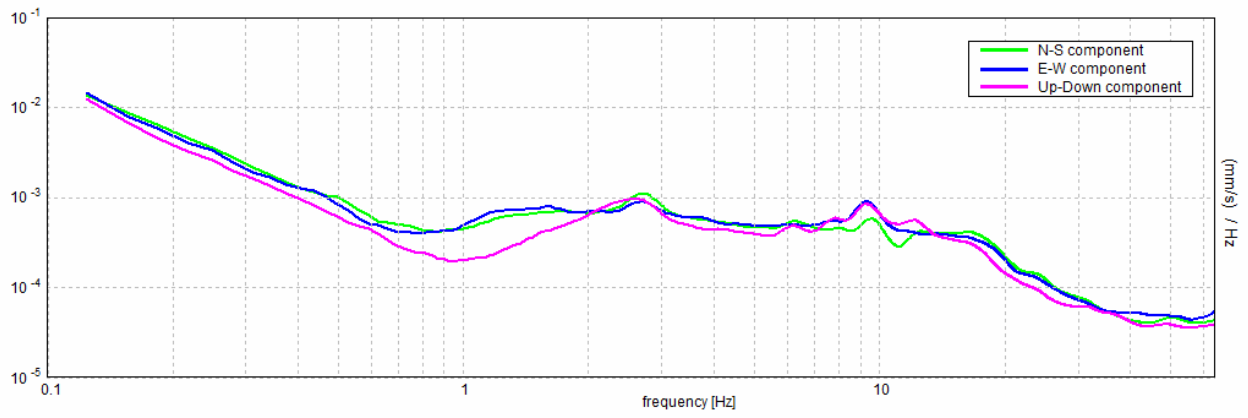
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



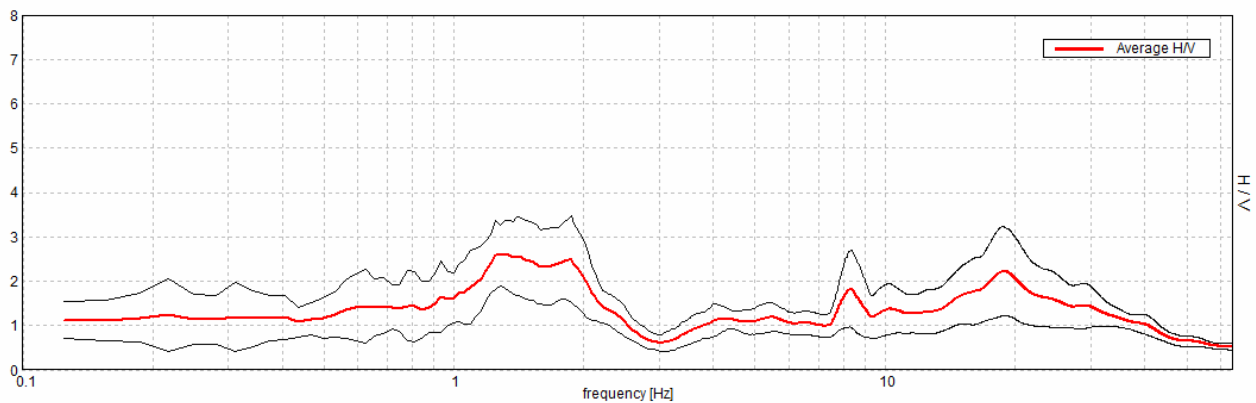
## MICROZONAZIONE MIRANDOLA, R106

Start recording: 22/12/11 11:44:42      End recording: 22/12/11 11:56:43  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

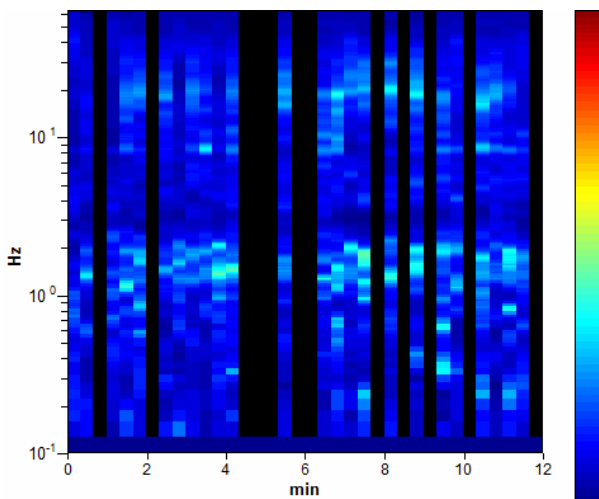
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

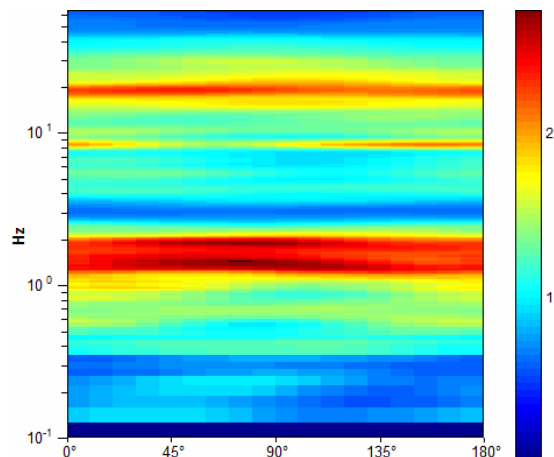
Max. H/V at  $1.31 \pm 0.05$  Hz (in the range 0.0 - 64.0 Hz).



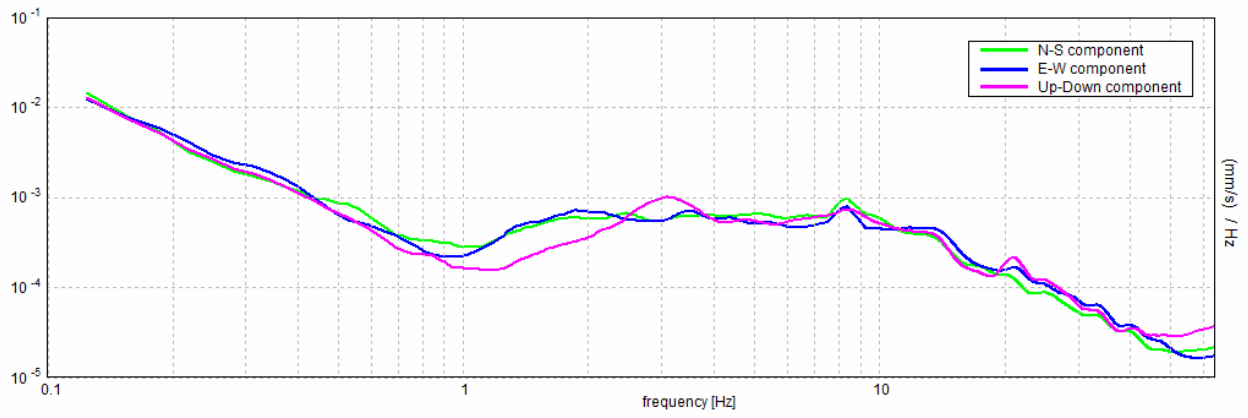
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



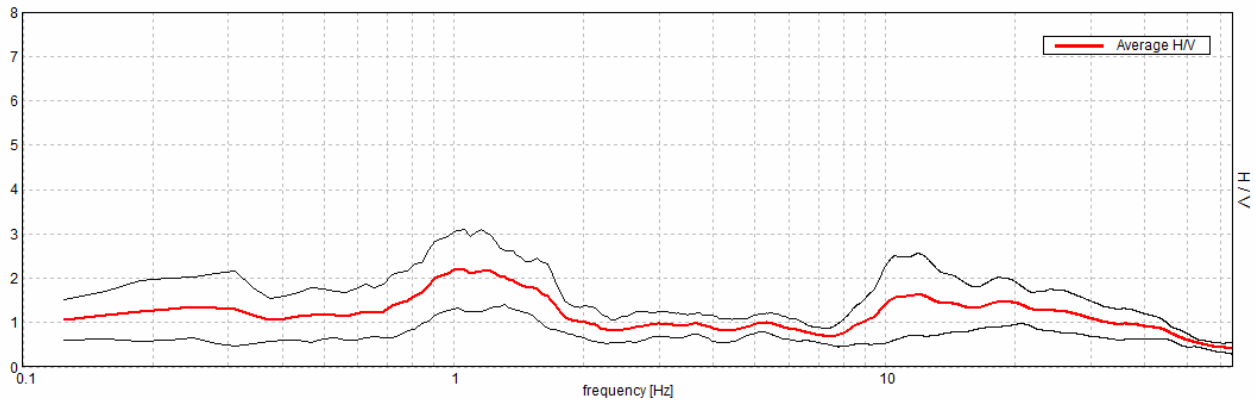
## MICROZONAZIONE MIRANDOLA, R107

Start recording: 22/12/11 12:05:04      End recording: 22/12/11 12:17:05  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

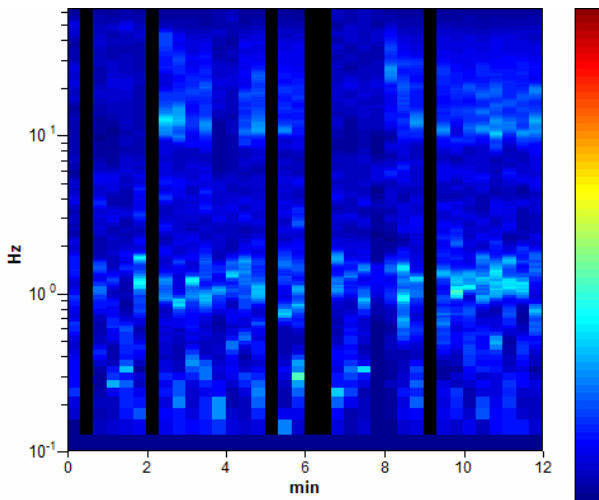
Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

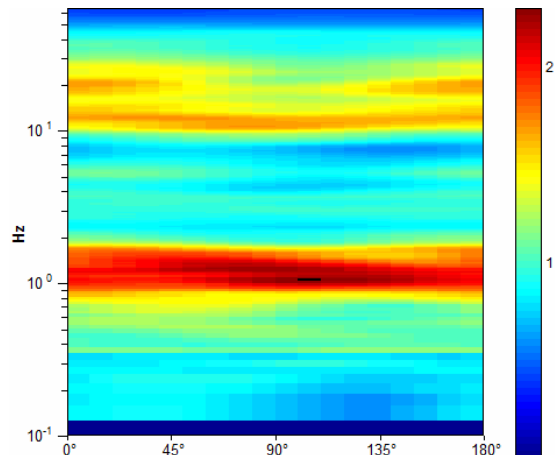
Max. H/V at  $1.03 \pm 0.09$  Hz (in the range 0.0 - 64.0 Hz).



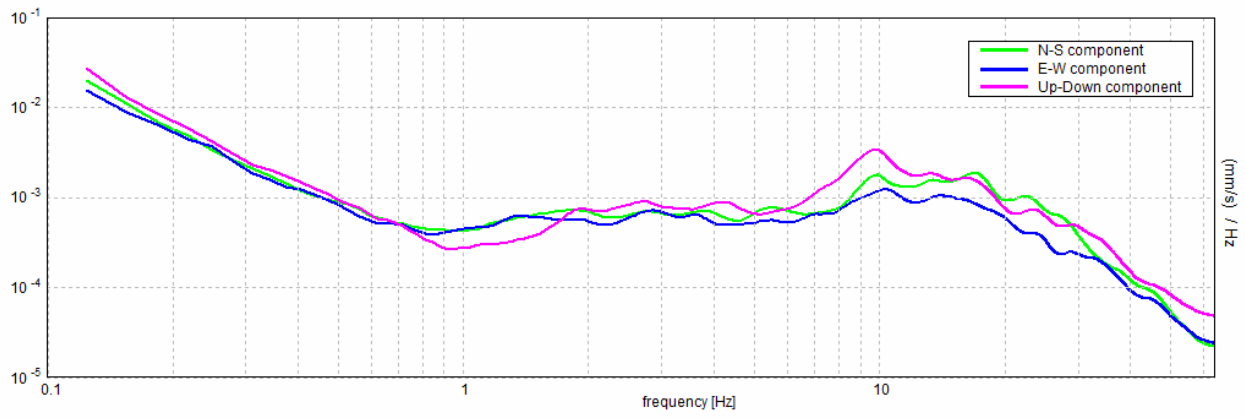
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



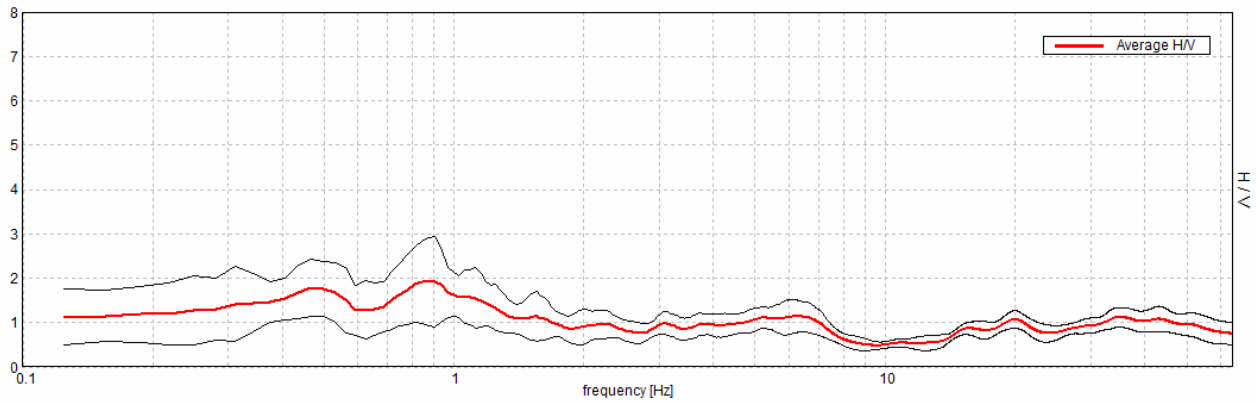
## MICROZONAZIONE MIRANDOLA, R108

Start recording: 22/12/11 12:31:33      End recording: 22/12/11 12:43:34  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

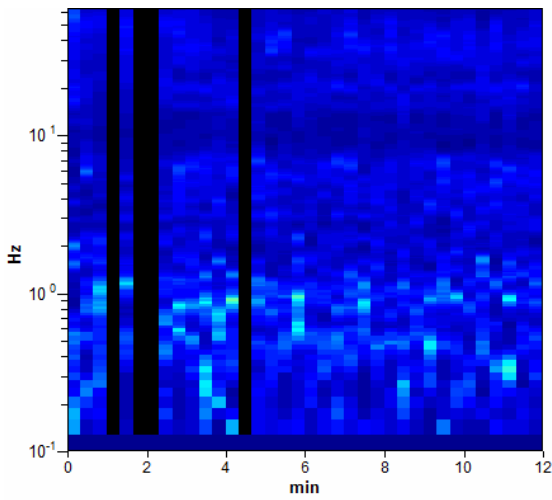
Trace length: 0h12'00".      Analyzed 89% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

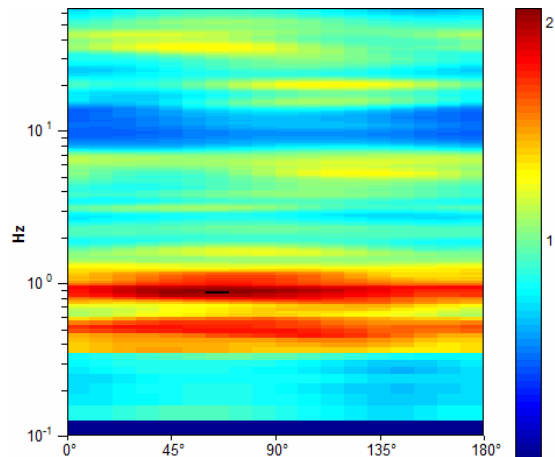
Max. H/V at  $1.0 \pm 0.15$  Hz. (In the range 0.0 - 64.0 Hz).



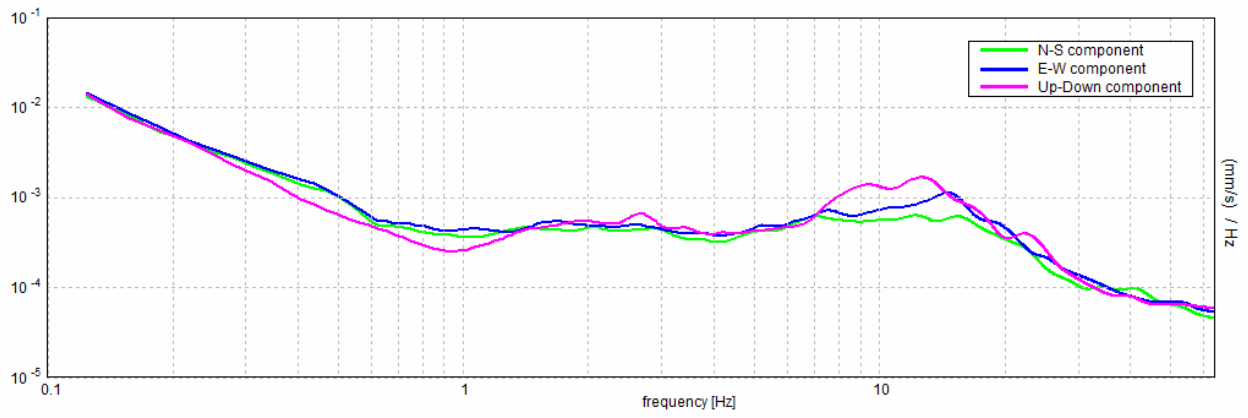
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





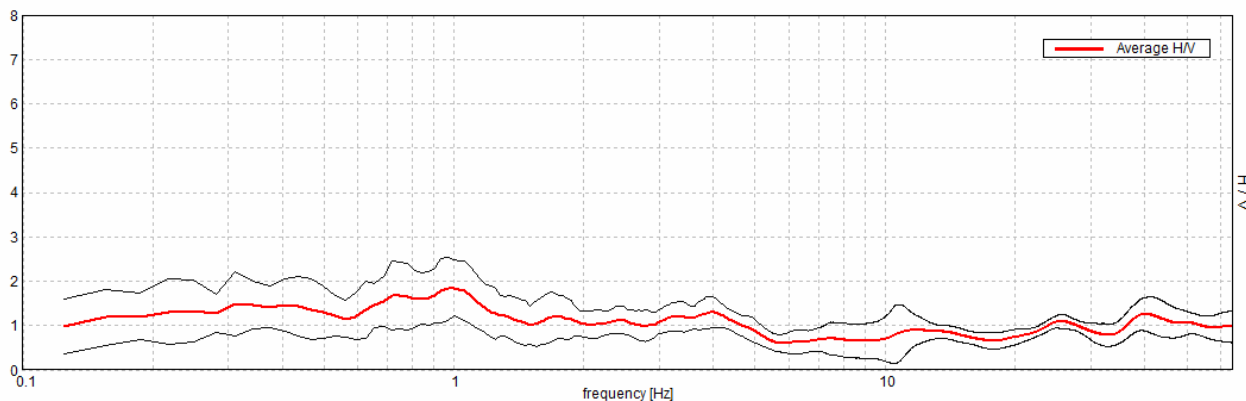
## MICROZONAZIONE MIRANDOLA, R109

Start recording: 22/12/11 12:58:11      End recording: 22/12/11 13:10:12  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

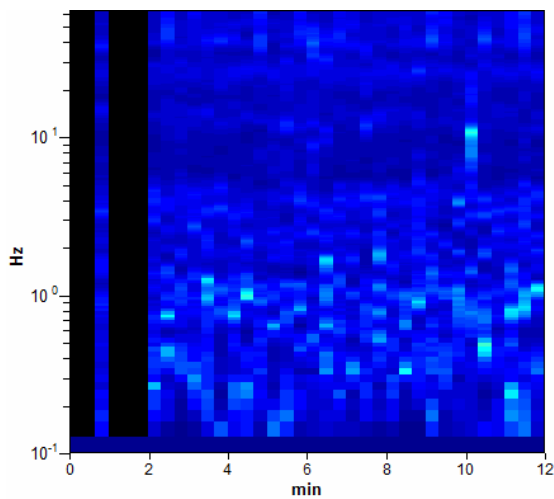
Trace length: 0h12'00".      Analyzed 86% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

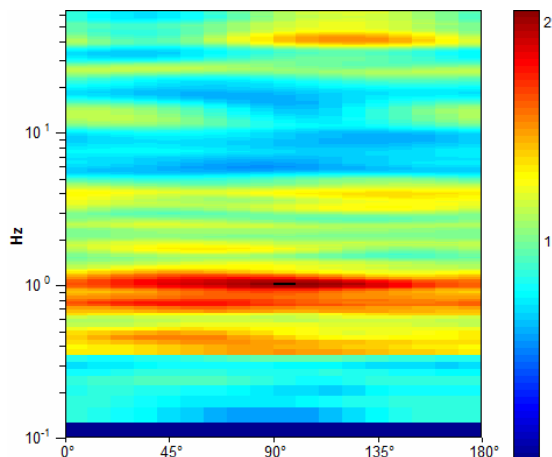
Max. H/V at  $1.0 \pm 0.18$  Hz. (In the range 0.0 - 64.0 Hz).



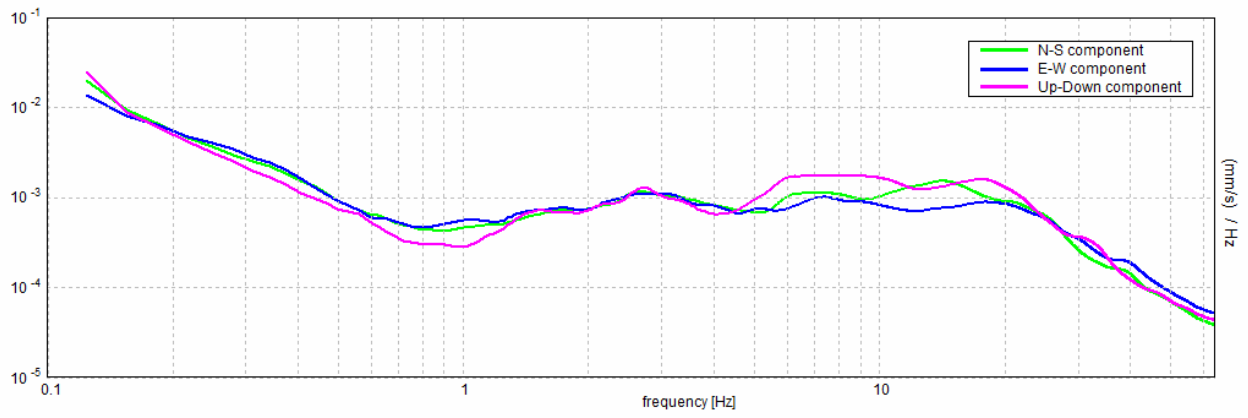
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA

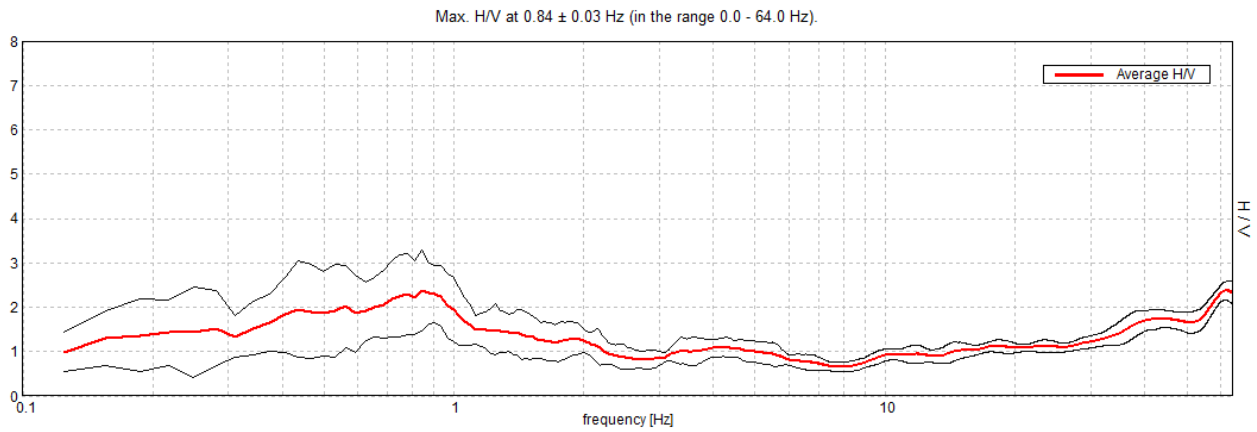


## MICROZONAZIONE MIRANDOLA, R110

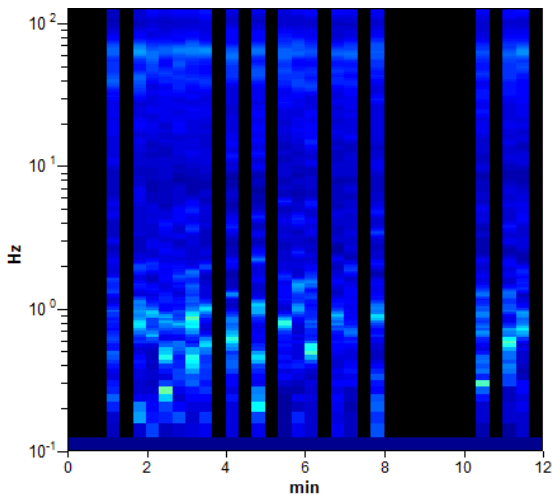
Start recording: 22/12/11 13:22:58      End recording: 22/12/11 13:34:58  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 50% trace (manual window selection)  
Sampling frequency: 256 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

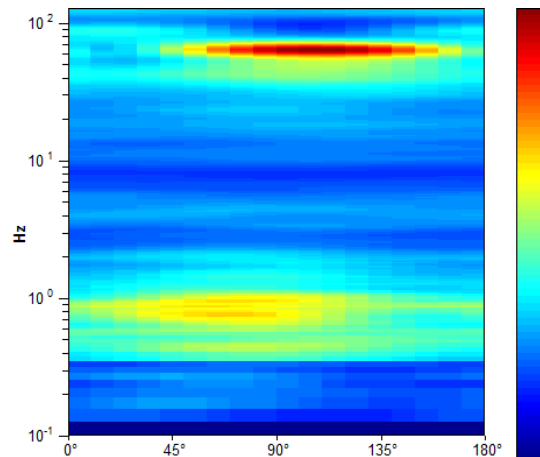
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



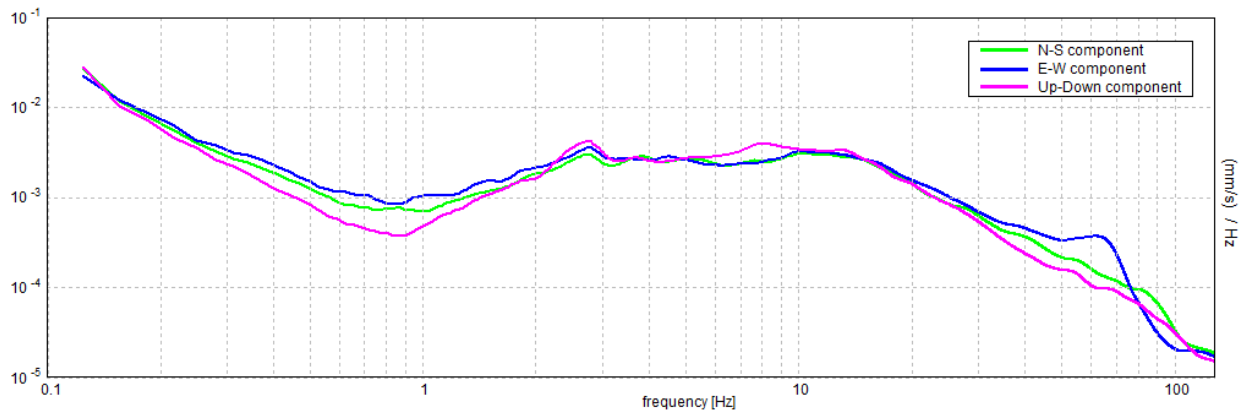
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



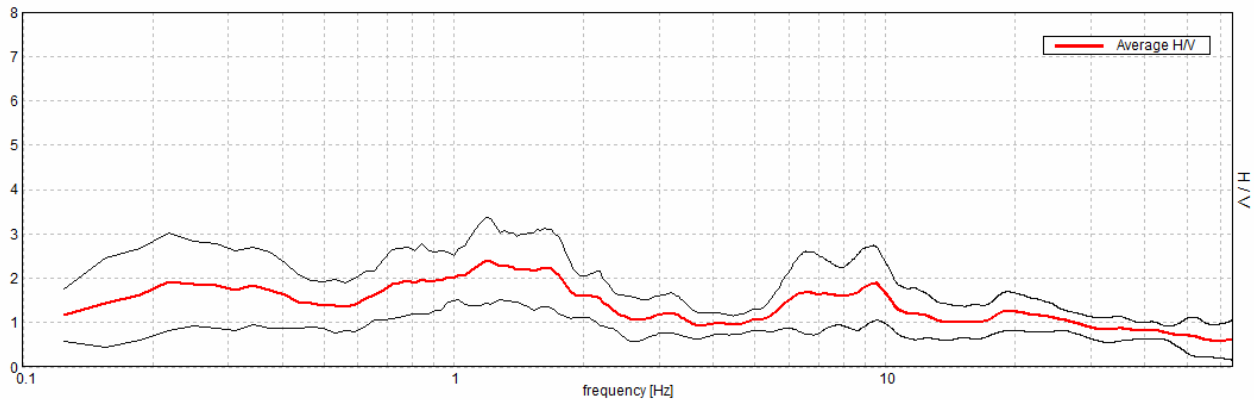
## MICROZONAZIONE MIRANDOLA, R111

Start recording: 22/12/11 14:24:28      End recording: 22/12/11 14:36:28  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

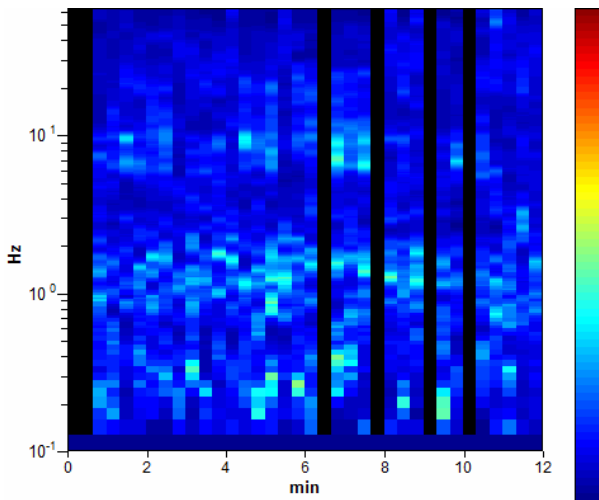
Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

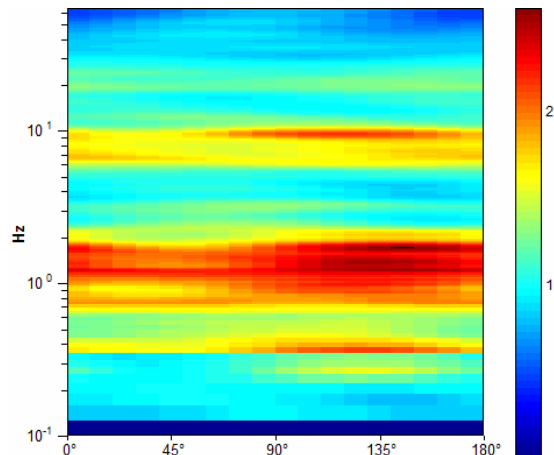
Max. H/V at  $1.19 \pm 0.83$  Hz (in the range 0.0 - 64.0 Hz).



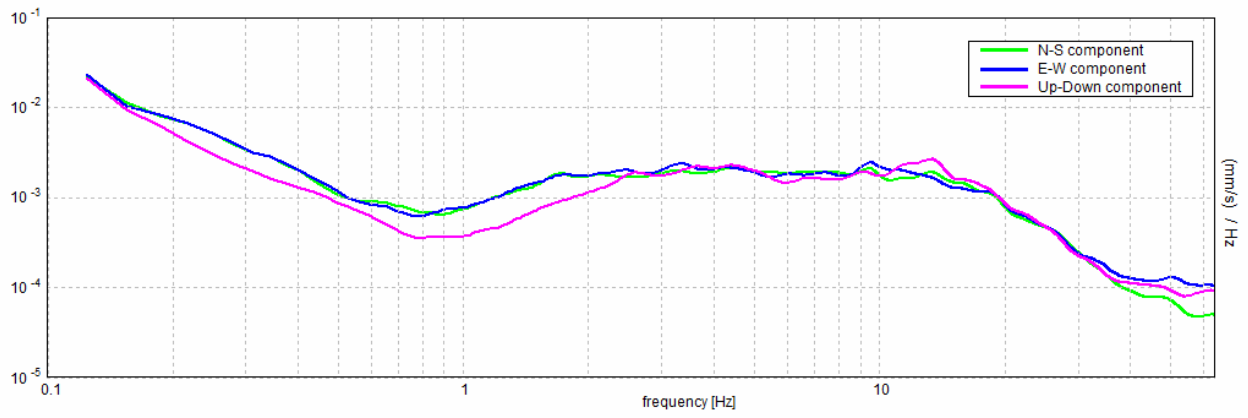
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



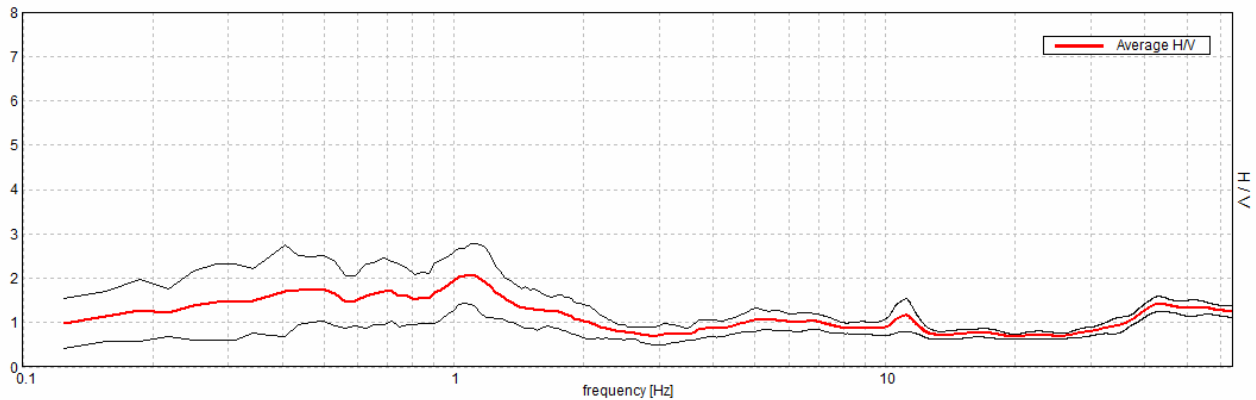
## MICROZONAZIONE MIRANDOLA, R112

Start recording: 22/12/11 14:54:20      End recording: 22/12/11 15:06:21  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

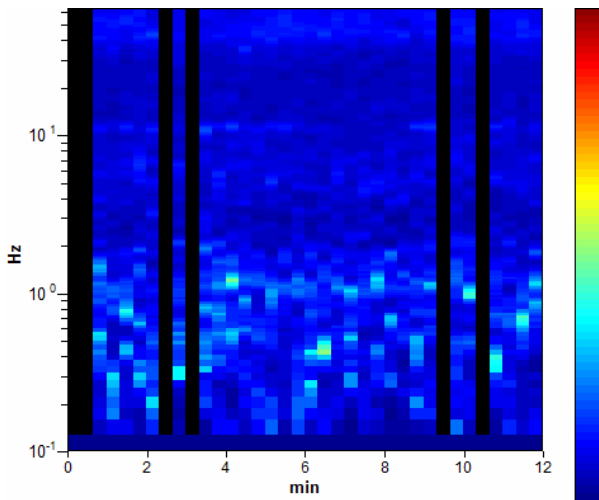
Trace length: 0h12'00".      Analyzed 83% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

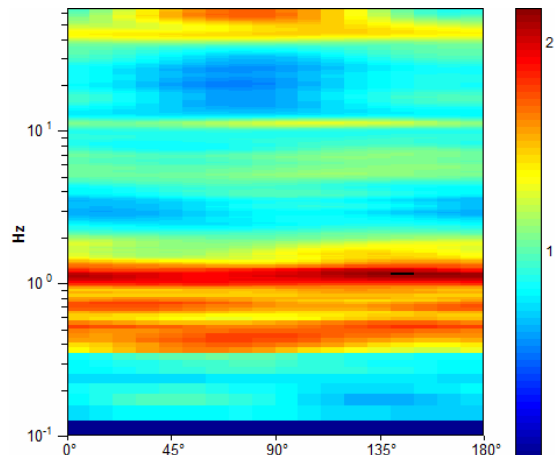
Max. H/V at  $0.88 \pm 0.07$  Hz. (In the range 0.0 - 64.0 Hz).



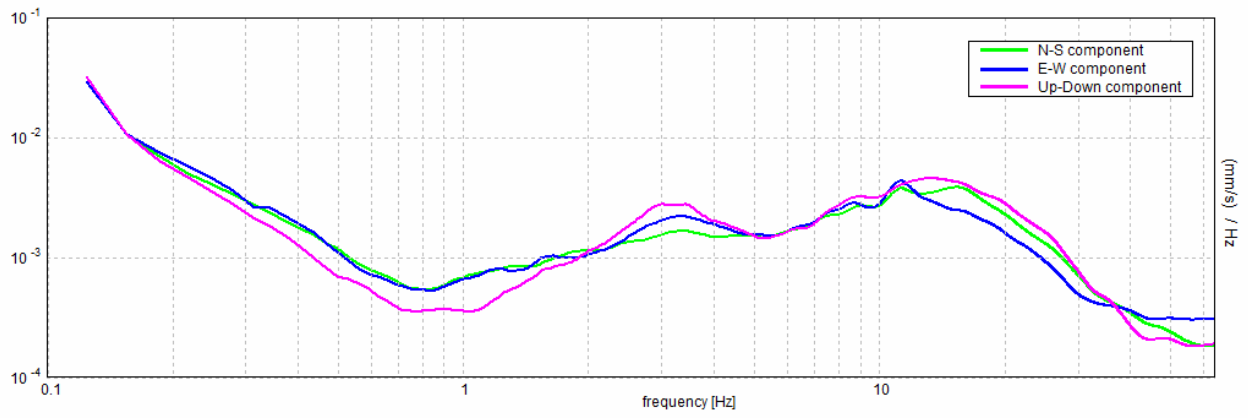
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



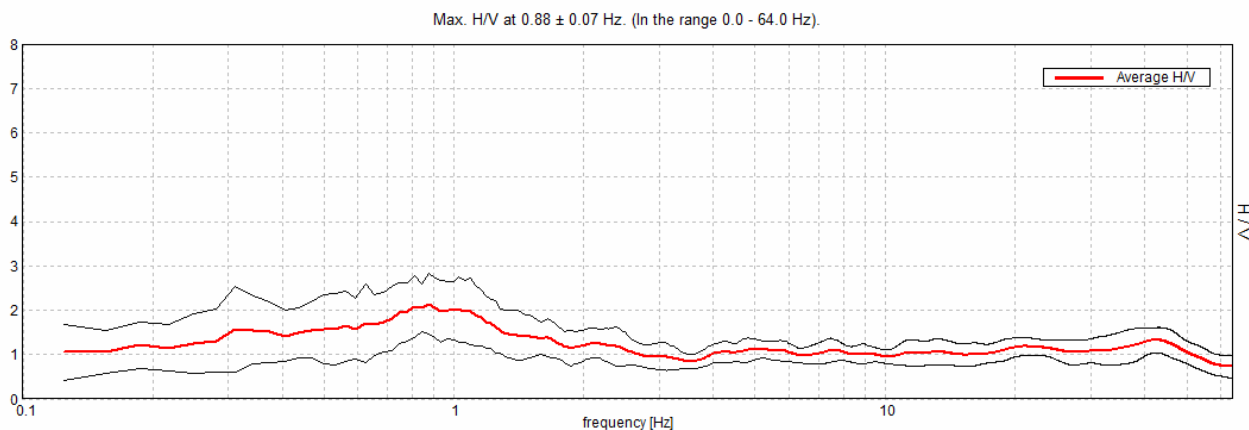


## MICROZONAZIONE MIRANDOLA, R113

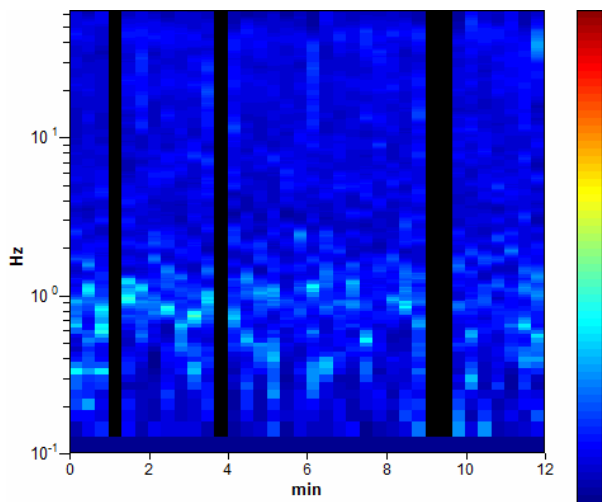
Start recording: 22/12/11 15:19:41      End recording: 22/12/11 15:31:41  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

Trace length: 0h12'00".      Analyzed 89% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

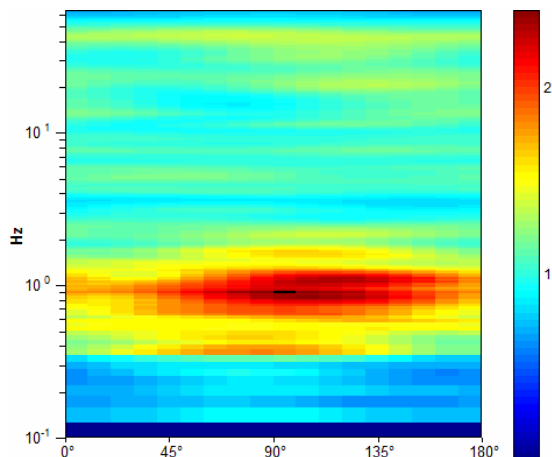
### HORIZONTAL TO VERTICAL SPECTRAL RATIO



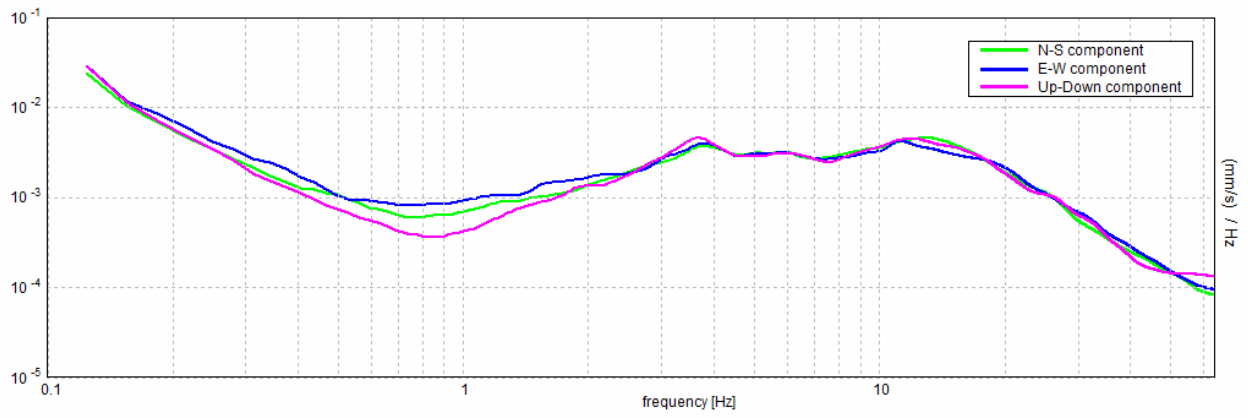
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



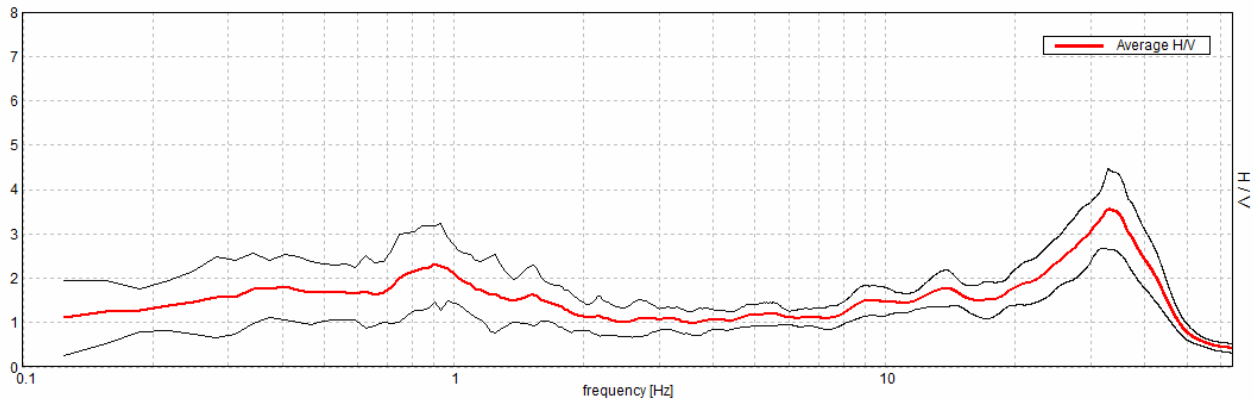
## MICROZONAZIONE MIRANDOLA, R114

Start recording: 22/12/11 15:40:44      End recording: 22/12/11 15:52:45  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

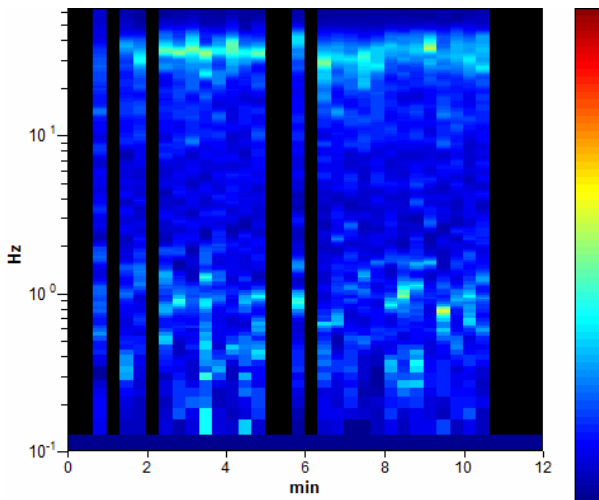
Trace length: 0h12'00".      Analyzed 69% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

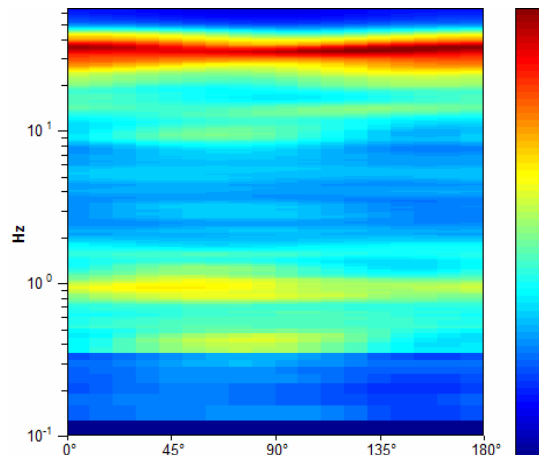
Max. H/V at  $32.81 \pm 3.83$  Hz (in the range 0.0 - 64.0 Hz).



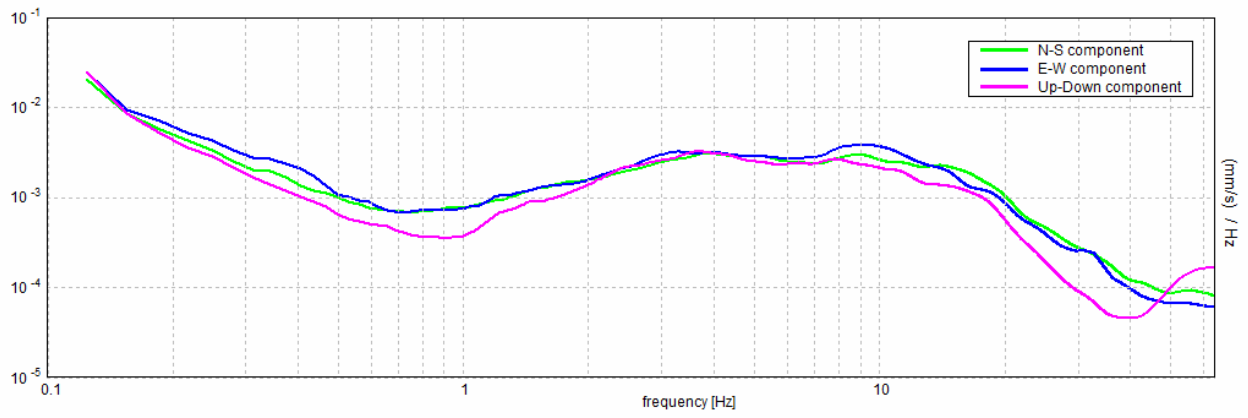
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



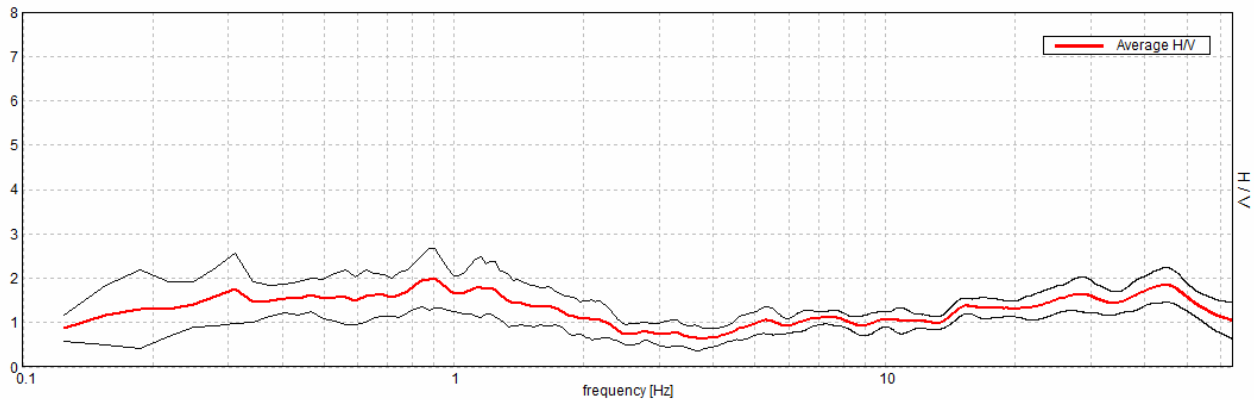
## MICROZONAZIONE MIRANDOLA, R115

Start recording: 22/12/11 16:02:29      End recording: 22/12/11 16:14:30  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

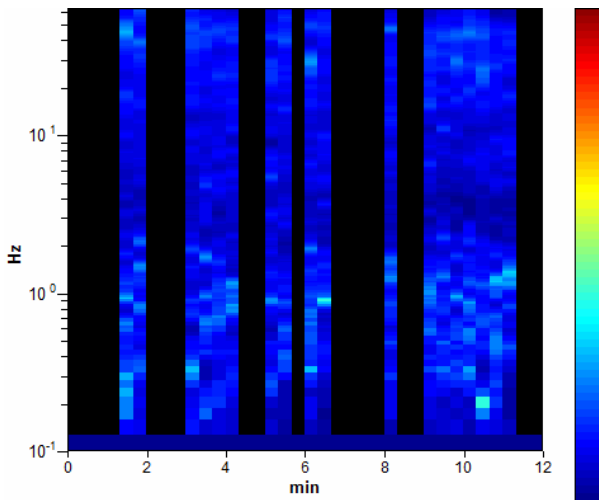
Trace length: 0h12'00".      Analyzed 50% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

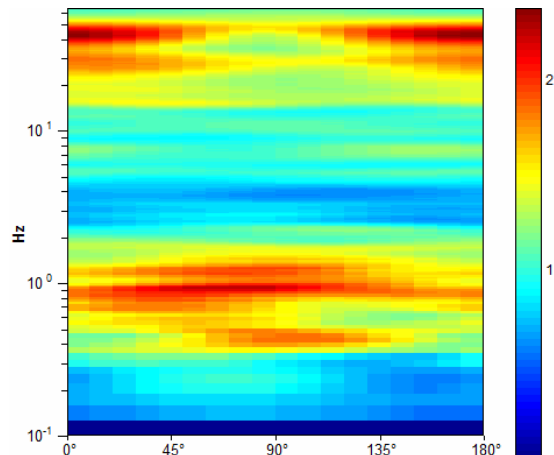
Max. H/V at  $0.91 \pm 0.07$  Hz (in the range 0.0 - 64.0 Hz).



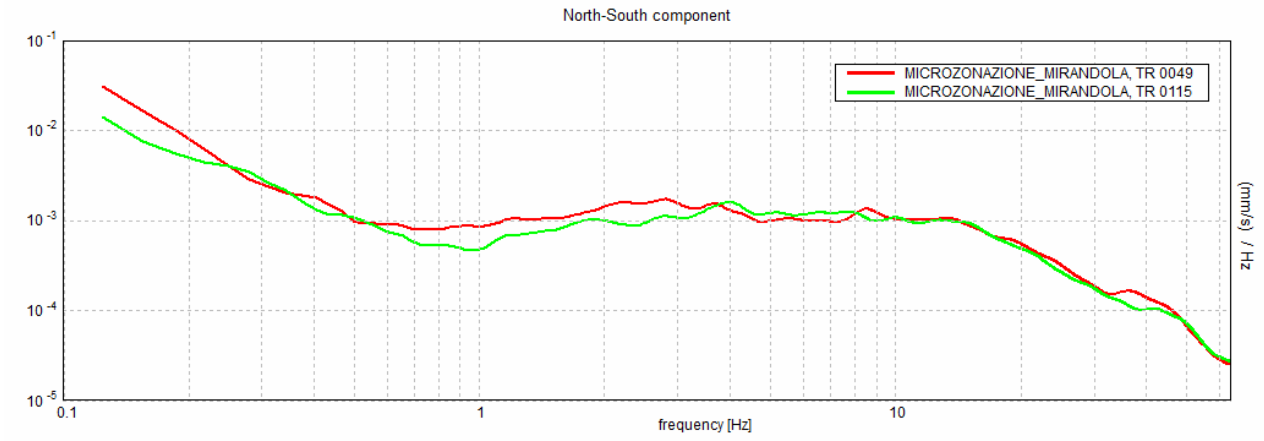
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



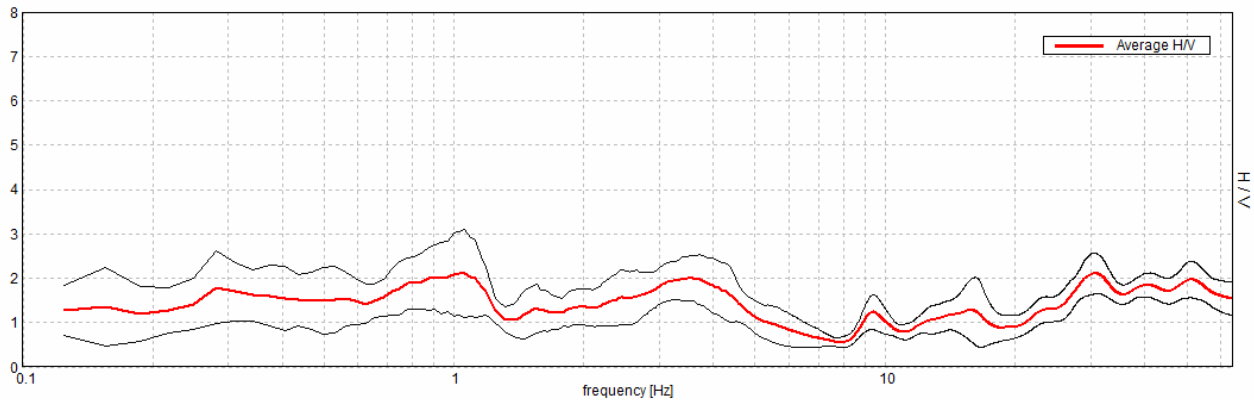
## MICROZONAZIONE MIRANDOLA, R116

Start recording: 22/12/11 16:31:05      End recording: 22/12/11 16:43:06  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

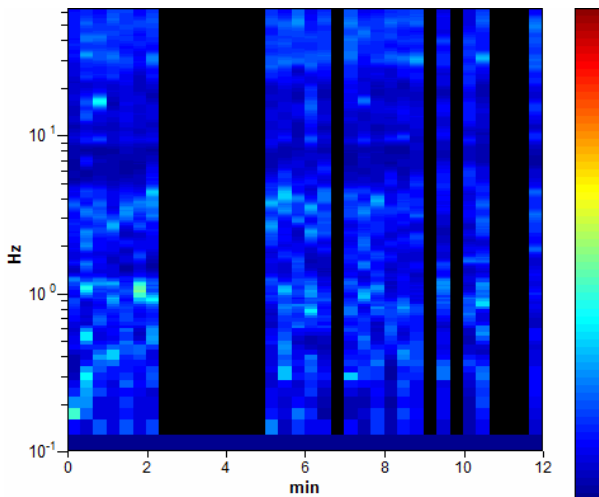
Trace length: 0h12'00".      Analyzed 61% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

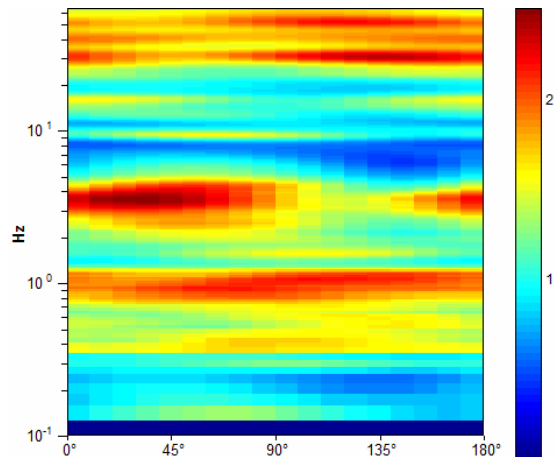
Max. H/V at  $1.06 \pm 0.12$  Hz (in the range 0.0 - 64.0 Hz).



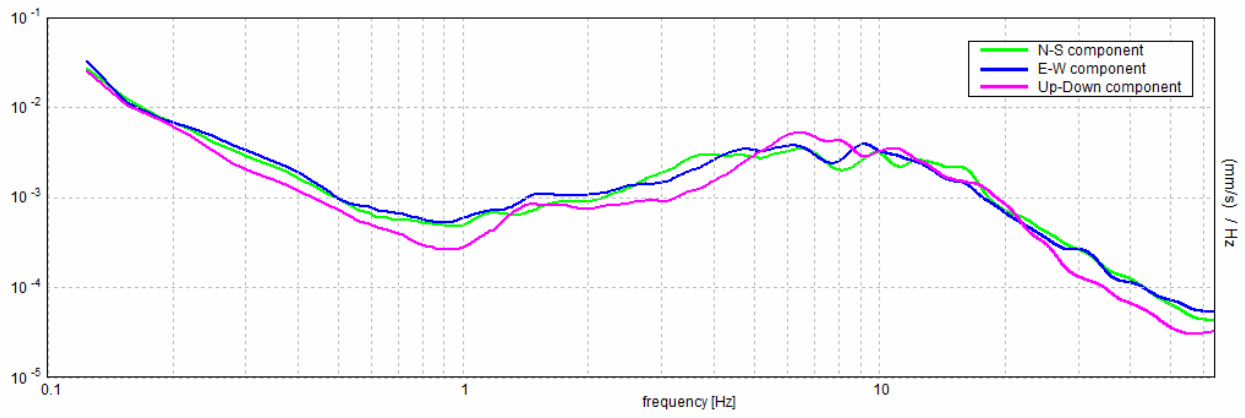
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA





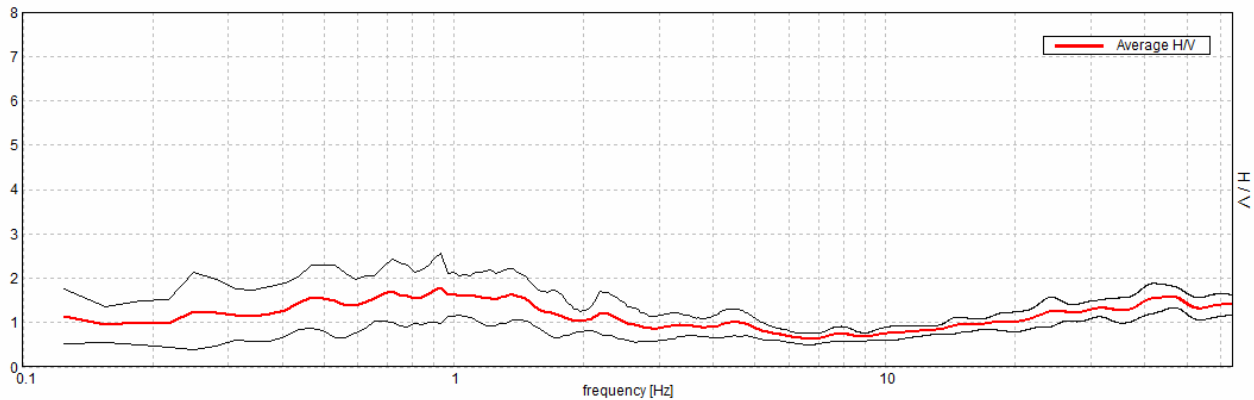
## MICROZONAZIONE MIRANDOLA, R117

Start recording: 22/12/11 16:50:36      End recording: 22/12/11 17:02:37  
Channel labels: NORTH SOUTH; EAST WEST ; UP DOWN  
GPS data not available

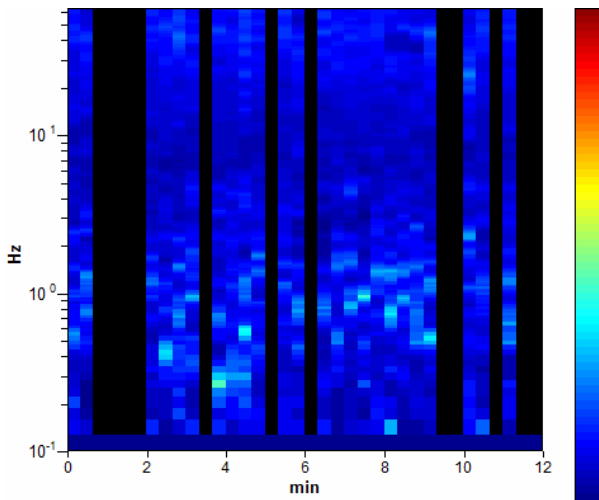
Trace length: 0h12'00".      Analyzed 67% trace (manual window selection)  
Sampling frequency: 128 Hz  
Window size: 20 s  
Smoothing window: Triangular window  
Smoothing: 10%

### HORIZONTAL TO VERTICAL SPECTRAL RATIO

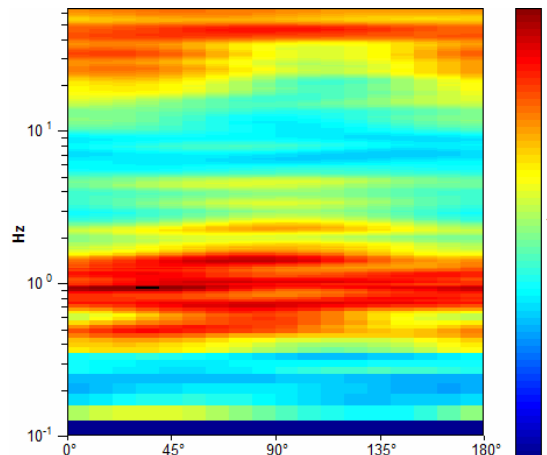
Max. H/V at  $0.94 \pm 3.55$  Hz (in the range 0.0 - 64.0 Hz).



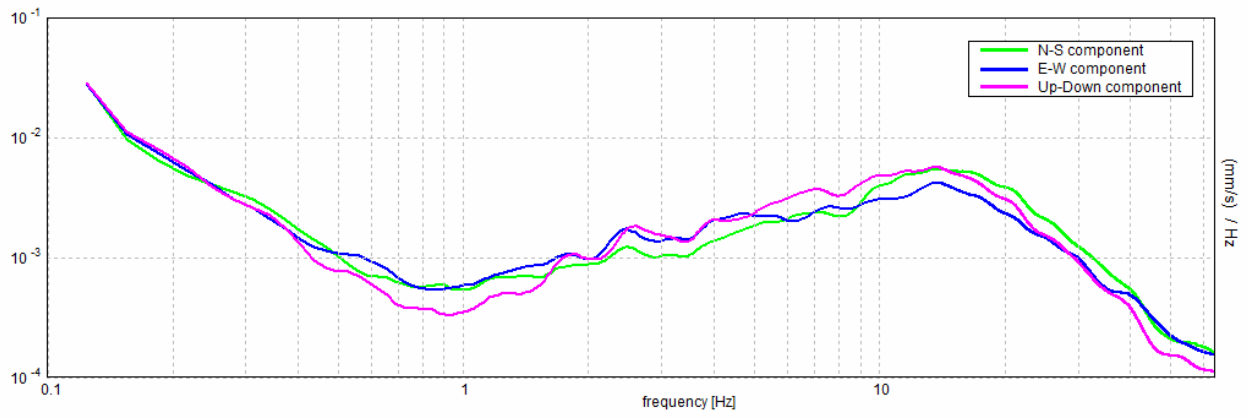
### H/V TIME HISTORY



### DIRECTIONAL H/V



### SINGLE COMPONENT SPECTRA



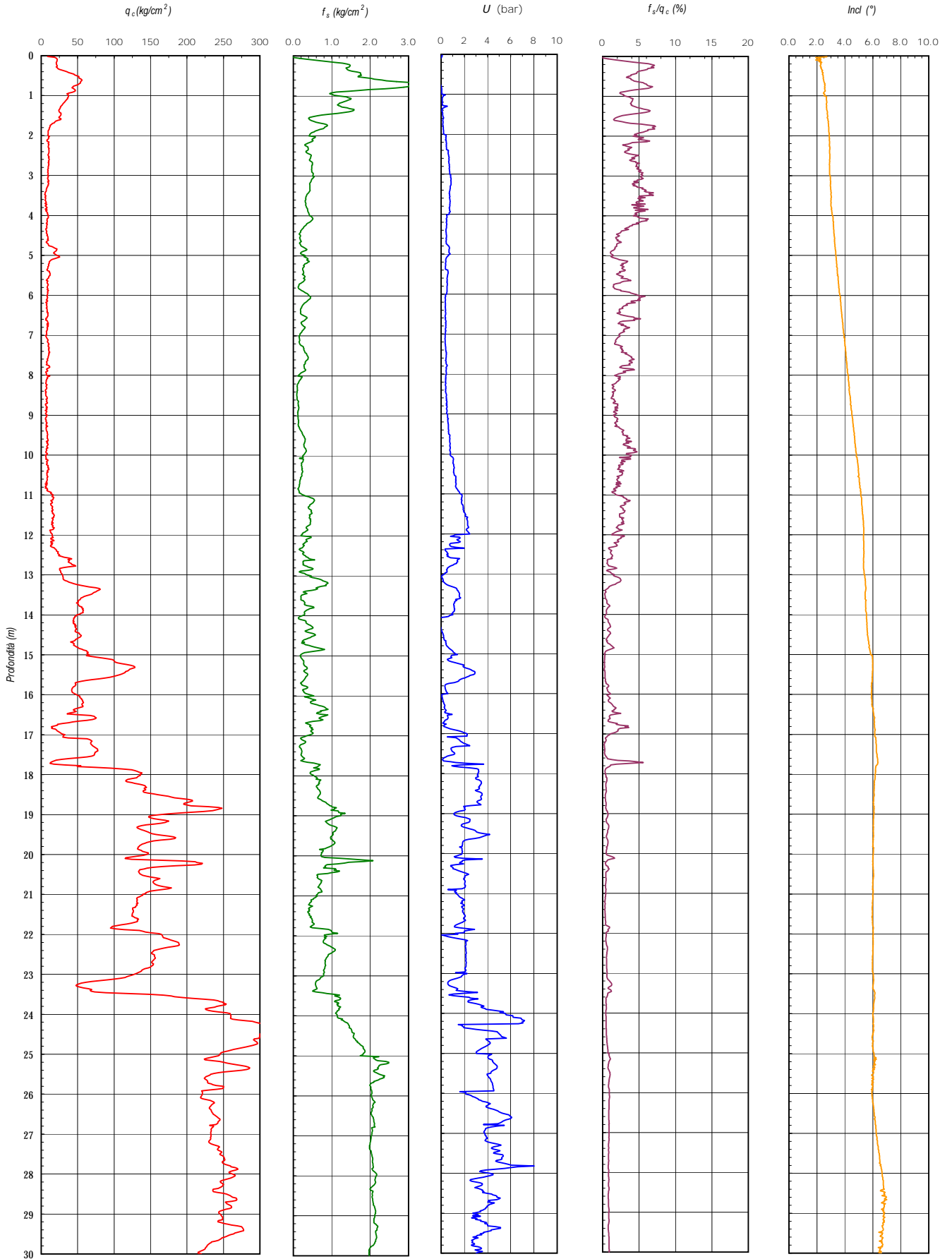


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

**PREFORO (m da p.c.):**  
**PROF. FALDA (m da p.c.):**  
**TIPO PUNTA**

**assente**  
**chiuso a 1,66**  
**piezocono sismico**

**PROVA : SCPTU1    PROFONDITA' (m da p.c.): 30,00 m.    DATA PROVA: 17/11/2011    Certificato di prova:**





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' :

Mirandola

CANTIERE:

PSC Mirandola

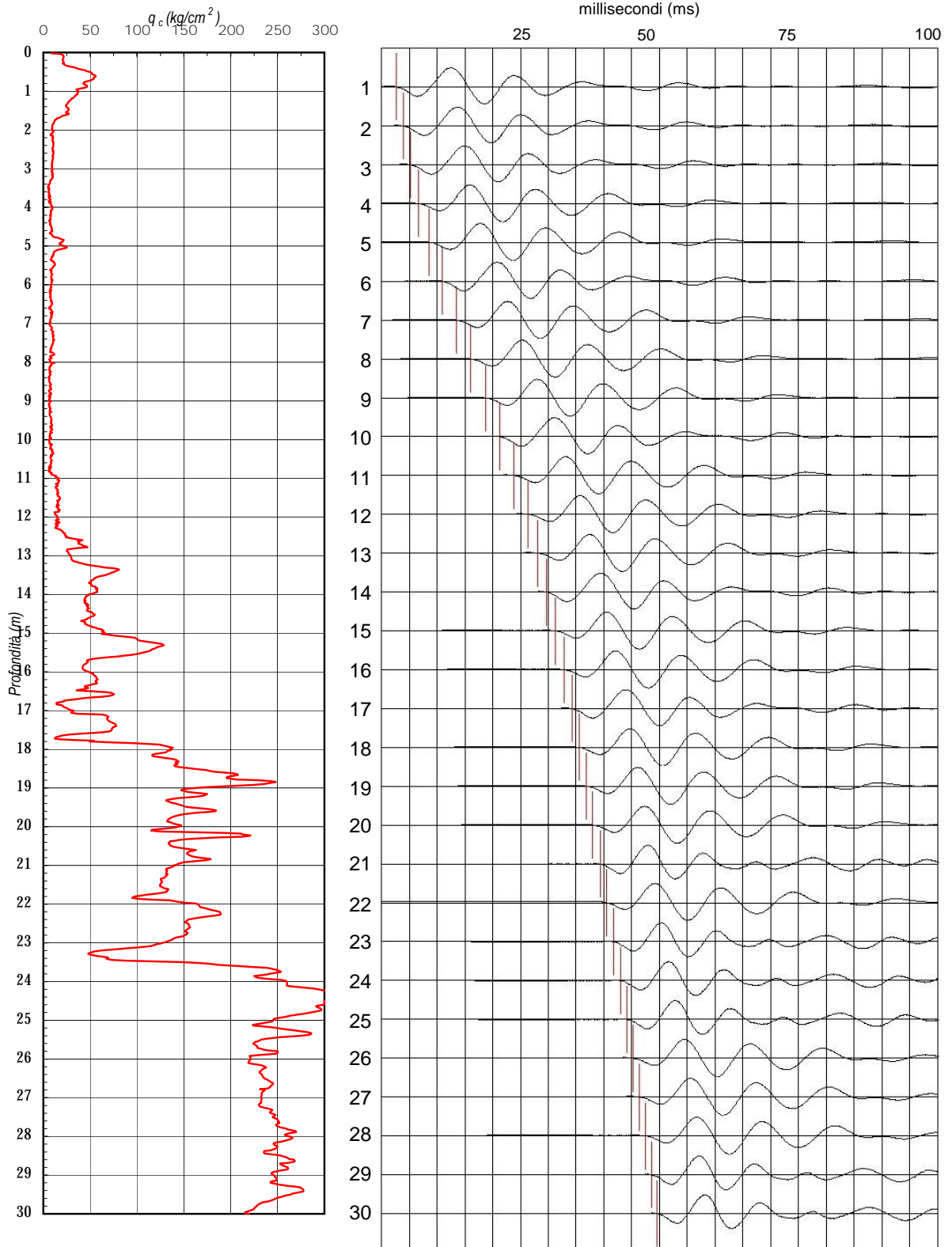
PROVA :

SCPTU1

DATA PROVA:

17/11/2011

### SISMOGRAMMI ONDE P



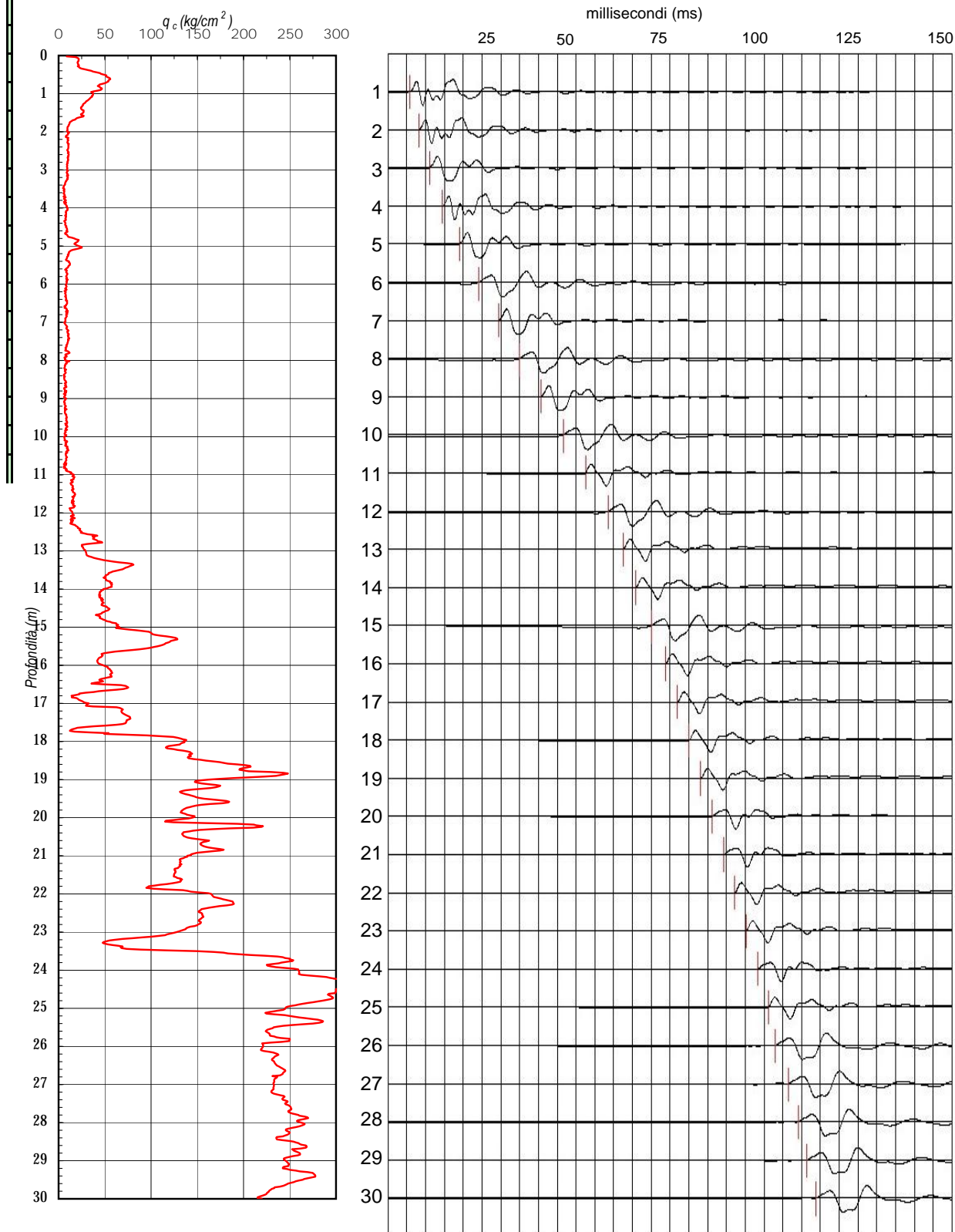


# Comune di Mirandola (Modena)

## Indagini per PSC

LOCALITA': Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU1	DATA PROVA: 17/11/2011
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## SISMOGRAMMI ONDE S





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU1	DATA PROVA: 17/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	2.800	689	1.93	0.0028	689
2.00	2.59	0.004	3.900	665	0.66	0.0011	603
3.00	3.42	0.005	5.200	658	0.83	0.0013	639
4.00	4.33	0.007	6.700	646	0.90	0.0015	602
5.00	5.27	0.009	8.700	605	0.94	0.0020	469
6.00	6.22	0.011	11.000	566	0.96	0.0023	416
7.00	7.19	0.014	13.500	533	0.97	0.0025	388
8.00	8.17	0.016	16.000	511	0.98	0.0025	391
9.00	9.15	0.019	18.600	492	0.98	0.0026	378
10.00	10.14	0.021	21.200	478	0.99	0.0026	379
11.00	11.12	0.024	23.800	467	0.99	0.0026	380
12.00	12.11	0.026	26.400	459	0.99	0.0026	381
13.00	13.10	0.028	28.100	466	0.99	0.0017	583
14.00	14.10	0.030	29.600	476	0.99	0.0015	662
15.00	15.09	0.031	31.300	482	0.99	0.0017	584
16.00	16.08	0.033	32.900	489	0.99	0.0016	621
17.00	17.08	0.034	34.200	499	1.00	0.0013	765
18.00	18.08	0.036	35.500	509	1.00	0.0013	766
19.00	19.07	0.037	36.800	518	1.00	0.0013	766
20.00	20.07	0.038	38.000	528	1.00	0.0012	830
21.00	21.06	0.039	39.300	536	1.00	0.0013	767
22.00	22.06	0.041	40.500	545	1.00	0.0012	831
23.00	23.06	0.042	41.700	553	1.00	0.0012	831
24.00	24.06	0.043	43.000	559	1.00	0.0013	767
25.00	25.05	0.044	44.200	567	1.00	0.0012	831
26.00	26.05	0.045	45.300	575	1.00	0.0011	907
27.00	27.05	0.046	46.400	583	1.00	0.0011	907
28.00	28.05	0.048	47.500	590	1.00	0.0011	907
29.00	29.05	0.049	48.500	599	1.00	0.0010	998
30.00	30.05	0.050	49.500	607	1.00	0.0010	998



## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU1	DATA PROVA: 17/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.006	5.800	333	1.93	0.0058	333
2.00	2.59	0.008	8.200	316	0.66	0.0024	276
3.00	3.42	0.011	11.100	308	0.83	0.0029	287
4.00	4.33	0.015	14.500	298	0.90	0.0034	266
5.00	5.27	0.019	19.000	277	0.94	0.0045	209
6.00	6.22	0.024	24.100	258	0.96	0.0051	188
7.00	7.19	0.030	29.500	244	0.97	0.0054	179
8.00	8.17	0.035	35.000	233	0.98	0.0055	178
9.00	9.15	0.041	40.700	225	0.98	0.0057	172
10.00	10.14	0.047	46.600	217	0.99	0.0059	167
11.00	11.12	0.053	52.500	212	0.99	0.0059	167
12.00	12.11	0.059	58.600	207	0.99	0.0061	162
13.00	13.10	0.063	62.500	210	0.99	0.0039	254
14.00	14.10	0.066	65.900	214	0.99	0.0034	292
15.00	15.09	0.070	70.000	216	0.99	0.0041	242
16.00	16.08	0.074	73.800	218	0.99	0.0038	262
17.00	17.08	0.077	77.000	222	1.00	0.0032	311
18.00	18.08	0.080	80.100	226	1.00	0.0031	321
19.00	19.07	0.083	83.200	229	1.00	0.0031	321
20.00	20.07	0.086	86.200	233	1.00	0.0030	332
21.00	21.06	0.089	89.300	236	1.00	0.0031	322
22.00	22.06	0.092	92.200	239	1.00	0.0029	344
23.00	23.06	0.095	95.200	242	1.00	0.0030	332
24.00	24.06	0.098	98.300	245	1.00	0.0031	322
25.00	25.05	0.101	101.100	248	1.00	0.0028	356
26.00	26.05	0.104	103.800	251	1.00	0.0027	370
27.00	27.05	0.107	106.500	254	1.00	0.0027	370
28.00	28.05	0.109	109.100	257	1.00	0.0026	384
29.00	29.05	0.112	111.500	261	1.00	0.0024	416
30.00	30.05	0.114	113.800	264	1.00	0.0023	434

**Vs30 = 262 m/s**

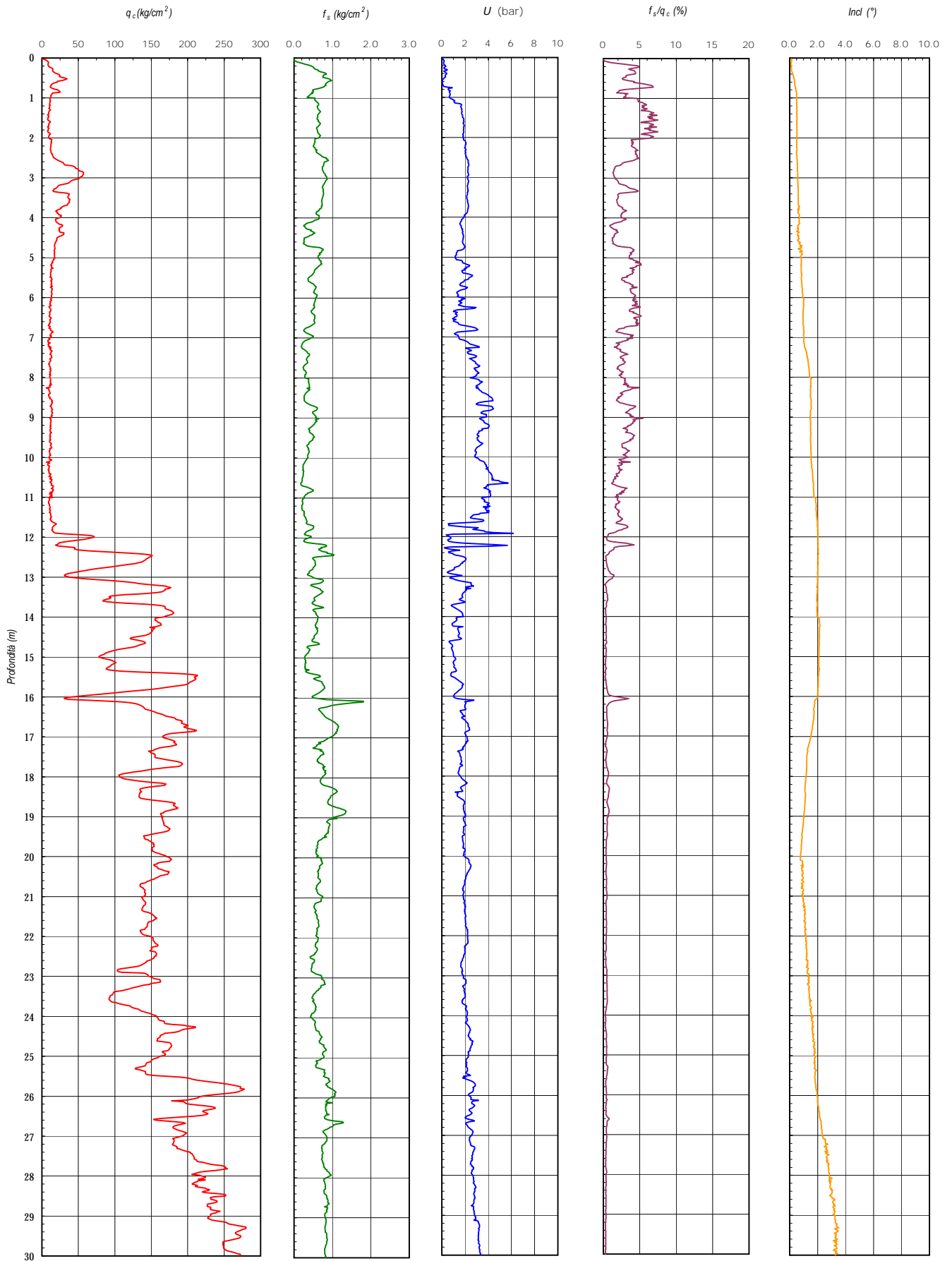


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

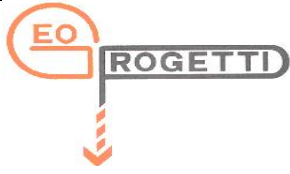
**PREFORO (m da p.c.):**  
**PROF. FALDA (m da p.c.):**  
**TIPO PUNTA**

**assente**  
**2,36 m.**  
**piezometro sismico**

**PROVA : SCPTU2    PROFONDITA' (m da p.c.): 30,00 m.    DATA PROVA: 18/11/2011    Certificato di prova:**







Comune di Mirandola (Modena)

Indagini per PSC

LOCALITA' :

Mirandola

CANTIERE:

PSC Mirandola

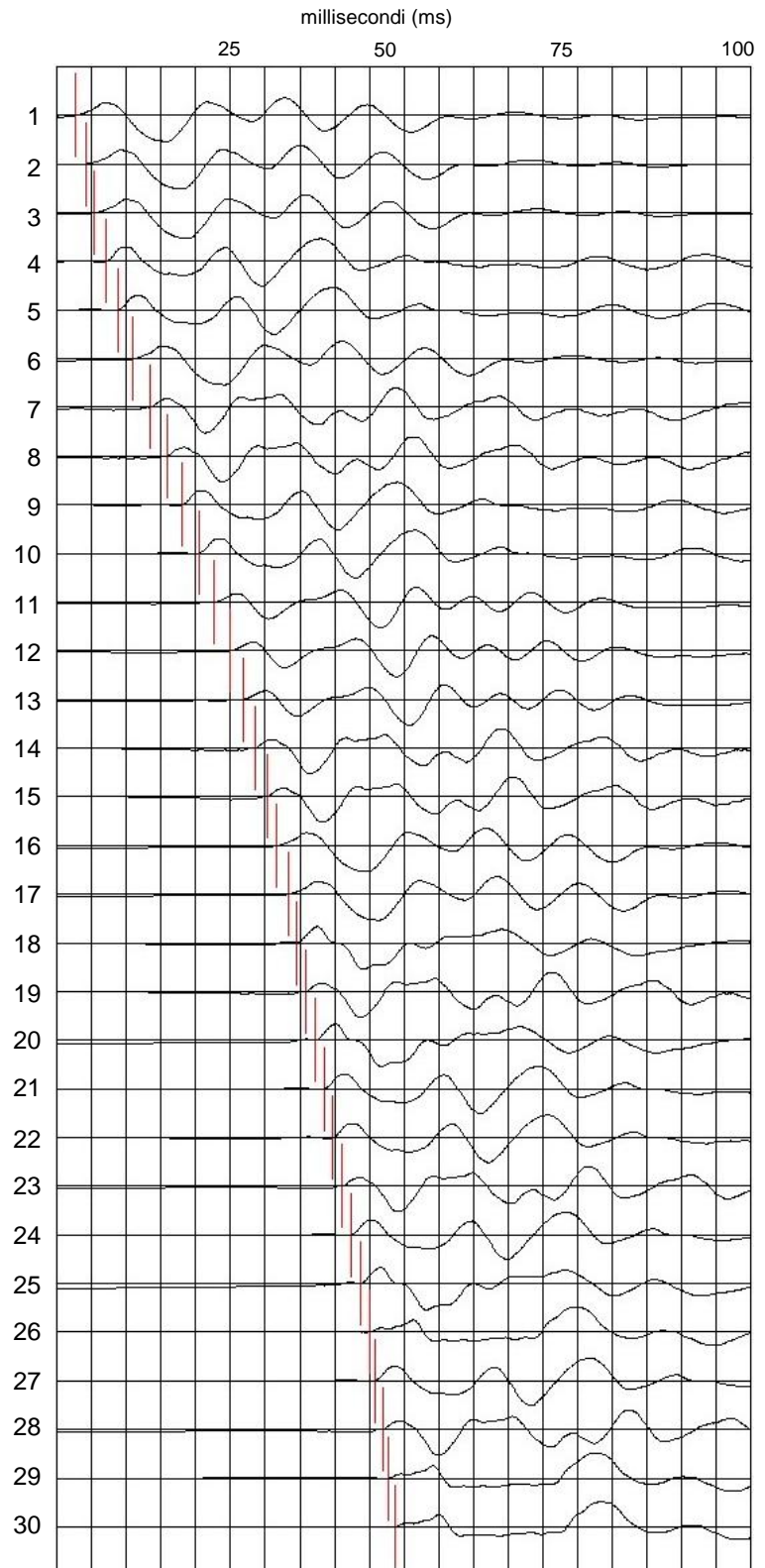
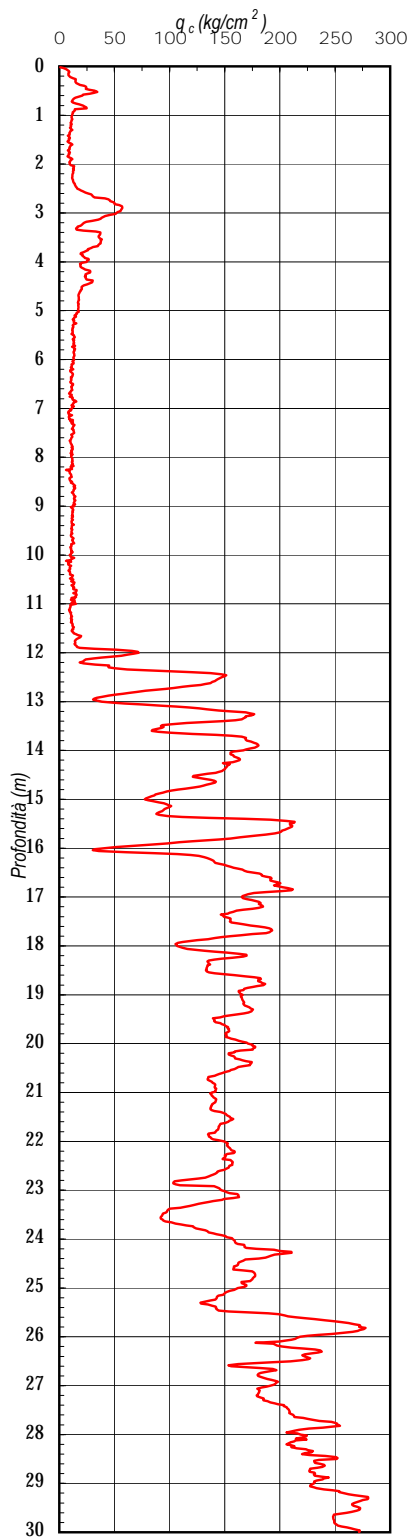
PROVA :

SCPTU2

DATA PROVA:

18/11/2011

SISMOGRAMMI ONDE P



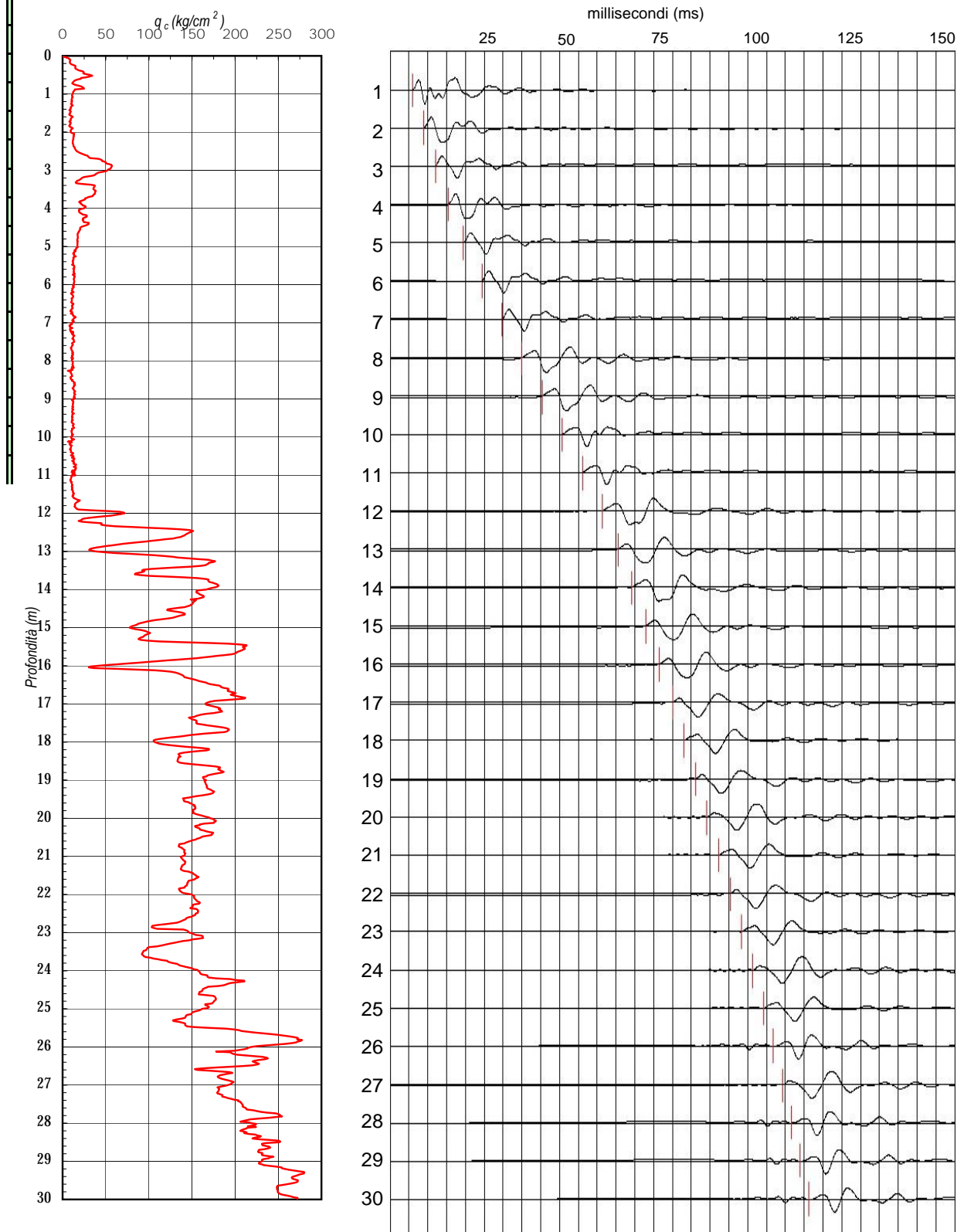


# Comune di Mirandola (Modena)

## Indagini per PSC

LOCALITA': Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU2	DATA PROVA: 18/11/2011
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## SISMOGRAMMI ONDE S





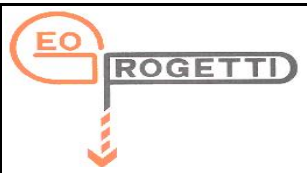
## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU2	DATA PROVA: 18/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	2.700	715	1.93	0.0027	715
2.00	2.59	0.004	4.100	632	0.66	0.0014	474
3.00	3.42	0.005	5.400	634	0.83	0.0013	639
4.00	4.33	0.007	7.000	618	0.90	0.0016	564
5.00	5.27	0.009	8.800	598	0.94	0.0018	521
6.00	6.22	0.011	11.000	566	0.96	0.0022	435
7.00	7.19	0.013	13.400	537	0.97	0.0024	404
8.00	8.17	0.016	15.800	517	0.98	0.0024	407
9.00	9.15	0.018	18.100	506	0.98	0.0023	427
10.00	10.14	0.020	20.400	497	0.99	0.0023	428
11.00	11.12	0.023	22.700	490	0.99	0.0023	430
12.00	12.11	0.025	25.000	485	0.99	0.0023	430
13.00	13.10	0.027	26.800	489	0.99	0.0018	551
14.00	14.10	0.029	28.500	495	0.99	0.0017	584
15.00	15.09	0.030	30.200	500	0.99	0.0017	584
16.00	16.08	0.032	31.800	506	0.99	0.0016	621
17.00	17.08	0.033	33.300	513	1.00	0.0015	663
18.00	18.08	0.035	34.600	522	1.00	0.0013	766
19.00	19.07	0.036	35.900	531	1.00	0.0013	766
20.00	20.07	0.037	37.200	539	1.00	0.0013	766
21.00	21.06	0.039	38.500	547	1.00	0.0013	767
22.00	22.06	0.040	39.800	554	1.00	0.0013	767
23.00	23.06	0.041	41.100	561	1.00	0.0013	767
24.00	24.06	0.042	42.400	567	1.00	0.0013	767
25.00	25.05	0.044	43.600	575	1.00	0.0012	831
26.00	26.05	0.045	44.700	583	1.00	0.0011	907
27.00	27.05	0.046	45.800	591	1.00	0.0011	907
28.00	28.05	0.047	46.800	599	1.00	0.0010	998
29.00	29.05	0.048	47.800	608	1.00	0.0010	998
30.00	30.05	0.049	48.700	617	1.00	0.0009	1109



## Comune di Mirandola (Modena)

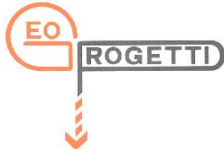
### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU2	DATA PROVA: 18/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L $V_s = L/t$	L2 - L1	t2 - t1	Vs for each level of one meter $V_s = (L2-L1)/(t2-t1)$
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.006	5.900	327	1.93	0.0059	327
2.00	2.59	0.009	9.000	288	0.66	0.0031	214
3.00	3.42	0.012	12.000	285	0.83	0.0030	277
4.00	4.33	0.016	15.500	279	0.90	0.0035	258
5.00	5.27	0.020	19.500	270	0.94	0.0040	235
6.00	6.22	0.024	24.400	255	0.96	0.0049	195
7.00	7.19	0.030	29.800	241	0.97	0.0054	179
8.00	8.17	0.035	35.000	233	0.98	0.0052	188
9.00	9.15	0.040	40.400	226	0.98	0.0054	182
10.00	10.14	0.046	45.800	221	0.99	0.0054	182
11.00	11.12	0.051	51.000	218	0.99	0.0052	190
12.00	12.11	0.056	56.400	215	0.99	0.0054	183
13.00	13.10	0.061	60.500	217	0.99	0.0041	242
14.00	14.10	0.064	64.200	220	0.99	0.0037	268
15.00	15.09	0.068	68.000	222	0.99	0.0038	261
16.00	16.08	0.072	71.600	225	0.99	0.0036	276
17.00	17.08	0.075	75.000	228	1.00	0.0034	293
18.00	18.08	0.078	78.100	231	1.00	0.0031	321
19.00	19.07	0.081	81.200	235	1.00	0.0031	321
20.00	20.07	0.084	84.200	238	1.00	0.0030	332
21.00	21.06	0.087	87.300	241	1.00	0.0031	322
22.00	22.06	0.090	90.400	244	1.00	0.0031	322
23.00	23.06	0.093	93.400	247	1.00	0.0030	332
24.00	24.06	0.096	96.300	250	1.00	0.0029	344
25.00	25.05	0.099	99.200	253	1.00	0.0029	344
26.00	26.05	0.102	101.700	256	1.00	0.0025	399
27.00	27.05	0.104	104.200	260	1.00	0.0025	399
28.00	28.05	0.107	106.600	263	1.00	0.0024	416
29.00	29.05	0.109	109.000	266	1.00	0.0024	416
30.00	30.05	0.111	111.300	270	1.00	0.0023	434

**Vs30 = 267 m/s**

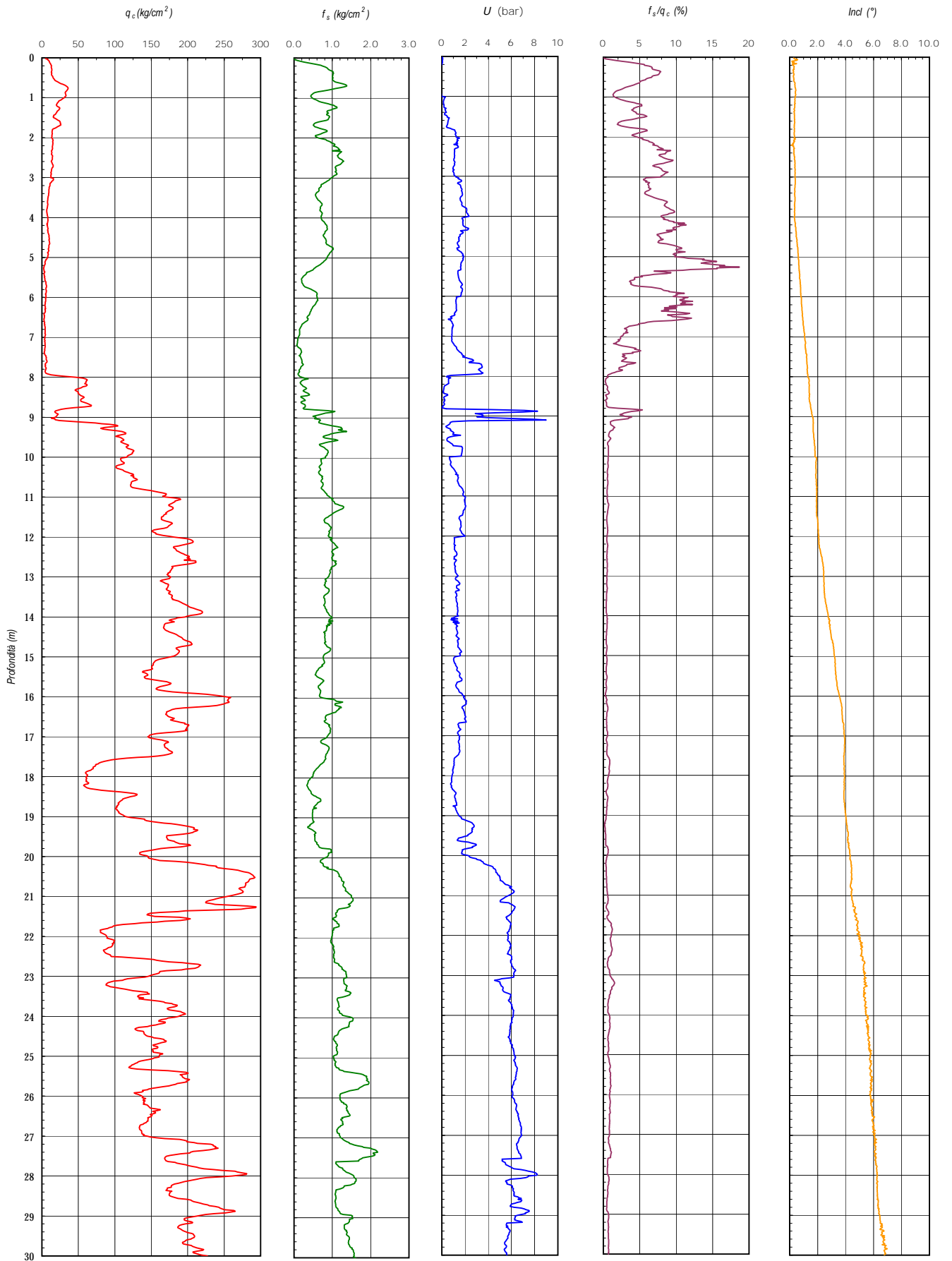


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

**PREFORO (m da p.c.):**  
**PROF. FALDA (m da p.c.):**  
**TIPO PUNTA**

assente  
3,22 m.  
piezocono sismico

**PROVA :** SCPTU3    **PROFONDITA' (m da p.c.):** 30,00 m.    **DATA PROVA:** 18/11/2011    **Certificato di prova:**





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' :

Mirandola

CANTIERE:

PSC Mirandola

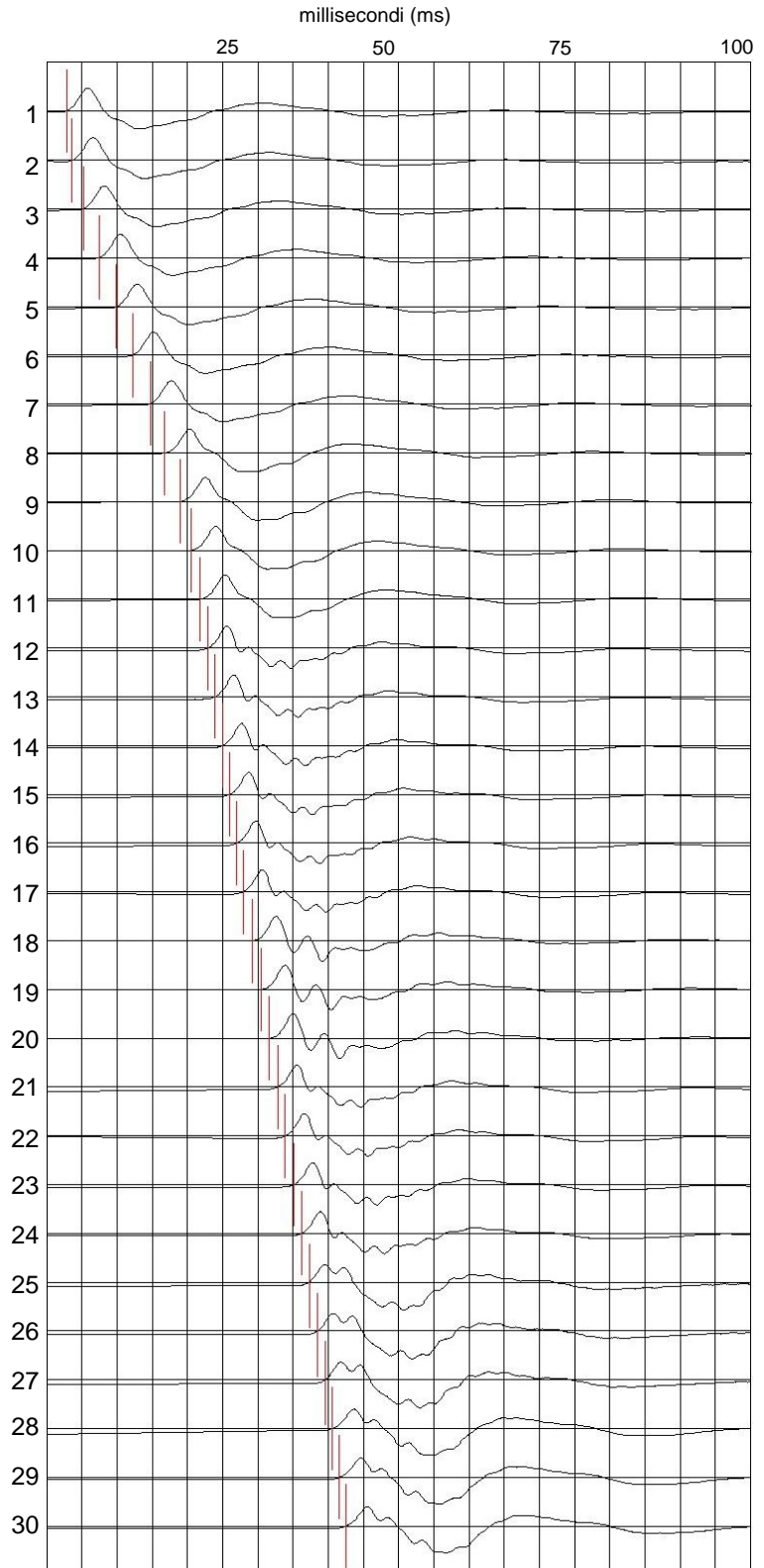
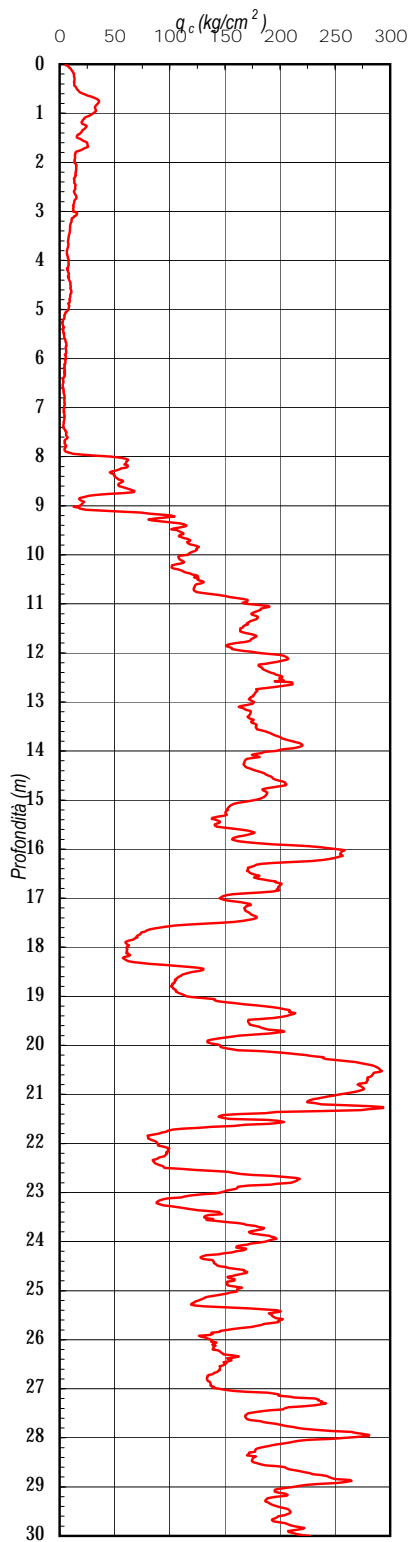
PROVA :

SCPTU3

DATA PROVA:

18/11/2011

### SISMOGRAMMI ONDE P



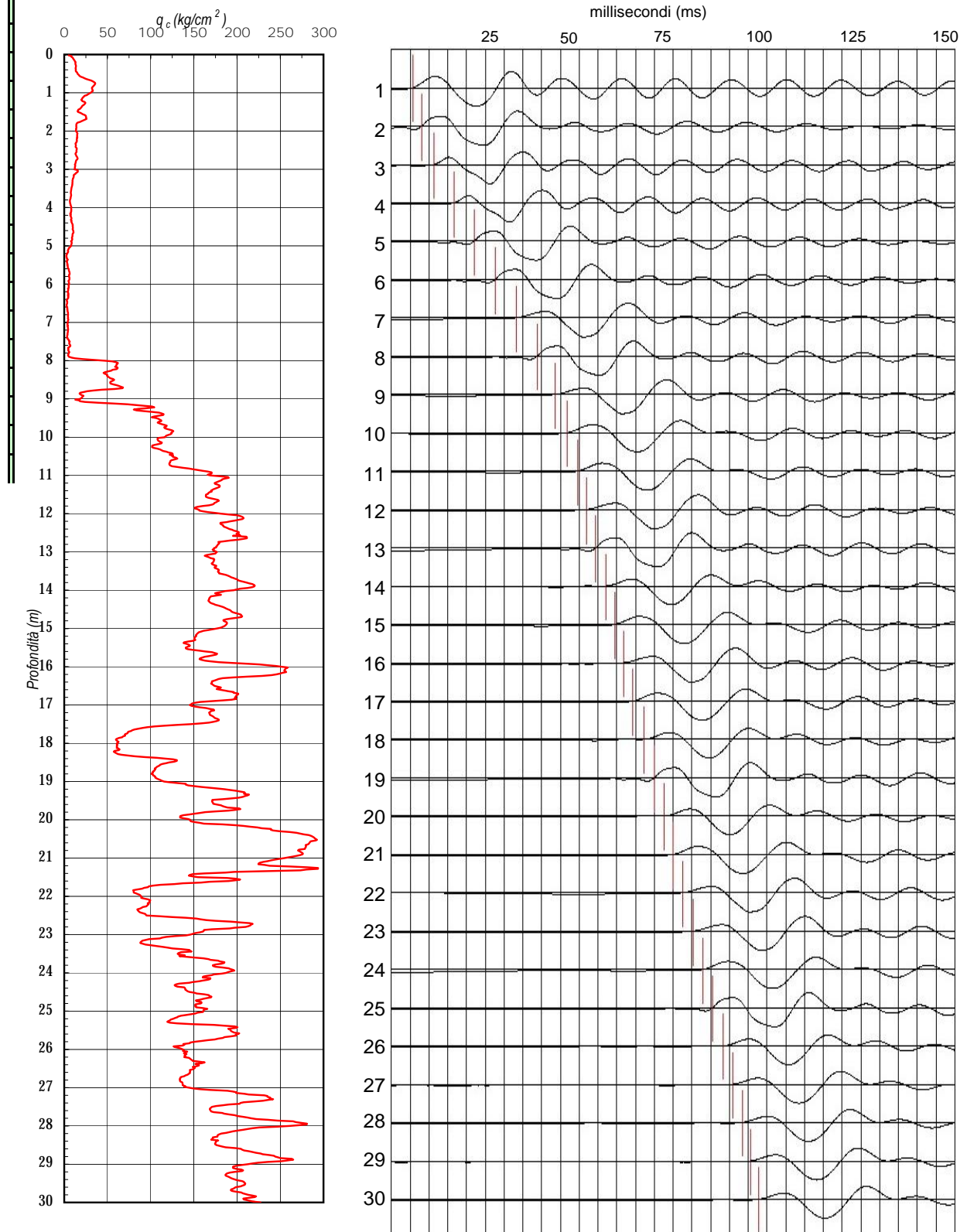


## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA': Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU3	DATA PROVA: 18/11/2011
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### SISMOGRAMMI ONDE S





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU3	DATA PROVA: 18/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	2.700	715	1.93	0.0027	715
2.00	2.59	0.004	3.700	701	0.66	0.0010	663
3.00	3.42	0.005	5.200	658	0.83	0.0015	554
4.00	4.33	0.007	7.400	585	0.90	0.0022	411
5.00	5.27	0.010	9.800	537	0.94	0.0024	391
6.00	6.22	0.012	12.200	510	0.96	0.0024	399
7.00	7.19	0.015	14.600	493	0.97	0.0024	404
8.00	8.17	0.017	16.900	483	0.98	0.0023	425
9.00	9.15	0.019	19.000	482	0.98	0.0021	467
10.00	10.14	0.021	20.500	494	0.99	0.0015	657
11.00	11.12	0.022	21.800	510	0.99	0.0013	760
12.00	12.11	0.023	22.900	529	0.99	0.0011	900
13.00	13.10	0.024	23.900	548	0.99	0.0010	991
14.00	14.10	0.025	25.000	564	0.99	0.0011	902
15.00	15.09	0.026	26.000	580	0.99	0.0010	994
16.00	16.08	0.027	27.000	596	0.99	0.0010	994
17.00	17.08	0.028	27.900	612	1.00	0.0009	1106
18.00	18.08	0.029	29.200	619	1.00	0.0013	766
19.00	19.07	0.030	30.400	627	1.00	0.0012	830
20.00	20.07	0.032	31.600	635	1.00	0.0012	830
21.00	21.06	0.033	32.800	642	1.00	0.0012	831
22.00	22.06	0.034	33.900	651	1.00	0.0011	906
23.00	23.06	0.035	35.100	657	1.00	0.0012	831
24.00	24.06	0.036	36.200	665	1.00	0.0011	907
25.00	25.05	0.037	37.300	672	1.00	0.0011	907
26.00	26.05	0.039	38.500	677	1.00	0.0012	832
27.00	27.05	0.040	39.600	683	1.00	0.0011	907
28.00	28.05	0.041	40.600	691	1.00	0.0010	998
29.00	29.05	0.042	41.600	698	1.00	0.0010	998
30.00	30.05	0.043	42.500	707	1.00	0.0009	1109





## Comune di Mirandola (Modena)

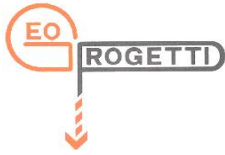
### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU3	DATA PROVA: 18/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.006	5.700	338	1.93	0.0057	338
2.00	2.59	0.008	8.000	324	0.66	0.0023	288
3.00	3.42	0.011	11.400	300	0.83	0.0034	244
4.00	4.33	0.017	16.600	261	0.90	0.0052	174
5.00	5.27	0.022	22.000	239	0.94	0.0054	174
6.00	6.22	0.028	27.600	225	0.96	0.0056	171
7.00	7.19	0.033	33.200	217	0.97	0.0056	173
8.00	8.17	0.039	38.800	211	0.98	0.0056	174
9.00	9.15	0.044	43.500	210	0.98	0.0047	209
10.00	10.14	0.047	46.700	217	0.99	0.0032	308
11.00	11.12	0.050	49.500	225	0.99	0.0028	353
12.00	12.11	0.052	52.000	233	0.99	0.0025	396
13.00	13.10	0.054	54.400	241	0.99	0.0024	413
14.00	14.10	0.057	56.900	248	0.99	0.0025	397
15.00	15.09	0.059	59.400	254	0.99	0.0025	397
16.00	16.08	0.062	61.800	260	0.99	0.0024	414
17.00	17.08	0.064	64.200	266	1.00	0.0024	415
18.00	18.08	0.067	67.100	269	1.00	0.0029	343
19.00	19.07	0.070	69.900	273	1.00	0.0028	356
20.00	20.07	0.073	72.600	276	1.00	0.0027	369
21.00	21.06	0.075	74.900	281	1.00	0.0023	433
22.00	22.06	0.078	77.600	284	1.00	0.0027	369
23.00	23.06	0.080	80.300	287	1.00	0.0027	369
24.00	24.06	0.083	82.900	290	1.00	0.0026	384
25.00	25.05	0.086	85.500	293	1.00	0.0026	384
26.00	26.05	0.088	88.200	295	1.00	0.0027	370
27.00	27.05	0.091	90.800	298	1.00	0.0026	384
28.00	28.05	0.093	93.200	301	1.00	0.0024	416
29.00	29.05	0.096	95.500	304	1.00	0.0023	434
30.00	30.05	0.098	97.700	308	1.00	0.0022	454

**Vs30 = 304 m/s**

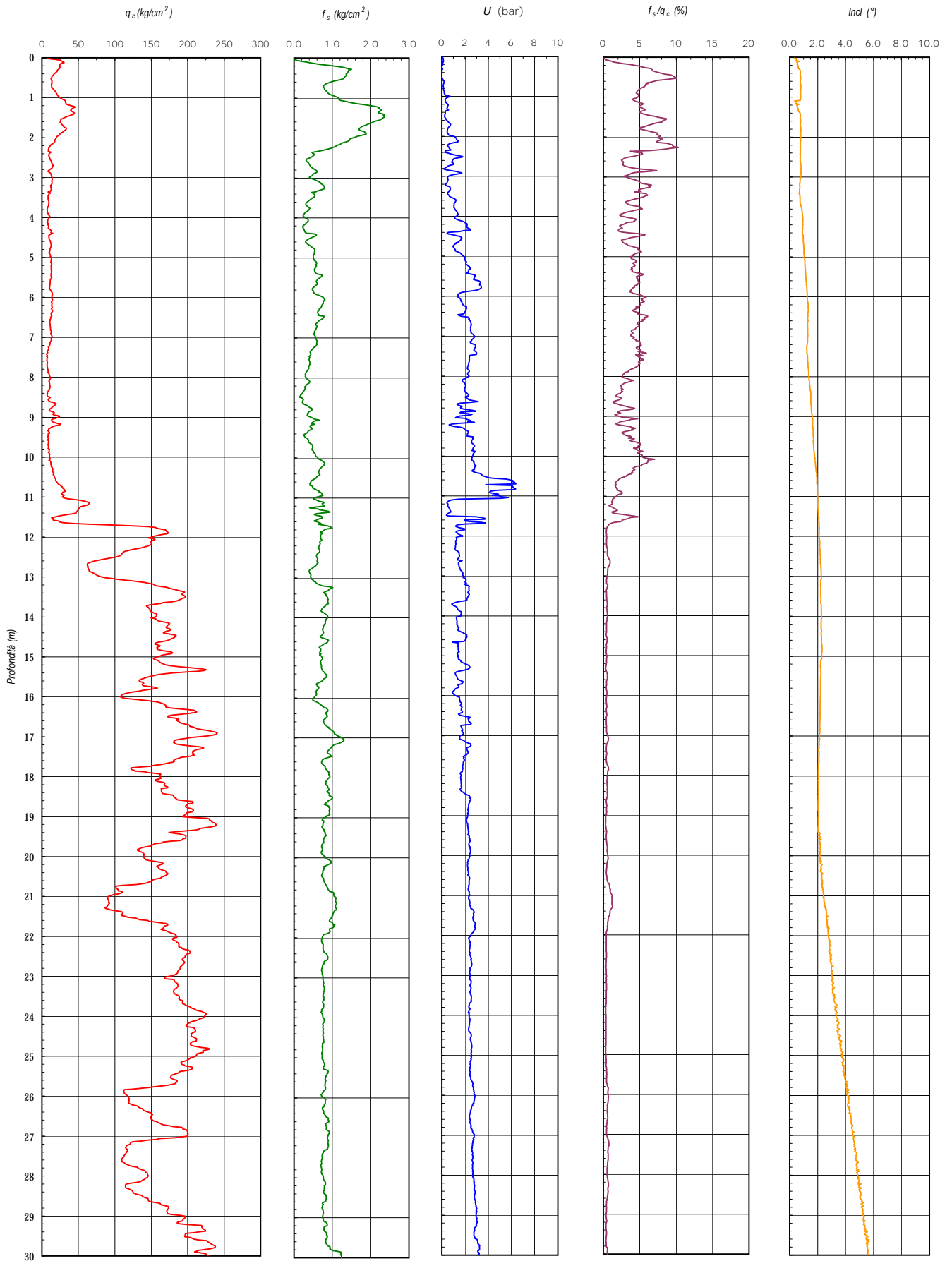


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

**PREFORO (m da p.c.):**  
**PROF. FALDA (m da p.c.):**  
**TIPO PUNTA**

assente  
foro chiusa a  
piezometro sismico

**PROVA:** SCPTU4    **PROFONDITA' (m da p.c.):** 30,00 m.    **DATA PROVA:** 18/11/2011    **Certificato di prova:**



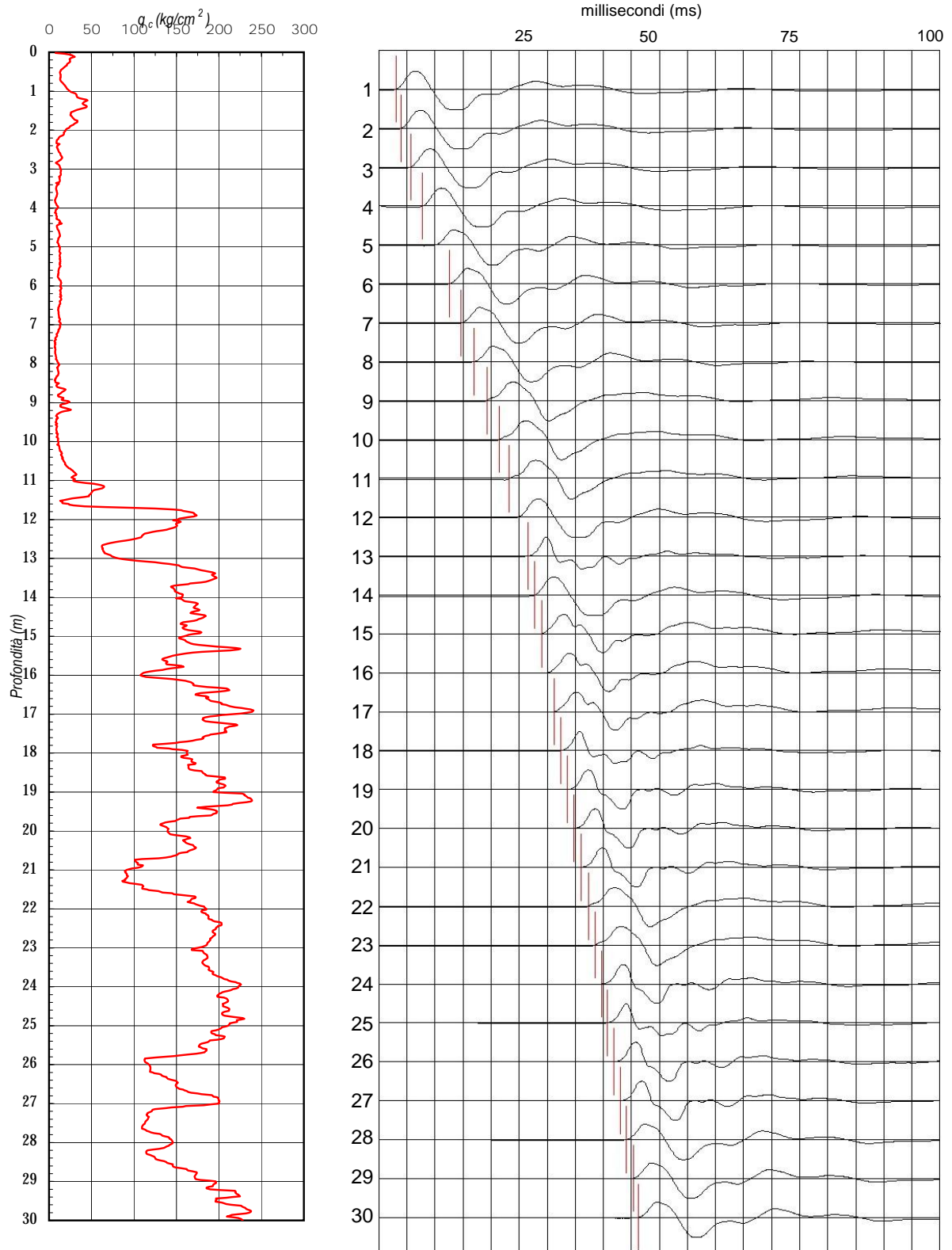


## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU4	DATA PROVA: 18/11/2011
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### SISMOGRAMMI ONDE P





# Comune di Mirandola (Modena)

## Indagini per PSC

LOCALITA':

Mirandola

CANTIERE:

PSC Mirandola

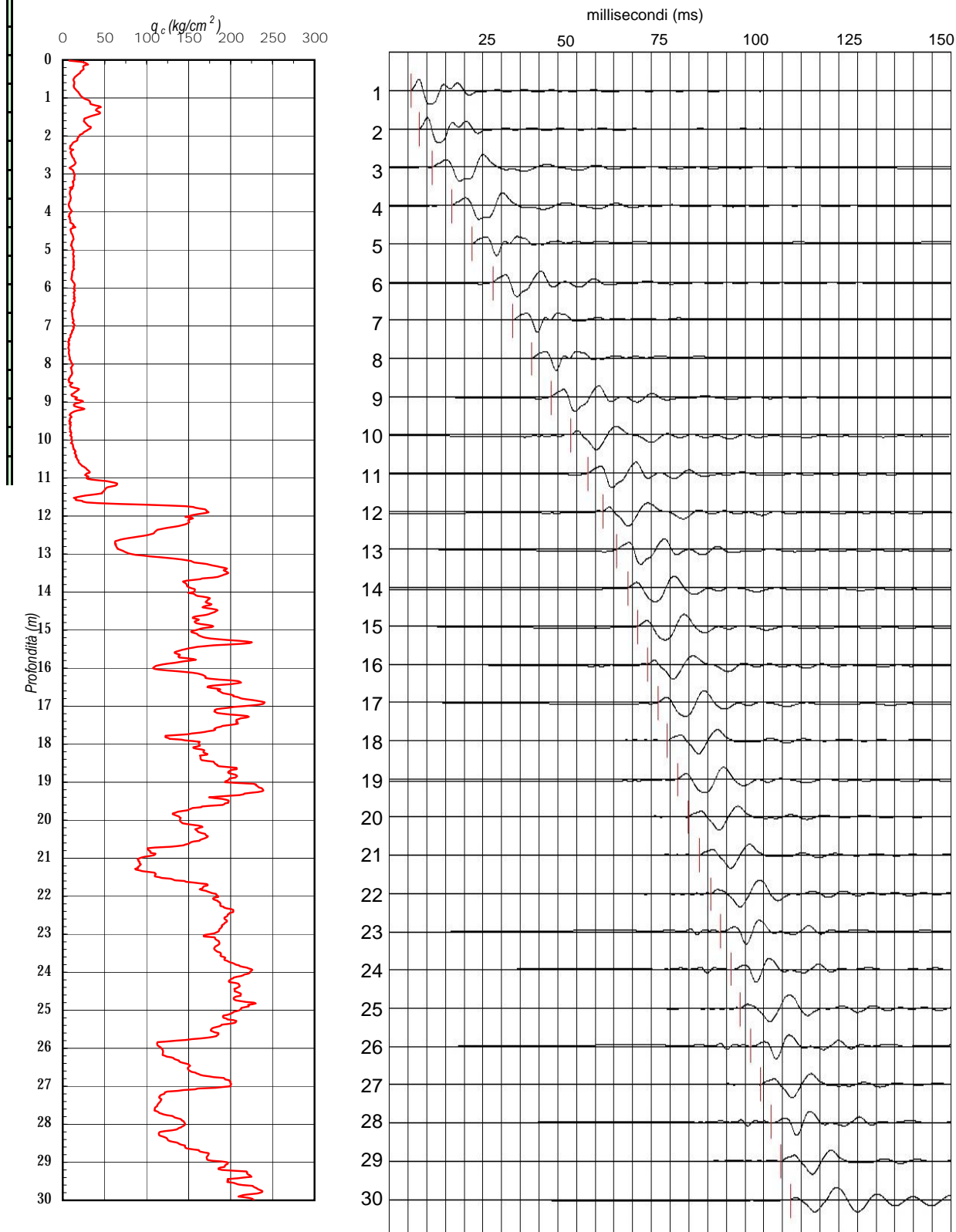
PROVA:

SCPTU4

DATA PROVA:

18/11/2011

## SISMOGRAMMI ONDE S





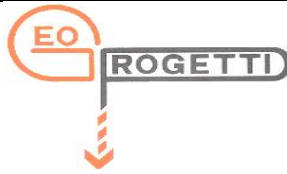
## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU4	DATA PROVA: 18/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	3.000	643	1.93	0.0030	643
2.00	2.59	0.004	4.000	648	0.66	0.0010	663
3.00	3.42	0.006	5.600	611	0.83	0.0016	519
4.00	4.33	0.008	7.800	555	0.90	0.0022	411
5.00	5.27	0.010	10.100	521	0.94	0.0023	408
6.00	6.22	0.013	12.500	498	0.96	0.0024	399
7.00	7.19	0.015	14.800	486	0.97	0.0023	421
8.00	8.17	0.017	17.000	480	0.98	0.0022	444
9.00	9.15	0.019	19.200	477	0.98	0.0022	446
10.00	10.14	0.022	21.500	471	0.99	0.0023	428
11.00	11.12	0.023	23.400	475	0.99	0.0019	520
12.00	12.11	0.025	25.000	485	0.99	0.0016	619
13.00	13.10	0.027	26.500	495	0.99	0.0015	661
14.00	14.10	0.028	27.800	507	0.99	0.0013	764
15.00	15.09	0.029	29.000	520	0.99	0.0012	828
16.00	16.08	0.030	30.100	534	0.99	0.0011	904
17.00	17.08	0.031	31.300	546	1.00	0.0012	829
18.00	18.08	0.032	32.400	558	1.00	0.0011	905
19.00	19.07	0.034	33.500	569	1.00	0.0011	905
20.00	20.07	0.035	34.700	578	1.00	0.0012	830
21.00	21.06	0.036	36.000	585	1.00	0.0013	767
22.00	22.06	0.037	37.300	591	1.00	0.0013	767
23.00	23.06	0.039	38.500	599	1.00	0.0012	831
24.00	24.06	0.040	39.600	607	1.00	0.0011	907
25.00	25.05	0.041	40.700	616	1.00	0.0011	907
26.00	26.05	0.042	41.900	622	1.00	0.0012	832
27.00	27.05	0.043	43.000	629	1.00	0.0011	907
28.00	28.05	0.044	44.100	636	1.00	0.0011	907
29.00	29.05	0.045	45.200	643	1.00	0.0011	908
30.00	30.05	0.046	46.300	649	1.00	0.0011	908



## Comune di Mirandola (Modena)

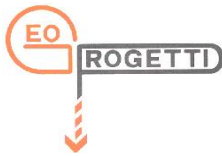
### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU4	DATA PROVA: 18/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.006	5.800	333	1.93	0.0058	333
2.00	2.59	0.008	8.100	320	0.66	0.0023	288
3.00	3.42	0.012	11.500	298	0.83	0.0034	244
4.00	4.33	0.017	16.700	259	0.90	0.0052	174
5.00	5.27	0.022	22.200	237	0.94	0.0055	171
6.00	6.22	0.028	27.700	225	0.96	0.0055	174
7.00	7.19	0.033	32.900	219	0.97	0.0052	186
8.00	8.17	0.038	38.100	214	0.98	0.0052	188
9.00	9.15	0.043	43.200	212	0.98	0.0051	192
10.00	10.14	0.049	48.500	209	0.99	0.0053	186
11.00	11.12	0.053	53.100	209	0.99	0.0046	215
12.00	12.11	0.057	57.000	213	0.99	0.0039	254
13.00	13.10	0.061	60.700	216	0.99	0.0037	268
14.00	14.10	0.064	63.700	221	0.99	0.0030	331
15.00	15.09	0.066	66.400	227	0.99	0.0027	368
16.00	16.08	0.069	69.000	233	0.99	0.0026	382
17.00	17.08	0.072	71.700	238	1.00	0.0027	369
18.00	18.08	0.074	74.300	243	1.00	0.0026	383
19.00	19.07	0.077	76.900	248	1.00	0.0026	383
20.00	20.07	0.080	79.700	252	1.00	0.0028	356
21.00	21.06	0.083	82.800	254	1.00	0.0031	322
22.00	22.06	0.086	85.800	257	1.00	0.0030	332
23.00	23.06	0.089	88.500	261	1.00	0.0027	369
24.00	24.06	0.091	91.100	264	1.00	0.0026	384
25.00	25.05	0.094	93.600	268	1.00	0.0025	399
26.00	26.05	0.097	96.500	270	1.00	0.0029	344
27.00	27.05	0.099	99.200	273	1.00	0.0027	370
28.00	28.05	0.102	102.000	275	1.00	0.0028	357
29.00	29.05	0.105	104.600	278	1.00	0.0026	384
30.00	30.05	0.107	107.100	281	1.00	0.0025	399

**Vs30 = 278 m/s**

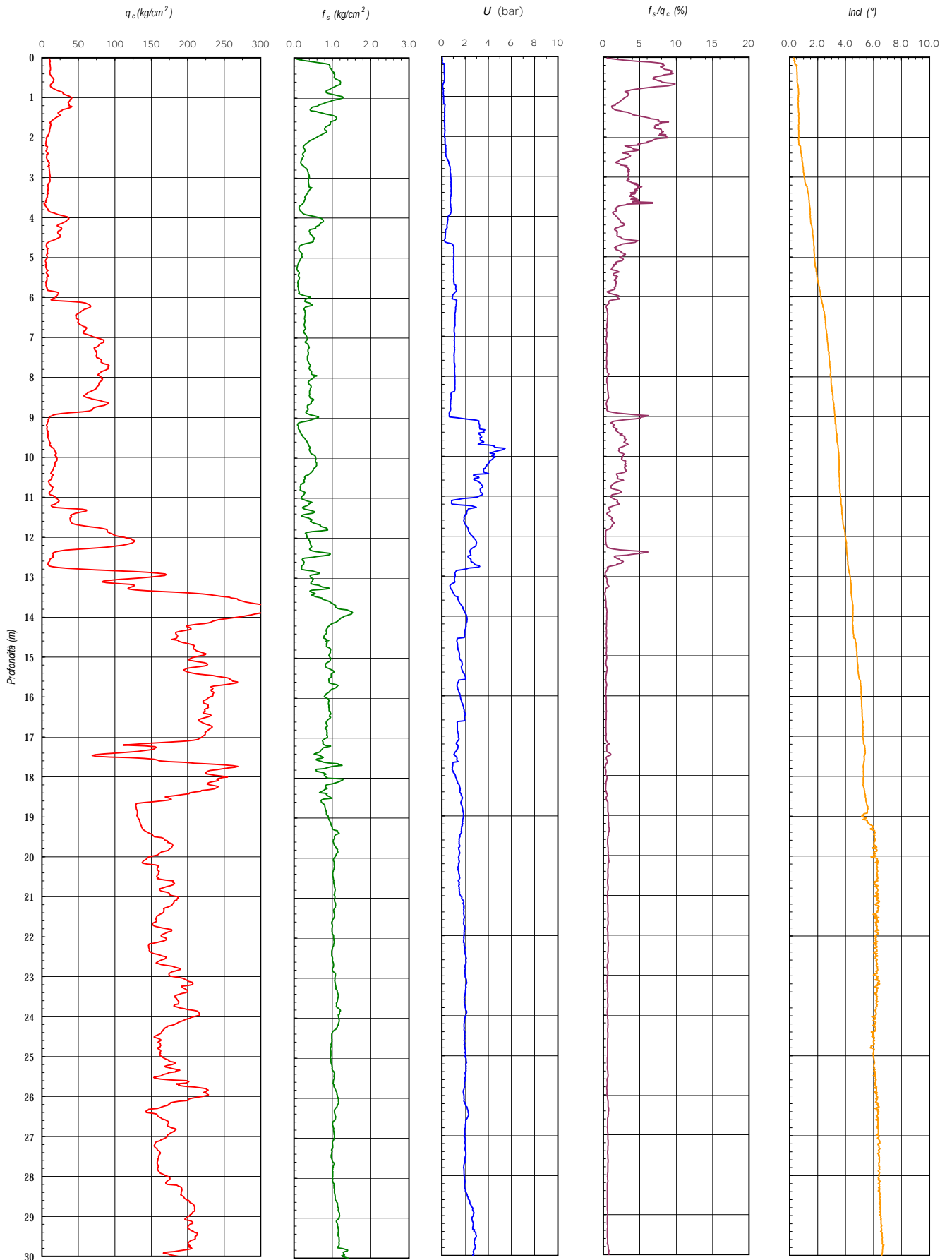


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

**PREFORO (m da p.c.):**  
**PROF. FALDA (m da p.c.):**  
**TIPO PUNTA**

**assente**  
**2,48 m.**  
**piezocono sismico**

**PROVA : SCPTU5    PROFONDITA' (m da p.c.): 30,00 m.    DATA PROVA: 21/11/2011    Certificato di prova:**





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' :

Mirandola

CANTIERE:

PSC Mirandola

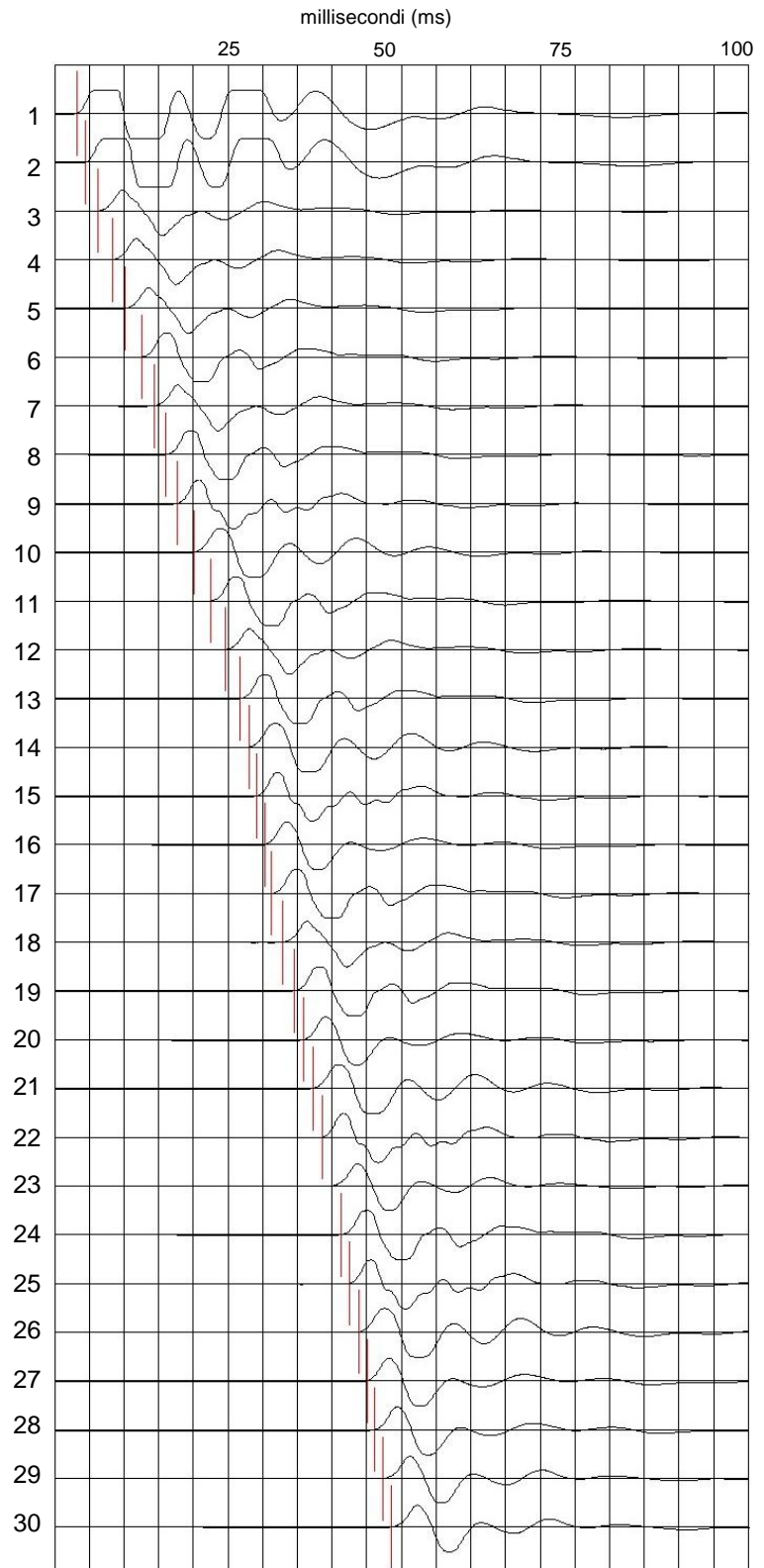
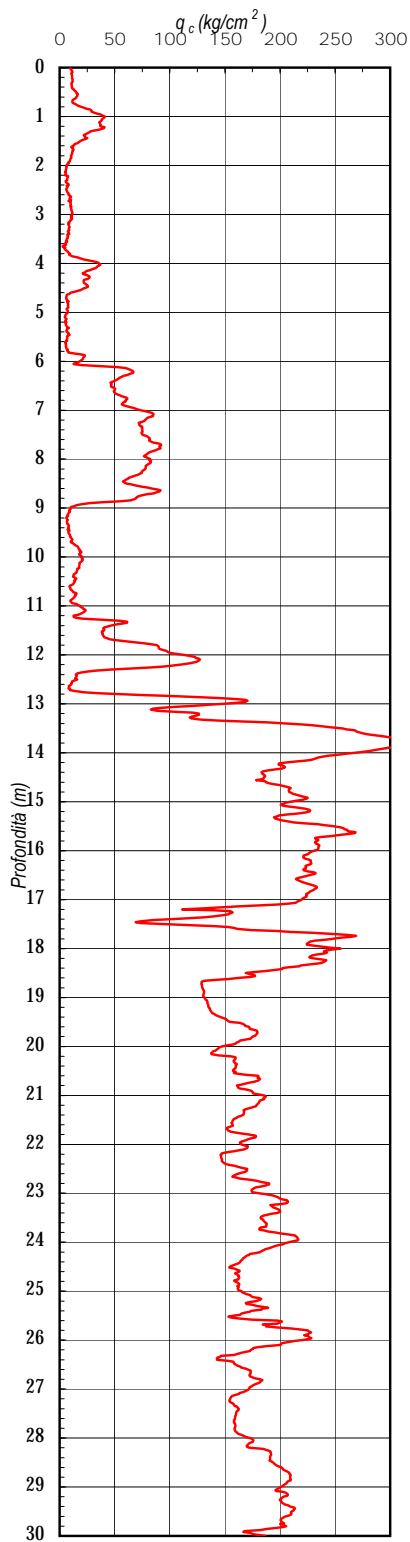
PROVA :

SCPTU5

DATA PROVA:

21/11/2011

### SISMOGRAMMI ONDE P





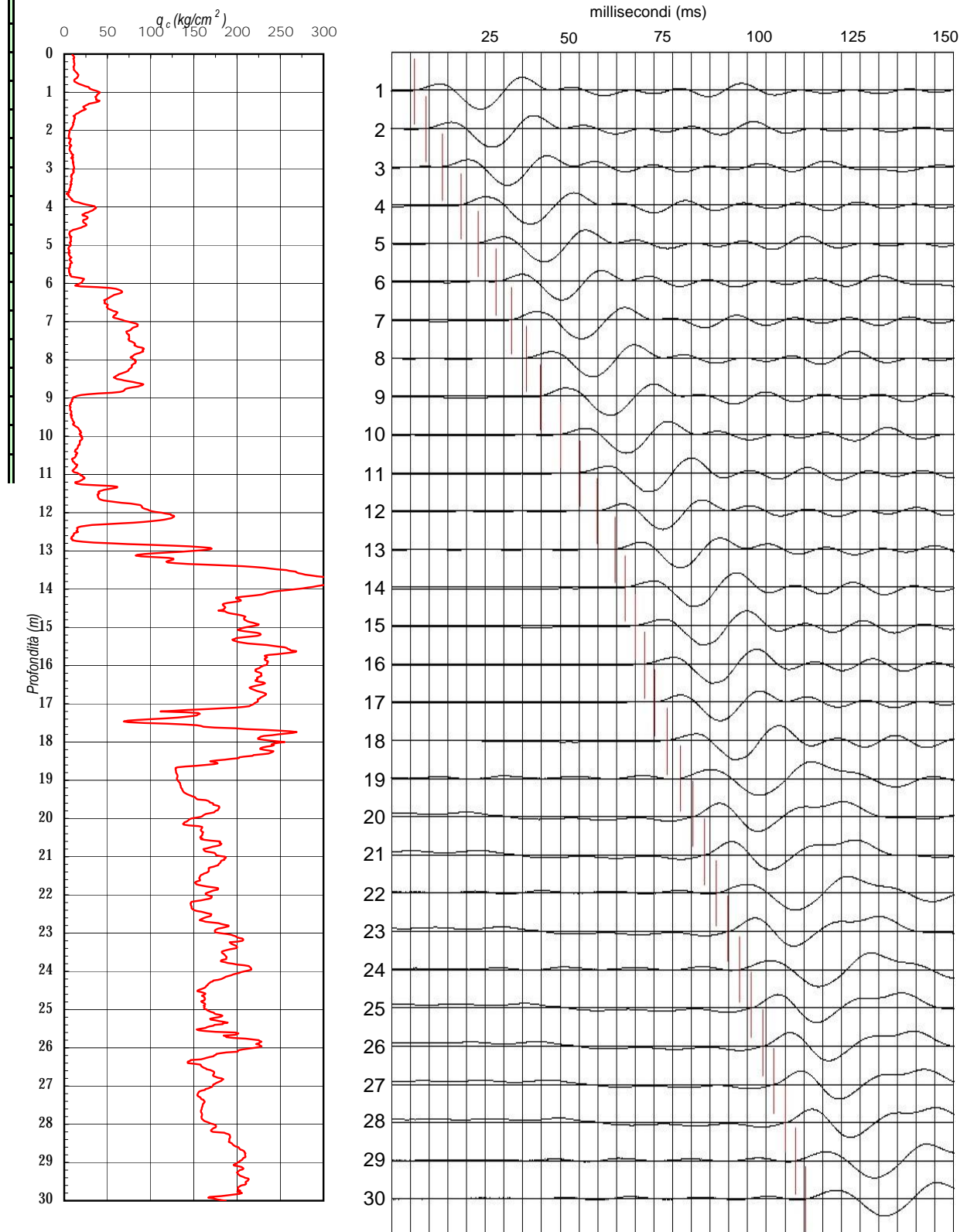


## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA': Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU5	DATA PROVA: 21/11/2011
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### SISMOGRAMMI ONDE S





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU5	DATA PROVA: 21/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	3.200	603	1.93	0.0032	603
2.00	2.59	0.005	4.500	576	0.66	0.0013	510
3.00	3.42	0.006	6.300	543	0.83	0.0018	462
4.00	4.33	0.008	8.300	521	0.90	0.0020	452
5.00	5.27	0.010	10.200	516	0.94	0.0019	494
6.00	6.22	0.013	12.500	498	0.96	0.0023	416
7.00	7.19	0.014	14.300	503	0.97	0.0018	538
8.00	8.17	0.016	16.000	511	0.98	0.0017	574
9.00	9.15	0.018	17.700	517	0.98	0.0017	577
10.00	10.14	0.020	20.100	504	0.99	0.0024	411
11.00	11.12	0.023	22.500	494	0.99	0.0024	412
12.00	12.11	0.025	24.600	492	0.99	0.0021	471
13.00	13.10	0.027	26.800	489	0.99	0.0022	451
14.00	14.10	0.028	28.000	503	0.99	0.0012	827
15.00	15.09	0.029	29.100	519	0.99	0.0011	903
16.00	16.08	0.030	30.300	531	0.99	0.0012	829
17.00	17.08	0.031	31.400	544	1.00	0.0011	905
18.00	18.08	0.033	32.900	549	1.00	0.0015	664
19.00	19.07	0.034	34.400	554	1.00	0.0015	664
20.00	20.07	0.036	35.800	561	1.00	0.0014	712
21.00	21.06	0.037	37.200	566	1.00	0.0014	712
22.00	22.06	0.039	38.600	572	1.00	0.0014	712
23.00	23.06	0.040	39.900	578	1.00	0.0013	767
24.00	24.06	0.041	41.200	584	1.00	0.0013	767
25.00	25.05	0.043	42.500	590	1.00	0.0013	767
26.00	26.05	0.044	43.800	595	1.00	0.0013	768
27.00	27.05	0.045	45.000	601	1.00	0.0012	832
28.00	28.05	0.046	46.200	607	1.00	0.0012	832
29.00	29.05	0.047	47.400	613	1.00	0.0012	832
30.00	30.05	0.049	48.500	619	1.00	0.0011	908



## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU5	DATA PROVA: 21/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.006	6.200	311	1.93	0.0062	311
2.00	2.59	0.009	9.200	282	0.66	0.0030	221
3.00	3.42	0.014	13.500	254	0.83	0.0043	193
4.00	4.33	0.019	18.500	234	0.90	0.0050	181
5.00	5.27	0.023	22.900	230	0.94	0.0044	213
6.00	6.22	0.028	27.900	223	0.96	0.0050	192
7.00	7.19	0.032	32.100	224	0.97	0.0042	231
8.00	8.17	0.036	36.000	227	0.98	0.0039	250
9.00	9.15	0.040	39.800	230	0.98	0.0038	258
10.00	10.14	0.045	44.900	226	0.99	0.0051	193
11.00	11.12	0.050	50.100	222	0.99	0.0052	190
12.00	12.11	0.055	54.700	221	0.99	0.0046	215
13.00	13.10	0.060	59.600	220	0.99	0.0049	202
14.00	14.10	0.062	62.300	226	0.99	0.0027	368
15.00	15.09	0.065	64.900	233	0.99	0.0026	382
16.00	16.08	0.068	67.600	238	0.99	0.0027	368
17.00	17.08	0.070	70.200	243	1.00	0.0026	383
18.00	18.08	0.074	73.600	246	1.00	0.0034	293
19.00	19.07	0.077	77.000	248	1.00	0.0034	293
20.00	20.07	0.080	80.300	250	1.00	0.0033	302
21.00	21.06	0.084	83.500	252	1.00	0.0032	311
22.00	22.06	0.087	86.700	254	1.00	0.0032	312
23.00	23.06	0.090	89.800	257	1.00	0.0031	322
24.00	24.06	0.093	92.800	259	1.00	0.0030	333
25.00	25.05	0.096	95.900	261	1.00	0.0031	322
26.00	26.05	0.099	99.000	263	1.00	0.0031	322
27.00	27.05	0.102	102.000	265	1.00	0.0030	333
28.00	28.05	0.105	104.900	267	1.00	0.0029	344
29.00	29.05	0.108	107.800	269	1.00	0.0029	344
30.00	30.05	0.111	110.600	272	1.00	0.0028	357

**Vs30 = 268 m/s**

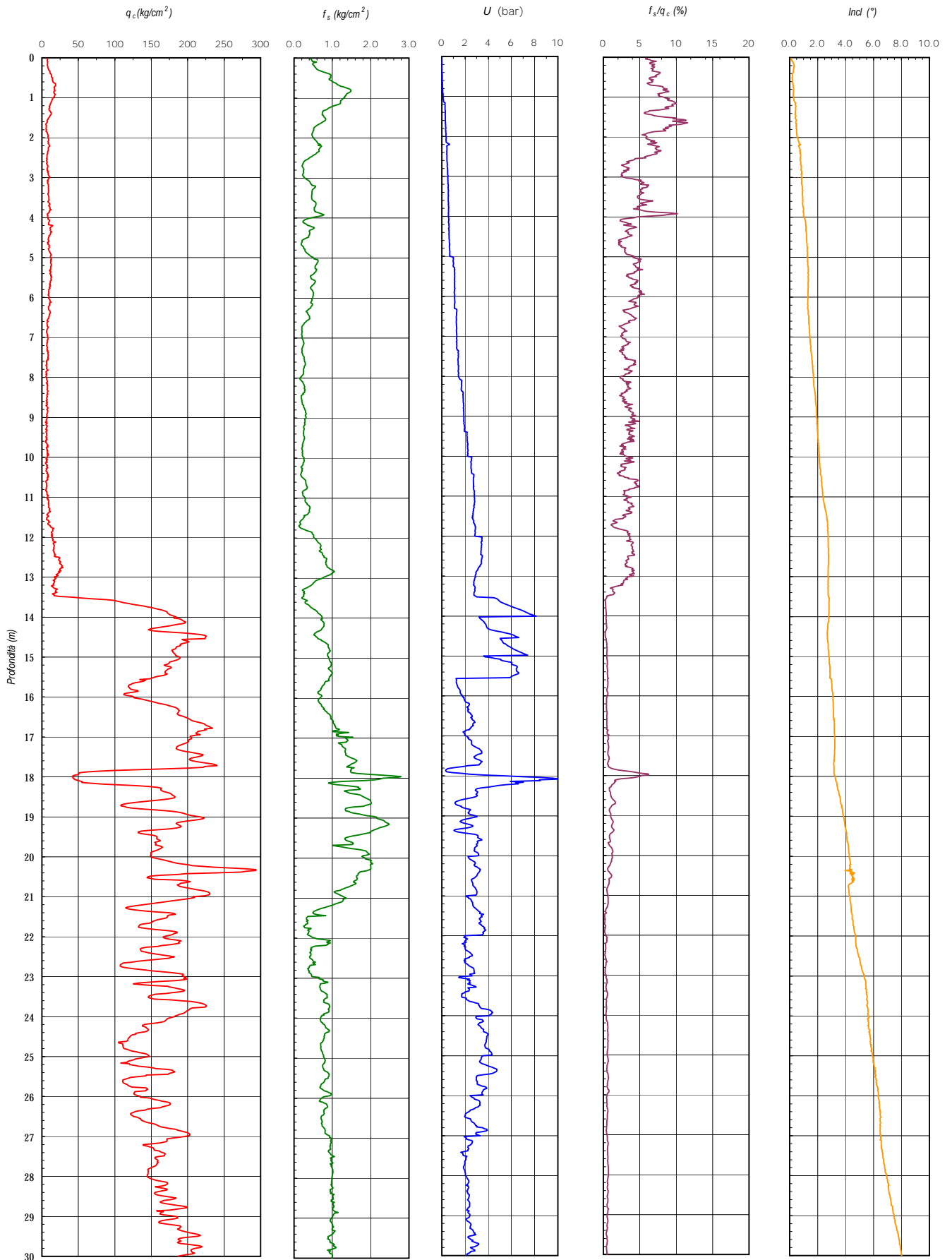


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

**PREFORO (m da p.c.):**  
**PROF. FALDA (m da p.c.):**  
**TIPO PUNTA**

assente  
chiuso 1,35 m  
piezocono sismico

**PROVA :** SCPTU6    **PROFONDITA' (m da p.c.):** 30,00 m.    **DATA PROVA:** 21/11/2011    **Certificato di prova:**





# Comune di Mirandola (Modena)

## Indagini per PSC

LOCALITA':

Mirandola

CANTIERE:

PSC Mirandola

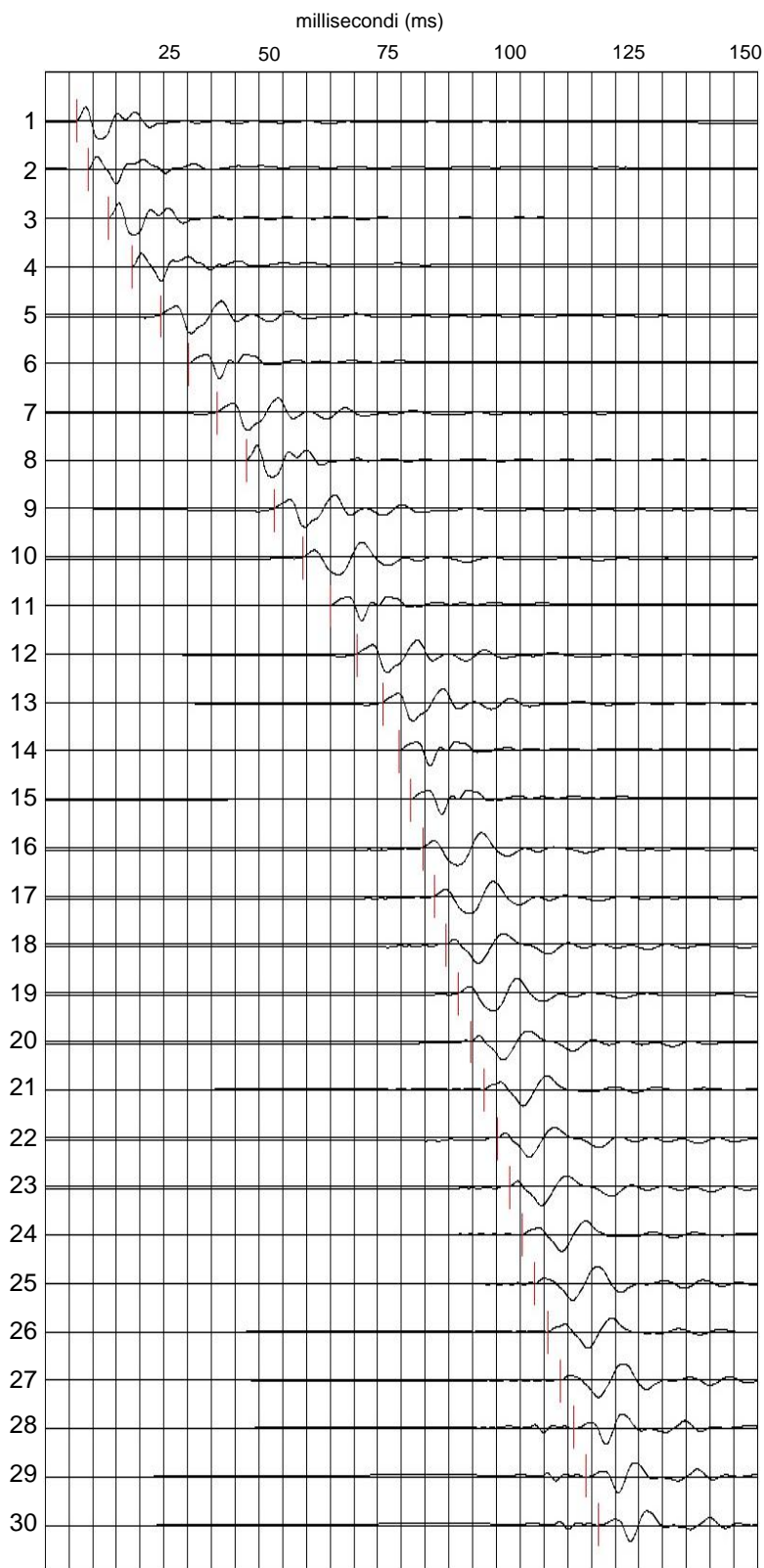
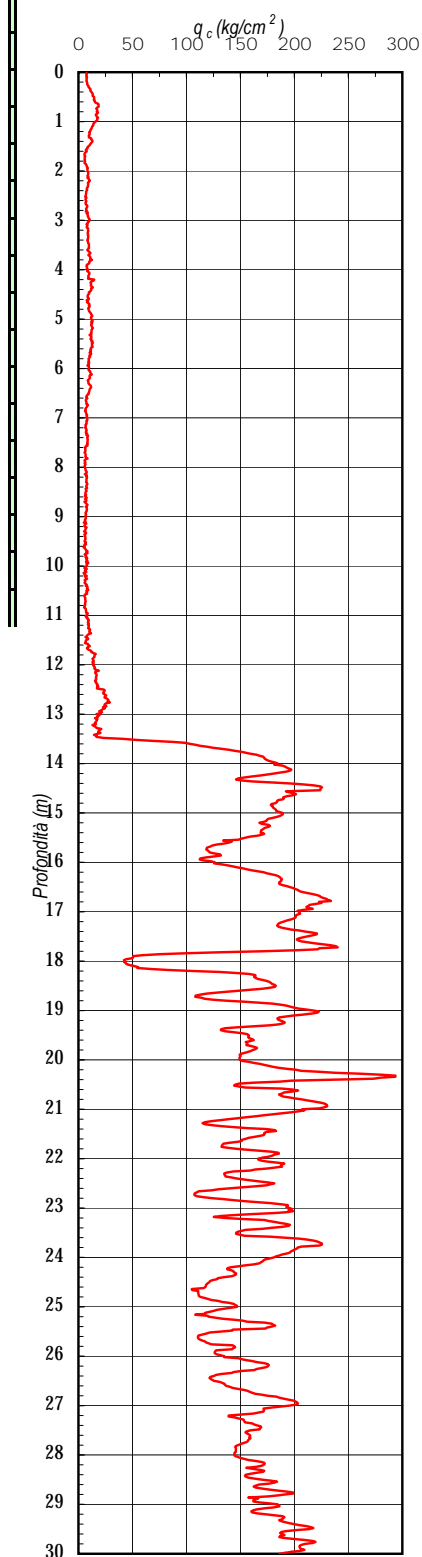
PROVA:

SCPTU6

DATA PROVA:

21/11/2011

## SISMOGRAMMI ONDE S





Comune di Mirandola (Modena)

Indagini per PSC

LOCALITA' :

Mirandola

CANTIERE:

PSC Mirandola

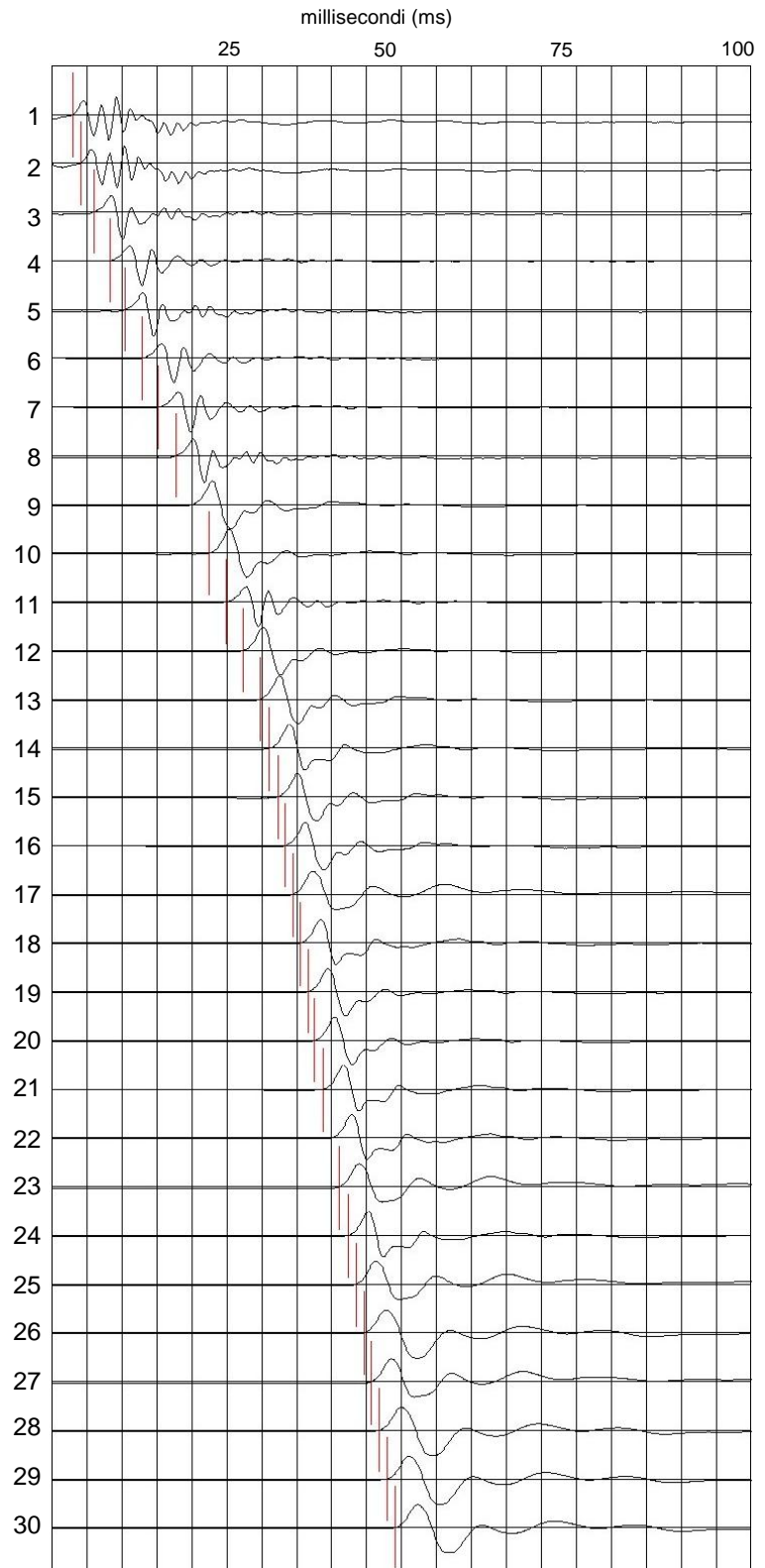
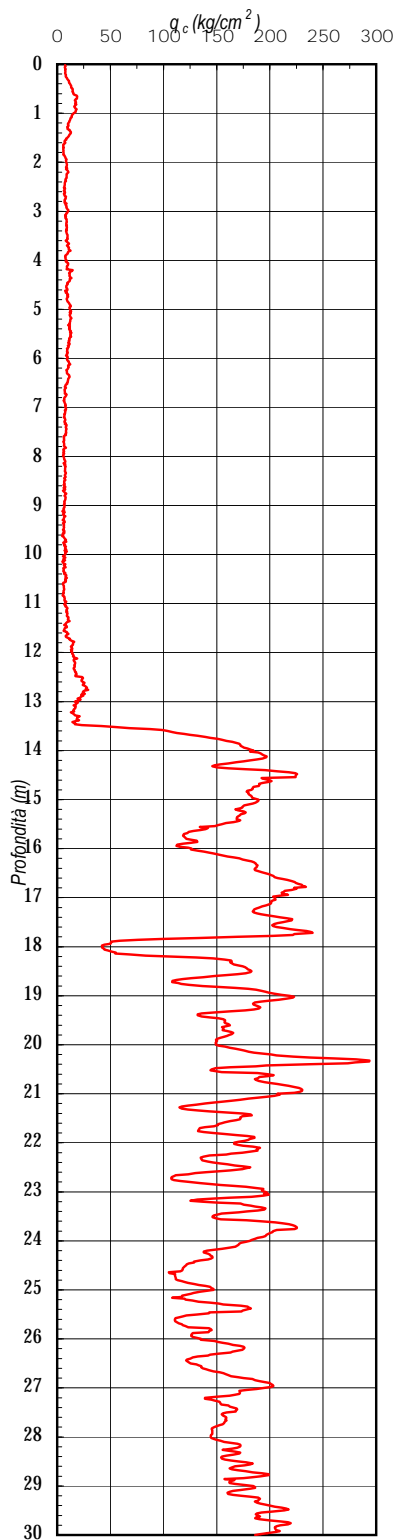
PROVA :

SCPTU6

DATA PROVA:

21/11/2011

SISMOGRAMMI ONDE P





## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU6	DATA PROVA: 21/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	3.000	643	1.93	0.0030	643
2.00	2.59	0.004	4.100	632	0.66	0.0011	603
3.00	3.42	0.006	6.000	571	0.83	0.0019	437
4.00	4.33	0.008	8.200	528	0.90	0.0022	411
5.00	5.27	0.011	10.500	501	0.94	0.0023	408
6.00	6.22	0.013	12.900	482	0.96	0.0024	399
7.00	7.19	0.015	15.300	470	0.97	0.0024	404
8.00	8.17	0.018	17.700	461	0.98	0.0024	407
9.00	9.15	0.020	20.100	455	0.98	0.0024	409
10.00	10.14	0.023	22.500	450	0.99	0.0024	411
11.00	11.12	0.025	24.900	447	0.99	0.0024	412
12.00	12.11	0.027	27.300	444	0.99	0.0024	412
13.00	13.10	0.030	29.700	441	0.99	0.0024	413
14.00	14.10	0.031	31.200	452	0.99	0.0015	662
15.00	15.09	0.032	32.300	467	0.99	0.0011	903
16.00	16.08	0.033	33.400	482	0.99	0.0011	904
17.00	17.08	0.035	34.500	495	1.00	0.0011	905
18.00	18.08	0.036	35.500	509	1.00	0.0010	996
19.00	19.07	0.037	36.600	521	1.00	0.0011	905
20.00	20.07	0.038	37.600	534	1.00	0.0010	996
21.00	21.06	0.039	38.800	543	1.00	0.0012	831
22.00	22.06	0.040	39.900	553	1.00	0.0011	906
23.00	23.06	0.041	41.100	561	1.00	0.0012	831
24.00	24.06	0.042	42.300	569	1.00	0.0012	831
25.00	25.05	0.044	43.500	576	1.00	0.0012	831
26.00	26.05	0.045	44.600	584	1.00	0.0011	907
27.00	27.05	0.046	45.700	592	1.00	0.0011	907
28.00	28.05	0.047	46.800	599	1.00	0.0011	907
29.00	29.05	0.048	47.900	606	1.00	0.0011	908
30.00	30.05	0.049	49.000	613	1.00	0.0011	908



## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU6	DATA PROVA: 21/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.007	6.600	292	1.93	0.0066	292
2.00	2.59	0.009	9.000	288	0.66	0.0024	276
3.00	3.42	0.013	13.200	259	0.83	0.0042	198
4.00	4.33	0.018	18.400	235	0.90	0.0052	174
5.00	5.27	0.024	24.300	217	0.94	0.0059	159
6.00	6.22	0.030	30.200	206	0.96	0.0059	162
7.00	7.19	0.036	36.300	198	0.97	0.0061	159
8.00	8.17	0.042	42.300	193	0.98	0.0060	163
9.00	9.15	0.048	48.200	190	0.98	0.0059	166
10.00	10.14	0.054	54.300	187	0.99	0.0061	162
11.00	11.12	0.060	60.000	185	0.99	0.0057	173
12.00	12.11	0.066	65.600	185	0.99	0.0056	177
13.00	13.10	0.071	71.000	185	0.99	0.0054	184
14.00	14.10	0.075	74.500	189	0.99	0.0035	284
15.00	15.09	0.077	76.900	196	0.99	0.0024	414
16.00	16.08	0.080	79.500	202	0.99	0.0026	382
17.00	17.08	0.082	82.000	208	1.00	0.0025	398
18.00	18.08	0.084	84.400	214	1.00	0.0024	415
19.00	19.07	0.087	87.100	219	1.00	0.0027	369
20.00	20.07	0.090	89.600	224	1.00	0.0025	399
21.00	21.06	0.092	92.300	228	1.00	0.0027	369
22.00	22.06	0.095	95.100	232	1.00	0.0028	356
23.00	23.06	0.098	97.700	236	1.00	0.0026	384
24.00	24.06	0.100	100.400	240	1.00	0.0027	369
25.00	25.05	0.103	103.100	243	1.00	0.0027	370
26.00	26.05	0.106	105.900	246	1.00	0.0028	356
27.00	27.05	0.109	108.500	249	1.00	0.0026	384
28.00	28.05	0.111	111.200	252	1.00	0.0027	370
29.00	29.05	0.114	113.800	255	1.00	0.0026	384
30.00	30.05	0.116	116.400	258	1.00	0.0026	384

**Vs30 = 256 m/s**



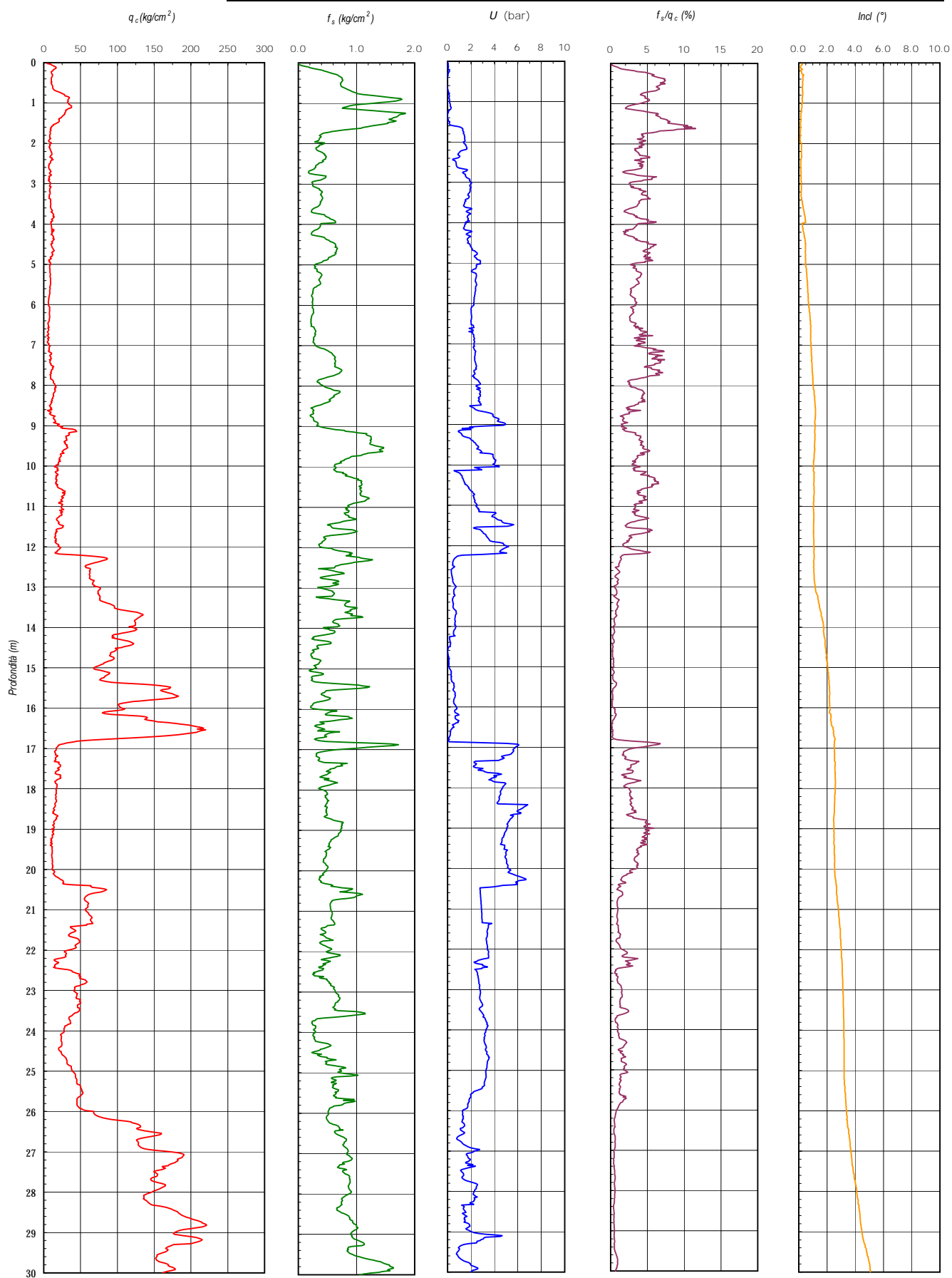


**COMMITTENTE:** Comune di Mirandola (Modena)  
**CANTIERE:** PSC Mirandola  
**LOCALITA':** Mirandola

**PREFORO (m da p.c.)**  
**PROF. FALDA (m da p.c.)**  
**TIPO PUNTA**

assente  
1,64 m.  
piezocono sismico

**PROVA :** SCPTU7    **PROFONDITA' (m da p.c.):** 30,00 m.    **DATA PROVA:** 21/11/2011    **Certificato di prova:**





Comune di Mirandola (Modena)

Indagini per PSC

LOCALITA' :

Mirandola

CANTIERE:

PSC Mirandola

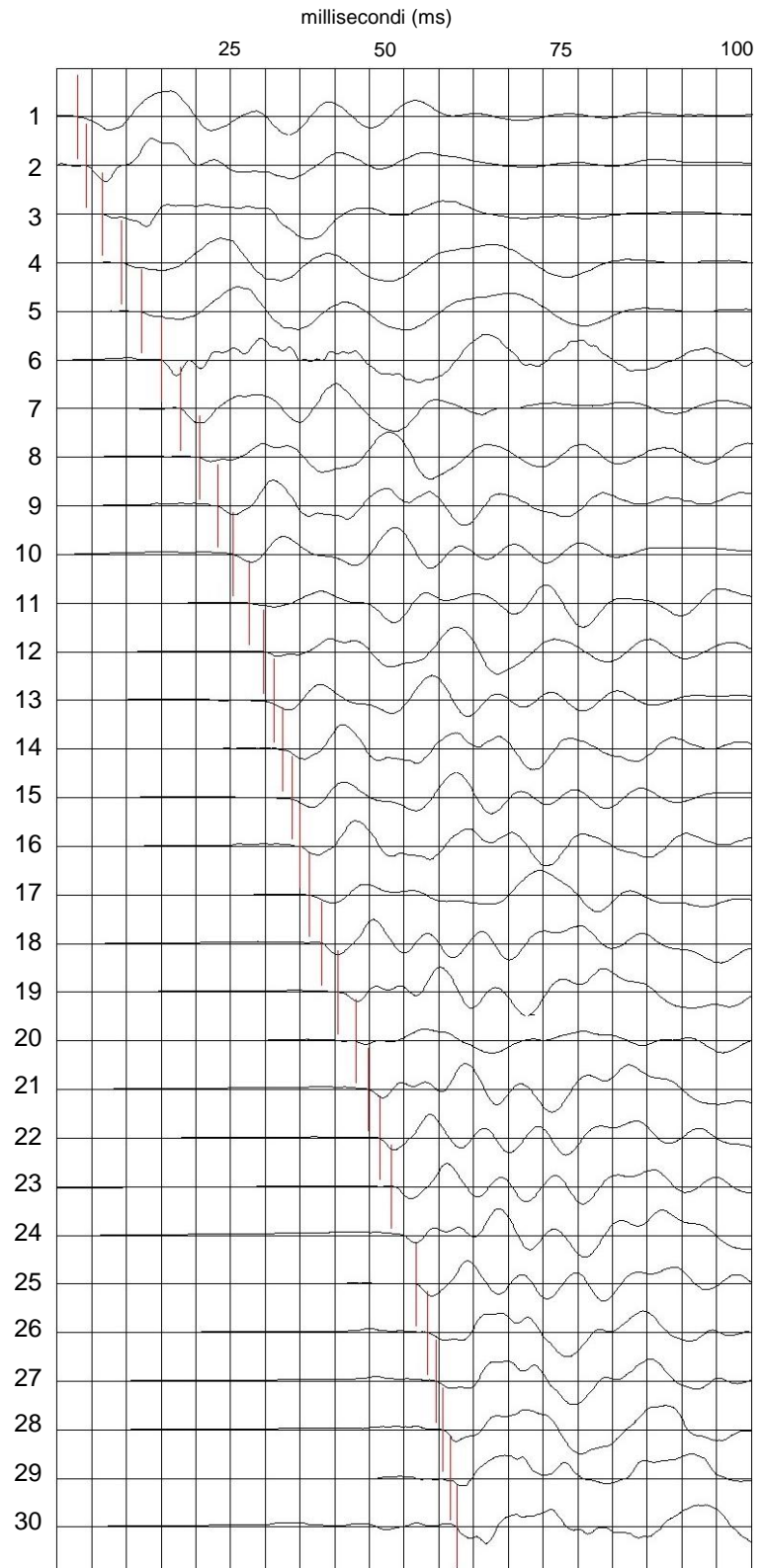
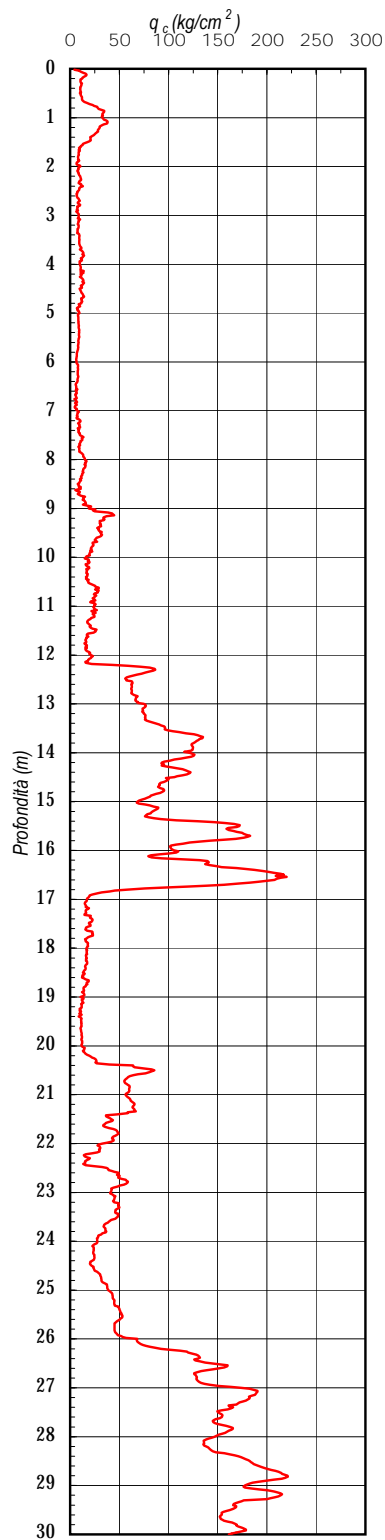
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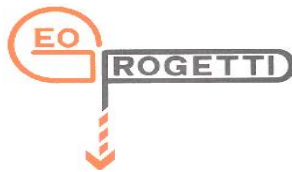
SCPTU7

DATA PROVA:

21/11/2011

SISMOGRAMMI ONDE P





# Comune di Mirandola (Modena)

## Indagini per PSC

LOCALITA':

Mirandola

CANTIERE:

PSC Mirandola

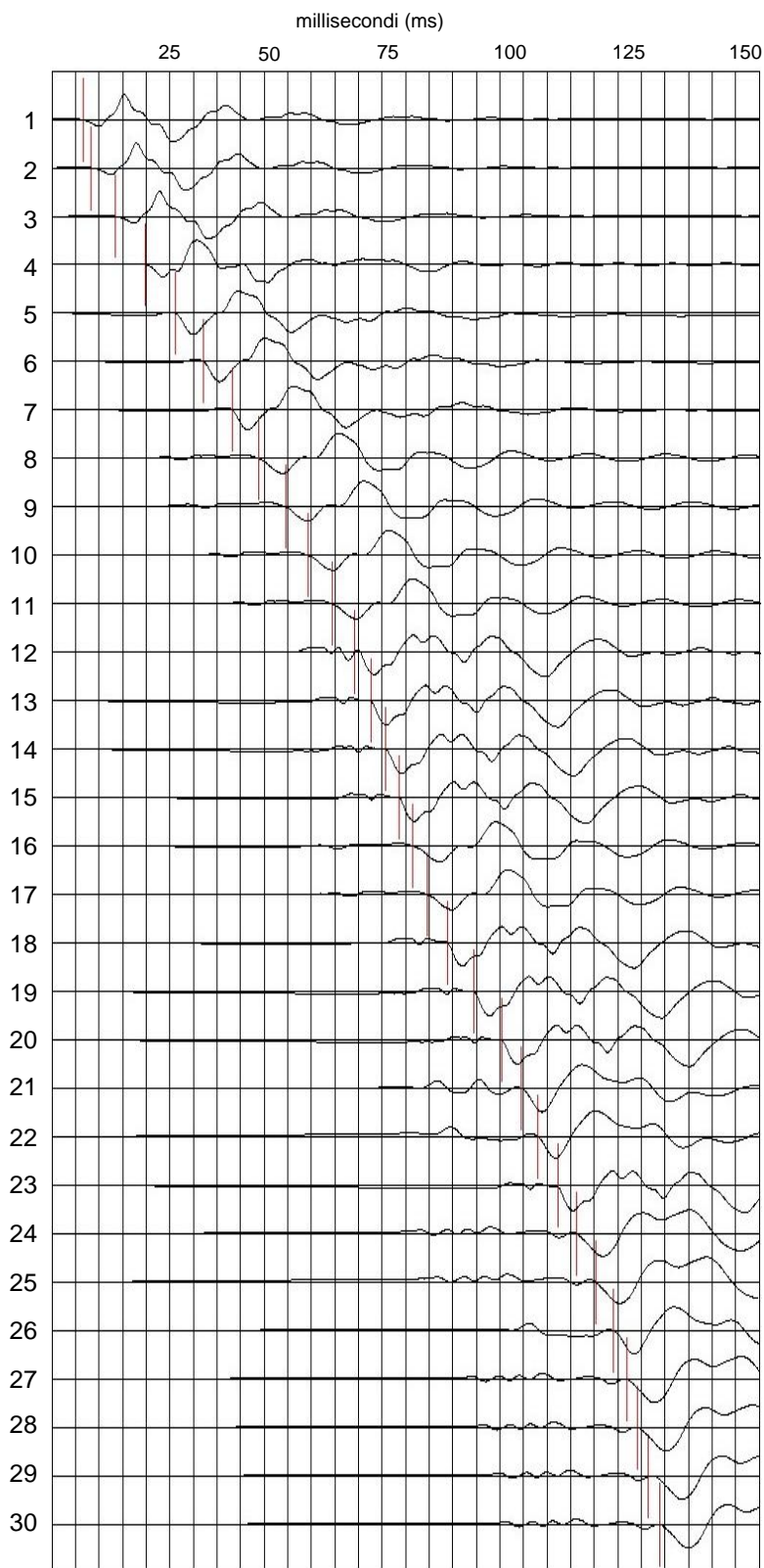
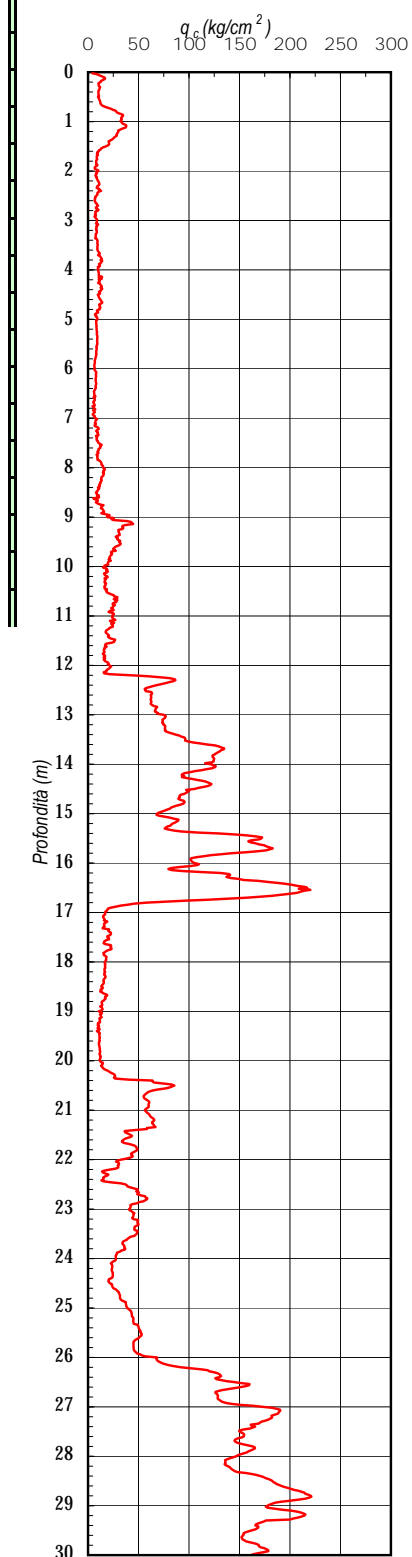
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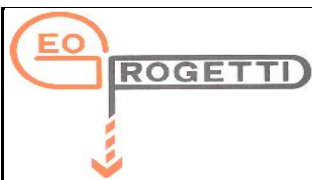
SCPTU7

DATA PROVA:

21/11/2011

## SISMOGRAMMI ONDE S





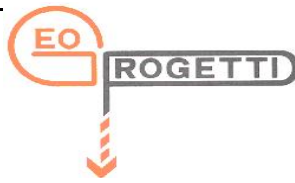
## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU7	DATA PROVA: 21/11/2011
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### Tabella onde P

Sismic data acquisition depth	Distance source P-wave - triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.003	3.200	603	1.93	0.0032	603
2.00	2.59	0.004	4.200	617	0.66	0.0010	663
3.00	3.42	0.007	6.600	519	0.83	0.0024	346
4.00	4.33	0.009	9.300	465	0.90	0.0027	334
5.00	5.27	0.012	12.100	435	0.94	0.0028	335
6.00	6.22	0.015	15.000	415	0.96	0.0029	330
7.00	7.19	0.018	17.800	404	0.97	0.0028	346
8.00	8.17	0.021	20.500	398	0.98	0.0027	362
9.00	9.15	0.023	23.100	396	0.98	0.0026	378
10.00	10.14	0.025	25.400	399	0.99	0.0023	428
11.00	11.12	0.028	27.700	402	0.99	0.0023	430
12.00	12.11	0.030	29.800	406	0.99	0.0021	471
13.00	13.10	0.031	31.200	420	0.99	0.0014	708
14.00	14.10	0.033	32.500	434	0.99	0.0013	764
15.00	15.09	0.034	33.800	446	0.99	0.0013	764
16.00	16.08	0.035	35.000	460	0.99	0.0012	829
17.00	17.08	0.036	36.300	471	1.00	0.0013	765
18.00	18.08	0.038	38.100	474	1.00	0.0018	553
19.00	19.07	0.041	40.500	471	1.00	0.0024	415
20.00	20.07	0.043	43.000	467	1.00	0.0025	399
21.00	21.06	0.045	44.900	469	1.00	0.0019	525
22.00	22.06	0.047	46.500	474	1.00	0.0016	623
23.00	23.06	0.048	48.200	478	1.00	0.0017	587
24.00	24.06	0.050	49.900	482	1.00	0.0017	587
25.00	25.05	0.052	51.700	485	1.00	0.0018	554
26.00	26.05	0.053	53.400	488	1.00	0.0017	587
27.00	27.05	0.055	54.600	495	1.00	0.0012	832
28.00	28.05	0.056	55.600	504	1.00	0.0010	998
29.00	29.05	0.057	56.600	513	1.00	0.0010	998
30.00	30.05	0.058	57.600	522	1.00	0.0010	998



## Comune di Mirandola (Modena)

### Indagini per PSC

LOCALITA' : Mirandola	CANTIERE: PSC Mirandola	PROVA : SCPTU7	DATA PROVA: 21/11/2011
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### Tabella onde S

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1.00	1.93	0.007	6.700	288	1.93	0.0067	288
2.00	2.59	0.008	8.400	309	0.66	0.0017	390
3.00	3.42	0.013	13.400	256	0.83	0.0050	166
4.00	4.33	0.020	19.800	219	0.90	0.0064	141
5.00	5.27	0.026	26.100	202	0.94	0.0063	149
6.00	6.22	0.032	32.200	193	0.96	0.0061	157
7.00	7.19	0.038	38.300	188	0.97	0.0061	159
8.00	8.17	0.044	43.800	186	0.98	0.0055	178
9.00	9.15	0.050	49.500	185	0.98	0.0057	172
10.00	10.14	0.054	54.400	186	0.99	0.0049	201
11.00	11.12	0.059	59.400	187	0.99	0.0050	198
12.00	12.11	0.064	64.200	189	0.99	0.0048	206
13.00	13.10	0.068	67.600	194	0.99	0.0034	292
14.00	14.10	0.071	70.800	199	0.99	0.0032	310
15.00	15.09	0.074	73.700	205	0.99	0.0029	343
16.00	16.08	0.077	76.500	210	0.99	0.0028	355
17.00	17.08	0.080	79.500	215	1.00	0.0030	332
18.00	18.08	0.084	84.000	215	1.00	0.0045	221
19.00	19.07	0.089	89.400	213	1.00	0.0054	184
20.00	20.07	0.095	95.400	210	1.00	0.0060	166
21.00	21.06	0.100	99.500	212	1.00	0.0041	243
22.00	22.06	0.103	103.100	214	1.00	0.0036	277
23.00	23.06	0.107	107.300	215	1.00	0.0042	237
24.00	24.06	0.111	111.300	216	1.00	0.0040	249
25.00	25.05	0.115	115.300	217	1.00	0.0040	249
26.00	26.05	0.119	119.000	219	1.00	0.0037	270
27.00	27.05	0.122	121.800	222	1.00	0.0028	356
28.00	28.05	0.124	124.200	226	1.00	0.0024	416
29.00	29.05	0.127	126.500	230	1.00	0.0023	434
30.00	30.05	0.129	128.800	233	1.00	0.0023	434

**Vs30 = 231 m/s**