ITACA (ITalian ACcelerometric Archive)

RAN

Rete Accelerometrica Nazionale

(National Accelerometric Network)

Recording Station

Colfiorito

Station Code

CLF

	Day	Month	Year
First compilation	13	september	2006
Last update	28	october	2008

General Information

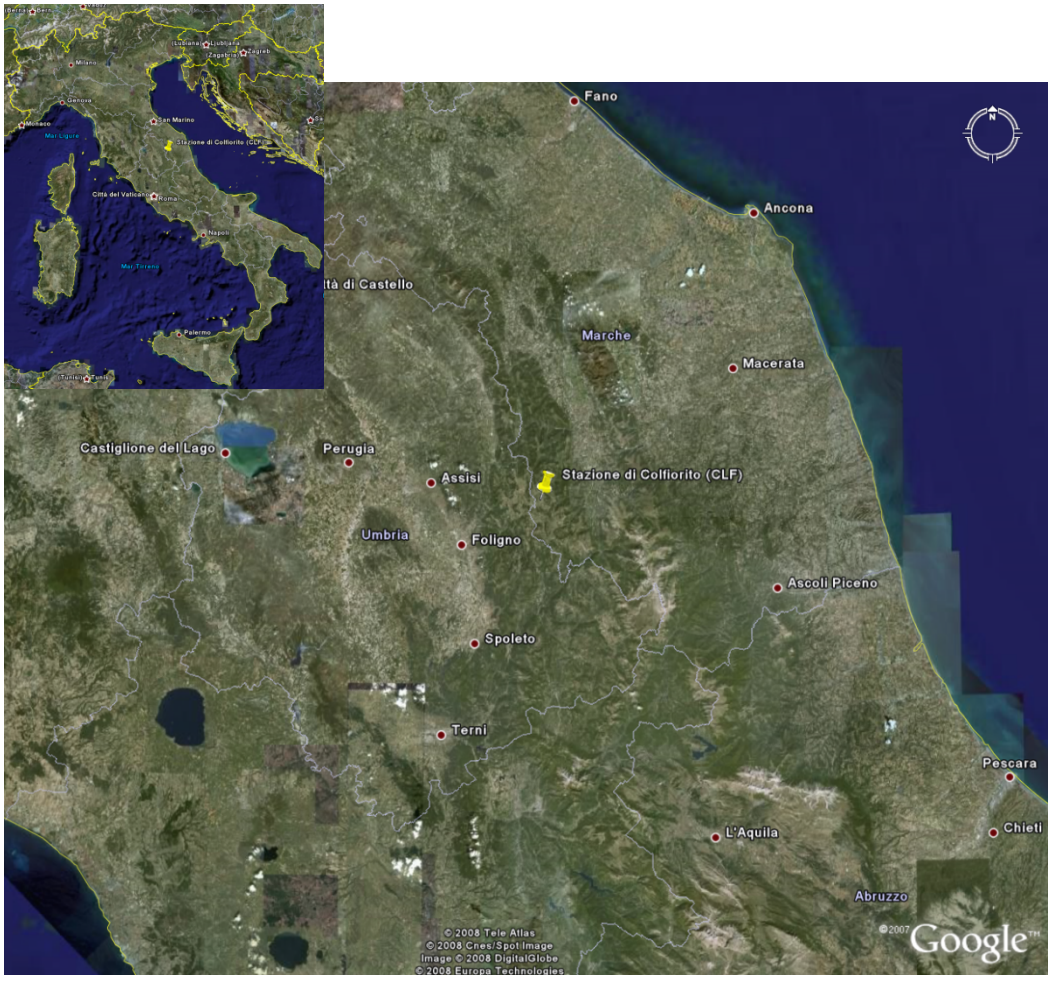
Station photograph	
Code	**CLF**
Owner	**DPC (Italian Civil Protection Department)**
Type of network	**Permanent**
Activation date	**22 May 1991**
Removal date	**-**
Instrument type	**Analogue**
Instrument model	**SMA-1**
Location	**ENEL cabin MC52E07**
Housing	**Free field**
Notes	**-**

Geographical Information (1)

Location

Region	**Marche**
Province	**Macerata**
City	**Serravalle del Chienti**
Place / Address	**Casone di Taverne**
ISTAT Code	**110043052**
Notes	**-**

Location map
(Italy and Region)



Geographical Information (2)

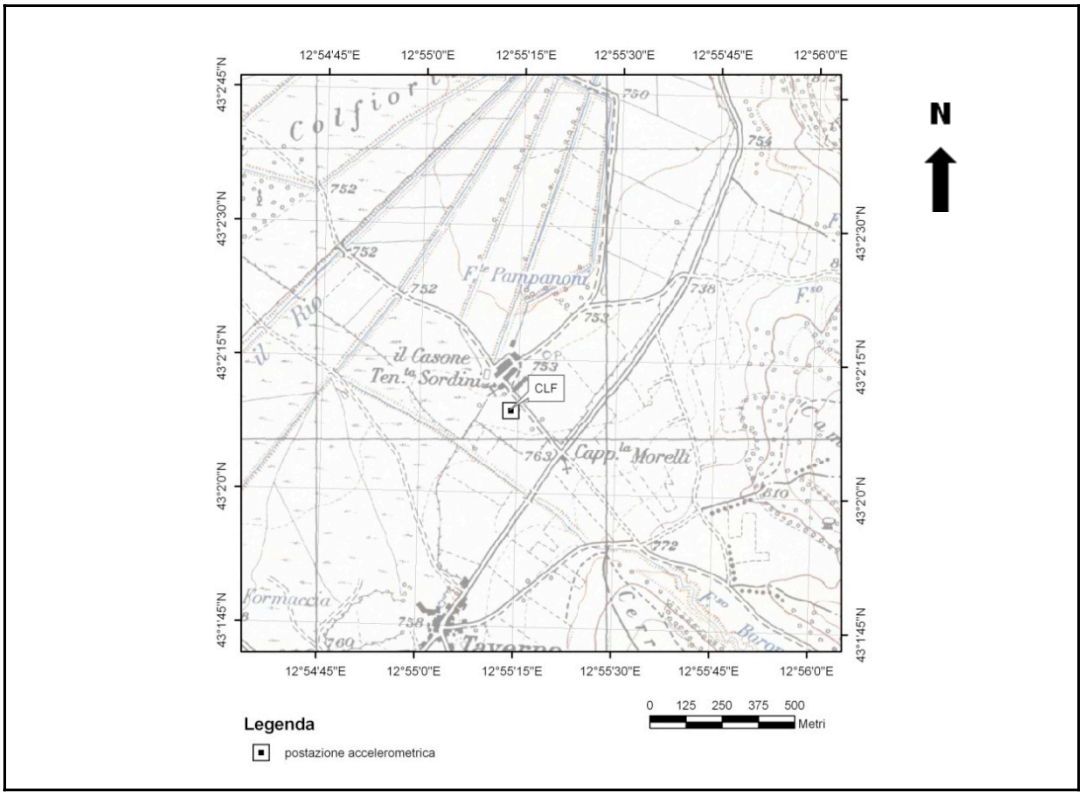
Coordinates

	Latitude	Longitude
Geographic (WGS84)	**43.036667**	**12.921111**
UTM (WGS84 zone 33)	**-**	**-**
Gauss-Boaga	**-**	**-**
Elevation (m a.s.l.)	**753**	

Cartography

	Scale	Code
Topographic map (I.G.M.I.)	**1:25.000**	**123 II SE**
	Scale	Element number
Regional technical map (C.T.R.)	**-**	**-**

I.G.M.I. map



Geomorphology

Site morphology

Plain	Valley (centre)	Valley (edge)	**Alluvial fan**
Saddle	Slope	Edge of scarp	Ridge

Landslides

[X] Not present

Present

[ ] Active or quiescent

[ ] Inactive or stabilized

Distance (m)

I.F.F.I. map

-

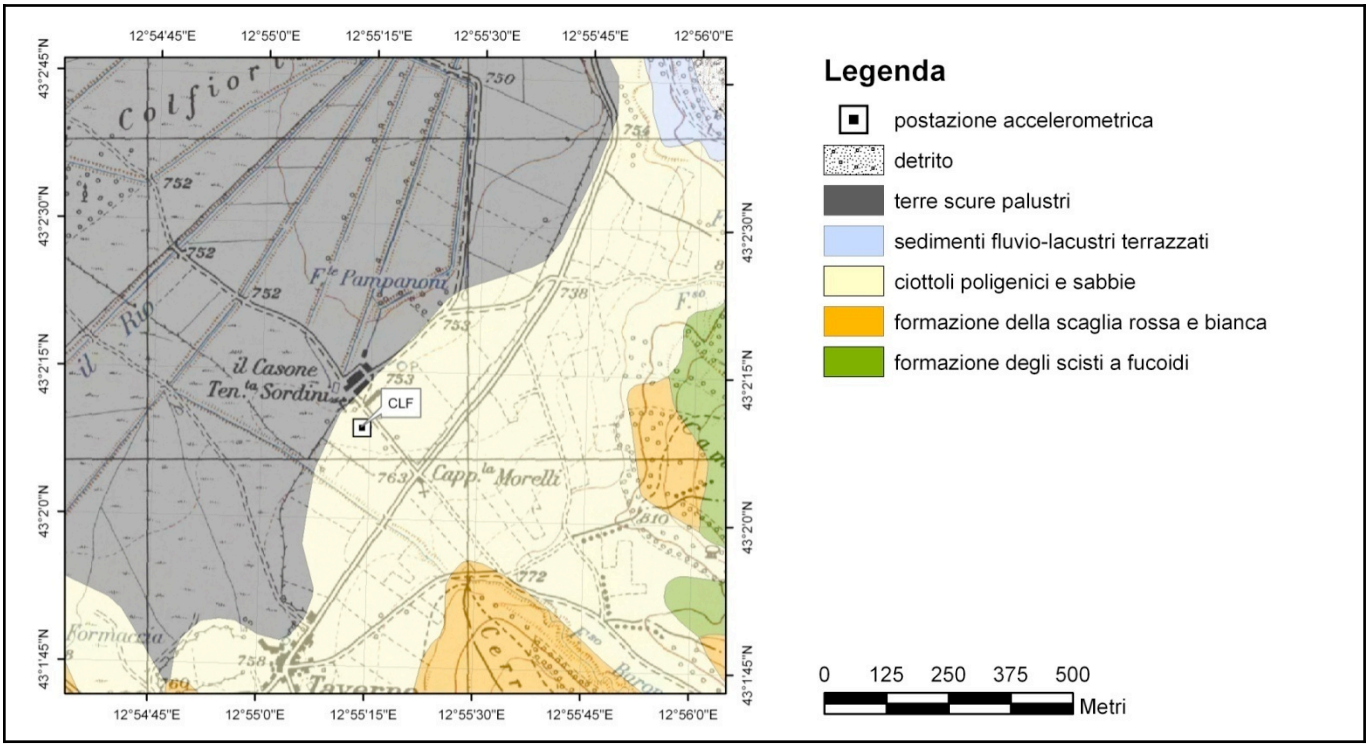
Notes

-

Geology

Cartography

	Scale	Sheet number	Sheet name
Geological map	**1:100.000**	**123**	**Assisi**



Geological cross section

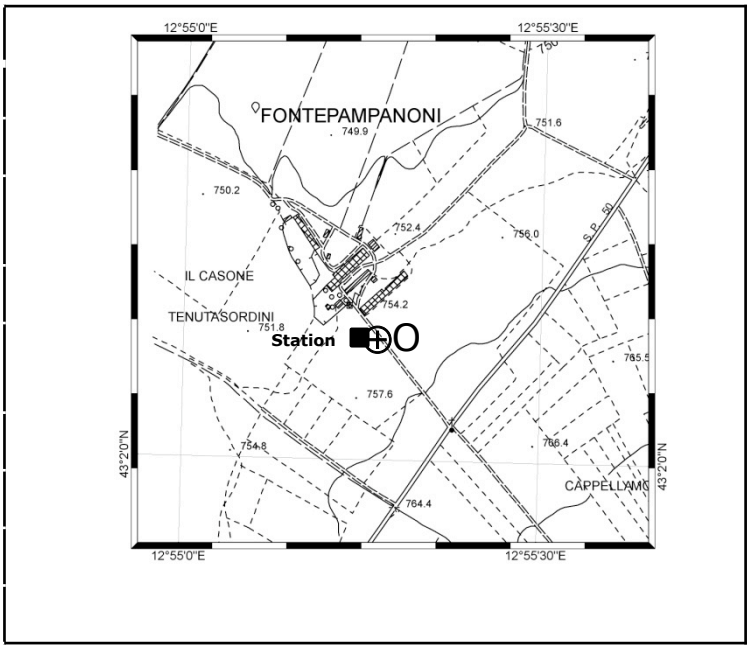
Fault ☐ present (if fault–station distance < 300 m)

Notes -

Geotechnical & Geophysical Information (1)

Test summary and location

	⊗	Borehole
	P	Piezometer
	▲	Penetration tests (SPT, CPT)
X	⊕	Down-Hole, Cross-Hole (DH, CH)
	∇-∇	Seismic refraction/reflection
X	O	SASW, MASW
	∅	Spectral Ratio (H/V)
	◊-◊	Geoelectric
		Lab tests



Stratigraphic profile

Depth (m), #Layer, Piezometric level, Samples, Layer description

Geotechnical & Geophysical Information (2)

In situ Tests: *Piezometric measurements*

Table	*Chart*

In situ Tests: *Penetration Test (SPT, CPT)*

Chart (SPT)	*Chart (CPT)*

Geotechnical & Geophysical Information (3)

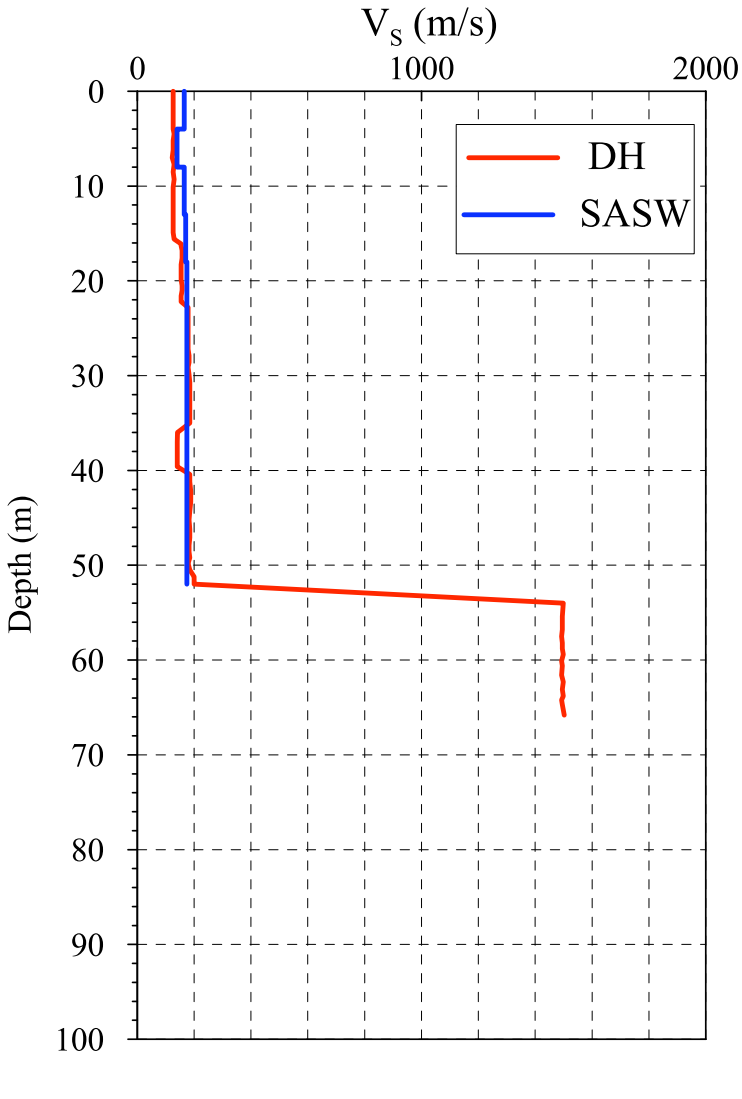
In situ Tests: *Down-Hole (DH), Cross-Hole (CH), SASW, MASW*

DH
(Di Giulio et al., 2003)

Depth (m)	Vs (m/s)	Depth (m)	Vs (m/s)
0.0	126.0	31.5	185.0
4.0	126.4	32.2	185.0
4.5	129.5	33.0	185.0
5.2	126.4	33.7	185.0
6.2	126.4	34.3	185.0
7.0	123.3	35.0	185.0
7.7	129.5	36.0	141.9
8.5	126.4	37.0	141.0
9.3	129.5	37.8	141.0
10.1	126.4	38.6	141.0
10.9	126.4	39.6	141.0
11.5	126.4	40.4	185.0
12.2	126.4	41.2	185.0
13.0	126.4	42.2	188.1
13.8	126.4	43.3	188.1
14.4	126.4	44.3	185.0
14.9	126.4	45.2	181.9
15.6	129.5	46.2	185.0
16.1	154.2	47.1	185.0
16.3	154.2	47.9	181.9
16.8	157.3	48.6	181.9
17.6	157.3	49.2	185.0
18.3	154.2	49.8	178.9
18.7	154.2	50.5	185.0
19.3	154.2	51.2	200.0
19.9	154.2	52.0	200.0
20.5	157.3	54.0	1498.7
21.0	157.3	55.4	1495.6
21.6	154.2	56.1	1495.6
22.2	154.2	56.8	1495.6
22.8	178.9	57.5	1492.5
23.6	178.9	58.2	1495.6
24.4	178.9	58.8	1495.6
25.2	178.9	59.4	1498.7
25.9	178.9	60.1	1492.5
26.5	178.9	60.6	1495.6
27.2	178.9	61.6	1492.5
27.9	181.9	62.3	1498.7
28.6	181.9	63.1	1495.6
29.1	178.9	63.8	1498.7
29.9	181.9	64.2	1492.5
30.7	185.0	64.7	1495.6
		65.8	1501.8

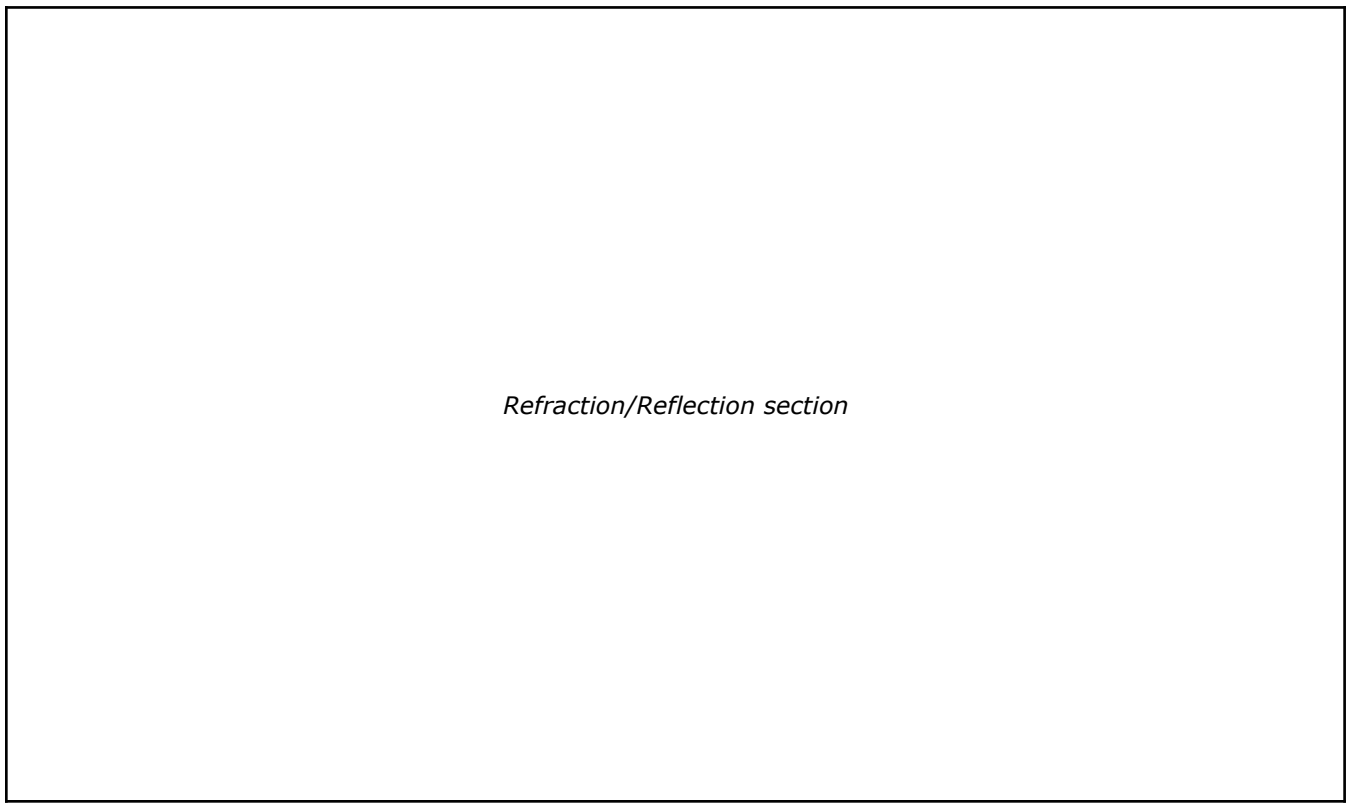
SASW
(Scassera et al., 2008)

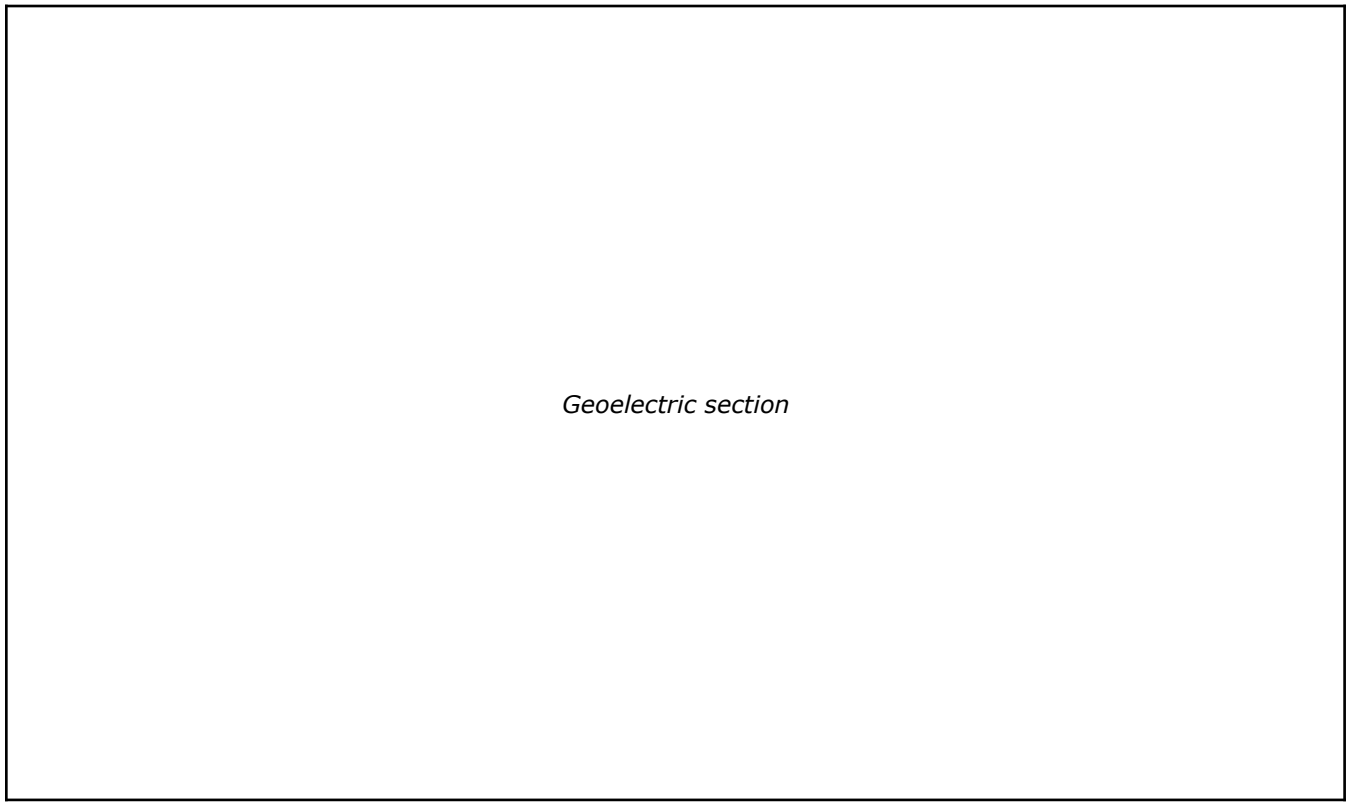
Depth (m)	Vs (m/s)
0.0	165.0
4.0	140.0
8.0	165.0
13.0	170.0
18.0	175.0
52.0	180.0



Geotechnical & Geophysical Information (4)

In situ Tests: *Refraction/Reflection section – Geoelectric section*





Geotechnical & Geophysical Information (5)

Laboratory Tests: *physical properties*

Borehole	Sample	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	w (%)	γ_s (kN/m³)	γ (kN/m³)	w_L (%)	I_P (%)	I_C	A	e

Chart
depth (m) - γ (kN/m³)

Chart
Depth (m) - wP, w, wL (%)

Chart
Depth (m) – I_C

Chart
Depth (m) - e

Plasticity chart

Granulometry chart

Geotechnical & Geophysical Information (6)

Laboratory Tests: *Direct shear/Triaxial tests*

Table

Chart

Table

Chart

Legend
DS = *Direct shear*
CIU =*Triaxial-Consolidated Undrained*
CID =*Triaxial-Consolidated Drained*
UU =*Traxial-Unconsolidated Undrained*

Average values of mechanical parameters

Litotype	c' (kPa)	φ' (°)	c_u (kPa)

Note

Geotechnical & Geophysical Information (7)

Laboratory Tests: *Resonant Column (RC)*

Borehole / Sample / Depth (m)													
	γ (%)												
	G/G_0												
	D (%)												
	γ (%)												
	G/G_0												
	D (%)												
	γ (%)												
	G/G_0												
	D (%)												

Chart
G/G_0 - γ (%)

Chart
D (%) - γ (%)

Geotechnical & Geophysical Information (8)

Laboratory Tests: *Cyclic Triaxial (CTX)*

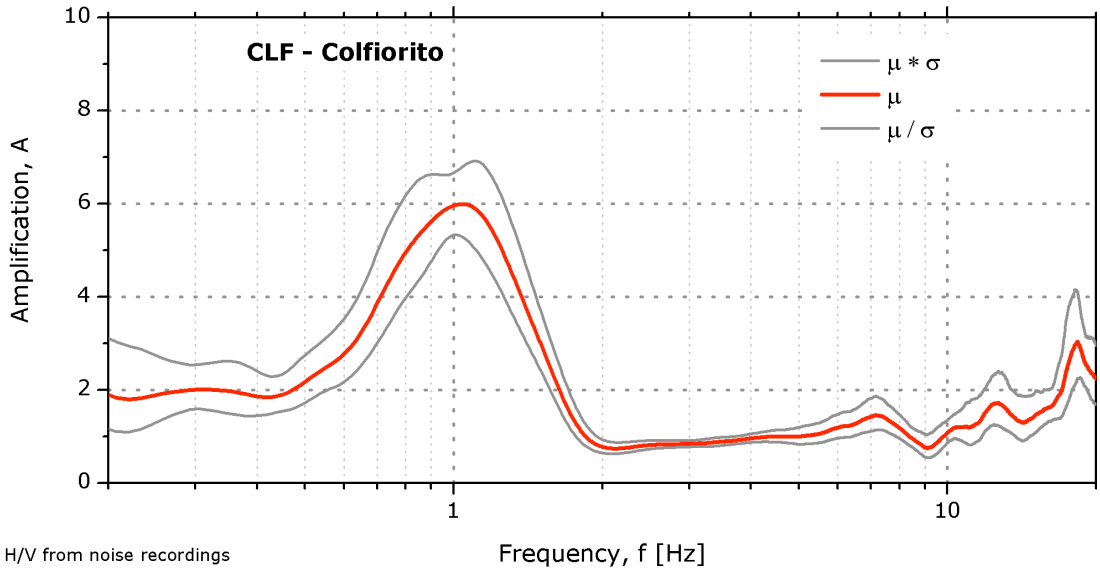
Borehole / Sample	p'_c (MPa)												
		ε (%)											
		E (MPa)											
		ε (%)											
		E (MPa)											
		ε (%)											
		E (MPa)											

Chart
E (MPa) - ε (%)

Microtremor H/V spectral ratio

Freq. (Hz)	μ ▪ σ	μ	μ / σ
0.20	1.16	1.90	3.11
0.25	1.30	1.89	2.74
0.30	1.59	2.01	2.54
0.40	1.45	1.87	2.40
0.50	1.73	2.18	2.75
0.60	2.18	2.77	3.54
0.70	3.01	3.86	4.96
0.80	3.98	4.96	6.17
1.00	5.33	5.96	6.66
1.25	4.11	5.03	6.16
1.50	2.42	3.00	3.70
1.75	1.06	1.36	1.74
2.00	0.65	0.78	0.94

Freq. (Hz)	μ ▪ σ	μ	μ / σ
2.50	0.73	0.82	0.92
3.00	0.78	0.85	0.92
4.00	0.88	0.96	1.06
5.00	0.84	1.00	1.20
6.00	0.96	1.19	1.48
7.00	1.12	1.42	1.82
8.00	0.96	1.18	1.46
10.00	0.87	1.08	1.35
12.50	1.25	1.71	2.34
15.00	1.07	1.44	1.94
17.50	1.71	2.50	3.65
20.00	1.70	2.25	2.96
-	-	-	-

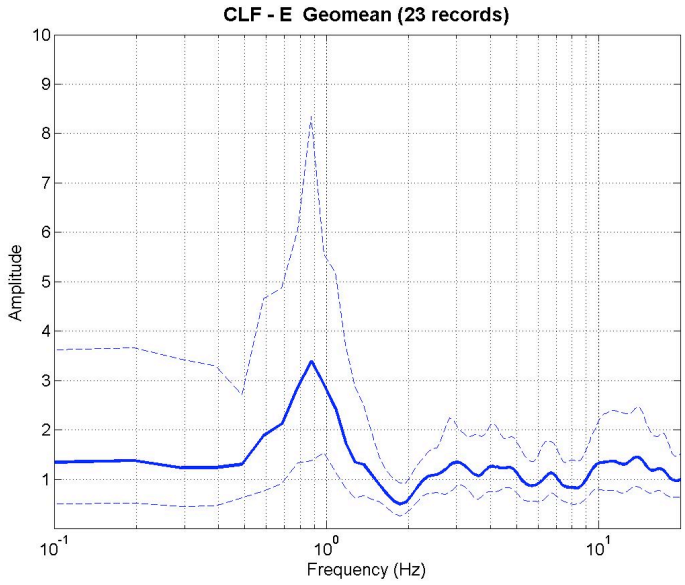


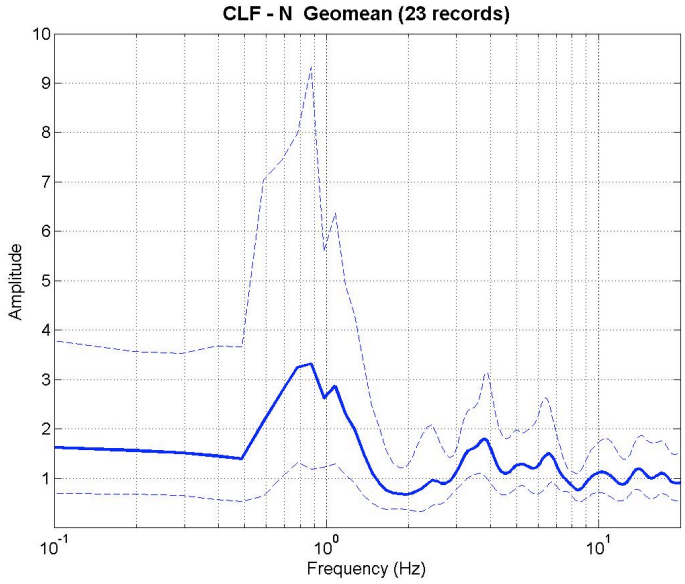
$f_{0\ (mt)}$ (Hz) **1.0**

Date of measurements	Day	Month	Year
	-	-	-

Earthquake H/V spectral ratio

List of selected records from ITACA





$f_{0\ (eq)}$ (Hz) **1.0**

Year-Month-Day_Hour:Minute:Second
1997-09-03-22:07:29
1997-09-26-09:40:25
1997-10-12-09:48:31
1997-10-12-09:48:31
1997-09-07-23:28:05
1997-09-26-00:33:12
1997-09-26-00:33:12
1997-10-06-23:24:53
1997-10-06-23:24:53
1997-10-14-15:23:09
1997-09-26-09:40:25
1997-09-26-00:33:12
1997-10-04-16:13:32
1997-10-22-04:57:06
1997-10-14-15:23:09
1997-09-26-09:40:25
1997-09-03-22:07:29
1997-09-26-13:30:52
1997-10-04-16:13:32
1997-10-12-09:48:31
1997-10-23-08:58:43
1997-10-05-15:38:04
1997-09-26-00:59:22
1997-10-05-15:38:04
1997-09-26-13:30:52
1997-10-04-19:39:45
1997-09-07-23:28:05
1997-09-26-00:59:22
1997-10-04-19:39:45
1997-10-23-08:58:43
1997-10-04-19:39:45
1997-09-03-22:07:29
1997-10-06-23:24:53
1997-10-23-08:58:43
1997-10-14-15:23:09
1997-09-26-13:30:52
1997-09-07-23:28:05
1997-10-22-04:57:06
1997-10-22-04:57:06
1997-09-26-00:59:22
1997-10-04-16:13:32
1997-10-05-15:38:04

Site classification (EC8 – NTC2008)

Lithostratigraphic classification

Estimated

Method[1]	Soil class[2]	Notes

1 Legend

GEO	Geological data
EC	Empirical correlation
HV	H/V spectral ratio

Based on in-situ measurements

Method[3]	V_{s30} (m/s)	Soil class[3]
DH	**147**	**D**

2 Legend

A	Rock or other rock-like geological formation, including at most 5 m of weaker material at the surface (V_{s30}>800 m/s).
B	Deposits of very dense sand, gravel, or very stiff clay, at least several tens of m in thickness, characterised by a gradual increase of mechanical properties with depth (V_{s30}=360–800 m/s).
C	Deep deposits of dense or mediumdense sand, gravel or stiff clay with thickness from several tens to many hundreds of m (V_{s30}=180–360 m/s).
D	Deposits of loose-to-medium cohesionless soil (with or without some soft cohesive layers), or of predominantly soft-to-firm coesive soil (V_{s30}<180 m/s).
E	A soil profile consisting of a surface alluvium layer with V_s values of type C or D and thickness varying between about 5 m and 20 m, underlain by stiffer material with V_s>800 m/s.

3 Legend

CH	Cross-Hole
DH	Down-Hole
MW	MASW
SH	SH-Refraction
SW	SASW

Topographic classification

Topographic category[4]
T1

4 Legend

T1	Flat surface, isolated slopes and cliffs with average slope angle i≤15°.
T2	Slopes with average slope angle i>15°.
T3	Ridges with crest width significantly less than the base width and average slope angle 15°≤i≤30°.
T4	Ridges with crest width significantly less than the base width and average slope angle i>30°.

Synthesis of information

Information relevant to site classification		Notes
V_{s30} (m/s)	147	Down-hole
Average N_{SPT} to 30m	-	
Average c_U to 30m (kPa)	-	
Site class (EC8 – NTC2008)	D	
Topographic category (EC8 – NTC2008)	T1	

Geological and geomorphological information

Lithology	Pebbles and sands	
Morphology	Alluvial fan	

Other information relevant to seismic site response

Depth to bedrock (m)	52.0	
Average V_s to bedrock (m/s)	161	
f_0 from H/V microtremors (Hz)	1.0	
f_0 from H/V earthquakes (Hz)	1.0	

Observed anomalies of station response	-	

References

Geomorphology & Geology

Carta geologica d'Italia in scala 1:100.000 – Foglio n. 123 "Assisi". Servizio Geologico Nazionale
The Umbria-Marche strong motion data set (September 1997 – June 1998), SSN Monitoring System Group, CD-ROM, 2002
Sito web del Progetto IFFI: http://www.mais.sinanet.apat.it/cartanetiffi/

Geotechnical & Geophysical Information

Di Giulio G., Rovelli A., Cara F., Azzara R.M., Marra F., Basili R., and Caserta A. (2003). *Long-duration asynchronous ground motions in the Colfiorito plain, central Italy, observed on a two-dimensional dense array*. Journal of Geophysical Research, Vol. 108, No. B10, 2486, doi:10.1029/2002JB002367
Scasserra G., Stewart J.P., Kayen R.E., Lanzo G. (2008). *Database for eartquake strong motion studies in Italy*. Journal of Earthquake Engineering (accepted for publication)
Microtremor measurements by INGV – Sezione di Milano - Pavia

Enclosures

List

N.	Description