INQUA
International Union for Quaternary Research

GROUP ON EARTH OBSERVATIONS

"The EEE Catalogue: A global catalogue of earthquake environmental effects"

Earthquake Environmental Effects Catalogue

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

http://www.eeecatalog.sinanet.apat.it/login.php

GEO Work Plan 2009 - 2011

DI-09-01: Systematic Monitoring for Geohazards Risk Assessment

Concerning seismic hazard assessment, in-situ data related to earthquakes environmental effects will be provided by a catalogue compiled at global level by several research and academic institutions worldwide in the frame of an international cooperation within INQUA (International Union for Quaternary Research).

Earthquake Environmental Effects - EEEs

Earthquake Environmental Effects (EEEs) are any phenomena generated by a seismic event in the natural environment

Earthquake Environmental Effects - EEEs

PRIMARY EFFECTS

Earthquake Environmental Effects - EEEs

SECONDARY EFFECTS

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Web Implementation interface

http://www.eeecatalog.sinanet.apat.it/login.php

Developed to support the remote compilation of the EEE Catalogue.
The access is restricted to compilers.

Public Viewing interface

UNDER CONSTRUCTION

http://www.eeecatalog.sinanet.apat.it/publiclist.php

Only earthquake records validated by the Scientific Committee will be added to the public version of the EEE catalogue.
From this interface, it will be possible to view the distribution of localities (labels: locality name; ESI local intensity) and sites (labels: site name; type of effect, image). Moreover, it will be possible to export some selected fields in .DBF and .KML formats.

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GROUP ON EARTH OBSERVATIONS

Id Earthquake Code	39
Earthquake Code	IT20090406m
ID Compiler	lipl
Year	2009
Month	04
Day	06
Date Uncertainity	
Hour	01
Min	32
Sec	
Epicentral Area	L'Aquila, Abruzzo
Country	Italy Add
Epicentral Latitude	42.33
Epicentral Longitude	13.33
SRL (Kilometers)	6
MaxD (meters)	0.08
Slip Type	normal Add
Total Area Of Secondary Effects (km2)	1000
Number Of Effects	192
Magnitude	6.3
Magnitude Type	Mw Add
Damage Based Epicentral Intensity	9
Intensity Type	MCS Add
ESI Epicentral Intensity	9
Authors	Lippmann L.
Verified	ok

Id Locality	80
Earthquake Code	IT20090406m
Locality Name	Paganica
Town /district	L'Aquila
Locality Latitude	42.35667
Locality Longitude	13.47067
Locality Altitude (meters)	783
Local PGA (in g)	
Geomorph Setting	Alluvial terrace Add
Damage based Local intensity	8
ESI Local	

Id Locality	83
Earthquake Code	IT20090406m
Locality Name	Tempera
Town /district	L'Aquila
Locality Latitude	42.35667
Locality Longitude	13.47067
Locality Altitude (meters)	657
Local P	
Geomor	
Damage	
ESI Loc	

Id Locality	82
Earthquake Code	IT20090406m
Locality Name	L'Aquila
Town /district	L'Aquila
Locality Latitude	42.3595
Locality Longitude	13.38983
Locality Altitude (meters)	714
Local PGA (in g)	
Geomorph Setting	Alluvial terrace Add
Damage based Local intensity	8
ESI Local Intensity	8

EARTHQUAKE

LOCALITIES

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GROUP ON EARTH OBSERVATIONS

Id Locality	80
Earthquake Code	IT20090406m
Locality Name	Paganica
Town /district	L'Aquila
Locality Latitude	42.35667
Locality Longitude	13.47067
Locality Altitude (meters)	783
Local PGA (in g)	
Geomorph Setting	Alluvial terrace Add
Damage based Local intensity	8
ESI Local Intensity	9

LOCALITY

SITES

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	168
Id Locality	82
Site Name	ISP-AQ060
Site Latitude	42.3725
Site Longitude	13.4052
Site Altitude	
Type Of Effects	Surface faulting Slope movement Ground settlement

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	168
Id Locality	82
Site Name	ISP-AQ060
Site Latitude	42.3725
Site Longitude	13.4052
Site Altitude	
Type Of Effects	Surface faulting Slope movement Ground settlement Ground cracks Hydrological anomaly

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	168
Id Locality	82
Site Name	ISP-AQ060
Site Latitude	42.3725
Site Longitude	13.4052
Site Altitude	
Type Of Effects	Surface faulting Slope movement Ground settlement Ground cracks Hydrological anomaly Anomalous waves Other effects
EEE Description	Millimetric cracks in paved road. No offset.
References For Description	ISPRA
Site Geomorphologic Setting	Hillslope Add

Save

Choose a PICTURE to upload: Sfoglia... Upload Image

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Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	116
Id Locality	80
Name	ISP-AQ037
Latitude	42.3649
Longitude	13.4685
Altitude	
Type Of Effects	Surface faulting
EEE Description	Cracks in paved (concrete road N130, length: 15 m; width: 2-7 cm; Offset: 7-8 cm
References For Description	ISPRA
Geomorphologic Setting	
Picture	

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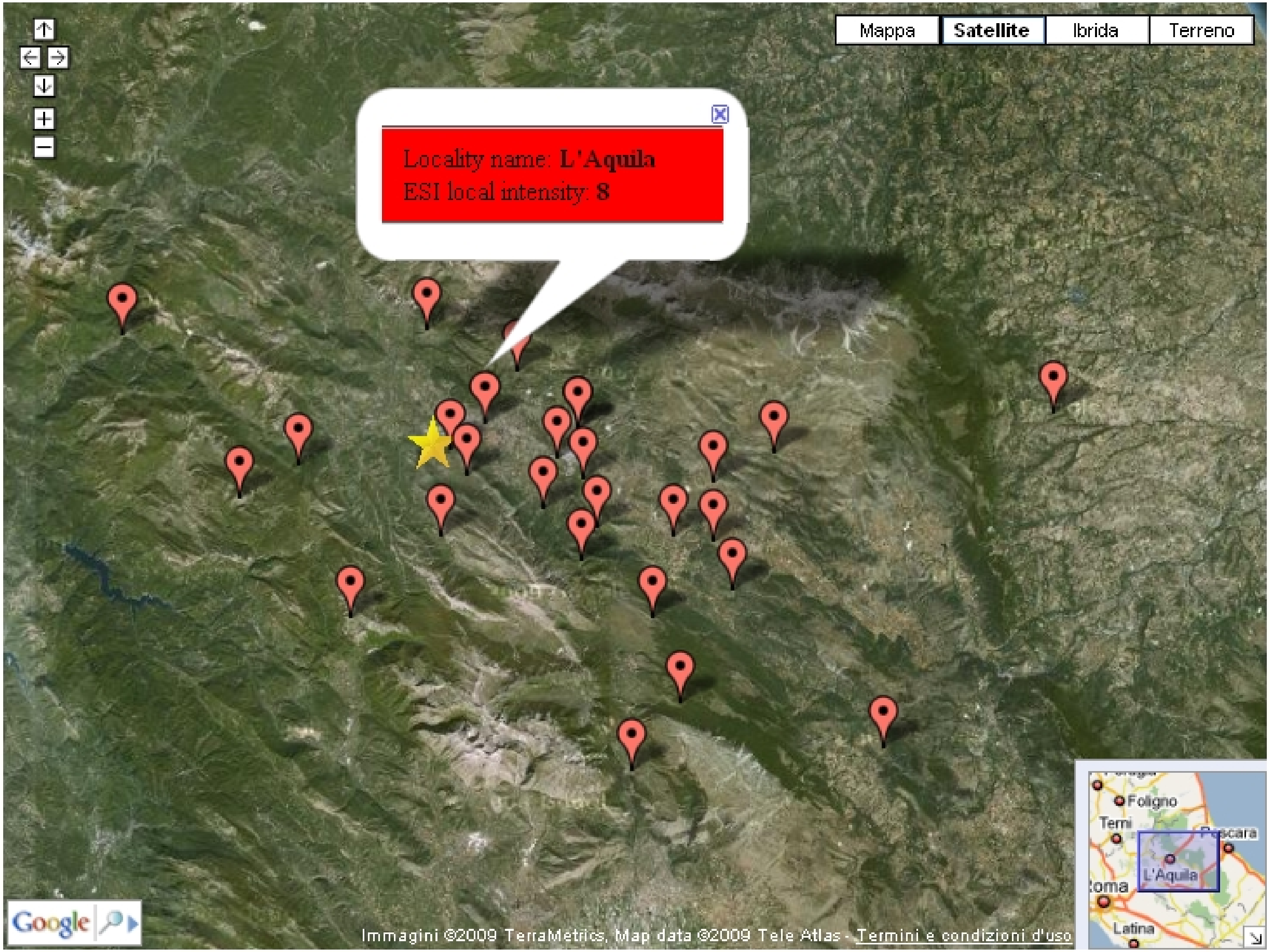

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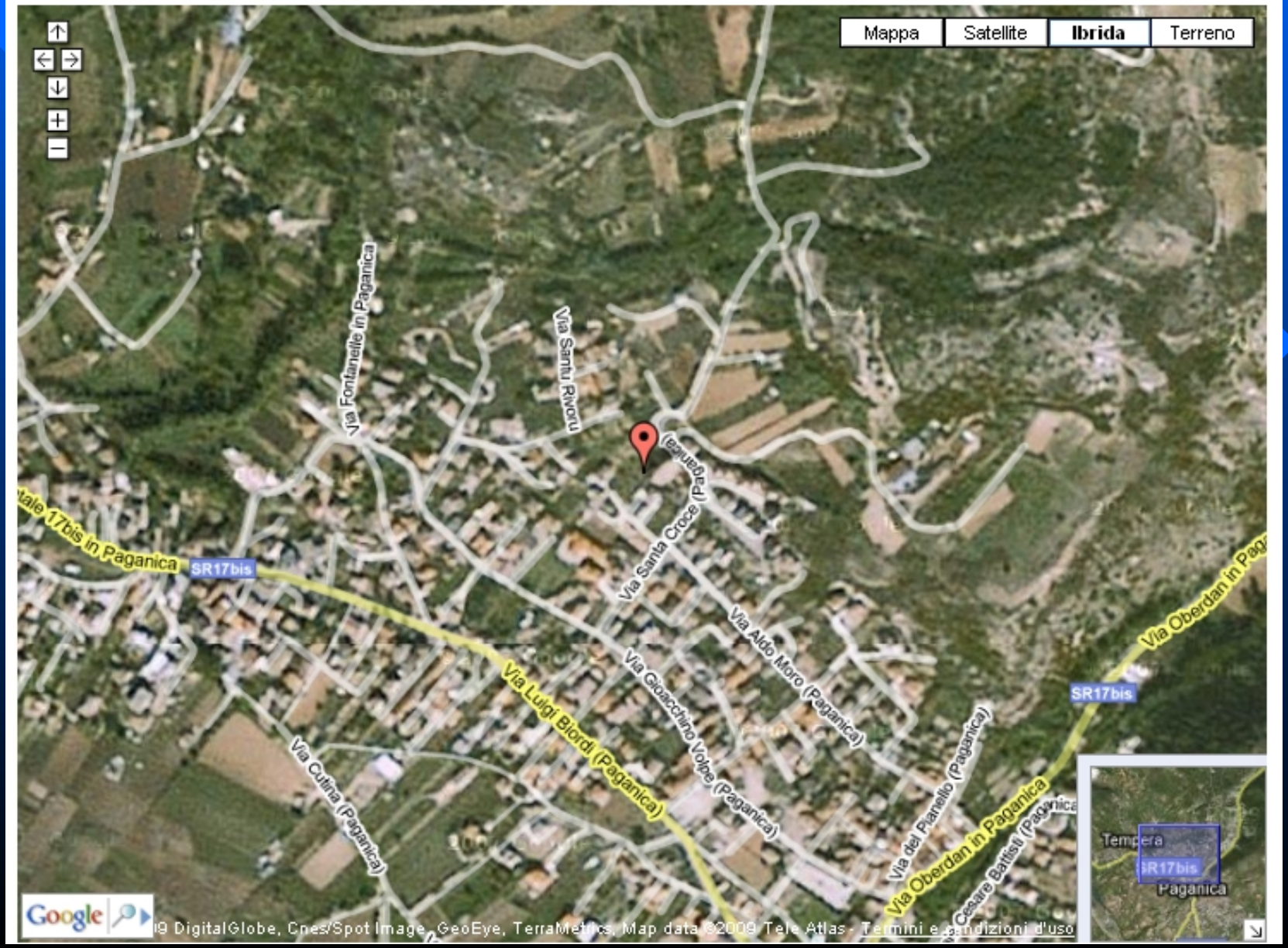
GEO GROUP ON EARTH OBSERVATIONS



Year	Month	Day	Epicentral Area	Country	Magnitude	Magnitude Type	Damage Based Epicentral Intensity	Intensity Type	ESI Epicentral Intensity	Authors					
-8100			Fucino	Italy	7.2	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
-4700			Fucino	Italy	7.0	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
-1500			Fucino	Italy	7.0	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
700			Fucino	Italy	6.5	Me			10	Blumetti A.M. & Guerrieri L.				Locality	Map
1586	07	10	Callao	Peru	8.1	Mm	10	MM	11	Zamudio Y, Marin G. & Vilcapoma L.,				Locality	Map
1703	02	02	L'Aquila, Abruzzo	Italy	6.6	Mm	10	MCS	10	Blumetti A.M.				Locality	Map
1703	01	14	Norcia, Umbria	Italy	7.1	Mm	11	MCS	11	Blumetti A.M.				Locality	Map
1829	03	21	Torreveja, Alicante	Spain	6.6	Mm	10	EMS	9	Alfaro P., Silva P.G. & Bardají T.				Locality	Map
1915	01	13	Fucino	Italy	7.0	Ms	10	MCS	11	Blumetti A.M. & Guerrieri L.				Locality	Map
1980	11	23	Irpinia-Basilicata	Italy	6.9	Mw	10	MCS	10	Esposito E. & Porfido S.				Locality	Map
1995	05	27	Neftegorsk, Sakhalin Island	Russia	7.4	Mw	9	MSK	11	Tatevossian R.E., Rogozhin E.A., Arefiev S.S., Ovsyuchenko A.N.				Locality	Map
1997	09	26	Colfiorito	Italy		Mw		MCS		Campagnolo D. & Sileo G.				Locality	Map
1999	01	25	Armenia	Colombia	6.1	Mw	7	MM		Lalinde Pulido C.P. & Franco L. E.				Locality	Map
1999	09	21	Chi-chi	Taiwan	7.7	Mw	6	JMA	11	Lin-Wong N. & Ota Y.				Locality	Map
2004	10	23	Chuetsu, Nijgata region	Japan	6.6	Mw	7	JMA		Ota Y. & Azuma T.				Locality	Map
2009	04	06	L'Aquila, Abruzzo	Italy	6.3	Mw	9	MCS	9	Lippmann L.				Locality	Map

PALEOEARTHQUAKES

HISTORICAL EARTHQUAKES

MODERN EARTHQUAKES

Year	Month	Day	Epicentral Area	Country	Magnitude	Magnitude Type	Damage Based Epicentral Intensity	Intensity Type	ESI Epicentral Intensity	Authors					
-8100			Fucino	Italy	7.2	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
-4700			Fucino	Italy	7.0	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
-1500			Fucino	Italy	7.0	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
700			Fucino	Italy	6.5	Me			10	Blumetti A.M. & Guerrieri L.				Locality	Map
1586	07	10	Callao	Peru	8.1	Mm	10	MM	11	Zamudio Y, Marin G. &				Locality	Map

1703 February 2nd, L'AQUILA HISTORICAL EARTHQUAKE

1703	01	14	Norcia, Umbria	Italy	7.1	Mm	11	MCS	11	Blumetti A.M.				Locality	Map
1829	03	21	Torreveja, Alicante	Spain	6.6	Mm	10	EMS	9	Alfaro P., Silva P.G. & Bardají T.				Locality	Map
1915	01	13	Fucino	Italy	7.0	Ms	10	MCS	11	Blumetti A.M. & Guerrieri L.				Locality	Map
1980	11	23	Irpinia-Basilicata	Italy	6.9	Mw	10	MCS	10	Esposito E. & Porfido S.				Locality	Map
1995	05	27	Neftegorsk, Sakhalin Island	Russia	7.4	Mw	9	MSK	11	Tatevossian R.E., Rogozhin E.A., Arefiev S.S., Ovsyuchenko A.N.				Locality	Map
1997	09	26	Colfiorito	Italy		Mw		MCS		Campagnolo D. & Sileo G.				Locality	Map
1999	01	25	Armenia	Colombia	6.1	Mw	7	MM		Lalinde Pulido C.P. & Franco L. E.				Locality	Map
1999	09	21	Chi-chi	Taiwan	7.7	Mw	6	JMA	11	Lin-Wong N. & Ota Y.				Locality	Map
2004	10	23	Chuetsu, Nijgata region	Japan	6.6	Mw	7	JMA		Ota Y. & Azuma T.				Locality	Map

2009, April 6th, L'AQUILA EARTHQUAKE

Id Earthquake Code	43
Earthquake Code	IT17030202m
ID Compiler	blumetti
Year	1703
Month	02
Day	02
Date Uncertainity	
Hour	
Min	
Sec	
Epicentral Area	L'Aquila, Abruzzo
Country	Italy
Epicentral Latitude	42.47
Epicentral Longitude	13.2
SRL (Kilometers)	
MaxD (meters)	
Slip Type	normal Add
Total Area Of Secondary Effects (km2)	
Number Of Effects	20
Magnitude	6.6
Magnitude Type	Mm Add
Damage Based Epicentral Intensity	10
Intensity Type	MCS Add
ESI Epicentral Intensity	10
Authors	Blumetti A.M.

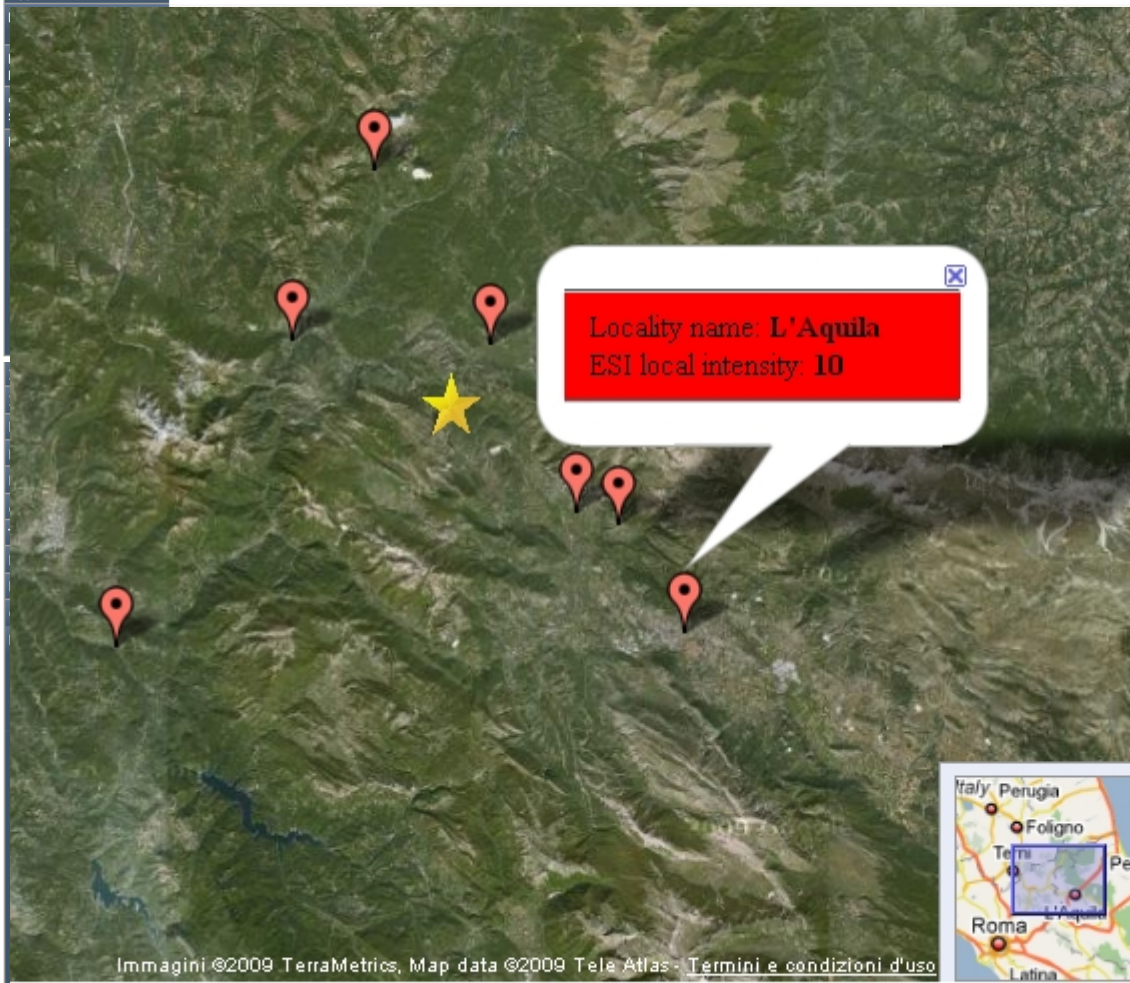
1703 February 2nd
L'Aquila earthquake

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity					
Posta	Rieti	Mountain valley	10	10				Sites	Map
Pizzoli	L'Aquila	Intermountain plain	10	10				Sites	Map
Arischia	L'Aquila	Intermountain plain	10	10				Sites	Map
Montereale	L'Aquila	Intermountain plain	10	10				Sites	Map
Cittareale	Rieti	Mountain valley	11	10				Sites	Map
Grotti	Rieti	Alluvial plain	8	9				Sites	Map
L'Aquila	L'Aquila	Intermountain plain	10	10				Sites	Map

Page 1 of 1 Records 1 to 7 of 7

Add

Type Of Effects | Other effects



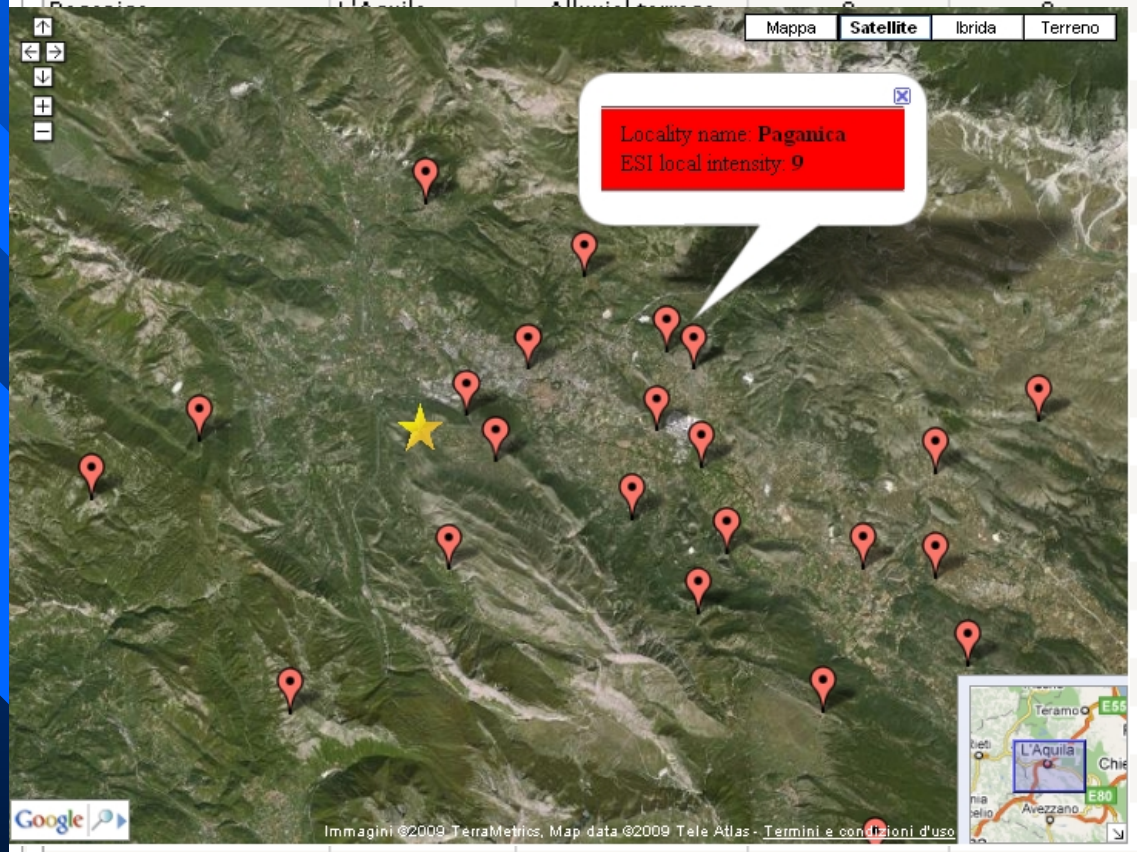
Id Earthquake Code	39
Earthquake Code	IT20090406m
ID Compiler	lipl
Year	2009
Month	04
Day	06
Date Uncertainity	
Hour	01
Min	32
Sec	
Epicentral Area	L'Aquila, Abruzzo
Country	Italy
Epicentral Latitude	42.33
Epicentral Longitude	13.33
SRL (Kilometers)	6
MaxD (meters)	0.08
Slip Type	normal Add
Total Area Of Secondary Effects (km2)	1000
Number Of Effects	192
Magnitude	6.3
Magnitude Type	Mw Add
Damage Based Epicentral Intensity	9
Intensity Type	MCS Add
ESI Epicentral Intensity	9
Authors	Lippmann L.

2009 April 6th L'Aquila earthquake

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site 256
Id Locality 80

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
Tempera	L'Aquila	Alluvial terrace	9	9



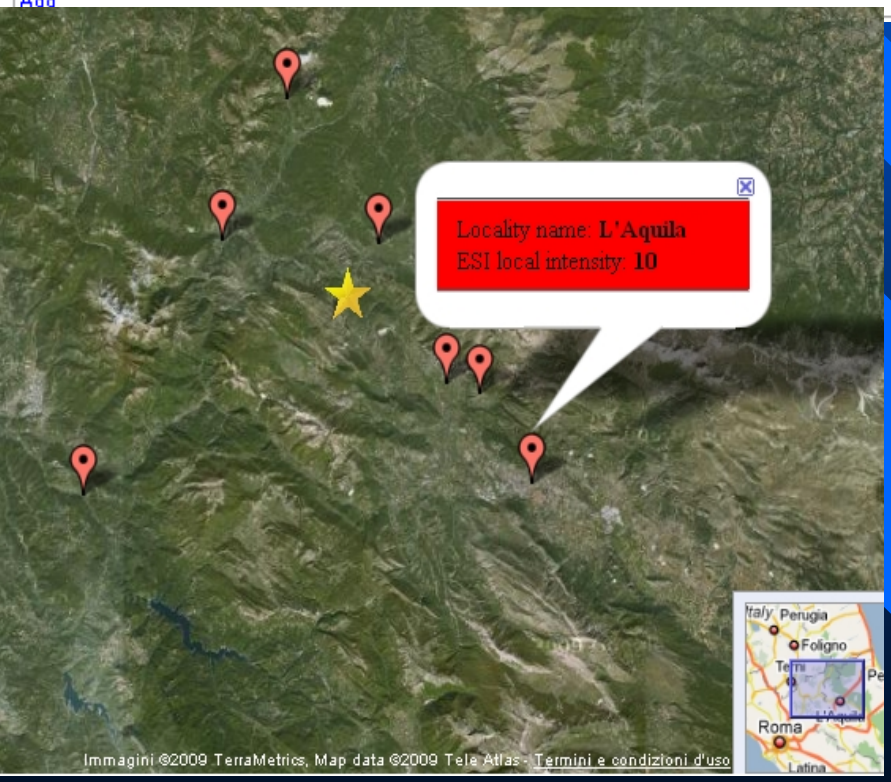
Barisciano	L'Aquila	Hillslope	6	6

Page 1 of 2 Records 1 to 20 of 27
Add

ISP-AQ098	Hydrological anomaly	increase in water discharge: 2 l/sec.	ISPRA

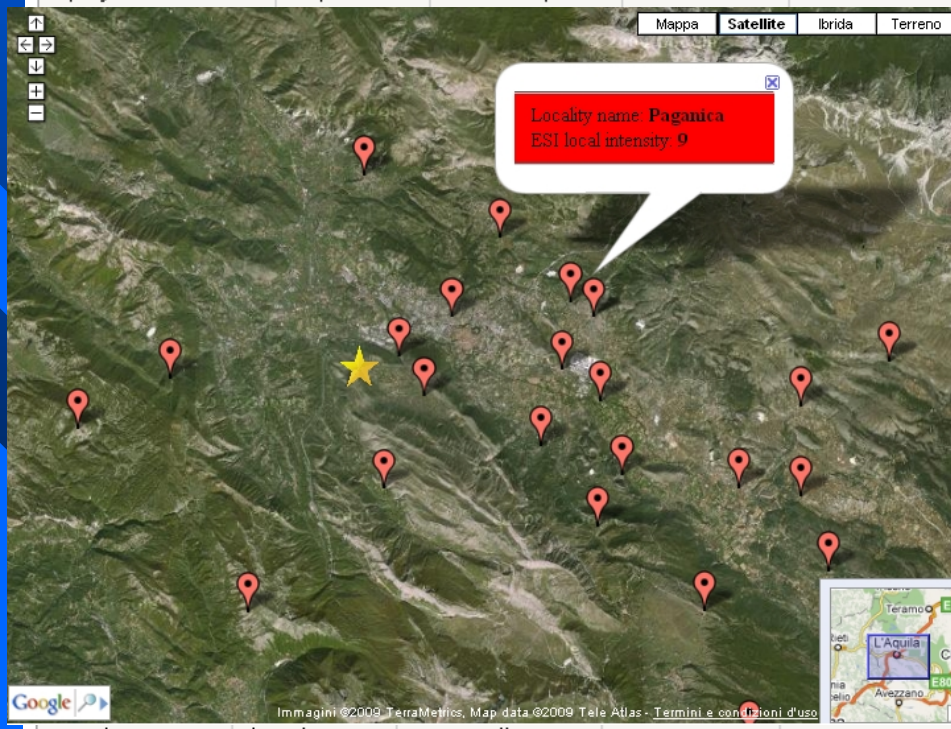
Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
Posta	Rieti	Mountain valley	10	10
Pizzoli	L'Aquila	Intermountain plain	10	10
Arischia	L'Aquila	Intermountain plain	10	10
Montereale	L'Aquila	Intermountain plain	10	10
Cittareale	Rieti	Mountain valley	11	10
Grotti	Rieti	Alluvial plain	8	9
L'Aquila	L'Aquila	Intermountain plain	10	10

Page 1 of 1 Records 1 to 7 of 7
Add



1703

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
Tempera	L'Aquila	Alluvial terrace	9	9
Paganica	L'Aquila	Alluvial terrace	8	9
Collebrincioni	L'Aquila	Mountain slope	6	8
San Demetrio ne' Vestini	L'Aquila	Hillslope	6	8
Fossa	L'Aquila	Hillslope	7	8
L'Aquila	L'Aquila	Alluvial terrace	8	8
Bazzano	L'Aquila	Hillslope	8	8
Capitignano	L'Aquila	Hillslope	5	8



Cugnoli	L'Aquila	Hills	6	6
Civitella Casanova	L'Aquila	Hillslope	6	6

Page 2 of 2 Records 21 to 27 of 27
Add

2009

Added value of the EEE catalogue

- Earthquake Environmental Effects are catalogued into a standardized way.
- For emergency phases
  - ✓ the EEE Catalogue provides indications about the vulnerability of natural environment.
- For seismic hazards assessment
  - ✓ beyond the completeness and quality of datasets, it is possible an objective comparison among recent, historical and also paleoearthquakes in terms of intensity in a 10^4 yrs time window.

http://www.eeecatalog.sinanet.apat.it/login.php

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GROUP ON EARTH OBSERVATIONS

THE EEE CATALOGUE: A CONTRIBUTE FOR SEISMIC HAZARD ASSESSMENT

L. Guerrieri

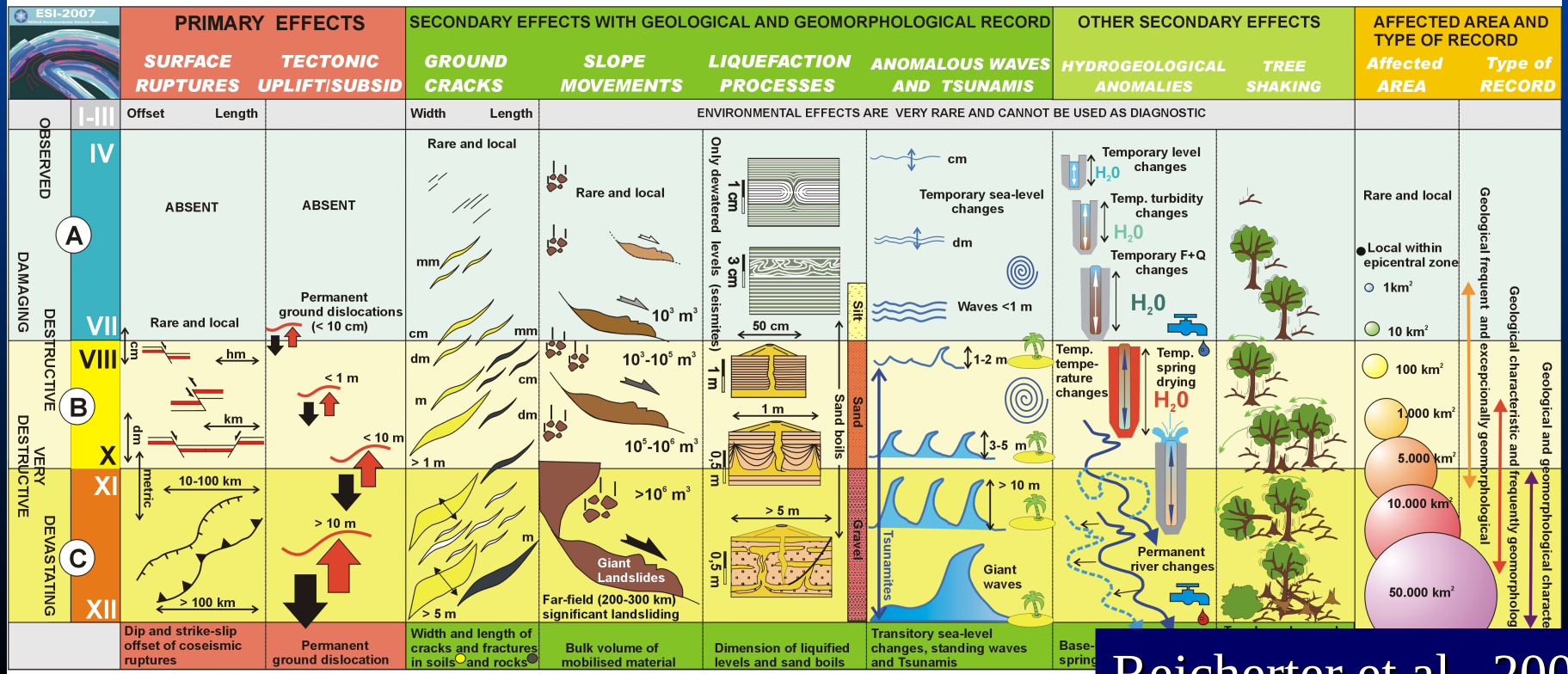
Earthquake Environmental Effects Catalogue

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

EEEs for intensity assessment

Added value to traditional intensity evaluations:

- in not inhabited areas;
- for greatest earthquakes, not afflicted by saturation.



Michetti et al., 2007. Environmental Seismic Intensity scale - ESI 2007. Memorie Descrittive della Carta Geologica d'Italia, 74, Servizio Geologico d'Italia, APAT, Rome, Italy

Reicherter et al., 2008

Year	Month	Day	Epicentral Area	Country	Magnitude	Magnitude Type	Damage Based Epicentral Intensity	Intensity Type	ESI Epicentral Intensity	Authors					
-8100			Fucino	Italy	7.2	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
-4700			Fucino	Italy	7.0	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
-1500			Fucino	Italy	7.0	Me			11	Blumetti A.M. & Guerrieri L.				Locality	Map
700			Fucino	Italy	6.5	Me			10	Blumetti A.M. & Guerrieri L.				Locality	Map
1586	07	10	Callao	Peru	8.1	Mm	10	MM	11	Zamudio Y, Marin G. & Vilcapoma L.,				Locality	Map
1703	02	02	L'Aquila, Abruzzo	Italy	6.6	Mm	10	MCS	10	Blumetti A.M.				Locality	Map
1703	01	14	Norcia, Umbria	Italy	7.1	Mm	11	MCS	11	Blumetti A.M.				Locality	Map
1829	03	21	Torreveja, Alicante	Spain	6.6	Mm	10	EMS	9	Alfaro P., Silva P.G. & Rodaji T.				Locality	Map
1980	11	23	Irpinia-Basilicata	Italy	6.9	Mw	10	MCS	10	Esposito E. & Porfido S.				Locality	Map
1995	05	27	Neftegorsk, Sakhalin Island	Russia	7.4	Mw	9	MSK	11	Tatevossian R.E., Rogozhin E.A., Arefiev S.S., Ovsyuchenko A.N.				Locality	Map
1997	09	26	Colfiorito	Italy		Mw		MCS		Campagnolo D. & Sileo G.				Locality	Map
1999	01	25	Armenia	Colombia	6.1	Mw	7	MM		Lalinde Pulido C.P. & Franco L. E.				Locality	Map
1999	09	21	Chi-chi	Taiwan	7.7	Mw	6	JMA	11	Lin-Wong N. & Ota Y.				Locality	Map
2004	10	23	Chuetsu, Nijgata region	Japan	6.6	Mw	7	JMA		Ota Y. & Azuma T.				Locality	Map
2009	04	06	L'Aquila, Abruzzo	Italy	6.3	Mw	9	MCS	9	Lippmann L.				Locality	Map

FUCINO PALEOEARTHQUAKES

1915.01.13 FUCINO EARTHQUAKE

Id Earthquake Code	36
Earthquake Code	IT08100pal1
ID Compiler	blumetti
Year	-8100
Month	
Day	
Date Uncertainity	2600
Hour	
Min	
Sec	
Epicentral Area	Fucino
Country	Italy
Epicentral Latitude	41.955
Epicentral Longitude	13.5252
SRL (Kilometers)	
MaxD (meters)	3
Slip Type	normal Add
Total Area Of Secondary Effects (km2)	
Number Of Effects	3
Magnitude	7.2
Magnitude Type	Me Add
Damage Based Epicentral Intensity	Please Select
Intensity Type	Please Select Add
ESI Epicentral Intensity	11
Authors	Blumetti A.M. & Guerrieri L

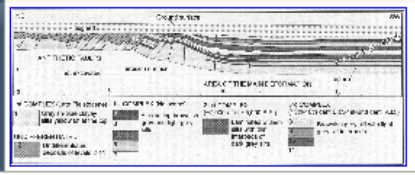
- 8100 ± 2600 yrs

Site Name	Type Of Effects	EEE Description	References For Description
Site 1 - Trasacco	Surface faulting	Vertical offset about 3 m	Galadini et al., 1997
Site 3 - Trasacco	Surface faulting	Vertical offset up to 180 cm	Galadini et al., 1997
Site 4 - Trasacco	Surface faulting	Vertical offset about 1 m	Galadini et al., 1997

Page 1 of 1 Records 1 to 3 of 3

Add

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	579
Id Locality	134
Name	Site 4 - Trasacco
Latitude	41.955
Longitude	13.5252
Altitude	
Type Of Effects	Surface faulting
EEE Description	Vertical offset about 1 m
References For Description	Galadini et al., 1997
Geomorphologic Setting	
Picture	

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
TRASACCO		Intermountain plain		11

Page 1 of 1 Records 1 to 1 of 1

Add

Id Earthquake Code	38
Earthquake Code	IT00500pal1
ID Compiler	blumetti
Year	700
Month	
Day	
Date Uncertainity	200
Hour	
Min	
Sec	
Epicentral Area	Fucino
Country	Italy
Epicentral Latitude	42.004
Epicentral Longitude	13.622
SRL (Kilometers)	
MaxD (meters)	1
Slip Type	normal Add
Total Area Of Secondary Effects (km2)	
Number Of Effects	5
Magnitude	7.0
Magnitude Type	Me Add
Damage Based Epicentral Intensity	Please Select
Intensity Type	Please Select Add
ESI Epicentral Intensity	10
Authors	Blumetti A.M. & Guerrieri L.

700 AD ± 200 yrs

Site Name	Type Of Effects	EEE Description	References For Description				
Trasacco - site 1	Surface faulting	Vertical offset higher than 25 cm	Galadini et al., 1997				Map
Trasacco - site 2	Surface faulting	Vertical offset higher than 30 cm	Galadini et al., 1997				Map
Trasacco - site 3	Surface faulting	Vertical offset higher than 70 cm	Galadini et al., 1997				Map
Trasacco - site 4	Surface faulting	Vertical offset about 20 cm	Galadini et al., 1997				Map

Site Name	Type Of Effects	EEE Description	References For Description				
San benedetto dei Marsi	Surface faulting	Vertical offset higher than 1 meter	Michetti et al., 1996				Map

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	588
Id Locality	137
Name	San benedetto dei Marsi
Latitude	41.998
Longitude	13.622
Altitude	660
Type Of Effects	Surface faulting
EEE Description	Vertical offset higher than 1 meter
References For Description	Michetti et al., 1996
Geomorphologic Setting	Intermountain plain
Picture	

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity					
TRASACCO	Avezzano	Intermountain plain		10				Sites	Map
San Benedetto dei Marsi	Avezzano	Intermountain plain		10				Sites	Map

Id Earthquake Code	45
Earthquake Code	IT19150113m
ID Compiler	blumetti
Year	1915
Month	01
Day	13
Date Uncertainity	
Hour	06
Min	52
Sec	
Epicentral Area	Fucino
Country	Italy
Epicentral Latitude	42.013
Epicentral Longitude	13.53
SRL (Kilometers)	24
MaxD (meters)	1.5
Slip Type	Please Select Add
Total Area Of Secondary Effects (km2)	
Number Of Effects	10
Magnitude	7.0
Magnitude Type	Ms Add
Damage Based Epicentral Intensity	10
Intensity Type	MCS Add
ESI Epicentral Intensity	11
Authors	Blumetti A.M. & Guerrieri L.

Sites | Surface faulting | Slope movements | Ground settlements | Ground cracks | Hydrological anomalies | Anomalous waves | Other effects

Id Site	586
Id Locality	136
Name	San benedetto dei Marsi
Latitude	41.998
Longitude	13.622
Altitude	660
Type Of Effects	Surface faulting
EEE Description	downwarping of the ground surface and opening of several fessures

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
San Benedetto dei Marsi	Avezzano	Intermountain plain	11	10
Trasacco	Avezzano	Intermountain plain	8	10
Gioia dei Marsi	Avezzano	Intermountain plain	11	10
Venere	Avezzano	Intermountain plain	10	10
Luco dei Marsi	Avezzano	Intermountain plain	8	9

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1915 January 13
Fucino earthquake

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
TRASACCO		Intermountain plain		11

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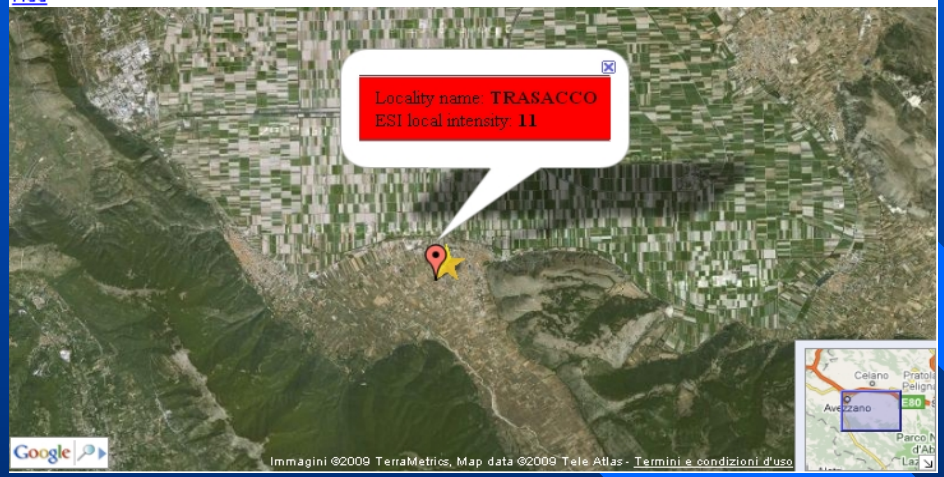
Add



Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity		
TRASACCO	Avezzano	Intermountain plain		10	Sites	Map
San Benedetto dei Marsi	Avezzano	Intermountain plain		10	Sites	Map

Locality Name	Town /district	Geomorph-setting (in g)	Damage Based Local Intensity	ESI Local Intensity
San Benedetto dei Marsi	Avezzano	Intermountain plain	11	10
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