

2018



INGV

INGV terremoti

<http://ingvterremoti.wordpress.com>

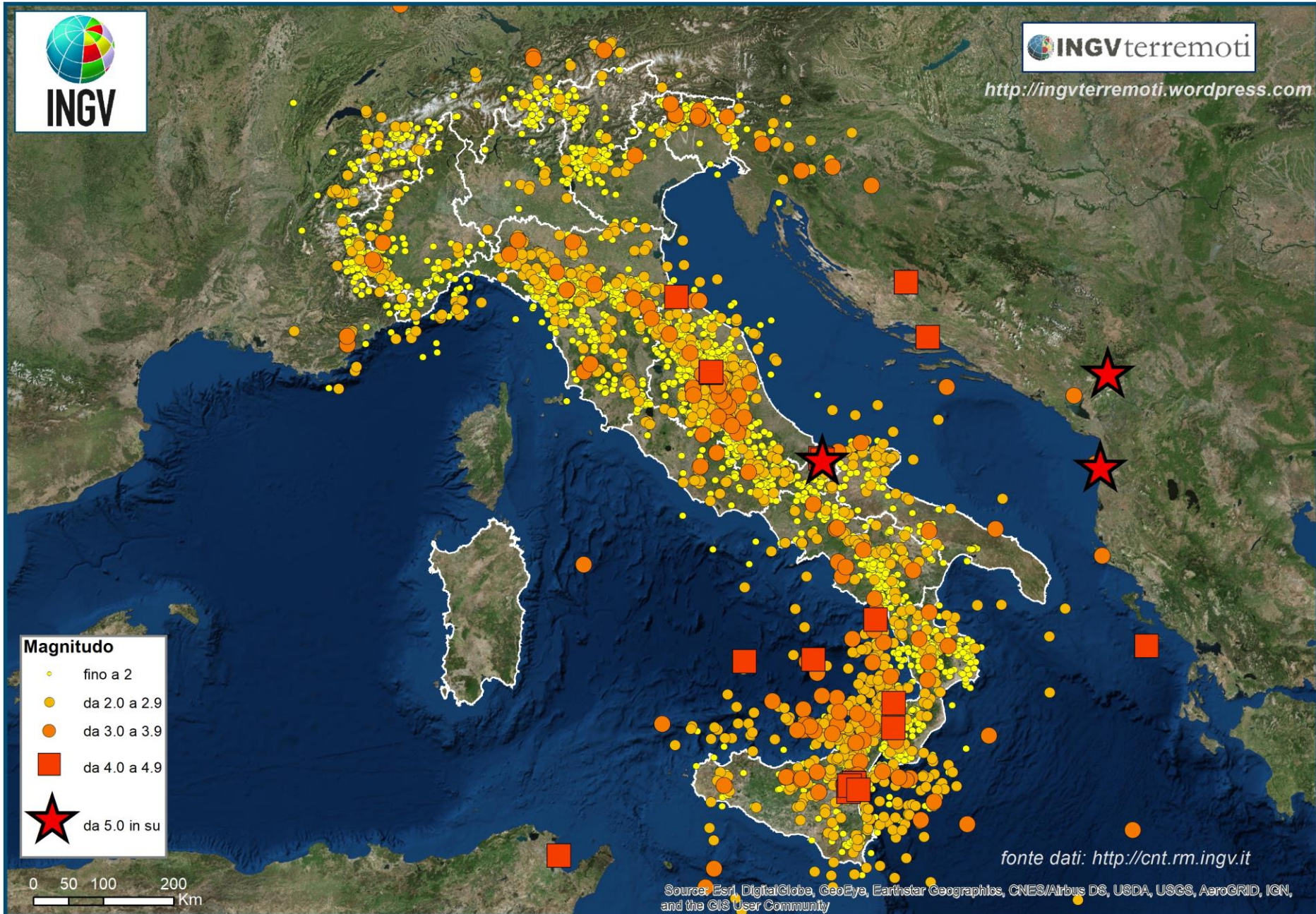
Magnitudo

- fino a 2
- da 2.0 a 2.9
- da 3.0 a 3.9
- da 4.0 a 4.9
- ★ da 5.0 in su

0 50 100 200
Km

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

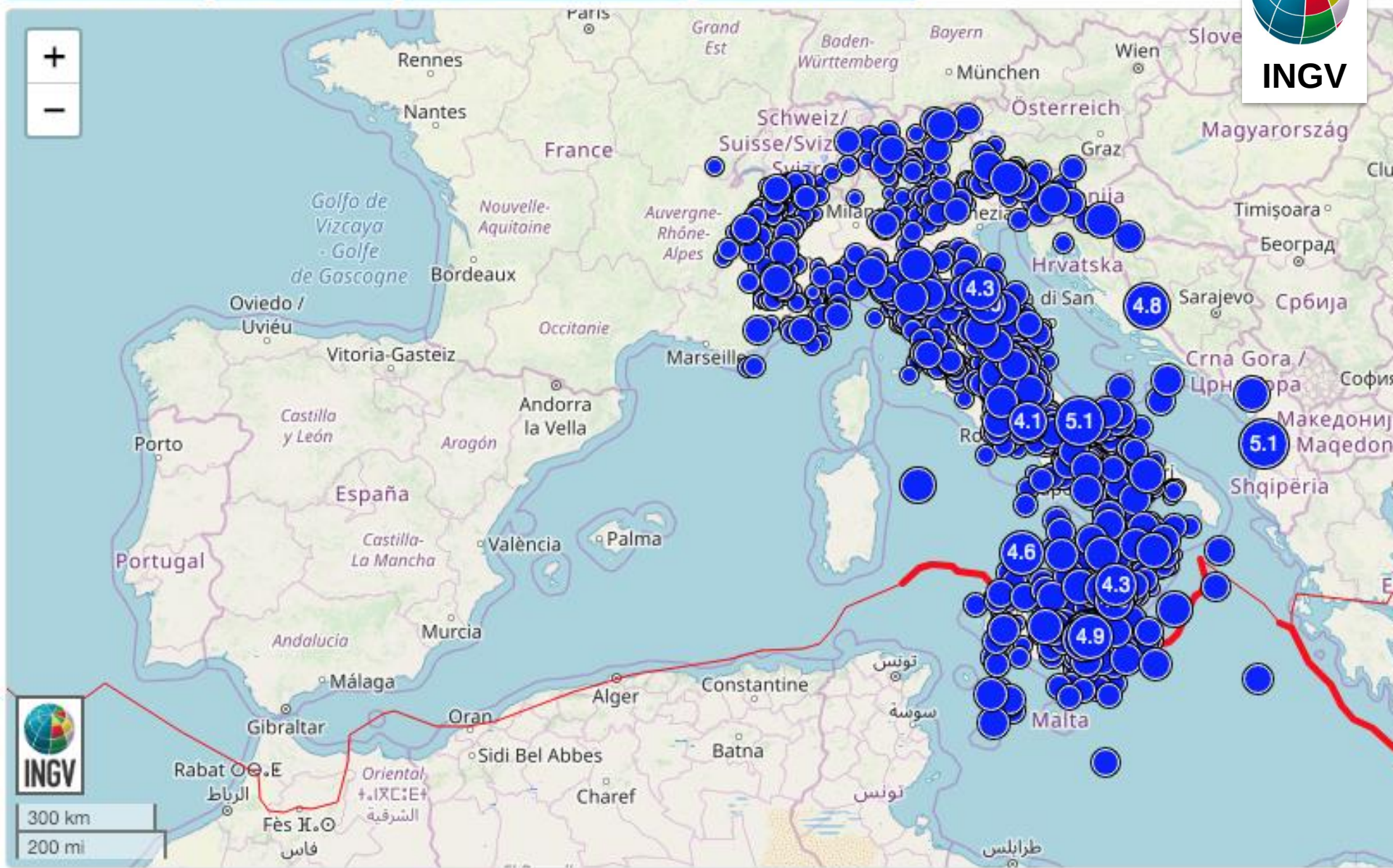
fonte dati: <http://cnt.rm.ingv.it>





INGV

▼ Fuso Orario: Italia ▼ Dal 01-01-1985 ▼ Magnitudo maggiore di 1.0 ▼ Lat[35 48] Lon[5 20]

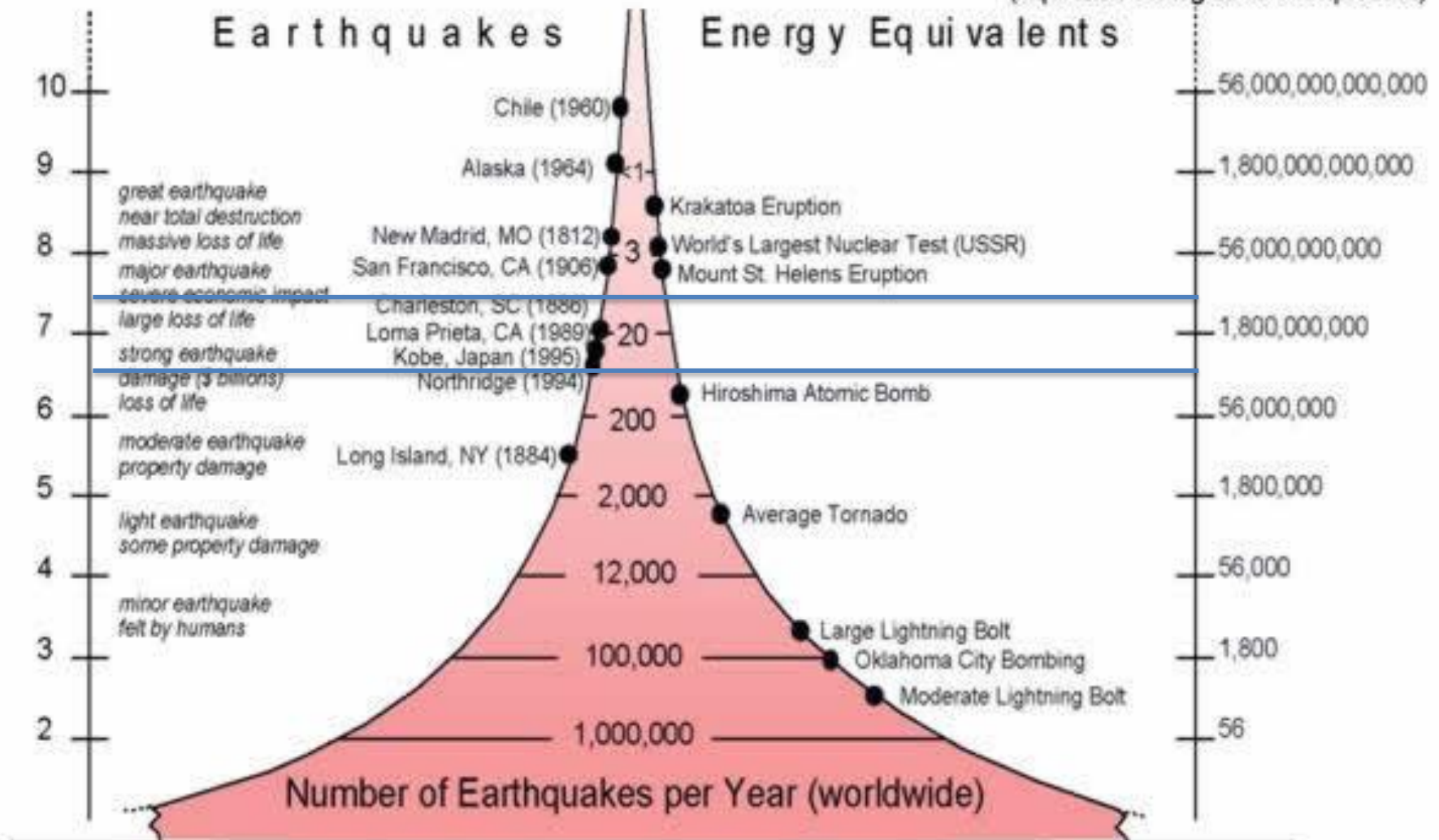


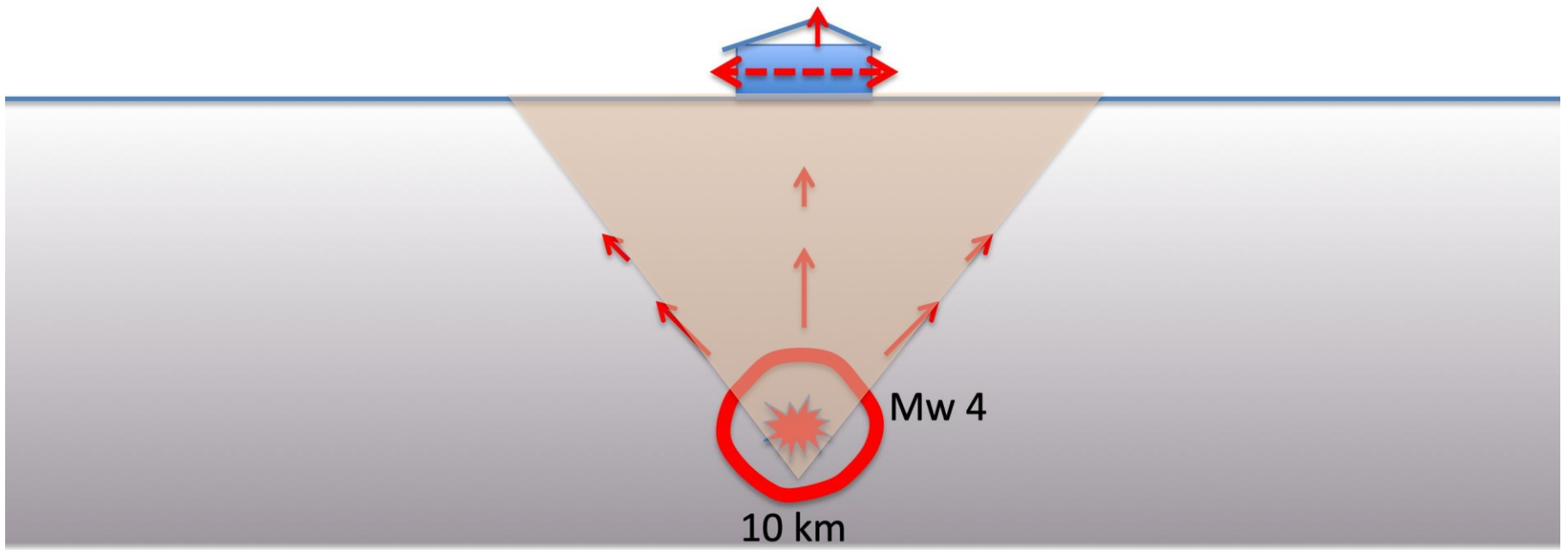
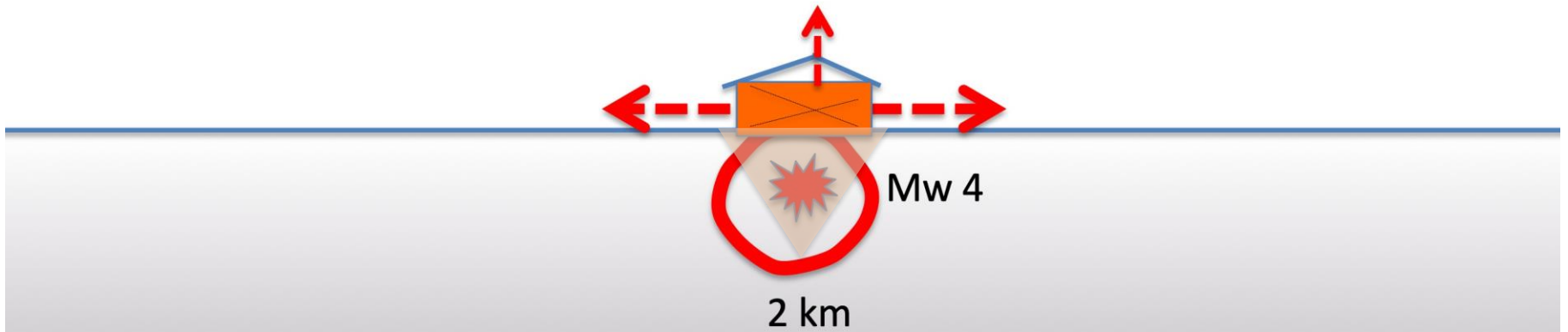
300 km
200 mi

Visualizzati terremoti da 1 a 30 dei **286829** trovati (Ordinamento Tempo Decrescente)

Magnitude

Energy Release
(equivalent kilograms of explosive)





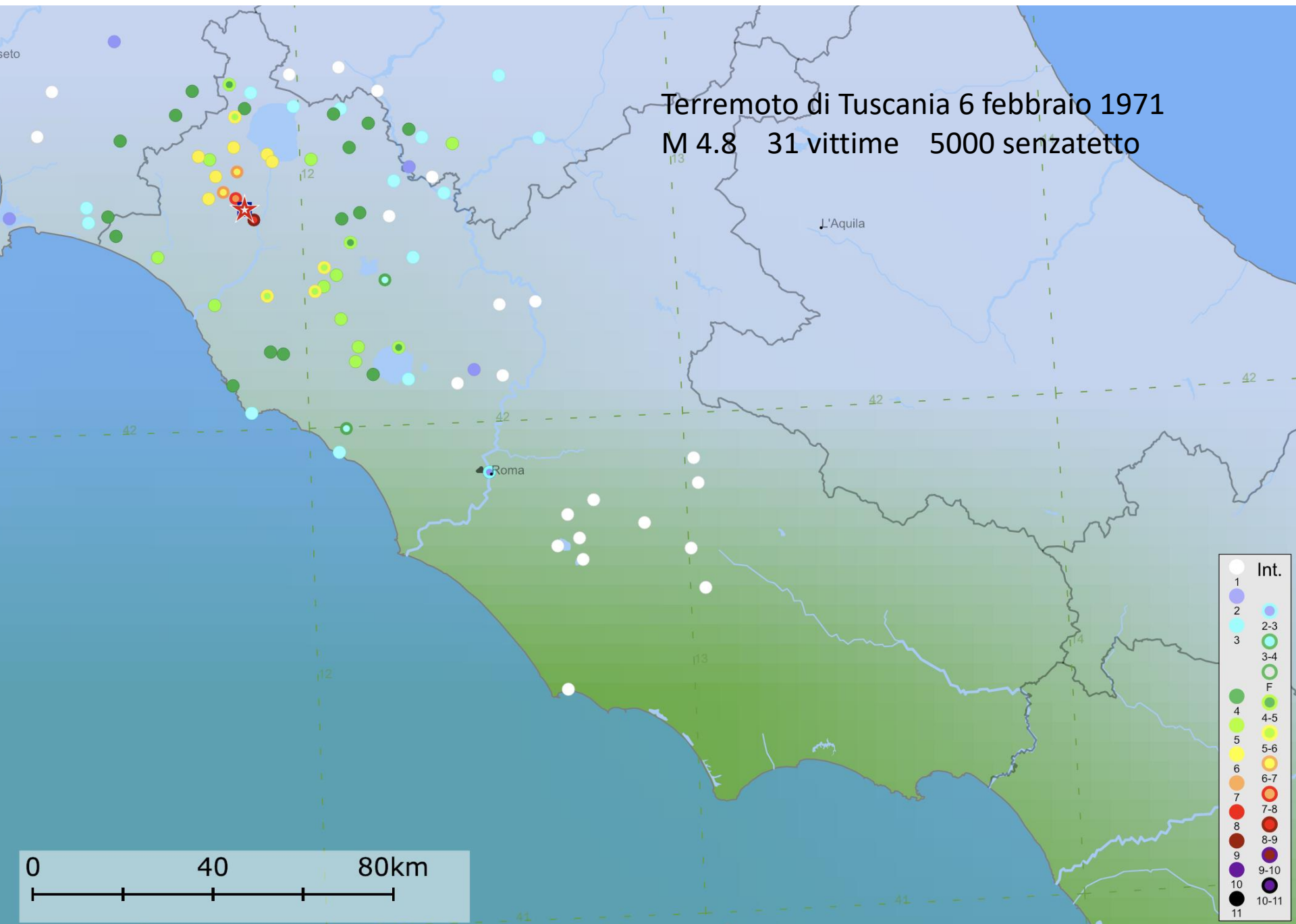
Tuscania 1971

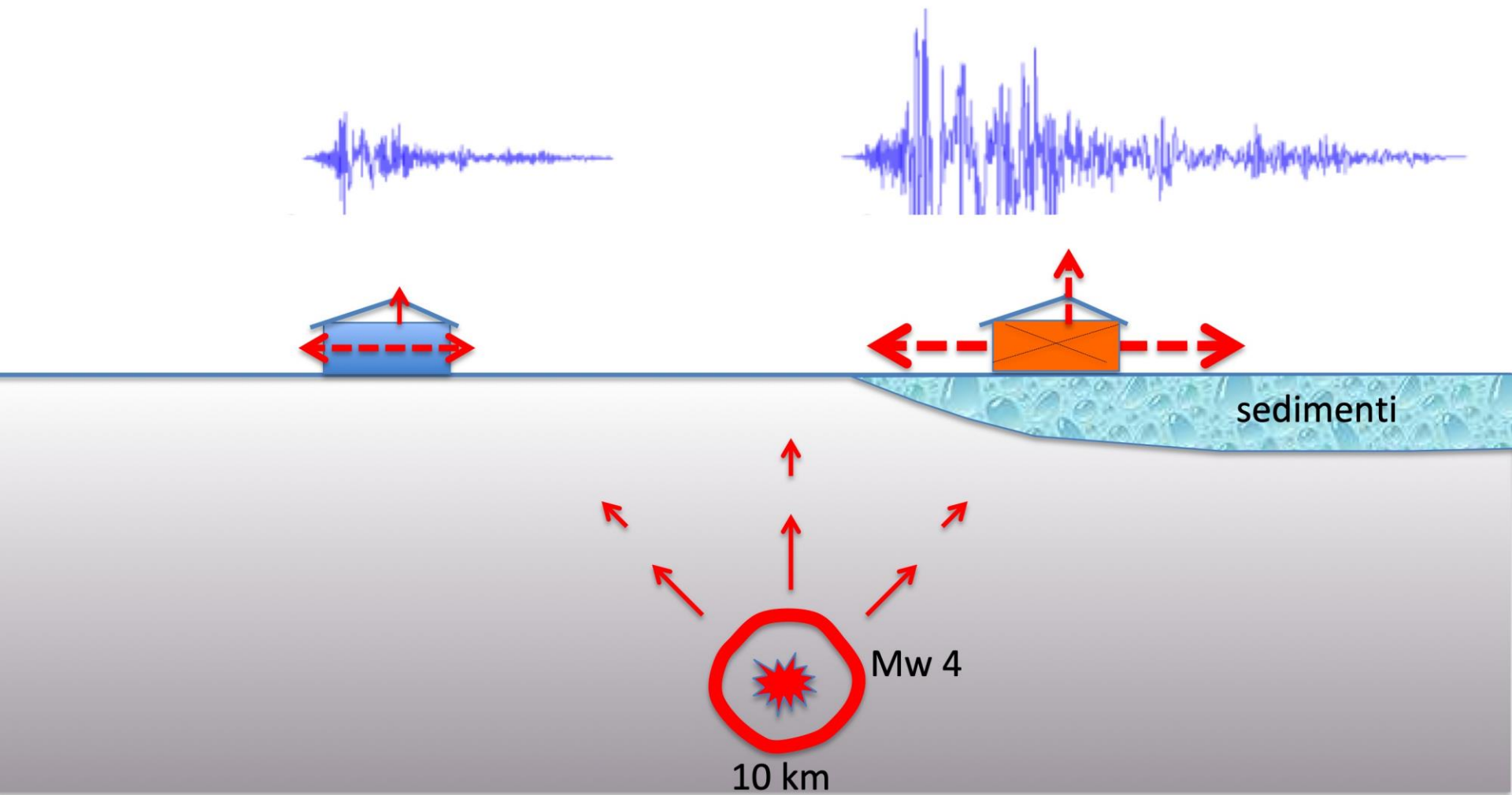


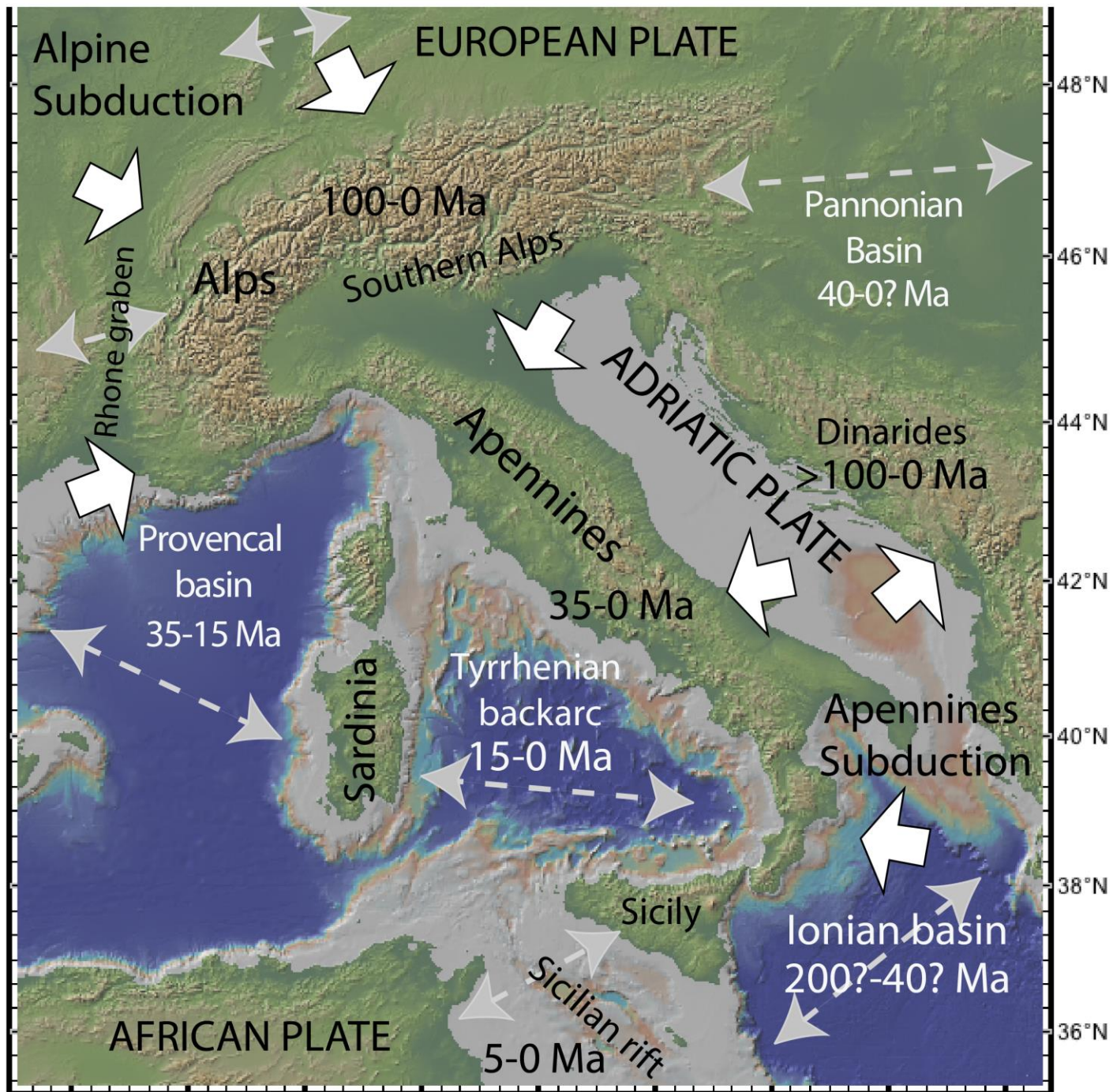
Marco Quarantotti

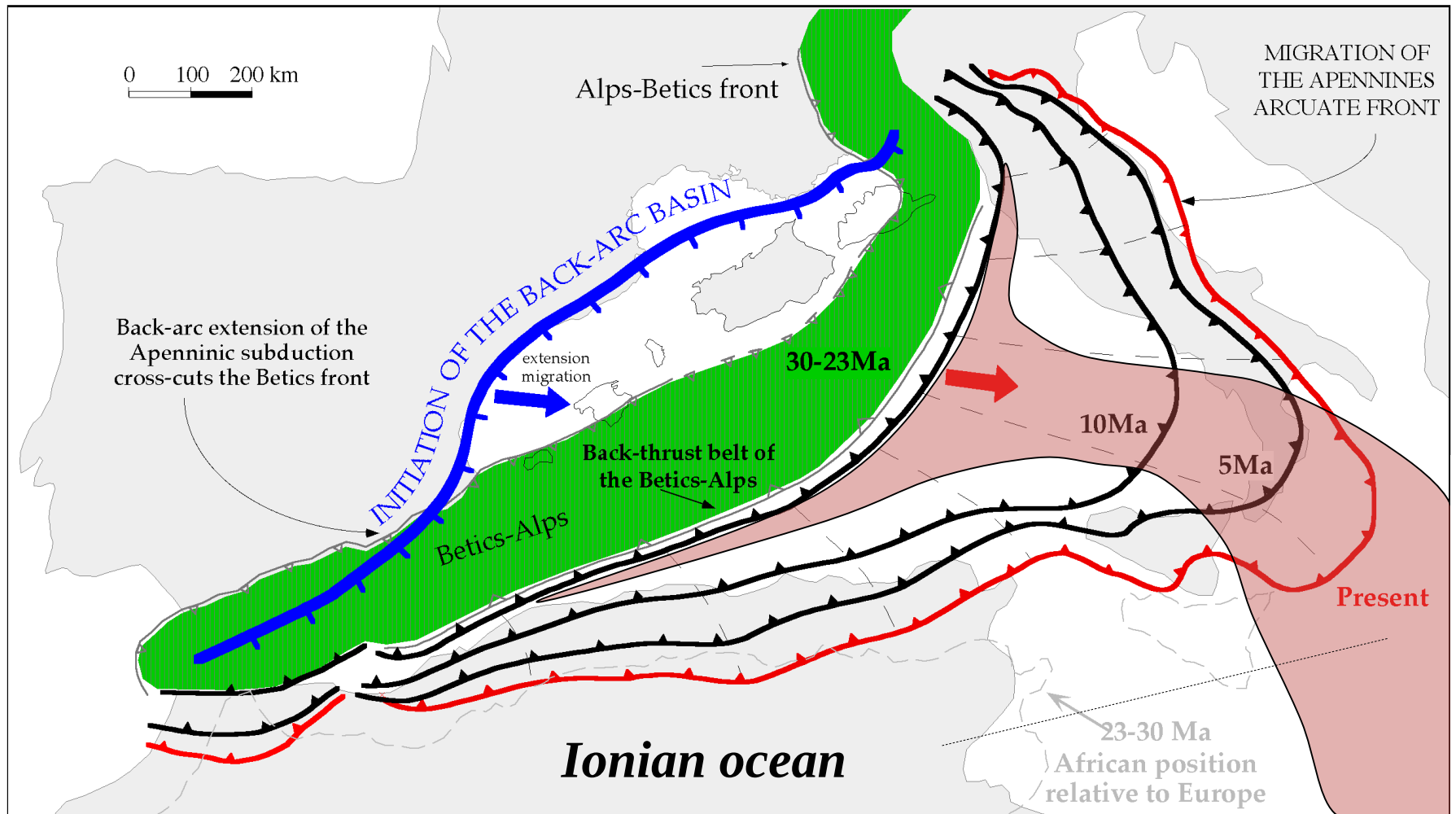
Terremoto di Toscana 6 febbraio 1971

M 4.8 31 vittime 5000 senzatetto

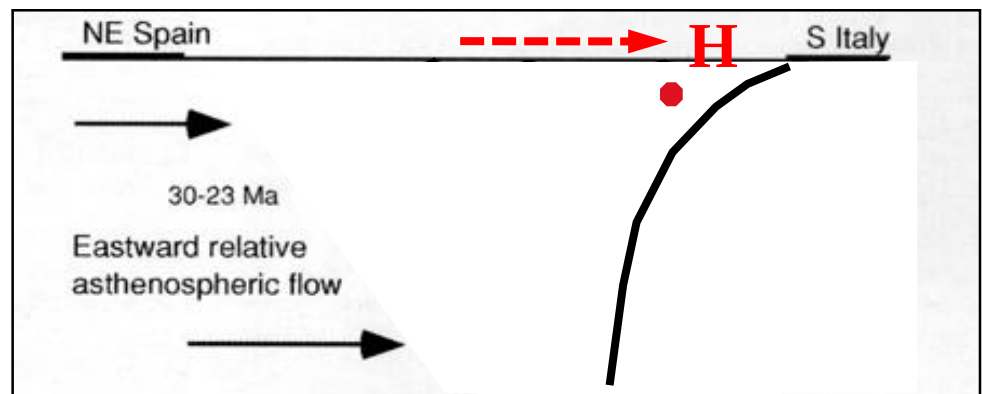








***E-ward slab retreat
5 times faster than N-S
convergence***



extension

contraction

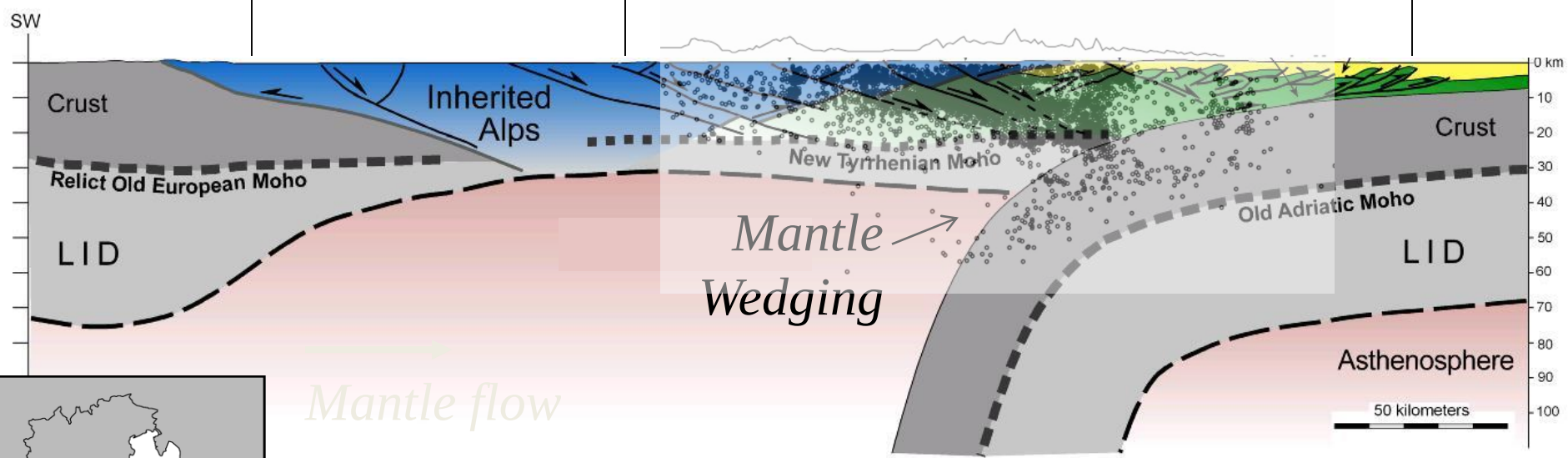
coast

Tirreno

coast

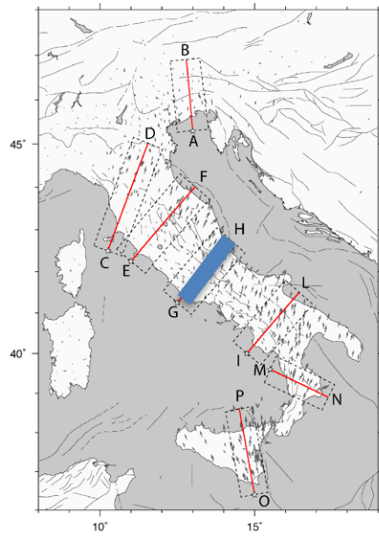
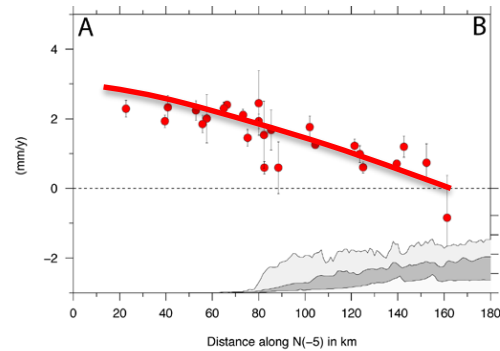
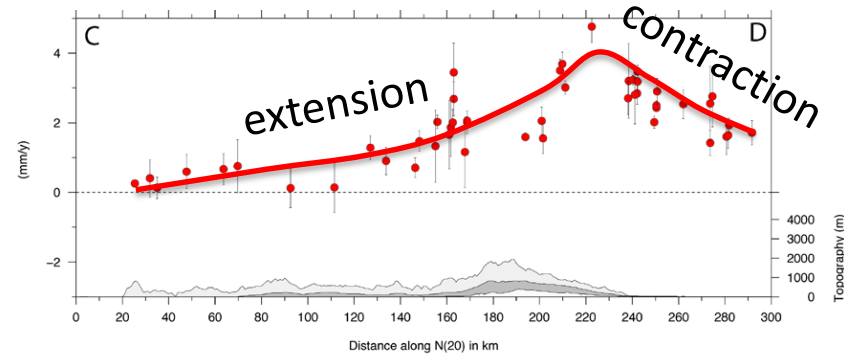
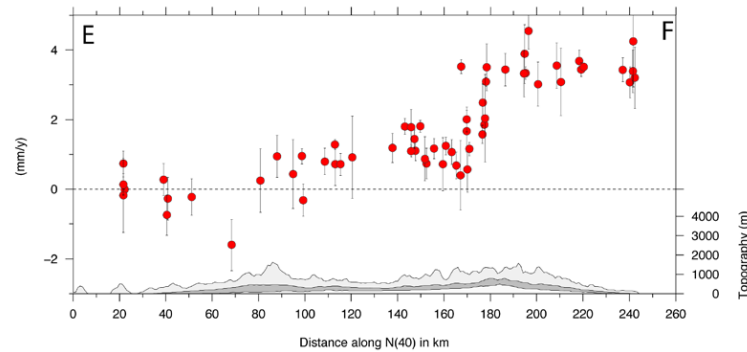
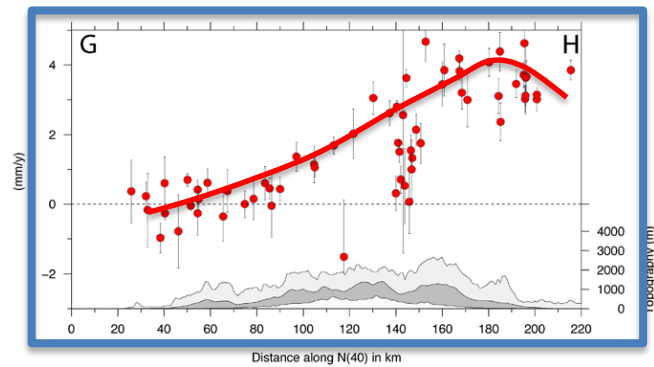
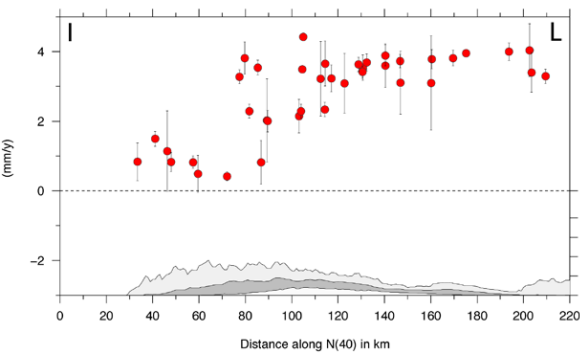
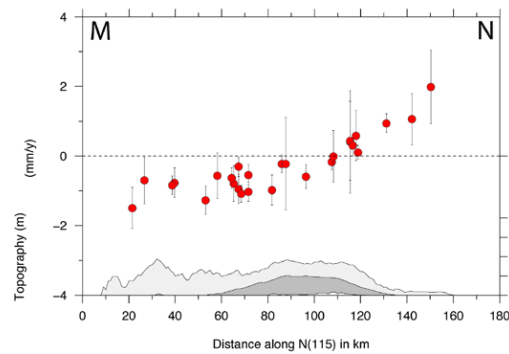
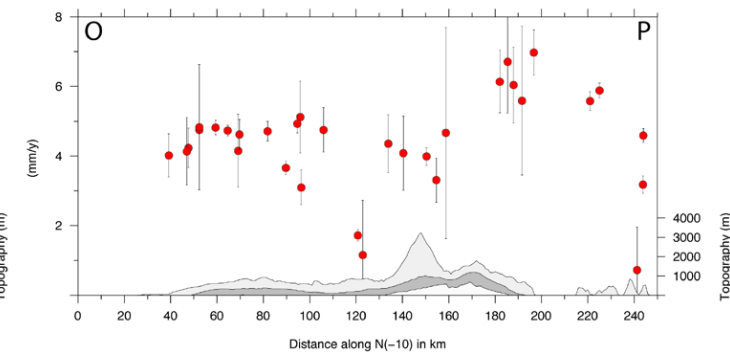
Appennini

coast





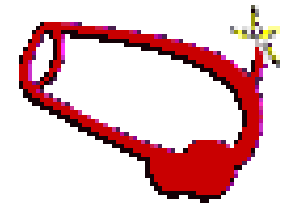
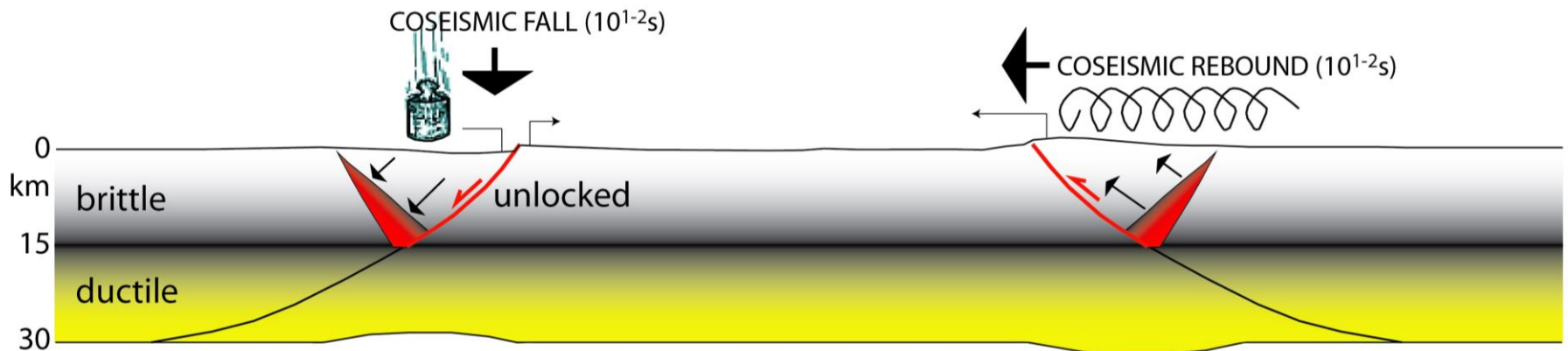
INGV

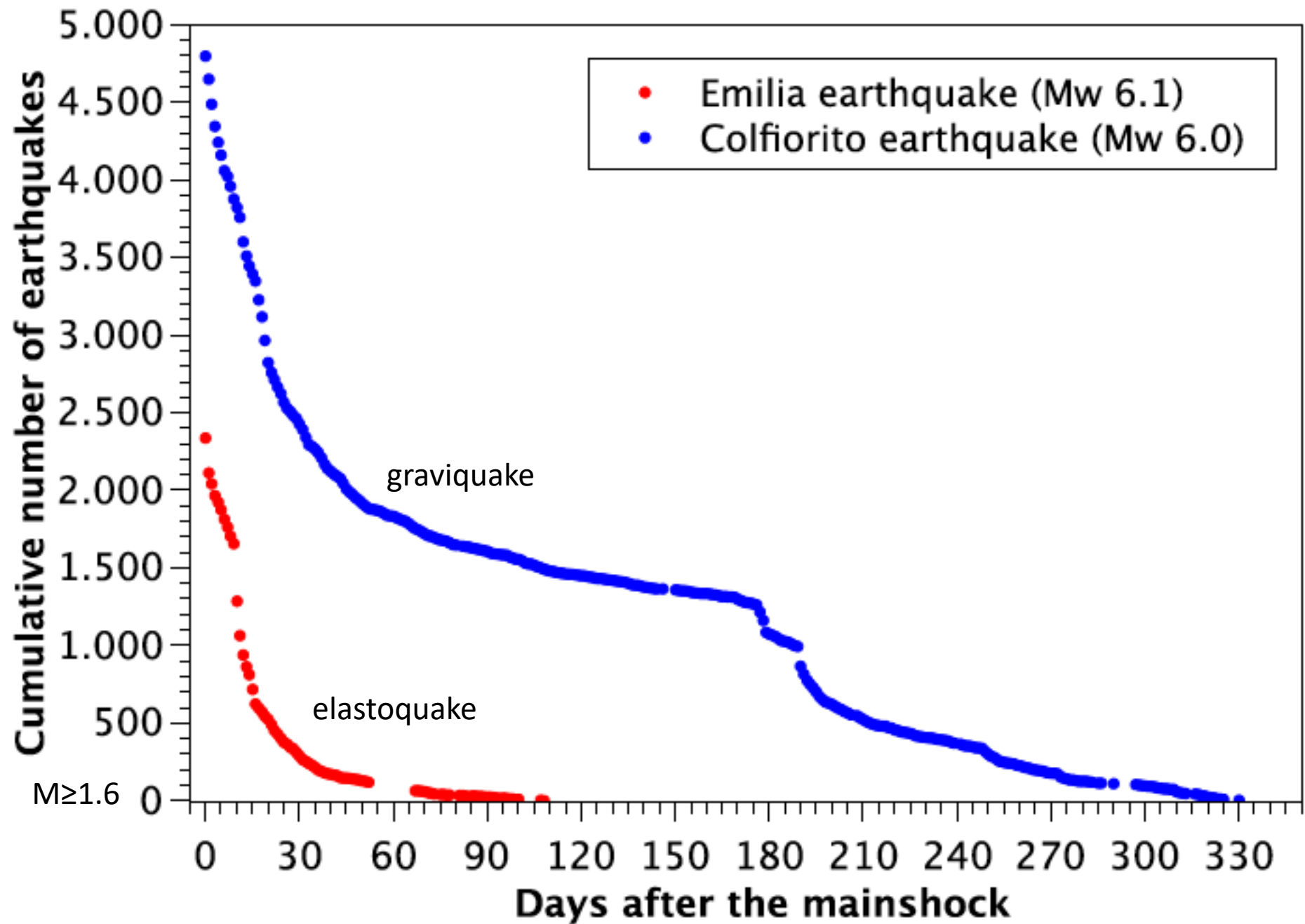


Devoti et al. 2017 Ann. Geophys.

pro gravity

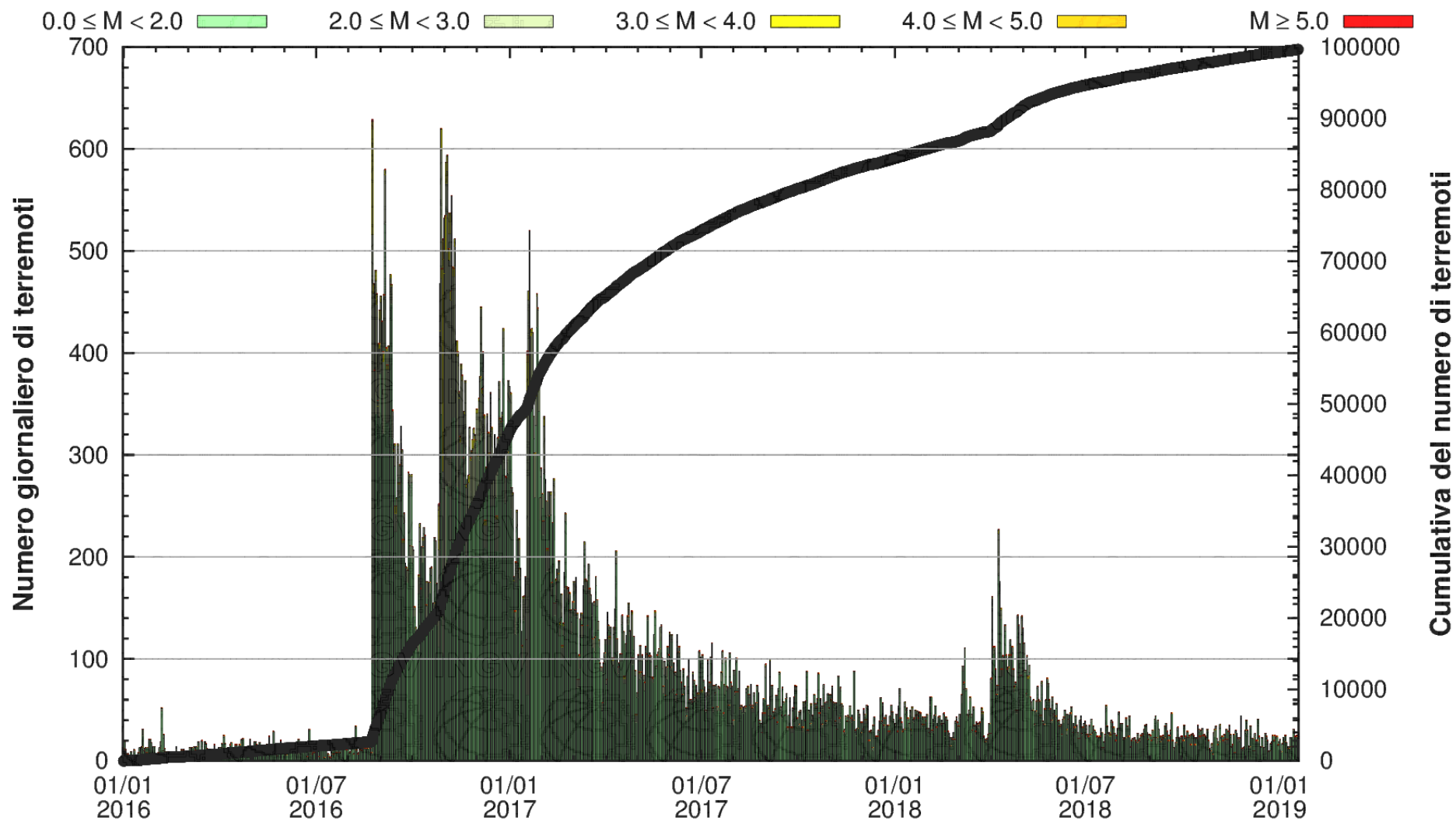
against gravity







INGV

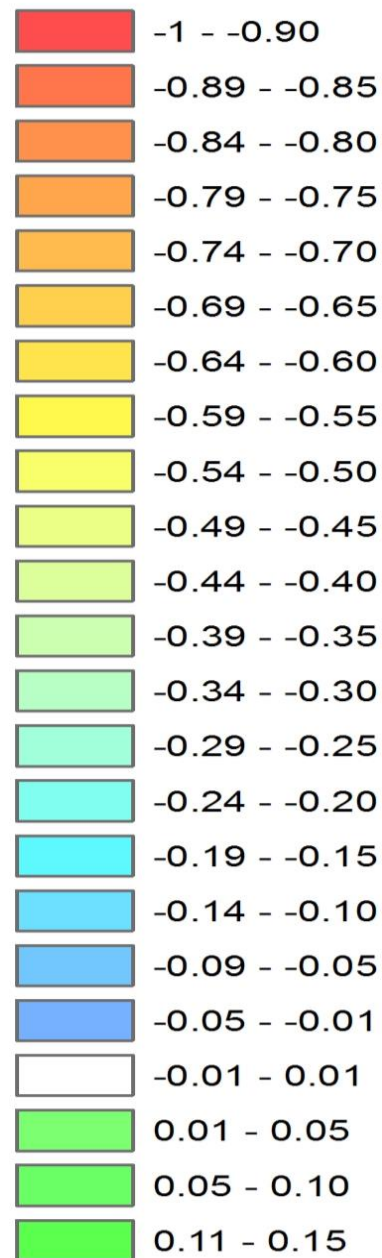
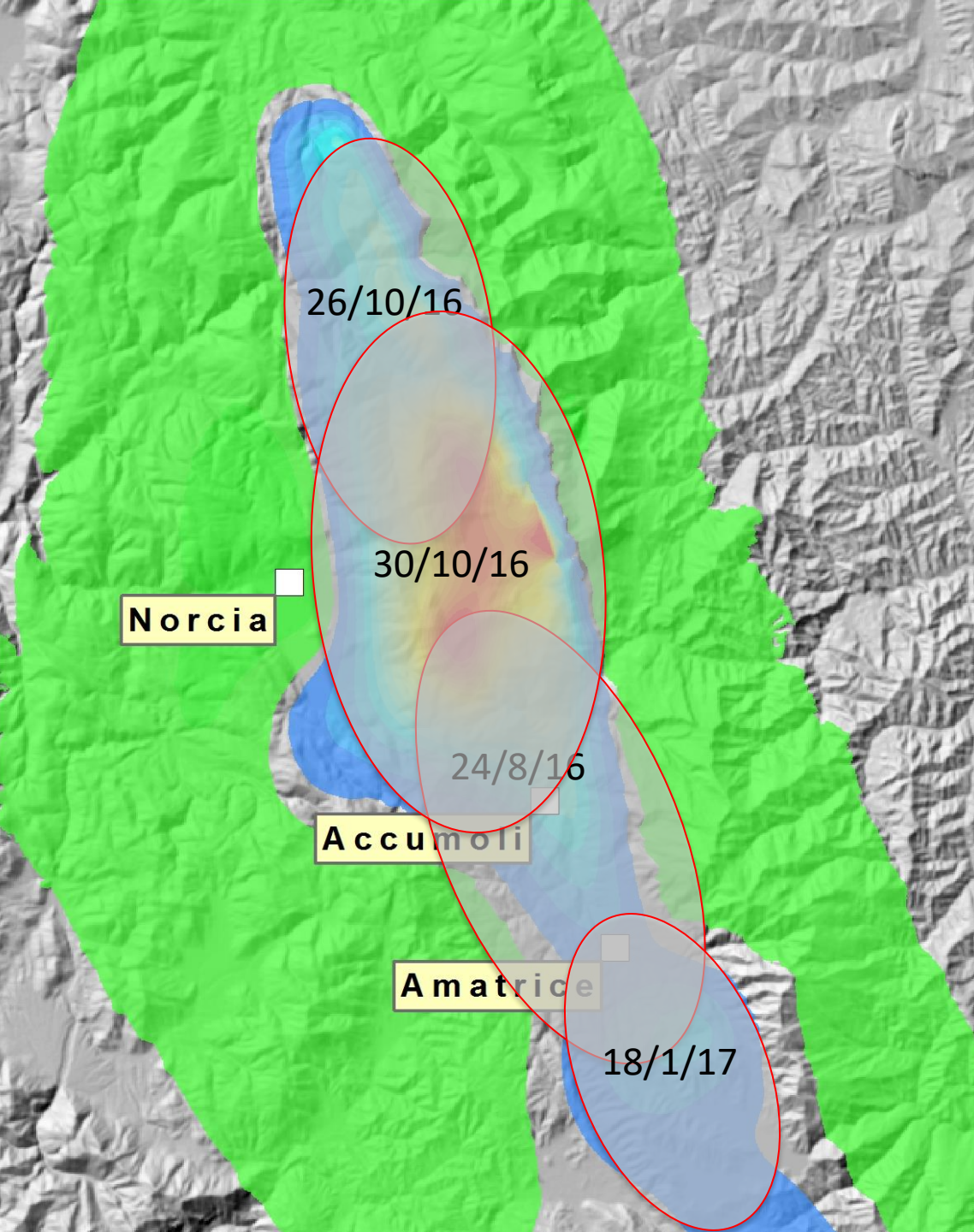


Spostamenti Verticali 2009-2017

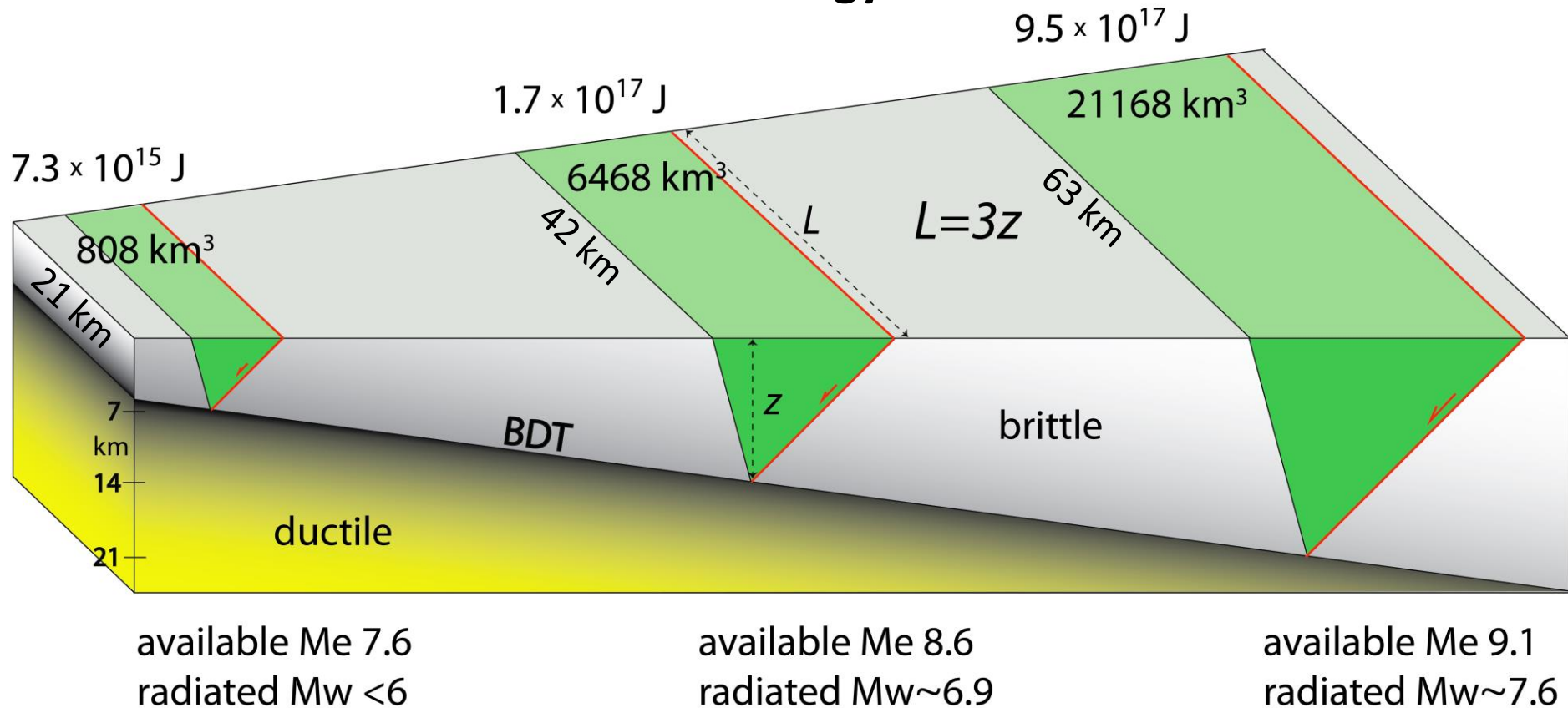


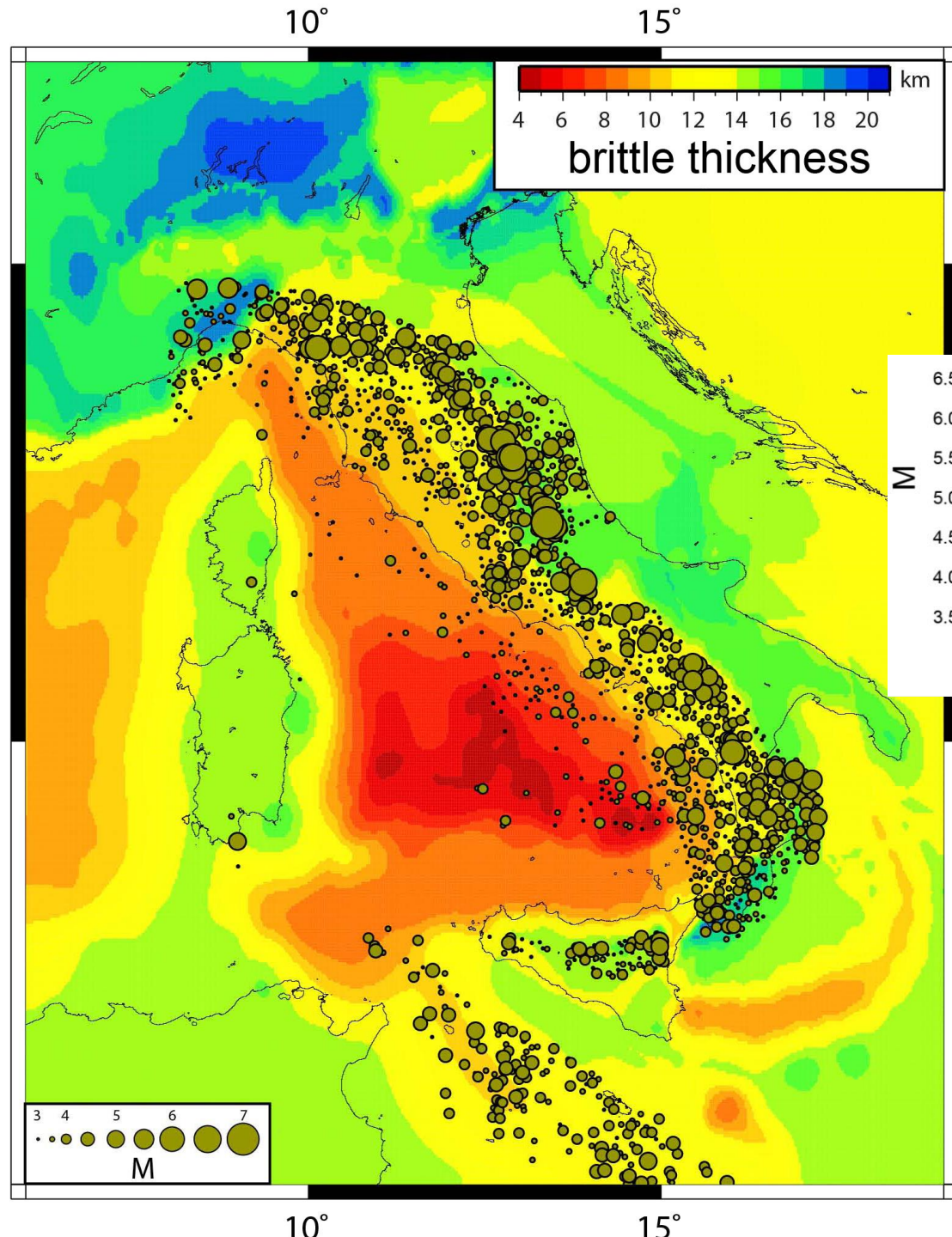
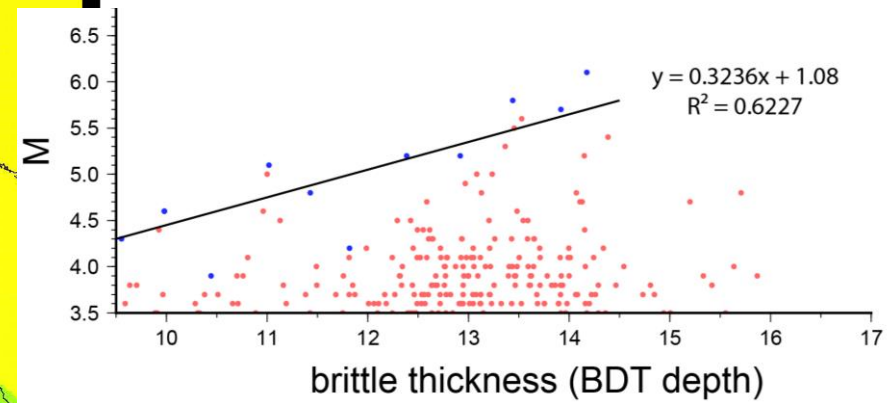
INGV

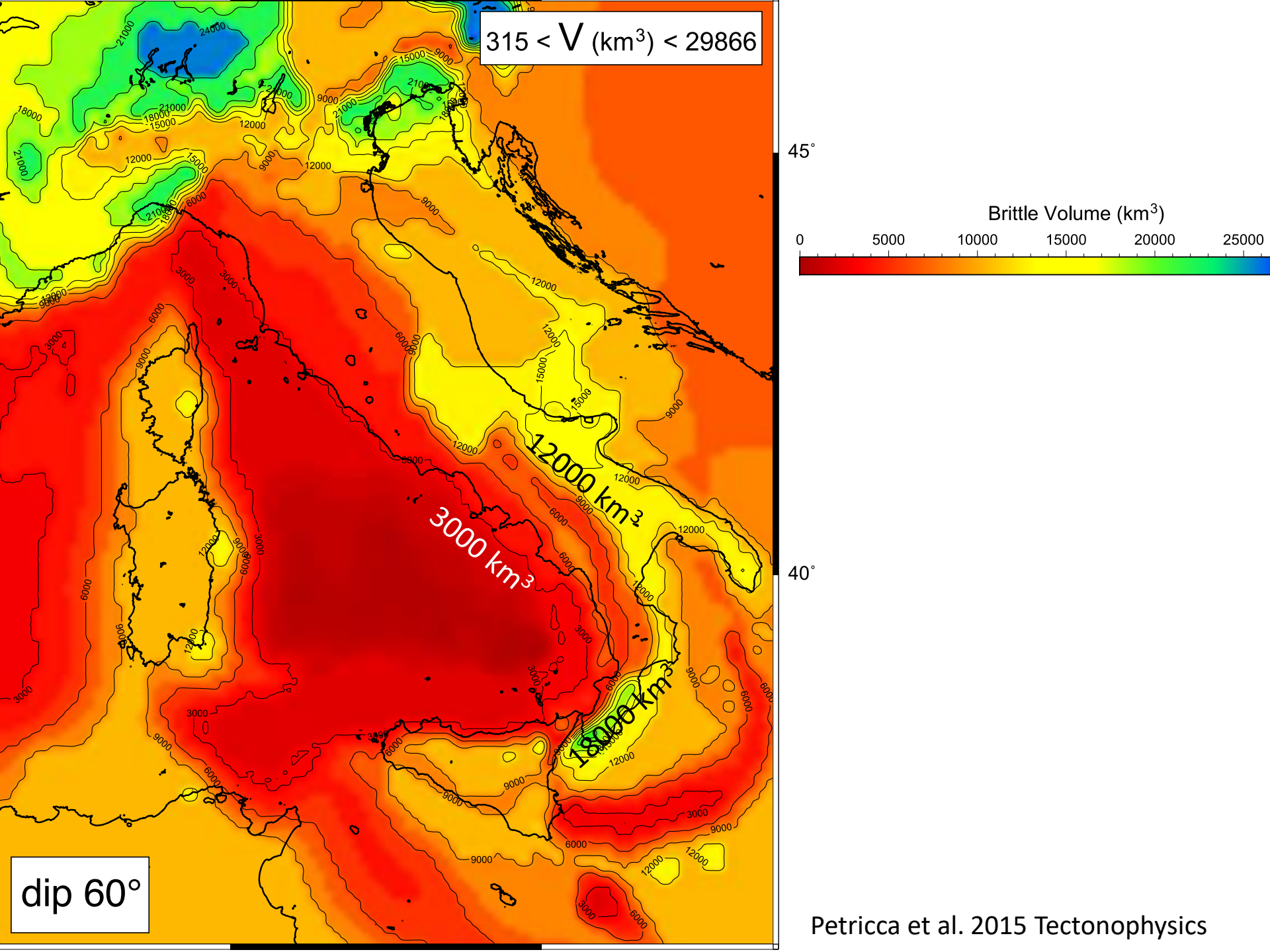
<VALUE>



3 times BDT depth
26 times mass
>100 total energy
>1000 seismic energy

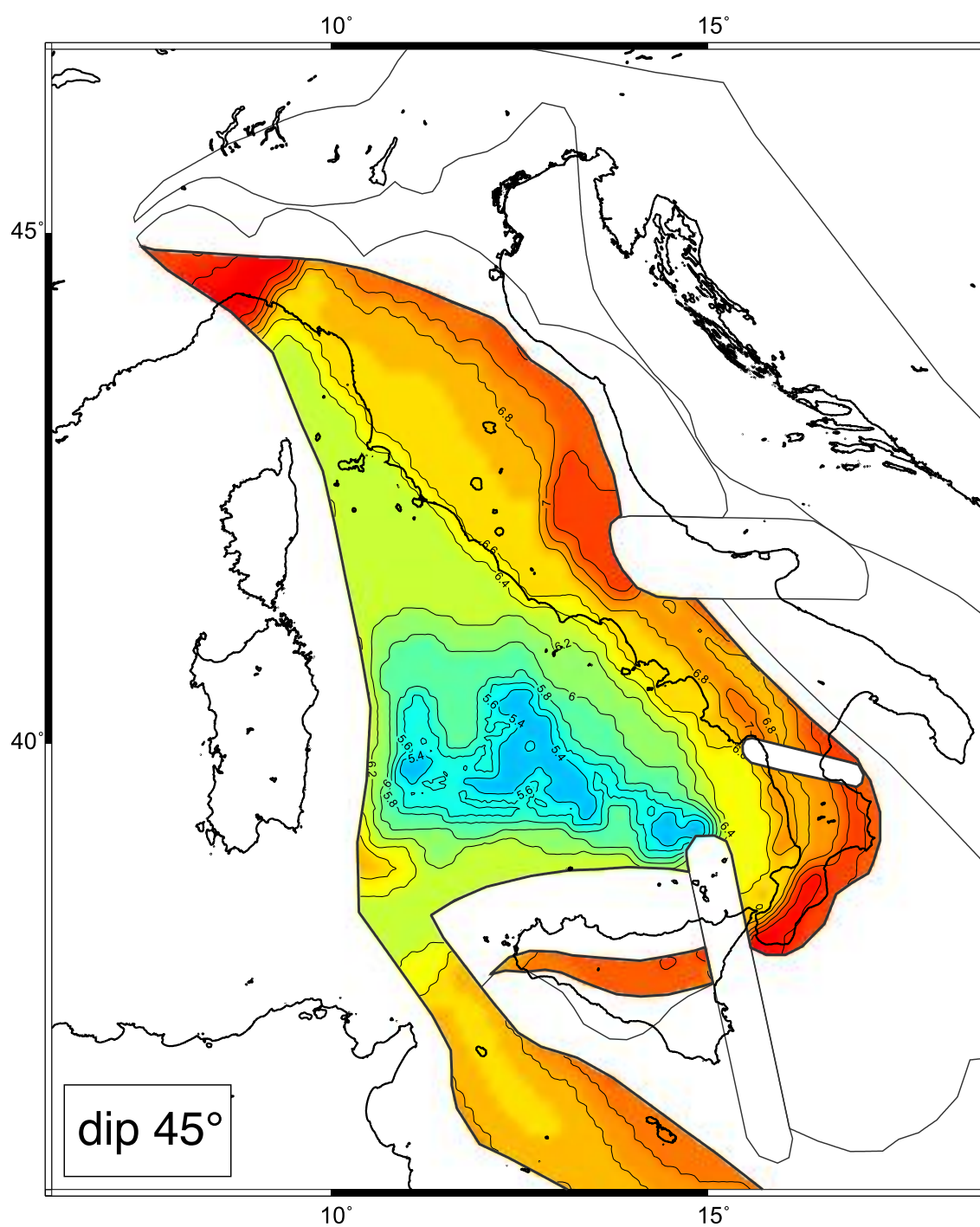


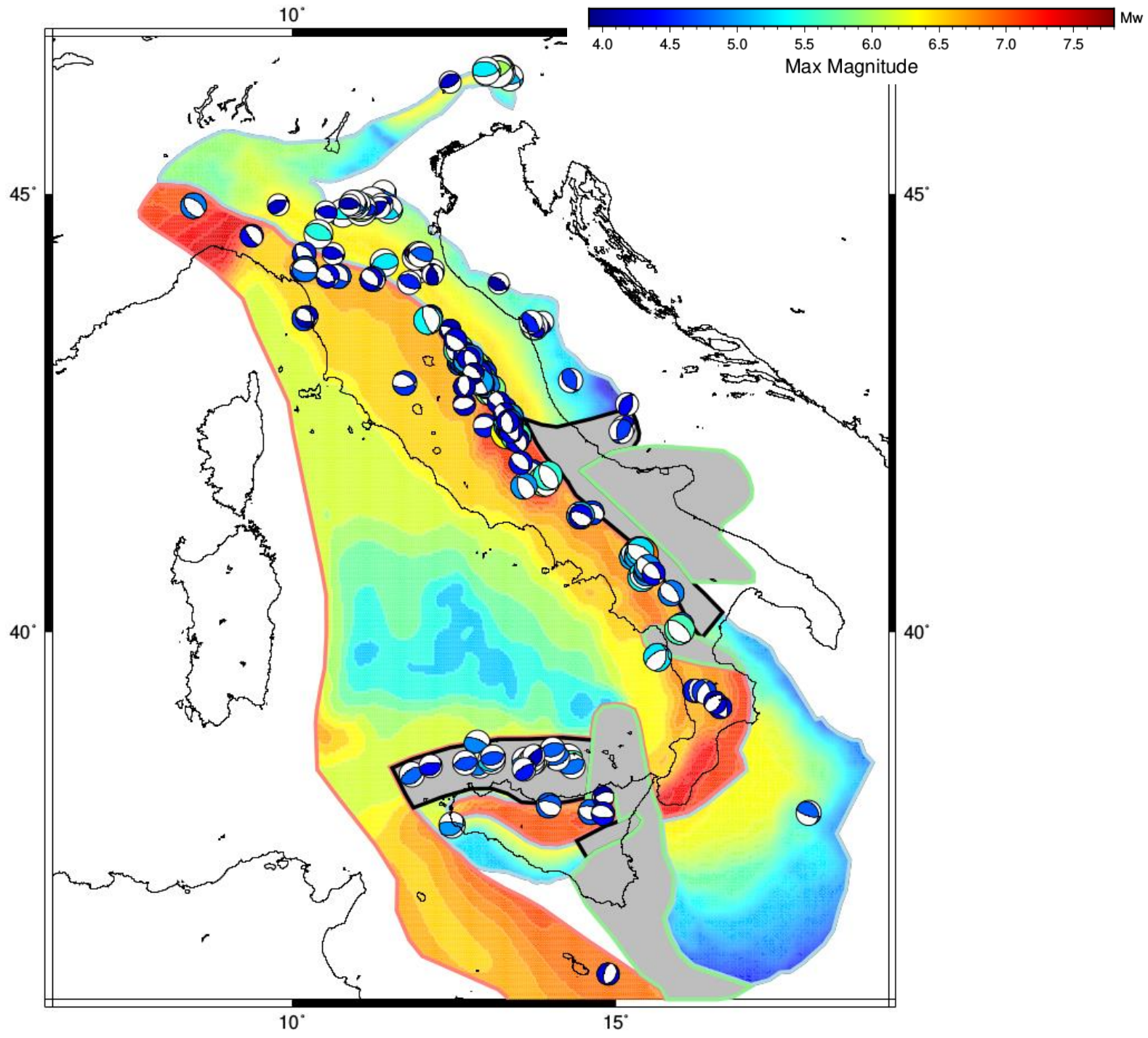


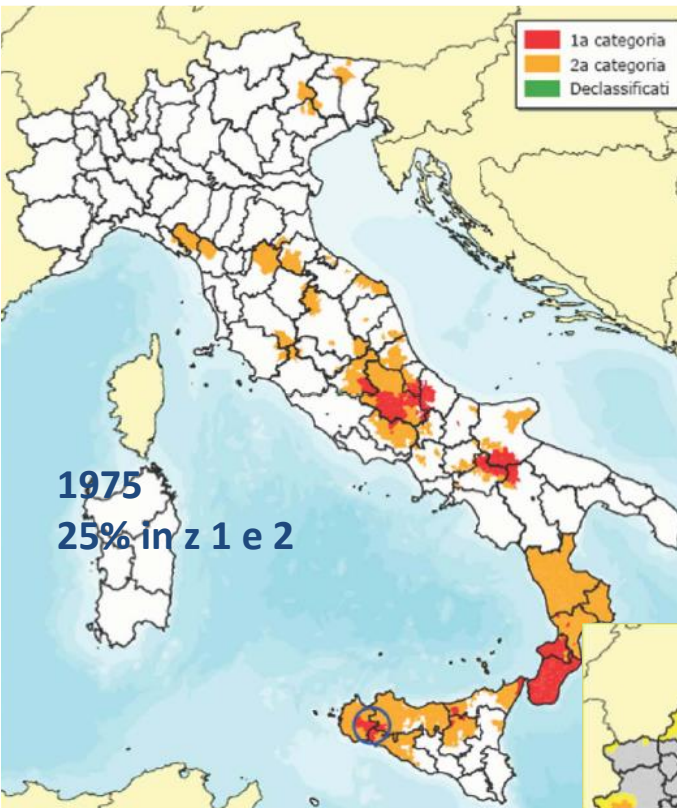
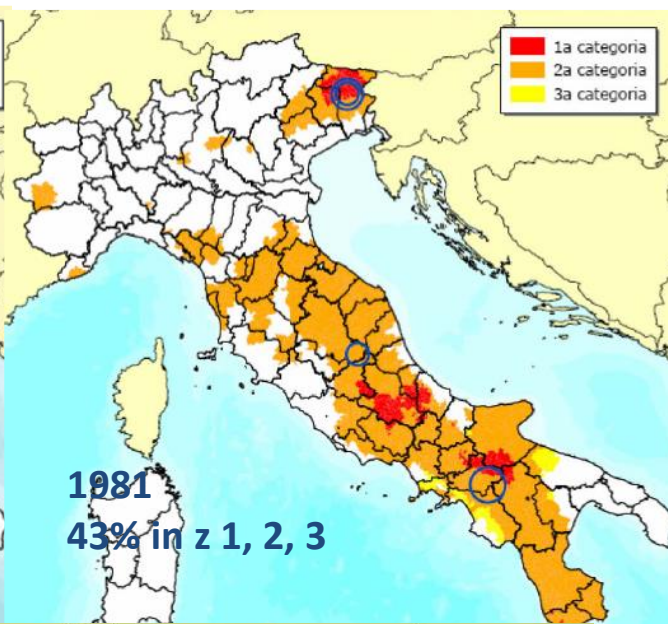
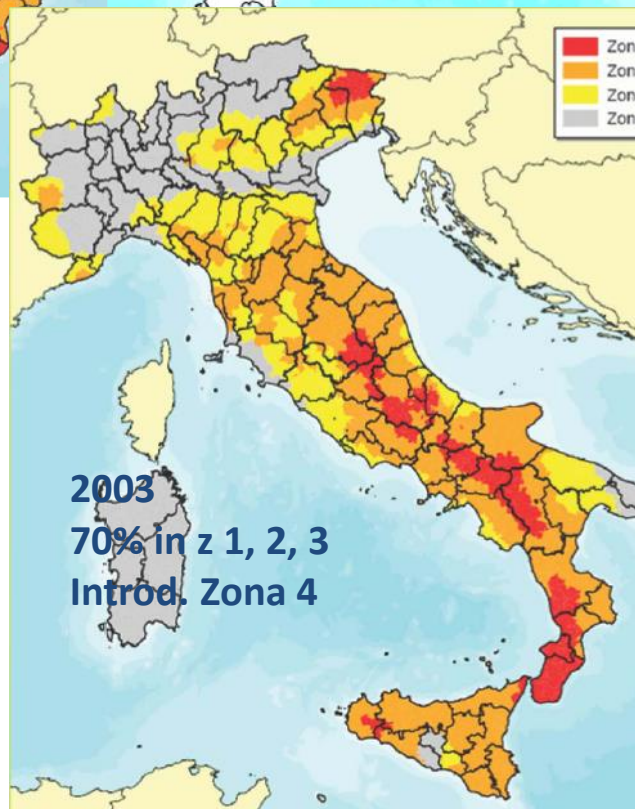
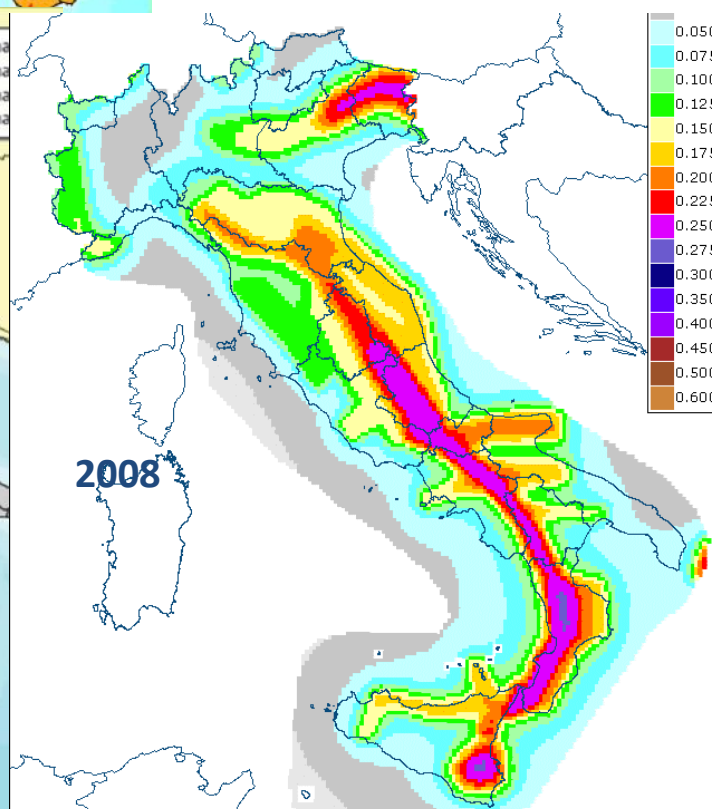




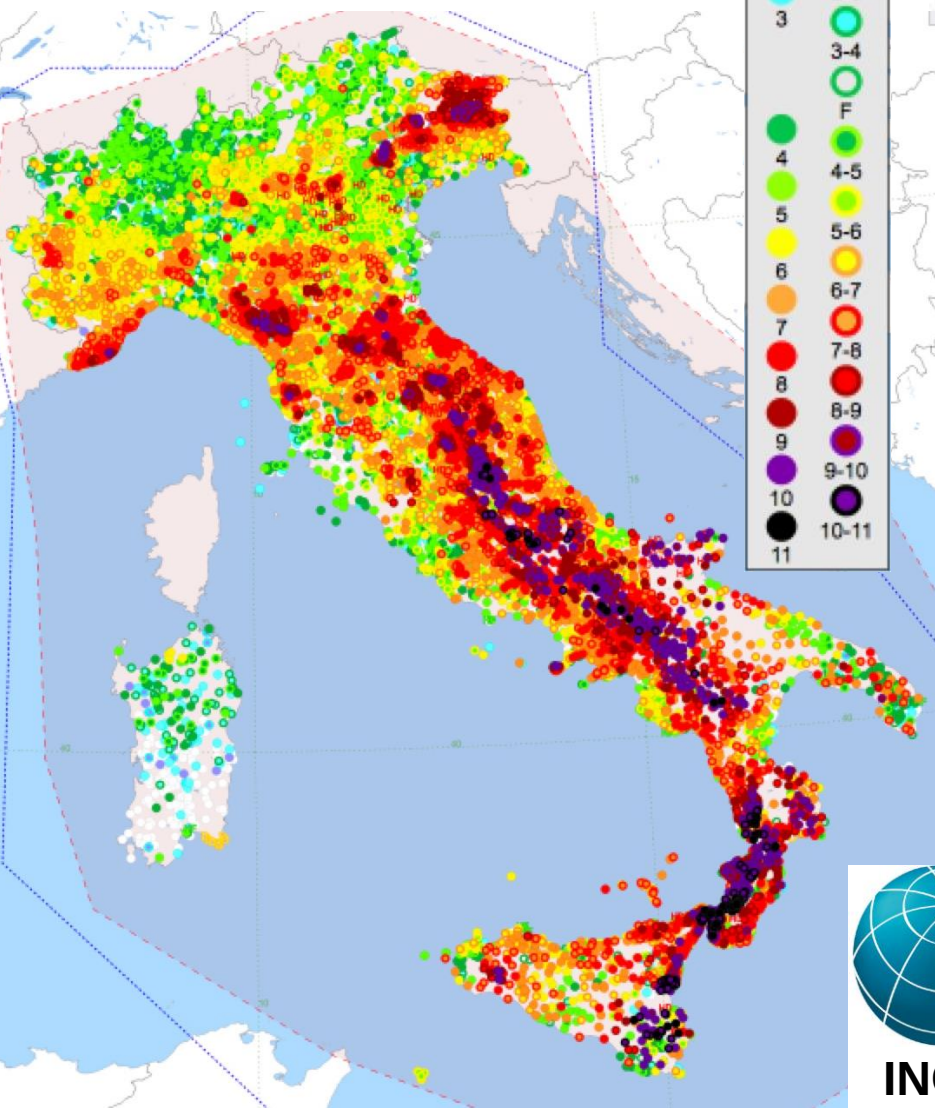
INGV





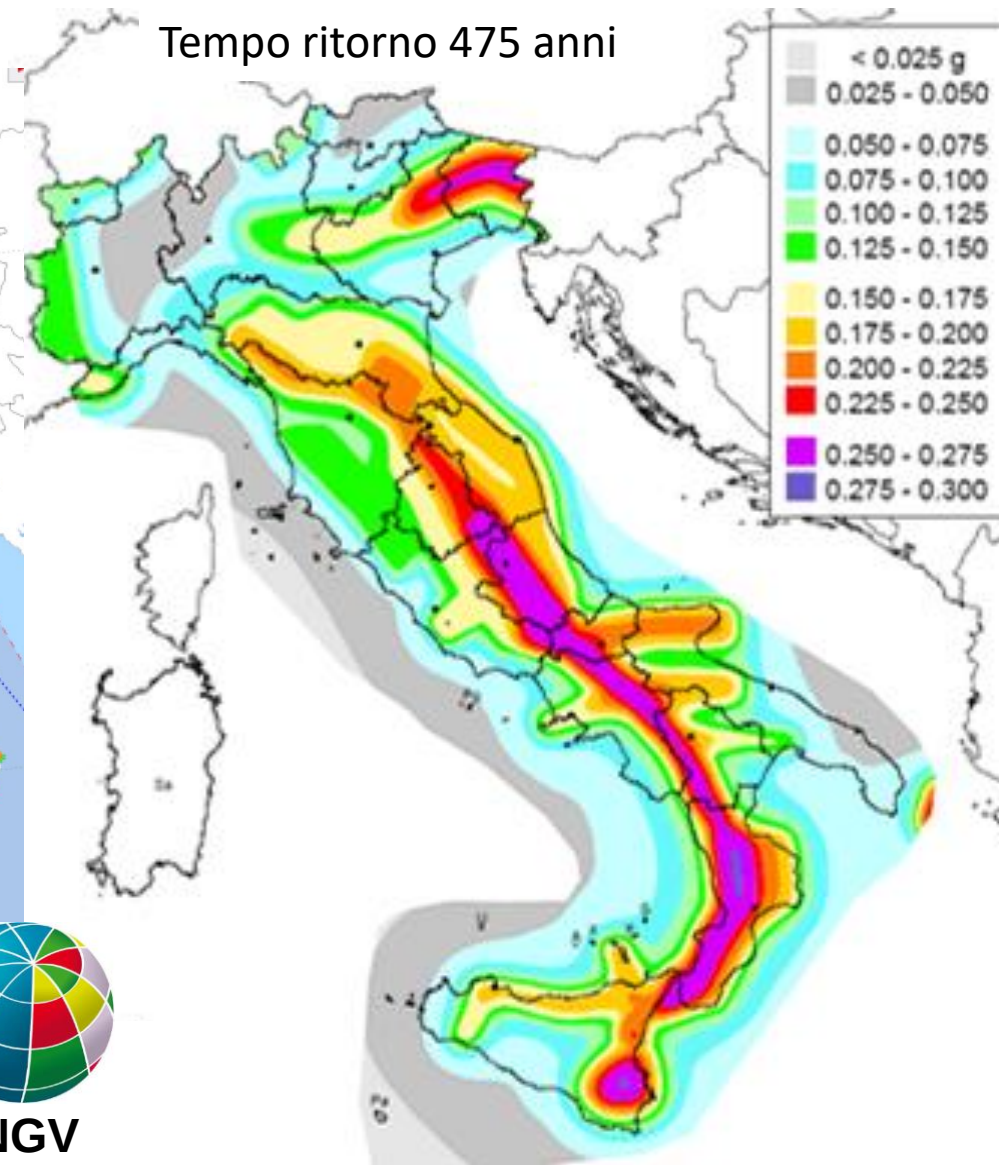


Earthquakes after 1000 AD



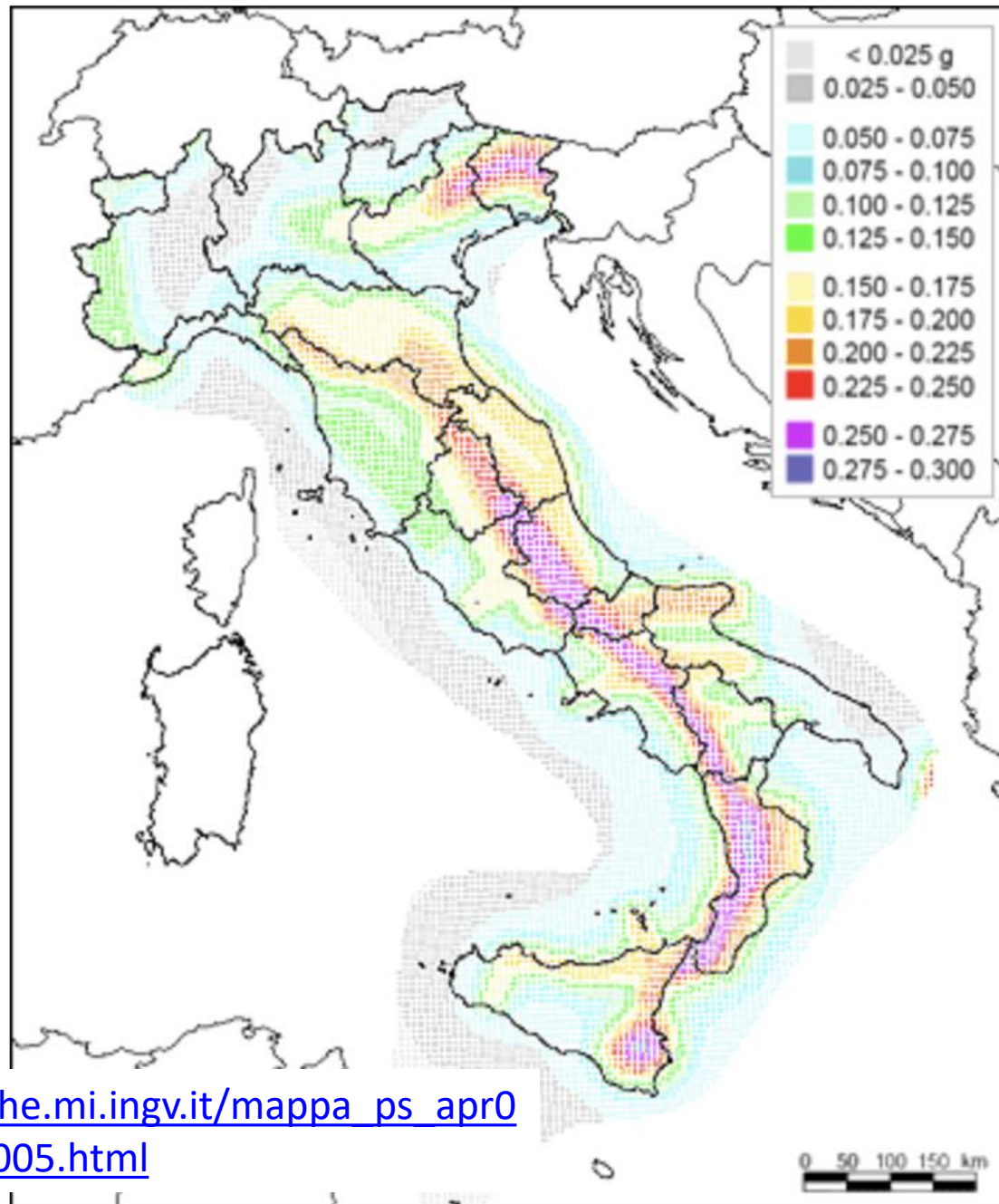
Catalogo Parametrico Terremoti Italiani

50 anni
eccedenza 10%
Tempo ritorno 475 anni



Carta della Pericolosità Sismica

Valori di ag su griglia con passo 0.05°



http://zonesismiche.mi.ingv.it/mappa_ps_apr04/consultazione_005.html



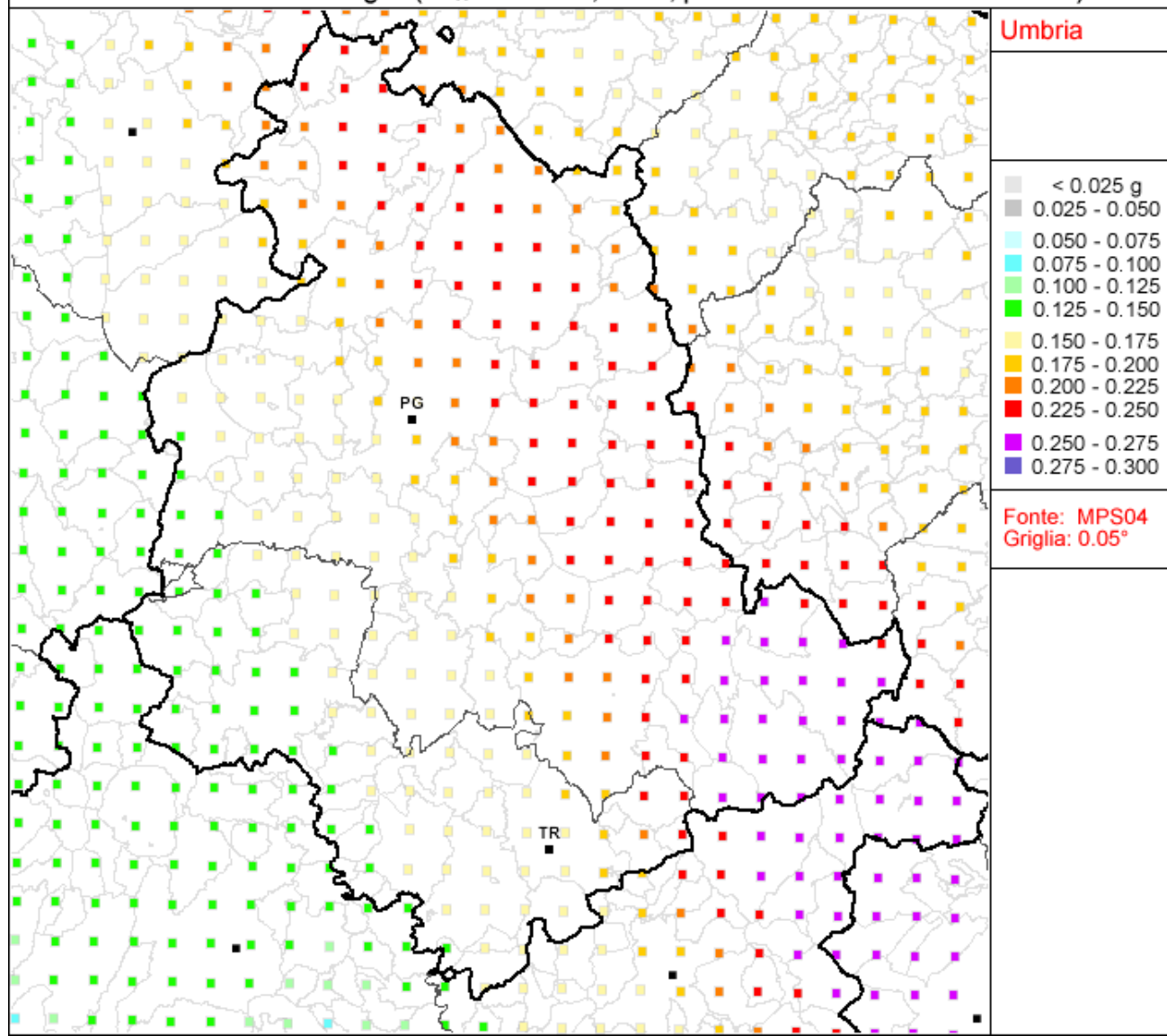
Valori di pericolosità sismica del territorio nazionale

(riferimento: Ordinanza PCM del 28 aprile 2006 n.3519, All.1b)

espressi in termini di accelerazione massima del suolo

con probabilità di eccedenza del 10% in 50 anni

riferita a suoli rigidi ($V_{s30} > 800$ m/s; cat.A, punto 3.2.1 del D.M. 14.09.2005)

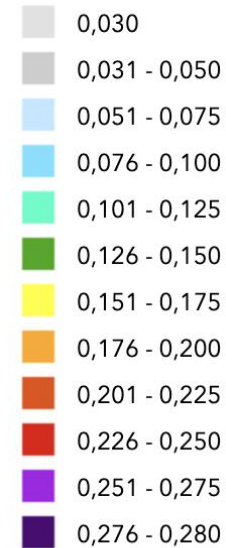


Mappa dei rischi dei comuni italiani

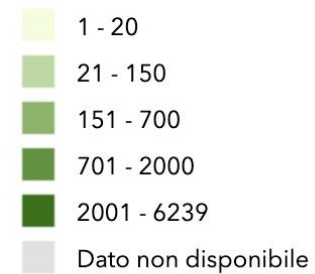
Confini regionali



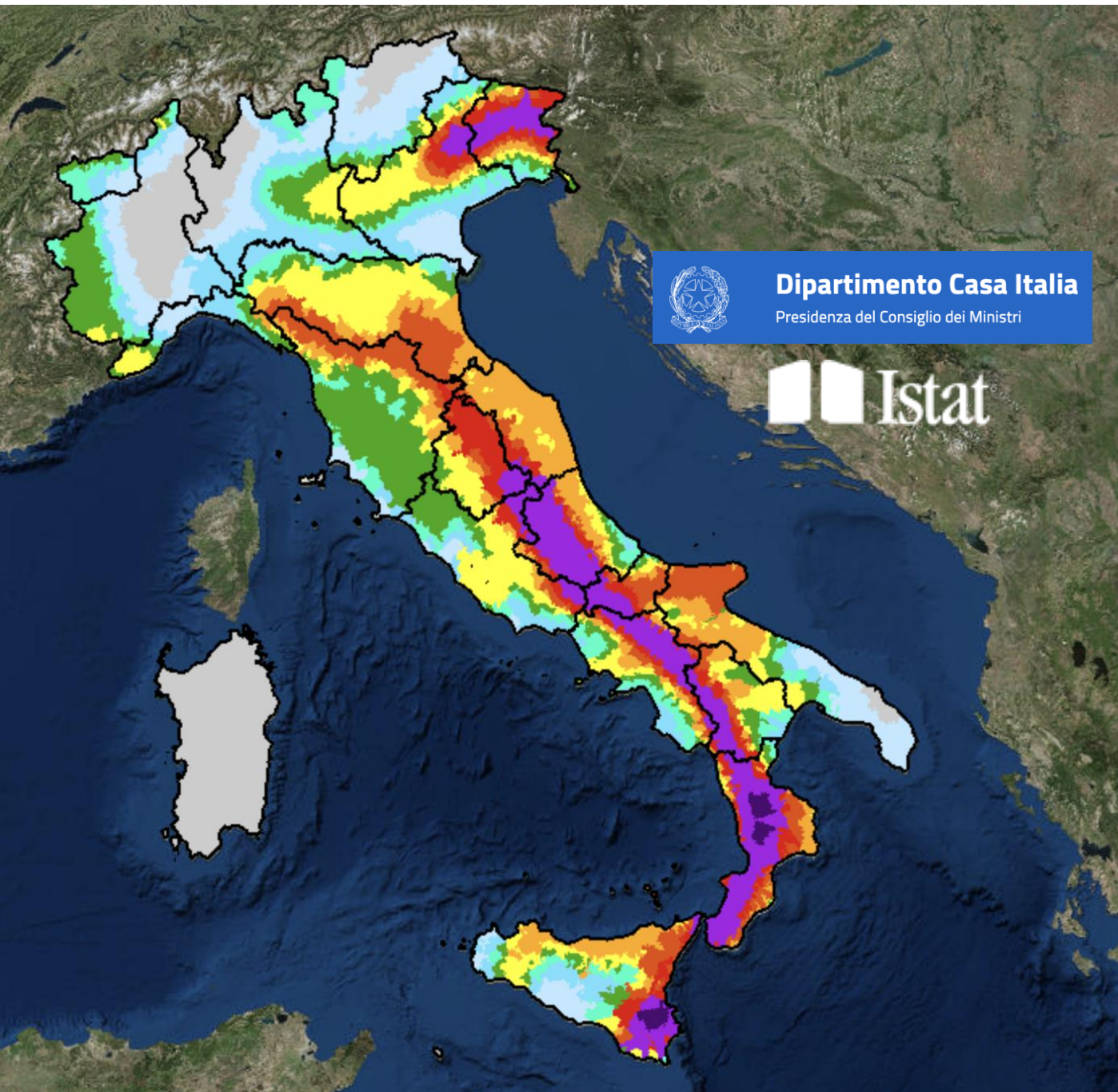
Accelerazione sismica max suolo

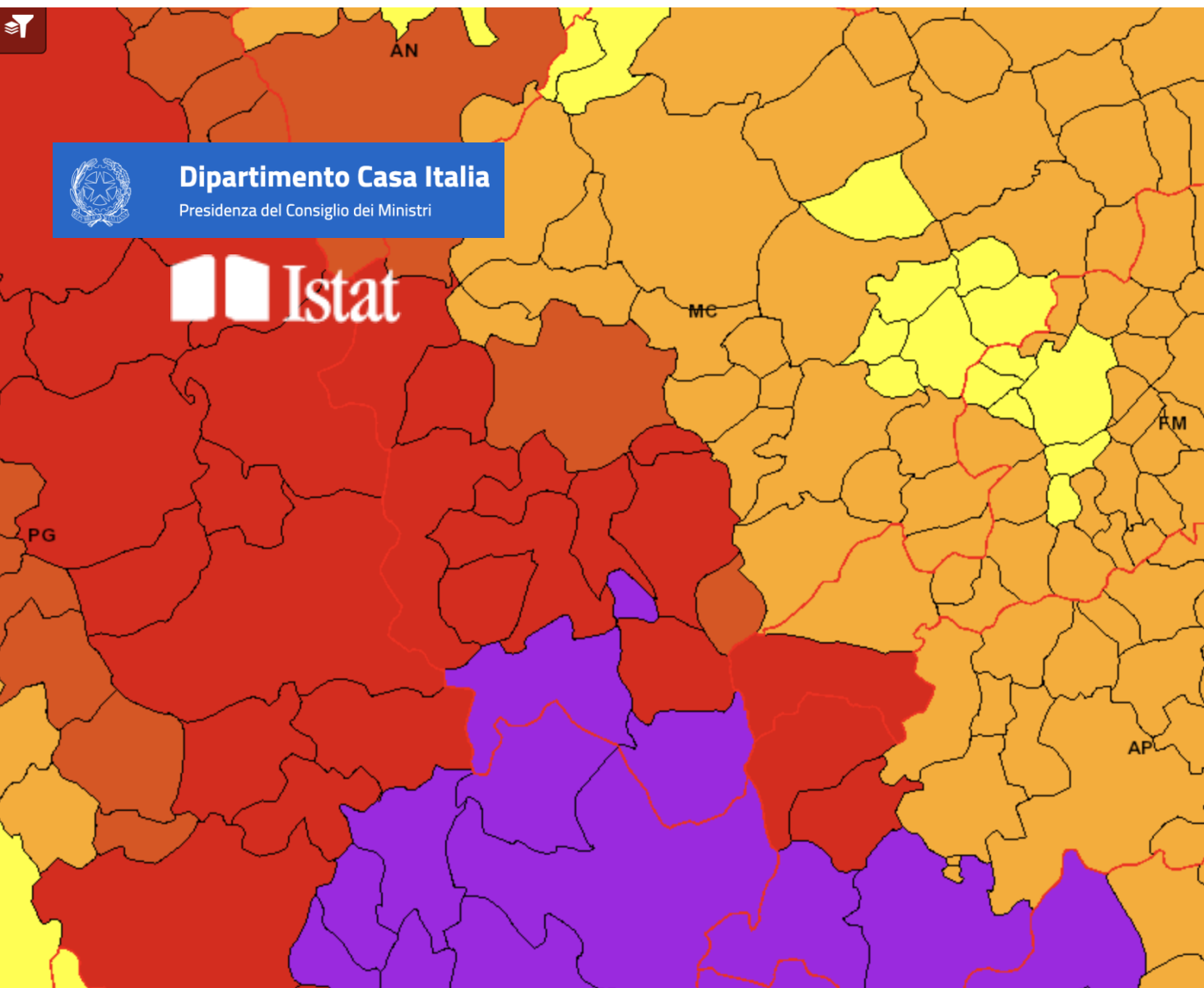


Beni culturali totali



Istan





Mapa dei rischi dei comuni italiani

Confini provinciali



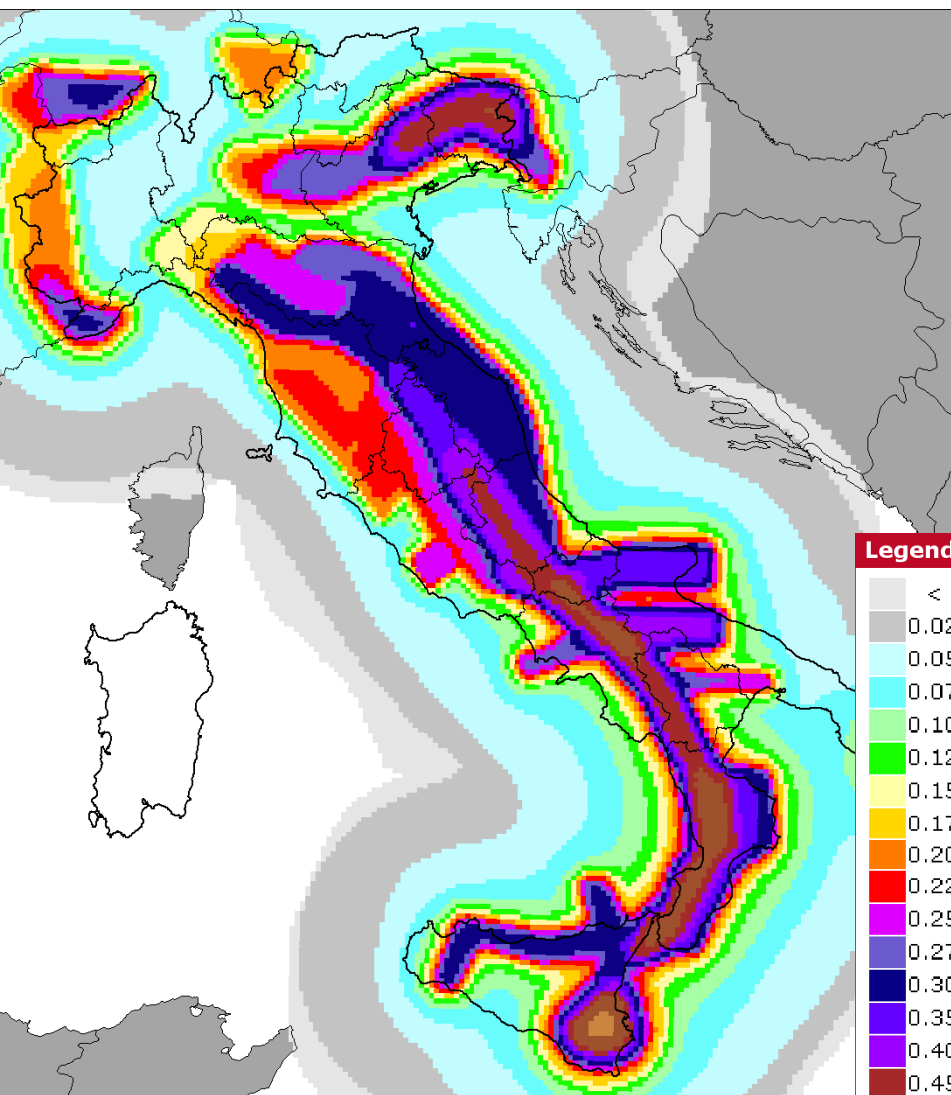
Confini comunali



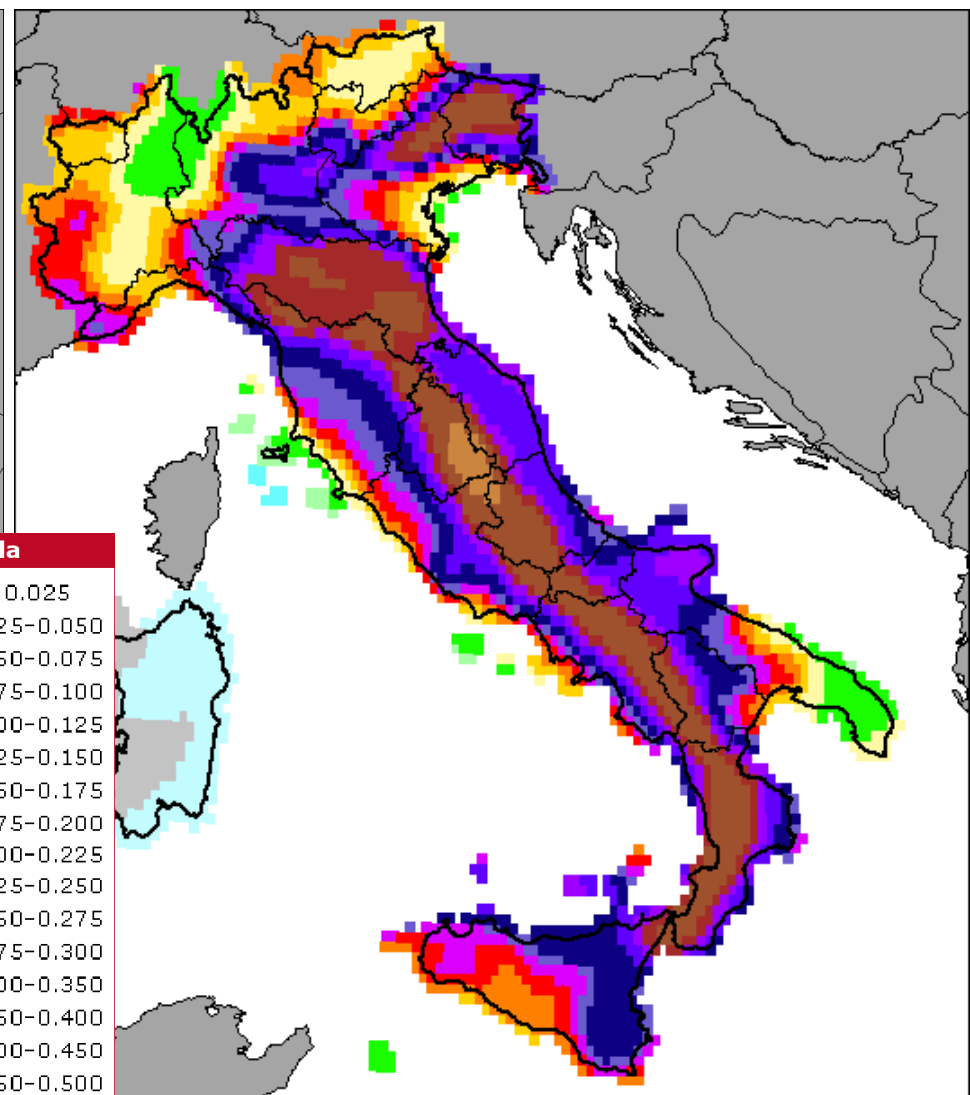
Accelerazione sismica max suolo

- 0,030
- 0,031 - 0,050
- 0,051 - 0,075
- 0,076 - 0,100
- 0,101 - 0,125
- 0,126 - 0,150
- 0,151 - 0,175
- 0,176 - 0,200
- 0,201 - 0,225
- 0,226 - 0,250
- 0,251 - 0,275
- 0,276 - 0,280

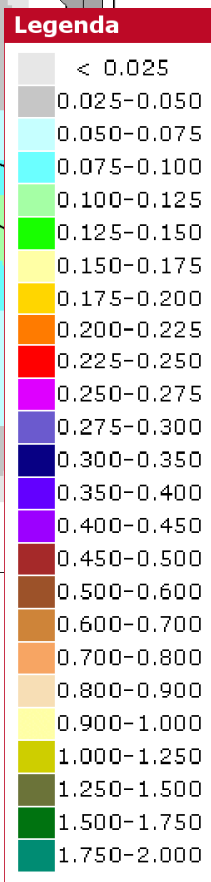
Istan

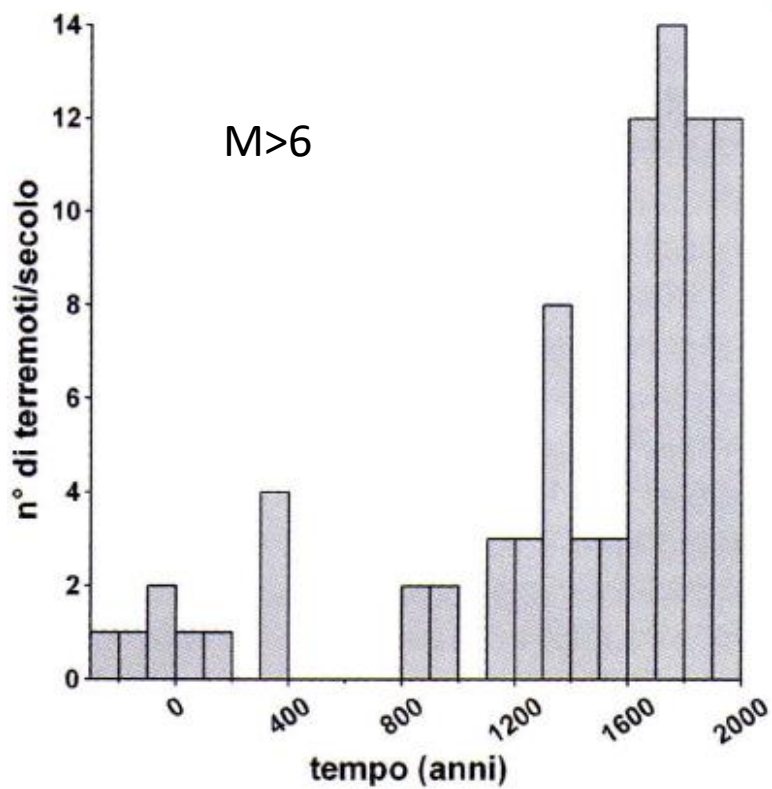
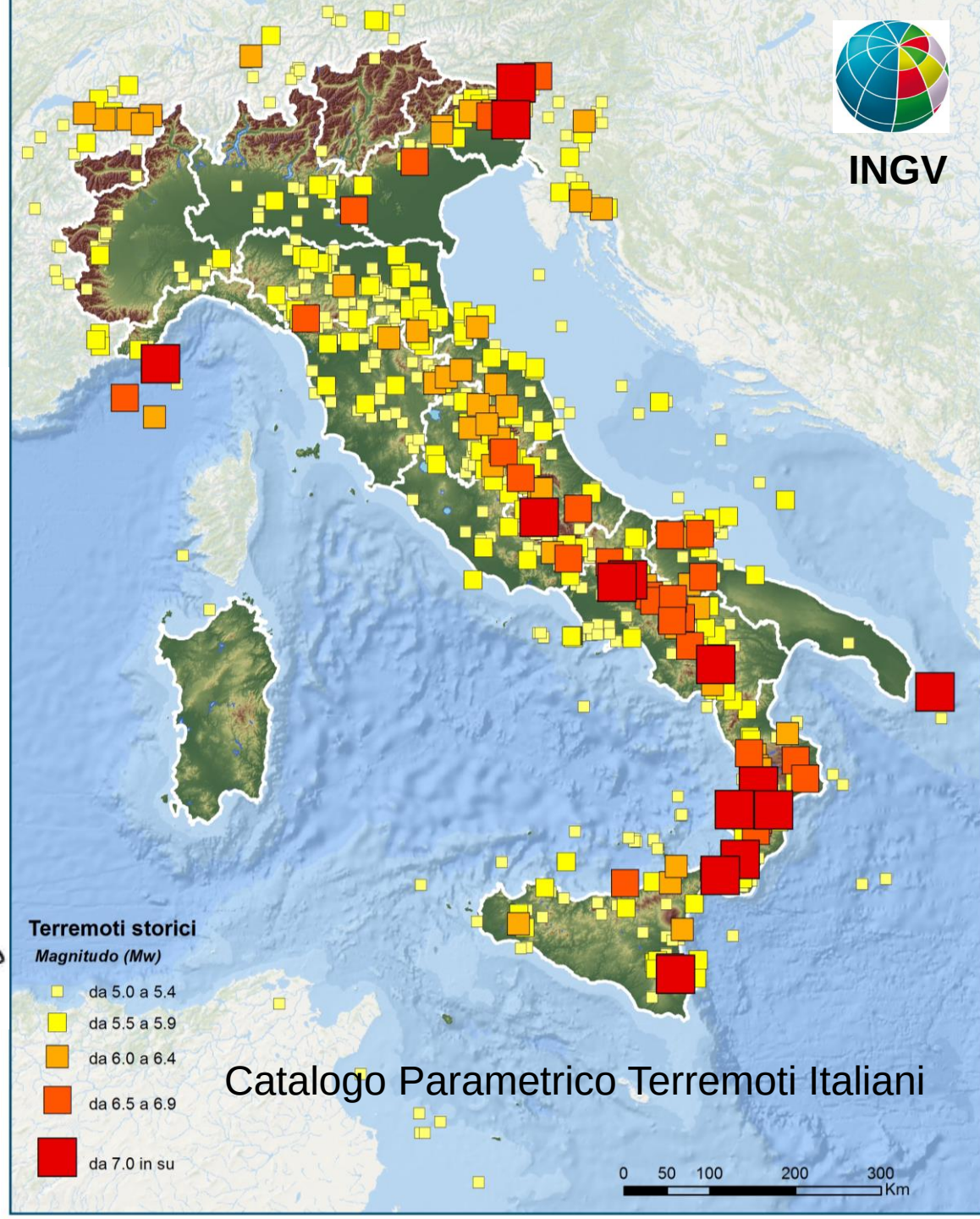


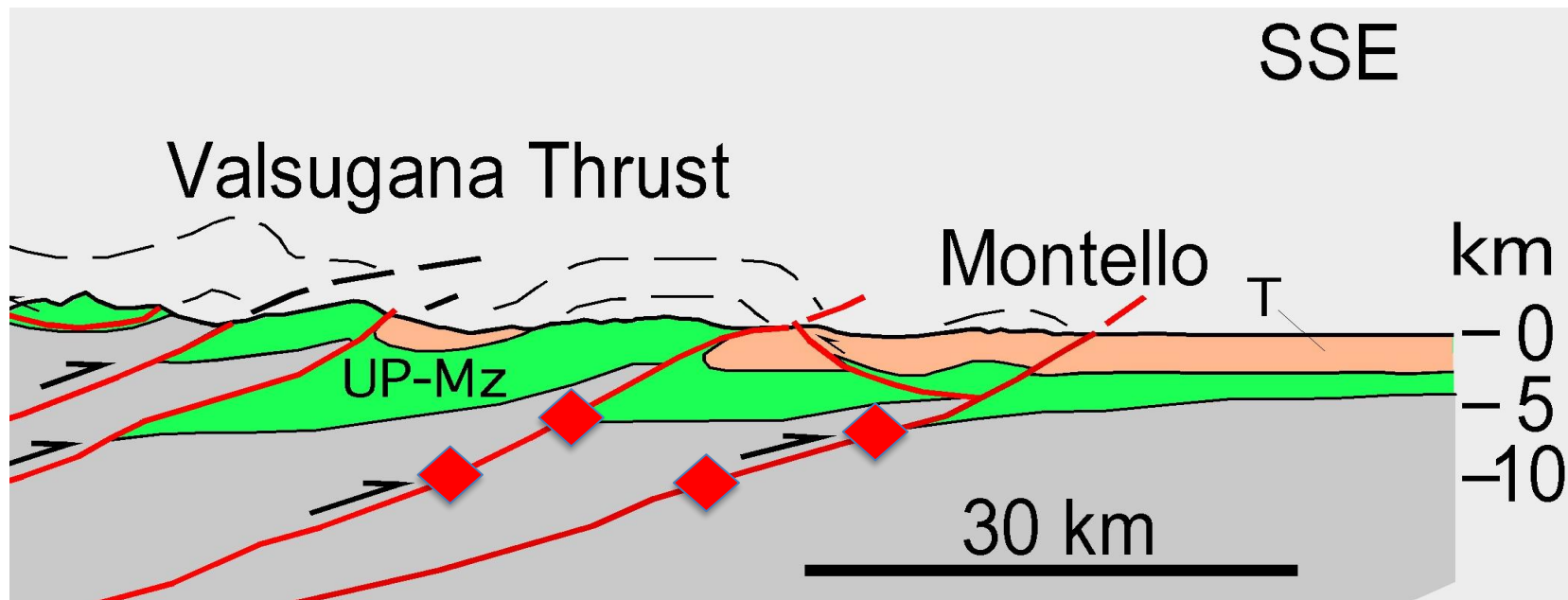
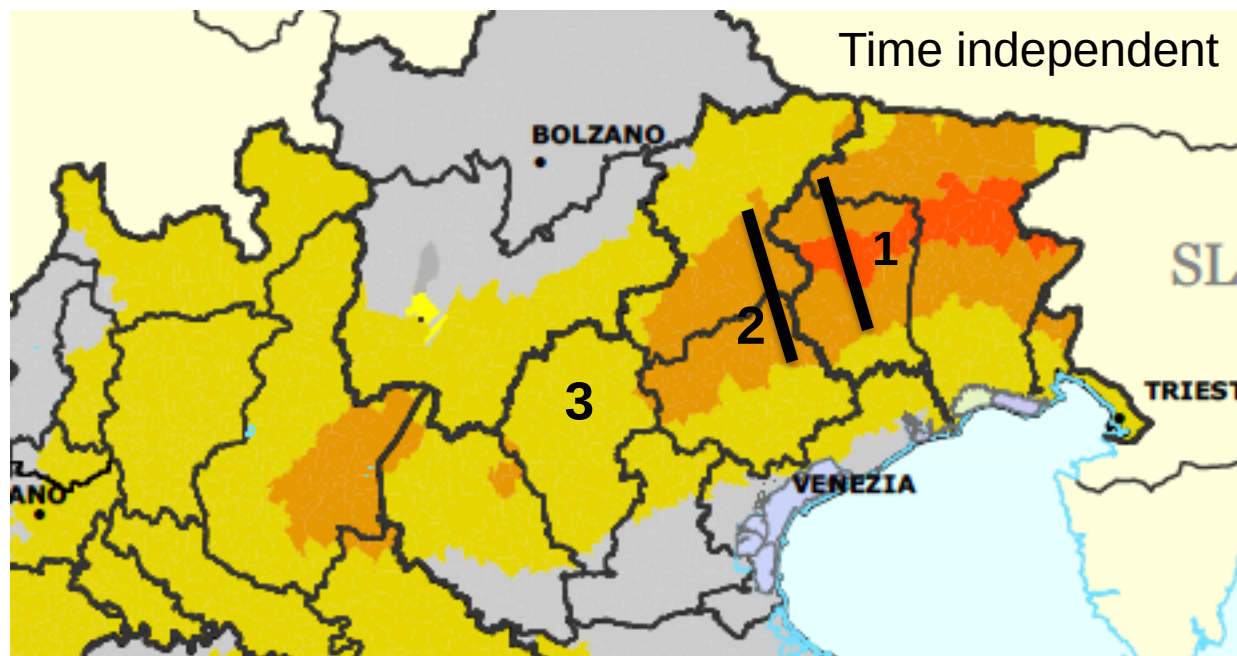
MPS04

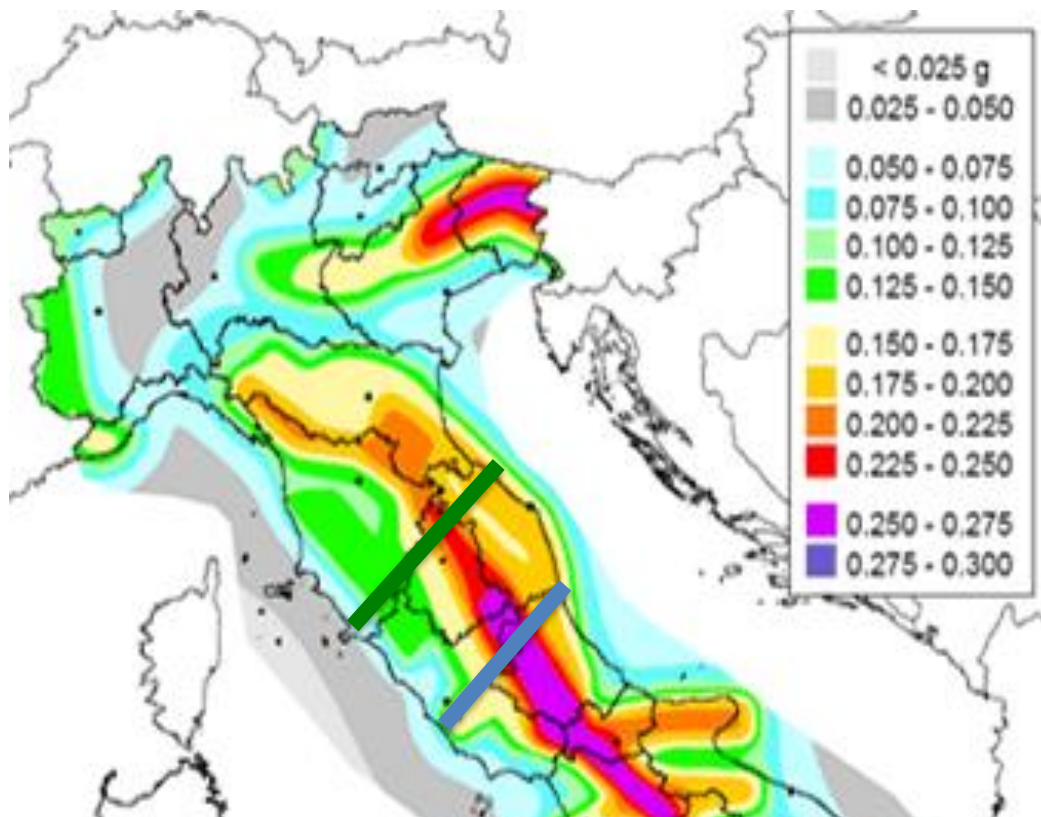
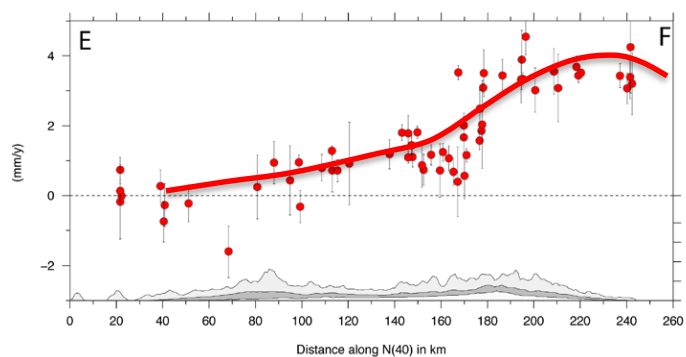
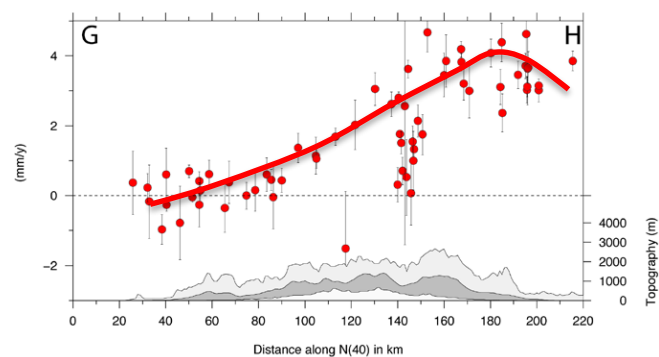


MPS17



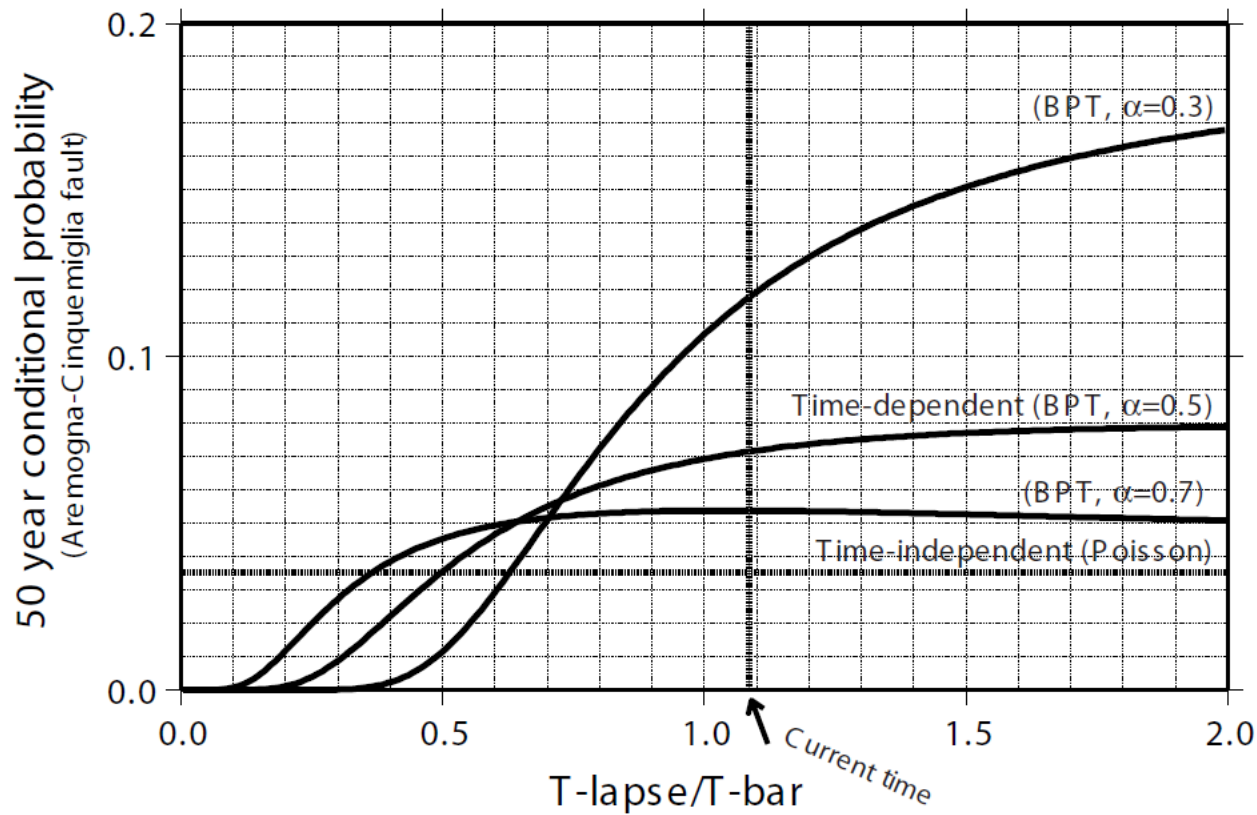




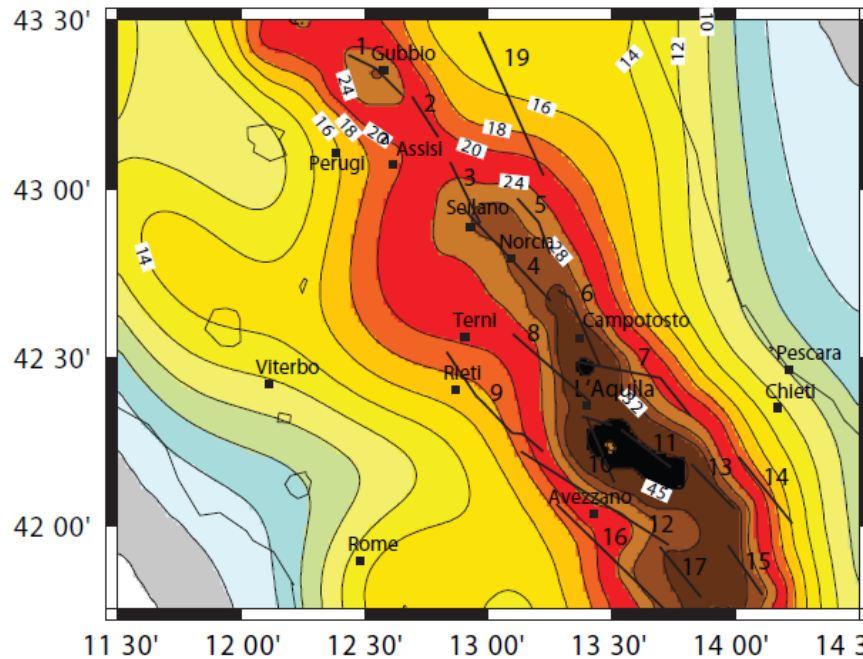


DEFINIZIONE DELLA DISTRIBUZIONE TEMPORALE

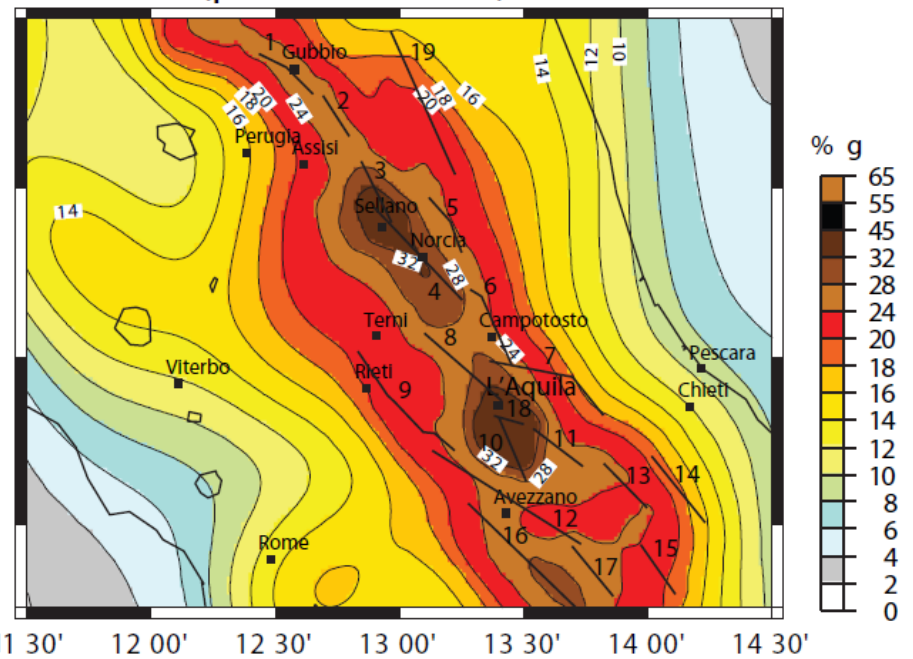
modello di Poisson (casuale e i terremoti senza memoria)
modello renewal (considera l'intervallo dall'ultimo terremoto caratteristico avvenuto)



A) (PGA) 10% Probability in 50 years
(renewal model, BPT, $\alpha=0.3$)



D) (PGA) 10% Probability in 50 years
(poisson model)



Dal 1904 al 1920 Terremoti di $M > 5.5$

17 anni – 15 terremoti

1904-24 febbraio Marsica M 5.7

1905-8 settembre Calabria M 6.9

1908-28 dicembre Messina M 7.1

1909-1 luglio Messina M 5.5

1910-7 giugno Irpinia-Basilicata M 5.8

1913-28 giugno Calabria settentrionale M 5.6

1914-27 ottobre Lucchesia M 5.6

1915-13 gennaio Marsica M 7.1

1916-17 maggio Rimini M 5.8

1916-16 novembre Alto Reatino M 5.5

1917-26 aprile Monterchi M 6

1918-10 novembre Appennino Forlivese M 5.9

1919-29 giugno Mugello M 6.4

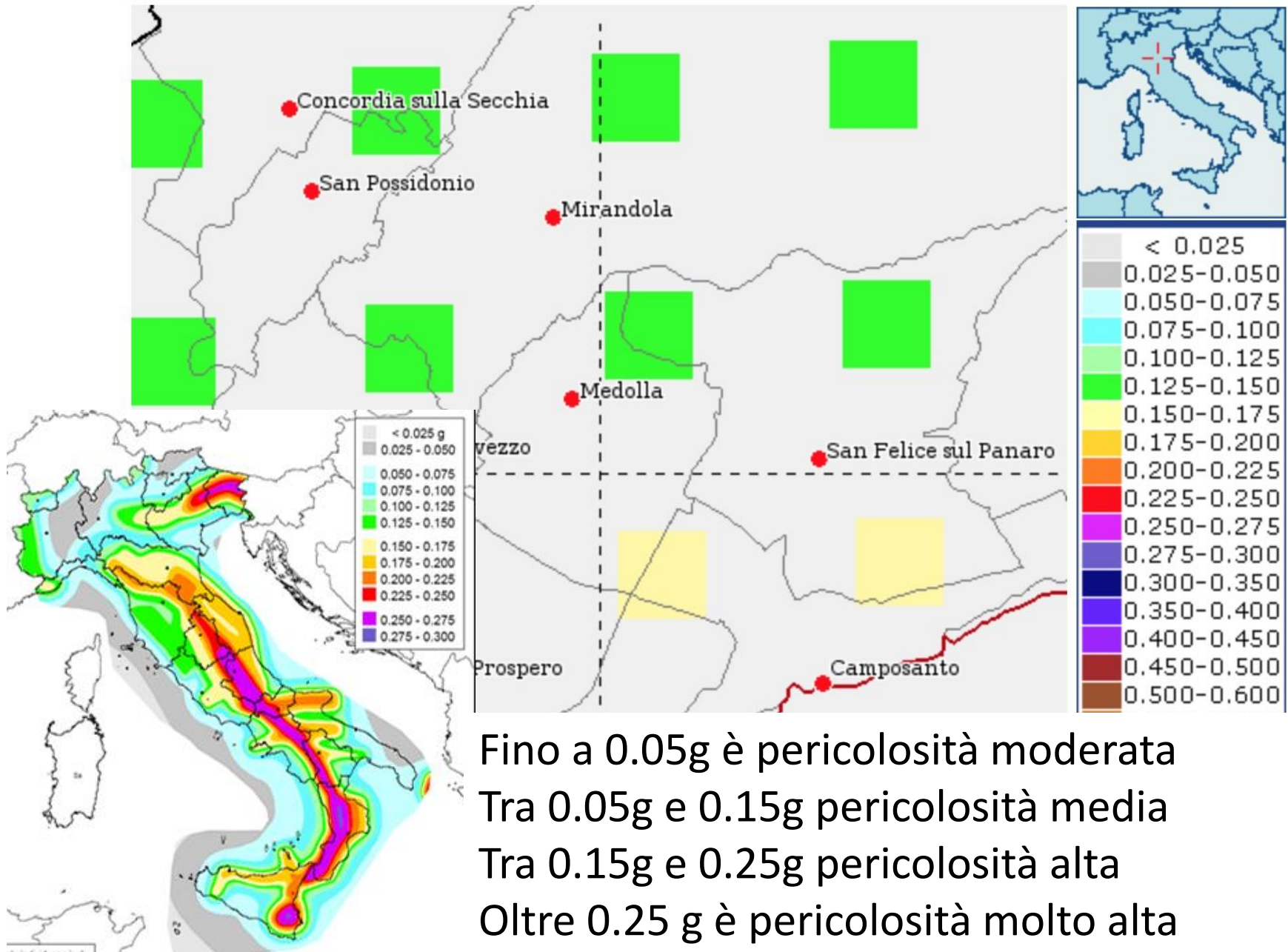
1920-6 settembre Garfagnana M 5.6

1920-7 settembre Garfagnana M 6.5

Catalogo Parametrico dei Terremoti Italiani



Mappe interattive di pericolosità



Fino a 0.05g è pericolosità moderata

Tra 0.05g e 0.15g pericolosità media

Tra 0.15g e 0.25g pericolosità alta

Oltre 0.25 g è pericolosità molto alta

Event

Event id IT-2012-0011 
Date 2012-05-29 07:00:02
Event name EMILIA_2ND_SHOCK
 M_L 5.8
 M_W 6.0

Castelmassa
Sermide

Cavezzo
San Felice
Sul Panaro

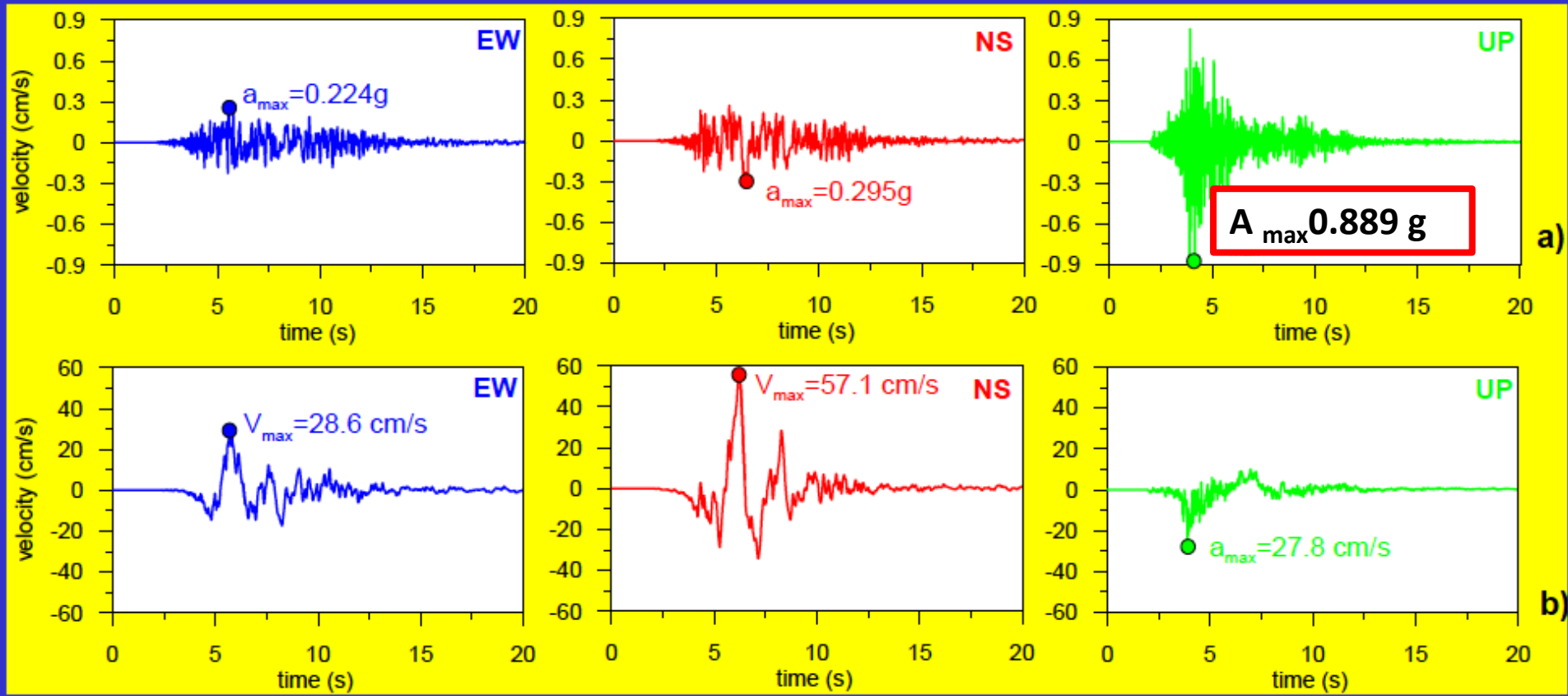
Finale Emilia

Mirandola station 29 May 2012

Stazione RAN su suolo C

Amplificazione $1.125 \times 1.5 = (0.18-0.20)$

Maugeri et al.



CASTELLUCCIO– 30/10/2016			
	Misurata [cm/s^2]	NTC 2008 - SLV [cm/s^2]	
Componente orizzontale	850	459	1.85
Componente verticale	869	212	4.10

AMATRICE - 24/08/2016			
	Misurata [cm/s^2]	NTC 2008 - SLV [cm/s^2]	
Componente orizzontale	851	461	1.85
Componente verticale	391	213	1.84

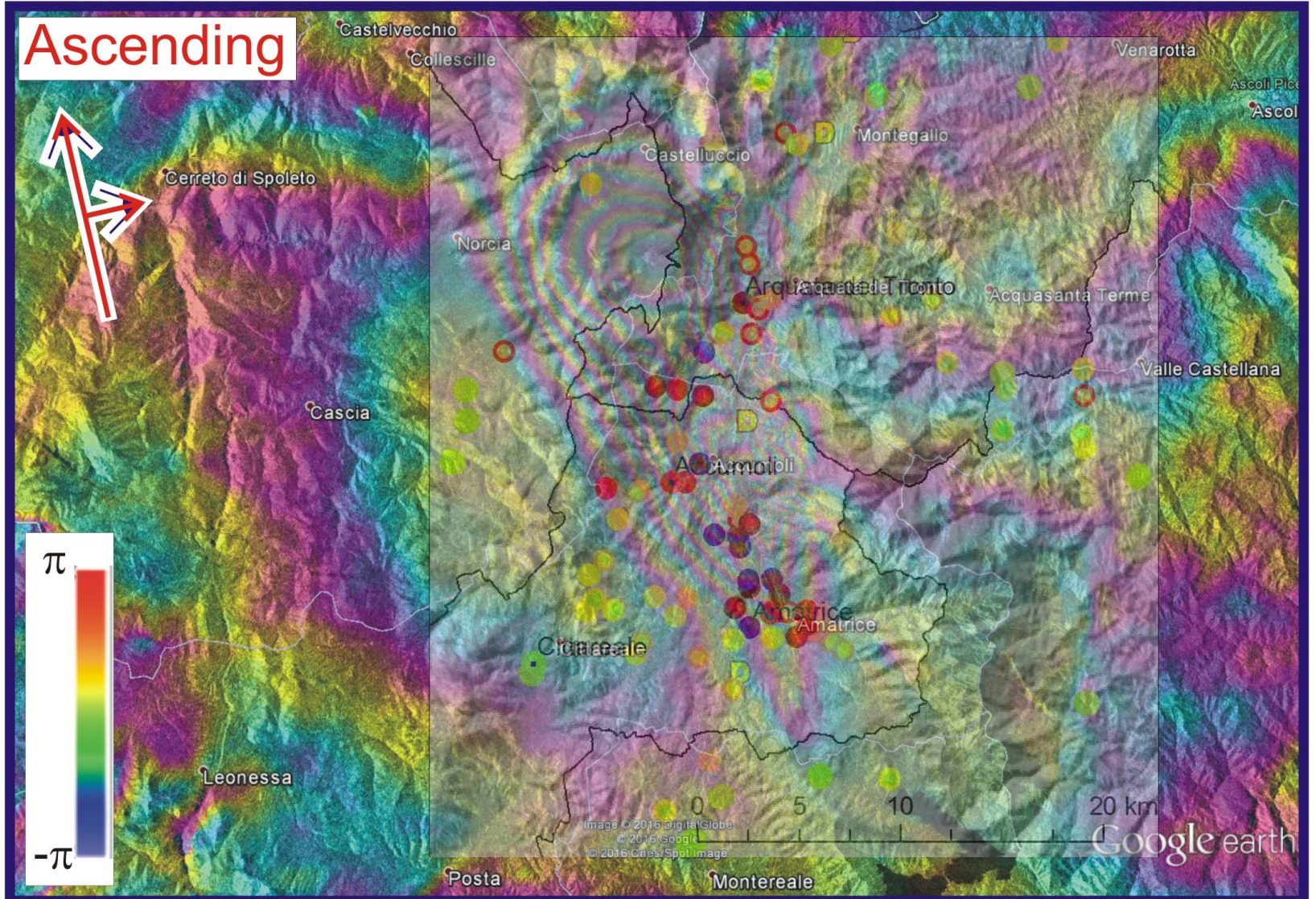
L'AQUILA - 06/04/2009			
	Misurata [cm/s^2]	NTC 2008 - SLV [cm/s^2]	
Componente orizzontale	644	462	1.39
Componente verticale	487	215	2.27

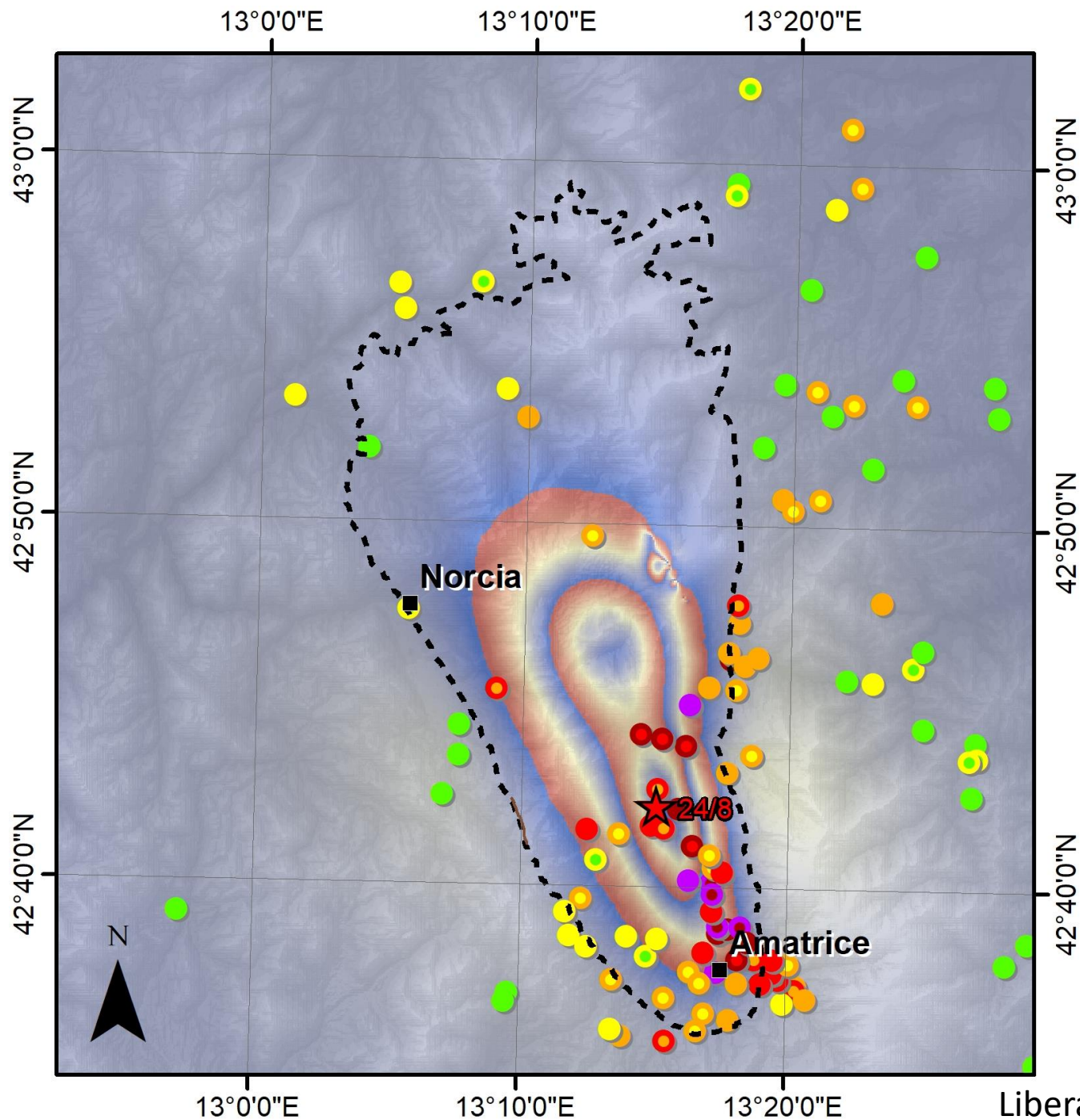
UMBRIA/MARCHE - 26/09/1997			
	Misurata [cm/s^2]	NTC 2008 - SLV [cm/s^2]	
Componente orizzontale	492	439	1.12
Componente verticale	398	187	2.13

Le accelerazioni sono state ottenute considerando:
 Categoria di sottosuolo D: depositi di terreni a grana grossa scarsamente addensati o terreni a grana fine scarsamente consistenti
 Categoria topografica T3: Rilievi con larghezza in cresta molto minore che alla base e inclinazione media $15^\circ < i < 30^\circ$
 Edificio in classe d'uso II, Vita nominale 50 anni

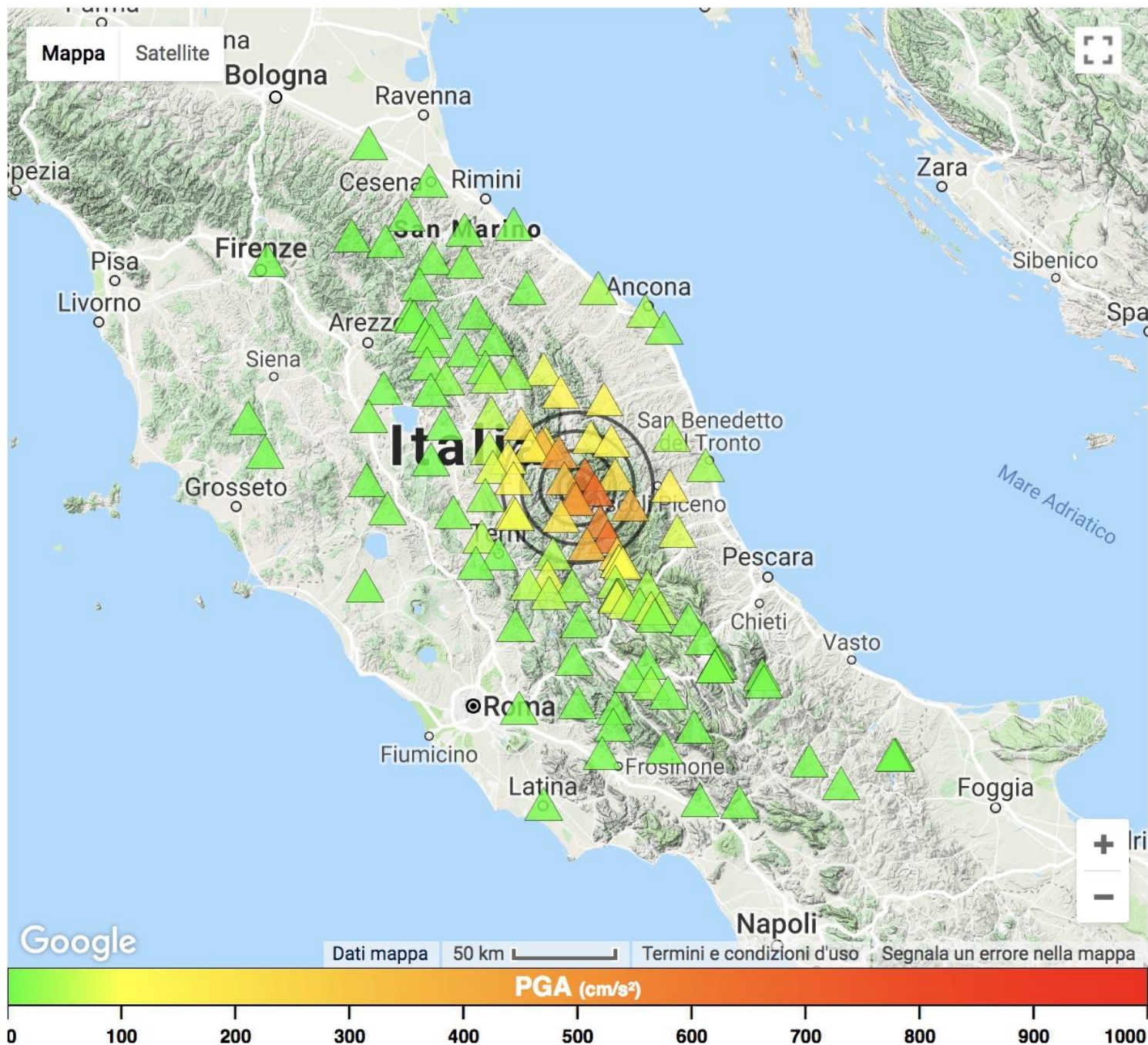
Interferogramma SENTINEL 1A

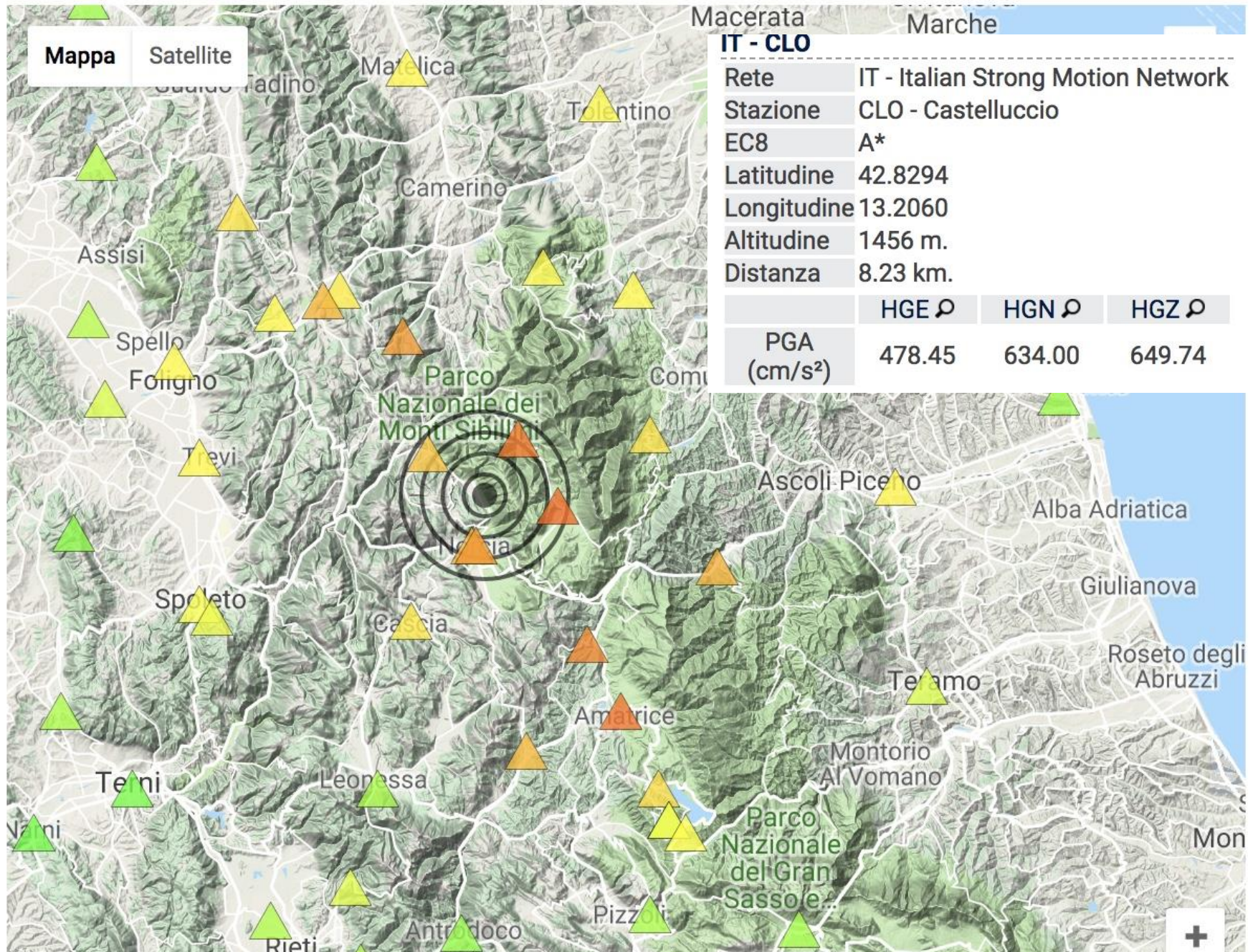
Ascendente coppia 15 -27 Agosto





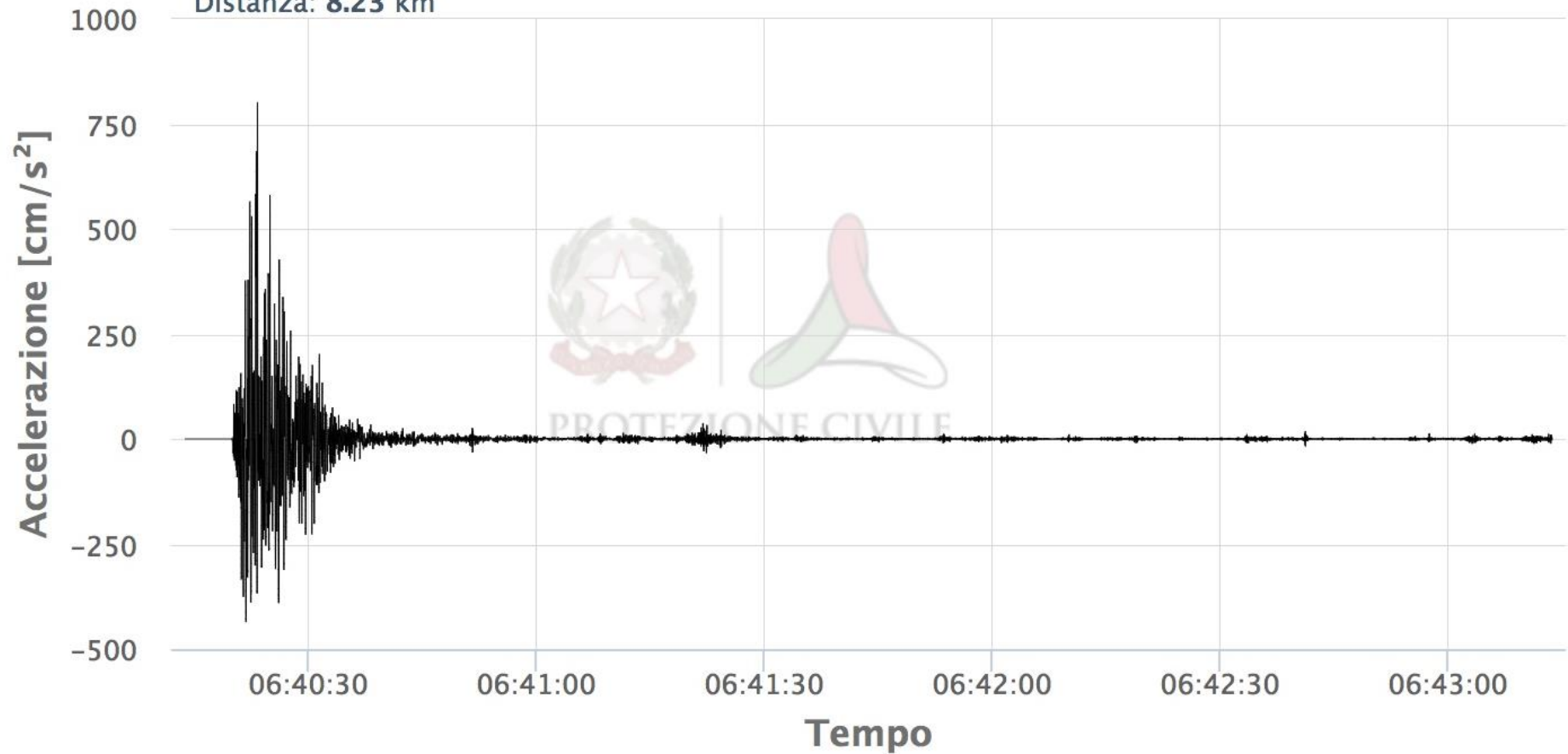
RETE ACCELEROMETRICA NAZIONALE - RAN DOWNLOAD





2016-10-30 06:40:17
IT_CLO_HGZ - CASTELLUCCIO

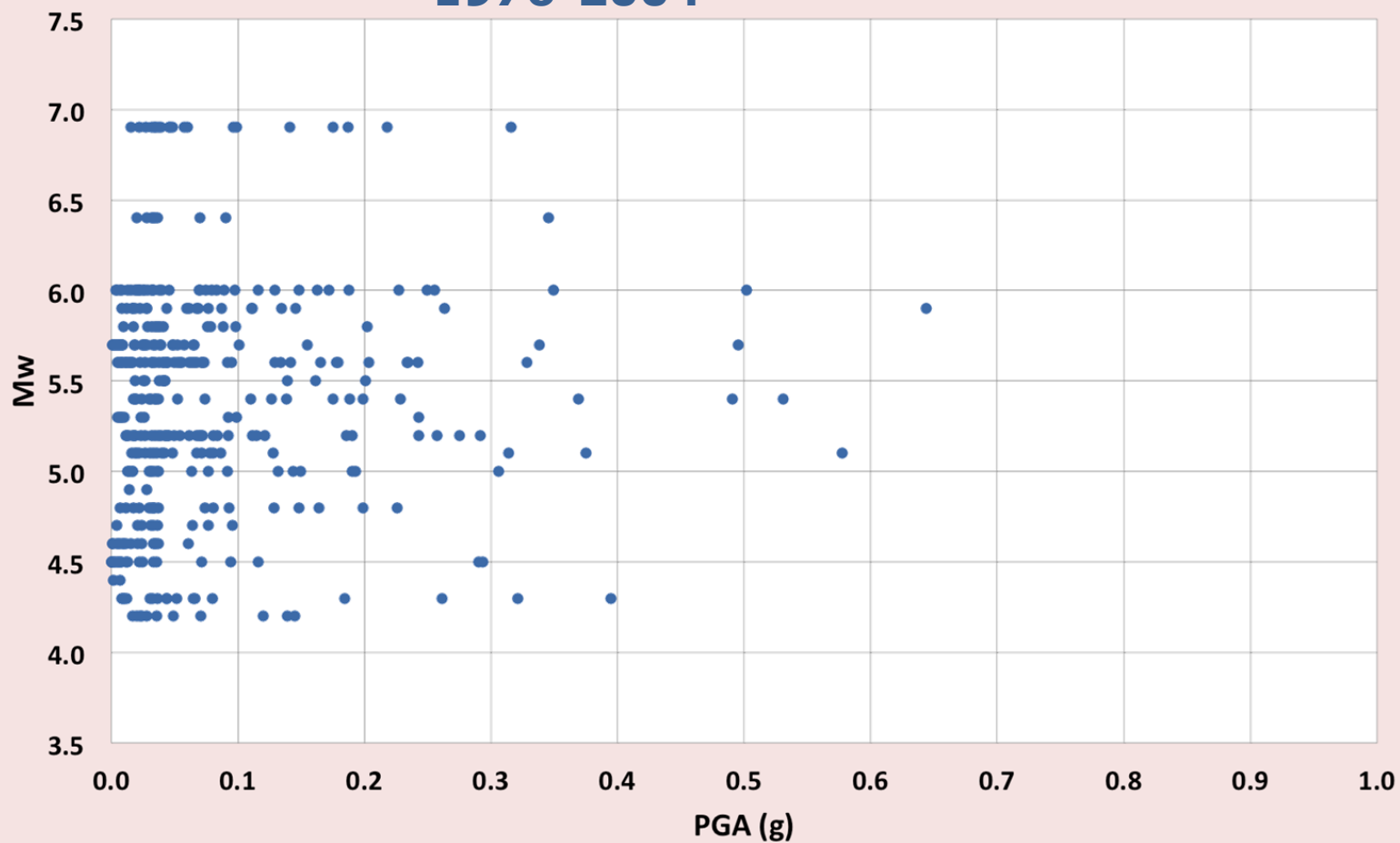
Distanza: 8.23 km



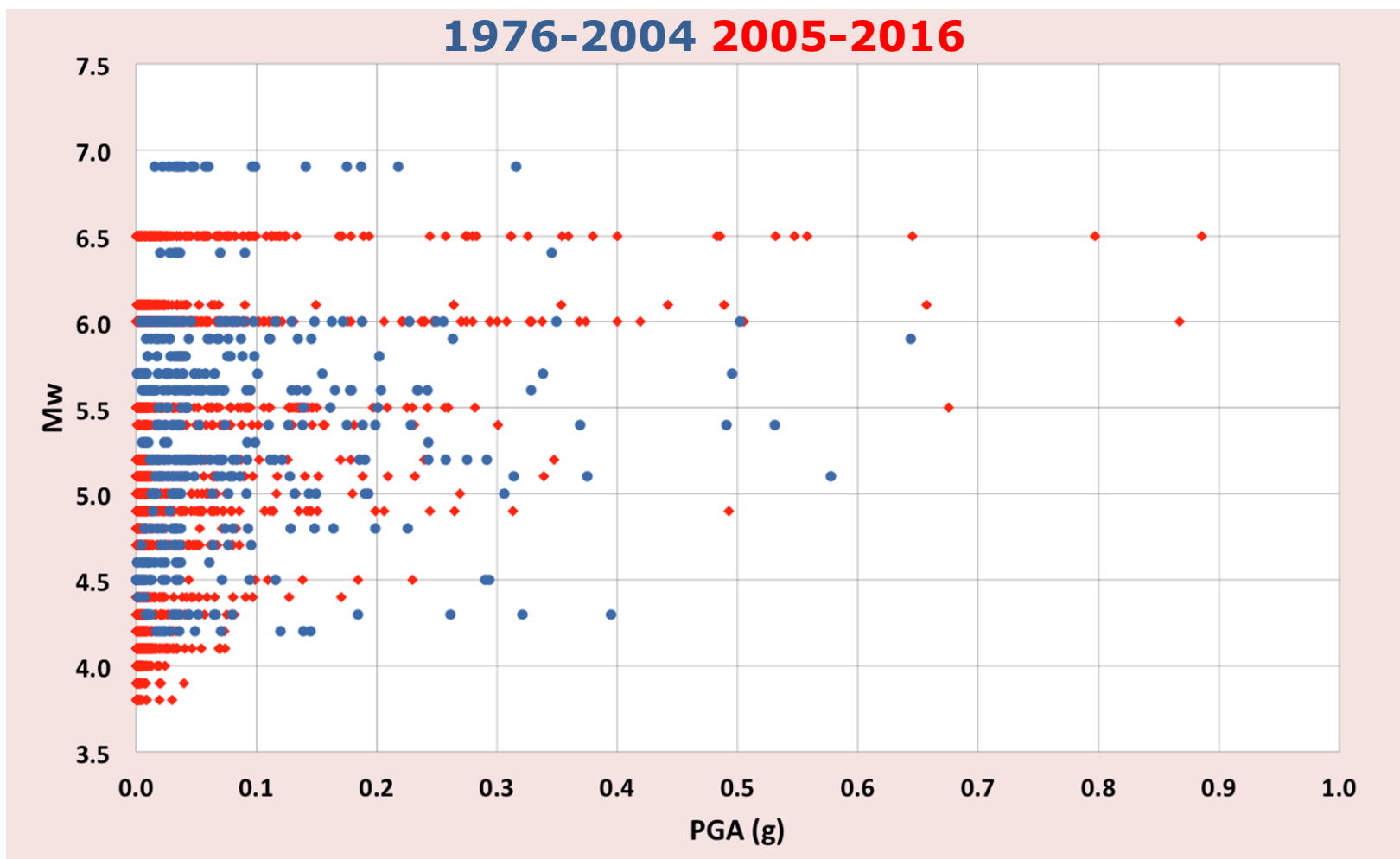
Station	Date	<i>PGA</i> (cm/s ²)	<i>PGV</i> (cm/s)
AMT	2016/08/24	851.2	45.18
CLO	2016/10/30	590.5	69.58
CNE	2016/10/30	487.2	41.66
FCC	2016/10/30	938.5	81.76
IV.T1213	2016/10/30	883.5	62.03
IV.T1214	2016/10/30	623.7	56.24

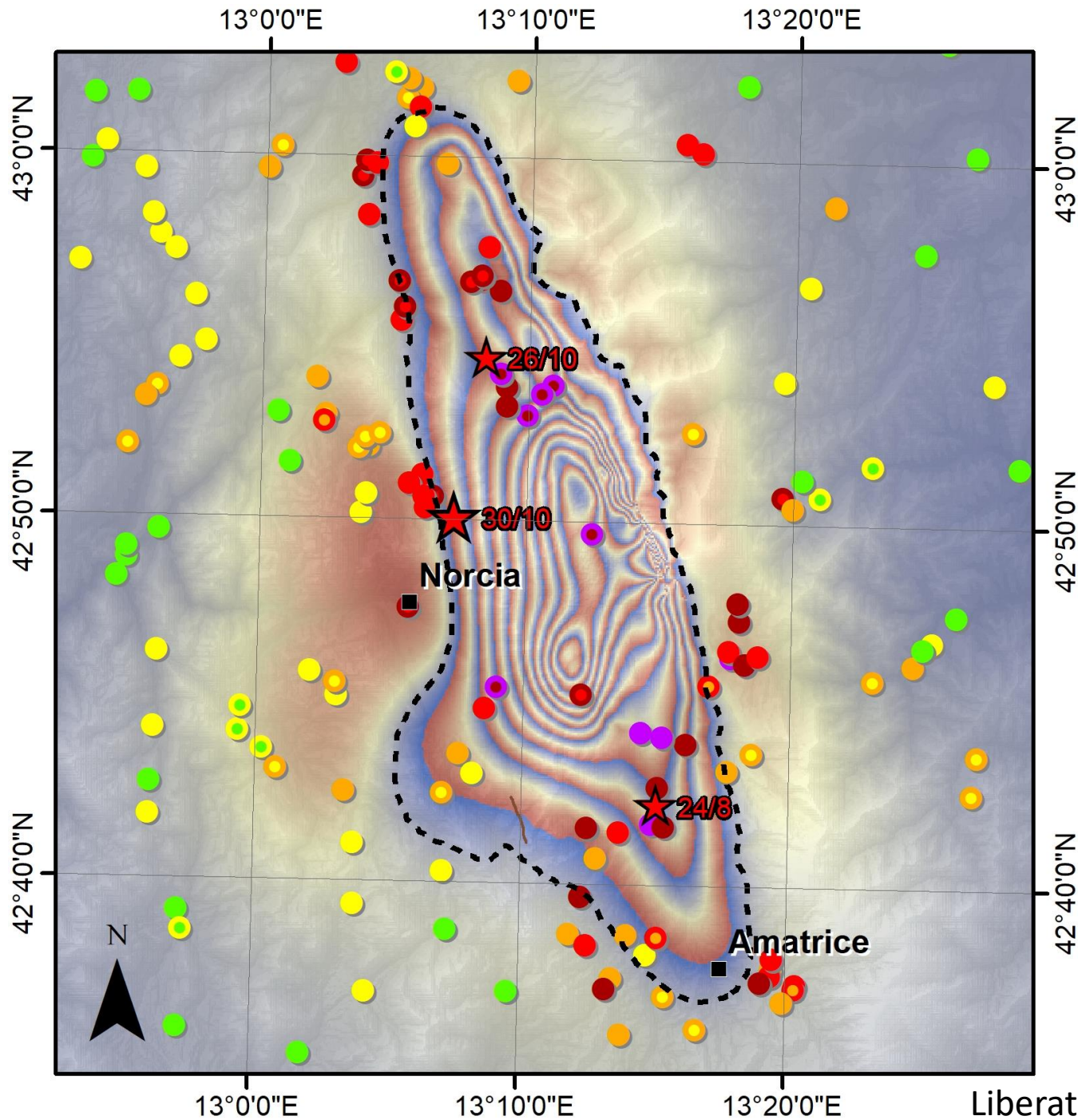
Dati accelerometrici disponibili per l'area italiana

1976-2004



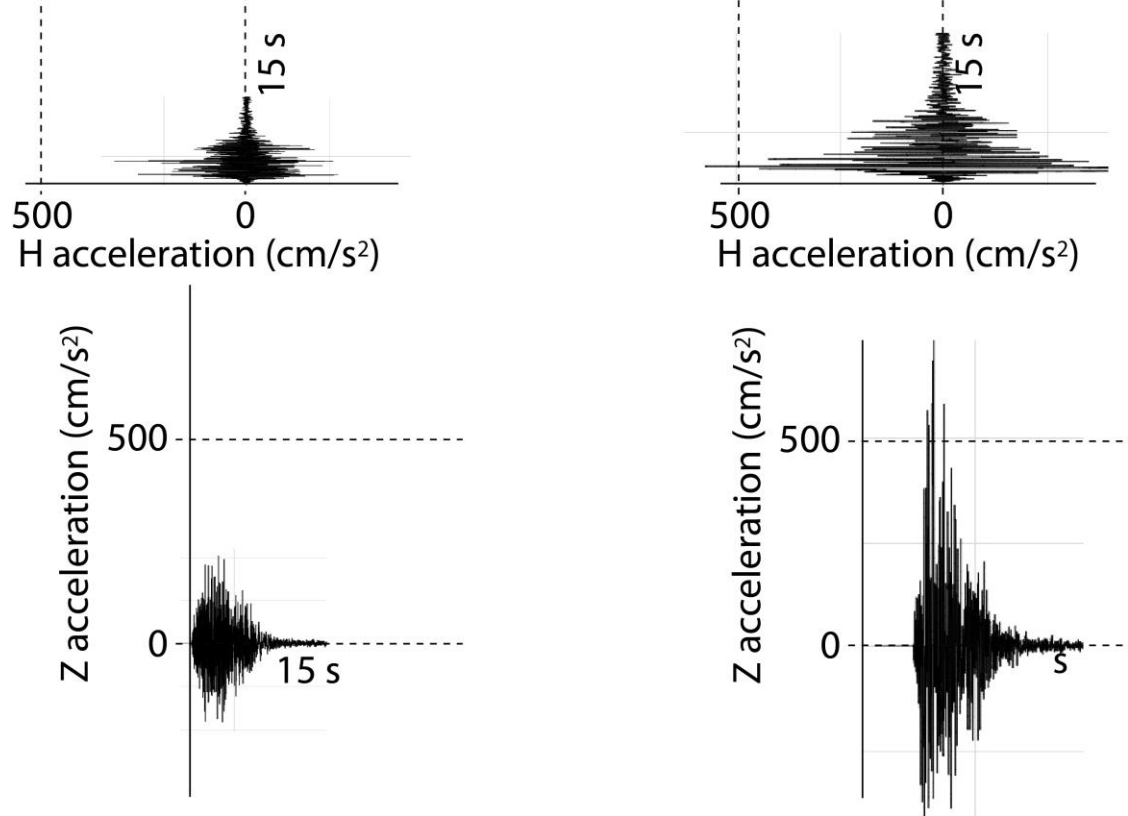
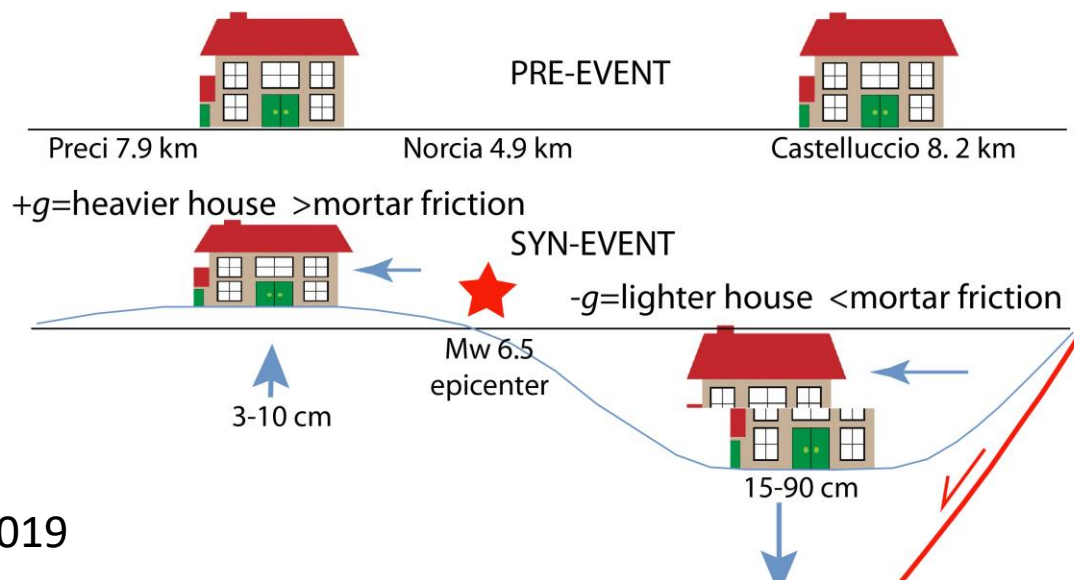
Dati accelerometrici disponibili per l'area italiana

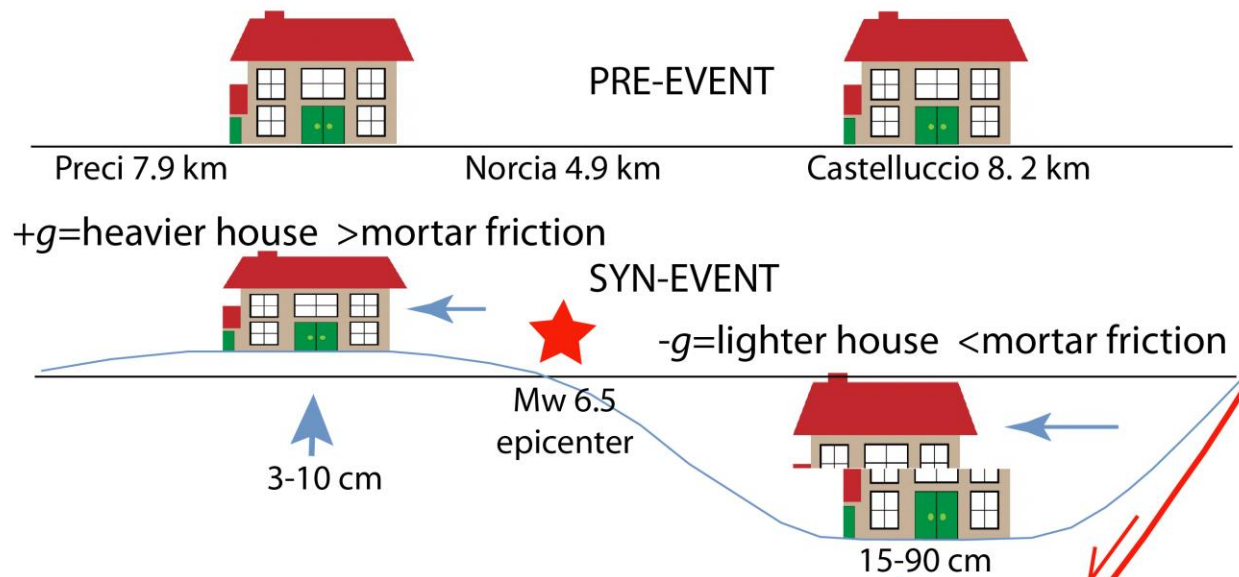
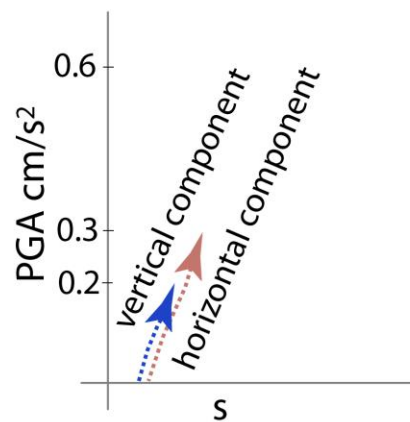
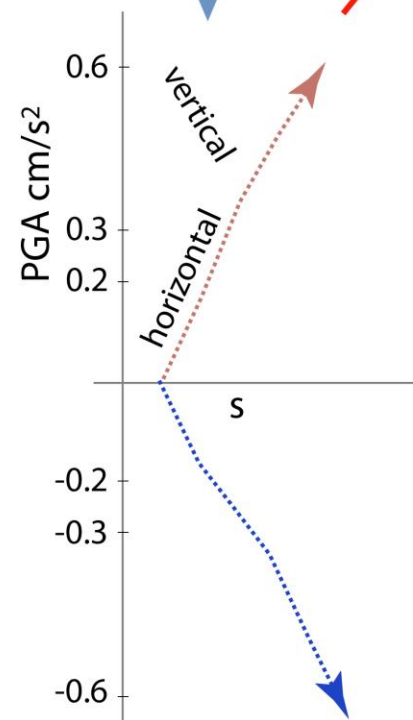




Intensity (EMS)







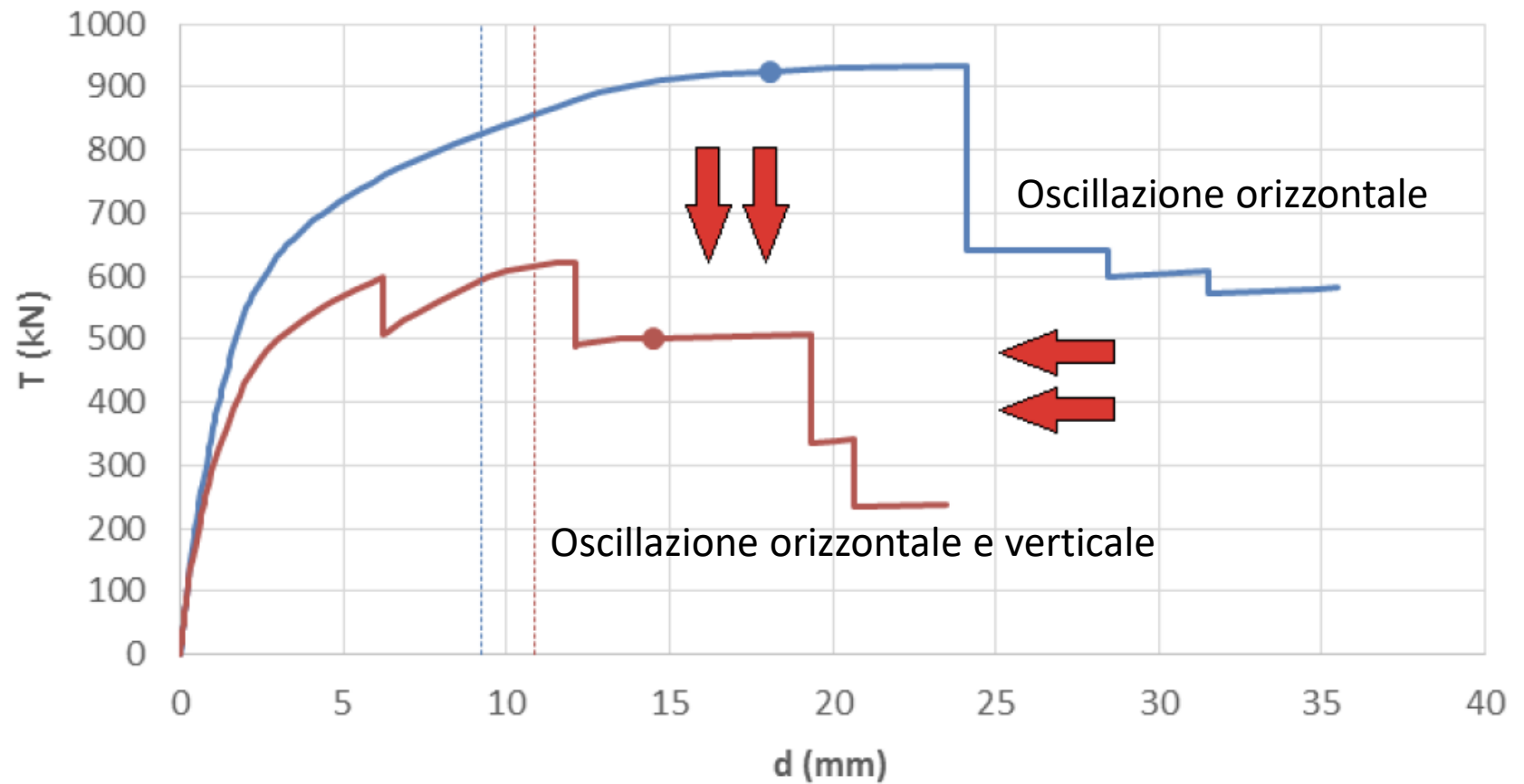


17

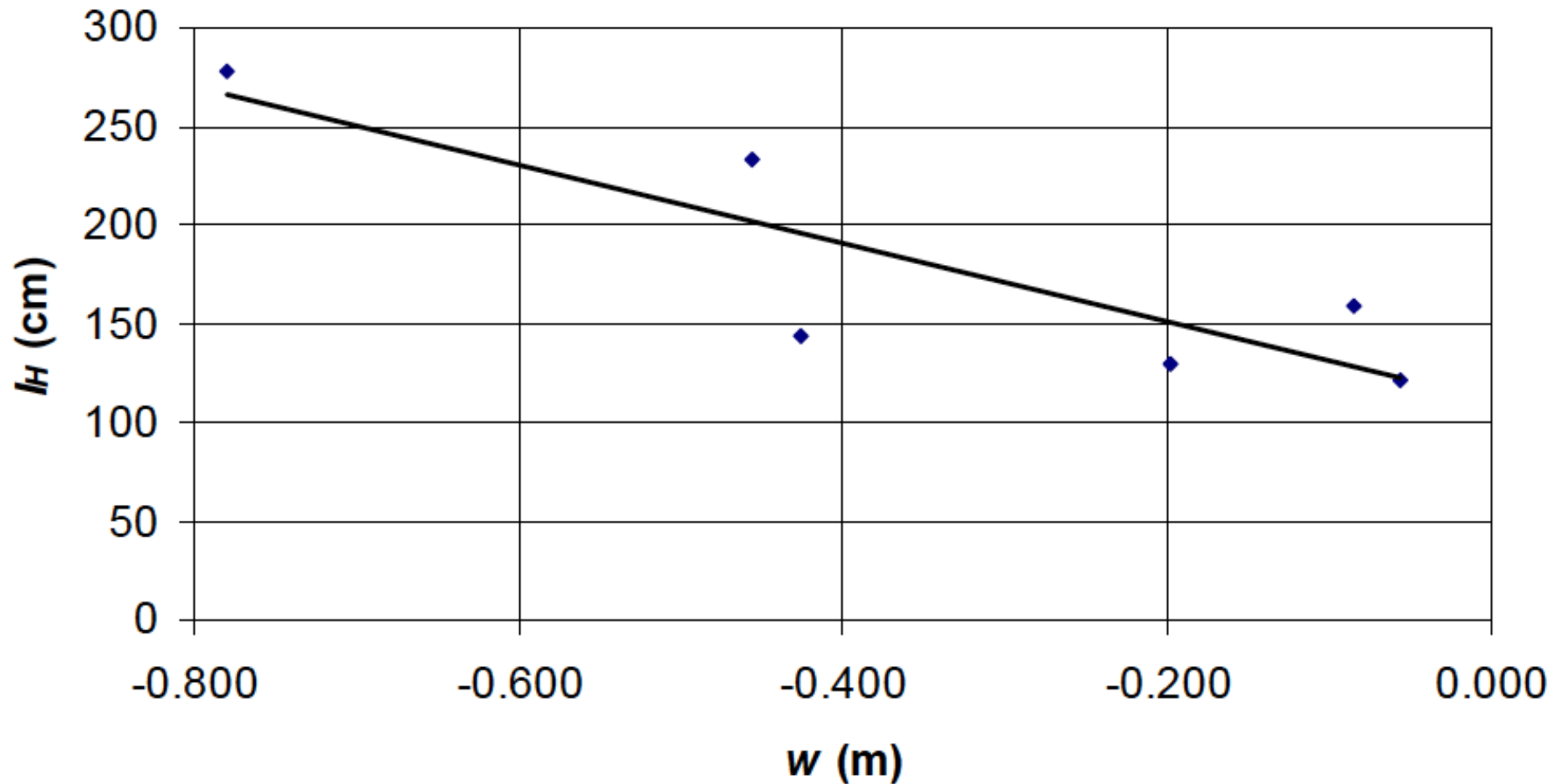


LND 2 30-8

Muratura A6







Regression between Housner Intensity and InSAR vertical displacement.

Per una nuova mappa di pericolosità:

- Tempi di ritorno irregolari e oltre record catalogo – Introdurre aperiodicità
- Monitorare la variazione nel tempo dello SR
- Valorizzare la componente verticale
- Conteggiare l'incompletezza del catalogo
- Ricalcolare PGA e PGV su valori osservati
- Omologare aree a diversa classificazione ma con tettonica e dati GPS simili
- Dipendenza dal tempo
- Aggiornamento conoscenze geologiche e revisione zonazione sismogenetica
- b-value funzione ambiente tettonico
- Magnitudo dipendente dai volumi
- Strategia comunicativa diversa: prima Mmax e poi probabilità