

ISIDe, the Italian Seismic Data Base

Mele F M, Basili A, Bono A, Lauciani V, Marcocci C, Marchetti A, Moro R, Pintore S, Quintiliani M, Scognamiglio L, Mazza S

(1) INGV, via di Vigna Murata 605, 00143, Roma, Italy, franco.mele@ingv.it

Abstract

ISIDe, the Italian Seismic Instrumental and parametric DatabasE, includes today more than 38000 earthquakes occurred in Italy and surrounding seas since April 16 2005, ranging from magnitude ML 0.2 to ML 5.9. The recent L'Aquila seismic sequence contributes with more than 12000 preliminary locations.

ISIDe provides the best revised information about the Italian very recent seismicity, as soon as it is available, and includes:

1) Revised Quasi-Real-Time Locations,

2) the Seismic Bulletin (since April 16th 2005),

3) the Seismic Bulletin (before April 16th 2005).

All the ML are computed from synthetic Wood-Anderson records obtained from horizontal broad band and very-broad band registrations. The minimum magnitude of completeness is ML 1.8, as computed from the cumulated Gutenberg-Richter distribution.

ISIDe Interface

We started the web page **ISIDe.rm.ingv.it** in April 2005 with the aim of easily distribute to the seismological community a revised information on the Italian seismicity in quasi-real-time, as produced by the *Rete Sismica Nazionale (RSN*, the Italian National) Seismic Network). The ISIDe web page is an interface to a relational data base that includes today the *Bollettino Sismico* Italiano. The simple ISIDe page allows the user to select earthquakes by date, magnitude, regional area or distance from geographic coordinates. The advanced search (Fig. 1) gives access to additional information (ipocentre and magnitude errors) and mapping options.

Triggered records are available in real time in SAC format at <u>ftp://</u> <u>iside.rm.ingv.it/events/;</u> phases and old Bulletins since 1983 are available at <u>ftp://ftp.rm.ingv.it/pro/bollet/</u>.

New Earthquake instruments Centeck Language Context About us Dicklimer & Copyright Earthquakes data Interpret Date: Disable From: Disable From: Disable Min: Max: Disable Very Conv and geographic area: Disable Usit Lon and disance Date: Disable Min: Disable Min	2	DATA-BASE ISID®	
Contacts About is Disclamer & Copyright Let ever Earthquakes data This page use the external technology Google maps. Please check if your browser is supported: visit the google page help of Date: Disable From: Doogle(8y28 To: 2008/09/22 Magnitude: Disable Min: 10 Max: 100 Town and geographic area: Disable Min: 60 Longitude Min: 60 Longitude Min: 60 Longitude Min: 60 Max: 100 Max: 100 Max: 100 Max: 100 Select the magnitude to filter on Min Min Min Min Min Min Min Min Min Fror Mi Min Fror Min Fror Mi Min Fror	Home	Earthquakes Instruments Contacts Language	
Editory and a set of the state		Contacts About us Disclaimer & Copyright	ıpdate
This page use the external technology Google maps. Please check if your browser is supported: visit the google page help/?	Earth	quakes data	
Date: Disable From:/2009/09/20 To: 2009/09/20 Magnitude: Disable Min: (20 Max: (200	This p	bage use the external technology Google maps. Please check if your browser is supported: visit the google page help 🖗	
Prom:: To:: 2008/09/02 Image:: Disable Image:: Max:: 1000 Image:: Disable Image:: Max:: 1000 Image:: Town and geographic area:: Disable Image:: Lat.: Longitude Max:: 460 Image:: Town and distance 1000 1000 Image:: Max:: 1000 1000 I	?	Date: 📃 Disable	
Magnitude: Disable Mix: 100 Max: 100 Mix: 100 Mix: 100 Lat. Lon and distance Max: 100 Ma Ma Ma	From	: 2008/08/26 To: 2008/09/02	
Min: 0 Max: 100 Image: Town and geographic area: Disable Image: Lon, min and max Latitude Max: 440 Image: Longitude Max: 60 Longitude Max: 450 Advanced research Image: Latitude Max: 100 100 Advanced research Image: Max: Max: 1000 Image: Longitude Min: Image: Max: 1000 1000 Max: 1000 Max: 1000 Image: Longitude to filter on Image: Longitude to filter on Image: Longitude to filter on Image: Longitude error Max: 1000 1mage: Longitude error Image: Longitude error Image: Longitude error 1mage: Longitude error 1mage: Longitude error Image: Longitude error Image: Longitude error 1mage: Longitude error 1mage: Longitude error Image: Longitude error Image: Longitude error 1mage: Longitude error 1mage: Longitude error Image: Longitude error Image: Longitude error 1mage: Longitude error 1mage: Longitude error Image: Longitude error Image: Longitude error 1mage: Longitude error 1mage: Longitude error 1mage: Lo	?	Magnitude: 📄 Disable	
Image: Contract of the state of the sta	Min:	0.0 Max: 10.0	
Lat. Lon min and max Lat. Lon and distance Latitude Min: <u>560</u> Lat.Lon Min and max Latitude Min: <u>560</u> Latitude Max: <u>180</u> Advanced research © Depth (km): <u>©</u> Disable Min: <u>100</u> Magnitude Mi M M	?	Town and geographic area:	
town and distance town and distance town and distance the set town and distance the set	0 L	it. Lon. min and max	
Latitude Min: 360 Latitude Max: 460 Longitude Min: 60 Longitude Max: 930 Advanced research © Depth (km): © Disable Min: 10 Max: 1000 © Select the magnitude to filter on © Magnitude Md Mi MS © Select the additional fields to show © Origin time error Latitude error Depth error Depth error Depth error Md Fror Md Mi Fror MS © Select the map options © Select the map	0 1	own and distance	
Advanced research Depth (km): Depth (km): Depth (km): Max: 1000 Magnitude Magnitude Md Md Md Md Md Ms Select the additional fields to show Origin time error Logitude error Depth error Depth error Depth error Depth error Depth error Depth error Md Error Md Mr Mr Fror MS Select the map options View town No town Color map Grey map	Latit	ude Min: 36.0 Latitude Max: 48.0	
Advanced research Bepth (km): Depth (km): Max: 1000 Max: 1000 Magnitude Magnitude Md MM MM MM MS Select the additional fields to show Origin time error Latitude error Longitude error Doptine error Peterred Magnitude error Md Fror Md M M MS Select the map options View town O to town O tow	Long		
Depth (km): Disable Min: Max:	- Adva		
Min: 0.0 Max: 100.0 Select the magnitude to filter on Max: 100.0		Depth (km): 🗹 Disable	
Image: Select the magnitude to filter on Magnitude Md Md Mi Origin time error Latitude error Depth error Preferred Magnitude error Md Error Md Mi Error Mi MB Error MS Image: Select the map options View town No town Color map Grey map	Mi	n: 0.0 Max: 100.0	
Magnitude Md Md Mi Select the additional fields to show Origin time error Latitude error Depth error Preferred Magnitude error Md Fror Md Fror Mi Error Mi Mi Error Mi Mi Error MS Select the map options View town No No town Color map Grey map Search Reset	~?	Select the magnitude to filter on	
Md Mi MB MB MW MS © Select the additional fields to show Origin time error Longitude error Depth error Preferrer Magnitude error Md Error Md Mi Error Mi MB Error MB Error MS © Select the map options View town © Niew town © Color map © Grey map	•	Magnitude	
M MB MW MS Origin time error Latitude error Latitude error Depth error Preferred Magnitude error M MI Error Md MB Error MI MB Error MS Ø Select the map options View town Otion map Ø Grey map Search		Md MI	
MB MW MS Select the additional fields to show Origin time error Latitude error Depth error Preferred Magnitude error Md Error Md Error MI MB Error MB MW Error MB MW Error MS Select the map options View town O Nown Color map O Grey map	0	M	
MS Image: Select the additional fields to show Origin time error Latitude error Depth error Preferred Magnitude error Md Error Md MI Error MB MW Error MB MW Error MS Ø Select the map options View town No town Color map Grey map		MB MW	
Select the additional fields to show Origin time error Latitude error Dopth error Preferred Magnitude error Md Error Md Mi Error Mi MB Error MB MW Error MS Select the map options View town © No town Color map @ Grey map	ŏ	MS	
 Origin time error Latitude error Depth error Preferred Magnitude error Md Error Md Mi Error Mi M Error MB Fror MB Error MW MS Error MS Select the map options View town O town Color map Grey map 	?	Select the additional fields to show	
Latitude error Longitude error Depth error Md Error Md Mi Error Mi M Error M MB Error MB MW Error MS Select the map options View town No town Color map Grey map Manual Select Search Reset		Origin time error	
Depth error Preferred Magnitude error Md Error Md MI Error M MB Error MB MW Error MS Ø Select the map options View town O No town Color map Ø Grey map		Latitude error	
Preferred Magnitude error Md Fror Md Fror Md Mi Error Mi MB Frror MB MW Frror MW MS Error MS Select the map options View town O Color map Grey map		Depth error	
Frror Md MI Error MI M Error M MB Error MB MW Error MW MS Error MS View town O town Color map Grey map Search Reset		Preferred Magnitude error	
 MI Error MI M Error MB MW Error MW MS Error MS Ø Select the map options View town No town Color map Ø Grey map 		Error Md	
Error M M Error MB B Error MB MW Error MW MS Error MS Error MS View town O town Color map Grey map Search Reset			
 ⊨ Error M → MB ⊨ Error MB → MW → Error MW → MS → Error MS ✓ Select the map options ✓ View town ◇ No town ◇ Color map ③ Grey map 		M	
Imp Error MB MW Error MW MS Error MS Important View town No town Color map Important Search Reset		Error M	
WW Error MW MS Error MS View town No town Color map @ Grey map Search Reset		MID Error MB	
Error MW MS Error MS Select the map options View town No town Color map Grey map Search Reset		MW	
Error MS Select the map options View town O No town Color map Grey map Search Reset		Error MW MS	
 Select the map options View town No town Color map Grey map 		Error MS	
 ○ View town ○ No town ○ Color map ● Grey map 	?	Select the map options	
No town Color map Grey map Search Reset	0	View town	
Color map Grey map Search Reset	•	No town	
Search Reset	•	Color map Grey map	
Search Reset			
		Search Reset	

Although ISIDe is spanning only the last four years and half of Italian seismicity, it is unprecedented in Italy for completeness and homogeneity and represents an optimum test data set to verify small and moderate seismicity pattern model. ISIDe is now available at <u>http://iside.rm.ingv.it/</u>.

Magnitudo

Local Magnitude estimates are based on synthetic Wood-Anderson waveforms for a very large majority of the events reported in the Bulletin after April 15, 2005. In 2007 estimated ML magnitudes has been the 97.8% on a total of 5871 regional earthquakes.

We apply the Hutton-Boore relation to take into account the attenuation with hypocentral distance (Hutton-Boore, 1987).

> MN.AQU .-- .BHZ : 11693 PSDs 01-JAN-2009 / 07-SEP-2009

Figure 1 | ISIDe form to interactively request, download and map locations from the Italian Seismic Bulletin.

The New Italian Seismic Bulletin

Until April 15th 2005, robust procedures, consolidated by a long practice, were used to review seismograms and produce the Bulletin. Daily analysis based on them was unfortunately limited to analog 1-component short period instruments only. Starting from April 2005, we use new procedures to create the Seismic Bulletin for Italy: more than 250 3-component broad-band and a few tens of short period velocimeters are now included in the routine analysis. Furthermore, the density of high quality stations of the Italian Seismic Network (fig.2) allows to detect low magnitude seismicity trends inside the Bulletin, that could be identified in Italy until a recent past only by means of local (often temporary) networks.



Near real time locations

We use the robust revised location (produced by the Seismic Service for the Civil Protection within 30 minutes after the seismic event) to update ISIDe pages. A final location is released when we publish the Italian Seismic Bulletin. Usually this happens every 15 days, with delays of 1 to 2 months. Due to the heavy seismicity occurred after L'Aquila main earthquake, ISIDe includes today preliminary locations for about 12000 shocks (Fig.2). The Bulletin of the first fifteen days of April will be published at the end of October.

Completeness Analysis

Schorlemmer et al. (2008) showed that the detection capability of the Italian National Seismic Network and, as a consequence, the minimum magnitude of completeness of the catalogue is highly variable from place to place, ranging from M \approx 1.5 in some restricted areas of the southern Apennines to M = 2.9 in western Sicily.



Figure 4-5 | Beside station information ISIDe provides quality analysis as Probability Density Functions (above) and time evolution of Power Spectral Density at 3 chosen frequencies (below).



Figure 2 | Shocks occurred in 6 months and located by the personnel of the seismic duty, starting from April 6 in L'Aquila region (Ml>2.5).



Figure 3 | The minimum magnitude of completeness of the Italian Seismic Bulletin lowered from Mc ≈ 2.3 in year 2000 to Mc \approx 1.8 in 2006 (Amato and Mele, 2008).



