ISIDe, the Italian Seismic Data Base

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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.

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 **http://iside.rm.ingv.it/**.

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).

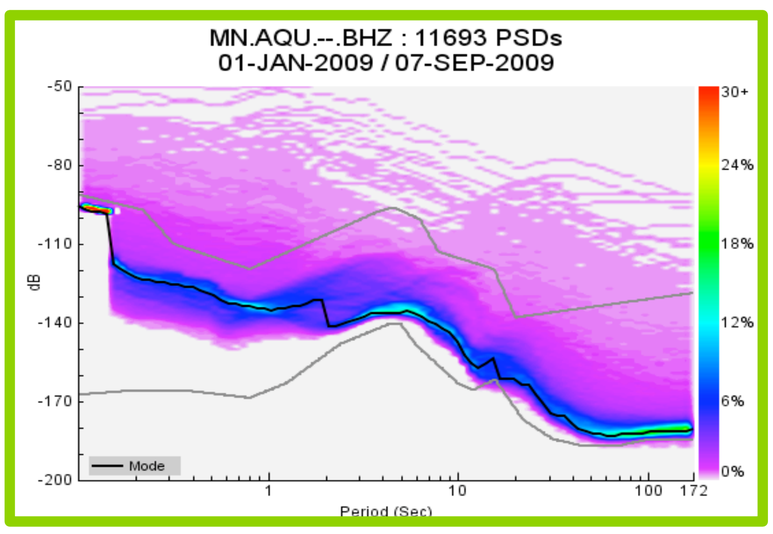
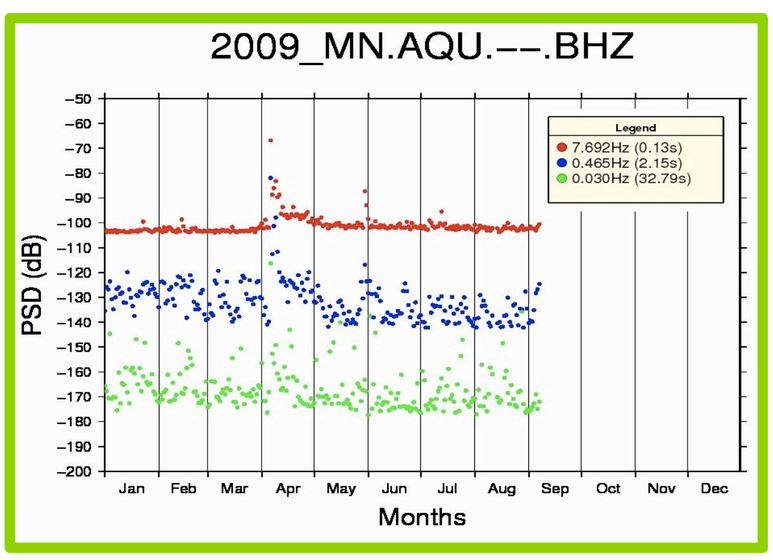


Figure 4-5 | Beside station information ISIDe provides quality analysis as Probability Density Funcions (above) and time evolution of Power Spectral Density at 3 chosen frequencies (below).



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 ftp://iside.rm.ingv.it/events/; phases and old Bulletins since 1983 are available at ftp://ftp.rm.ingv.it/pro/bollet/.

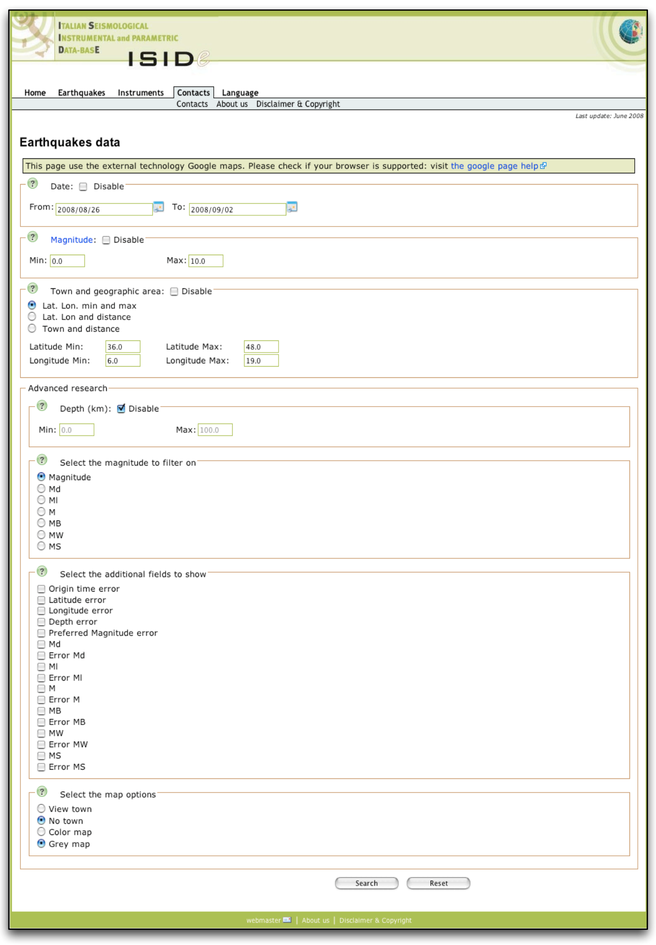


Figure 1 | ISIDe form to interactively request, download and map locations from the Italian Seismic Bulletin.

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.

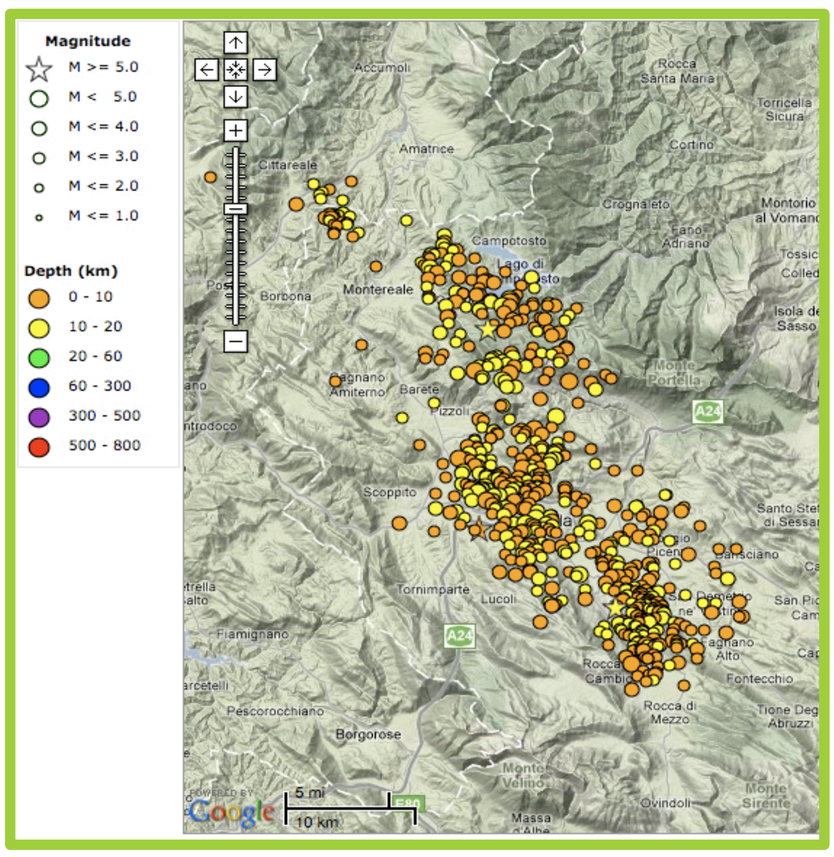


Figure 2 | Shocks occurred in 6 months and located by the personnel of the seismic duty, starting from April 6 in L'Aquila region (Ml>2.5).

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≈1.5 in some restricted areas of the southern Apennines to M =2.9 in western Sicily.

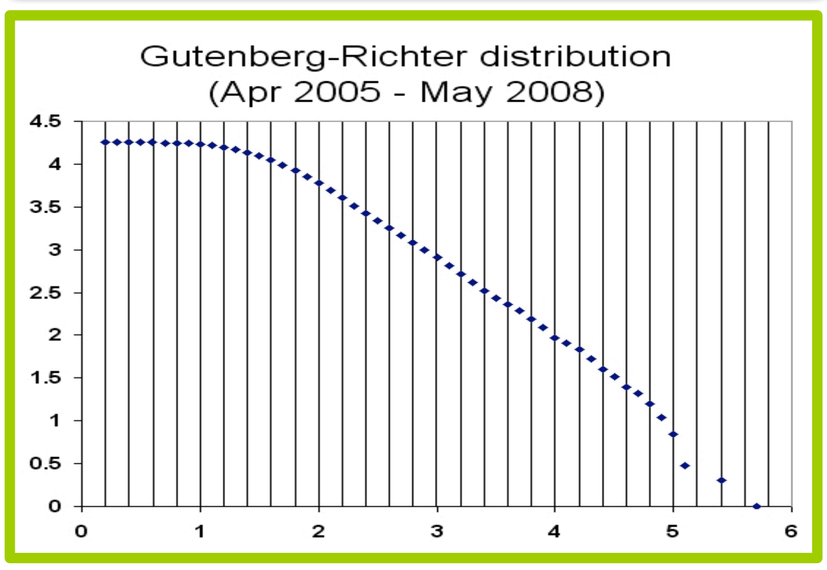


Figure 3 | The minimum magnitude of completeness of the Italian Seismic Bulletin lowered from Mc ≈ 2.3 in year 2000 to Mc ≈ 1.8 in 2006 (Amato and Mele, 2008).

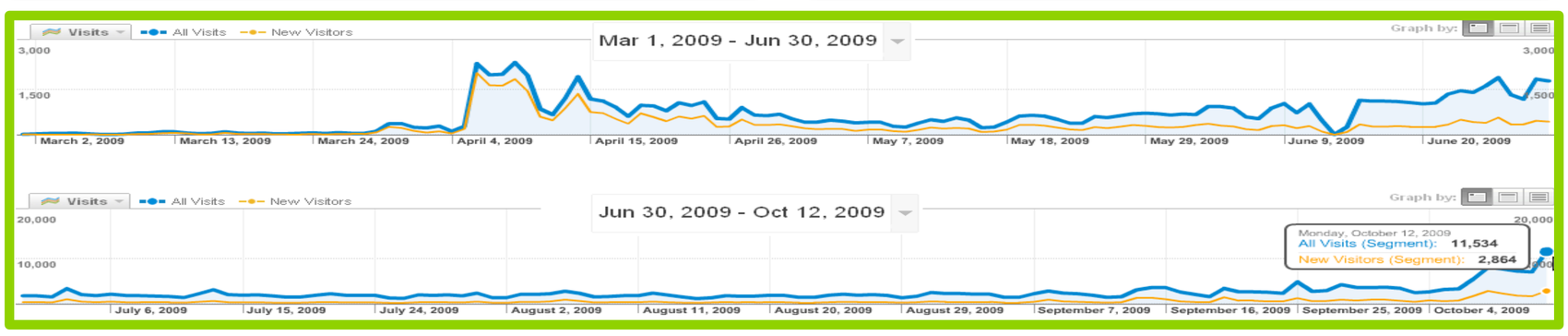


Figure 6 | Visits to ISIDe increased from a few hundreds before L'Aquila main shock, to 2800/day right after, to more than 10000 after the recent Sora sequence.