The National Spanish Earthquake Catalogue

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The national Spanish earthquake catalogue reports data of over 100,000 earthquakes occurred since 880 B.C. It is compiled and updated online in real time by the Instituto Geográfico Nacional (www.ign.es).

It includes the largest earthquakes known in Western Europe (Lisbon 1755, $M_w \approx 8.5$, and other great offshore earthquakes). At the other extreme, events with $M_w \approx 0$ are nowadays routinely recorded in the areas where the seismological network is densest.

Earthquakes were recorded in record numbers in relation to the submarine eruption offshore El Hierro (Canary Islands, 2011).

Catalogue description

Network evolution in the Iberian Peninsula

The first Spanish and Portuguese observatories in the Iberian Peninsula were established in the late XIX century. The first WWSSN station in the area dates from 1962. The short-period Spanish National Seismic Network began to be deployed in 1978 and its broadband replacement started in 2000. Other networks (not shown) also contribute data for the final catalogue version.

Network evolution and magnitude of completeness in the Canary Islands

As in the Iberian region, the magnitude of completeness is tightly related to the spatial density of stations and the deployment of the broadband network.

Location precision

Before November 1997, instrumental locations were calculated with Hypo71. Since that date, improved automatic location routines have been used, and hypocentral locations have been calculated with Evloc.

The locations are much more precise in the Iberian Peninsula than elsewhere. Depth determinations are particularly uncertain for distant offshore earthquakes.

Magnitude of completeness in the Iberian region

The magnitude of completeness ($M_c$) and its uncertainty ($\delta M_c$) are calculated here with the entire-magnitude-range method (Woessner & Wiemer, BSSA, 2005).

The sudden improvement in November 1997 was mostly due to the new automatic detection procedures. Since March 2002, a much lower $M_c$ results from the introduction of an improved magnitude definition (which tends to yield lower values) and especially from the broadband network.

Periodic variations of detection capabilities

Because of the smaller seismic noise, earthquakes are predominantly recorded during night time and, in the Iberian region, also on Saturdays and Sundays (weekend effect).

These variations tend to vanish if only the complete part of the catalogue is considered.

Blasts

Despite routine screening, the catalogue contains mine and quarry blasts mixed with natural earthquakes (as already evidenced by Gulia, 2010, Natural Hazards). Some occur during daylight hours, for example like clockwork between 15:50-15:56 UT at the Trimouns open-pit talc mine (left).

But in underground mines (below), they may be recorded preferentially at night. Blasts are detonated during breaks or work shifts (every 8 or 12 hours), when nobody is inside the mine.