

A Reappraisal of the Seismicity of Sardinia, Italy

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Abstract

In popular opinion, Sardinia is the only nonseismic region of Italy. Most researchers are likely to agree, up to a point. Geology-wise, the Sardinia–Corsica block is among the stablest areas of the Mediterranean. History-wise, up to 2011, only one M_w 5.1 event located offshore Sardinia was listed by Italian seismic catalogs (13 November 1948). Seismic networks record only a few, low energy ($M_w < 5$) events, mostly located offshore and with little or no effects on land. Seismic hazard in Sardinia is very low.

“Low,” yes, but not “totally lacking.” We present the results of a recent reappraisal of Sardinian seismicity. We gathered information on three major earthquakes (1616, 1771, and the 1948–1949 sequence). Another sequence (January–March 1901) was re-evaluated, identifying its previously unknown main event. It was confirmed that some earthquakes (1870, 1906, 1922, and 1924) had low magnitudes and scarce to nil macroseismic effects, whereas some other turned out either very doubtful or wholly fictitious (1835, 1838, 1855, and 1898). The seismic hazard of Sardinia can now be reassessed on a sounder basis than before. We hope that our work will help the people of Sardinia to improve their awareness of living in a seismic land, if with a low level of seismicity.

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[Supplemental Material](#)

Introduction: Sardinia, An Earthquakeless Island?

Sardinia, the second-largest Italian island, is a land of great natural beauty and cultural heritage, and also a world-class tourist attraction thanks to huge real-estate investments made from the 1970s onward by the Karim Aga Khan IV-sponsored Costa Smeralda Consortium. Sardinia is also commonly held to be “earthquake free.” Tourist agencies and real-estate societies like to make this point to customers (Fig. 1), often quoting on this the Italian Civil Protection Agency and/or the European Seismic Hazard Map by [Giardini et al. \(2013\)](#).

In fact, several earthquakes have occurred in Sardinia in recent years. On 18 June 1970, one was located some kilometers northwest of Porto Torres and was felt as far as the France–Liguria coast. On 28 August 1977, another earthquake located 100 km southwest of Capo Teulada was strongly felt in south Sardinia causing panic in Cagliari. On 26 April 2000, two strong shocks were located at sea east of Olbia, causing slight damage in Olbia itself and panic in Posada and Costa Smeralda. Later events (2004, 2006, 2011, 2012, and 2020) were also perceived locally.

Despite this, whenever an earthquake is felt in Sardinia, the popular belief that such things do not happen there sparks heated public debate and the hunt for fanciful explanations of what is, really, a natural, if infrequent, event. By setting out, as clearly and exhaustively as possible, all that is known at present about the historical seismicity of Sardinia, we hope to provide a sounder basis for future discussions

The Geological and Seismotectonic Context

From a geodynamic point of view, the Sardinia and Corsica islands can be considered as a single block with a homogenous history (the Sardinia–Corsica block). Before the opening of the western Mediterranean (30 Ma), the two islands were part of the Iberian peninsula, in a position around parallel to the present coast of Spain. Having rotated with a velocity of around 4–5 cm/yr, 15 Ma ago they reached their current position ([Faccenna et al., 2002](#)). Since then, the Sardinia–Corsica block has been locked in this position and tectonic activity was at its east, with the opening of the Tyrrhenian Sea. The Sardinia–Corsica block is far from active plate boundaries and the seismicity is rare within the block; earthquakes are mainly observed along the faults that border the block (Fig. 2).

The Istituto Nazionale di Geofisica e Vulcanologia instrumental catalog (see [Data and Resources](#); Fig. 3) includes some dozens of Sardinian earthquakes occurred from 1985 onward. Only four of them had a magnitude greater than 4.0: to the northeast, the two events that occurred on 26 April 2006 (M 4.2 at 13:28; M 4.7 at 13:37) and the 18 December 2004

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