



One century after the 1908 Southern Calabria - Messina earthquake (southern Italy): a review of the geological effects

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The December 28, 1908, Southern Calabria - Messina earthquake (I MCS XI, estimated magnitude 7.2) was one of the strongest seismic events that rocked Italy during historical times and the most ruinous in terms of casualties (at least 80,000). According to most reconstructions, its epicentre was located at sea in the Messina Straits.

The impact of the earthquake was particularly catastrophic in Reggio Calabria and Messina. Damages have been more intense and widespread along the Calabrian coast, between south of Reggio Calabria and south-west of Scilla. In Sicily the most damaged area was the coast from its easternmost tip to south of Messina.

Some minutes after the earthquake, a destructive tsunami inundated both sides of the Strait, with a run-up that rose above 10 meters in some places, killing at least 2,000 people.

This study attempts at reconstructing the coseismic effects on the environment based on a careful review of contemporary documents (i.e. technical and photographic reports, newspapers and other archive material). Among the effects, particularly relevant were the changes in elevation, partly due to the settlement of coastal loose sediments and artificial backfilling (e.g., Messina port area), and partly ascribed to tectonic slip.

Portions of the coast were lost, specially on the Calabrian side. The most relevant ground cracks were reported in Messina, Reggio Calabria and at San Procopio near Sant'Eufemia in Calabria (here they were 4-5 km long, according to Baratta), landslides and rockfalls were seen in a modest number of localities (specially near Bagnara Calabria). A submarine telephone cable between Gallico (in Calabria) and Gazzi (in Sicily) was broken in two pieces after the earthquake, and only one segment could be recovered, likely because the other segment was buried by a slide.

The obtained database allows a comprehensive view of ground coseismic environmental effects, giving also the possibility to apply the ESI 2007 environmental intensity scale in order to corroborate the intensity evaluation of the earthquake. It is readily evident that, apart from the huge tsunami wave, coseismic environmental effects appear to be modest with respect to the effects reported for earthquakes of similar magnitude occurred in the same region (i.e., 1783 Calabrian and 1693 eastern Sicily earthquakes). This might be in agreement with a submarine location of the epicentral area. Nevertheless, even so, the historical record of environmental effects does seem to be somehow incomplete in terms of occurrence and distribution. This might be due, at least in part, to a lesser attention to environmental effects because of the dramatic size of the catastrophe.