



A modern re-examination of the locations of the 1905 Calabria and the 1908 Messina Straits earthquakes

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Reliable estimates of the locations of large historical earthquakes is critical for the evaluation of seismic hazard. In this work we focus on hypocentral relocation of two large events - the 1905 Calabria and the 1908 Messina Straits earthquakes. Both events occurred in Southern Italy, featured similar maximum intensities (XI MCS) and resulted in extensive damage and, in 1908 especially, many fatalities.

The data used in this work consists of the world-wide phase data prepared and published by Rizzo in 1906 and 1910 for the two earthquakes. In addition, for the 1908 event we have re-interpreted the Taranto station waveforms using the scanned images of the original seismogram that are available in the INGV Sismos earthquake database (<http://sismos.ingv.it>).

For relocation of these two events we use the fully non-linear, probabilistic earthquake location algorithm NonLinLoc (Lomax, 2005; <http://www.alomax.net/nlloc>). We obtain multiple locations using different assumptions on the errors and phase identifications for the reported readings. This process allowed us to investigate fully the resolving power of the data set and the uncertainty in the resulting locations. Our preferred solution for the 1905 earthquake is about 30 km offshore of the Calabrian coast to the west of Capo Vaticano. Our preferred solution for the 1908 event is in the southern part of the Messina Straits near the Calabrian coast. This latter result is consistent with previous investigations of the extension of the causative fault and with the northwards direction of rupture determined by Pino et al. (2000). Overall, this study shows that application of modern and robust techniques can be extremely useful in the investigation of past historical events and underlines the importance of preserving historical

data as performed at INGV (<http://sismos.ingv.it>).

Lomax, A., A Reanalysis of the Hypocentral Location and Related Observations for the Great 1906 California Earthquake, *Bull. Seism. Soc. Am.*, (2005 accepted, in revision).

Pino, N. A., D. Giardini, E. Boschi, The December 28, 1908, Messina Straits, southern Italy, earthquake: Waveform modeling of regional seismograms, *J. Geophys. Res.*, 105(B11), 25473-25492, 10.1029/2000JB900259, 2000.