



Reassessment of the historical earthquake of 23 February 1887 in Liguria (north-western Mediterranean) on the basis of magnetogram recordings

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In the early morning of 23 February 1887, the ‘Ligurian earthquake’, a devastating seismic event currently estimated at MW 6.3-7.2, shook the towns of the Italian and French Riviera. It is the most devastating earthquake known in this region: it is thought to have claimed at least six hundred lives, displaced twenty thousand people, and destroyed many historic buildings and houses. As a result of the event, a tsunami with a maximum run-up of two meters near Imperia (Italy) also occurred and the record of the tide gauge in the port of Genoa (Italy) has long been considered the only existing record of the event.

However, we found that the 1887 earthquake was also recorded by historical magnetometers in the UK and France. These instruments were used to measure variations in geomagnetic field strength, but were also able to record seismic waves, which were essentially a simple ‘disturbance’. Almost uninterrupted records of this type of variometric data are held by the British Geological Survey (BGS). Traces recorded at Greenwich, Kew, and Falmouth magnetic observatories, which clearly show waveforms related to the event, were used. The Bureau Central de Magnetisme Terrestre (BCMT) also keeps magnetograms: in particular, we used the recordings of the instrument at Le Parc de Saint-Maur (Saint-Maur-des-Fossés, Paris).

The waveforms were digitized and processed according to the theory of Eleman (1966), which describes the response of a classical declinometer and/or a horizontal force instrument to harmonic ground displacement, and according to the work of Krüger et al. (2018).

The location of the epicenter and the magnitude of this historical earthquake are difficult to characterize with high accuracy, and the focal mechanism of the fault responsible for the event remains controversial to this day. We present the preliminary results of our research, which is focused on the revaluation of the Ligurian earthquake in terms of magnitude and focal mechanism. This would lead for the first time to a definition of magnitude on an instrumental basis for this important seismic event, whose macroseismic intensity is usually assessed based on studies conducted immediately after the event to determine the damage it had caused.