

Children of a Lesser Seismological God: The 1971 Tuscania (Central Italy) “Historical” Earthquake

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Abstract

The 6 February 1971 Tuscania (central Italy) earthquake belongs to a peculiar family of destructive seismic events that have occurred in an area classified as low-seismic hazard, causing heavy damage and tens of casualties. However, this earthquake took place at the dawn of modern seismology in Italy and is far from being fully characterized from an instrumental and macroseismological point of view. This article aims at bridging the gap of information that affects that earthquake, through a twofold research path: (1) with an archival investigation looking for new available sources and with the use of the European Macroseismic Scale-98 (EMS-98) intensity scale, and (2) with the calculation of a more constrained hypocentral location. The results of this investigation can be summarized as follows: the reappraisal of the earthquake in terms of EMS-98 provides a maximum intensity 8 in Tuscania (previously quoted 8–9 Mercalli–Cancani–Sieberg [MCS] in the catalog), and a general decrease of intensity in many damaged localities. The new epicenter location is shifted almost 10 km southeast of the old one, at about 3 km depth. This new location is more robust than the previous one and is consistent with the general distribution of the most damaged localities; however, we cannot exclude that effects of directivity might have played a role in the peculiar pattern of damage caused by the event. Finally, we provide new values of magnitude (M_D 4.9 and M_L 5.1) that point to an upward scaling of the earthquake. The ultimate lesson of this work is that a deepening of the research can always provide room for an improvement of our knowledge even for significant earthquakes that have occurred relatively recently.

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Introduction

Every developed nation from a seismological point of view has experienced, during the past century, a period of time in which instrumental data have progressively joined the macroseismology in the attempt to better characterize the seismic phenomenon. In Italy, this period is usually identified with the second postwar period, ending with the catastrophic M 6.9 earthquake of 23 November 1980 in Irpinia (southern Italy). However, this 30 yr period turned out to be an obscure one because the efforts in macroseismology (often reduced because of economic causes) were not compensated by an exhaustive instrumental characterization of the events. Hence, many moderate earthquakes are still overlooked, like children of a lesser seismological god. The 6 February 1971 Tuscania earthquake belongs to that period.

In fact, this event, although falling fully into the instrumental era, can be properly classified as a historical earthquake, given that the information available so far has allowed the investigators to better characterize it from a macroseismic point

of view (Bartolucci *et al.*, 1972). This is due to the poor general configuration of the seismic network at that time and in particular to the small number of seismic stations in the epicentral area (only one seismic station within 100 km epicentral distance). This last point is a direct consequence of the scarce seismic history and of the low-seismic hazard associated with this area.

The literature concerning the 1971 event is very poor and limited to two contemporary works, Console and Sonaglia (1972) from the seismological point of view and Bartolucci *et al.* (1972), who presented a report of the damage. Therefore, there is room for attempting to improve our knowledge on the event, (1) from a macroseismic point of view, with an archival investigation looking for new available sources and

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