

The earthquakes of 1834 in the Northern Apennines

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Abstract

In 1834 two damaging earthquakes of the same intensity range ($I_0 = \text{VIII MCS}$) took place in the Northern Apennines, at a distance of about five months. In this paper we present some preliminary results of the archive investigation, which proves that the first one had a far larger damaging impact. Also the epicentral area of the second one should probably be relocated, considering the fact that the area damaged by the first one was not able to record the second one.

1. Introduction

In 1834 two damaging earthquakes took place in the Northern Apennines, at a distance of about five months. The Italian catalogue (Postpischl, 1985) assigns the same epicentral intensity ($I_0 = \text{VIII MCS}$) to them and locate them at a distance of about 40 kilometres. Both locations fall in seismic zones, one stretching along the present axis of the chain (fig. 1a), zone 1), the second one along the margin of the Po plane (fig. 1a), zone 2). The seismicity of both zones is not constant through time (fig. 1b) and 1c)), rising the doubt whether some medieval earthquakes, reported only by very few sources from the most important towns of the plane, should be located in the Apennine, where the observers were scarce and the records may be lost.

Figure 2 shows the near-field information available for both events from Baratta (1901), the main source for the Italian catalogue. The intensity distribution for the 14 February event does not allow a univocal epicentral location: the present one is closer to a VII MCS area rather than to the VIII MCS intensity points.

Most information comes from the territory of the Granduchy of Tuscany, one of the many states which had shared the area for a few cen-

turies. They are supplied by a literate from Fivizzano, G. Gargioli, who, a few months after the event, published a report on the earthquake using information from eye-witnesses (Gargioli, 1834). The pattern changes slightly if we add the information available from another paper of the same kind and value, such as the «Ragguaglio particolareggiato delle ruine cagionate dal terremoto nel Valtarese ne' giorni 14 febbraio e susseguenti a tutto il 4 marzo 1834». This paper, presumably written by Peschieri (1834), was printed in Parma and reports the damaging effects in the areas of the Duchy of Parma. The data provided by Peschieri are also evidenced in fig. 2.

The earthquake of July 4 was felt throughout the Po plane. Following Baratta (1901), it was strong in the Parma area and, mostly, in S. Vitale di Baganza, where some buildings were ruined according to Benassi (1899), who reports oral information «supplied by old local people»:

a proposito di S. Vitale i vecchi raccontano ancora le tristi conseguenze di questa scossa, la quale avrebbe ivi e nei dintorni rovinati parecchi edifici, tra cui la Chiesa Parrocchiale (Benassi, 1899, p. 55).

This area has been the epicentral area for many earthquakes, including the recent, well-studied, 1983 one: therefore, in principle, there is no

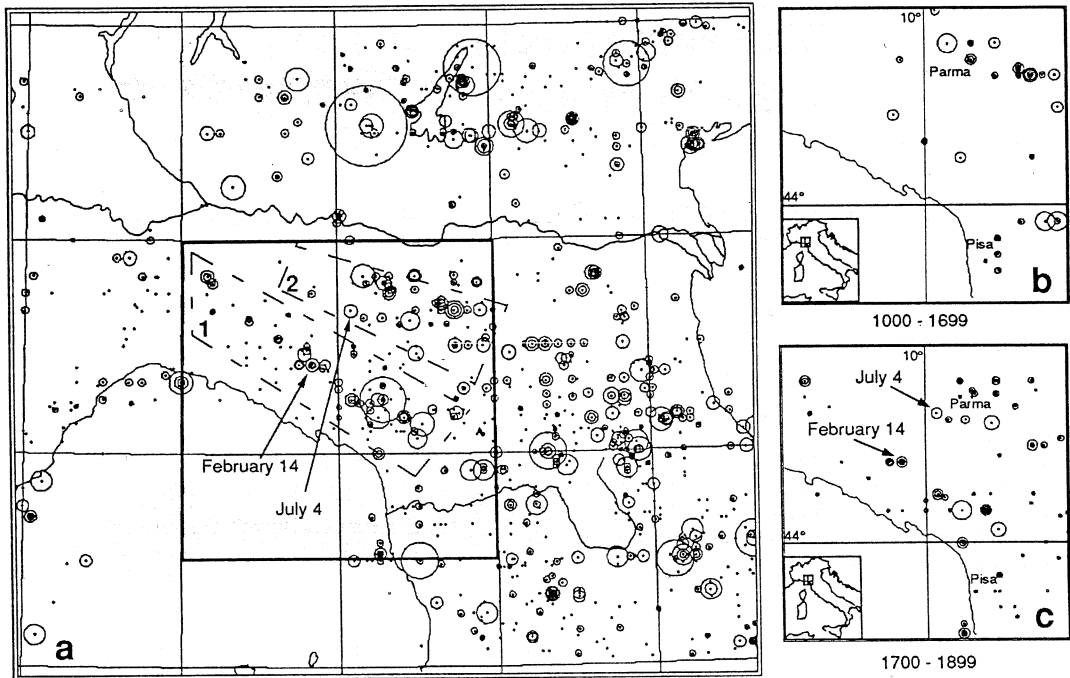


Fig. 1. Time-space distribution of seismicity in the Northern Apennines as obtained from the Italian catalogue (Postpischl, 1985).

reason to doubt of the location proposed by the catalogue.

2. Investigation

In order to improve the knowledge on both earthquakes, archive investigations have been undertaken, following the reconstruction of territories, frontiers and administrative organizations. A main road lead from Parma to the sea through Pontremoli, minor roads served the villages (Zuccagni Orlandini, 1832). The relationship among central and local governments has turned out very different in the neighbouring states. The Duchy of Parma and, mostly, the Granduchy of Tuscany, had built up a detailed network of powers (Casini, 1953-54; Aquarone, 1956; Biotti, 1985), while, for instance, the Duchy of Modena did not define very clearly the powers of its peripheral governments (Schupfer, 1900; Bertuzzi, 1977; Marini, 1979).

2.1. *Granduchy of Tuscany*

Most of the records of the earthquake have been found at the archives which store the documents issued by political authorities of Granduchy: the «Camera di Sovrintendenza Comunitativa di Pisa», to which the area of Pontremoli was subordinate, and the «Commissario Regio» of Pontremoli, the local authority in Lunigiana. The quality and the amount of the records vary according to the efficiency of the administrative organization. As fig. 3 shows, the whole periphery administrative structure was involved soon after the first earthquake.

The records show a large amount of letters and reports on damage in the area of Pontremoli. As an example, here follow some parts of the «Relazione dei Terremoti sentiti in Pontremoli dal 14 Febbraio 1834...», Pontremoli, 12 marzo 1834» (ASPi, 1834), a report compiled one month after the earthquake by the Commissario Regio:

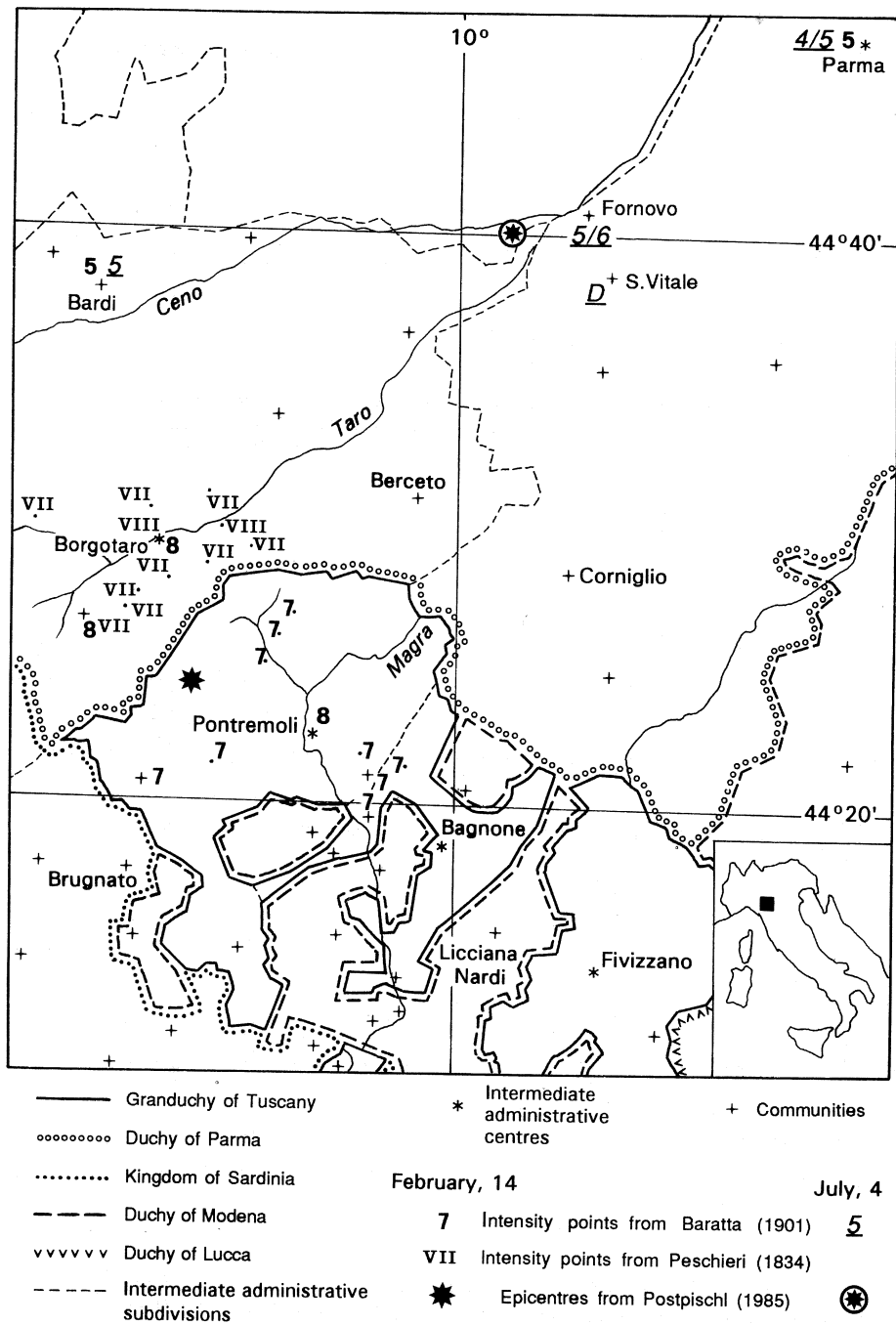


Fig. 2. Near-field intensity points and epicentral location of the earthquakes of 1834 (from Moroni *et al.*, 1992, modified).

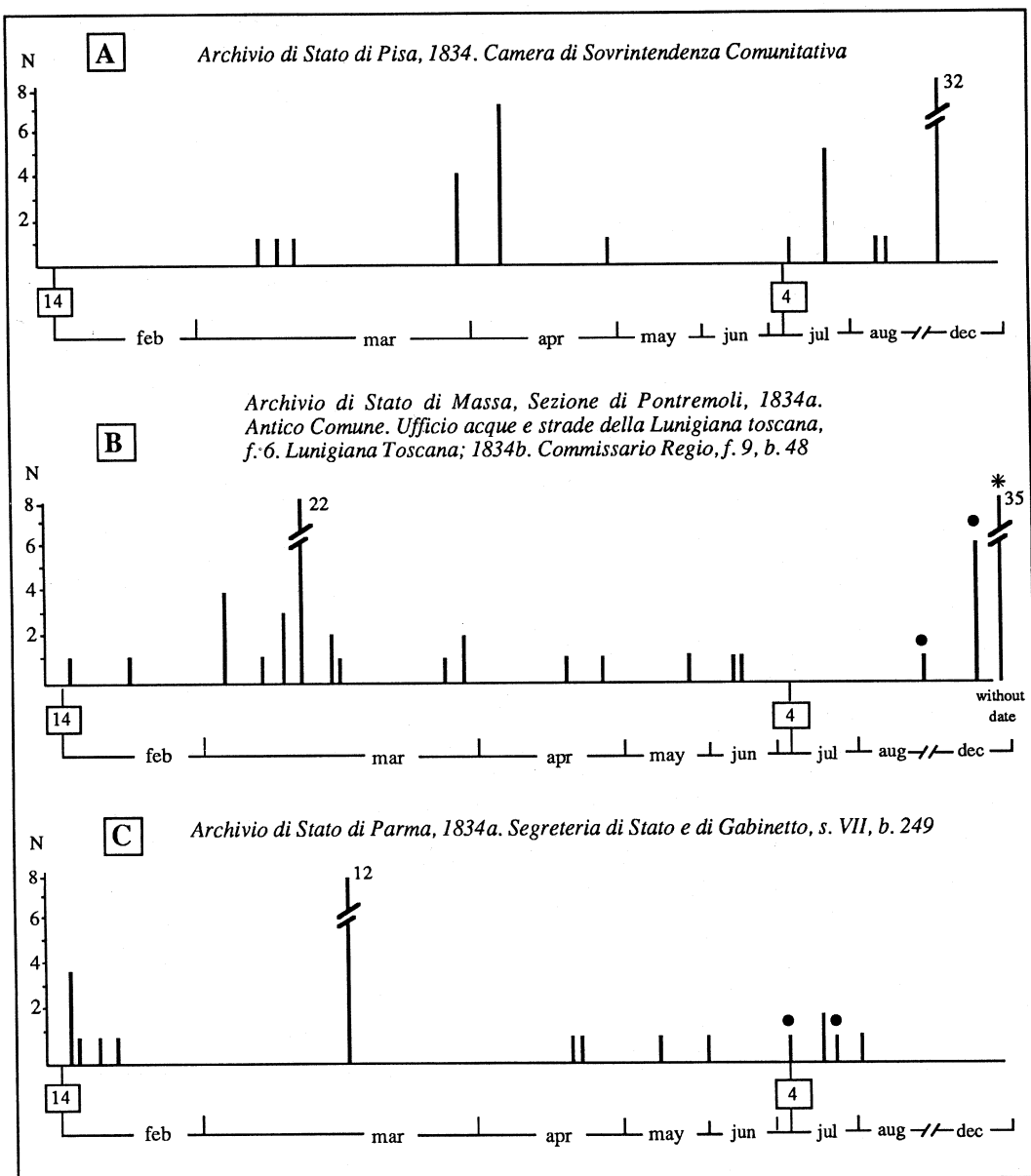


Fig. 3. Time distribution of the documents reporting the February 14 and July 4 earthquakes produced by the administrations of Granduchy of Tuscany (A) and (B) and Duchy of Parma (C). Bars are proportional to the number of localities quoted. Black dots indicate documents that record the July 4 earthquake: for the Duchy of Parma these documents are Police Reports. Asterisk indicates a document for which no date is reported; it is possible however to say that it was compiled after the summer of 1834.

Relazione dei terremoti sentiti in Pontremoli dal 14 febbraio 1834 fino all' infrascritto giorno, vittime, feriti, e danni cagionati dalla terribile scossa

Venerdì 14 a ora due e venti minuti pomeridiane una spaventevole scossa di terremoto

Il villaggio di Guinadi contava 53 case, o fuochi. Non ne sono più servibili che sette, o otto al più. Quattordici sono le case affatto rovinate e sei o sette case sono state fatte demolire per evitare le conseguenze di una sicura rovina.

A Montelungo ha poco sofferto la chiesa e la canonica. Due case sono si può dire interamente rovinate.

(ASPi, 1834. Camera di Sovrintendenza Comunitativa, f. 491, Pontremoli, corrispondenza ministeriale. Relazione dei Terremoti sentiti in Pontremoli dal 14 Febbraio 1834..., Pontremoli, 12 marzo 1834)

2.2. Duchy of Parma

Also for these territories many documents on the earthquakes have been found, mostly belonging to two funds (Bellettati, 1991). The first one is the correspondence between the local administrations and the Government (ASPr, 1816-1848a): these documents supply data concerning the Duchy, but also the neighbouring area of Pontremoli. The sovereign Decree of March 18, 1834 (Decreto Sovrano n. 53, 1834) summarizes the intervention of the Government. There follows a report of the Finance Ministry, of March 17, which lists the Communes «damaged» and «not hurt»; the report adds some considerations on the state of the buildings before the earthquake and suggests the amount of money needed for each locality:

Presidenza delle Finanze.
Contribuzioni

Soccorsi per infortuni straordinari. Tremuoto di Febbraio 1834. Si propone:

1- che al Comune di Borgotaro sia diminuita d'una metà la contribuzione prediale ch'esso dovrebbe pagare dovrebbe all'Erario dello Stato pel 1834

2- che à Comuni della Commesseria di Borgotaro danneggiati dal tremuoto di Febbraio sia concesso un sussidio di L. 24.000 [...].

I Comuni danneggiati furono: Borgotaro più di tutti; Compiano; Berceto; Albareto; Bedonia; Valmozzola

(ASPr, 1834a. Segreteria di Stato e di Gabinetto, s. VII, b 249, Relazione del Presidente delle Finanze, 17 marzo)

The report says that: *many houses of Borgotaro and those of other small villages nearby, and most of those of S. Giovanni di Pontolo were of old and unstable construction, ... so that the earthquake easily succeeded producing its negative effects.* The news of the localities are supplied by the «Podestà» (official representative).

The second, important source are the Police Reports (ASPr, 1816-1848b), which supplied the Duke by daily overviews of what happened in the State. The Police Bureau gathered information on theatres, foreign visitors, prisoners, accidents and incidents (thefts, murders, fires, natural disasters) and sent reports to the State Secretary. This fund provides a continuous coverage and, therefore, many data on minor earthquakes as well. For instance, the following report accounts for the effects of some earthquakes in April 1834 (ASPr, 1834b):

Relazione di Buon Governo
del giorno 15 al 16 Aprile 1834
All'Eccelsa Segreteria di Gabinetto di Sua Maestà.

Avvenimenti funesti.

Si era sparsa voce questa mattina per la città di gravissime devastazioni cagionate in Borgotaro dal Terremoto e questa voce si è purtroppo avverata [...] gli abitanti si trovano nella massima desolazione. Mentre una parte della popolazione si dispone ad abbandonare i propri Lari, l'altra sta costruendo capanne per le vicine campagne

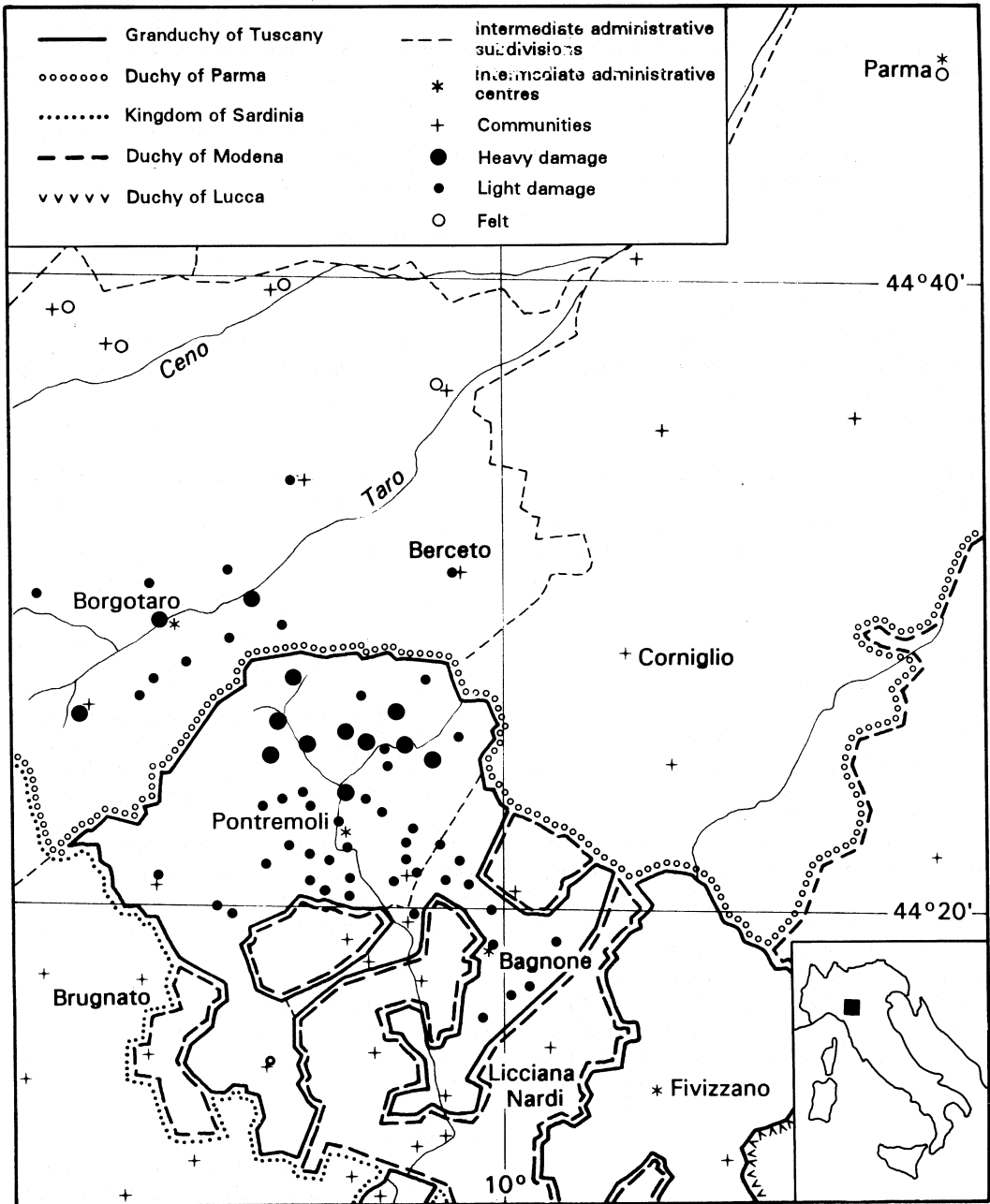


Fig. 4. Distribution of damage in the near-field area from the main archive sources for the February 14 earthquake.

[...]. Le autorità locali stanno anche per provvedere alla sicurezza dei detenuti in quelle carceri facendoli tradurre altrove.

(ASPr, 1834b, Segreteria di Stato e di Gabinetto, s. XIII, b. 322, Relazioni di Buongoverno dal giorno 15 al 16 aprile, 18 aprile)

Governor of the Lunigiana Estense for the year 1834 (ASMs, 1834). In the same way, no records of the earthquake have been found in the documents of the Government of Modena (ASMO, 1834-36; 1831-59). As the research is still in progress, it is not yet possible to interpret the silence of these sources.

2.3. Duchy of Modena

The investigation concerning the enclaves of the Duchy of Modena located a few kilometres south of the most damaged area (fig. 1) is not concluded. Up to now, only documents on current affairs have been found in the records of the

3. Results

A preliminary map of the effects of the February 14 earthquake is shown in fig. 4. The pattern does not differ very much from the one of fig. 2, but the most damaged area is now closed to the Apenninic range, which follows the frontier between Tuscany and Parma.

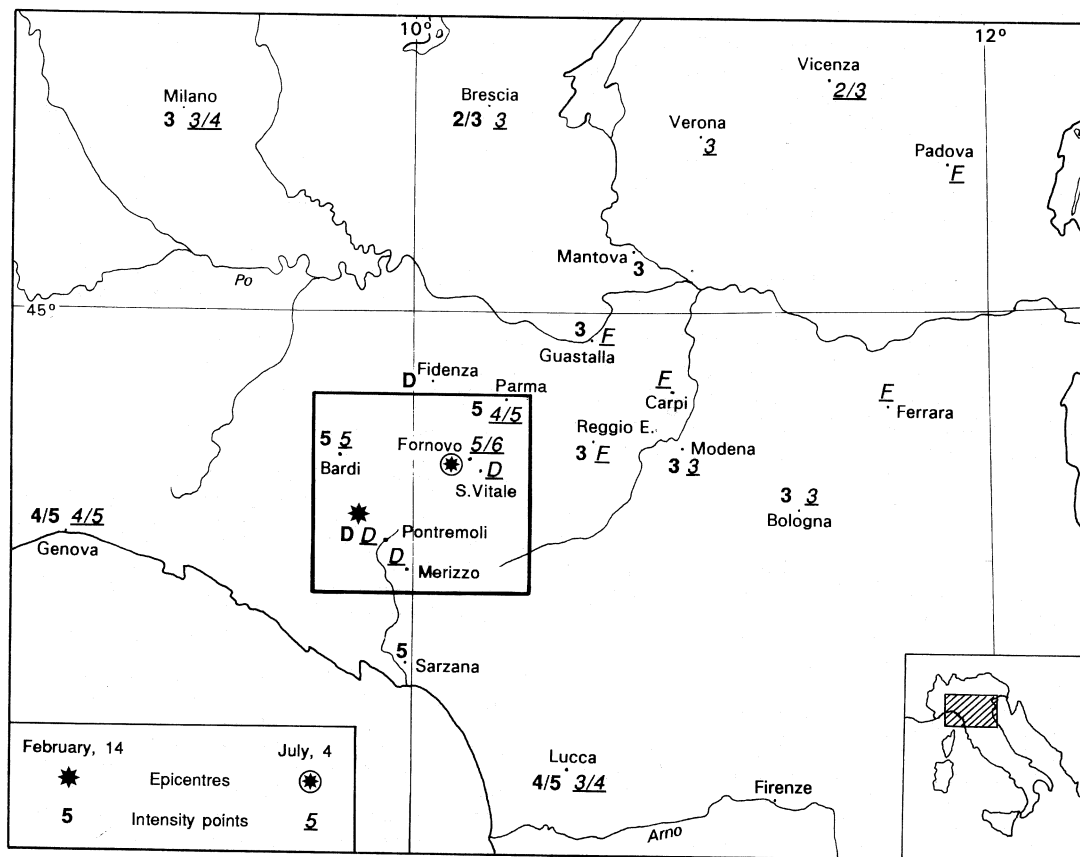


Fig. 5. Intensity points for the February 14 and July 4 earthquakes. The damage in Fidenza — then Borgo S. Donnino — reported by the Gazzetta di Genova (1834), has not been proved by other sources.

For what concerns the earthquake of July 4 no contemporary source quotes any damage, including two Police Reports (July 4 and 11, 1834, ASPr, 1834c and 1834d), which say that the earthquake was stronger «in the hills (Apennines) than in Parma, and that no damage is reported». From the Tuscan side, a damage survey (ASPo, 1834a) reports that the earthquake of July 4 has affected the already damaged buildings in Pontremoli, while a letter from Merizzo (ASPo, 1834b) informs that the church, not hurt in February, has been damaged in July. Furthermore, plotting the far-field data of both events (fig. 5) shows that the patterns are very similar, with the exception that a greater number of data-points are available in the North for the July event. These evidences suggest that also the epicentral area of the July 4 earthquake could be located in the Apennines, maybe in the same area of the previous event, though from this area only very few records are available. Actually, in this area the administrative and political activity was obviously weak: moreover the buildings which had survived the previous event could be considered as «saturated» recorders.

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