In Troubled Times, in a Divided Country: The 1789 Valtiberina Earthquake

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Abstract The Valtiberina region (central Italy) has a seismic record going back to the Middle Ages and including five Io>VIII MCS earthquakes, the earliest of which (1352, 1389, 1458), though recently and extensively studied, remain rather poorly known. This makes it all the more important to ensure that the later ones (1789, 1917) are as thoroughly studied as possible. The 1789 earthquake is listed by the current Italian catalogue (CPTI Working Group 2004) with Io VIII-IX MCS and Mm 5.8. These parameters were assessed from a database of twenty-eight macroseismic intensity data points (Castelli et al. 1996), which is less than plentiful for a late 18th century earthquake. An analysis of the historical context of the 1789 earthquake and its influence on the production of contemporary accounts evidences a few research paths that previous studies either did not or could not take. Following them, the macroseismic database of the 1789 earthquake can be noticeably improved, providing the catalogue compiler with a mean to check the reliability of its current parameters.

1 Introduction

Late in the morning of September 30, 1789 a strong earthquake hit Valtiberina, the upper valley of the Tiber, in central Italy. The seismic history of this area goes back to the Middle Ages, with at least nine Io≥VII MCS regional earthquakes (Fig. 1).

The 1789 earthquake – listed by (CPTI Working Group 2004) with Io VIII-IX MCS and Mm 5.8 – is one of the five strongest regional earthquakes (Table 1). Though recently and extensively studied (Boschi et al. 1995; Boschi et al. 1997; Boschi et al. 2000; Castelli 2002; Guidoboni and Comastri 2005) the earliest of these earthquakes (1352, 1389, 1458) remain rather poorly known, with less than ten macroseismic intensity data points (MIDP) available for each (Table 1). This makes

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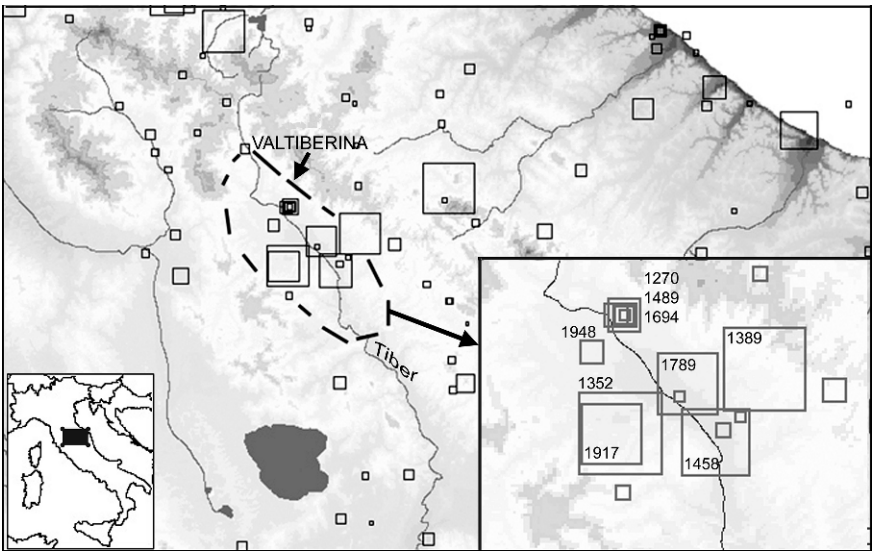

Fig. 1 Valtiberina historical seismicity according to the Italian catalogue (CPTI Working Group 2004)

Table 1 Valtiberina major historical earthquakes according to the Italian catalogue (CPTI Working Group 2004)

Year	Mo	Da	Epicentral zone	MIDP	Io MCS	Lat	Lon	Mm
1352	12	25	Monterchi	7	IX	43.465	12.127	6.0
1389	10	18	Bocca Serriola	9	IX	43.523	12.295	6.0
1458	04	26	Città di Castello	5	IX	43.456	12.239	6.0
1789	09	30	Valtiberina	28	VIII-IX	43.505	12.208	5.8
1917	04	26	Monterchi-Citerna	128	IX	43.465	12.125	6.0

MIDP: Macroseismic Intensity Data Points

it all the more important that the two later ones (1789 and 1917) are as thoroughly studied as possible. This paper deals with the 1789 earthquake, whose current epicentral parameters have been assessed from a database of 28 MIDP (Fig. 2). Taking into account the MIDP-per-earthquake ratio in the 18th century time-window of the Italian catalogue (Table 2), a database of this size suggests that the 1789 earthquake is better known than most 18th century events but not quite as well as a good many of them. Moreover, the MIDP distribution in the 1789 intensity map (Fig. 2) seems sparser in the lesser damage intensity ranges (VII and VI MCS), than in the higher damage ones (VIII and IX MCS), most MIDP being located south of the border which runs through the Figure, marking the present administrative boundary between Tuscany and Umbria (or, in 1789, between the Grand-Duchy of Tuscany and the Papal States). Both circumstances seem to hint that part of the information pertaining to this earthquake could be lacking. Why should it be so? And what could be done to improve this situation?

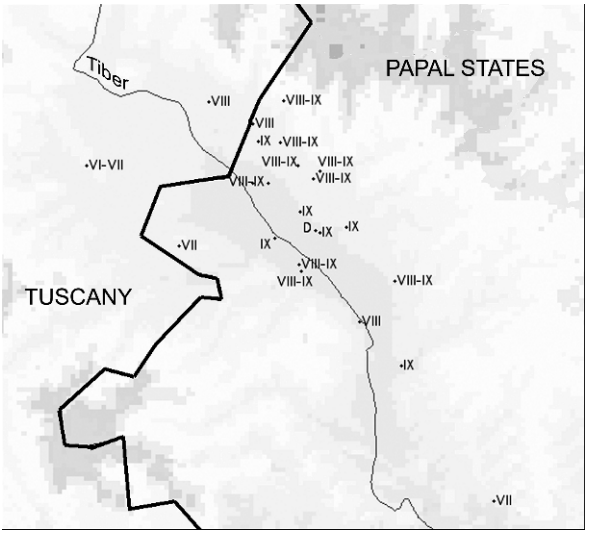

Fig. 2 Current macroseismic data base for the 1789 earthquake (Castelli et al. 1996)

Table 2 MIDP per-earthquake in the 18th century time-window of the Italian catalogue (CPTI Working Group 2004)

18th century earthquakes (CPTI Working Group 2004)	$\leq$ 10 MIDP	11–30 MIDP	31–100 MIDP	101–357 MIDP
126	79	19	16	7

MIDP: Macroseismic Intensity Data Points

As many outstanding methodological contributions pointed out along the years (Ambraseys and Melville 1982; Gisler 2003; Guidoboni 2000; Guidoboni and Stucchi 1993; Gutdeutsch and Hammerl 1988; Musson 1998; Vogt 1993 to name but a few) to answer these questions one should, first of all, consider the historical circumstances within which the earthquake took place, and in which way they could have influenced (i.e. furthered or hindered) the production of contemporary written accounts of the earthquake itself and their preservation for future use by historical seismologists.

2 The Historical Context Within Which the 1789 Earthquake Took Place

The 1789 earthquake occurred across what was then the frontier between two independent countries – the Grand-Duchy of Tuscany and the Papal States – and at a time of European strife. Both circumstances influenced the way in which contemporary observers perceived the 1789 earthquake and recorded its effects for future memory.

The involvement of two countries implies that earthquake victims asked for help to two distinct rulers (Pope Pius VI and Grand Duke Pietro Leopoldo I of

Habsburg-Lorraine), and that there were two independent official responses to the emergency. Letters were exchanged between the earthquake-affected area and two capital cities (Florence and Rome); damage surveys had to be made, relief measures taken, restoration work done, and financial accounts totted up. Each of these actions would leave a paper trace in written records destined to be stored, in local and central archives. Once there they would undergo all the vicissitudes that archives are exposed to and which sometimes lead records to be lost, either temporarily or for good; for more on this subject see (Vogt 1993) (chapter on "Archives: general considerations").

Contemporary perception of the 1789 earthquake is also likely to have been influenced by an earthquake of another kind. Two month and a half before September 30 a Parisian mob had stormed the Bastille and, in quick succession, King Louis XVI of France was forced to acknowledge the National Assembly, panic swept through France, and the Déclaration des Droits de l'Homme et du Citoyen was issued. By the end of September 1789, the French revolution and its repercussions on European politics had become the major focus of attention for most European observers; additional interest was provided by the Balkans (where an Austro-Russian army was confronting Turkey) and by the Austrian Low Countries (which had revolted against Habsburg rule).

The international situation is the likeliest responsible for the lack of interest shown by learned members of the Italian intelligentsia, for the 1789 earthquake, as witnessed by the fact that no scientific treatises were written on the 1789 earthquake, contrarily to what had happened in the wake of many comparatively minor earthquakes occurred in Tuscany and the Papal States in the 1780s (Augusti 1779; Augusti 1780; Augusti 1785; Canterzani 1779; Cavalli 1785a; Cavalli 1785b; Della Valle 1781; Gilii 1786; Parere 1787; Rinieri de' Rocchi 1788; Saggio 1787; Sarti 1783; Vannucci 1787). Newspapermen showed more interest in the 1789 earthquake. The earliest gazettes to report on the 1789 earthquake were those printed in Florence and Rome (Gazzetta Universale 1789a; Notizie politiche 1789a): second-hand accounts based on letters received from the provincial capitals of the afflicted districts (Tuscan Sansepolcro and Papal Città di Castello), which would in their turn become a source for other Italian (Avvisi di Genova 1789; Gazzetta di Bologna 1789a, 1789b, 1789c; Gazzetta di Mantova 1789d; Notizie del Mondo 1789a, 1789b, 1789c) and foreign gazettes: by November 1789 the news had reached London (Gentleman's Magazine 1789), Madrid (Mercurio de España 1789a, 1789b) and Paris (Gazette de France 1789).

3 The 1789 Earthquake in the Eye of Contemporary Newspapermen

From mid-19th century onwards the 1789 earthquake became a subject for historical reconstruction, first on the part of local erudites (Muzi 1842-1844) then by seismologists (Baratta 1901; Boschi et al. 1995; Boschi et al. 2000) and architecture

historians (Giovanetti 1992). All these reconstructions have in common an almost total reliance on contemporary journalistic sources as their providers of raw data. To understand how this can have influenced the resulting depiction of the 1789 earthquake, it is necessary to consider how exhaustive a view of the 1789 earthquake can be derived from contemporary journalistic sources.

A comparison between earthquake reports printed in a large sample of gazettes published in October/November 1789 (Avvisi di Genova 1789; Diario Estero 1789; Diario Ordinario 1789a, 1789b, 1789c; Gazette de France 1789; Gazzetta di Bologna 1789a, 1789b, 1789c; Gazzetta di Mantova 1789d; Gazzetta Toscana 1789a, 1789b; Gazzetta Universale 1789a, 1789b, 1789c; Gentleman's Magazine 1789; Mercurio de España 1789a, 1789b; Notizie del Mondo 1789a, 1789b, 1789c; Notizie politiche 1789a, 1789b) allows to identify a few descriptions that, judging from their wide circulation, must have been particularly influential in creating a "popular image" of the 1789 earthquake:

a) the earliest Florentine report, dated October 2 (Gazzetta Universale 1789a). It was taken up by (Gazette de France 1789; Gazzetta di Bologna 1789a; Gazzetta di Mantova 1789d; Gazzetta Toscana 1789a; Gentleman's Magazine 1789; Mercurio de España 1789a; Notizie del Mondo 1789b); a summary of effects in Sansepolcro with a few rumours about effects in the Papal States;
b) the earliest Roman report, dated October 7 (Notizie politiche 1789a). It was taken up by (Gazzetta di Bologna 1789a; Notizie del Mondo 1789a); a summary of effects in Città di Castello and district, with a few hints on Tuscany;
c) an anonymous report, published in Florence on October 17 (Gazzetta Toscana 1789b), whose author was one abbé Lampredi of Anghiari, a village near the Tuscan-Papal border (Lampredi 1789). On October 1, 1789 Lampredi crossed the border, walked as far as Città di Castello and went back home to write a stirring tale of devastation. The report printed in (Gazzetta Toscana 1789b) would also be reprinted, verbatim, by the Roman periodical (Notizie politiche 1789b);
d) a journalistic pamphlet (Brami 1789) printed in Città di Castello, probably at the end of October 1789, on behalf of the Municipality that wished "to set right many errors seen in previous reports" (a possible reference to Lampredi's one). It details the damage suffered by the main monuments of Città di Castello, with special reference to the loss of important artworks, adding summary descriptions of earthquake effects in a few minor localities of the district and information on the official response to the emergency.

All these accounts agree in presenting the 1789 earthquake as a shocking drama whose main protagonist is Città di Castello, though a few other affected localities are also singled out for consideration (Sansepolcro, San Giustino, Selci, Cospaia). The damage sustained by the main public and private buildings of Città di Castello is extensively detailed, while descriptions of earthquake effects in the lesser localities tend to be global and to privilege the most dramatic episodes.

4 Archive Records and Their Relevance in Reconstructing the 1789 Earthquake

The first study to make a comparatively extensive use of contemporary archive records for the reconstruction of the 1789 earthquake was (Castelli et al. 1996). It hardly needs to say that this statement does not imply any criticism whatsoever of previous reconstructions. Local erudites – in whose eye the 1789 earthquake was no more than an anecdote – relied on newspaper accounts as a matter of opportunity rather than choice. The classical national-scale earthquake compilation by (Baratta 1901) was largely dependent on contributions by local erudites, whose methodological biases it inherited. Finally, the 1789 studies by (Boschi et al. 1995; Boschi et al. 2000) were preliminary ones, based on the "critical revision of existing bibliography and of selected sources" (Boschi et al. 2000, p. 843) and not required to perform any systematic archive research at all, though in fact their references include some archive records together with a good sample of contemporary newspapers. However, the importance of archive records for the study of historical earthquake cannot be overstated, as a quantitative comparison between the 1789 earthquake intensity map provided by (Boschi et al. 1995) and the one by (Castelli et al. 1996) (Fig. 3) shows.

Unfortunately, using archive records has some drawbacks too. As Jean Vogt brilliantly put it in (Vogt 1993), finding out exactly which records were produced after a given earthquake and discovering their present whereabouts can be a slow, complicated, and even frustrating task. Now, earthquake historians, particularly if they are taking part to the compilation of a new catalogue, will sooner or later have to find an acceptable compromise between thoroughness and the meeting of deadlines. In the case of the 1789 study by (Castelli et al. 1996) the compromise was reached by giving priority to the records stored in the central archives of the involved gov-

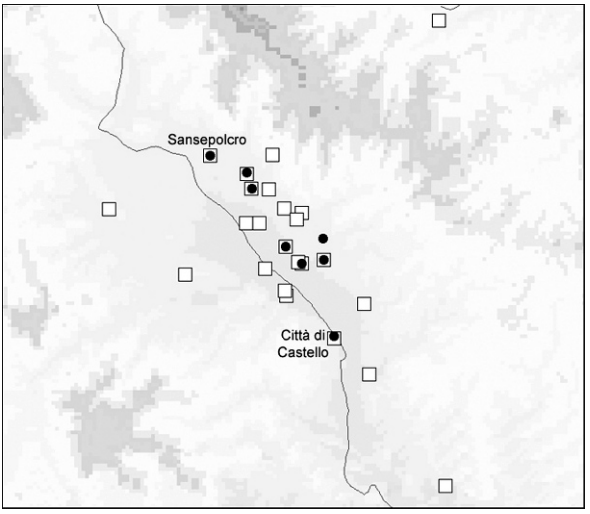

Fig. 3 1789 intensity maps: a comparison between (Boschi et al. 1995) and (Castelli et al. 1996)
Note: *Black dots*: (Boschi et al. 1995) *White squares*: (Castelli et al. 1996).

ernments, which – as a general rule – are richer, better preserved, easier to find and more accessible to researchers than most municipal archives. The records produced by Papal officials that had dealt with earthquake effects in the Papal States were easily retrieved (ASRM [Archivio di Stato, Rome] 1789–1795) but their Tuscan homologues – the damage surveys made in Sansepolcro and its district – could not be located in the Archivio di Stato of Florence, owing to damage suffered by the relevant holdings in the Great Flood of 1966 (a loss reflected by the paucity of Tuscan data mentioned in 1). It was also impossible to retrieve a most important document mentioned in Roman records, a damage survey of the whole Governatorate of Città di Castello, which had been made during the 1789–1790 winter and, after having been originally stored in Rome, had been later on sent to Città di Castello, in whose municipal archives it should have been preserved. Unfortunately, when the (Castelli et al. 1996 study was carried out, the historical section of the archives was still uninventoried, and therefore unavailable to researchers. It took six or seven years more before an inventory was started and reached an advanced enough stage to identify one of the three ledgers originally composing the survey (ASCC [Archivio storico comunale, Città di Castello] 1790). Though incomplete, this document gives information on about 85% of the buildings of Città di Castello itself (Castelli 2002) and on several outlying hamlets. More or less at the same time, and by a mere chance, a list of names and addresses of the householders who had been subsidized by the State on account of damage suffered during the 1789 earthquake was discovered in the municipal archives of Sansepolcro (ASCS [Archivio storico comunale, Sansepolcro] 1789–1791). Though this kind of information cannot make up for the loss of the actual damage surveys, it gives at least the location of single damaged buildings and can therefore be used for a preliminary identification of affected localities. The input of these data allows to add another forty-five previously unknown affected sites to the macroseismic database of the 1789 earthquake (Fig. 4, Table 3).

5 Why to Tell This Story?

How does this story end and why to tell it at all? The referees who read its first draft asked to know whether the increase in MIDP improves the parameters of the 1789 earthquake. A fair question, which the author must leave unanswered: pending the revision of the current Italian earthquake catalogue, the "new" 1789 earthquake database was turned in to the people in charge and the judgment is now up to them. However, it can at least be pointed out that – for what concerns the town of Città di Castello itself – the evidence of a contemporary damage survey (ASCC [Archivio storico comunale, Città di Castello] 1790) allows to draw a much more reliable image of urban damage than previously available and to refute the catastrophic scenario depicted by (Giovanetti 1992), according to which the 1789 earthquake "rase al suolo una gran parte degli edifici e [...] risparmiò solo quelli di più recente costruzione" [razed to the ground a great many buildings, leaving untouched only

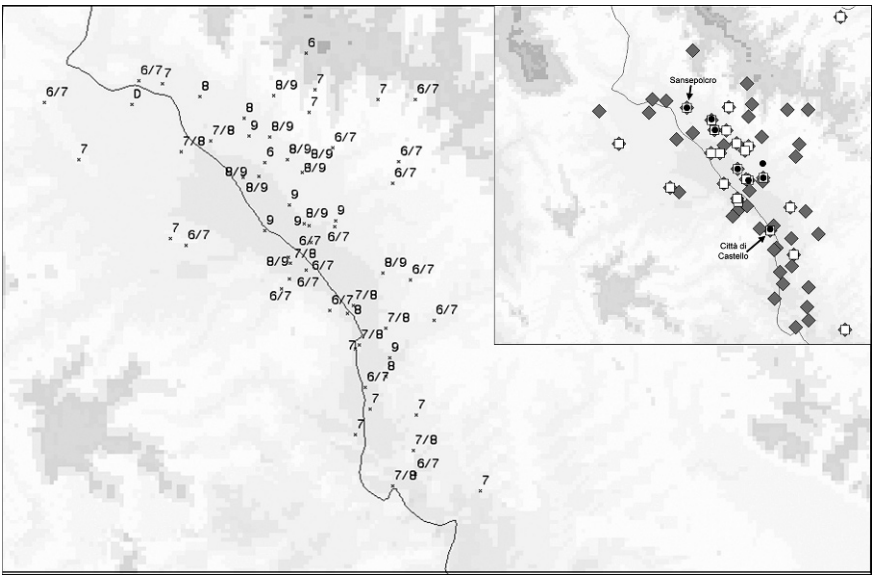

Fig. 4 Figure 4 The 1789 earthquake according to this study
Note: Intensity expressed in MCS scale. Inset: a quantitative comparison between (Boschi et al. 1995) (*black dots*), (Castelli et al. 1996) (*white squares*) and this study (*grey diamonds*).

Table 3 Intensity table for the September 30, 1789 earthquake (this study)

Locality	Class	In previous studies?	Latit	Long	I MCS (this study)
Turicchio		Y	43.433	12.267	IX
Selci		Y	43.500	12.183	IX
San Giustino		Y	43.549	12.174	IX
Lama		Y	43.513	12.201	IX
Grumale		Y	43.504	12.233	IX
Cerbara		Y	43.502	12.214	IX
Bagnaia		Y	43.528	12.180	VIII/IX
Belvedere		Y	43.476	12.265	VIII/IX
Capanne		Y	43.528	12.169	VIII/IX
Celalba		Y	43.536	12.201	VIII/IX
Corposano		Y	43.569	12.193	VIII/IX
Montione		Y	43.533	12.216	VIII/IX
Piano di Grumale	SS	Y	43.503	12.211	VIII/IX
Piosina		Y	43.486	12.199	VIII/IX
Pitigliano		Y	43.529	12.211	VIII/IX
Sant'Anastasio		Y	43.548	12.189	VIII/IX
Sansepolcro		Y	43.570	12.141	VIII
San Donnino	MS	N	43.423	12.264	VIII
Cospaia		Y	43.558	12.171	VIII
Città di Castello		Y	43.456	12.239	VIII
Giove		Y	43.483	12.200	VII/VIII
Bisacchi	MS	N	43.448	12.265	VII/VIII

Table 3 (continued)

Locality	Class	In previous studies?	Latit	Long	I MCS (this study)
Chiesa di Marchigliano	SS	N	43.385	12.281	VII/VIII
Il Peglio	MS	N	43.440	12.246	VII/VIII
Il Trebbio	MS	N	43.547	12.147	VII/VIII
Meltina	SS	N	43.460	12.243	VII/VIII
Promano		N	43.367	12.266	VII/VIII
San Marino		N	43.542	12.126	VII/VIII
Bisacchio	SS	N	??.???	??.???	VII/VIII
Fiorentina di Sopra	MS	N	??.???	??.???	VII/VIII
Valdimonte	MS	N	43.560	12.217	VII
Seripole		N	43.403	12.284	VII
Sant'Onda	MS	N	??.???	??.???	VII
San Martino d'Upo	MS	N	43.438	12.243	VII
San Martino di Castelvecchio	SS	N	43.394	12.241	VII
Ponte d'Avorio		N	43.407	12.252	VII
Pocaia	SS	N	43.577	12.115	VII
Passano		N	43.571	12.222	VII
Montone		Y	43.363	12.327	VII
La Grillaia	SS	N	??.???	??.???	VII
Germagnano	MS	N	43.622	12.151	VII
Citerna		Y	43.498	12.116	VII
Cantone	MS	N	43.565	12.266	VII
Anghiari		Y	43.540	12.054	VII
Barzotti	SS	N	43.451	12.299	VI/VII
Case Salebio	SS	N	43.472	12.284	VI/VII
Fuscagna		N	43.501	12.232	VI/VII
Gragnano	SS	N	43.579	12.098	VI/VII
Lerchi		N	43.475	12.199	VI/VII
Micciano	MS	N	43.570	12.031	VI/VII
Nuvole		N	43.470	12.193	VI/VII
Palmolara		N	43.541	12.233	VI/VII
Parnacciano		N	43.564	12.292	VI/VII
Parrocchia Colledipozzo	SS	N	43.373	12.282	VI/VII
Pieve delle Rose		N	43.522	12.274	VI/VII
Regnaldello		N	43.458	12.226	VI/VII
Regnano		N	43.493	12.215	VI/VII
Riosecco		N	43.479	12.211	VI/VII
San Savino	SS	N	??.???	??.???	VI/VII
Santa Lucia		N	43.418	12.249	VI/VII
Vallurbana		N	43.533	12.279	VI/VII
Carsuga	SS	N	43.494	12.127	VI/VII
Fiorentina di Sotto	MS	N	??.???	??.???	VI/VII
San Patrignano	SS	N	??.???	??.???	VI/VII
San Vincenzo		N	??.???	??.???	VI/VII
Madonna di Altomare	SS	N	43.535	12.185	VI
Case Valghisola		N	43.590	12.217	VI
Falcigiano	SB	N	43.567	12.093	D
Castiglion Fiorentino		Y	43.341	11.923	IV/V
Mercatello sul Metauro		Y	43.647	12.337	IV/V
Siena		Y	43.321	11.328	IV

Table 3 (Continued)

Locality	Class	In previous studies?	Latit	Long	I MCS (this study)
Firenze		Y	43.777	11.249	IV
Cortona		Y	43.274	11.986	IV

Y: yes
N: no
SS: small settlement (<30 buildings)
MS: multiple settlement: (buildings scattered over an expanse of land)
SB: solitary building (church, monastery, castle, villa, farm etc.)
D: generic damage

those recently constructed]: a statement which gives too much credit to the moving stories circulated by 1789 newspapers.

As to the reasons for telling this story: there is none really, apart from the wish to keep a record of an intricate investigation that would else have remained hidden behind a catalogue string of earthquake parameters. I hope the late Jean Vogt would agree that sometimes "ce n'est pas l'histoire des succès, c'est l'histoire des épreuves qui mérite d'être racontée"[1]; I just tried to do that.

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[1] Adapted from Jules Verne's Michel Strogoff

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