Journalistic communication in the 17th-18th centuries and its influence on the completeness of parametric catalogues

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ABSTRACT Current European parametric catalogues are still based, to a large extent, on the "seismological tradition" represented by the historical earthquake compilations issued between the second half of the 19th century and the first decades of the 20th century. Relatively few earthquakes from outside this tradition are included in the existent parametric catalogues, and those mostly as the result of fortuitous findings. No large scale search of such events has ever been carried out, mainly because of a widespread – if not expressed in such terms – consensus that such operations would be too costly and yield little. Being unlikely that strong earthquakes have been overlooked by any sort of compilation, these investigations would only yield low earthquakes, not effective for the definition of seismic hazard. The authors of this paper believe that a systematic inspection of journalistic sources from the 17th and 18th centuries can significantly contribute towards improving the knowledge of the seismicity of the past, both in general (by leading to the discovery of previously unlisted earthquakes) and also with reference to the retrieval of information on previously unknown earthquakes capable of significant damage, and therefore important for hazard evaluation purposes.

1. Introduction

Many European countries have a longstanding tradition of historical earthquake collections, where seismologists drew information on a large scale when they first started putting the European parametric catalogues together, between the 1950s and 1970s. Most earthquakes contained in the present European parametric catalogues up to the beginnings of the 20th century, derive from this tradition; the few exceptions are generally the result of accidental findings.

In the last thirty years, in Italy and in the rest of Europe, many efforts and resources have been dedicated to a thorough analysis of the major earthquakes contained in the parametric catalogues. At the same time, the amount of information on the seismicity of the past which is contained in the parametric catalogues has been utilised to define hypotheses on the completeness of this same information. In doing this, however, little or no thought has been dedicated to the properties, choices and limitations of the process responsible for the collection of this same information, that in fact does not represent the whole spectrum of available earthquake knowledge but, at best, a wide selection of it.

Lack of awareness of the high selectivity involved in the compilation of historical earthquake collections has engendered – particularly in Italy – a widespread belief that the earthquakes of the

past have been fully investigated and historical seismology has more or less exhausted its scope. Some earthquakes, ignored by the old earthquake collections, have indeed been discovered along the years, but such trouvailles generated only a short-lived interest, failing to initiate any specific, large scale search of still unlisted earthquakes (in the sense defined above). It has been repeatedly pointed out that ventures of this kind would be too costly and yield little, as it is unlikely that really strong earthquakes have been overlooked by the existing collections; this fact would leave only scope for the discovery of minor earthquakes that would not offer any real significance.

Are these reservations founded or would it still be possible to find original and reliable sources of unlisted earthquakes? And could these contain destructive earthquakes, relevant for the definition of hazard level? A study of early journalistic sources from the 17th and 18th centuries leads the authors to answer "yes" to both questions.

2. The European journalistic network in the 17th-18th centuries

The European journalistic network, born at the beginning of the 16th century, expanded between the 17th and 18th centuries in a very efficient, localized and flexible way. Its products (handwritten periodical newslists, monographic broadsheets and gazettes, both printed), are sources of prime importance for the study of European history in the modern age. The study of the Italian and European journalistic system between the 17th and 18th centuries allows one to specifically analyse the characteristics and inner workings of these sources, and to estimate their overall reliability as historical sources.

The oldest journalistic sources (handwritten newslists) were a commodity reserved for merchants, politicians and diplomats. Printed broadsheets and, later on, gazettes targeted a bigger, more popular audience. Up to the end of the 18th century, gazettes concentrated almost entirely on providing local readers with news from foreign states and countries, and ignored local news that readers could easily acquire by themselves (19th century gazettes adopted a progressively more local outlook). Each gazette was a node in a dense network of news circulation (Fig. 1), where, it could act both as the initiator of the circulation of original news (that other gazettes would afterwards take up) and as the receiver of news originating elsewhere. Gazzettes had considerable circulation and were an important means of information dissemination, as proved by the frequency with which private memoirs of the 17th and 18th centuries mention news derived from gazettes or suchlike (Table 1).

Journalistic sources are extremely important and sometimes essential to uncover single earthquakes often of considerable intensity. The 1639 Amatrice (Latium) and the 1780 Patti (Sicily) earthquakes were included in the parametric catalogues thanks to isolated journalistic reports (Ligresti and Gallo, 1991; Mariotti, 1995; Castelli, 2003). Generally speaking, however, seismological literature has drawn on these sources sporadically, and often inaccurately. The most prominent French earthquake collector of the 19th century (A. Perrey) consulted only one defective collection of French gazettes of the 17th and 18th century, representing less than 30% of the overall resources available. His Italian counterpart, M. Baratta, made only sporadic use of Italian journalistic sources, drawing on earthquake lists compiled in an approximate and incomplete way.

The authors of this paper have undertaken a study of Italian journalistic sources including the

Table 1 - Earthquake news recorded by private diaries from journalistic sources.

Diary/chronicle	Gazette/handwritten newslist
"Some letters from Calabria and Basilicata, dated the 28 of last month report that on Wednesday night several earthquake shocks were felt in many places there: the town of Castelluccia, belonging to the Pescaras, was almost destroyed, and 50 people died there. The town of Viggianello, a fief of the Prince of Bisignano suffered too, and damage occurred also elsewhere in the same Province, as I will record. From Reggio, they also write [...]" (Diario Napolitano, XVIII cent.)	"The letters from Calabria and Basilicata, written on the 28 of the same month report about several earthquake shocks felt in many of those places; the town of Castelluccia, belonging to the Pescara family, was almost destroyed, with 50 casualties; the same was suffered in Viggianello, a town of the Prince of Bisignano, with damage to other places of the same Provinces; as it will be said afterwards. And from Reggio they write [...]" (Napoli, 1708)
"On June 12 1646, a Tuesday, news from Naples came on how, in the night of 30 May past, at 6.45 a very strong earthquake was felt in Naples, for the same length of time necessary to tell the Credo thrice, greatly scaring the whole city though with no damage whatsoever. And that the aforesaid earthquake was also in Apulia and Terra di Lavoro, where a score of towns and villages and many thousands of people were destroyed." (Settimanni, XVII cent.)	"Last Sunday the news came in that the earthquake ensued here in the night of 30 May past, around 7.00, to the great terror of all this City, as it was so very strong, caused extremely high damage in Apulia where it caused many houses, belltowers and fortresses to fall to the ground in a score of towns and villages, with the death of a thousand people." (ASVat, 1646)

systematic analysis of gazettes (Bologna gazettes, 1692-1796, on a systematic basis; Mantua gazette, 1693-1799, on a systematic basis, in progress; Naples, Foligno, Milan and Genoa gazettes, yearly revision) and selected inspections of manuscript newslists of the 17th century stored in the *Archivio Segreto Vaticano* and the Modena *Archivio di Stato*. To date, it has been possible to collect around 2,800 items of news related to earthquakes, that were either listed, partially listed or unlisted in the parametric catalogues. Considering that the gazettes have been only partially and sporadically relied upon by seismological literature, the contribution of the journalistic sources of the 17th and 18th centuries appears to be considerable, vouchsafing an original addition of information even on already extensively investigated earthquakes (Camassi and Castelli, 2004).

3. The reliability of European gazettes: real quakes, fake news

In recent years, several seismological studies started to make a somewhat limited use of the 17th-18th centuries journalistic sources, simultaneously taking great care to openly profess their scepticism about the reliability of the information such sources can supply, and to state their preference for administrative and historiographical testimonies (whenever available) over journalistic ones. The authors of this paper are inclined to take a less rigid view on the matter, though by no means a less cautious or critical one. In fact, caution and a critical attitude are to be exercised with respect to historical sources of any kind, as they are all equally influenced by the dynamics of communication typical of the period that produced them.

A critical and unbiased analysis of early journalistic sources shows that some are richer in

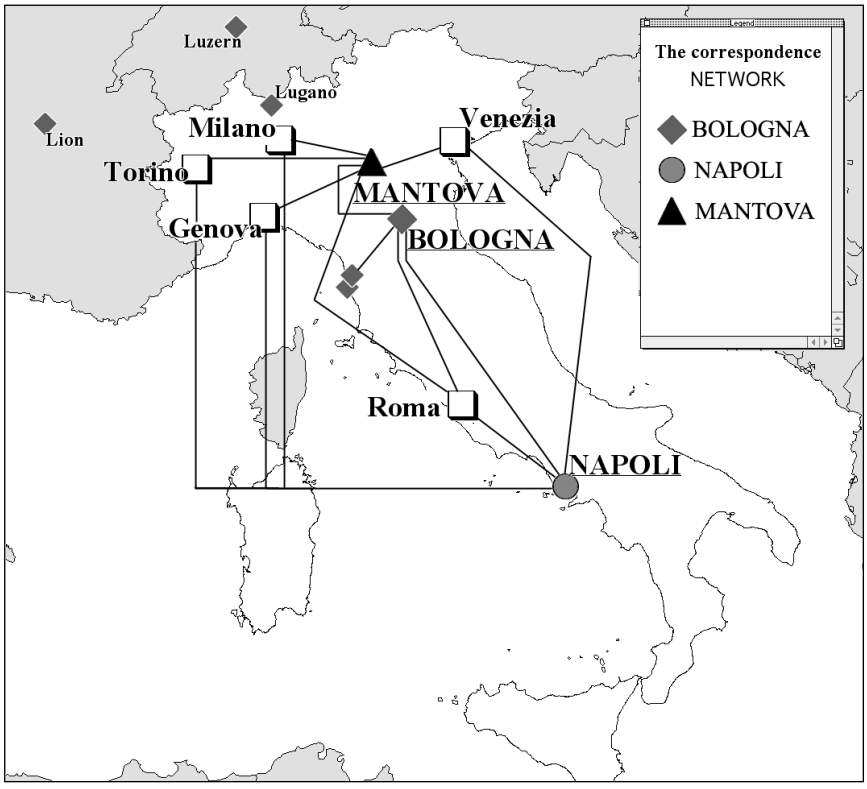

Fig. 1 - Correspondences featured regularly by some Italian early 18th c. gazettes (Bologna, Mantua and Naples).

contents, more accurate and more reliable than others. As a general rule, Italian journalistic sources rate among the best in this sense. This would seem to depend, partly on the position of Rome and Venice as the main European hubs of news gathering, and partly on the regime of strong commercial competition in which Italian journalists had to work. Many gazettes were printed in close proximity, in each of the several regional states in which Italy was then divided, and Italian journalists vied with each other in checking the reliability of news, rectifying errors, uncovering spoofs and so on. In France and Spain, where the news market was monopolized by a few state-controlled, heavily censored gazettes, the accuracy of journalistic news tended to be considerably lower. Quite a few earthquakes purportedly Italian, which under close scrutiny showed to be fictional ones (Fig. 2), were originated by French gazettes. For instance a violent storm that hit northeastern Italy on 17 August 1756 (Bologna, 1756; Mantova, 1756) would be misrepresented as a storm followed by damaging earthquake shocks by the Journal Encyclopedique (1756) and the Mercure de France (1756). The story was picked up by the Perrey (1848) and Baratta (1901) earthquake compilations and would eventually find its way into the earliest Italian parametric earthquake catalogue. Other "journalistic mystifications" (Boschi *et al*., 1995) generated the purportedly destructive Siracusa (Sicily) earthquake of 6 August 1757 (Mercure de France, 1757), not mentioned by any Italian gazette, and the catastrophic so-called earthquake of 1737 in Bengal (Gazette de France, 1738; Gentleman's Magazine, 1738; London Magazine, 1738; Mercure de France, 1738) was in fact a violent cyclone (Bilham, 1994) and was

correctly reported as such by Italian periodicals (Mantova, 1738) which relied on the well-informed Gazette d'Amsterdam.

This is not to say that early Italian journalism was wholly immune to sensationalism and exaggeration. However, these taints seem to have affected the broadsheets or pamphlets (one-offs meant for an occasional, less than refined public, to be enticed by the unsubtlest of means) more than the gazettes, that had a comparatively constant and sophisticated readership and a reputation for reliability to preserve. An exemplary case is that of the 1676 explosion of a gunpowder depot in Ivrea (Piedmont), which became the subject of a now extremely rare pamphlet (Nuova e vera relatione, 1676). The pamphlet's longwinded title implied that an earthquake had caused the accident, while the actual text baldly told that the explosion had been caused by a stroke of lightning (not an uncommon occurrence before the invention of lightning-rods) without mentioning any earthquake at all. The episode was reported in the same terms by gazette of Mantua (Mantova, 1676). The title reference to a fictional earthquake must have been a cheap ploy meant to attract sensational-minded perspective buyers.

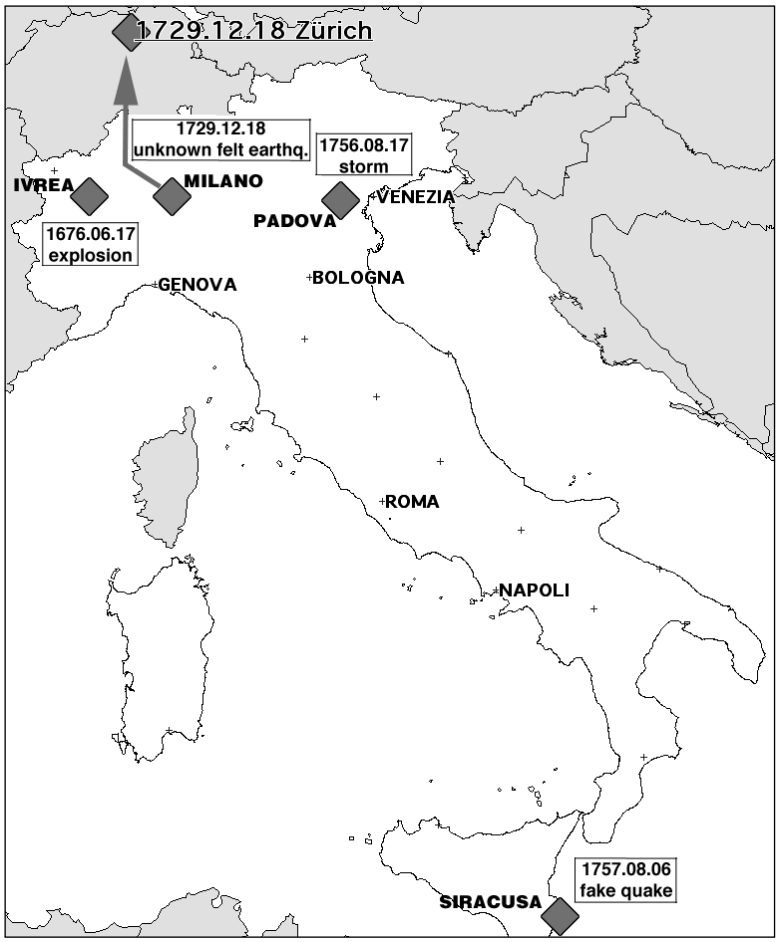

Fig. 2 - Fake quakes identified through Italian gazettes.

4. Case-histories

4.1. Southern Italian earthquakes

In northern and central Italy the Italian gazettes' network was very close-meshed, but much less so in southern Italy. There, Naples monopolized most of the production of handwritten and printed journalistic sources, acting (as far as non-Neapolitan gazettes were concerned) as the main provider of news from the very large area then belonging to the Neapolitan Kingdom. At the close of the 17th century, the Naples gazette featured regular correspondence from Rome, Milan, Genoa, Venice and (from the beginning of the 18th century) Turin, but conversely, the outgoing flow of local news it provided to non-Neapolitan gazettes was much more fitful. The Bologna gazette, for instance, reported Neapolitan news only when inserted in its bi-weekly correspondence from Rome, and would start to feature a more or less regular Neapolitan correspondence only in the first half of the 18th century. The texts of earthquake news were often synthetic and geographically vague, especially when not concerning Naples itself or its surrounding but remote areas such as Calabria or Abruzzo. The vagueness of many descriptions of far-off southern Italy earthquakes broadcasted from Naples also tended to increase as the original news was passed on to and summarized by other gazettes; names of little-known damaged towns could be mispelled or left out, testimonies of damage could disappear. This could diminish their interest as foreign news and lead some of them to be ignored by non-Neapolitan gazettes, especially when they occurred at the same time as some more newsworthy event. A Neapolitan correspondence dated 21 June 1656 and included in a handwritten Roman newslist (ASVat, 1656) described the *"earthquakes recently occurred in Lower Calabria, causing the ruin of some villages and noticeable damage in Cosenza*". Unfortunately, the correspondence was written at the peak of an outburst of plague that killed thousands of people in the whole Kingdom of Naples, owing to which circumstance it failed to attract the attention of any gazette and remained unknown, to this day, to seismological compilations and parametric catalogues alike. Another such case is the damaging earthquake of August 1704, reported by the Bologna gazette *"in the vicinity of Abruzzo"* (Bologna, 1704b) that, for no immediately evident reason, was not inserted in the earthquake list extracted from the Bologna gazette by A. Malvasia (De Rossi, 1889). Generally speaking, the lack (or loss on the way) of clear references to damaging effects resulted in the discarding of some items of earthquake news even at very late dates: Baratta (1901) for instance did systematically exclude from its listing any earthquake whose evidence did not provide damage descriptions explicit enough to classify it as "very strong", "ruinous" or "disastrous".

4.2. Central Italian earthquakes

The Bologna gazette, a crucial node in the journalistic network of the Papal States, provides a quantity of earthquake news from inside that area (and its immediate surroundings) including quite a few events that occurred very far from Bologna itself. The Bologna gazette was used as source material by the Malvasia (De Rossi, 1889) compilation, itself partly subsumed by the Baratta (1901) compilation and through it by the Italian parametric catalogue. The attention the Bologna gazette devoted to earthquakes was subject to fluctuations, but the situation of the Papal

States is particularly felicitous from this point of view. They provided other concurring gazettes, as long-lived as the Bologna one, information about several earthquakes still unknown to the current catalogue helping to fill the gaps. The Foligno gazette for instance, reported, in detail, about a seismic period that afflicted the Foligno area between 29 January and 3 February 1690 *"causing the fall of some chimneypots, roofs and pieces of wall, and damage to some churches, even in neighbouring places"* (Foligno, 1690a, 1690b). This event was not featured in the Bologna gazette, whose correspondence, from the southern half of the Papal States, for 1690 are much reduced. The Bologna gazette did, on the contrary, feature an earthquake that occurred, on 13 February 1700, across the border that divided the Papal States from the Grand-Dukedom of Tuscany in the frame of a Roman correspondence. According to the Roman news the Bologna gazette had, this event did not cause any damage. However, a different tale departed from Tuscany for Venice, thence to be sent on to Naples and printed in the local gazette: according to this story the earthquake had indeed caused "some damage" in Radicofani (Tuscany), Bagnaia (Papal States) and surrounding places (Ancona, 1700; Bologna, 1700; Foligno, 1700; Napoli, 1700). This piece of news did not reach Malvasia (De Rossi, 1889), because the collection of the Bologna gazette used to prepare this earthquake compilation, does not cover the period between 1691 and 1711. Another Tuscan earthquake, reported in the Bologna gazette but ignored by this compilation (this time for reasons unknown) caused some damage in Siena on 26 June 1779 (Bologna, 1779; Mantova, 1779). Finally, it remains unclear why Baratta (1901) decided to ignore some slightly damaging earthquakes duly reported by the Malvasia (De Rossi, 1889), such as the Nocera Umbra earthquakes of 13 July 1740 and 25 July 1748 (Bologna, 1740, 1748; Mantova, 1748).

4.3. Earthquakes in the northern Apennines

For a long time, between the latter half of the 17th century and the beginnings of the 18th century, the Bologna gazette did not seem to have a direct connection with nearby Tuscany. Though Bologna is geographically quite near the Tuscan capital, Florence, news originating from there (and from the slightly more southern Sienese area) mainly reached Bologna indirectly, either inserted in correspondence from Rome or sometimes in even more devious ways. During the first score of years of the 18th century, the Bologna gazette started featuring a regular correspondence from the Tuscan port of Leghorn, but the main body of news from there did not come from Tuscany but rather from overseas countries (France, Spain …). All things considered, the Bologna gazette does not seem to have had as good a connection with Tuscany as the one enjoyed by the Mantua gazette, whose output in terms of earthquake news from northern and western Tuscany is noticeable. As the Bologna gazette was – via Malvasia (De Rossi, 1889) and Baratta (1901) – an indirect source of the parametric catalogues, while the Mantua gazette was not, a number of comparatively minor damaging earthquakes in Tuscany remain outside the current catalogues. One of these was the 9 March 1727 earthquake, strongly felt in Florence and thought to have had heavier effects elsewhere, according to a correspondence printed by the Mantua gazette (Mantova, 1727b) and the Gazette de France (1727b). It is interesting to note that for this event a contemporary Bolognese diarist (Galeati, XVIII cent.) recorded a very strong earthquake shock felt in Bologna on the same day – too local a story for the Bologna gazette to

daign to mention at all – and that the available information seems to point to a northern Apenninic earthquake of some relevance.

The connection between the Bologna gazette and Genoa was more regular than the Tuscan one. News of an earthquake that caused some damage in Finale Ligure (Ligurian coast) in May 1704 reached the Bologna gazette via Milan, and the Mantua gazette through a correspondence from Genoa (Bologna, 1704a; Mantova, 1704), but remained unknown to Malvasia (De Rossi, 1889) owing to the already mentioned gap in the gazette collection controlled by this compilation. The Genoa earthquake of 25 February 1727 was, on the contrary, listed by Malvasia (De Rossi, 1889), and discarded by Baratta (1901) on account of its explicit lack of any evidence of damage. However, a cross-check between the information collected in the Bologna gazette and that made available by the Mantua gazette leads one to think that in this case, like in the previous one, the evidence concerning Genoa could be only part of a larger picture, possibly pertaining to a still partially unknown earthquake located in the northern Apenninic area (Bologna, 1727a, 1727b; Gazette de France, 1727a; Mantova, 1727a).

5. The journalistic sources in the seismological tradition

The preceding case-histories show how the information provided by the 17th-18th century journalistic sources on several damaging Italian earthquakes came to be ignored by the "seismological tradition" of the country (Fig. 3), leading in the end to the exclusion of the same earthquakes from the modern parametric catalogues (Table 2).

Two main considerations seem to have influenced the selective process examined in this paper. One is the relative efficiency of the complex machinery of news gathering and news circulation on which the production of journalistic sources depended in the period under study, and that was strongly connected to the cultural status of the several regions involved. In some parts of Italy, this machinery was clearly much less efficient than in others. Southern Italy was in a particularly unfavourable position from this point of view, with extremely high levels of illiteracy (especially

Table 2 - Preliminary parameters of the described earthquakes (HD: heavy damage; SD: slight damage; D: damage; HF: heavily felt).

Date	Area	Effects	remarks
1656.06	Calabria, Cosenza	HD	unknown
1690.01.29-02.03	Foligno	HD	unknown
1700.02.13	Siena, Radicofani, Bagnaia	SD	unknown
1704.05	Finale Ligure	SD	unknown
1704.08	Abruzzo	SD	unknown
1727.02.25	Genova	HF	unknown
1727.03.09	Firenze, Bologna	HF	unknown
1731.09.15	Abruzzo	D	known
1732.05.22	Livorno	HF	unknown
1737.11.11 [15]	Siracusa	SD	unknown
1740.07.13	Nocera Umbra	SD	unknown
1748.07.25	Nocera Umbra	SD	unknown
1779.06.26	Siena	D	unknown

Fig. 3 - Unknown earthquakes described in the text.

in Abruzzo, part of Apulia, Basilicata and most of Calabria) and very few printing centres outside Naples, the latter being the only long-standing centre of production and diffusion of journalistic news, on a large scale.

The other strong influence at work is the "filter" function exercised by the earthquake collections or compilations produced between the 19th and early 20th centuries. Only one of these (De Rossi 1889), did intensive research into the 17th-18th century journalistic sources, taking into account only the Bologna gazette (in an incomplete collection). Moreover, the Italian compilation which was the main reference for the modern parametric catalogue (Baratta, 1901) adopted non homogeneous criteria in selecting items of journalistic provenance from previous compilations, a procedure which led to further, untoward discarding of already available data. Most of the pre-1900 data contained in the modern parametric catalogues, from Postpischl (1985) to the latest CPTI (Working Group CPTI, 1999), are derived from the earthquake compilations produced between the 19th and early 20th centuries, Baratta (1901) being foremost among them. Therefore, the selective procedures adopted by Baratta (1901) are still defining the extent of the knowledge available at the present time.

Our present "earthquake consciousness" (as embodied in the current parametric catalogues) is directly descended from the selection of earthquake data operated by Baratta and by the 19th century earthquake collectors by working on a set of repertories that included: collections of printed chronicles, classical erudite textbooks, 16th-19th century historiography and 19th century newspapers and meteorological-seismological bulletins. The main vehicle of information available in Italy between the 16th and 18th centuries, namely the Italian-European journalistic network, remains conspicuously outside this selection of repertories (apart from marginal and sporadic forays on the part of single earthquake collectors).

6. Conclusions

In recent years, the topic of earthquake catalogue completeness has attracted several researchers, whose papers offer a wide range of viewpoints and techniques to address [among them Camassi and Castelli (2000), Stucchi and Albini (2000), Albarello *et al*. (2001), Stucchi *et al*. (2004)].

This study adopted an experimental approach involving the collection of earthquake data from a network of professional gatherers of information embracing the time-window of the 17th and 18th centuries. Its findings allow us to define, broadly, but also firmly enough, what seem to be the most likely trends of information loss affecting the current Italian earthquake catalogue for the studied time-window.

1. Probable loss of most "minor" earthquakes (Ix ≤ VII MCS), especially those occurring in Southern Italy during the 18th century. All along this century the activity of Neapolitan newspapermen was heavily controlled, censored and curtailed by the local rulers. To worsen an already unpromising situation, the extant collections of Neapolitan gazettes are incomplete: for the period 1675-1750 perhaps 75% of the issues originally printed are still available, but for the period going from 1750 to the end of the 18th century only a few scattered and fragmentary remnants of the actual production have been preserved.
2. Possible loss of some comparatively relevant earthquakes (Ix ≤ VIII MCS) occurring in geographical areas situated farthest from the main roads. Most of these are to be found, again, in Southern Italian regions, Abruzzo, Molise, Basilicata, northern and central Calabria, the Gargano peninsula (Apulia) and the Southern Apennines (including Irpinia) being foremost among them.
3. Very likely, loss of most or even all comparatively minor earthquakes ("comparatively" meaning, in this case, anything ranging from VI to VII and even VIII MCS) occurred in the geographical and chronological vicinity of major events, seismic and otherwise, such as severe epidemic outbursts, wars, meteorological emergencies, volcanic eruptions and suchlike. The occurrence of these phenomena did often disrupt/interrupt the normal flow of journalistic information via the postal routes, curtailing, as a result, the production and diffusion of earthquake news. Moreover, the same phenomena tended to attract/distract the attention of newspapermen, to the detriment of any "lesser" contemporary seismic events (Castelli and Camassi, 2005).

In conclusion, the findings of this study, however rough and preliminary, suggest adopting an even more conservative view than that put forward by Stucchi *et al*. (2004). According to their

estimate, the catalogue is complete from the early 1500's for earthquakes with magnitude 5.6 to 6.2 (Ix VIII-IX MCS) in Southern Italy. Since, this study has brought to light quite a few "lost" earthquakes, whose dimensions seem to have been significant enough, the authors are inclined to believe that, at least for Southern Italy, it would be more prudent to fix the starting date of a complete earthquake catalogue at the end of the 17th century, not earlier.

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