

Earthquakes in medieval Sicily

A historical revision (7th-13th century)

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Abstract

The need to understand the activity of the main seismogenic structures, to calculate the recurrence periods of major earthquakes and to identify their main epicentral areas, requires wide-ranging research in the field of historical seismology. The present research was conducted in the framework of the projects of the Istituto Nazionale di Geofisica (1991-1995). The presence of different populations and ruling élites, and hence of languages and cultures, has in many cases confused the historical context of the medieval Sicilian sources. However, by going beyond the local sources, and analysing the events in a wider European and Mediterranean context, taking due account of the Byzantine, Latin and Arab sources, it has been possible to identify five seismic events that do not exist in the Italian catalogues or whose dates are very difficult to establish. Six spurious events have been deleted thanks to the revision (659, 785, 796, 963, 1069, 1259); the date of an event has been corrected (1140 into 1125) and five unknown events have been discovered: 853, 1172, 1203-1204, 1255-1256 and 1295-1296. The data on which these findings are based are in many cases dispersed and unused within the many specialised sectors of historical research; in some cases they are unknown even to historians. An example of textual analysis of the sources is also presented to show by what a roundabout route the chronological parameter for the 1125 earthquake was reached. The new events confirm the high seismicity of the eastern area of Sicily; nevertheless, the newly identified series does not seem to show any seismic event comparable to the one that struck the Messina Strait, in 1908 ($I_0 = XI$ MCS, $M = 7.2$): this historical element can provide information regarding the return times of such great event; a hypothesis is formulated by the authors: it will have to be carefully examined by archaeology research. The criteria used in this research are explained, as well as the problems tackled in accordance with the method for the revision of the historical earthquakes adopted by ING-SGA.

Key words *historical earthquakes - Sicily - Messina - Syracuse - Trapani*

1. Introduction

The tradition of Italian catalogues of historic earthquakes is recognised as one of the most important in the world, in terms of the quality and quantity of the seismic events listed: the Italian catalogues cover the period from 5th century B.C. to 1980 (ING-SGA cata-

logue: Boschi *et al.*, 1995). However, in spite of this set of data unique in the world, many zones of Italy, especially for the medieval period, are characterised by a considerable discontinuity of information. In recent years the Istituto Nazionale di Geofisica, in collaboration with SGA, launched research aimed at:

1) the improvement of information at the microterritorial level regarding the effects of major seismic events, otherwise known only in broad outline;

2) the analysis of «gaps» in the catalogue, to improve the known historic series and to supplement them where necessary with unknown seismic events;

3) the historical analyses carried out on a territorial basis to explain whether the «seismic

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silence» in certain zones of geophysical interest is due to the lack of research, of historical information or of seismic activity (Valensise and Guidoboni, 1995).

The present research represents a complex historical revision of the seismicity of Sicily from the 7th to the 13th century and shows the results of the research carried out from 1991 to 1995.

The revised earthquakes were listed in the following Italian catalogues: the macroseismic (with description of the effects) catalogues by Mercalli (1883) and Baratta (1901) and the parametric catalogues by CNEN (Carozzo *et al.*, 1973), ING (Gasparini *et al.*, 1983) and PFG (Postpischl, 1985). We have taken account of the fact that, for this interval, only 8 seismic events were known (see table I), 4 of which have already been demonstrated to be spurious events: the 659, April 785, April 796 or 797 and 22 July 963 earthquakes.

2. Earthquakes «generated» from the tradition of the texts

A first revision had already pointed out that 4 out of these events were the result of chronological errors: 659, 785, 796 or 797 and 963 (Guidoboni, 1989; Marmo, 1989). The «earthquake» in Sicily of the year 659 is mentioned by antiquary historiography of the 16th century and was mentioned in the catalogues by Baratta (1901) and ING (Gasparini *et al.*, 1983). The research chain leads to Byzantine

historian Zonaras (12th century). Bardi (1581a,b) drew from Zonara's work, but this passage deeply modified the information. In fact, Zonaras did not precisely locate the event, referring in a generic way to «many areas» belonging to the Byzantine empire. The date can be inferred within the time-span of Costante's reign (641-668). Bardi «produced» from Zonaras an earthquake in 659 and located it in Sicily: this is the clear result of a source distortion (Marmo, 1989).

Both the 785 and 796 or 797 «earthquakes» mentioned in the catalogues by Mercalli (1883), Baratta (1901) and ING (Gasparini *et al.*, 1983) derive from a single source, Theophanes (760-818); they represent a case of reception of errors included within the tradition of the texts. Theophanes mentioned a single earthquake in Crete in April 796. Theophanes' work, translated into Latin and in print edition (*Historia Miscella*) presented a mistaken lection: *in Sicilia* instead of *in insula*. That error has been transmitted through the following editions, including the one of the famous philologist and editor L.A. Muratori (1723), with considerable doublings of dates. This «generated» the location in Sicily of two earthquakes dogmatically received into the 19th-century seismological tradition, up to Baratta (1901) (see fig. 1).

The historical records regarding the 963 earthquake mentioned in the catalogue by Baratta (1901) had their historiographical origin in the works by Sicilian scholar Mongitore (1743). Even though Mongitore explicitly stated he had drawn that note from 17th cen-

Table I. Earthquakes in Sicily from 7th to 13th century: state of knowledge before the present revision.

Year	Month	Day	Location	I_0 (MCS)	Parametric catalogues	Descriptive catalogues
659	–	–	Sicily	VII-VIII	Gasparini <i>et al.</i> (1983)	Baratta (1901)
785	04	–	Ionian Sea, Sicily	VI	Gasparini <i>et al.</i> (1983)	Mercalli (1883)
796	04	07	Crete, Sicily (felt)	V	Gasparini <i>et al.</i> (1983)	Baratta (1901)
963	07	22	Sicily (Ionian Sea)	X	Gasparini <i>et al.</i> (1983)	Baratta (1901)
1069	–	–	N-E Sicily	≥VIII	Carozzo <i>et al.</i> (1973)	Baratta (1901)
1140	02	01	Syracuse	VIII	Postpischl (1985)	Baratta (1901)
1169	02	04	Ionian Sea	XI	Postpischl (1985)	Lombardo (1985)
1259	–	–	Trapani	VII	Postpischl (1985)	Baratta (1901)

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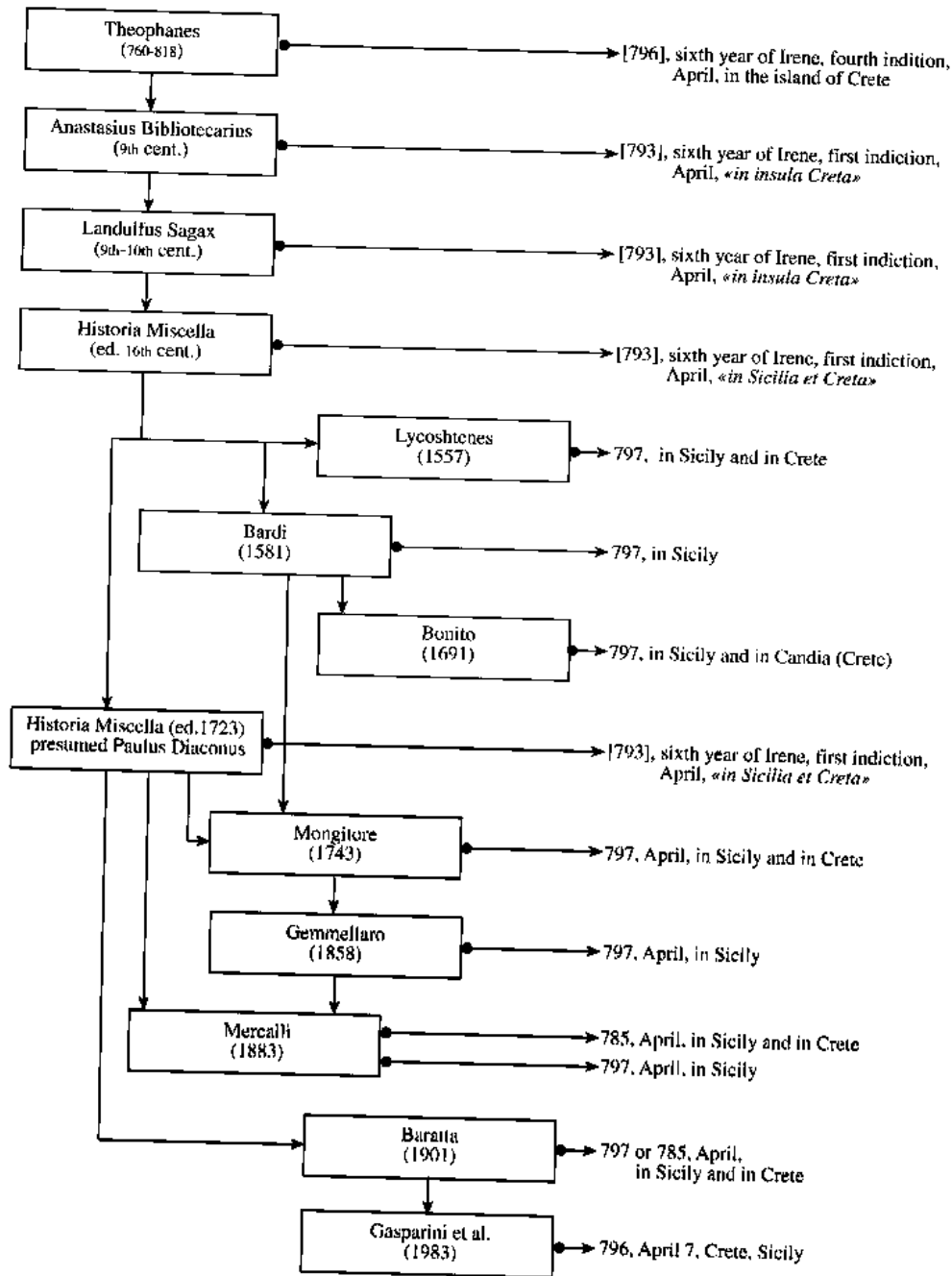


Fig. 1. Theophanes (760-818) mentioned a single earthquake in Crete in April, 796. Theophanes' work, in its Latin translation and in print edition (*Historia Miscella*) presented a mistaken lection: *in Sicilia* instead of *in insula*. That error has been transmitted through the following editions, including the one of the famous philologist and editor Muratori (1723), with considerable doublings of dates. This «generated» the localization in Sicily of two earthquakes received into the nineteenth-century-seismological tradition up to modern catalogues (Gasparini *et al.*, 1983).

tury historian Gabriele Bucellino, checks carried out on many works written by this author did not provide positive results (Bucellinus, 1650, 1654, 1664). In fact, only one earthquake is mentioned in 963 in Egypt by the Arab tradition (al-Andāki, 10th-11th century; Guidoboni *et al.*, 1994). Perhaps it was located in Sicily by Mongitore owing to a mistaken geographic extension.

An interesting case stressing the type of errors that may have been produced by the reading and interpretation of ancient texts is represented by the 1069 Sicilian earthquake. The error begins with Bonito (1691), author of a famous catalogue of earthquakes. He had evidently misunderstood the passage relating to the earthquake of 1063 in the chronology of Bardi (1581a,b) and located in Sicily an earthquake that struck «the Greeks». Bardi was referring to the Byzantine situation, testified by coeval sources. The basic source of information is Byzantine historian Attaleiates (11th century): the passage was paraphrased in the so-called «continuation of Skylitzes» (c. 12th century) and by Michael Glykas (second half of 12th century). Attaleiates was in fact referring to an earthquake occurred between Macedonia and Bithynia. The observer's point of view was, of course, Constantinople. Attaleiates, a historian particularly interested in natural phenomena (something exceptional for Byzantine historiography), observed the «migration» of the shocks, noting that the earthquake had begun «from the western regions». He meant thereby Macedonia. Whether it was this particular phrase that was misunderstood is not clear, but in any case it was by historiographical misunderstanding that the area affected by this earthquake was extended as far west as Sicily.

After Bonito (1691), other scholars complicated the matter by shifting the date of the earthquake by a few years: the report of the event with its new date of 1069, taken from Mongitore (1743), was included in the catalogue of Baratta (1901) and then found its way into an Italian catalogue (CNEN: Carrozzo *et al.*, 1973). In the PFG Catalogue (Postpischl, 1985), this event was not included, but the critical motivation is unknown.

2.1. *The 1259 Trapani earthquake, generated by source misinterpretation*

There is a long tradition of seismic catalogues mentioning the 1259 Trapani earthquake (Western Sicily). The interest in this event is connected to the analysis of the seismicity of the Belice Valley, of which the only known historical event is the 1968 earthquake ($I_0 = IX$ MCS, $M = 6.0$).

The first catalogue that mentions the 1259 event is the one by Perrey (1848), followed by Mercalli (1883) and Baratta (1901), which was in turn mentioned by CNEN (Carrozzo *et al.*, 1973) and in the PFG catalogue (Postpischl, 1985): the reference is to a damaging earthquake in Trapani (VII MCS). The last catalogue is the one by Alexandre (1990), based on the sources and therefore defined «critical catalogue» by the author himself. The catalogues by Bonito (1691) and Mongitore (1743) do not mention this event.

The case of the 1259 earthquake shows how research on sources alone is a necessary but not a sufficient condition for the revision of the historical seismic events. If information is not contextualized within the cognitive historical and semantic framework of the time and in the actual territory, mistakes can be made, even when literally applying philological research.

The actual territory is the area of Mount Erice, at the foot of which lies the city of Trapani – approximately where it lies today. The note regarding an «earthquake» in Trapani comes from two slightly different traditions:

1) one can be found in the *Annales Cavenses* (written in the monastery of La Cava, near Salerno; ed. G.H. Pertz, 1839; previously edited by L.A. Muratori, 1725), which were used by Perrey (1848), Mercalli (1883) and Baratta (1901) and, therefore, were included in the derived catalogues;

2) the other one is represented by 3 monastic annals of the German area (*Annales S. Rudberti Salisburgenses*, ed. W. Wattenbach, 1851; *Annales Scheftlarienses Minores*, ed. Ph. Jaffé, 1861; *Emonis et Menkonis Werumensium Chronica*, ed. L. Weinland, 1874) contemporary to the mentioned event.

Both traditions briefly mention an «earthquake» in Trapani and a thunderbolt that caused a fire in Messina. Both sources have in common the lack of a direct relationship with the territory: in fact, they belong to places lying far from Trapani. Therefore, the existence of an intermediate oral tradition was assumed – however from witnesses – as the *Werumensium chronicle* seems to confirm. Only this source mentions that informative note in its largest version. «The earthquake», it reads, «shattered the Mount of Erice and the rocks, falling down, damaged some houses and blocked the street, so that the monks could not enter the city». Clearly that was a landslide: on the Mount Erice this phenomenon is so frequent that even nowadays the inhabitants consider it hardly important.

It is not surprising that this event is not mentioned in any of the 13th century Sicilian chronicles (Bartholomaeus de Neocastro, ed. G. Paladino, 1921-1922; *Chronicon Siculum*, ed. G. Gregorio, 1792; *Historia Sicula*, ed. L.A. Muratori, 1726; Saba Malaspina, ed. G. Del Re, 1868; *Supplementum* (1258-1263) to *Gesta Friderici II*, ed. G. Del Re, 1868). The silence of the sources can also be found in the scholarly catalogue by Mongitore (1743).

As far as the use of the word «earthquake» is concerned, historical seismologists should no longer be misled: with that term ancient and medieval culture often meant different destructive phenomena (landslides, hurricanes, etc.). Only the critical use of the sources and of their context allows to distinguish the different meanings of that term. On the contrary, the compilers of a recent revision have supposed that event might have been even stronger than previously estimated, assessing an intensity of VII-VIII grade (NT 4, 1996).

3. Historical and historiographical Sicily's context

The new questions of seismology about the activity of seismogenic structures in historical time do not regard only the quality of information, that is *what* we can know further about certain massive earthquakes, but also *why* we

do not know more about the seismogenic potential of particular structures to improve our knowledge on the return time of strong earthquakes.

These considerations are based on an historical knowledge of the territory. The particular historical and geographical situation of Sicily was decisive for the «fortune» of some earthquakes. At the same time, many other events were erased from the collective memory for historical and cultural reasons. In fact, the sources mainly devoted attention to military events, which often tend to be superimposed over, and even to conceal, natural events. However, it is above all the political balance of power in the Mediterranean which has actually favoured the creation of «grey areas» in the documentation. As far as the more ancient period is concerned, Sicily's marginal position vis-à-vis the Roman, and later the Byzantine, sphere of influence was of decisive importance in this respect. The scarce preponderance of the urban model, with one or two exceptions, was also a not insignificant factor; it determined the isolation of Sicily from the main political tendencies in neighbouring territories with a common historical tradition, such as North Africa (Cracco Ruggini, 1980).

Under the period of Arab domination (827-1060), and up to the 13th century, the seismic activity of Sicily even in its more powerful manifestations did not seem to have aroused much attention either, in spite of the renewed interest in geography and the natural sciences (Johns, 1989). Arab geographers restricted their attention to the activity of Etna. Sicily, though situated at the centre of the Mediterranean, continued, in the perspective of the scholars of Baghdad and even of Arab historians, to fall into the category of «Maghreb», the Moslem West. More significant information is available for the Norman period (1060-1194).

Here too, however, discontinuities are apparent: while the Latin chronicles did devote some attention to earthquakes such as the one in 1169 (ING-SGA catalogue: Boschi *et al.*, 1995), the Greek chronicles reveal a certain disinterest in these more «western» zones of the sphere of Byzantine influence. In this case,

too, Sicily remained a marginal territory. Sicilian historians and antiquarians have tried in vain to find references to Sicily, or even to Southern Italy, in the works of Byzantine historians and chroniclers.

In spite of the efforts of local antiquarian research, undoubtedly hampered by lack of familiarity with ancient and Byzantine chronology, historical research on Sicilian earthquakes had no tradition of its own. A factor which has powerfully limited research on historical earthquakes in Sicily is the lack of interaction, or collaboration, between historians and seismologists: a symptom of a certain 'autarchic' tendency which is now disappearing in seismological studies. In the case of Sicily, the seismological bibliography, in spite of its frequent historical errors, has evinced a greater documentary effort, and hence has often been shown to be the sole depository of information on earthquakes, which in many cases has not been taken into consideration by the historians.

Historical seismologists who deal with Sicily from the 7th to the 13th century must, in short, come to terms with a certain «localism» of the Sicilian historical tradition. Only in the last few decades has this been overcome. Yet we are still far from having satisfactory documentation at our disposal. The Sicilian documents remain far less known, and less widely published, than, for example, those of Northern and Central Italy, or those of Naples. The reason for this is not just a matter of evidence. Indeed, as we will show below, a part of our research conducted on already published sources has revealed the existence of newly documented earthquakes which in some cases have revealed some real surprises.

The problem, then, is not only the lack of records, but also the historical perspective on which previous research was based. We are convinced of the importance of studying the earthquakes of Sicily in a wider Mediterranean and, in some cases, European perspective – see in the text above the case of the 1259 Trapani earthquake. Territories placed at the confines of various civilisations, as was Sicily for many centuries, can only be studied in the light of a far wider documentation, both geographically

and linguistically, and taking account of the problems this involves.

Thanks to greater awareness of Sicily's position in its wider historical and geographical context, it has been possible both to augment and to correct the previous state of knowledge, and to define the chronological and geographical context of Sicilian earthquakes more accurately from the 7th to the 13th century on the basis of evidence which had not been taken into consideration either by historians or by seismologists. Below we describe both the new seismic events ascertained and our conclusions relating to the sources as a whole.

4. The Messina earthquake of 31 August 853: cross-checks in different sources

A «big earthquake» which occurred in the year 6361 of the Byzantine era from the Creation of the world (1 September 852-31 August 853) is recorded by the anonymous author of the *Cambridge Siculo-Saracen Chronicle* (Schreiner, 1975-1979). This is a minor chronicle written in Sicily between the 9th and 10th century, of which one Arab and two Greek versions, not always coinciding, are known, relating to the events of the Arab conquest in Sicily and in Calabria (Johns, 1989). The note regarding the earthquake is mentioned only in the Greek version. The supposed location of the event in Sicily and Calabria had been deduced from the context of the source. The text, however, specifies neither the localities struck by the earthquake nor the destructiveness of the event.

The evidence for this earthquake thus seemed to rest on the meagre evidence of this brief chronicle report; though it has to be said that, in Byzantine documentary contexts, these brief chronographic notes often represent the sole source of historiographic evidence. In the Christian Greek Middle-Ages, especially starting from the 13th century, the *kolophon* and *notulae* took the place of the historiographical stories (which have acquired a more literary feature) neglecting the *Realia*. In the works of Greek speaking copyists and scholars this kind of information was limited, which was not

the case, for example, in the Armenian area (Guidoboni and Traina, 1995).

The Italian seismic catalogues (Baratta, 1901; CNEN: Carozzo *et al.*, 1973) have not recorded the earthquake that occurred in 853. But on the basis of the above mentioned chronicle it has been recorded in Guidoboni's catalogue (1989, p. 615) and then dated around the 1 September 852-31 August 853 and generically located in Sicily and Calabria. Only the recent catalogue by Guidoboni *et al.* (1994, pp. 382-383) and the following ING-SGA catalogue (Boschi *et al.*, 1995, pp. 181, 586 and cd-rom) have recorded the new sources, that we present in the following.

Research extended to literary sources of another type enabled us to specify the context of the earthquake, and to show that the *Cambridge Siculo-Saracen Chronicle* is not in fact the only source for the event. The first text is a Greek version of the so-called *Vision of Daniel* (9th century), concerning the prophecy of the sufferings which the wrath of God would inflict on the Christian churches. The identification of the earthquake with the one recorded by the Cambridge chronicle had already been proposed by the distinguished historian of Byzantium, Alexander (1985), though without this contribution being recognised and accepted by the scientific community. Two references to an earthquake can be found in this text:

«And the earth will quake from God's anger and the earth will raise its loud groan towards the Lord. And when half of the week is full, the Lord will look upon the earth and will make it quake».

After this rather generic description, the anonymous author of the *Vision* describes the historical context which the text refers to:

«And afterwards the sons of Ismael will be afraid and will cry out loud while fleeing to Mariana. And afterwards the sons of Ismael will once again attack the land of Helinia being appealed to [summoned by the inhabitants]; others will attack the City of the Rebel without appeal».

The city of *Mariana*, as may also be noted from the Slav version of the *Vision of Daniel* (chapter 4), is to be identified with a Moslem

fortress in Sicily; the fall of Enna (*Helinia*) dates to the year 859; and the «City of the Rebel» is to be identified with Syracuse. Analyzing the text in its general context, Alexander (1985) concluded that the *Vision* alluded to two distinct earthquakes. He identified the first with the Sicilian one, and the second with that of Constantinople in 869 (Guidoboni *et al.*, 1994, pp. 387-388).

Thence, as Alexander argues: «The Moslems, who evidently had been ravaging the territory of Enna and perhaps also attacking Syracuse, had been driven back to their base in Mariana by an earthquake, and were now once again attacking these two cities». Alexander's interpretation enables us to confirm that an earthquake did indeed take place during the crucial years leading to the final conquest of the island by the Arabs. But the definitive confirmation of this event comes from a source whose liturgical character had not hitherto attracted the attention of historians. The source in question is the *typikon* of the monastery of S. Salvatore in Messina (Ms. Mess. Gr. 115), dating to 1131. It is a kind of breviary-calendar, in which all the prescriptions relating to the liturgy were noted: it indicates what liturgical rites are to be celebrated and what chants to be intoned for the various feast-days during the year (Arranz, 1969). On fol. 160ro of the manuscript the *anagnōsmata* [biblical readings] to be recited for the feast of 31 August are specified:

«three *anagnōsmata* in commemoration of the earthquake and the arrival of the barbarians» (p. 184, 26-27).

No one seems to have pointed out that, in the usual Byzantine liturgy, no earthquake is commemorated on 31 August. The *typikon* of Messina records only one other anniversary of an earthquake, namely the one on 26 October, the feast of St. Demetrius martyr. This was the famous earthquake which struck Constantinople in 740, devastating the city and other towns, and destroying the church of Hagia Irini (Guidoboni, 1989, pp. 708-709; Guidoboni *et al.*, 1994, pp. 364-365; Fioriti, 1989, p. 193). It is not strange to find a Constantinopolitan an-

niversary in the Messina *typikon*. This was one of those cases in which natural calamity assumed a «universal» fame. It involved not only the population of the capital of the Empire, but all the members of the Byzantine Church, whose principal authority remained the emperor of Byzantium: all the Orthodox faithful were thus obliged (as they still are to this day) to pray on the occasion of this sorrowful anniversary. It became a solemn celebration of all the other events remembered, but not celebrated, during the liturgical year (Fioriti, 1989).

While it may have been normal to commemorate the famous date of a Byzantine earthquake, the one of 26 October, it still remains to be explained why an earthquake should have been commemorated on 31 August. No earthquake is in fact attested in Byzantium on this date. It is clear that this earthquake of 31 August must have been of great importance in the tradition of the church of Messina, at least equal in importance to that of 26 October which, in some way, epitomised the memory of all the earthquakes of Constantinople. It thus seems logical to assume that the commemoration of 31 August in the Messina *typikon* refers to a local earthquake, one which took place in Messina itself.

Of this event, in theory, we know only the *terminus ante quem*: i.e. the year 1131, the date

of the redaction of the manuscript in which it is mentioned. But, in fact, there is a further indication of its date: for the earthquake is placed in relation to a barbarian invasion, which cannot but be correlated with the first phase of the Arab invasion of Sicily (827-859). The link between earthquake and Arab invasion is provided by the *Vision of Daniel*. And the earthquake was such that the monks had no hesitation in giving it an importance equal to that of the earthquake of Constantinople of 9 January 869, which was the most important seismic event in the Constantinopolitan area and commemorated as such by the liturgical tradition. On the basis of these premises, we concluded that the earthquake of the *Cambridge Siculo-Saracen Chronicle* occurred on 31 August 853, and was probably so strong in the area of Messina to be commemorated by a liturgical book (see fig. 2a,b).

The present knowledge does not allow us to establish whether this was a specific earthquake that occurred in the Messina Strait with a magnitude comparable to the one that occurred in 1908 ($M = 7.2$). The absence of information concerning earthquake effects in the town of Reggio Calabria (at that time under the Byzantine domination) seems to suggest that, unlike 1908, the event occurred in a limited area of the north-eastern coast of Sicily.

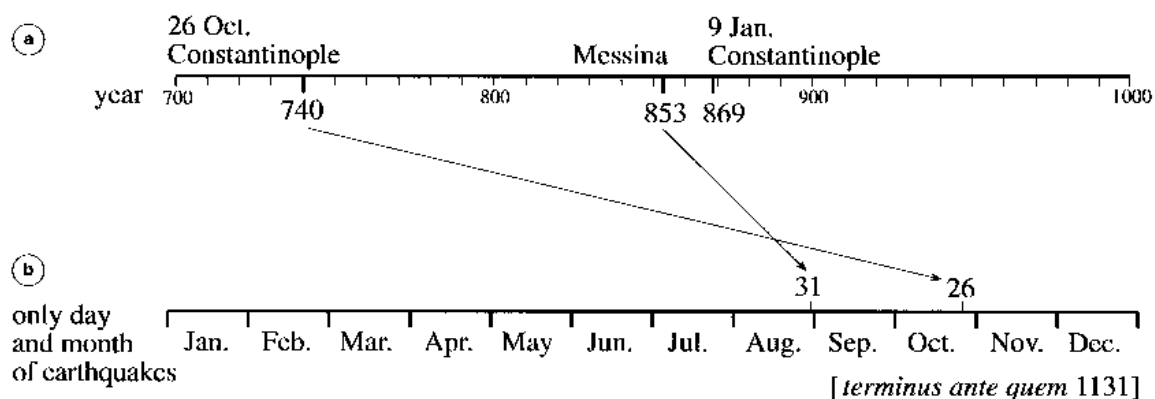


Fig. 2. Relationship between dates of earthquakes mentioned in coeval written sources (a) (Theophanes, *The Vision of Daniel*) and days and months registered in the (b) liturgical calendar in the church of San Salvatore in Messina (12th century). This comparison has allowed the identification of the chronological data and the localization of the earthquake of 31 August 853.

5. Through the «labyrinth» of the antiquarian tradition to the primary sources: the earthquake of Syracuse of 7 June 1125

Not infrequently, historians who attempt to revise historical seismic catalogues seem to fall prey to a kind of «impatience»; they prefer to eliminate a seismic event unless it is supported by contemporary sources, rather than to test its authenticity by subjecting it to further scrutiny. This criterion of elimination, based solely on the principle of «contemporaneity», seems to us slightly reductive in the light of present research. While retaining only those events attested by contemporary sources may apparently provide some kind of «foolproof guarantee» of authenticity, the many problems of research it rejects by doing so may lead to the elimination not just of spurious, but also of genuine earthquakes.

Often the research of historical seismology in the strict sense, that is the critical study of the tradition of the texts or the sources concerning earthquake effects, is excluded or not mentioned in scientific works. Usually, only the final results of this research are published and, moreover, they are transformed into numerical parameters. Then, if by the word scientific we mean only the numerical aspect of researches, this practice can be correct. But if by the word scientific we mean a method of work, that is the demonstration that the choices made can be controlled and repeated, the practice in itself is debatable. The case we are going to present is not anomalous: we wish to discuss it here to demonstrate concretely that the *basic researches* of historical seismology are not «behind» or «below» from the scientific research concerning the seismology, but they represent an integral part of it, as historical seismology.

This case concerns a medieval earthquake recorded by the Sicilian antiquarian tradition of the 16th-18th centuries. It is therefore a seismic event previously not supported by primary sources: *i.e.* an earthquake which could be defined, from one point of view, as «at risk of elimination». As a matter of fact the researchers of historical seismology usually show intolerance towards this kind of events,

which depends on the fact that they have often been shown to be groundless and devoid of any direct testimony.

According to this late Sicilian antiquarian tradition, a part of the Cathedral of Syracuse collapsed between the 11th and 12th century. The date ranges between 1070 and 1140, often being confused with that of other earthquakes of the Byzantine area. The local historians of the 16th and 18th century were unable to resolve this probably pre-existing confusion of dates (see table II).

In the PFG catalogue (Postpischl, 1985) the date of the earthquake is 1 February 1140. This date was based on the catalogue of Baratta (1901), whose information was derived from a well-known scholar from Palermo, Mongitore (1743). Baratta pointed out the remarkable discordance among the various texts in dating this earthquake, but he gave only a partial explanation of why he chose the year 1140. Moreover, we do not know where Baratta obtained the date of 1 February from, since Mongitore mentions only the year. The absence of a precise and reliable chronological parameter has made the research of documents aimed at establishing the date impossible; moreover, it was still doubtful if the date was the result of a confused memory concerning different seismic events.

Further research into the sources, extended to the Mediterranean area and not restricted merely to local Sicilian and Italian chronicles, has enabled us to trace the missing links in the documentary chain. The various contradictory reports on the chronology of this Syracusan earthquake made it necessary for us to trace the event backwards through the local antiquarian tradition in order to identify which of the numerous European medieval sources might have been the original source of information.

This «backwards» mode of procedure is not unusual in seismological studies, where linguistic analysis and attention to the circulation of the information contained in texts which were read, copied but rarely cited, provide some clues for the possible identification of more reliable data. Already Pirri (1733), a Sicilian scholar who lived between 1577 and

Table II. Variation of the date in the erudite historiographical tradition for a seismic event: from 1070 to 1140.

Year	Month	Day	Authors
1070	-	-	Marcello Bonito (1691) Conrads Lycosthenes (1557)
1072	-	-	Girolamo Bardi (1581a)
1082	-	-	Girolamo Bardi (1581b)
1086	-	-	Secondus Lancellotti (1673)
1086/1087	-	-	Bartolomeo Sacchi (Platina) (15th century) Iohannes Nauclerus (1675) Marc'Antonio Sabellico (1504) Giovanni Tarcagnola (1558) A. Ciaconius [Chacón] (1601) Vincenzo Magnati (1688)
1087	-	-	Iacobus Goutoulas (1665)
1094	-	-	Paolo Morigia (1592)
1100	-	-	Mattheus Palmerius (15th century) Conrad Lycosthenes (1557) Mario Arezio (1719) Vincenzo Mirabella (1613) Giuseppe Capodieci (19th century)
1110	-	-	Vincenzo Coronelli (1693)
1125	-	-	Rocco Pirri (1733)
1130	06	07	<i>Manuscript Catalogue of the Bishops of the Syracuse Church</i> (lost - a copy is in Rocco Pirri, 1733) Cristoforo Scobar (1520) Giuseppe Capodieci (19th century)
1140	-	-	Antonino Mongitore (1743) Rocco Pirri (1733)
1140	04	06	Giuseppe Capodieci (19th century)

1651, and Mongitore (1743) had pointed out the great variety of dates which historians had attributed to the Syracusan earthquake. The list of the authors cited by Pirri was considerably extended first by Mongitore and then by Capodieci (19th century). In table II the authors they mention are regrouped according to the chronological hypothesis to which they subscribe.

These are all authors considerably later than the presumed date of the event, with the exception of «Martinus Sottus» (or Scotus), a medieval source we will further discuss below.

The complex genealogy of borrowings between the various authors cannot now be reconstructed. For some of them, indeed, only second-hand quotations are available, because their original text has been lost.

We also thought it worthwhile to examine the «indirect» evidence of the anonymous catalogue of the Syracusan bishops (*Manuscript Catalogue of the Bishops of the Syracuse Church*) cited by various authors, but apparently no longer extant. It was formerly in the Cathedral Library (the present Alagoniana Library) in Syracuse, where it was consulted by

Scobar (1520), by Cajetani (1707) and by Pirri (1733), who left a transcription. This manuscript, which was perhaps destroyed in a fire well-known by the historiographers and in which other books of the Library were destroyed, seems to be of some importance as a source independent of the others. It is thought to have been compiled not prior to the 12th century and seems to show, according to Cajetani (1707, p. 355), a dependence on lost Greek sources. It may be presumed that it was composed by various hands in successive periods, or that the one author had used materials of the period in which Greek was still the language of the liturgy in Syracuse.

This was a phenomenon common to all the Italian areas in the Middle Ages where Greek was the official language. It is well known that, after the Byzantine domination, during the consolidation of Norman domination many documents translated from Greek into Latin were summarised to make them more easily available to the new dominant class.

Whatever the case, the date of composition of the *Manuscript Catalogue of the Bishops of the Syracuse Church* cannot be precisely determined. We could date it to the 14th century, since Pirri cites it in his work in connection with the bishops of the first half of that century (up to 1338 at least: p. 627). Then the information about this earthquake in the Sicilian antiquarian historiography is based on a lost Greek tradition. The only possibility to go back to original sources has been to study the Latin parallel tradition. Nevertheless, the texts belonging to this tradition cannot be considered Sicilian local sources (in which case they would have been written in Greek). However, several facts have led the research in this direction:

1) the way in which information was transmitted in the century examined: as a matter of fact the circulation of information in culturally homogeneous environments, such as the ecclesiastic and monastic environments, gives us the possibility to identify events that occurred even before a long time;

2) the almost «sacred» idea of written texts, in which re-elaboration, if any, can be recog-

nised thanks to the comparison with other parallel texts.

The first «pretext» to go back was the work of Bartolomeo Sacchi, better known under his nickname Platina (15th century), also a source for Mongitore (1743).

In order to continue the analysis and have the possibility to make a comparison among the authors, the texts have been divided pointing out the informative segments (sections) and classifying them to recognize the derivation in the texts as follows:

- T₁ year/years or datable historic events;
- T₂ day of the week;
- T₃ hours or parts of the day;
- A list of the prodigies;
- B destructive earthquake in Syracuse;
- C effects on the Syracuse Cathedral;
- D effects on the Archthusa source;
- E other destructive effects on Syracuse;
- F transporting of the St. Nicola relic;
- G referring to Martin Scot.

In Platina's text, quoted below, we find the basic segments of information which served as clues to the identification of the original source:

«Some write that: [A] many prodigies appeared during this period [T₁] [the pontificate of Victor III, 1086-1087], that even domestic fowl, such as chickens, geese, doves and peacocks, flew towards the mountains and became wild, and the fish both in the rivers and the sea in part died. [B] Some cities were so violently shaken by the earthquake that the basilica of Syracuse, collapsing [T₃] while Vespers were being celebrated, [C] crushed all those who were gathered in the church, leaving alive only two persons by divine grace, the deacon and the sub-deacon. [F] Some say that it was during this period that the body of St. Nicholas of Bari was translated by some merchants and sold here, [G] as is written in his history by Martin Scot, a man of great doctrine and of exemplary life».

The various segments of information contained in this brief text derive from heterogeneous traditions, promiscuously mixed together, rather as in the prodigy lists of pagan historiography in antiquity. This prevents us from taking such texts literally. However, one firm clue is provided by the sole explicit refer-

ence to a medieval author made by Platina in this passage. This is to the so-called «Martin Scot». The identity of this author is contested, but Chevalier (1907, vol. 3, p. 3107) proposed identifying him with the medieval chronicler *Martinus Polonus*, though without any justification, other than the coincidence in name. A more plausible hypothesis occurred to us by comparing Platina's text with one of his principal sources, the *Historia ecclesiastica* of Ptolemy of Lucca, written towards the end of the 13th century:

«According to the great enlightened historian Vincent of Beauvais, also [G] Marianus Scotus lived at the time of this Pope (Victor III, 1086-1087), and also in this period a very strange [A] and monstrous event occurred in some regions of the Gaul, since domestic fowl, such as peacocks, geese and chickens flew towards the mountains and woods and became wild, and the fish both in the rivers and the lakes died. [...]

[T₁] Almost in this period [of the pontificate of Victor III, 1086-1087] according to what the author (Vincent) says [B] the city of Syracuse was struck by such a strong earthquake that [T₂] on Sunday, [T₃] towards the third hour, while Mass was being celebrated [C] the main Church collapsed and crushed all the people and clergy; only the priest, the deacon and sub-deacon who were celebrating Mass were saved, to great wonder of everyone. [F] In this period the citizens from Bari have sailed reaching the coast of Myrrea, in Lycia, where the Turkish had settled. According to what the historians say, the people coming from Bari were discovered by four nuns who were obliged to show them the grave of St. Nicholas».

In this work we find the same sequence of sentences as in Platina's text. His life of Pope Victor III is followed by: [A] a description of the strange behaviour of domestic fowl «in Gallia»; [B], [T₂], [T₃] and [C] a report of the earthquake in Syracuse; [F] an account of the translation of the body of St. Nicholas from the mountains of the Caspian to Bari. As for the prodigies Ptolemy explicitly refers to *Vincent*, and indeed it is almost literally borrowed from the *Speculum Historiale* of Vincent of Beauvais, who was writing around 1245. As far as the earthquake is concerned he generically refers to «what the histories transmit». It may be noted that Ptolemy attributes to «Marianus»

Scotus [G] exactly the same characteristics as Platina does to Martin Scot: a writer of history and a man of great doctrine. Probably «Martin Scot» is a fictitious personage, originating from a corrupt reading of the text of Ptolemy of Lucca by Platina. No doubt it is from the same name that the *Martinus Sottus* of Pirri's list of authors also derives, even though it is difficult to explain his presumed dating of the earthquake to so late a period. In fact, if *Martinus Sottus* is to be identified with *Marianus Scotus*, it would not be possible to attribute this dating to him at all, since he lived several centuries earlier; if, on the other hand, he is to be identified with Vincent of Beauvais (13th century), it would equally not be possible to do so, since this author reports only the segments of information [A], [F] and [G] without any information on the earthquake.

The text relating to the earthquake of Syracuse is thus independent of the other two texts with which it is collocated in the works of Platina and Ptolemy of Lucca. Assuming that the first and last piece of information derive from Vincent of Beauvais, we searched for the possible provenance of the report of the Syracusan earthquake among Ptolemy's other named sources.

One of these reports the event in almost the same words as Ptolemy's text: namely, the *Chronicon pontifum et imperatorum* of Martin of Troppau, also known as *Martin Polonus* and *Martin Oppaviensis* (13th century):

«In this period [T₁, prior to the death of Gregory VII in 1085] [B] the city of Syracuse in Sicily suffered a serious earthquake, so that [T₂] on Sunday [T₃] towards the third hour, while Mass was being celebrated, [C] the main church collapsed and crushed all the people and clergy; only the priest, the deacon and the sub-deacon who were celebrating Mass together in the sanctuary were saved, to the great wonder of everyone».

Platina's text differs from this in at least two particulars: the indication of the time of day and the number of survivors. As regards the first, Platina shifts the event from the third hour (in the morning) to the hour of Vespers (towards sunset); he also omits any mention of the day (Sunday). These details, however,

would have little significance in the absence of the main chronological parameters (year, month and day).

As regards the second aspect, we may infer that the discrepancy was based on an ambiguity in the original source, which was handed down from chronicle to chronicle, generating variations as it went and making it difficult to trace the genealogy of the sources. Ptolemy too displays some distance in the way he treats his source, Martinus Polonus. The latter in fact dated the event prior to the death of Gregory VII and before the intervention of Robert Guiscard in his support, *i.e.* between 1085 and 1086. But Ptolemy, perhaps prompted by his own narrative requirements, placed his report of the earthquake in the period of pope Victor III, *i.e.* 1086-1087.

Thus, expanding on the extraordinary events relating to animal behaviour, cited by Vincent de Beauvais and placed in the period of Victor III, Ptolemy only extends the list of extraordinary cases. Together they form an exceptional conjuncture coinciding, among other things, with the presumed poisoning of the Pope.

Martin of Tropicpeau does not explicitly refer to any other previous chronicler in his report on the Syracusan earthquake. However, at the beginning of his Chronicle (pp. 407-408) he lists the various chroniclers he had used as sources: 1) Bonizone da Sutri; 2) Richard of Poitou, a monk of Cluny; 3) Gilberto Romano; 4) Gervase of Canterbury; 5) Escodius; 6) Goffredo of Viterbo; and 7) Vincent of Beauvais.

Not all the chronicles of these authors survive: those of authors (1) and (5) are lost. Of the others, with the exception of Vincent of Beauvais, who in any case, as we have already said, does not mention the earthquake, only some *excerpta* have been published in the collection of the *MGH (Monumenta Germaniae Historica)*, which is the main «corpus» of the European sources of Middle Ages. In the fragmentary texts of these authors so far published only one report of the Syracusan earthquake can be traced. It occurs in the chronicle of author (2) Richard of Poitou, who lived in the second half of the 12th century. Three successive versions (or *recensiones*) exist of his chronicle: the first, composed around 1153,

continues to the year 1145; the second to 1162; and the third to 1172-1174. And it is in this third *recensio* that we find the text of concern to us. It should be added that the third version is preserved in three manuscripts which themselves present some interesting variants. The text of two of the three manuscripts (retained respectively in Perugia and Madrid, both dating to the 13th century), reads as follows:

«Subsequently, [T₁] in the year of the incarnation of the Word 1128, [T₃] towards the third hour [B] in the city of Syracuse in Sicily a great earthquake occurred, [C] so that the episcopal church collapsed in the twinkling of an eye, while the clergy were singing [T₂] the Sunday Mass, and all the clergy who were reciting the Psalms in the choir perished with the church; only the bishop, who perhaps had left after the Gospel, was saved together with the deacon and the sub-deacon who were celebrating Mass in the sanctuary, which survived, and who remained unhurt to the great wonder of everyone. [D] Also the fountain of Arethusa, which has its source close to the walls [of the city] and provided the citizens with drinking water, was turned into brine. The which contributed notably to confirm the fables of the poets, who maintain that this same water, running below the sea through subterranean passages, emerges from the earth in the aforesaid spring to form the river Alfeo. [E] The walls of the city also collapsed together with many houses».

Richard of Poitou, who was writing some fifty years after the event (seventh decade of the 12th century), at last provides us with a precise dating of the earthquake: 1128. He also confirms the time of day, though without specifying the actual day on which Syracuse was struck by the earthquake. Apart from the damage caused to the church, which is described in terms of a collapse of the choir and not of the whole roof, and the collapse of the walls of the city and many houses, Richard of Poitou mentions a detail which would recur in the descriptions of the earthquake of Catania in 1169 (ING-SGA catalogue: Boschi *et al.*, 1995): namely, the segment of information [D], the reported infiltration of saltwater into the Arethusa spring, celebrated for producing drinking water from a source located only a few tens of metres from the seashore. This could have been caused by a confusion or con-

The Syracuse earthquake of 7 June 1125: analysis of the chronological parameters and relationship between sources and catalogues

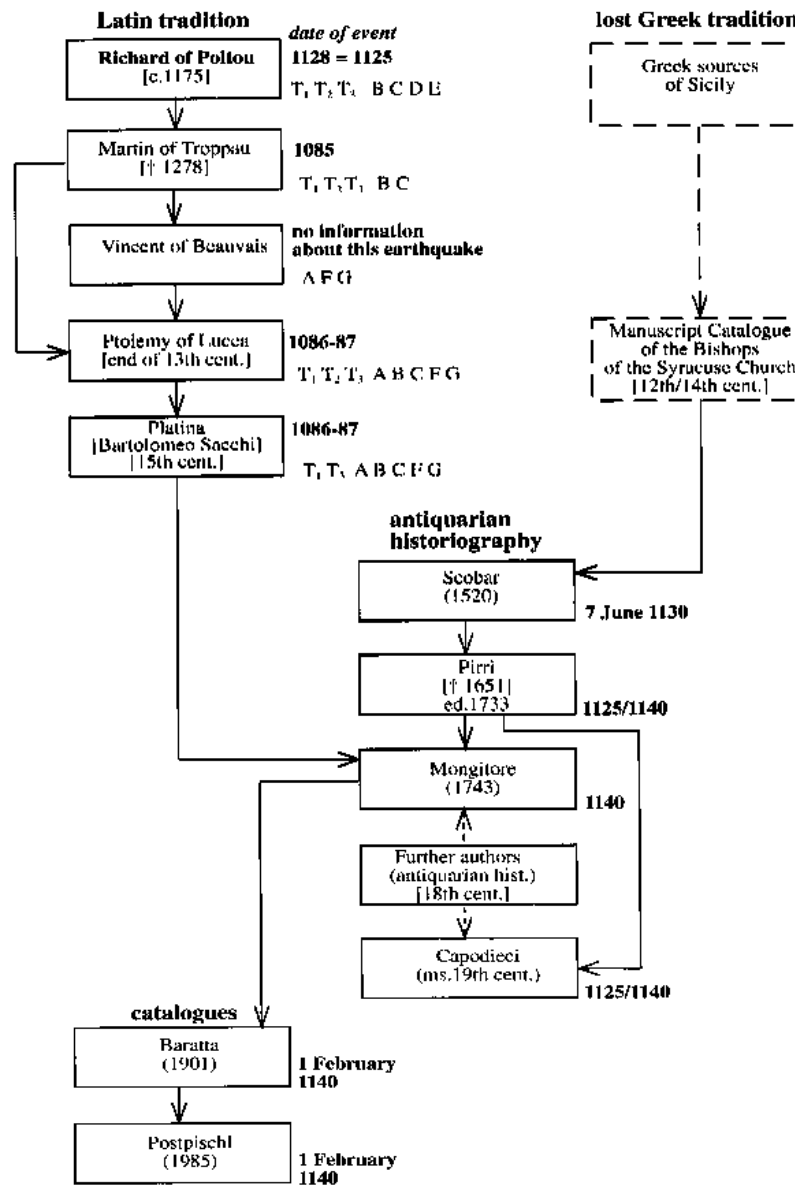


Fig. 3. Relationship between sources of the Latin tradition and of the Sicilian antiquary historiographical tradition for the identification of the exact chronological data of the earthquake which struck Syracuse in the 12th century: previously it had uncertainly been dated between 1070 and 1140. Such indeterminateness had aroused the suspicion that it was more than one destructive event. Philological analyses of the texts (the informative segments are marked by letters, see p. 1211) allowed to state that the earthquake, mentioned using so different chronological parameters, was a single event: it occurred on 7 June 1125.

flation between the two reports during the process of their transmission, probably oral, but it cannot be ruled out that the phenomenon in question was repeated forty years later, on the occasion of the Catania earthquake in 1169. Very probably, the infiltration of saltwater into the Arethusa spring occurred during both seismic events.

Clearly, if it caused not only the Cathedral but the walls of the city to collapse, the Syracusan earthquake was of considerable intensity. A confirmation that it occurred at a later date than attested by the historical tradition is provided by the catalogue of the Syracusan bishops compiled by Cristoforo Scobar and by the text of the *Manuscript Catalogue*, from which Scobar (1520) claimed to have derived information. We transcribe the text of the *Manuscript Catalogue* as reported by Pirri (1733):

«[T₁] In the year 1130 [T₂] on the Sunday of 7 June at the third indiction [C] the Cathedral [of Syracuse] has collapsed because of a strong earthquake crushing all those who were there, except for three of them, that is the priest, the deacon and sub-deacon, who were celebrating Holy Mass».

The text of the two sources is rather different and there is a notable discrepancy in dating: Scobar (1520) dates the event to 7 June 1130, instead of the year 1128 specified by Richard of Poitou. However, as Pirri already noted, 1130 does not correspond to the indiction cycle indicated. In fact the years 1125 and 1140, but not 1130, fell into the third indiction. The dating proposed by Scobar is not therefore reliable.

An analysis of all the possible coincidences between the day of the week (Sunday), year and indiction cycle shows that the most likely date for the seismic event was Sunday, 7 June 1125 (see fig. 3). Having established this chronological parameter, the result of a «labyrinthine» textual analysis, further corroboration may now be sought in the local archival sources by initiating a search in the surviving archival documentation in Sicily for the period in question.

This earthquake shows some similarities with the one that occurred on 10 December

1542 with its epicentre in the Syracuse inland ($I_0 = X$ MCS) and which had intensity effects in the town of VIII MCS (Boschi *et al.*, 1995).

6. The contribution of the Greek *notulae* on the earthquakes of the years 1169, 1172, 1255-1256 and 1295-1296

In completing the historical series of medieval earthquakes, the so-called *notulae* are of considerable importance. These are the annotations placed in the margins of manuscripts by copyists, or even by readers (this phenomenon, linked to the rise in literacy, came particularly to the fore after the 10th century). However, the collections of these marginal annotations are far from complete. In some cases the *notulae* are expanded to the point when they become minor chronicles in their own right; in other cases they are no more than casual annotations, prompted by the desire to record immediately an event the annotator himself had experienced.

In the Byzantine tradition at least, annotations of this kind are found in practically every manuscript. The so-called *Chronica minora*, edited by Schreiner (1975-1979), which gather together and augment the previous editions of *notulae* and minor chronicles, are incomplete. But a supplement to them is provided by the collection of *notulae* since published by Evangelatou-Notara (1982, 1984), a scholar who has devoted particular study to historical earthquakes. It is not by chance that the sources comprised in these collections have yielded information on events in Sicily, where Byzantine *scriptoria* were active.

The *notula* on the famous earthquake of 4 February 1169 published by Evangelatou-Notara (1982, p. 209, no. 428) is a simple chronological note that adds no further records to what we have already learnt about that event from other sources (see ING-SGA catalogue: Boschi *et al.*, 1995, pp. 192-193 and 598-600). Three other similar *notulae* yield new data on previously unknown Sicilian earthquakes, already familiar to philologists but ignored by historians and hitherto absent from the seismological bibliography. Firstly, a note in the mar-

gin of Ms. 73 of S. Salvatore of Messina reports on fol. 306:

«On 26 September, sixth indiction, year 6681 [1 September 1172-31 August 1173], ninth hour, a dreadful and very terrible earthquake occurred in the city of Messina as a result of our impiety» (Evangelatou-Notara, 1982, p. 210, no. 435).

Secondly, a *notula* in Ms. Bib. Univ. of Messina (formerly in the possession of S. Salvatore Church), fol. 55vo, reports:

«On the same day, the 17th, Wednesday, at the fifth hour, there was a large and terrible earthquake that made the foundations of the earth tremble, in [the year] 6764, fourth indiction [*sic* = in fact the fourteenth, 1 September 1255-31 August 1256]» (Evangelatou-Notara, 1984, p. 63, no. 203).

As for the dating of this earthquake it has to be said that in the period between the 1 September 1255 and the 31 August 1256, only 17 November 1255 and 17 May 1256 fell on Wednesday.

Thirdly, a *notula* added to an Italo-Greek *typikon* of 1292 (Ms. Vat. Gr. 1877, fol. 13vo) reports:

«[...] at the tenth hour of the night a big earthquake occurred in the island of Sicily [...], with the result that all the walls collapsed. In the year 6804, ninth indiction [1 September 1295-31 August 1296]» (Evangelatou-Notara, 1984, p. 173, no. 571).

We have already said before of the historical value of these mini-chronicles, which, in the 13th century, also had the function of supplementing, or filling gaps in the historiographic sources, which tended, at least in the Greco-Byzantine world, to abandon the chronicle dimension. It should not be forgotten that the information in question constitutes only a fraction of the brief reports recoverable from *notulae*, colophons and marginal scholia. Detailed studies on the damage to buildings and reconstructions mentioned by other manuscripts would help to retrieve other valuable materials for the ascertainment of any other unattested seismic events. The recovery of these chronological traces is an essential prerequisite for conducting research on the

contemporary documentation preserved in Sicilian archives: the documentary collections relating to the great monasteries of Sicily from the 7th to the 13th century cannot be investigated without these preliminary researches, aimed at fixing the basic chronological parameters of seismic events.

7. The Arab reports of the earthquake in Sicily in 600 H. = 1203-1204: a «hidden» seismic event?

Another earthquake is reported for Sicily by two Oriental sources around the year 600 of the Hegira (10 September 1203-28 August 1204). The first of these sources is Ibn al-Athir, the most important Arab historian of the 13th century, who reports:

«In that year [600 H.] there was a very violent earthquake, which affected the larger part of Egypt, Syria, Jazirah [Mesopotamia], the territory of Rum [Byzantine Empire, or rather Anatolia], as well as Sicily, Cyprus, and which reached as far as Mossul, in Iraq and elsewhere, etc.» (*al-Kāmil fī'l-tārīkh*, XII, 198).

The same information is reported almost verbatim by Barhebraeus, a Syrian chronographer of the 13th century:

«And in the same year a violent earthquake also took place, and it destroyed the wall of Tyre and other places in Egypt, and in Palestine and in Bēth Nahrīn (*i.e.* Mesopotamia) and Māwsil, and also in the islands of Cyprus and Sicily». [Budge's transl.].

The mention of Sicily in such a context actually raises some doubts; yet it could not be completely wrong, since there is evidence for a seismic event in the Western part of the Mediterranean, *i.e.* the Maghreb. In fact, Ibn Wāsil (13th century) records under the same date that an earthquake was felt at Ceuta (Sabta), a town of Morocco just opposite Gibraltar, and «as far as the extreme west», with a terminology that would seem to refer to the Maghreb and in particular to Morocco and to Andalusia. So, in theory, this earthquake could have affected Sicily, which according to

the ideas of Arab geographers was a part of Maghreb (Miquel, 1973). However, this is not enough to explain the mention of Sicily in the context reported by Ibn al-Athīr. Ambraseys and Melville (1988) have assumed that Ibn al-Athīr's information constitutes one of the frequent duplications that exist in Arab chronicles, and that the localities he mentions refer, in fact, to the famous earthquake of 20 May 1202 (Ambraseys and Melville, 1988). Indeed, Ibn al-Athīr had already reported a destructive earthquake in the Eastern Mediterranean three years previously:

«In the month of sha'ban of that year [597 H.] the earth trembled at Mawsil, in all the centres of Mesopotamia, in Syria, in Egypt and elsewhere. In Syria the effects were terrible; many houses were destroyed at Damascus, at Hims and at Hamat, and a village close to Busra was swallowed up by the earth. Along the Syrian coast too the damage was enormous: the citadels of Tripoli, Sur, Acri and Nabilus were destroyed. The earthquake was also propagated to Byzantine territory. In Iraq the damages were slight» (*al-Kāmil fī'l-tārīkh*, XII, 180-181).

The date corresponds to the period between 7th May and 4th June 1201. Ambraseys and Melville (1988) have shown, however, that Ibn al-Athīr's report was antedated by one year. On the basis of a correlation of the sources and an investigation of the problems of chronology posed by the study of this earthquake, it can be concluded that it occurred on 20 May 1202; hence the dating should be corrected to the year 598 of the Hegira, which runs from 1 October 1201 to 19 September 1202. In this case we would thus have an earthquake in the Eastern Mediterranean for this date, and one in the Maghreb for 1203-1204.

Ibn al-Athīr's testimony, however, appears suspect for other reasons, especially as regards the mention of Sicily. Given that this earthquake also caused serious damage to the Kingdom of «Little Armenia» situated in Cilicia (today's South-eastern Turkey), as may be deduced from various Latin and Armenian authors, and in view of the duplication perpetrated by Ibn al-Athīr, it cannot be ruled out that the Arab historian was referring not to Sicily, but to *Cilicia*. The position of Cilicia

appears logical in the description of the Arab historian, who enumerates the regions struck by the quake according to a strict geographical sequence, in which only the mention of «Sicily» appears distinctly anomalous. The substitution of Sicily for Cilicia, however, does not seem justifiable from a philological point of view, unless it was an error in transcription made by the copyist; but in this case the error must have arisen at an early date, since, as we have seen, the same tradition is reported by Barhebraeus. Besides, the Arab authors were by no means ignorant of Sicily's seismic activity, notably as a phenomenon associated with the eruptions of Etna, although, as we have noted, they had no real interest in historically contextualizing these earthquakes. A similar attitude is encountered in Byzantine historiography.

There remains the testimony of Ibn Wāṣil, all the more interesting if we bear in mind that this author is in general little interested in earthquakes, and does not even allude to, still less describe, the famous quake of 20 May 1202: he only mentions the major earthquake in Aleppo in 1170 (I, 185). Ibn Wāṣil was a Syrian from Hama, who was presumably in possession of precise and accurate information. Ambraseys and Melville on the basis of their documents have associated Sicily and Ceuta [Sabta] to the area affected by the earthquake that occurred on 20 May 1202. The distance between Ceuta and the epicentral area is about 3800 km. Then, we honestly think that the lack of exhaustive documents (for the local area) should lead to a more careful behaviour. For this reason we have a suspicious attitude towards the insertion of «universal» earthquakes in the seismological literature. The study of historical sources regarding earthquakes has demonstrated that in the texts of Antiquity and of the Middle Ages some natural events having a strong impact on the environment and society of that time have had such a relevance as to overshadow the effect of seismic events of minor importance, so that even the «historical memory» of them was missed.

The event which occurred in the Mediterranean area on 21 July 365 is one of the most evident examples of this kind. A series of factors contributed to make this earthquake a sort

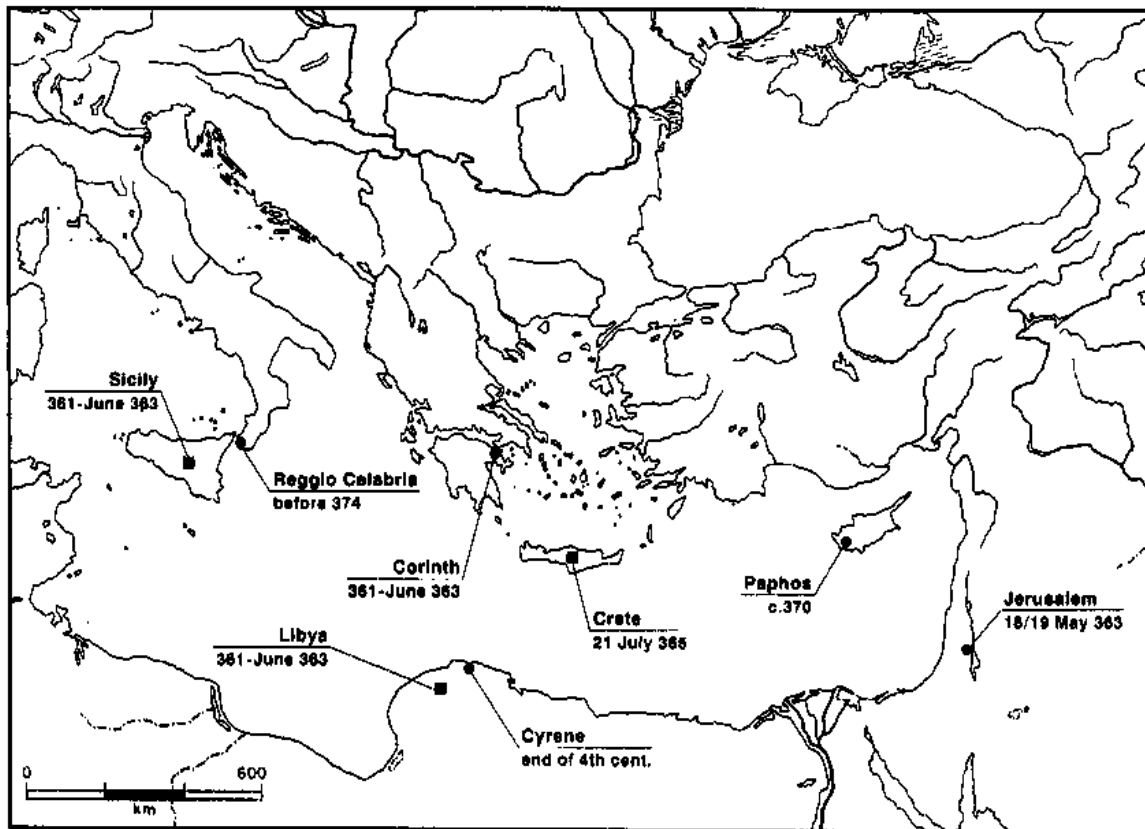


Fig. 4. Location of the impressive earthquake sequence which struck the South-East Mediterranean around the second half of the 4th century: seismic events close one to another can often be mistaken for a single one, which nevertheless tends to become «too» exceptional (source: Guidoboni *et al.*, 1994, p. 255).

of «black hole» in the documentary field, which have led ancient and especially modern observers to associate this event with even far reaching effects. This is due to the fact that the effects themselves have not been clearly recorded (see the critical presentation of the event by Guidoboni *et al.*, 1994, pp. 267-274). Eight important seismic events which occurred in the Mediterranean area from 361 to the end of 4th century (see fig. 4) have been focused upon. But similar cases have happened even in recent times: for example, the great earthquakes which occurred in Calabria in 1783 have probably «concealed» the disruptive earthquake which occurred in Sicily on 14 September 1780, which was unknown until recently (Ligresti and Gallo, 1991; Mariotti,

1995). It has to be said that even the local scholars have had this drastic tendency to select information.

This is why we cannot avoid considering that the events which occurred during the first years of the 13th century in Sicily and Ceuta, respectively, are different earthquakes with respect to the famous one that occurred on 20 May 1202.

From so confused a situation of the sources it may be suspected that Ibn al-Athīr's mention of Sicily cannot be eliminated entirely as a result of an accidental duplication, aggravated by a possible textual confusion between Sicily and Cilicia. And if Ibn al-Athīr's testimony cannot be rejected, we must admit the possibility that an earthquake, or a series of earthquakes, did

Earthquakes in medieval Sicily. A historical revision (7th-13th century)

take place in the South-western Mediterranean around this date. Given that this was a particularly critical moment in the history of the Near East, due to the foundation of new Latin kingdoms there in the aftermath of the Fourth Crusade, the lack of precision of historians and chroniclers of the period is understandable.

8. Conclusions and open problems

Considerable difficulties arise in trying to co-ordinate elusive and sometimes inexact historical data on seismic events. Our research shows, however, that it is possible to revise and correct traditionally accepted (or even

«traditionally» rejected) earthquake data, thanks to a critical reading of the sources philologically and historically more attentive to the context in which these events took place. It shows, furthermore, that the exegesis of the sources is a decisive factor in historical seismology. In particular, with regard to the period here analysed (between the 7th and the 13th century), and with regard to an area like Sicily, at the confines of various cultures (Arab, Latin and Byzantine), our method of source analysis was focused on little known historiographical situations, conducted through novel procedures of historiographical research. The summary of the results of the research can be found in table III.

Table III. Earthquakes in Sicily from 7th to 13th century: results of the historical revision.

Year	Month	Day	Location	I_0 (MCS)	Parametric catalogues	References of the correction
1. Deleted events						
659	-	-	Sicily	VII-VIII	Gasparini <i>et al.</i> (1983)	Guidoboni (1989)
785	04	-	Ionian Sea, Sicily	VI	Gasparini <i>et al.</i> (1983)	Marmo (1989)
796	04	07	Crete, Sicily (felt)	V	Gasparini <i>et al.</i> (1983)	Marmo (1989)
963	07	22	Sicily (Ionian Sea)	X	Gasparini <i>et al.</i> (1983)	Guidoboni (1989)
1069	-	-	N-E Sicily	\geq VIII	Carozzo <i>et al.</i> (1973)	This study
1259	-	-	Trapani	VII	Postpischl (1985)	This study
2. Change of date						
1140	02	01	Syracuse	VIII	Postpischl (1985)	
now it is:						
1125	06	07	Syracuse	VIII		This study
3. Events confirmed with integrations of new sources and changes of epicentral intensity and location						
1169	02	04	Ionian Sea	XI	Postpischl (1985)	
1169	02	04	Catania Plain	X		Catalogue ING-SGA 1995; Boschi <i>et al.</i> (1995)
4. New events						
				I_{max} (MCS)		
853	08	31	Messina	VIII	-	Guidoboni <i>et al.</i> (1994)
1172	09	26	Messina	VIII	-	This study
1203-1204?	-	-	Sicily?	VII-VIII?	-	This study
1255-1256	-	-	Messina	VIII	-	This study
1295-1296	-	-	Sicily	VIII	-	This study

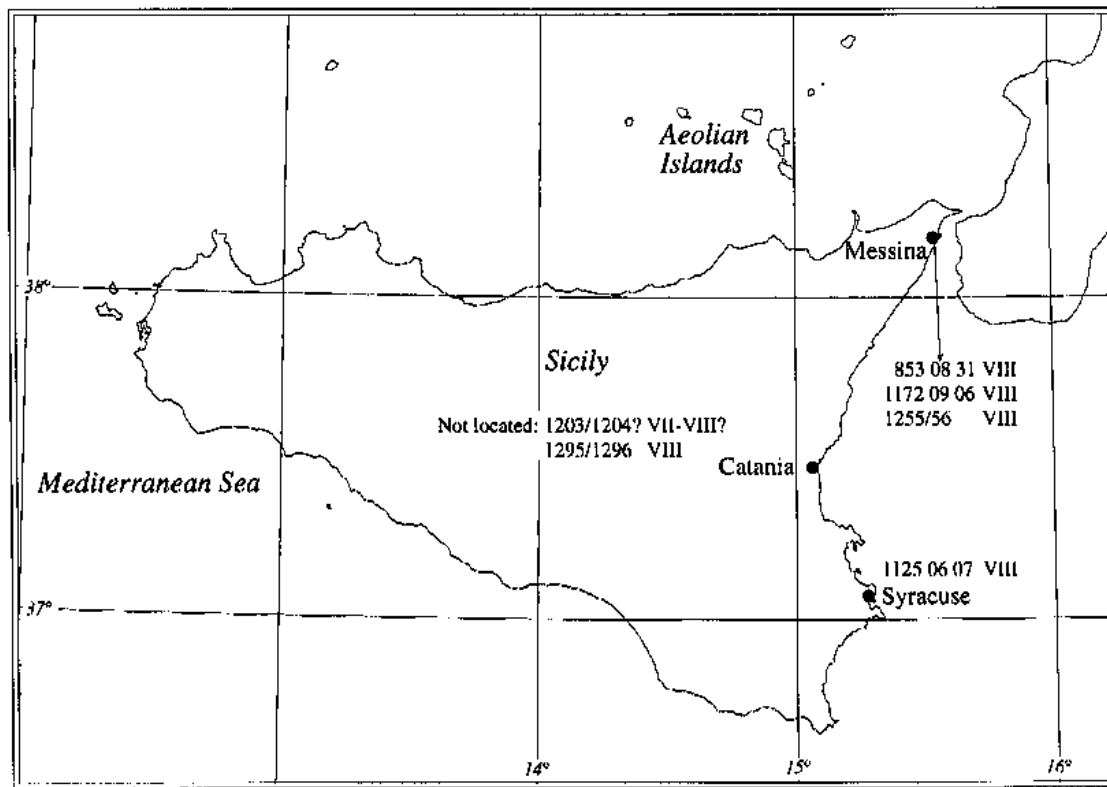


Fig. 5. Sicily: localization of the new 6 seismic events identified: 5 previously unknown, 1 re-dated.

This kind of detailed source analysis now characterises historical seismology. It is helping to turn the historical approach into a «precision» tool for seismological and geological analysis. The results obtained, and the chronological parameters established, form an essential prerequisite for conducting more specific research at the level of local archival documentation, with the aim of describing the seismic effects in greater detail.

Even at this first level of the analysis we think none of the six new seismic events (fig. 5) were similar to the one that occurred on 28 December 1908 ($I_0 = XI$, $M = 7.2$). For the study of past earthquakes the results of this investigation suggest going deeply into the paleoseismological and archaeological studies and pointing out the methodological values of the researches carried out within several disciplines.

The most destructive seismic events in Sicily which are already known are the following:

4 February 1169	$I_0 = X$ MCS
10 December 1542	$I_0 = X$ MCS
11 January 1693	$I_0 = XI$ MCS
28 December 1908	$I_0 = XI$, $M = 7.2$

Considering the results of the revision, one may wonder if historical «twins» of those events are recognizable. Maps of the effects of these four great earthquakes are already available: they are based on widely developed historical research (see ING-SGA catalogue: Boschi *et al.*, 1995, pp. 192-193, 598-600; 250-252, 648-650; 291-297, 678-699; 462-463, 893-904, and cd-rom). It can be stated that such events had different levels of destructiveness. The two earthquakes of 1169 and 1542 present some analogies in their major effect maps. As much as historical research

has displayed, the most destructive events were the 1693 and the 1908 earthquakes. Comparing the maps of the macroseismic effects of these two events (many instrumental recordings are also available for the 1908 earthquake), it can be observed that very large and substantially different areas were damaged. The 1693 earthquake's major damage was found in Catania and in the eastern and south-eastern coast of Sicily; minor damage was found as far as Palermo, whereas the effects in Reggio Cal-

abria were considerably attenuated ($I = VII$). On the other hand, the 1908 earthquake's major damage struck the areas of Reggio Calabria and of Messina, and the damage involved the whole of Calabria as far as Catanzaro ($I = VI$). Damage was therefore traced down in an area which lay north-west to the destructive one which had been struck by the 1693 event (see fig. 6). It is reasonable to think, even merely on the basis of the macroseismic effects, that different faults were activated.

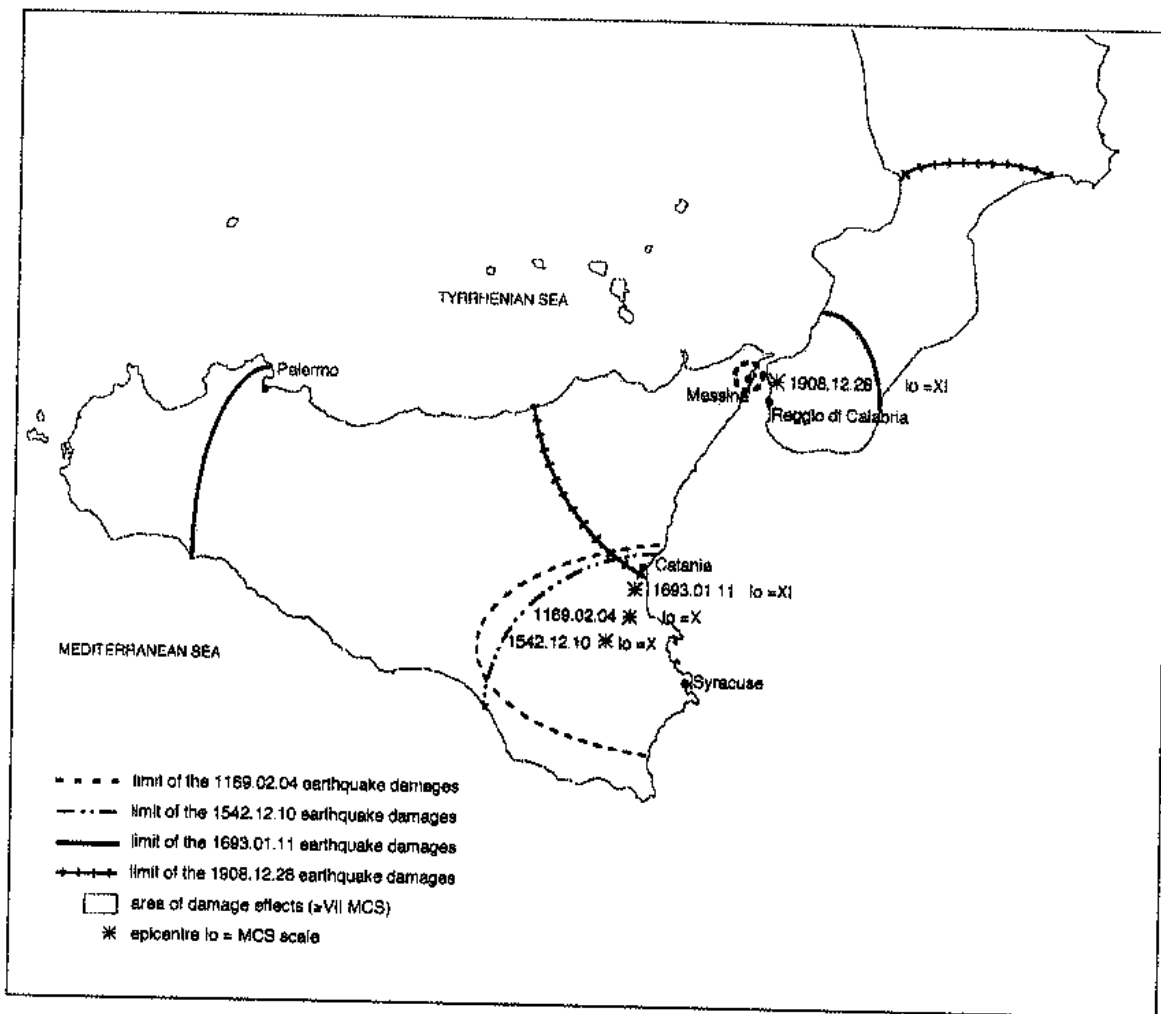


Fig. 6. Comparison of the areas of damage $\geq VII$ MS caused by the most destructive earthquakes in Eastern Sicily ($I_0 \geq X$ MCS) (source catalogue ING-SGA: Boschi *et al.*, 1995).

The detection in the past of events like the above-mentioned earthquakes necessarily needs a «backwards» procedure. Figure 7 shows the major seismic events in Eastern Sicily and Southern Calabria. On the basis of historical records only, it seems reasonable to state that, going backwards in time, no events «similar» to the 1693 and 1908 earthquakes have occurred between the 19th and the 7th century. Considering this area's history on the basis of significant historical periodizations, one can state that no highly destructive earthquakes have occurred from the 19th back to the 17th century, because the seismological and memoir tradition would have provided evidence. For the period between the 16th and the 14th century, too, we can already state that no events like the 1693 and 1908 ones took place: this has been confirmed by the sources and by this territory's history. From the 13th back to the 7th century – which is the time span anal-

ysed in the present paper – shocks seem to have less destructive capacity. From the 6th century to the classical period, one can use the results of an exhaustive research on the written and epigraphic sources that has been carried out (see Guidoboni *et al.*, 1994). Written sources provide traces, even though uncertain, of an earthquake in Reggio Calabria in 91 B.C. (see Guidoboni *et al.*, 1994, pp. 157-158); in addition, an epigraphic evidence has been pointed out regarding the rebuilding of the *Thermae* in Reggio Calabria in 374 A.D., collapsed by an earthquake: presumably, the 361-363 A.D. earthquake. Written sources mention Sicily as interested area, but within a cultural context «disturbed» by the 365 Crete earthquake (see Guidoboni *et al.* 1994, p. 260). Nothing is known about the written sources regarding Messina, Catania and their hinterland, that were an inhabited territory all the same. Only a methodological approach including ar-

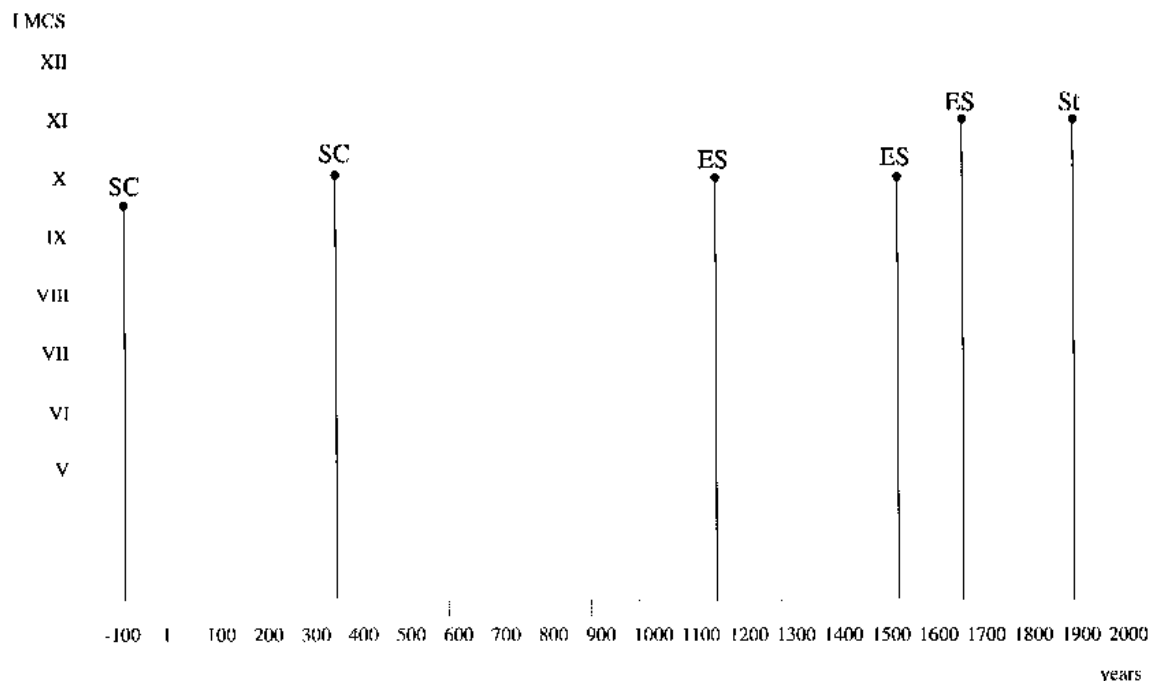


Fig. 7. Known earthquakes of intensity \geq IX MCS located in Eastern Sicily (ES), volcanic earthquakes in the Etna area except in Southern Calabria (SC) and in the Straits (St) (source: catalogue ING-SGA: Boschi *et al.*, 1995).

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chaeology and paleoseismology could increase this state of knowledge: it is necessary to analyse the seismic effects onto the territory that was inhabited at that time, considering the variation of the habitational frameworks, of urban topography, and of the different building characteristics of ancient towns. Indications regarding return times for an earthquake of magnitude ≥ 7 in the Messina Strait can be provided by the discovery through archaeological and paleoseismological evidence of highly destructive earthquakes in that area: whether the earthquake of 91 B.C., or of 361-363 A.D., or an another ancient event, unnoticed in historical records.

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