

Strong earthquakes in north-western Africa in the second half of the 17th century, AD: a critical reappraisal of the historical evidence

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Abstract

The recent seismological literature recorded three strong earthquakes in Algeria, Libya and Tunisia between 1656 and 1694 AD. The historical evidence for these derives from European sources only (gazettes, journalistic pamphlets, missionary literature). Considering the kind of sources involved, their likely biases and the geographical distances that divided their places of production from the places that they spoke about, it is possible that some of these accounts could be less than reliable, and therefore have little use as materials from which to assess earthquake parameters. To answer these doubts, we have retrieved, cross-checked and critically analysed the original historical sources quoted in previous compilations and studies.

1. Introduction

Fig. 1

The recent achievements of earthquake research in Maghreb countries are attested by the reports of many scientific studies and the release of Maghreb-including hazard maps on the part of GSHAP (Giardini, 1999). This shows that there is a growing interest in hazard evaluation in these regions. Much of the available data deal with the instrumental period of seismological recording only, although the historical seismicity of the Maghreb region has also been the object of painstaking studies. These started with the groundbreaking research by the founding fathers of modern historical seismology (Ambraseys, 1984; Ambraseys and Vogt, 1988; Ambraseys et al., 1994; Vogt, 2004), in whose footsteps did follow Benouar (1994; 2004), Mokrane et al. (1994), Benouar and Laradi (1996), Hamdache

(1998), Hamdache et al. (1998), Oussadu (2002), Harbi et al. (2003; 2005), Abdunnur et al. (2004), Suleiman et al. (2004) (Fig. 1).

The study of historical earthquakes is a constantly ongoing process, however, because of the complexities of historical research and the interactions between historians and seismologists. According to the trends of local historical research and the completeness of the records available, any regional historical earthquake catalogue is likely to be more complete within some time windows than within others. This is well illustrated by the earthquake catalogue for Libya from classical antiquity to the present by Suleiman et al. (2004), which lists several earthquakes in the 19th and 20th centuries, but almost none for the 704 AD to 1803 time window. Similarly, the Harbi et al. (2005) catalogue for North Algeria, from 1359 AD to 1895, lists 14 earthquakes through the whole of the 14th to 17th century, 21 in the 18th century and 90 in the 19th century.

The present study focuses on a very short time window in the seismicity of north-west Africa: the second half of the 17th century AD; very few earthquakes are listed within this time window by the current catalogues and the only evidence available on them is of European origin. Our aim is to retrieve, cross-check and critically analyse the original historical sources quoted by previous compilations and studies in connection with these earthquakes. Through this approach, we hope to contribute to a better understanding of the historical seismicity of the Mediterranean basin.

2. The Earthquakes Studied and Their Historical Evidence

Table 1

Table 1 lists the earthquakes that we have set out to investigate, indicating their dates of occurrence and their presumed epicentre locations, and the general descriptions and evidence quoted by the seismological studies that made first mention of them.

Harbi et al. (2005) stated that most of the eight 17th century earthquakes included in their catalogue were either poorly known or doubtful, except that of 1673 in Algiers, which was assessed as Io 8 MM (the parametric Ibero-Maghrebi

catalogue by Mezcua and Martines Solares, 1983 gives similar parameters, locating the earthquake in Algiers with Io VIII). Regrettably, Harbi et al. (2005) did not expand upon their statement with a discussion of the local 17th century historical evidence, which would have been of enormous help for an outside historian to assess the reliability of non-local historical evidence against that which is local. However, this critical judgement by an authoritative local study must be kept in mind as one appraises the historical evidence that has been responsible for the identification of the earthquakes listed in Table 1.

2.1. The 1656 Tripoli Earthquake

The first mention of the 1656 Tripoli earthquake in the seismological literature was by Ambraseys (1984), followed by Ambraseys et al. (1994) and Suleiman et al. (2004). The original historical source for Ambraseys (1984) was an 18th century German earthquake listing (*Dressdnische Gelherte Anzeigen*, 1756), according to which this earthquake affected “Tripoli in der Barbaren”, now the capital of Libya. This source is not necessarily unreliable just because it was published a century after the earthquake it describes; however, as pointed out by Ambraseys (1984) himself, there is no general consensus concerning the real location of this 1656 earthquake. Indeed, the earliest seismological compilations that mentioned it (Hoff, 1840; Perrey, 1850) proposed that it should be re-located as having been in the Tripoli on the Lebanese coast.

2.2. The March 10, 1673, Algiers Earthquake

As evidence of the March 10, 1673, earthquake in Algiers, Ambraseys and Vogt (1988) quote an 18th century French missionary report concerning a redemption expedition undertaken by three Trinitarian Fathers to Algiers and Tunis in 1720 (the Trinitarian and Mercedarians were “ransoming orders”, whose mission was buying back Christian slaves). This work was originally published in 1721 (Comelin et al., 1721; the study quotes a later edition, Comelin et al., 1735), and is therefore almost fifty years later than the earthquake about which it provides evidence. Indeed, the evidence in question is also rather roundabout, forming a part of a description of a strong earthquake that affected Algiers in 1716 (the

consequences of which were still clearly visible in 1720). Thus Comelin et al. (1735) related how in the aftermath of the 1716 earthquake, a member of the Turkish community of Algiers was sentenced to death for having remarked, seditiously, that “40 years before” (i.e. *circa* 1676) there had been another earthquake that had been followed by a series of aftershocks as long as the current one, and that these had only stopped after the murder of the Dey (Regent) of Algiers. As can be seen, this source only indicates the occurrence of an earthquake around 1676. Ambraseys and Vogt (1988) pinpoint its date to 1673 by taking into account evidence of a contemporary journalistic pamphlet, which they were not able to retrieve, but the existence of which they were indirectly aware of from its description (possibly extracted from a Portuguese library catalogue) as a “Relacon em espanol dadada de 30 de maio de 1673, feita por un religioso... estragos que os tremores de terra ali fizeram” [Report written in Spanish on May 30, 1673, by a cleric... on the damage caused by an earthquake].

2.3. The May 25, 1685, Tripoli Earthquake

Suleiman et al. (2004) mention, although as a possibility only, an “unknown” destructive earthquake that occurred in Tripoli (Libya) on May 25, 1685. Their source was a contemporary journalistic pamphlet printed in Bologna (Italy). This purporting to be based on a letter sent to a merchant living in the town of Ancona, on the western coast of the Adriatic Sea (Tripoli, 1685), the reference to which they obtained from Minutilli (1903). Suleiman et al. (2004) also state that this account “sounds emphatic, and verging on exaggeration”, but they defer to the opinion expressed by Bono (1982), according to whom this account “though unsupported by other sources [and] extremely unlikely in parts, cannot be said to be completely inauthentic”.

3. Seventeenth Century Journalistic Sources as Providers of Information on Earthquakes of North-West Africa

The two aims of the present study are: a) to retrieve and critically analyse the original sources responsible for the inclusion of studied earthquakes in the north African seismic record; and b) to collect additional information on the same earthquakes from contemporary sources. As the large majority of the sources concerned are of a journalistic nature, it is opportune to provide here some information concerning the 17th century European journalistic network, a body of serial historical sources of outstanding importance for information relating to the Mediterranean basin (Camassi and Castelli, 2004).

In the 17th century, news circulated in three basic ways: as “*Avvisi*”, gazettes and pamphlets. The *Avvisi* (literally translated as "Announcements") were short manuscript summaries of recent occurrences in one or several towns, and were issued regularly to subscribers. Gazettes were rather like *Avvisi* in layout (correspondence from several sites), range of topics (wide) and style (terse), but unlike *Avvisi* they were meant for a more general market. Pamphlets (also known as tracts, broadsheets, canards, and *Relazioni*) were cheap printed accounts of single occurrences that were often of a sensational nature, also meant for a more general market. The modern equivalents of these three forms of news circulation would be press-agency releases, general newspapers and the tabloid newspapers, respectively.

North African news generally reached the Italian journalistic market via the Thyrrenian seaports, such as Genoa and Leghorn, both of which produced their own *Avvisi* and also despatched them to Florence, Genoa, Rome and elsewhere. Venice, the other great Italian newsgathering centre, is less important than the Thyrrenian seaports for the present study as it was mostly focused on the Balkan and Eastern Mediterranean areas.

Generally speaking, *Avvisi* and gazette writers tried to be fairly accurate, and would explicitly disclaim any seemingly relevant items of news if it turned out to be untrue. The same could not always be said of the cheaper pamphlets, among which fabrications abounded. For the term fabrication, the concept is of a story that although presented as “new” news, was actually duplicated from earlier

pamphlets and therefore not new, or potentially not even true at all, although their actual contents could originally have been both new and true (Caracciolo 2001). These were thus prepared by taking a story that had been reported by a different pamphlet, giving it a new date, freshening it up a little by changing a few names, transposing a few adjectives, and adding a paragraph or two. The result was a story ready to be sold as “new”. The easiest stories to multiply in this way were those set in exotic places, which had the double advantage of lowering the chances of their ever being easily checked or refuted, while counting on the age-old human tendency to equate “abroad” with “outlandish”. The countries on the southern and eastern Mediterranean shores were particularly associated in the collective imagination of 17th century Italy as the abode of the pirates that periodically raided the Italian coasts (Davis, 2004). These thus represented far-off places of wonder and fear, with odd customs that were known through the tales of ransomed prisoners. It can therefore maybe be expected that several “multiplied” pamphlets take the misfortunes of Christian slaves in north-Africa as their subject: e.g., there was the death of the Italian Friar Francesco Zirano, who was actually executed in Algiers in 1603 (Devilla, 1924), but which was then re-told a further three times, in 1639, 1718 and 1740. There was also the killing of a Sicilian youth in Tunis that was told twice, in 1660 and 1716 (Caracciolo 2001).

Although a favoured subject for pamphlets, earthquakes did not appear to have been as favoured a subject for multiplication. An ongoing census of earthquake pamphlets shows that most of them deal with events that have been amply attested to by independent sources. The one specific mention of a fictional Italian earthquake so far identified occurred in the *title* of a 17th century Italian pamphlet (*Nuova e vera relatione*, 1676), where the *text* clearly described the phenomenon as the explosion of a powder-magazine (Camassi and Castelli, 2005). Things can get more mixed up, however, when far-off countries are involved and there are political and human scores to settle, as we will now see.

4. Case histories

4.1. The 1656 Tripoli Earthquake: a Middle East Earthquake?

Can the actual location of the 1656 Tripoli earthquake be ascertained by a perusal of 17th century journalistic sources? There are few collections of Italian gazettes that cover the year 1656; moreover, most of these focused on the ongoing siege of Candia and the related military operations in the Eastern Mediterranean, rather than on north Africa. Among those sources that did report on Tripoli, there were the Genoa gazette and the Bologna, Genoa, Venice and Malta *Avvisi* (ASV, 1656a; ASV, 1656b; ASV, 1657a; ASV, 1657b). These reported on several occurrences in Tripoli, but did not mention earthquakes either in Tripoli or elsewhere in north Africa during 1656 and 1657. However, there is contemporary evidence of earthquakes in Turkey and Syria. An *Avviso* written in Ragusa (now Dubrovnik) on April 13, 1656 (Dujcev, 1935) mentions an earthquake felt in Constantinople “on St. Gregory’s Eve”. Among the several St Gregory feast days of the Orthodox Church calendar, January 25 and January 30 are those that fall nearest to April 13. Then, taking into account the 10-day difference that existed between the Julian and the Gregorian calendars in the 17th century, the Ragusan *Avviso* could refer to an earthquake felt in Constantinople in early February, 1656, and about which no more is known. An almost contemporary missionary report (Besson, 1660; 1662) states that in 1657, “the earth shook four times in the space of two months in Aleppo and similar earthquakes occurred along the whole coast of Syria”.

In short, some new evidence has been collected that appears to make it likely that the *Dressdnische Gelherte Anzeigen* (1756) mention of a 1656 earthquake in the Tripoli in Africa was actually related to a 1656 or 1657 earthquake in the Tripoli in the Middle East. However, this evidence is not conclusive enough to indicate that the 1656 earthquake should be removed from the catalogues relating to north Africa.

4.2. The 1673 Algiers Earthquake: was it Part of a Larger Picture?

Fig. 2

A search among the pamphlet collections of the main European national libraries led to the retrieval of a Portuguese pamphlet (*Relaçam nova, e verdadeira...*, 1673; Fig. 2) that is not quite the same as the Spanish pamphlet quoted by Ambraseys and Vogt (1988), appears indeed to be a closely related item. The news reported in this pamphlet seem to have circulated widely, as witnessed by an entry by a contemporary Mexican diarist (Robles, 1665-1703) that relates the same tale presented in the Spanish pamphlet.

Table 2

The text of *Relaçam nova, e verdadeira...* (1673) is presented as a letter that was written on May 30, 1673, by an enslaved Dominican Friar to Alonso Enriques de San Thomas, the Bishop of Malaga. This letter describes a long sequence of earthquake shocks that were felt in Algiers between May 10 and May 21, along with several astronomical phenomena that accompanied them, and the religious functions celebrated by the Catholic slaves in the Algiers slave quarters, or Bagnos (Table 2). All of these details that are easy to confirm (e.g., the name of the Bishop of Malaga, the existence of Catholic places of worship in the Bagnos) are correct and the circumstances described are known to be realistic. On the other hand, there is no mention of earthquakes in the Algiers news for March 1673 and the following months, as featured in the Genoa and Venice *Avvisi* (ASMO, 1673) and in the *Gazette de France*. By itself, however, this is insufficient to prove that the earthquake described in the *Relaçam nova, e verdadeira...* (1673) did not occur at all. The circumstances described in it could actually be related to a minor local earthquake, or to one located inland from Algiers which could have set in motion a large landslide, which would be responsible in turn for the damage described. There is also the possibility that the phenomena described from the point of view of Algiers in the *Relaçam nova, e verdadeira...* (1673) are related to the aftermath of the 1672 Cabeço Gordo eruption (Fayal Island, Azores), which was also described by another, very detailed, 1673 pamphlet (*Relaçam dos tremores de terra, e fogo...*, 1673).

4.3. The Unlikely Tripoli Earthquake of 1685.

Fig. 3

The background of the details mentioned by Suleiman et al. (2004) concerning a possibly “unknown” 1685 earthquake in Tripoli is indeed authentic, but the story itself appears questionable. For one thing, the present study discovered another pamphlet (Tripoli, 1685) that was printed in Milan and was purportedly based on “a private letter addressed to His Serene Highness the Grand-Duke of Tuscany from a ship just landed in Leghorn”. Here, the same earthquake is described as having occurred on January 25 instead of May 25. This suggests a case of “pamphlet multiplication” (see also: Algieri, 1686, Fig. 3), which is all the more likely as there is no mention of any Tripoli earthquake in the Naples, Venice and Paris *Avvisi* for January-August 1685 (ASMo, 1685a; 1685b). This despite all of these being extremely interested in news from Tripoli at the time (which they received via Genoa and Marseilles) because of the ongoing French-Tripoli conflict that was to result in the French bombardment of Tripoli (June 22, 1685).

5. Evidence of New Earthquakes “On Paper” only

By sifting through the collections of 17th century journalistic accounts that are available in a few of the main European libraries, several pamphlets were discovered that describe previously unknown, strong earthquakes as occurring in north-west African towns. However, pamphlets are an elusive kind of source, which have never been seriously studied before very recent times, and which were produced for commercial and/or ideological ends. While their declared aim was to describe “real” news, their contents could turn out to be a mix of truth and imagination, and indeed, even pure fiction. Thus, taking pamphlets at face value can lead to giving credence to fictional events, and to avoid this risk these pamphlets should first of all be positioned within the broader national (or even international) publishing context. In the present case, even a partial census of 17th century pamphlets allows us to identify groups of items that were printed between 1668 and 1694 for which common features abound, such that they are all clearly based on the same literary scheme (or even the same original text), which follows two main “traditions” (see also Appendix 1): The “A” group of pamphlets describe a seismic sequence that was concurrent with odd astronomical phenomena, and that had severe effects in Algiers (the destruction of 300 houses and the main Mosques) and surrounding villages. A Seville-printed pamphlet

(Assimismo se dà noticia de las cometas..., 1668) dates this between December 29, 1667, and January 10, 1668, and is supported by the Mexican *Diario de sucesos notables* (De Robles, 1665-1703). The earthquake apparently shifts to Tunis between April 27 and May 1, 1677, according to an Italian pamphlet (*Tunisi 3 maggio 1677. Vera relatione e copia di lettera...*, 1677), and then returns to Algiers in 1686 according to another pamphlet (*Algieri li 4 luglio 1686. Vera e distinta relazione...*, 1686). These A pamphlets are clearly based on a common template – a text that still remains to be identified – which they reproduce with slight variations for the epilogue (sometimes a new earthquake, sometimes a plague outbreak).

The “B” pamphlets describe an earthquake that occurred in Tripoli either in January 1685 (*Tripoli li 4 febraro 1685. Distinto ragguaglio*, 1685), or in May 1685 (*Tripoli 16 maggio 1685. Distinto Ragguaglio...*, 1685), or even in September 1694 (*Verissima relatione...*, 1694). The B template is very similar to the A template, from which it differs only in the choice of the epilogue (the lightning-induced explosion of a powder-magazine which blows up a quarter of the city, causing thousands of deaths).

6. Hints of a Possibly Destructive Earthquake in Early 1640 (on the Algerian Coast)

<p>Fig. 4 Table 3</p>

Among so many fictional earthquakes, there is sometimes a real one. The historical and seismological literature (De Grammont, 1887; Ambraseys and Vogt, 1988; Cresti, 2005; Harbi et al., 2005) mention a minor earthquake felt in Algiers some time in 1639. Contemporary *Avvisi* do not mention any earthquake as having occurred in Algiers in 1639 (which is not sufficient to conclude that the 1639 earthquake is fictional, of course), but they do give comparatively ample evidence of a possibly destructive seismic sequence that occurred in Algiers and its surroundings in February-March 1640 (Table 3). News of this earthquake (Fig. 4) first spread into Italy in a Genoese *Avviso* of April 6, 1640 (BAV, 1640a). This

is certainly based on news that left Algiers after March 12 (as it describes earthquake shocks that occurred from February 26 to March 12), and which certainly reached Genoa by ship, possibly directly from Algiers as there is no mention in the *Avviso* of any other forwarding seaport. This earthquake is also described in two Roman *Avvisi* (ASV, 1640a), released later than the Genoese one (April 14 and April 21) but carrying older news than it did. Their data, which had passed through the Tuscan seaport of Leghorn, appear to have arrived via a different channel to the one that supplied the Genoese news, as it mentioned only the February 26 event. Thus more than a month had elapsed from the start of the earthquake (February 26) to its first recording in an Italian *Avviso* (April 6). The seacrossing from Algiers to Italy would normally have taken less time than this, but in early spring bad weather could have delayed sea travel; moreover, there was at that time no regular mail service between Algiers and Italy, and the news would have had to wait for a chance carrier before setting out from Africa. It is quite likely that the length of this seismic sequence and its severe effects were what made its occurrence newsworthy enough to reach the Italian journalistic centres, as lesser earthquakes would probably not have managed this. Further Genoese and Roman *Avvisi* went back to describing this Algerian seismic sequence on April 21 and May 6 (ASV, 1640b; BAV, 1640b). Piecing together all of these available bits of information, it is possible to outline the picture of an earthquake that started on February 26 and was felt “over most of the Algerian coast”. This wreaked havoc over some hamlets in the areas surrounding Algiers (BAV, 1640a), and possibly in Algiers itself, if the April 21 Roman *Avviso* and the May 6 Genoese *Avviso* are to be taken seriously. According to these latter, “in Algiers, part of the houses had collapsed and unnumbered people had died” (ASV1640b; BAV, 1640b).

At this stage, it would be interesting to know the sources that led to the identification of the 1639 earthquake that is already listed in the seismological literature, and which could perhaps turn out to be a foreshock of the 1640 earthquake.

8. Conclusions.

Table 4

Two out of three 17th century earthquakes that were previously believed to have occurred in north-west Africa turn out to be probably not true after this critical revision of the historical sources that were responsible for their inclusion in the local earthquake catalogue (Table 4). At the same time, however, new evidence of possibly significant earthquakes has come to light. The results of this very preliminary study confirm that there is room for interesting developments in the reconstruction of the historical seismic records of the area. European researchers wishing to contribute to this historico-seismological venture must, of course, primarily rely on European sources, among which the European journalistic ones offer especially high potential (and particularly concerning the 16th-18th century time window). However, as there is no such thing as an impartial historical source, it should be kept in mind that the European journalistic sources can be biased in several aspects: politically, by being mainly focused on privateering semi-military actions (“guerra di corsa”); geographically, by being more interested in occurrences along the African coast rather than in its interior; and ideologically too, because after all, they wrote about “enemy” countries during times of violent religious and military strife. In any case, this complex game is worth playing, so that we can improve the perception of this time window of north African historical seismicity. Pursuing this goal does carry with it first of all the need to start afresh with systematic parallel analyses of primary historical records from both sides of the Mediterranean basin, a venture in which we would like to see contemporary European journalistic sources taking on a role.

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Relaçam dos tremores de terra, e fogo, que arrebetou na ilha do Fayal, que ainda vai continuando, Lisboa, Na Officina de António Craesbeeck de Mello Impresor da Casa Real, 1673.

Relaçam nova, e verdadeira, tirada da copia da carta, que hum Religioso da Ordem dos Pregadores, que se acha em **Argel** em cativo escreveo Illusmo & Rmo Senhor D.F. Alosno Hnriques de S. Thomas, Bispo de Malega, em que lhe dà conta dos continuados tremores de terra, assolação dos muitos Povos, & casas, que ha havido em Argel. & seus confins, com grande mortandade, & estrago de innumeraveis paganos; & assi mesmo as procissoens, & penitencias que os Christanos escravos fizeram por largo tempo em os Banhos em qos alojao aquelles Barbaros, este presente anno de 1673

Suleiman A. S., Albin, P. and P. Migliavacca, 2004. A short introduction to historical earthquakes in Libya, *Annals of Geophysics*, 47, 2/3, 545-554.

Tripoli li 16 Maggio 1685 Distinto Raggiuglio Gionto per Lettera particolare ad un mercante, In Roma, & in Bologna, per l'Erede del Sarti Nel Porto d'Ancona.

Tripoli li 4 Febraro 1685 Distinto Raggiuglio Gionto per lettera particolare all'Altezza Serenissima del Gran Ducato di Toscana, da un Vascello mercantile arrivato nel Porto di Livorno. In Fiorenza, Torino, & Milano Nella R.D.C. per Marc'Antonio Pandolfo Malatesta Stampator R.C.

Tunisi 3 Maggio 1677. Vera Relatione e copia di Lettera scritta da D. Gio. Garzia dalla Ighiera. Naturale della città di Cadice. Nella quale dà conto a suo Padre delle rovine e compassionevoli prodigi succeduti nella detta Città di Tunisi, e nella distanza di cinquanta leghe da essa, essendo rimasti rouinati dalla mano poderosa di Nostro Signore ducento quattro Terre nello spatio di ventidue hore, con ammiratione, e spauento di quei Barbari infedeli. In Venetia & in Bologna, per Giacomo Monti, 1677.

Verissima Relatione Venuta dalla Città di Tripoli di Barbaria. Dove s'intende il grandissimo Terremoto, & le Comete apparse e le Ruine succese in quella Città, con la morte di 15 mille Turchi, e come si sono vendicati contro li Christiani. Seguita li 5 Settembre. In Venetia, 1694

Vogt J., 2004. Avant-propos, *Annali di Geofisica*, 37, 4, VII-X.

Figure legends

Figure 1. Simplified filiation scheme of sources and studies available for the main north-west Africa earthquakes

Figure 2. Frontispiece of the *Relaçam nova, e verdadeira...* (1673)

Figure 3. Frontispieces of the pamphlets on the apparently fictitious earthquakes of 1685-1686

Figure 4. Reports and news written about the 1640 earthquake[s].

Tables

Date	Epicentral area	General description and quoted historical evidence	First mentioned in seismological literature
1656	Tripoli (Libya)	“Exceptionally strong earthquake in Tripoli in Libya destroyed almost half its houses and caused the loss of five pirate vessels in the harbour.” (Source quoted: Dresdnische, 1756)	Ambraseys (1984)
1673 March 10	Algiers	“A destructive earthquake in Algiers and its surroundings, comparable, it is said, to the earthquake of 1716. Strong aftershocks, 71 in all, lasted for about 40 days” (Source quoted: Anonymous, 1673; Comelin and Bernard, 1735)	Ambraseys and Vogt (1988)
1685 May 25	Tripoli (Libya)	“The earthquake made more than 200 buildings collapse” (Source quoted: Anonymous, 1685)	Suleiman et al. (2004)

Tab. 1 The earthquakes under consideration.

Date	Time	Place	Occurrences
1673.03.1 0?		Algiers	A “fiery snake” (meteorite?) is seen plunging into the sea just before the first earthquake shock.
1673.03.1 0	9h in the night	Algiers	The earth starts shaking.
1673.03.1 0	in the night	Algiers	18 earthquake shocks are felt.
1673.03.1 0/11	next day	Algiers	6 earthquake shocks are felt
1673.03.1 1/12	next night	Algiers	47 earthquake shocks are felt.
1673.03	during the 24 hours before	A place called “Arboleda” (possibly a Spanish rendering of the Arabic name “Bab el Oued”, i.e. Algiers North gate)	A landslide or mudslide destroys 80 houses.
1673.03		Algiers	Catholic slaves celebrate the Church rituals prescribed in case of

			calamities (Rogations, Rosary) in the Bagnos ¹ chapels. ¹ slave quarters.
1673.03.3 1		Southern end of Algiers beach	More than 200 dead “corvinas” (birds?) and fish found
1673.04.2			Easter
1673.04.1 0		Southern end of Algiers beach	More than 500 dead fish found
1673.05.2 1	Pentecost Day (“Pascua de Espiritu Santo”)	Algiers	Earthquake shocks felt up to this day
1673.05.3 0		Algiers	Relaçam’s writing date.

Tab. 2. The occurrences of 1673 in Algiers (Relaçam nova, e verdadeira..., 1673).

Date	Place	Occurrences
Feb 26	Algiers’ coast	Earthquake
After Feb 26	Near Algiers	Earthquake shocks demolish villages
Mar 12	Algiers	New earthquake felt; people afraid
Apr 6	Genoa	Earthquake news from Algiers published in Genoa <i>Avvisi</i>
Apr 14	Rome	Earthquake news from Algiers via Leghorn published in Rome <i>Avvisi</i>
Apr 21	Rome	Earthquake news from Algiers via Leghorn published in Rome <i>Avvisi</i>
May 6	Genoa	Earthquake news from Algiers published in Genoa <i>Avvisi</i>

Tab. 3. News of the 1640 Algiers region earthquake.

Date	Site	RMK	Sources
1639 1640 Feb 26	Algiers	Destructive earthquake?	Manuscript <i>Avvisi</i> , historiography, earthquake compilations.
1656	Tripoli (Libya)	Doubtful news	Dressdner Gelherte Anzeigen (1756)
1673 Mar 10	Algiers	Doubtful?	Pamphlet; not reported in contemporary Italian <i>Avvisi</i> and gazettes.

1676 Feb	Algiers	Doubtful?	Not quoted by Ambraseys and Vogt (1988)
1677 Mar 10	Tunis	Fictional news	Pamphlets
1685 Jan 24	Tripoli (Libya)	Fictional news	Pamphlets
1685 May 25	Tripoli (Libya)	Fictional news	Pamphlets
1686 Jun 27	Algiers	Fictional news	Pamphlets
1694 Sept 05	Tripoli	Fictional news	Pamphlets

Tab. 4. Real and fictional earthquakes of north-western Africa (according to the present study).

Tables captions

Table 1. The earthquakes under consideration.

Tab. 2 – The occurrences of 1673 in Algiers (Relaçam nova, e verdadeira..., 1673).

Table 3. News of the 1640 Algiers region earthquake.

Table 4 Real and fictional earthquakes of north-western Africa (according to the present study).

	Algiers 1667	Algiers 1667	Tunis 1677	Algiers 1686
Frontispiece	<i>[P. Antonio de Robles, Diario de sucesos notables, 3 Vols. México: Editorial Porrúa, 1972]</i>	Assimismo se dà noticia de las cometas que aparecieron en la Ciudad de Argel, y las ruinas y lastimosos sucessos que causaron en dicha Ciudad en la distancia de cinquenta leguas, que destruyó la Magestad de Dios N.S. docientos y quatro Lugares, y la crueldad que hizieron los Barbaros con unos Christianos. Dase quenta de las cometas y lo que sucedió en la Ciudad de Argel, sacado de una carta que vino de dicha Ciudad.	Tunisi 3 maggio 1677. Vera relatione e copia di lettera scritta da D. Gio. Garzia dalla Ighiera. Naturale della città di Cadice. Nella quale dà conto a suo Padre delle rovine e compassionevoli prodigi succeduti nella detta Città di Tunisi, e nella distanza di cinquanta leghe da essa, essendo rimasti rouinati dalla mano poderosa di Nostro Signore ducento quattro Terre nello spatio di ventidue hore, con ammiratione, e spauento di quei Barbari infedeli.	Algieri li 4 Luglio 1686 Vera e Distinta Relazione dell'horrendo, e spaventoso Terremoto seguito nella detta città d'Algieri Nella distanza di 50 miglia, essendo rimaste rovinare dalla mano poderosa di Nostro Signore quattro grandissimi Terre di quei Turchi, e Cani, come leggendo intenderete.
Printer, printing date/place	<i>[24 de septiembre de 1668]</i>	En Sevilla 1668	In Venetia & in Bologna, per Giacomo Monti, 1677.	In Roma, Milano, et in Parma, Per gli Heredi del Vigna.
Introduction			So' che il racconto de' prodigi succeduti in questa Città di Tunisi cagionerà V.S. non poco terrore, e compassione [...]	So' che il racconto de' prodigi succeduti in questa Città di Algieri cagionerà Vosignoria non poco terrore, e compassione [...]
Forewarnings of following calamities		le daré a v. m. noticia de la ruina, que Sabado a 24 de Diziembre del año passado de 67 se vio en esta Ciudad, y fue en esta manera	Il giorno 16 Aprile dell'Anno presente 1677 si sentirono in questa Città i preludij delle rovine, che poi seguirono,	Il giorno 16 Giugno dell'Anno presente 1686 si sentirono in questa Città i preludij delle rovine, che poi seguirono.
Comets and astral signs	Que en Argel el día 25 de diciembre del año pasado vieron dos cometas , el uno muy abominable y sus horas limitadas; la primera vez [...]	El día 25 del dicho se vieron dos Cometas en esta Ciudad, que al parecer era el uno muy abominable, y sus horas limitadas; la primera vez [...]	Ed il giorno 23 comparvero sopra questa Città due Comete d'aspetto terribile, l'una, e l'altra, e durarono alcune hore, cioè la prima volta [...]	Ed il giorno 23 comparvero su questa Città due horrendi, e spaventevoli segni , l'uno, e l'altro d'aspetto terribile, e durarono alcune hore, cioè la prima volta [...]
Christian slaves pray		Estuvimos todos los cautivos la [referida] noche encomendandonos muy de veras a N. Señor IesuChristo , y a N. Señora de Guadalupe .	Stessimo tutti li Schiavi la sudetta notte raccomandandosi di cuore à Nostro Signor Giesù Christo , & alla Beatissima Vergine .	Stessimo tutti li schiavi la sudetta notte raccomandandoci di cuore i Nostro Signore Giesù Christo , & alla Beatissima Vergine Maria .
Blood rain, darkening of the sun, storm:	el día 28 del dicho llovió sangre tres horas, y se vio el sol eclipsado que amenazaba la ruina;	Y el día 28 del dicho llovió sangre tres horas, y se vió el Sol eclypsado , que amenazaba la ruina.	Il giorno 26 piovette sangue per tre hore continue, e si vidde il Sole, che perduti i suoi raggi naturali, minacciava qualche grand'infortunio;	Il giorno 23 piovette fittissima tempesta per un quarto d'hora, e si vide il Sole, che perduti i suoi raggi naturali, minacciava qualche grande infortunio,
An earthquake destroy 300 houses and	el día 29 con un terremoto horrible destuyó la majestad de Dios Nuestro Señor más de trescientas casas, y las mezquitas	Y el dia 29 del dicho destruyó la Magestad de Dios N. Señor trescientas casas, y las Mezquitas donde hazen or[r]acion a su falso Profeta Mahoma,	& il giorno 27 seguente atterrò da trecento case, e le Moschee principali dove è solito orare questi barbari al suo falso Profeta Maometto.	& il giorno 27 seguente atterò il Terremoto trecento Case, e le Moschee principali , dove è solito orare questi Barbari al suo falso Profeta

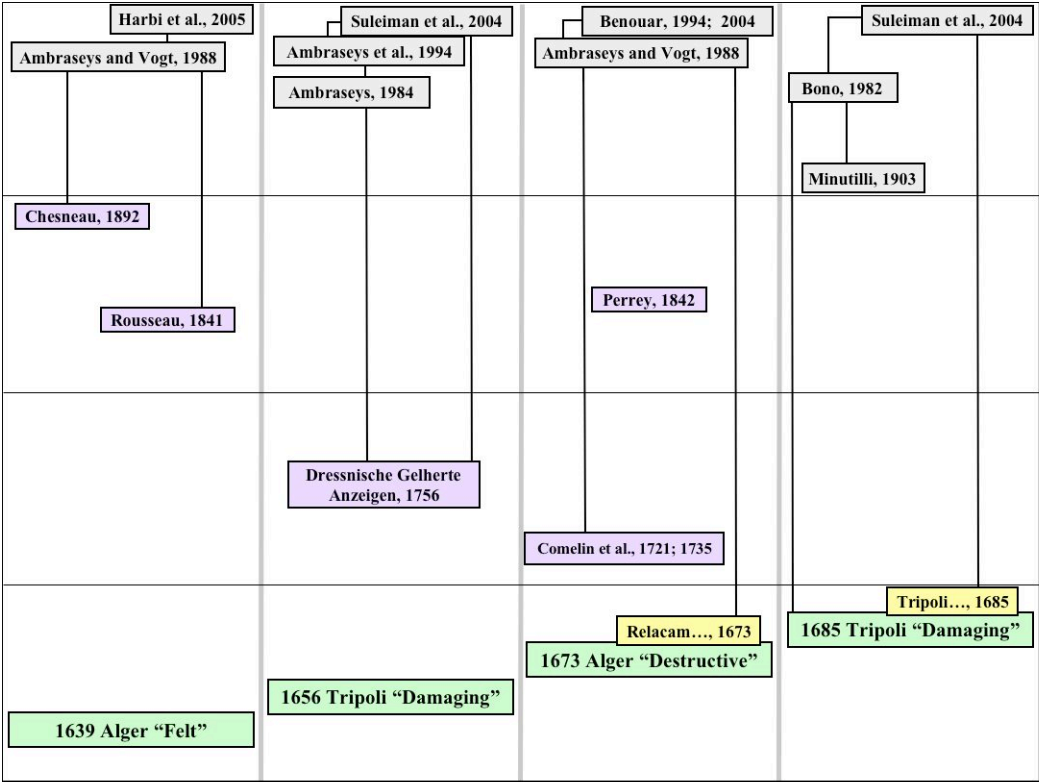
Mosques	donde hacían oración a su falso profeta Mahoma quedaron demolidas y arruinadas,	quedaron demolidas, y arruinadas; [earthquake not explicitly mentioned]	[earthquake not explicitly mentioned]	Maometto.
More comets; villages destroyed	y el día 2 de enero de este año reinaban con las mismas crueldades los cometas; el día 3 del dicho se destruyeron en la distancia de cincuenta leguas en contorno más de doscientos lugares que quedaron demolidos [...]	Y el día dos de Enero de este año sesenta y ocho, reynava con las mismas crueldades los Cometas. Y el día tres del dicho mes se destruyeron en la di[s]tan[c]ia de cinco[n]ta leguas, docientos y quatro Lugares , que quedaron demolidos [...]	Il giorno 29 detto comparvero nel Cielo più Comete tutte di diversi, e spaventosi colori, e ne segui il giorno appresso, ultimo del Mese, gli effetti nella total destruttione di 204 Terre , che qui chiamano Aduari, i quali si disfecero in cenere [...]	Il giorno 29 detto comparvero nel Cielo più segni tutti diversi, e spaventosi, e ne segui il giorno appresso, ultimo del mese gli effetti nella total destruttione di quattro Terre , che qui si chiamano Aduari, i quali si disfecero in [...]
Wrath of local people against slaves		Y no ob[st]ante dare noticia de lo que suce[d]ió, y el r[i]g[ur]osissimo castigo que executa[r]on en quatro Christianos cautivos, que los tres fueron quemados vivos a fuego lento;	Mà ciò non ostante adirati questi Barbari sfogarono la loro rabbia, e furore contro d'alcuni Christiani qui Schiavi. Brugiandone quattro à fuoco lento	mà di ciò non ostanti adirati questi Barbari, sfogarono la loro rabbia e furore contro d'alcuni Christiani qui schiavi, bruggiandone quattrocento à fuoco lento,
The case of a slave		pero nuestro hermano Manuel Sanchez fue arrastrado, y quemado	fra quali Emanuelle Sanchez.	frà quali D. Diego Rovis,
who for killing a local notable		Y fue la causa, que los dichos Christianos entraron [...] y a uno de los susodichos le hirió muy mal herido , y era uno de los estimados en el Palacio, y murió dentro de tres horas,	E la cagione di sì rigoroso castigo fù, perche [...] il detto Emanuelle Sanchez ferì d'una coltellata uno delli Infedeli de più amati del Divano, il quale dalla ferita morì,	e la cagione di sì rigoroso castigo fù, perché [...] il detto D. Diego Rovis ferì d'una coltellata uno delli Infedeli più amati del Divano, il quale dalla ferita morì,
is arrested, dragged by horse to the execution ground		y los dichos Christianos fueron presos rigurosamente [...] y el dicho Hermano Manuel Sanchez fue arra[st]rado por toda la Ciudad [...]	per lo che essendo tutti fatti prigionieri [...] il detto Emanuelle Sanchez, essendo stato tirato à coda di Cavallo per la Città [...].	per lo che, essendo tutti fatti prigionieri [...] il detto D. Diego Rovis, essendo tirato à coda di Cavallo per la Città [...].
and finally stabbed to death with a spear.		Pero en esta ocasion se halló, y le fue siguiendo las calles Fr. Francisco Garcia [...] pero uno de los verdugos con una lança le passó el cuerpo, y no murió tan presto [...].	E però vero, che l'accompagnò sempre consolandolo per le strade F. Francesco Garzia [...] poi finalmente da uno de' Carnefici con una lancia fù trafitto, subitamente morì [...]	E' però vero, che l'accompagnò sempre consolandolo per le strade il Padre Francesco del Migno [...] poi finalmente da uno de' Carnefici con una lancia fu trafitto, e subitamente morì [...]
Oubreak of plague, another earthquake, many victims		Al siguiente dia Martes, que se contaron diez de Enero, embió Dios el Contagio , con que ha padecido gran numero de gente.	il seguente giorno primo di Maggio si sparse per la Città un morbo contagioso dal quale morì gran numero di persone.	il seguente giorno successe per la Città un gran Terremoto , nel quale morì il numero di vintimilla persone.

Appendix 1a. Pamphlets wich follow the literary scheme “A”.

	Tripoli 1685 Jan 16	Tripoli 1685 May 16	Tripoli 1694 Sep 5
Frontispiece	Tripoli li 4 Febraro 1685 Distinto Ragguaglio Gionto per lettera particolare all' Altezza Serenissima del Gran Ducato di Toscana, da un Vascello mercantile arrivato nel Porto di Livorno.	Tripoli 16 Maggio 1685 Distinto Ragguaglio Gionto per Lettera particolare ad un mercante Nel Porto d' Ancona.	Verissima Relatione Venuta dalla Città di Tripoli di Barbaria. Dove s' intende il grandissimo Terremoto, & le Comete apparse e le Ruine succese in quella Città, con la morte di 15 mille Turchi, e come si sono vendicati contro li Christiani. Seguita li 5 Settembre.
Printer, printing date/place	In Fiorenza, Torino, & Milano Nella R.D.C. per Marc' Antonio Pandolfo Malatesta Stampator R.C.	In Roma, & in Bologna, per l' Erede del Sarti	In Venetia, 1694
Sub-title	Distinto Ragguaglio seguito li 16 Genaro 1685	Distinto Ragguaglio. Seguito li 16 Maggio 1685.	Relatione venuta dalla città di Tripoli di Barbaria. Seguita li cinque settembre.
Introduction	So che il Ragguaglio de' castighi dal Sommo Iddio mandati in questa famosa Città di Tripoli cagioneranno alle vostre Signorie non poco timore, e compassion [...].	So che il Ragguaglio de' castighi dal Sommo Iddio mandati in questa famosa Città di Tripoli cagioneranno alle vostre Signorie non poco timore, e compassione [...].	So' che il Ragguaglio de' Castighi dal Sommo Iddio mandati in questa famosa Città di Tripoli cagioneranno alle vostre Signorie non poco timore, e compassione [...].
Forewarnings of following calamities	Il giorno 16 di Genaro dell' Anno presente 1685 s' udirono in questa Città i precludij delle rovine, che dovevano seguire [...]	Il giorno 16 Maggio dell' Anno presente 1685 s' udirono in questa Città i precludij delle rovine, che dovevano seguire [...]	Il giorno 5 Settembre dell' Anno presente 1694 s' udirono in questa Città i precludij delle rovine, che dovevano seguire [...]
Comets and astral signs	il giorno 23 sudetto si sono vedute apparir trè famose Comete d' aspetto terribile, la prima comparve alle hore due di notte, e durò sino alle 5, e svanita questa, si vidde una gran mutatione di tempo [...]	il giorno 23 sudetto si sono vedute apparir trè famose Comete d' aspetto terribile, la prima comparve alle hore due di notte, e durò sino alle 5, e svanita questa, si vidde una gran mutatione di tempo [...]	il giorno sudetto si sono vedute apparire trè famose Comete d' aspetto terribile, la prima comparve alle due hore di notte, e durò sino alle cinque, e svanita questa, si vidde una gran mutatione di tempo [...]
Christian slaves pray	Stettero quei miseri Schiavi tutta quella notte, pregando caramente la Beatissima VERGINE, che volesse intercedergli gratia dal suo carissimo Figlio GIESU di non voler gettare i suoi fulmini contro di loro, come così successe.	Stettero quei miseri Schiavi tutta quella notte, pregando caramente la Beatissima VERGINE, che volesse intercedergli gratia dal suo carissimo Figlio GESU' di non voler gettare i suoi fulmini contro di loro, come così successe.	Stettero quei miseri Schiavi tutta quella notte, pregando divotamente la Beatissima Vergine Maria, che voleese intercedergli gratia dal suo Carissimo Figliuolo Giesù Christo di non volere gettare i suoi fulmini contro di loro, come così successe.
Storm	Sù'l far del giorno si cominciò ad oscurar talmente, che pareva si fosse mutato da giorno in notte, e poi venne una gran pioggia accompagnata da una terribilissima tempesta, che ruppe tutti li Tetti delle Case, & uccise più di cinque milla di quei Barbari [...].	Sù'l far del giorno si cominciò ad oscurar talmente, che pareva si fosse mutato da giorno in notte, e poi venne una gran pioggia accompagnata da una terribilissima tempesta, che ruppe tutti li Tetti delle Case, & uccise più di cinque milla di quei barbari [...].	Sù'l far del giorno si cominciò ad oscurar talmente, che pareva si fosse mutato da giorno <i>in una oscurissima</i> notte, e poi venne una <i>grandissima</i> pioggia accompagnata da una terribilissima tempesta, che ruppe tutti li Tetti delle Case, & uccise più di cinque milla di quei Barbari [...].
An earthquake destroys	Il giorno seguente abbattè il Terremoto più di	Il giorno seguente abbattè il Terremoto più di	Il giorno seguente abbattè <i>à terra</i> il Terremoto

200 Houses and Mosques	ducento Case, e frà queste le trè le più famose Moschee, che sono soliti orare questi falsi Maomettani.	200 Case, e frà queste le trè le più famose Moschee, che sono soliti orare questi falsi Maomettani.	più di doicento Case, e frà queste trè le più famose Moschee, che sono soliti Orare questi falsi Maomettani.
Moral consideration: prayers averted calamities.	E certo sarebbe sobissata tutta la Città, se non fosse stato i prieghi di quei miseri Schiavi Christiani, che in vedere sì grande spettacolo la compassion li mosse à pregare DIO nostro Signore che ci liberi da simili castighi.	E certo sarebbe subissata tutta la Città, se non fosse stato i prieghi di quei miseri Schiavi Christiani, che in veder sì grande spettacolo la compassion li mosse. DIO nostro Signore ci liberi da simili castighi.	E certo sarebbe subissata tutta la Città, se non fosse stato i preghi di quei miseri Schiavi Christiani, che in vedere sì grande spettacolo la compassione li mosse à pregare Dio Nostro Signore che ci liberi da simili castighi.
Wrath of local people against slaves	Mà non sapendo in che modo sfogare la loro Barbara crudeltà, si mossero a tormentare quei poveri Schiavi, che in breve tempo ne fecero morir più di cinquecento,	Mà non sapendo in che modo sfogare la loro Barbara crudeltà, si mossero a tormentare quei poveri Schiavi, che in breve tempo ne fecero morir più di cinquecento,	Ma non sapendo in che modo sfogare la loro Barbara crudeltà, si <i>missero</i> a tormentare quei poveri Schiavi, che in breve tempo ne fecero morire più di cinquecento,
The case of a slave	e frà questi vi fù un povero Giovanni Dericos [...].	e frà questi vi fù un povero Giovanni Dericos [...].	e frà questi vi fù un povero Giovane [...].
who is emprisoned, sentenced to death, dragged by horses through the city	fu carcerato in compagnia di molti altri, che à <u>tal ufficio attendevano</u> , alla fine del mese furono sententiati, & si eseguì il castigo, il quale fù rigoroso al detto D. Giovanni Dericos , essendo tirato à coda di Barbari [English “ Barbs ”] per la Città [...].	fu carcerato in compagnia di molti altri, che à <u>tal ufficio attendevano</u> , alla fine del mese furono sententiati, & si eseguì il castigo, il quale fù rigoroso al detto D. Giovanni Dericos , essendo tirato à coda di Cavallo per la Città [...].	fu carcerato in compagnia di molti altri, <u>che à tal ufficio attendevano</u> , alla fine del Mese furono sententiati, e si esserquì il castigo, il quale fù rigoroso al detto Giovane, essendo tirato à coda di Cavallo per la Città [...].
and finally executed by lapidation together with one of the clerics assisting him.	Fù assistito da due famosi Religiosi, che accompagnandolo ricevertero ancora loro molti pugni, e calci [...]. Giunto con salutevoli sospiri al luogo da loro destinato per il di lui <i>martirio</i> , e fu fatto bersaglio di quella Barbara nazione per le sassate dateli, come pur restò feritò di colpo mortale uno de’ sudetti Religiosi, e con questo rese l’Anima à Dio il povero.	Fù assistito da due famosi Religiosi, che accompagnandolo ricevertero ancora loro molti pugni, e calci [...]. Giunto con salutevoli sospiri al luogo da loro destinato per il di lui <i>suplittio</i> , e fu fatto bersaglio di quella Barbara nazione per le sassate dateli, come pur restò feritò di colpo mortale uno de’ sudetti Religiosi, e con questo rese l’Anima <i>al Cielo</i> il povero.	Fù assistito da due famosi Religiosi, che accompagnandolo ricevertero ancora loro molti pugni, e calci [...]. Giunto con salutevoli sospiri al luogo da loro destinato per il di lui <i>supplicio</i> , e fu fatto bersaglio di quella Barbara Nazione per le sassate dateli, come pur restò feritò di colpo mortale uno de’ sudetti Religiosi, e con questo rese l’Anima à Dio il povero Giovine .
A powder-magazin ignited by lightning blows up the fourth part of the city with thousands of victims.	Nel ritorno che facevano quella gente, da sì crudel <i>carneficina</i> caddè un folgore nel Magazeno della polvere, che fece saltare in aria la quarta parte della Città, con tutto quel Popolo, che aveva <i>martirizzato</i> il povero D. Giovanni , che ascendono al numero di otto milla.	Nel ritorno che facevano quella gente, da sì crudel <i>carnificina</i> cadè un folgore nel Magazeno della polvere, che ve n’era più di cinquecento barili , che fece saltare in aria la quarta parte della Città, con tutto quel Popolo, che aveva <i>martirizzato</i> il povero D. Giovanni , che ascendono al numero di 15 mila.	Nel ritorno che faceva quella gente, da sì crudel <i>martirio</i> caddè un folgore nel Magazeno della polvere, che ivi era più di cinquecento barili , che fece saltare in aria la quarta parte della Città, con tutto quel Popolo, che aveva tormentato il povero Giovane , che ascendono al numero di quindici milla.

Appendix 1b. Pamphlets wich follow the literary scheme “B”.



RELAC, AM
NOVA, E VERDADEIRA,
Tirada da copia da carta, que hum
Religioso da Ordem dos Pregado-
res, que se acha em Argel em cati-
veiro, escreveo ao Illuf^{mo}. & R^{mo}. Se-
nhor D. F. Afonso Henriques de S.
Thomas, Bispo de Malega, em que
lhe dá conta dos continuados tre-
mores da terra. assolção dos mui-
tos Povos, & casafas, que ha havido
em Argel, & seus confins, com grã
de mortandade, & estrago de innu-
méraveis pagãos; & affi mesmo as
procissões, & penitências que os
Christãos escravos fizeram por lar-
go tempo em os Banhos em q os
alojaõ aquelles Barbaros, este pre-
fente anno de 1673.



Aos

Tripoli li 4. Febraro 1685. ②

DISTINTO RAGGVAGLIO

Gionto per lettera particolare all'Altezza Serenissima del Gran Duca di Toscana, da vn Vascello mercantile artiuato nel Porto di Liorno.



In Firenze, Torino, & in Milano,

Nella R.D.C. per M^{re} Antonio Pandolfo Malatesta Stampator R.C.

Tripoli li 16. Maggio 1685.

DISTINTO RAGGVAGLIO

Gionto per Lettera particolare
AD VN MERCANTE
Nel Porto d' Ancona.



In Roma, & in Bologna, per l'Erede del Sarti, dal Monte delle Scuole, alla Rosa. Con licenza de' Superiori.

Algieri li 4. Luglio 1686. 47

VERA, E DISTINTA RELAZIONE DELL' HORRENDO, E SPAVENTOSO TERREMOTO,

SEGVITO NELLA DETTA CITTA' D'ALGIERI.
Nella distanza di 50. miglia, essendo rimaste, rouinate dalla mano poderosa di NOSTRO SIGNORE quattro grandissime Terre di quei Turchi, e Cani, come leggendo intenderete.



CONFIRMATION REBETOT
DI
BOLAGNA.

IN ROMA MILANO, ET IN PARMA,

Per gli Eredi del Vigna. Con licenza de' Superiori.

